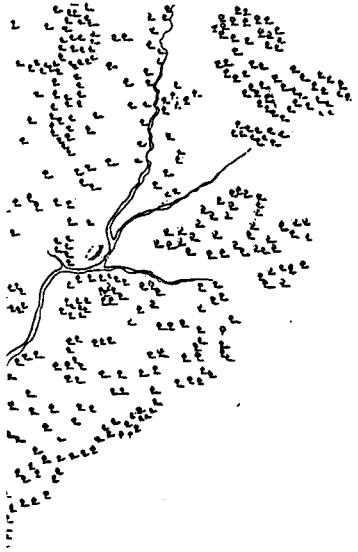
Appendix A to:

CONTAMINATION DISTRIBUTION AND MOVEMENT AT GRASSY ISLAND
(Background and history of contaminants in sediments on and near Grassy Island in the Wyandotte National Wildlife Refuge in the Detroit River near Detroit, Michigan)

Appendix A: Unpublished Scientific Information.

1. 1796 Map titled "Plan Topographique du Detroit et des Eaux qui forment la jonction du Lac Erie savec le Lac St. Clair. Dresse pour l'intelligence des Voyages du Gal Collon dans cette partic du Continent en 1796" showing Grassy Island labeled as the "Ile Maricageuse". 2 pp.



Plan Topographique

du Détroit

et des Eaux qui forment la jonction du

Lac Erié avec le Lac Jr Clair.

Dressé pour l'intelligence des Voyages du

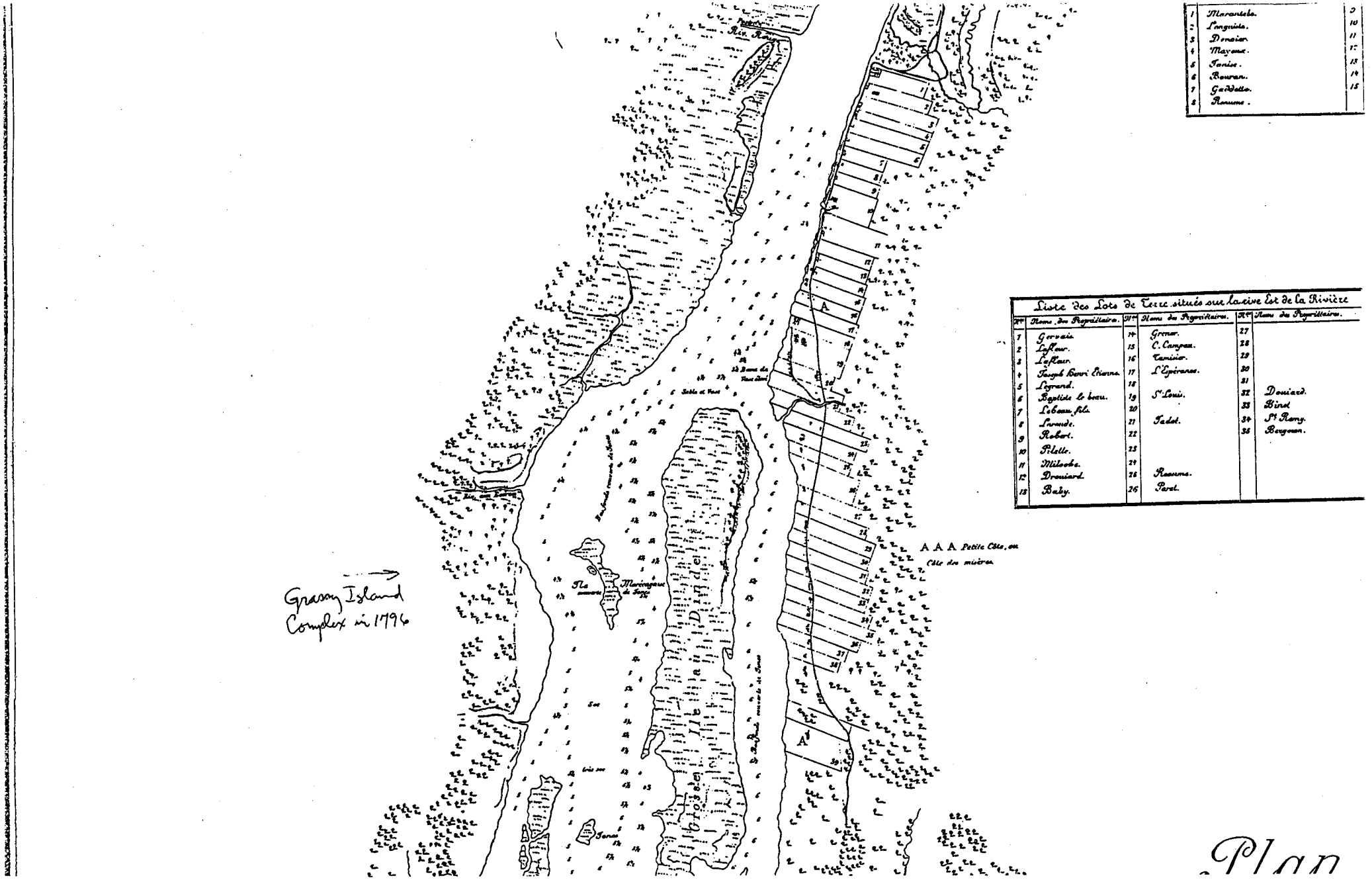
Gal Collot

dans cette partie du Continent en 1796.

Les chiffres de Sondes sont exprimés en Pieds.

Nouveau fort, commencé par les Anglais depuis l'evacuation du poste du Détroit.
Autre fort commencé au même temps mais dont les travaux sont suspendus depuis que les Etats Unis ont réclamé des Anglais, l'Ile aux Bois blancs, comme devant leur appartenir.

Pour Copie conforme
L'Ingenieur Hydrographe en Chef
de la Marine
A Bouguet de la Grye



Liste des Lots de Terre situés sur la rive Est de la Rivière

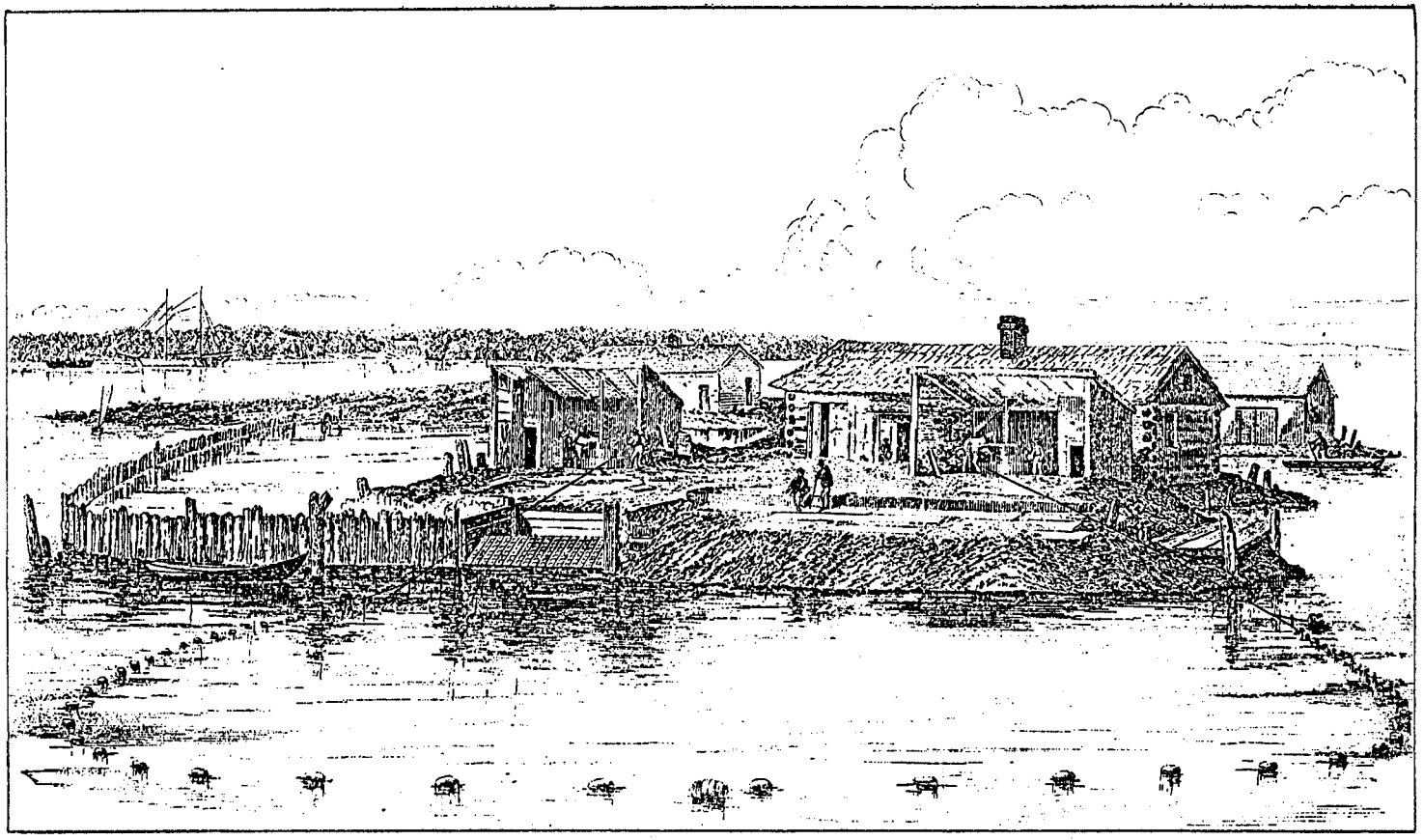
Nos	Noms des Propriétaires.	Nos	Noms des Propriétaires.	Nos	Noms des Propriétaires.
1	Gervais.	14	Grenier.	27	
2	Lafleur.	15	C. Campau.	28	
3	Lafleur.	16	Tamisier.	29	
4	Joseph Henri Etienne.	17	L'Espérance.	30	
5	Legrand.	18		31	
6	Baptiste le beau.	19	St Louis.	32	Douiard.
7	Lebeau fils.	20		33	Hinot
8	Lavoude.	21	Jadot.	34	St Remy.
9	Robert.	22		35	Bergeron.
10	Pilette.	23			
11	Miloche.	24			
12	Drouiard.	25	Reaume.		
13	Baby.	26	Parat.		

Plan

Appendix A: Unpublished Scientific Information.

2. Plate from Milner (1873) showing Grassy Island Pond-Fishery. 1 pp.

MILNER, JAMES W. Report on the fisheries of the Great Lakes: The results of inquiries prosecuted in 1871 and 1872. U.S. Commission of Fisheries. 1873.



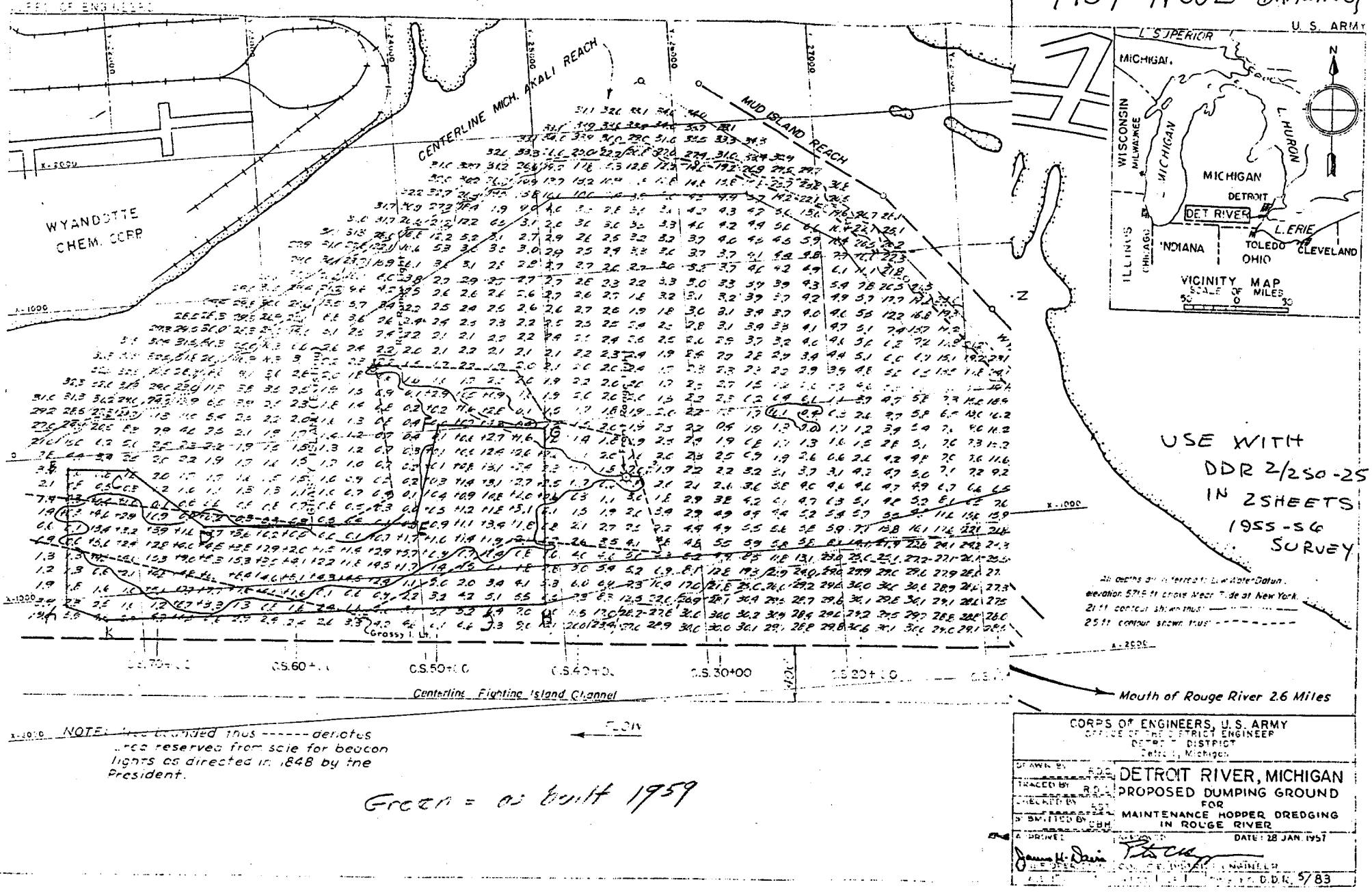
Grassy Island Pond-Fishery, Detroit River.

Plate XXXVII.

Appendix A: Unpublished Scientific Information.

3. 1957 ACOE drawing of proposed Grassy Island dumping ground. 1 pp.

1951 ROUGE DRAWING



USE WITH DDR 2/250-25 IN 2 SHEETS

1955-56 SURVEY

CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER
DETROIT DISTRICT
Detroit, Michigan

DETROIT RIVER, MICHIGAN
PROPOSED DUMPING GROUND
FOR
MAINTENANCE HOPPER DREDGING
IN ROUGE RIVER

DRAWN BY: R.D.C.
TRACED BY: R.D.L.
CHECKED BY: E.D.T.
SUBMITTED BY: C.B.H.
APPROVED:
DATE: 28 JAN. 1957

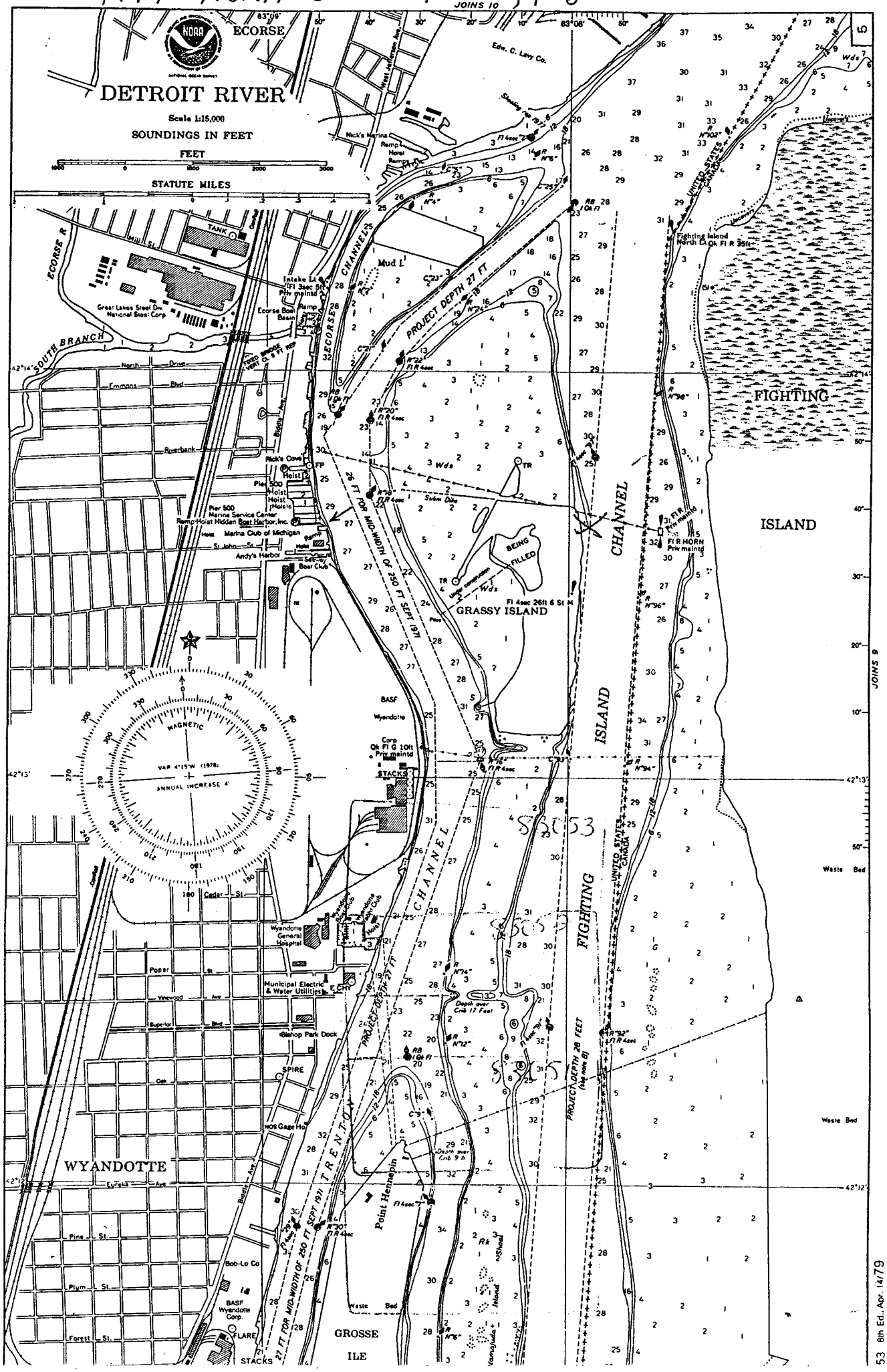
James H. Davis
DISTRICT ENGINEER

D.D.R. 5/83

Appendix A: Unpublished Scientific Information.

4. 1979 NOAA Chart 14853 showing Grassy Island area. 1 pp.

1979 NOAA Chart 17053; Page 5



Appendix A: Unpublished Scientific Information.

5. circa 1959 Detroit River Boring locations and Boring logs near Grassy Island. 5 pp.

1959 Detroit River Boring Locations

GREAT LAKES CONNECTING CHANNELS & HARBOR STUDY

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Boring Logs — Sect. II

ST. CLAIR RIVER
Boring Locations — Sect. III
Boring Logs — Sect. IV

DETROIT RIVER
Boring Locations — Sect. V
Boring Logs — Sect. VI

PROPOSED BORINGS
ST. MARY'S RIVER — SECT. VII
ST. CLAIR RIVER — SECT. VIII
DETROIT RIVER — SECT. IX

CIRCA 1959

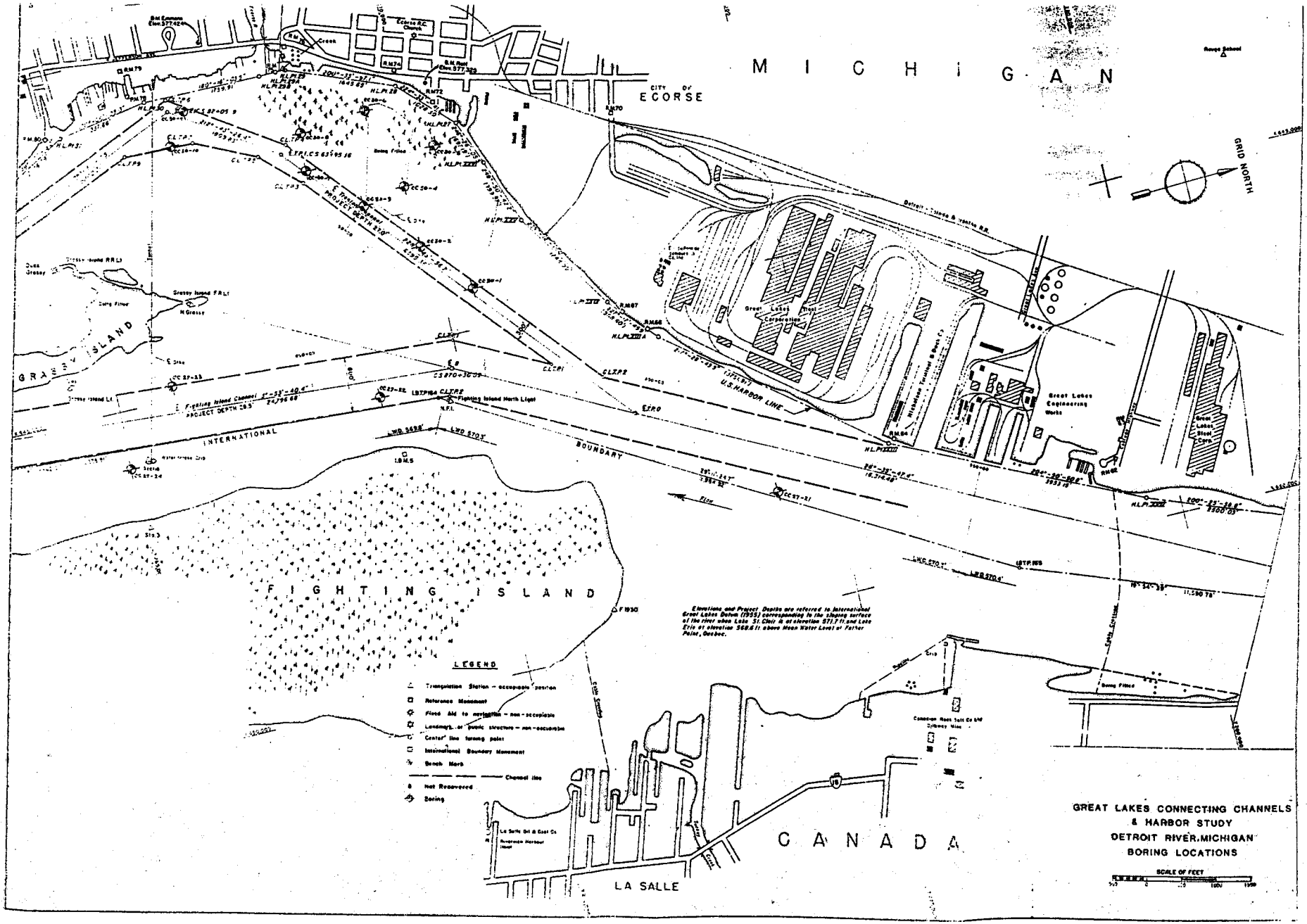
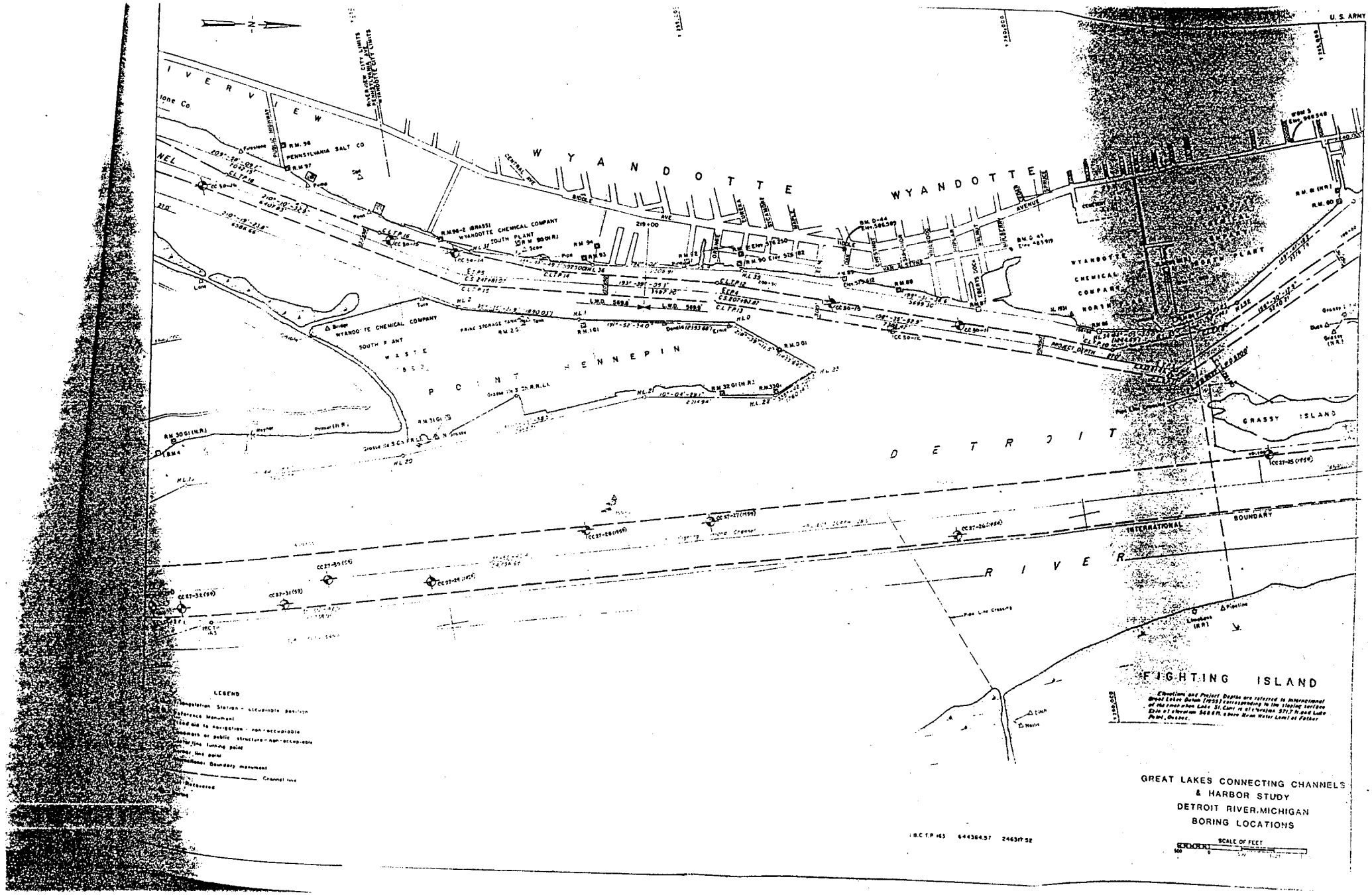
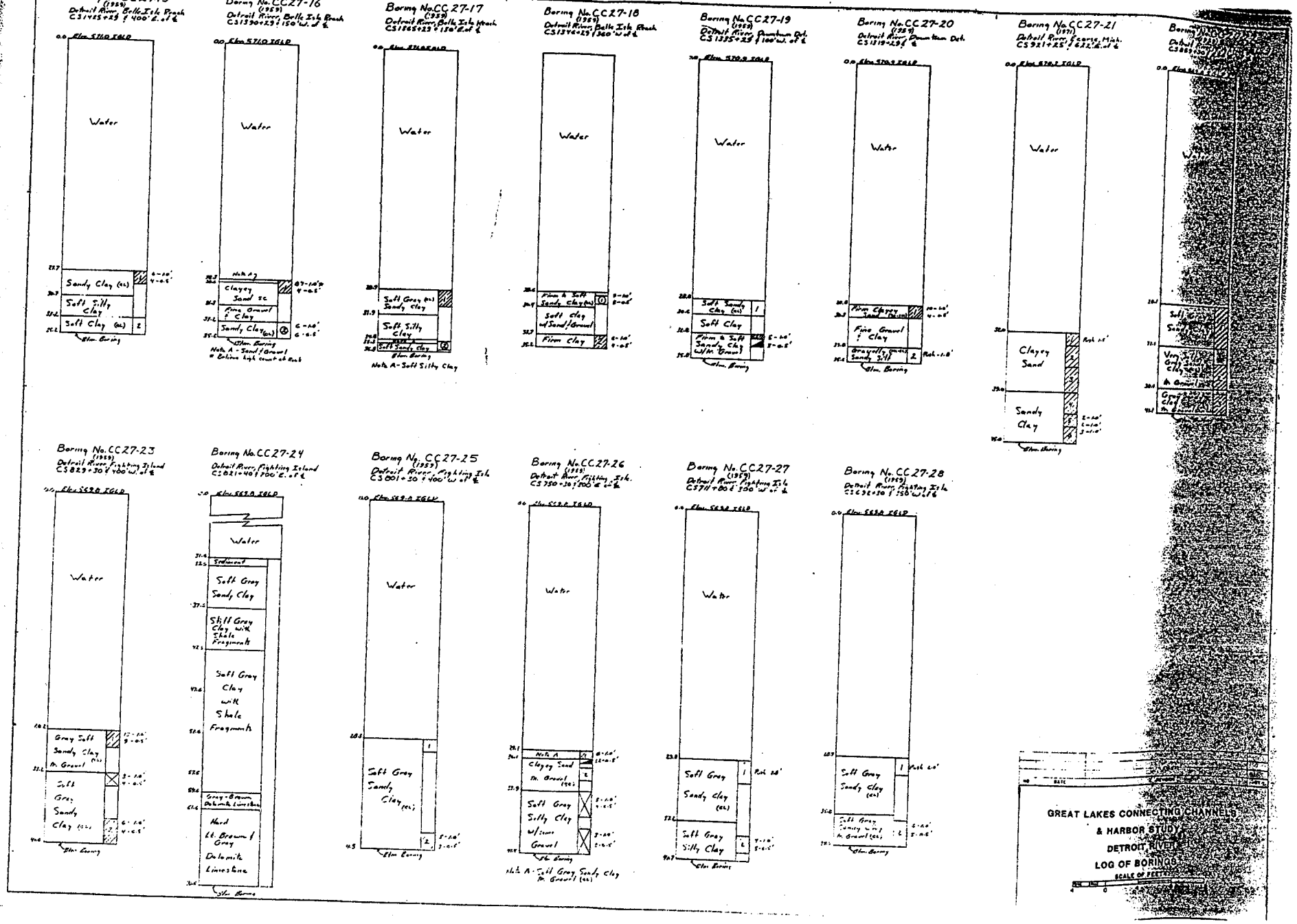
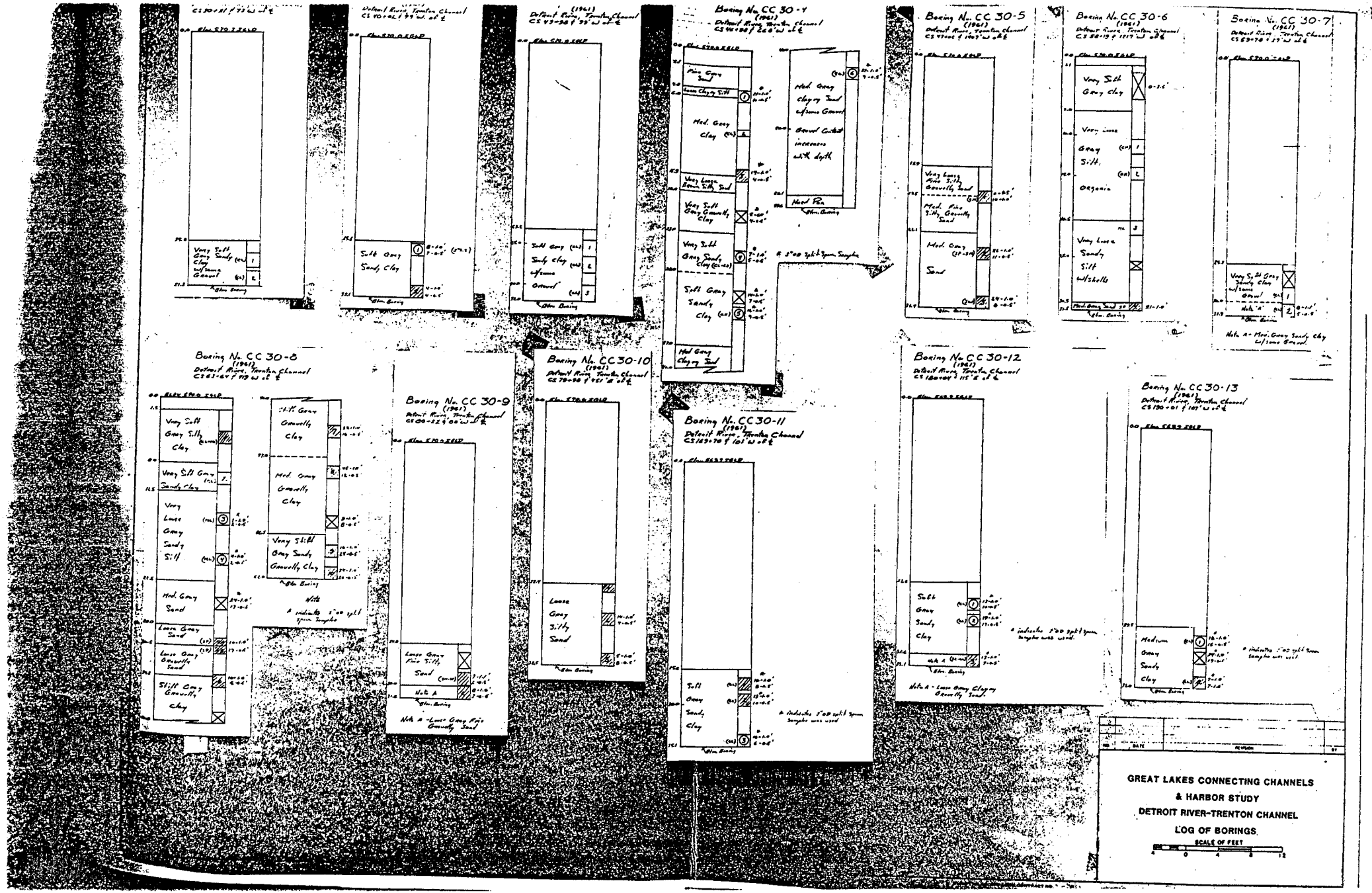

M I C H I G A N
CITY OF ECORSE
GRID NORTH
GRASSY ISLAND
INTERNATIONAL BOUNDARY
U.S. HARBOR LINE
Great Lakes Engineering Works
Great Lakes Steel Corp.
FIGHTING ISLAND
Elevations and Project Depths are referred to International Great Lakes Datum (1955) corresponding to the stage surface of the river when Lake St. Clair is at elevation 571.7 ft and Lake Erie at elevation 568.6 ft above Mean Water Level at Father Point, Quebec.
LEGEND
Triangulation Station — occupiable position
Reference Monument
Fixed Aid to navigation — non-occupiable
Landmark or prominent structure — non-occupiable
Center line turning point
International Boundary Monument
Bench Mark
Channel line
Not Recovered
Boring
C A N A D A
LA SALLE
GREAT LAKES CONNECTING CHANNELS
& HARBOR STUDY
DETROIT RIVER, MICHIGAN
BORING LOCATIONS
SCALE OF FEET

PLATE 22


U. S. ARMY
WYANDOTTE
WYANDOTTE
RIVERVIEW
PENNSYLVANIA SALT CO
WYANDOTTE CHEMICAL COMPANY
SOUTH PLANT
WYANDOTTE CHEMICAL COMPANY
SOUTH PLANT
WASTE BED
POINT HENNEPIN
DETROIT
RIVER
GRASSY ISLAND
INTERNATIONAL BOUNDARY
FIGHTING ISLAND
LEGEND
GREAT LAKES CONNECTING CHANNELS
& HARBOR STUDY
DETROIT RIVER, MICHIGAN
BORING LOCATIONS
SCALE OF FEET


Boring No. CC27-16 (1959)
Detroit River, Belle Isle Reach
Boring No. CC27-17 (1959)
Detroit River, Belle Isle Reach
Boring No. CC27-18 (1959)
Detroit River, Belle Isle Reach
Boring No. CC27-19 (1959)
Detroit River, Downtown Det.
Boring No. CC27-20 (1959)
Detroit River, Downtown Det.
Boring No. CC27-21 (1971)
Detroit River, Ecorse, Mich.
Boring No. CC27-23 (1959)
Detroit River, Fighting Island
Boring No. CC27-24
Detroit River, Fighting Island
Boring No. CC27-25 (1959)
Detroit River, Fighting Isle
Boring No. CC27-26 (1959)
Detroit River, Fighting Isle
Boring No. CC27-27 (1959)
Detroit River, Fighting Isle
Boring No. CC27-28 (1959)
Detroit River, Fighting Isle
Water
Sandy Clay
Soft Silty Clay
Soft Clay
Clayey Sand
Fine Gravel & Clay
Soft Gray Sandy Clay
Soft Silty Clay
Firm Clay
Soft Sandy Clay
Soft Clay
Firm Clayey Sand
Fine Gravel & Clay
Gravelly Sandy Silt
Clayey Sand
Sandy Clay
Soft Gray Sandy Clay
Stiff Gray Clay with Shale Fragments
Soft Gray Clay with Shale Fragments
Hard Lt. Brown & Gray Dolomite Limestone
Soft Gray Sandy Clay
Soft Gray Silty Clay
Note A - Soft Silty Clay
Note A - Soft Gray Sandy Clay
Note A - Soft Gray Sandy Clay
GREAT LAKES CONNECTING CHANNELS
& HARBOR STUDY
DETROIT RIVER
LOG OF BORINGS
SCALE OF FEET


Boring No. CC 30-4 (1961)
Detroit River - Trenton Channel
Boring No. CC 30-5 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-6 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-7 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-8 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-9 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-10 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-11 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-12 (1961)
Detroit River, Trenton Channel
Boring No. CC 30-13 (1961)
Detroit River, Trenton Channel
GREAT LAKES CONNECTING CHANNELS
& HARBOR STUDY
DETROIT RIVER-TRENTON CHANNEL
LOG OF BORINGS
SCALE OF FEET

Appendix A: Unpublished Scientific Information.

6. FWPCA 1967 Report "Pilot study of Rouge River Dredging Aug-Dec 1967". 114 pp.

FWPCA 1967 REPORT

APPENDIX A 6

PILOT STUDY OF ROUGE RIVER DREDGING

AUGUST - DECEMBER 1967

U.S. DEPARTMENT OF THE INTERIOR
Federal Water Pollution Control Administration
Great Lakes Region
Detroit Program Office
U.S. Naval Air Station
Grosse Ile, Michigan

ROUGE RIVER PILOT STUDY

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Nitrate	63
Nitrite	64
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Organic Nitrogen	66
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Fecal Coliform	68
Total Solids	69
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PURPOSE

The Rouge River Pilot Study was conducted to determine the degree and extent of pollution caused by the dredging operations on the Rouge River and the associated dumping of the dredged material on to Grassy Island.

SCOPE

The results of the study include water quality measurements in the Rouge and Detroit Rivers during the period of dredging, chemical characteristics of the undisturbed and dredged bottom sediments, water quality of discharges from the dumping grounds, and the quality of water found in the Grassy Island wells.

The quality of industrial and municipal discharges during the study and variations in flow characteristics of the Detroit and Rouge Rivers during the same period were not determined.

ORGANIZATION

The Rouge River Pilot Study was a cooperative effect of the Detroit District of the U.S. Army Corps of Engineers and the Detroit Program Office of the Federal Water Pollution Control Administration.

ACKNOWLEDGEMENTS

The Detroit Program Office received assistance in the preparation of this report from several individuals and organizations including the U.S. Army Corps of Engineers and the City of Wyandotte.

SUMMARY

1. Both the undisturbed and dredged Rouge River bottom sediments are grossly polluted, containing high concentrations of oil, iron and volatile solids. (pages 7-15, 95 and 96)

2. The dredging operation causes significant increases in concentrations of suspended solids, COD, BOD, total phosphate, volatile suspended solids, and iron in the immediate vicinity of the dredge. (pages 94 and 97)

3. The most severe pollution caused by the dredging operation was observed during the overflow of the hopper bins. (pages 45-48)

4. Decreased transparencies were observed in the dredging area for up to an hour after the passing of the dredge. (pages 45 and 48)

5. Decreases in the dissolved oxygen concentration were observed in the dredging area after the dredge had passed. (pages 45 and 48)

6. Levels of polluting constituents decreased substantially at a distance one-half mile downstream from the dredging activity. (pages 94 and 97)

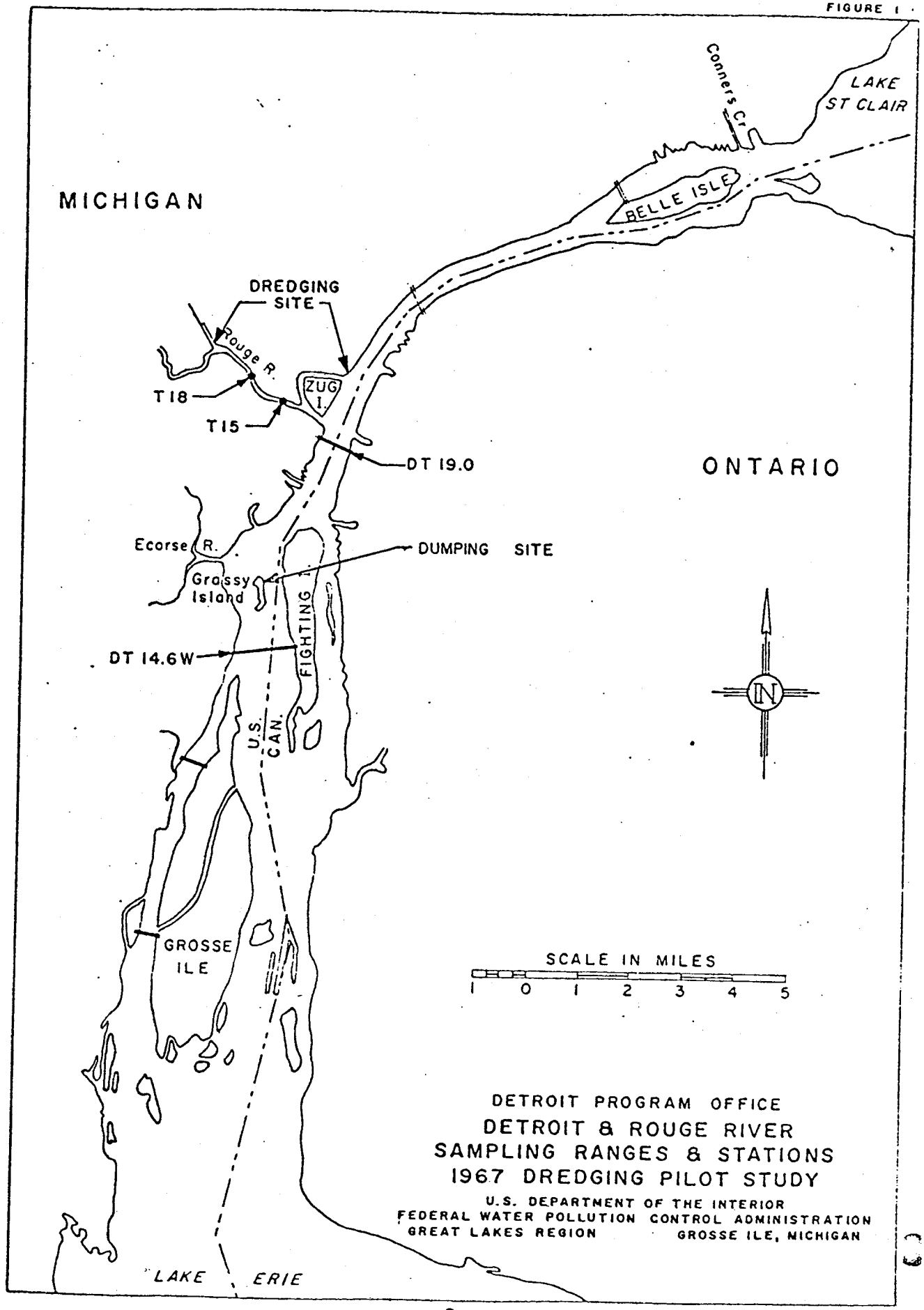
7. Detention of the homogeneous dredged material in the hopper bins provided for 47% solids removal before overflow. (pages 95 and 96)

8. Water quality changes in the Detroit River could not be attributed to either the dredging or disposal operations. (page 94)

9. The seepage rate from the Grassy Island dumping grounds is low. (page 98)

10. The Grassy Island pond acts as a stabilization and settling pond. (page 98)

FIGURE 1



DETROIT PROGRAM OFFICE

DETROIT & ROUGE RIVER
SAMPLING RANGES & STATIONS
1967 DREDGING PILOT STUDY

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN

INTRODUCTION AND BACKGROUND

The Rouge River rises northwest of Detroit and flows southeasterly, emptying into the Detroit River at a point 19 miles north of Lake Erie.

The lower 3.5 miles of the river lies in an area dominated by heavy industry. Allied Chemical Corporation, American Agricultural Chemical Company, Darling and Company, Ford Motor Company, American Cement Corporation, and Scott Paper Company have outfalls on the Rouge River which discharge nearly 500 million gallons of cooling and process water each day. Principal waste constituents discharged are: iron, oxygen-demanding substances, bacteria, suspended solids, oil, pickle liquor, phenols, chlorides, cyanides, toxic metals, and ammonia. In additon, the Detroit sewage treatment plant discharges over 500 MGD of primary effluent into the Detroit River near the mouth of the Rouge River. There are also numerous stormwater outfalls which discharge into the Rouge and Detroit Rivers. An overflow can be considered to occur for all rainstorms greater than .2 inches total precipitation per day. The record of daily precipitation reported at Detroit Metropolitan Airport is shown in Table 1.

The main sources of pollution on the Rouge and Detroit Rivers are discussed in detail in the "Proceedings of the Conference in the Matter of Pollution of the Navigable Waters of the Detroit River and Lake Erie and their Tributaries in the State of Michigan, Second Session June 15-18, 1965." Industrial waste outfalls are shown in Volume 1, page 217A, and the average concentrations of the waste constituents are listed in Volume II, pages 374, and 375. The sewage plant outfalls and stormwater overflows are shown in Volume 1, page 226, and the summary of the Domestic Waste Surveys.

Table 1
- Metropolitan Airport -
Detroit, Michigan
Precipitation
(Total Water Equivalent, Inches)
1967

FWPCA, DPO

Aug.	21	0	Oct.	5	0	Nov.	19	0
Aug.	22	trace	Oct.	6	0	Nov.	20	0
Aug.	23	0	Oct.	7	.01	Nov.	21	.13
Aug.	24	0	*Oct.	8	1.02	Nov.	22	.11
Aug.	25	0	Oct.	9	.03	Nov.	23	trace
*Aug.	26	.3	Oct.	10	.01	Nov.	24	0
Aug.	27	.04	Oct.	11	trace	Nov.	25	trace
Aug.	28	.12	Oct.	12	0	Nov.	26	trace
Aug.	29	trace	Oct.	13	.08	Nov.	27	trace
*Aug.	30	.34	Oct.	14	trace	Nov.	28	.03
Aug.	31	0	*Oct.	15	1.03	Nov.	29	trace
Sept.	1	0	*Oct.	16	.39	Nov.	30	.02
Sept.	2	0	*Oct.	17	1.70	Dec.	1	0
Sept.	3	0	Oct.	18	.01	*Dec.	2	.73
Sept.	4	0	Oct.	19	trace	Dec.	3	.05
Sept.	5	0	Oct.	20	0			
Sept.	6	0	Oct.	21	0			
Sept.	7	0	Oct.	22	0			
Sept.	8	0	Oct.	23	0			
Sept.	9	0	Oct.	24	.03			
Sept.	10	0	Oct.	25	trace			
Sept.	11	0	Oct.	26	trace			
Sept.	12	0	*Oct.	27	.54			
Sept.	13	0	Oct.	28	trace			
Sept.	14	0	Oct.	29	0			
Sept.	15	0	Oct.	30	0			
Sept.	16	0	Oct.	31	.02			
Sept.	17	0	*Nov.	1	.85			
Sept.	18	0	Nov.	2	.18			
Sept.	19	trace	*Nov.	3	.49			
Sept.	20	.07	Nov.	4	.02			
*Sept.	21	1.20	Nov.	5	.01			
Sept.	22	0	Nov.	6	trace			
Sept.	23	trace	Nov.	7	trace			
Sept.	24	trace	Nov.	8	trace			
Sept.	25	0	Nov.	9	0			
Sept.	26	0	Nov.	10	.05			
*Sept.	27	.22	*Nov.	11	.26			
Sept.	28	.04	Nov.	12	.02			
*Sept.	29	.30	Nov.	13	.04			
Sept.	30	.13	Nov.	14	.11			
Oct.	1	0	Nov.	15	0			
Oct.	2	0	Nov.	16	0			
Oct.	3	0	*Nov.	17	.34			
Oct.	4	0	Nov.	18	.11			

*Probable stormwater overflows

is shown in Volume II, pages 363 and 364.

Continual accumulation of bottom sediments from effluents discharged to the Rouge River and from natural runoff necessitates annual maintenance dredging of the navigation channel in the lower river. Each year, a U.S. Corps of Engineers' hopper dredge removes over 100,000 cubic yards of bottom sediments from the Rouge River. The following table indicates the dredging activities which have been undertaken in the Rouge River in the last six years. The bin volume is the amount of sludge actually deposited on Grassy Island from the dredge. The place volume indicates the amount of undisturbed material removed from the Rouge.

Corps of Engineers
Maintenance Dredging
Rouge River
1962-1967

Dredging Period	Bin Volume (cu. yds.)	Place Volume (cu. yds.)
October - December 1962	148,000	95,000
September - December 1963	160,000	102,000
September 18 - December 17, 1964	253,000	171,000
October 1 - December 17, 1965	209,000	125,000
September 26 - December 17, 1966	281,000	119,000
August 25 - November 16, 1967	342,000	222,000

The Grassy Island dumping grounds, covering an area of 80 acres, is located on the American side of the Detroit River approximately four miles south of the mouth of the Rouge River. Grassy Island was formerly a low swampy area at approximately river level. In 1960, the Corps of Engineers completed construction of an earth dike of clay material approximately 6 feet high around the perimeter of the island to contain the spoil

from Rouge River dredging. As now constructed there is no overflow weir. There is however, a valved drain pipe which is used to remove water after settling.

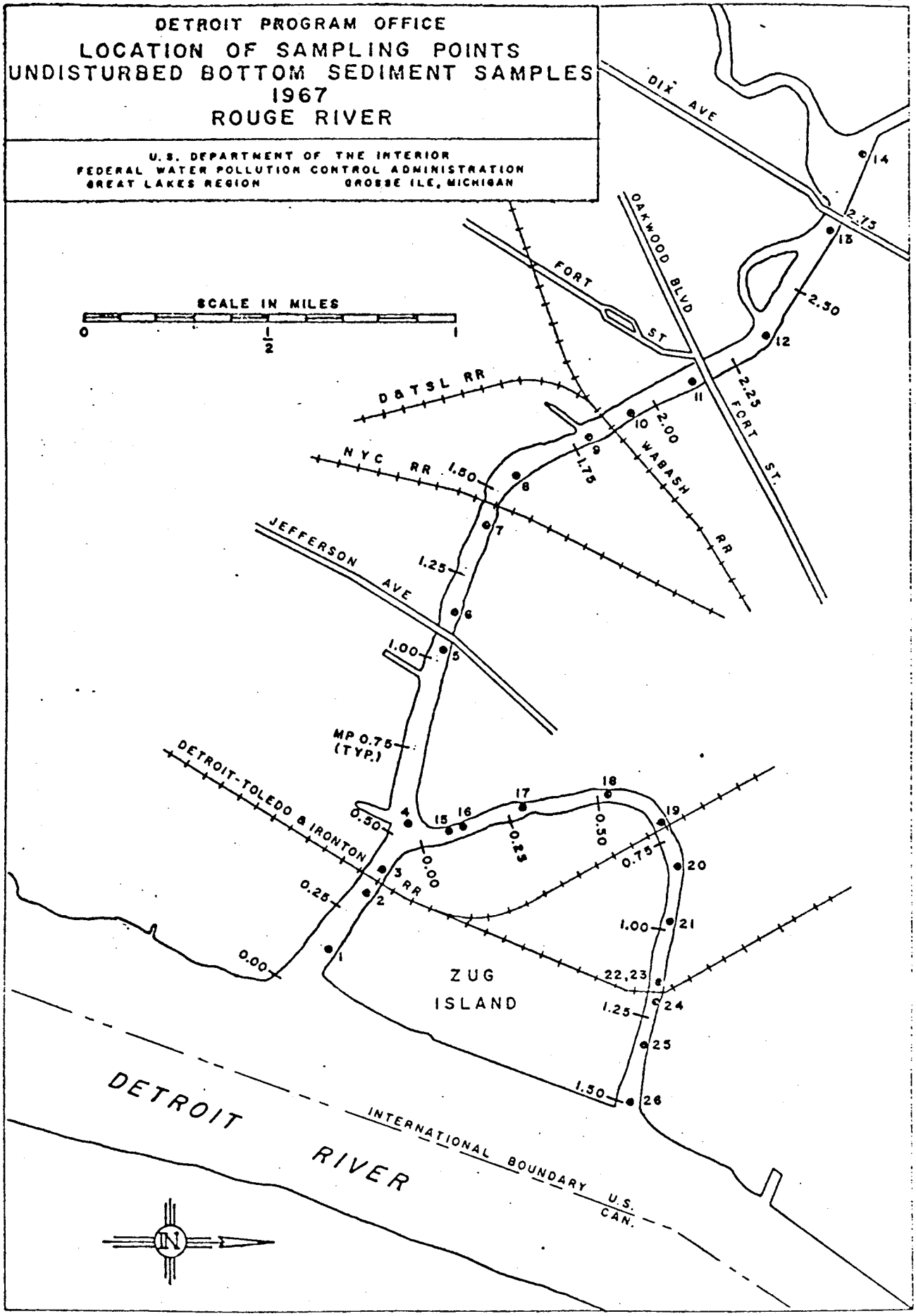
On a typical dredging and dumping run of two to three hour duration, the dredge, with its hoppers loaded with Rouge River bottom sediments, traveled south down the Detroit River to Grassy Island. Upon reaching the island, the dredge was hooked up to the inflow pipe and its load was pumped on to the island through one branch of the Y-shaped piping system (shown in Figure 7). After unloading, the dredge returned to the Rouge River to repeat the cycle.

I. INVESTIGATION PROCEDURES AND DATA

A. Dredging Site - Rouge River

Characteristics of Undisturbed Bottom Sediments

In order to determine the characteristics of the undisturbed bottom sediments, sludge samples were collected with the Petersen dredge along the length of the Rouge River prior to the commencement of the dredging operations. Fourteen samples were collected in the main stem of the Rouge from Ford Motor Company turning basin to the mouth of the Short-cut Canal. Twelve additional bottom sediment samples were collected in the Old Channel of the Rouge. The sampling stations are shown in Figure 2 and the results of the analysis of the sludge as shown in Table 3. Explanation of the material and descriptions listed in Table 3 is given on pages 7 and 8.


DETROIT PROGRAM OFFICE
LOCATION OF SAMPLING POINTS
UNDISTURBED BOTTOM SEDIMENT SAMPLES
1967
ROUGE RIVER
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN
SCALE IN MILES
0
1/2
1
DIX AVE
OAKWOOD BLVD
FORT ST
D&TSL RR
NYC RR
JEFFERSON AVE
WABASH RR
FORT ST.
DETROIT-TOLEDO & IRONTON RR
MP 0.75 (TYP.)
ZUG ISLAND
DETROIT RIVER
INTERNATIONAL BOUNDARY U.S. CAN.
N
1.80
1.75
2.00
2.25
2.30
1.25
1.00
0.50
0.25
0.00
0.75
1.50

Description of Bottom Material

The descriptions of bottom materials are listed in Table 2. The sediments were classified as follows:

Ooze: soft, fine, decaying organic material.

Sludge: (clay, silt, mud or organic material): non-gritty material of natural or unnatural origin.

Sand: gritty particles up to 1/25" in diameter

Gravel: 1/25" to 1/4"

Pebbles: 1/4" to 2"

Stones: 2" to 10"

Table 1
Qualitative Descriptions of Odors*
FWPCA, DPO, 1967

Code	Nature of Odor	Description (Such as Odors of:)
A	Aromatic (spicy)	camphor, cloves, lavender, lemon
Ac	cucumber	Synura
B	Balsamic (flowery)	geranium, violet, vanilla
Bg	geranium	Asterionella
Bn	nasturtium	Aphanizomenon
Bs	sweetish	Coelosphaerium
Bv	violet	Mallomonas
C	Chemical	industrial wastes or treatment chemicals
Cc	chlorinous	free chlorine
Ch	hydrocarbon	oil refinery wastes
Cm	medicinal	phenol and iodoform
Cs	sulfuretted	hydrogen sulfide
D	Disagreeable	(pronounced, unpleasant)
Df	fishy	Uroglenopsis, Dinobryon
Dp	pigpen	Anabaena
Ds	septic	stale sewage
E	Earthy	damp earth
Ep	peaty	peat
G	Grassy	crushed grass
M	Musty	decomposing straw
Mm	moldy	damp cellar
V	Vegetable	root vegetables

*Standard Methods of Examination of Water & Wastewater, 11th Edition, p. 255

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Rouge River Pilot Study - 1967
Undisturbed Bottom Sediment

Table 3

SAMPLE NO.	MILE POINT	CORPS. DESIGNATION	DATE	LAB. NO.	TEMP. °C	GROSS DESCRIPTION (Description; odor*)
Main Rouge						
at D.R.	.00					
1	.14	29-26	7-18	29754	19.0	Black, gray sludge & coal
2	.33	27-19	7-18	29755	19.5	Black ooze & pulpwood, sludge worms
3	.40	25-29	7-18	29757	19.5	Gray sludge; D (decomposing wood)
4	.55	24-27	7-18	29756	19.5	Gray sludge & ooze; D (decomposing wood)
5	1.05	21-23	7-19	29763	21.0	Dark-gray sludge; C_h
6	1.15	19-22	7-19	29764	22.0	Dark-gray sludge; C_h
7	1.40	17-22	7-19	29765	20.0	Dark gray sludge & ooze; C_h
8	1.57	15-26	7-19	29766	21.0	Dark gray sludge & ooze; C_h
9	1.80	13-17	7-19	29767	21.0	Dark gray sludge & ooze; C_h
10	1.93	11-24	7-19	29768	22.0	Dark gray sludge; C_h, D, M
11	2.14	9-19	7-26	30751	23.5	Dark gray sludge & ooze; C_h
12	2.37	7-23	7-26	30752	24.0	Dark gray sludge & ooze; trace oil & iron oxide; C_h
13	2.71	5-20	7-19	29769	24.0	Dark gray sludge, ooze, trace oil & iron oxide; C_h
14	2.94	2-18	7-19	29770	24.0	Dark sludge, ooze, trace oil & iron oxide; C_h
Old Channel						
Cutoff	.00					
15	.08	32-20	7-18	29762	20.0	Gray sludge & pulpwood; D (decomposing wood), C_h
16	.12	34-	7-18	29758	20.0	Gray sludge & pulpwood; D (decomposing wood), C_h
17	.29	36A-21	7-18	29759	27.0	Gray sludge, trace oil; C_h
18	.52	36-17	7-18	29760	24.0	Gray sludge & pulpwood, sludge worms, trace oil; D
19	.70	38-21	7-18	29761	20.0	Gray sludge & ooze, some sand, C_m, C_h, D
20	.82	39-20	7-18	29750	22.0	Dark gray sand, sludge & ooze; C_m, C_h
21	.98	40-22	7-18	29749	23.0	Dark gray sand, sludge, stones, pebbles; C_m, C_h
22	1.15	42-24	7-18	29748	22.0	Dark gray gravel, pebbles & sand; C_m, C_h
23	1.15	42-24	7-26	30750	19.0	Dark gray ooze, sand & pebbles, sludge worms; C_m, C_h
24	1.20	43-14	7-18	29751	19.0	Light gray sludge; C_m, C_h
25	1.32	45-21	7-18	29752	19.0	Gray sludge & ooze, some clay; D_s, D_p, C_h
26	1.48	46-25	7-18	29753	18.5	Gray sludge & ooze; C_h, D

Rouge River Pilot Study - 1967
Undisturbed Bottom Sediment

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Table 3 (cont.)

SAMPLE NO.	IMMED. DO DEM Mg/Kg Wet Basis	COD Mg/Kg Wet Basis	PHENOLS µg/Kg Wet Basis	TOTAL PO_4 Mg/Kg Wet Basis	TOT. SOL. PO_4 Mg/Kg Wet Basis	NITRATE NO_3-N Mg/Kg Wet Basis	NITRITE NO_2-N Mg/Kg Wet Basis	AMMONIA NH_3-N Mg/Kg Wet Basis	ORGANIC NITROGEN Mg/Kg Wet Basis	IRON Mg/Kg Wet Basis	OIL & GREASE Mg/Kg Dry Basis	TOTAL SOLIDS % Wet Basis	VOL SOLIDS % Dry Basis	BOD Mg/Kg Wet Basis
1	100		1300	870	3	80	-	20	30	7800	9000	51	34	10,000
2	70		880	250	4	40	.1	10	30	8500	9000	52	20	11,000
3	-		690	2400	2	< 8	< .05	6	10	7300	1000	66	6	820
4	-		440	2700	2	< 8	.1	30	-	17,000	20,000	48	13	3900
5	80		220	4800	2	< 8	.08	100	60	45,000	40,000	51	19	6700
6	100		440	5000	3	20	.1	300	80	41,000	60,000	45	19	4800
7	100		340	1800	4	8	.06	50	60	43,000	50,000	35	17	5400
8	100		1900	3800	1	90	.05	50	80	43,000	40,000	36	18	10,000
9	200		780	4500	< 1	10	.06	70	-	50,000	50,000	39	18	6700
10	100		1000	2900	3	10	.05	60	40	39,000	30,000	40	14	6700
11	500		410	3900	5	30	< .05	-	-	59,000	50,000	45	16	8500
12	500		2100	1700	4	20	< .05	50	200	50,000	60,000	40	15	14,000
13	100		< 190	2700	2	20	.06	70	60	44,000	30,000	44	11	2200
14	100		590	1700	4	10	< .05	100	100	55,000	40,000	39	18	5800
15	-		440	660	1	8	< .05	40	20	6500	20,000	28	35	5800
16	-		1500	760	2	20	< .05	30	40	3600	20,000	28	16	9100
17	-		690	1300	< 1	10	< .05	70	80	6800	10,000	48	11	4800
18	-		1200	1400	2	< 8	.05	60	30	10,000	10,000	56	15	1700
19	-		1500	1400	2	< 8	< .05	20	40	16,000	1,000	65	16	2700
20	90		1300	1300	2	40	.09	-	-	14,000	20,000	56	22	8200
21	40		2600	190	2	60	.1	30	9	11,000	5,000	81	10	3800
22	60		5600	3600	5	20	.1	30	8	22,000	40,000	73	12	9100
23	40		1800	1000	6	10	< .05	50	-	9400	60,000	44	18	9200
24	30		1000	520	1	8	.1	8	40	3000	9,000	47	11	6700
25	60		1200	920	3	70	.08	8	50	6600	10,000	37	16	9100
26	70		1100	440	1	200	.06	50	20	10,000	2,000	43	12	2700

Dredged Sludge (Intake and Overflow)

In order to determine the characteristics of the dredged sludge, samples were collected from the intake of the hopper dredge. The material, as it flowed with varying consistency into the hopper from an inflow chute, was collected with a metal bucket suspended from a rope. Samples collected after October 12 were composites of the inflow from both side of the dredge.

Samples were also collected from the overflow material. These samples were collected with a metal bucket at the edge of the hopper as the material overflowed into the river. The results of the chemical analysis of both the intake and overflow material are shown in Tables 4 and 5. The conclusions regarding the dredged sludge are discussed on pages 95 and 96.

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TABLE 4
HOFFMAN INTAKE

Date	IMMED. DO DEM Mg/Kg Wet Basis	COD Mg/Kg Wet Basis	PHENOLS ug/Kg Wet Basis	TOTAL PO_4 Mg/Kg Wet Basis	TOT. SOL. PO_4 Mg/Kg Wet Basis	NITRATE NO_3-N Mg/Kg Wet Basis	NITRITE NO_2-N Mg/Kg Wet Basis	AMMONIA NH_3-N Mg/Kg Wet Basis	ORGANIC NITROGEN Mg/Kg Wet Basis	IRON Mg/Kg Wet Basis	OIL & GREASE Mg/Kg Dry Basis	TOTAL SOLIDS % Wet Basis	FIXED SOLIDS % Dry Basis	VOL. SOLIDS % Dry Basis
8-31	-	68,000	1,100	2,800	3	20	0.3	200	50	40,000	40,000	40	86	14
9-7	1,000	24,000	2,200	2,600	3	30	0.07	200	40	46,000	20,000	62	51	49
9-14	800	86,000	610	3,000	3	40	0.07	200	40	42,000	40,000	40	85	15
9-21	500	130,000	890	3,600	2	10	0.08	80	20	38,000	40,000	39	85	15
10-5	400	68,000	2,000	1,900	3	20	0.09	100	40	24,000	40,000	23	86	14
10-12	700	150,000	940	4,400	4	20	0.05	200	70	50,000	50,000	42	80	20
10-19	500	97,000	1,000	2,700	<1	10	0.06	100	40	24,000	50,000	26	83	17
10-29	50	44,000	990	550	3	<8	<0.05	40	40	5,100	10,000	22	84	16
11-8	600	120,000	850	40		< 8	< 0.05	10	2	24,000	40,000	36	83	17

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TABLE 5
HOFFMAN OVERFLOW

Date	IMMED. DO DEM Mg/Kg Wet Basis	COD Mg/Kg Wet Basis	PHENOLS ug/Kg Wet Basis	TOTAL PO_4 Mg/Kg Wet Basis	TOT. SOL. PO_4 Mg/Kg Wet Basis	NITRATE NO_3-N Mg/Kg Wet Basis	NITRITE NO_2-N Mg/Kg Wet Basis	AMMONIA NH_3-N Mg/Kg Wet Basis	ORGANIC NITROGEN Mg/Kg Wet Basis	IRON Mg/Kg Wet Basis	OIL & GREASE Mg/Kg Dry Basis	TOTAL SOLIDS % Wet Basis	FIXED SOLIDS % Dry Basis	VOL. SOLIDS % Dry Basis
8-31		53000	660	2200	2	20	0.06	70	20	31000	70000	23	79	21
9-7	500	50000	750	1800	1	20	< 0.05	90	90	25000	40000	22	85	15
9-14	400	63000	1000	2300	2	20	0.07	100	30	23000	60000	22	84	16
9-21	300	-	1400	1900	1	10	0.07	200	40	17000	50000	19	85	15
10-5	200	66000	1500	1600	2	10	0.08	100	20	20000	40000	19	86	14
10-12	200	61000	810	1500	4	10	< 0.05	30	40	17000	70000	15	79	21
10-19	300	25000	1100	2200	< 1	< 8	< 0.05	60	30	17000	50000	21	84	16
10-29	30	30000	380	480	2	< 8	< 0.05	30	30	5000	20000	16	86	14
11-8	100	23000	490	17		< 8	< 0.05	< 1	70	13000	40000	16	85	15

Dredging Operation

The study of the dredging operation was conducted to determine the pollutional effect of dredging on the water quality of the Rouge and Detroit Rivers. Water quality changes caused by dredging operations must be distinguished from changes occurring as a result of changes in effluent of the numerous pollution sources.

Station T15 (Jefferson Street bridge) and Station T18 (Fort Street bridge) on the Rouge River and R139 and R142 (on range DT 19.0, 100 and 400 feet from U.S. shore, respectively) on the Detroit River were sampled at mid-depth each week to determine water quality at these fixed points as the dredging progressed downriver. These stations are shown on Figure 3 and the results of the analyses as related to the position of the dredging operation are listed in Table 6 .

Water quality determinations of mid-depth samples were also made in the vicinity of the dredging operation. Samples collected in the stirred-up material about 50 feet behind the dredge during hopper overflow were analyzed to determine the worst condition created by the dredging. The sample collected 1/4 mile upstream reflects the water quality of the river unaffected by dredging. The analysis of the sample collected (1/4 mile and 1/2 mile) downstream shows the extent of the pollution. The results of the analyses are shown in Table 6 .

