

# **SDMS US EPA REGION V -1**

**SOME IMAGES WITHIN THIS  
DOCUMENT MAY BE ILLEGIBLE  
DUE TO BAD SOURCE  
DOCUMENTS.**

60081  
142790



**US Army Corps  
of Engineers**  
Chicago District

## Site Selection Study

# Waukegan Harbor, Illinois Confined Dredged Disposal Facility

April 1984

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL AREA  
SITE SELECTION STUDY

Table of Contents

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
1	Purpose of Report	1
2	Project Location	1
3	Existing Project	1
a.	Authorization	1
b.	Description	1
c.	Status	1
d.	Local Cooperation	3
e.	Maintenance Requirements	3
4	Harbor Navigation	3
a.	Waterborne Commerce	3
b.	Recreational Boating	3
5	Contained Disposal of Polluted Dredge Materials	3
a.	Authorization	3
b.	Dredged Material and Disposal	4
c.	Character of Dredged Materials	5
6	Previous Dredging and Disposal Methods	6
a.	Method of Dredging and Disposal Prior to 1970	6
b.	Method of Dredging and Disposal since 1969	6

Table of Contents (Cont'd)

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
7	Proposed Future Dredging	6
a.	Area of Dredging	6
b.	Methods	6
c.	Dredging Volumes	7
8	Coordination	8
a.	Previous Coordination	8
b.	Future Coordination	8
9	Required Local Cooperation	8
10	Plans Investigated	9
a.	General	9
b.	Site Number 1	10
c.	Site Number 4	11
d.	Site Number 16	13
11	Other Sites Discussed	15
a.	General	15
b.	Site No. 2	15
c.	Site No. 3	15
d.	Site No. 5	15
e.	Site No. 6	15
f.	Site No. 7	15
g.	Site No. 8	16

Table of Contents (Cont'd)

<u>Paragraph</u>	<u>Title</u>	<u>Page</u>
h.	Site No. 9	16
i.	Site No. 10	16
j.	Sites No. 11, 12, 13A, and 13R	16
k.	Site No. 14	16
l.	Site No. 15	16
12	Cost Comparisons	16
a.	Dredging Costs	16
b.	Estimated Construction Costs	17
13	Cost Allocation	18
14	Contribution by Local Interests	19
15	Discussions	19
16	U.S. Environmental Protection Agency Project	19
17	Combined E.P.A. - Corps of Engineer's Project	20
18	Local Sponsor	20
19	Conclusion	21

## TABLES

<u>No.</u>	<u>Title</u>	<u>Page</u>
1	Authorizing Legislation	2
2	Alternative plans for volumes of dredged material to be contained in CDF	7
3	Cost comparisons for 60,000 cy capacity CDFs	17
4	Cost comparisons for 163,000 cy capacity CDFs	17
5	Cost comparisons for 187,500 cy capacity CDFs	18
6	Cost comparisons for 221,000 cy capacity CDFs	18
7	Advantages and Disadvantages of the Sites	19

## PLATES

<u>No.</u>	<u>Title</u>
1	General Location Map
2	Project Map
3	Areas considered for clean-up operations
4	Location Map of Disposal Sites Considered
5	Plan View - Site 1
6	Plan View - Site 16
7	Typical Dike Section

## APPENDICES

A	Section 123, PL 91-611
B	Character of Dredged Material
C	Geology and Soils
D	Cost Estimates
E	Environmental Assessment by the Corps of Engineers
F	Planning Aid Letter from U.S. Fish and Wildlife
G	Letter from U.S. EPA on Status of 25% Waiver

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL AREA  
SITE SELECTION STUDY

Waukegan Harbor, Illinois  
Confined Dredge Disposal Facility  
Site Selection Study

1. PURPOSE OF REPORT. This report presents the results of engineering, operational and environmental analysis of various sites proposed to be used for the disposal of polluted maintenance dredging from Waukegan Harbor. The report will serve as the basis for recommending a plan for containing the dredgings determined to be unsuitable for open lake disposal.

2. PROJECT LOCATION. As shown on Plate 1, Waukegan Harbor is located in northeastern Illinois (Lake County) on the west shore of Lake Michigan, about 35 miles north of Chicago and 16 miles south of Kenosha, Wisconsin.

3. Existing Project.

a. Authorization. The existing Federal Navigation Project at Waukegan Harbor was authorized by the River and Harbor Act of 14 June 1880 and subsequent acts as indicated on Table No. 1.

b. Description. The existing project, as shown on Plate 2, provides for the following:

(1) A northerly exterior timber crib breakwater 600 feet long and a concrete and steel pile extension to shore about 1300 feet long.

(2) Two parallel timber crib and pile piers about 240 feet apart, 2074 and 3111 feet long for north and south piers respectively, the inshore end of the south pier diverging southward opposite river basin. The north pier length includes the north revetment.

(3) An entrance channel 390 feet wide and 22 feet deep from that depth in the lake to the east end of the north pier, reducing to a channel 200 feet wide between piers and 18 feet deep.

(4) An inner basin 18 feet deep, 375-500 feet wide, and 1,650 feet long.

(5) A revetment 882 feet long at the southwest corner of the inner basin.

All depths are referred to low water datum (International Great Lakes Datum elevation 576.8 feet above mean water level at Father Point, Quebec) for Lake Michigan.

c. Status. The existing project is complete. As indicated in Table No. 1, certain portions of the project have been deauthorized.

Table No. 1  
Authorizing Legislation

Acts	Work Authorized	Documents
June 14, 1880 Aug. 3, 1882	Parallel piers and basins. Modified location of harbor entrance.	Annual Report, 1880, p. 1942. Annual Report, 1882, pp. 277, 2162.
June 13, 1902	Detached breakwater, extend piers, increase width of harbor at inner end of north pier, and dredge channel and basin to depth of 20 feet.	H. Doc. 343, 56th Cong., 1st sess.
July 3, 1930	Extension of breakwater to shore, dredging near outer end of north pier, and enlarging inner basin.	Rivers and Harbors Committee Doc. 27, 71st Cong., 2d sess.
Mar. 2, 1945	Dredge an entrance channel to existing project dimensions from outer end of north pier to project depth in lake, and dredge an anchorage area in southwest corner of inner basin to existing project depth. Abandonment of dredging triangular area in southwest corner of inner basin to 18 feet deep.	H. Doc. 116, 77th Cong., 1st sess.
Dec. 17, 1970 Sec. 201	Provides for deepening the existing entrance channel in the outer harbor to 25 feet and extending it to that depth in Lake Michigan, at widths varying from 380 feet to 500 feet; deepening the channel between piers to a depth of 23 feet at a width of 180 feet, and deepening the inner basin to 23 feet and extending its limits approximately 275 feet northward.	H. Doc. 368, 90th Cong., 2d sess.
Oct. 27, 1965 (1)		

(1) Project deauthorized in 1983.

d. Local Cooperation. The required local cooperation is indicated in the various River and Harbor Acts listed in Table No. 1. However, none of these acts require that dredge disposal areas for maintenance dredging be furnished as an item of local cooperation.

e. Maintenance Requirements. The estimated dredging backlog, based upon 1982 examination soundings, is approximately 105,000 cubic yards of material in those areas where deep draft navigation occurs. This volume includes 45,000 cubic yards of sandy sediment in the outer channel which will not require confined disposal.

#### 4. HARBOR NAVIGATION.

a. Waterborne Commerce. The major portion of waterborne commerce in Waukegan Harbor is shipping of building cement and gypsum received by Gold Bond Building Products and Huron Cement Company which are both divisions of National Gypsum Company. In 1982, 114,000 tons of building cement were received and in 1981, 130,000 tons of building cement and 81,000 tons of gypsum were received. A commercial fishing fleet of eight active boats also operates out of the harbor. Thirty-six tons of fresh fish were unloaded at the harbor in 1982 and twenty-five tons were unloaded in 1981. The Port of Waukegan is also homesite to a number of small and large scale industries, including OMC Johnson and Outboard Marine Corporation, together employing over 2,000 persons. Other industries include Falcon Marine and a marine contractor.

b. Recreational Boating. Another key use of the Port of Waukegan is recreational boating. Currently, the Waukegan Port District operates 158 slips and moorings as well as 103 dry dock spaces. Directly to the north of Slip 3, Larson Marine Service houses approximately 300 small pleasure craft for storage and repair. Since the mid 70's the Waukegan area has been recognized as one of the major co-ho and salmon fishing areas on Lake Michigan. The recreational use of the Waukegan Harbor has grown significantly over the past twenty years and has served as the stimulus for the construction of new harbor facilities to the south of Waukegan Harbor which are expected to be completed in 1985. The new facilities will include 761 new slips for small pleasure craft. This expansion will also increase the number of charter fishing boats from 35 in 1983 to a projected 60 charter boats operating out of the Waukegan area in 1987.

#### 5. CONTAINED DISPOSAL OF POLLUTED DREDGE MATERIALS.

a. Authorization. Section 123 of the River and Harbor Act of 1970 (PL 91-611) authorizes the construction of confined dredge disposal facilities to hold maintenance dredgings which are produced over a period not to exceed 10 years. Only dredgings classified as unsuitable for open lake disposal by the Administrator, U.S. Environmental Protection Agency, (USEPA), can be placed within the confinement area. Under this program the cost of construction and maintenance is primarily borne by the Federal Government with local interests required to provide rights-of-way and cer-

tain assurances. The local assurance requirements are given in Paragraph 9. The design capacity is based on an estimate of the total amount of polluted material which will be dredged in a particular harbor over a period of ten years. A copy of Section 123 of PL 91-611 is attached as Appendix A.

b. Dredged Material and Disposal. At the time PL 91-611 was passed the technical base on dredged material and the environmental effects of dredging and disposal was limited. Congress authorized the Dredged Material Research Program (DMRP) also under PL 91-611. The Corps undertook this program via the Waterways Experiment Station (WES) at Vicksburg, Mississippi. Initiated in 1973, the DMRP was accomplished in the planned 5-year time frame at a cost of \$32.8 million. The DMRP was a highly interdisciplinary research effort involving more than 250 individual studies. These consisted of a planned and phased mixture of conceptual, laboratory, and field studies in association with routine Corps projects designed to understand the processes and mechanisms involved in environmental impacts.

The DMRP was designated to be as broadly applicable as possible on a national basis with no major type of dredging activity or region or environmental setting excluded. It thus resulted in methods of evaluating the physical, chemical, and biological impacts of a variety of disposal alternatives-in water, on land or in wetland areas-and produced tested, viable, cost-effective methods and guidelines for reducing the impacts of conventional disposal alternatives. At the same time, it demonstrated the viability and limits of feasibility of new disposal alternatives, including the productive use of dredged material as a natural resource.

Since the completion of the DMRP in 1978, the Corps has continued to develop the technical base of research on dredging and dredged material disposal through support by WES to District offices, exchange of dredging technologies with Japan and the Netherlands, field verification studies done in coordination with the USEPA and studies on the long-term effects of dredged material disposal.

Among the basic conclusions of the DMRP were the following:

- a) No single disposal alternative is suitable for all regions or projects.
- b) Environmental considerations require long-range regional planning as a lasting, effective solution to disposal problems.
- c) As long as the geochemical environment is not changed, most contaminants are not released from sediment particles to the water.
- d) The short-term impacts of increased turbidity from dredging or open-water disposal are primarily aesthetic rather than biological.

e) If a confined disposal site is to be effective from an environmental protection standpoint, it must be efficient in retaining a high percentage of the fine sediments, for it is the clays and silts which carry the contaminants.

Work units of the DMRP have examined the PCB-sediment matrix in laboratory and field investigations. These studies found PCB's to be strongly bound to the fine grained sediment particles, that the release of PCB's from sediments to the soluble portion of the water column was generally not significant, and that the presence of PCB's in the water column was dependent on the presence of suspended solids. Polluted sediments at the bottom of a harbor or river are directly exposed to the water column, and may be resuspended by currents or by navigation traffic. The containment of solids is the key to the disposal of dredged materials. Studies of dredged material disposal areas supported these findings. The removal of PCBs closely matched the solids removal efficiencies. Filtering tests conducted with PCB contaminated sediments from the Chicago District (Indiana Harbor and the Chicago River) have supported these relationships. Recently, leaching tests using PCB contaminated sediments from Ashtabula River, Ohio were conducted. Columns filled with sediments were leached with artificial acid rain for a period of three months. No detectable PCBs were found in the column leachate.

The Diked Disposal Program includes a total of 48 federal navigation projects on the Great Lakes. Twenty-four confined dredged disposal sites have been constructed and two others are under construction. The Chicago District has designed and constructed facilities at Milwaukee, Kenosha, Manitowoc, Kewanee, Green Bay, Michigan City and Lucas Berg, Worth, Illinois. The facility at Calumet Harbor is under construction and will be completed this year.

c. Character of Dredged Materials. The bottom sediments of the Waukegan Harbor have been sampled and analysed by the USEPA (1973, 1976, 1977) and the Corps of Engineers (1981, 1982). Sediments were classified using the USEPA "Guidelines for Pollutional Classification of Bottom Sediments from Great Lakes Harbors "(1977). Most of the sediments within Waukegan Harbor west of the South Pier light are polluted and require confined disposal. However, sandy sediments along the eastern portion of the North Pier are unpolluted and can be disposed in the lake or used for beach nourishment. Survey results have shown a wide spectrum of pollutional levels, with polychlorinated biphenyls (PCBs) being the contaminant of major concern. Results of the analysis of site water indicate little evidence of pollution. Most of the contaminants appear to be contained in the sediments. A summary of the physical and chemical characteristics of the bottom sediments is contained in Appendix B.

## 6. PREVIOUS DREDGING AND DISPOSAL METHODS.

a. Method of Dredging and Disposal prior to 1970. Through 1969, dredging was accomplished primarily with a Government-owned hopper dredge. A Government-owned dipper dredge was used occasionally to cleanup areas not readily accessible to the hopper dredge. The materials were placed in the hopper dredge's bins or scows and bottom dumped in the established deep-water disposal area in Lake Michigan located about 2½ miles east of the north breakwater light.

b. Method of Dredging and Disposal since 1969. Since the discovery of PCB contamination at Waukegan, the only maintenance dredging permitted has been to the east of the south pier light. This work was performed in 1974, 1976, 1977 and again in 1982. No dredging work west of the south pier light, in the navigation channel and inner basin, has been proposed by the Chicago District pending recommendations from USEPA. The USEPA and Corps of Engineers (COE) have done extensive sampling of the harbor area and have determined that the material within the Federal channel contains less than 50 ppm PCBs. Even if the PCB material did not exist in the harbor there are other chemical constituents within the harbor material which warrant it being classified as unsuitable for open lake disposal.

## 7. PROPOSED FUTURE DREDGING

a. Area of Dredging. The Corps of Engineers is limited to dredging the authorized Federal channel, as shown on Plate 2, at Waukegan. The US Environmental Protection Agency has recommended that, following dredging operations, the level of PCB at the exposed surface of sediment not exceed the level which was at the surface prior to dredging. In order to meet this recommendation the Corps will need to dredge deeper than the authorized depths shown on Plate 2 and also will need to dredge outside the limits of the channel to remove sediments next to piers and bulkheads. Alternatives have been investigated which include dredging deeper than authorized depths, extending the Corps' limits of dredging up to the 50 ppm PCB limit and the possibility of combining the efforts of the USEPA and COE cleanup programs.

b. Methods. Future dredging is generally expected to be performed by contract utilizing a clamshell dredge and scows. The loaded scows would be transported to an unloading area within the harbor from which the dredged materials would be rehandled into water tight trucks for transportation to the disposal site. Hydraulic dredging is not feasible due to distances to potential disposal sites and the requirement to treat and discharge large volumes of effluent. The Corps has recently investigated the use of modified clamshell dredging (closed bucket) and its effects on the resuspension of sediments. This simple and inexpensive modification has been shown effective in reducing the turbidity in the upper water column by 30-70%. The use of this modified clamshell will be considered by the Corps for Waukegan dredging.

c. Dredging Volumes. Plate 3 shows an outline of the harbor and boundaries which the USEPA established in 1981 for delineating areas of different sediment PCB concentrations. Also shown on Plate 3 by a dashed line is the boundary of the authorized Federal channel. For the purpose of determining the volume of dredge material to be disposed in the confined disposal facility, four alternatives are being considered. These are listed in Table 2 and the numbered areas are those shown on Plate 3. Sediments from area 6 can be disposed in Lake Michigan as has been done in the past or used for beneficial purposes such as beach nourishment. Results of sampling done by the Corps of Engineers in 1981 indicate that most of the sediments in Area 6 actually contain PCB concentrations of 1 ppm or less. These estimates of volumes to be disposed are based on the assumption that one dredging operation will remove all polluted sediment for the ten year period for which the capacity of the CDF is designed. Any other dredging done within the ten year period will not contain PCB concentration sufficient to require special containment. However, if PCB contaminated sediments in the upper harbor are not removed prior to or during the federal channel dredging, there is a possibility that PCB's would migrate to the Federal channel and cause a need for additional special confined disposal in future operations.

Table 2 Alternative plans for volumes of dredged material to be contained in CDF

Alternative	Description	Volume of dredged material (yd <sup>3</sup> )
A	Only sediments from dredging of authorized Federal Channel (Area 4)	60,000
B	All soft sediments within "Expanded Federal Channel" which includes areas adjacent to piers and bulk-heads and extends below authorized depths (Area 4)	163,000
C	All soft sediments between the 50 ppm PCB line and the 10 ppm PCB line (Areas 3 and 4)	187,500
D	All soft sediments between the 500 ppm PCB line and the 10 ppm PCB line (Areas 2, 3 and 4)	221,000

## 8. COORDINATION.

a. Previous Coordination. Coordination to locate and secure an acceptable disposal area for the dredging from Waukegan Harbor was begun in August 1982. The first series of meetings were conducted separately between the Corps of Engineers and Illinois Department of Transportation Division of Water Resources, Illinois Environmental Protection Agency, U.S. Environmental Protection Agency, Detroit District, Corps of Engineers, Waukegan Port District, Lake County Planning Commission and the Lake County Health Department. The purpose of these meetings was to solicit the various agencies assistance in the identification of potential sites. Additional inter-agency meetings were held on 9 February 1983 and 19 May 1983. Details on sites considered and eliminated are presented in paragraphs 10 and 11.

b. Future Coordination. The agencies listed below will be requested to comment on the analyses presented in this report. In addition, public input will be solicited at an informal workshop prior to selecting a final site.

- (1) United States Environmental Protection Agency (USEPA)
- (2) Illinois Department of Transportation (IDOT)
- (3) Waukegan Port District
- (4) Northeastern Illinois Planning Commission (NIPC)
- (5) Lake County Regional Planning Commission
- (6) Illinois Environmental Protection Agency (IEPA)
- (7) Lake Michigan Shoreline Advisory Committee
- (8) City of Waukegan
- (9) Illinois Department of Conservation
- (10) United States Fish and Wildlife Service
- (11) Governor of Illinois
- (12) Illinois Congressional Delegation
- (13) Board of Commissioners, Lake County, Illinois
- (14) Lake County Health Department

9. REQUIRED LOCAL COOPERATION. Construction of a disposal facility under the authority of Section 123 of PL 91-611 is subject to the provisions that local interests furnish assurances of certain items of local cooperation. The local sponsor must be a legally constituted public body with full authority and capability to perform the terms of the agreement and to pay damages, if necessary, in the event of failure to perform. The items of local cooperation are summarized as follows:

a. Furnish all lands, easements and rights-of-way necessary for the construction, operation and maintenance of the facility.

b. Contribute to the United States 25 percent of the construction costs, such amount to be payable either in cash prior to construction, in installments during construction, or in installments, with interest at a rate to be determined by the Secretary of the Treasury, as of the beginning

of the fiscal year in which construction is initiated, on the basis of the computed average interest rate payable by the Treasury upon its outstanding marketable public obligations, which are neither due nor callable for redemption for fifteen years from date of issue.

c. Hold and save the United States free from damages due to construction, operation, and maintenance of the facility except for damages due to the fault or negligence of the United States or its contractors.

d. Maintain the facility after completion of its use for disposal purposes in a manner satisfactory to the Secretary of the Army.

e. The participating non-Federal interest or interests shall retain title to all lands, easements, and rights-of-way furnished by it pursuant to subparagraph a. above. A spoil disposal facility owned by a non-Federal interest or interests may be conveyed to another party only after completion of the facility's use for disposal purposes and after the transferee agrees in writing to use or maintain the facility in a manner which the Secretary of the Army determines to be satisfactory.

f. The requirements for the appropriate non-Federal interest or interests to furnish an agreement to contribute 25 percent of the construction costs as set forth in subparagraph b. above shall be waived by the Secretary of the Army upon a finding by the Administrator of the Environmental Protection Agency that for the area to which such construction applies, the State or States involved, interstate agency, municipality, and other appropriate political subdivision of the State and industrial concerns are participating in and in compliance with an approved plan for the general geographical area of the dredging activity for construction, modification, expansion, or rehabilitation of waste treatment facilities and the Administrator has found that applicable water quality standards are not being violated.

g. In acquiring lands, easements and rights-of-way for construction and subsequent maintenance of the project, the non-Federal interest will comply with the applicable provisions of the "Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970," Public Law 91-646, approved 2 January 1971, and inform affected persons of pertinent benefits, policies and procedures in connection with said Act.

h. The non-Federal interests shall also comply with Section 601 of Title VI of the Civil Rights Act of 1964 (P.L. 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in Part 300 of Title 32, Code of Federal Regulations, in connection with the maintenance and operation of the project and the use of project lands.

#### 10. PLANS INVESTIGATED

a. General. With the assistance of other agencies, 15 alternative sites were selected to be evaluated for selection as a disposal location for material dredged from the navigation channel at Waukegan Harbor, Illinois. Of the original 15 sites nine were selected for further study.

Of those nine selected for further study three were selected for detailed study and evaluation for possible recommendation as the selected site. The three sites described below are sites 1, 4, and 16 with the location of each shown on Plate 4.

b. Site Number 1.

(1) Description: This site is in the SW quarter of Section 29, T46N, R12E, Waukegan, Illinois. The property for this site will be acquired by the Waukegan Port District to use as a clear zone for a proposed runway extension for the Waukegan Memorial Airport. The total area of the clear zone is 78.7 acres however Lewis Avenue and Wadsworth Road pass through the clear zone and divide it into much smaller parcels. The area proposed for site 1 is approximately 21 acres. It is a triangular area within the clear zone bounded by Lewis Avenue on the east and Wadsworth Road on the south. A plan view for the proposed dike alignment is shown on Plate 5. Site 1 is presently covered by brush, small trees and grass. The underlying soil is weathered residual till soil or a silty clay with fine to coarse sand and rounded gravel pebbles.

(2) Capacity: This site is capable of holding 187,500 cubic yards of dredge material with the height of the dike at 28.5 feet. Sufficient capacity would also be available for a 2-foot clay seal and 2 feet of topsoil after completion of dredging operations.

(3) Retaining Structures Required: An earth dike between 12.5 and 28.5 feet high would be required to retain the dredge materials depending on the volume of dredge material to be disposed. To avoid any migration of the polluted materials into the existing groundwater, a two foot thick clay liner would be required over the entire area as well as a liner of synthetic impervious material. A typical section of the earth dike is shown on Plate 7.

(4) Method of Dredging and Disposal: Dredging would most likely be performed by clamshell with the dredge materials placed into scows. These scows would then be transported to an unloading area in the harbor. The material would then be rehandled and placed into water tight trucks which will transport the sediments to the disposal site.

(5) Costs:

(a) Land Acquisition: The property which makes up site number 1 is currently owned or in the process of being acquired by the Waukegan Port District. Though no costs have been identified specifically for this site the costs for the disposal site and any easements would be a non-Federal cost.

(b) Construction Cost: The total cost of construction including dredging would depend on the volume of sediment to be disposed of in the CDF. Detailed cost estimates are contained in Appendix D.

(c) Maintenance Cost: The annual cost of maintaining the facility would be minimal after the CDF is capped and seeded. Maintenance would principally be mowing and maintaining fences and cost would not vary greatly depending on the site chosen.

(6) Environmental Assessment:

(a) Physical Resources and Impacts: The site is relatively high in elevation (680 to 710 feet above sea level) with no ponded or running surface water. Soils are high in clay content with probable low permeation rates and a low water table. Site permeability must be investigated to determine leaching potentials and additional groundwater protection needs. Site effluent handling and/or treatment requirements must be evaluated.

(b) Vegetation and Wildlife Resources and Impacts: Site 1 consists of a mixture of habitat types including agricultural fields, early and advanced old fields and a small old conservation project plantation of pine trees (Pinus sp.). The advanced old field contains perennial forbes, grasses, and scattered elm trees (Ulmas sp.). A small, low, wet patch within the field is vegetated to seed canary grass (Phalarus arundinacea). Residences along two of the site's perimeters are surrounded by mowed lawns and cultivated trees and shrubs. The U.S. Fish and Wildlife Service stated in a 30 August 1983 letter that the wildlife value of the site is fairly high in that it provides some habitat diversity in an area surrounded by urban and agricultural lands. Conversion of all or part of the site to a confined disposal area would have a significant impact on resident species due to habitat losses. Therefore, destruction of woody vegetation should be avoided where possible. Site capping must be evaluated to prevent entry of contaminants into the food chain.

(c) Social Setting and Impacts: Homes are scattered along the site's southern and eastern perimeters but would be removed as part of the proposed extension of the Waukegan Memorial Airport. The area surrounding the site is scattered residential and undeveloped open space. Provided the existing houses are displaced by the airport expansion, no significant social impacts are anticipated. Potential haul routes for dredge material from dredge sites to the disposal site should be mapped to minimize disruptive impacts.

(d) Cultural Resources and Impacts: No known archaeological studies have been made at the site. Shovel-testing of the site is needed before drawing any conclusions regarding the presence of archaeological or historic resources.

c. Site number 4.

(1) Description: Site 4 is located in the NW corner of Section 18 and the SW quarter of Section 7 of T46N, R12E, unincorporated Lake County, Illinois. The site is an 80-acre agricultural field bounded by 9th

Street on the north and by Green Bay Road (Rt. 131) on the west. Zion, the closest community, is to the east. The area consists of gently sloping to steeply sloping agricultural lands with well to moderately well drained deep soils and moderate to moderately slow permeability. The soil appears to be derived from morainal silty clay till with sand and rounded pebbles or gravel. Ground elevations range from 700 to 730 ft. above sea level with bedrock approximately 200 feet below the surface.

(2) Capacity: This site is capable of holding any of the proposed disposal alternatives up to 221,000 cubic yards of dredge material. Sufficient capacity would also be available for a 2-foot clay seal and 2 feet of topsoil after completion of dredging operations.

(3) Retaining Structures Required: An earth dike from approximately 21.5 feet to 26.5 feet high would be required to retain the dredge materials. To avoid any migration of the polluted materials into the existing groundwater, a two foot thick clay liner would be required beneath the dredge material, as well as a liner of synthetic impervious material. A typical section of the earth dike is shown on Plate 7. For site 4 the optimum dike alignment would form a square shape.

(4) Method of Dredging and Disposal: Dredging would most likely be performed by clamshell with the dredge materials placed into scows. These scows would then be transported to an unloading area in the harbor. The material would then be rehandled and placed into water tight trucks which will transport the sediments to the disposal site.

(5) Costs:

(a) Land Acquisition: The property which makes up site number 4 is owned privately and would have to be purchased by the local sponsor. Land within site 4 could be purchased for approximately \$8,400 per acre.