FIGURE 3

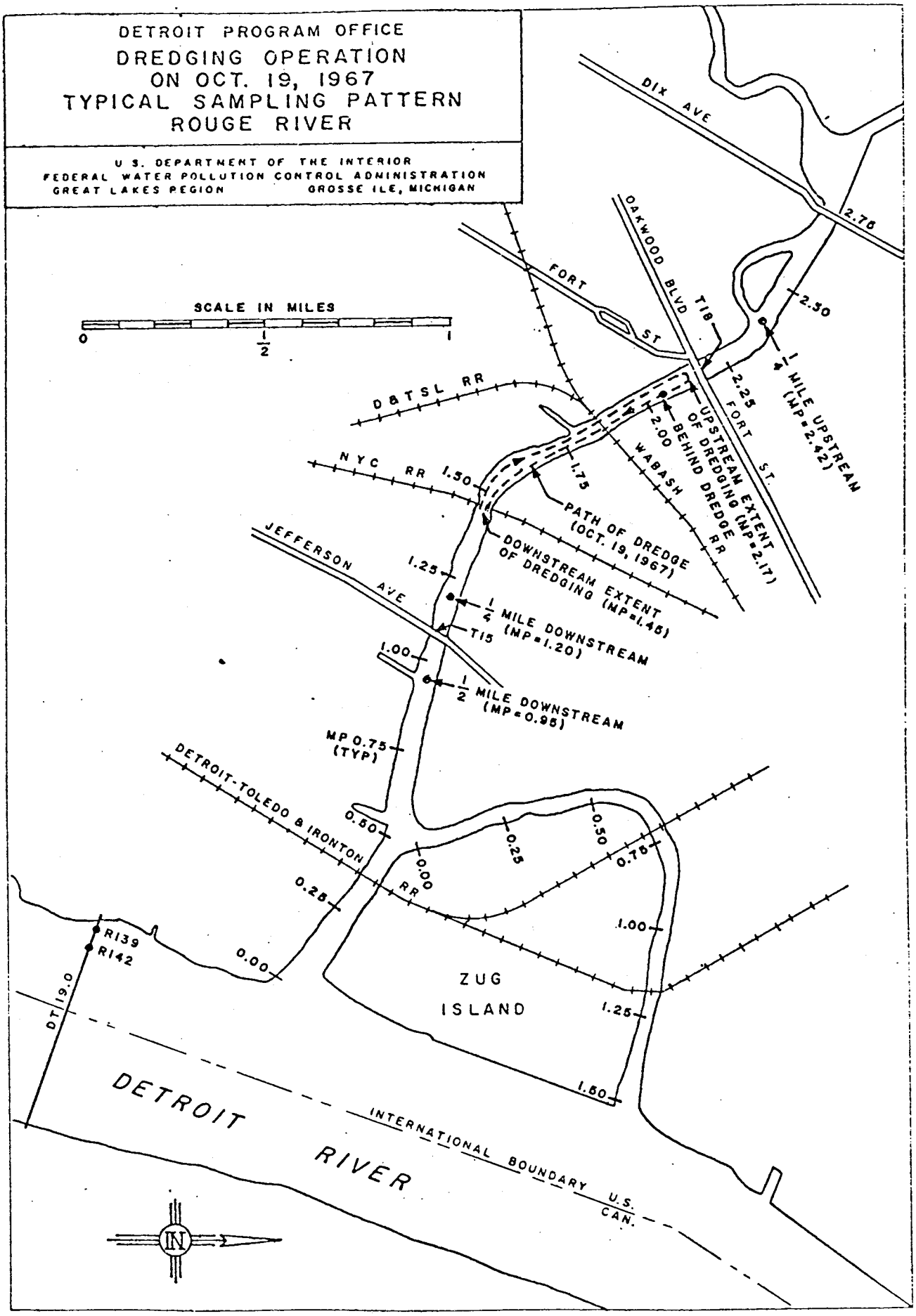

DETROIT PROGRAM OFFICE
DREDGING OPERATION
ON OCT. 19, 1967
TYPICAL SAMPLING PATTERN
ROUGE RIVER
U S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN
SCALE IN MILES
0
1/2
1
DIX AVE
2.75
OAKWOOD BLVD
FORT ST
T18
2.50
1/4 MILE UPSTREAM (MP=2.42)
2.25
FORT ST.
UPSTREAM EXTENT OF DREDGING (MP=2.17)
BEHIND DREDGE
2.00
WABASH RR
D&TSL RR
NYC RR
1.50
1.75
PATH OF DREDGE (OCT. 19, 1967)
DOWNSTREAM EXTENT OF DREDGING (MP=1.45)
JEFFERSON AVE
1.25
1/4 MILE DOWNSTREAM (MP=1.20)
T15
1.00
1/2 MILE DOWNSTREAM (MP=0.95)
MP 0.75 (TYP)
DETROIT-TOLEDO & IRONTON RR
0.50
0.25
0.00
0.50
0.75
0.25
1.00
R139
R142
0.00
DT 19.0
ZUG ISLAND
1.25
1.60
DETROIT RIVER
INTERNATIONAL BOUNDARY U.S. CAN.
IN

TABLE 6
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Temperature (°C)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	27.5	28.0	21.0	21.0
8-31	2.67 to 2.94	-	26.5	27.0	27.0	-	-	-	-
9-7	2.55 to 2.94	27.0	-	27.5	27.0	27.0	26.0	21.5	23.0
9-14	2.40 to 3.00	-	20.5	20.5	20.5	21.5	20.5	19.0	18.5
9-21	1.93 to 2.63	22.5	23.0	22.5	22.0	22.5	22.0	20.5	20.0
10-5	1.87 to 2.69	-	17.0	17.0	17.0	17.0	16.5	16.0	16.0
10-12	1.50 to 2.17	14.5	14.5	15.0	14.5	14.5	14.0	13.0	13.0
10-19	1.45 to 2.17	12.5	12.5	11.5	11.5	11.0	12.0	13.0	12.0
10-29	Old Channel	9.0	8.5	9.0	-	-	-	9.5	8.5
11-8	0.87 to 1.46	12.5	12.5	10.0	8.0	12.0	13.0	6.0	5.0
	Average	16.5	17.0	18.0	18.5	19.0	19.0	15.5	15.0
	Maximum	27.0	26.5	27.5	27.0	27.5	28.0	21.5	23.0
	Minimum	9.0	8.5	9.0	8.0	11.0	12.0	6.0	5.0
	No. Samples	6	8	9	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: pH (standard units)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	6.7	6.9	7.2	7.2
8-31	2.67 to 2.94	-	6.6	-	7.1	-	-	-	-
9-7	2.55 to 2.94	7.3	-	7.4	7.3	7.3	7.4	8.0	7.8
9-14	2.40 to 3.00	-	7.5	7.5	7.6	7.6	7.8	7.5	8.0
9-21	1.93 to 2.63	7.3	7.1	7.4	7.7	7.2	7.4	7.5	7.5
10-5	1.87 to 2.69	-	7.6	7.5	7.6	7.6	7.5	7.5	8.0
10-12	1.50 to 2.17	7.4	7.6	7.5	7.5	7.6	7.6	7.8	8.0
10-19	1.45 to 2.17	7.6	7.5	7.5	7.5	7.5	7.5	7.7	8.0
10-29	Old Channel	8.2	8.1	7.8	-	-	-	7.8	8.0
11-8	0.87 to 1.46	8.0	7.8	7.9	7.9	8.1	8.2	8.1	8.2
	Average	7.6	7.5	7.6	7.5	7.5	7.5	7.7	7.9
	Maximum	8.2	8.1	7.9	7.9	8.1	8.2	8.1	8.2
	Minimum	7.3	6.6	7.4	7.1	6.7	6.9	7.2	7.2
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Conductivity (umhos/cm)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	300	320	220	240
8-31	2.67 to 2.94	-	410	-	430	-	-	-	-
9-7	2.55 to 2.94	400	-	380	390	390	410	300	300
9-14	2.40 to 3.00	-	350	310	310	310	430	300	240
9-21	1.93 to 2.63	360	690	370	460	410	400	380	240
10-5	1.87 to 2.69	-	300	310	320	300	320	270	210
10-12	1.50 to 2.17	350	370	350	420	350	410	290	230
10-19	1.45 to 2.17	520	510	520	510	510	510	280	220
10-29	Old Channel	210	230	280	-	-	-	290	260
11-8	0.87 to 1.46	430	460	540	460	440	440	270	240
	Average	380	420	380	410	380	400	290	240
	Maximum	520	690	520	510	510	510	380	260
	Minimum	210	230	280	320	300	320	220	210
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Alkalinity (mg/l as $CaCO_3$)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	46	48	73	77
8-31	2.67 to 2.94	-	34	-	-	-	-	-	-
9-7	2.55 to 2.94	61	-	65	64	64	68	79	77
9-14	2.40 to 3.00	-	91	81	85	83	88	85	79
9-21	1.93 to 2.63	82	94	89	92	88	92	77	77
10-5	1.87 to 2.69	-	87	92	92	87	92	78	79
10-12	1.50 to 2.17	85	89	96	94	83	96	69	76
10-19	1.45 to 2.17	110	110	97	100	110	110	77	72
10-29	Old Channel	76	88	82	-	-	-	81	79
11-8	0.87 to 1.46	93	110	95	82	93	100	78	76
	Average	85	88	87	87	82	87	77	77
	Maximum	110	110	97	100	110	110	85	79
	Minimum	61	34	65	64	46	48	69	72
	No. Samples	6	8	8	7	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Chlorides (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	24	31	25	14
8-31	2.67 to 2.94	-	30	-	27	-	-	-	-
9-7	2.55 to 2.94	36	-	35	40	40	43	25	25
9-14	2.40 to 3.00	-	27	20	21	20	49	27	11
9-21	1.93 to 2.63	39	130	40	47	47	46	35	12
10-5	1.87 to 2.69	-	23	27	27	24	28	27	9
10-12	1.50 to 2.17	35	38	44	48	37	45	30	12
10-19	1.45 to 2.17	64	63	65	64	62	65	26	10
10-29	Old Channel	8	10	23	-	-	-	30	22
11-8	0.87 to 1.46	40	41	77	69	40	41	17	11
	Average	37	45	41	43	37	44	27	14
	Maximum	64	130	77	69	62	65	35	25
	Minimum	8	10	20	21	20	28	17	9
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Phenol (µg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	94	11	15	10
8-31	2.67 to 2.94	-	10	41	51	-	-	-	-
9-7	2.55 to 2.94	9	-	12	12	12	8	4	8
9-14	2.40 to 3.00	-	3	4	5	1	2	4	3
9-21	1.93 to 2.63	15	16	13	11	18	9	19	19
10-5	1.87 to 2.69	-	15	15	13	17	23	16	16
10-12	1.50 to 2.17	245	110	80	14	220	21	24	22
10-19	1.45 to 2.17	15	14	16	13	19	16	18	17
10-29	Old Channel	8	12	17	-	-	-	16	17
11-8	0.87 to 1.46	22	13	24	19	27	9	13	8
	Average	52	24	25	17	51	12	14	13
	Maximum	245	110	80	51	220	23	24	22
	Minimum	8	3	4	5	1	2	4	3
	No. Samples	6	8	9	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Dissolved Oxygen (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	1.8	2.9	7.4	7.9
8-31	2.67 to 2.94	-	1.5	-	1.9	-	-	-	-
9-7	2.55 to 2.94	1.3	-	2.9	2.3	2.3	2.2	8.1	8.0
9-14	2.40 to 3.00	-	1.9	3.9	3.0	3.1	1.7	7.9	8.6
9-21	1.93 to 2.63	4.7	0.1	0.2	.3	0.2	.2	7.7	8.2
10-5	1.87 to 2.69	-	5.4	2.7	2.4	5.2	1.8	9.9	9.7
10-12	1.50 to 2.17	2.0	0.6	0.1	0.1	2.2	0.1	9.1	9.6
10-19	1.45 to 2.17	4.4	2.8	3.6	3.0	4.3	2.8	9.6	10.0
10-29	Old Channel	10.6	10.1	8.1	-	-	-	10.4	10.5
11-8	0.87 to 1.46	7.6	6.8	6.5	9.2	7.7	6.4	11.2	11.5
	Average	5.1	3.7	3.5	2.8	3.4	2.3	9.0	9.3
	Maximum	10.6	10.1	8.1	9.2	7.7	6.4	11.2	11.5
	Minimum	1.3	0.1	0.1	0.1	0.2	0.1	7.4	7.9
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: BOD (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	3	3	4	4
8-31	2.67 to 2.94	-	4	-	3	-	-	-	-
9-7	2.55 to 2.94	2	-	2	2	2	2	5	4
9-14	2.40 to 3.00	-	16	4	2	3	4	5	4
9-21	1.93 to 2.63	2	7	5	4	4	3	5	9
10-5	1.87 to 2.69	-	13	5	4	4	4	7	4
10-12	1.50 to 2.17	5	5	6	6	4	6	5	4
10-19	1.45 to 2.17	3	11	4	5	4	4	2	3
10-29	Old Channel	3	6	14	-	-	-	4	4
11-8	0.87 to 1.46	2	9	13	16	2	4	5	4
	Average	3	9	7	5	3	4	5	4
	Maximum	5	16	14	16	4	6	7	9
	Minimum	2	4	2	2	2	2	2	3
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: COD (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	10	17	21	27
8-31	2.67 to 2.94	-	24	-	11	-	-	-	-
9-7	2.55 to 2.94	-	-	-	-	-	-	-	-
9-14	2.40 to 3.00	-	110	15	9	18	18	18	13
9-21	1.93 to 2.63	19	58	27	23	31	23	31	36
10-5	1.87 to 2.69	-	67	32	20	22	24	24	8
10-12	1.50 to 2.17	20	140	42	38	24	28	16	16
10-19	1.45 to 2.17	34	28	52	44	36	40	4	<1
10-29	Old Channel	6	35	61	-	-	-	22	14
11-8	0.87 to 1.46	19	130	58	56	19	33	25	8
	Average	20	74	41	29	23	26	20	15
	Maximum	34	140	61	56	36	40	31	36
	Minimum	6	24	15	9	10	17	4	<1
	No. Samples	5	8	7	7	7	7	8	8

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Total Phosphate (as PO_4) (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	.64	.55	.28	.60
8-31	2.67 to 2.94	-	.57	-	-	-	-	-	-
9-7	2.55 to 2.94	.38	-	.45	.34	.34	.27	.40	.51
9-14	2.40 to 3.00	-	4.9	.95	2.1	.91	2.7	.28	.38
9-21	1.93 to 2.63	.26	1.7	.67	.40	.61	.50	.24	.65
10-5	1.87 to 2.69	-	1.9	1.2	.92	1.3	.94	.32	.61
10-12	1.50 to 2.17	.67	.24	1.5	1.1	.65	1.2	.33	.66
10-19	1.45 to 2.17	.88	2.6	1.0	1.4	1.0	1.3	.35	.29
10-29	Old Channel	.17	.82	.55	-	-	-	.45	.71
11-8	0.87 to 1.46	1.2	3.0	2.2	.51	.49	4.2	.97	.75
	Average	.59	2.0	1.1	.97	.74	1.5	.40	.57
	Maximum	1.2	4.9	2.2	2.1	1.3	4.2	.97	.75
	Minimum	.17	.24	.45	.34	.34	.27	.24	.29
	No. Samples	6	8	8	7	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Total Soluble Phosphate (as PO_4)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	.28	.22	.12	.20
8-31	2.67 to 2.94	-	.06	-	-	-	-	-	-
9-7	2.55 to 2.94	.06	-	.11	.07	.07	.15	.32	.41
9-14	2.40 to 3.00	-	.08	.50	1.6	.49	2.3	.17	.23
9-21	1.93 to 2.63	.17	.13	.15	.19	.06	.15	.15	.27
10-5	1.87 to 2.69	-	.29	.14	.21	.22	.28	.30	.50
10-12	1.50 to 2.17	.17	.23	.17	.22	.18	.24	.12	.36
10-19	1.45 to 2.17	.39	.31	.34	.53	.31	.29	.27	.27
10-29	Old Channel	.09	.15	.33	-	-	-	.43	.30
11-8	0.87 to 1.46	.06	.06	.19	.47	.39	.30	.26	.27
	Average	.16	.16	.24	.47	.25	.49	.24	.31
	Maximum	.39	.31	.50	1.6	.49	2.3	.43	.50
	Minimum	.06	.06	.11	.07	.06	.15	.12	.20
	No. Samples	6	8	8	7	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Nitrate-N (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	.3	.3	.3	.3
8-31	2.67 to 2.94	-	.5	-	.3	-	-	-	-
9-7	2.55 to 2.94	<.1	-	<.1	.1	.1	<.1	.1	.1
9-14	2.40 to 3.00	-	1.9	.4	.4	.4	.3	.4	.4
9-21	1.93 to 2.63	.3	.3	.2	.3	.2	.1	.6	.4
10-5	1.87 to 2.69	-	.8	.5	.4	.6	.4	.3	.3
10-12	1.50 to 2.17	.4	.9	.6	.3	.5	.5	.3	.3
10-19	1.45 to 2.17	2.5	2.2	2.4	2.2	2.7	2.5	.4	.4
10-29	Old Channel	.2	.3	.2	-	-	-	.2	.1
11-8	0.87 to 1.46	1.4	1.3	1.2	.7	1.7	1.8	.6	.6
	Average	.8	1.0	.7	.6	.8	.8	.4	.3
	Maximum	2.5	2.2	2.4	2.2	2.7	2.5	.6	.6
	Minimum	<.1	.3	<.1	.1	.1	<.1	.1	.1
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Nitrite-N (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	.03	.03	<.01	<.01
8-31	2.67 to 2.94	-	.05	-	.06	-	-	-	-
9-7	2.55 to 2.94	.02	-	.02	.02	.02	.02	.01	.01
9-14	2.40 to 3.00	-	.02	.01	.01	.01	.01	.01	.01
9-21	1.93 to 2.63	.02	.04	.09	.04	.03	.05	.01	.02
10-5	1.87 to 2.69	-	.01	.02	.02	.02	.02	.01	.01
10-12	1.50 to 2.17	.04	.04	.09	.10	.04	.11	.02	.01
10-19	1.45 to 2.17	.05	.04	.05	.05	.05	.05	.02	.01
10-29	Old Channel	.01	.01	.01	-	-	-	.02	.02
11-8	0.87 to 1.46	.02	.02	.02	.01	.02	.03	.01	.01
	Average	.03	.03	.04	.04	.03	.04	.01	.01
	Maximum	.05	.05	.09	.10	.05	.11	.02	.02
	Minimum	.01	.01	.01	.01	.01	.01	<.01	<.01
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Ammonia-N (mg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	1.90	1.50	.12	.42
8-31	2.67 to 2.94	-	-	-	-	-	-	-	-
9-7	2.55 to 2.94	.83	-	1.30	-	1.20	1.10	.43	.30
9-14	2.40 to 3.00	-	.94	1.20	1.20	1.10	1.30	.06	.41
9-21	1.93 to 2.63	.58	1.70	1.50	1.80	1.20	1.30	.32	.72
10-5	1.87 to 2.69	-	.56	.85	.84	.64	.77	.46	.32
10-12	1.50 to 2.17	1.60	1.70	2.40	1.60	1.40	2.00	.34	.45
10-19	1.45 to 2.17	.69	.51	.76	.65	.80	.77	.40	.18
10-29	Old Channel	.12	.36	.10	-	-	-	.36	.45
11-8	0.87 to 1.46	.83	1.10	.97	.55	.99	1.00	.54	.37
	Average	.78	.98	1.10	1.10	1.20	1.20	.34	.40
	Maximum	1.60	1.70	2.40	1.80	1.90	2.00	.54	.72
	Minimum	.12	.36	.10	.55	.64	.77	.06	.18
	No. Samples	6	7	8	6	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Organic-N (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	.14	.14	.23	-
8-31	2.67 to 2.94	-	-	-	-	-	-	-	-
9-7	2.55 to 2.94	.12	-	.08	-	.07	<.05	.05	.05
9-14	2.40 to 3.00	-	<.05	.18	.05	.14	.10	<.05	.08
9-21	1.93 to 2.63	.09	<.05	.09	.10	<.05	.11	.14	.15
10-5	1.87 to 2.69	-	.10	.11	.17	.11	.06	.11	.10
10-12	1.50 to 2.17	.34	<.05	.35	.16	.09	.13	.58	.32
10-19	1.45 to 2.17	.12	.18	.18	.19	.12	.15	.16	.10
10-29	Old Channel	<.05	.24	.15	-	-	-	.11	.10
11-8	0.87 to 1.46	.06	.41	.10	.08	.08	.08	.18	.09
	Average	.13	.15	.16	.13	.10	.10	.18	.12
	Maximum	.34	.41	.35	.19	.14	.15	.58	.32
	Minimum	<.05	<.05	.08	.05	<.05	<.05	<.05	.05
	No. Samples	6	7	8	6	8	8	9	8

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Total Coliform (MF/100 ml)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	21,000	30,000	30,000	20,000
8-31	2.67 to 2.94	-	61,000	58,000	33,000	-	-	-	-
9-7	2.55 to 2.94	1,000	-	3,800	2,900	2,900	6,700	4,500	500
9-14	2.40 to 3.00	-	1,800	1,200	8,000	2,200	42,000	50,000	510,000
9-21	1.93 to 2.63	900	3,800	8,300	14,000	1,900	17,000	220,000	140,000
10-5	1.87 to 2.69	-	4,000	7,400	33,000	3,400	120,000	26,000	270
10-12	1.50 to 2.17	>20,000	140,000	73,000	360,000	>19,000	91,000	7,500	400
10-19	1.45 to 2.17	540,000	500,000	470,000	420,000	510,000	420,000	39,000	3,000
10-29	Old Channel	80,000	110,000	110,000	-	-	-	57,000	3,400
11-8	0.87 to 1.46	390,000	100,000	830,000	360,000	34,000	86,000	77,000	7,400
	Median	50,000	81,000	58,000	33,000	11,200	64,000	39,000	3,400
	Maximum	540,000	500,000	830,000	420,000	510,000	420,000	220,000	510,000
	Minimum	900	1,800	1,200	2,900	1,900	6,700	4,500	270
	No. Samples	6	8	9	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Fecal Coliform (MF/100 ml)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	930	2,600	1,100	440
8-31	2.67 to 2.94	-	3,600	2,200	1,300	-	-	-	-
9-7	2.55 to 2.94	<100	-	200	400	400	900	100	<100
9-14	2.40 to 3.00	-	70	100	650	280	12,000	4,100	56,000
9-21	1.93 to 2.63	110	480	900	1,800	50	4,700	21,000	710
10-5	1.87 to 2.69	-	320	750	1,600	340	7,700	530	10
10-12	1.50 to 2.17	3,000	4,400	5,200	14,000	2,800	6,300	400	<100
10-19	1.45 to 2.17	22,000	39,000	17,000	25,000	37,000	32,000	2,400	170
10-29	Old Channel	5,000	6,900	8,600	-	-	-	3,400	1,900
11-8	0.87 to 1.46	1,600	4,200	56,000	25,000	1,800	3,300	6,600	80
	Median	2,300	3,900	2,200	1,700	670	5,500	2,400	170
	Maximum	22,000	39,000	56,000	25,000	37,000	32,000	21,000	56,000
	Minimum	<100	70	100	400	50	900	100	10
	No. Samples	6	8	9	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Total Solids (mg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	230	250	220	170
8-31	2.67 to 2.94	-	330	-	290	-	-	-	-
9-7	2.55 to 2.94	280	-	260	270	270	280	230	200
9-14	2.40 to 3.00	-	680	270	240	240	300	230	180
9-21	1.93 to 2.63	240	630	320	300	320	290	240	180
10-5	1.87 to 2.69	-	400	290	210	270	260	220	160
10-12	1.50 to 2.17	250	450	340	330	260	330	220	150
10-19	1.45 to 2.17	420	430	460	450	410	450	200	160
10-29	Old Channel	170	390	310	-	-	-	250	200
11-8	0.87 to 1.46	290	720	400	380	300	370	-	-
	Average	280	500	330	310	290	320	230	180
	Maximum	420	720	460	450	410	450	250	200
	Minimum	170	330	260	210	230	250	200	150
	No. Samples	6	8	8	8	8	8	8	8

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Dissolved Solids (mg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	210	230	180	140
8-31	2.67 to 2.94	-	270	-	260	-	-	-	-
9-7	2.55 to 2.94	260	-	240	260	260	280	200	190
9-14	2.40 to 3.00	-	330	240	210	210	260	220	180
9-21	1.93 to 2.63	240	470	270	280	260	270	230	160
10-5	1.87 to 2.69	-	190	210	170	200	230	190	140
10-12	1.50 to 2.17	210	240	240	270	230	260	200	140
10-19	1.45 to 2.17	350	160	350	320	320	430	180	140
10-29	Old Channel	150	160	210	-	-	-	220	170
11-8	0.87 to 1.46	280	720	340	340	280	300	-	-
	Average	250	320	260	260	250	280	200	160
	Maximum	350	720	350	340	320	430	230	190
	Minimum	150	160	210	170	200	230	180	140
	No. Samples	6	8	8	8	8	8	8	8

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Suspended Solids (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	21	15	42	31
8-31	2.67 to 2.94	-	62	-	28	-	-	-	-
9-7	2.55 to 2.94	18	-	17	10	10	2	26	12
9-14	2.40 to 3.00	-	350	29	27	34	34	6	7
9-21	1.93 to 2.63	8	160	47	21	56	24	12	21
10-5	1.87 to 2.69	-	210	81	43	78	30	21	17
10-12	1.50 to 2.17	35	210	95	60	31	65	20	12
10-19	1.45 to 2.17	67	270	120	120	90	14	24	21
10-29	Old Channel	23	230	93	-	-	-	34	34
11-8	0.87 to 1.46	13	450	60	38	21	72	10	11
	Average	27	240	68	43	43	32	22	18
	Maximum	67	450	120	120	90	72	42	34
	Minimum	8	62	17	10	10	2	6	7
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Total Volatile Solids (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	84	88	71	52
8-31	2.67 to 2.94	-	98	85	-	-	-	-	-
9-7	2.55 to 2.94	84	-	71	-	78	64	71	71
9-14	2.40 to 3.00	-	160	120	86	60	81	110	67
9-21	1.93 to 2.63	89	230	120	110	110	110	120	78
10-5	1.87 to 2.69	-	100	74	87	86	73	90	60
10-12	1.50 to 2.17	72	110	91	100	88	92	83	49
10-19	1.45 to 2.17	86	87	120	110	78	100	75	-
10-29	Old Channel	57	92	110	-	-	-	96	56
11-8	0.87 to 1.46	130	350	290	160	100	170	-	-
	Average	86	150	110	110	86	97	90	62
	Maximum	130	350	290	160	110	170	120	78
	Minimum	57	87	74	86	60	64	71	49
	No. Samples	6	8	9	6	8	8	8	7

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Volatile Suspended Solids (mg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	4	4	5	6
8-31	2.67 to 2.94	-	13	10	10	-	-	-	-
9-7	2.55 to 2.94	8	-	2	3	3	1	4	2
9-14	2.40 to 3.00	-	52	4	8	4	6	1	2
9-21	1.93 to 2.63	4	27	10	7	11	9	7	12
10-5	1.87 to 2.69	-	34	13	10	11	5	7	5
10-12	1.50 to 2.17	4	27	10	6	1	8	5	2
10-19	1.45 to 2.17	10	41	24	14	19	12	1	3
10-29	Old Channel	2	28	13	-	-	-	1	1
11-8	0.87 to 1.46	3	82	14	11	2	13	5	1
	Average	5	38	11	9	7	7	4	4
	Maximum	10	82	24	14	19	13	7	12
	Minimum	2	13	2	3	1	1	1	1
	No. Samples	6	8	9	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Iron (mg/1)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	1.7	2.0	1.5	1.0
8-31	2.67 to 2.94	-	8.8	-	5.0	-	-	-	-
9-7	2.55 to 2.94	5.7	-	4.2	3.5	3.5	2.8	1.0	2.4
9-14	2.40 to 3.00	-	55	5.5	3.1	4.6	2.9	.73	.71
9-21	1.93 to 2.63	.95	14	3.5	1.3	4.5	1.8	.22	.82
10-5	1.87 to 2.69	-	12	4.7	4.6	6.1	2.1	.52	.42
10-12	1.50 to 2.17	3.7	18	11	7.6	3.5	6.8	.54	.78
10-19	1.45 to 2.17	3.3	7.1	8.1	9.6	5.1	10	.61	.10
10-29	Old Channel	.88	9.0	2.2	-	-	-	1.2	.82
11-8	0.87 to 1.46	2.6	34	5.7	1.4	3.3	6.6	.71	.41
	Average	2.9	20	5.6	4.5	4.0	4.4	.78	.83
	Maximum	5.7	55	11	9.6	6.1	10	1.5	2.4
	Minimum	.88	7.1	2.2	1.3	1.7	1.8	.22	.10
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Oil & Grease (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	-	-	-	-
8-31	2.67 to 2.94	-	-	-	-	-	-	-	-
9-7[a]	2.55 to 2.94	-	-	-	-	-	-	-	-
9-14	2.40 to 3.00	-	29	12	12	4	16	5	7
9-21[b]	1.93 to 2.63	7	10	35	6	7	16	36	15
10-5	1.87 to 2.69	-	7	3	4	3	3	4	4
10-12	1.50 to 2.17	5	5	4	4	4	4	2	3
10-19	1.45 to 2.17	3	3	4	4	5	5	4	5
10-29	Old Channel	2	3	2	-	-	-	3	2
11-8	0.87 to 1.46	-	-	-	-	-	-	-	-
	Average	4	10	10	6	5	9	9	6
	Maximum	7	29	35.	12	7	16	36	15
	Minimum	2	3	2	4	3	3	2	2
	No. Samples	4	6	6	5	5	5	6	6

a - Extensive oil slick covering the Rouge River
b - Heavy oil slick between NYC RR (MP 1.47) and Wabash RR (MP 1.87) bridges.

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Turbidity (Jackson Units)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	35	30	35	30
8-31	2.67 to 2.94	-	50	-	35	-	-	-	-
9-7	2.55 to 2.94	35	-	35	25	25	<25	<25	<25
9-14	2.40 to 3.00	-	500	70	40	55	45	25	<25
9-21	1.93 to 2.63	<25	110	70	<25	55	30	<25	<25
10-5	1.87 to 2.69	-	180	110	70	120	45	<25	<25
10-12	1.50 to 2.17	60	220	160	90	65	100	<25	<25
10-19	1.45 to 2.17	130	280	220	210	150	210	<25	<25
10-29	Old Channel	25	160	85	-	-	-	40	25
11-8	0.87 to 1.46	<25	130	35	<25	<25	70	<25	<25
	Average	50	200	100	65	66	69	28	26
	Maximum	130	500	220	210	150	210	40	30
	Minimum	<25	50	35	<25	<25	<25	<25	<25
	No. Samples	6	8	8	8	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Secchi Disc (inches)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	18	18	30	18
8-31	2.67 to 2.94	-	-	-	-	-	-	-	-
9-7	2.55 to 2.94	18	-	17	-	16	18	30	30
9-14	2.40 to 3.00	-	-	7	9	7	12	28	24
9-21	1.93 to 2.63	24	3	7	16	9	11	28	18
10-5	1.87 to 2.69	-	6	9	12	9	12	24	25
10-12	1.50 to 2.17	11	4	6	6	11	6	23	26
10-19	1.45 to 2.17	7	3	6	6	6	6	20	40
10-29	Old Channel	18	3	8	-	-	-	14	16
11-8	0.97 to 1.46	14	3	6	13	12	5	14	24
	Average	15	4	8	10	11	11	23	25
	Maximum	24	6	17	16	18	18	30	40
	Minimum	7	3	6	6	6	5	14	16
	No. Samples	6	6	8	6	8	8	9	9

TABLE 6 (cont'd)
DREDGING OPERATION SAMPLING RESULTS
PARAMETER: Sulfate (mg/l)

Date 1967	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	DT 19.0 R139	DT 19.0 R142
8-24	None	-	-	-	-	55	57	18	16
9-7	2.55 to 2.94	49	-	-	-	39	40	17	17
9-14	2.40 to 3.00	-	39	31	30	32	40	19	17
9-21	1.93 to 2.63	29	36	30	34	38	32	20	19
10-5	1.87 to 2.69	-	35	32	32	26	31	18	16
10-12	1.50 to 2.17	28	28	31	37	27	33	18	15
10-19	1.45 to 2.17	49	50	-	52	48	50	20	17
10-29	Old Channel	12	16	14	-	-	-	18	13
11-8	0.87 to 1.46	56	56	45	34	54	48	22	18
	Average	37	37	31	37	40	41	19	16
	Maximum	56	56	45	52	55	57	22	19
	Minimum	12	16	14	30	26	31	17	13
	No. Samples	6	7	6	6	8	8	9	9

Transparency and Dissolved Oxygen Measurements

On three occasions, special field studies were conducted in the vicinity of the dredging operation. Before the arrival of the dredge the field crew recorded transparency (secchi disc, inches) and dissolved oxygen readings every 300 feet along the estimated path of the dredging operation. When the HOFFMAN returned to the Rouge, the FWPCA boat followed the dredge at a distance of approximately 100 feet. Transparency and dissolved oxygen values, now under the direct influence of the dredging operation, were recorded every 300 feet as before. The results of the survey (pre-dredging and during dredging) for September 18, 1967, is shown in Figure 4 . Surveys on October 2 and November 9 showed similar transparency results.

The results of all three surveys showed that the average transparency before dredging was slightly greater than the transparency during the dredging operation with no overflow. After overflow occurred substantial decrease in transparency were noted. The average secchi disc readings during the three phases are shown in Figure 5 .

Measurements of dissolved oxygen were made simultaneously with the secch disc readings. The results in Figure 5 show no significant immediate change in dissolved oxygen level as a result of the dredging operation.

The transparency and dissolved oxygen were also measured at time intervals at a particular point on the dredging path. Significant decreases in transparency were noted when the overflowing dredge passed. The transparency of the water returned to its pre-dredging value after varied time periods. (See Figure 6). The dissolved oxygen levels declined after the dredge passed as shown in Figure 6 .

TRANSPARENCY MEASUREMENTS ALONG DREDGING PATH

SEPTEMBER 18, 1967

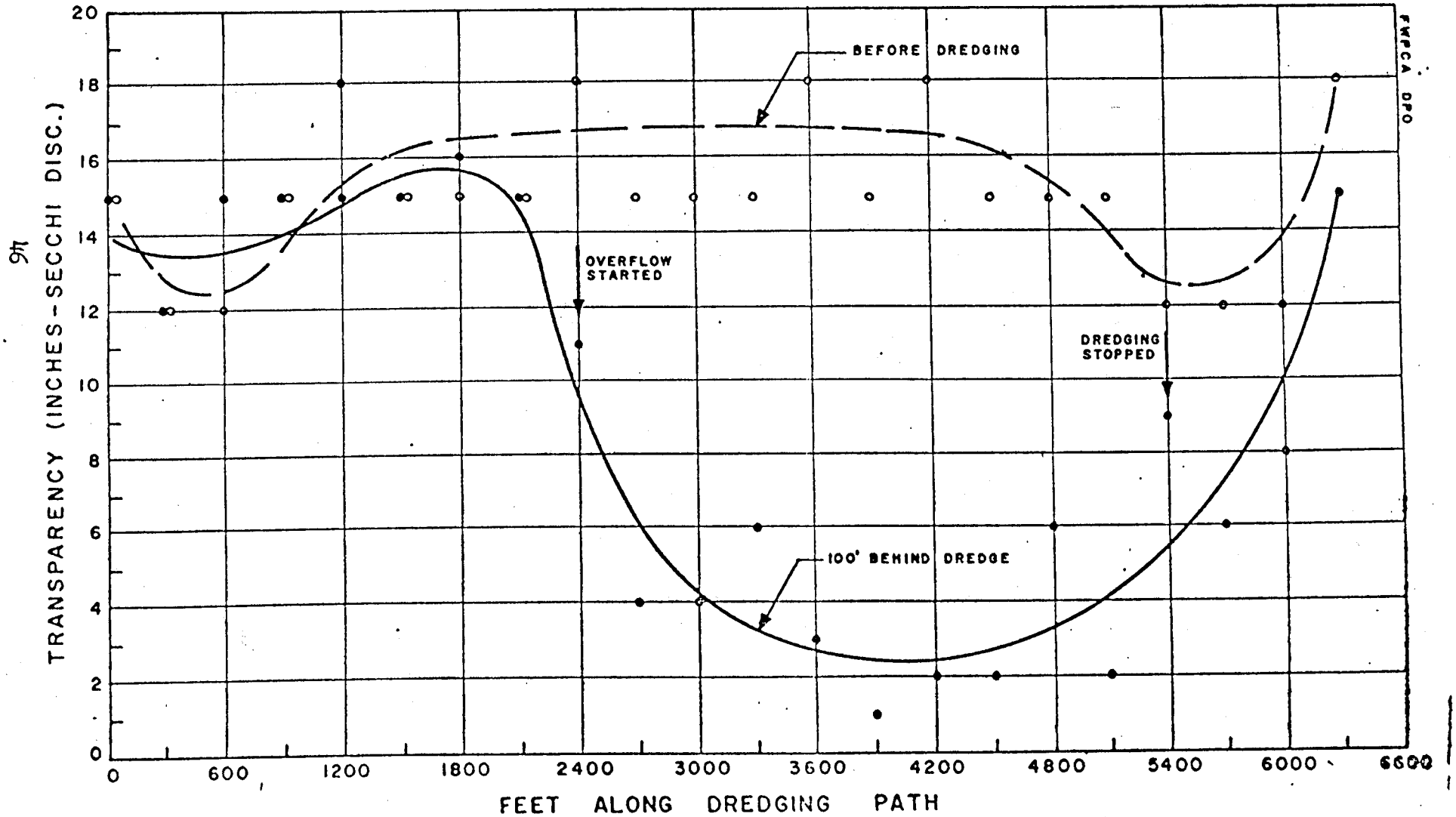
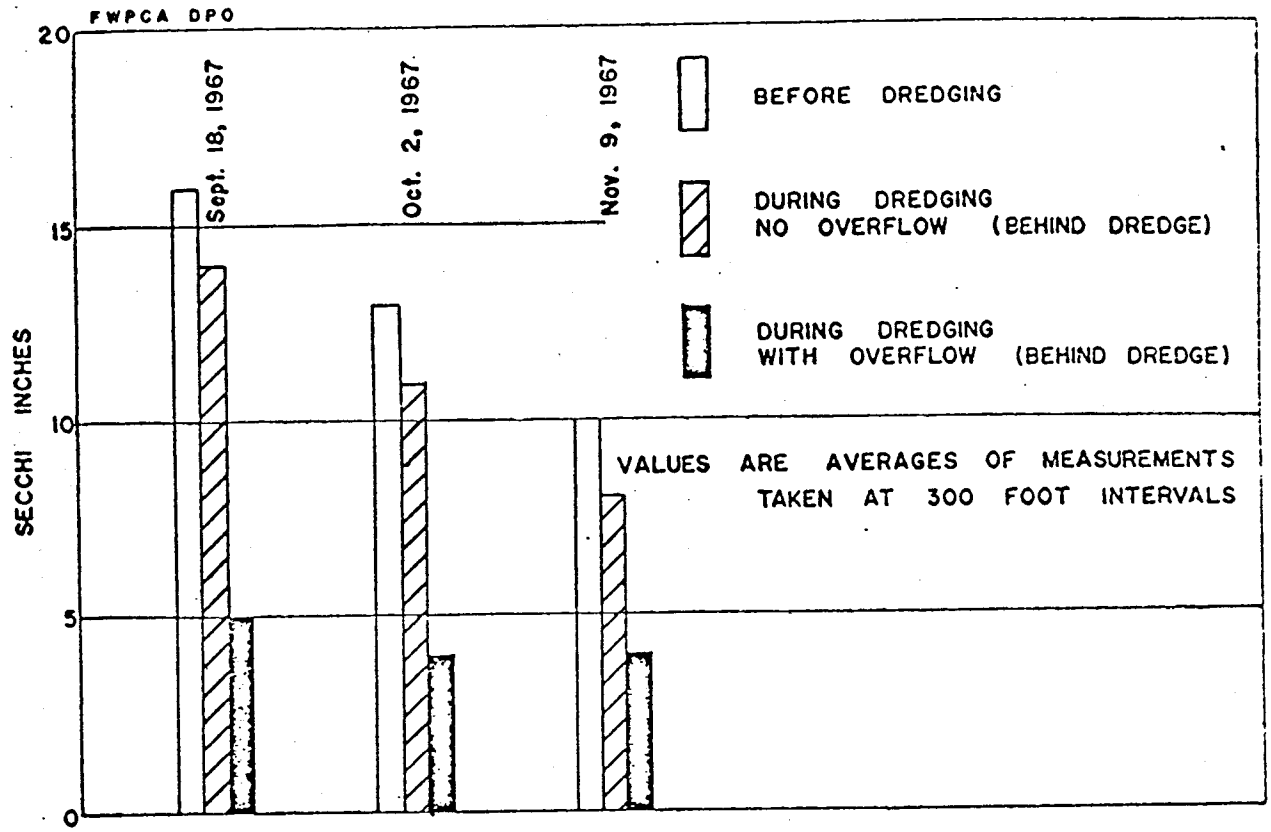
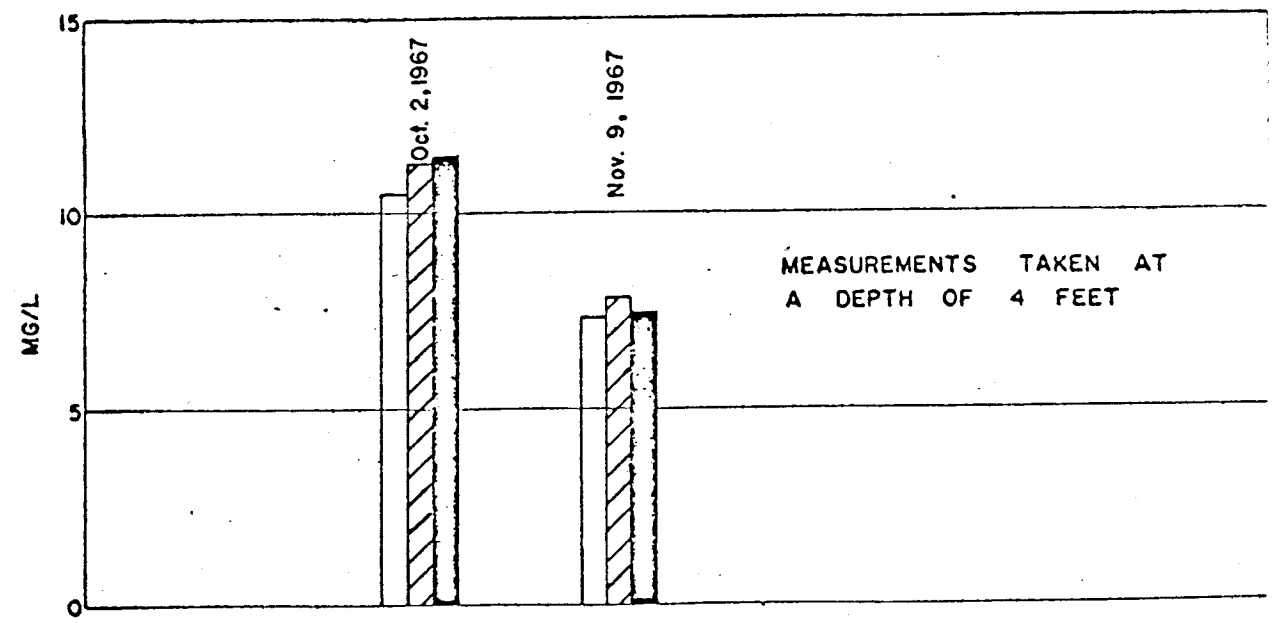


FIGURE 5

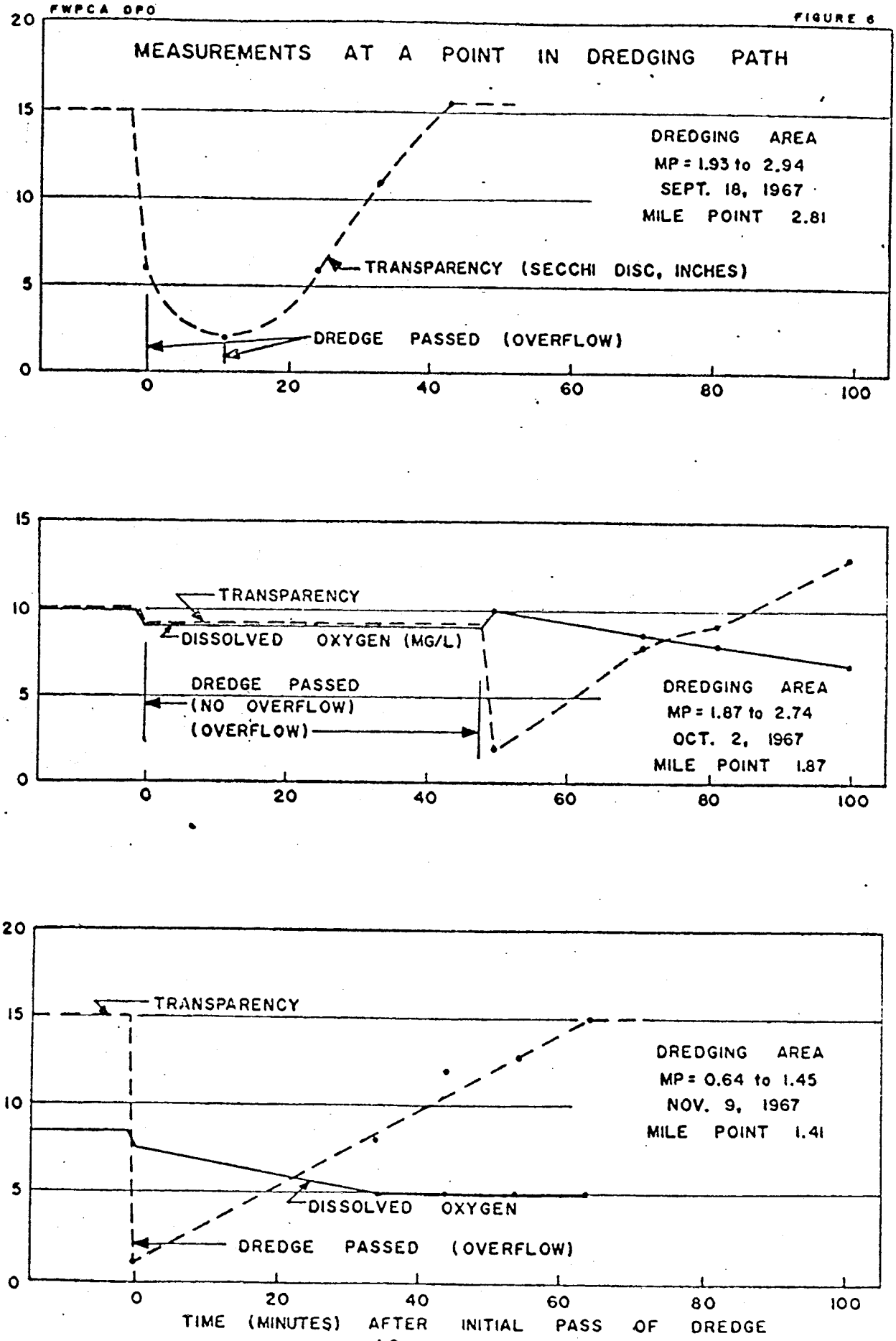
TRANSPARENCY AND DISSOLVED OXYGEN MEASUREMENTS ALONG DREDGING PATH



AVERAGE TRANSPARENCY



AVERAGE DISSOLVED OXYGEN


FWPCA OPO
FIGURE 6
MEASUREMENTS AT A POINT IN DREDGING PATH
DREDGING AREA
MP = 1.93 to 2.94
SEPT. 18, 1967
MILE POINT 2.81
TRANSPARENCY (SECCHI DISC, INCHES)
DREDGE PASSED (OVERFLOW)
TRANSPARENCY
DISSOLVED OXYGEN (MG/L)
DREDGE PASSED
(NO OVERFLOW)
(OVERFLOW)
DREDGING AREA
MP = 1.87 to 2.74
OCT. 2, 1967
MILE POINT 1.87
TRANSPARENCY
DISSOLVED OXYGEN
DREDGE PASSED (OVERFLOW)
DREDGING AREA
MP = 0.64 to 1.45
NOV. 9, 1967
MILE POINT 1.41
0
5
10
15
20
0
20
40
60
80
100
TIME (MINUTES) AFTER INITIAL PASS OF DREDGE

Observations

The most severe pollution caused by the dredging operation appeared to occur during the overflow of the hopper bins. At this time, the dredge left a trail of turbidity and surface oil often extending to 150 feet in width. The dredging operation prior to overflow caused minor disturbances observable at the surface from the operation of the drags. Bubbles were observed rising to the surface occasionally bringing up a slight oil film. The bubbles were probably gases released from the anaerobic organic decomposition in the bottom material. However, the propeller action of not only the HOFFMAN but also passing freighters was observed to stir up the bottom sediments to create turbid areas.

No leakage was observed while the dredge was in transit to Grassy Island and no significant leakage occurred at the inflow hookup during the unloading operation.

B. Dumping Grounds - Grassy Island

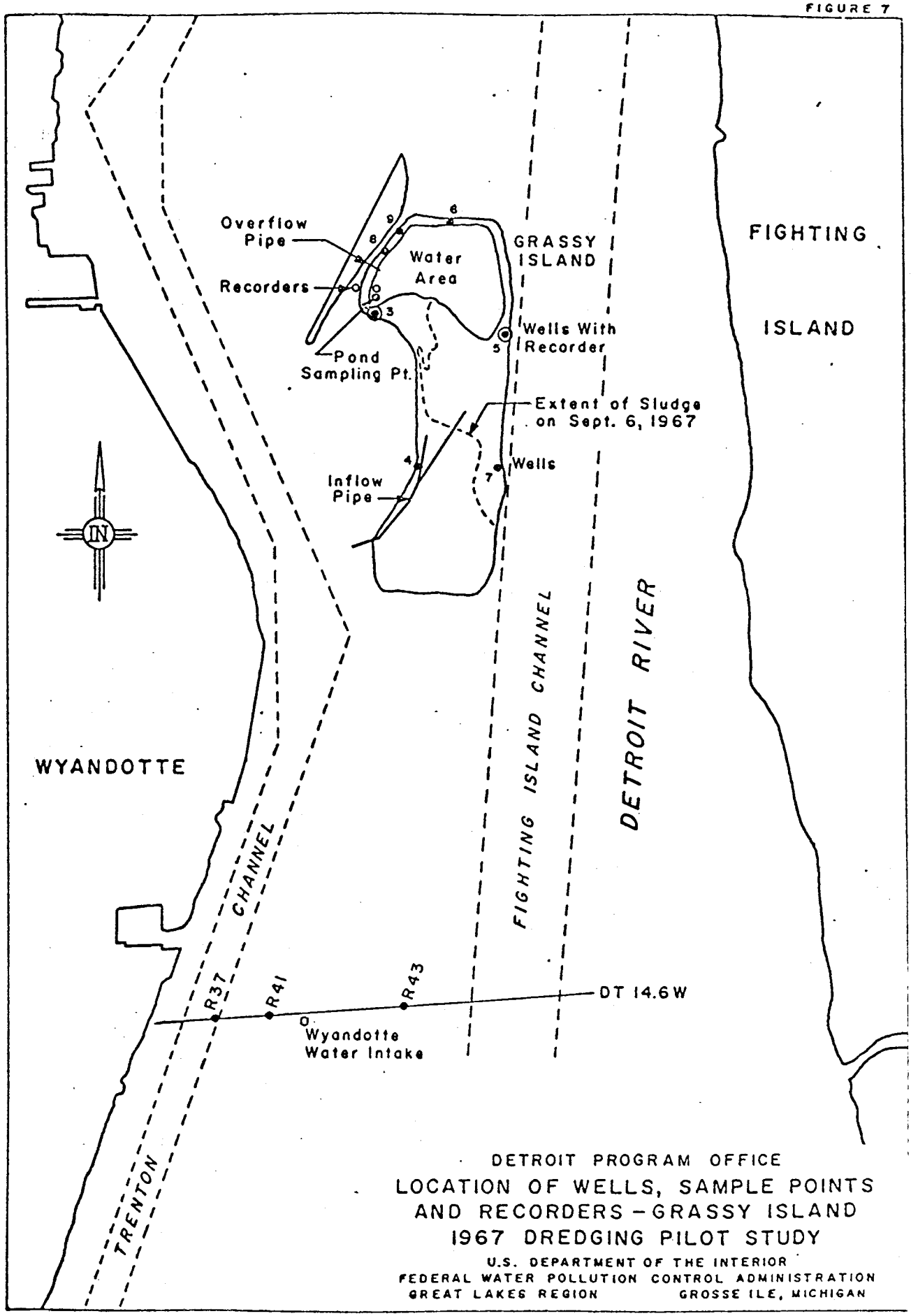
Effect of Dumping Ground on Detroit River

A water quality study was made of the Detroit River immediately downstream from Grassy Island. Three stations (R37, R41, and R43; 600, 1100, and 2300 feet from U.S. shore, respectively) on range DT 14.6 (less than 3/4 mile south of Grassy Island) were sampled at mid-depth weekly to detect changes in water quality during the period of the dumping operation. The results of the analysis of the samples are shown in Table 7. The City of Wyandotte water intake is also located south of Grassy Island as shown in Figure 7. The results of the routine analysis of this city's raw water before treatment and distribution are shown in Table 8.

Seepage Through Dikes

Seven wells were installed at points along the circumference of the dike to determine the amount of seepage through the dike into the Detroit River. The well holes were hand drilled into the dike the depth required to reach the water table. A six-inch casing with a well screen (approximately 3 feet in length), attached at the lower end, was then dropped into the hole. The hole surrounding the pipe was then backfilled and the casings were covered with a threaded metal cap to prevent contamination of the well. Each well was pumped the day before samples were to be collected. On the sampling day, the coliform samples were first collected with a J.Z. bacteriological sampler and then the chemical samples were collected with a Kemmerer depth sampling device. A surface sample was also collected from the Grassy Island pond at the point as shown on Figure 7. The results of the analyses of well and pond samples are shown in Table 7.

FIGURE 7



DETROIT PROGRAM OFFICE

LOCATION OF WELLS, SAMPLE POINTS AND RECORDERS - GRASSY ISLAND 1967 DREDGING PILOT STUDY

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Temperature (°C)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	19.5	19.5	19.5
9-13	-	15.0	15.0	15.0	17.0	15.0	16.0	15.0	19.0	19.0	18.5
9-20	20.0	16.5	15.0	16.0	18.5	17.0	17.0	17.5	21.0	21.0	20.5
10-3	-	-	-	-	-	-	-	-	13.5	14.0	13.0
10-4	-	15.5	-	16.0	16.0	16.0	15.0	16.0	14.0	14.0	14.0
10-11	13.0	14.0	13.0	14.0	14.0	13.5	13.0	13.0	13.0	12.5	12.5
10-18	11.0	13.5	-	13.0	-	13.0	11.5	12.5	13.0	13.0	13.0
10-25	-	-	-	-	-	-	-	-	10.5	10.5	10.5
10-26	-	-	-	-	-	-	-	-	10.0	9.5	9.5
11-1	10.0	13.0	13.0	13.0	-	13.0	11.0	12.0	-	-	-
11-7	3.5	11.5	11.0	11.0	-	10.0	7.5	10.0	7.0	6.5	6.0
11-27	1.0	-	-	-	-	-	-	-	-	1.5	2.0
11-28	-	-	-	-	-	-	-	-	-	2.5	2.5
11-29	-	-	-	-	-	-	-	-	-	2.0	2.0
Average	10.0	14.0	13.5	14.0	16.5	14.0	13.0	13.5	14.0	11.0	11.0
Maximum	20.0	16.5	15.0	16.0	18.5	17.0	17.0	17.5	21.0	21.0	21.5
Minimum	1.0	11.5	11.0	11.0	14.0	10.0	7.5	10.0	7.0	1.5	2.0
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: pH (standard units)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	7.6	7.8	8.0
9-13	-	7.0	7.4	7.0	7.4	7.0	7.0	7.1	7.9	8.0	7.9
9-20	6.9	6.8	7.6	7.2	7.3	6.8	6.8	7.0	7.6	7.9	8.0
10-3	-	-	-	-	-	-	-	-	8.0	8.2	8.1
10-4	-	7.0	-	7.4	7.8	7.0	7.0	7.4	8.0	8.1	8.2
10-11	7.8	7.4	7.8	6.9	7.7	6.5	7.3	6.4	8.0	8.0	8.1
10-18	7.7	7.4	-	6.9	-	7.4	7.1	7.4	7.8	8.0	8.0
10-25	-	-	-	-	-	-	-	-	8.0	8.2	8.2
10-26	-	-	-	-	-	-	-	-	7.9	8.0	8.2
11-1	7.6	7.1	7.8	7.5	-	6.8	7.2	7.2	-	-	-
11-7	8.2	8.0	7.8	8.2	-	7.8	8.1	7.9	8.2	8.3	8.4
11-27	8.1	-	-	-	-	-	-	-	-	8.1	8.2
11-28	-	-	-	-	-	-	-	-	-	8.1	8.1
11-29	-	-	-	-	-	-	-	-	-	8.0	8.2
Average	7.7	7.2	7.7	7.3	7.6	7.0	7.2	7.2	7.9	8.1	8.1
Maximum	8.2	8.0	7.8	8.2	7.8	7.8	8.1	7.9	8.2	8.3	8.4
Minimum	6.9	6.8	7.4	6.9	7.3	6.5	6.8	6.4	7.6	7.8	7.9
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA

FWPCA, DPO

PARAMETER: Conductivity (umhos/cm)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	-	-	-
9-13	-	1100	3500	1300	2300	4000	2000	1300	250	240	240
9-20	1100	2200	2800	1300	2200	4000	1800	1200	250	240	230
10-3	-	-	-	-	-	-	-	-	230	210	210
10-4	-	2400	-	1700	2200	3700	1500	1100	240	220	220
10-11	1100	2800	2800	1600	2300	3700	2000	1300	250	230	220
10-18	960	2600	-	1600	-	3500	1600	1100	290	230	210
10-25	-	-	-	-	-	-	-	-	260	220	220
10-26	-	-	-	-	-	-	-	-	280	230	220
11-1	1000	2600	2900	1500	-	3700	1600	1300	-	-	-
11-7	950	2500	2900	1700	-	3500	1600	1200	300	210	220
11-27	1000	-	-	-	-	-	-	-	-	220	210
11-28	-	-	-	-	-	-	-	-	-	210	210
11-29	-	-	-	-	-	-	-	-	-	220	200
Average	1000	2400	3000	1500	2200	3700	1700	1200	260	220	220
Maximum	1100	2800	3500	1700	2300	4000	2000	1300	300	240	240
Minimum	950	1100	2800	1300	2200	3500	1500	1100	240	210	200
No. Samples	6	7	5	7	4	7	7	7	9	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Alkalinity (mg/l as $CaCO_3$)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	42	79	77
9-13	-	250	860	590	430	330	270	660	77	77	83
9-20	260	380	890	530	400	660	300	270	79	75	79
10-3	-	-	-	-	-	-	-	-	45	73	76
10-4	-	480	-	440	380	650	270	300	79	78	78
10-11	290	440	770	530	390	540	380	380	78	76	75
10-18	260	340	-	510	-	540	230	270	79	75	73
10-25	-	-	-	-	-	-	-	-	80	78	78
10-26	-	-	-	-	-	-	-	-	82	78	76
11-1	290	460	700	550	-	600	310	410	-	-	-
11-7	260	460	670	510	-	520	280	330	82	72	77
11-27	270	-	-	-	-	-	-	-	-	82	78
11-28	-	-	-	-	-	-	-	-	-	77	77
11-29	-	-	-	-	-	-	-	-	-	81	76
Average	270	400	780	520	400	550	290	370	72	77	77
Maximum	290	480	890	590	430	660	380	660	82	82	83
Minimum	260	250	690	440	380	330	230	270	42	72	73
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO **Parameter: Chlorides (mg/l)**

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	15	13	20
9-13	-	33	68	66	99	280	66	160	15	12	11
9-20	130	76	61	51	100	250	100	130	13	12	11
10-3	-	-	-	-	-	-	-	-	12	9	10
10-4	-	110	-	84	94	230	140	140	15	11	10
10-11	130	140	57	73	94	210	110	86	15	10	9
10-18	130	120	-	74	-	200	120	110	21	11	9
10-25	-	-	-	-	-	-	-	-	17	10	10
10-26	-	-	-	-	-	-	-	-	21	10	9
11-1	140	140	59	46	-	200	110	88	-	-	-
11-7	120	140	60	79	-	170	110	110	28	9	9
11-27	160	-	-	-	-	-	-	-	-	10	8
11-28	-	-	-	-	-	-	-	-	-	12	10
11-29	-	-	-	-	-	-	-	-	-	12	9
Average	140	110	61	68	97	220	110	120	17	11	10
Maximum	160	140	68	84	100	280	140	160	28	13	11
Minimum	120	33	57	46	94	170	66	86	12	9	8
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Phenols (ug/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	15	24	16
9-13	-	10	10	7	9	7	15	11	6	6	6
9-20	22	10	14	16	8	13	13	12	15	11	6
10-3	-	-	-	-	-	-	-	-	5	7	5
10-4	-	18	-	7	6	9	7	11	9	8	6
10-11	9	13	3	8	7	12	15	14	10	9	9
10-18	12	12	-	9	-	10	8	9	12	9	9
10-25	-	-	-	-	-	-	-	-	12	8	6
10-26	-	-	-	-	-	-	-	-	12	6	5
11-1	13	10	8	10	-	5	8	8	-	-	-
11-7	-	-	-	-	-	-	-	-	-	-	-
11-27	10	-	-	-	-	-	-	-	-	8	5
11-28	-	-	-	-	-	-	-	-	-	4	6
11-29	-	-	-	-	-	-	-	-	-	4	2
Average	13	12	9	10	8	9	11	11	11	9	7
Maximum	22	18	14	16	9	13	15	14	15	24	16
Minimum	9	10	3	7	6	5	7	8	5	4	2
No. Samples	5	6	4	6	4	6	6	6	9	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Dissolved Oxygen (mg/l)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	-	8.6	8.5
9-13	-	.6	.4	.4	1.1	.8	.1	.9	8.2	8.3	8.7
9-20	< .1	1.2	3.3	.1	.9	.6	.5	1.0	8.2	8.0	8.6
10-3	-	-	-	-	-	-	-	-	-	-	-
10-4	-	.1	-	.6	.8	.4	.6	1.6	9.8	9.8	10.0
10-11	.1	1.2	2.9	.2	.9	1.0	1.1	1.2	9.5	9.5	9.7
10-18	3.5	1.5	-	.8	-	1.2	1.0	2.1	9.5	9.6	9.8
10-25	-	-	-	-	-	-	-	-	10.4	10.5	10.7
10-26	-	-	-	-	-	-	-	-	10.2	10.6	10.7
11-1	1.7	1.5	1.5	.7	-	2.0	1.4	1.7	-	-	-
11-7	5.7	.8	2.1	.2	-	1.2	1.1	.5	10.5	11.3	11.3
11-27	6.0	-	-	-	-	-	-	-	-	12.8	12.6
11-28	-	-	-	-	-	-	-	-	-	12.7	12.9
11-29	-	-	-	-	-	-	-	-	-	12.7	12.6
Average	2.9	1.0	2.0	.4	.9	1.0	.8	1.3	9.5	10.4	10.5
Maximum	6.0	1.5	3.3	.8	1.1	2.0	1.4	2.1	10.5	12.8	12.9
Minimum	< .1	.1	.4	.1	.8	.4	.1	.5	8.2	8.0	8.5
No. Samples	6	7	5	7	4	7	7	7	8	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: BOD (mg/l)

FWPCA, DPO

Date	Pond	Wells 3	4	5	6	7	8	9	DT 14.6 R37	R41	R43
9-6	-	-	-	-	-	-	-	-	4	2	1
9-13	-	8	16	21	5	17	9	10	3	3	3
9-20	42	12	13	26	6	9	14	47	5	4	3
10-3	-	-	-	-	-	-	-	-	4	7	2
10-4	-	13	-	18	5	7	11	73	5	4	3
10-11	17	9	10	11	5	8	9	21	5	3	2
10-18	15	20	-	17	-	10	10	170	4	3	2
10-25	-	-	-	-	-	-	-	-	4	2	2
10-26	-	-	-	-	-	-	-	-	2	2	1
11-1	13	6	4	10	-	4	3	13	-	-	-
11-7	9*	10*	9*	16*	-	4*	6*	45*	5*	4*	2*
11-27	7	-	-	-	-	-	-	-	-	3	2
11-28	-	-	-	-	-	-	-	-	-	2*	3*
11-29	-	-	-	-	-	-	-	-	-	5	3
Average	18	11	10	17	5	8	9	54	4	3	2
Maximum	42	20	16	26	6	17	14	170	5	7	3
Minimum	7	6	4	10	5	4	3	10	2	2	1
No. Samples	6	7	5	7	4	7	7	7	10	13	13

*Estimated

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: COD (mg/l)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-			
9-13	-	160	280	96	55	260	250	120	9	7	< 1
9-20	160	180	620	120	54	270	160	210	13	12	13
10-3	-	-	-	-	-	-	-	-	16	8	1
10-4	-	210	-	97	51	240	150	380	8	61	< 1
10-11	130	150	250	88	46	190	540	130	18	12	10
10-18	110	170	-	78	-	160	120	210	24	14	6
10-25	-	-	-	-	-	-	-	-	16	6	6
10-26	-	-	-	-	-	-	-	-	14	10	10
11-1	100	120	370	66	-	170	160	120	-	-	-
11-7	85	170	350	67	-	130	130	140	27	15	2
11-27	84	-	-	-	-	-	-	-	-	15	26
11-28	-	-	-	-	-	-	-	-	-	7	7
11-29	-	-	-	-	-	-	-	-	-	4	4
Average	110	170	370	87	52	200	220	190	16	14	7
Maximum	160	210	620	120	55	270	540	380	27	61	26
Minimum	84	120	250	66	46	130	120	120	8	4	< 1
No. Samples	6	7	5	7	4	7	7	7	9	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Total Phosphate (as PO_4) (mg/l)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	-	-	-
9-13	-	4.2	.71	3.9	.89	.49	2.3	1.8	.37	.29	.11
9-20	1.9	.63	8.8	1.5	.39	.97	1.1	2.9	.29	.27	.23
10-3	-	-	-	-	-	-	-	-	.60	.55	.32
10-4	-	3.4	-	2.1	2.1	2.3	2.9	9.1	.48	.43	.44
10-11	1.0	.63	2.0	1.3	.37	1.3	4.5	2.0	.39	.33	.14
10-18	1.1	1.7	-	.61	-	1.2	1.6	5.5	.48	.18	.19
10-25	-	-	-	-	-	-	-	-	.52	.55	.44
10-26	-	-	-	-	-	-	-	-	.57	.28	.27
11-1	.51	.64	3.3	.51	-	1.5	1.1	1.9	-	-	-
11-7	.92	.81	.79	.51	-	.56	1.0	1.8	.61	.43	.30
11-27	.30	-	-	-	-	-	-	-	-	.29	.15
11-28	-	-	-	-	-	-	-	-	-	.26	.12
11-29	-	-	-	-	-	-	-	-	-	.30	.16
Average	.96	1.7	3.1	1.5	.94	1.2	2.1	3.6	.48	.36	.24
Maximum	1.9	4.2	8.8	3.9	2.1	2.3	4.5	9.1	.61	.65	.44
Minimum	.30	.63	.71	.51	.37	.49	1.0	1.8	.29	.18	.11
No. Samples	6	7	5	6	4	7	7	7	9	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Total Soluble Phosphates (as PO_4) (mg/1)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	-	-	-
9-13	-	.07	.13	.08	.03	.36	.12	.23	.20	.20	.06
9-20	.46	.02	.11	.04	< .01	.06	.02	1.2	.21	.19	.18
10-3	-	-	-	-	-	-	-	-	.33	.22	.14
10-4	-	2.31	-	.53	.53	.68	1.0	1.4	.27	.30	.23
10-11	.61	.34	.25	.16	.08	.36	.19	.63	.23	.15	.08
10-18	.49	.24	-	.06	-	.22	.24	.90	.30	.18	.18
10-25	-	-	-	-	-	-	-	-	.24	.17	.09
10-26	-	-	-	-	-	-	-	-	.39	.19	.16
11-1	.19	.07	.06	.07	-	.11	.14	.26	-	-	-
11-7	.06	.17	.12	.30	-	.09	.77	.34	.03	.10	.05
11-27	.18	-	-	-	-	-	-	-	-	.15	.07
11-28	-	-	-	-	-	-	-	-	-	.06	.05
11-29	-	-	-	-	-	-	-	-	-	.21	.08
Average	.33	.46	.13	.17	.16	.27	.35	.71	.24	.18	.11
Maximum	.61	2.31	.25	.53	.53	.68	1.0	1.4	.39	.30	.32
Minimum	.06	.02	.06	.04	< .01	.06	.02	.23	.03	.06	.05
No. Samples	6	7	5	7	4	7	7	7	9	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO **Parameter: Nitrate-N (mg/l)**

Date	Pond	Wells 3	4	5	6	7	8	9	DT 14.6 R37	R41	R43
9-6	-	-	-	-	-	-	-	-	< .1	< .1	< .1
9-13	-	2.0	1.8	1.6	.7	8.4	4.3	22	.4	.3	.3
9-20	.4	1.5	3.5	.9	.5	1.2	8.2	13	.3	.2	.3
10-3	-	-	-	-	-	-	-	-	.3	.4	.4
10-4	-	.8	-	.6	.2	7.9	.5	2.4	.3	.3	.3
10-11	.4	.8	1.3	.6	.4	9.6	.6	1.2	.3	.3	.3
10-18	1.2	7.5	-	.8	-	19	14	20	.9	.6	.3
10-25	-	-	-	-	-	-	-	-	.4	.4	.4
10-26	-	-	-	-	-	-	-	-	.1	.1	.1
11-1	1.7	1.0	0.2	.4	-	2.6	.2	2.6	-	-	-
11-7	.4	4.0	4.6	.8	-	8.8	5.5	9.2	.4	.2	.3
11-27	.5	-	-	-	-	-	-	-	.3	.3	.3
11-28	-	-	-	-	-	-	-	-	.4	.4	.4
11-29	-	-	-	-	-	-	-	-		.4	.3
Average	.8	2.5	2.3	.8	.5	8.2	4.8	10	.4	.3	.3
Maximum	1.7	7.5	4.6	1.6	.7	19	14	22	.9	.6	.4
Minimum	.4	.8	.2	.4	.2	1.2	.2	1.2	< .1	< .1	< .1
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Nitrite-N (mg/l)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	.01	.01	< .01
9-13	-	.02	-	-	-	.71	1.4	1.0	.01	.01	.01
9-20	< .01	-	-	-	-	.04	.33	.85	.01	.01	.01
10-3	-	-	-	-	-	-	-	-	.01	.01	.01
10-4	-	.01	-	.01	< .01	.26	.02	.29	.01	.01	.01
10-11	.01	.03	.05	.03	.01	.85	.04	.06	.01	.01	.01
10-18	.05	.07	-	.02	-	1.0	.14	.18	.02	.01	.01
10-25	-	-	-	-	-	-	-	-	.02	.01	.01
10-26	-	-	-	-	-	-	-	-	.02	.02	.01
11-1	.06	.03	.02	.02	-	.20	.02	.12	-	-	-
11-7	.08	.04	.03	.03	-	.39	.05	.08	.02	.01	.01
11-27	.04	-	-	-	-	-	-	-	-	.01	.01
11-28	-	-	-	-	-	-	-	-	-	.01	.01
11-29	-	-	-	-	-	-	-	-	-	.01	< .01
Average	.04	.03	.03	.02	< .01	.49	.29	.37	.01	.01	< .01
Maximum	.08	.07	.05	.03	.01	1.0	1.4	1.0	.02	.02	.01
Minimum	< .01	.01	.02	.01	< .01	.04	.02	.06	.01	.01	< .01
No. Samples	6	6	3	5	2	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO **Parameter: Ammonia-N (mg/l)**

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	1.1	0.9	2.8	2.2	-	2.4	-	0.32	< 0.05	0.18
9-13	-	1.0	0.6	5.9	1.2	1.6	1.7	1.6	0.06	0.06	< 0.05
9-20	18	2.9	1.1	5.7	1.0	1.7	2.9	11.0	0.05	-	-
10-3	-	-	-	-	-	-	-	-	0.18	0.14	< 0.05
10-4	-	3.4	-	3.5	0.6	2.1	5.0	17.0	0.32	0.08	0.18
10-11	21	5.1	0.7	3.5	0.6	2.6	3.2	5.0	0.25	0.12	0.30
10-18	18	3.3	-	3.1	-	2.5	3.3	9.2	0.24	0.14	0.12
10-25	-	-	-	-	-	-	-	-	0.29	0.18	0.18
10-26	-	-	-	-	-	-	-	-	0.36	0.18	0.24
11-1	18	5.6	0.7	3.1	-	1.9	4.2	3.2	-	-	-
11-7	18	4.9	0.8	2.6	-	2.2	4.8	4.2	0.40	-	0.14
11-27	6	-	-	-	-	-	-	-	-	0.18	< 0.05
11-28	-	-	-	-	-	-	-	-	-	0.17	0.10
11-29	-	-	-	-	-	-	-	-	-	0.12	0.08
Average	17	3.4	0.8	3.8	1.1	2.1	3.4	7.3	0.25	0.13	0.14
Maximum	21	5.6	1.1	5.9	2.2	2.6	5.0	17.0	0.40	0.18	0.30
Minimum	6	1.0	0.6	2.6	0.6	1.6	1.7	1.6	0.05	< 0.05	< 0.05
No. Samples	6	8	6	8	5	7	8	7	10	11	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Organic-N (mg/l)

FWPCA, DPO

Date	Pond	Wells 3	4	5	6	7	8	9	DT 14.6 R37	R41	R43
9-6	-	0.67	0.30	0.32	0.44	-	2.08	-	0.20	0.15	< 0.05
9-13	-	0.37	0.19	< 0.05	< 0.05	0.72	4.70	0.34	< 0.05	0.06	< 0.05
9-20	0.55	0.27	0.22	0.10	< 0.05	0.48	0.66	-	0.08	-	-
10-3	-	-	-	-	-	-	-	-	0.08	0.10	< 0.05
10-4	-	0.90	-	0.14	0.14	0.32	0.37	1.25	0.10	0.10	0.11
10-11	0.06	0.08	0.20	0.18	< 0.05	< 0.05	0.22	0.12	0.31	0.13	0.10
10-18	0.30	0.43	-	0.07	-	0.58	0.30	0.46	0.05	0.07	0.14
10-25	-	-	-	-	-	-	-	-	0.16	< 0.05	< 0.05
10-26	-	-	-	--	-	-	-	-	0.18	0.10	0.08
11-1	0.34	0.34	0.22	0.25	-	0.10	0.27	0.06	-	-	-
11-7	0.22	0.29	0.19	0.13	-	0.29	0.54	0.30	0.08	0.24	0.08
11-27	0.21	-	-	-	-	-	-	-	-	< 0.05	0.06
11-28	-	-	-	-	-	-	-	-	-	0.09	0.18
11-29	-	-	-	-	-	-	-	-	-	0.10	0.11
Average	0.28	0.42	0.22	0.16	0.15	0.36	1.10	0.42	0.13	0.10	0.09
Maximum	0.55	0.90	0.30	0.32	0.44	0.72	4.70	1.25	0.31	0.24	0.18
Minimum	0.06	0.08	0.19	< 0.05	< 0.05	< 0.05	0.22	0.06	< 0.05	< 0.05	< 0.05
No. Samples	6	8	6	8	5	7	8	6	10	12	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Total Coliform (MF/100 ml)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	4,600	90,000	23,000
9-13	-	31,000	94,000	35,000	111,000	660,000	200,000	170,000	2,200	2,200	1,300
9-20	16,000	10,000	25,000	10,000	800	30,000	170,000	60,000	34,000	19,000	89,000
10-3	-	-	-	-	-	-	-	-	690	410	400
10-4	-	5,700	-	6,500	390	31,000	25,000	23,000	30,000	7,100	15,000
10-11	25,000	570	3,400	800	140	17,000	1,900	2,300	8,400	4,200	1,600
10-18	15,000	33,000	-	1,800	-	18,000	48,000	330,000	220,000	60,000	4,400
10-25	-	-	-	-	-	-	-	-	2,000	400	900
10-26	-	-	-	-	-	-	-	-	2,200	1,200	750
11-1	8,800	1,000	700	300	-	15,000	1,400	2,800	-	-	-
11-7	1,600	220	60	60	-	1,900	1,900	22,000	120,000	21,000	4,100
11-27	400	-	-	-	-	-	-	-	-	3,700	200
11-28	-	-	-	-	-	-	-	-	-	600	70
11-29	-	-	-	-	-	-	-	-	-	2,800	100
Average	12,000	5,700	3,400	1,800	600	18,000	25,000	23,000	6,500	3,700	1,300
Maximum	25,000	33,000	94,000	35,000	111,000	660,000	200,000	330,000	220,000	90,000	89,000
Minimum	400	220	60	60	140	1,900	1,400	2,300	690	400	70
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO Parameter: Fecal Coliform (MF/100 ml)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	220	8,300	120
9-13	-	160	20	< 10	40	1,900	420	2,000	130	90	130
9-20	830	160	90	480	30	50	4,000	11,000	1,300	480	2,600
10-3	-	-	-	-	-	-	-	-			
10-4	-	-	-	-	-	-	-	-	-	-	-
10-11	750	160	10	50	< 10	260	110	60	810	340	30
10-18	300	700	-	10	-	110	290	1,000	23,000	4,300	210
10-25	-	-	-	-	-	-	-	-	100	< 100	< 100
10-26	-	-	-	-	-	-	-	-	130	20	30
11-1	630	10	< 10	< 10	-	10	10	20	-	-	-
11-7	44	18	< 2	< 2	-	220	50	12	9,400	890	360
11-27	10	-	-	-	-	-	-	-	-	310	10
11-28	-	-	-	-	-	-	-	-	-	48	6
11-29	-	-	-	-	-	-	-	-	-	250	10
Average	470	160	10	< 10	30	170	200	530	520	310	< 100
Maximum	830	700	90	480	40	1,900	4,000	11,000	23,000	8,300	2,600
Minimum	10	10	< 2	< 2	< 10	10	10	12	100	20	6
No. Samples	6	6	5	6	3	6	6	6	8	11	11

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Total Solids (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	190	190	170
9-13	-	3900	4000	1600	2500	4300	3300	1200	190	190	170
9-20	720	2700	9100	1400	2200	3900	1800	1000	180	180	170
10-3	-	-	-	-	-	-	-	-	160	140	150
10-4	-	3600	-	1800	2300	4100	1600	2300	220	170	150
10-11	670	2900	3300	1700	2300	3800	4800	1200	180	180	160
10-18	600	3300	-	1400	-	3400	1600	1800	220	150	140
10-25	-	-	-	-	-	-	-	-	190	170	160
10-26	-	-	-	-	-	-	-	-	220	180	160
11-1	670	2700	5200	1400	-	4000	1800	1500	-	-	-
11-7	600	3400	5500	1700	-	3400	1800	1400	290	160	180
11-27	680	-	-	-	-	-	-	-	-	160	150
11-28	-	-	-	-	-	-	-	-	-	160	150
11-29	-	-	-	-	-	-	-	-	-	140	150
Average	660	3200	5400	1600	2300	3800	2400	1500	200	170	160
Maximum	720	3900	9100	1800	2500	4300	4800	2300	290	190	180
Minimum	600	2700	3300	1400	2200	3400	1600	1000	160	140	140
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Suspended Solids (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6		-	-	-	-	-	-	-	11	25	5
9-13	-	790	290	710	340	200	980	400	29	14	10
9-20	89	620	5700	400	180	140	380	220	30	26	22
10-3	-	-	-	-	-	-	-	-	23	19	15
10-4	-	1100	-	160	120	190	310	1600	23	26	18
10-11	62	200	420	480	100	90	3100	330	23	40	18
10-18	39	1000	-	250	-	100	290	1100	39	20	11
10-25	-	-	-	-	-	-	-	-	33	26	30
10-26	-	-	-	-	-	-	-	-	43	49	44
11-1	62	250	2300	140	-	570	460	490	-	-	-
11-7	35	780	2200	170	-	68	330	49	88	23	33
11-2	34	-	-	-	-	-	-	-	-	-	-
11-2	20	-	-	-	-	-	-	-	-	-	-
11-2	33	-	-	-	-	-	-	-	-	28	24
~~11-28~~	-	-	-	-	-	-	-	-	-	36	30
~~11-29~~	-	-	-	-	-	-	-	-	-	21	-
Average	47	680	2200	330	190	190	840	600	34	27	22
Maximum	89	1100	5700	710	340	570	3100	1600	88	49	44
Minimum	20	200	290	140	100	68	290	49	11	14	5
No. Samples	8	7	5	7	4	7	7	7	10	13	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO
Parameter: Dissolved Solids (mg/l)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	180	160	160
9-13	-	3100	3700	930	2100	4100	2400	790	160	170	160
9-20	630	2100	3400	960	2100	3800	1400	740	150	150	150
10-3	-	-	-	-	-	-	-	-	130	120	140
10-4	-	2500	-	1700	2200	3900	1200	740	200	150	130
10-11	610	2700	2900	1200	2200	3800	1800	900	160	140	140
10-18	560	2300	-	1200	-	3300	1300	730	180	130	120
10-25	-	-	-	-	-	-	-	-	160	150	130
10-26	-	-	-	-	-	-	-	-	180	130	120
11-1	600	2400	2900	1300	-	3500	1300	1000	-	-	-
11-7	560	2600	3300	1500	-	3400	1400	910	200	130	150
11-27	640	-	-	-	-	-	-	-	-	130	120
11-28	-	-	-	-	-	-	-	-	-	130	120
11-29	-	-	-	-	-	-	-	-	-	120	-
Average	600	2500	3200	1300	2200	3700	1500	830	170	140	140
Maximum	640	3100	3700	1700	2200	4100	2400	1000	200	170	160
Minimum	560	2100	2900	930	2100	3300	1200	730	130	120	120
No. Samples	6	7	5	7	4	7	7	7	10	13	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Total Volatile Solids (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	89	53	5
9-13	-	540	930	280	540	1100	580	360	89	69	73
9-20	180	490	890	350	450	750	360	240	64	80	40
10-3	-	-	-	-	-	-	-	-	36	24	34
10-4	-	780	-	530	600	950	350	450	85	55	13
10-11	160	720	810	470	590	950	890	280	67	60	57
10-18	130	520	-	320	-	680	340	400	56	85	31
10-25	-	-	-	-	-	-	-	-	59	55	40
10-26	-	-	-	-	-	-	-	-	66	43	42
11-1	190	580	880	400	-	780	370	320	-	-	-
11-7	180	670	990	410	-	760	440	420	74	38	40
11-27	170	-	-	-	-	-	-	-	-	56	51
11-28	-	-	-	-	-	-	-	-	-	36	49
11-29	-	-	-	-	-	-	-	-	-	49	50
Average	170	610	900	390	550	850	480	350	69	54	40
Maximum	190	780	990	530	600	1100	890	450	89	85	73
Minimum	130	490	810	280	450	680	340	240	36	24	5
No. Samples	6	7	5	7	4	7	7	7	10	13	13

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Volatile Suspended Solids (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	1	2	1
9-13	-	56	22	42	38	32	120	62	8	1	2
9-20	24	58	340	40	21	48	56	47	10	8	5
10-3	-	-	-	-	-	-	-	-	6	4	4
10-4	-	120	-	23	14	41	54	250	7	9	3
10-11	24	28	42	37	15	33	390	61	7	9	5
10-18	12	92	-	21	-	29	41	150	1	5	3
10-25	-	-	-	-	-	-	-	-	2	2	9
10-26	-	-	-	-	-	-	-	-	7	5	6
11-1	6	34	180	18	-	44	56	92	-	-	-
11-7	16	62	140	17	-	15	44	68	14	2	3
11-27	10	-	-	-	-	-	-	-	-	9	7
11-28	-	-	-	-	-	-	-	-	-	6	10
11-29	-	-	-	-	-	-	-	-	-	1	-
Average	15	64	140	28	22	35	110	100	6	5	5
Maximum	24	120	340	42	38	48	390	250	14	9	10
Minimum	6	28	22	17	14	15	41	47	1	1	1
No. Samples	6	7	5	7	4	7	7	7	10	13	12

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Iron (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	.56	.98	.27
9-13	-	94	15	37	5.6	9.1	34	9.8	.89	.71	.55
9-20	8.3	28	230	19	7.4	12	8.0	10	.61	.39	.27
10-3	-	-	-	-	-	-	-	-	.47	.32	.23
10-4	-	54	-	9.6	3.0	12	9.8	76	.78	.61	.37
10-11	2.4	9.5	10	17	5.6	13	57	15	.95	1.5	.56
10-18	2.4	48	-	14	-	8.5	8.6	40	1.7	.50	.13
10-25	-	-	-	-	-	-	-	-	.85	.65	.68
10-26	-	-	-	-	-	-	-	-	1.4	1.1	1.2
11-1	4.1	21	13	9.5	-	16	6.0	11	-	-	-
11-7	1.8	30	77	8.3	-	9.2	7.6	21	3.2	.81	.97
Average	3.8	41	69	16	5.4	11	19	26	1.1	.76	.52
Maximum	8.3	94	230	37	7.4	16	57	76	3.2	1.5	1.2
Minimum	1.8	9.5	10	8.3	3.0	8.5	6.0	9.8	.47	.32	.13
No. Samples	5	7	5	7	4	7	7	7	10	10	10

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Oil and Grease (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	-	-	-
9-13		9	7	5	7	8	14	14	4	11	15
9-20	10	10	12	5	7	10	11	6	10	10	11
10-3	-	-	-	-	-	-	-	-	3	3	5
10-4	-	7	-	2	3	4	4	4	1	2	1
10-11	3	3	3	4	3	6	8	4	4	3	3
10-18	2	2	-	3	-	3	3	3	2	2	1
10-25	-	-	-	-	-	-	-	-	2	2	2
10-26	-	-	-	-	-	-	-	-	2	2	3
11-27	4									4	4
11-28										4	3
11-29										5	3
Average	5	6	7	4	5	6	8	6	4	4	5
Maximum	10	10	12	5	7	10	14	14	10	11	15
Minimum	2	2	3	2	3	3	3	3	1	2	1
No. Samples	4	4	3	5	4	5	5	5	8	11	11

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
FWPCA, DPO Parameter: Turbidity (Jackson Units)

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	-	-	-	-	-	-	-	< 25	< 25	< 25
9-13	-	2300	550	1200	340	140	1200	480	25	< 25	< 25
9-20	150	650	650	210	140	170	310	170	< 25	< 25	< 25
10-3	-	-	-	-	-	-	-	-	< 25	< 25	< 25
10-4	-	1000	-	130	75	220	280	900	< 25	< 25	< 25
10-11	25	120	340	360	120	120	2600	270	< 25	< 25	< 25
10-18	100	1000	-	320	-	100	270	390	< 25	< 25	< 25
10-25	-	-	-	-	-	-	-	-	25	< 25	< 25
10-26	-	-	-	-	-	-	-	-	40	40	35
11-1	130	230	2400	140	-	520	320	550	-	-	-
11-7	30	650	2100	45	-	110	180	560	< 25	-	< 25
Average	87	850	1200	340	170	200	740	470	27	27	26
Maximum	150	2300	2400	1200	340	520	2600	900	40	40	35
Minimum	25	230	340	45	75	100	180	170	< 25	< 25	< 25
No. Samples	5	7	5	7	4	7	7	7	10	9	10

TABLE 7 (cont'd)
1967 SAMPLING RESULTS - GRASSY ISLAND AREA
Parameter: Sulfate (mg/l)

FWPCA, DPO

Date	Pond	Wells							DT 14.6		
		3	4	5	6	7	8	9	R37	R41	R43
9-6	-	650	1500	240	720	-	360	-	15	-	14
9-13	-	320	1300	38	880	1400	760	250	20	17	13
9-20	50	950	1700	150	820	1600	570	90	17	16	15
10-3	-	-	-	-	-	-	-	-	28	-	15
10-4	-	1000	-	540	950	1600	410	80	18	16	16
10-11	34	1100	1500	270	930	1500	380	120	16	14	14
10-18	34	1100	-	290	-	1400	440	120	20	17	16
10-25	-	-	-	-	-	-	-	-	15	13	13
10-26	-	-	-	-	-	-	-	-	17	14	13
11-1	44	1100	1400	290	-	1300	270	120	-	-	-
11-7	40	1100	1400	380	-	1300	470	130	16	15	38
Average	40	920	1500	280	860	1400	460	130	18	15	17
Maximum	50	1100	1700	540	950	1600	760	250	28	17	38
Minimum	34	320	1300	38	720	1300	270	80	15	13	13
No. Samples	5	8	6	8	5	7	8	7	10	8	10

Table 8
City of Wyandotte
Filter Plant Records
Raw Water Analyses
1967

FWPCA, DPO

DATE	TURBIDITY UNITS	CHLORIDES mg/l	ALKALINITY mg/l	COLIFORM MPN/100 ml
8-21	6	-	-	4,300
8-22	6	12	80	15,000
8-23	7	-	-	4,300
8-24	8	11.5	80	4,300
8-25	8	-	-	4,300
8-26*	7	14	78	3,900
8-27	6	-	-	2,300
8-28	7	12	80	7,500
8-29	7	-	-	2,300
8-30*	7	12	80	4,300
8-31	9	-	-	210
9-1	10	11.5	80	2,400
9-2	7	-	-	930
9-3	6	11	80	4,600
9-4	6	-	-	4,600
9-5	6	12.5	80	930
9-6	7	-	-	2,400
9-7	6	13	80	4,600
9-8	6	-	-	2,400
9-9	6	12.5	80	2,400
9-10	6	-	-	2,400
9-11	12	11.5	81	750
9-12	14	-	-	11,000
9-13	11	11.5	78	750
9-14	10	-	-	3,900
9-15	7	12	80	9,300
9-16	7	-	-	24,000
9-17	7	11.5	78	110,000
9-18	7	-	-	4,300
9-19	6	12	80	4,300
9-20	6	-	-	4,300
9-21*	7	12	82	2,300
9-22	7	-	-	46,000
9-23	7	12.5	80	24,000
9-24	7	-	-	24,000
9-25	7	11.5	82	1,200
9-26	8	-	-	2,400
9-27*	8	10	80	24,000
9-28	13	-	-	9,300
9-29*	32	11	82	4,300
9-30	39	-	-	4,300

*Probable Stormwater Overflow
#Grassy Island Overflow Pipe Open

Table 8 (cont.)
City of Wyandotte
Filter Plant Records
FWPCA, DPO Raw Water Analyses
1967

DATE	TURBIDITY UNITS	CHLORIDES mg/l	ALKALINITY mg/l	COLIFORM MPN/100 ml
10-1	18	10	78	4,300
10-2	13	-	-	2,300
10-3	12	10	82	2,300
10-4	10	-	-	4,300
10-5	15	10	82	9,300
10-6#	14	-	-	750
10-7#	18	11	80	4,300
10-8*#	24	-	-	9,300
10-9#	22	19	80	46,000
10-10	20	-	-	15,000
10-11	14	20	80	4,300
10-12	12	-	-	2,300
10-13	13	20	80	4,300
10-14	11	-	-	2,300
10-15*	12	11.5	80	9,300
10-16*	19	-	-	110,000
10-17*	17	14	80	9,300
10-18	12	-	-	46,000
10-19	11	12	80	15,000
10-20	11	-	-	24,000
10-21	12	12	80	2,300
10-22	11	-	-	930
10-23	11	8.5	80	9,300
10-24	11	-	-	24,000
10-25#	15	11.5	82	2,300
10-26#	16	-	-	2,300
10-27*#	28	9.5	80	4,300
10-28	36	-	-	2,300
10-29	17	10	80	4,300
10-30	18	-	-	4,300
10-31	35	8	80	3,900
11-1*	31	-	-	2,300
11-2	28	9	76	110,000
11-3*	19	-	-	4,300
11-4	11	11	80	9,300
11-5	10	-	-	4,300
11-6	12	12.5	80	110,000
11-7	12	-	-	4,300
11-8	14	12	80	4,300
11-9	13	-	-	4,300
11-10	13	12	78	3,900

*Probable Stormwater Overflow
#Grassy Island Overflow Pipe Open

FWPCA, DPO

Table 8 (cont.)
City of Wyandotte
Filter Plant Records
Raw Water Analyses
1967

DATE	TURBIDITY UNITS	CHLORIDES mg/l	ALKALINITY mg/l	COLIFORM MPN/100 ml
11-11*	11	-	-	9,300
11-12	14	12.5	80	4,300
11-13	16	-	-	1,500
11-14	14	14	78	930
11-15	17	-	-	4,600
11-16	19	10.5	82	430
11-17*	28	-	-	9,300
11-18	17	12.5	78	4,300
11-19	15	-	-	4,300
11-20	14	6	80	4,300
11-21	14	-	-	4,300
11-22	11	6	80	9,300
11-23	12	-	-	4,300
11-24	12	10.5	80	930
11-25	9	-	-	1,500
11-26	9	7.5	80	4,600
11-27#	10	-	-	930
11-28#	12	8	80	750
11-29#	8	-	-	2,400
11-30#	11	8.5	80	2,400
12-1#	28	10	94	15,000
12-2*#	21	-	-	3,900
12-3#	21			21,000

*Probable Stormwater Overflow
#Grassy Island Overflow Pipe Open

Overflow and Leakage

On October 2, 3, and 4, the field crew reported overflow of the Grassy Island dike at points on the north and east side of Grassy Island. Samples of the overflow were collected on October 3.

On three occasions, an overflow pipe (approximately 21 inches in diameter) located on the west side of the island (see Figure 7) was opened to drain the accumulated supernatent liquid. During the discharges which commenced on October 25 and November 27, samples were collected with a dip sampler directly from the overflow. Some leakage did occur even when the overflow pipe was sealed with a metal plate. Results of the analyses of dike overflow, leakage through overflow pipe, and the discharge through the overflow pipe are shown in Table 9 .

FWPCA, DPO

Table 9
Rouge River Pilot Study
Grassy Island Overflow & Leakage

Date	Time	Type of Discharge	Estimated Flow (CFS)	Pond Water Level
10-3	1030	Overflow of dike 500' N. of well 7	< .1	576.8
10-3	1100	Overflow of dike 40' E. of well 6	< .1	576.8
10-6		Overflow pipe opened at 1530 (no sample taken)		576.8
10-25	1438	Overflow pipe opened at 1433	20	576.8
10-25	1503	Overflow pipe open	10	576.8
10-26	1015	Overflow pipe open	10	575.6
11-1	1045	Leakage; overflow pipe	< .1	575.0
11-7	1155	Leakage; overflow pipe	< .1	576.0
11-15	1145	Leakage; overflow pipe	< .1	576.7
11-27	1047	Overflow pipe opened at 1017	20	576.6
11-28	0920	Overflow pipe open	10	-
11-29	1040	Overflow pipe open	3	574.7

FWPCA, DPO

Rouge River Pilot Study 1967

Grassy Island Leakage & Overflow

Table 9 (cont.)

	Date	Time	Temp °C	Turb J.C.U.	Alkalinity mg/l	Total Solids mg/l	Diss Solids mg/l	Total Vol.Sol. mg/l	Susp. Solids mg/l	Vol.Sus Solids mg/l	Sulfate mg/l	Total Coli. MF/100ml	Fecal Coli. MF/100
	10-3	1030	16.0	-	-	230,000	5300	26000	230,000	26000	-	870,000	-
	10-3	1100	15.0	26	290	660	620	170	37	19	15	4,000	-
(1)	10-25	1438	10.5	53	170	590	540	160	50	22	34	1,800	70
(1)	10-25	1503	10.0	52	260	570	540	140	38	19	32	1,700	70
(1)	10-26	1015	8.0	57	270	580	540	150	41	14	36	3,100	10
(2)	11-1	1045	10.0	77	280	650	610	190	34	4	38	5,100	510
(2)	11-7	1155	3.5	< 25	260	590	560	180	32	9	21	850	32
(2)	11-15	1145	0.0	82	260	670	630	210	38	8	45	7,900	730
(1)	11-27	1147	1.0	-	250	700	660	230	34	12	-	700	10
(1)	11-28	0920	0.0	-	250	710	630	220	78	16	-	2,000	24
(1)	11-29	1040	0.0	-	280	710	640	230	68	28	-	570	10
(1)	Overflow Pipe												
		Ave.	5.0	54	250	640	590	190	52	19	34	1,800**	17**
		Max.	10.5	57	280	710	660	230	78	28	36	3,100	70
		Min.	0.0	52	170	570	540	140	34	12	32	570	10
		N.S.	6	3	6	6	6	6	6	6	3	6	6
(2)	Overflow Pipe Leakage												
		Ave.	4.5	61	270	640	600	190	35	7	35	5,100**	510**
		Max.	10.0	82	280	670	630	210	38	9	45	7,900	730
		Min.	0.0	< 25	260	590	560	180	32	4	21	850	32
		N.S.	3	3	3	3	3	3	3	3	3	3	3

*Estimated

**Median

Observations

The extent of the filled area inside the dike, as determined by a survey conducted on September 6, is shown in Figure 7 . By September 11, the sludge had extended to the dikes on all sides and the depth of the material accumulated inside the dike began to show a noticeable increase. A Belfort recorder was installed within the diked area to record these changes in water level as the dredging progressed. Similar recorders were installed in the Detroit River, at well #3, and at well #5. The Belfort records along with weekly observations and measurements performed by the field crew are presented in Figure 8 . On October 2, 3, and 4 the field crew reported overflow of the dike on the north and east sides of the island. Samples of the overflows were collected on October 3 near wells 6 and 7. On October 6, the overflow pipe was opened and an estimated 13 million gallons of supernatent drained into the Detroit River during a 48-hour period. The overflow pipe was also opened on two other occasions as previously discussed (October 25 and November 27). Even when the overflow pipe was sealed with a metal plate, leakage (estimated at less than .1 cfs) was observed.

C. Past Records

Data collected by various agencies at DT 14.6W between 1963 and 1967 were divided into two groups: dredging and non-dredging periods. The average temperature, phenol and chloride concentrations and median coliform densities measured at five stations on DT 14.6W are shown for dredging and non-dredging periods since 1963. (See Table 10)

Analytical statistical results* during the 1963 non-dredging period for stations R139 and R142 (on Detroit River range DT 19.0) and T15 (on the Rouge River) are given in Table 11 . Phenol and chloride concentrations for 1963 appear higher than 1967 Pilot Study results while coliform densities are lower.

*Detroit River Lake Erie Project, U.S. Public Health Service

FWPCA, DPO

Table 10
Statistics of Water Quality
Dredging & Non-Dredging Periods
Detroit River

Range: DT14.6W
Station: R36 (400' from U.S. Shore)

		Temp °C	Phenols ug/l	Cl. mg/l	Total Coliform* MF/100 ml
1963	Ave.	12.2	6	19	3100
Dredging	Max.	20.5	8	20	3200
Period	Min.	3.0	4	19	600
	N.S.	3	3	3	3
1963	Ave.	13.6	8	21	2750
Non-	Max.	26.0	23	32	520,000
Dredging	Min.	6.0	1	15	560
Period	N.S.	14	6	8	14
1964	Ave.	15.0	9	-	31,100
Dredging	Max.	18.0	14	-	60,000
Period	Min.	12.0	3	-	2200
	N.S.	2	2	-	2
1964	Ave.	22.8	4	-	97,500
Non-	Max.	25.5	7	-	290,000
Dredging	Min.	19.5	0	-	1000
Period	N.S.	6	6	-	6
1965	Ave.	-	7	15	4,000
Dredging	Max.	-	7	16	6,700
Period	Min.	-	6	14	1,300
	N.S.	-	2	2	2
1965	Ave.	13.1	3	14	4,750
Non-	Max.	18.0	6	14	120,000
Dredging	Min.	7.0	0	14	300
Period	N.S.	4	7	1	8
1966	Ave.	12.2	4	20	1,600
Dredging	Max.	15.0	11	23	2,500
Period	Min.	8.0	0	15	900
	N.S.	3	3	3	3
1966	Ave.	18.1	6	22	3,300
Non-	Max.	24.0	11	44	5,500
Dredging	Min.	9.0	0	14	< 300
Period	N.S.	7	6	7	7
1967	Ave.	12.2	7	19	15,000
Dredging	Max.	15.0	10	23	22,000
Period	Min.	9.5	4	14	7,400
	N.S.	2	2	2	2
1967	Ave.	15.0	8	16	13,000
Non-	Max.	22.0	18	19	120,000
Dredging	Min.	9.0	< 1	12	3,300
Period	N.S.	5	6	6	6

*Median (not average) shown for bacteriological data

Table 10 (cont.)
Statistics of Water Quality
Dredging & Non-Dredging Periods
Detroit River

FWPCA, DPO

Range: DT14.6W
Station: R38 (800' from U.S. Shore)

		Temp °C	Phenols ug/l	Cl. mg/l	Total Coliform* MF/100 ml
1963	Ave.	12.2	3	12	2800
Dredging	Max.	20.5	6	13	4500
Period	Min.	3.0	1	11	500
	N.S.	3	3	3	3
1963	Ave.	13.3	6	15	2000
Non-	Max.	26.0	16	17	440,000
Dredging	Min.	5.5	0	10	200
Period	N.S.	13	6	9	13
1964	Ave.	15.3	4	-	12,950
Dredging	Max.	18.0	8	-	25,000
Period	Min.	12.5	0	-	900
	N.S.	2	2	-	2
1964	Ave.	22.6	4	-	47,500
Non-	Max.	25.5	9	-	290,000
Dredging	Min.	19.0	0	-	3,000
Period	N.S.	6	6	-	6
1965	Ave.	-	5	13	24,500
Dredging	Max.	-	5	13	48,000
Period	Min.	-	5	12	1,000
	N.S.	-	2	2	2
1965	Ave.	12.8	3	13	3,950
Non-	Max.	18.0	4	13	59,000
Dredging	Min.	6.0	0	13	1,200
Period	N.S.	4	7	1	8
1966	Ave.	12.2	2	14	1,400
Dredging	Max.	15.0	5	15	1,400
Period	Min.	8.0	0	13	400
	N.S.	3	3	3	3
1966	Ave.	18.0	6	15	1,000
Non-	Max.	24.0	9	23	9,300
Dredging	Min.	9.0	0	12	< 300
Period	N.S.	7	7	7	7
1967	Ave.	12.5	6	15	13,000
Dredging	Max.	15.5	10	18	18,000
Period	Min.	9.5	2	12	7,100
	N.S.	2	2	2	2
1967	Ave.	15.0	9	14	4,600
Non-	Max.	22.0	19	15	140,000
Dredging	Min.	9.0	1	12	2,000
Period	N.S.	5	5	6	6

*median (not average) values shown for bacteriological data

Table 10 (cont.)
Statistics of Water Quality
Dredging & Non-Dredging Periods
Detroit River
Range: DT14.6W
Station: R40 (1000' from U.S. Shore)

FWPCA, DPO

		Temp °C	Phenols ug/l	Cl. mg/l	Total Coliform* MF/100 ml
1963	Ave.	12.3	4	12	1800
Dredging	Max.	21.0	8	18	2200
Period	Min.	3.0	1	9	1100
	N.S.	3	3	3	3
1963	Ave.	13.2	4	19	1100
Non-	Max.	26.0	11	54	380,000
Dredging	Min.	5.5	1	12	160
Period	N.S.	13	5	9	13
1964	Ave.	15.0	5	-	9,850
Dredging	Max.	17.5	5	-	19,000
Period	Min.	12.5	4	-	700
	N.S.	2	2	-	2
1964	Ave.	22.5	3	-	43,500
Non-	Max.	25.5	5	-	260,000
Dredging	Min.	19.0	0	-	1000
Period	N.S.	6	6	-	6
1965	Ave.	-	4	11	19,250
Dredging	Max.	-	4	12	38,000
Period	Min.	-	3	9	500
	N.S.	-	2	2	2
1965	Ave.	12.5	3	13	3,050
Non-	Max.	17.5	13	13	58,000
Dredging	Min.	6.0	0	13	600
Period	N.S.	4	8	1	8
1966	Ave.	12.0	2	13	400
Dredging	Max.	15.0	4	14	1,200
Period	Min.	7.5	0	12	200
	N.S.	3	3	3	3
1966	Ave.	17.9	5	14	1,400
Non-	Max.	24.0	9	20	4,300
Dredging	Min.	8.5	0	12	360
Period	N.S.	7	7	7	7
1967	Ave.	12.5	6	13	7,400
Dredging	Max.	15.5	9	14	8,200
Period	Min.	9.5	3	12	6,700
	N.S.	2	2	2	2
1967	Ave.	15.0	7	13	3,700
Non-	Max.	22.0	14	15	< 150,000
Dredging	Min.	9.0	< 1	8	250
Period	N.S.	5	6	6	6

*Median (not average) values shown for bacteriological data

Table 10 (cont.)
Statistics of Water Quality
Dredging & Non-Dredging Periods
Detroit River
Range: DT14.6W
Station: R42 (2000' from U.S. Shore)

FWPCA, DPO

		Temp °C	Phenols ug/l	Cl. mg/l	Total Coliform* MF/100 ml
1963	Ave.	12.0	2	9	1400
Dredging	Max.	20.5	3	10	1900
Period	Min.	3.0	1	8	1400
	N.S.	3	3	3	3
1963	Ave.	12.8	2	19	1200
Non-	Max.	25.5	4	47	200,000
Dredging	Min.	5.0	0	10	80
Period	N.S.	13	5	8	13
1964	Ave.	14.8	5	-	3,950
Dredging	Max.	17.5	5	-	7,600
Period	Min.	12.0	4	-	300
	N.S.	2	2	-	2
1964	Ave.	22.4	3	-	58,000
Non-	Max.	25.5	7	-	620,000
Dredging	Min.	19.0	0	-	2,000
Period	N.S.	6	6	-	6
1965	Ave.	-	3	9	21,750
Dredging	Max.	-	3	10	43,000
Period	Min.	-	3	8	500
	N.S.	-	2	2	2
1965	Ave.	12.4	3	12	2,250
Non-	Max.	17.5	7	12	27,000
Dredging	Min.	5.5	0	12	310
Period	N.S.	4	8	1	8
1966	Ave.	11.8	4	10	500
Dredging	Max.	14.5	9	11	1,100
Period	Min.	7.5	0	9	500
	N.S.	3	3	3	3
1966	Ave.	17.5	3	12	900
Non-	Max.	23.5	9	17	9,300
Dredging	Min.	8.0	0	10	< 300
Period	N.S.	7	7	7	7
1967	Ave.	12.0	2	10	3,200
Dredging	Max.	15.0	2	11	3,900
Period	Min.	9.0	2	10	2,400
	N.S.	2	2	2	2
1967	Ave.	14.7	7	11	1,600
Non-	Max.	22.0	13	14	> 150,000
Dredging	Min.	8.5	3	6	< 10
Period	N.S.	5	6	6	6

*Median (not average) values shown for bacteriological data

Table 10 (cont.)
Statistics of Water Quality
Dredging & Non-Dredging Periods
Detroit River

FWPCA, DPO

Range: DT14.6W
Station: R44 (3000' from U.S. Shore)

		Temp °C	Phenols ug/l	Cl. mg/l	Total Coliform* MF/100 ml
1963 Dredging Period	Ave.	11.8	2	9	600
	Max.	20.0	4	10	1300
	Min.	3.0	0	8	420
	N.S.	3	3	3	3
1963 Non-Dredging Period	Ave.	12.5	2	13	420
	Max.	25.5	6	33	50,000
	Min.	4.5	0	7	10
	N.S.	13	5	9	13
1964 Dredging Period	Ave.	14.5	5	-	1,100
	Max.	17.5	7	-	1,800
	Min.	11.5	3	-	400
	N.S.	2	2	-	2
1964 Non-Dredging Period	Ave.	22.3	2	-	31,500
	Max.	25.5	5	-	220,000
	Min.	19.0	0	-	1,200
	N.S.	6	5	-	6
1965 Dredging Period	Ave.	-	3	9	1,850
	Max.	-	3	9	3,400
	Min.	-	2	9	300
	N.S.	-	2	2	2
1965 Non-Dredging Period	Ave.	12.0	3	11	1,550
	Max.	17.5	8	11	16,000
	Min.	5.0	0	11	90
	N.S.	4	8	1	8
1966 Dredging Period	Ave.	11.7	0	9	200
	Max.	14.5	1	10	300
	Min.	7.5	0	9	200
	N.S.	3	3	3	3
1966 Non-Dredging Period	Ave.	17.4	2	12	500
	Max.	23.5	9	18	4,300
	Min.	8.0	0	9	< 300
	N.S.	7	7	7	7
1967 Dredging Period	Ave.	12.0	3	12	320
	Max.	15.0	5	12	350
	Min.	9.0	1	11	290
	N.S.	2	2	2	2
1967 Non-Dredging Period	Ave.	14.3	4	10	960
	Max.	22.0	12	12	93,000
	Min.	8.5	< 1	5	200
	N.S.	5	6	6	6

*Median (not average) values shown for bacteriological data

FWPCA, DPO

Table 11
Water Quality Statistics
1963 Non-Dredging Period

	Temp (°C)	Phenols (ug/l)	Chlorides (mg/l)	Total Coliform* (MF/100 ml)
R139				
Ave.	17.0	28	35	6,000
Max.	27.0	79	42	440,000
Min.	7.0	8	28	1,300
N.S.	7	5	5	7
R142				
Ave.	16.5	18	27	7,000
Max.	28.0	28	35	750,000
Min.	6.0	0	12	400
N.S.	7	5	5	7
T-15				
Ave.	13.0	42	40	7,500
Max.	21.0	160	69	140,000
Min.	5.0	0	10	600
N.S.	16	10	8	16

*Median (not average) for bacteriological data.

II. Conclusions

Dredging Operation

The dredging operation causes significant degradation of water quality in the immediate vicinity of the dredge as indicated by increases in concentrations of suspended solids, COD, BOD, total phosphate, volatile suspended solids, and iron. The concentration of these waste constituents generally decreased to substantially lower levels at a distance one half mile downstream from the dredging operation as shown in Figure 9. No pollutional effects of the dredging operation on the Detroit River were detected. Temperature, pH, conductivity, alkalinity, chlorides, phenols, total soluble phosphate, nitrates, nitrite, total coliform, fecal coliform, and dissolved solids did not show measurable increases in the Rouge or Detroit Rivers as a result of dredging the Rouge.

The analysis of the mid-depth samples do not show significant oil pollution. However, the visible film of an oil-solid mixture frequently stirred up behind the dredging operation was not collected as part of the depth samples. Oil films generated by the dredging operation were not of major significance on the Rouge and were not observed at all on the Detroit River.

The dissolved oxygen concentration in the dredging areas decreased with time while the stirred-up material was still suspended in the river. On the dissolved oxygen surveys on October 2 and November 9, decreases of 3 mg/l (in 50 minutes) and 3.5 mg/l (in 34 minutes) respectively, were observed as shown in Figure 6.

Station T18 at Fort St. was sampled during the entire pilot study. Ford Motor Company discharges and the dredging operations are two of the

major factors which affect the water quality at this point. Due to the Ford strike the influence of the discharge of this company was the least during the 60-day period commencing on September 8. Six samples were collected at Fort St. during this period. Three samples were collected with the dredging operation upstream and three with the dredging downstream from the bridge. The average of these three samples show only a small increase in certain parameters under the influence of the dredging operation as shown in the following table:

Station T-18
Fort St. Bridge
Average Values

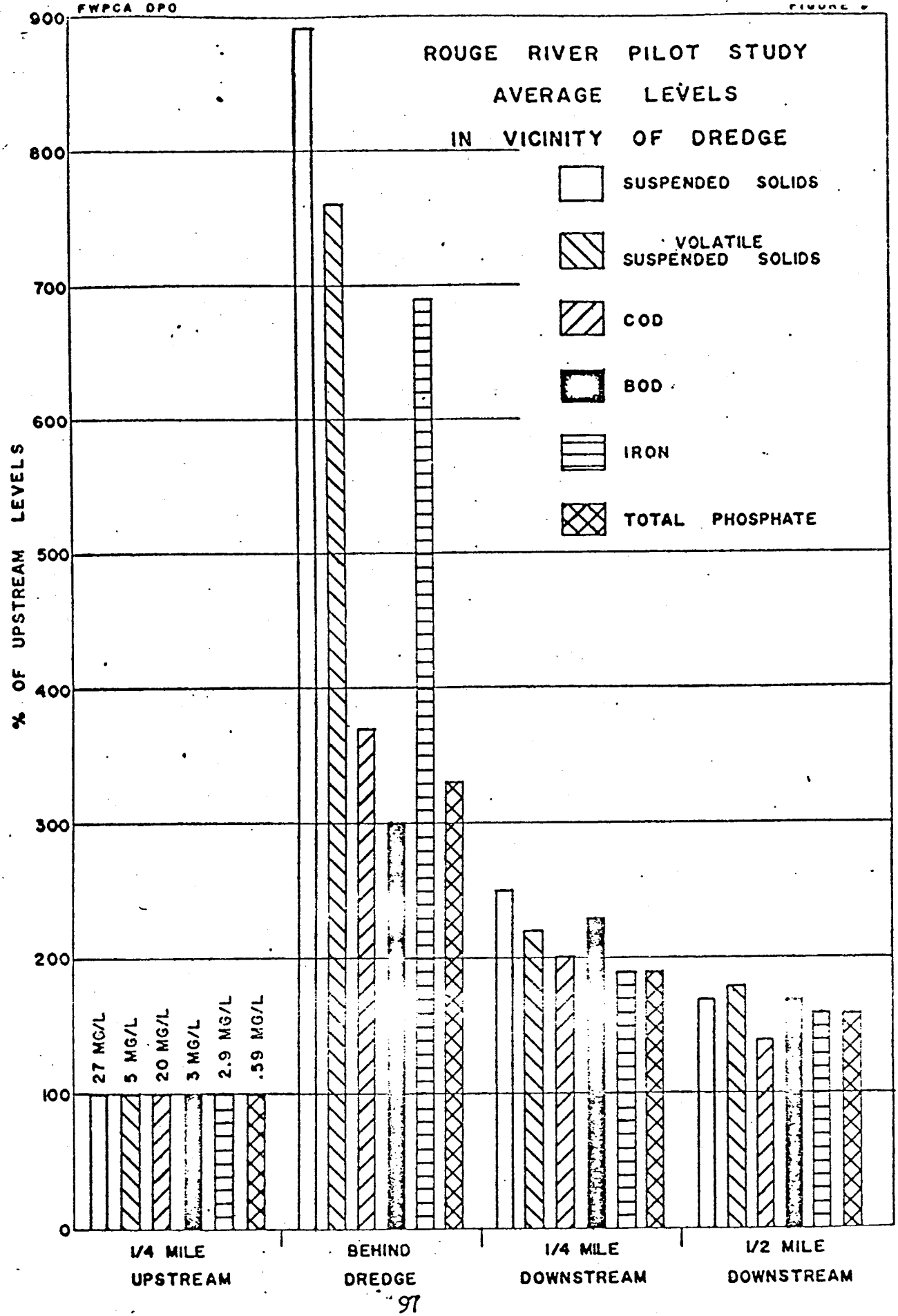
Parameter (mg/l) (average of three values)	Dredging Operation Upstream from Fort St.	Dredging Operation Downstream from Fort St.
COD	24	26
BOD	4	3
Suspended solids	56	50
Volatile susp. solids	9	7
Total phosphates	.94	.71
Iron	5.6	4.0

The average solid content of the intake sludge was 38%. The detention of the material in the hoppers provided for 47% removal of the solid material from the sludge before overflow. The dredged sludge was homogenous and the solids contained in the intake and overflow sludge exhibited similar chemical characteristics. The following table lists the average concentrations of several constituents in the dry solid dredged material.

	Intake & Overflow Average Concentration* mg/kg Dry Basis (except as noted)
Volatile Solids (% Dry Basis)	18
Total Phosphate	8700
Total Soluble Phosphate	8
Nitrate	60
Nitrite	.3
Ammonia	400
Iron	100
Oil & Grease	40,000
COD	260,000

Both the undisturbed and dredged sediments were found to be highly polluted, exerting high oxygen demand and containing large concentrations of iron, oil and volatile solids. The highest concentrations of oil and iron were found in sediments collected from the Rouge upstream from its intersection with the Old Channel.

*Excluding intake & overflow from the Old Channel


ROUGE RIVER PILOT STUDY
AVERAGE LEVELS
IN VICINITY OF DREDGE
SUSPENDED SOLIDS
VOLATILE SUSPENDED SOLIDS
COD
BOD
IRON
TOTAL PHOSPHATE
% OF UPSTREAM LEVELS
900
800
700
600
500
400
300
200
100
0
27 MG/L
5 MG/L
20 MG/L
3 MG/L
2.9 MG/L
.59 MG/L
1/4 MILE UPSTREAM
BEHIND DREDGE
1/4 MILE DOWNSTREAM
1/2 MILE DOWNSTREAM

Dumping Grounds

Sampling st Stations R37, R41, and R43 downstream from Grassy Island showed no appreciable degradation of water quality during the dredging period. Examination of past data records for dredging and non-dredging periods also fail to show consistent changes in water quality.

The measurement of water levels inside the wells on Grassy Island indicate that the seepage rate through the dumping ground dikes is low. Well water levels were found remain near that elevation of the Detroit River. The rate of rise after sampling in water level in well #3 also indicate the low seepage rates typical of clayey subsoils. In the week following the end of the dumping operation, the water level in the pond subsided approximately 1 1/2 inches. At this rate the seepage flow from the island is estimated at less than .2 cfs.

The water collected from the wells was found to be grossly polluted. However, it is expected that many of the pollutional characteristics are imparted to the water by the surrounding soils and that the well water is not necessarily representative of water quality of a seepage flow.

The Grassy Island pond acts as a settling and stabilization basin. Results of the analysis of the pond sample indicate a decrease in BOD, COD, total phosphate and suspended solids with time. The quality of the pond water are compared to effluent recommendations or requirements set down by the Public Health Service and the Michigan Water Resources Commission for certain industries and municipalities in the Detroit area. (See Table 12) The concentration of these constituents are comparable to the levels required for other discharges to the Detroit River.

Table 12
Water Quality
FWPCA, DPO Grassy Island Pond

Parameter	Recommendations or Requirements	Pond Average (4)	Overflow Average (4)
Suspended Solids (mg/l)	50 (1)	47	52
Total Coliform (org/100 ml)	note (3)	12,000	1800
Fecal Coliform (org/100 ml)	note (3)	470	17
Oil (mg/l)	15 (1) (2)	6	3
Phenol (ug/l)	20 (2)	13	9
BOD (5-day) (mg/l)	20 (2)	18	10
pH (standard units)	5.8 - 10.3 (1)	7.7	8.0
Iron (mg/l)	17 (1) (2)	3.8	2.4

(1) Michigan Water Resources Commission stipulation for certain effluents.
(2) U.S. Public Health Service recommendation for certain effluents.
(3) Proposed water quality standard:
Total body contact: The average of any series of 10 consecutive samples shall not exceed 1000 organisms/100 ml nor shall 20% of the samples exceed 5000. The average fecal coliform density for the same 10 consecutive samples shall not exceed 100. This standard applies to the Detroit River except at the mouths of tributaries, and in the immediate vicinity of enclosed harbor areas and waste treatment plant outfalls.
(4) Median for coliform.

III. APPENDIX

Laboratory Procedure

Bottom sediment samples were analyzed according to the Chicago Program Office (FWPCA) procedures and Standard Methods for the Examination of Water and Wastewater, 12th Edition, 1965.

Parameters not run according to the Chicago Program Office procedures are: IDOD, BOD, NO_2, NH_3-N and Organic-Nitrogen. However, the first three of these parameters were run according to "Standard Methods" with modifications and the NH_3-N and Organic-Nitrogen analyses were run according to published procedures.

The following is a condensed procedure for each of these parameters which were run by the Detroit Program Office, FWPCA. Chicago procedures are not listed.

A limited number of precision tests were run on all parameters except BOD, to provide a base for the number of significant figures to which each test is reported.

Immediate Dissolved Oxygen Demand (IDOD)
and BOD (5-day) Determinations
Using a Dissolved Oxygen Analyzer (D.O. probe)

1. Prepare dilution water at 20°C and measure its oxygen content.
2. Weigh 5-10 grams of sample and siphon in dilution water to fill the BOD bottle.
3. Let stand exactly 15 minutes.
4. Measure oxygen content and report as IDOD based on 10 or 5 grams at 20°C.
5. In addition to the 5-10 gram sample prepare dilutions containing 1 gram and .5 gram of sample. Determine dissolved oxygen content after 15 minutes.

Use the 15 minute oxygen concentrations as initial oxygne content for BOD.

6. Measure oxygen content after five days incubation at 20°C.

Nitrite - Nitrogen (Manual Determination)

1. Weigh 5 grams of sample into 150 ml beaker. Add 50 ml nitriet-free water, and let stand overnight.
2. Filter through membrane filter and analyze according to "Standard Methods."

Determination of Ammonia and Organic Nitrogen following Phenol Analysis Using Cupric Sulfate as Catalyst

Ammonia - Nitrogen (Manual Determination)

1. Place 10 grams of sample into a 1000 ml distilling flask. Add 550 ml phenol-free distilled water and 10 ml of 10% $Cu\text{-}SO_4\text{-}H_3PO_4$ solution.
2. Distill over phenol.
3. To the residue in flask, add 5 ml of NAOH (250 g/liter), a few glass beads, and enough water to make 250 ml approximately.
4. Distill over NH_3 in bottles. (Boric Acid is used only for extremely high concentrations).
5. Measure the volume and save for nesslerization.

Organic Nitrogen

1. Add 10-50 ml $K_2SO_4\text{-}H_2SO_4$ solution to the residue from ammonia determination; digest until fumes are acid to litmus paper.
2. Cool; add distilled water to volume of about 250 ml.
3. Add 50% solution of NaOH containing thiosulfate, the volume of which is equal to the amount of $K_2SO_4\text{-}H_2SO_4$ added in Step 1.

4. Distill over NH_3 into bottle. Measure volume and save for nesslerization.

5. Nesslerize NH_3 and organic samples according to "Standard Methods."

Rouge River Water Quality - Ford Motor Company

The 61-day Ford Motor Company strike commenced on September 7. During this period of pollutants by that company were expected to be lower than usual. Samples were collected to determine water quality during the strike period. The results are shown in Table and the averages are shown below

Average Values
Station T-19

		Phenol ug/l	Oil Mg/l	Iron mg/l	Suspended Solids mg/l
Oct. 18 - Nov. 7	Ave.	16	3	3.8	34
	Max.	160*	5	9.0	79
	Min.	5	2	.7	12
	N.S.	12	13	15	14
Nov. 8 - Nov. 24 (except Nov. 16)	Ave.	14	3	6.2	34
	Max.	22	4	13	57
	Min.	10	2	3.0	15
	N.S.	9	10	10	10

The averages show little difference in phenol, oil and suspended solids concentration. However, the affect of Ford Motor Company on the Rouge River should not be underestimated for several reasons.

1. The activities within the Rouge Plant during the official strike period are not known.
2. The pollution caused by stormwater overflow may have masked the effects of Ford.
3. Surface oil is not reflected in depth sample concentration.
4. The Rouge water quality appeared improved during the UAW strike period.
5. Routine freighter activity causes polluted condition as shown by the sample collected on November 16, 1967.

The iron concentration does show a 60% decrease during the strike period.

*Not included in average

The levels of all these contaminants during this period will be compared to similar measurements made in the future.

FWPCA, DPO

Table 13
Rouge River
Station T19
Dix Ave. Bridge
Mid-Depth Samples

Date	Temp. °C	Phenol ug/l	Oil mg/l	Iron mg/l	Suspended Sol. mg/l
10-18 S	15.0	12	4	2.6	79
10-19	12.0	18	4	2.6	-
10-20	12.5	18	3	1.7	26
10-23	12.0	5	2	.7	13
10-24	12.0	160	3	.8	12
10-25	12.5	29	3	.7	16
10-26	12.0	16	3	1.6	17
10-27 S	12.0	14	3	7.6	29
10-30	11.5	8	3	9.0	45
10-31	14.0	18	3	4.8	29
11-1 S	15.0	-	3	5.0	34
11-2	13.5	24	5	4.4	57
11-3 S	14.0	-	3	7.3	47
11-6	10.0	10	5	3.8	30
11-7#	11.5	-	4	4.9	37
11-8	12.0	-	3	3.0	25
11-9	12.0	20	4	3.2	15
11-13 S	11.0	13	2	6.2	37
11-14	12.0	10	3	6.8	23
11-15	11.0	11	2	6.2	28
11-16*	11.0	10	14	46	94
11-17 S	10.5	10	3	7.5	31
11-20	7.5	17	3	5.6	44
11-21	11.0	22	3	4.9	32
11-22	10.0	-	2	13	57
11-24	7.0	17	1	5.4	49

*Passing freighter stirred bottom material
S - Data may reflect stormwater overflows on October 15, 16, 17 and 27 and November 1, 3, 11, 17.
#Strike officially ended on November 7, 1967

Flow Records - Detroit and Rouge Rivers

The flow pattern of the Detroit River, which has an estimated average discharge of 178,000 cfs, is shown in Figure 10 . Variations in flow during the study were not determined. However, an above-average discharge was maintained during the dredging period as shown in the following table.

	Detroit River Average Flow (cfs)
August, 1967	198,000
September, 1967	196,000
October, 1967	194,000
November, 1967	196,000

A portion of the Detroit River flow, estimated at 2800 cfs, is diverted into the upstream end of the Old Channel of the Rouge and returns to the Detroit River by way of the Short - cut Canal. The Short - Cut Canal is an artificial connection from the Detroit River to the natural bend in the Rouge River which eliminates and "S" shaped curve near the mouth.

Discharge measurements are taken by the U.S. Geological Survey at the Lower, Middle and Upper Rouge. The summation of the average discharges of record from these three gages shows an average flow of the Rouge River above the influence of Detroit River backwater of approximately 216 cfs. However, the flow during the autumn months are somewhat lower as indicated in the following table.

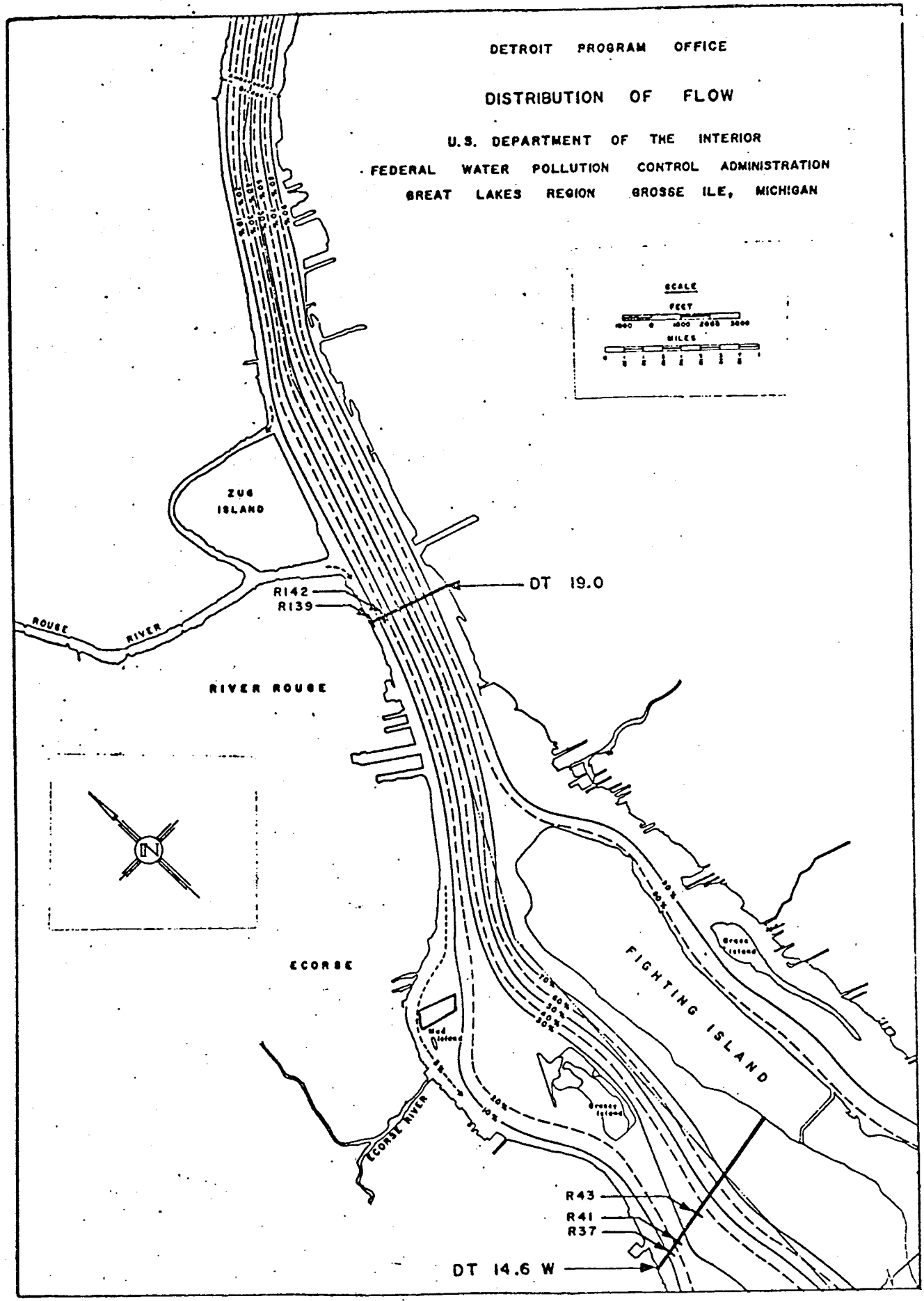
	Average Flow (cfs)
August	64
September	59
October	86
November	120

The flow records for the Rouge River during the 1967 dredging period are not available at this time. However, the streamflow in the Southeastern Michigan basin was in the normal range during the study.

Variations in effluent flow from the Ford Motor Company can cause major changes in the flow in the dredging area. This company discharges an average of more than 600 cfs, of waste and cooling water, ten times the average natural September basin yield.

In summary, the flow entering the Detroit River from the Rouge River Short - Cut Channel is effectively the sum of the Rouge River natural yield (average = 216 cfs), the Ford Motor Company discharge (average = 600 cfs), and the Old Channel flow (average = 2800 cfs).

FIGURE 10


DETROIT PROGRAM OFFICE
DISTRIBUTION OF FLOW
U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN
SCALE
FEET
MILES
ZUG ISLAND
DT 19.0
R142
R139
ROUGE RIVER
RIVER ROUGE
ECORSE
FIGHTING ISLAND
ECORSE RIVER
R43
R41
R37
DT 14.6 W

Attached is a list of lab numbers as used in the Rouge River Pilot Study Report.

Rouge River Pilot Study 1967

PARAMETER: Lab. No.

Date	Dredge Loc. (mile points)	1/4 Mile Upstream	Behind Dredge	1/4 Mile Downstream	1/2 Mile Downstream	Rouge R. T18 (MP 2.19)	Rouge R. T15 (MP 1.09)	Detroit R. R139	Detroit R. R142
8-24	None	-	-	-	-	34553	34554	34551	34552
8-31	2.67 to 2.94	-	35500	35501	35502	-	-	-	-
9-7	2.55 to 2.94	36527	-	36529	36526	36526	36525	36523	36524
9-14*	2.40 to 3.00	-	37523	37524	37525	37527	37526	37521	37522
9-21*	1.93 to 2.63	38524	38523	38521	38522	38525	38526	38527	38528
10-5*	1.87 to 2.69	-	40547	40545	40546	40544	40543	40541	40542
10-12*	1.50 to 2.17	41525	41526	41523	41524	41528	41527	41521	41522
10-19*	1.45 to 2.17	42554	42560	42555	42556	42553	42552	42557	42558
10-29	Old Channel	44500	44501	44502	-	-	-	44504	44505
11-8*	0.87 to 1.46	45534	45536	45533	45535	45532	45531	45537	45530

Appendix A: Unpublished Scientific Information.

7. FWQA 1970 Report by L.B. O'Leary on Grassy Island Sediment Mercury. 17 pp.

FWQA 1970 REPORT

DEPARTMENT OF THE INTERIOR
HEALTH, EDUCATION, AND WELFARE
Federal Water Quality Administration
1970

September 22, 1970

Mr. W. Nord
Fish and Wildlife Service
Bureau of Sports Fisheries and Wildlife
Federal Building, Fort Snelling
Twin Cities, Minnesota 55111

Dear Mr. Nord:

As was stated in our letter of September 3, attached is the additional information on mercury levels in the sediments on and around Grassy Island. Sediment samples from the Rouge River were also analyzed. These data are included in the attached table. Maps showing the locations of these areas are also attached.

Mercury concentrations in the sediments reported earlier did not exceed 0.5 mg/kg, the lower limit of detectability at that time. Collections around Grassy Island on September 3 did not contain more than 0.6 mg/kg of mercury and only slightly higher values were found in the Rouge River sediments. The mercury concentrations found in the pools of water on the island are unexplained.

If we can be of further assistance, please let us know.

Very truly yours,

Laurence B. O'Leary
Basin Office Director

Attachments:
Data table (Grassy Island Sediments)
Maps - Rouge River & Grassy Island

cc: (w/ attachments)
C. Pemberton, FWQA
D. Gross, BOR
Col. Snoke, COE
J. Cook, Mich. Dept. of Commerce
H. Miller, Mich. Dept. of Nat. Resources

FILE COPY

Office	Initials	Date	Office	Initials	Date
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			

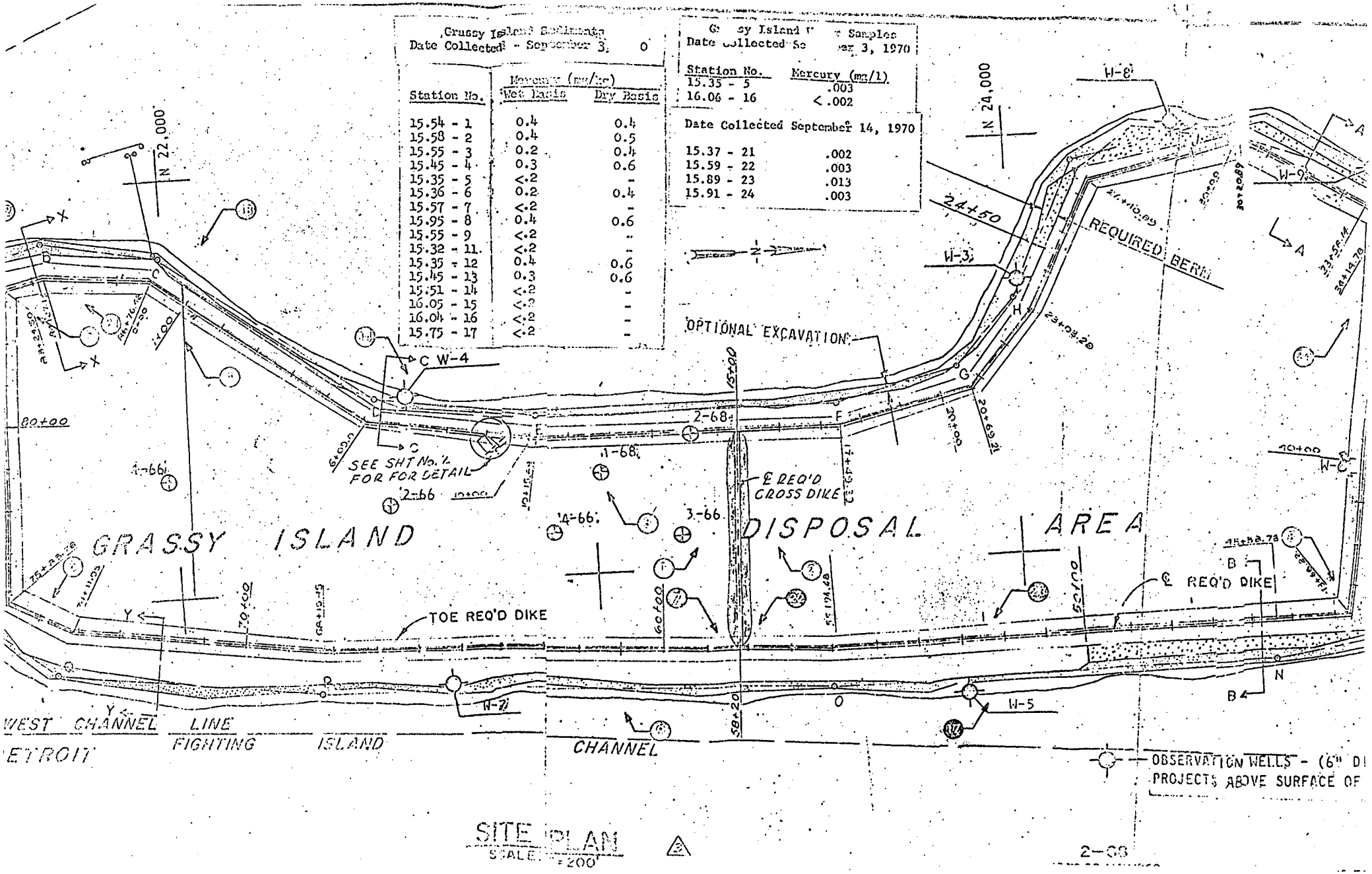
Federal Water Quality Administration
Lake Huron Basin Office
Grosse Ile, Michigan

Grassy Island Sediments
Date Collected - September 3, 1970

Station No.	Lab. No.	Mercury (mg/kg) Wet Basis	Mercury (mg/kg) Dry Basis	Percent Solids (%)
15.54 - 1	36800	0.4	0.4	93.0
15.58 - 2	36801	0.4	0.5	77.4
15.55 - 3	36802	0.2	0.4	55.2
15.45 - 4	36803	0.3	0.6	48.5
15.35 - 5	36805	<.2	-	73.2
15.36 - 6	36806	0.2	0.4	46.9
15.57 - 7	36807	<.2	-	73.8
15.95 - 8	36808	0.4	0.6	67.6
15.55 - 9	36809	<.2	-	79.4
15.32 - 11	36810	<.2	-	70.5
15.35 - 12	36811	0.4	0.6	62.3
15.45 - 13	36812	0.3	0.6	52.6
15.51 - 14	36813	<.2	-	74.4
16.05 - 15	36814	<.2	-	73.1
16.04 - 16	36815	<.2	-	77.5
15.75 - 17	36817	<.2	-	76.6
Rouge River				
0.06 - 18	36818	<.2	-	78.9
0.60 - 19	36819	0.4	0.7	55.3
Old Channel				
0.05 - 20	36820	0.4	0.8	50.6

Grassy Island Water Samples
Date Collected September 3, 1970

		Mercury (mg/l)
15.35 - 5	36804	.003
16.04 - 16	36816	<.002
Date Collected September 14, 1970		
15.37 - 21	38700	.002
15.59 - 22	38701	.003
15.89 - 23	38702	.013
15.91 - 24	38703	.003



SITE PLAN

SCALE 1" = 200'

[illegible] DF discharge began 25 July

ROUGE RIVER SEDIMENT SAMPLING
AUG. 3, 1976 GAGE 4.1

#4 site
300' upstream bridge Jefferson Ave.
E side River.
sediment & chemical
10' off shore
black mud - light clay
10:00 am

#5
300' upstream RR bridge
10:20 a.m. W side River
sediment
at 20' & 25' depth composite sample
black - light clay - debris - wet
burning sensation

#6

300' upstream Fort St. bridge
22' no material, bucket empty
24' dark clay, dryer than sites 4 & 5 - more grains - debris - black & gray
10:40 - sediment

#7

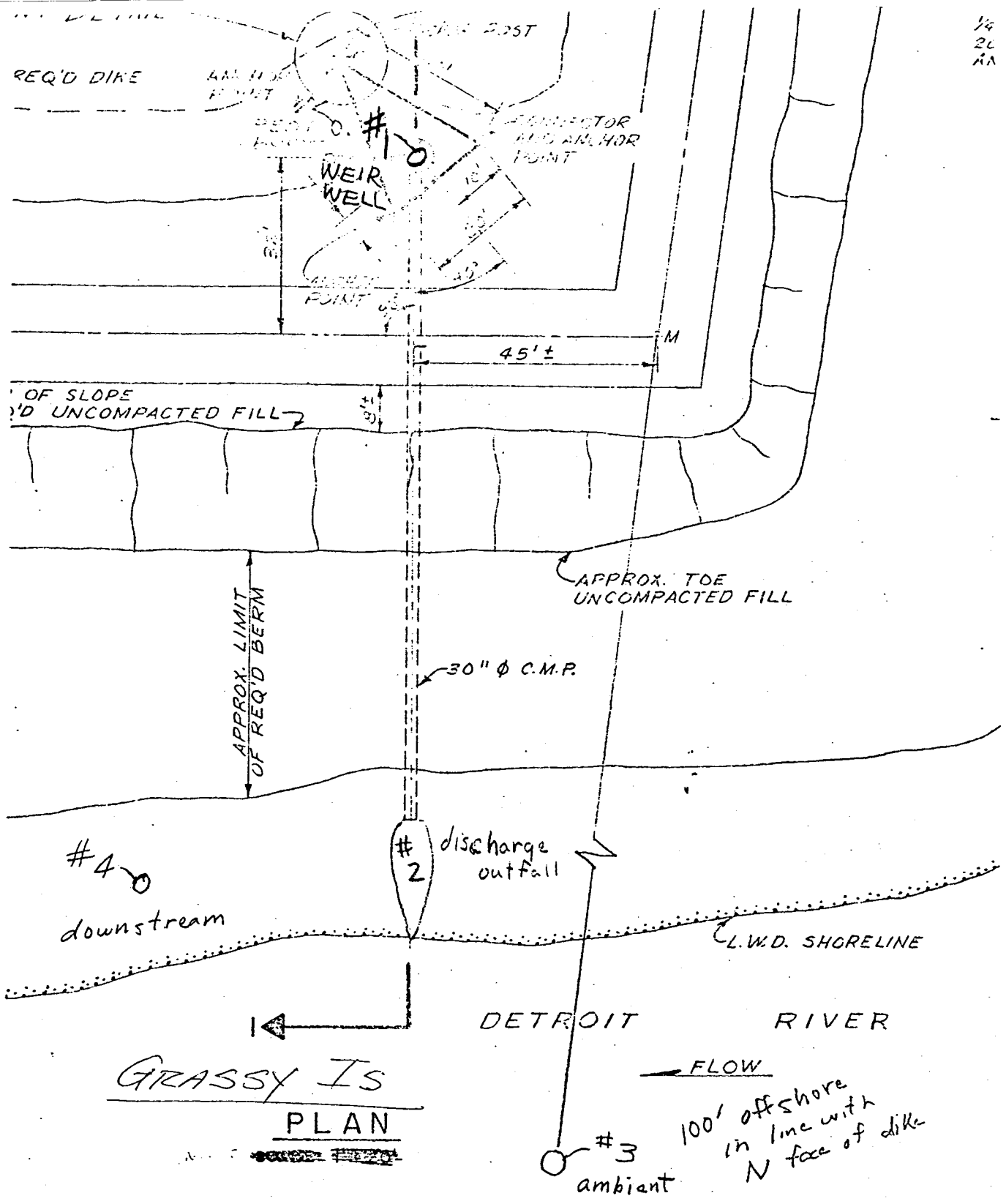
sediment
200' downstream Dix Ave bridge
N side river 11:00
3 tries no sample - bucket empty - went 200' upstream same side,
22'-24' no good
21' final sample - uniform gray - clay - solid.

#8 sediment & chemical
11:15 a.m. 250' W Sun Oil
Dock in Turning Basin
23' good sample
sandy - dark gray - uniform - compositie
sample - thick -
the chemical sample later exploded
at the lab - it had been left
unrefrigated overnight -

#3 sediment - ~~time~~
200' downstream NE side Jefferson
Ave. bridge
22' 11:45
firm bottom - gray - clay - some
sand

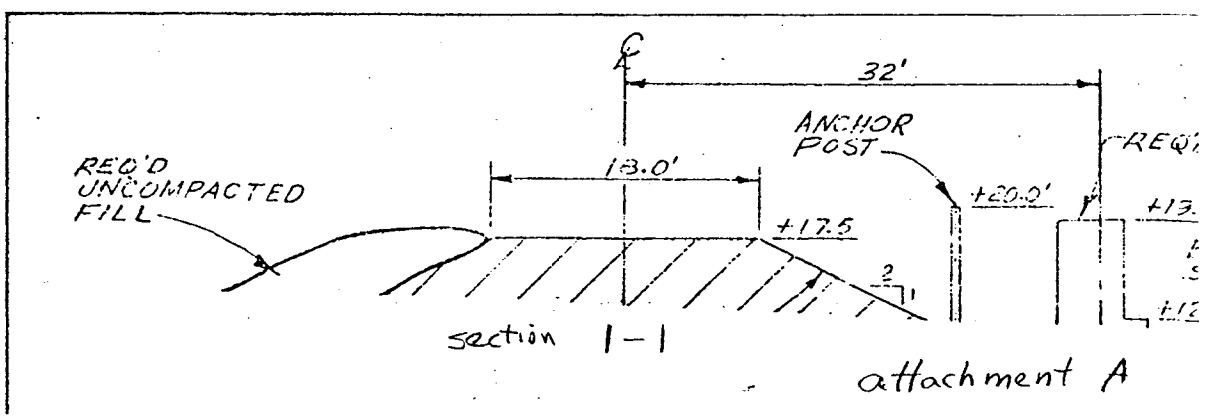
2 sediment + chemical
800' downstream Edison Bridge
N side no sample after 5 tries
went on opposite side river
(there is much cement on the N
side of Zug Island & we
only brought up rocks)
22' composite - high moisture -
sand

1 sediment
W side River
300' in mouth river
21'
clay - gray

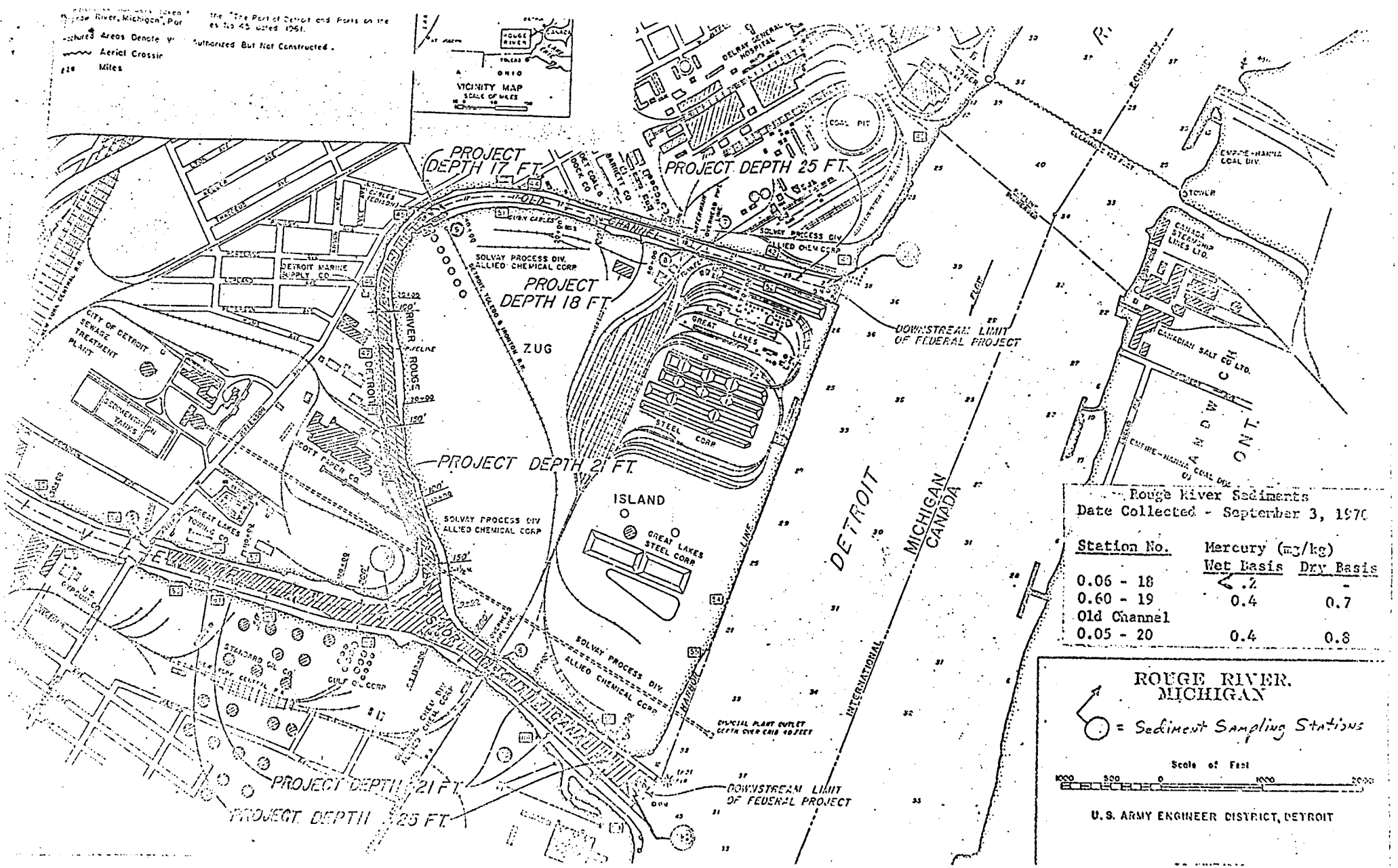


GRASSY IS

PLAN



attachment A



Rouge River Sediments
Date Collected - September 3, 1970

Station No.	Mercury (mg/kg) Wet Basis	Dry Basis
0.06 - 18	< .2	-
0.60 - 19	0.4	0.7
Old Channel		
0.05 - 20	0.4	0.8

Table 4 FWQA 1970 Rept. Cont'd

MERCURY SURVEY

Sample Analysis Results

Roure River

Sample Collection Date	River Mile	Mercury Content Sediment (mg/kg) Wet Basis	Dry Basis	Water (mg/l)
1970				
3/26	1.1	< 1.0		< 0.01
4/23	.3 Old Channel	< 0.5		
"	1.5 Old Channel	< 0.5		
4/24	1.8	< 0.5		
"	3.1	< 0.5		
"	.1	< 0.5		

er Light

VEY

Table 15
1968 Analysis Results
Dix Ave Bridge (MP 2.75)

Date	Temp. °C	Chloride mg/l	Phenol ug/l	Iron mg/l	Susp. Solids mg/l	Oil mg/l	Total Coliform MF/100 ml
4-4	1.5	76	21	8.8	77	3	170,000
5-1	17.0	51	4	6.5	24	3	"
5-27	15.0	-	11	1.2	160	7	-
6-11	29.5	44	5	4.8	13	3	-
7-10	24.0	43	14	5.4	50	-	-
Average	-	54	11	7.5	65	4	-

Table 15
1968 Analytical Results
Bottom Sediment Core Samples
Detroit & Rouge River

SAMPLE NO.	Area	Depth	COLLECT DATE	LAB. NO.	GROSS DESCRIPTION
5	Rouge River	27	9-24-68	39531	Black sludge, oil present; strong Ds and Cs odors
8	Rouge River	27	9-24-68	39532	Black sludge, some oil, strong Cs
10	Rouge River	28	9-24-68	39533	Greyish black sludge, some oil, Ch
12	Rouge River	26	9-24-68	39534	Brownish black sludge, oily; Ch
13	Rouge River	26	9-24-68	39535	Brownish black sludge, little oil; Ch and E

1968 An .1 Results
Bottom Sediment Core Samples
Detroit & Rouge River

FWPCA, Lab

SAMPLE NO.	IMMED. DO DEM Mg/Kg Wet Basis	COD Mg/Kg Wet Basis	PHENOLS µg/Kg Wet Basis	TOTAL PO_4 Mg/Kg Wet Basis	TOT. SOL. PO_4 Mg/Kg Wet Basis	NITRATE NO_3-N Mg/Kg Wet Basis	NITRITE NO_2-N Mg/Kg Wet Basis	AMMONIA NH_3-N Mg/Kg Wet Basis	ORGANIC NITROGEN Mg/Kg Wet Basis	IRON Mg/Kg Wet Basis	OIL & GREASE Mg/Kg Dry Basis	TOTAL SOLIDS % Wet Basis	VOL. SOLIDS % Dry Basis	BOD
5	210	170,000	2200	7,100				530	-	8,800	200,000	17.6		
8	410	120,000	550	4,500				110	-	00,000	56,000	41.5		
10	530	100,000	1500	4,000				120	-	2,000	44,000	42.2		
12	590	110,000	2300	2,300				59	-	7,000	38,000	30.7		
13	510	100,000	1100	2,700				97	-	0,000	40,000	44.2		

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Table 16

Proposed Dredging Sites Samples by FWPCA, DPO 1967

SAMPLE NO.	HARBOR	Approx. Cross Section	COLLECT DATE	LAB. NO.	GROSS DESCRIPTION (Description; Odor)
1	Harbor Beach		4-19-67	16210	Black ooze; very strong odor: Ds, Dp, Cs
2	"		4-19-67	16211	Black ooze; very strong odor: Ds, Dp, Cs
3	"		4-19-67	16212	Black ooze; very strong odor: Ds, Dp, Cs
4	"		4-19-67	16213	Black ooze; very strong odor: Ds, Dp, Cs
1	Rouge River Old Channel		5-9-67	19531	Coal,ooze,sludge,gravel,trace oil; No odor
2	"		5-9-67	19532	Coal,ooze,sand,stone,trace oil; No odor
3	"		5-9-67	19533	Coal,ooze,sludge,sand,gravel,stones,trace oil;N
1	Saginaw R. - Bay City	125+00R	7-7-67	27200	Dark gray ooze; Ds.
2	"	168+00R	7-7-67	27201	Dark gray ooze; trace of oil; Ds
3	"	209+00R	7-7-67	27202	Dark gray ooze & sand, trace of oil; Ds
4	"	236+00R	7-7-67	27203	Gray ooze & sand; Ds
5	Saginaw Bay - Outer	406+00	9-6-67	36200	Black ooze, sludge & sand; Ds, Ch
6	"	506+00	9-6-67	36201	Black sludge & sand; Ds
7	"	606+00	9-6-67	36202	Black ooze, sludge & sand; Ds (slight)
8	"	706+00	9-6-67	36203	Black ooze, sludge & sand; no odor
9	Saginaw Bay - Inner	16+00	9-12-67	37200	Dark gray ooze,sludge & sand, trace oil; Ds, Ch
10	"	106+00	9-12-67	37201	Black ooze & sludge, trace oil; Ds, Ch
11	"	206+00	9-12-67	37202	Light gray ooze & sand; no odor
12	"	306+00	9-12-67	37203	Light gray ooze, sludge & sand; no odor

Table 16 (con't.)