(b) Construction Cost: The total cost of construction, including dredging, would depend on the volume of sediment to be disposed in the CDF. Detailed cost estimates are contained in Appendix D.

(c) Maintenance Cost: The annual cost of maintaining the facility would be minimal after the CDF is capped and seeded. Maintenance required would principally be mowing and maintaining fences and cost would not vary greatly depending on the site chosen.

(6) Environmental Assessment:

(a) Physical Resources and Impacts: The site is relatively high in elevation (710-730 feet above sea level) with no ponded or running surface water. The area consists of well to moderately well drained deep soils and moderate to moderately slow permeability. Soils are Miami Silt Loam, Montmorenci Silt Loam, Pella Silty Clay Loam, Beecher Silt Loam, Peotone Silty Clay Loam, Barrington Silt Loam, Corwin Silt Loam Grays and

Markham Silt Loams, Barrington and Varna Silt Loams and Mundelein and Elliot Silt Loams. The soil appears to be derived from morainal silty clay till with sand and rounded pebbles or gravel. Bedrock is about 500 feet above sea level or over 200 feet below the surface. The disposal facility design, including effluent handling or treatment, would have to include, measures to assure groundwater protection.

(b) Vegetation and Wildlife Resources and Impacts: Crop field can have value to wildlife as an auxillary or cold weather food source except that, in this case, there is essentially no interspersation of other habitat types around the site to provide the remainder of their life requirements. For example, deer and raccoon often feed in corn fields but require woods for reproduction. Pheasants too feed in corn but nest in brush and grass often found along fencerows. Some species such as crows and blackbirds will undoubtedly make use of the crop field although they are considered pest species. A few songbirds may make use of the trees found on the site. In total, the U.S. Fish and Wildlife Service has rated the site quite low in wildlife value. Since the site is currently of low value to wildlife, the impact of its use as a disposal site is insignificant. Depending on how the site is reclaimed following use habitat values could actually be increased for a variety of wildlife species.

(c) Social Setting and Impacts: The site is cropland. The surrounding area includes agricultural land, landfills (Browning Ferris and the North Shore Sanitary District) and open space. Zion is the closest community. Displacement of a farm is the primary social impact foreseen. A determination as to whether the site includes any prime or unique farmland would have to be made in cooperation with other federal and state agencies.

(d) Cultural Resources and Impacts: A cursory examination of the northern portion of the 80-acre site revealed only a few non-cultural fragments of poor quality tan-white chert. Shovel-testing of the site or examination while the surface is exposed after plowing is needed before drawing any conclusions regarding the presence of archaeological or historic resources.

d. Site Number 16.

*Vacant Foundary Property*

(1) Description: Site 16 is located in the NE quarter of Section 22, T 45N, R 12E, Waukegan, Illinois. The site lies between Waukegan Harbor and Lake Michigan. Although owned by Outboard Marine Corporation it apparently sits idle or is used for temporary storage of materials and parking. The surface soils are aeolian dune sands generally very fine to fine grained overlying transgressing beach sands which are fine to coarse grained. The dune sands are very loose to medium dense while the beach sand is loose to dense. Borings at site 16 found glacial till at elevations of -25 to -30 feet LWD. The glacial till is a sandy silty clay with gravel and high carbonate content.

(2) Capacity: This site is capable of holding 187,500 cubic yards of dredge material with capacity available for a 2-foot clay seal and 2 feet of topsoil after completion of dredging operations.

(3) Retaining Structures Required: An earth dike from approximately 21.5 feet to 26.5 feet high would be required to retain the dredge materials. To avoid any migration of the polluted materials into the existing groundwater, a two foot thick clay liner would be required beneath the dredge material as well as a liner of synthetic impervious material. A typical section of the earth dike is shown on Plate 7. Plate 6 is a plan view showing a proposed dike alignment.

(4) Method of Dredging and Disposal: Dredging could be performed by clamshell or hydraulic dredge. If the material were to be dredged hydraulically the use of a dewatering facility would be necessary.

(5) Costs:

(a) Land Acquisition: The property which makes up site number 16 is currently owned by the Outboard Marine Corporation and would have to be acquired by the local sponsor. An exact value has not been identified for the site, however, land cost has been estimated to be about \$3.00 per square foot.

(b) Construction Cost: The total cost of construction including dredging would depend on the volume of sediment to be placed in the CDF. Detailed cost estimates are contained in Appendix D.

(c) Maintenance Cost: The annual cost of maintaining the facility would be minimal after the CDF is capped and seeded. Maintenance would principally be mowing and maintaining fences and cost would not vary greatly depending on the site chosen.

(6) Environmental Assessment:

(a) Physical Resources and Impacts: The predevelopment terrain consisted of coastal dunes with a marsh or swampy area underlying a bluff which represents a lake terrace or former shoreline of ancient Lake Michigan. The permeability of the site's soils would have to be determined and groundwater protection requirements determined for the disposal facility design specifications.

(b) Vegetation and Wildlife Resources and Impacts: Site 16 is characterized by being flat with no standing or running water and is vegetated by a variety of weedy grass and forb species which are periodically mowed. It is of low value to wildlife although it does provide some food and cover for various birds and small mammals. The use of the site for dredge disposal would have little impact on wildlife resources.

(c) Social Setting and Impacts: The site is in an industrial area north of the Waukegan Harbor entrance. A waterworks facility is between the site and the entrance to the federal channel. Further north beyond the site is a waste treatment plant. A public beach and beach house are along the Lake Michigan shoreline to the east, but are separated from

site 16 by a harbor access road. It should be possible to minimize or avoid disturbing the beach area during dredging and disposal operations. No significant social impacts are anticipated from disposal, but future development of the site may be affected.

(d) Cultural Resources and Impacts: Borings taken in June 1983 show that the site consists of modern fill (slag and gravel) to a depth between five and twelve feet. The site has been graded flat; it is not likely to contain intact or significant archaeological or historical resources.

#### 11. OTHER SITES DISCUSSED:

a. General: A total of 15 sites were originally identified to be considered in the search for an acceptable dredge confinement facility. All but three sites were rejected for various reasons prior to the detailed analysis of this report. These sites are shown on Plate 4 and are briefly summarized below.

b. Site No. 2. This site is an existing sanitary landfill located near the Waukegan airport and currently owned by the Waukegan Port Authority. This site was rejected by agency meeting on 9 February 1983 based on additional costs needed to repair a present leaching problem at the landfill and the proximity of a school and residential areas.

c. Site No. 3. This site is the existing confined disposal facility at Kenosha, Wisconsin. The site was deleted from the list by agency meeting dated 19 May 1983 after being informed by the COE Detroit District that the Wisconsin DNR would not go along with the disposal of the Waukegan material at Kenosha for environmental reasons.

d. Site No. 5. This is the North Shore Sanitary District Landfill, which is currently being used. The community of Zion is to the east of the site. The site is bounded on the east by Green Bay Road (Rt. 131) and 9th Street on the north. At the request of the property owner this site has been eliminated from further consideration.

e. Site No. 6. This site is a landfill owned by Browning-Ferris and was selected for further study at an Interagency meeting held on 19 May 1983. After further study this office determined that though it provided an effective means of disposal it could not be implemented under the Section 123 diked disposal authority. The possibility for funding the project within this commercial site by utilizing continuing operation and maintenance funds was considered. However, justification for the use of these funds is based on the total yearly commercial tonnage that is handled by the harbor. Unfortunately Waukegan Harbor's yearly commercial tonnage is approximately 150,000 tons and will only justify \$150,000 of the construction costs. Therefore, this site was deleted from further consideration.

f. Site No. 7. This site was determined to also be Site No. 14.

g. Site No. 8. The Chicago CDF was considered in the initial phase of study but was determined not to have sufficient excess capacity to accommodate the Waukegan material and was not designed for PCB laden material. For these reasons the deletion of site 8 was concurred to by agency meeting dated 9 February 1983.

h. Site No. 9. This site is a water site located in Lake Michigan and adjacent to the south jetty wall of Waukegan Harbor. The site was selected for further study at an Interagency meeting held on 9 February 1983. After further study it was decided at the Interagency meeting dated 19 May 1983 that the site should be dropped from further study due to its interruption of the Waukegan river and the inability to meet the effluent treatment standards of Lake Michigan.

i. Site No. 10. This site is along the shoreline of Lake Michigan south of Waukegan Harbor in the vicinity of the old railroad turning house. This site was eliminated at the Interagency meeting dated 19 May 1983 due to the stringent limitations it would impose upon future usage and development of the waterfront location.

j. Sites No. 11, 12, 13A, and 13B. These sites are sections of property owned by the Lake County Forest Preserve and were eliminated from consideration as confined dredge disposal sites at the request of the owners.

k. Site No. 14. This site is an old landfill adjacent to 14th Street and was eliminated from further consideration due to the limited disposal capacities available and the necessity to excavate and dispose of existing landfill material.

l. Site No. 15. This site is between the existing and proposed northeast-southwest paved runways at the Waukegan Memorial Airport. The site is presently a grass covered, clear zone. It was eliminated from further consideration due to the limitations on disposal capacity and probable interruption of existing utilities.

## 12. COST COMPARISONS

### a. Dredging Costs:

(1) Previous Costs: Dredging at Waukegan Harbor used to be performed by mechanical dredges with the dredged materials transported in bottom dump scows to the authorized dumping area in Lake Michigan. The cost of this practice based on present day prices is approximately \$5.70/cubic yard.

(2) Project Costs: Cost for future dredging depends on which site is selected because of the different hauling distances required. For Site 1 the cost is expected to be approximately \$11.00 per cubic yard, for Site 4 \$12.00 per cubic yard and for Site 16 \$6.50 per cubic yard.

b. Estimated Construction Costs: Estimates for the various proposals are presented in Appendix D and are summarized below in Tables 3, 4, 5 and 6.

Table 3 Cost comparisons for 60,000 cy capacity CDFs  
costs in thousands of dollars

	Site 1	Site 4	Site 16
Construction of CDF	2649	2649	2649
Interest during construction	108	108	108
Real Estate (7.5 acres)	0	63	980
Dredging and Hauling	<u>914</u>	<u>991</u>	<u>556</u>
Total	3671	3811	4293
Cost per cubic yard of dredge material (\$/cy)	61.20	63.50	71.60

Table 4 Cost comparison for 163,000 cy capacity CDFs  
costs in thousands of dollars

	Site 1	Site 4	Site 16
Construction of CDF	5190	5190	5190
Interest during construction	210	210	210
Real Estate (13.4 acres)	0	113	1751
Dredging and Hauling	<u>2330</u>	<u>2536</u>	<u>1406</u>
Total	7730	8049	8557
Cost per cubic yard of dredge material (\$/cy)	47.40	49.40	52.50

Table 5 Cost comparisons for 187,500 cy capacity CDFs  
costs in thousands of dollars

	Site 1	Site 4	Site 16
Construction of CDF	5716	5716	5716
Interest during construction	232	232	232
Real Estate (14.5 acres)	0	122	1895
Dredging and Hauling	<u>2668</u>	<u>2904</u>	<u>1605</u>
Total	8616	8974	9448
Cost per cubic yard of dredge material (\$/cy)	45.90	47.90	50.40

Table 6 Comparison of cost for 221,000 cy capacity CDFs  
costs in thousands of dollars

	Site 1	Site 4	Site 16
Construction of CDF	(1)	6403	6403
Interest during construction		260	260
Real Estate (16.2 acres)		136	2117
Dredging and Hauling		<u>3406</u>	<u>1878</u>
Total		10,205	10,658
Cost per cubic yard of dredge material (\$/cy)		46.20	48.20

(1) Site 1 does not have sufficient area to accommodate a CDF with 221,000 cy design capacity.

13. COST ALLOCATION. All costs of construction of any of the discussed disposal sites at Waukegan Harbor are attributed to water quality and as such are a Federal responsibility subject only to the provisions of the required local cooperation.

#### 14. CONTRIBUTION BY LOCAL INTERESTS.

a. According to the authorizing laws, local interests are required to contribute 25% of the construction cost if no waiver, as described in paragraph 9f above, can be obtained. In response to the request for a ruling, the U.S. EPA has stated that the area has a certified and approved Water Quality Management Plan, and that all major discharges in the area are in compliance with their NPDES (National Pollution Discharge Elimination System) permits. Therefore, under paragraph (d) of Section 123 of P.L. 91-611, the Secretary of the Army can waive the requirement that the local sponsor contribute 25% of the construction cost.

#### 15. DISCUSSIONS

The analysis performed to date indicate that the decision as to which site should be recommended has to consider construction costs, operation and maintenance costs, capping costs, dredging costs, probable environmental impacts, possible enhancements, and the desires and needs of the City, County, State, Federal agencies and the general public. Table 7 is a summary of additional advantages and disadvantages associated with each site.

Table 7  
Advantages and Disadvantages of the Sites

Site No.	Advantages	Disadvantages
1.	Ownership by Waukegan Port District.	High dike required. Possible interference for aircraft.
4.	Adjacent to existing landfills.	
16.	Close proximity to dredging operation.	High dike required. Limits future use of lakefront property.

16. U.S. ENVIRONMENTAL PROTECTION AGENCY PROJECT. The USEPA has conducted a feasibility study to evaluate cleanup alternatives for the PCB contamination in Waukegan Harbor. The feasibility study was completed in July 1983 under the authority of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 1980. The portion of the EPA's project which is most closely associated with that of the Corps of Engineers' project is the action that will be taken in Slip No. 3 and the

Upper Harbor. Within this action a containment wall would be constructed around the perimeter of the western portion of Slip No. 3 and part of the Upper Harbor sediments would be dredged and placed in the contained area. The containment area would then be capped.

17. Combined EPA-Corps of Engineers' Project. By legal authority the Corps of Engineers is limited to dredging only the federal channel in Waukegan Harbor. Maintenance dredging to be done by COE would only include Alternative A (see Table 2). Additional authorization would have to be obtained for COE to perform any of the other alternatives. The position of the USEPA Officer of Environmental Review on dredging of PCB contaminated sediments is that following dredging, the level of PCB at the exposed surface of the sediment should not be greater than that which was at the surface before dredging. This position is stated in a memorandum from the USEPA Environmental Review Staff to the OMC Task Force Members dated 30 October 1981. This position was reaffirmed by USEPA at a meeting 29 September 1982 in clarification of a USEPA letter to the COE, Chicago District Engineer dated 30 August 1982.

According to a report submitted to the USEPA by Mason and Hanger - Silas Mason Co. in January 1981 the entire top soft muck sediment layer is contaminated with PCB down to the underlying sand at almost all locations where any PCB contamination occurs. This report and conclusion has been accepted by the USEPA. Therefore in order to satisfy the requirement that PCB concentrations exposed after dredging not exceed those at the surface prior to dredging all soft muck sediments would have to be removed. Mr. Hooper reaffirmed this conclusion in a conversation with Mr. Rodney Lynn, Study Manager for Chicago District COE on 5 October 1982. It seems probable therefore that if COE does any dredging in Waukegan Harbor it will, at the least, have to dredge all soft muck sediments from the Federal Channel which will exceed the present authorization for dredging by COE.

The USEPA and Illinois EPA have identified only those areas contaminated with more than 50 ppm PCB for clean-up. The net result is that the area between the Corps project and EPA project will remain untouched and contaminated unless some effort can be initiated to clean it up.

If this area is not dredged at the same time or prior to the time the Federal Channel is dredged, PCB will migrate to the Federal Channel and dredge material from future maintenance dredging will very likely contain more than 10 ppm PCB and require confined disposal. The amount of contaminated material and the number of times in the future that routine maintenance dredgings will contain contaminated material cannot be accurately predicted. However, it would be much more economical to clean up the entire harbor at once rather than deal with the PCB contamination in maintenance dredging year-after-year.

18. LOCAL SPONSOR. At the present time no local sponsor has been identified.

19. CONCLUSION. No recommendation is being made as to which of the sites is to be used for the dredgings from Waukegan Harbor. Only the facts and costs are being presented in this site selection study. Which of the sites ultimately is recommended will be based on consideration of construction and operation costs, environmental impacts, and the desires and concerns of a local sponsor, local and Federal agencies and the general public. Comments and/or recommendations are being requested in response to this document and will again be requested as follows:

- Public Workshop - June 1984
- Draft Environmental Impact Statement - December 1984
- Final Environmental Impact Statement - September 1985



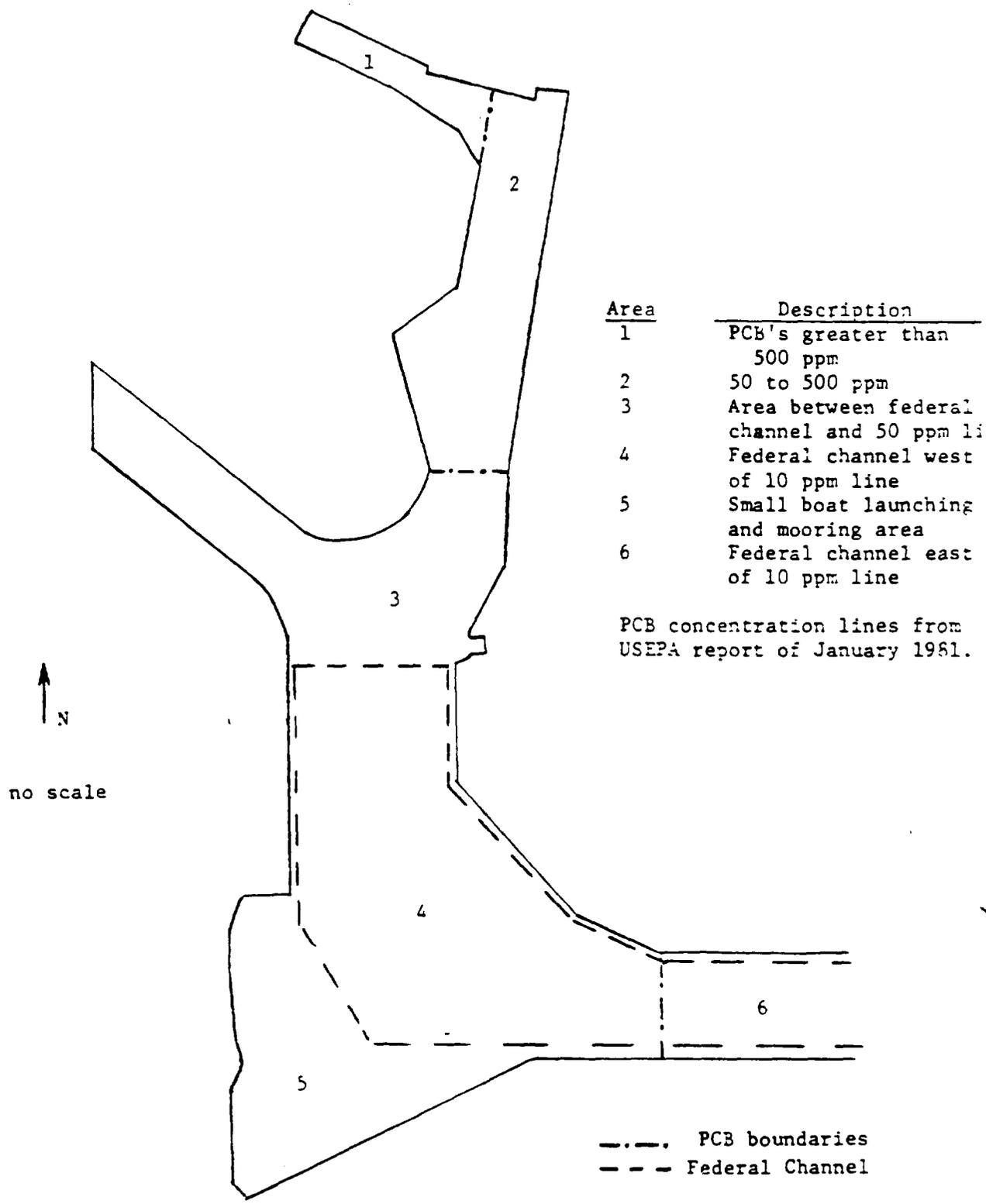


PLATE 3

Waukegan Harbor, Illinois  
Areas considered for clean-up operations

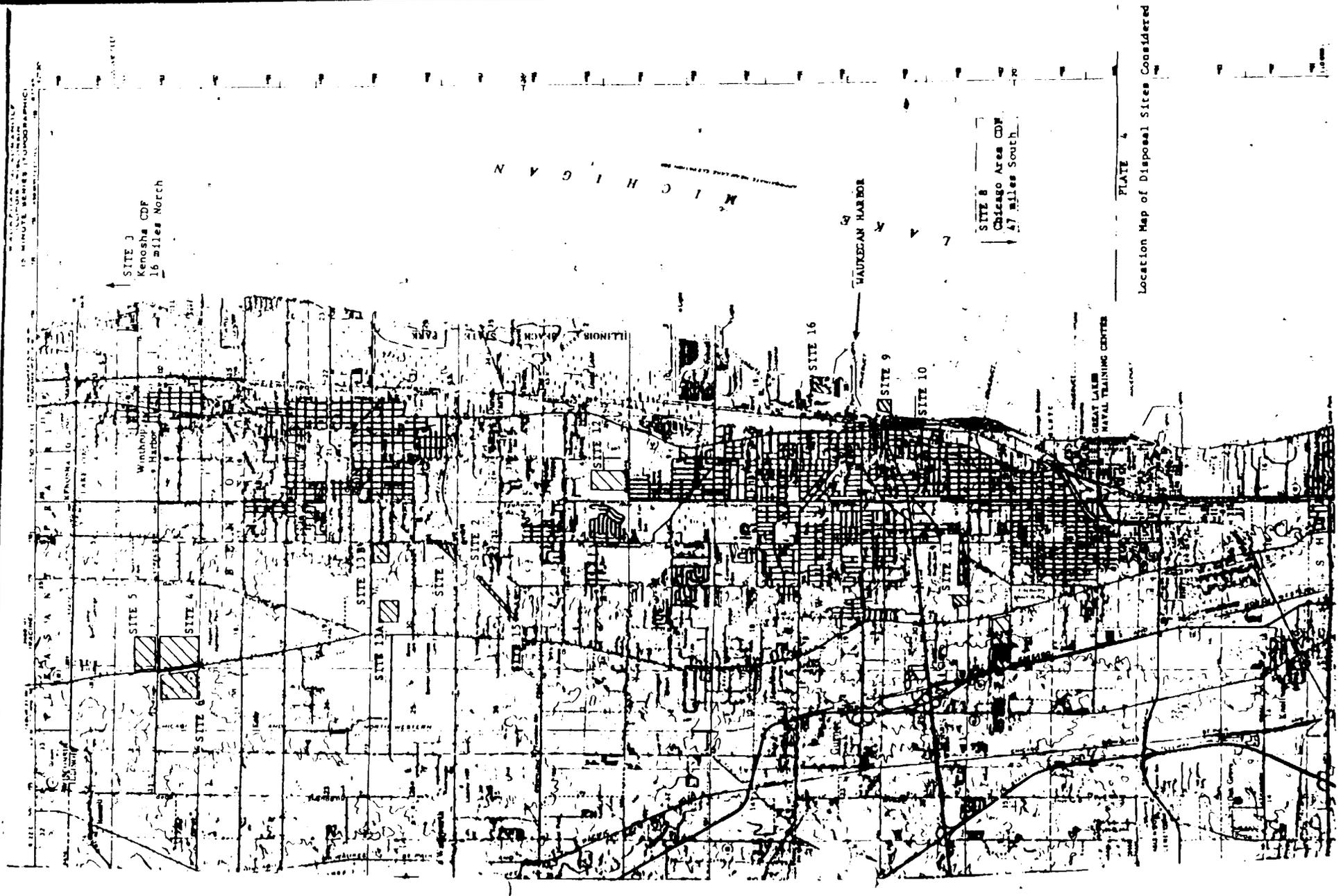
1:250,000  
1:500,000  
1:1,000,000  
1:2,000,000  
1:5,000,000  
1:10,000,000  
1:25,000,000  
1:50,000,000  
1:100,000,000  
1:200,000,000  
1:500,000,000  
1:1,000,000,000

SITE 3  
Kenosha CDF  
16 miles North

SITE 8  
Chicago Area CDF  
47 miles South

PLATE 4

Location Map of Disposal Sites Considered



WAUKEGAN HARBOR CDF  
SITE # 1  
AIRPORT CLEAR ZONE  
PLAN VIEW  
2/17/83  
1" = 200'

PLATE 5

Wadsworth Road

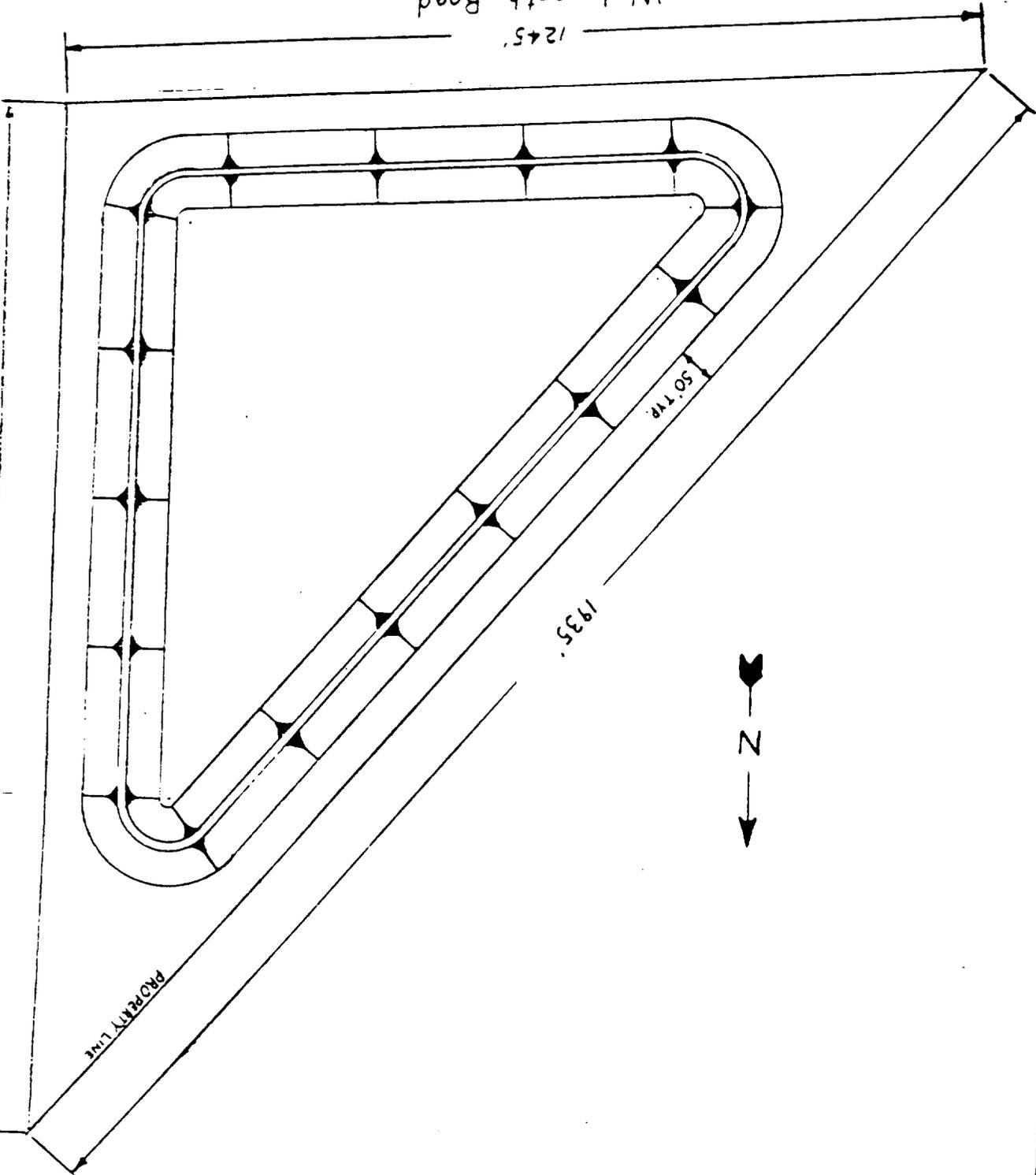
1245'