Proposed Dredging Sites Samples by FWPCA, DPO 1967

SAMPLE NO.	IMMED. DO DEM Mg/Kg Wet Basis	COD Mg/Kg Wet Basis	PHENOLS µg/Kg Wet Basis	TOTAL PO_4 Mg/Kg Wet Basis	TOT. SOL. PO_4 Mg/Kg Wet Basis	NITRATE NO_3-N Mg/Kg Wet Basis	NITRITE NO_2-N Mg/Kg Wet Basis	AMMONIA NH_3-N Mg/Kg Wet Basis	ORGANIC NITROGEN Mg/Kg Wet Basis	IRON Mg/Kg Wet Basis	OIL & GREASE Mg/Kg Dry Basis	TOTAL SOLIDS % Wet Basis	VOL SOLIDS % Dry Basis	BOD Mg/K Wet Ba
1	-	65,000	890	1200	10	22,000	-	500	100	55,000	2000	63.8	6.3	190
2	-	33,000	760	1100	10	6,000	-	300	200	55,000	800	67.0	3.6	130
3	-	38,000	330	1200	10	16,000	-	200	200	60,000	1000	60.3	5.0	200
4	-	35,000	530	1300	10	8,000	-	400	200	38,000	1000	62.4	4.4	200
1	60	-	560	2700	20	20	.6	200	20	20,000	3000	50.3	11.5	330
2	40	-	310	900	10	8	.8	20	3	9,200	6000	60.6	10.0	300
3	20	-	280	1400	10	8	.6	40	2	12,000	1000	50.0	15.1	250
1	200	-	690	320	.8	200	-	100	100	6,400	7000	41.5	16.6	33
2	200	-	560	< 80	2	40	-	40	10	4,700	7000	49.0	8.0	260
3	100	-	690	< 80	3	200	-	100	30	6,300	2000	49.6	8.6	13
4	100	-	750	150	3	40	-	40	90	8,500	3000	56.0	8.7	12
5	50	7,800	< 190	510	1	30	.1	60	40	4,000	200	73.4	1.8	-
6	100	20,000	< 190	650	< 1	20	.1	100	80	5,000	700	45.6	4.4	-
7	100	14,000	220	620	< 1	20	.1	60	50	5,400	800	52.5	3.3	-
8	100	18,000	250	670	< 1	20	.1	80	80	5,800	600	52.7	3.6	-
9	60	47,000	320	1700	10	20	.1	400	70	5,400	8,000	47.1	8.8	-
10	70	35,000	310	1400	10	30	.1	100	40	6,600	20,000	41.4	9.9	-
11	50	22,000	320	560	2	10	.1	200	60	2,900	1,000	59.6	3.8	-
12	60	24,000	220	630	2	20	.1	100	50	4,700	2,000	49.2	5.3	-

129.

FIGURE 14

LOCATION OF SAMPLING POINTS
STUDIED BOTTOM SEDIMENT SAMPLES
1968
ROUGE RIVER

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
GREAT LAKES REGION — GROSSE ILE, MICHIGAN

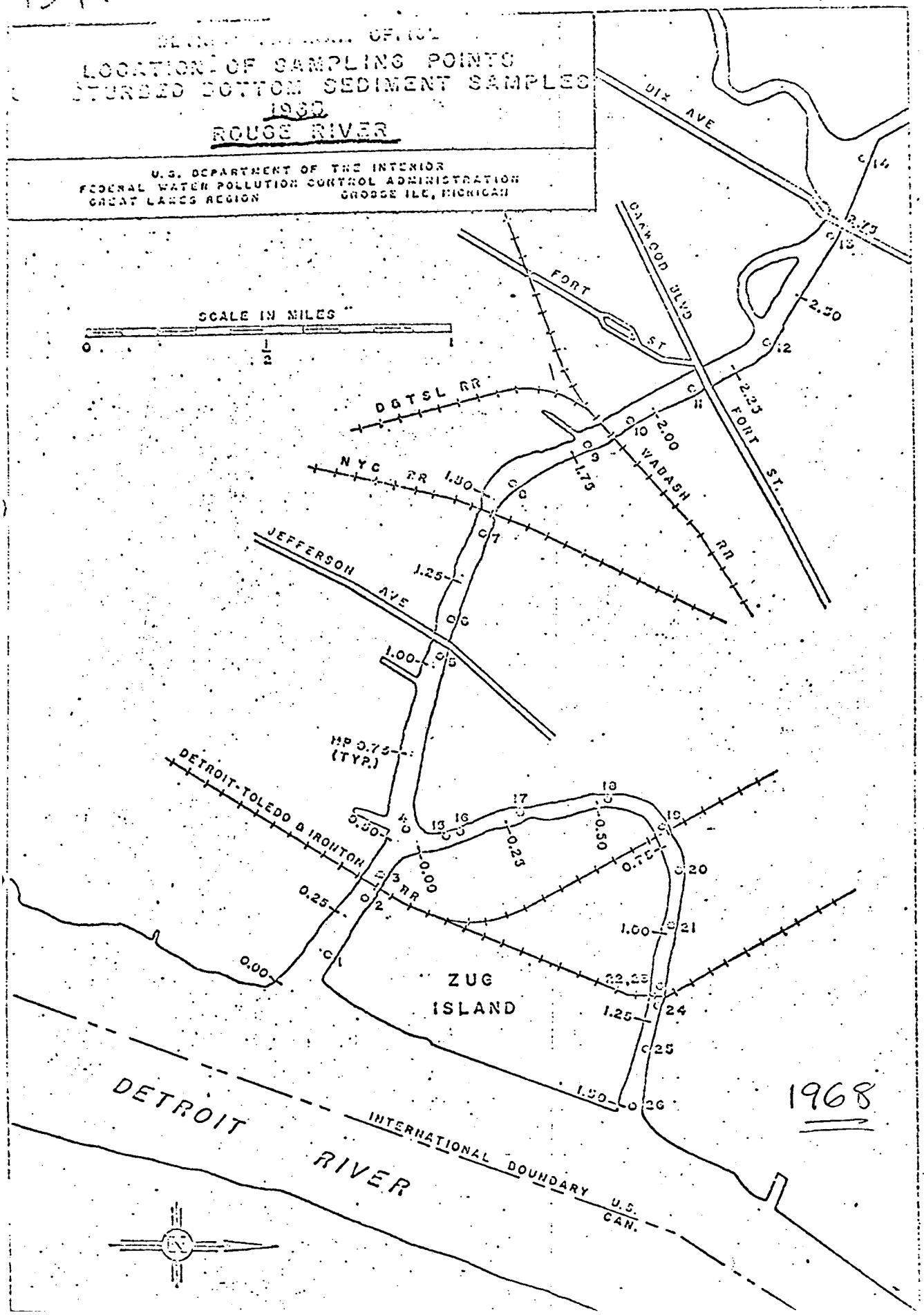

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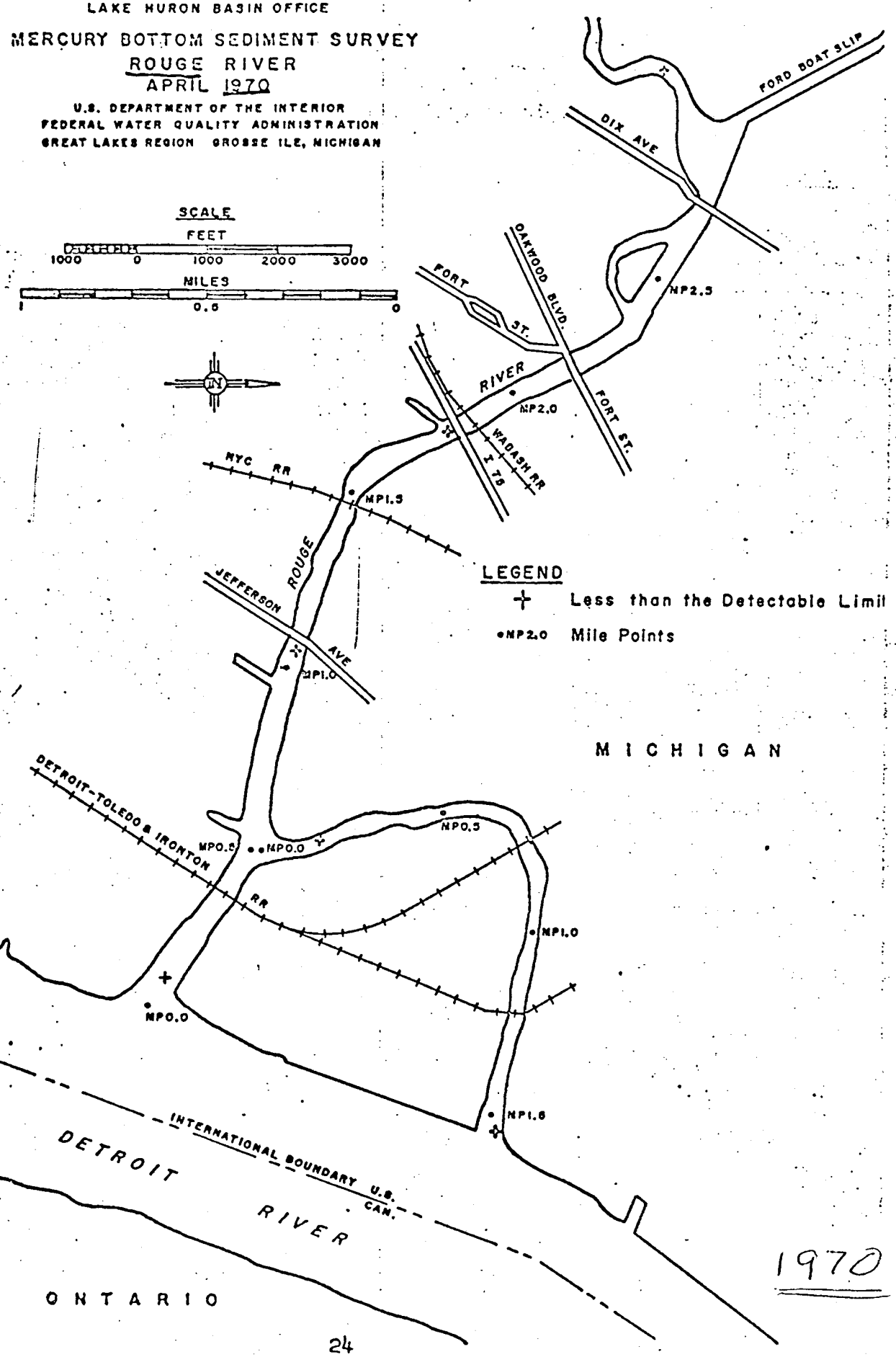
FIGURE 4

LAKE HURON BASIN OFFICE

MERCURY BOTTOM SEDIMENT SURVEY
ROUGE RIVER
APRIL 1970

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER QUALITY ADMINISTRATION
GREAT LAKES REGION GROSSE ILE, MICHIGAN



1970

Appendix A: Unpublished Scientific Information.

8. ACOE 1979 Report "1979 Water Quality Monitoring of Grassy Island CDF". 44 pp.

ACOE 1979 Report

1979 WATER QUALITY MONITORING OF THE GRASSY ISLAND CONFINED DISPOSAL FACILITY OCTOBER 1979

U.S. ARMY CORPS OF ENGINEERS
DETROIT DISTRICT

1979 WATER QUALITY MONITORING OF THE GRASSY ISLAND CONFINED DISPOSAL FACILITY OCTOBER 1979

Background:

Grassy Island is an 80 acre 930,000 cubic yard capacity Confined Disposal Facility (CDF). It is located on the site of a previously existing shallow, marshy shoal. In 1960, the U.S. Army Corps of Engineers constructed 6 foot, earthen dikes around the shoal, later increasing their height to 20 feet.

After dredge material is disposed into the CDF, the bulk of the suspended sediments settle and excess water is discharged over a weir which is located at the northeast corner of the CDF about 200 feet from its north end. During the period 20 July through 17 September 1979, the Rouge River was dredged by the U.S. Army Corps of Engineers' hopper dredge LYMAN and disposal into Grassy Island CDF took place. The resultant weir overflow was monitored on three different dates, 14 August, 28 August, and 12 September 1979.

Methodology and Results:

Parameters sampled included metals, fecal coliform bacteria, pH, dissolved oxygen, COD, plant nutrients, oil and grease, PCB, chlorine and total dissolved solids.

Stations were located 150 feet upstream from the weir discharge; at the overflow of the weir; the plume (50 feet downstream, 20 feet from shore); and downstream, about 250 feet from the weir discharge.

Dissolved oxygen in water coming over the weir ranged from a low of 1.2 on 28 August to 3 mg/l on 14 August, but was always found to be above 7 mg/l in the plume, well above the minimum for warm water fisheries. While COD was high in weir overflow (83 mg/l), and about one-half that in the plume downstream levels showed no effect and remained the same as upstream. Fecal coliforms were found to be high in the plume but lower in the weir overflow than in upstream or downstream samples, which were found to remain at approximately 25 colonies/100 ml, well below the 200/100 ml level allowed for full body contact.

Samples taken from both the weir discharge and ambient river water had similar ranges of values for pH, nickel, lead, chlorine, cadmium and dissolved iron.

Other parameters including Kjeldahl nitrogen, phosphorus, turbidity, total dissolved solids, total suspended solids, conductance, oil and grease, phenols, manganese, copper, zinc, chromium, arsenic, barium, and calcium

carbonate, were usually higher in the weir overflow, than in the river, but were brought down to ambient levels in the plume and had insignificant effects on downstream levels.

Chlorine was always higher at the weir than in the receiving waters. Samples taken at the downstream station indicated rapid dilution to ambient conditions. All stations, including those of the receiving waters, had chlorine levels which are considered high (above 10 ppb) and reflect the condition of the Detroit River in that area.

Two contaminants of particular concern are PCB and mercury. Levels of mercury remained within the same range at both the upstream and downstream stations.

During the same time period, concentrations flowing over the weir showed a decrease even though there was a significant increase in mercury being discharged into the CDF, up to 0.78 mg/kg on 12 September. Sampling on August 28th indicated a sharp increase in the mercury in the plume, reflected by higher levels downstream. Simultaneous samples taken at the weir showed no increase in mercury concentration, however.

Upstream concentrations of PCB revealed a large decrease over the sampling period, from a high on 14 August of 2.5 ppb, dropping down, by 12 September to .04 ppb. The range of values for PCB in the river was much higher than that actually coming over the weir. Concentrations peaked on 28 August, at the weir, and were reflected by a slight rise in levels at the plume to .16 ppb. Downstream, no rise in PCB contamination was indicated, rather, there was a continuous slide from a high of .3 ppb on 14 August, to a low of .04 ppb on 12 September.

Conclusion:

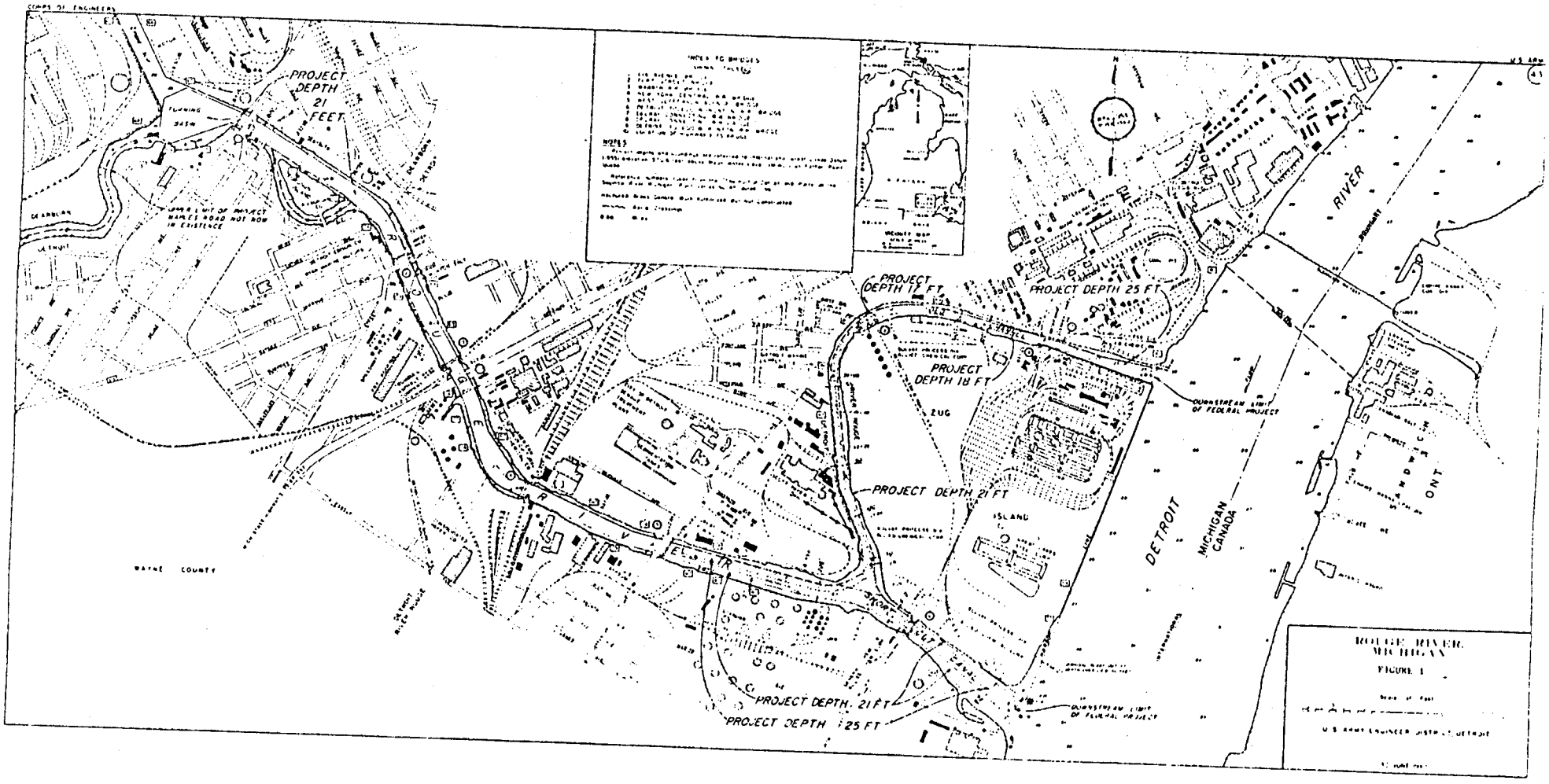
Levels of all parameters showed little or no effect on downstream waters. The fluctuations of mercury in the plume and downstream station but not in the weir overflow, which remained at constant low levels, is an indication that there were conditions, possibly wind and currents, which prevented the contaminant from moving out of the plume area.

The plume also showed a slight rise in PCB, but this increase occurred simultaneously with a rise in PCB at the weir. In this case, downstream levels of PCB were actually lower than upstream, a further indication of possible localized current reversals.

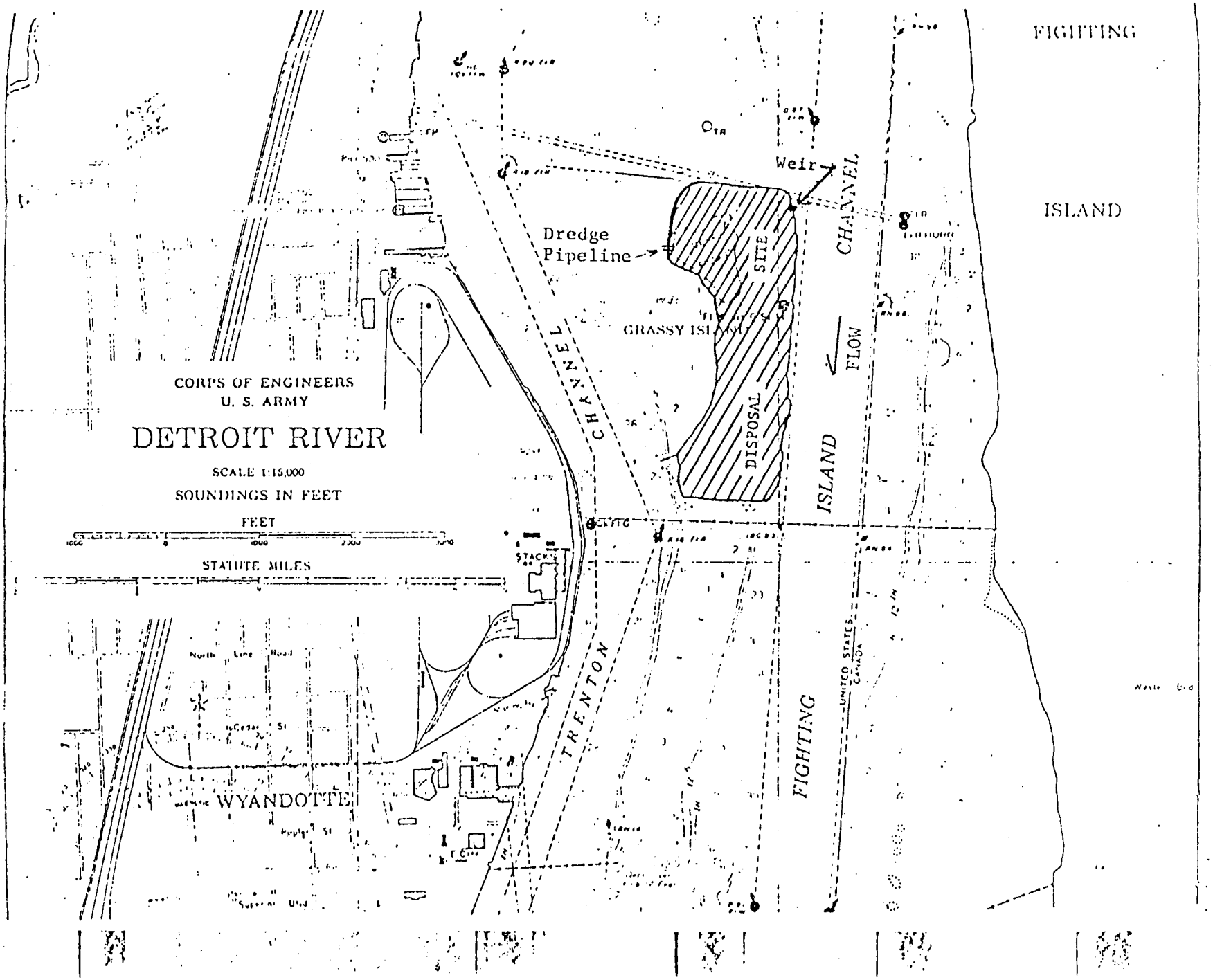
There appears to be little overall effect on ambient waters due to the weir discharge. During the period sampled, there was a general downward trend in contaminant levels, and a general trend for the weir overflow to approach the levels of ambient waters.

On the basis of the above discussion, the continued use of Grassy Island CDF would not be expected to impose significant adverse impact on the surrounding environment, and may be considered beneficial to the environment by containing toxic substances which would otherwise remain available to the aquatic system.

On the basis of the above discussion, the continued use of Grassy Island CDFwould not be expected to impose significant adverse impact on the surrounding environment, and may be considered beneficial to the environment by containing toxic substances which would otherwise remain available to the aquatic system.


PROJECT DEPTH 21 FEET
PROJECT DEPTH 17 FT.
PROJECT DEPTH 25 FT.
PROJECT DEPTH 18 FT.
PROJECT DEPTH 21 FT
PROJECT DEPTH 21 FT.
PROJECT DEPTH 25 FT
DETROIT
MICHIGAN
CANADA
RIVER
ISLAND
ZUG
WAYNE COUNTY
ROUGE RIVER
MICHIGAN
FIGURE 1

GRASSY ISLAND
DREDGED MATERIAL DISPOSAL FACILITY
FIGURE 2



Grassy
7 Sep 79

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Sample taken 9-7-79 (spot check)

HYDRO NO:		
CUST. ID:	32834 9-7-79 Mixing Zone	32835 9-7-79 500' Upstream
Turbidity NTU	2.4	2.4
Nitrogen, Ammonia, N, mg/l	0.52	0.36
Dissolved Oxygen, mg/l	9.6	10.0

Weather conditions: Sunny, cool, windy winds out of Northwest 12 mph river chopy 59°F

Sampling conditions: Corps representative, Mr. Schoenbeck, present to operate boat and assist in sampling. Dredge not operational at time of sampling.

Weir: Overflow = 2½" slight sanitary smell (9:40 A.M.)

Mixing Zone: Dissolved oxygen 9.6 (9:50 A.M.)

Upstream: Dissolved Oxygen 10.0 (10:00 A.M.)

Misc.: All sampling points (except Weir) sampled by boat. See map for location.

(4)

(EXTRA)
21 Aug 79

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-21-79 (spot check)

HYDRO NO:	31815	31816
CUST. ID:	500' Upstream	50' Downstream Mixing Zone
Turbidity NTU	3.0	4.9
Ammonia mg/l	0.20	0.33

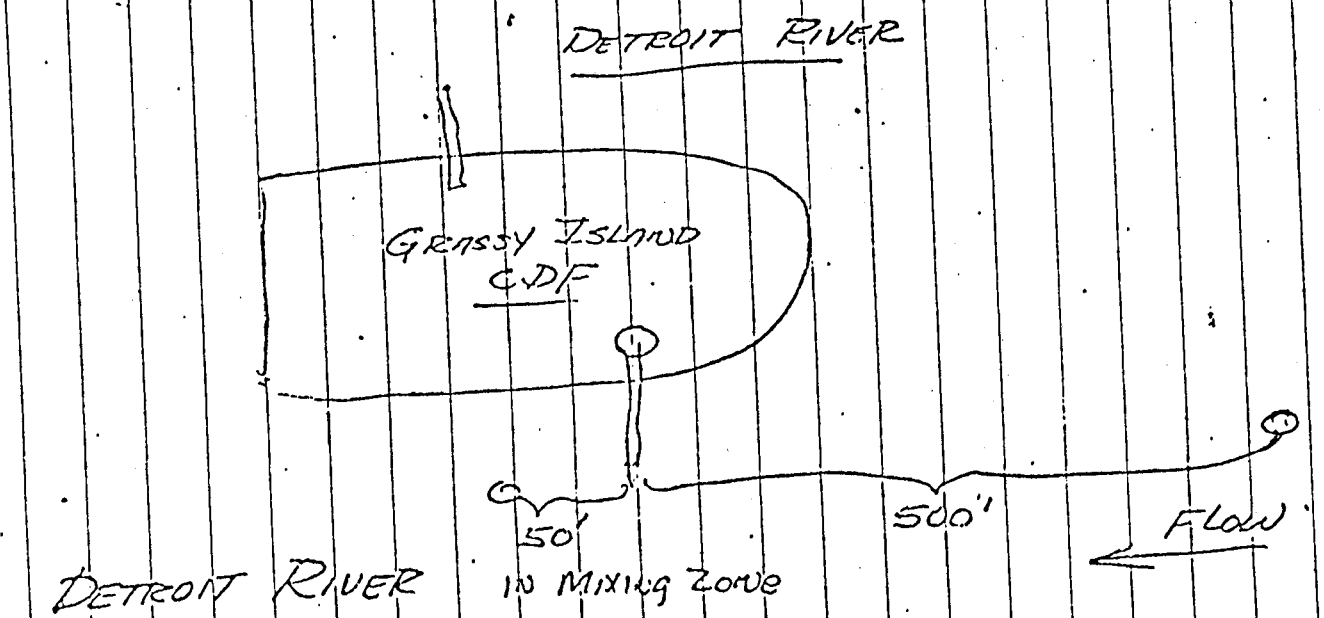
Weather conditions: Sunny, winds light, Northeast. Tempurature 72°F.

Weir: Height 2¼". Water very turbid, oily again (dredge not pumping at time of sampling). Time out 9:35.

Mixing zone area: Water clear, D.O. 6.8 (see map for sampling location).

Upstream: Water clear, D.O. 8.0.

Misc.: Corps representatives Mr. Vermillin and Mr. Schoenbeck present to operate boat and assist in carrying equipment.



MONITORING SPOT CHECKS

TURBIDITY, AMMONIA, AND DISSOLVED OXYGEN

BE SURE WEIR IS OVERFLOWING

ROUGE RIVER
MAINTENANCE
DREDGING

(~~EXTRA~~) 21 Aug 79

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-21-79 (spot check)

HYDRO NO:	31815	31816
CUST. ID:	500' Upstream	50' Downstream Mixing Zone
Turbidity NTU	3.0	4.9
Ammonia mg/l	0.20	0.33

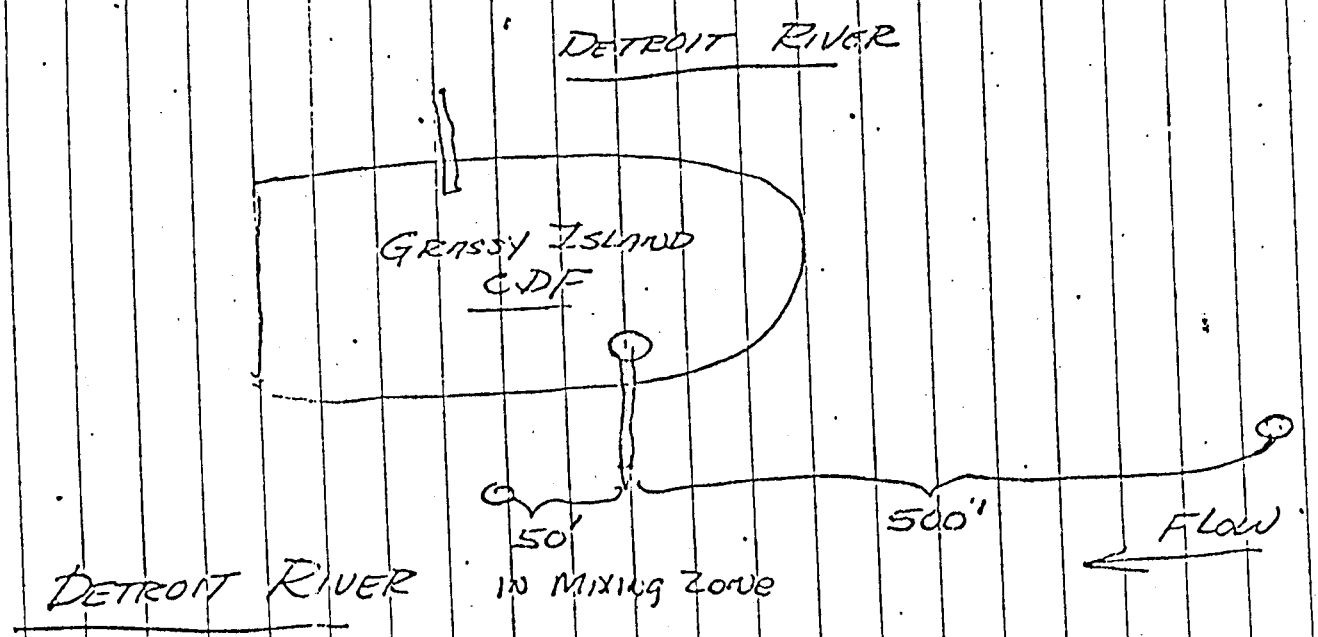
Weather conditions: Sunny, winds light, Northeast. Tempurature 72°F.

Weir: Height 2¼". Water very turbid, oily again (dredge not pumping at time of sampling). Time out 9:35.

Mixing zone area: Water clear, D.O. 6.8 (see map for sampling location).

Upstream: Water clear, D.O. 8.0.

Misc.: Corps representatives Mr. Vermillin and Mr. Schoenbeck present to operate boat and assist in carrying equipment.



MONITORING SPOT CHECKS

TURBIDITY, AMMONIA, AND DISSOLVED OXYGEN

BE SURE WEIR IS OVERFLOWING

ROUGE RIVER
MAINTENANCE
DREDGING

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

Weather conditions: Sunny 63°F very calm winds out of the south-east.

Sampling conditions: Dredge had pumped about 10 mins. prior to my arrival. Sampling began at weir. Dredge came in again about two hours later.

Discharge: Sampled continuously for about 25 minutes. Discharge oily, alot of pebbles at first (for 10-15 minutes) (12:00)

Weir: overflow 2¼", somewhat muddy, alot of bugs in water. (10:00 A.M.)

P_1: Dissolved oxygen only = 9.8 (10:20 A.M.)

P_2: (see map) (10:25 A.M.)

Station 4: (see map) (10:35 A.M.)

A_1: (see map) (10:45 A.M.)

Misc.: All sampling points except weir sampled by boat.

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Detroit, MI 48231
Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

	- Field Measurements -			
HYDRO NO:	32963	32962	32964	32965
CUST. ID:	Weir	A-1	P-2	4
Dissolved Oxygen, mg/l	2.0	10.3	9.8	10.2
Temperature, ^{o}C	19	19	19	20
pH	7.59	8.42	8.30	8.40

N
5 DREDGE DISCHARGE PIPELINE
1 (PD)
GRASSY ISLAND CDF
2 DFO
WEIR
3 DO AT LEVEL OF PIPE ONLY PARAMETER
50'
4
5
3
1
A1
P1
100'
4
250'
P2
FLOW
DETROIT RIVER
EXTENSIVE
BIWEEKLY TESTING
ROUGE RIVER
MAINTENANCE DRE

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Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO:	32963	32962	32964	32965
CUST. ID:	Weir	A-1	P-2	4
Hardness, Calcium as $CaCO_3$, mg/l	28	72	78	74
Specific Con., umhos/cm	635	220	235	225
C.O.D., mg/l	64	36	32	44
Turbidity, N.T.U.	39	6.6	8.0	6.6
Solids, Total, Diss., mg/l	300	120	120	120
Solids, Total, Vol., mg/l	96	38	42	40
Solids, Total, Susp., mg/l	53	7	5	1
Nitrogen, Kjeldahl, N, mg/l	19.	0.57	0.82	0.74
Sulfide, S, mg/l	<0.2	<0.2	0.3	<0.2
Nitrogen, Ammonia, N, mg/l	17.	0.25	0.27	0.32
Chlorine, Total, Residual mg/l	2.1	0.5	0.9	1.1
Phosphorus, Total, P, mg/l	0.05	<0.02	<0.02	<0.02
Phenols, ug/l	2	2	2	2

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P.O.#DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO:	32963	32962	32964	32965
CUST. ID:	Weir	A-1	P-2	4
Oil & Grease, mg/l	3.3	1.5	2.3	1.6
Bacteria, Fecal Coli., ($44.5^{\circ}C$, col/100 ml)	<10	<2	2	16
Manganese, Total, Mn, mg/l	0.035	0.12	<0.002	<0.002
Nickel, Total, Ni, mg/l	0.02	0.02	0.01	0.01
Lead, Total, Pb, mg/l	<0.01	<0.01	<0.01	<0.01
Iron, Total, Fe, mg/l	0.19	1.5	0.17	0.12
Iron, Diss., Fe, mg/l	<0.01	<0.01	<0.01	<0.01
Chromium, Total, Cr, mg/l	<0.002	0.002	0.002	<0.002
Copper, Total, Cu, mg/l	<0.001	<0.001	<0.001	<0.001
Arsenic, Total, As, ug/l	2.3	17.	0.5	<0.2
Mercury, Total, Hg, ug/l	<0.1	<0.1	<0.1	<0.1
Barium, Total, Ba, mg/l	0.21	0.45	0.35	0.29
Cadmium, Total, Cd, mg/l	<0.001	0.009	<0.001	0.002
Zinc, Total, Zn, mg/l	0.033	<0.001	<0.001	<0.001

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Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO:	32966	32967
CUST. ID:	Elutriate Background Water	Elutriate Water
Hardness, Calcium as $CaCO_3$, mg/l	139	124
Solids, Total, Diss., mg/l	320	310
Solids, Total, Vol, mg/l	78	76
C.O.D., mg/l	60	100
Nitrogen, Kjeldahl, N, mg/l	18.	19.
Nitrogen, Ammonia, N, mg/l	18.	19.
Phosphorus, Total, P, mg/l	0.04	0.05
Sulfide, S, mg/l	0.2	0.7
Chlorine, Total, Residual, mg/l	2.6	1.9
pH	8.22	8.28
Phenols, ug/l	<2	6
Oil & Grease, mg/l	3.3	1.5
Manganese, Total, Mn, mg/l	0.054	0.012
Nickel, Total, Ni, mg/l	0.03	0.02
Lead, Total, Pb, mg/l	<0.01	<0.01

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Detroit District Corps of Engineers
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Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO:	32966	32967
CUST. ID:	Elutriate Background Water	Elutriated Water
Mercury, Total, Hg, ug/l	0.8	0.5
Chromium, Total, Cr, mg/l	<0.002	<0.002
Arsenic, Total, As, ug/l	<0.5	2.3
Barium, Total, Ba, mg/l	0.31	0.27
Cadmium, Total, Cd, mg/l	0.009	0.011
Iron, Diss., Fe, mg/l	<0.01	<0.01
Zinc, Total, Zn, mg/l	<0.001	<0.001
Copper, Total, Cu, mg/l	0.002	0.001

Dissolved Oxygen during elutriation		
0 minutes	-----	0.19 mg/l
10 minutes	-----	0.53 mg/l
20 minutes	-----	2.93 mg/l
30 minutes	-----	3.79 mg/l
Temp. during elutriation		
0 minutes	-----	22.0°C
10 minutes	-----	22.3°C
20 minutes	-----	22.7°C
30 minutes	-----	22.8°C

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Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO:	32968
CUST. ID:	Pipeline Discharge

Water portion:

Nitrogen, Ammonia, N, mg/l	25.
Solids, Total, Diss., mg/l	560
Solids, Susp., mg/l	45
Decanted Milliliters	4090 in 2 gallons of sediment

	Wet weight basis	Dry weight basis
Bulk sediment:		
Solids, Total, %	37.3	-----
Solids, Total, Vol, mg/kg	58,000	156,000
C.O.D., mg/kg	95,000	255,000
Hardness, Calcium, as $CaCO_3$, mg/kg	8,400	22,500
Nitrogen, Kjeldahl, N, mg/kg	120	330
Sulfide, S, mg/kg	188	500
Phosphorus, Total, P, mg/kg	550	1,470
Phenols, mg/kg	0.15	0.41
Oil & Grease, mg/kg	5,500	14,700

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Detroit District Corps of Engineers
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Detroit, MI 48231
Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

HYDRO NO: 32968
CUST. ID: Pipeline Discharge

Bulk sediment:	Wet weight basis	Dry weight basis
Zinc, Total, Zn, mg/kg	39	104
Mercury, Total, Hg, mg/kg	0.78	2.1
Iron, Total, Fe, mg/kg	5340	14,300
Manganese, Total, Mn, mg/kg	290	770
Lead, Total, Pb, mg/kg	<0.7	<1.9
Cadmium, Total, Cd, mg/kg	0.73	2.0
Copper, Total, Cu, mg/kg	72	190
Nickel, Total, Ni, mg/kg	26	70
Chromium, Total, Cr, mg/kg	43	115
Arsenic, Total, As, mg/kg	3.2	8.6
Barium, Total, Ba, mg/kg	120	320

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Detroit District Corps of Engineers
P.O. Box 1027
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Attn: Project Operation Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 9-12-79

		PCB's, ug/l		
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
32963	Weir	0.05	-----	<0.02
32962	A-1	<0.02	-----	<0.02
32964	P-2	<0.02	-----	<0.02
32965	4	<0.02	-----	<0.02

		PCB's, ug/l		
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
32966	Elutriate Background	<0.02	-----	<0.02
32967	Elutriated Water	<0.02	-----	<0.02

			PCB's, mg/kg		
HYDRO NO:	CUST. ID:		Aroclor 1242	1254	1260
32968	Pipeline discharge -	(Wet Wt.)	2.4	-----	1.8
	Bulk Sediment	(Dry Wt.)	6.4	-----	4.9

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Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Sample taken 9-7-79 (spot check)

HYDRO NO:	32834	32835
CUST. ID:	9-7-79 Mixing Zone	9-7-79 500' Upstream
Turbidity NTU	2.4	2.4
Nitrogen, Ammonia, N, mg/l	0.52	0.36
Dissolved Oxygen, mg/l	9.6	10.0

Weather conditions: Sunny, cool, windy winds out of Northwest 12 mph river chopy 59°F

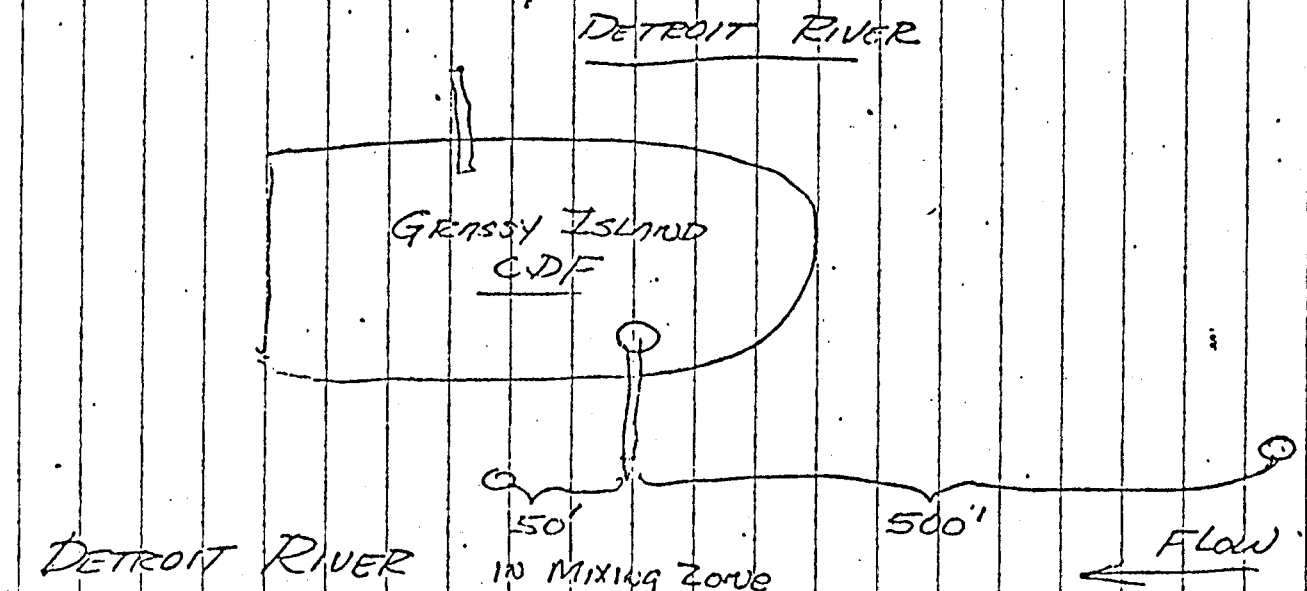
Sampling conditions: Corps representative, Mr. Schoenbeck, present to operate boat and assist in sampling. Dredge not operational at time of sampling.

Weir: Overflow = 2½" slight sanitary smell (9:40 A.M.)

Mixing Zone: Dissolved oxygen 9.6 (9:50 A.M.)

Upstream: Dissolved Oxygen 10.0 (10:00 A.M.)

Misc.: All sampling points (except Weir) sampled by boat. See map for location.



MONITORING SPOT CHECKS

TURBIDITY, AMMONIA, AND DISSOLVED OXYGEN

BE SURE WEIR IS OVERFLOWING

ROUGE RIVER MAINTENANCE DREDGING

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

September 12, 1979

C.O.E. GRASSY ISLAND

8-28-79

Weather conditions: Very foggy in morning (caused about one hour delay) eventually clearing up around 11:00. Winds light South-east.

Sampling conditions: Dredge operational. Corps representatives, Mr. Rivers and Mr. Vermiller present to operate boat and assist in sampling.

Discharge: Discharge was very watery. Four one gallon wide mouth jars were filled in order to obtain enough sediment. It was difficult to reach out to end of pipeline because of water build up in C.D.F. (11:00 A.M.)

Weir: Overflow = 2 1/8". Again, water muddy and sanitary smell. Low ground in front of C.D.F. was more marshy than the time before. C.D.F. has filled in some more, with vegitation growing in. (11:20)

P_1: From boat, D.O. only = 7.9 (11:30) (SEE MAP)

P_2: From boat (11:40) (SEE MAP)

Station 4: From boat (11:50) (SEE MAP)

A_1: From boat (12:00) (SEE MAP)

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

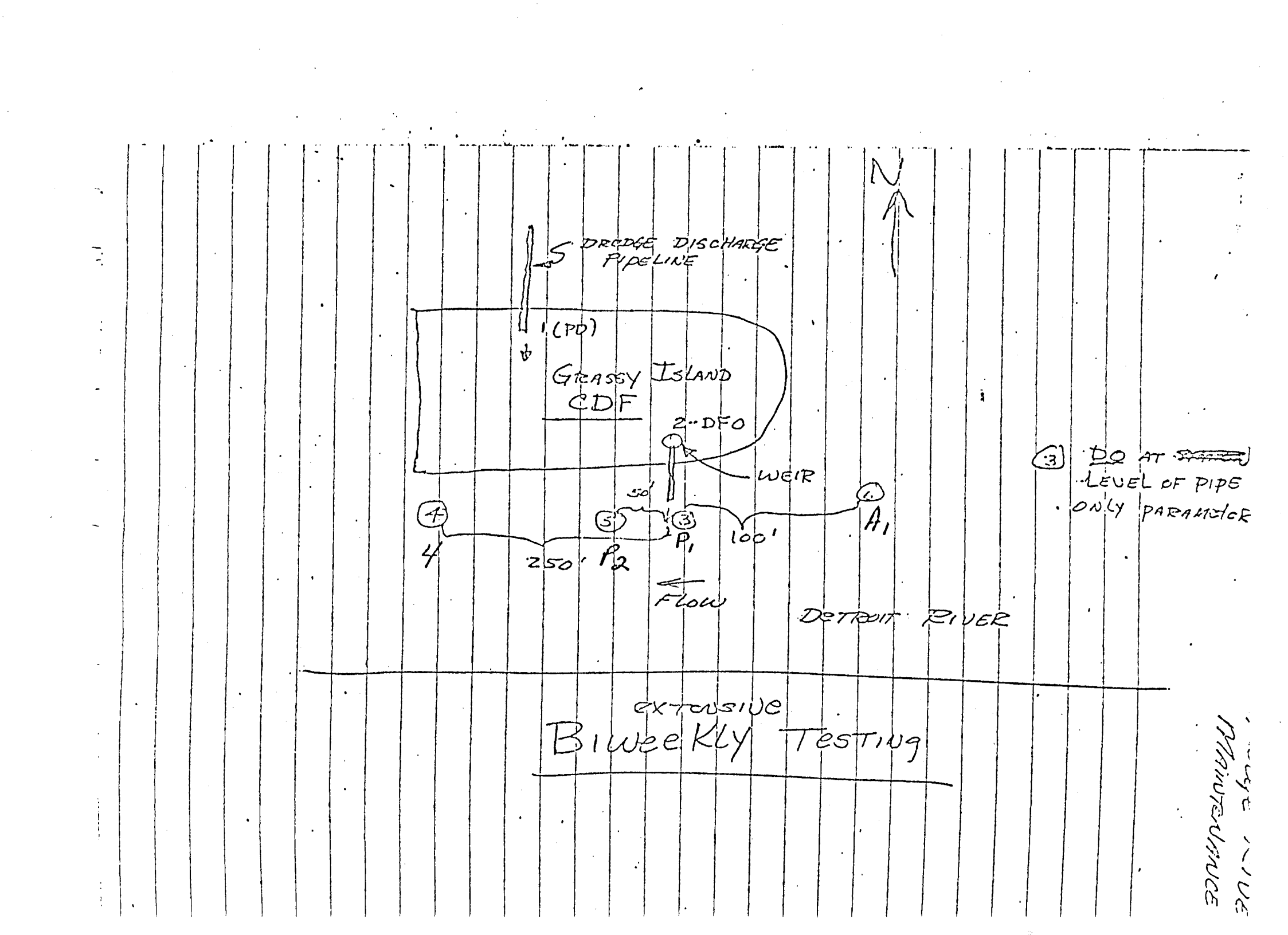
P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

- Field Measurements -

HYDRO NO:	32508	32509	32510	32511
CUST. ID:	Weir	A_1	P_2	4
Dissolved Oxygen, mg/l	1.2	8.4	8.3	7.4
Temperature, ^{o}C	21	21	21	21
pH	7.39	8.25	8.26	8.31


N
5 DREDGE DISCHARGE PIPELINE
1 (PD)
GRASSY ISLAND CDF
2 - DFO
WEIR
50'
4
5
3
1
A1
P1
100'
4
250'
P2
FLOW
DETROIT RIVER
3 DO AT LEVEL OF PIPE ONLY PARAMETER
EXTENSIVE
BIWEEKLY TESTING

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

HYDRO NO:	32508	32509	32510	32511
CUST. ID:	Weir	A_1	P_2	4
Hardness, Calcium as $CaCO_3$, mg/l	146	72	72	72
Specific Con., umhos/cm	655	220	220	220
C.O.D., mg/l	49	8	8	8
Turbidity, N.T.U.	71	7.6	8.2	8.5
Solids, Total, Diss., mg/l	308	109	109	122
Solids, Total, Vol., mg/l	120	46	42	42
Solids, Total, Susp., mg/l	66	2	8	1
Nitrogen, Kjeldahl, N, mg/l	21	0.80	1.1	1.1
Sulfide, S, mg/l	< 0.2	< 0.2	0.4	0.6
Nitrogen, Ammonia, N, mg/l	19.7	0.56	0.49	0.21
Chlorine, Total, Residual mg/l	1.2	0.8	0.8	0.9
Phosphorus, Total, P, mg/l	0.13	< 0.02	<0.02	<0.02
Phenols, ug/l	7	3	3	< 2

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Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

HYDRO NO: CUST. ID:	32508 Weir	32509 A_1	32510 P_2	32511 4
Oil & Grease, mg/l	1.4	0.6	1.2	0.5
Bacteria, Fecal Coli., ($44.5^{o}C$, col/100 ml)	2900	18	46	32
Manganese, Total, Mn, mg/l	0.32	< 0.002	0.002	<0.002
Nickel, Total, Ni, mg/l	<0.01	< 0.01	< 0.01	< 0.01
Lead, Total, Pb, mg/l	0.03	<0.01	<0.01	< 0.01
Iron, Total, Fe, mg/l	2.9	0.06	0.06	0.11
Iron, Diss., Fe, mg/l	<0.01	< 0.01	<0.01	< 0.01
Chromium, Total, Cr, mg/l	0.010	< 0.002	<0.002	< 0.002
Copper, Total, Cu, mg/l	0.032	< 0.002	<0.002	< 0.002
Arsenic, Total, As, ug/l	4.6	2.3	1.1	1.1
Mercury, Total, Hg, ug/l	0.2	< 0.1	2.7	0.5
Barium, Total, Ba, mg/l	<0.02	< 0.02	<0.02	< 0.02
Cadmium, Total, Cd, mg/l	<0.002	< 0.002	<0.002	<0.002
Zinc, Total, Zn, mg/l	0.14	0.015	0.018	0.015

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Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

HYDRO NO: CUST. ID:	32512 Elutriate Background Water	32513 Elutriated Water
Hardness, Calcium as $CaCO_3$, mg/l	146	116
Solids, Total, Diss., mg/l	300	236
Solids, Total, Vol, mg/l	82	68
C.O.D., mg/l	49	61
Nitrogen, Kjeldahl, N, mg/l	17.	20.
Nitrogen, Ammonia, N, mg/l	17.	19.
Phosphorus, Total, P, mg/l	0.02	0.02
Sulfide, S, mg/l	<0.2	<0.2
Chlorine, Total, Residual, mg/l	0.8	0.8
pH	7.9	8.0
Phenols, ug/l	<2	<2
Oil & Grease, mg/l	4.8	12
Manganese, Total, Mn, mg/l	0.014	0.016
Nickel, Total, Ni, mg/l	0.02	0.02
Lead, Total, Pb, mg/l	<0.01	<0.01

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Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

HYDRO NO:	32512	32513
CUST. ID:	Elutriate Background Water	Elutriated Water
Mercury, Total, Hg, ug/l	0.4	0.9
Chromium, Total, Cr, mg/l	< 0.002	< 0.002
Arsenic, Total, As, ug/l	2.3	3.8
Barium, Total, Ba, mg/l	< 0.02	< 0.02
Cadmium, Total, Cd, mg/l	< 0.002	< 0.002
Iron, Diss., Fe, mg/l	< 0.01	< 0.01
Zinc, Total, Zn, mg/l	< 0.002	< 0.002
Copper, Total, Cu, mg/l	< 0.002	< 0.002

Dissolved Oxygen during elutriation	----	
0 minutes	----	0.40 mg/l
10 minutes	----	4.95 mg/l
20 minutes	----	5.63 mg/l
30 minutes	----	6.20 mg/l
Temp. during elutriation	----	
0 minutes	----	21.6°C
10 minutes	----	22.2°C
20 minutes	----	22.6°C
30 minutes	----	22.7°C

Department of the Army
Detroit District Corps of Engineers
P.O. Box 1027
Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

HYDRO NO:	32514
CUST. ID:	Pipeline discharge

Water portion:

Nitrogen, Ammonia, N, mg/l	19.
Solids, Total, Diss., mg/l	252
Solids, Susp., mg/l	144
Decanted Milliliters	5,260 in 2 gallons of sediment

	Wet weight basis	Dry weight basis
Bulk sediment:		
Solids, Total, %	-----	33.9
Solids, Total, Vol, mg/kg	34,600	102,000
C.O.D., mg/kg	61,000	180,000
Hardness, Calcium, as $CaCO_3$, mg/kg	590	1,740
Nitrogen, Kjeldahl, N, mg/kg	729	2,150
Sulfide, S, mg/kg	151	445
Phosphorus, Total, P, mg/kg	815	2,400
Phenols, mg/kg	18.8	55.6
Oil & Grease, mg/kg	4,720	13,900

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Grassy Island CDF

Samples taken 8-28-79

HYDRO NO: 32514
CUST. ID: Pipeline discharge

	Wet weight basis	Dry weight basis
Bulk sediment:		
Zinc, Total, Zn, mg/kg	284	838
Mercury, Total, Hg, mg/kg	0.55	1.6
Iron, Total, Fe, mg/kg	7,400	21,800
Manganese, Total, Mn, mg/kg	222	650
Lead, Total, Pb, mg/kg	107	320
Cadmium, Total, Cd, mg/kg	2	5.9
Copper, Total, Cu, mg/kg	72	210
Nickel, Total, Ni, mg/kg	30	88
Chromium, Total, Cr, mg/kg	41	120
Arsenic, Total, As, mg/kg	3.2	9.4
Barium, Total, Ba, mg/kg	54	159

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-28-79

		PCB's, ug/l		
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
32508	Weir	0.71	----	0.35
32509	A_1	< 0.1	----	0.5
32510	P_2	< 0.1	----	< 0.05
32511	4	< 0.1	----	< 0.05

		PCB's, ug/l		
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
32512	Elutriate Background	< 0.1	----	0.05
32513	Elutriated Water	< 0.1	----	< 0.05

			PCB's, mg/kg		
HYDRO NO:	CUST. ID:		Aroclor 1242	1254	1260
32514	Pipeline discharge - Bulk Sediment	(Wet Wt.)	1.9	----	1.7
		(Dry Wt.)	5.7	----	5.0

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Attn: Project Operations Section

August 29, 1979

Grassy Island Confined Disposal Facility

8-14-79

Weather conditions: Partly cloudy (30% cloud cover), cool, 65°F (rain overnight). Winds South, Southwest, 15 to 20 mph., with gusts up to 25 mph.

Sampling conditions: Dredge operational. Corps representative, Mr. Carl Schoof present, also crew members Mr. Vermillen and Mr. Schoenbeck were present to operate boat.

Discharge: Continuous sampling for 25 minutes; first two grabs very watery. A glass French square bottle was used, holding it at the bottom of the discharge in order to obtain enough sediment for the required test. All of the discharge samples were transferred to gallon glass jars. There were a lot of oil spots in C.D.F.; also a lot of oil coming from discharge at time of sampling (time out 11:00).

Weir: Weir height (overflow) 2"; weir width 65"; from top of weir to water level 3¼"; from top of weir to bottom board 5¼". Weir discharge (into river) muddy, also a lot of bugs in weir water (time out 11:40).

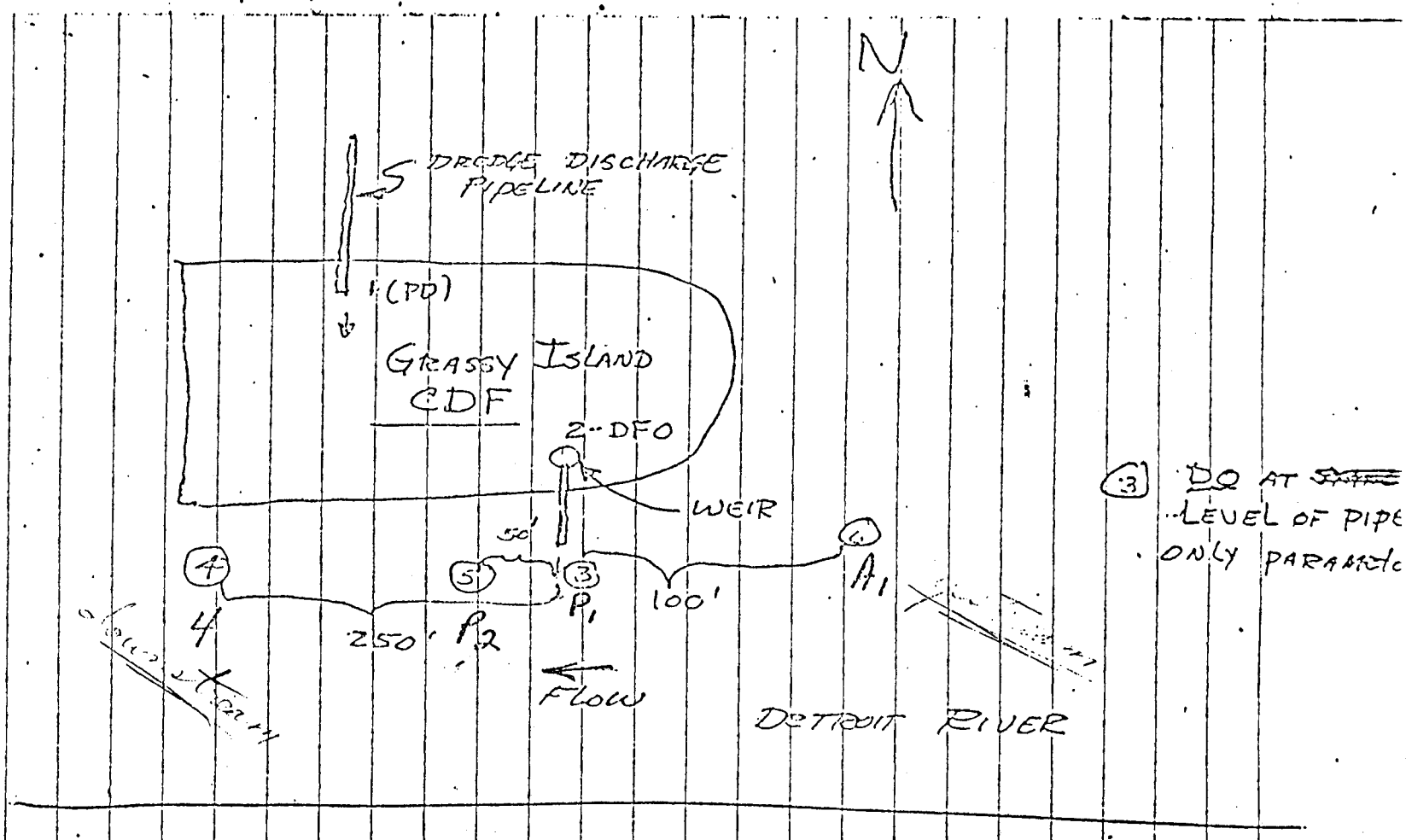
P-1 (at end of weir discharge): D.O. only (time out 11:50). D.O. = 8.2 mg/l.

P-2: From boat; 20' from shore; 50' downstream. Very strong winds made it difficult to hold boat in one position.

Station 4: From boat, 20' from shore, 200' to 250' downstream, again hard to hold boat stable.

A-1: 100' to 150' upstream (see map); winds gusty.

Misc.: Wildlife noted: Ducks, Killdeer, gulls, frogs, and wildflowers. C.D.F. is rapidly filling in; vegetation growing in area that has filled in.



EXTENSIVE
BIWEEKLY TESTING

MAINTENANCE DRE

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Detroit, MI 48231
Attn: Project Operations Section

P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO:	31675	31676	31677	31678
CUST. ID:	Weir	A-1	P_2	4
Dissolved Oxygen, mg/l	3.0	6.8	7.0	6.8
Temperature, °C	20°C	21°C	21°C	21°C
pH	7.5	7.8	7.8	7.7

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-21-79 (spot check)

HYDRO NO:	31815	31816
CUST. ID:	500' Upstream	50' Downstream Mixing Zone
Turbidity NTU	3.0	4.9
Ammonia mg/l	0.20	0.33

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO:	31675	31676	31677	31678
CUST. ID:	Weir	A-1	P_2	4
Oil & Grease, mg/l	1.8	0.8	0.5	0.7
Bacteria, Fecal Coli., (44.5°C, col/100 ml)	<10	25	190	24
Manganese, Total, Mn, mg/l	0.23	0.002	< 0.002	< 0.002
Nickel, Total, Ni, mg/l	< 0.01	< 0.01	< 0.01	< 0.01
Lead, Total, Pb, mg/l	0.03	0.02	< 0.02	< 0.02
Iron, Total, Fe, mg/l	2.0	0.12	0.18	0.18
Iron, Diss., Fe, mg/l	0.01	0.01	0.01	0.01
Chromium, Total, Cr, mg/l	0.005	0.002	< 0.002	< 0.002
Copper, Total, Cu, mg/l	0.020	0.002	< 0.002	< 0.002
Arsenic, Total, As, ug/l	1.0	< 0.2	< 0.2	< 0.2
Mercury, Total, Hg, ug/l	< 0.2	0.5	< 0.2	< 0.2
Barium, Total, Ba, mg/l	0.20	0.08	0.08	0.09
Cadmium, Total, Cd, mg/l	< 0.002	< 0.002	< 0.002	< 0.002
Zinc, Total, Zn, mg/l	0.100	0.017	0.013	0.008

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO: CUST. ID:	31675 Weir	31676 A-1	31677 P_2	31678 4
Oil & Grease, mg/l	1.8	0.8	0.5	0.7
Bacteria, Fecal Coli., (44.5°C, col/100 ml)	<10	25	190	24
Manganese, Total, Mn, mg/l	0.23	0.002	< 0.002	< 0.002
Nickel, Total, Ni, mg/l	< 0.01	< 0.01	< 0.01	< 0.01
Lead, Total, Pb, mg/l	0.03	0.02	< 0.02	< 0.02
Iron, Total, Fe, mg/l	2.0	0.12	0.18	0.18
Iron, Diss., Fe, mg/l	0.01	0.01	0.01	0.01
Chromium, Total, Cr, mg/l	0.005	0.002	< 0.002	< 0.002
Copper, Total, Cu, mg/l	0.020	0.002	< 0.002	< 0.002
Arsenic, Total, As, ug/l	1.0	< 0.2	< 0.2	< 0.2
Mercury, Total, Hg, ug/l	< 0.2	0.5	< 0.2	< 0.2
Barium, Total, Ba, mg/l	0.20	0.08	0.08	0.09
Cadmium, Total, Cd, mg/l	< 0.002	< 0.002	< 0.002	< 0.002
Zinc, Total, Zn, mg/l	0.100	0.017	0.013	0.008

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO:	31679
CUST. ID:	Pipeline discharge

Water portion:

Nitrogen, Ammonia, N, mg/l	32
Solids, Total, Diss., mg/l	336
Solids, Susp., mg/l	35
Decanted Milliliters	3800 in 2 gal. sediment

	Wet weight basis	Dry weight basis
Bulk sediment:		
Solids, Total, %	———	42.2
Solids, Total, Vol, mg/kg	60,300	143,000
C.O.D., mg/kg	120,000	284,000
Hardness, Calcium, as $CaCO_3$, mg/kg	3,150	8,180
Nitrogen, Kjeldahl, N, mg/kg	1,120	2,650
Sulfide, S, mg/kg	17	40
Phosphorus, Total, P, mg/kg	526	1,250
Phenols, mg/kg	7.	16.
Oil & Grease, mg/kg	4,900	11,700

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO: 31679
CUST. ID: Pipeline discharge

	Wet weight basis	Dry weight basis
Bulk sediment:		
Zinc, Total, Zn, mg/kg	49	116
Mercury, Total, Hg, mg/kg	0.2	0.5
Iron, Total, Fe, mg/kg	2,700	6,398
Manganese, Total, Mn, mg/kg	120	284
Lead, Total, Pb, mg/kg	16	40
Cadmium, Total, Cd, mg/kg	0.26	0.62
Copper, Total, Cu, mg/kg	7.5	18.
Nickel, Total, Ni, mg/kg	34	81
Chromium, Total, Cr, mg/kg	4.7	11.
Arsenic, Total, As, mg/kg	2.3	5.5
Barium, Total, Ba, mg/kg	5.9	14
Total Slurry:		
Solids, Total %	19.1	

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO: CUST. ID:	31680 Elutriate Background water	31681 Elutriated water
Hardness, Calcium as $CaCO_3$, mg/l	168	140
Solids, Total, Diss., mg/l	370	190
Solids, Total, Vol, mg/l	108	106
C.O.D., mg/l	63	55
Nitrogen, Kjeldahl, N, mg/l	25.	28.
Nitrogen, Ammonia, N, mg/l	24.	26.
Phosphorus, Total, P, mg/l	0.07	0.06
Sulfide, S, mg/l	< 0.2	< 0.2
Chlorine, Total, Residual, mg/l	1.0	0.6
pH	8.1	8.0
Phenols, ug/l	38	< 5
Oil & Grease, mg/l	2.9	2.6
Manganese, Total, Mn, mg/l	0.100	0.160
Nickel, Total, Ni, mg/l	< 0.01	< 0.01
Lead, Total, Pb, mg/l	0.02	< 0.02

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

HYDRO NO: / CUST. ID:	31680 Elutriate Background water	31681 Elutriated water
Mercury, Total, Hg, ug/l	0.6	1.0
Chromium, Total, Cr, mg/l	< 0.002	< 0.002
Arsenic, Total, As, mg/l	0.6	0.9
Barium, Total, Ba, mg/l	0.16	0.12
Cadmium, Total, Cd, mg/l	< 0.002	< 0.002
Iron, Diss., Fe, mg/l	0.02	0.02
Zinc, Total, Zn, mg/l	0.028	0.024
Copper, Total, Cu, mg/l	0.005	0.006

Dissolved Oxygen during elutriation	———	
0 minutes	———	0.19 mg/l
10 minutes	———	4.09 mg/l
20 minutes	———	4.48 mg/l
30 minutes	———	6.53 mg/l
Temp. during elutriation	———	
0 minutes	———	21.8°C
10 minutes	———	22.0°C
20 minutes	———	22.3°C
30 minutes	———	22.4°C

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P.O. #DACW35-79-M-1192

Grassy Island CDF

Samples taken 8-14-79

			PCB's ug/l	
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
31675	Weir	1.2	----	0.82
31676	A-1	0.05	----	0.20
31677	P_2	< 0.05	----	0.05

			ug/l	
HYDRO NO:	CUST. ID:	Aroclor 1242	1254	1260
31678	4	0.10	----	0.20
31680	Elutriate Background	0.05	----	0.05
31681	Elutriated Water	0.1	----	0.2

				mg/kg	
HYDRO NO:	CUST. ID:		Aroclor 1242	1254	1260
31679	Pipeline discharge -	(Wet Wt.)	18	----	4.7
	Bulk sediment	(Dry Wt.)	43	----	11

Appendix A: Unpublished Scientific Information.

9. 1946 ACOE drawing of Authorized crossings of Detroit River near Grassy Island. 8 pp.

All depths are referred to I. G. L. D. corresponding to the sloping surface of the river when Lake St. Clair is at elevation 571.7 ft. and Lake Erie is at elevation 568.6 ft. above Mean Water Level at Father Point, Quebec, Canada (I.G.L.D. 1955).

Note:

To convert L.W.D. to I.G.L.D. subtract 1.8 feet from L.W.D. elevations.

◯ Permit Issued – Work Completed

◌ Permit Issued – Under Construction

DETROIT RIVER, MICH

AUTHORIZED CROSSINGS

In 2 Sheets Sheet No. 2 Scale 1:30000

Scale of Feet

1000 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15000

U. S. ENGINEER OFFICE, DETROIT, MICH., 26 AUG. 1946

Submitted:

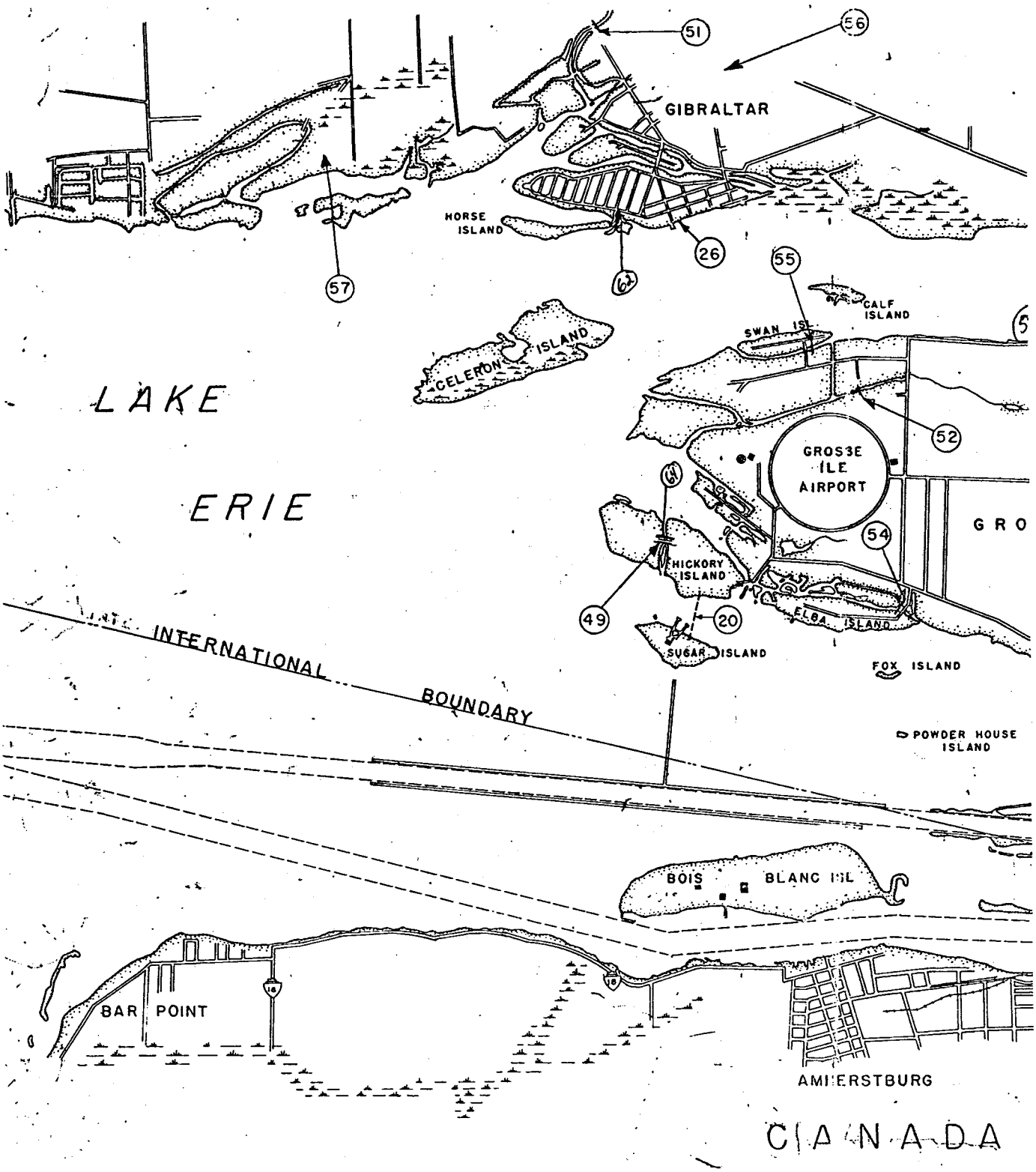
John C. Tulga
Principal Engineer

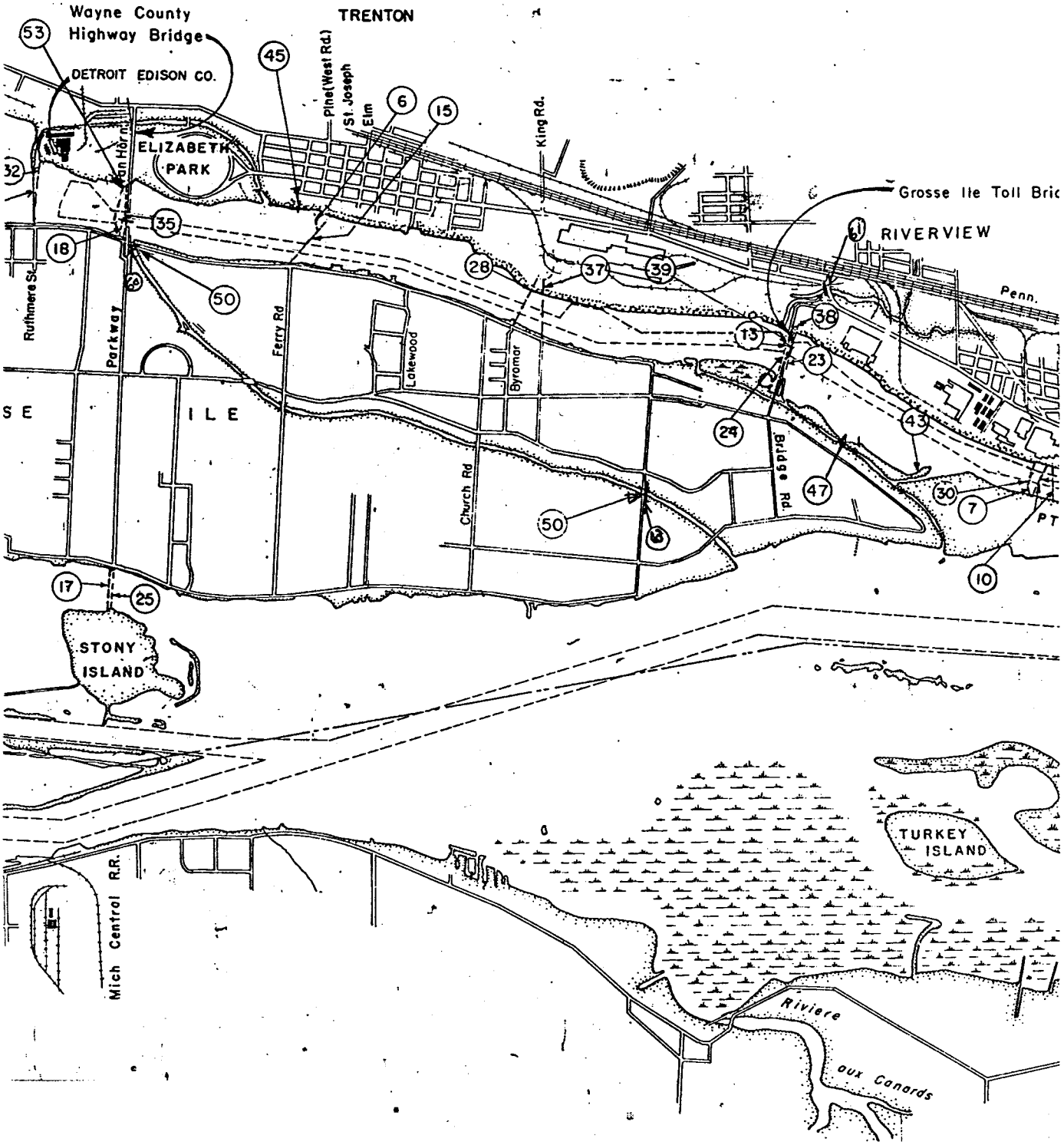
Approved:

A. V. Crane
Col., Corps of Engineers

Drawn by N.L.K.

File No: D.D.R. 4/159


51
56
GIBRALTAR
HORSE ISLAND
57
26
55
CALF ISLAND
SWAN ISL
CELERON ISLAND
LAKE
ERIE
52
GROSSE ILE AIRPORT
GRO
54
HICKORY ISLAND
49
20
ELBA ISLAND
SUGAR ISLAND
FOX ISLAND
INTERNATIONAL BOUNDARY
POWDER HOUSE ISLAND
BOIS BLANC ISL
BAR POINT
AMHERSTBURG
CANADA


Wayne County
Highway Bridge
TRENTON
DETROIT EDISON CO.
ELIZABETH
PARK
Jefferson
Pine(West Rd.)
St. Joseph
Elm
King Rd.
Grosse Ile Toll Bric
RIVERVIEW
Penn.
Ruthmere St.
Parkway
Ferry Rd
Lakewood
Byromar
Church Rd
Bridge Rd.
SE
ILE
STONY
ISLAND
TURKEY
ISLAND
Mich Central R.R.
Riviere
aux Canards
PT
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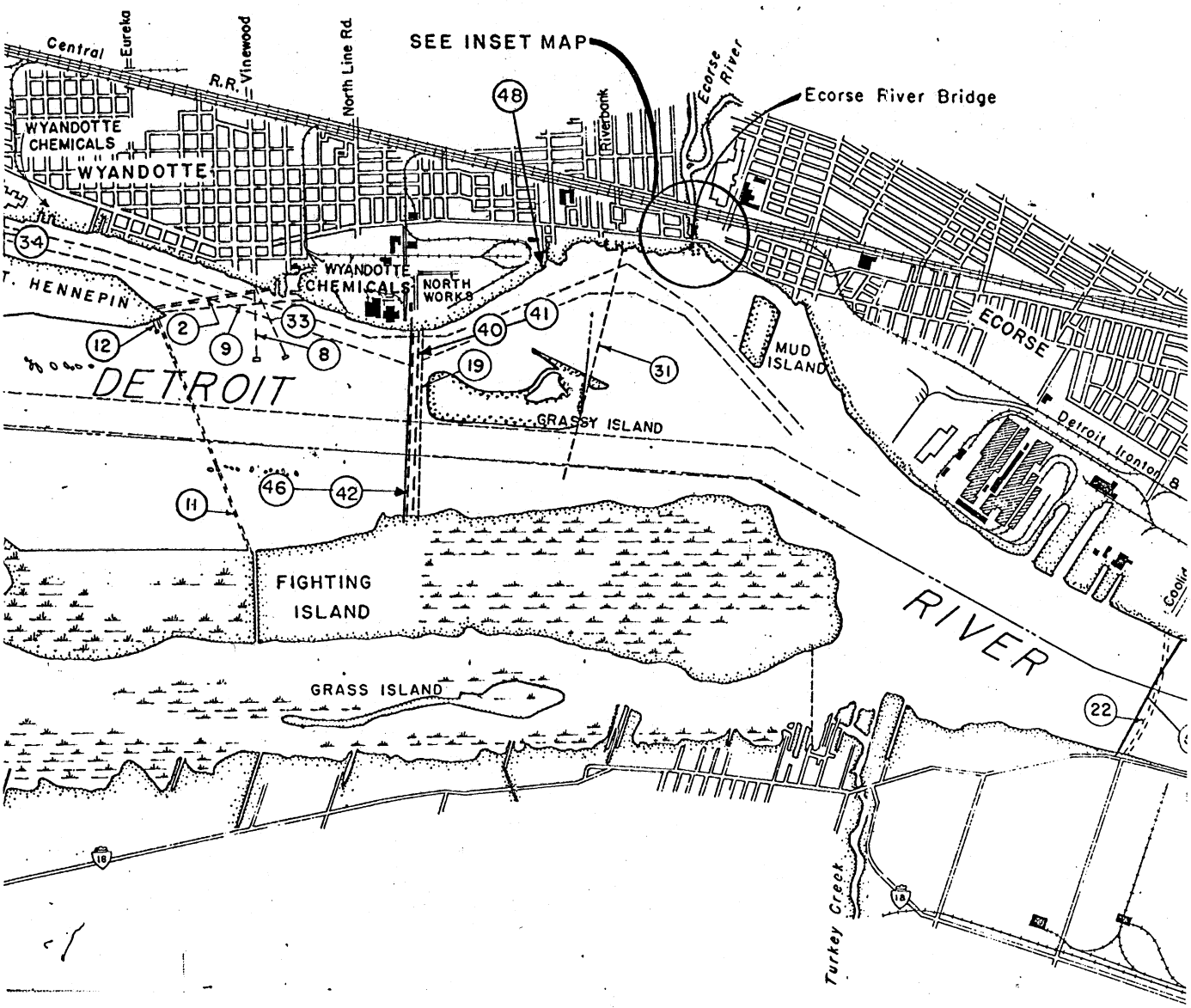
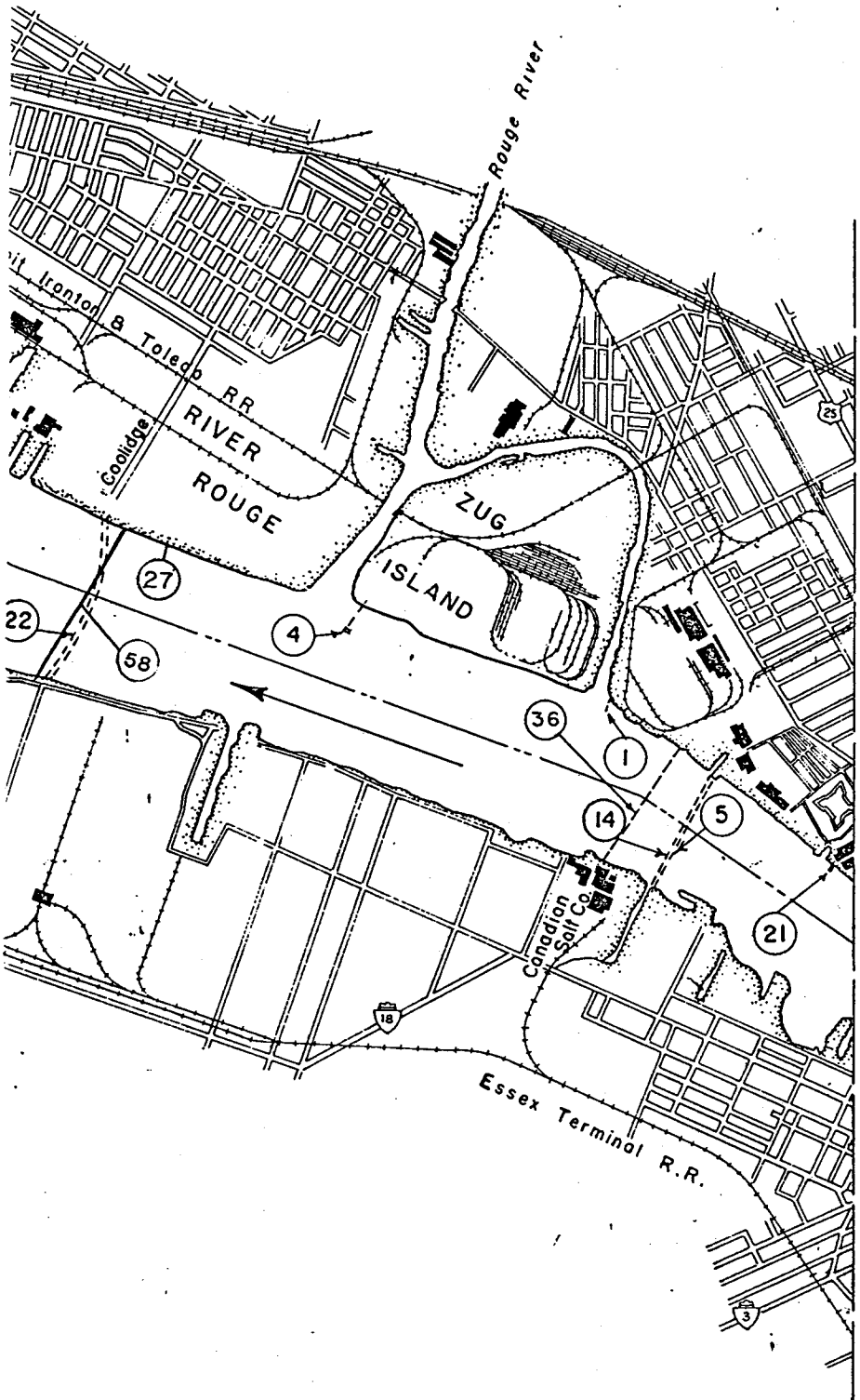
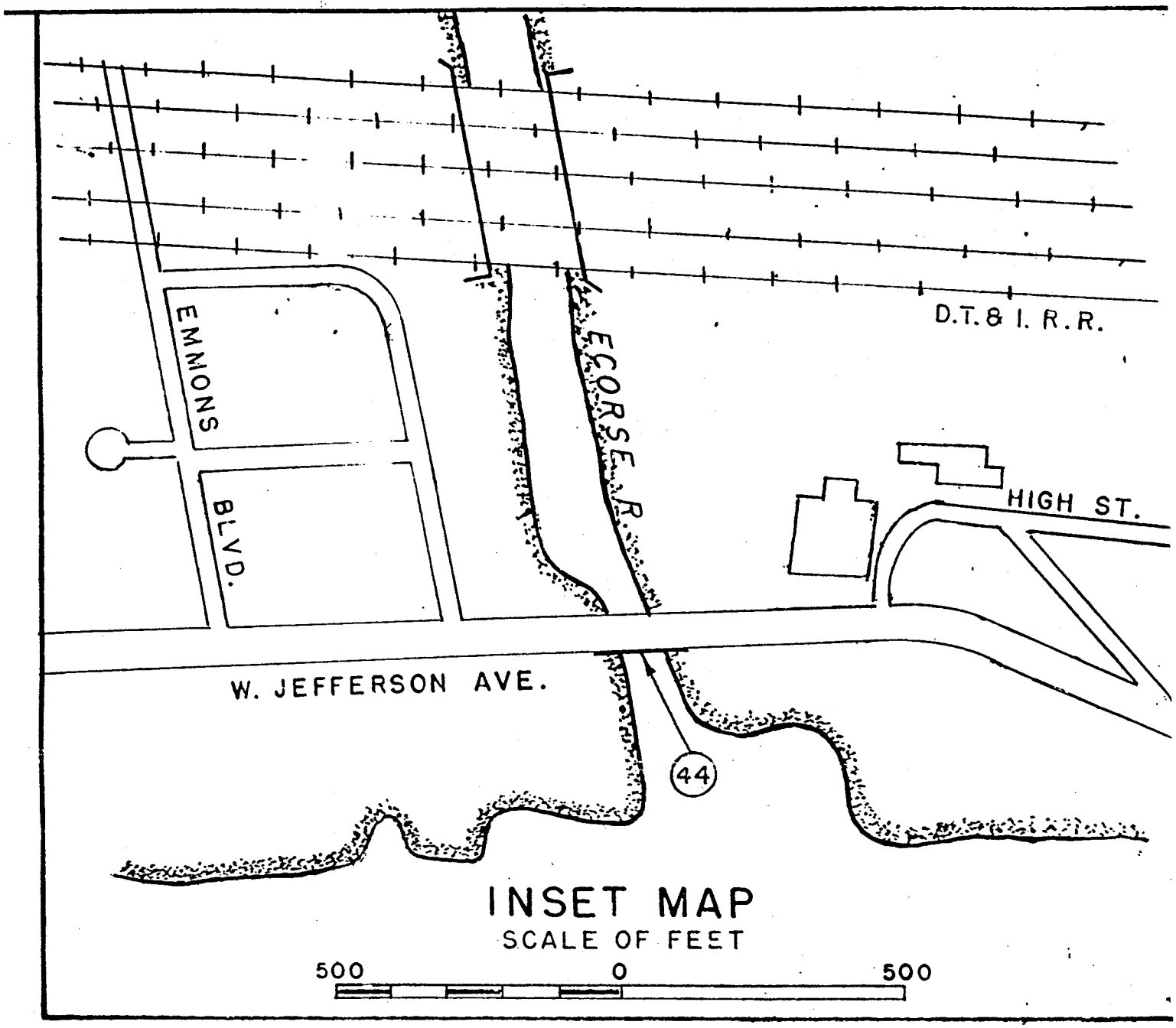

Central
Eureka
R.R.
Vinewood
North Line Rd.
SEE INSET MAP
48
Riverbank
Ecorse River
Ecorse River Bridge
WYANDOTTE CHEMICALS
WYANDOTTE
34
T. HENNEPIN
WYANDOTTE CHEMICALS
NORTH WORKS
12
2
9
33
8
40
41
19
31
MUD ISLAND
ECORSE
DETROIT
GRASSY ISLAND
Detroit Ironton B
11
46
42
FIGHTING ISLAND
RIVER
GRASS ISLAND
22
Turkey Creek



All depths are referred to I. G. L. D. corresponding to the sloping surface of the river when Lake St. Clair is at elevation 571.7 ft. and Lake Erie is at elevation 568.6 ft. above Mean Water Level at Father Point, Quebec, Canada (I.G.L.D. 1955).


EMMONS
BLVD.
ESCORSE R.
D.T. & I. R.R.
HIGH ST.
W. JEFFERSON AVE.
44
INSET MAP
SCALE OF FEET
500
0
500

AUTHORIZED CROSSINGS OF DETROIT RIVER

No.	Permit	Date	Issued To
(1)	00-07-3	26 April 1900,	The Solvay Process Co. of Detroit,—1 sewer pipe at mouth of Rouge River (old channel), extending 35' beyond Detroit River Harbor-line, 30 ft. below L.W.D.
(2)	17-07-2	24 August 1912,	Michigan Alkali Co.,—2 pipelines from the head of Grosse Ile to the Michigan Alkali Co., North Wks., Wyandotte, Michigan, 25' below L.W.D.
(3)			
(4)	36-09-6	23 January 1937,	City of Detroit,—1-18' outlet in Detroit River, 600 ft. North of Short Cut Canal extentending 415 ft. riverward of harbor line, 35 ft. below L.W.D.
(5)	11-07-3	17 January 1912,	Essex Light & Power Co., Ontario,—6 electric submarine cables in the Detroit River, 100' south of Ft. Wayne southern boundary, to a point 100' north of canal in Park Lot B. Ontario, 28' below L.W.D.
(6)	39-07-4	5 July 1939	Michigan Bell Telephone Co. Relocated existing cables (05-07-1, 08-07-2 & 28-07-1) from foot of Pine St., Trenton, to foot of Ferry Rd. on the island of Grosse Ile. 28 feet below L.W.D. Added Cables (73-07-35). and (80-07-023)
(7)	43-07-3	Nov. 1943,	Wyandotte Chemical Corp.,— 1-16" water intake 140' feet riverward of harbor line and .9 miles downstream from Pt. Hennepin, 8 ft. below L.W.D.
(8)	49-07-1	14 April 1949,	City of Wyandotte,—1-42" submarine water intake pipeline at foot of Vinewood Street 1388' from U.S. Harbor Line, Crib elevation 17.44' below L.W.D. at U.S. Harbor Lines, 353' below L.W.D. at midpoint of pipeline.
(9)	48-07-8	24 Feburary 1949,	Wyandotte Chemicals Corp.,— 2 submarine pipelines from Pt. Hennepin to the Wyandotte Chem. Corp. North Works, 6' below L.W.D. at U.S. Harbor Lines, 30' below L.W.D. at midpoint of pipeline. See 63-07-14 also
(10)	48-07-5	15 February 1949,	Wyandotte Chemical Corp.,— 3 submarine cables and 2 pipelines from Wyandotte Chem. Corp. South Works Wyandotte to Grosse Ile, 35' below L.W.D.
(11)	48-07-4	16 May 1949,	Wyandotte Chemical Corp.— 2 submarine pipelines from northern tip of Pt. Hennepin to Fighting Island, 36' below L.W.D. at Fighting Island Channel. (pipelines are 14" on 80' c-c)
(12)	48-07-7	15 February 1949,	Wyandotte Chemical Corp.— 1-30" submarine water intake off east shore of Pt. Hennepin, Grosse Ile, extending 325' riverward of U.S.H.L., 9.0' below L.W.D.
(13)	50-07-1	2 May 1950,	Michigan Bell Telephone Co. —1 Telephone Cable under west draw of Detroit River (Trenton Channel) at Hwy. Bridge from Riverview to Grosse Ile, in same trench as 12" Water Main which is 50' downstream of ℄ of Bridge.
(14)	52-07-2	25 June 1952	Detroit Edison Co.— 1 Aerial Transmission Line from Detroit immediately downstream from Ft. Wayne, to Ontario, Canada, Min. Ele. 183.0' above L.W.D.
(15)	39-07-3	24 June 1939,	Detroit Edison Co.,—3 Submarine electric Cables from St. Joseph St. Trenton, to Ferry Rd. Grosse Ile, 25' below L.W.D.
	51-07-3	13 June 1951,	Detroit Edison Co.,—1 Submarine Cable in existing trench, 25' below L.W.D. Also see 11-07-1 & 23-07-4
(16)			
(17)	27-07-10	3 Nov. 1927,	Detroit Edison Co.,— 1 Submarine electric Cable, immediately below abandoned Mich. Cen. R.R. Br. from Grosse Ile to Stoney Island Mich., 7' below L.W.D.
(18)	30-07-6	3 Dec. 1930,	Detroit Edison Co.,— 1 Submarine electric Cable from Grosse Ile to center pier of bridge, at Van Horn Road Trenton, 20' below L.W.D.
	65-07-6	12 July 1965	
(19)	37-07-1	9 April 1937,	Michigan Alkali Co., 2-12" and 1-14" pipelines from Mich. Alkali Co. North Wks., Wyandotte, to Fighting Island Canada, 35' below L.W.D. 18-07-1 5 Jan. 1919 1-12" pipeline located as above.
(20)	20-07-1	2 March 1920,	Fred W. Pearce,— 2 Submarine Cables, (1 Telephone & 1 Power), from Hickory Island to Sugar Island, 18' below L.W.D.
(21)	21-07-2	19 July 1921,	Michigan Copper & Brass Co.,— 1-24" Water intake offshore Revere Copper & Brass Co., and extending 197 ft. riverward of U.S. Harbor Line, 30.5 ft. below L.W.D.
(22)	46-07-2	4 April 1946,	Panhandle Eastern Pipe Line Co.,— 2-12" Submarine gas pipelines from foot of Coolidge Hwy. River Rouge Mich. to Ontario Canada, 43 ft. below L.W.D.
(23)	42-07-5	19 Nov. 1942,	City of Detroit Dept. of Water Supply — 1-16" Water Main under Detroit River (Trenton Channel), from Riverview Mich. to Grosse Ile, 40' north & paralell to upper Grosse Ile Bridge, 30' below L.W.D.
(24)	36-07-1	23 March 1936,	H.G. Knight Grosse Ile Township,— 1-8" Water Main from Riverview to Grosse Ile, 48' downstream from upper Grosse Ile Bridge, 21 ft. below L.W.D.
(25)	14-07-1	3 April 1914,	Mich. State Telephone Co.,— 1 Submarine Cable from Grosse Ile to Stony Island at foot of Parkway Rd. Grosse Ile, Cable layed on natural bottom of river. 73-07-42, 4 Feb. 1974 Abandoned existing cable in place & install new cable on existing bottom.
(26)	66-07-1	8 Feb 1966,	U.S. Water Pollution Control Administration One Water Intake Monitor 10 ft. Below I.G.L.D.
(27)	67-07-1	Great Lakes Steel	Outfall Structure 200 ft. Upstream from Harbor Line Point #22.
(28)	29-07-7	24 June 1929,	Jewell Land Co.,— 1-4" Water Main from foot of King Road Trenton, to Grosse Ile, north of Church Road, 30' below L.W.D. at channel. (not in use at present but not obandoned)
(29)			
(30)	54-07-7,	27 Aug. 1954,	Wyandotte Chemical Corp.— 2-12" Submarine pipe line and 1 submarine cable in a common trench 6' in depth from south works to Grosse Ile.
(31)	56-07-7,	13 Mar. 1957,	Wayne County,— 1-12' inside dia. water intake tunnel from Riverbank Ave. to International Boundary. Min. depth 115' below L.W.D.
(32)	56-07-3	14 June 1956,	Detroit Edison Co. 1 Submarine cable 100' downstream from Trenton channel turning basin between Trenton Channel Power Plant & foot of Ruthmere Street on island of Grosse Ile. 2 ft. below channel bottom
(33)	18-07-2	6 Dec. 1918	City of Wyandotte 1-24" submarine water intake pipe from foot of Vinewood St. approximately 1400' from U.S. Harbor Line, crib being 28' below L.W.D. Abandoned
(34)	41-07-7	27 Dec. 1941,	Michigan Alkali Co. 1-submarine pipeline and 1-submarine cable from Point Henripin to the south works of Michigan Alkali Co. at Wyandotte, Michigan, 30' below L.W.D.
(35)	54-07-4	22 July 1954	Michigan Bell Telephone Co. 1-submarine cable at Wayne County Bridge from west approoch to center pier, on channel bottom, 21' below L.W.D.
(36)	57-07-5	23 Oct. 1957	American Brine Inc. 2-submarine pipelines and 1 submarine cable about 2 miles downstream from Ambassador Bridge, 10' below channel bottom.
(37)	63-07-1	7 June 1963	Michigan Consolidated Gas Co.— 1-12" submarine pipeline (gas) from King Road, Trenton to Highland Drive, Grosse Ile, 34' below I.G.L.D.
(38)	63-07-13	26 Dec. 1963	Grosse Ile Bridge Co., Submarine Cable (Electric Power) 30' downstream from the centerline of the Grosse Ile Toll Bridge 33.0' below I.G.L.D.
(39)	67-07-7	24 Jan 1968	Gross Ile Bridge Co. One Submarine Cable 20 ft. Downstream from Center Line of the Grosse Ile Toll Bridge, 33 ft. Below I.G.L.D. Elev.
(40)	70-07-4	3 Sept. 1970	Wyandotte Chemicals Corp., To Replace a 12" Line with a 14" Line at a depth of (30 ft. Trenton Channel, 31.5' Fighting Island Channel) See 76-07-023 for authorized repairs.
(41)	70-07-8	6 Oct 1970	Wyandotte Chemical Corp. To replace Approx. 1,000 ft. of DBO Submerged Pipe Line from North Works to Fighting Island.

(42)	65-07-6	12 July 1965	Wyandotte Chemical Corp. to Replace 14" Pipeline North Works to Fighting Island (Trenton Channel 27 ft.) (Fighting Island Channel 28.5 ft.) See (46)
(43)	70-07-3	12 Aug 1970	Wyandotte Chemical Corp. To place (3) brine wells with accessory pipes and cables
(44)	15-08-1	5 Aug 1915	Detroit City Gas Co. 3 Submarine Gas Mains 1-12" & 2-8".
(45)	75-07-27	12 Sept. 1975	Mobil Oil Corp. Water Intake.
(46)	75-07-2	18 July 1975	BASF Wyandotte Corp. Submerged 14" Pipeline 6' min below L.W.D. in channel areas. Replaces (42)
(47)	74-07-021	19 Mar., 1975	BASF Wyandotte Corp., Brine Wells and associated piping.
(48)	77-07-022	20 July, 1977	BASF Wyandotte Corp., 24-inch diameter outfall structure.
(49)	76-07-057	15 Apr., 1977	Wayne County Drain Commission, 4-inch sewer pipeline.
(50)	83-07-015	12 July, 1983	Township of Grosse Ile, Two 12-inch diameter watermain pipe crossings, 10.9 feet below LWD with a minimum 6 feet cover from the top of the pipe.
(51)	85-07-024	14 May, 1985	Wayne County Department of Public Works, buried 36-inch force main across Brownstown Creek and Frank and Poet Drain.
(52)	85-07-025	21 May, 1985	Detroit Edison Co., submerged 4-inch conduit and cable.
(53)	80-07-002	23 Mar., 1982	Township of Grosse Ile, place a 24-inch diameter water main, 30 feet below LWD, with a minimum of 5 foot cover in all areas.
(54)	76-07-054	15 Apr., 1977	Wayne County, to place a 4-inch pipeline a minimum of 3 feet (to the top of the pipe below the existing river bottom.
(55)	76-07-055	6 Aug., 1977	Wayne County, to place a 4-inch pipeline a minimum of 3 feet (to the top of the pipe) below the existing river bottom.
(56)	87-07-003	26 Feb., 1987	Wayne County office of Public Service, submerged 12-inch force main crossing Frank and Poet No. 1 Drain.
(57)	84-01-010	2 Oct., 1985	Huron-Clinton Metropolitan Authority, to install a 3-inch intake pipe 1.5 feet below the existing lake bottom, extending 100 feet lakeward, 0.9 miles southeasterly from intersection of Huron River Drive and River Road.
(58)	88-7-7-8801	4 May 1988	National Steel Corporation to construct a single 16 inch steel pipe (natural gas) to a depth of 510.0 feet IGLD, located approximately 0.6 mile downstream from the Rouge River Short Cut Canal at Ecorse, Michigan
(59)	91-7-81-9001	25 JAN 1991	Detroit Edison Co. 1 SUBMARINE Cable 100' downstream from Trenton Channel TURNING BASIN Between Trenton Channel + foot of RUTHMERE St. on Island of Grosse Ile ON Channel Bottom
(60)	96-007-001-0	17 JAN 1996	MICHCON one 2" Submarine gas pipeline east side of West River Rd. Bridge a minimum of 4' below channel bottom
(61)	96-007-002-0	17 JAN 1996	MICHCON one 2" Submarine gas pipeline south side of W. Jefferson Rd. bridge a minimum of 4' below channel bottom
(62)	96-007-003-0	17 JAN 1996	MICHCON one 4" Submarine gas pipeline north side of House Island Drive Bridge a minimum of 4' below channel bottom
(63)	96-007-004-0	17 JAN 1996	MICHCON one 4" Submarine gas pipeline north side of Horsemill Rd. Bridge a minimum of 4.5' below channel bottom
(64)	96-007-005-0	17 JAN 1996	MICHCON one 4" Submarine gas pipeline east side of E. River Rd. Bridge a minimum of 4' below channel bottom

Appendix A: Unpublished Scientific Information.

10. Table titled "Annual Report of Dredging Data" dated 03-02-96. 2 pp.

FAX FORM

U.S. FISH AND WILDLIFE SERVICE - REGION 3
DIVISION OF ENGINEERING
BISHOP HENRY WHIPPLE FEDERAL BUILDING
1 FEDERAL DRIVE
FT. SNELLING, MN 55111-4056

PAGE 1 OF 2 PAGES
DATE 5/2/96

TO: Dr. Bruce Manny
NBS Great Lakes Science Center
FAX: (313) 994-8780
PHONE: (700) 378-1255

FROM: Patrick McDermott / DEN
U.S. Fish and Wildlife Service
FAX: (612) 725-3527
PHONE: (612) 725-3550 Ext 211

Subject: Grassy Island -- Dredging Data

I did finally catch up with Carla Fisher COE Detroit.
She ran this sort from their database.

Bruce
If it doesn't transmit ok,
give me a call.
Pat

ANNUAL REPORT DREDGING DATA
U.S. ARMY CORPS OF ENGINEERS
DETROIT DISTRICT
PROJECT OPERATIONS SECTION

PROJECT	FISC YEAR	CUBIC YARDS	TOTAL COST	CU/YD COST	PLACEMENT AREA	CONTRACTOR OR GOVERNMENT
DETROIT RIVER, MI	1971	39427	31057	$ 0.79	GRASSY ISLAND CDF	GOVT/HAINS
LAKE ST CLAIR, MI	1971	5995	22748	$ 3.79	GRASSY ISLAND CDF	GOVT/HAINS
LAKE ST CLAIR, MI	1971	30291	68200	$ 2.25	GRASSY ISLAND CDF	GOVT/HOFFMAN
ROUGE RIVER, MI	1971	6443	25598	$ 3.97	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1971	238772	154865	$ 0.65	GRASSY ISLAND CDF	GOVT/HOFFMAN
ROUGE RIVER, MI	1972	26374	55623	$ 2.11	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1972	108948	233590	$ 2.14	GRASSY ISLAND CDF	GOVT/HOFFMAN
ROUGE RIVER, MI	1973	56308	195009	$ 3.48	GRASSY ISLAND CDF	GOVT/LYMAN
ROUGE RIVER, MI	1974	99554	218114	$ 2.17	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1975	109669	127118	$ 1.16	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1976	226457	682127	$ 3.01	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1977	86060	361941	$ 4.21	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1978	152845	529453	$ 3.46	GRASSY ISLAND CDF	GOVT/HAINS
ROUGE RIVER, MI	1978	8464	31999	$ 3.78	GRASSY ISLAND CDF	GOVT/HOFFMAN
ROUGE RIVER, MI	1978	13677	69999	$ 5.12	GRASSY ISLAND CDF	GOVT/LYMAN
ROUGE RIVER, MI	1979	134083	557365	$ 4.16	GRASSY ISLAND CDF	GOVT/LYMAN
ROUGE RIVER, MI	1980	117997	486687	$ 4.12	GRASSY ISLAND CDF	GOVT/LYMAN
ROUGE RIVER, MI	1981	115549	496289	$ 4.30	POINTE MOUILLEE/GRASSY IS. CDF	GOVT/HOFFMAN
ROUGE RIVER, MI	1983	44310	325318	$ 7.34	GRASSY ISLAND CDF	CONT/LUEDTKE
*** Total ***		1619223	4670228			

% of total
DTR 2.4
LSC 2.2
Rouge R. 94.4

Appendix A: Unpublished Scientific Information.

11. EPA 1975 Report "Sediment Sampling Data Rouge River (1967, 1968, 1973)". 17 pp.

EPA 1975 Report

Appendix A.

Sediment Sampling Data

Rouge River

(1967, 1968, 1973)

From Rouge River Maintenance Dredging Environmental Impact Statement, 1975, by the USEPA.

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Total Iron (mg/kg)		Total Phosphate (mg/kg)		Tot. Sol. Phosphate (mg/kg)		Ammonia Nitrogen (mg/kg)		Organic Nitrogen (mg/kg)		Nitrate (mg/kg)	
		Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Main Rouge River													
1	1967	7800	15000	870	1700	3	6	20	39	30	59	80	160
2	1967	8500	16000	250	480	4	8	10	19	30	58	40	77
	1973	11000	22000	-	-	-	-	-	-	-	-	-	-
3	1967	7300	11000	1400	2100	2	3	6	9	10	15	8	12
4	1967	17000	35000	2700	5600	2	4	30	62	-	-	8	16
5	1967	45000	98000	4800	9400	2	4	100	200	60	120	8	16
	1968	8800	50000	7100	40000	-	-	530	3000	-	-	-	-
	1973	21000	46000	-	-	-	-	-	-	-	-	-	-
6	1967	41000	91000	5000	11000	3	7	300	670	80	180	20	44
7	1967	43000	120000	1800	5100	4	11	50	140	60	170	8	22
8	1967	43000	120000	3800	10000	1	3	50	140	80	220	90	250
	1968	42000	100000	4500	11000	-	-	110	260	-	-	-	-
9	1967	50000	130000	4500	12000	1	2	70	180	-	-	10	26
	1973	35000	73000	-	-	-	-	-	-	-	-	-	-
10	1967	39000	98000	2900	7200	3	8	60	150	40	100	10	25
	1968	45000	110000	4000	9500	-	-	120	280	-	-	-	-
11	1967	59000	130000	3900	8700	5	11	-	-	-	-	30	67

EPA Criteria Concentration Limits

[a] EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Lead (mg/kg) Wet B	Lead (mg/kg) Dry B	Nickel (mg/kg) Wet B	Nickel (mg/kg) Dry B	Molybdenum (mg/kg) Wet B	Molybdenum (mg/kg) Dry B	Zinc (mg/kg) Wet B	Zinc (mg/kg) Dry B
Main Rouge River									
1	1967	-	-	-	-	-	-	-	-
2	1967	-	-	-	-	-	-	-	-
	1973	110	220	29	58	4	8	320	640
3	1967	-	-	-	-	-	-	-	-
4	1967	-	-	-	-	-	-	-	-
5	1967	-	-	-	-	-	-	-	-
	1973	240	530	41	90	4	9	750	1600
6	1967	-	-	-	-	-	-	-	-
7	1967	-	-	-	-	-	-	-	-
8	1967	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-
9	1967	-	-	-	-	-	-	-	-
	1973	330	690	33	69	4	8	1300	2700
10	1967	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-
11	1967	-	-	-	-	-	-	-	-
EPA Criteria Concentration Limits			50						50

[a] EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Cadmium (mg/kg)		Total Chromium (mg/kg)		Cobalt (mg/kg)		Copper (mg/kg)		Manganese (mg/kg)	
		Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Main Rouge River											
1	1967	-	-	-	-	-	-	-	-	-	-
2	1967	-	-	-	-	-	-	-	-	-	-
	1973	2.4	4.8	48	96	7.2	14	71	140	170	340
3	1967	-	-	-	-	-	-	-	-	-	-
4	1967	-	-	-	-	-	-	-	-	-	-
5	1967	-	-	-	-	-	-	-	-	-	-
	1973	4.8	10	96	210	4.8	10	96	210	390	860
6	1967	-	-	-	-	-	-	-	-	-	-
7	1967	-	-	-	-	-	-	-	-	-	-
8	1967	-	-	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-	-	-
9	1967	-	-	-	-	-	-	-	-	-	-
	1973	6.4	13	100	210	7.2	15	110	230	590	1200
10	1967	-	-	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-	-	-
11	1967	-	-	-	-	-	-	-	-	-	-

EPA Criteria Concentration Limits

[a] EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Depth (ft.)	Year Sampled	Lab. No.	Sediment Description				Temp. °C
				Color	Odor[b]	Oil	Percent Composition	
Main Rouge River								
12	-	1967	30752	Dark Gray	Cm	yes	Sludge, ooze & iron oxide	24.0
	26	1968	39534	Brown & Black	Ch	yes	Sludge	-
13	-	1967	29769	Dark Gray	Ch	yes	Sludge, ooze & iron oxide	24.0
	26	1968	39535	Brown & Black	Ch,E	yes	Sludge	-
	20	1973	15703	Shiney Black	-	yes	--	10.5
14	-	1967	29770	--	Ch	yes	Sludge, ooze & iron oxide	24.0
Old Channel								
15	-	1967	29762	Gray	D,Ch	-	Sludge and pulpwood	20.0
16	-	1967	29758	Gray	D,Ch	-	Sludge and pulpwood	20.0
17	-	1967	29759	Gray	Ch	yes	Sludge	27.0
18	-	1967	29760	Gray	D	yes	Sludge and pulpwood, sludgeworms	24.0
19	-	1967	29761	Gray	Cm,Ch,D	-	Sludge, ooze, some sand	20.0
	28	1973	15704	Lt. Brown-Gray	E	-	90 Clay, 10 Gravel	8.5

[a] EPA Data
[b] Odor Code on Page A-16

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Solids (percent) Total	Solids (percent) Tot. Vol.	COD (mg/kg) Wet B	COD (mg/kg) Dry B	Phenol (mg/kg) Wet B	Phenol (mg/kg) Dry B	Tot. Kjeldahl Nitrogen (mg/kg) Wet B	Tot. Kjeldahl Nitrogen (mg/kg) Dry B	Total Phos. (mg/kg) Wet B	Total Phos. (mg/kg) Dry B	Oil & Grease (mg/kg) Wet B	Oil & Grease (mg/kg) Dry B
Main Rouge River													
12	1967	40	15	-	-	2.1	5.2	-	-	-	-	-	60000
	1968	30.7	-	110000	360000	2.3	7.5	-	-	-	-	-	38000
13	1967	44	11	-	-	.19	.4	-	-	-	-	-	30000
	1968	44.2	-	100000	230000	1.1	2.5	-	-	-	-	-	41000
	1973	53.6	11.2	130000	240000	.34	.63	1400	2600	1100	2000	16000	30000
14	1967	39	18	-	-	.59	1.5	-	-	-	-	-	40000
Old Channel													
15	1967	28	15	-	-	.44	1.6	-	-	-	-	-	20000
16	1967	28	16	-	-	1.5	5.4	-	-	-	-	-	20000
17	1967	48	11	-	-	.69	1.4	-	-	-	-	-	10000
18	1967	56	15	-	-	1.2	2.1	-	-	-	-	-	10000
19	1967	65	16	-	-	1.5	2.3	-	-	-	-	-	1000
	1973	68.3	3.3	23000	34000	.09	.13	560	820	290	420	150	220
EPA Criteria Concentration Limits			6.0		50000				1000				1500

[a]EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Total Iron (mg/kg)		Total Phosphate (mg/kg)		Tot. Sol. Phosphate (mg/kg)		Ammonia Nitrogen (mg/kg)		Organic Nitrogen (mg/kg)		Nitrate (mg/kg)	
		Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Main Rouge River													
12	1967	50000	120000	1700	4200	4	10	50	125	200	500	20	50
	1968	37000	120000	2300	7500	-	-	59	190	-	-	-	-
13	1967	44000	100000	2700	6100	2	4	70	160	60	140	20	45
	1968	45000	100000	2700	6100	-	-	97	220	-	-	-	-
	1973	30000	56000	-	-	-	-	-	-	-	-	-	-
14	1967	55000	140000	1700	4400	4	10	100	260	100	260	10	26
Old Channel													
15	1967	6500	23000	660	2400	1	4	40	140	20	71	8	28
16	1967	3600	13000	760	2700	2	7	30	110	40	140	20	71
17	1967	6800	14000	1300	2700	1	2	70	140	80	170	10	21
18	1967	10000	18000	1400	2500	2	4	60	110	30	54	8	14
19	1967	16000	25000	1400	2200	2	3	20	31	40	52	8	12
	1973	14000	20000	-	-	-	-	-	-	-	-	-	-

EPA Criteria Concentration Limits

[a]EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Cadmium (mg/kg) Wet B	Cadmium (mg/kg) Dry B	Total Chromium (mg/kg) Wet B	Total Chromium (mg/kg) Dry B	Cobalt (mg/kg) Wet B	Cobalt (mg/kg) Dry B	Copper (mg/kg) Wet B	Copper (mg/kg) Dry B	Manganese (mg/kg) Wet B	Manganese (mg/kg) Dry B
Main Rouge River											
12	1967	-	-	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-	-	-
13	1967	-	-	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-	-	-
	1973	15	28	130	240	7.2	13	180	340	400	750
14	1967	-	-	-	-	-	-	-	-	-	-
Old Channel											
15	1967	-	-	-	-	-	-	-	-	-	-
16	1967	-	-	-	-	-	-	-	-	-	-
17	1967	-	-	-	-	-	-	-	-	-	-
18	1967	-	-	-	-	-	-	-	-	-	-
19	1967	-	-	-	-	-	-	-	-	-	-
	1973	.8	1.2	19	28	9.6	14	14	20	260	380

EPA Criteria Concentration Limits

[a]EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Lead (mg/kg)		Nickel (mg/kg)		Molybdenum (mg/kg)		Zinc (mg/kg)	
		Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Main Rouge River									
12	1967	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-
13	1967	-	-	-	-	-	-	-	-
	1968	-	-	-	-	-	-	-	-
	1973	130	240	34	63	4	7	530	990
14	1967	-	-	-	-	-	-	-	-
Old Channel									
15	1967	-	-	-	-	-	-	-	-
16	1967	-	-	-	-	-	-	-	-
17	1967	-	-	-	-	-	-	-	-
18	1967	-	-	-	-	-	-	-	-
19	1967	-	-	-	-	-	-	-	-
	1973	11	16	17	25	4	6	36	53
EPA Criteria Concentration Limits			50						50

[a]EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Depth (ft.)	Year Sampled	Lab. No.	Sediment Description				Temp. °C
				Color	Odor[b]	Oil	Percent Composition	
Old Channel								
20	-	1967	29750	Dark Gray	Cm,Ch	-	Sand, sludge, ooze	22.0
21	-	1967	29749	Dark Gray	Cm,Ch	-	Sand, sludge, stones, pebbles	23.0
22	-	1967	29748	Dark Gray	Cm,Ch	-	Gravel, pebbles and sand	22.0
23	-	1967	30750	Dark Gray	Cm,Ch	-	Ooze, sand, pebbles sludgeworms	19.0
24	-	1967	29751	Light Gray	Cm,Ch	-	Sludge	19.0
25	-	1967	29752	Gray	Ds,Dp,Ch	-	Sludge, ooze, some clay	19.0
26	-	1967	29753	Gray	Ch,D	-	Sludge and ooze	18.5

[a] EPA Data
[b] Odor Code on Page A-16

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Solids (percent)		COD (mg/kg)		Phenol (mg/kg)		Tot. Kjeldahl Nitrogen (mg/kg)		Total Phos. (mg/kg)		Oil & Grease (mg/kg)	
		Total	Tot. Vol.	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Old Channel													
20	1967	56	22	-	-	1.3	2.3	-	-	-	-	-	20000
21	1967	81	10	-	-	2.6	3.2	-	-	-	-	-	5000
22	1967	73	12	-	-	5.6	7.7	-	-	-	-	-	40000
23	1967	44	18	-	-	1.8	4.1	-	-	-	-	-	60000
24	1967	47	11	-	-	1.0	2.1	-	-	-	-	-	9000
25	1967	37	16	-	-	1.2	3.2	-	-	-	-	-	10000
26	1967	43	12	-	-	1.1	2.6	-	-	-	-	-	2000
EPA Criteria Concentration Limits			60		50000				1000				1500

[a] EPA Data

APPENDIX A (Cont.)

BOTTOM SEDIMENT SAMPLE ANALYSIS[a]
ROUGE RIVER
(1967, 1968, 1973)

Station No.	Year	Total Iron (mg/kg)		Total Phosphate (mg/kg)		Tot. Sol. Phosphate (mg/kg)		Ammonia Nitrogen (mg/kg)		Organic Nitrogen (mg/kg)		Nitrate (mg/kg)	
		Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B	Wet B	Dry B
Old Channel													
20	1967	14000	25000	1300	2300	2	4	-	-	-	-	40	71
21	1967	11000	14000	190	230	2	2	30	37	9	11	60	74
22	1967	22000	30000	3600	4900	5	7	30	41	8	11	20	27
23	1967	9400	21000	1000	2300	6	14	50	110	-	-	10	23
24	1967	3000	5400	520	1100	1	2	8	17	40	85	8	17
25	1967	6600	18000	920	2500	3	8	8	22	50	140	70	190
26	1967	10000	23000	440	1000	1	2	50	120	20	46	200	460

[a] EPA Data

APPENDIX A

QUALITATIVE DESCRIPTIONS OF ODORS*

Code	Nature of Odor	Description (such as odors of:)
A	Aromatic (spicy)	camphor, cloves, lavender, lemon
Ac	cucumber	Synura
B	Balsamic (flowery)	geranium, violet, vanilla
Bg	geranium	Asterionella
Bn	nasturtium	Aphanizomenon
Bs	sweetish	Coelosphaerium
Bv	violet	Mallomonas
C	Chemical	industrial wastes or treatment chemicals
Cc	chlorinous	free chlorine
Ch	hydrocarbon	oil refinery wastes
Cm	medicinal	phenol and iodoform
Cs	sulfuretted	hydrogen sulfide
D	Disagreeable	(pronounced, unpleasant)
Df	fishy	Uroglenopsis, Dinobryon
Dp	pigpen	Anabaena
Ds	septic	stale sewage
E	Earthy	damp earth
Ep	peaty	peat
G	Grassy	crushed grass
M	Musty	decomposing straw
Mm	moldy	damp cellar
V	Vegetable	root vegetables

*Standard Methods of Examination of Water & Wastewater, 11th Edition, p. 255.

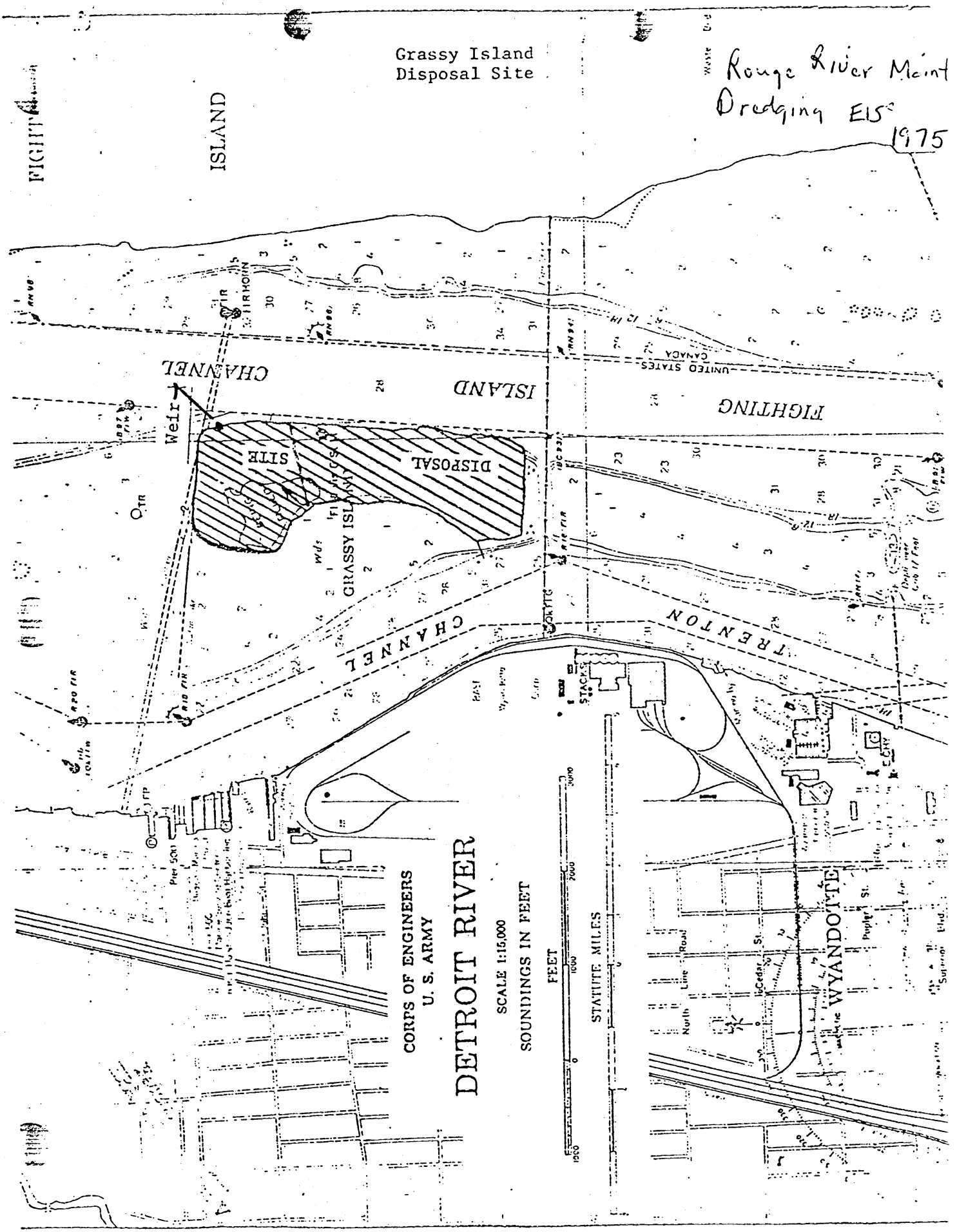

Grassy Island
Disposal Site
Rouge River Maint
Dredging EIS
1975
FIGHTING ISLAND
CHANNEL
Weir
SITE
DISPOSAL
GRASSY ISLAND
CHANNEL
TRENTON
FIGHTING ISLAND
UNITED STATES CANADA
DETROIT RIVER
SCALE 1:15,000
SOUNDINGS IN FEET
FEET
STATUTE MILES
CORPS OF ENGINEERS
U. S. ARMY
WYANDOTTE

Figure 2

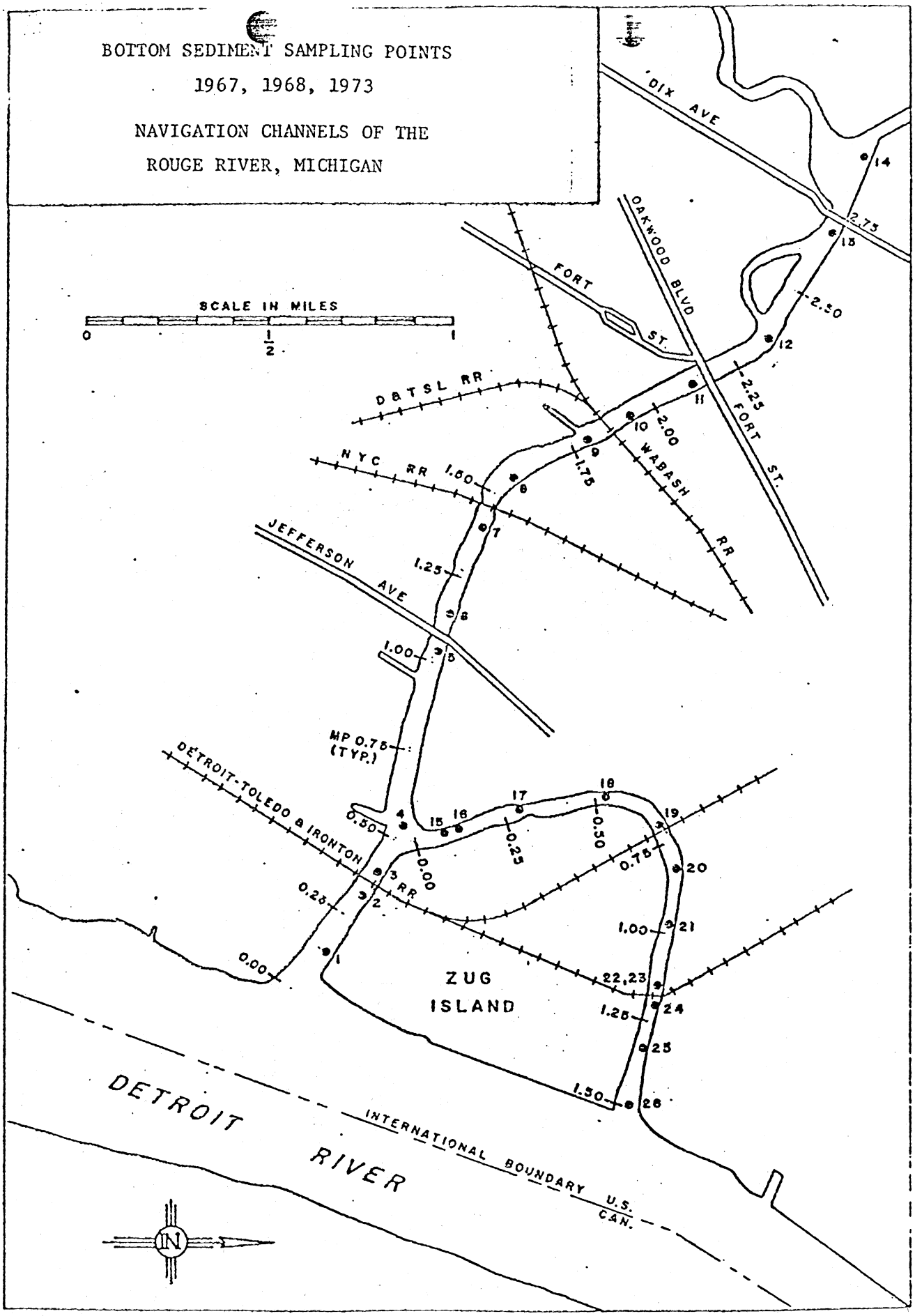

BOTTOM SEDIMENT SAMPLING POINTS
1967, 1968, 1973
NAVIGATION CHANNELS OF THE
ROUGE RIVER, MICHIGAN
SCALE IN MILES
0
1/2
1
DIX AVE
OAKWOOD BLVD
FORT ST.
D&TSL RR
NYC RR
WABASH RR
JEFFERSON AVE
MP 0.75 (TYP.)
DETROIT-TOLEDO & IRONTON RR
ZUG ISLAND
DETROIT RIVER
INTERNATIONAL BOUNDARY U.S. CAN.
N
2.75
2.50
2.25
2.00
1.75
1.60
1.25
1.00
0.75
0.50
0.25
0.00
1.26
1.50

Figure 4

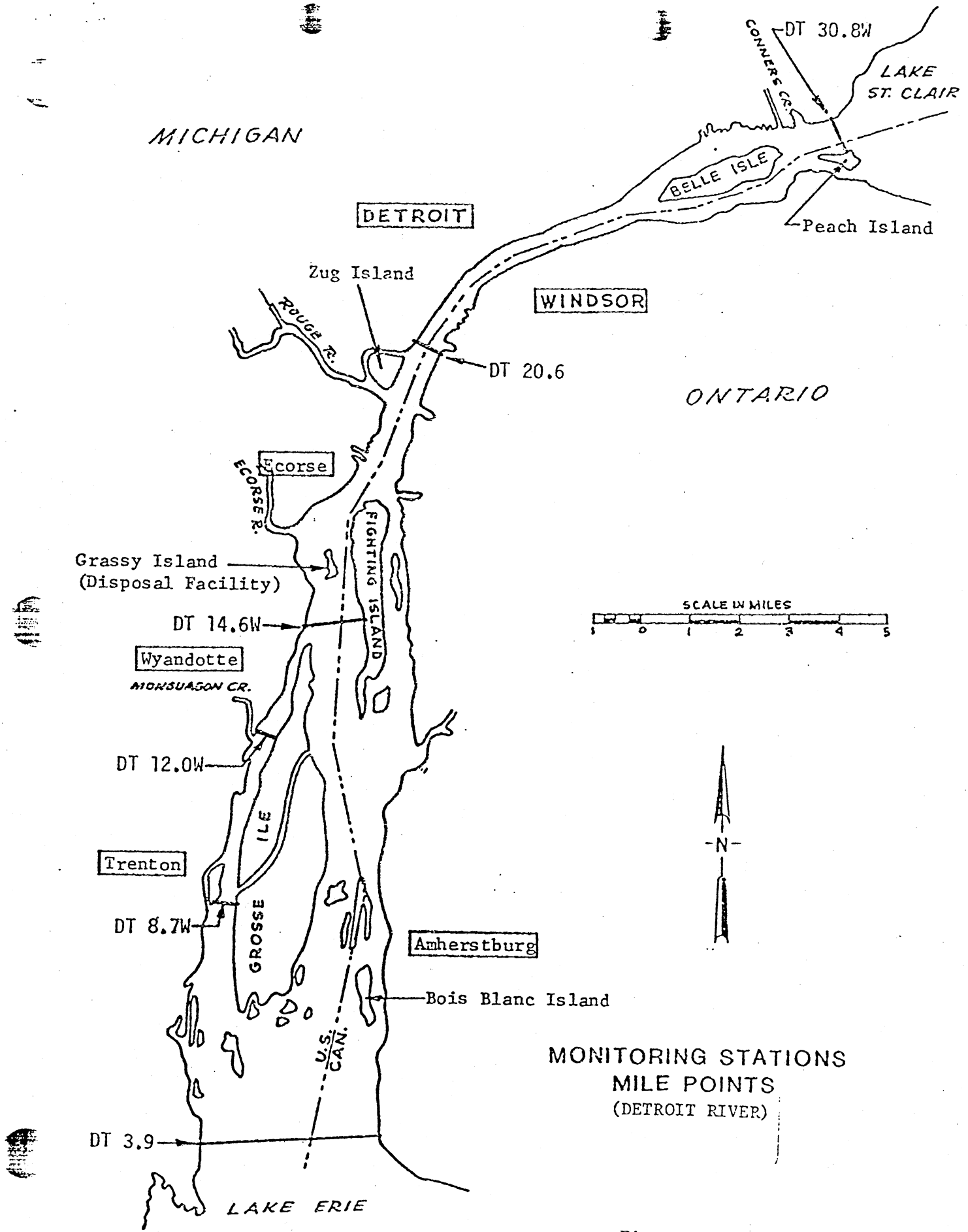

MICHIGAN
DETROIT
WINDSOR
ONTARIO
LAKE ST. CLAIR
CONNERS CR.
DT 30.8W
BELLE ISLE
Peach Island
Zug Island
ROUGE R.
DT 20.6
Ecorse
ECORSE R.
FIGHTING ISLAND
Grassy Island
(Disposal Facility)
DT 14.6W
Wyandotte
MONGUAGON CR.
DT 12.0W
ILE
Trenton
DT 8.7W
GROSSE
Amherstburg
Bois Blanc Island
U.S.
CAN.
DT 3.9
LAKE ERIE
SCALE IN MILES
0 1 2 3 4 5
N
MONITORING STATIONS
MILE POINTS
(DETROIT RIVER)

Figure 5

Appendix A: Unpublished Scientific Information.

12. ACOE 1982 Field Report "Rouge River, Michigan". 10 pp.

ACOE 1982 Field Report

1982 a

FIELD REPORT

ROUGE RIVER, MICHIGAN

Introduction:

This report presents the data collected from the Rouge River, Michigan on May 20/21, 1982. Water, sediment and benthos samples were collected at all nine sampling stations.

General Site Description:

The water at all locations was quite turbid and a light, oily film was observed on the surface water at sampling location #9.

Sampling Locations:

The sites from which the samples were collected are indicated on the attached map. Location ID's are as designated on the attached map.

Sampling Methods:

Sediments were collected using a gravity coring device equipped with non-contaminating plastic sleeves. After each sampling the sleeves were removed, capped and new sleeves then placed in the gravity corer.

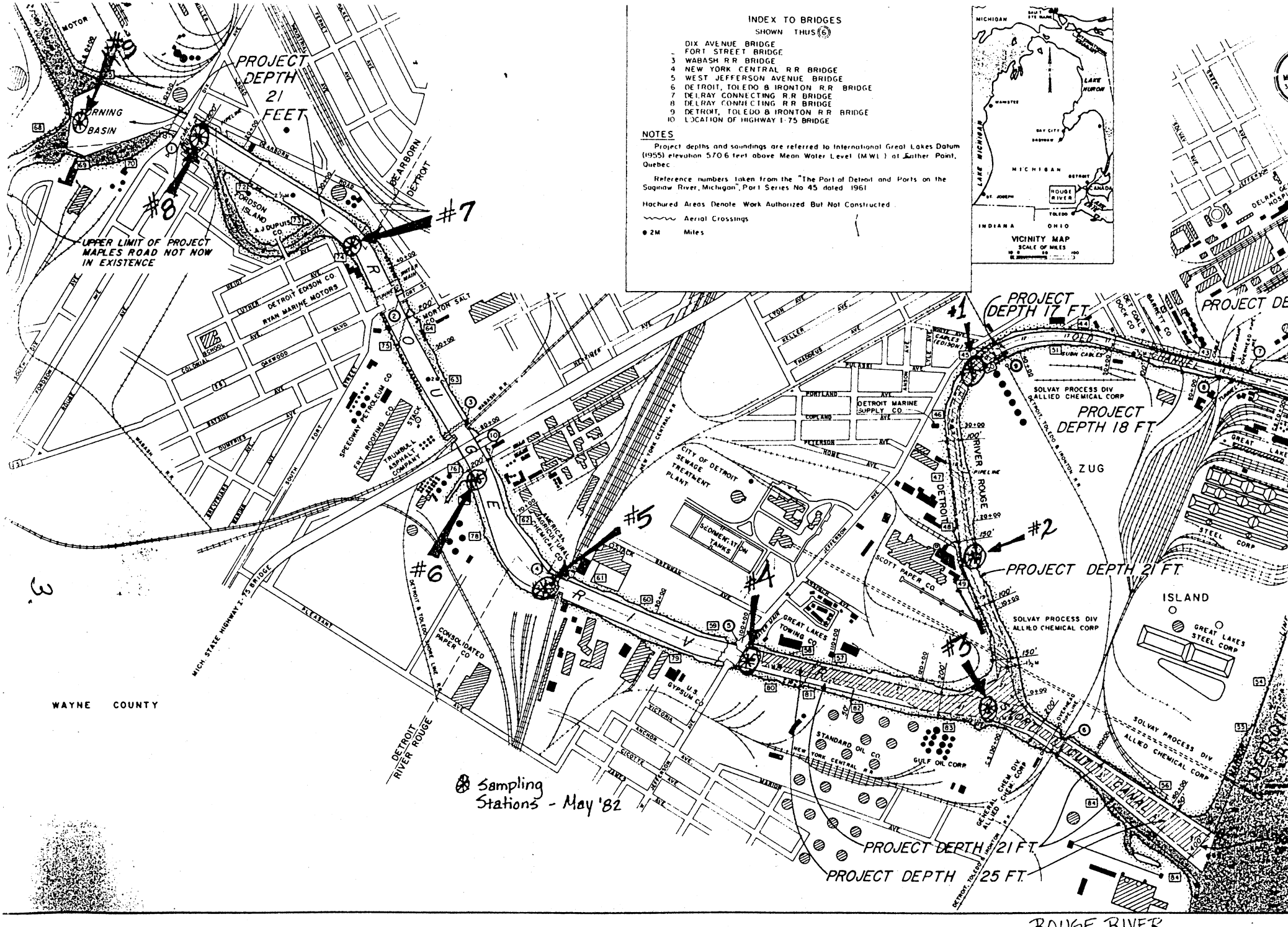
Benthos samples were collected using a petite dredge. The samples were collected, washed through a #30 mesh sieve and preserved with alcohol and delivered to the laboratory for identification.

Water samples were collected using a non-metallic kemmerer sampler from one meter off the bottom in the water column.

All samples were placed in the appropriate containers with the proper preservative and placed on ice for transportation to the laboratory.

Sampling Equipment:

1. Petite ponar dredge
2. 2.2 liter kemmerer of PVC construction
3. YSI Model 57 Dissolved Oxygen/Temperature meter
4. YSI Model S-C-T 33 conductivity meter
5. Sieve #30 mesh
6. Gravity corer with PVC plastic sleeves
7. 30 ft sampling vessel



ROUGE RIVER, MICHIGAN

FIELD OBSERVATIONS

HARBOUR: ROUGE RIVER, MICHIGAN

5/20/82

AIR TEMPERATURE: 23 °C

WEATHER CONDITIONS: Clear sky, light breeze

SAMPLE #	DEPTH (ft)	TIME	D.O. (ppm)	TEMP. (°C)	CONDUCT. (umos/cm^3)	pH (su)	COLOR	ODOR	COMMENTS
RR #1	26	11:40	10.0	17.0	221		blk	Ch,Cs	Sediments consisted of clay and mud
RR #2	25	12:30	8.2	17.0	241		blk	Ch,Cs	Sediments consisted of clay and mud
RR #3	18	13:00	8.5	18.1	250		blk	Ch,Cs	Sediments consisted of clay and mud
RR #4	20	13:30	5.3	20.8	360		blk	Ch,Cs	Sediments consisted of silt and mud
RR #5	22	14:05	5.7	21.1	389		blk	CH,Cs	Sediments consisted of silt and mud
RR #6	21	14:35	6.2	21.1	399		blk	Ch,Cs	Sediments consisted of silt and mud
RR #7	21	09:00	6.4	22.2	419		blk	Ch,Cs	Sediments consisted of clay and mud
RR #8	23	10:25	5.4	22.0	520		blk	Ch,Cs	Sediments consisted of clay and mud
RR #9	21	09:45	5.6	22.3	471		blk	Ch,Cs	Sediments consisted of clay and mud

Macroinvertebrate Results from Selected Stations of the Rouge River During May, 1982. Organisms Expressed in Number per Square Meter.