1400'  
Lewis Avenue

PROPERTY LINE

1935'

50' TYP



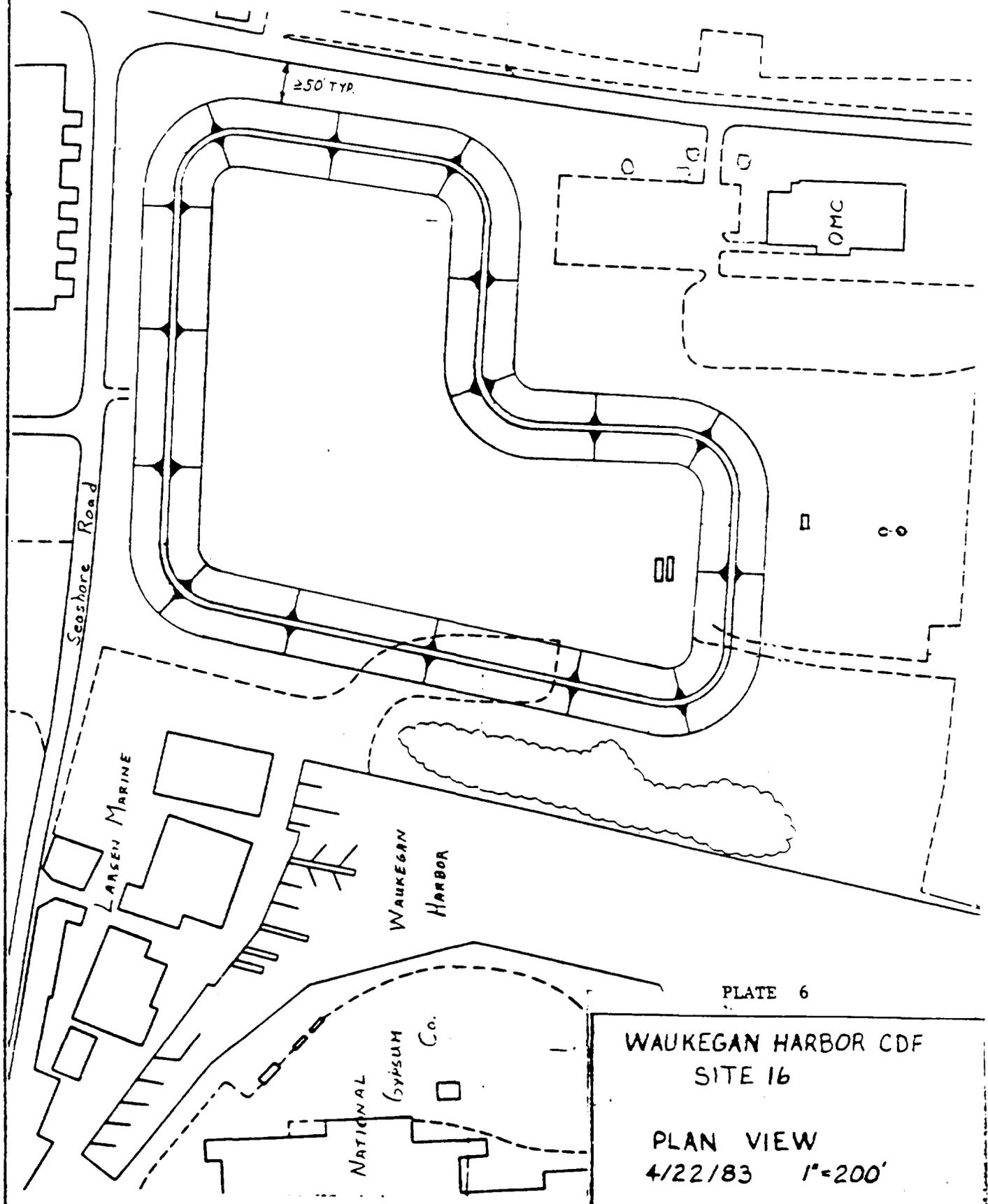
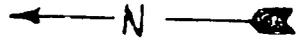
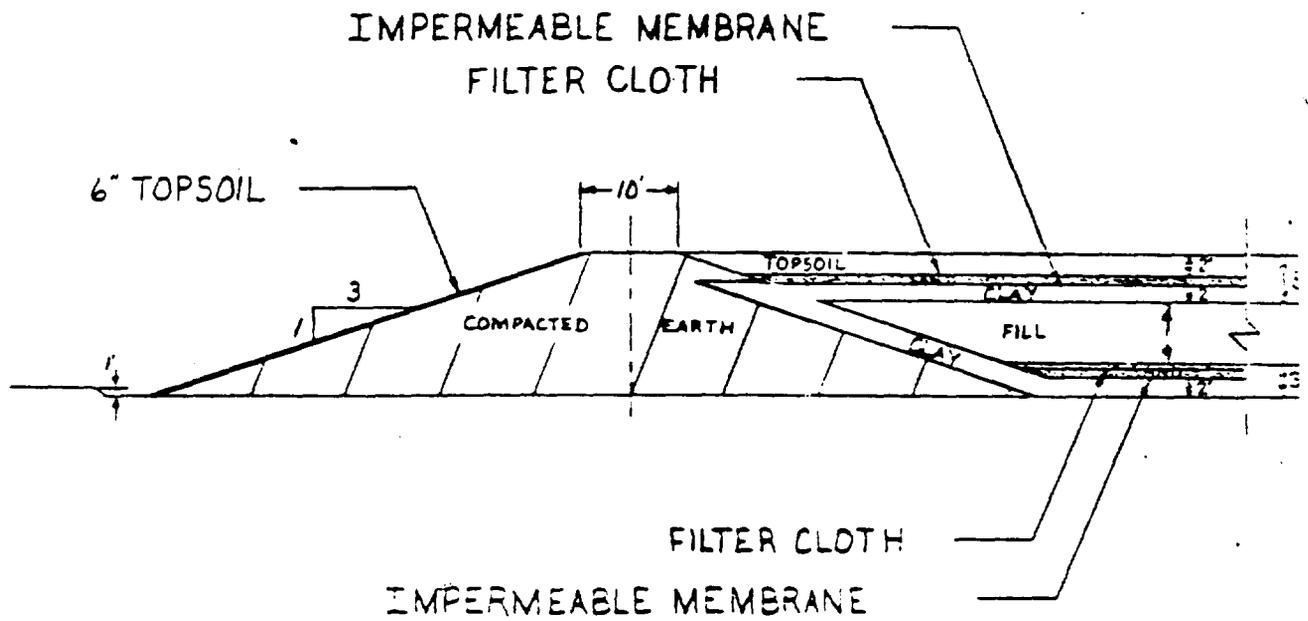


PLATE 6

WAUKEGAN HARBOR CDF  
SITE 16

PLAN VIEW  
4/22/83 1"=200'



100,000 CY CAPACITY

PLATE 7  
WAUKEGAN HARBOR CDF  
TYPICAL DIKE SECTION  
SCALE 1" = 20'

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX A  
SECTION 123, P.L. 91-611

Sec. 123. (a) The Secretary of the Army, acting through the Chief of Engineers, is authorized to construct, operate, and maintain, subject to the provisions of subsection (c), contained spoil disposal facilities of sufficient capacity for a period not to exceed ten years, to meet the requirements of this section. Before establishing each such facility, the Secretary of the Army shall obtain the concurrence of appropriate local governments and shall consider the views and recommendations of the Administrator of the Environmental Protection Agency and shall comply with requirements of section 21 of the Federal Water Pollution Control Act, and of the National Environmental Policy Act of 1969. Section 9 of the River and Harbor Act of 1899 shall not apply to any facility authorized by this section.

(b) The Secretary of the Army, acting through the Chief of Engineers, shall establish the contained spoil disposal facilities authorized in subsection (a) at the earliest practicable date, taking into consideration the views and recommendations of the Administrator of the Environmental Protection Agency as to those areas which, in the Administrator's judgment, are most urgently in need of such facilities and pursuant to the requirements of the National Environmental Policy Act of 1969 and the Federal Water Pollution Control Act.

(c) 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) contribute to the United States 25 per centum of the construction costs, such amount to be payable either in cash prior to construction, in installments during construction, or in installments, with interest at a rate to be determined by the Secretary of the Treasury, as of the beginning of the fiscal year in which construction is initiated, on the basis of the computed average interest rate payable by the Treasury upon its outstanding marketable public obligations, which are neither due or callable for redemption for fifteen years from date of issue; (3) hold and save the United States free from damages due to con-

struction, operation, and maintenance of the facility; and (4) except as provided in subsection (f), maintain the facility after completion of its use for disposal purposes in a manner satisfactory to the Secretary of the Army.

(d) The requirement for appropriate non-Federal interest or interests to furnish an agreement to contribute 25 per centum of the construction costs as set forth in subsection (c) shall be waived by the Secretary of the Army upon a finding by the Administrator of the Environmental Protection Agency that for the area to which such construction applies, the State or States involved, interstate agency, municipality, and other appropriate political subdivision of the State and industrial concerns are participating in and in compliance with an approved plan for the general geographical area of the dredging activity for construction, modification, expansion, or rehabilitation of waste treatment facilities and the Administrator has found that applicable water quality standards are not being violated.

(e) Notwithstanding any other provision of law, all costs of disposal of dredged spoil from the project for the Great Lakes connecting channels, Michigan, shall be borne by the United States.

(f) The participating non-Federal interest or interests shall retain title to all lands, easements, and rights-of-way furnished by it pursuant to subsection (c). A spoil disposal facility owned by a non-Federal interest or interests may be conveyed to another party only after completion of the facility's use for disposal purposes and after the transferee agrees in writing to use or maintain the facility in a manner which the Secretary of the Army determines to be satisfactory.

(g) Any spoil disposal facilities constructed under the provisions of this section shall be made available to Federal licensees or permittees upon payment of an appropriate charge for such use. Twenty-five per centum of such charge shall be remitted to the participating non-Federal interest or interests except for those excused from contributing to the construction costs under subsections (d) and (e).

(h) This section, other than subsection (i), shall be applicable only to the Great Lakes and their connecting channels.

(i) The Chief of Engineers, under the direction of the Secretary of the Army, is hereby authorized to extend to all navigable waters, connecting channels, tributary streams, other waters of the United States and waters contiguous to the United States, a comprehensive program of research, study, and experimentation relating to dredged spoil. This program shall be carried out in cooperation with other Federal and State agencies, and shall include, but not be limited to, investigations on the characteristics of dredged spoil, and alternative methods of its disposal. To the extent that such study shall include the effects of such dredge spoil on water quality, the facilities and personnel of the Environmental Protection Agency shall be utilized.

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX B  
CHARACTER OF DREDGED MATERIAL

APPENDIX B  
CHARACTER OF DREDGED MATERIAL

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.	Purpose	B-1
2.	Study Limits	B-1
3.	Bottom Sediment Sampling and Analysis	B-1
4.	Disposal and Treatment	B-3
5.	References	B-3

LIST OF TABLES

B-1	Summary of pollution classification of sediment samples from Area 1	B-4
B-2	Summary of pollution classification of sediment samples from Area 2	B-5

LIST OF PLATES

B-1	Waukegan Harbor, Illinois	B-6
B-2	Areas of maintenance dredging from Waukegan Harbor	B-7
B-3	Distribution of PCB contamination in Waukegan Harbor Sediments	B-8

LIST OF ATTACHMENTS

B-1	Results of bulk chemical and standard elutriate analysis of sediment samples collected from Waukegan Harbor in October 1981
-----	---

## 1. Purpose

This appendix will summarize the physical and chemical character of bottom sediments in Waukegan Harbor, Waukegan, Illinois to be included in the maintenance dredging proposed by the Corps of Engineers.

## 2. Study Limits

2.1 A map of Waukegan Harbor is shown on Plate B-1. The federal channel extends from just below slip #1, including the turning area and main channel between the north and south piers, to beyond the U.S. breakwater. The only recent dredging (1982) from the federal channel was from the entrance channel southeast of the breakwater. The authorized project depth of the entrance channel (eastward of the end of the north pier) is -22 feet Low Water Datum (LWD). The project depth for the remainder of the federal channel is -18 feet LWD. The Chicago District is not currently authorized to dredge beyond the defined limits of the federal channel, except for an allowable two-foot pay prism (overdepth).

2.2 The USEPA, as part of the SUPERFUND clean-up of PCB's in and around Waukegan Harbor has proposed dredging bottom sediments from areas of the "upper harbor" north of the federal channel.

## 3. Bottom Sediment Sampling and Analysis

3.1 Prior to 1976, routine analysis of bottom sediments from Waukegan Harbor was performed by the Corps of Engineers and the USEPA/Federal Water Pollution Control Administration in relation to maintenance dredging. Sediments were commonly analyzed for organic nutrients and heavy metals. The sediments of the inner harbor (project depth -18 ft LWD) were considered polluted and not acceptable for open-water disposal. Those sediments from the outer harbor (project depth -22 ft LWD) were considered only slightly polluted. In 1976, the USEPA first discovered the presence of polychlorinated biphenyls (PCB's) in Waukegan Harbor.

3.2 Prior to the maintenance dredging from the outer entrance channel in 1982, the Chicago District conducted analysis of the sediments (reference 5.2). The material was fine grained sand, presumably littoral drift, with concentrations of PCB's all less than one part per million (ppm).

3.3 In 1981, the Chicago District conducted a sampling program on the bottom sediments from the federal channel at Waukegan Harbor (reference 5.3). Borings and grab samples of sediment were collected for physical and chemical analysis, standard elutriate testing, and bioassays. The results of bulk chemical and standard elutriate analysis from this sampling program are provided as Attachment B-1. Also provided in this attachment is a plate showing the locations of sediment samples.

3.4 In 1982, the Chicago District collected grab samples of sediment from the upper end of the federal channel and the area around slip #1. In addition, borings were made to determine the depth of soft silty "muck" overlying the lake bed or till. The sediment samples were used for modified elutriate testing. The results were reported in reference 5.4.

3.5 Physically the bottom sediments of the federal channel at Waukegan Harbor are of two basic types. The bottom sediments along the north pier and in the entrance channel are mostly sand and silty-sand. These locations are shown as Area 1 on Plate B-2. These sediments most probably represent littoral drift, or sand blown over the north pier from the beach area above of the harbor. The second basic type of bottom sediments in Waukegan Harbor are sandy-clay and silts present in the inner harbor areas. These locations are shown as Area 2 on Plate B-2.

3.6 Chemically, the sediments of Waukegan Harbor will be evaluated based on the USEPA "Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments" (reference 5.5). These guidelines were developed to meet the need for "immediate decisions regarding the disposal of dredged material." The guidelines are based on several assumptions including:

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

3.7 The sand and silty-sand sediments of Area 1 were generally non-polluted with metals or organic contaminants. A summary of the pollution classification of samples from this area is shown on Table B-1.

3.8 The sandy-clay and silty sediments of the inner harbor areas are characterized as "moderately" to "heavy polluted" with some heavy metals and "moderately polluted" with organic content and nutrients. A summary of the pollutational classification of sediment samples collected from Area 2 is shown on Table B-2.

3.9 The concentrations of PCB's in the bottom sediments of Waukegan Harbor varies with location and depth. The USEPA report (reference 5.1) divided the harbor into areas of specific PCB concentrations. Plate B-3 is reproduced from this report. All areas of the Federal channel are identified as having PCB concentrations less than 50 ppm. Grab and core samples of the sandy-clay and silty sediments of the inner harbor (Area 2) contained PCB levels well below 50 ppm (references 5.3 and 5.4). Analysis of the silty-sand and sand from Area 1 showed PCB concentrations less than 1.0 ppm throughout.

3.10 Elutriate tests are designed to demonstrate the release or solubilization of contaminants during dredging and/or disposal. The standard elutriate test was developed to evaluate the impacts of open water disposal of dredged materials. A sediment and water mixture is prepared and agitated. The soluble fraction is then analyzed for contaminants. Standard elutriate tests conducted with Waukegan Harbor sediments (reference 5.3) demonstrated little or no release of contaminants into solution. These results are in agreement with the findings of the Corps' Dredged Material Research Program which conducted exhaustive testing of dredged material around the country. Most heavy metals were found to be tightly bound to the silty-clay particles of urban sediments.

3.11 Chlorinated hydrocarbons are very hydrophobic substances. PCB's in the environment are adsorbed onto soil/sediment particles. In Waukegan Harbor the PCB's present are tightly bound to the organic silts and clays of the upper harbor and are not readily leached into solution.

#### 4. Disposal and Treatment

4.1 The bottom sediments from Waukegan Harbor within the Federal channel need to be dredged in order to maintain the authorized navigation depth. Using depth surveys of 1981, the volume of material above project depth (plus a 2-foot pay prism allowance) in Area 1 was estimated as about 45,000 yd<sup>3</sup>. Because these materials are generally sand and silty-sand with little or no organic or metal contaminants and no PCB's (<1 ppm), the disposal options available could include open water disposal, beach nourishment, or use as a construction fill.

4.2 The volume of sandy-clay and silty sediments above project depth (plus 2-foot allowance) in Area 2 was estimated as about 60,000 yd<sup>3</sup>. The Corps' is currently considering the disposal of these dredged materials in an upland confined facility. These sediments have an average moisture content of about 50% (in place) and a specific gravity of between 2.5 and 2.7. Mechanical dredging of Waukegan Harbor bottom sediments will allow the disposal of these materials with little additional water.

4.3 The dewatering/densification of dredged material will immediately follow disposal. The dewatering can occur by evaporation, decanting of the surface water, underdrainage, progressive trenching, or by a combination of these. Water drained from the disposal area can be treated by filtration or coagulation if the concentration of suspended solids is excessive.

4.4 Corps' sponsored research under the Dredged Material Research Program has shown that dredged material can dry to a moisture content equal to about 1.2 times its plastic limit (about 20-25% moisture in the case of Waukegan sediments). Dredged material once dewatered is fairly stable in terms of acid/base conditions. The dredged material can be capped with a clay layer and the disposal area completed.

#### 5. References

5.1 The PCB Contamination Problem in Waukegan, Illinois, USEPA Region V, 21 January 1981.

5.2 Waukegan Outer Harbor Sediment Analysis, U.S. Army Corps of Engineers, Chicago District, 5 June 1981.

5.3 Waukegan Harbor, Illinois; Analysis of Sediment Samples collected in October 1981, U.S. Army Corps of Engineers, Chicago District, May 1982.

5.4 Waukegan Harbor, Illinois; Analysis of Sediment Samples collected in November 1982, U.S. Army Corps of Engineers, Chicago District, February 1983.

5.5 Guidelines for the Pollutational Classification of Great Lakes Harbor Sediments, USEPA Region V, 1977.

Table B-1 Summary of pollution classification of sediment samples from Area 1.

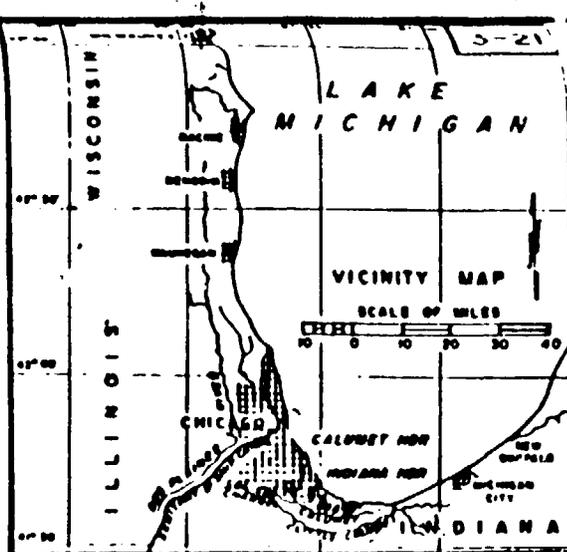
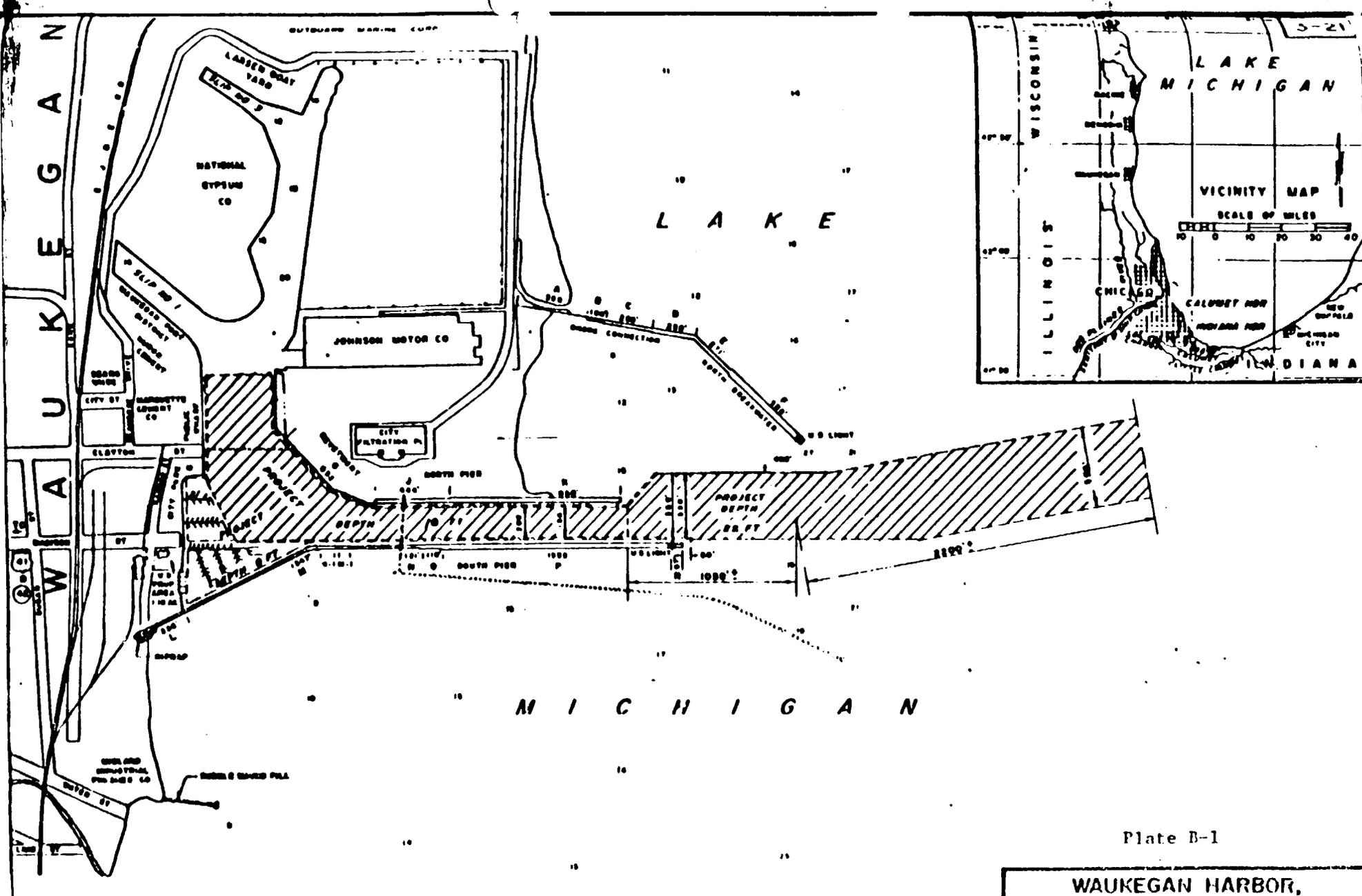
<u>PARAMETER</u>	<u>Non-Polluted</u>	<u>Moderately Polluted</u>	<u>Heavily Polluted</u>	<u>P</u>
Volatile Solids	19			V
Chemical Oxygen Demand	19			C
Oil and Grease	19			O
Ammonia-Nitrogen	17	1	1	A
Total Kjeldahl Nitrogen	18	1		T
Phosphorous	19			P
Cyanide	13	2	1	C
Arsenic	4	10	5	A
Barium	15	4		B
Cadmium	*	*		C
Chromium	18		1	C
Copper	9	5	5	C
Iron	19			I
Lead	18		1	L
Manganese	16	3		M
Mercury	*	*		M
Nickel	19			N
Zinc	16	2	1	Z

\*lower limits not established

Table B-2 Summary of pollution classification of sediment samples from Area 2.