	RR-1	RR-2	RR-3	RR-4	RR-5	RR-6	RR-7	RR-8	RR-9
Oligochaeta									
Aulodrilus sp.	129	731							
Limnodrilus cervix							9,245	5,543	
Limnodrilus hoffmeisteri	7,396	10,363	6,450	129	2,150	9,847	190,361	8,726	1,611
Limnodrilus udekemianus			2,021		946	774	9,073		
Lumbriculus sp.	43				43				
Potamothrix hammonensis			6,321						
Potamothrix vedovskyi						10,277			43
Hirudinea									
Placobdella sp.		129	86				43		
Arthopoda									
Insecta									
Diptera									
Palpomyia sp. (pupa)				43					
Pelecypoda									
Sphaerium sp.			43						
TOTAL Number of Taxa	3	3	5	2	3				
TOTAL Number of Organisms	7,568	11,223	14,921	172	3,139	20,901			

ROUGE RIVER, MICHIGAN
SEDIMENT RESULTS (cont'd)
May 20, 1982

PARAMETERS	STATION RR #6	STATION RR #7	STATION RR #8	STATION RR #9
Ammonia Nitrogen, mg/kg	188	94	567	420
Arsenic, mg/kg	<0.002	<0.002	<0.002	<0.002
Cadmium, mg/kg	4.24	3.49	2.96	4.44
Chemical Oxygen Demand mg/kg	70,539	53,009	54,647	54,419
Total Organic Carbon, mg/kg	39,000	15,000	15,000	43,000
Chlorinated Pesticides, ppb	<10	<10	<10	<10
Chromium, mg/kg	82.39	62.36	60.69	125.2
Copper, mg/kg	56.67	73.45	52.14	99.65
Fecal Coliform, cells/ g	3,000	20	30	100
Total Kjeldahl Nitrogen, mg/kg	1,553	1,542	2,278	2,300
Cyanide, mg/kg	<0.05	0.275	<0.05	<0.05
Iron, mg/kg	17,592	17,132	16,602	15,882
Lead, mg/kg	226.6	173.6	172.4	147.7
Manganese, mg/kg	433.1	390.8	444.6	393
Mercury, mg/kg	<0.002	<0.002	<0.002	<0.002
Nickel, mg/kg	24.10	27.92	19.64	32.41
Zinc, mg/kg	624.7	377.3	365.1	381.7
Oil & Grease, mg/kg	1,815	455	1,200	2,860
Phenol, mg/kg	<10	<10	<10	<10
PCB, ug/kg	207	139	30	204
Total Phosphorus, mg/kg	1,300	1,050	1,025	1,300
% Solids	55.47	59.12	54.76	58.58
Density, mg/kg	1.37	1.16	1.51	1.19
Volatile Solids, mg/kg	65,228	57,052	59,425	68,560
Grain Size, % retained;				
0.850 mm	20	3	7	15
0.430 mm	10	2	5	5
0.074 mm	15	10	9	3
% passed 0.074mm	55	85	79	77

ROUGE RIVER, MICHIGAN
SEDIMENT RESULTS
May 20, 1982

PARAMETERS	STATION RR #1	STATION RR #2	STATION RR #3	STATION RR #4	STATION RR #5
Ammonia Nitrogen, mg/kg	132.5	45	192.5	55	81
Arsenic, mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium, mg/kg	5.77	4.65	4.08	<0.10	5.50
Chemical Oxygen Demand, mg/kg	41,387	43,087	65,897	20,187	67,324
Total Organic Carbon, mg/kg	11,000	56,000	18,000	36,000	58,000
Chlorinated Pesticides, ppb	<10	<10	<10	<10	<10
Chromium, mg/kg	136.1	76.39	81.34	8.15	114
Copper, mg/kg	74.47	58.58	56.82	6.51	108.3
Fecal Coliform, cells/g	<10	<10	<10	<10	10
Total Kjeldahl Nitrogen, mg/kg	1,317	1,717	1,442	461	932
Cyanide , mg/kg	<0.05	<0.05	<0.05	<0.05	0.20
Iron, mg/kg	16,306	18,384	15,840	12,580	20,480
Lead, mg/kg	158.7	192.5	126.3	<1.0	206
Manganese, mg/kg	227.5	315.7	273.2	210.4	392.6
Mercury, mg/kg	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel, mg/kg	72.86	32.68	31.24	11.76	29.41
Zinc, mg/kg	458.3	582	294.2	32.72	571.3
Oil & Grease , mg/kg	1,130	620	2,665	100	1,610
Phenol, mg/kg	<10	<10	<10	<10	<10
PCB, ug/kg	147	542	315	50	119
Total Phosphorus, mg/kg	1,400	1,425	1,300	375	1,460
% Solids	54.19	57.46	48.23	76.26	57.72
Density, mg/kg	1.16	1.50	1.11	1.83	1.30
Volatile Solids, mg/kg	52,886	60,291	57,981	24,644	65,964
Grain Size, % retained;					
0.850 mm	8	2	15	10	8
0.430 mm	5	2	5	5	4
0.074 mm	10	5	5	15	10
%passed 0.074mm	77	91	75	70	78

ROUGE RIVER, MICHIGAN
ELUTRIATE RESULTS
May 20, 1982

PARAMETERS	STATION RR #1	STATION RR #2	STATION RR #3	STATION RR #4	STATION RR #5
Ammonia Nitrogen, mg/l	29.96	24.36	20.30	10.43	25.90
Arsenic, mg/l	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium, mg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Chemical Oxygen Demand mg/l	42.7	66.7	48	96	90.7
Total Organic Carbon, mg/l	36	15	15	4	48
Chlorinated Pesticides, ppb	<10	<10	<10	<10	<10
Chromium, mg/l	0.018	0.018	<0.01	<0.01	0.014
Copper, mg/l	0.053	0.037	0.028	<0.01	0.045
Fecal Coliform, cells/100 ml	--	--	--	--	--
Total Kjeldahl Nitrogen, mg/l	31.20	28.00	22.10	11.00	26.8
Cyanide , mg/l	<0.050	<0.050	<0.050	<0.050	<0.050
Iron, mg/l	1.223	1.197	0.577	0.232	1.718
Lead, mg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Manganese, mg/l	0.046	0.184	0.085	0.008	0.169
Mercury, mg/l	<0.002	<0.002	<0.002	<0.002	<0.002
Nickel, mg/l	<0.02	<0.02	<0.02	<0.02	<0.02
Zinc, mg/l	0.156	0.218	0.083	0.006	0.272
Oil & Grease , mg/l	174	170	160	64	108
Phenol, mg/l	<10	<10	<10	<10	<10
PCB, ug/l	<10	<10	<10	<10	<10
Total Phosphorus, mg/l	2.2	0.20	0.21	0.15	0.21
Dissolved Solids, mg/l	305	353	318	988	318
Suspended Solids, mg/l	58	78	116	18	90

8

ROUGE RIVER, MICHIGAN
ELUTRIATE RESULTS (cont'd)
May 20, 1982

PARAMETERS	STATION RR #6	STATION RR #7	STATION RR #8	STATION RR #9
Ammonia Nitrogen, mg/l	18.90	41.30	44.10	37.80
Arsenic, mg/l	<0.002	<0.002	<0.002	<0.002
Cadmium, mg/l	<0.01	<0.01	<0.01	<0.01
Chemical Oxygen Demand, mg/l	53.3	90.7	96	96
Total Organic Carbon, mg/l	10	61	48	90
Chlorinated Pesticides, ppb	<10	<10	<10	<10
Chromium, mg/l	<0.01	<0.01	<0.01	0.040
Copper, mg/l	0.022	0.067	0.087	0.091
Fecal Coliform, cells/100 ml	--	--	--	--
Total Kjeldahl Nitrogen, mg/l	20.10	45.30	51.20	41.20
Cyanide, mg/l	<0.050	<0.050	<0.05	<0.05
Iron, mg/l	0.523	2.403	2.949	2.805
Lead, mg/l	<0.10	<0.10	<0.10	<0.10
Manganese, mg/l	0.087	0.119	0.131	0.130
Mercury, mg/l	<0.002	<0.002	<0.002	<0.002
Nickel, mg/l	<0.02	<0.02	<0.02	<0.02
Zinc, mg/l	0.036	0.313	0.178	0.380
Oil & Grease, mg/l	50	128	82	116
Phenol, mg/l	<10	<10	<10	<10
PCB, ug/l	35.2	<10	<10	<10
Total Phosphorus, mg/l	0.11	0.20	0.35	0.20
Dissolved Solids, mg/l	323	398	408	345
Suspended Solids, mg/l	26	110	46	200

ROUGE RIVER, MICHIGAN
WATER QUALITY MONITORING
May 20, 1982

PARAMETERS	COMPOSITE A	COMPOSITE B	COMPOSITE C
Ammonia Nitrogen, mg/l	0.30	0.50	0.48
Arsenic, mg/l	<0.002	<0.002	<0.002
Cadmium, mg/l	<0.01	<0.01	<0.01
Chemical Oxygen Demand mg/l	16	21.3	32
Total Organic Carbon, mg/l	4	10	12
Chlorinated Pesticides, ppb	<10	<10	<10
Chromium, mg/l	<0.01	<0.01	<0.01
Copper, mg/l	<0.01	<0.01	<0.01
Fecal Coliform, cells/100 ml	<10	<10	<10
Cyanide mg/l	<0.01	<0.01	<0.01
Iron, mg/l	0.591	0.883	0.770
Lead, mg/l	<0.10	<0.10	<0.10
Manganese, mg/l	0.031	0.095	0.104
Mercury, mg/l	<0.002	<0.002	<0.002
Nickel, mg/l	<0.02	<0.02	<0.02
Zinc, mg/l	0.018	0.014	0.010
Oil & Grease , mg/l	10.75	26.25	9.0
Phenol, mg/l	<0.01	<0.01	<0.01
PCB, ug/l	<10	<10	<10
Total Phosphorus, mg/l	0.08	0.11	0.09
Dissolved Solids, mg/l	208	285	350
Suspended Solids, mg/l	13	17	15

Appendix A: Unpublished Scientific Information.

13. TMA/ERG 1989 Report "Rouge River, Michigan Sediment Quality Evaluation". 32 pp.

TMA/ERG 1989 Report

ROUGE RIVER, MICHIGAN
SEDIMENT QUALITY EVALUATION
OCTOBER 16, 1989

Sediment samples were collected from twelve locations (Enclosure 1) within the Federal Channel at the Rouge River on August 19, 1988. Gravity cores were attempted at all locations, however due to the nature of the bottom sediments, samples 9,11, and 12 had to be collected using a ponar dredge.

Samples consisted of black silts with detrital material in the upper reaches of the project area shifting to stiff gray clays in the lower reaches. All of the samples were described as exhibiting visible oil and having a hydrocarbon odor. A number of samples contained spent fly ash.

Analyses for conventional indicators of organic pollution (TKN, COD, TOC) and nutrients indicate extremely degraded conditions. Sediments contain between 4 and 18% organic carbon, with high concentrations of phosphorus and ammonia.

Concentrations of metals reflect the industrial nature of the basin. Over the entire project area, concentrations of cadmium, chromium, copper, iron, lead, nickel and zinc all surpass levels considered indicative of polluted conditions.

Analyses for organic parameters indicate significant concentrations of a number of priority pollutants. PCBs occur in the range of 5 ppm in the turning basin (Stations 1 & 2); 10 ppm in the channel upstream (Stations 3-5) declining to less than 5 ppm in the lower channel and the short cut canal (Stations 8-12).

Base/neutral and acid extractables were measured at a number of locations. The analyses indicated elevated concentrations of a number of polynuclear aromatic hydrocarbons (PAHs) including acenaphthene, anthracene, fluoranthene, fluorene, phenanthrene, pyrene, and chrysene throughout the project area. Rarer PAHs, including benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-cd]pyrene, naphthalene and benzo[g,h,i]perylene were seen sporadically throughout the harbor. Station 11 exhibited PAHs at much higher concentrations than the other stations tested.

The base/neutral fraction further indicated very high concentrations of bis(2-ethylhexyl)phthalate, butyl benzyl phthalate and hexachlorobenzene at Station 4.

Volatile components were measured at selected locations also. Analyses indicated detectable concentrations of ethylbenzene (Stations 1,6,9), methylene chloride (Stations 1, 10), toluene (1,4,6,9,11) and trichloroethene (8,11,12).

Based upon the analytical and physical data the sediments in the Rouge River Federal Project Area are heavily contaminated with metals, organic material, volatile and semi-volatile compounds. Material dredged from this area should be completely isolated (Figure 1). Dredging, conveyance, and disposal practices and final site closure should assure that the volatile and semi-volatile constituents are transported to and remain isolated within the Confined Disposal Facility (CDF). Disposal below the water surface within the CDF with capping of the site after closure would minimize any loss through volatilization (Miller et al., 1987).

David W. Bowman

David W. Bowman
Physical Scientist
Environmental Analysis Branch

Enclosures

Literature Cited

Miller, G.C., Hebert, V.R., and R.G. Zepp. 1987. Chemistry and Photochemistry of Low-volatility Organic Chemicals on Environmental Surfaces. Environ. Sci. and Tech. 21(12):1164-1167.

Bowman

U.S. CORPS OF ENGINEERS
DISTRICT - DETROIT

D.O. #0008

Rouge River

September 23, 1988

ROUGE RIVER
SEDIMENT SAMPLING
DELIVERY ORDER NO. 0008
AUGUST 19, 1988

Introduction

On August 19, 1988 Thermo Analytical Inc./ERG (TMA/ERG) conducted a sediment sampling program for the Detroit District U.S. Army Corp of Engineers on the Rouge River in River Rouge, Michigan. Samples were collected from twelve (12) stations as depicted on the project map provided to TMA/ERG by the Corp of Engineers. Refer to the attached map for the location of each sampling station.

Sediment Samples

With the exception of stations 9, 11, and 12, all samples were collected using a 150 lb Ball-Check gravity corer equipped with a 42 inch barrel. Due to the nature of the material encountered at stations 9, 11, and 12 samples were collected using a 10" x 10" ponar dredge.

Gravity cores were collected using clean CAB plastic sleeves that were inserted into the core barrel to receive the sample. Upon retrieval of the sampler from the river bottom, the tubes were removed and the sample was immediately extruded into a clean stainless steel bowl. For stations requiring volatile organic analysis, random subsamples of the bulk sample were quickly transferred into two duplicate 40 ml glass vials equipped with teflon lined septum caps. The remaining sample was then thoroughly mixed and transferred into clean one-quart glass containers equipped with teflon lined caps.

Grab samples at stations 9, 11, and 12 were handled in the same manner as previously mentioned. All resultant samples were stored on ice within a cooler for transport back to the laboratory.

Sediment Description

The following is a station-by-station description of the sediment types encountered at each station:

STATION NO. 1

DEPTH = 22.8'

Three (3) cores were collected at this station yielding 14", 6" and 28" of sample respectively. The samples consisted of dark gray to black thick silts with some detrital material, small stones and approximately 20% gray medium coarse sand. The sample contained a large amount of oil and an oil sheen appeared on the surface of the water upon retrieval of the sampler. The texture was primarily smooth and the sample had a strong hydrocarbon odor.

STATION NO. 2

DEPTH = 19.6'

One (1) core yielded 40" of sample. The top 4" consisted of loose black silts with detrital material. The remaining 36" was consolidated heavily oiled black silts. The odor was strong hydrocarbon and the texture was smooth.

STATION NO. 3
DEPTH = 20.9'

One (1) drop yielded 38" of sample. The top 10" was loose oily black silts with a small amount of detrital material. The remaining sample was dark black very thick silts with a large amount of oil. The texture was smooth and the odor was strong hydrocarbon.

STATION NO. 4
DEPTH = 23.1'

Two (2) cores were collected with one yielding 22" and one yielding 24". Both samples consisted of dark gray to black consolidated silts with approximately 30% medium coarse sand. Heavy oils were observed in the sample and on the water's surface. Texture was smooth to light gritty and the odor was strong hydrocarbon.

STATION NO. 5
DEPTH = 21.7'

One (1) drop yielded 30" of dark gray to dark black unconsolidated silts with a small amount of detrital material intermixed. The texture was smooth and heavy amounts of oil were again observed. The odor was strong hydrocarbon.

STATION NO. 6
DEPTH = 22.6'

The first core yielded 22" of sample. The top 15" consisted of dark black loose silts over 7" of very stiff gray clay.

The second core yielded 21" of sample. The top 2" was pea gravel, the next 9" were black oily loose silts, the bottom 10" was gray very sticky clay.

Both samples had a great deal of oil with a strong hydrocarbon odor. The texture ranged from gritty to smooth.

STATION NO. 7
DEPTH = 21.8'

The first core was 20" with the top 2" consisting of dark gray gelatinous silts. The remaining 18" were dark black stiffer silts which contained a large amount of oil.

The second core yielded 28" of sample. It consisted of 3" of dark gray gelatinous silts over 25" of dark black stiff silts.

Both samples had a strong hydrocarbon odor, the texture was smooth and a large amount of oil was present.

STATION NO. 8
DEPTH = 23.0'

One (1) drop yielded 30" of dark gray silty sand (90:10) with a 1" gray clay plug in the bottom. The texture was primarily smooth, heavy oils were observed and the sample had a strong hydrocarbon odor.

STATION NO. 9
DEPTH = 22.3'

Attempted six (6) cores in this area, all yielding 1" or less of gray clay. Collected three (3) ponar grabs for the sample which yielded a mixture of spent fly ash, pea gravel and a small amount of silts over gray clay. The texture was gritty, moderate oil was observed and the sample had a mild hydrocarbon odor.

STATION NO. 10
DEPTH = 22.5'

The first core yielded 20" of spent fly ash mixed with gray silts and pea gravel.

The second sample was 12" with 3" of sand and gravel over 9" of gray/brown very stiff clay.

The final core was 26" long with the top 23" consisting of gray loose silts mixed with pea gravel and detrital material. The bottom 3" consisted of a gray/brown clay plug.

All of the samples exhibited light oil, the texture was primarily gritty and the odor was mild hydrocarbon.

STATION NO. 11
DEPTH = 22.2'

Three (3) cores at this station resulted in the following: 10" all gray firm clay; 3" of loose gray silts and gravel over 4" of hard packed gray clay; 5" all stiff gray clay.

One (1) ponar grab was collected to supplement the sample. It consisted of a 3" mixture of gray silts, detrital material, and pea gravel over 1" of gray/brown stiff clay. There was a moderate amount of oil and the odor was mild hydrocarbon.

STATION NO. 12
DEPTH = 21.6'

Five (5) cores were attempted in this area, two (2) were empty and the other three (3) contained 2" to 3" of very stiff gray clay. One (1) ponar grab resulted in a mixture of gray silts, spent fly ash, gravel and small pieces of gray clay. There was a light to moderate amount of oil and the odor was mild hydrocarbon.

CAUTION

high water conditions in the Great Lakes, narted as visible at Low Water Datum ed, particularly in the near shore areas. roceed with caution.

AKE ST. CLAIR

APR	MAY	JUNE	JULY	AUG.	SEPT	OCT.	NOV	DEC.

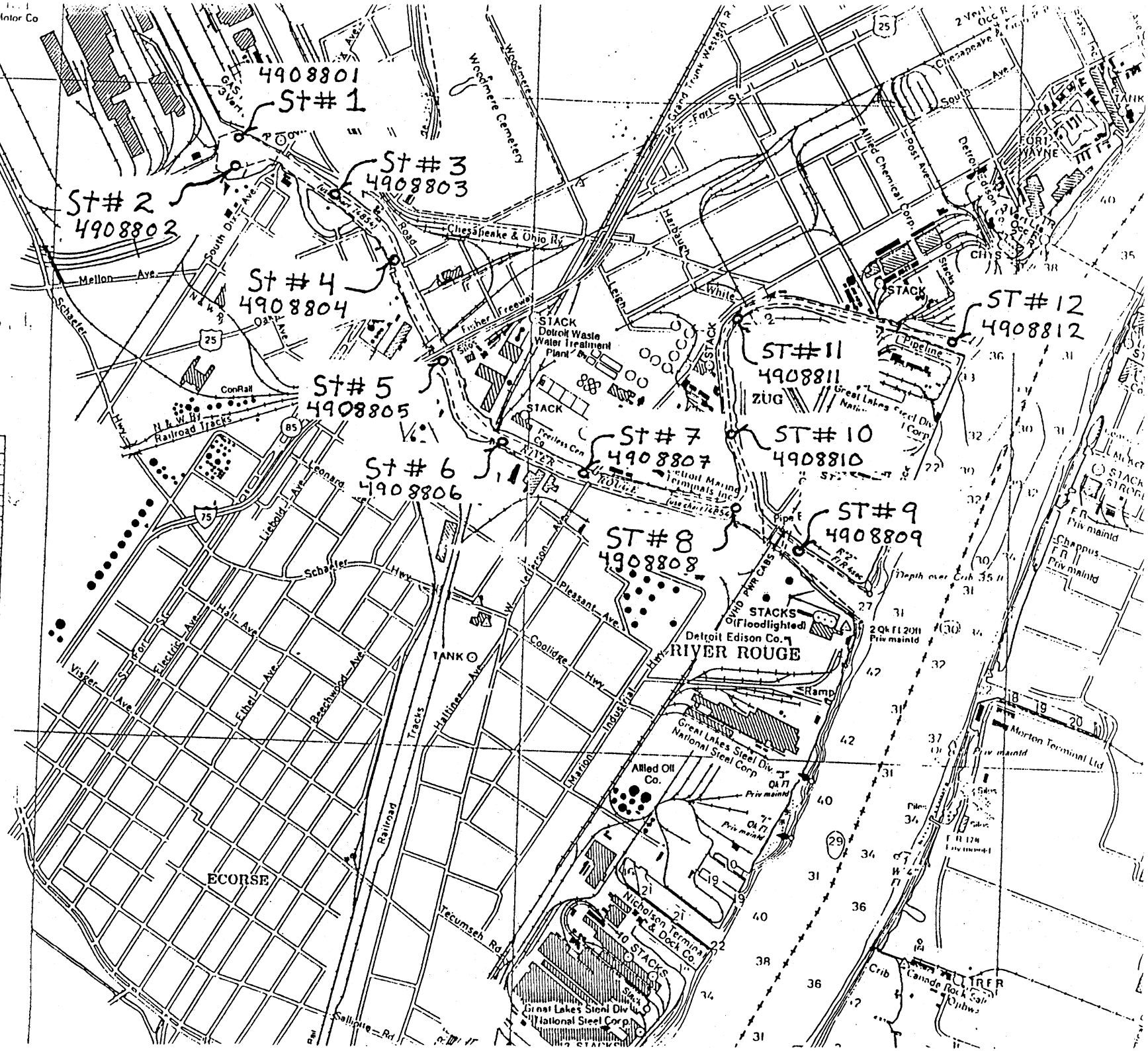
Low Water Datum

Average levels (1972-1981)

Extreme Levels (period of record)

n, which is the plane of reference for the e above hydrograph, is also the plane of arted depths. If the lake level is above or atum, the existing depths are correspond- er than the charted depths.

LAKE ERIE



ROUGE RIVER MICHIGAN

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 1	Station 2	Station 3	Station 4	Station 5
solids %	44	37	42	48	40
solids total volatile %	12.1	12	9	5	12
arsenic total mg/kg	7.5	8.4	9.3	8.4	5.2
barium total mg/kg	210	330	250	310	300
cadmium total mg/kg	15	24	21	16	17
chromium total mg/kg	150	340	190	170	190
COD mg/kg	150000	210000	180000	200000	260000
copper total mg/kg	180	340	230	190	240
cyanide mg/kg	.05K	.05K	.10	.08	2.2
Density g/cc	1400	NR	NR	NR	NR
iron total mg/kg	36000	58000	47000	44000	46000
lead total mg/kg	320	510	370	360	470
mercury total mg/kg	0.53	.65	.56	.89	.53
nickel total mg/kg	56	85	60	62	73
nitrogen ammonia mg/kg	490	740	480	150	240
nitrogen total Kjeldahl mg/kg	1800	1800	1400	660	1300
oil and grease mg/kg	14000	29000	16000	19000	21000
carbon organic total mg/kg	63000	75000	76000	89000	80000
phenolics total mg/kg	.30	.25	.38	.26	.19
phosphorus total mg/kg	1760	2900	2160	1910	2190
selenium total mg/kg	.16K	.38	.26	.48	.36
zinc total mg/kg	560	960	1400	870	1000
4.4-DDD ug/kg	100K	100K	100K	250K	250K
4.4-DDE ug/kg	100K	100K	100K	250K	250K
4.4-DDT ug/kg	100K	100K	100K	250K	250K
Aldrin ug/kg	100K	100K	100K	250K	250K
Chlordane ug/kg	100K	100K	100K	250K	250K
Dieldrin ug/kg	100K	100K	100K	100K	100K
Endrin ug/kg	100K	100K	100K	100K	100K
Heptachlor ug/kg	100K	100K	100K	250K	250K
Heptachlor epoxide ug/kg	100K	100K	100K	250K	250K
Hexachlorobenzene ug/kg	100K	100K	100K	250K	250K
Methoxychlor ug/kg	500K	500K	500K	1300	1300K
Mirex ug/kg	100K	100K	100K	250K	250K
PCB 1016 ug/kg	200K	200K	200K	500K	500K

ROUGE RIVER MICHIGAN

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 1	Station 2	Station 3	Station 4	Station 5
PCB 1221 ug/kg	200K	200K	200K	500K	500K
PCB 1232 ug/kg	200K	5300	200K	500K	500K
PCB 1242 ug/kg	4700	200K	10000	5100	7900
PCB 1248 ug/kg	200K	200K	200K	500K	500K
PCB 1254 ug/kg	200K	200K	200K	500K	4700
PCB 1260 ug/kg	200K	200K	200K	5500	500K
Toxaphene mg/kg	1000K	1000	1000K	2500	2500
a-BHC ug/kg	100K	100K	100K	250K	250K
b-BHC ug/kg	100K	100K	100K	250K	250K
d-BHC ug/kg	100K	100K	100K	250K	250K
g-BHC (lindane) ug/kg	100K	100K	100K	250K	250K
1.1-Dichloroethane ug/kg	5K	NR	NR	5K	NR
1.1.1-Trichloroethane ug/kg	5K	NR	NR	5K	NR
1.1.2-Trichloroethane ug/kg	5K	NR	NR	5K	NR
1.1.2.2-Tetrachloroethane ug/kg	5K	NR	NR	5K	NR
1.2-Dichlorobenzene ug/kg	90K	NR	NR	90K	NR
1.2-Dichloroethane ug/kg	5K	NR	NR	5K	NR
1.2-Dichloropropane ug/kg	5K	NR	NR	5K	NR
1.2.4-Trichlorobenzene ug/kg	90~~000~~K	NR	NR	90~~000~~K	NR
1.3-Dichlorobenzene ug/kg	90K	NR	NR	90K	NR
1.4-Dichlorobenzene ug/kg	90K	NR	NR	90K	NR
2-Chloroethyl vinyl ether ug/kg	10K	NR	NR	10K	NR
2-Chloronaphthalene ug/kg	90K	NR	NR	90K	NR
2-Chlorophenol ug/kg	90K	NR	NR	90K	NR
2-Nitrophenol ug/kg	90K	NR	NR	600K	NR
2.4-Dichlorophenol ug/kg	90K	NR	NR	90K	NR
2.4-Dimethylphenol ug/kg	90K	NR	NR	90K	NR
2.4-Dinitrophenol ug/kg	600K	NR	NR	600K	NR
2.4-Dinitrotoluene ug/kg	90K	NR	NR	90K	NR
2.4.6-Trichlorophenol ug/kg	90K	NR	NR	90K	NR
2.6-Dinitrotoluene ug/kg	90K	NR	NR	90K	NR
3.3-Dichlorobenzidine ug/kg	180K	NR	NR	180K	NR
4-Bromophenyl phenyl ether ug/kg	90K	NR	NR	90K	NR

ROUGE RIVER MICHIGAN

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 1	Station 2	Station 3	Station 4	Station 5
4-Chlorophenyl phenyl ether ug/kg	90K	NR	NR	90K	NR
4-Nitrophenol ug/kg	600K	NR	NR	600K	NR
Acenaphthene ug/kg	90K	NR	NR	90K	NR
Acenaphthylene ug/kg	90K	NR	NR	200	NR
Anthracene ug/kg	140K	NR	NR	340	NR
Benzene ug/kg	5K	NR	NR	6	NR
Benzo(a)anthracene ug/kg	410	NR	NR	490	NR
Benzo(a)pyrene ug/kg	430	NR	NR	440	NR
Benzo(b)fluoranthene ug/kg	570	NR	NR	530	NR
Benzo(g.h.i)perylene ug/kg	90K	NR	NR	90K	NR
Benzo(k)fluoranthene ug/kg	370	NR	NR	380	NR
bis(2-Chloroethoxy)methane ug/kg	90K	NR	NR	90K	NR
bis(2-Chloroethyl)ether ug/kg	90K	NR	NR	90K	NR
bis(2-Chloroisopropyl)ether ug/kg	90K	NR	NR	90K	NR
bis(2-Ethylhexyl)phthalate ug/kg	1800	NR	NR	16000	NR
Bromodichloromethane ug/kg	5K	NR	NR	5K	NR
Bromoform ug/kg	5K	NR	NR	5K	NR
Bromomethane ug/kg	10K	NR	NR	10K	NR
Butyl benzyl phthalate ug/kg	90K	NR	NR	26000	NR
Carbon tetrachloride ug/kg	5K	NR	NR	5K	NR
Chlorobenzene ug/kg	5K	NR	NR	5K	NR
Chloroethane ug/kg	10K	NR	NR	10K	NR
Chloroform ug/kg	5K	NR	NR	5K	NR
Chloromethane ug/kg	10K	NR	NR	10K	NR
cis-1.3-Dichloropropene ug/kg	5K	NR	NR	5K	NR
Di-n-butyl phthalate ug/kg	90K	NR	NR	90K	NR
Dibromochloromethane ug/kg	5K	NR	NR	5K	NR
Diethyl phthalate ug/kg	90K	NR	NR	90K	NR
Dimethyl phthalate ug/kg	90K	NR	NR	90K	NR

ROUGE RIVER MICHIGAN

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 1	Station 2	Station 3	Station 4	Station 5
Endosulfan sulfate ug/kg	100K	100K	100K	100K	100K
Endrin aldehyde ug/kg	100K	100K	100K	100K	100K
Ethylbenzene ug/kg	10	NR	NR	11	NR
Fluoranthene ug/kg	740	NR	NR	90K	NR
Fluorene ug/kg	90K	NR	NR	870	NR
Hexachlorobutadiene ug/kg	90K	NR	NR	90K	NR
Hexachlorocyclopentadiene ug/kg	90K	NR	NR	90K	NR
Hexachloroethane ug/kg	90K	NR	NR	90K	NR
Indeno(1.2.3-c.d)pyrene ug/kg	90K	NR	NR	90K	NR
Isophorone ug/kg	90K	NR	NR	90K	NR
Methylene chloride ug/kg	110	NR	NR	10K	NR
n-Nitrosodiphenylamine ug/kg	90K	NR	NR	90K	NR
Naphthalene ug/kg	960	NR	NR	1600	NR
Nitrobenzene ug/kg	90K	NR	NR	90K	NR
Phenanthrene ug/kg	740	NR	NR	1100	NR
Phenol ug/kg	90K	NR	NR	90K	NR
Pyrene ug/kg	1500	NR	NR	1400	NR
Toluene ug/kg	12	NR	NR	89	NR
trans-1.2-Dichloroethene ug/kg	5K	NR	NR	5K	NR
trans-1.3-Dichloropropene ug/kg	5K	NR	NR	5K	NR
Vinyl chloride ug/kg	10K	NR	NR	10K	NR

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 6	Station 7	Station 8	Station 9	Station 10
solids %	58	41	44	72	70
solids total volatile %	5	4	10	9	4
arsenic total mg/kg	5.5	.89	8.2	3.7	4.5
barium total mg/kg	160	290	200	66	140
cadmium total mg/kg	8.5	20	12	2.2	5.2
chromium total mg/kg	96	220	140	28	110K
COD mg/kg	86000	180000	120000	77000	87000
copper total mg/kg	100	220	160	45	57
cyanide mg/kg	.09	.63	.25	5.4	.05K
iron total mg/kg	28000	44000	33000	13000	23000
lead total mg/kg	190	420	290	44	110K
manganese total mg/kg	NR	NR	1.0K	NR	NR
mercury total mg/kg	.39	.51	.40	.006K	.13
nickel total mg/kg	33	74	60	19	79
nitrogen ammonia mg/kg	190	NR	210	50	130
nitrogen total Kjeldahl mg/kg	970	1600	960	110	910
oil and grease mg/kg	6400	21000	7700	2800	4000
carbon organic total mg/kg	37000	93000	81000	100000	42000
phenolics total mg/kg	.26	.38	.23	.050	.04K
phosphorus total mg/kg	912	3240	2167	1510	833
selenium total mg/kg	.31	.38	.60	.92	.10
zinc total mg/kg	440	1200	670	97	180
4.4-DDD ug/kg	100K	1000K	100K	100K	100K
4.4-DDE ug/kg	100K	1000K	100K	100K	100K
4.4-DDT ug/kg	100K	1000K	100K	100K	100K
Aldrin ug/kg	100K	1000K	100K	100K	100K
Chlordane ug/kg	100K	1000K	100K	100K	100K
Dieldrin ug/kg	100K	100K	100K	100K	100K
Endrin ug/kg	100K	100K	100K	100K	100K
Heptachlor ug/kg	100K	1000K	100K	100K	100K
Heptachlor epoxide ug/kg	100K	1000K	100K	100K	100K
Hexachlorobenzene ug/kg	100K	NR	1000K	90K	90K
Methoxychlor ug/kg	500K	500K	5000K	500K	500K
Mirex ug/kg	100K	100K	1000K	100K	100K
PCB 1016 ug/kg	200K	2000K	200K	200K	200K

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 6	Station 7	Station 8	Station 9	Station 10
PCB 1221 ug/kg	200K	2000K	200K	200K	200K
PCB 1232 ug/kg	200K	2000K	200K	200K	200K
PCB 1242 ug/kg	610	3800	1100	200	550
PCB 1248 ug/kg	200K	2000K	200K	200K	200K
PCB 1254 ug/kg	910	2000K	3400	500	200K
PCB 1260 ug/kg	200K	4400	200K	200K	2400
Toxaphene mg/kg	1000	1K	100K	1000K	1000
a-BHC ug/kg	100K	1000K	100K	100K	100K
b-BHC ug/kg	100K	1000K	100K	100K	100K
d-BHC ug/kg	100K	1000K	100K	100K	100K
g-BHC (lindane) ug/kg	100K	1000K	100K	100K	100K
1.1-Dichloroethane ug/kg	5K	NR	5K	5K	5K
1.1.1-Trichloroethane ug/kg	5K	NR	5K	5K	5K
1.1.2-Trichloroethane ug/kg	5K	NR	5K	5K	5K
1.1.2.2-Tetrachloroethane ug/kg	5K	NR	5K	5K	5K
1.2-Dichlorobenzene ug/kg	90K	NR	90K	90K	90K
1.2-Dichloroethane ug/kg	5K	NR	5K	5K	5K
1.2-Dichloropropane ug/kg	5K	NR	5K	5K	5K
1.2.4-Trichlorobenzene ug/kg	90000K	NR	90000K	90000K	90000K
1.3-Dichlorobenzene ug/kg	90K	NR	90K	90K	90K
1.4-Dichlorobenzene ug/kg	90K	NR	90K	90K	90K
2-Chloroethyl vinyl ether ug/kg	10K	NR	10K	10K	10K
2-Chloronaphthalene ug/kg	90K	NR	90K	90K	90K
2-Chlorophenol ug/kg	90K	NR	90K	90K	90K
2-Nitrophenol ug/kg	90K	NR	90K	90K	90K
2.4-Dichlorophenol ug/kg	90K	NR	90K	90K	90K
2.4-Dimethylphenol ug/kg	90K	NR	90K	90K	90K
2.4-Dinitrophenol ug/kg	600K	NR	600K	90K	600K
2.4-Dinitrotoluene ug/kg	90K	NR	90K	90K	90K
2.4.6-Trichlorophenol ug/kg	90K	NR	90K	90K	90K
2.6-Dinitrotoluene ug/kg	90K	NR	90K	90K	90K
3.3-Dichlorobenzidine ug/kg	180K	NR	1800K	180K	180K
4-Bromophenyl phenyl ether ug/kg	90K	NR	90K	90K	90K

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 6	Station 7	Station 8	Station 9	Station 10
4-Chlorophenyl phenyl ether ug/kg	90K	NR	90K	90K	90K
4-Nitrophenol ug/kg	600K ~~90K~~	NR	600K	600K	600K
Acenaphthene ug/kg	320K	NR	90K	390	130
Acenaphthylene ug/kg	90K	NR	260	190	90K
Anthracene ug/kg	200	NR	350	890	370
Benzene ug/kg	5K	NR	5K	10	5K
Benzo(a)anthracene ug/kg	X190	NR	2800	1100	780
Benzo(a)pyrene ug/kg	90K	NR	1600	700	1000
Benzo(b)fluoranthene ug/kg	90K	NR	4000	1500	2400
Benzo(g.h.i)perylene ug/kg	90K	NR	~~90K~~	90K	90K
Benzo(k)fluoranthene ug/kg	90K	NR	970K	90K	90K
bis(2-Chloroethoxy)methane ug/kg	90K	NR	~~90K~~	90K	90K
bis(2-Chloroethyl)ether ug/kg	90K	NR	90K	90K	90K
bis(2-Chloroisopropyl)ether ug/kg	90K	NR	90K	90K	90K
bis(2-Ethylhexyl)phthalate ug/kg	90K	NR	90K	90K	90K
Bromodichloromethane ug/kg	5K	NR	5K	5K	5K
Bromoform ug/kg	5K	NR	5K	5K	5K
Bromomethane ug/kg	1K	NR	10K	5K	10K
Butyl benzyl phthalate ug/kg	9K	NR	90K	90K	200
Carbon tetrachloride ug/kg	5K	NR	5K	5K	5K
Chlorobenzene ug/kg	5K	NR	5K	5K	5K
Chloroethane ug/kg	10K	NR	10K	10K	10K
Chloroform ug/kg	5K	NR	5K	5K	5K
Chloromethane ug/kg	10K	NR	10K	10K	10K
Chrysene ug/kg	NR	NR	1600K	940	950
cis-1.3-Dichloropropene ug/kg	5K	NR	NR	5K	5K
Di-n-butyl phthalate ug/kg	90K	NR	90K	90K	90K
Dibromochloromethane ug/kg	5K	NR	5K	5K	5K
Diethyl phthalate ug/kg	90K	NR	90K	90K	90K

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 6	Station 7	Station 8	Station 9	Station 10
Dimethyl phthalate ug/kg	90K	NR	90K	90K	90K
Endosulfan sulfate ug/kg	100K	100K	100K	100K	20K
Endrin aldehyde ug/kg	100K	100K	100K	100K	100K
Ethylbenzene ug/kg	5K	NR	5K	100K	5K
Fluoranthene ug/kg	440K	NR	2900	2800	1000
Fluorene ug/kg	240K	NR	90K	650	130
Hexachlorobutadiene ug/kg	90K	NR	90K	90K	90K
Hexachlorocyclopentadiene ug/kg	90K	NR	90K	90K	90K
Hexachloroethane ug/kg	90K	NR	90K	90K	90K
Indeno(1.2.3-c.d)pyrene ug/kg	90K	NR	1100	90K	310
Isophorone ug/kg	90K	NR	90K	90K	90K
Methylene chloride ug/kg	NR	NR	NR	10K	26
n-Nitrosodiphenylamine ug/kg	90K	NR	90K	90K	90K
Naphthalene ug/kg	280K	NR	330	2200	310
Nitrobenzene ug/kg	90K	NR	90K	90K	90K
Pentachlorophenol ug/kg	NR	NR	600K	NR	600K
Phenanthrene ug/kg	620K	NR	2500	2900	870
Phenol ug/kg	90K	NR	90K	90K	90K
Pyrene ug/kg	770K	NR	3700	2700	1800
Toluene ug/kg	8	NR	NR	12	5K
trans-1.2-Dichloroethene ug/kg	5K	NR	5K	5K	5K
trans-1.3-Dichloropropene ug/kg	5K	NR	5K	5K	5K
Vinyl chloride ug/kg	10K	NR	10K	10K	10K

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 11	Station 12	Station 13	Station 14	Station 15
solids %	~~6~~ 38	50	NR	NR	NR
solids total volatile %	~~320~~ 6	17	NR	NR	NR
arsenic total mg/kg	5.8	3.9	NR	NR	NR
barium total mg/kg	170	120K	NR	NR	NR
cadmium total mg/kg	6.2	3.6	NR	NR	NR
chromium total mg/kg	78	58	NR	NR	NR
COD mg/kg	100000	63000	NR	NR	NR
copper total mg/kg	90	82	NR	NR	NR
cyanide mg/kg	.05K	.05K	NR	NR	NR
iron total mg/kg	25000	24000	NR	NR	NR
lead total mg/kg	~~180K~~ 330	~~120K~~ 200	NR	NR	NR
manganese total mg/kg	1.0K	NR	NR	NR	NR
mercury total mg/kg	.30	.20	NR	NR	NR
nickel total mg/kg	45	36	NR	NR	NR
nitrogen ammonia mg/kg	360	152	NR	NR	NR
nitrogen total Kjeldahl mg/kg	940	770	NR	NR	NR
oil and grease mg/kg	6300	3400	NR	NR	NR
carbon organic total mg/kg	49000	180000	NR	NR	NR
phenolics total mg/kg	.24	.23	NR	NR	NR
phosphorus total mg/kg	855	645	NR	NR	NR
selenium total mg/kg	.28	.17	NR	NR	NR
zinc total mg/kg	320	200	NR	NR	NR
4.4-DDD ug/kg	10K	10K	NR	NR	NR
4.4-DDE ug/kg	10K	10K	NR	NR	NR
4.4-DDT ug/kg	10K	10K	NR	NR	NR
Aldrin ug/kg	10K	10K	NR	NR	NR
Chlordane ug/kg	10K	10K	NR	NR	NR
Dieldrin ug/kg	100K	50K	NR	NR	NR
Endrin ug/kg	100K	50K	NR	NR	NR
Heptachlor ug/kg	10K	10K	NR	NR	NR
Heptachlor epoxide ug/kg	10K	10K	NR	NR	NR
Hexachlorobenzene ug/kg	10K	90K	NR	NR	NR
Methoxychlor ug/kg	50K	50K	NR	NR	NR
Mirex ug/kg	10K	10K	NR	NR	NR
PCB 1016 ug/kg	20K	20K	NR	NR	NR

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 11	Station 12	Station 13	Station 14	Station 15
PCB 1221 ug/kg	20K	20K	NR	NR	NR
PCB 1232 ug/kg	20K	20K	NR	NR	NR
PCB 1242 ug/kg	590	220	NR	NR	NR
PCB 1248 ug/kg	20K	20K	NR	NR	NR
PCB 1254 ug/kg	20K	1100	NR	NR	NR
PCB 1260 ug/kg	2000	20K	NR	NR	NR
Toxaphene mg/kg	100K	100K	NR	NR	NR
a-BHC ug/kg	10K	10K	NR	NR	NR
b-BHC ug/kg	10K	10K	NR	NR	NR
d-BHC ug/kg	10K	10K	NR	NR	NR
g-BHC (lindane) ug/kg	10K	10K	NR	NR	NR
1.1-Dichloroethane ug/kg	5K	5K	NR	NR	NR
1.1.1-Trichloroethane ug/kg	5K	9	NR	NR	NR
1.1.2-Trichloroethane ug/kg	5K	5K	NR	NR	NR
1.1.2.2-Tetrachloroethane ug/kg	5K	5K	NR	NR	NR
1.2-Dichlorobenzene ug/kg	90K	90K	NR	NR	NR
1.2-Dichloroethane ug/kg	5K	5K	NR	NR	NR
1.2-Dichloropropane ug/kg	5K	5K	NR	NR	NR
1.2.4-Trichlorobenzene ug/kg	90000K	90000K	NR	NR	NR
1.3-Dichlorobenzene ug/kg	90K	90K	NR	NR	NR
1.4-Dichlorobenzene ug/kg	90K	90K	NR	NR	NR
2-Chloroethyl vinyl ether ug/kg	10K	10K	NR	NR	NR
2-Chloronaphthalene ug/kg	90K	90K	NR	NR	NR
2-Chlorophenol ug/kg	90K	90K	NR	NR	NR
2-Nitrophenol ug/kg	90K	90K	NR	NR	NR
2.4-Dichlorophenol ug/kg	90K	90K	NR	NR	NR
2.4-Dimethylphenol ug/kg	90K	90K	NR	NR	NR
2.4-Dinitrophenol ug/kg	600K	600K	NR	NR	NR
2.4-Dinitrotoluene ug/kg	90K	90K	NR	NR	NR
2.4.6-Trichlorophenol ug/kg	90K	90K	NR	NR	NR
2.6-Dinitrotoluene ug/kg	90K	90K	NR	NR	NR
3.3-Dichlorobenzidine ug/kg	180K	180K	NR	NR	NR
4-Bromophenyl phenyl ether ug/kg	90K	90K	NR	NR	NR

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 11	Station 12	Station 13	Station 14	Station 15
4-Chlorophenyl phenyl ether ug/kg	90K	90K	NR	NR	NR
4-Nitrophenol ug/kg	600K	600K	NR	NR	NR
Acenaphthene ug/kg	3200	6900	NR	NR	NR
Acenaphthylene ug/kg	660	2500	NR	NR	NR
Anthracene ug/kg	3800	1100	NR	NR	NR
Benzene ug/kg	5K	5K	NR	NR	NR
Benzo(a)anthracene ug/kg	16000	1700	NR	NR	NR
Benzo(a)pyrene ug/kg	9900	1600	NR	NR	NR
Benzo(b)fluoranthene ug/kg	11000	3700	NR	NR	NR
Benzo(g.h.i)perylene ug/kg	27000	380	NR	NR	NR
Benzo(k)fluoranthene ug/kg	5300	90K	NR	NR	NR
bis(2-Chloroethoxy)methane ug/kg	90K	90K	NR	NR	NR
bis(2-Chloroethyl)ether ug/kg	90K	90K	NR	NR	NR
bis(2-Chloroisopropyl)ether ug/kg	90K	90K	NR	NR	NR
bis(2-Ethylhexyl)phthalate ug/kg	90K	90K	NR	NR	NR
Bromodichloromethane ug/kg	5K	5K	NR	NR	NR
Bromoform ug/kg	5K	5K	NR	NR	NR
Bromomethane ug/kg	10K	100K	NR	NR	NR
Butyl benzyl phthalate ug/kg	660	90K	NR	NR	NR
Carbon tetrachloride ug/kg	5K	5K	NR	NR	NR
Chlorobenzene ug/kg	5K	5K	NR	NR	NR
Chloroethane ug/kg	10K	10K	NR	NR	NR
Chloroform ug/kg	5K	5K	NR	NR	NR
Chloromethane ug/kg	10K	10K	NR	NR	NR
Chrysene ug/kg	8400	NR	NR	NR	NR
cis-1.3-Dichloropropene ug/kg	5K	5K	NR	NR	NR
Di-n-butyl phthalate ug/kg	90K	90K	NR	NR	NR
Dibromochloromethane ug/kg	5K	5K	NR	NR	NR
Diethyl phthalate ug/kg	90K	90K	NR	NR	NR

ROUGE RIVER

U.S. ARMY CORPS OF ENGINEERS

Compound	Station 11	Station 12	Station 13	Station 14	Station 15
Dimethyl phthalate ug/kg	90K	90K	NR	NR	NR
Endosulfan sulfate ug/kg	100K	50K	NR	NR	NR
Endrin aldehyde ug/kg	100K	50K	NR	NR	NR
Ethylbenzene ug/kg	5K	5K	NR	NR	NR
Fluoranthene ug/kg	31000	2300	NR	NR	NR
Fluorene ug/kg	2600	730	NR	NR	NR
Hexachlorobutadiene ug/kg	90K	90K	NR	NR	NR
Hexachlorocyclopentadiene ug/kg	90K	90K	NR	NR	NR
Hexachloroethane ug/kg	90K	90K	NR	NR	NR
Indeno(1.2.3-c.d)pyrene ug/kg	6500	90K	NR	NR	NR
Isophorone ug/kg	90K	90K	NR	NR	NR
Methylene chloride ug/kg	20K	10K	NR	NR	NR
n-Nitrosodiphenylamine ug/kg	90K	90K	NR	NR	NR
Naphthalene ug/kg	2100	6900	NR	NR	NR
Nitrobenzene ug/kg	90K	90K	NR	NR	NR
Pentachlorophenol ug/kg	600K	600K	NR	NR	NR
Phenanthrene ug/kg	19000	3000	NR	NR	NR
Phenol ug/kg	90K	90K	NR	NR	NR
Pyrene ug/kg	16000	3600	NR	NR	NR
Toluene ug/kg	23	5K	NR	NR	NR
trans-1.2-Dichloroethene ug/kg	5K	5K	NR	NR	NR
trans-1.3-Dichloropropene ug/kg	5K	5K	NR	NR	NR
Vinyl chloride ug/kg	10K	10K	NR	NR	NR

ANALYTICAL REPORT

Report Date: 01/0

Results by Sample

Prepared for:
U.S. ARMY ENGINEER DISTRICT -DETROIT,
BOX 1027
DETROIT, MI 48231
Attention: DAVE BOWMAN

Client P.O.: DACW35-88-D-0007
Report #: 688
Samples Rec'd: 08-22-88

Approved: Barbara Scribner
Refer Questions to:
LINDA DUNLAP

**
Residual Samples Will Be Held
For Two Weeks
**

Client ID	4908801	4908802	4908803	4908804	4908805	4908806
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194452	08/194453	08/194454	08/194455	08/194456	08/194457
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
ACID FRACTION (PRIOR. POLLS. METH 625)						
CHLOROPHENOL, 2- mg/Kg	<0.09	-	-	<0.09	-	<0.09
NITROPHENOL, 2- mg/Kg	<0.09	-	-	<0.09	-	<0.09
PHENOL mg/Kg	<0.09	-	-	<0.09	-	<0.09
DIMETHYLPHENOL, 2,4- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DICHLOROPHENOL, 2,4- mg/Kg	<0.09	-	-	<0.09	-	<0.09
TRICHLOROPHENOL, 2,4,6- mg/Kg	<0.09	-	-	<0.09	-	<0.09
CHLORO-3-METHYLPHENOL, 4- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DINITROPHENOL, 2,4- mg/Kg	<0.6	-	-	<0.6	-	<0.6
METHYL-4,6-DINITROPHENOL, 2 mg/Kg	<0.6	-	-	<0.6	-	<0.6
PENTACHLOROPHENOL mg/Kg	<0.6	-	-	<0.6	-	<0.6
NITROPHENOL, 4- mg/Kg	<0.6	-	-	<0.6	-	<0.6
B/N FRACTION (PRIOR. POLLS METH. 625)						
ACENAPTHENE mg/Kg	<0.09	-	-	<0.09	-	0.32
ACENAPTHYLENE mg/Kg	<0.09	-	-	0.2	-	<0.09
ANTHRACENE mg/Kg	0.14	-	-	0.34	-	0.2
BENZIDINE mg/Kg	<0.6	-	-	<0.6	-	<0.6
BENZO(A)ANTHRACENE mg/Kg	0.41	-	-	0.49	-	0.19
BENZO(A)PYRENE mg/Kg	0.43	-	-	0.44	-	<0.09
BENZO(B)FLUORANTHENE mg/Kg	0.57	-	-	0.53	-	<0.09
BENZO(K)FLUORANTHENE mg/Kg	0.37	-	-	0.38	-	<0.09
BENZO(G,H,I)PERYLENE mg/Kg	<0.09	-	-	<0.09	-	<0.09
BIS(2-CHLORDETHYL)ETHER mg/Kg	<0.09	-	-	<0.09	-	<0.09
BIS(2-CHLORETHOXY)METHANE mg/Kg	<0.09	-	-	<0.09	-	<0.09
BIS(2-CHLOROISOPROPYL)ETHER mg/Kg	<0.09	-	-	<0.09	-	<0.09
BIS(2-ETHYLHEXYL)PHTHALATE mg/Kg	1.8	-	-	16	-	<0.09
BROMOPHENYL PHENYL ETHER, 4 mg/Kg	<0.09	-	-	<0.09	-	<0.09
BUTYL BENZYL PHTHALATE mg/Kg	<0.09	-	-	26	-	<0.09
CHLORONAPHTHALENE, 2- mg/Kg	<0.09	-	-	<0.09	-	<0.09
CHLOROPHENYL PHENYL ETHER, mg/Kg	<0.09	-	-	<0.09	-	<0.09
CHRYSENE mg/Kg	0.46	-	-	0.58	-	0.19
DI-N-BUTYLPHTHALATE mg/Kg	<0.09	-	-	<0.09	-	<0.09
DIBENZO(A,H)ANTHRACENE mg/Kg	<0.09	-	-	<0.09	-	<0.09
DICHLOROBENZENE, 1,2- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DICHLOROBENZENE, 1,3- mg/Kg	<0.09	-	-	<0.09	-	<0.09

 See last page for explanation of symbols

Client ID	4908801	4908802	4908803	4908804	4908805	4908806
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194452	08/194453	08/194454	08/194455	08/194456	08/194457
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
DICHLOROBENZENE, 1,4- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DICHLOROBENZIDINE, 3,3'- mg/Kg	<0.18	-	-	<0.18	-	<0.18
DIETHYLPHTHALATE mg/Kg	<0.09	-	-	<0.09	-	<0.09
DIMETHYLPHTHALATE mg/Kg	<0.09	-	-	<0.09	-	<0.09
DINITROTOLUENE 2,4- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DINITROTOLUENE 2,6- mg/Kg	<0.09	-	-	<0.09	-	<0.09
DIOCTYLPHTHALATE mg/Kg	<0.09	-	-	<0.09	-	<0.09
DIPHENYLHYDRAZINE 1,2- mg/Kg	<0.09	-	-	<0.09	-	<0.09
FLUORANTHENE mg/Kg	0.74	-	-	<0.09	-	0.44
FLUORENE mg/Kg	<0.09	-	-	0.87	-	0.24
HEXACHLOROBENZENE mg/Kg	<0.09	-	-	0.22	-	<0.09
HEXACHLOROBUTADIENE mg/Kg	<0.09	-	-	<0.09	-	<0.09
HEXACHLOROCYCLOPENTADIENE mg/Kg	<0.09	-	-	<0.09	-	<0.09
HEXACHLOROETHANE mg/Kg	<0.09	-	-	<0.09	-	<0.09
INDENO(1,2,3-CD)PYRENE mg/Kg	<0.09	-	-	<0.09	-	<0.09
ISOPHORONE mg/Kg	<0.09	-	-	<0.09	-	<0.09
N-NITROSODI-N-PROPYLAMINE mg/Kg	<0.09	-	-	<0.09	-	<0.09
N-NITROSODIMETHYLAMINE mg/Kg	<0.09	-	-	<0.09	-	<0.09
N-NITROSODIPHENYLAMINE mg/Kg	<0.09	-	-	<0.09	-	<0.09
NAPHTHALENE mg/Kg	0.96	-	-	<0.09	-	<0.09
NITROBENZENE mg/Kg	<0.09	-	-	1.6	-	0.28
PHENANTHRENE mg/Kg	0.74	-	-	<0.09	-	<0.09
PYRENE mg/Kg	1.5	-	-	1.1	-	0.62
TRICHLOROBENZENE, 1,2,4- mg/Kg	<90	-	-	1.4	-	0.77
VOLATILE FRACTION (PRIOR. POLLS. EPA METH 624)				<90	-	<90
BENZENE mg/Kg	<0.005	-	-	0.006	-	<0.005
BROMODICHLOROMETHANE mg/Kg	<0.005	-	-	<0.005	-	<0.005
BROMOFORM mg/Kg	<0.005	-	-	<0.005	-	<0.005
BROMOMETHANE mg/Kg	<0.01	-	-	<0.01	-	<0.01
CARBON TETRACHLORIDE mg/Kg	<0.005	-	-	<0.005	-	<0.005
CHLOROBENZENE mg/Kg	<0.005	-	-	<0.005	-	<0.005
CHLOROETHANE mg/Kg	<0.01	-	-	<0.01	-	<0.01
CHLOROETHYLVINYLETHER,2 mg/Kg	<0.01	-	-	<0.01	-	<0.01
CHLOROFORM mg/Kg	<0.005	-	-	<0.005	-	<0.005
CHLOROMETHANE mg/Kg	<0.01	-	-	<0.01	-	<0.01
CIS-1,3-DICHLOROPROPENE mg/Kg	<0.005	-	-	<0.005	-	<0.005
DIBROMOCHLOROMETHANE mg/Kg	<0.005	-	-	<0.005	-	<0.005
DICHLOROETHANE, 1,1- mg/Kg	<0.005	-	-	<0.005	-	<0.005
DICHLOROETHANE, 1,2- mg/Kg	<0.005	-	-	<0.005	-	<0.005
DICHLOROETHENE, 1,1- mg/Kg	<0.005	-	-	<0.005	-	<0.005
DICHLOROPROPANE, 1,2- mg/Kg	<0.005	-	-	0.011	-	<0.005
ETHYLBENZENE mg/Kg	0.01	-	-	<0.01	-	0.29
METHYLENE CHLORIDE mg/Kg	0.11	-	-	<0.005	-	<0.005
TETRACHLOROETHANE, 1,1,2,2- mg/Kg	<0.005	-	-	<0.005	-	<0.005
TETRACHLOROETHENE mg/Kg	<0.005	-	-	<0.005	-	<0.005

 See last page for explanation of symbols

Client ID	4908801	4908802	4908803	4908804	4908805	4908806
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194452	08/194453	08/194454	08/194455	08/194456	08/194457
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
TOLUENE mg/Kg	0.012	-	-	0.089	-	0.008
TRANS-1,3-DICHLOROPROPENE mg/Kg	<0.005	-	-	<0.005	-	<0.005
TRANS-1,2-DICHLOROETHYLENE mg/Kg	<0.005	-	-	<0.005	-	<0.005
TRICHLOROETHANE, 1,1,1- mg/Kg	<0.005	-	-	<0.005	-	<0.005
TRICHLOROETHANE, 1,1,2- mg/Kg	<0.005	-	-	<0.005	-	<0.005
TRICHLOROETHENE mg/Kg	<0.005	-	-	<0.005	-	<0.005
TRICHLOROFLUOROMETHANE mg/Kg		-	-		-	
VINYL CHLORIDE mg/Kg	<0.01	-	-	<0.01	-	<0.01
P. POLL PEST. AND PCB'S (COE LIST)						
ALDRIN mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
a-BHC mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
b-BHC mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
d-BHC mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
g-BHC mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
CHLORDANE mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
4,4'-DDD mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
4,4'-DDE mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
4,4'-DDT mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
DIELDRIN mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
ENDOSULFAN I mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ENDOSULFAN II mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ENDOSULFAN SULFATE mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ENDRIN mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
ENDRIN ALDEHYDE mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
HEPTACHLOR mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
HEPTACHLOR EPOXIDE mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
TOXAPHENE mg/Kg	<1.0	<1.0	<1.0	<0.25	<0.25	<0.10
PCB 1016 mg/Kg	<0.20	<0.20	<0.20	<2.5	<2.5	<1.0
PCB 1221 mg/Kg	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20
PCB 1232 mg/Kg	<0.20	5.3	<0.20	<0.50	<0.50	<0.20
PCB 1242 mg/Kg	4.7	<0.20	10	5.1	7.9	0.61
PCB 1248 mg/Kg	<0.20	<0.20	<0.20	<0.50	<0.50	<0.20
PCB 1254 mg/Kg	<0.20	<0.20	<0.20	<0.50	4.7	0.91
PCB 1260 mg/Kg	<0.20	<0.20	<0.20	5.5	<0.50	<0.20
MIREX mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
METHOXYCHLOR mg/Kg	<0.50	<0.50	<0.50	<1.3	<1.3	<0.50
HEXACHLOROBENZENE mg/Kg	<0.10	<0.10	<0.10	<0.25	<0.25	<0.10
ALUMINUM mg/Kg	19000	31000	26000	23000	-	23000
ARSENIC mg/Kg	7.5	8.4	9.3	8.4	5.2	5.5
BARIUM mg/Kg	210	330	250	310	300	160
CADMIUM mg/Kg	15	24	21	16	17	8.5
ORGANIC CARBON, TOTAL mg/Kg	63000	75000	76000	89000	80000	37000
CHROMIUM mg/Kg	150	340	190	170	190	96
HEXAVALENT CHROMIUM mg/Kg	<15	27	<15	<15	-	<15
COPPER mg/Kg	180	340	230	190	240	100
CYANIDE, TOTAL mg/Kg	<0.05	<0.05	0.10	0.08	2.2	0.09
CHEMICAL OXYGEN DEMAND mg/Kg	150000	210000	180000	200000	260000	86000
IN PLACE DENSITY gm/cm3	1.4	1.3	1.3	1.3	1.4	1.5
IRON mg/Kg	36000	58000	47000	44000	46000	28000
LEAD mg/Kg	320	510	370	360	470	190

 See last page for explanation of symbols

Client ID	4908801	4908802	4908803	4908804	4908805	4908806
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194452	08/194453	08/194454	08/194455	08/194456	08/194457
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
MERCURY mg/Kg	0.53	0.65	0.56	0.89	0.53	0.39
NICKEL mg/Kg	56	85	60	62	73	33
AMMONIA NITROGEN mg/Kg	490	740	480	150	240	190
KJELDAHL NITROGEN, TOTAL mg/Kg	1800	1800	1400	660	1300	970
OIL AND GREASE mg/Kg	14000	29000	16000	19000	21000	6400
PARTICLE SIZING, COE (5 PT)						
PARTICLE SIZE > 2.0 mm %	5.9	0.5	5.6	5.9	34.0	25.1
PARTICLE SIZE > 0.43 mm %	8.1	2.4	2.1	3.8	18.9	9.4
PARTICLE SIZE > 0.17 mm %	35.6	10.8	5.2	13.0	6.9	4.8
PARTICLE SIZE > 0.074 mm %	11.2	5.4	0.3	6.5	4.8	0.9
PARTICLE SIZE < 0.074 mm %	39.2	80.9	86.8	70.8	35.4	59.8
PHENOLS mg/Kg	0.30	0.25	0.38	0.26	0.19	0.26
PHOSPHORUS, TOTAL mg/Kg	1760	2900	2160	1910	2190	912
SELENIUM mg/Kg	<0.16	0.38	0.26	0.48	0.36	0.31
SOLIDS, PERCENT %	44	37	42	48	40	58
VOLATILE SOLIDS %	12.1	12	9	5	12	5
ZINC mg/Kg	560	960	1400	870	1000	440

Client ID	4908807	4908808	4908809	4908810	4908811	4908812
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194458	08/194459	08/194460	08/194461	08/194462	08/194463
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
ACID FRACTION (PRIOR. POLLS. METH 625)						
CHLOROPHENOL, 2- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
NITROPHENOL, 2- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
PHENOL mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DIMETHYLPHENOL, 2,4- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DICHLOROPHENOL, 2,4- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
TRICHLOROPHENOL, 2,4,6- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
CHLORO-3-METHYLPHENOL, 4- mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DINITROPHENOL, 2,4- mg/Kg	-	<0.6	<0.6	<0.6	<0.6	<0.6
METHYL-4,6-DINITROPHENOL, 2 mg/Kg	-	<0.6	<0.6	<0.6	<0.6	<0.6
PENTACHLOROPHENOL mg/Kg	-	<0.6	<0.6	<0.6	<0.6	<0.6
NITROPHENOL, 4- mg/Kg	-	<0.6	<0.6	<0.6	<0.6	<0.6
B/N FRACTION (PRIOR. POLLS METH. 625)						
ACENAPTHENE mg/Kg	-	<0.09	0.39	0.13	3.2	0.69
ACENAPTHYLENE mg/Kg	-	0.26	0.19	<0.09	0.66	0.25
ANTHRACENE mg/Kg	-	0.35	0.89	0.37	3.8	1.1
BENZIDINE mg/Kg	-	<0.6	<0.6	<0.6	<0.6	<0.6
BENZO(A)ANTHRACENE mg/Kg	-	2.8	1.1	0.78	16	1.7
BENZO(A)PYRENE mg/Kg	-	1.6	0.7	1	9.9	1.6
BENZO(B)FLUORANTHENE mg/Kg	-	4	1.5	2.4	11	3.7
BENZO(K)FLUORANTHENE mg/Kg	-	0.97	<0.09	<0.09	5.3	<0.09
BENZO(G,H,I)PERYLENE mg/Kg	-	<0.09	<0.09	<0.09	2.7	0.38
BIS(2-CHLOROETHYL)ETHER mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
BIS(2-CHLORETHOXY)METHANE mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09

 See last page for explanation of symbols

Client ID		4908807	4908808	4908809	4908810	4908811	4908812
Collected		08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number		08/194458	08/194459	08/194460	08/194461	08/194462	08/194463
Matrix		SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter							
BIS(2-CHLOROISOPROPYL)ETHER	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
BIS(2-ETHYLHEXYL)PHTHALATE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
BROMOPHENYL PHENYL ETHER, 4	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
BUTYL BENZYL PHTHALATE	mg/Kg	-	<0.09	<0.09	0.2	0.66	<0.09
CHLORONAPHTHALENE, 2-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
CHLOROPHENYL PHENYL ETHER,	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
CHRYSENE	mg/Kg	-	1.6	0.94	0.95	8.4	2
DI-N-BUTYLPHTHALATE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DIBENZO(A,H)ANTHRACENE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DICHLOROBENZENE, 1,2-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DICHLOROBENZENE, 1,3-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DICHLOROBENZENE, 1,4-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DICHLOROBENZIDINE, 3,3'-	mg/Kg	-	<0.18	<0.18	<0.18	<0.18	<0.18
DIETHYLPHTHALATE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DIMETHYLPHTHALATE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DINITROTOLUENE 2,4-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DINITROTOLUENE 2,6-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
DIOCTYLPHTHALATE	mg/Kg	-	0.85	<0.09	0.25	<0.09	0.11
DIPHENYLHYDRAZINE 1,2-	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
FLUORANTHENE	mg/Kg	-	2.9	2.8	1	31	2.3
FLUORENE	mg/Kg	-	<0.09	0.65	0.13	2.6	0.73
HEXACHLOROBENZENE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
HEXACHLOROBUTADIENE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
HEXACHLOROCYCLOPENTADIENE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
HEXACHLOROETHANE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
INDENO(1,2,3-CD)PYRENE	mg/Kg	-	1.1	<0.09	0.31	6.5	<0.09
ISOPHORONE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
N-NITROSODI-N-PROPYLAMINE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
N-NITROSODIMETHYLAMINE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
N-NITROSODIPHENYLAMINE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
NAPHTHALENE	mg/Kg	-	0.33	2.2	0.31	2.1	6.9
NITROBENZENE	mg/Kg	-	<0.09	<0.09	<0.09	<0.09	<0.09
PHENANTHRENE	mg/Kg	-	2.5	2.9	0.87	19	3
PYRENE	mg/Kg	-	3.7	2.7	1.8	16	3.6
TRICHLOROBENZENE, 1,2,4-	mg/Kg	-	<90	<90	<90	<90	<90
VOLATILE FRACTION (PRIOR. POLLS. EPA METH 624)							
BENZENE	mg/Kg	-	<0.005	0.01	<0.005	<0.005	<0.005
BROMODICHLOROMETHANE	mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
BROMOFORM	mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
BROMOMETHANE	mg/Kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
CARBON TETRACHLORIDE	mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
CHLOROBENZENE	mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005

 See last page for explanation of symbols

Client ID	4908807	4908808	4908809	4908810	4908811	4908812
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194458	08/194459	08/194460	08/194461	08/194462	08/194463
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
CHLOROETHANE mg/Kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
CHLOROETHYLVINYLETHER, 2 mg/Kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
CHLOROFORM mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
CHLOROMETHANE mg/Kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
CIS-1,3-DICHLOROPROPENE mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
DIBROMOCHLOROMETHANE mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
DICHLOROETHANE, 1,1- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
DICHLOROETHANE, 1,2- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
DICHLOROETHENE, 1,1- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
DICHLOROPROPANE, 1,2- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
ETHYLBENZENE mg/Kg	-	<0.005	0.047	<0.005	<0.005	<0.005
METHYLENE CHLORIDE mg/Kg	-	<0.01	<0.01	0.026	0.02	<0.01
TETRACHLOROETHANE, 1,1,2,2- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
TETRACHLOROETHENE mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
TOLUENE mg/Kg	-	<0.005	0.012	<0.005	0.023	<0.005
TRANS-1,3-DICHLOROPROPENE mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
TRANS-1,2-DICHLOROETHYLENE mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
TRICHLOROETHANE, 1,1,1- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	0.009
TRICHLOROETHANE, 1,1,2- mg/Kg	-	<0.005	<0.005	<0.005	<0.005	<0.005
TRICHLOROETHENE mg/Kg	-	0.008	<0.005	<0.005	0.006	0.009
TRICHLOROFLUOROMETHANE mg/Kg	-					
VINYL CHLORIDE mg/Kg	-	<0.01	<0.01	<0.01	<0.01	<0.01
P. POLL PEST. AND PCB'S (COE LIST)						
ALDRIN mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
a-BHC mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
b-BHC mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
d-BHC mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
g-BHC mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
CHLORDANE mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
4,4'-DDD mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
4,4'-DDE mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
4,4'-DDT mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
DIELDRIN mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
ENDOSULFAN I mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
ENDOSULFAN II mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
ENDOSULFAN SULFATE mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
ENDRIN mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
ENDRIN ALDEHYDE mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.10	<0.050
HEPTACHLOR mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
HEPTACHLOR EPOXIDE mg/Kg	<1.0	<0.10	<0.10	<0.10	<0.010	<0.010
TOXAPHENE mg/Kg	<1.0	<1.0	<1.0	<1.0	<0.10	<0.10
PCB 1016 mg/Kg	<2.0	<0.20	<0.20	<0.20	<0.020	<0.020
PCB 1221 mg/Kg	<2.0	<0.20	<0.20	<0.20	<0.020	<0.020
PCB 1232 mg/Kg	<2.0	<0.20	<0.20	<0.20	<0.020	<0.020
PCB 1242 mg/Kg	3.8	1.1	0.20	0.55	0.59	0.22
PCB 1248 mg/Kg	<2.0	<0.20	<0.20	<0.20	<0.020	<0.020
PCB 1254 mg/Kg	<2.0	3.4	0.50	<0.20	<0.020	1.1
PCB 1260 mg/Kg	4.4	<0.20	<0.20	2.4	2.0	<0.020

 See last page for explanation of symbols

Client ID	4908807	4908808	4908809	4908810	4908811	4908812
Collected	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88	08-22-88
TMA Sample Number	08/194458	08/194459	08/194460	08/194461	08/194462	08/194463
Matrix	SOLID	SOLID	SOLID	SOLID	SOLID	SOLID
Parameter						
MIREX mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.010	<0.010
METHOXYCHLOR mg/Kg	<0.50	<0.50	<0.50	<0.50	<0.050	<0.050
HEXACHLOROBENZENE mg/Kg	<0.10	<0.10	<0.10	<0.10	<0.010	<0.010
ALUMINUM mg/Kg	-	-	-	24000	-	-
ARSENIC mg/Kg	0.89	8.2	3.7	4.5	5.8	3.9
BARIUM mg/Kg	290	200	66	140	170	120
CADMIUM mg/Kg	20	12	2.2	5.2	6.2	3.6
ORGANIC CARBON, TOTAL mg/Kg	93000	81000	100000	42000	49000	180000
CHROMIUM mg/Kg	220	140	28	110	78	58
HEXAVALENT CHROMIUM mg/Kg	-	-	-	<15	<15	<15
COPPER mg/Kg	220	160	45	57	90	82
CYANIDE, TOTAL mg/Kg	0.63	0.25	5.4	<0.05	<0.05	<0.05
CHEMICAL OXYGEN DEMAND mg/Kg	180000	120000	77000	87000	100000	63000
IN PLACE DENSITY gm/cm3	1.4	1.4	1.7	1.7	1.2	1.5
IRON mg/Kg	44000	33000	13000	23000	25000	24000
LEAD mg/Kg	420	290	44	110	180	120
MERCURY mg/Kg	0.51	0.40	<0.006	0.13	0.30	0.20
NICKEL mg/Kg	74	60	19	79	45	36
AMMONIA NITROGEN mg/Kg	370	210	50	130	360	152
KJELDAHL NITROGEN, TOTAL mg/Kg	1600	960	110	910	940	770
OIL AND GREASE mg/Kg	21000	7700	2800	4000	6300	3400
PARTICLE SIZING, COE (5 PT)						
PARTICLE SIZE > 2.0 mm %	8.3	12.0	52.3	7.6	4.7	11.3
PARTICLE SIZE > 0.43 mm %	4.6	3.6	27.9	4.7	4.3	16.4
PARTICLE SIZE > 0.17 mm %	5.8	5.8	10.4	10.8	7.4	27.6
PARTICLE SIZE > 0.074 mm %	2.7	8.1	1.8	9.4	9.8	7.1
PARTICLE SIZE < 0.074 mm %	78.6	70.5	7.6	67.5	73.8	37.6
PHENOLS mg/Kg	0.38	0.23	0.050	<0.043	0.24	0.23
PHOSPHORUS, TOTAL mg/Kg	3240	2167	1510	833	855	645
SELENIUM mg/Kg	0.38	0.60	0.92	0.10	0.28	0.17
SOLIDS, PERCENT %	41	44	72	70	38	50
VOLATILE SOLIDS %	4	10	9	4	6	17
ZINC mg/Kg	1200	670	97	180	320	200

Project Comments:

Comments about sample 08/194452
- SOLIDS, PERCENT - AVERAGE OF DUPLICATE RUNS
- CHEMICAL OXYGEN DEMAND - AVERAGE OF DUPLICATE RUNS
- OIL AND GREASE - AVERAGE OF DUPLICATE RUNS
- TOTAL ORGANIC CARBON - AVERAGE OF DUPLICATE RUNS
- VOLATILE SOLIDS - AVERAGE OF DUPLICATE RUNS
- HEXAVALENT CHROMIUM - AVERAGE OF DUPLICATE RUNS

Comments about sample 08/194454
- AMMONIA NITROGEN - AVERAGE OF DUPLICATE RUNS

Comments about sample 08/194455
- PHENOLS - AVERAGE OF DUPLICATE RUNS

Comments about sample 08/194456
- TOTAL CYANIDE - AVERAGE OF DUPLICATE RUNS

Comments about sample 08/194457
- PARTICLE SIZING, COE (5 PT) - AVERAGE OF DUPLICATE RUNS
- ARSENIC - AVERAGE OF DUPLICATE RUNS
- SELENIUM - AVERAGE OF DUPLICATE RUNS
- TOTAL PHOSPHORUS - AVERAGE OF DUPLICATE RUNS

CONTINUED

Comments about sample 08/194460
TOTAL CYANIDE - 126
Comments about sample 08/194462
CHEMICAL OXYGEN DEMAND - AVERAGE OF DUPLICATE RUNS
CADMIUM - AVERAGE OF DUPLICATE RUNS
COPPER - AVERAGE OF DUPLICATE RUNS
CHROMIUM - AVERAGE OF DUPLICATE RUNS
IRON - AVERAGE OF DUPLICATE RUNS
LEAD - AVERAGE OF DUPLICATE RUNS
ZINC - AVERAGE OF DUPLICATE RUNS
NICKEL - AVERAGE OF DUPLICATE RUNS
BARIUM - AVERAGE OF DUPLICATE RUNS
Comments about sample 08/194463
SOLIDS, PERCENT - AVERAGE OF DUPLICATE RUNS
IN PLACE DENSITY - AVERAGE OF DUPLICATE RUNS
VOLATILE SOLIDS - AVERAGE OF DUPLICATE RUNS
PHENOLS - AVERAGE OF DUPLICATE RUNS
ARSENIC - AVERAGE OF DUPLICATE RUNS
MERCURY - AVERAGE OF DUPLICATE RUNS
SELENIUM - AVERAGE OF DUPLICATE RUNS

Note Results indicated by '#' are in mg/L instead of mg/Kg
FR = See field report for result
NA = Not applicable to test requested
ND = Nondetected, detection limit in ()
SD = Sample damaged
SR = See attached report for result
< = Positive result but at unquantifiable concentration below inicated level
- = Test not requested for this sample

QC REPORT

BLANKS AND REFERENCE SAMPLES

CLIENT: ARMY CORP OF ENGINEERS
PROJECT: A9241 ROUGE RIVER
SAMPLES RECEIVED: 08-24-88 DATE: 11-22-88

MATRIX: SOIL
UNITS: MG/KG

COMPOUND	REAGENT BLANK	SOURCE	REFERENCE SAMPLES REFERENCE VALUE (UG)	REF. SAMPLE RESULT (UG)	% RECOVERY
gamma-BHC	<0.010	USEPA	0.20	0.21	105%
Heptachlor	<0.010	USEPA	0.20	0.19	95%
Aldrin	<0.010	USEPA	0.20	0.21	105%
Heptachlor Epoxide	<0.010	USEPA	0.20	0.25	125%
p,p-DDE	<0.010	USEPA	0.40	0.51	128%
p,p-DDD	<0.010	USEPA	0.40	0.55	138%
p,p-DDT	<0.010	USEPA	0.40	0.53	133%
alpha-Endosulfan	<0.010	USEPA	0.20	0.16	80%
Dieldrin	<0.010	USEPA	0.40	0.38	90%
Endrin	<0.010	USEPA	0.80	0.71	89%
Methoxychlor	<0.050	USEPA	5.0	4.1	82%
Hexachlorobenzene	<0.010	USEPA	5.0	3.1	63%
Mirex	<0.010	USEPA	5.0	3.3	66%

USEPA - United States Environmental Protection Agency

DUPLICATES AND SPIKED SAMPLE RECOVERY

CLIENT: ARMY CORP OF ENGINEERS
PROJECT: A9241 ROUGE RIVER
SAMPLES RECEIVED: 8-24-88

DATE: 11-16-88

MATRIX: SOIL
UNITS: MG/KG

COMPOUND	SAMPLE I.D.	SAMPLE RESULT (S)	DUPLICATE RESULT (D)	RPD	SPIKED SAMPLE RESULT (SS)	SPIKE ADDED (SA)	PERCENT RECOVERY
ALUMINUM	194462	26,000	26,000	0.0%	0	0	0
ARSENIC	194303*	6.4	5.5	17%	52	50	92%
BARIUM	194462	170	170	0.0%	770	590	102%
CADMIUM	194462	7.1	5.0	35%	21	14	107%
CHROMIUM	194462	82	74	10%	140	66	94%
COPPER	194462	84	95	12%	170	66	122%
IRON	194462	26,000	25,000	3.9%	0	0	0
LEAD	194462	170	190	11%	340	130	123%
MERCURY	194463	0.19	0.21	10.0%	0	0	0
NICKEL	194462	45	45	0.0%	180	130	104%
SELENIUM	194457	<0.22	<0.22	NC	6.8	10	68%
ZINC	194462	320	320	0.0%	470	130	115%
AMMONIA-N	194454	500	460	8.3%	810	380	87%
KJELDAHL-N	194462	1200	690	54%	1800	600	142%
CYANIDE	194460	5.5	5.4	1.8%	89	67	125%
PHENOL	194463	0.24	0.21	13%	0.97	0.98	77%
T.PHOSPHORUS	194457	914	909	0.55%	1900	819	121%
HEXAVALENT CHROME	194452	<5.0	<5.0	NC	NoSS		
TOC:							
Inorganic carbon	194452	6200	6400	3.2%	15,600	6,600	141%
Total carbon	194452	35,800	32,600	9.4%	64,900	30,000	102%
OIL AND GREASE	194452	12,700	16,300	25%	41,000	58,000	46%
TOTAL SOLIDS	192463	50	50	0.0%	NR	NR	NR
VOLATILE SOLIDS	192463	16	17	6.1%	NR	NR	NR
COD	194452	142,000	163,000	14%	NR	NR	NR
PARTICLE SIZING	194457						
>2.0mm		14.1%	36%	87%	NR	NR	NR
>0.43mm		8.4%	10.5%	22%	NR	NR	NR
>0.25mm		6.2%	3.3%	61%	NR	NR	NR
>0.075mm		0.8%	1.1%	32%	NR	NR	NR
<0.075mm		70.5%	49.1%	36%	NR	NR	NR
IN PLACE DENSITY	194463	1.5	1.5	0.0%	NR	NR	NR

COMMENTS:

RPD = {|S-D|/[(S+D)/2]} * 100% PERCENT RECOVERY = {[SS-(S+D)/2]/SA} * 100%

NC - Non calculable RPD due to value(s) less than detection limit.

NR - Not required I - Matrix Interference O - Spike Diluted Out

NoD - No Duplicate Run NoSS - No Spiked Sample

BLANKS AND REFERENCE SAMPLES

CLIENT: ARMY CORP OF ENGINEERS
PROJECT: A9241 ROUGE RIVER
SAMPLES RECEIVED: 08-24-88

DATE: 11-22-88

UNITS: MG/L

COMPOUND	REAGENT BLANK	SOURCE	REFERENCE SAMPLES REFERENCE VALUE	REF. SAMPLE RESULT	% RECOVERY
ALUMINUM	0.05	ERA	1.0	1.5	150%
ARSENIC	<0.005	ERA	104	109	105%
BARIUM	<0.01	ERA	1.0	1.0	100%
CADMIUM	<0.005	ERA	1.0	1.1	110%
CHROMIUM	<0.01	ERA	1.0	1.1	110%
COPPER	<0.01	ERA	1.0	1.0	100%
IRON	<0.03	ERA	1.0	1.0	100%
LEAD	<0.03	ERA	1.0	1.1	110%
MERCURY	<0.0005	ERA	5.0	5.0	100%
NICKEL	<0.01	ERA	1.0	1.1	110%
SELENIUM	<0.005	ERA	0.082	0.089	108%
ZINC	<0.01	ERA	1.0	1.0	100%
AMMONIA-N	0.04	ERA	3.8	4.2	111%
KJELDAHL-N	<0.01	USEPA	25,240mg/kg	24,170mg/kg	104%
CYANIDE	<0.01	ERA	0.10	0.087	87%
PHENOL	<0.002	ERA	0.16	0.16	100%
TOTAL PHOSPHORUS	<0.01	ERA	4.4	4.7	107%
HEXAVALENT CHROMIUM	<0.01	ERA	0.50	0.50	100%
TOC, Soil					
Inorganics	----------	COUL	120,000mg/kg	135,000mg/kg	112%
Total	----------	COUL	680,000mg/kg	680,000mg/kg	100%
OIL AND GREASE	2.2	USEPA	53,000	49,000	92%
TOTAL SOLIDS	----------	ERA	40	46	115%
VOLATILE SOLIDS	----------	ERA	1050	1000	95%

ERA - Environmental Resource Associates, Inc.
NBS - National Bureau of Standards
USEPA - United States Environmental Protection Agency
COUL - Coulmetrics Inc.

Appendix A: Unpublished Scientific Information.

14. TMA 1993 Report "Thermo Analytical/ERG Sediment Sampling Program". 32 pp.

TMA 1993 REPORT

FY93

THERMO ANALYTICAL/ERG
SEDIMENT SAMPLING PROGRAM
DELIVERY ORDER 0004
ROUGE RIVER NAVIGATION CHANNEL
DETROIT, MICHIGAN

INTRODUCTION

During the period of April 21 and 22, 1993 Thermo Analytical/ERG conducted a sediment sampling program for the Detroit District Corps of Engineers on the Rouge River Navigation Channel. A total of twenty (20) stations were sampled, from areas of shoaling, that were designated on the sounding charts supplied to TMA/ERG by the Detroit COE Environmental Branch. At each sample station, angle coordinates were read from known land features using a sextant as a pelorus for possible future duplication of each sampling site. Refer to the attached site maps for location of each station and the angle references.

In addition to the sediment collection, bulk water for elutriate testing and two sets of water quality samples were collected from the Pte. Mouillee confined disposal facility on April 20, 1993. Water for both elutriate and water quality testing were collected directly from the confined disposal facilities Cell No. 5 that will receive the dredge spoils from the Rouge River.

SAMPLE COLLECTION

When possible, sediment samples were collected using a 120 lb. K.B. gravity corer. A Ponar dredge was used for sample collection in areas where the substrate was unsuitable for coring.

The gravity corer was equipped with a 48" barrel and two 20" CAB plastic liners to receive the sample. Upon retrieval of the corer from the river bottom, the sample tubes were removed, measured for depth of penetration and then extruded into a clean stainless steel bowl. A sample description was recorded and the material was then thoroughly mixed and transferred into two clean one-quart glass containers equipped with teflon lined caps. Refer to the attached Sediment Description Section for all on-site observations.

Samples collected with the Ponar dredge were transferred directly into the stainless steel bowl and handled as discussed in the above paragraph. All equipment used for sample collection was thoroughly scrubbed and rinsed with river water between each station.

All resultant samples from this project were stored on ice within a cooler for transport back to TMA/ERG's Ann Arbor laboratory. All sample preservation was in accordance with "Test Methods for Evaluating Solid Waste" 3rd Ed., U.S. EPA No. SW-846. Chain-of-Custody protocols were followed throughout this project.

ROUGE RIVER
SEDIMENT DESCRIPTIONS
DELIVERY ORDER NO.004
CONTRACT: DACW35-93-D-0005
APRIL 21 AND 22, 1993

STATION RG9301

DEPTH TO BOTTOM = 15.50' COLLECTION METHOD-GRAVITY CORE

Two cores in this area yielded 27" and 26" of material. Both cores consisted of looser dark black silts with a very light amount of fine sand over 12" of very compact dark black silts. The texture was smooth, there was oil visible and the odor was strong hydrocarbon.

STATION RG9302

DEPTH TO BOTTOM = 22.0' COLLECTION METHOD-GRAVITY CORE

Two cores yielded 20" and 30" of sample. Both cores had 8" to 10" of very compact, thick dark black silts at the bottom of the core. The remaining upper material was looser striated gray to black gelatinous silts with a light amount of fine sand (<10%). The sample had a strong hydrocarbon odor, oil was observed and the texture was smooth.

STATION RG9303

DEPTH TO BOTTOM = 17.0' COLLECTION METHOD-GRAVITY CORE

It should be noted that a freighter passed through the area of sample collection prior to the sampling effort. Four cores were collected in this area with three cores yielding 20" and the fourth 8". The cores were made up of loose dark gray slightly sandy (20%) silts (80%). There was a light amount of detrital material, oil visible, hydrocarbon odor and the texture was lightly gritty.

STATION RG9304

DEPTH TO BOTTOM = 20.8' COLLECTION METHOD-GRAVITY CORE

Three cores were collected that yielded 24", 14" and 23" respectively. All of the cores consisted of looser gray black silts over 10" to 11" of very compact, thick dark black silts. Oil was visible especially in the bottom compacted silts and the samples had a very strong hydrocarbon odor and a smooth texture.

STATION RG9305

DEPTH TO BOTTOM = 18.9' COLLECTION METHOD-GRAVITY CORE

We sounded the entire area of shoaling as indicated on the map and did not find any contours in the 14' to 16' range. The first core was 26" with the top 4" consisting of looser silts and the remaining material (22") was

thick gelatinous stiff silts. The second core yielded 34" of identical material with the exception of the top 8" consisted of looser silts. Both samples were black to dark gray with some small fluorescent green color striations. The sample was heavily oiled and had a very strong naphthalene (moth ball) odor. The texture was smooth.

STATION RG9306

DEPTH TO BOTTOM = 15.3' COLLECTION METHOD-GRAVITY CORE

Collected two cores at this location with recoveries of 30" and 27". The bottom 20" of each core consisted of dark gray compacted silts with a light oil sheen. The top sections of each core (10" and 7") were composed of looser wet silts with a light amount of fine sand <10%. The texture was primarily smooth, the odor was mild hydrocarbon and oil was visible.

STATION RG9307

DEPTH TO BOTTOM = 17.0' COLLECTION METHOD-GRAVITY CORE

Two cores in this area resulted in yields of 28" and 25". The bottom 12" to 13" of each core consisted of dense dark black to gray consolidated silts with a very light amount of visible oil. The top layers of each core were more gelatinous in texture with a light amount of detrital material. The odor was moderate hydrocarbon, oil was observed and the texture was smooth.

STATION RG9308

DEPTH TO BOTTOM = 20.0' COLLECTION METHOD-GRAVITY CORE

Searched area and did not find any shoaling depths of 18.0' as indicated on the project map. Collected sample in the area as indicated on the map at a depth of 20.0'. Three cores were collected ranging in depths of 16", 14" and 18". All cores consisted of looser gelatinous gray black silts without any sand. The texture was smooth, a light amount of oil was observed and the odor was moderate hydrocarbon.

STATION RG9309

DEPTH TO BOTTOM = 17.0' COLLECTION METHOD-GRAVITY CORE

Collected two cores, both yielded 31" of sample. The top 13" consisted of loose gelatinous dark black silts with a very light amount of fine sand. The bottom 18" was also dark black and was composed of very compact oily silts. The sample had a strong hydrocarbon odor, the texture was smooth and oil was observed.

STATION RG9310

DEPTH TO BOTTOM = 17.5' COLLECTION METHOD-GRAVITY CORE

In this area two cores were collected with recoveries of 24" and 26". For both cores the bottom 8" to 9" consisted of very dense dark black to gray silts with a light amount of fine sand (5-10%) and some very small stones.

The top layers of the cores were basically the same material but looser in ıature. There was oil visible, the texture was smooth to light gritty and the odor was moderate hydrocarbon.

STATION RG9311

DEPTH TO BOTTOM = 16.5' COLLECTION METHOD-GRAVITY CORE

The first core yielded only 10" of sample. It was composed of sandy silts with pea gravel throughout and fly ash. We moved the sampling site slightly in towards shore and attempted another core. This core resulted in 31" of sample. The bottom 21" was all gray to black consolidated silts with a very light amount of small stones and fine sand. The remaining top 10" was composed of loose gray silts with a light amount of fine sand. The sample had a moderate hydrocarbon odor, oil was visible and the texture was smooth to light gritty.

STATION RG9312

DEPTH TO BOTTOM = 17.8' COLLECTION METHOD-GRAVITY CORE

Collected two cores that yielded 18" and 22" respectively. The bottom 9" of both cores consisted of light brown clay with a very light amount of silts. The remaining overburden was dark gray silts with coarse sand (20%) and a few small silts. The sample had a mild hydrocarbon odor, oil was visible and the texture was primarily gritty.

STATION RG9313

DEPTH TO BOTTOM = 14.3' COLLECTION METHOD-GRAVITY CORE

Two cores were collected in this area that yielded 29" and 27". The bottom 11" to 12" of each core was dark black heavily oiled dense silts. The top 16" to 17" was less dense, black silts with some fine sand and pea gravel. The texture was primarily smooth the odor was strong hydrocarbon and there was a great deal of oil observed.

STATION RG9314

DEPTH TO BOTTOM = 21.8' COLLECTION METHOD-GRAVITY CORE/PONAR

Attempted three cores in this area that resulted in recoveries of 8", 8" and 10". The cores were a mixture of dark gray coarse sand, stones and silts. A light amount of oil was observed, the odor was light hydrocarbon and the texture was gritty. One ponar grab resulted in the same basic mixture as the three cores.

STATION RG9315

DEPTH TO BOTTOM = 19.2' COLLECTION METHOD-GRAVITY CORE/PONAR

Three core attempts yielded recoveries of 7", 6" and 10" respectively. All three cores consisted of a mixture of gray silts, medium coarse sand and gravel. The texture was gritty, no oil and the odor was earthy.
One ponar grab resulted in 2" of unconsolidated gray silts over a mixture of silts, gravel and coarse sand. There was also a very light amount of detrital material in the ponar grab.

STATION RG9316

DEPTH TO BOTTOM = 20.6' COLLECTION METHOD-GRAVITY CORE

Two cores in this area resulted in recoveries of 30" and 31". The bottom 20" of each core consisted of dark black very compact silts. The remaining overburden (10" and 11") consisted of looser more gelatinous gray silts. There was a very light amount of fine sand throughout the sample, oil was visible, the sample had a strong hydrocarbon odor and the texture was primarily smooth.

STATION RG9317

DEPTH TO BOTTOM = 17.2' COLLECTION METHOD-GRAVITY CORE/PONAR

Attempted four core drops in this area and they all resulted in penetration depth of 6" or less. The core samples were a mixture of gray gravel, coarse sand and a very light amount of silts. A ponar grab also resulted in a mixture of sand, silts and a lighter amount of gravel. The sample had an earthy odor, no oil was observed and the texture was gritty.

STATION RG9318

DEPTH TO BOTTOM = 16.8' COLLECTION METHOD-PONAR DREDGE

There were no cores collected in this area. Two ponar grabs resulted in gray to brown hard packed sand with a very light amount of silts. There was a light amount of aquatic vegetation on the samples surface, no oil was observed and the sample had an earthy odor.

STATION RG9319

DEPTH TO BOTTOM = 22.9' COLLECTION METHOD-GRAVITY CORE

Two 40" cores were collected at this station. They were both loose gray to darker gray silts with some fine sand (10%) and some small stones mixed throughout. The texture was smooth to very light gritty, no oil was observed and the odor was earthy.

STATION RG9320

DEPTH TO BOTTOM = 19.8 COLLECTION METHOD-PONAR DREDGE

Four core attempts in this area resulted in no sample. Two ponar grabs yielded a mixture of gravel, silts and pieces of spent coal. The sample was gray in color, no visible oil, the texture was gritty and the odor was mild septic.

ROUGE RIVER SEDIMENT DATA DELIVERY ORDER NO.0004 DATE COLLECTED 4/21-22/93

PARAMETERS (ug/Kg)	RG9301	RG9302	RG9303	RG9304	RG9305	RG9306	RG9307	RG9308	RG9309	RG9310	RG9311	RG9312
ALDRIN	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
CHLORDANE	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
DIELDRIN	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
ENDIN ALDEHYDE	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
ENDOSULFAN S.	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
ENDRIN	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
HEPTACHLOR EPOX	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
HEPTACHLOR	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
METHOXYCHLOR	<1.8	<0.93	<2.2	<0.91	<0.86	<0.91	<0.92	<1.3	<1.0	<1.1	<0.92	<0.92
PCB1016	<0.60	<0.31	<0.75	<0.30	<0.29	<0.30	<0.31	<0.43	<0.34	<0.37	<0.34	<0.31
PCB1221	<0.60	<0.31	<0.75	<0.30	<0.29	<0.30	<0.31	<0.43	<0.34	<0.37	<0.34	<0.31
PCB1232	<0.60	<0.31	<0.75	<0.30	<0.29	<0.30	<0.31	<0.43	<0.34	<0.37	<0.34	<0.31
PCB1242	1.6	0.67	1.8	3.7	0.48	2.5	2.4	1.8	0.46	<0.37	1.7	0.56
PCB1248	<0.60	<0.31	<0.75	<0.30	<0.29	<0.30	<0.31	<0.43	<0.34	<0.37	<0.34	<0.31
PCB1254	<0.60	<0.31	<0.75	<0.30	<0.29	<0.30	<0.31	<0.43	<0.34	<0.37	<0.34	<0.31
PCB1260	1.4	0.42	1.2	0.33	0.56	0.85	0.90	1.5	1.6	0.69	1.4	0.41
TOXAPHENE	<12	<6.2	<15	<6.1	<5.8	<6.0	<6.2	<8.6	<6.8	<7.3	<6.2	<6.2
a-BHC	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
a-ENDOSULFAN	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
b-BHC	<0.18	<0.93	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
b-ENDOSULFAN	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
d-BHC	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
g-BHC	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
p,p'-DDD	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
p,p'-DDE	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
p,p'DDT	<0.18	<0.093	<0.22	<0.091	<0.086	<0.091	<0.092	<0.13	<0.10	<0.11	<0.10	<0.092
ARSENIC	10	13	10	9.2	17	9.8	8.8	9.7	13	9.3	12	9.4
CADMIUM	3.2	6.1	4.9	5.1	8.1	4.8	8.4	2.9	6.9	2.8	5.9	<1.4
CHROMIUM	88	94	70	80	50	94	100	86	170	99	150	54
COPPER	130	150	120	170	330	150	170	160	240	150	210	80
IRON	29000	31000	30000	32000	25000	31000	30000	35000	47000	31000	38000	27000
LEAD	150	190	150	180	300	310	290	210	350	200	380	120
MERCURY	0.45	0.50	0.48	0.47	2.2	0.49	0.76	0.52	0.69	0.54	0.49	0.30
NICKEL	34	41	38	42	43	44	51	53	55	49	61	36
ZINC	510	580	510	620	1900	720	880	720	950	670	1000	370
AMMONIA	120	690	320	360	970	290	340	370	290	370	220	210
TKN	220	1000	420	2200	1400	1900	1500	4100	2400	3000	2400	410
T.PHOS.	1100	1400	1100	2700	780	960	1300	1400	2100	1200	3400	1500
COD	130000	130000	140000	170000	250000	220000	210000	250000	310000	200000	220000	100000
CYANIDE	<1.5	<1.5	<1.5	<1.5	53	<1.5	<1.5	<1.5	7.6	<1.5	<1.5	<1.5
O&G	12000	11000	9800	9200	36000	11000	11000	17000	22000	13000	18000	4300
TVS	9.7	12	12	7.7	9.8	9.7	9.0	9.1	12	12	11	6.5
TOC	70000	54000	54000	62000	54000	54000	63000	59000	67000	56000	53000	14000
% SOLIDS	53	51	44	53	55	53	51	37	46	43	46	53
SP. GRAVITY	2.1	1.6	1.3	1.5	1.7	1.5	1.6	1.3	1.4	1.4	1.6	1.7
ACENAPHTHENE	<0.60	<0.60	1.1	-----	<0.60	-----	-----	-----	<0.60	-----	-----	-----
ACENAPHTHYLENE	1.2	3.0	2.0	-----	2.0	-----	-----	-----	3.6	-----	-----	-----
ANTHRACENE	1.9	0.91	5.3	-----	3.1	-----	-----	-----	6.4	-----	-----	-----
BENZO(a)ANTHRACENE	2.9	1.1	5.5	-----	6.6	-----	-----	-----	2.7	-----	-----	-----
BENZO(a)PYRENE	3.3	1.1	6.7	-----	4.9	-----	-----	-----	0.95	-----	-----	-----
BENZO(b)FLUORANTHENE	4.3	1.6	6.4	-----	5.6	-----	-----	-----	1.2	-----	-----	-----
BENZO(ghi)PERYLENE	1.6	<0.60	3.2	-----	2.7	-----	-----	-----	<0.60	-----	-----	-----
BENZO(k)FLUORANTHENE	1.8	<0.60	2.9	-----	2.4	-----	-----	-----	<0.60	-----	-----	-----
CHRYSENE	3.3	1.3	3.7	-----	3.3	-----	-----	-----	3.6	-----	-----	-----
DIBENZO(a,h)ANTHRACENE	1.6	<0.60	1.7	-----	2.0	-----	-----	-----	<0.60	-----	-----	-----
FLUORANTHENE	1.6	1.1	4.8	-----	2.4	-----	-----	-----	4.8	-----	-----	-----
FLUORENE	9.2	3.9	19	-----	12	-----	-----	-----	12	-----	-----	-----
INDENO(1,2,3-cd)PYRENE	16	3.0	27	-----	26	-----	-----	-----	<0.60	-----	-----	-----
NAPHTHALENE	4.0	1.3	4.1	-----	0.65	-----	-----	-----	18	-----	-----	-----
PHENATHRENE	6.6	3.3	17	-----	11	-----	-----	-----	18	-----	-----	-----

PARAMETERS (ug/Kg)	RG9313	RG9314	RG9315	RG9316	RG9317	RG9318	RG9319	RG9320
ALDRIN	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
HLORDANE	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
DIELDRIN	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
ENDIN ALDEHYDE	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
ENDOSULFAN S.	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
ENDRIN	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
HEPTACHLOR EPOX	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
HEPTACHLOR	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
METHOXYCHLOR	<0.89	<1.2	<1.2	<0.97	<1.1	<0.83	<1.1	<1.1
PCB1016	<0.30	<0.39	<0.39	<0.32	<0.38	<0.28	<0.37	<0.37
PCB1221	<0.30	<0.39	<0.39	<0.32	<0.38	<0.28	<0.37	<0.37
PCB1232	<0.30	<0.39	<0.39	<0.32	<0.38	<0.28	<0.37	<0.37
PCB1242	1.3	1.4	0.83	0.77	<0.38	<0.28	<0.37	<0.37
PCB1248	<0.30	<0.39	<0.39	<0.32	<0.38	<0.28	<0.37	<0.37
PCB1254	<0.30	<0.39	<0.39	<0.32	<0.38	<0.28	<0.37	<0.37
PCB1260	1.4	0.88	5.5	1.1	1.2	1.5	<2.5	0.87
TOXAPHENE	<5.9	<7.7	<7.8	<6.8	<7.7	<5.6	<7.3	<7.4
a-BHC	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
a-ENDOSULFAN	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
b-BHC	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
b-ENDOSULFAN	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
d-BHC	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
g-BHC	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
p,p'-DDD	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
p,p'-DDE	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
p,p'DDT	<0.089	<0.12	<0.12	<0.097	<0.11	<0.083	<0.11	<0.11
ARSENIC	11	11	8.8	9.0	7.6	4.9	7.6	6.7
CADMIUM	13	4.8	2.9	3.8	4.8	<1.5	4.5	2.3
CHROMIUM	160	170	67	79	48	60	55	34
COPPER	190	200	95	140	81	88	87	54
IRON	35000	45000	25000	23000	21000	24000	21000	20000
LEAD	450	290	120	200	97	170	100	67
MERCURY	0.57	0.58	0.30	0.52	0.30	0.25	0.52	0.31
NICKEL	62	66	50	51	41	33	50	32
ZINC	840	770	330	470	280	750	280	200
AMMONIA	300	230	200	260	220	60	370	220
TKN	1300	1400	2300	2400	2700	140	1600	2400
T.PHOS.	3400	3400	1500	2200	1200	780	1100	980
COD	150000	200000	120000	170000	56000	140000	160000	150000
CYANIDE	7.4	<1.5	<1.5	<1.5	<1.5	4.9	<1.5	<1.5
O&G	11000	15000	4700	3700	2400	5500	3600	3100
TVS	8.4	8.3	8.0	16	7.4	3.6	11	5.5
TOC	66000	20000	18000	80000	32000	39000	120000	45000
% SOLIDS	56	43	41	50	42	59	45	45
SP. GRAVITY	1.7	1.4	1.2	1.5	1.3	1.5	1.2	1.3
ACENAPHTHENE	1.3	<0.60	<0.60	<0.60	<0.60	-----	-----	-----
ACENAPHTHYLENE	6.8	9.7	<0.60	<0.60	0.85	-----	-----	-----
ANTHRACENE	7.0	2.3	4.8	0.62	4.3	-----	-----	-----
BENZO(a)ANTHRACENE	8.0	4.5	6.2	<0.60	7.5	-----	-----	-----
BENZO(a)PYRENE	<0.60	7.4	9.4	1.0	7.5	-----	-----	-----
BENZO(b)FLUORANTHENE	6.6	5.8	8.6	1.4	8.5	-----	-----	-----
BENZO(ghi)PERYLENE	1.2	1.7	3.0	2.4	3.0	-----	-----	-----
BENZO(k)FLUORANTHENE	3.2	4.0	4.0	<0.60	4.1	-----	-----	-----
CHRYSENE	4.6	6.2	3.7	<0.60	6.2	-----	-----	-----
DIBENZO(a,h)ANTHRACENE	1.4	1.3	6.4	<0.60	2.1	-----	-----	-----
FLUORANTHENE	6.6	<0.60	2.7	<0.60	3.2	-----	-----	-----
FLUORENE	3.8	11	0.86	2.2	18	-----	-----	-----
INDENO(1,2,3-cd)PYRENE	4.6	16	11	1.0	8.5	-----	-----	-----
NAPHTHALENE	4.5	3.0	1.8	<0.60	3.4	-----	-----	-----
PHENATHRENE	25	7.3	13	1.5	14	-----	-----	-----

ROUGE RIVER DELIVERY ORDER NO. 0004 7 POINT PARTICLE SIZE

RG9301
SIEVE SIZE

<4750 um - 98.2%
<2000 um - 96.8%
<850 um - 95.4%
<425 um - 92.7%
<180 um - 82.1%
<75 um - 77.3%
<53 um - 67.0%

RG9302
SIEVE SIZE

<4750 um - 99.5%
<2000 um - 99.1%
<850 um - 98.7%
<425 um - 97.1%
<180 um - 82.3%
<75 um - 59.5%
<53 UM - 52.1%

RG9303
SIEVE SIZE

<4750 um - 98.9%
<2000 um - 98.5%
<850 um - 98.1%
<425 um - 97.2%
<180 um - 91.6%
<75 um - 84.2%
<53 UM - 77.9%

RG9304
SIEVE SIZE

<4750 um - 99.7%
<2000 um - 99.5%
<850 um - 99.1%
<425 um - 97.1%
<180 um - 90.7%
<75 um - 78.3%
<53 UM - 71.0%

RG9305
SIEVE SIZE

<4750 um - 99.8%
<2000 um - 99.2%
<850 um - 98.7%
<425 um - 97.6%
<180 um - 95.4%
<75 um - 92.7%
<53 UM - 84.9%

RG9306
SIEVE SIZE

<4750 um - 96.2%
<2000 um - 94.5%
<850 um - 93.0%
<425 um - 90.7%
<180 um - 82.1%
<75 um - 79.8%
<53 UM - 69.8%

RG9307
SIEVE SIZE

<4750 um - 99.2%
<2000 um - 99.0%
<850 um - 98.3%
<425 um - 97.0%
<180 um - 87.2%
<75 um - 70.6%
<53 um - 60.2%

RG9308
SIEVE SIZE

<4750 um - 99.8%
<2000 um - 99.6%
<850 um - 99.5%
<425 um - 99.3%
<180 um - 96.3%
<75 um - 92.4%
<53 um - 88.7%

RG9309
SIEVE SIZE

<4750 um - 98.8%
<2000 um - 97.7%
<850 um - 97.0%
<425 um - 94.4%
<180 um - 85.5%
<75 um - 81.1%
<53 um - 75.0%

RG9310
SIEVE SIZE

<4750 um - 90.4%
<2000 um - 89.4%
<850 um - 88.5%
<425 um - 86.6%
<180 um - 82.3%
<75 um - 82.2%
<53 um - 77.0%

RG9311
SIEVE SIZE

<4750 um - 99.7%
<2000 um - 98.7%
<850 um - 97.9%
<425 um - 96.0%
<180 um - 88.6%
<75 um - 84.6%
<53 um - 81.0%

RG9312
SIEVE SIZE

<4750 um - 96.6%
<2000 um - 91.8%
<850 um - 86.2%
<425 um - 78.0%
<180 um - 77.2%
<75 um - 76.7%
<53 um - 72.9%

RG9313
SIEVE SIZE

<4750 um - 90.4%
<2000 um - 85.4%
<850 um - 76.4%
<425 um - 63.7%
<180 um - 44.7%
<75 um - 40.7%
<53 um - 35.1%

RG9314
SIEVE SIZE

<4750 um - 84.6%
<2000 um - 77.2%
<850 um - 74.7%
<425 um - 72.2%
<180 um - 67.2%
<75 um - 67.2%
<53 um - 63.2%

RG9315
SIEVE SIZE

<4750 um - 95.5%
<2000 um - 91.5%
<850 um - 85.9%
<425 um - 75.8%
<180 um - 54.8%
<75 um - 50.6%
<53 um - 42.7%

RG9316
SIEVE SIZE

<4750 um - 97.2%
<2000 um - 95.0%
<850 um - 90.2%
<425 um - 84.6%
<180 um - 73.3%
<75 um - 70.7%
<53 um - 63.3%

RG9317
SIEVE SIZE

<4750 um - 94.8%
<2000 um - 93.2%
<850 um - 91.6%
<425 um - 88.7%
<180 um - 79.9%
<75 um - 78.5%
<53 um - 65.8%

RG9318
SIEVE SIZE

<4750 um - 98.8%
<2000 um - 97.6%
<850 um - 94.0%
<425 um - 81.6%
<180 um - 55.0%
<75 um - 51.1%
<53 um - 42.7%

RG9319
SIEVE SIZE

<4750 um - 99.8%
<2000 um - 97.4%
<850 um - 93.1%
<425 um - 88.7%
<180 um - 81.5%
<75 um - 80.8%
<53 um - 73.7%

RG9320
SIEVE SIZE

<4750 um - 72.2%
<2000 um - 64.9%
<850 um - 59.2%
<425 um - 55.8%
<180 um - 50.0%
<75 um - 48.6%
<53 um - 43.6%

PARAMETERS		RG9301	RG9305	RG9309	RG9313	RG9316	RG9319	W.Q.#1	W.Q.#2
ALDRIN	ug/L	<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
CHLORDANE		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
DIELDRIN		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
ENDIN ALDEHYDE		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
ENDOSULFAN S.		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
ENDRIN		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
HEPTACHLOR EPOX		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
HEPTACHLOR		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
METHOXYCHLOR		<0.16	<0.15	<0.18	<0.30	<0.30	<0.18	<0.75	<0.75
PCB1016		<0.030	<0.050	<0.030	<0.060	<0.060	<0.030	<0.25	<0.25
PCB1221		<0.030	<0.050	<0.030	<0.060	<0.060	<0.030	<0.25	<0.25
PCB1232		<0.030	<0.050	<0.030	<0.060	<0.060	<0.030	<0.25	<0.25
PCB1242		0.11	0.050	0.085	0.14	0.12	<0.030	<0.25	<0.25
PCB1248		<0.030	<0.050	<0.030	<0.060	<0.060	<0.030	<0.25	<0.25
PCB1254		<0.030	<0.050	<0.030	<0.060	<0.060	<0.030	<0.25	<0.25
PCB1260		0.032	0.050	0.034	0.090	0.085	0.054	<0.25	<0.25
TOXAPHENE		<1.1	<1.0	<1.2	<2.0	<2.0	<1.2	<5.0	<5.0
a-BHC		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
a-ENDOSULFAN		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
b-BHC		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
b-ENDOSULFAN		<0.080	<0.077	<0.090	<0.15	<0.15	<0.090	<0.050	<0.050
d-BHC		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
g-BHC		<0.080	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
p,p'-DDD		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
p,p'-DDE		<0.016	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
p,p'DDT		<0.080	<0.015	<0.018	<0.030	<0.030	<0.018	<0.050	<0.050
ARSENIC	mg/L	0.004	0.007	0.006	0.004	0.004	0.002	<0.002	<0.002
BARIUM		0.66	0.35	0.42	0.62	0.58	0.60	0.05	0.05
CADMIUM		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
CHROMIUM		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005
COPPER		0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	0.006
LEAD		<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
MERCURY		<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
NICKEL		0.005	0.012	0.008	0.010	0.006	0.011	0.005	0.006
SELENIUM		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SILVER		<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
ZINC		0.09	0.06	0.12	0.12	0.12	0.10	0.02	0.03
AMMONIA		14	47	29	22	21	28	0.60	0.59
TKN		17	47	27	23	25	30	4.1	3.3
T.PHOS.		0.066	0.052	0.050	0.061	<0.01	0.018	0.13	0.13
COD		44	68	50	40	26	37	24	29
CYANIDE		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
O&G		4.3	6.1	11	2.8	2.2	6.3	1.6	3.2
TOC		19	32	25	21	14	19	12	13
TDS		330	320	260	260	240	280	190	190
T.HARDNESS		170	140	160	160	160	190	140	140
TSS		190	22	500	160	230	260	46	58
ACENAPHTHENE		<0.50	36	<0.50	1.4	<0.50	<0.50	<0.50	<0.50
ACENAPHTHYLENE		<0.50	47	<0.50	7.4	<0.50	<0.50	<0.50	<0.50
ANTHRACENE		<0.50	9.2	<0.50	5.4	<0.50	<0.50	<0.50	<0.50
BENZO(a)ANTHRACENE		<0.50	3.5	<0.50	4.6	<0.50	<0.50	<0.50	<0.50
BENZO(a)PYRENE		<0.50	2.5	<0.50	2.5	<0.50	<0.50	<0.50	<0.50
BENZO(b)FLUORANTHENE		<0.50	2.4	<0.50	3.0	<0.50	<0.50	<0.50	<0.50
BENZO(ghi)PERYLENE		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
BENZO(k)FLUORANTHENE		<0.50	1.5	<0.50	0.73	<0.50	<0.50	<0.50	<0.50
CHRYSENE		0.51	3.6	0.81	3.2	1.1	0.65	<0.50	<0.50
DIBENZO(a,h)ANTHRACENE		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
FLUORANTHENE		<0.50	29	<0.50	7.2	<0.50	0.55	<0.50	<0.50
FLUORENE		0.52	14	1.7	16	1.2	1.1	<0.50	<0.50
INDENO(1,2,3-cd)PYRENE		<0.50	2.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
NAPHTHALENE		<0.50	<0.50	<0.50	2.0	<0.50	<0.50	<0.50	<0.50
PHENATHRENE		<0.50	30	<0.50	1.5	0.99	<0.50	<0.50	<0.50
PYRENE		<0.50	6.9	2.2	9.7	1.4	0.81	<0.50	<0.50

PROJECT NO. 14-3308 00

NTH Consultants, Ltd.

TABULATION OF LABORATORY TEST DATA

Test Boring or Test Pit Number	Sample Number	Depth of Sample Tip	Elevation of Sample Tip	Unconfined Compressive Strength (PSF)	Failure Strain (Percent)	Natural Water Content (Percent of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Particle Size Distribution							Atterberg Limits			Apparent Specific Gravity	Loss on Ignition (Percent)
								Colloids (Percent)	Clay (Percent)	Silt (Percent)	Fine Sand (Percent)	Medium Sand (Percent)	Coarse Sand (Percent)	Gravel (Percent)	Liquid Limit (Percent)	Plastic Limit (Percent)	Plasticity Index (Percent)		
STA1	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	56	32	24	-	-
STA2	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	67	32	35	-	-
STA3	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	69	37	32	-	-
STA4	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	64	17	47	-	-
STA5	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	54	30	24	-	-
STA6	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	55	30	25	-	-
STA7	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	53	36	27	-	-
STA8	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	73	39	34	-	-

PROJECT NO. 14-3308 00

NTH Consultants, Ltd.

TABULATION OF LABORATORY TEST DATA

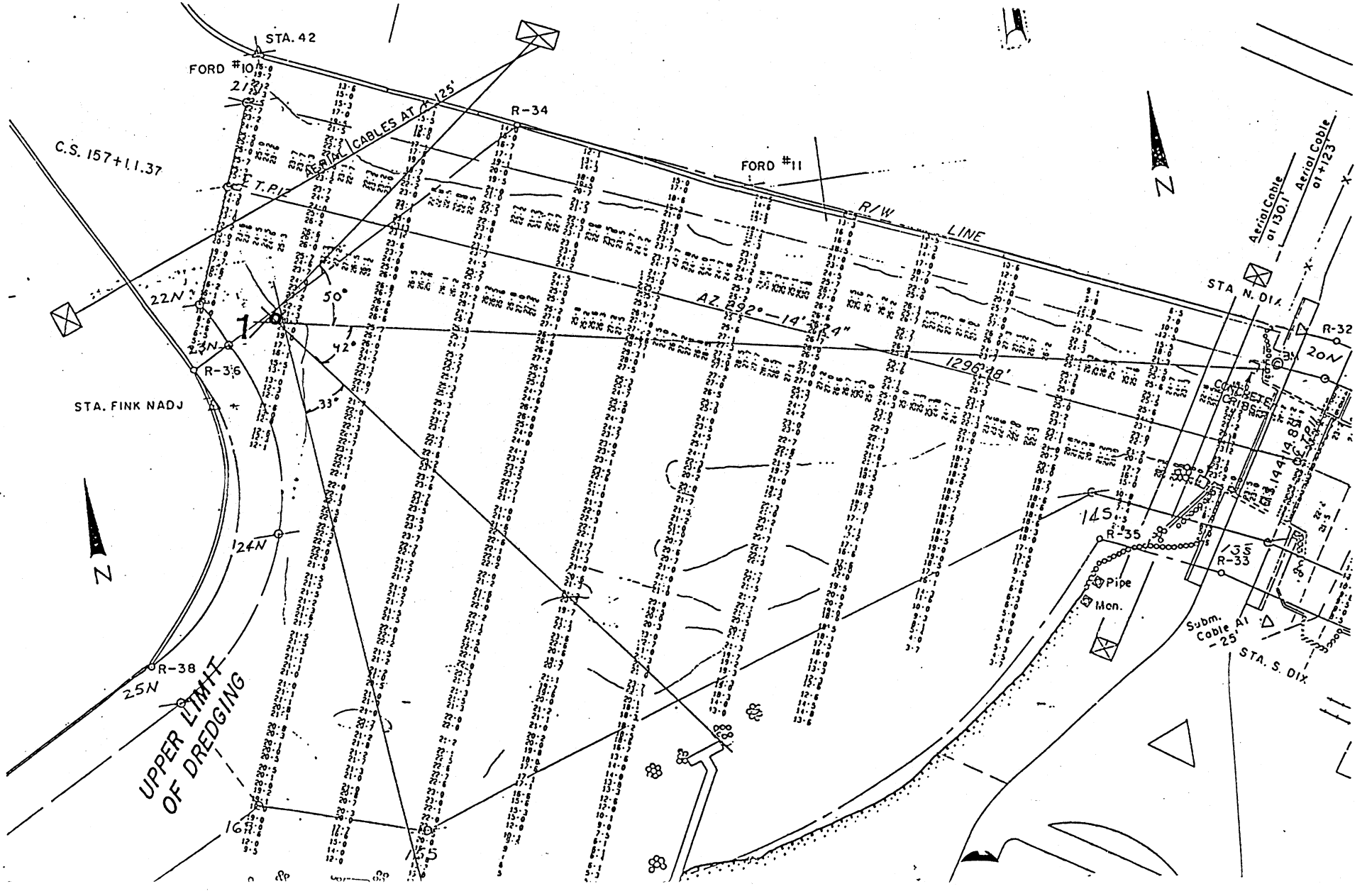
Test Boring or Test Pit Number	Sample Number	Depth of Sample Tip	Elevation of Sample Tip	Unconfined Compressive Strength (PSF)	Failure Strain (Percent)	Natural Water Content (Percent of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Particle Size Distribution							Atterberg Limits			Apparent Specific Gravity	Loss on Ignition (Percent)
								Colloids (Percent)	Clay (Percent)	Silt (Percent)	Fine Sand (Percent)	Medium Sand (Percent)	Coarse Sand (Percent)	Gravel (Percent)	Liquid Limit (Percent)	Plastic Limit (Percent)	Plasticity Index (Percent)		
STA9	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	64	36	28	-	-
STA10	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	71	33	38	-	-
STA11	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	60	33	27	-	-
STA12	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	51	28	23	-	-
STA13	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	40	27	13	-	-
STA14	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	60	30	30	-	-
STA15	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	44	28	16	-	-
STA16	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	56	32	24	-	-

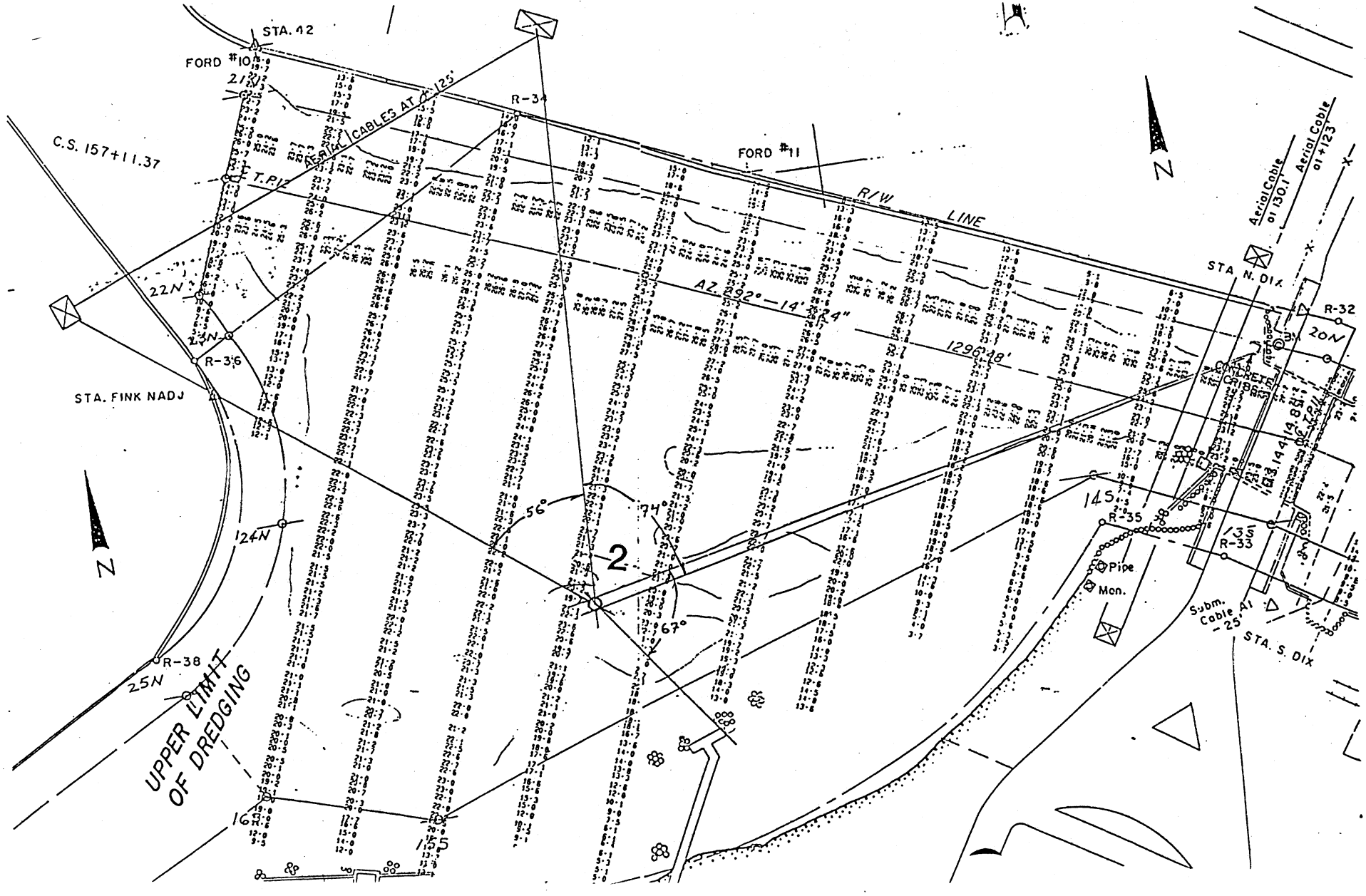
PROJECT NO. 14-3308 00

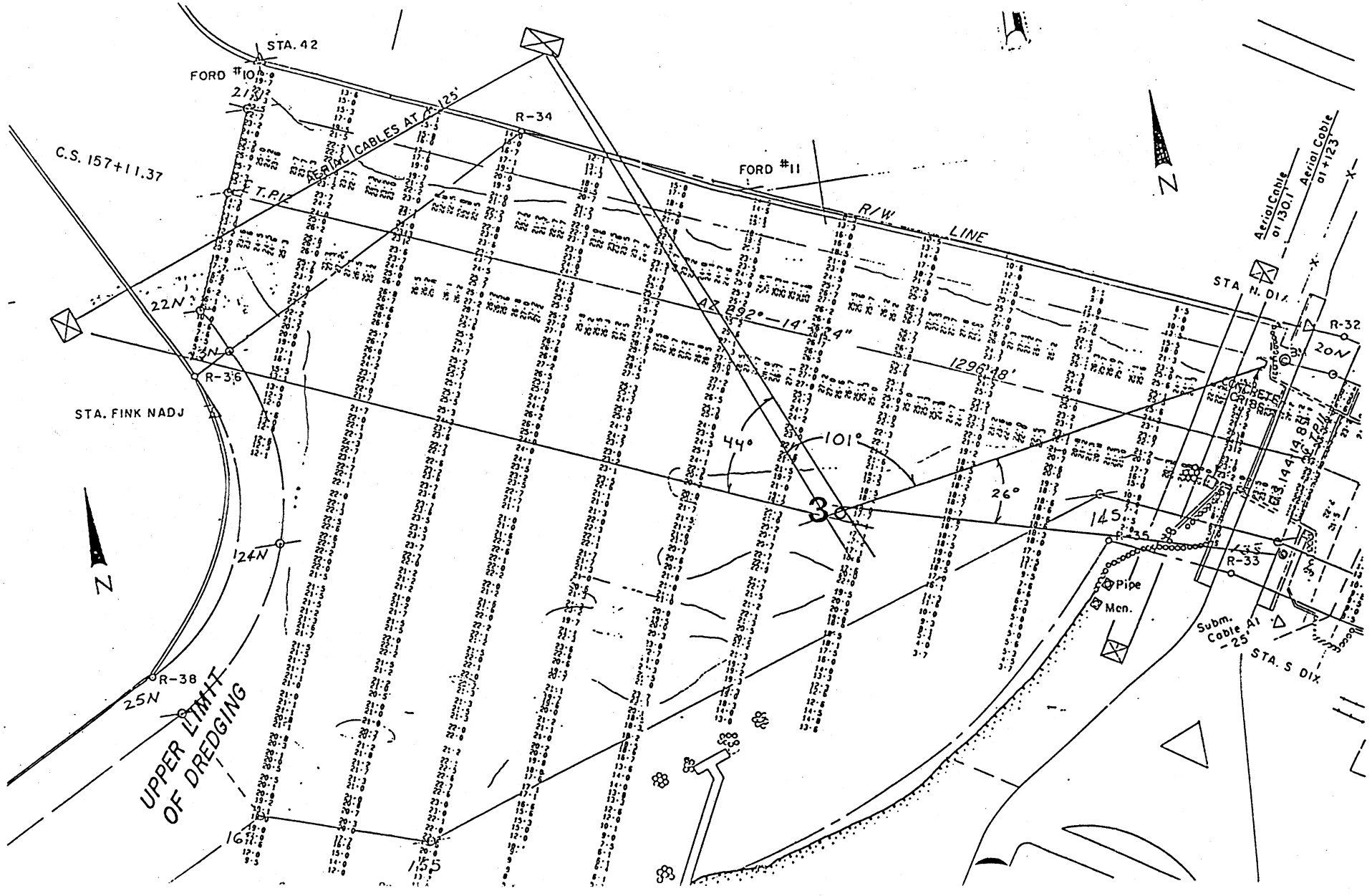
NTH Consultants, Ltd.

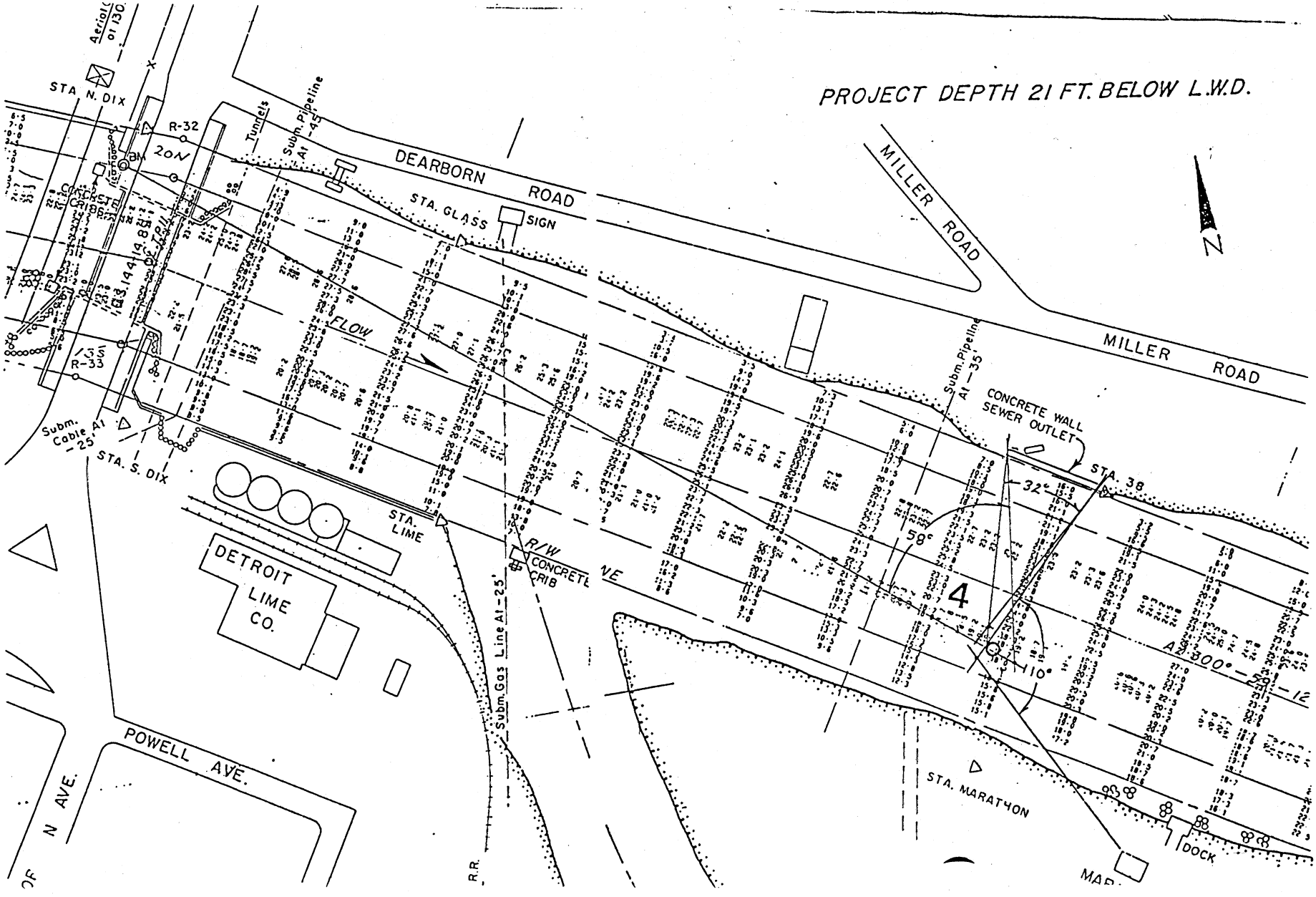
TABULATION OF LABORATORY TEST DATA

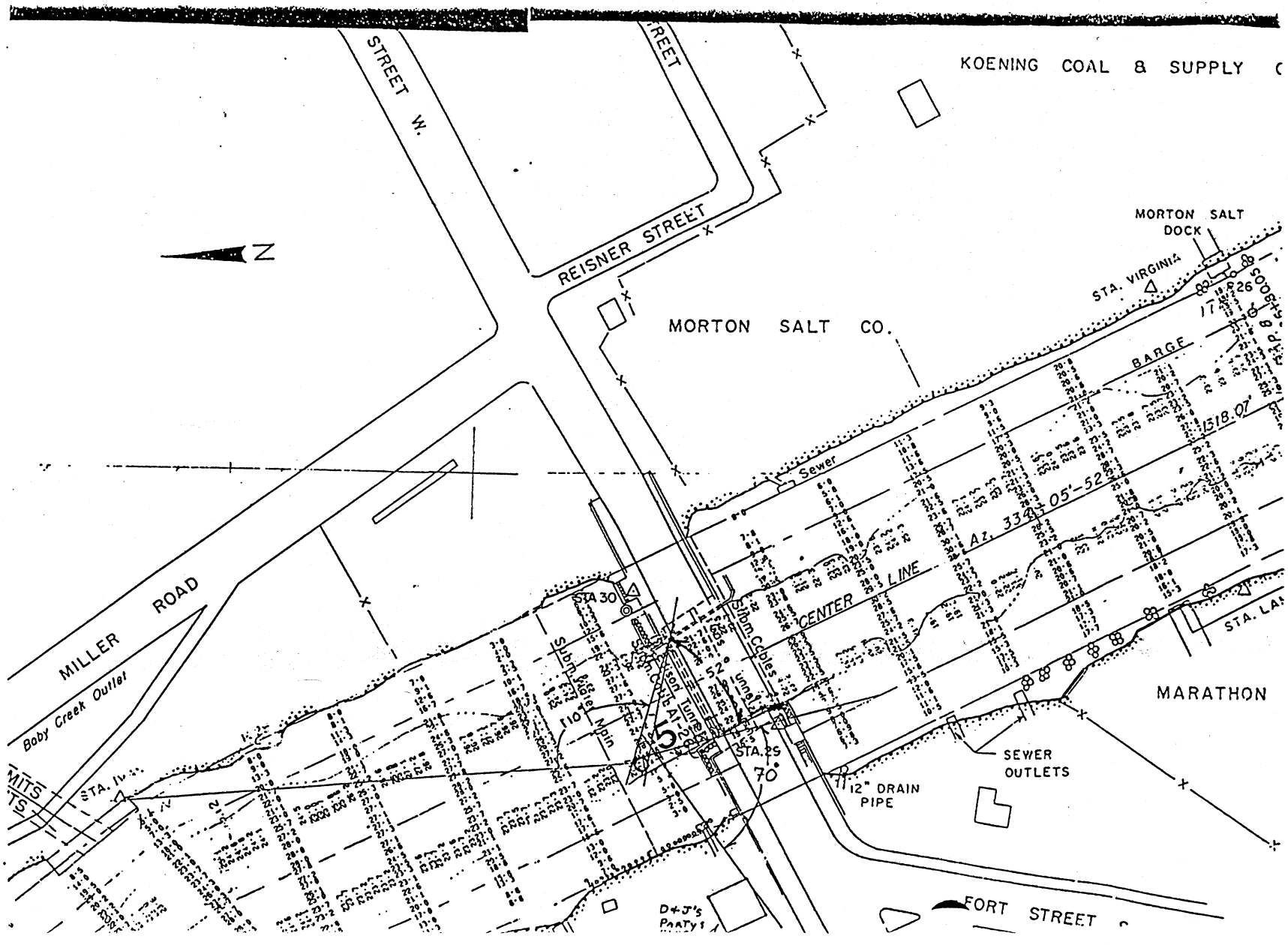
Test Boring or Test Pit Number	Sample Number	Depth of Sample Tip	Elevation of Sample Tip	Unconfined Compressive Strength (PSF)	Failure Strain (Percent)	Natural Water Content (Percent of Dry Weight)	In-Place Dry Density (Pounds per Cubic Foot)	Particle Size Distribution							Atterberg Limits			Apparent Specific Gravity	Loss on Ignition (Percent)
								Colloids (Percent)	Clay (Percent)	Silt (Percent)	Fine Sand (Percent)	Medium Sand (Percent)	Coarse Sand (Percent)	Gravel (Percent)	Liquid Limit (Percent)	Plastic Limit (Percent)	Plasticity Index (Percent)		
STA17	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	57	30	27	-	-
STA18	1	-	-	-	-	-	-	-	-	-	-	-	-	-	NON PLASTIC			-	-
STA19	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	61	32	29	-	-
STA20	1	1.0	-	-	-	-	-	-	-	-	-	-	-	-	63	24	39	-	-


STA. 42
FORD #10
R-34
C.S. 157+11.37
AERIAL CABLES AT +125'
FORD #11
R/W LINE
AZ. 292°-14'-24"
1296.48'
STA. N. DIX
Aerial Cable at 130.1'
Aerial Cable at +123'
R-32
20N
22N
23N
R-36
STA. FINK NADJ
50°
42°
33°
N
24N
R-38
25N
UPPER LIMIT OF DREDGING
R-35
R-33
Pipe
Mon.
Subm. Cable At -25'
STA. S. DIX

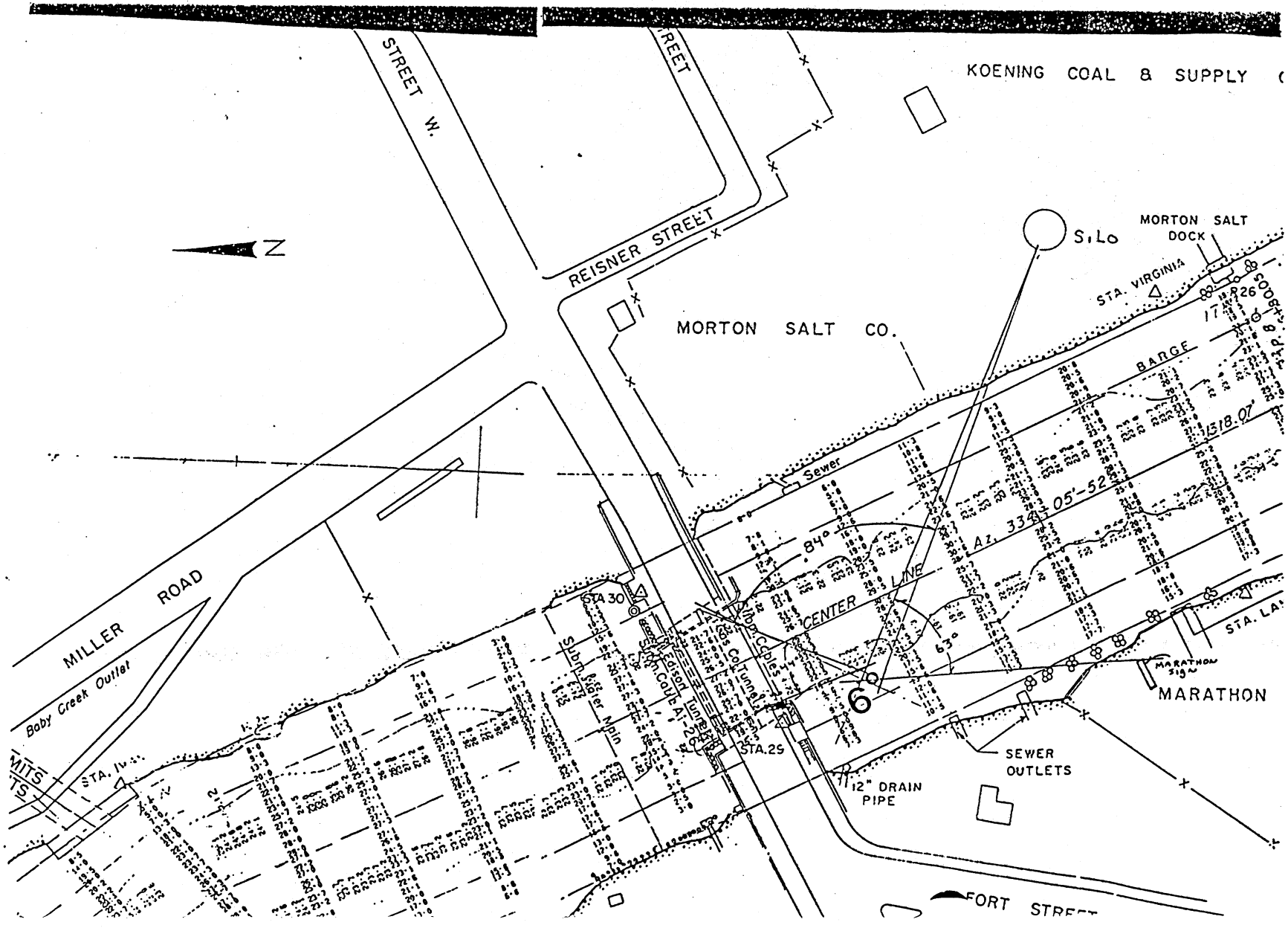

STA. 42
FORD #10
21N
R-34
AERIAL CABLES AT ± 125'
C.S. 157+11.37
T.P.I.
FORD #11
R/W LINE
AZ 292°-14'-24"
1296.48'
STA. N. DIX
Aerial Cable
at 130.1'
Aerial Cable
at +123'
R-32
20N
22N
19N
R-36
STA. FINK NADJ
124N
56°
74°
67°
2
145
R-35
135
R-33
Pipe
Mon.
Subm. Cable A1
25'
STA. S. DIX
R-38
25N
UPPER LIMIT OF DREDGING
165
155
N


STA. 42
FORD #10
R-34
C.S. 157+11.37
AERIAL CABLES AT +125'
FORD #11
R/W LINE
Aerial Cable at 130.1'
Aerial Cable at +123'
STA. N. DIX
R-32
20N
22N
R-36
STA. FINK NADJ
44°
101°
26°
145
R-35
R-33
Pipe
Mon.
Subm. Cable At -25'
STA. S DIX
24N
R-38
25N
UPPER LIMIT OF DREDGING
N

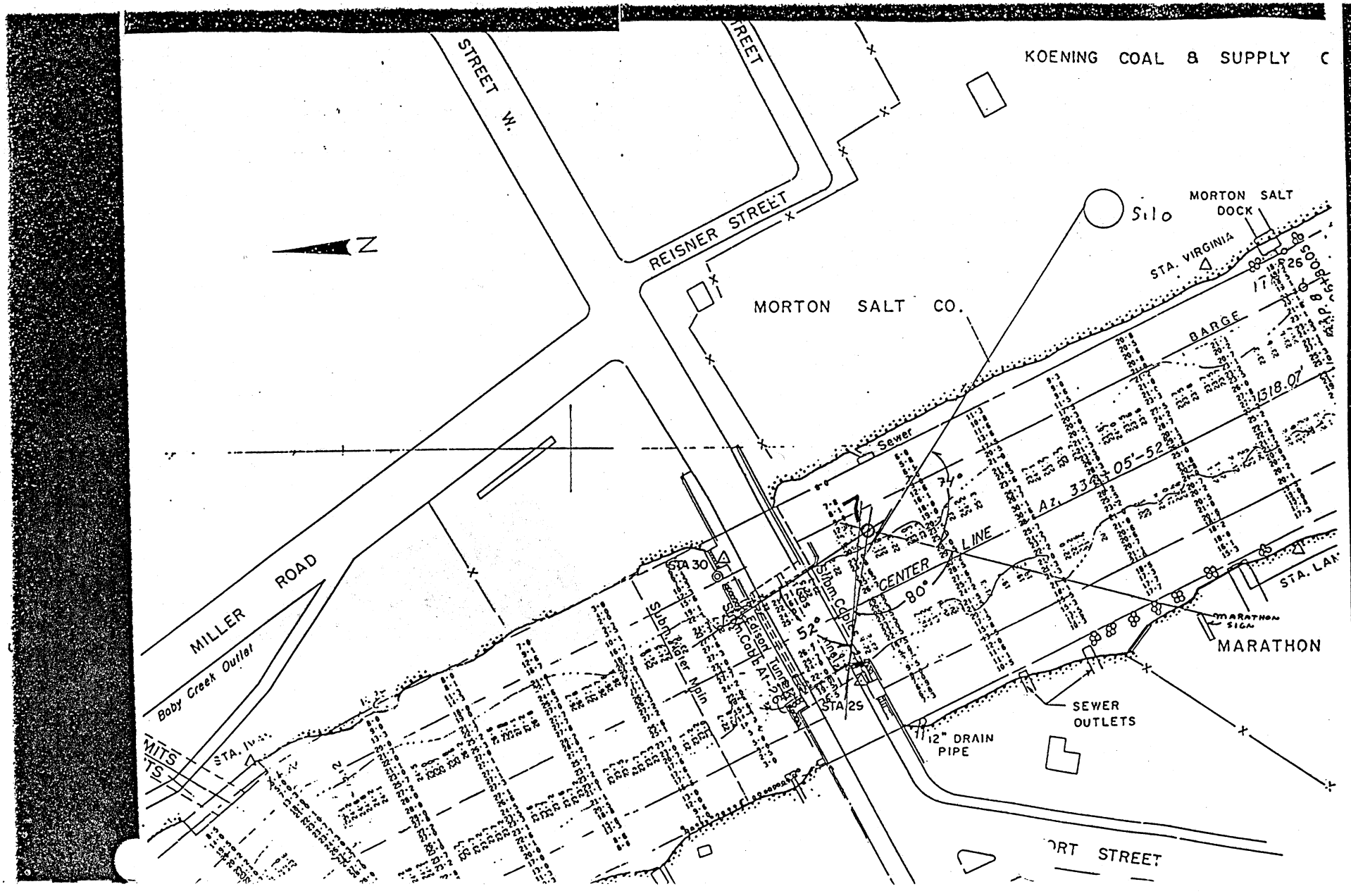

PROJECT DEPTH 21 FT. BELOW L.W.D.
Aerial
01 130
STA. N. DIX
R-32
20N
BM
Tunnels
Subm. Pipeline
A1 -45'
DEARBORN ROAD
STA. GLASS
SIGN
MILLER ROAD
FLOW
R-33A
Subm. Cable A1 -25'
STA. S. DIX
STA. LIME
DETROIT LIME CO.
R/W
CONCRETE CRIB
Subm. Gas Line A1-25'
Subm. Pipeline A1-35'
CONCRETE WALL SEWER OUTLET
STA. 38
32°
58°
110°
4
A1 300'
POWELL AVE.
N AVE.
STA. MARATHON
DOCK
MAR
N

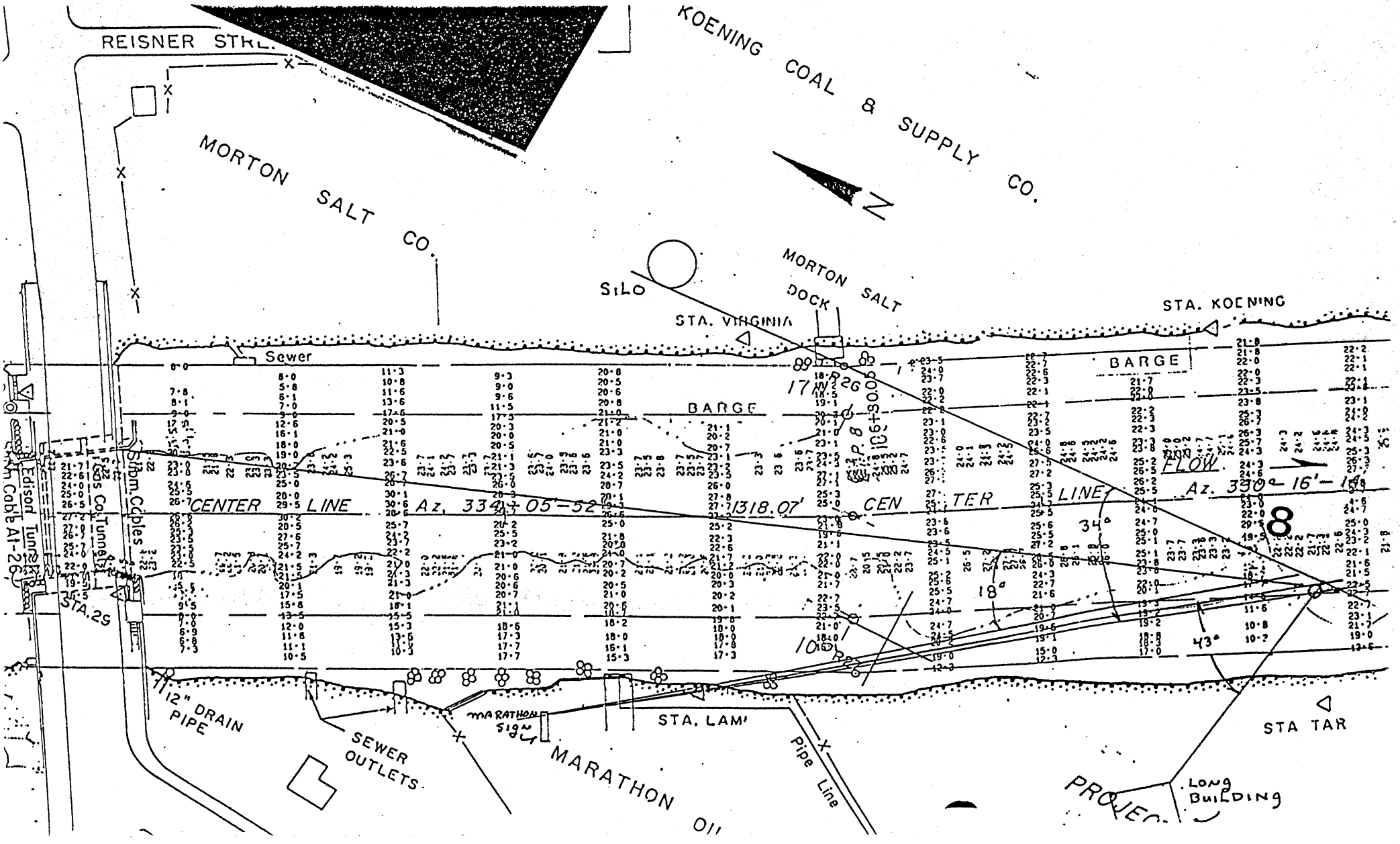


KOENING COAL & SUPPLY
STREET W.
REISNER STREET
MORTON SALT CO.
MORTON SALT DOCK
STA. VIRGINIA
BARGE
Sewer
CENTER LINE
Az. 334°-05'-52"
1318.07'
STA 30
Subm. Cables
Subm. Water Main
52°
STA. 29
70°
12" DRAIN PIPE
SEWER OUTLETS
MARATHON
MILLER ROAD
Baby Creek Outlet
FORT STREET
D+J's Party
N