<u>PARAMETER</u>	<u>Non-Polluted</u>	<u>Moderately Polluted</u>	<u>Heavily Polluted</u>
Volatile Solids	6	3	5
Chemical Oxygen Demand	7	3	
Oil and Grease	8	2	
Ammonia-Nitrogen	6	4	
Total Kjeldahl Nitrogen	6	4	
Phosphorous	10		
Cyanide	6	3	1
Arsenic		4	11
Barium	3	8	4
Cadmium	*	*	1
Chromium	9	5	1
Copper	2	3	5
Iron	10		
Lead	5	2	8
Manganese	3	6	1
Mercury	*	*	
Nickel	10		
Zinc	3	5	2

\*lower limits not established



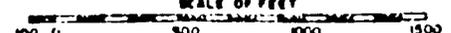
PROJECT DEPTHS AND SOUNDINGS ARE REFERRED TO LOW WATER DATUM 576.6 FEET ABOVE MEAN WATER LEVEL AT FATHEN POINT, QUEBEC I G L D (1955) (INTERNATIONAL GREAT LAKES DATUM)

 - Federal Navigation Channel

Plate B-1

**WAUKEGAN HARBOR,  
ILLINOIS**

IN 3 SHEETS SHEET NO 1

SCALE OF FEET  
  
 100 0 500 1000 1500

CORPS OF ENGINEERS CHICAGO, ILL

GENERAL MOTORS CORP

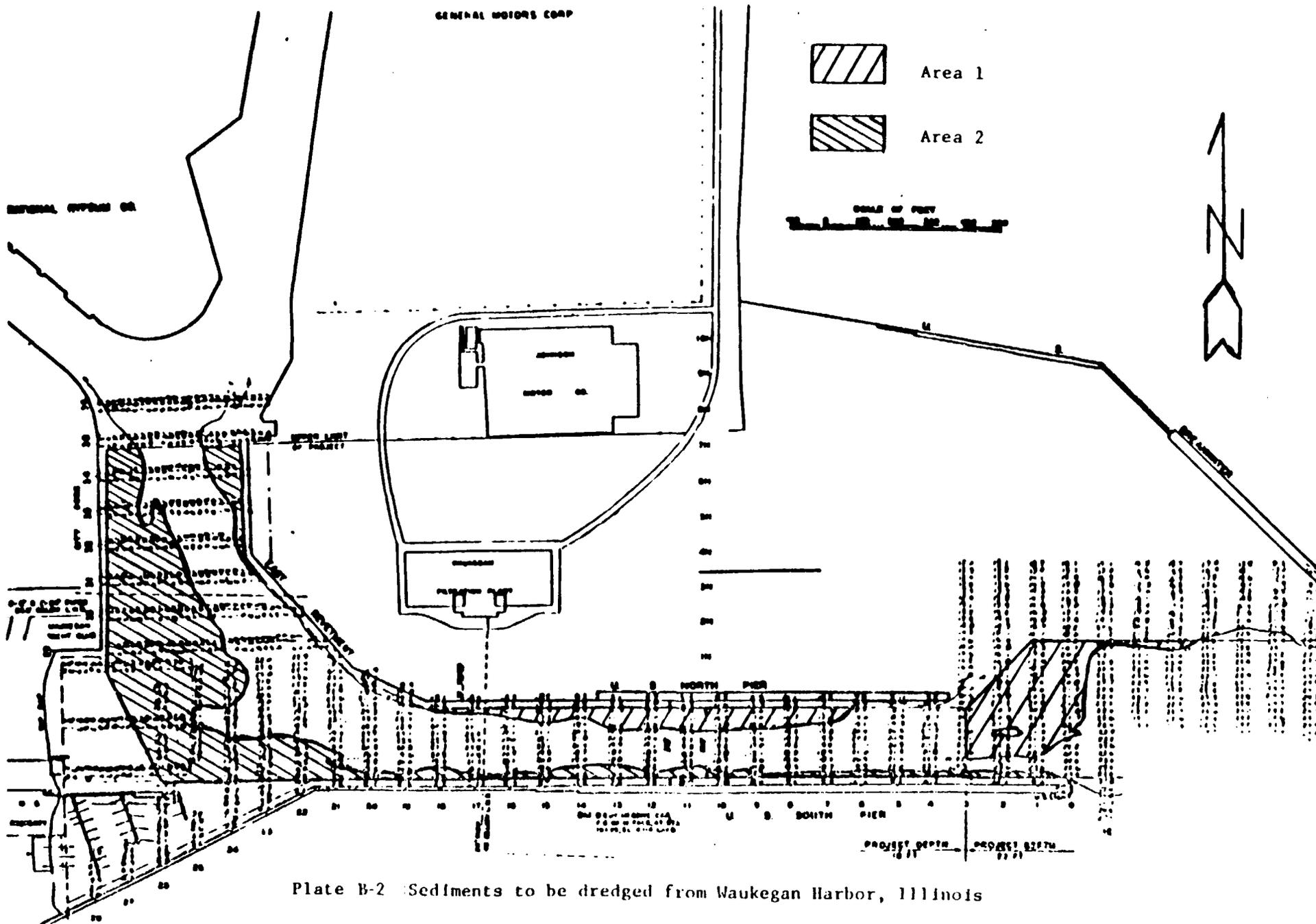
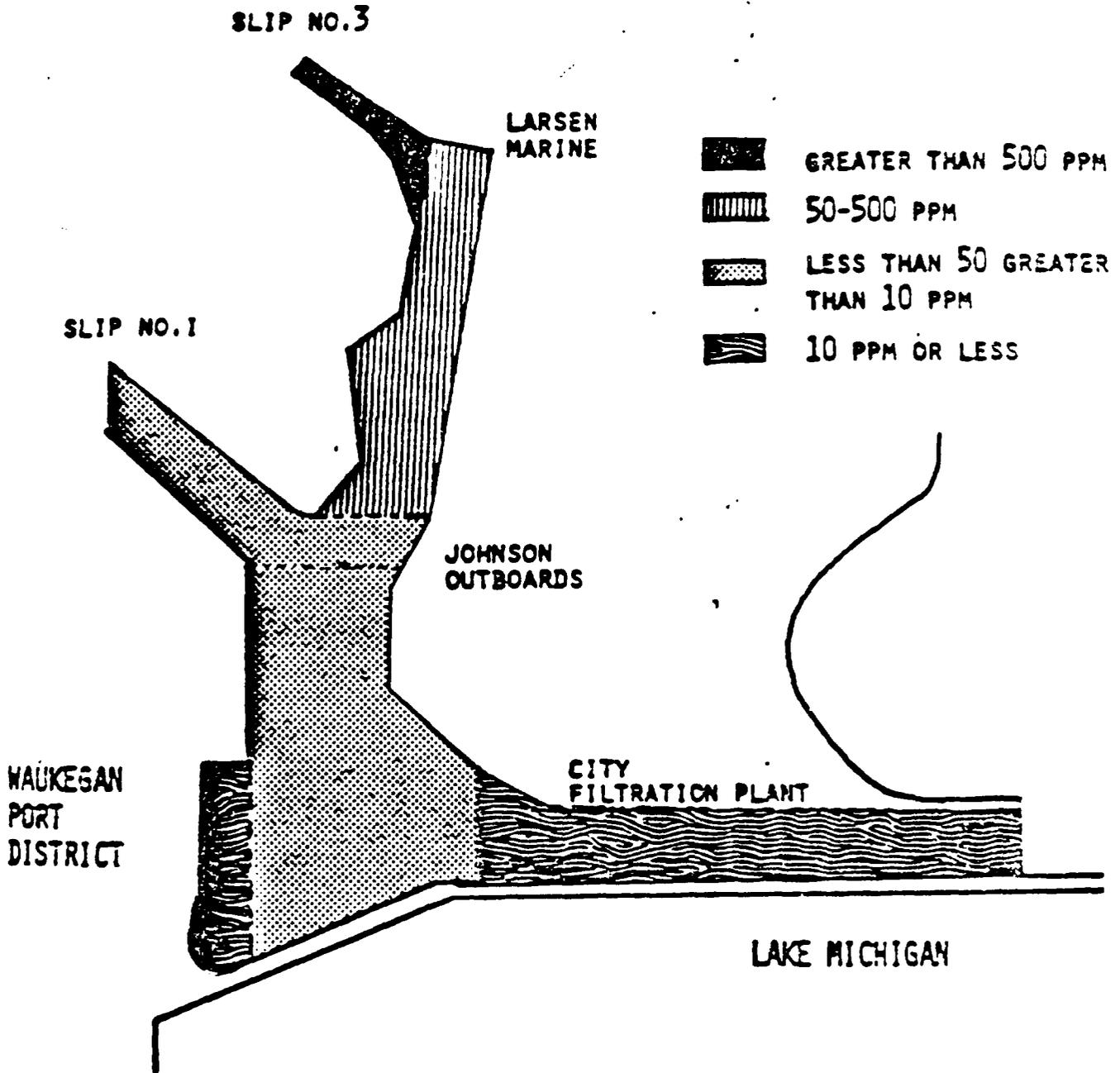


Plate B-2 Sediments to be dredged from Waukegan Harbor, Illinois



SCALE: 1"=500' (APPROXIMATE)

PLATE B-3 DISTRIBUTION OF PCB CONTAMINATION IN WAUKEGAN HARBOR SEDIMENT

(from US EPA report "The PCB Contamination Problem in Waukegan, Illinois", January 1981)

ATTACHMENT B-1

Results of Bulk Chemical and Standard Elutriate  
Analysis of Sediment Samples Collected from  
Waukegan Harbor in October 1981  
(from reference 5.3)







Table 4 Waukegan Grab Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>2</sup> (ft)	PCB's (total)	Archlor								
				1016	1221	1232	1242	1248	1254	1260	1262	
CWH-06-81	Grab	-5 IWD		L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1	5
CWH-07-81	Grab	-16 IWD		L 1	L 1	L 1	29'	L 1	L 1	L 1	L 1	29
CWH-20-81	Grab	-14 IWD		L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1
CWH-21-81	Grab	-23 IWD		L 1	L 1	L 1	L 1	L 1	L 1	L 1	L 1	15
CWH-22-81	Grab	-15 IWD		L 1	L 1	L 1	510'	L 1	L 1	L 1	L 1	171

1. All units expressed as µg/kg dry weight (ppb).  
 2. Depth is relative to International Great Lakes Low Water Datum (IWD).

Table 5 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>3</sup> (ft)	Moisture (%)	Volatile Solids (%)	COD	TKN	Ammonia Nitrogen	Total P	Nitrite Nitrate	Oil & Grease
CWH-01-81	01	-19.5 to -21.5	20.3	1.280	5560	71	L 25	15	L 25	310
	02	-21.5 to -23.5	24.2	1.680	28000	584	100	31	L 25	520
	03	-23.5 to -25.5	19.6	1.070	10100	111	39	14	63	160
CWH-02-81	01	-21 to -23	20.2	0.978	6200	181	L 25	16	L 25	590
	02	-23 to -25	42.7	3.550	35200	1424	228	81	L 25	550
CWH-03-81	01	-20.2 to -22.2	19.4	3.750	24400	153	L 25	24	L 25	60
CWH-04-81	01	-16.5 to -18.5	16.5	0.720	6080	238	L 25	23	L 25	40
	02	-18.5 to -20.5	31.4	2.780	6980	187	L 25	28	L 25	210
	03	-20.5 to -22.5	18.5	0.981	8660	158	L 25	17	L 25	20
CWH-05-81	01	-16.7 to -18.7	33.1		35800	909	104	52	L 25	930
	02	-18.7 to -20.7	21.8	0.453	3450	68	L 25	11	L 25	70
	03	-20.7 to -22.7	18.7	0.801	22900	73	29	11	L 25	20
Heavily polluted <sup>2</sup>				> 8	> 80000	> 2000	> 200	> 650		> 2000
Moderately polluted <sup>2</sup>				5-8	40000-80000	1000-2000	75-200	420-650		1000-2000
Non-polluted <sup>2</sup>				< 5	< 40000	< 1000	< 75	< 420		< 1000

1. All units expressed as mg/kg dry weight unless noted otherwise.

2. According to USEPA Region V Guidelines for Pollutional Classification of Great Lakes Harbor Sediments

3. Depths reported relative to International Great Lakes Low Water Datum.

Table 6 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>4</sup> (ft)	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Cu	Cn	Fe
CWH-01-81	01	-19.5 to -21.5	1988	L 50	4	7	L 5	L 5	41900	L 5	7	L 0.1	4110
	02	-21.5 to -23.5	4464	L 50	9	20	L 5	L 5	76700	11	59	L 0.1	9570
	03	-23.5 to -25.5	3042	L 50	4	16	L 5	L 5	36500	7	39	L 0.1	7310
CWH-02-81	01	-21 to -23	1602	L 50	3	5	L 5	L 5	20300	L 5	30	L 0.1	3500
	02	-23 to -25	6955	L 50	13	39	L 5	L 5	56300	103	74	0.35	12740
CWH-03-81	01	-20.2 to -22.2	2052	L 50	3	21	L 5	L 5	32300	6	25	L 0.1	4360
CWH-04-81	01	-16.5 to -18.5	2161	L 50	6	6	L 5	L 5	23000	L 5	6	L 0.1	4090
	02	-18.5 to -20.5	3945	L 50	5	21	L 5	L 5	47600	8	95	L 0.1	9120
	03	-20.5 to -22.5	1962	L 50	4	6	L 5	L 5	50400	7	32	L 0.1	4420
CWH-05-81	01	-16.7 to -18.7	5174	L 50	12	34	L 5	L 5	44100	14	61	L 0.1	11520
	02	-18.7 to -20.7	2725	L 50	5	8	L 5	L 5	60900	L 5	L 5	L 0.1	4690
	03	-20.7 to -22.7	2131	L 50	4	6	L 5	L 5	49800	L 5	L 5	L 0.1	3560
Heavily polluted <sup>2</sup>					>8	>60		>6 <sup>3</sup>		>75	>50	>.25	>25000
Moderately polluted <sup>2</sup>					3-8	20-60				25-75	25-50	.1-.25	12500 <sup>5</sup>
Non-polluted <sup>2</sup>					<3	<20				<25	<25	<.1	<17000

1. All units expressed as mg/kg dry weight unless noted otherwise.
2. According to USEPA Region V Guidelines for Pollutional Classification Of Great Lakes Harbor Sediments
3. No acceptable concentrations are established.
4. Depths reported relative to International Great Lakes Low Water Datum.

Table 7 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH 4 (ft)	Pb	Mg	Mn	Hg	Ni	K	Se	Na	Tl	Zn
CWH-01-81	01	-19.5 to -21.5	18	21000	169	L 0.1	L 5	300	36	200	200	L 50
	02	-21.5 to -23.5	31	39900	474	L 0.1	6	700	45	300	360	90
	03	-23.5 to -25.5	16	15400	175	L 0.1	L 5	400	29	200	200	76
CWH-02-81	01	-21 to -23	30	10100	99	L 0.1	L 5	300	26	50	130	L 50
	02	-23 to -25	69	28400	383	L 0.1	10	1300	45	200	320	220
CWH-03-81	01	-20.2 to -22.2	19	15900	142	L 0.1	L 5	300	28	100	170	87
CWH-04-81	01	-18.5 to -18.5	7	12100	115	L 0.1	L 5	200	42	200	150	L 50
	02	-18.5 to -20.5	22	24400	298	L 0.1	L 5	400	27	200	280	171
	03	-20.5 to -22.5	20	27100	177	L 0.1	L 5	100	20	200	240	L 50
CWH-05-81	01	-16.7 to -18.7	141	23000	322	L 0.1	8	800	31	200	290	284
	02	-18.7 to -20.7	8	31400	207	L 0.1	L 5	300	43	300	260	L 50
	03	-20.7 to -22.7	L 5	25000	177	L 0.1	L 5	200	39	200	220	L 50
Heavily polluted <sup>2</sup>			> 60		> 500	≥ 1 <sup>3</sup>	> 50					> 200
Moderately polluted <sup>2</sup>			40-60		300-500		20-50					90-200
Non-polluted <sup>2</sup>			< 40		< 300		< 20					< 90

1. All units expressed as mg/kg dry weight unless noted otherwise.
2. According to USEPA Region V Guidelines for Pollutional Classification of Great Lakes Harbor Sediments
3. No acceptable concentrations are established.
4. Depths reported relative to International Great Lakes Low Water Datum

Table 8 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>3</sup> (ft)	PCB's (total)	Archlor <sup>2</sup>							
				1016	1221	1232	1242	1248	1254	1260	1262
CWH-01-81	01	-19.5 to -21.5					8				L 1
	02	-21.5 to -23.5					7				L 1
	03	-23.5 to -25.5					L 1				6
CWH-02-81	01	-21 to -23					L 1				4
	02	-23 to -25					L 1				42
CWH-03-81	01	-20.2 to -22.2					L 1				12
CWH-04-81	01	-16.5 to -18.5					L 1				48
	02	-18.5 to -20.5					L 1				56
	03	-20.5 to -22.5					L 1				30
CWH-05-81	01	-16.7 to -18.7					L 1				1041
	02	-18.7 to -20.7					L 1				190
	03	-20.7 to -22.7					L 1				45

1. All units expressed as µg/kg dry weight (ppb).

2. Detectable levels (> 1 ppb) of Archlors 1242 and 1262 only, all other Archlors are less than 1 ppb.

3. Depths reported relative to International Great Lakes Low Water Datum.

Table 9 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>3</sup> (ft)	Moisture (%)	Volatile Solids (%)	COD	TKN	Ammonia Nitrogen	Total P	Nitrite Nitrate	Oil & Grease
CWH-06-81	01	-5.1 to -7.6	21.8	0.331	1880	L 25	L 25	8	L 25	70
	02	-7.6 to -10.1	19.9	0.338	2420	L 25	L 25	9	L 25	40
	03	-10.3 to -13.3	16.3		2620	L 25	L 25	11	L 25	40
	04	-13.3 to -15.3	19.7	0.601	4000	37	L 25	13	L 25	120
	05	-15.3 to -17.3	16.5	0.551	4260	L 25	L 25	13	L 25	140
	06	-17.3 to -19.3	12.2	1.280	13300	97	L 25	12	L 25	330
	07	-19.3 to -21.3	11.4	1.250	23400	206	L 25	16	L 25	40
CWH-07-81	01	-16.8 to -19.8	9.7	2.160	29800	282	L 25	24	L 25	310
	02	-19.8 to -21.3	27.6	2.040	21100	423	62	29	L 25	420
	03	-21.3 to -22.8								
CWH-08-81	01	-15.8 to -18.3	19.6	0.843	5810	L 25	L 25	10	L 25	290
	02	-18.3 to -20.3	16.5	1.060	18200	28	L 25	9	L 25	660
	03	-20.3 to -22.8	18.0	1.380	7650	244	L 25	28	L 25	420
Heavily polluted <sup>2</sup>			> 8	> 80000	> 2000	> 200	> 650	> 2000		
Moderately polluted <sup>2</sup>			5-8	40000-80000	1000-2000	75-200	420-650	1000-2000		
Non-polluted <sup>2</sup>			< 5	< 40000	< 1000	< 75	< 420	< 1000		

1. All units expressed as mg/kg dry weight unless noted otherwise.
2. According to USEPA Region V Guidelines for Pollutional Classification of Great Lakes Harbor Sediments
3. Depths reported relative to International Great Lakes Low Water Datum.

Table 10 Wankegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH <sup>4</sup> (ft)	Al	Sb	As	Ba	Be	Cd	Ca	Cr	Cu	Cn	Fe
CWH-06-81	01	-5.1 to -7.6	1251	L 50	L 1	L 5	L 5	L 5	15500	L 5	L 5	L 0.1	2360
	02	-7.6 to -10.1	1800	L 50	L 1	L 5	L 5	L 5	17300	L 5	L 5	0.2	3660
	03	-10.1 to -13.3	2657	L 50	7	13	L 5	L 5	21600	L 5	L 5	L 0.1	6220
	04	-13.3 to -15.3	1423	L 50	4	L 5	L 5	L 5	24600	L 5	118	L 0.1	3760
	05	-15.3 to -17.3	2376	L 50	7	7	L 5	L 5	26800	L 5	8	L 0.1	6050
	06	-17.3 to -19.3	3750	L 50	10	13	L 5	L 5	22800	L 5	34	0.2	8750
	07	-19.3 to -21.3	8233	L 50	19	25	L 5	L 5	59900	L 5	37	L 0.1	15500
CWI-07-81	01	-16.8 to -19.8	10608	60	17	34	L 5	L 5	58900	L 5	37	L 0.1	15660
	02	-19.8 to -21.3	3377	L 50	8	18	L 5	L 5	54700	L 5	63	L 0.1	9290
	03	-21.3 to -22.8											
CMI-08-81	01	-15.8 to -18.3	1901	L 50	4	7	L 5	L 5	27200	L 5	L 5		4340
	02	-18.3 to -20.3	1018	L 50	L 1	L 5	L 5	L 5	13100	L 5	15		2040
	03	-20.3 to -22.8	2748	L 50	15	7	L 5	L 5	25000	L 5	51		3930
Heavily polluted <sup>2</sup>					>8	>60		>6 <sup>3</sup>		>75	>50	>.25	>25000
Moderately polluted <sup>2</sup>					3-8	20-60				25-75	25-50	.1-.25	17000
Non-polluted <sup>2</sup>					<3	<20				<25	<25	<.1	<17000

1. All units expressed as mg/kg dry weight unless noted otherwise.
2. According to USEPA Region V Guidelines for Pollutional Classification of Great Lakes Harbor Sediments
3. No acceptable concentrations are established.
4. Depths reported relative to International Great Lakes Low Water Datum.

Table 11 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH (ft) <sup>4</sup>	Pb	Mg	Mn	Hg	Ni	K	Se	Na	Tl	Zn
CWH-06-81	01	-5.1 to -7.6	L 5	7600	75	L 0.1	L 5	50	9	50	L 100	L 50
	02	-7.6 to -10.1	L 5	8800	114	L 0.1	L 5	50	13	100	130	L 50
	03	-10.1 to -13.3	8	10800	198	L 0.1	L 5	200	6	200	160	L 50
	04	-13.3 to -15.3	7	12600	112	L 0.1	L 5	50	10	200	150	86
	05	-15.3 to -17.3	L 5	14200	166	L 0.1	L 5	100	8	100	170	L 50
	06	-17.3 to -19.3	L 5	12300	239	L 0.1	L 5	700	9	200	190	L 50
	07	-19.3 to -21.3	L 5	34500	554	L 0.1	L 5	1600	14	300	370	68
CWH-07-81	01	-16.8 to -19.8	L 5	33400	545	L 0.1	L 5	2900	15	300	390	157
	02	-19.8 to -21.3	11	28800	307	L 0.1	L 5	500	14	200	290	118
	03	-21.3 to -22.8										
CWH-08-81	01	-15.8 to -18.3	L 5	13800	137	L 0.1	L 5	200	7	300	160	L 50
	02	-18.3 to -20.3	L 5	6600	62	L 0.1	L 5	50	7	50	L 100	L 50
	03	-20.3 to -22.8	11	12400	119	L 0.1	L 5	50	11	100	150	L 50
Heavily polluted <sup>2</sup>			> 60		> 500	≥ 1 <sup>3</sup>	> 50					> 200
Moderately polluted <sup>2</sup>			40-60		300-500		20-50					90-200
Non-polluted <sup>2</sup>			< 40		< 300		< 20					< 90

1. All units expressed as mg/kg dry weight unless noted otherwise.
2. According to USEPA Region V Guidlines for Pollutional Classification of Great Lakes Harbor Sediments
3. No acceptable concentrations are established.
4. Depths reported relative to International Great Lakes Low Water Datum.

Table 12 Waukegan Core Sample Bulk Chemistry Results<sup>1</sup>

STATION ID	SAMPLE ID	DEPTH (ft) <sup>3</sup>	PCB's (total)	Archlor <sup>2</sup>							
				1016	1221	1232	1242	1248	1254	1260	1262
CWI-06-81	01	-5.1 to -7.6					L 1				27
	02	-7.6 to -10.1					L 1				55
	03	-10.1 to -13.3					L 1				67
	04	-13.3 to -15.3					L 1				278
	05	-15.3 to -17.3					L 1				26
	06	-17.3 to -19.3					L 1				19
	07	-19.3 to -21.3					L 1				56
CWI-07-81	01	-16.8 to -19.8					L 1				33
	02	-19.8 to -21.3					L 1				17
	03	-21.3 to -22.8					L 1				
CWI-08-81	01	-15.8 to -18.3					L 1				7
	02	-18.3 to -20.3					38				133
	03	-20.3 to -22.8					L 1				14

1. All units expressed as µg/kg dry weight (ppb).  
 2. Detectable levels (> 1 ppb) of Archlors 1242 and 1262 only, all other Archlors are less than 1 ppb.  
 3. Depths reported relative to International Great Lakes Low Water Datum.

Table 13 Results of Elutriate Analysis<sup>1</sup>

STATION ID	SUB-Samples <sup>2</sup>	TYPE <sup>3</sup>	Diss. Solids mg/l	TKN mg/l	NH <sub>3</sub> -N mg/l	Diss. P	NO <sub>2</sub> & NO <sub>3</sub> mg/l	Al	Sb	As	Ba	Be	Cd	Ca mg/l	Cr
CWH-1-81	3	Elut	168	4.3	4.3	L 10	0.1	70	L 100	L 1	39	L 1	L 1	63	L 1
		H <sub>2</sub> O	16	0.2	L 0.1	L 10	0.3	L 50	L 100	L 1	14	L 1	L 1	47	L 1
CWH-2-81	2	Elut	160	5.4	5.4	L 10	0.1	420	L 100	5	35	L 1	L 1	49	3
		H <sub>2</sub> O	148	0.2	L 0.1	L 10	0.3	L 50	L 100	L 1	14	L 1	L 1	48	L 1
CWH-3-81	1	Elut	300	2.2	2.2	L 10	0.1	100	L 100	L 1	37	L 1	L 1	73	L 1
		H <sub>2</sub> O	18	0.2	L 0.1	30	0.3	L 50	L 100	2	15	L 1	L 1	47	L 1
CWH-4-81	3	Elut	174	1.5	1.5	L 10	0.1	130	L 100	L 1	36	L 1	L 1	66	L 1
		H <sub>2</sub> O	172	0.2	L 0.1	L 10	0.3	L 50	L 100	L 1	14	L 1	L 1	47	L 1
CWH-5-81	3	Elut		1.6	1.2	L 10	8.3	90	L 100	13	35	2	L 1	87	2
		H <sub>2</sub> O		0.3	L 0.1	10	0.3	L 50	L 100	2	14	L 1	L 1	48	L 1
CWH-6-81	7	Elut	186	0.8	0.8	L 10	0.3	180	L 100	L 1	43	L 1	L 1	66	L 1
		H <sub>2</sub> O	184	0.2	0.1	L 10	0.3	L 50	L 100	L 1	14	L 1	L 1	48	L 1
Illinois Standards for Lake Michigan water <sup>4</sup>			≤ 180		≤ 0.02					≤ 10	≤ 1000		≤ 100		≤ 50

1. All units expressed as µg/l unless noted otherwise.
2. Sub samples from a boring station were combined and an elutriate prepared with this composite.
3. Analysis was performed on the elutriate and the background water used in the preparation.
4. According to Illinois PCB (reference 1.6.g).

Table 14 Results of Elutriate Analysis<sup>1</sup>

STATION ID	SUB <sup>2</sup> SAMPLES	TYPE <sup>3</sup>	Cu	Cn	Fe	Pb	Mg mg/l	Mn	Hg	Ni	K mg/l	Se	Na mg/l	Tl	Zn
			L 5	L 0.1	L 100	5	13	20	1.1	L 5	L 1	L 1	6	100	50
CWH-1-81	3	Elut	L 5	L 0.1	L 100	5	13	20	1.1	L 5	L 1	L 1	6	100	50
		H <sub>2</sub> O	13		L 100	4	12	L 10	L 1	L 5	L 1	L 1	5	100	L 50
CWH-2-81	2	Elut	6	L 0.1	400	4	14	30	1.3	L 5	4	L 1	6	200	L 50
		H <sub>2</sub> O	L 5		L 100	L 2	12	L 10	L 1	L 5	L 1	L 1	5	100	L 50
CWH-3-81	1	Elut	L 5	L 0.1	L 100	L 2	12	L 10	L 1	L 5	3	L 1	6	200	L 50
		H <sub>2</sub> O	7		L 100	8	12	L 10	L 1	L 5	L 1	L 1	6	100	L 50
CWH-4-81	3	Elut	L 5	L 0.1	L 100	L 2	14	20	L 1	L 5	3	L 1	6	200	L 50
		H <sub>2</sub> O	9		L 100	L 2	12	L 10	L 1	L 5	L 1	L 1	6	L 100	L 50
CWH-5-81	3	Elut	6		L 100	L 2	19	80		L 5	L 1	6	7	400	L 50
		H <sub>2</sub> O	7		L 100	3	12	L 10	1.1	L 5	L 1	L 1	6	200	L 50
CWH-6-81	7	Elut	L 5	L 0.1	L 100	L 2	14	L 10	1.3	6	3	L 1	8	200	L 50
		H <sub>2</sub> O	10		L 100	5	12	L 10	1.1	L 5	L 1	L 1	6	L 100	L 50
Illinois Standards for Lake Michigan water <sup>4</sup>			≤ 20	≤ 25	≤ 300	≤ 50		≤ 50	≤ 0.5	≤ 1000		≤ 100			≤ 1000

1. All units expressed as µg/l unless noted otherwise.
2. Sub samples from a boring station were combined and an elutriate prepared with this composite.
3. Analysis was performed on the elutriate and the background water used in the preparation.
4. According to Illinois PCB (reference 1.6.g).



Table 16 Results of Elutriate Analysis<sup>1</sup>

STATION ID	SUB <sup>2</sup> SAMPLES	TYPE <sup>3</sup>	Cu	Cd	Fe	Pb	Mg mg/l	Mn	Hg	Ni	K mg/l	Se	Na mg/l	Tl	Zn
CWH-7-81	2	Elut	1.5	1.0.1	1.100	1.2	16	20	1.1	1.5	5	1.1	8	300	1.50
		H <sub>2</sub> O	1.5		1.100	1.2	12	1.10	1.1	1.5	1.1	1.1	6	100	1.50
CWH-8-81	3	Elut	27		1200	13	11	10		1.5	1.1	5	6	400	1.50
		H <sub>2</sub> O	7		1.100	3	12	1.10	1.1	1.5	1.1	1.1	6	200	1.50
Illinois Standards for Lake Michigan water <sup>4</sup>			≤ 20	≤ 25	≤ 300	≤ 50		≤ 50	≤ 0.5	≤ 1000		≤ 100			≤ 1000

1. All units expressed as µg/l unless noted otherwise.
2. Sub samples from a boring station were combined and an elutriate prepared with this composite.
3. Analysis was performed on the elutriate and the background water used in the preparation.
4. According to Illinois PCB (reference 1.6.g).



WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX C  
GEOLOGY AND SOILS

WAUKEGAN HARBOR CDF SITE SELECTION

An investigation of the three final CDF sites of the original sixteen proposed CDF sites was undertaken during the third and fourth weeks of June. These sites were selected by a process of elimination, with various sites being withdrawn for consideration due, chiefly to adverse opposition of land owners and the immediate community of each site area to a confined disposal facility to contain the dredged material in Waukegan Harbor. Due to extensive media coverage of the PCB problems in the Waukegan Harbor area, strong local opposition exists to CDF sites.

The three sites investigated have the least, or minimal opposition. Site 16 is located in the immediate harbor area and would be the most acceptable site from a public relations or ownership standpoint. Site 4 as it is located immediately adjacent to a similar existing landfill operation has less opposition for this reason than site 1 located on proposed airport extension land. The latter site in fact was not drilled as originally planned as the landowners would not give access to their property or permission to drill, and the holes drilled were relocated on county airport owned land immediately south of the proposed area.

The exploration borings were taken by a crew from the St. Paul District comprised of the following persons: Elmer Schmidtken, driller/foreman, George Lackey, oiler/helper, Mike McWilliams, driver/laborer. The drill was F-700 Ford truck mounted CME 55 drill rig, accompanied by a GMC supply truck (VE-600), a Dodge power wagon (Model 200) and a 500 gallon trailer mounted water tank.

The CME drill was equipped with an automatic drive hammer to obviate blow count errors, such as, too short strokes, fatigue and missed count. (The hammer had a counter to register accurate counts). This automatic hammer greatly facilitated and speeded up the accuracy and rate of sampling.

A continuous sampling procedure was followed in each hole with undisturbed samples taken <sup>EACH</sup> at change of material that could be sampled. Sampling commenced at site #4, moved to site #1 and ended on site #16, however, an additional boring hole was taken on site #1. A total of 201 disturbed and 23 undisturbed 3" Shelby tube samples were taken. The disturbed drive samples were standard penetration test (SPT) samples taken with a 140# hammer falling 30" and using a split spoon-2"O.D. or 1 1/2" I.D. with 3.0 feet internal length or 3 1/2 feet external length. Drives were made for two feet and were continuous except for the undisturbed samples. Undisturbed sampling was staggered from hole to hole to obtain a better soil profile. To obtain entry to the site 16 property owned by OMC it was necessary to promise that only engineering property tests would be taken, no chemical testing would be allowed and the samples taken would be destroyed after testing.

Cu  
II  
la  
ar  
II  
be  
re  
cc  
tl  
s  
t  
o  
d  
f  
l  
E

Physiography and Drainage - Lake County is in the Wheaton Morainal country of the Great Lakes section of the Central Lowland province. In general it has gently sloping relief and poorly defined drainage patterns. Many drainage ways terminate in marshes and depressions. The extreme eastern edge of the county for 2 to 3 miles inland drains into Lake Michigan and sites 1 and 16 drain back to Lake Michigan. Site 4 drains into the Des Plaines River. Wells supplying individual homes have been drilled into the glacial drift, but those supplying villages, towns and cities have been drilled into the underlying bedrock or hard water supplies pumped in from Lake Michigan.

NCCPE-TS

SUBJECT: Waukegan Harbor CDF Site Selection

Geology - The site is located on the northern end of the Kankakee area, a broad gently sloping area of paleozoic sediments that connect the Wisconsin arch immediately to the northwest with the Cincinnati area to the southeast and thus separates the Michigan and Illinois basins.

Bedrock Geology - Buried bedrock valleys head near the crest of the Niagara Cuesta and flow eastward down dip or diverge slightly to the northeast in Illinois and Wisconsin. Of five important valleys in Illinois, two enter the lake in Lake County. These valleys are relatively broad and shallow with low gradients and pass below the present shore of Lake Michigan at elevations of around 450 feet M.S.L. The glacial drift in the valleys themselves may be Illinoian overlain by the younger Wisconsin Lake Moraine material. The Silurian bedrock strata underlying the till strike essentially North-South and have a regional eastward dip of about 15 feet per mile. The Silurian formations comprise a resistant dolomite unit of uniform composition with maximum thickness of about 450 feet in the Lake County area. The upper part of the system consists of Racine and Waukesha rocks with large erosion resistant reefs common. These reefs outcrop farther south and north and occur between the bedrock valleys. The buried Niagaran Cuesta reaches a maximum elevation of about 900 feet in Mc Henry County and drops about 450 feet over a 30 mile distance from there to the lake shoreline. Local buried relief is about 100 feet between the valley bottoms and rims so the glacial drift varies from 100' to 250' in thickness with Klintar rising to underground elevations 50' to 100' above general bedrock levels.

NCCPE-TS  
 SUBJECT: Waukegan Harbor CDF Site Selection

Geology - There are four broad low moraines along Lake Michigan in Lake County all composed of clayey till running roughly parallel to the Lake Shore. These morainal ridges have a very marked drainage control. The westernmost parallels the Des Plaines River and is called the Park Ridge. In northern Lake County it has fused with the next easterly moraine, the Deerfield, but further South they separate into distinct moraines. The Blodgett Moraine is the smallest and least distinct moraine, while the Highland Park Moraine runs immediately parallel to the lake and is characterized on its east side by wave cut bluffs. The glacial soils are geologically speaking of recent origin (less than 11,000 years old) and so are relatively unleached and calcareous. Sandy gravelly clay tills predominate in site areas No. 1 and No. 4 which are located on the Highland Park Moraine.

SITE LOCATIONS

	Township - Range -		Section	Roads
1	46N.	12.E.	29 SW 1/4 (Airport Ext.)	Oak Rd. - Wadsworth SE & Lewis Avenue
4.	46N.	12.E.	17 SW 1/4 - 18 NW 1/4	Greenbay Road - 9th St. & 17th St.
16.	45N.	12.E.	22 NW 1/4	Sea Horse Drive - South and West

INDIVIDUAL SITES

- Waukegan Airport Area - Site 1,
- 5318 - Markham Silt Loam - 1 to 4% slopes - 531 C - 4% - 7% slopes
- 232 Ashkum Silty Clay Loam
- 979 B - Grays and Markham Silt Loams
- 194 - Morley Silt Loam - 4 to 7% slopes

NCC  
 SUB.  
 The  
 soil  
 cha  
 the  
 and  
 vat  
 715  
 co  
 qu  
 co  
 so  
 Th  
 St  
 1s  
 9t  
 1a  
 sl  
 90  
 Be  
 L  
 E  
 t  
 f

NCCPE-TS

SUBJECT: Waukegan Harbor CDF Site Selection

These are gently sloping to steep well drained to moderately well drained deep soils with moderately slow permeability derived from glacial morainal clay till characterized by a sandy silty clay soil with small rounded pebble gravel. At the airport area site some dredgings could be spread between the existing and a proposed new runway in an elongated site between runways. Bedrock elevations would be at around 500' to 550' while airport runway elevations are 715 feet. So overburden depth in this area is about 200 feet.

Site 1 - This is a triangular area northeast of the airport which would be acquired by the airport under a proposed future runway extension. It is presently covered by brush, small trees and grass. The soil is weathered residual till soil or a silty clay with fine to coarse sand and rounded gravel pebbles. This is the most isolated and suitable site in the airport area.

Site 4. - Along Highway 131 (Green Bay Road) near the Wisconsin border Site 4 is east of the highway (about 310 acres) between Highway 173 (17th St. and 9th St.). The area consists of gently sloping to steeply sloping agricultural lands with well to moderately well drained deep soils and moderate to moderately slow permeability. Soil symbols are 27C, 57B, 298, 232, 298, 330, 443, 495, 979, 984 and 989; Miami Silt Loam, Montmorenci Silt Loam, Pella Silty Clay Loam, Beecher Silt Loam, Peotone Silty Clay Loam, Barrington Silt Loam, Corwin Silt Loam, Grays and Markham Silt Loams, Barrington and Varna Silt Loams and Mundelein Elliott Silt Loams. The soil appears to be derived from morainal silty clay till with sand and rounded pebbles or gravel. Elevations range from 700 to 730 ft. with bedrock around 500 feet or over 200 feet deep.

NCCPE-TS  
SUBJECT: Waukegan Harbor CDF Site Selection

Site 16W - Located on property belonging to OMC between Sea Horse Drive and the inner harbor in an open field used for parking in the area of Waukegan Harbor which is located on Lake Michigan about 8 miles south of the Wisconsin-Illinois Line and about 25 miles north of Chicago. The Harbor is an artificial or man made one with a project depth of -18 LWD. The Harbor contains two marinas, a marine engineering service, a cement company and the large manufacturing complex of Outboard Marine Corporation. The predevelopment terrain consisted of coastal dunes with a marsh or swampy area underlying a bluff which represents a lake terrace or former shore line of ancient Lake Michigan.

Soils - The surface soils are aeolian dune sands generally very fine to fine grained overlying transgressing beach sands, fine to coarse grained. The dune sands are very loose to medium dense while the beach sand is loose to dense. These sands interfinger and overlay the Waukegan member of the Lake Michigan formation which forms or underlies much of the lake bottom by Waukegan and much of the center and eastern side of southern Lake Michigan. Some till and bedrock outcrops occur in local high areas and this formation is absent. It consists of soft sandy silt, varved with silty clay with a high sand, gravel and water content. The member becomes sandier shoreward and pinches out to a brown silt facies less than a foot thick under Waukegan proper. The sand above the Waukegan is often termed the Ravinia sand member and is usually clean unless contaminated by man. Below the Waukegan is the Lake Forest member, 0-4' feet thick with varved dark gray silty clay (winter interspersed with organic black summer clay layers and from 6920 to 7050 years B.P. (before present) old  $\pm$  200 years as measured by radio<sup>active</sup> carbon content.

NCCPE-TS

SUBJECT: Waukegan Harbor CDF Site Selection

1-6 feet of brown gray clay with intervening black beds, seams or varves underlies the Lake Forest member. This clay is somewhat sandy and is termed the Winnetka member. In this area it rests on glacial till.

The glacial till is Woodfordian and is a sandy silty clay with gravel and high carbonate content. It has been formed by glacial action from underlying Silurian dolomites and Devonian shales.

Most previous soil borings have been done in the harbor or the harbor structures in this area. These were generally very shallow except for some off shore borings which indicated hard tills at -50 LWD elevations. The site 16W area found till at depths of -25 to -30 LWD, a much more favorable disposal site condition.

#### Site Elevation

General - All sites are located in Lake County in the NE corner of Illinois in the vicinity of Waukegan. Site 1 is located on the Highland Park Moraine, site 4 on the lake border ground moraine and site 16 on a littoral drift or beach sand area.

All sites are underlain by impermeable clay till bottoms. In site 1 impermeable clay till lies at depths of 3' to 9'. In site 4 around 10 feet deep but vertical permeability exists and a bottom liner will be necessary. In site 16, the till layer lies at depth of between 25' and 30' with overlying permeable sands. See cross sections. The ground conditions are best at site 1 but site 16 is the most conveniently located. Site 1 will require no liner and its dikes can be built of clay material excavated in the dike area. Site 4 will require compaction and/or lining of its bottom while site 16 will need a clay bottom liner and dikes which must be transported into the site and this will offset the higher transportation costs for waste disposal at sites 1 and 16.

NCCPE-TS

SUBJECT: Waukegan Harbor CDF Site Selection

The area around site 16W might be excavated as a new harbor slip while the old highly contaminated slip is encapsulated and used as a CDF area. In this regard the black organics(?) that occur in the sand must eventually be analyzed to see if the black material is harmless natural organics or injected industrial waste material in which case our waste disposal problem becomes far more complicated, serious and expensive if the waste was of a hazardous nature.

PERMEABILITY OF SITES

SITE	Recharge Tests			Test Depths				
	HOLES	W.T.@	Tests					
1W	1	-9.7	0					
	4&5	Dry	0	5 Min. Tests				
				18'-20'	13'-20'	8'-20'	3'-20'	K
	2	Dry below 12'	4	0	0	0	0	V. Low
			10 Min. Tests					
			20'-24'	15'-24'	10'-15'	5'-10'		
3			4	12.5 gpm	No take *Cave in	1/10 gpm	1/10 gpm	

Horizontal permeability probably present along thin sand seams. Water penetrates soil along rotted tree roots and other deep rooted vegetation.

4W	1	27.0'	1	0-40'	0 gpm	Use of drilling mud prevented testing
	2	14.6'	0	0-40	z	
	3	10.7'	1	0-34	0 gpm	
16W	1	2.2	0	Use of drilling mud		
	2	1.8	0	Prevented testing		
	3	2.4	0			
	4	3.3	1	0-10' depth - 0.5 gpm water - 30 gallons per hour		
	5	4.0	0	8'-10' - 1 gpm - 60 gallons per hour		

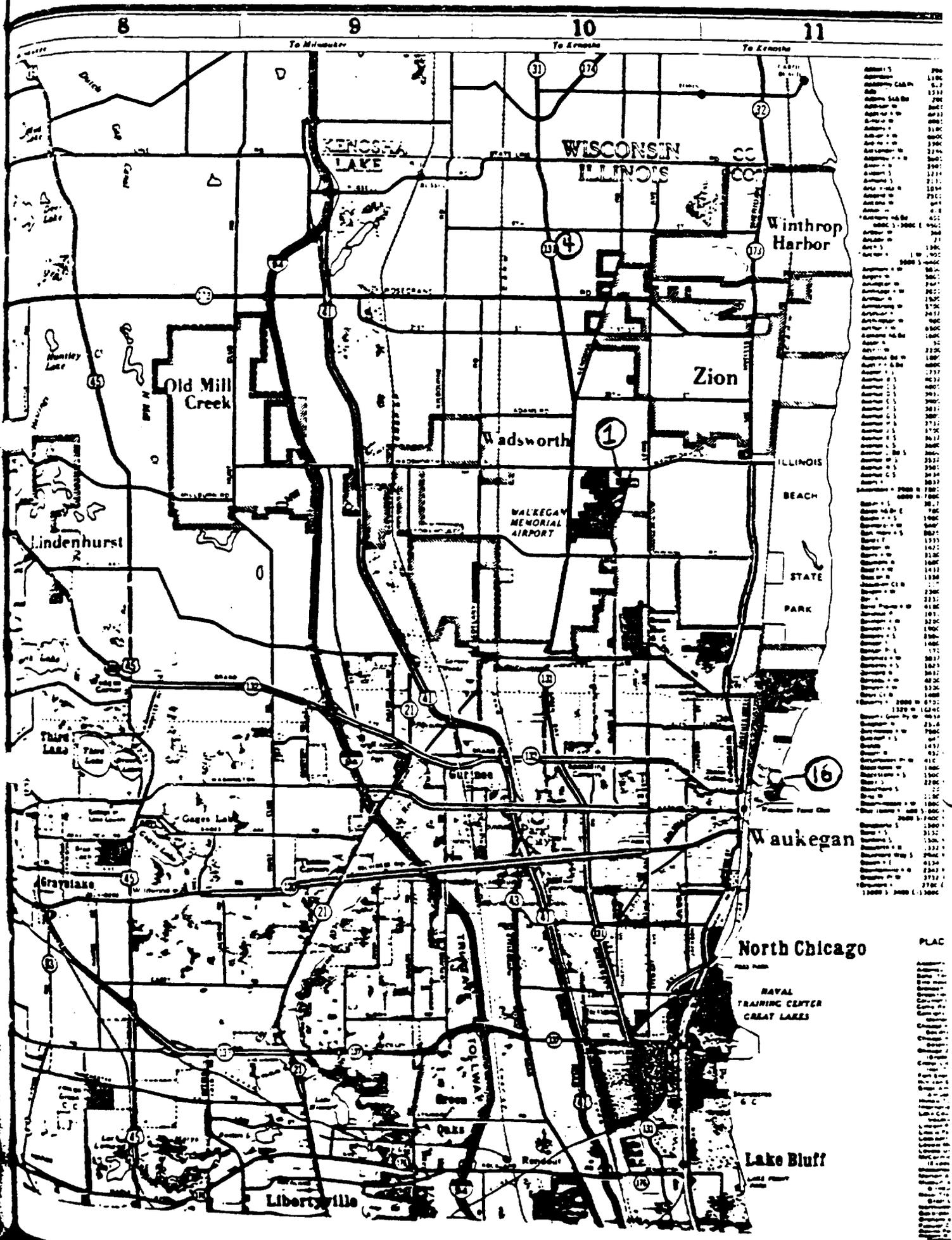
When drill water was used we had 100% drill water return indicating very low permeabilities. However areas of clean sand had very large water takes and required use of drilling mud.

NCCPE-TS  
SUBJECT: Waukegan Harbor CDF Site Selection

SITE RECOMMENDATION

Site 1 is the preferred site as it is underlain by the most impermeable material at the shallowest depth and would be the most economical CDF site to construct.

*James W. Knox*  
JAMES W. KNOX  
District Geologist  
Chicago District



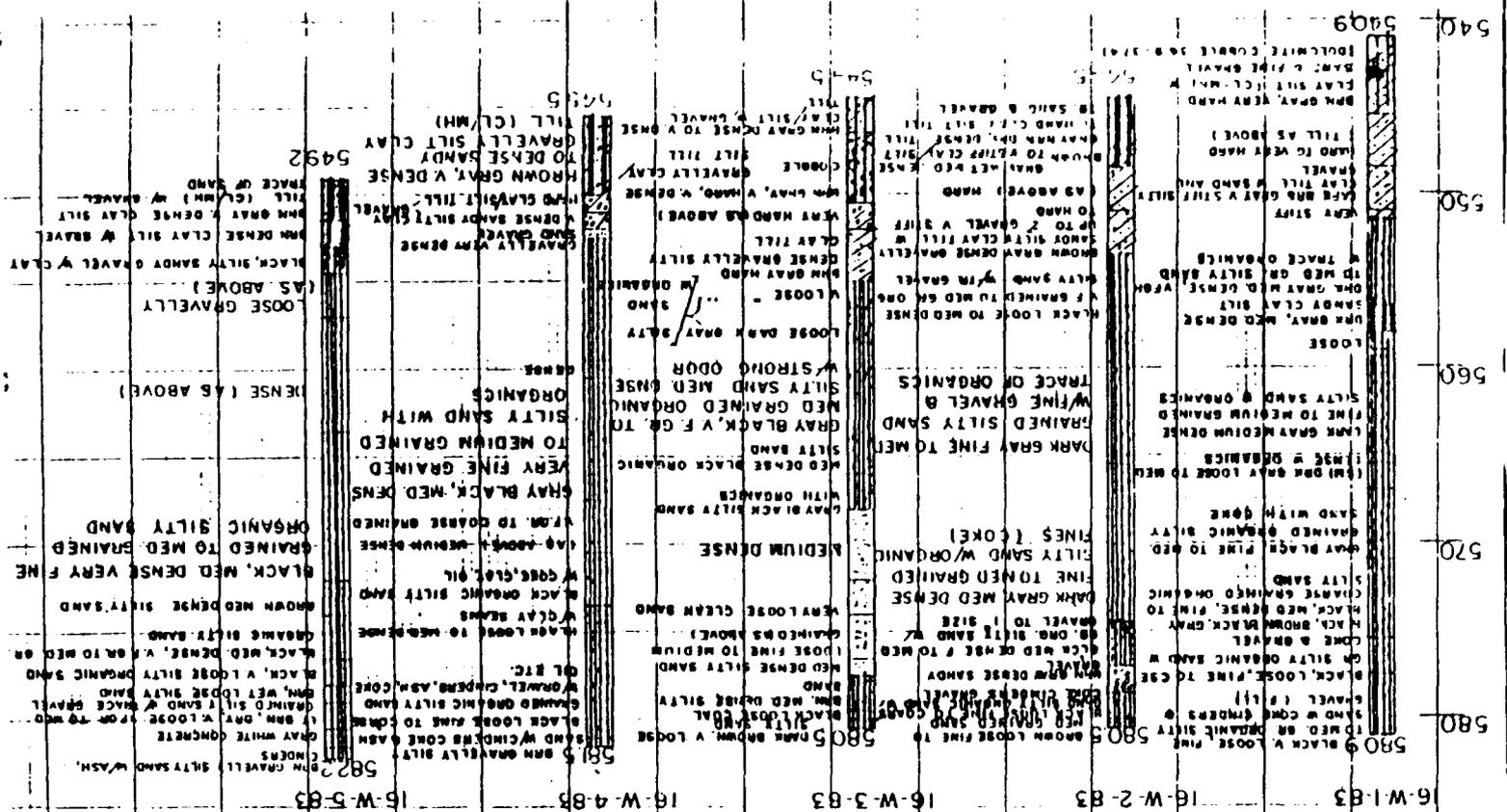
Address	PLAC
1000 W. Waukegan	1000
1001 W. Waukegan	1001
1002 W. Waukegan	1002
1003 W. Waukegan	1003
1004 W. Waukegan	1004
1005 W. Waukegan	1005
1006 W. Waukegan	1006
1007 W. Waukegan	1007
1008 W. Waukegan	1008
1009 W. Waukegan	1009
1010 W. Waukegan	1010
1011 W. Waukegan	1011
1012 W. Waukegan	1012
1013 W. Waukegan	1013
1014 W. Waukegan	1014
1015 W. Waukegan	1015
1016 W. Waukegan	1016
1017 W. Waukegan	1017
1018 W. Waukegan	1018
1019 W. Waukegan	1019
1020 W. Waukegan	1020
1021 W. Waukegan	1021
1022 W. Waukegan	1022
1023 W. Waukegan	1023
1024 W. Waukegan	1024
1025 W. Waukegan	1025
1026 W. Waukegan	1026
1027 W. Waukegan	1027
1028 W. Waukegan	1028
1029 W. Waukegan	1029
1030 W. Waukegan	1030
1031 W. Waukegan	1031
1032 W. Waukegan	1032
1033 W. Waukegan	1033
1034 W. Waukegan	1034
1035 W. Waukegan	1035
1036 W. Waukegan	1036
1037 W. Waukegan	1037
1038 W. Waukegan	1038
1039 W. Waukegan	1039
1040 W. Waukegan	1040
1041 W. Waukegan	1041
1042 W. Waukegan	1042
1043 W. Waukegan	1043
1044 W. Waukegan	1044
1045 W. Waukegan	1045
1046 W. Waukegan	1046
1047 W. Waukegan	1047
1048 W. Waukegan	1048
1049 W. Waukegan	1049
1050 W. Waukegan	1050
1051 W. Waukegan	1051
1052 W. Waukegan	1052
1053 W. Waukegan	1053
1054 W. Waukegan	1054
1055 W. Waukegan	1055
1056 W. Waukegan	1056
1057 W. Waukegan	1057
1058 W. Waukegan	1058
1059 W. Waukegan	1059
1060 W. Waukegan	1060
1061 W. Waukegan	1061
1062 W. Waukegan	1062
1063 W. Waukegan	1063
1064 W. Waukegan	1064
1065 W. Waukegan	1065
1066 W. Waukegan	1066
1067 W. Waukegan	1067
1068 W. Waukegan	1068
1069 W. Waukegan	1069
1070 W. Waukegan	1070
1071 W. Waukegan	1071
1072 W. Waukegan	1072
1073 W. Waukegan	1073
1074 W. Waukegan	1074
1075 W. Waukegan	1075
1076 W. Waukegan	1076
1077 W. Waukegan	1077
1078 W. Waukegan	1078
1079 W. Waukegan	1079
1080 W. Waukegan	1080
1081 W. Waukegan	1081
1082 W. Waukegan	1082
1083 W. Waukegan	1083
1084 W. Waukegan	1084
1085 W. Waukegan	1085
1086 W. Waukegan	1086
1087 W. Waukegan	1087
1088 W. Waukegan	1088
1089 W. Waukegan	1089
1090 W. Waukegan	1090
1091 W. Waukegan	1091
1092 W. Waukegan	1092
1093 W. Waukegan	1093
1094 W. Waukegan	1094
1095 W. Waukegan	1095
1096 W. Waukegan	1096
1097 W. Waukegan	1097
1098 W. Waukegan	1098
1099 W. Waukegan	1099
1100 W. Waukegan	1100

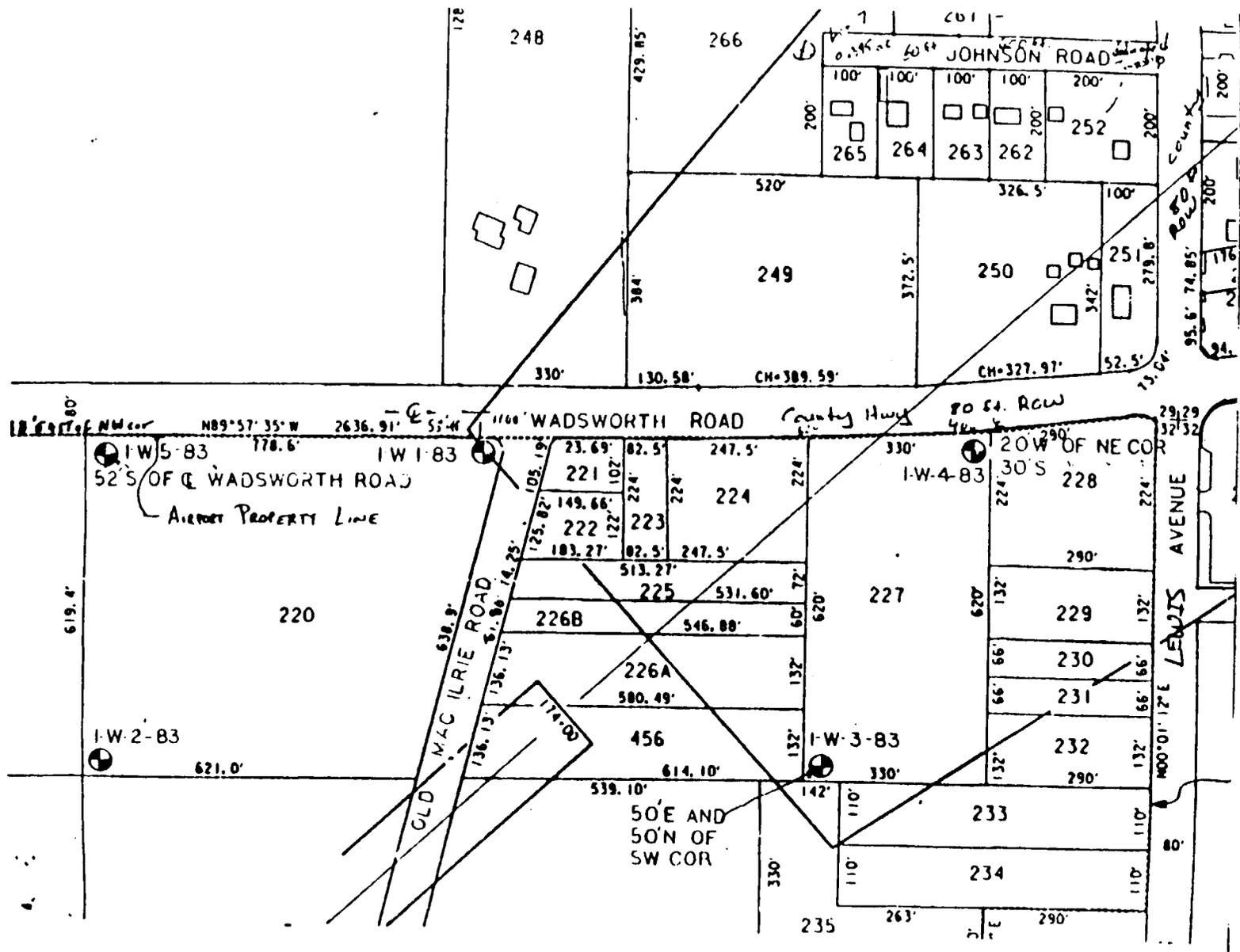
Address	PLAC
1101 W. Waukegan	1101
1102 W. Waukegan	1102
1103 W. Waukegan	1103
1104 W. Waukegan	1104
1105 W. Waukegan	1105
1106 W. Waukegan	1106
1107 W. Waukegan	1107
1108 W. Waukegan	1108
1109 W. Waukegan	1109
1110 W. Waukegan	1110
1111 W. Waukegan	1111
1112 W. Waukegan	1112
1113 W. Waukegan	1113
1114 W. Waukegan	1114
1115 W. Waukegan	1115
1116 W. Waukegan	1116
1117 W. Waukegan	1117
1118 W. Waukegan	1118
1119 W. Waukegan	1119
1120 W. Waukegan	1120
1121 W. Waukegan	1121
1122 W. Waukegan	1122
1123 W. Waukegan	1123
1124 W. Waukegan	1124
1125 W. Waukegan	1125
1126 W. Waukegan	1126
1127 W. Waukegan	1127
1128 W. Waukegan	1128
1129 W. Waukegan	1129
1130 W. Waukegan	1130
1131 W. Waukegan	1131
1132 W. Waukegan	1132
1133 W. Waukegan	1133
1134 W. Waukegan	1134
1135 W. Waukegan	1135
1136 W. Waukegan	1136
1137 W. Waukegan	1137
1138 W. Waukegan	1138
1139 W. Waukegan	1139
1140 W. Waukegan	1140
1141 W. Waukegan	1141
1142 W. Waukegan	1142
1143 W. Waukegan	1143
1144 W. Waukegan	1144
1145 W. Waukegan	1145
1146 W. Waukegan	1146
1147 W. Waukegan	1147
1148 W. Waukegan	1148
1149 W. Waukegan	1149
1150 W. Waukegan	1150





WAUKEGAN HARBOR CDF SITE SELECTION  
SITE 16





18' 6" 97' 11" NW COR N89°57'35"W 2636.91' E 55°44'

1100' WADSWORTH ROAD County Hwy

70 54' ROW

I-W-5-83 778.6'  
52'S OF Q WADSWORTH ROAD  
AIRPORT PROPERTY LINE

I-W-4-83  
20'W OF NE COR  
30'S

I-W-2-83  
621.0'

I-W-3-83

OLD M&C ILRIE ROAD  
630.9'  
136.13'  
136.13'  
51.86'  
14.25'

50E AND 50N OF SW COR

LEWIS AVENUE  
100' 0" 12' E

95.6' 74.85'  
200'  
200'  
200'  
200'

619.4'

220

248

266

249

250

252

265

264

263

262

221

222

223

224

225

226B

226A

456

227

228

229

230

231

232

233

234

235

429.85'

384'

520'

130.58'

CH=389.59'

326.5'

CH=327.97'

52.5'

100'

342'

279.8'

29.29'

32.32'

224'

290'

132'

66'

132'

110'

110'

80'

200'

100'

100'

100'

200'

200'

200'

200'

224'

620'

60'

72'

132'

330'

110'

110'

263'

290'

200'

200'

200'

200'

200'

200'

200'

200'

224'

620'

60'

72'

132'

330'

110'

110'

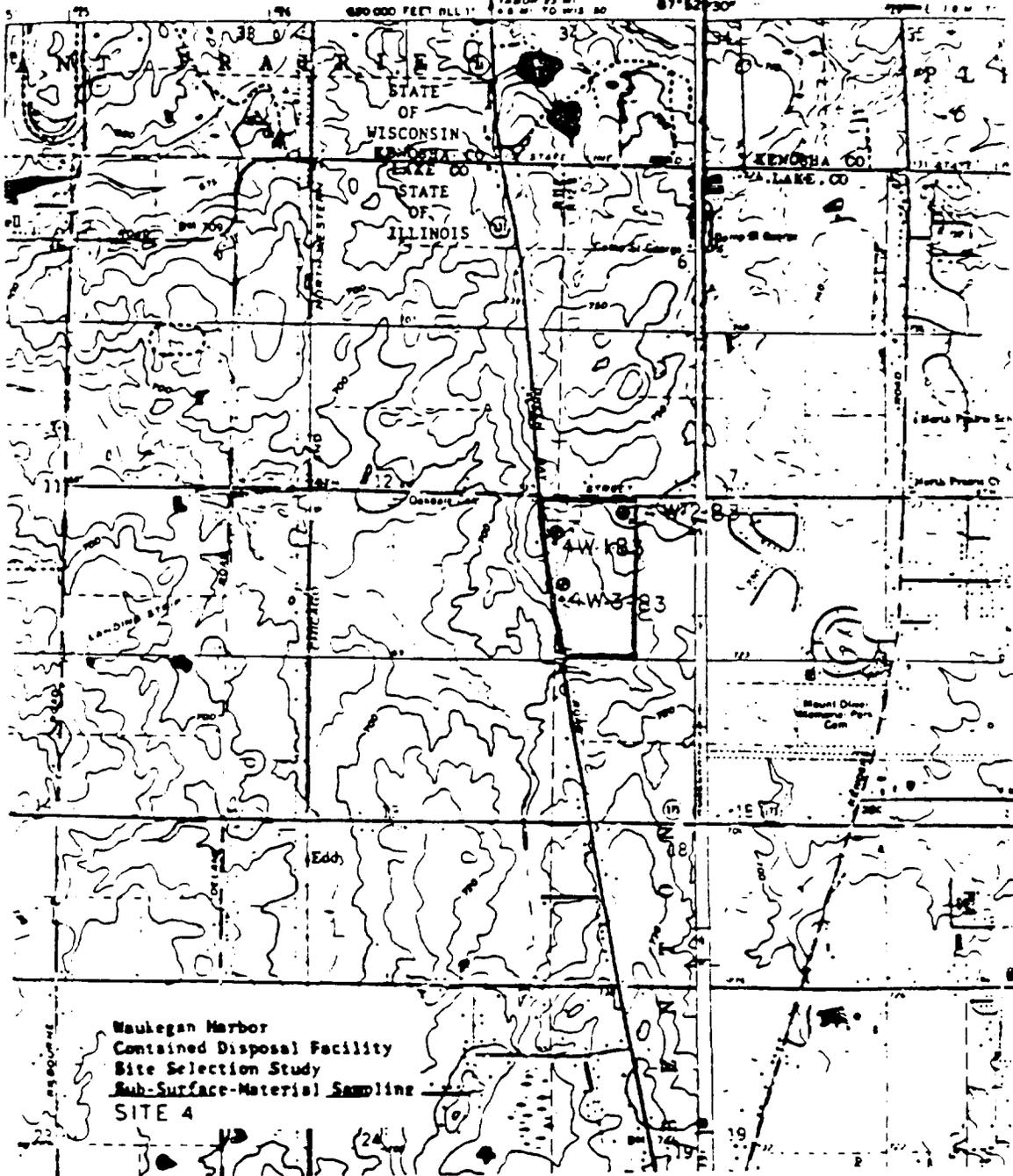
263'

290'

SITE NO. 4  
Winthrop Harbor Properties  
C/O Jack B. Winters  
100 North Green Bay Road  
Waukegan, Illinois 60085

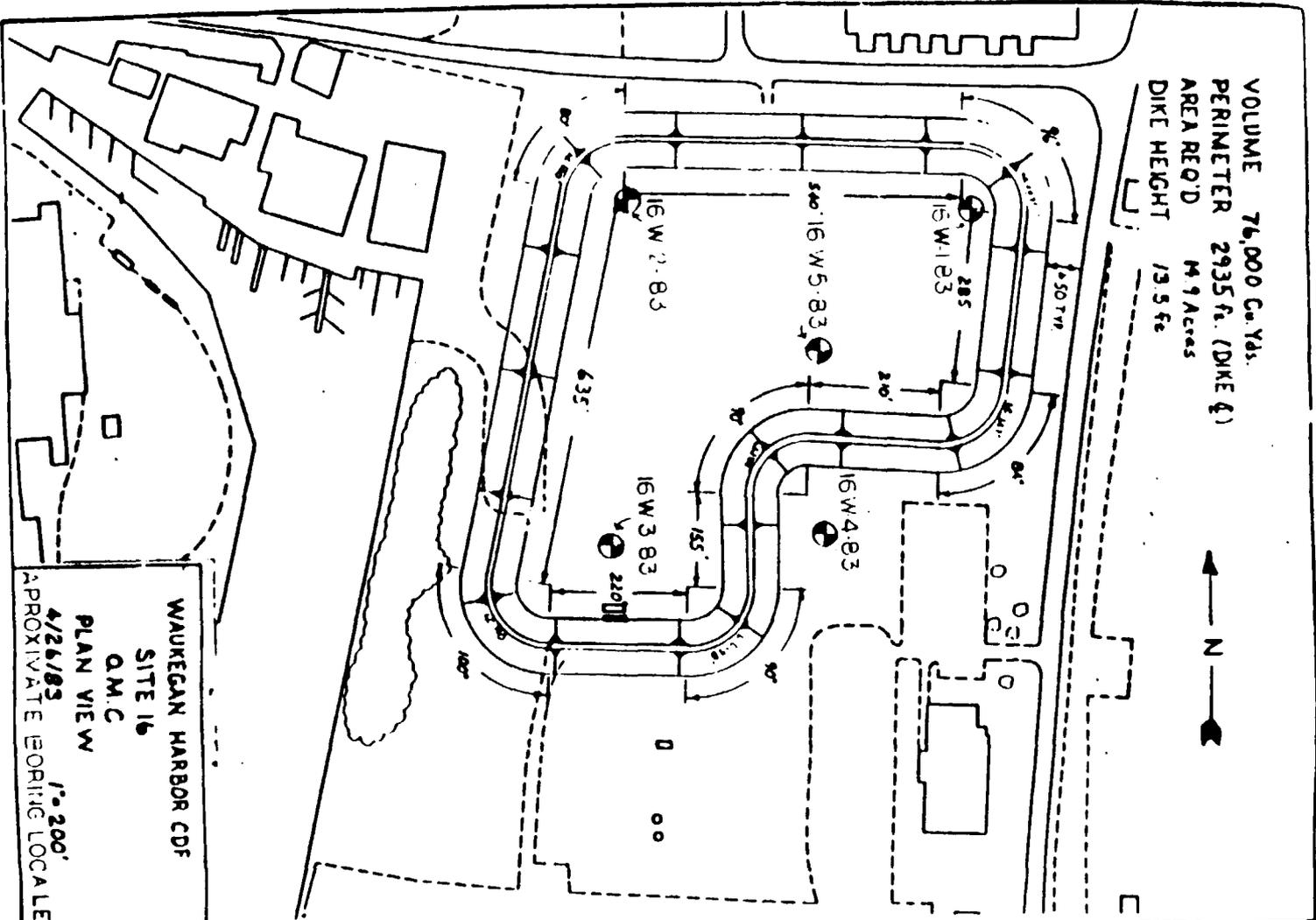
WADSWORTH QUADRANGLE  
ILLINOIS-WISCONSIN  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
NW 1/4 WAUKEGAN 15 QUADRANGLE

ZION QUADRANGLE  
ILLINOIS-WISCONSIN  
7.5 MINUTE SERIES (TOPOGRAPHIC)  
NE 1/4 WAUKEGAN 15 QUADRANGLE



Waukegan Harbor  
Contained Disposal Facility  
Site Selection Study  
Sub-Surface-Material Sampling  
SITE 4

VOLUME 76,000 Cu.Yds.  
PERIMETER 2935 Ft. (DIKE &)  
AREA REQ'D 49 Acres  
DIKE HEIGHT 13.5 ft



WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX D  
PRELIMINARY CDF DESIGNS AND  
COST ESTIMATES

## APPENDIX D

### Preliminary Design and Cost Estimates

1. The CDF design criteria used herein were derived from the USEPA document titled, "RCRA Guidance Document, Landfill Design, Liner System and Final Cover". The design information and cost estimates are preliminary in nature. Provisions for dewatering the dredged material and treating the effluent have not been incorporated into these designs and cost estimates.

2. Site layouts (plans showing the CDF dike alignments) at Sites 1 and 16 are shown on Plates 5 and 6. From the layouts it was determined that a maximum of 14.2 and 15.6 acres can be utilized for CDF construction at Sites 1 and 16, respectively. An important limitation at Site 1 is the finished height of a proposed CDF because it is within a future clear zone of an airport runway. A site layout at Site 4 was not prepared because large scale maps of Site 4 were not available. However, since more than adequate space is available at Site 4 (78 acres), CDF shape, size and height limitations are probably not important considerations.

3. All design data and cost estimates herein are based on a "square shaped" CDF of a particular design capacity. That is, given a design capacity; the area, height and cost were determined based on a square shaped CDF having an area equivalent to the area of the proposed CDF at the site, regardless of its shape. To verify the assumption, the total construction costs of square and non-square CDFs with the same design capacities and areas were computed for several test cases. Variations between the total construction costs of square and non-square CDF's were demonstrated to be on the average, about 3%.

4. The summary tables inclosed make reference to minimum and optimum CDF sizes. The minimum size for a particular design capacity is simply the smallest amount of space (area) that would be needed to construct a CDF of sufficient capacity (volume) to contain the design volume of dredged material. The optimum CDF size refers to the one CDF size (area), out of all possible combinations of area and height, that will contain the design volume and is the least expensive to construct. Also mentioned in the tables is a "CDF which utilizes all available space at a site". This means that the limited area for CDF construction at a site, as determined by the site layouts, was used to define the area of the CDF and the corresponding height and cost were computed based on this area. This was done in some cases because (as in Site 1) the final height of the CDF is a limitation and by utilizing all available area the height could be reduced.

WAUKEGAN HARBOR CDF - ESTIMATED COSTS IN MILLIONS OF DOLLARS (1)

	Design capacity C.Y.	Minimum CDF size required for design capacity			Optimum CDF size determined by minimizing CDF costs (2)			CDF size which utilizes all available space at site		
		CDF (2)	Dredge (3)	Total (4)	CDF (2)	Dredge (3)	Total (4)	CDF (2)	Dredge (3)	Total (4)
SITE 1 14.2 acres	60,000	2.206	.731	3.672	2.119	.731	3.562	3.724	.731	5.569
	163,000	4.488	1.864	7.940	4.151	1.864	7.519	4.237	1.864	7.626
	187,500	4.869	2.134	8.753	4.572	2.134	8.383	4.620	2.134	8.442
	221,000	5.552	2.502	10.068	(5)	(5)	(5)	(5)	(5)	(5)
SITE 4 78 acres	60,000	(6)	(6)	(6)	2.119	.793	3.640	(6)	(6)	(6)
	163,000	(6)	(6)	(6)	4.151	2.029	7.725	(6)	(6)	(6)
	187,500	(6)	(6)	(6)	4.573	2.323	8.620	(6)	(6)	(6)
	221,000	(6)	(6)	(6)	5.122	2.725	9.809	(6)	(6)	(6)
SITE 16 15.6 acres	60,000	2.206	.445	3.327	2.119	.445	3.217	3.724	.455	5.224
	163,000	4.400	1.125	7.015	4.151	1.125	6.594	4.428	1.125	6.940
	187,500	4.869	1.284	7.691	4.573	1.284	7.321	4.635	1.284	7.399
	221,000	5.553	1.502	8.818	5.122	1.502	8.279	(7)	(7)	(7)

D-2

- (1) Based on a square shaped CDF design. February 1984 prices.
- (2) Cost of CDF construction only.
- (3) Includes the cost of dredging and hauling dredged material to the site.
- (4) Sum of (2) and (3) plus 25% for contingencies. Does not include land cost, E&D or S&A.
- (5) This site does not have sufficient space available for the design capacity.
- (6) There are no apparent size or height limitations at this site. Use the optimum CDF size.
- (7) Site 16 will probably not accommodate a design volume of 221,000 C.Y. because of its irregular shape.

WAUKEGAN HARBOR CDF - DESIGN DATA (1)  
 MINIMUM AND OPTIMUM CDF SIZES

Design Capacity (C.Y.)	Minimum CDF size (in acres) required for design capacity		Optimum CDF size determined by minimizing CDF costs (2)	
	Area (acres)	Height (feet)	Area (acres)	Height (feet)
50,000	7.27	25.5	7.49	21.5
13,000	12.75	32.5	13.36	25.5
27,500	13.83	32.5	14.45	26.5
21,000	15.21	34.5	16.15	26.5

1) Based on a square shaped CDF design.

2) The cost of CDF construction was minimized. Dredgings and haulings costs were not included in the optimization.

WAUKEGAN HARBOR CDF - DESIGN DATA (1)

DESIGNS WHICH UTILIZE ALL AVAILABLE SPACE AT CDF SITES

	Design capacity (C.Y.)	Size (acres)	Height (feet)
Site 1	60,000	13.73	12.5
1.2 acres	163,000	14.24	22.5
	187,500	14.11	28.5
	221,000	(2)	(2)

NOTE 4. 78 acres. THERE ARE NO APPARENT SIZE OR HEIGHT LIMITATIONS.  
 OPTIMUM SIZE.

	Design capacity (C.Y.)	Size (acres)	Height (feet)
Site 16	60,000	13.73	12.75
3.6 acres	163,000	15.23	23.5
	187,500	15.32	20.5
	221,000	(3)	(3)

Based on a square shaped CDF design.

A minimum of 15.21 acres is required for a design volume of 21,000.

Site 16 will probably not accommodate a design volume of 221,000 because of its irregular shape.

ESTIMATED COST - FEBRUARY 1984 DOLLARS

AMERICAN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

REMARK: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 60000

THICKNESS OF FILL (FEET) = 13

HEIGHT OF CDF (FEET) = 21.5

AREA OF CDF (ACRES) = 7.49

HAULING DISTANCE (MILES) = 7

ACTIVITY DESCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>				
GRIPPING	12502	C.Y.	4	50011
EMBANKMENT FILL	96469	C.Y.	10	964699
LAY LINER - BOTTOM&SLOPE	12667	C.Y.	11	139346
LAY - CAP	11734	C.Y.	11	129077
SOIL LAYER - BOTTOM	5322	C.Y.	18	95797
SOIL - CAP	6135	C.Y.	18	110439
SOIL LAYER - SLOPE	2566	C.Y.	5	12831
SOIL LAYER - CAP	12819	C.Y.	10	128197
PERV. MEMBRANE - BOTTOM&SLOPE	18656	S.Y.	9	167908
PERVIOUS MEMBRANE - CAP	18136	S.Y.	9	163225
FILTER CLOTH - BOTTOM	10747	S.Y.	5	53738
FILTER CLOTH - CAP	18678	S.Y.	5	93394
MONITORING WELLS	4	EA.	2500	10000
TOTAL				2118666
<b>INFILTRATION</b>				
STABILIZATION & DEMOBILIZATION	1	JOB	71000	71000
TRUCKS (INCLUDING HAULING)	60000	C.Y.	11	660000
TOTAL				731000
TOTAL				2849666
CONTINGENCIES (25%)				712416
CONSTRUCTION COSTS				3562082

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WISCONSIN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

REMARK: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 60000  
 THICKNESS OF FILL (FEET) = 4  
 HEIGHT OF CDF (FEET) = 12.5  
 AREA OF CDF (ACRES) = 13.73  
 HAULING DISTANCE (MILES) = 7

QUANTITY DISCRPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>				
STRIPPING	22730	C.Y.	4	90921
DUNE EMBANKMENT FILL	54926	C.Y.	10	549266
CLAY LINER - BOTTOM&SLOPE	33136	C.Y.	11	364497
CLAY - CAP	31721	C.Y.	11	348937
SAND LINER - BOTTOM	21348	C.Y.	18	384278
SP - CAP	16300	C.Y.	19	293401
TOP SOIL LAYER - SLOPE	2158	C.Y.	5	10793
TOP SOIL LAYER - CAP	33490	C.Y.	10	334906
IMPERV. MEMBRANE - BOTTOM&SLOPE	48846	S.Y.	9	439619
IMPERVIOUS MEMBRANE - CAP	48458	S.Y.	9	436130
FILTER CLOTH - BOTTOM	42904	S.Y.	5	214522
FILTER CLOTH - CAP	49343	S.Y.	5	246717
MONITORING WELLS	4	EA.	2500	10000
SUBTOTAL				3723992
<b>DREDGING</b>				
MOBILIZATION & DEMOBILIZATION	1	JOB	71000	71000
DREDGING (INCLUDING HAULING)	60000	C.Y.	11	660000
SUBTOTAL				731000
TOTAL				4454992
CONTINGENCIES (25%)				1113748
TOTAL CONSTRUCTION COSTS				5568700

ESTIMATED COST - FEBRUARY 1984 DOLLARS

LAKEGAN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 163000

THICKNESS OF FILL (FEET) = 17

HEIGHT OF CDF (FEET) = 25.5

AREA OF CDF (ACRES) = 13.36

HAULING DISTANCE (MILES) = 7

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STIFFING	22119	C.Y.	4	88479
	EMBANKMENT FILL	185365	C.Y.	10	1853653
	CLAY LINER - BOTTOM&SLOPE	25163	C.Y.	11	276798
	CLAY - CAP	23714	C.Y.	11	260855
	LAND LINER - BOTTOM	11416	C.Y.	18	205489
	LAND - CAP	12237	C.Y.	18	220270
	ROCK LAYER - SLOPE	4128	C.Y.	5	20640
	ROCK LAYER - CAP	25246	C.Y.	10	252469
	GEOTEX. MEMBRANE - BOTTOM&SLOPE	37203	S.Y.	9	334827
	GEOTEX. MEMBRANE - CAP	36329	S.Y.	9	326966
	GEOTEX. CLOTH - BOTTOM	20993	S.Y.	5	114917
	GEOTEX. CLOTH - CAP	37095	S.Y.	5	185479
	PIED POND WELLS	4	EA.	2500	10000
					4150348
GENERAL					
	MOBILIZATION & DEMOBILIZATION	1	JOB	71000	71000
	HAULING (INCLUDING HAULING)	163000	C.Y.	11	1793000
					1863999
					6014846
	CONTINGENCIES (25%)				1503711
	TOTAL CONSTRUCTION COSTS				7518600

ESTIMATED COST - FEBRUARY 1984 DOLLARS

AUNEGAN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

COMMENT: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 163000  
 THICKNESS OF FILL (FEET) = 14  
 HEIGHT OF CDF (FEET) = 22.5  
 AREA OF CDF (ACRES) = 14.24  
 HAULING DISTANCE (MILES) = 7

QUANTITY DESCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>				
CRIPPING	23566	C.Y.	4	94265
INE EMBANKMENT FILL	155857	C.Y.	10	1558572
DAY LINER - BOTTOM&SLOPE	28960	C.Y.	11	318568
AY - CAP	27443	C.Y.	11	301882
AND LINDER - BOTTOM	14687	C.Y.	18	264381
AND - CAP	14130	C.Y.	18	254352
SOIL LAYER - SLOPE	3819	C.Y.	5	19098
SOIL LAYER - CAP	29091	C.Y.	10	290910
SERV. MEMBRANE - BOTTOM&SLOPE	42791	S.Y.	9	385124
SERVICER MEMBRANE - CAP	41981	S.Y.	9	377832
ILTER CLATH - BOTTOM	29547	S.Y.	5	147737
ILTER CLATH - CAP	42804	S.Y.	5	214024
INITIAL WELLS	4	EA.	2500	10000
TOTAL				4238750
<b>DESIGN</b>				
DESIGN & DEMONSTRATION	1	JOB	71000	71000
EGGING (INCLUDING HAULING)	163000	C.Y.	11	1793000
TOTAL				1864000
				6100750
CONTINGENCIES (25%)				1525187
TOTAL CONSTRUCTION COSTS				7625900

ESTIMATED COST - FEBRUARY 1984 DOLLARS

JAKEGAN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 187500

THICKNESS OF FILL (FEET) = 18

HEIGHT OF CDF (FEET) = 26.5

AREA OF CDF (ACRES) = 14.45

HAULING DISTANCE (MILES) = 7

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	23901	C.Y.	4	95606
	DIKE EMBANKMENT FILL	207786	C.Y.	10	2077865
	CLAY LINER - BOTTOM&SLOPE	27351	C.Y.	11	300866
	CLAY - CAP	25814	C.Y.	11	283959
	SAND LINER - BOTTOM	12368	C.Y.	18	222628
	SAND - CAP	13303	C.Y.	18	239468
	TOPSOIL LAYER - SLOPE	4462	C.Y.	5	22313
	TOPSOIL LAYER - CAP	27412	C.Y.	10	274126
	IMPERV. MEMBRANE - BOTTOM&SLOPE	40461	S.Y.	9	364156
	IMPERVIOUS MEMBRANE - CAP	39512	S.Y.	9	355615
	FILTER CLOTH - BOTTOM	24893	S.Y.	5	124469
	FILTER CLOTH - CAP	40311	S.Y.	5	201559
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				4572635
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	71000	71000
	DREDGING (INCLUDING HAULING)	187500	C.Y.	11	2062500
	SUBTOTAL				2133500
	TOTAL				6706135
	CONTINGENCIES (25%)				1676533
	TOTAL CONSTRUCTION COSTS				8382700

ESTIMATED COST - FEBRUARY 1984 DOLLARS

SAUKEGAN HARBOR CDF - SITE# 1

SQUARE CDF DESIGN

COMMENT: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 187500  
 THICKNESS OF FILL (FEET) = 20  
 HEIGHT OF CDF (FEET) = 28.5  
 AREA OF CDF (ACRES) = 14.11  
 HAULING DISTANCE (MILES) = 7

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	23356	C.Y.	4	93426
	DUNE EMBANKMENT FILL	231269	C.Y.	10	2312695
	CLAY LINER - BOTTOM&SLOPE	25498	C.Y.	11	280484
	SAND - CAP	23992	C.Y.	11	263916
	SAND LINER - BOTTOM	10682	C.Y.	18	192387
	SAND - CAP	12378	C.Y.	18	222816
	TOPSOIL LAYER - SLOPE	4698	C.Y.	5	23494
	TOPSOIL LAYER - CAP	25534	C.Y.	10	255340
	IMPERV. MEMBRANE - BOTTOM&SLOPE	37743	S.Y.	9	339689
	IMPERVIOUS MEMBRANE - CAP	36751	S.Y.	9	330762
	FILTER CLOTH - BOTTOM	21522	S.Y.	5	107614
	FILTER CLOTH - CAP	37522	S.Y.	5	187614
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				4620236
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	71000	71000
	DREDGING (INCLUDING HAULING)	187500	C.Y.	11	2062500
	SUBTOTAL				2133500
	TOTAL				6753736
	CONTINGENCIES (25%)				1688434
	TOTAL CONSTRUCTION COSTS				8442170

ESTIMATED COST - FEBRUARY 1984 DOLLARS

LAUREGAN HARBOR CDF - SITE# 4

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 60000

THICKNESS OF FILL (FEET) = 13

HEIGHT OF CDF (FEET) = 21.5

AREA OF CDF (ACRES) = 7.49

HAULING DISTANCE (MILES) = 9

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	12502	C.Y.	4	50011
	DIKE EMBANKMENT FILL	96469	C.Y.	10	964699
	CLAY LINER - BOTTOM&SLOPE	12667	C.Y.	11	139346
	CLAY - CAP	11734	C.Y.	11	129077
	SAND LINER - BOTTOM	5322	C.Y.	18	95797
	SAND - CAP	6135	C.Y.	18	110439
	TOPSOIL LAYER - SLOPE	2566	C.Y.	5	12831
	TOPSOIL LAYER - CAP	12819	C.Y.	10	128197
	IMPERV. MEMBRANE - BOTTOM&SLOPE	18656	S.Y.	9	167908
	IMPERVIOUS MEMBRANE - CAP	18136	S.Y.	9	163225
	FILTER CLOTH - BOTTOM	10747	S.Y.	5	53738
	FILTER CLOTH - CAP	18678	S.Y.	5	93394
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				2118666
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	73000	73000
	DREDGING (INCLUDING HAULING)	60000	C.Y.	12	720000
	SUBTOTAL				793000
TOTAL					2911666
CONTINGENCIES (25%)					727916
TOTAL CONSTRUCTION COSTS					3639600

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WAUKEGAN HARBOR CDF - SITE# 4

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 163000

THICKNESS OF FILL (FEET) = 17

HEIGHT OF CDF (FEET) = 25.5

AREA OF CDF (ACRES) = 13.36

HAULING DISTANCE (MILES) = 9

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	22119	C.Y.	4	88479
	DINE EMBANKMENT FILL	185365	C.Y.	10	1853653
	CLAY LINER - BOTTOM&SLOPE	25163	C.Y.	11	276798
	CLAY - CAP	23714	C.Y.	11	260855
	SAND LINER - BOTTOM	11416	C.Y.	18	205489
	SAND - CAP	12237	C.Y.	18	220270
	TOPSOIL LAYER - SLOPE	4128	C.Y.	5	20640
	TOPSOIL LAYER - CAP	25246	C.Y.	10	252469
	IMPERV. MEMBRANE - BOTTOM&SLOPE	37203	S.Y.	9	334927
	IMPERVIOUS MEMBRANE - CAP	36329	S.Y.	9	326966
	FILTER CLOTH - BOTTOM	22983	S.Y.	5	114917
	FILTER CLOTH - CAP	37095	S.Y.	5	185479
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				4150946
PREPARING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	73000	73000
	HAULING (INCLUDING HAULING)	163000	C.Y.	12	1956000
	SUBTOTAL				2028999
					6179946
	CONTINGENCY (25%)				1544981
	TOTAL CONSTRUCTION COSTS				7724927

ESTIMATED COST - FEBRUARY 1984 DOLLARS

AUGUEGAN HARBOR CDF - SITE# 4

SQUARE CDF DESIGN

REMARK: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.  
 DESIGN CAPACITY (CUBIC YDS) = 187500  
 THICKNESS OF FILL (FEET) = 18  
 HEIGHT OF CDF (FEET) = 26.5  
 AREA OF CDF (ACRES) = 14.45  
 HAULING DISTANCE (MILES) = 9

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>					
	STRIPPING	23901	C.Y.	4	95606
	DUNE EMBANKMENT FILL	207786	C.Y.	10	2077865
	CLAY LINER - BOTTOM&SLOPE	27351	C.Y.	11	300866
	CLAY - CAP	25814	C.Y.	11	283959
	SAND LINER - BOTTOM	12368	C.Y.	18	222628
	SAND - CAP	13303	C.Y.	18	239468
	TOPSOIL LAYER - SLOPE	4462	C.Y.	5	22313
	TOPSOIL LAYER - CAP	27412	C.Y.	10	274126
	IMPERV. MEMBRANE - BOTTOM&SLOPE	40461	S.Y.	9	364156
	IMPERVIOUS MEMBRANE - CAP	39512	S.Y.	9	355615
	FILTER CLOTH - BOTTOM	24893	S.Y.	5	124469
	FILTER CLOTH - CAP	40311	S.Y.	5	201559
	MONITORING WELLS	4	EA.	2500	10000
	<b>SUBTOTAL</b>				<b>4572635</b>
<b>DREDGING</b>					
	MOBILIZATION & DEMOBILIZATION	1	JOB	73000	73000
	DREDGING (INCLUDING HAULING)	187500	C.Y.	12	2250000
	<b>SUBTOTAL</b>				<b>2323000</b>
	<b>TOTAL</b>				<b>6895635</b>
	<b>CONTINGENCIES (25%)</b>				<b>1723908</b>
	<b>TOTAL CONSTRUCTION COSTS</b>				<b>8619500</b>

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WILHEGAN HARBOR CDF - SITE# 4

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.  
 DESIGN CAPACITY (CUBIC YDS) = 221000  
 THICKNESS OF FILL (FEET) = 18  
 HEIGHT OF CDF (FEET) = 26.5  
 AREA OF CDF (ACRES) = 16.15  
 HAULING DISTANCE (MILES) = 9

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	26681	C.Y.	4	106726
	DIKE EMBANKMENT FILL	222748	C.Y.	10	2227484
	CLAY LINER - BOTTOM&SLOPE	31610	C.Y.	11	347714
	CLAY - CAP	29940	C.Y.	11	329346
	SAND LINER - BOTTOM	14964	C.Y.	18	267563
	SAND - CAP	15397	C.Y.	18	277148
	TOPSOIL LAYER - SLOPE	4746	C.Y.	5	23734
	TOPSOIL LAYER - CAP	31659	C.Y.	10	316599
	IMPERV. MEMBRANE - BOTTOM&SLOPE	46781	S.Y.	9	421029
	IMPERVIOUS MEMBRANE - CAP	45762	S.Y.	9	411863
	FILTER CLOTH - BOTTOM	29901	S.Y.	5	149509
	FILTER CLOTH - CAP	46622	S.Y.	5	233111
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				5121830
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	73000	73000
	DREDGING (INCLUDING HAULING)	221000	C.Y.	12	2652000
	SUBTOTAL				2725000
	TOTAL				7846830
	CONTINGENCIES (25%)				1961707
	TOTAL CONSTRUCTION COSTS				9808500

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WAUKEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.

DESIGN CAPACITY (CUBIC YDS) = 60000

THICKNESS OF FILL (FEET) = 13

HEIGHT OF CDF (FEET) = 21.5

AREA OF CDF (ACRES) = 7.49

HAULING DISTANCE (MILES) = .1

QUANTITY	DESCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	12502	C.Y.	4	50011
	DIKE EMBANKMENT FILL	96469	C.Y.	10	964699
	CLAY LINER - BOTTOM&SLOPE	12667	C.Y.	11	139346
	CLAY - CAF	11734	C.Y.	11	129077
	SD LINER - BOTTOM	5322	C.Y.	18	95797
	GRAD - CAF	6135	C.Y.	18	110439
	TOPSOIL LAYER - SLOPE	2566	C.Y.	5	12831
	TOPSOIL LAYER - CAF	12819	C.Y.	10	128197
	IMPERV. MEMBRANE - BOTTOM&SLOPE	18656	S.Y.	9	167908
	IMPERVIOUS MEMBRANE - CAF	18136	S.Y.	9	163225
	FILTER CLOTH - BOTTOM	10747	S.Y.	5	53738
	FILTER CLOTH - CAF	18678	S.Y.	5	93394
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				2118666
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
	DREDGING (INCLUDING HAULING)	60000	C.Y.	6.5	390000
	SUBTOTAL				455000
					2573666
	CONTINGENCIES (25%)				643416
	TOTAL CONSTRUCTION COSTS				3217100

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WAUKEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 60000  
 THICKNESS OF FILL (FEET) = 4  
 HEIGHT OF CDF (FEET) = 12.5  
 AREA OF CDF (ACRES) = 13.73  
 HAULING DISTANCE (MILES) = .1

QUANTITY	DISCRPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	22730	C.Y.	4	90921
	DINE EMBANKMENT FILL	54926	C.Y.	10	549266
	CLAY LINER - BOTTOM&SLOPE	33136	C.Y.	11	364497
	CLAY - CAP	31721	C.Y.	11	348937
	SD LINER - BOTTOM	21348	C.Y.	18	384278
	SAND - CAP	16300	C.Y.	18	293401
	TOPSOIL LAYER - SLOPE	2158	C.Y.	5	10793
	TOPSOIL LAYER - CAP	33490	C.Y.	10	334906
	IMPERV. MEMBRANE - BOTTOM&SLOPE	48846	S.Y.	9	439619
	IMPERVIOUS MEMBRANE - CAP	48458	S.Y.	9	436130
	FILTER CLOTH - BOTTOM	42904	S.Y.	5	214522
	FILTER CLOTH - CAP	49343	S.Y.	5	246717
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				3723992
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
	DREDGING (INCLUDING HAULING)	60000	C.Y.	6.5	390000
	SUBTOTAL				455000
	TOTAL				4178992
	CONTINGENCIES (25%)				1044748
	TOTAL CONSTRUCTION COSTS				5223700

ESTIMATED COST - FEBRUARY 1984 DOLLARS

WAUKEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.  
 DESIGN CAPACITY (CUBIC YDS) = 163000  
 THICKNESS OF FILL (FEET) = 17  
 HEIGHT OF CDF (FEET) = 25.5  
 AREA OF CDF (ACRES) = 13.36  
 HAULING DISTANCE (MILES) = .1

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	22119	C.Y.	4	88479
	DIKE EMBANKMENT FILL	185365	C.Y.	10	1853653
	CLAY LINER - BOTTOM&SLOPE	25163	C.Y.	11	276798
	CLAY - CAP	23714	C.Y.	11	260855
	SAND LINER - BOTTOM	11416	C.Y.	18	205489
	SAND - CAP	12237	C.Y.	18	220270
	TOPSOIL LAYER - SLOPE	4128	C.Y.	5	20640
	TOPSOIL LAYER - CAP	25246	C.Y.	10	252469
	IMPERV. MEMBRANE - BOTTOM&SLOPE	37207	S.Y.	9	334827
	IMPERVIOUS MEMBRANE - CAP	38329	S.Y.	9	326966
	FILTER CLOTH - BOTTOM	22983	S.Y.	5	114917
	FILTER CLOTH - CAP	37095	S.Y.	5	185479
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				4150846
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
	DREDGING (INCLUDING HAULING)	163000	C.Y.	6.5	1059500
	SUBTOTAL				1124499
					5275346
	CONTINGENCIES (10%)				1318836
	TOTAL CONSTRUCTION COSTS				6594200

ESTIMATED COST - FEBRUARY 1984 DOLLARS

ROCKEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 163000  
 THICKNESS OF FILL (FEET) = 12  
 HEIGHT OF CDF (FEET) = 20.5  
 AREA OF CDF (ACRES) = 15.23  
 HAULING DISTANCE (MILES) = .1

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STIFFING	25184	C.Y.	4	100736
	PIPE EMBANKMENT FILL	138146	C.Y.	10	1381465
	CLAY LINER - BOTTOM&SLOPE	32646	C.Y.	11	359113
	CLAY - CAP	31066	C.Y.	11	341726
	LAND LINER - BOTTOM	17741	C.Y.	18	319342
	LAND - CAP	15967	C.Y.	18	287419
	TOPSOIL LAYER - SLOPE	3637	C.Y.	5	18186
	TOPSOIL LAYER - CAP	32816	C.Y.	10	328169
	IMPERM. MEMBRANE - BOTTOM&SLOPE	48233	S.Y.	9	434102
	IMPERMEABLE MEMBRANE - CAP	47466	S.Y.	9	427198
	GRAVEL FLOTH - BOTTOM	35671	S.Y.	5	178355
	GRAVEL FLOTH - CAP	49341	S.Y.	5	241709
	WATER SAMPLING WELLS	4	EG.	2500	10000
					4407528
HAULING					
	DECONTAMINATION & DEMOBILIZATION	1	JOB	65000	65000
	HAULING (INCLUDING HAULING)	163000	C.Y.	6.5	1059500
					1124500
					5552028
					1338007
					6940000

ESTIMATED COST - FEBRUARY 1984 DOLLARS

AUREGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.  
 DESIGN CAPACITY (CUBIC YDS) = 187500  
 THICKNESS OF FILL (FEET) = 18  
 HEIGHT OF CDF (FEET) = 26.5  
 AREA OF CDF (ACRES) = 14.45  
 HAULING DISTANCE (MILES) = .1

QUANTITY DESCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>				
STRIPPING	23901	C.Y.	4	95606
DUNE EMBANKMENT FILL	207786	C.Y.	10	2077865
CLAY LINER - BOTTOM&SLOPE	27351	C.Y.	11	300866
SAND - CAP	25814	C.Y.	11	283959
CLAY LINER - BOTTOM	12368	C.Y.	18	222628
SAND - CAP	13303	C.Y.	18	239468
TOPSOIL LAYER - SLOPE	4462	C.Y.	5	22313
TOPSOIL LAYER - CAP	27412	C.Y.	10	274126
IMPERV. MEMBRANE - BOTTOM&SLOPE	40461	S.Y.	9	364156
IMPERVIOUS MEMBRANE - CAP	39512	S.Y.	9	355615
FILTER CLOTH - BOTTOM	24893	S.Y.	5	124469
FILTER CLOTH - CAP	40311	S.Y.	5	201559
MONITORING WELLS	4	EA.	2500	10000
SUBTOTAL				4572635
<b>DREDGING</b>				
MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
DREDGING (INCLUDING HAULING)	187500	C.Y.	6.5	1218750
SUBTOTAL				1283750
TOTAL				5856385
CONTINGENCIES (25%)				1464096
TOTAL CONSTRUCTION COSTS				7320500

ESTIMATED COST - FEBRUARY 1984 DOLLARS

AUNEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS A DESIGN UTILIZING ALL AVAILABLE SPACE AT THE CDF SITE.  
 DESIGN CAPACITY (CUBIC YDS) = 187500  
 THICKNESS OF FILL (FEET) = 15  
 HEIGHT OF CDF (FEET) = 23.5  
 AREA OF CDF (ACRES) = 15.32  
 HAULING DISTANCE (MILES) = .1

QUANTITY	DISCRIPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
DISPOSAL FACILITY					
	STRIPPING	25327	C.Y.	4	101311
	DUNE EMBANKMENT FILL	175559	C.Y.	10	1755595
	CLAY LINER - BOTTOM&SLOPE	31182	C.Y.	11	343012
	CLAY - CAP	29582	C.Y.	11	325407
	SAND LINER - BOTTOM	15691	C.Y.	18	282442
	SAND - CAP	15215	C.Y.	18	273880
	TOPSOIL LAYER - SLOPE	4135	C.Y.	5	20679
	TOPSOIL LAYER - CAP	31291	C.Y.	10	312917
	IMPERV. MEMBRANE - BOTTOM&SLOPE	46103	S.Y.	9	414932
	IMPERVIOUS MEMBRANE - CAP	45220	S.Y.	9	406983
	FILTER CLOTH - BOTTOM	31559	S.Y.	5	157799
	FILTER CLOTH - CAP	46075	S.Y.	5	230375
	MONITORING WELLS	4	EA.	2500	10000
	SUBTOTAL				4635337
DREDGING					
	MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
	DREDGING (INCLUDING HAULING)	187500	C.Y.	6.5	1218750
	SUBTOTAL				1283750
	TOTAL				5919087
	CONTINGENCIES (25%)				1479771
	TOTAL CONSTRUCTION COSTS				7398900

ESTIMATED COST - FEBRUARY 1984 DOLLARS

LAKEGAN HARBOR CDF - SITE# 16

SQUARE CDF DESIGN

COMMENT: THIS IS THE OPTIMUM CDF SIZE FOR THIS DESIGN CAPACITY.  
 DESIGN CAPACITY (CUBIC YDS) = 221000  
 THICKNESS OF FILL (FEET) = 18  
 HEIGHT OF CDF (FEET) = 26.5  
 AREA OF CDF (ACRES) = 16.15  
 HAULING DISTANCE (MILES) = .1

QUANTITY DISCRPTION	AMOUNT	UNIT	UNIT PRICE \$	COST \$
<b>DISPOSAL FACILITY</b>				
STRIPPING	26681	C.Y.	4	106726
DIKE EMBANKMENT FILL	222748	C.Y.	10	2227484
CLAY LINER - BOTTOM&SLOPE	31610	C.Y.	11	347714
CLAY - CAP	29940	C.Y.	11	329346
SAND LINER - BOTTOM	14864	C.Y.	18	267563
SAND - CAP	15397	C.Y.	18	277148
TOPSOIL LAYER - SLOPE	4746	C.Y.	5	23734
TOPSOIL LAYER - CAP	31659	C.Y.	10	316599
IMPERV. MEMBRANE - BOTTOM&SLOPE	46781	S.Y.	9	421029
IMPERVIOUS MEMBRANE - CAP	45762	S.Y.	9	411863
FILTER CLOTH - BOTTOM	29901	S.Y.	5	149509
FILTER CLOTH - CAP	46622	S.Y.	5	233111
MONITORING WELLS	4	EA.	2500	10000
SUBTOTAL				5121830
<b>DREDGING</b>				
MOBILIZATION & DEMOBILIZATION	1	JOB	65000	65000
DREDGING (INCLUDING HAULING)	221000	C.Y.	6.5	1436500
SUBTOTAL				1501500
TOTAL				6623330
CONTINGENCIES (25%)				1655832
TOTAL CONSTRUCTION COSTS				8279200

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX E  
ENVIRONMENTAL ASSESMENT BY THE  
CORPS OF ENGINEERS

Preliminary Environmental  
Assessment of Proposed  
Dredged Material Disposal Sites

Waukegan Harbor, Illinois

## INTRODUCTION

Between August 1982 and the present, there have been 15 sites (eleven upland sites and four lake sites) considered for disposal of dredged material from Waukegan Harbor. As a result of inter-agency meetings with the Illinois Department of Transportation's Division of Water Resources, Illinois Environmental Protection Agency, U.S. Environmental Protection Agency, Waukegan Port District, Lake County Planning Commission, and Lake County Health Department, all but 3 upland sites (1, 4, and 16) were eliminated from further consideration. All of the 15 sites are discussed below.

### Alternative Disposal Sites

#### Site 1 - Waukegan Airport Clear Zone

Site 1 is in the SW quarter of Section 29, T46N, R12E, Waukegan, Illinois. The 21-acre site is bounded on the east by Lewis Avenue and on the south by Wadsworth Road. The property is currently owned or in the process of being acquired by the Waukegan Port District for the proposed expansion of the Waukegan Memorial Airport.

#### Physical Resources (Site 1)

The site is relatively high in elevation (680 to 710 feet above sea level) with no ponded or running surface water. Soils are high in clay content with probable low permeation rates and a low water table.

#### Physical Impacts (Site 1)

Site permeability must be investigated to determine leaching potentials and additional groundwater protection needs. Site effluent handling and/or treatment requirements must be evaluated.

#### Vegetation and Wildlife Resources (Site 1)

Site 1 consists of a mixture of habitat types including agricultural fields, early and advanced old fields and a small, old conservation port plantation of pine trees (Pinus sp.). The advanced old field contains perennial forbes, grasses, and scattered elm trees (Ulmas sp.). A small, low, wet patch within the field is vegetated to reed canary grass (Phalarus arundinacea). Residences along two of the site's perimeters are surrounded by mowed lawns and cultivated trees and shrubs. The U.S. Fish and Wildlife Service stated in a 30 August 1983 letter that the wildlife value of the site is fairly high in that it provides some habitat diversity in an area surrounded by urban and agricultural lands.

### Wildlife Impacts (Site 1)

Conversion of all or part of the site to a confined disposal area would have a significant impact on resident species due to habitat losses. Therefore, destruction of woody vegetation should be avoided where possible. Site capping must be evaluated to prevent entry of contaminants into the food chain.

### Social Setting (Site 1)

Homes are scattered along the site's southern and eastern perimeters but would be removed as part of the proposed extension of the Waukegan Memorial Airport. The area surrounding the site is scattered residential and undeveloped open space.

### Social Impacts (Site 1)

Provided the existing houses are displaced by the airport expansion, no significant social impacts are anticipated. Potential haul routes for dredge material from dredge sites to the disposal site should be mapped to minimize disruptive impacts.

### Cultural Resources (Site 1)

No known archaeological studies have been made at the site.

### Cultural Impacts (Site 1)

Shovel-testing of the site is needed before drawing any conclusions regarding the presence of archaeological or historic resources.

### Site 2 - Waukegan Airport Sanitary Landfill Site

Site 2 is in the NW quarter of Section 32, T46N, R12E, outside the corporate limits of Waukegan, Illinois. The site is approximately 23 acres in size and bounded by Beach Road on the south and McCree Road on the west. The site was used as a modern landfill up until the late 1960's or early 1970's and allegedly leaches lead and arsenic on its northeast corner. On 9 February 1983, this site was eliminated from further consideration based on additional costs needed to repair the present leaching problem at the landfill and the proximity of a school and residential areas.

### Physical Resources (Site 2)

The site, due to landfill operations, is higher than the surrounding area. Due to past use, soil characteristics cannot be evaluated without further testing. There is no ponded or running surface water on the site. Water mains to the Waukegan Memorial Airport (just west of site 2) are being installed, but wells currently supply water to some of the nearby homes and to the school.

### Physical Impacts (Site 2)

Solution(s) to the present leaching problem would have to be implemented. Identification of additional groundwater protection needs would have to be undertaken. Site effluent handling and/or treatment requirements would have to be evaluated.

### Vegetation and Wildlife Resources (Site 2)

The site is primarily vegetated by grasses and scattered perennial forbes, including Queen Ann's lace (Daucas carota) and goldenrods (Solidago spp.). There are a few, small, unvegetated patches scattered throughout the site.

### Wildlife Impacts (Site 2)

Use of this area would have little effect on wildlife. However, site capping requirements to prevent entry of contaminants into the food chain in the future must be evaluated.

### Social Setting (Site 2)

Beach Park school is east of the site and residential developments are nearby to the east and south.

### Social Impacts (Site 2)

Because of the controversy surrounding the existing landfill, acquiring this site for disposal would probably involve the COE in the existing leaching problem. Potential land routes for dredged material would have to be identified and mapped to minimize disruptive impacts.

### Cultural Resources and Impacts

This site is a modern landfill, now covered in grasses. Construction here would not effect any archaeological or historic resources.

### Site 3 - Kenosha CDF

Site 3 is in the SW quarter of Section 32, T2N, R23N, Kenosha, Wisconsin. The 32 acre site is a COE confined lake disposal area bounded on the north by the south pier of the Federal navigation channel and on the west by American Motors Corporation and the Morelli Export Company properties. The site was eliminated from further consideration at an agency meeting on 19 May 1983 based upon information presented by the COE Detroit District that the Wisconsin DNR would not go along with the disposal of the Waukegan material at Kenosha for environmental reasons.

### Physical Resources (Site 3)

The CDF is a rubble-mound and steel sheet pile structure containing dredged material from the Kenosha navigation channels. Some 1977 water quality monitoring data for inside and outside the CDF is available.

### Physical Impacts (Site 3)

Site design modification may be necessary for the protection of Lake Michigan's water quality. This could include modification or redesign of existing filter cells. Assuming water borne transport of dredged material, there should be no disruptive impacts by the transportation. However, dredge material spillage during rehandling and transport would have to be minimized and monitored.

### Aquatic Resources (Site 3)

The interior of the CDF contains only those benthic organisms that were able to survive dredge disposal operations and are able to survive in the moderately polluted sediments contained in the CDF. The exterior of the CDF provides habitat for snails, mayfly larvae, amphipods, periphytic algae and small fish. The structure is utilized for trout (Salmo spp.), salmon (Oncorhynchus spp.), sunfish (Lepomis spp.) and bass (Micropterus spp.) fishing.

### Aquatic Impacts (Site 3)

Assuming site modifications would assume protection of Lake Michigan's water quality, no significant impacts would be expected.

### Vegetation and Wildlife Resources (Site 3)

The shallow margin between the dredgings and open water within the CDF support some aquatic emergent plants. Raccoon (Procyon lotor) tracks and a few mallards (Anas platyrhynchos) were observed in the CDF during a 8 September 1981 field reconnaissance.

### Wildlife Impacts (Site 3)

Site capping to prevent entry of contaminants into the food chain would be a significant project consideration.

### Social Setting (Site 3)

The shoreline in the area of the site consists of Kenosha Harbor, the CDF, the American Motors Corporation, Lake Front Park and private residences. The area encompasses a range of land uses including recreational, residential, industrial and commercial.

### Social Impact (Site 3)

The City of Kenosha would like to see the CDF filled so that it can revert to their use. However, filling the PCB-polluted material may not be readily acceptable to locals.

### Cultural Resources and Impacts

The facility contains no intact or significant archaeological or historical resources.

### Site 4 - Private Land

Site 4 is located in the NW corner of Section 18 and the SW quarter of Section 7 of T46N, R12E, unincorporated Lake County, Illinois. The site is an 80-acre agricultural field bounded by 9th Street on the north, by 17th Street on the south, and by Green Bay Road (Rt. 131) on the west. Zion, the closest community, is to the east.

### Physical Resources

The site is relatively high in elevation (710-730 feet above sea level) with no ponded or running surface water. The area consists of well to moderately well drained deep soils and moderate to moderately slow permeability. Soils are Miami Silt Loam, Montmorenci Silt Loam, Pella Silty Clay Loam, Beecher Silt Loam, Peotone Silty Clay Loam, Barrington Silt Loam, Corwin Silt Loam Grays and Markham Silt Loams, Barrington and Varna Silt Loams and Mundelein and Elliot Silt Loams. The soil appears to be derived from morainal silty clay till with sand and rounded pebbles or gravel. Bedrock is around 500 feet or over 200 feet deep.

#### Physical Impacts (Site 4)

The disposal facility design, including effluent handling or treatment, would have to include measures to assure groundwater protection.

#### Vegetation and Wildlife Resources (Site 4)

Crop field can have value to wildlife as an auxiliary or cold weather food source except that, in this case, there is essentially no interspersed of other habitat types around the site to provide the remainder of their life requirements. For example, deer and raccoon often feed in corn fields but require woods for reproduction. Pheasants too feed in corn but nest in brush and grass often found along fencerows. Some species such as crows and blackbirds will undoubtedly make use of the crop field although they are considered pest species. A few songbirds may make use of the trees found on the site. In total, the U.S. Fish and Wildlife Service has rated the site quite low in wildlife value.

#### Wildlife Impacts (Site 4)

Since the site is currently of low value to wildlife, the impact of its use as a disposal site is insignificant. Depending on how the site is reclaimed following use habitat values could actually be increased for a variety of wildlife species.

#### Social Setting (Site 4)

The site is cropland. The surrounding area includes agricultural land, landfills (Browning Ferris and the North Shore Sanitary District), and open space. Zion is the closest community.

#### Social Impacts (Site 4)

Displacement of a farm is the primary social impact foreseen. A determination as to whether the site includes any prime or unique farmland would have to be made in cooperation with other federal and state agencies.

#### Cultural Resources (Site 4)

A cursory examination of the northern portion of the 80-acre site revealed only a few non-cultural fragments of poor quality tan-white chert.

#### Cultural Impacts (Site 4)

Shovel-testing of the site or examination while the surface is exposed after plowing is needed before drawing any conclusions regarding the presence of archaeological or historic resources.

#### Site 5 - North Shore Sanitary Landfill Site

Site 5 is the North Shore Sanitary District Landfill, which is currently being used. It is located in the SE QUARTER OF Section 12, T46N, R11E, in unincorporated Lake County, Illinois. The community of Zion is to the east of the site. The site is bounded on the east by Green Bay Road (Rt. 131) and 9th Street on the north. At the request of the property owner this site has been eliminated from further consideration.

#### Physical Resources and Impacts (Site 5)

Elevations range from 690-710 feet above sea level with bedrock at approximately the 500 foot elevation. The landfill area is covered with silty clay mixed with sand and rounded gravel pebbles. There is no ponded or running surface water on the site. No significant impacts are anticipated as long as groundwater protection needs are met.

#### Wildlife Resources and Impacts (Site 5)

Due to the very low habitat values associated with a landfill, no significant impacts are foreseen.

#### Social Setting and Impacts (Site 5)

The site is somewhat isolated, but a few scattered residences are in the general area. The surrounding area is primarily agricultural and open space. Disposal in the landfill should not cause any significant social problems. Potential haul routes for the dredge material should be mapped to minimize disruptive impacts and assess transport costs.

#### Cultural Resources and Impacts (Site 5)

Because the site is an active sanitary landfill, construction would not affect any cultural resources.

#### Site 6 - Private Waste Disposal Site

Site 6 is a Browning-Ferris Waste Disposal Facility located in the NW 1/2 quarter of Section 7, T46N, R12E, in unincorporated Lake County. The site is near sites 4 and 5 and West of the community of Zion. It is bounded in the South by 9th Street and on the West by Green Bay Road (Rt. 131). The facility generates a heavy flow of truck traffic. This site was eliminated from further consideration because it is not implementable under the Section 123 diked disposal authority. Physical, vegetation and wildlife, and cultural resources, social setting, and impacts for site 6 are the same as described for site 5.

#### Site 7 - Private Waste Disposal Site

Same as Site No. 14

#### Site 8 - COE Chicago Area CDF

Site 8 is the COE's site for the Chicago Area confined lake disposal facility in Calumet Harbor. The 45-acre site is located in the SE quarter of Section 5, T37N, R15E, in Chicago, Illinois adjacent Chicago Port Authority's Iroquois Landing Site. The CDF is currently being constructed to contain dredge material from the Federal navigation channels in the Chicago and Calumet Rivers and harbors. It will be a lined, rubble-mound structure. Further information can be found in the Final Environmental Impact Statement (FEIS) for the CDF construction and dredging. The site was eliminated from further consideration due to insufficient capacity and the facility is not designed for PCB laden material.

#### Site 9 - Waukegan Lake Site

Site 9 is a lake site located in the SW quarter of Section 22 and NW quarter of Section 27, T45N, R12E, in Waukegan, Illinois. The site was eliminated from further consideration at an interagency meeting on 19 May 1983 due to its interruption of the Waukegan River and the inability to meet effluent treatment standards for Lake Michigan.

#### Physical Resources and Impacts (Site 9)

Water depths are 5 to 10 feet along a rubble/riprap, filled shoreline in a deserted industrial area at the mouth of the Waukegan River. The disposal facility design, including effluent handling or treatment, would have to include measures to protect Lake Michigan's water quality.

#### Aquatic Resources (Site 9)

The Waukegan River area, as well as the Waukegan Harbor, has been used as a salmonid stocking area by the Illinois Department of Conservation. The harbor-river area is extensively used by fishermen for trout, salmon, yellow perch and bass. Other fish utilizing the area include alewife (Alosa pseudoharengus), gizzard shad (Dorosoma cepedianum), smelt (Osmerus sp.), goldfish-carp hybrids, white sucker (Catostomus commersoni), and crappie (Pomoxis sp.).

#### Aquatic Impacts (Site 9)

Use of this site would require interruption and/or relocation of the Waukegan River. The Illinois Department of Conservation's salmonid stocking program, the aquatic flora and fauna, and recreational fishing in the Waukegan River would be significantly impacted by long term to permanent loss of aquatic habitats.

#### Wildlife Resources and Impacts (Site 9)

Due to the very low habitat values associated with the site, no significant impacts are foreseen if the site is adequately capped to prevent entry of contaminants into the food chain.

#### Social Setting (Site 9)

The immediate area is largely deserted industrial space, with some railroad tracks and yards still in use. The surrounding area is urban and somewhat depressed.

#### Social Impacts (Site 9)

No major social impacts are foreseen. The location of the site minimizes potential disposal impacts because hauling dredged material to an inland site would not be required.

#### Cultural Resources and Impacts (Site 9)

This site is part of the Waukegan Harbor and has been disturbed by dredging and construction. Disposal here would not affect any cultural resources.

#### Site 10 - Shoreline Site

Site 10 is a shoreline site located in the SW quarter of Section 22 and NW quarter of Section 27, T45N, R12E, in Waukegan, Illinois. The site is adjacent to site 9 and is largely a deserted industrial space, with some railroad tracks and yards still in use. This site was eliminated from further consideration at an interagency meeting on 19 May 1983 due to the stringent limitations it would impose upon future usage and development of the waterfront location.

#### Physical Resources (Site 10)

The site appears to be all fill land. The material on the surface appear to be cinders, slag, gravel, sand, and miscellaneous materials such as brick, concrete and clay.

#### Physical Impacts (Site 10)

The disposal facility design, including effluent handling or treatment, would have to include measures to assure protection of groundwater and Lake Michigan water quality.

#### Aquatic and Wildlife Resources, Social Setting and Impacts (Site 10)

The descriptions and impacts for site 9 regarding aquatics, wildlife and social aspects apply to site 10.

#### Cultural Resources and Impacts (Site 10)

This site is not likely to contain any intact or significant archaeological or historical resources. Therefore, disposal at site 10 would not affect any cultural resources.

#### Site 11 - Greenbelt Forest Preserve Site

Site 11 is in the SE quarter of Section 30, T45N, R12E, Waukegan, Illinois. It is in the Greenbelt Forest which is part of the Lake County Forest Preserve District. It is an old field bounded by Dilger Avenue on the east and 10th Street on the south. At the request of the Lake County Forest Preserve, this site has been eliminated from further consideration.

### Physical Resources (Site 11)

The area includes about 40 acres and elevations range from 685 to 705 feet M.S.L. This is a natural ground site with rolling open fields and a silty clay soil with sand and gravel derived from till. The soils are Miami Montmorenci Association soils with gently to strongly sloping terrain and moderately well to well drained deep soils with moderate permeability. Bedrock exists at about 560 feet or at a 125' to 145' depth. There is no standing or running surface water on the site.

### Physical Impacts (Site 11)

The disposal facility design, including effluent handling or treatment, would have to include measures to assure groundwater protection.

### Vegetation and Wildlife Resources (Site 11)

The site contains the remains of a farmstead (apple trees, road foundations), grasses and perennial forbes which include golden rod, Queen Ann's lace, black-eyed susan (Rudbeckia sp.), sunflower (Helianthus sp.) and yarrow (Achillea millifolian). Within the northern portion of the site is a lower wet area containing seed canary grass and an adjacent cluster of young trees.

### Wildlife Impacts (Site 11)

No significant problems are anticipated provided the project is closely coordinated with the Lake County Forest Preserve.

### Social Setting and Impacts (Site 11)

The site is an old agricultural field that is now undeveloped open space with a few scattered trees. It is relatively isolated except for a few scattered houses to the west and a housing development to the east. No major social impacts are foreseen.

### Cultural Resources and Impacts (Site 11)

As vegetation covers the ground surface, the area should be shovel-tested to determine whether or not archaeological resources are present.

## Site 12 - Lyons Woods Forest Preserve Site

Site 12 is located in the SW quarter of Section 4, T45N, R12E, in unincorporated Lake County, Illinois. The site is in Lyons Woods, a part of the Lake County Forest Preserve District. It is an old field bounded by Blanchard Road on the south and wooded areas on the east and west. At the request of the Lake County Forest Preserve, this site has been eliminated from further consideration.

### Physical Resources (Site 12)

U.S.G.S. quadrangle maps indicate there is a small marsh or wetland in the south central portion of the site that forms the headwaters of an intermittent stream. The stream flows southeast into the wetlands in and adjacent to the Illinois Beach State Park. This is a natural ground site with a clayey silt soil with sand and gravel on the sag plain between the Blodgett and Highland Park Moraines. The 100 acre area encompasses the till plain which is covered by grass and brush with wooded low moraine hills on either side. The soil types are Pella Silty Clay Loam, Ashkum Silty Clay Loam, Beecher Silt Loam, Peotone Silty Clay Loam, wet, Aptakisic Silt Loam, Zurich Silt Loam and Wauconda Silt Loam with slopes of 0 to 4%. The area is isolated and warrants further investigation. Elevations vary from 645 to 675 feet with bedrock around 500' - 550' or 100' to 175' depth.

### Physical Impacts (Site 12)

The disposal facility design, including effluent handling or treatment, would have to include measures to meet ground- and surface-water protection requirements.

### Aquatic Resources and Impacts (Site 12)

No known aquatic information is available on the intermittent stream at this time. Aquatic investigations would be required to determine the extent and significance of the aquatic resources associated with the stream.

### Vegetation and Wildlife Resources (Site 12)

The old field area consists of asters (Aster spp.), theistle (Cirsium sp.), Queen Ann's lace, evening primrose (Oenothera biennis), volunteer grasses and some areas of prairie grasses.

#### Wildlife Impacts (Site 12)

The extent and value of the prairie grasses would need to be determined in order to assess disposal impacts. No significant impacts are anticipated provided the project is closely coordinated with the Lake County Forest Preserve.

#### Social Setting (Site 12)

The site is north of Blanchard Road, Waukegan's northern boundary, in unincorporated Lake County. A residential development and school are south of Blanchard Road. The John S. Clark School is an elementary school with a playground. East of the school is Clark Park, part of the Waukegan Park District.

#### Social Impacts (Site 12)

Access to the site should be at an edge away from the school. Trucking dredged material would cause more of a noise problem than a safety hazard because both the residences and school are opposite Blanchard Road from the site, eliminating a school crossing problem.

#### Cultural Resources and Impacts (Site 12)

The ridge immediately east of site 12 is a more likely location for aboriginal occupation sites. However, site 12 should be shovel-tested to determine whether or not archaeological resources are present.

#### Site 13 - Zion Forest Preserve Site

Site 13 is located in the NW quarter of Section 29 and NE quarter of Section 30, T46N, R12E, in unincorporated Lake County, Illinois. Within the site there are two subareas being considered, 13A and 13B. 13A is in the center of the NE quarter of Section 30 and 13B is in the NE quarter of the NW quarter of Section 29. Site 13 is the part of the Lake County Forest Preserve District referred to as Zion and bounded by 29th Street on the north, Lewis Avenue on the east, 33rd Street on the south and Green Bay Road on the west. At the request of the Lake County Forest Preserve, this site has been eliminated from further consideration.

#### Physical Resources (Site 13)

The site is agricultural land with considerable relief from 750' to 680'. Water filled ditches indicate a high water table and relatively impermeable deep soils. Soil symbols are Houghton Silty Clay, and Markham Silt Loam

with 0 to 12% slopes and deep, well to poorly drained soils. The muck is a very poorly drained organic soil. The site includes an intermittent stream.

#### Physical Impacts (Site 13)

The disposal facility design, including effluent handling or treatment, would have to include measures to meet groundwater surface water protection requirements.

#### Aquatic Resources and Impacts (Site 13)

No known aquatic information is available on the site's intermittent stream at this time. Aquatic investigations would be required to determine the extent and significance of the aquatic resources associated with the stream.

#### Vegetation and Wildlife Resources (Site 13)

The site includes a soybean field, scattered oak-hickory (Quereus spp., Carya spp.) wooded areas, and an intermittent stream.

#### Wildlife Impacts (Site 13)

Avoidance of the wooded areas is recommended because of the wildlife habitat values associated with them.

#### Social Setting (Site 13)

The site is an agricultural field with scattered wooded areas. A few scattered houses with agricultural fields are to the north. The perimeter of site 13 is privately owned and mostly sparsely settled residential. Zion Nuclear Plant is visible to the east.

#### Social Impacts (Site 13)

Potential displacement of farmland is the primary social effect foreseen. Future consideration of site 13 should include a determination of whether it is prime or unique farmland.

#### Cultural Resources (Site 13)

During a field reconnaissance, visibility of the ground surface was excellent despite the soybeans. The highest, central portion of the site was examined briefly; only a few non-cultural fragments of poor-quality white-tan chert were seen.

#### Cultural Impacts (Site 13)

The entire site should be walked (preferably after plowing) to determine whether or not archaeological resources are present.

#### Site 14 - 14th Street Landfill

Site 14 is located in the NW quarter of Section 31, T45N, R12E in North Chicago, Illinois. The site is an old landfill adjacent to 14th Street. It is in a relatively isolated area, with some nearby agricultural fields. A single industrial development is to the South, across 14th Street. A nearby pond to the West was a borrow area for the Skokie Highway (Rt. 41) overpass. The North Shore Sanitary District maintains a pumping station to the North. This site was eliminated from further consideration due to the limited disposal capacities available and the necessity to excavate and dispose of existing landfill material.

#### Physical Resources (Site 14)

Site 14 is higher than the surrounding area and has no ponded or running surface water. Elevations range from 690' to 715' with bedrock from 500 to 550 feet M.S.L. or an overburden depth of 140' to 210'. The soil is disturbed clay till which appears to be transported, permeable and poorly vegetated with sparse grass. Water is puddled in local depressions. Erosion scars showed sand, gravel, slag, brick, wood, cinders, metal and trash under the silty clay with sand and gravel cap. Due to the old landfill which only covers part of the 40 acre site, this site appears less desirable than others visited.

#### Physical Impacts (Site 14)

The permeability of the site's soil would have to be determined and ground-water protection requirements determined for the disposal facility design specifications. Adequate capacity may be a problem due to the height of the existing fill.

#### Vegetation and Wildlife Resources and Impacts (Site 14)

Site 14 is primarily vegetated by grasses. Use of this site would have little effect on wildlife. However, site capping requirements to prevent entry of contaminants into the food chain in the future must be evaluated.

#### Social Setting and Impacts (Site 14)

The site is in a relatively isolated area, with some nearby agricultural fields. A single industrial development is to the south across 14th Street. No major social impacts are foreseen.

#### Cultural Resources and Impacts (Site 14)

The site is an old landfill, now covered with grass. Construction would not affect any cultural resources.

#### Site 15 - Waukegan Airport Between Runways

Site 15 is located in the east half of Section 31 and NW quarter of Section 32, T46N, R12E, Waukegan, Illinois. The site is between the existing and proposed northeast-southwest paved runways at the Waukegan Memorial Airport. The site is presently a grass covered, clear zone. This site was eliminated from further consideration due to the limitations on disposal capacity and probable interruption of existing utilities.

#### Physical Resources (Site 15)

There are two small ponds in the area of the site which will be relocated further away from the site as part of the airport expansion project. Soils are high in clay content with probable low permeation rates and a low water table.

#### Physical Impacts (Site 15)

The permeability of the site's soils would have to be determined and groundwater protection requirements determined for this disposal facility design specifications.

#### Vegetation and Wildlife Resources (Site 15)

The site is presently grass covered and has very little habitat value due to the proximity to the airport runway.

#### wildlife Impacts (Site 15)

There would be a potential aviation hazard with birds that are usually attracted by landfill and dredged material disposal sites.

#### Aquatic Resources and Impacts (Site 15)

No significant impacts are anticipated since the two ponds are not natural and would be relocated as part of the airport extension project.

#### Cultural Resources and Impacts (Site 15)

The site should be shovel-tested to determine whether or not cultural resources are present.

#### Site 16 - Outboard Marine Corp (OMC) Site

Site 16 is located in the NE quarter of Section 22, T45N, R12E, Waukegan, Illinois. The site lies adjacent to and between Waukegan Harbor and Lake Michigan. Although owned by OMC, it apparently sits idle or is used for temporary storage of materials.

#### Physical Resources (Site 16)

The predevelopment terrain consisted of coastal dunes with a marsh or swampy area underlying a bluff which represents a lake terrace or former shoreline of ancient Lake Michigan. The surface soils are aeolian dune sands generally very fine to fine grained overlying transgressing beach sands which are fine to coarse grained. The dune sands are very loose to medium dense while the beach sand is loose to dense.

#### Physical Impacts (Site 16)

The permeability of the site's soils would have to be determined and groundwater protection requirements determined for the disposal facility design specifications.

#### Vegetation and Wildlife Resources (Site 16)

Site 16 is characterized by being flat with no standing or running water and is vegetated by a variety of weedy grass and forb species which are periodically mowed. It is of low value to wildlife although it does provide some food and cover for various birds and small mammals.

### Wildlife Impacts

The use of the site for dredge disposal would have little impact on wildlife resources.

### Social Setting (Site 16)

The site is in an industrial area north of the Waukegan Harbor entrance. A waterworks facility is between the site and the entrance to the federal channel. Further north beyond the site is a waste treatment plant. A public beach and beach house are along the Lake Michigan shoreline to the east, but are separated from site 16 by a harbor access road.

### Social Impacts (Site 16)

It should be possible to minimize or avoid disturbing the beach area during dredging and disposal operations. No significant social impacts are anticipated from disposal, but future development of the site may be affected.

### Cultural Resources and Impacts (Site 16)

Borings taken in June 1983 show that the site consists of modern fill (slag and gravel) to a depth between five and twelve feet. The site has been graded flat; it is not likely to contain intact or significant archaeological or historical resources.

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX F  
PLANNING AID LETTER FROM U.S.  
FISH AND WILDLIFE



# United States Department of the Interior

FISH AND WILDLIFE SERVICE  
ROCK ISLAND FIELD OFFICE (E5)  
1830 Second Avenue, Second Floor  
Rock Island, Illinois 61201

IN REPLY REFER TO:

Commercial: 309-793-5800  
FTS: 386-5800

August 30, 1983

Lt. Colonel Christos A. Dovas  
District Engineer  
U.S. Army Engineer District  
Chicago  
219 South Dearborn Street  
Chicago, Illinois 60604

Dear Colonel Dovas:

This constitutes our Planning Aid Letter on four sites proposed for the potential disposal of contaminated materials from Waukegan Harbor, Waukegan, Illinois. It has been prepared under the authority of and in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). It is submitted for use in your planning process and for inclusion in your Site Selection Report. A copy has been sent to the Illinois Department of Conservation and any comments they may have will be forwarded upon receipt.

At this writing, the number of potential disposal sites under consideration has been reduced to four. The selected site will be used for the permanent disposal of PCB contaminated sediments from the federally maintained channel in Waukegan Harbor. We are assuming that the design of the confined disposal site will be adequate in terms of size and protection of ground water resources. The site will be capped with two feet of clay, one foot of sand, a filter cloth and a final two feet of top soil. The following is a description of the fish and wildlife resources of each of the four potential disposal sites and an evaluation of project impacts on them.

## Site Descriptions and Expected Impacts

### Site 1 - Waukegan Airport Clear Zone

This 78 acre site is located in the SW 1/4 of Section 29, T46N, R12E, bounded by Wadsworth Road on the south and Lewis Avenue on the east. It is triangular in shape and has been designated for purchase as a clear zone in conjunction with expansion of the Waukegan Memorial Airport. Several residences are located on the site which would be removed in the event of airport expansion.

The site contains no standing or running water. It consists of a mixture of habitat types including agricultural fields, early and advanced old fields and a small plantation of pine trees. The advanced old field consists of a

variety of perennial forbs and grasses with invasion by elm trees (Ulmas sp.) and shrubs such as sumac (Rhus sp.). The residences are surrounded by mowed lawns and cultivated trees and shrubs.

The wildlife value of the site is fairly high in that it provides some habitat diversity in an area surrounded by urban and agricultural lands. Such species as deer, fox, woodchucks, rabbits, skunks, voles, shrews, mice, pheasants and a variety of songbirds may utilize the site. Raptors such as the rough-legged hawk, red-tailed hawk, broad-winged hawk and sparrow hawk may use the site for hunting. The pine plantation would attract morning doves, chickadees, grosbeaks, blue jays, juncos, nuthatches, goldfinches, siskins, brown thrashers, warblers and titmice. The lack of permanent water on the site makes it unsuitable for waterfowl, marsh and shorebirds or aquatic mammals such as beaver, raccoon and muskrat.

Project Impacts - The conversion of all or part of this site to a confined disposal site will have a significant adverse impact on the resident species of the site and their habitat. It will have a lesser adverse impact on migratory or transient species as there is probably similar habitat in the vicinity that they could utilize. Depending on how the site revegetated following use, some of the lost habitat value can be reclaimed.

#### Site 4 - Private Land

This 80 acre site is located in the SW 1/4 of Section 7 and NW 1/4 of Section 18, T46N, R12E and is bounded by Green Bay Road (Rte. 131) on the west, Ninth Street on the north and Seventeenth Street on the south. It consists of agricultural land currently in corn with a few trees and shrubs located along fencelines. It has no standing or running water.

Crop field can have value to wildlife as an auxillary or cold weather food source except that, in this case, there is essentially no interspersion of other habitat types around the site to provide the remainder of their life requirements. For example, deer and raccoon often feed in corn fields but require woods for reproduction. Pheasants too feed in corn but nest in brush and grass often found along fencerows. Some species such a crows and blackbirds will undoubtedly make use of the crop field although they are considered pest species. A few songbirds may make use of the trees found on the site. In total, we would rate the site quite low in wildlife value.

Project Impacts - Since the site is currently of low value to wildlife, the impact of its use as a disposal site is insignificant. Depending on how the site is reclaimed following use habitat values could actually be increased for a variety of wildlife species.

#### Site 6 - Browning Ferris, Inc. Landfill

The site is located in the NW 1/4 of Section 7, R12E, T46N and is bounded by Green Bay Road (Rte. 131) as the west and Ninth Street on the south. It is in a continual state of disturbance due to landfilling activities and there is little or no wildlife value on the site. There is no standing or running water.

Project Impacts - Since the site is currently of no value to wildlife, there will be no impact due to its use as a disposal site. Depending on how the site is reclaimed following use, some habitat value could be created for a variety of wildlife species.

#### Site 16 - Outboard Marine Corporation

This site lies adjacent to Waukegan Harbor between it and Lake Michigan west of Seahorse Drive. It is characterized by being flat with no standing or running water and is vegetated by a variety of weedy grass and forb species which are periodically mowed. It is of low value to wildlife although does provide some food and cover for various birds and small mammals. Although owned by OMC, it apparently sits idle or is used for temporary storage of materials.

Project Impacts - Use of this site would have little impact on fish and wildlife resources. Following use, some habitat development could take place although the proximity to an industrial area would limit its use by many wildlife species.

#### Ranking of Alternatives

This Service would have no objection to the use of any of the four sites for confined disposal of dredged materials. However, we do have a preference in the following order:

- 1) Site 6 - Browning Ferris Landfill
- 2) Site 16 - OMC
- 3) Site 4 - Private Land
- 4) Site 1 - Airport Clear Zone

This preference is based upon the current habitat value, expected impacts, and potential for mitigation or enhancement following use.

#### Mitigation

The Services' Mitigation Policy provides for mitigation recommendations based upon the perceived value and scarcity of the habitat in question. The habitat types are placed in one of four categories, each with a different mitigation goal.

We would categorize the habitats of the four sites as follows:

<u>Habitat Type</u>	<u>Resource Category</u>	<u>Site</u>
Cultivated	4	1, 4
Early Old Field	3	1
Advanced Old Field	3	1
Pine Plantation	3	1
Mowed	4	1, 16
Wooded	3	4

Note that we do not consider Site 6 as habitat because it is continually being disturbed or will be disturbed during landfilling operations.

Only Site 1 would necessitate mitigation of project impacts. The mitigation goal for Resource Category 3 is "no net loss of habitat value" with compensation either in or out of kind. This could be accomplished by planting a variety of tree, shrub and forb species that would be beneficial to wildlife. The existing pine plantation and advanced old field should be avoided if at all possible to reduce the impacts on this site. Furthermore, a small depression or water catchment could be designed into the final site design to provide some semipermanent water for wildlife species.

At the other three sites, post-project habitat development would be a form of enhancement of wildlife values. The Corps might consider this as a form a "mitigation banking" wherein habitat values can be accumulated and then, at a later time and in a different location, this "account" can be drawn upon for another project where mitigation opportunities do not exist or they are inadequate to compensate for anticipated losses. We have enclosed some additional information on the subject of mitigation banking. If it looks like a concept that the Corps might wish to pursue in this case, we would be most happy to discuss it further.

Sincerely,

*Gerald Bode*

*for*

Thomas M. Groutage  
Field Supervisor

cc: IDOC (Lutz)

WAUKEGAN HARBOR, ILLINOIS  
CONFINED DREDGE DISPOSAL FACILITY  
SITE SELECTION STUDY  
APPENDIX G  
LETTER FROM U.S. EPA ON STATUS OF  
25% WAIVER



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

SEP 26 1983

27/19  
AEC  
7-27  
REPLY TO ATTENTION OF

Colonel Christos A. Dovas, P.E.  
District Engineer  
Chicago District, Corps of Engineers  
219 South Dearborn Street  
Chicago, Illinois 60604

Dear Colonel Dovas:

Your letter of August 11, 1983, asked us to determine the eligibility of a local sponsor at Waukegan Harbor, Illinois, to receive a waiver of the 25 percent cost sharing provision of Section 123 of Public Law 91-611. Eligibility allows the Secretary of the Army to waive the 25 percent non-Federal contribution toward costs for the construction of contained dredged spoil disposal facilities in the Great Lakes and connecting channels. The waiver may be granted if the area in which construction will take place is "in compliance with an approved plan for the general geographical area of the dredging activity for construction, modification, expansion or rehabilitation of waste treatment facilities", and the Environmental Protection Agency's (EPA) Administrator has found that applicable water quality standards are not being violated. The EPA has determined the foregoing to be met when the geographical area in question has a certified and approved Water Quality Management Plan, and when major dischargers in the area are in compliance with their National Pollutant Discharge Elimination System (NPDES) permits.

We have determined that the Waukegan Harbor area is covered by a certified and approved Water Quality Management Plan. With respect to the compliance of major dischargers with their NPDES permits, we have determined that there are three major dischargers in the general geographical area, and they are in compliance with their NPDES permits; therefore, applicable water quality standards are not being violated.

I trust the above response will prove adequate for your decisionmaking regarding the eligibility of the local sponsor for a waiver of the cost sharing requirements for the Waukegan Harbor project. If you have any questions about our review, please call Mr. James Hooper of the Environmental Review Branch, at 886-6694.

Sincerely yours,

Alan Levin  
Acting Regional Administrator