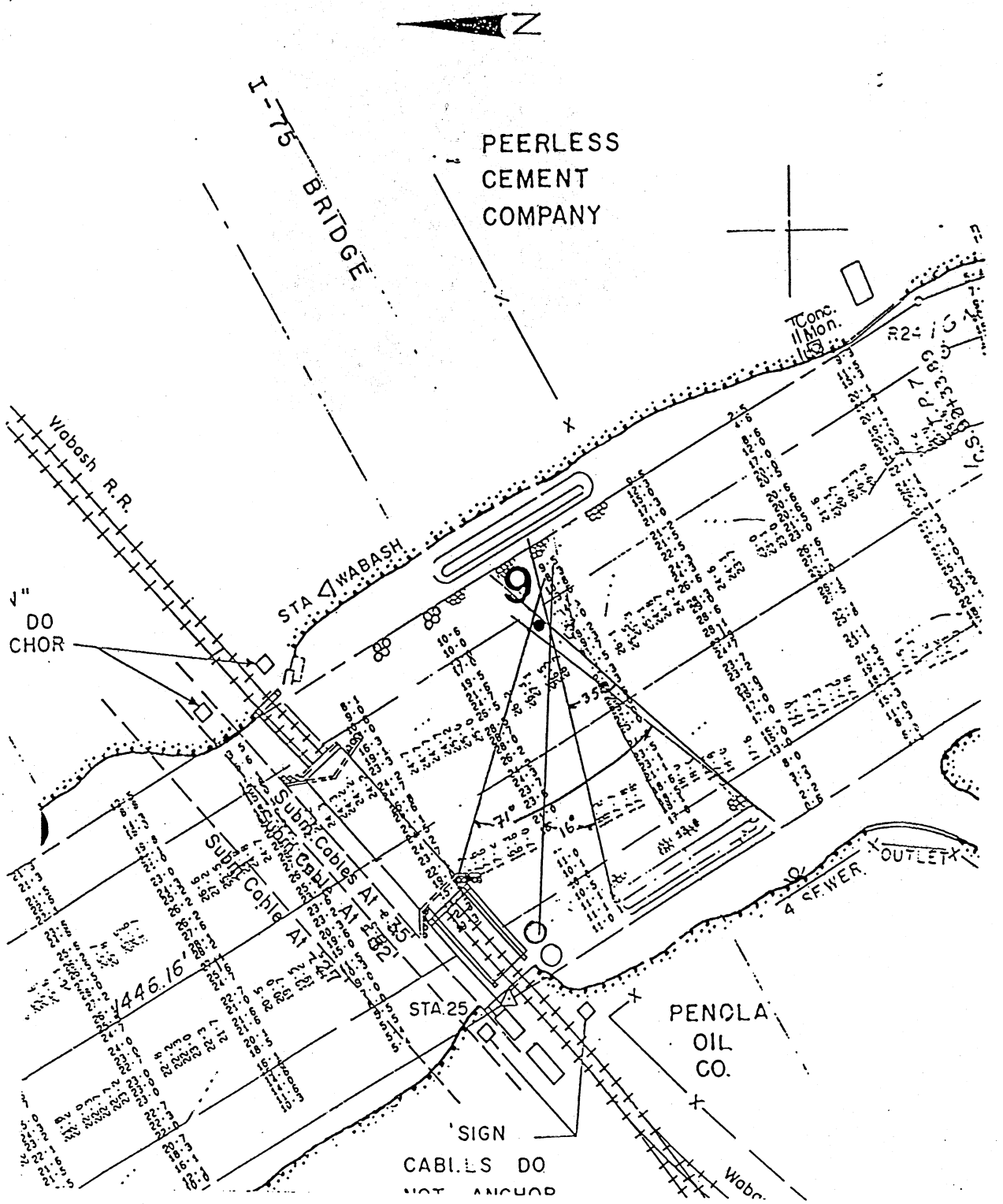


KOENING COAL & SUPPLY
STREET W.
REISNER STREET
MORTON SALT CO.
SILO
MORTON SALT DOCK
STA. VIRGINIA
BARGE
Sewer
CENTER LINE
Az. 334°05'-52"
84°
63°
STA 30
STA.29
MILLER ROAD
Baby Creek Outlet
Edison Tunnel
Cable Tunnel
Cables
Cable Tunnel
Submarine Main
MARATHON
MARATHON Sign
SEWER OUTLETS
12" DRAIN PIPE
FORT STREET

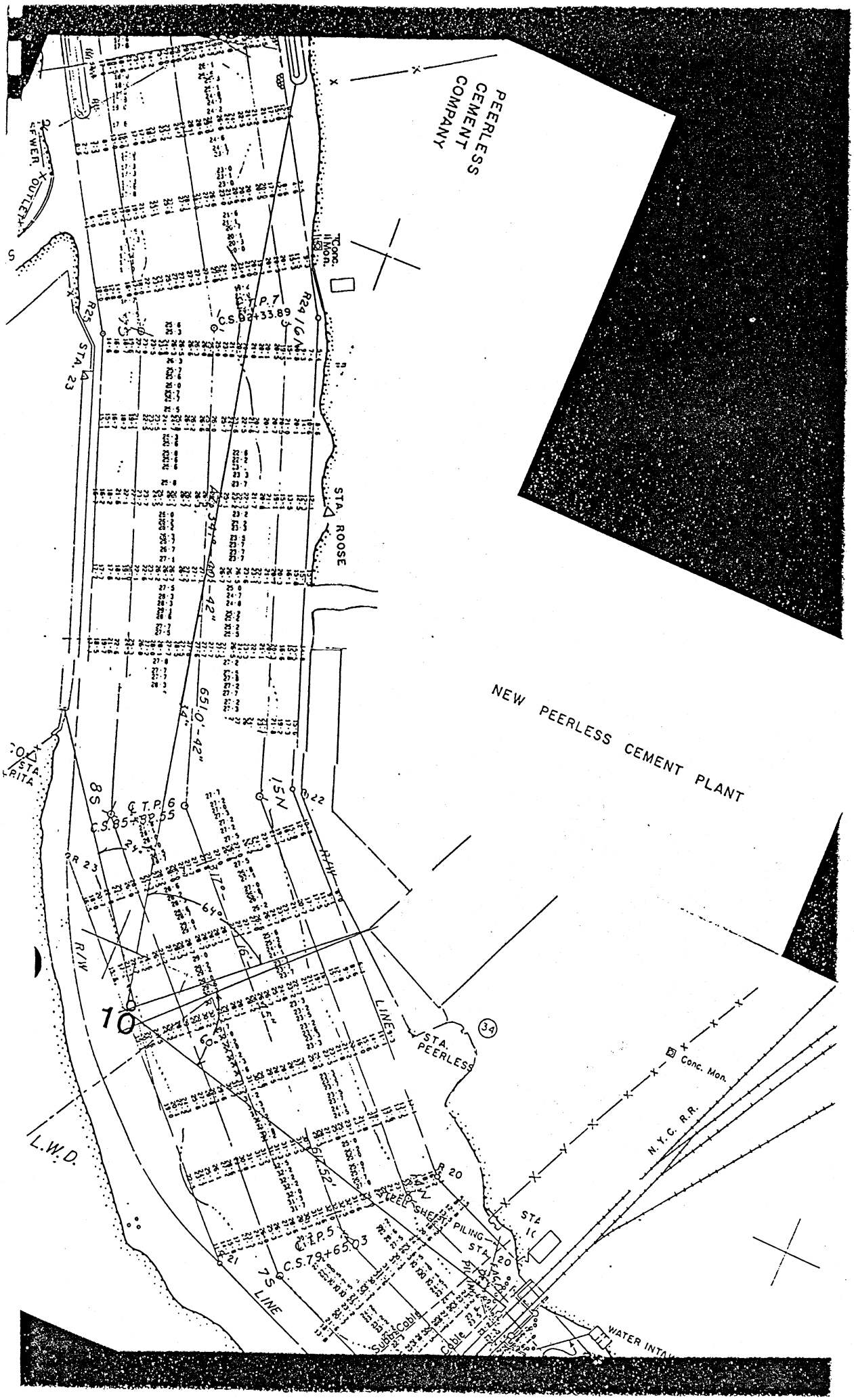

KOENING COAL & SUPPLY C
STREET W.
REISNER STREET
MORTON SALT CO.
Silo
MORTON SALT DOCK
STA. VIRGINIA
BARGE
Sewer
CENTER LINE
Az. 33°05'-52"
1318.07'
80°
52°
74°
STA 30
STA 29
Subm. Water Main
Subm. Cable
Edison Tunnel
MILLER ROAD
Baby Creek Outlet
MARATHON
MARATHON SIGN
SEWER OUTLETS
12" DRAIN PIPE
ORT STREET
N

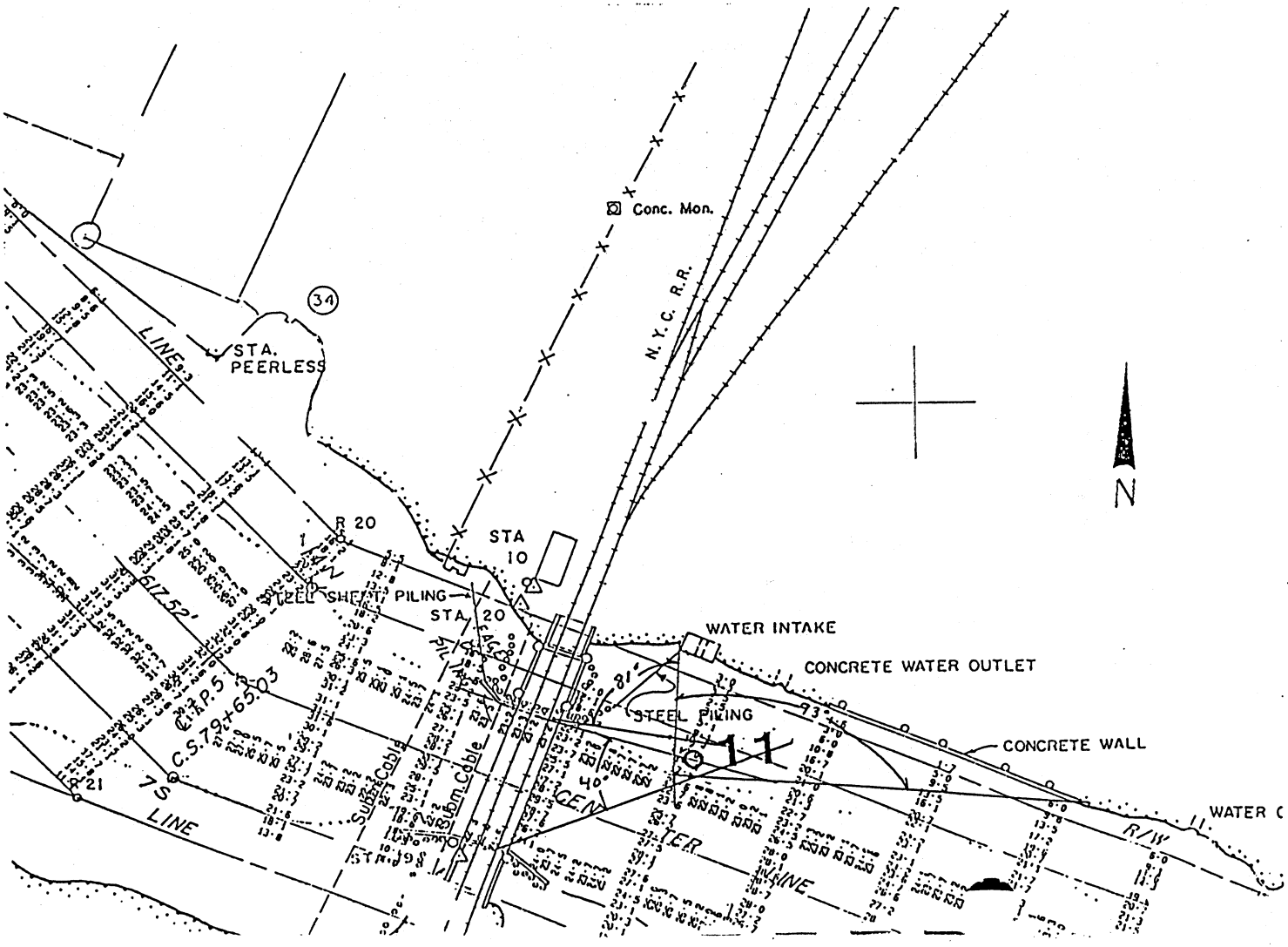


REISNER STR
KOENING COAL & SUPPLY CO.
MORTON SALT CO.
N
SILO
MORTON SALT DOCK
STA. VIRGINIA
STA. KOENING
Sewer
BARGE
BARGE
CENTER LINE Az. 334+05-52
1318.07'
CENTER LINE Az. 330+16'-14
FLOW
8
34°
18°
43°
Edison Tunnel
Cable At-26
Shim. Cables
STA. 29
12" DRAIN PIPE
SEWER OUTLETS
MARATHON SIGN
STA. LAM
MARATHON OIL
Pipe Line
STA TAR
LONG BUILDING
PROJEC

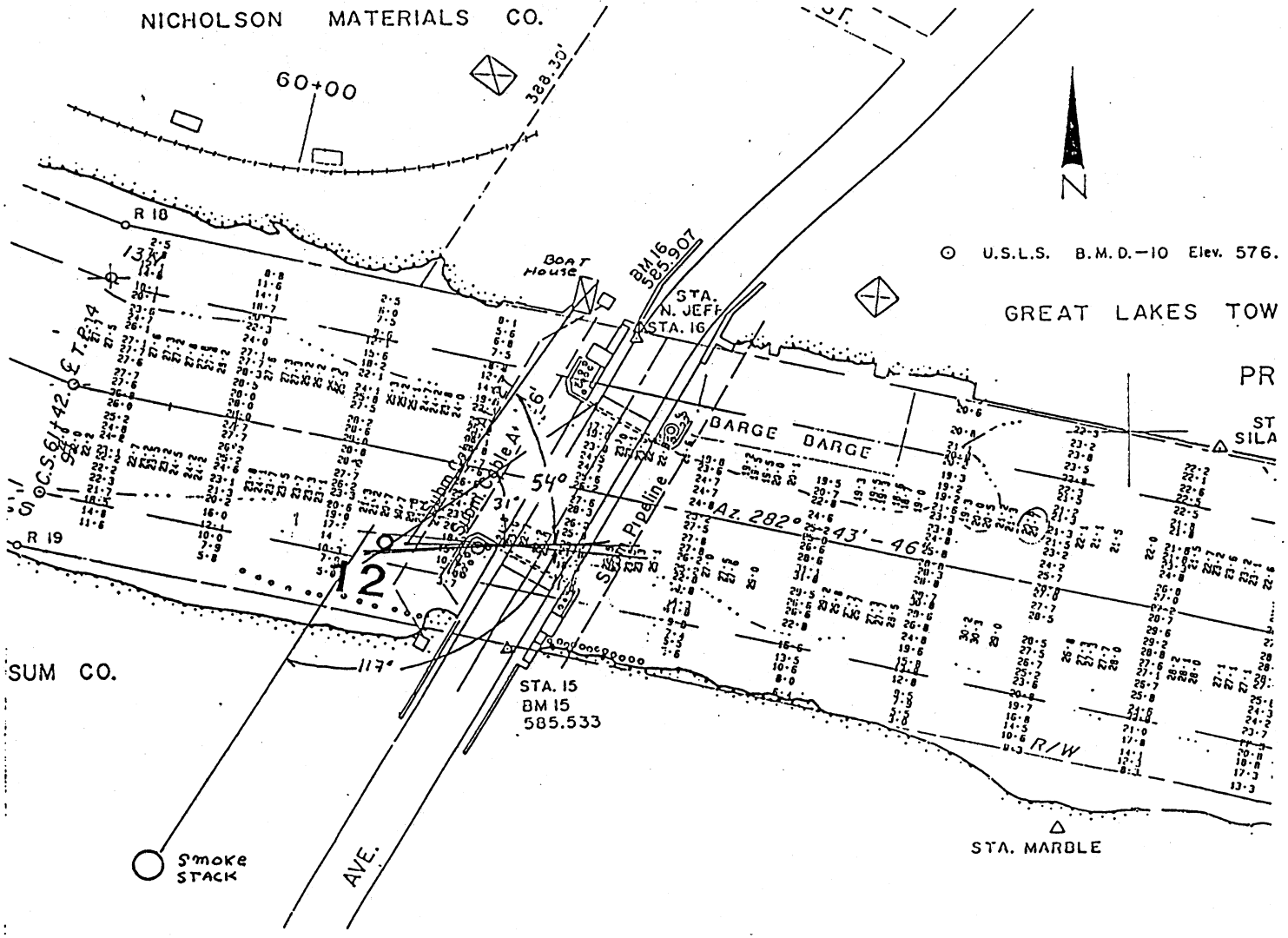


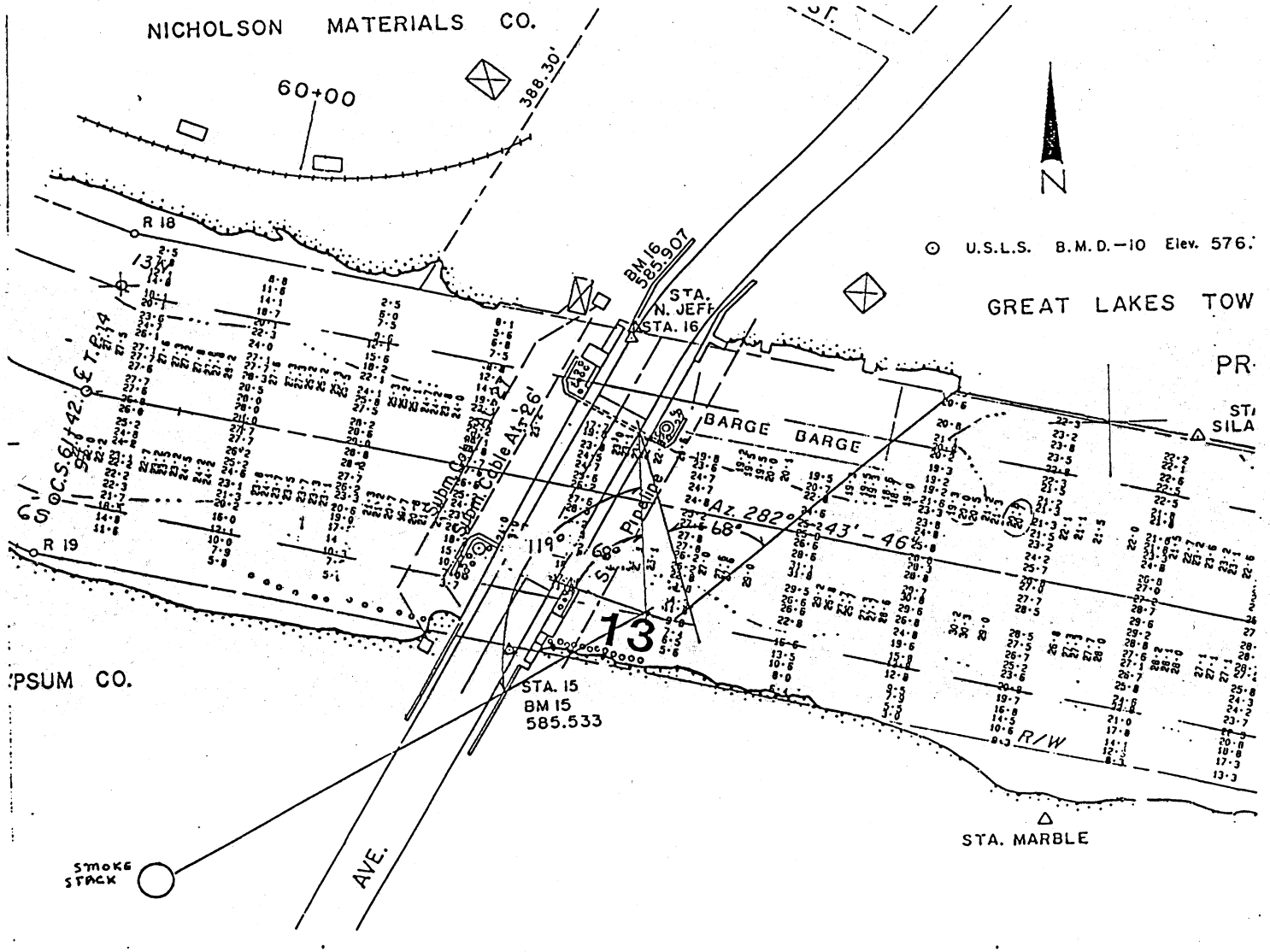
N
I-75 BRIDGE
PEERLESS
CEMENT
COMPANY
Conc. Mon.
Wabash R.R.
STA WABASH
DO
CHOR
Subm. Cables At +35
Subm. Cable At +82
Subm. Cable At +47
1446.16'
STA.25
PENOLA
OIL
CO.
OUTLET
4 SEWER
SIGN
CABLES DO

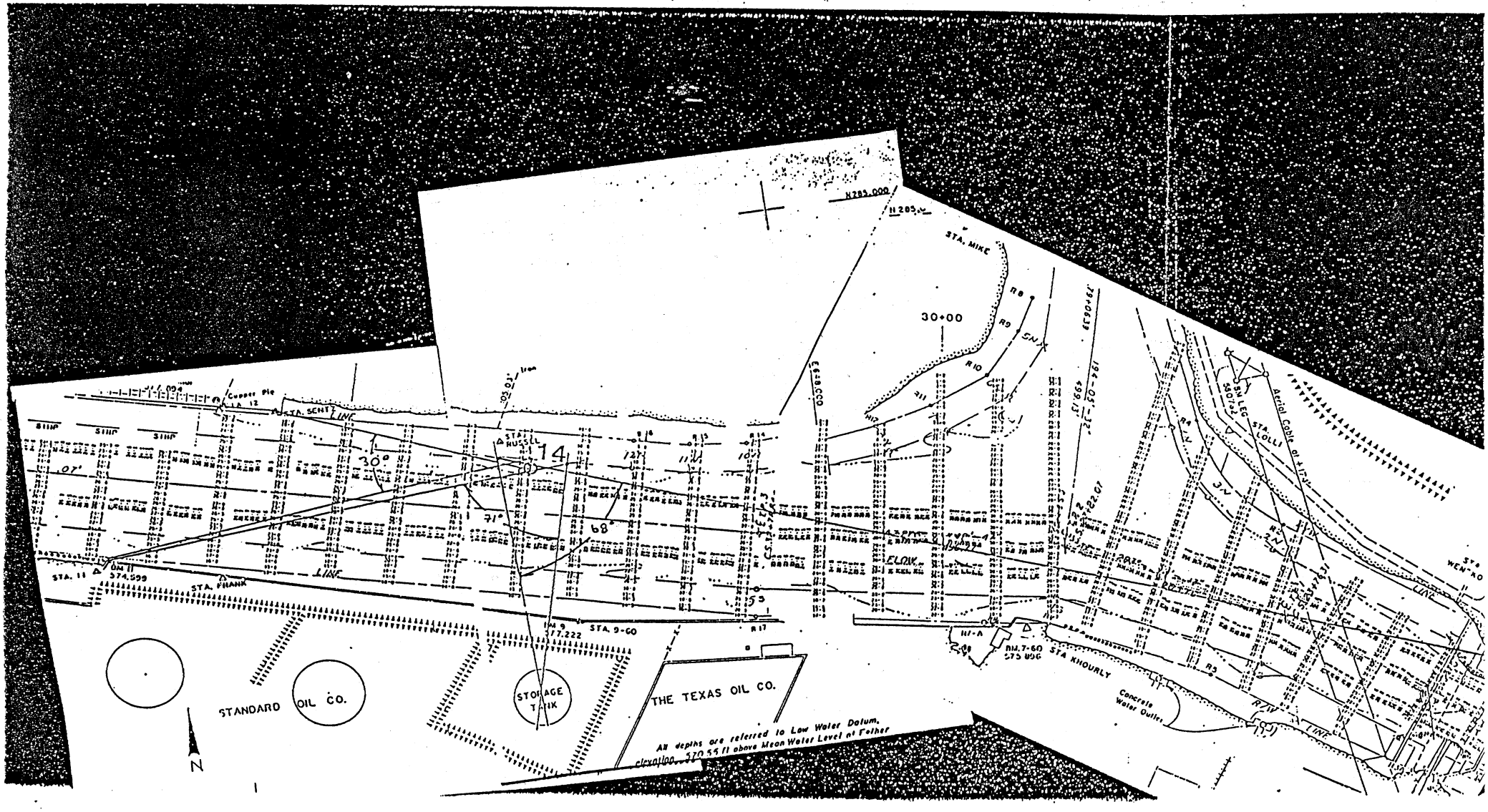

PEERLESS CEMENT COMPANY
NEW PEERLESS CEMENT PLANT
STA. ROOSE
STA. PEERLESS
STA. 23
STA. RITA
Conc. Mon.
N.Y.C. R.R.
L.W.D.
R/W
LINE
10
8S
15N
7S
R 23
R 20
R 24
C.T.P. 7
C.S. 92+33.89
C.T.P. 6
C.S. 85+32.55
C.T.P. 5
C.S. 79+65.03
651.0'-42"
617.52'
Subm. Cable
Cable
WATER INTAKE



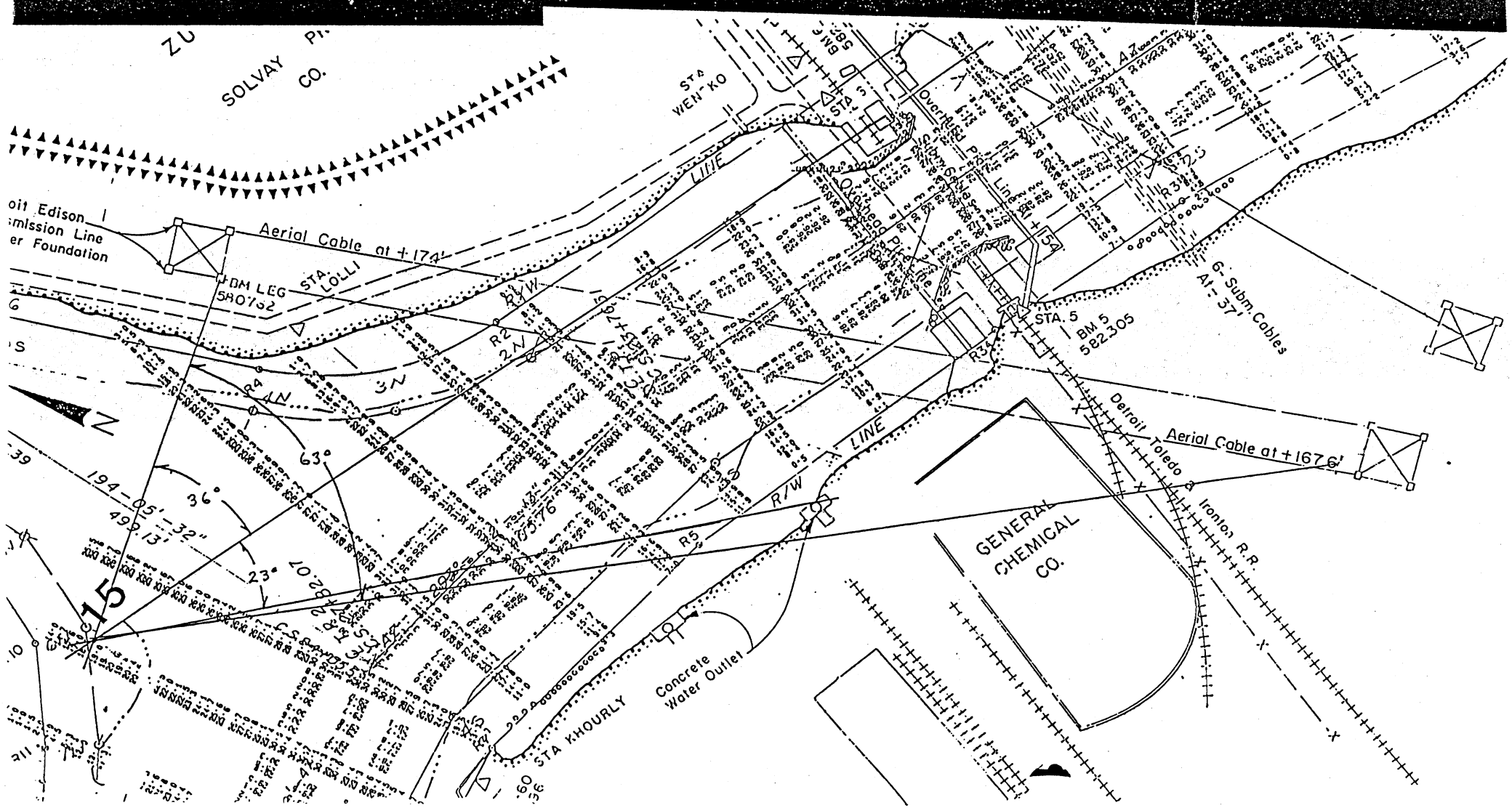
Conc. Mon.
N.Y.C. R.R.
34
STA. PEERLESS
LINE
R 20
STA 10
STEEL SHEET PILING
STA. 20
WATER INTAKE
CONCRETE WATER OUTLET
STEEL PILING
CONCRETE WALL
WATER C
R/W
N
C.S.79+65.03
R 21
7S
LINE
Subm. Cable
Subm. Cable
CENTER LINE

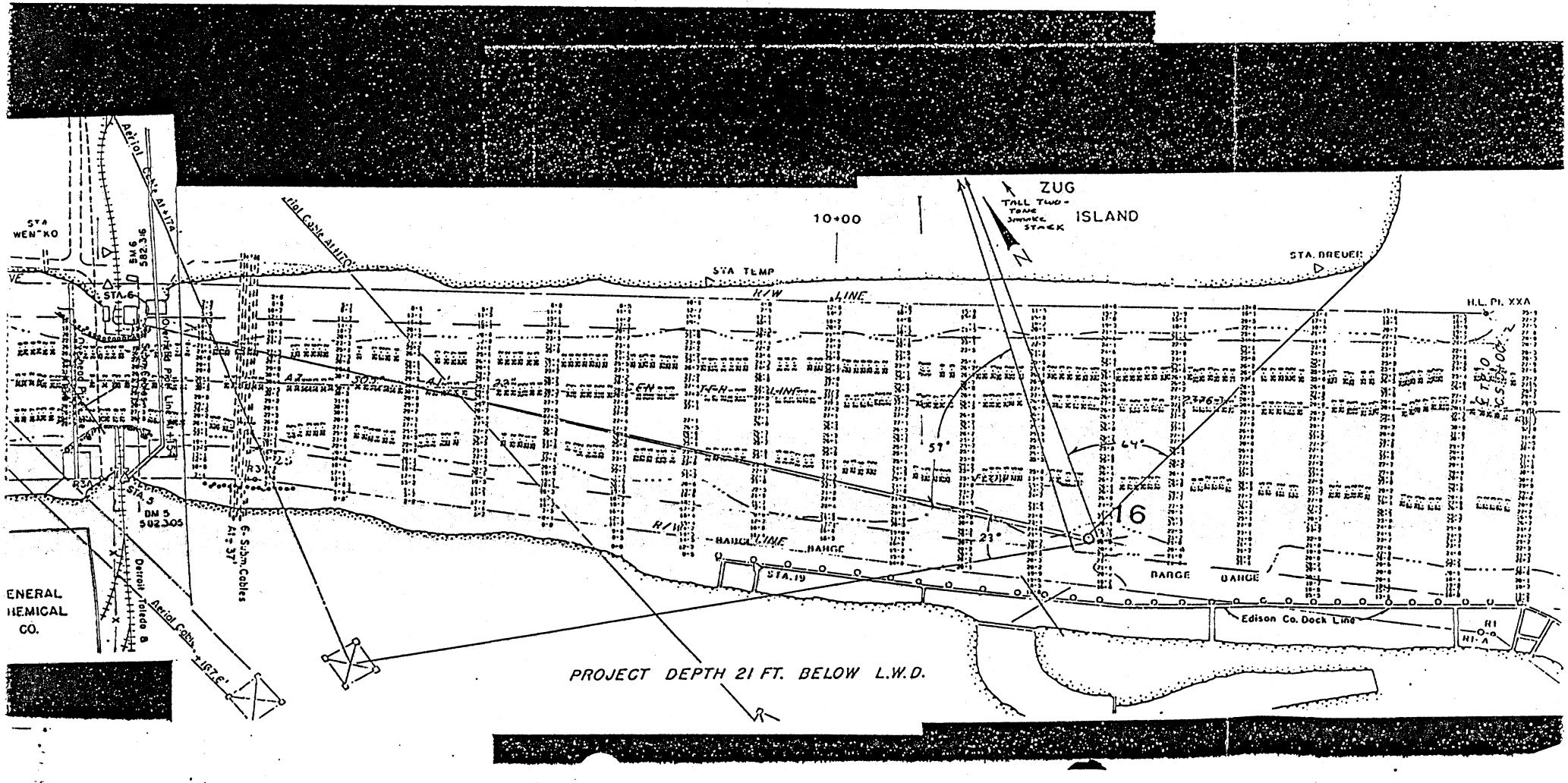

NICHOLSON MATERIALS CO.
60+00
328.30'
R 18
R 19
BOAT HOUSE
BM 16
585.907
STA. N. JEFF
STA. 16
U.S.L.S. B.M.D.-10 Elev. 576.
GREAT LAKES TOW
PR
ST SILA
BARGE BARGE
Az. 282° 43' - 46"
54°
31°
Subm. Cable A
Subm. Cable A'
Subm. Pipeline
12
117'
STA. 15
BM 15
585.533
R/W
STA. MARBLE
SUM CO.
Smoke STACK
AVE.
N

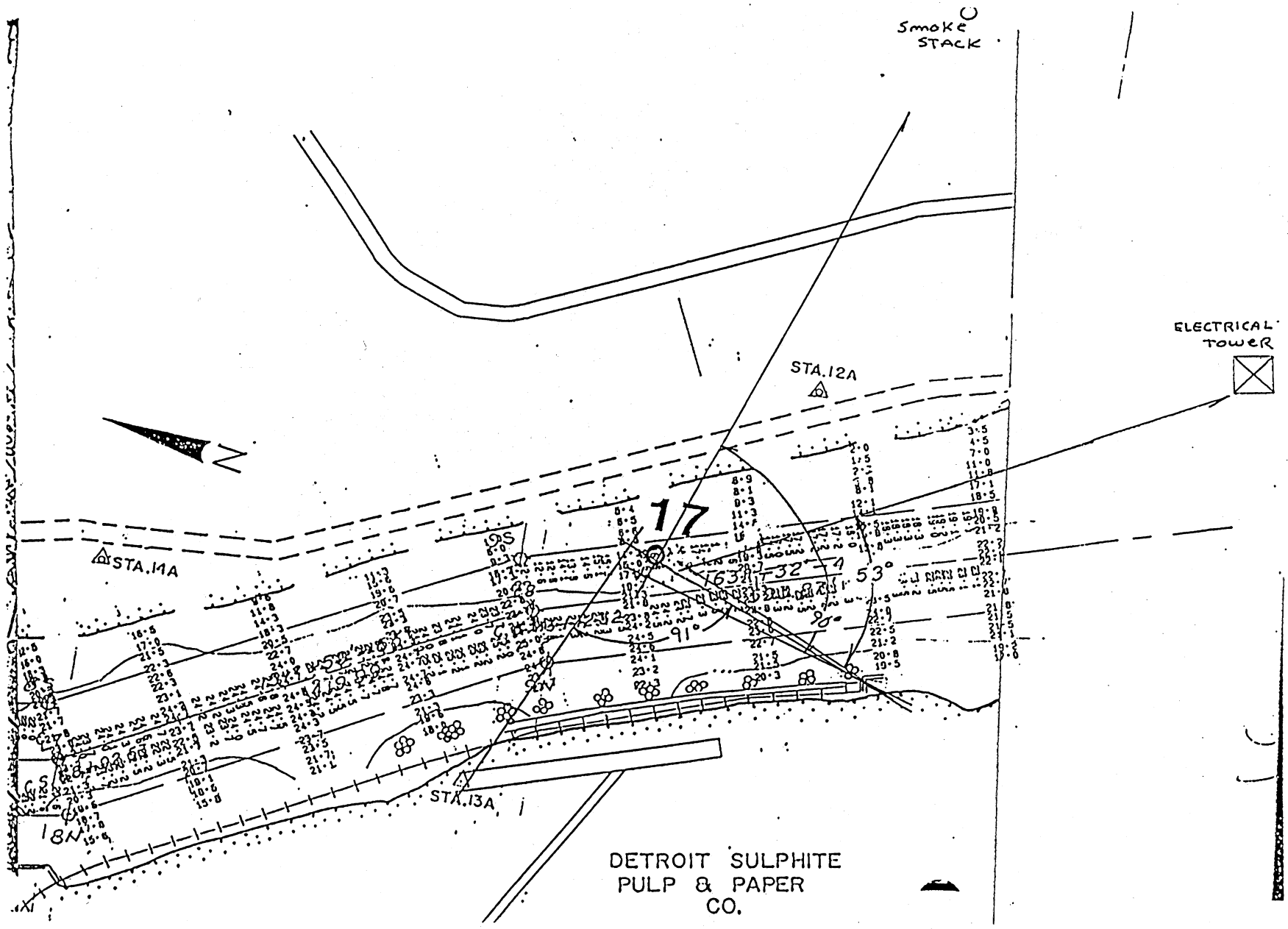

NICHOLSON MATERIALS CO.
60+00
388.30'
R 18
R 19
C.S. 61+42.
T.P. 14
BM 16
585.907
STA.
N. JEFF
STA. 16
Subm. Cable At 26'
Subm. Cable At 26'
BARGE
BARGE
Pipeline
Az. 282° 43' - 46"
68°
119°
68°
13
STA. 15
BM 15
585.533
PSUM CO.
AVE.
STACK
R/W
STA. MARBLE
U.S.L.S. B.M.D.-10 Elev. 576.
GREAT LAKES TOW
PR
N



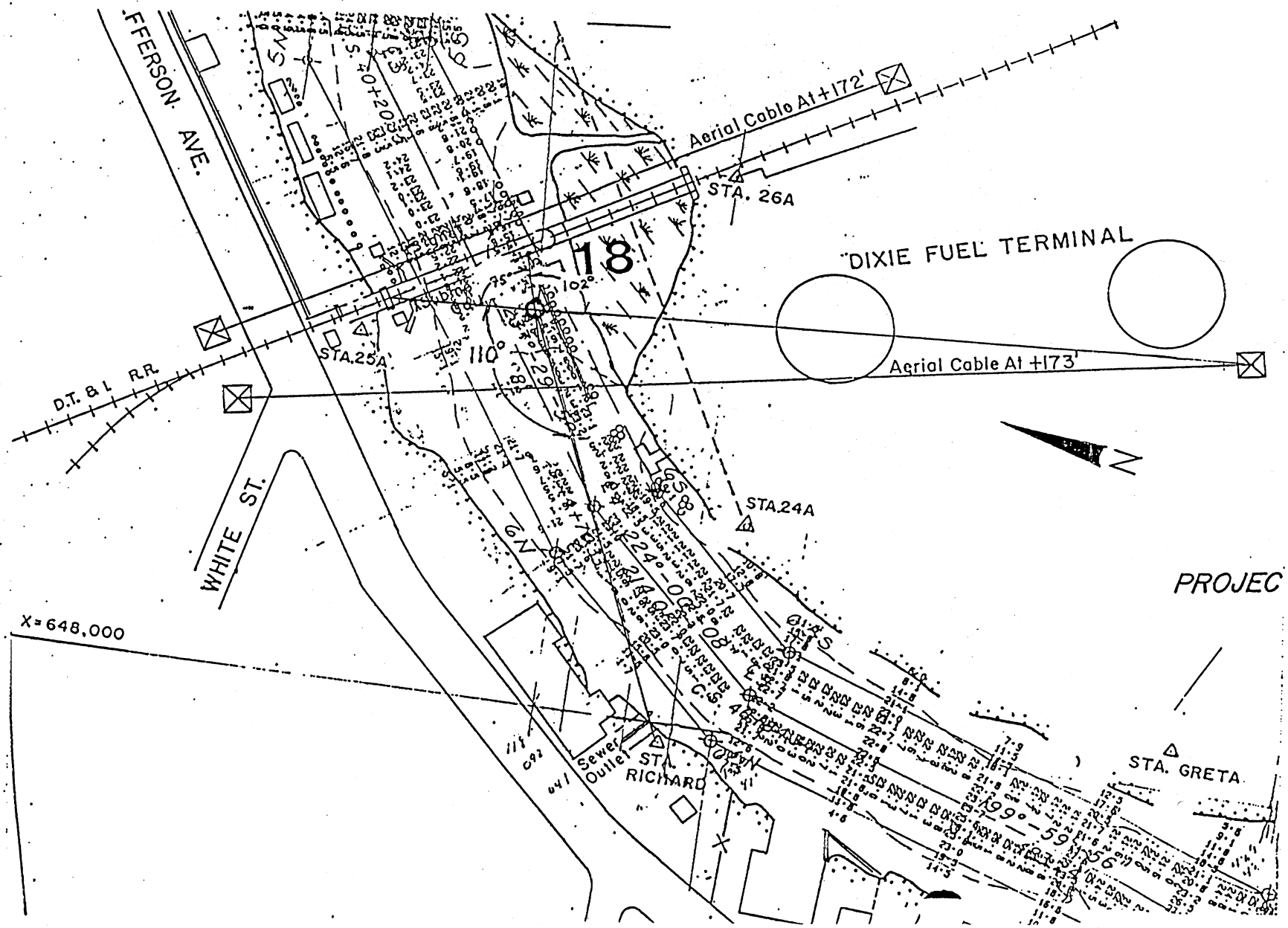
STA. MIKE
30+00
STA. SENT
STA. RUSSELL
14
30°
71°
68°
STA. 11
STA. FRANK
STA. 9-60
STA. KHOURLY
STA. LOLLI
Aerial Cable at
Concrete Water Outlet
STANDARD OIL CO.
STORAGE TANK
THE TEXAS OIL CO.
All depths are referred to Low Water Datum, elevation 570.55 ft above Mean Water Level at Father
N


SOLVAY
CO.
STA WENTKO
STA 3
Overhead Pipe Line At +154
Overhead Pipe Line
Aerial Cable at +174'
BM LEG 580762
STA. LOLLI
R/W
LINE
R2
2N
3N
4N
R4
R3
R5
R34
STA. 5
BM 5 582305
6- Subm. Cables At - 37'
Detroit Toledo & Ironton R.R.
Aerial Cable at +167.6'
GENERAL CHEMICAL CO.
Concrete Water Outlet
STA KHOURLY
63°
36°
23°
194-05'-32"
499.13'
15

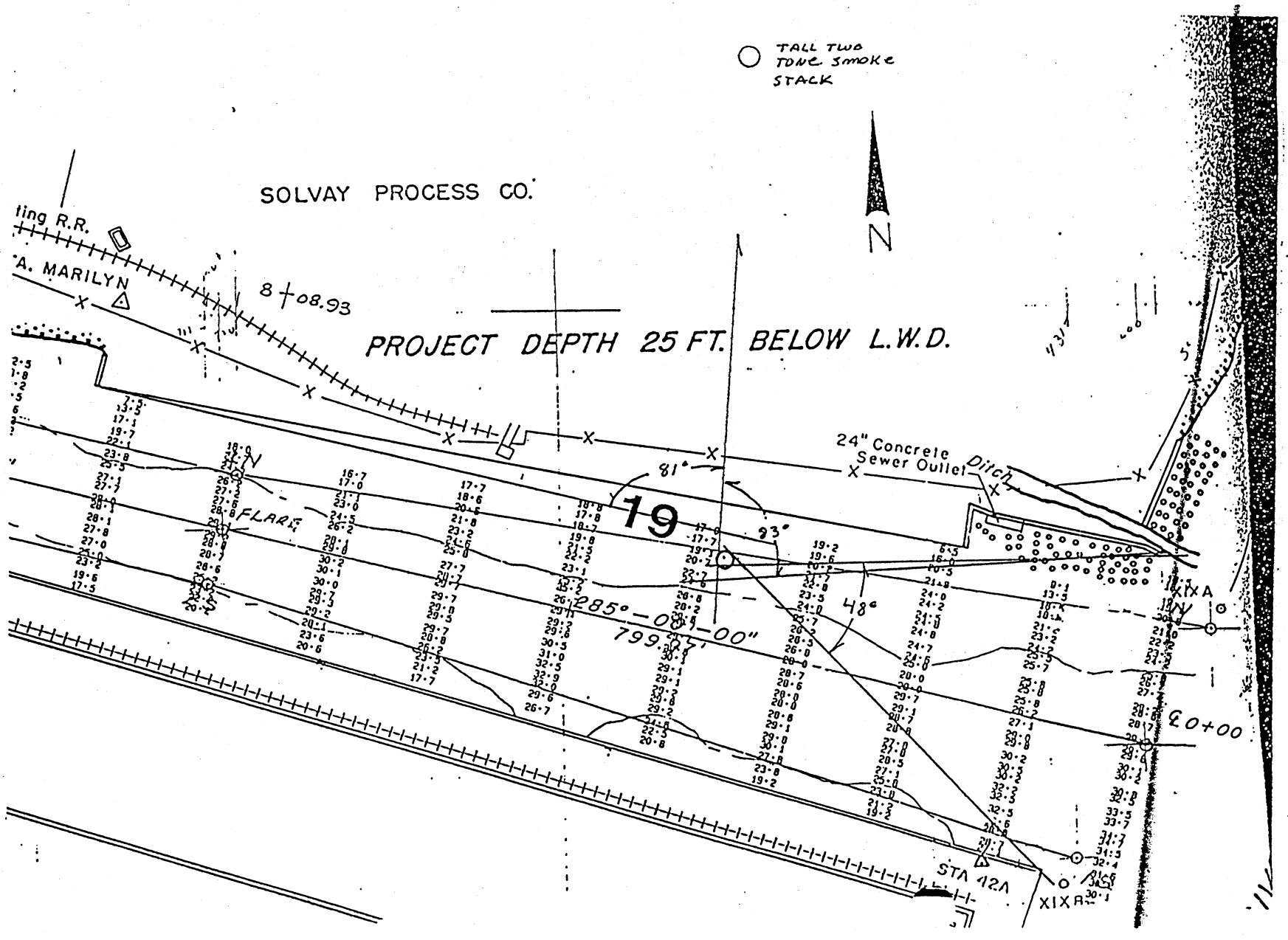

ZUG
ISLAND
TALL TWO-TONE SMOKE STACK
10+00
STA TEMP
STA. BREUER
R/W LINE
H.L. Pl. XXA
STA. 6
STA. 5
BM 5
582.305
BM 6
582.316
Aerial Cable At +174
Aerial Cable At +170
Aerial Cable At +167.6'
6-Subm. Cables At ± 37'
Detroit Toledo B
Overhead Pipe Line At +153
Overhead Pipe Line
Subm. Cables
STA. 19
BARGE
BARGE
BARGE
BARGE
Edison Co. Dock Line
R1
R1-A
16
57°
64°
23°
ENERAL
HEMICAL
CO.
PROJECT DEPTH 21 FT. BELOW L.W.D.



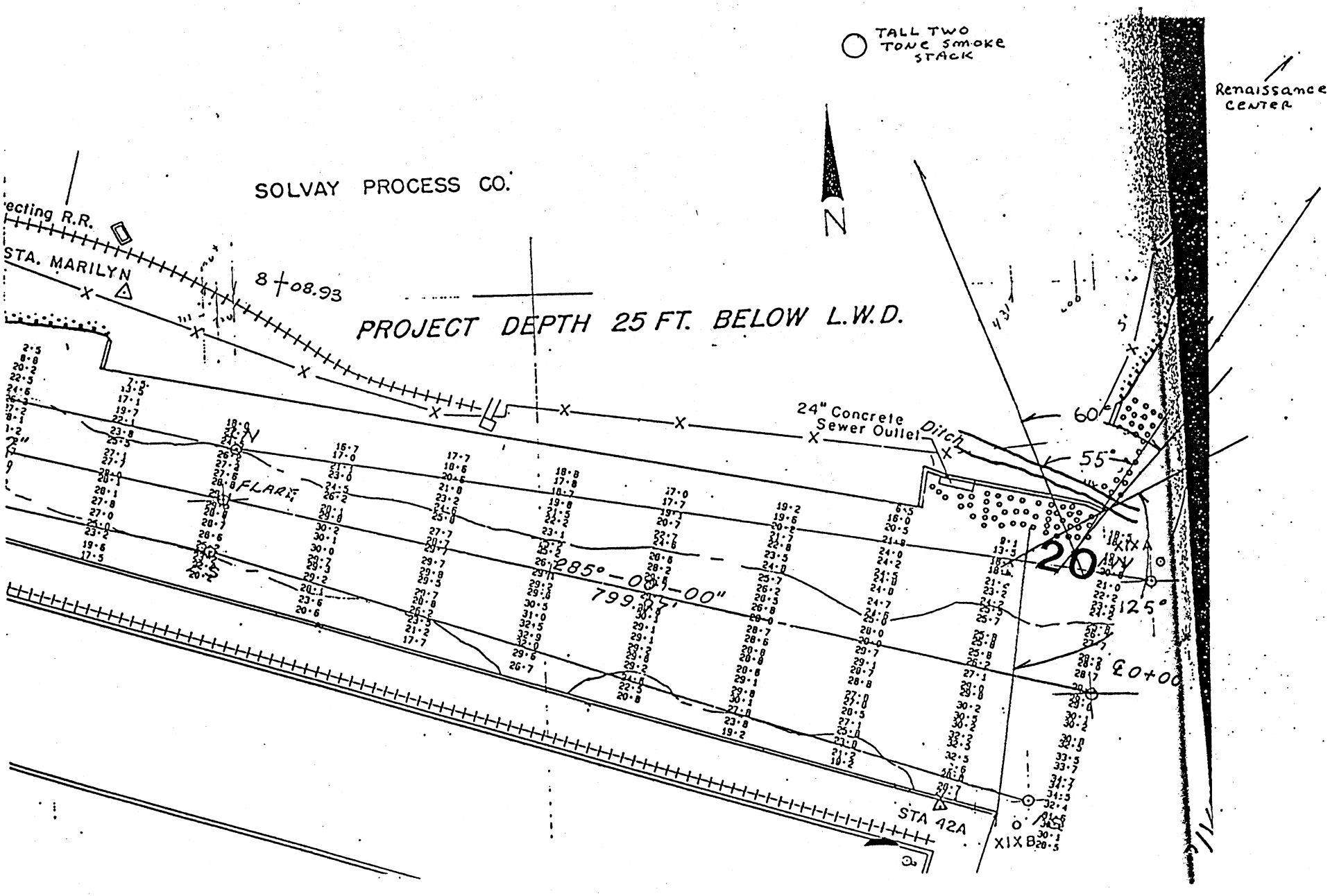
Smoke STACK
ELECTRICAL TOWER
STA.12A
STA.14A
STA.13A
N
17
53°
91°
DETROIT SULPHITE PULP & PAPER CO.



FFERSON AVE.
Aerial Cable At +172'
STA. 26A
18
DIXIE FUEL TERMINAL
STA.25A
110°
102°
Aerial Cable At +173'
D.T. & L. R.R.
N
STA.24A
WHITE ST.
PROJEC
X=648,000
Sewer Outlet
STA. RICHARD
STA. GRETA



TALL TWO TONE SMOKE STACK
SOLVAY PROCESS CO.
N
ting R.R.
A. MARILYN
8+08.93
PROJECT DEPTH 25 FT. BELOW L.W.D.
24" Concrete Sewer Outlet
Ditch
81°
19
83°
48°
FLARE
285°-00'-00"
799.
XIXA
XIXB
STA 42A



TALL TWO TONE SMOKE STACK
Renaissance CENTER
SOLVAY PROCESS CO.
N
ecting R.R.
STA. MARILYN
8+08.93
PROJECT DEPTH 25 FT. BELOW L.W.D.
24" Concrete Sewer Outlet
Ditch
60°
55°
20
125°
℄ 0+00
FLARE
285°-00'-00"
STA 42A
XIX B

Appendix A: Unpublished Scientific Information.

15. EPA 1993 Report "Industrial & Municipal Outfalls, Rouge River". 47 pp.

FIELD DATA SHEET

Environmental Response Team, Environmental Protection Agency
Woodbridge Ave., Edison, N.J. 08837
(201) 321-6660

Location: Rouge River - R-1

Collectors:

Lab Number (Consec.#'s)

Date Collected: Mo | Day | Yr.

Time (24 hr)

SOIL

Device	Soil Type
Auger	Rock
Core	Gravel
Split Spoon	Sand
Cylinder Cup	Clay
Spade	Silt
	Muck
	Loam
	Peat
	Color:

Depth: Ft. or In.

LAND

Upland-Dry
Lowland-Dry
Floodplain
Wetland
Gully

Slope > 15°
Slope < 15°

VEGETATION

Old Field Residential
Wooded Industrial
Farmland Commercial

Herbaceous ____ %
Shrubs ____ %
Trees ____ %

DBH ____ In.

GROUNDWATER

Water Table Depth ____ F

Sample Depth ____ F

Color:
Odor:
Oil:
Device:

SURFACE WATER

Color: ____ Temp ____
Odor: ____ pH ____

STREAM Width ____ Ft
Depth ____ Ft or In.
Velocity ____ Ft/Sec

FLOW DIRECTION ____

Pools ____ % Riffles ____ %

Device	Surface	Bottom %
Kemmerer	Clean	Ooze
Petersen	Oil	Sand
Surber	Garbage	Gravel
Manual	Trash	Clay
Net	Bubbles	Rubble
Seine	Dead Fish	Rock
Trowl	Sewage	Shell
Bucket	Ind. Waste	Organic
	Float. Solids	

SAMPLE PREPARATION

Container	Cleaning Procedure
Glass Jar	Low → High
Plastic Jar	Detergent W
Metal	Water Rinse
Acetate Core	Acetone Rinse
Paper Cap	Hexane Rinse
Teflon Cap	Other Solvent Rinse
Foil Cap	Specify:

Storage
Wet Ice
Ambient
Dry Ice

TRANSECT INFORMATION

Letter	Station #
R	01

Compass Direction ____ — ____

Distance Between Stations ____ to ____ is ____

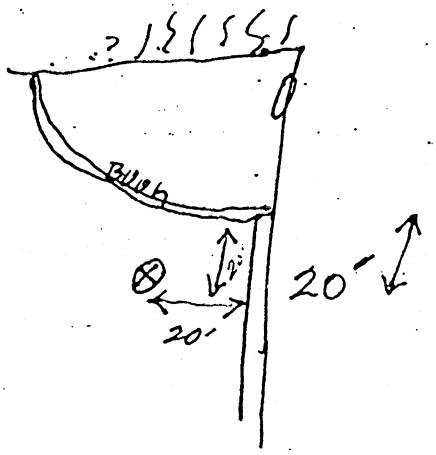
Remarks and Site Description

Below W128

Brown sludge

Sandy Crust on Top

6-8' Deep



NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
1700 Harmon Road
Auburn Hills, MI 48326
Tel: (313) 391-2050
Fax: (313) 391-9698

ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130380

Project #ZT2051
EMI1330SAA

Sample Description: R-1 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	54.	%	05/17/1993	das	160.3 (3)
Arsenic	7.0	mg/kg	05/19/1993	jbb	7061 (1)
Barium	140.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	16.	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	180.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	200.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	520.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.13	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	3.3 J	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	1500.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
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Auburn Hills, MI 48326
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05/25/1993

Job No.: 93.02489
Sample No.: 130380

Project #ZT2051
EMI1330SAA

Sample Description: R-1 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/13/1993	mk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/13/1993	mk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130380

Project #ZT2051
EMI1330SAA

Sample Description: R-1 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/11/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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Tel: (313) 391-2050
Fax: (313) 391-9698

ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130380

Project #ZT2051
EMI1330SAA

Sample Description: R-1 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Toluene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Xylenes	<10.	ug/kg	05/11/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
1700 Harmon Road
Auburn Hills, MI 48326
Tel: (313) 391-2050
Fax: (313) 391-9698

ANALYTICAL REPORT

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ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130380

Project #ZT2051
EMI1330SAA

Sample Description: R-1 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Acenaphthylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(b)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(k)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(ghi)perylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Chrysene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluorene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Naphthalene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Phenanthrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130381

Project #ZT2051
EMI1330SAA

Sample Description: R-2 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	51.	%	05/17/1993	das	160.3 (3)
Arsenic	8.8	mg/kg	05/19/1993	jbb	7061 (1)
Barium	170.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	10.	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	240.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	240.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	310.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.29	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	3.1	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	780.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130381

Project #ZT2051
EMI1330SAA

Sample Description: R-2 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/17/1993	mmk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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Herb Langer
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12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130381

Project #ZT2051
EMI1330SAA

Sample Description: R-2 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/10/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130381

Project #ZT2051
EMI1330SAA

Sample Description: R-2 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Toluene	25.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Xylenes	29.	ug/kg	05/10/1993	pmc	8260 (1)

Results on a dry weight basis.

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Project Manager

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05/25/1993

Job No.: 93.02489
Sample No.: 130381

Project #ZT2051
EMI1330SAA

Sample Description: R-2 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Acenaphthylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(b)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(k)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(ghi)perylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Chrysene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluorene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Naphthalene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Phenanthrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)

Results on a dry weight basis.

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130382

Project #ZT2051
EMI1330SAA

Sample Description: R-3 · 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	05/17/1993	das	160.3 (3)
Arsenic	5.1	mg/kg	05/19/1993	jbb	7061 (1)
Barium	140.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	2.5	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	150.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	150.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	220.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.17	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	1.2 J	mg/kg	05/19/1993	jbb	7741 (1)
Silver	0.63	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	600.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
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ANALYTICAL REPORT

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05/25/1993

Job No.: 93.02489
Sample No.: 130382

Project #ZT2051
EMI1330SAA

Sample Description: R-3 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<50.	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1221	<50.	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1232	<50.	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1242	<50	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1248	150.	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1254	<50.	ug/kg	05/14/1993	mmk	8080 (1)
Aroclor-1260	97.	ug/kg	05/14/1993	mmk	8080 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22,1992.

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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05/25/1993

Job No.: 93.02489
Sample No.: 130382

Project #ZT2051
EMI1330SAA

Sample Description: R-3 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Benzene	69.	ug/kg	05/13/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chlorobenzene	130.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl isobutyl ketone	230.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130382

Project #ZT2051
EMI1330SAA

Sample Description: R-3 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Toluene	240.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Xylenes	1200.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

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ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130382

Project #ZT2051
EMI1330SAA

Sample Description: R-3 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Acenaphthylene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Anthracene	25000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)anthracene	11000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(b)fluoranthene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(k)fluoranthene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)pyrene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(ghi)perylene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Chrysene	13000.	ug/kg	05/17/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Fluoranthene	35000.	ug/kg	05/17/1993	wad	8270 (1)
Fluorene	13000.	ug/kg	05/17/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Naphthalene	<6700.	ug/kg	05/17/1993	wad	8270 (1)
Phenanthrene	59000.	ug/kg	05/17/1993	wad	8270 (1)
Pyrene	34000. J	ug/kg	05/17/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130383

Project #ZT2051
EMI1330SAA

Sample Description: R-4 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	51.	%	05/17/1993	das	160.3 (3)
Arsenic	8.2	mg/kg	05/19/1993	jbb	7061 (1)
Barium	76.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	0.94	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	24.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	90.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	82.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.12	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	<0.5	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	140.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E Brown
Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
1700 Harmon Road
Auburn Hills, MI 48326
Tel: (313) 391-2050
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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130383

Project #ZT2051
EMI1330SAA

Sample Description: R-4 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/13/1993	mmk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130383

Project #ZT2051
EMI1330SAA

Sample Description: R-4 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130383

Project #ZT2051
EMI1330SAA

Sample Description: R-4 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Toluene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Xylenes	<10.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130383

Project #ZT2051
EMI1330SAA

Sample Description: R-4 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Acenaphthylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(b)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(k)fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(a)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Benzo(ghi)perylene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Chrysene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluoranthene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Fluorene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Naphthalene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Phenanthrene	<330.	ug/kg	05/13/1993	wad	8270 (1)
Pyrene	<330.	ug/kg	05/13/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130384

Project #ZT2051
EMI1330SAA

Sample Description: R-5 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	31.	%	05/17/1993	das	160.3 (3)
Arsenic	4.8	mg/kg	05/19/1993	jbb	7061 (1)
Barium	81.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	4.5	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	42.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	68.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	84.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.48	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	<0.4 J	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	210.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

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05/25/1993

Job No.: 93.02489
Sample No.: 130384

Project #ZT2051
EMI1330SAA

Sample Description: R-5 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/13/1993	mmk	8080 (1)

Results on a dry weight basis.

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Project Manager

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ANALYTICAL REPORT

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05/25/1993

Job No.: 93.02489
Sample No.: 130384

Project #ZT2051
EMI1330SAA

Sample Description: R-5 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130384

Project #ZT2051
EMI1330SAA

Sample Description: R-5 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Toluene	6800.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Xylenes	<10.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

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ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02489
Sample No.: 130384

Project #ZT2051
EMI1330SAA

Sample Description: R-5 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Acenaphthylene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Anthracene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)anthracene	2500.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(b)fluoranthene	2000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(k)fluoranthene	2900.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)pyrene	2200.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(ghi)perylene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Chrysene	1900.	ug/kg	05/17/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Fluoranthene	4200.	ug/kg	05/17/1993	wad	8270 (1)
Fluorene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Naphthalene	1700.	ug/kg	05/17/1993	wad	8270 (1)
Phenanthrene	3900.	ug/kg	05/17/1993	wad	8270 (1)
Pyrene	3500. J	ug/kg	05/17/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130385

Project #ZT2051
EMI1330SAA

Sample Description: R-6A 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	53.	%	05/17/1993	das	160.3 (3)
Arsenic	9.2	mg/kg	05/19/1993	jbb	7061 (1)
Barium	110.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	3.2	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	64.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	100.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	210.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.66	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	0.96 J	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	450.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E Brown/bb
Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130385

Project #ZT2051
EMI1330SAA

Sample Description: R-6A 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/13/1993	mmk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130385

Project #ZT2051
EMI1330SAA

Sample Description: R-6A 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/11/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/11/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130385

Project #ZT2051
EMI1330SAA

Sample Description: R-6A 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Toluene	24.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/11/1993	pmc	8260 (1)
Xylenes	230.	ug/kg	05/11/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130385

Project #ZT2051
EMI1330SAA

Sample Description: R-6A 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	1200.	ug/kg	05/14/1993	wad	8270 (1)
Acenaphthylene	<330.	ug/kg	05/14/1993	wad	8270 (1)
Anthracene	1800.	ug/kg	05/14/1993	wad	8270 (1)
Benzo(a)anthracene	4100.	ug/kg	05/14/1993	wad	8270 (1)
Benzo(b)fluoranthene	2600.	ug/kg	05/14/1993	wad	8270 (1)
Benzo(k)fluoranthene	2300.	ug/kg	05/14/1993	wad	8270 (1)
Benzo(a)pyrene	2500.	ug/kg	05/14/1993	wad	8270 (1)
Benzo(ghi)perylene	940.	ug/kg	05/14/1993	wad	8270 (1)
Chrysene	3000.	ug/kg	05/14/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/14/1993	wad	8270 (1)
Fluoranthene	6400.	ug/kg	05/14/1993	wad	8270 (1)
Fluorene	1600.	ug/kg	05/14/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	1000.	ug/kg	05/14/1993	wad	8270 (1)
Naphthalene	3000.	ug/kg	05/14/1993	wad	8270 (1)
Phenanthrene	5000.	ug/kg	05/14/1993	wad	8270 (1)
Pyrene	4900. J	ug/kg	05/14/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E Brown
Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130386

Project #ZT2051
EMI1330SAA

Sample Description: R-6B 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	45.	%	05/17/1993	das	160.3 (3)
Arsenic	8.7	mg/kg	05/19/1993	jbb	7061 (1)
Barium	100.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	2.7	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	53.	mg/kg	05/19/1993	jbb	6010 (1)
Copper	84.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	160.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.73	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	<0.4	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	360.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130386

Project #ZT2051
EMI1330SAA

Sample Description: R-68 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/17/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/17/1993	mmk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130386

Project #ZT2051
EMI1330SAA

Sample Description: R-68 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Benzene	170.	ug/kg	05/13/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Ethylbenzene	1400.	ug/kg	05/13/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130386

Project #ZT2051
EMI1330SAA

Sample Description: R-68 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Styrene	400.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Toluene	1100.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/13/1993	pmc	8260 (1)
Xylenes	8400.	ug/kg	05/13/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E Brown ps

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130386

Project #ZT2051
EMI1330SAA

Sample Description: R-68 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	49000.	ug/kg	05/17/1993	wad	8270 (1)
Acenaphthylene	56000.	ug/kg	05/17/1993	wad	8270 (1)
Anthracene	96000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)anthracene	82000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(b)fluoranthene	56000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(k)fluoranthene	31000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)pyrene	44000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(ghi)perylene	13000.	ug/kg	05/17/1993	wad	8270 (1)
Chrysene	73000.	ug/kg	05/17/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<330.	ug/kg	05/17/1993	wad	8270 (1)
Fluoranthene	150000.	ug/kg	05/17/1993	wad	8270 (1)
Fluorene	110000.	ug/kg	05/17/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	15000.	ug/kg	05/17/1993	wad	8270 (1)
Naphthalene	190000.	ug/kg	05/17/1993	wad	8270 (1)
Phenanthrene	220000.	ug/kg	05/17/1993	wad	8270 (1)
Pyrene	98000. J	ug/kg	05/17/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130387

Project #ZT2051
EMI1330SAA

Sample Description: R-7 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	56.	%	05/17/1993	das	160.3 (3)
Arsenic	<1.0	mg/kg	05/19/1993	jbb	7061 (1)
Barium	18.	mg/kg	05/19/1993	jbb	6010 (1)
Cadmium	0.54	mg/kg	05/19/1993	jbb	6010 (1)
Chromium	7.5	mg/kg	05/19/1993	jbb	6010 (1)
Copper	14.	mg/kg	05/19/1993	jbb	6010 (1)
Lead	13.	mg/kg	05/19/1993	jbb	6010 (1)
Mercury	0.61	mg/kg	05/12/1993	jbb	7471 (1)
Selenium	<0.8	mg/kg	05/19/1993	jbb	7741 (1)
Silver	<0.4	mg/kg	05/19/1993	jbb	6010 (1)
Zinc	45.	mg/kg	05/19/1993	jbb	6010 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130387

Project #ZT2051
EMI1330SAA

Sample Description: R-7 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1221	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1232	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1242	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1248	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1254	<33.	ug/kg	05/13/1993	mmk	8080 (1)
Aroclor-1260	<33.	ug/kg	05/13/1993	mmk	8080 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130387

Project #ZT2051
EMI1330SAA

Sample Description: R-7 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Acrylonitrile	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Acetone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Benzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromodichloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromoform	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Bromomethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Carbon disulfide	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Carbon tetrachloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chlorobenzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloroform	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Chloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Dibromochloromethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1-Dichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,2-Dichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,2-Dichloropropane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Ethylbenzene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
2-Hexanone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Methyl ethyl ketone	<100.	ug/kg	05/10/1993	pmc	8260 (1)
Methyl isobutyl ketone	<100.	ug/kg	05/10/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130387

Project #ZT2051
EMI1330SAA

Sample Description: R-7 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Styrene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Tetrachloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Toluene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Trichloroethene	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Vinyl chloride	<10.	ug/kg	05/10/1993	pmc	8260 (1)
Xylenes	<10.	ug/kg	05/10/1993	pmc	8260 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130387

Project #ZT2051
EMI1330SAA

Sample Description: R-7 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	4500.	ug/kg	05/17/1993	wad	8270 (1)
Acenaphthylene	3400.	ug/kg	05/17/1993	wad	8270 (1)
Anthracene	14000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)anthracene	25000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(b)fluoranthene	17000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(k)fluoranthene	18000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(a)pyrene	18000.	ug/kg	05/17/1993	wad	8270 (1)
Benzo(ghi)perylene	5700.	ug/kg	05/17/1993	wad	8270 (1)
Chrysene	23000.	ug/kg	05/17/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<700.	ug/kg	05/17/1993	wad	8270 (1)
Fluoranthene	27000.	ug/kg	05/17/1993	wad	8270 (1)
Fluorene	11000.	ug/kg	05/17/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	7100.	ug/kg	05/17/1993	wad	8270 (1)
Naphthalene	13000.	ug/kg	05/17/1993	wad	8270 (1)
Phenanthrene	25000.	ug/kg	05/17/1993	wad	8270 (1)
Pyrene	30000. J	ug/kg	05/17/1993	wad	8270 (1)

Results on a dry weight basis.

Bruce E. Brown
Project Manager

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
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Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130388

Project #ZT2051
EMI1330SAA

Sample Description: R-8 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Barium	<0.02	mg/L	05/19/1993	wjj	200.7 (3)
Cadmium	<0.01	mg/L	05/19/1993	jbb	200.7 (3)
Chromium	<0.02	mg/L	05/19/1993	wjj	200.7 (3)
Copper	<0.01	mg/L	05/19/1993	wjj	200.7 (3)
Lead	<0.05	mg/L	05/19/1993	wjj	200.7 (3)
Mercury	<0.0005	mg/L	05/12/1993	jbb	245.1 (3)
Silver	<0.02	mg/L	05/19/1993	wjj	200.7 (3)
Zinc	<0.02	mg/L	05/19/1993	wjj	200.7 (3)
Arsenic	<0.001	mg/L	05/20/1993	rjk	206.2 (3)
Selenium	<0.005	mg/L	05/18/1993	rjk	270.2 (3)

Bruce E. Brown
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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130388

Project #ZT2051
EMI1330SAA

Sample Description: R-8 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PCBs					
Aroclor-1016	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1221	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1232	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1242	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1248	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1254	<0.1	ug/L	05/14/1993	mmk	8080 (1)
Aroclor-1260	<0.1	ug/L	05/14/1993	mmk	8080 (1)

Bruce E. Brown
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130388

Project #ZT2051
EMI1330SAA

Sample Description: R-8 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS - HSL					
Acrolein	<10.	ug/L	05/10/1993	pmc	8260 (1)
Acrylonitrile	<10.	ug/L	05/10/1993	pmc	8260 (1)
Acetone	<50.	ug/L	05/10/1993	pmc	8260 (1)
Benzene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Bromodichloromethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Bromoform	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Bromomethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Carbon disulfide	<50.	ug/L	05/10/1993	pmc	8260 (1)
Carbon tetrachloride	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Chlorobenzene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Chloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
2-Chloroethyl vinyl ether	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Chloroform	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Chloromethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Dibromochloromethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,1-Dichloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,2-Dichloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,1-Dichloroethene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
cis-1,2-Dichloroethene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
trans-1,2-Dichloroethene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,2-Dichloropropane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
cis-1,3-Dichloropropene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
trans-1,3-Dichloropropene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Ethylbenzene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
2-Hexanone	<50.	ug/L	05/10/1993	pmc	8260 (1)
Methyl ethyl ketone	<50.	ug/L	05/10/1993	pmc	8260 (1)
Methyl isobutyl ketone	<50.	ug/L	05/10/1993	pmc	8260 (1)

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ANALYTICAL REPORT

Herb Langer
ECOLOGY & ENVIRONMENT INC
12251 Universal
Taylor, MI 48180

05/25/1993

Job No.: 93.02490
Sample No.: 130388

Project #ZT2051
EMI1330SAA

Sample Description: R-8 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Methylene chloride	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Styrene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Tetrachloroethene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Toluene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,1,1-Trichloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
1,1,2-Trichloroethane	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Trichloroethene	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Vinyl acetate	<10.	ug/L	05/10/1993	pmc	8260 (1)
Vinyl chloride	<1.0	ug/L	05/10/1993	pmc	8260 (1)
Xylenes	<1.0	ug/L	05/10/1993	pmc	8260 (1)

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Herb Langer
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05/25/1993

Job No.: 93.02490
Sample No.: 130388

Project #ZT2051
EMI1330SAA

Sample Description: R-8 05/04

Date Taken: 05/04/1993

Date Received: 05/05/1993

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
PNAH COMPOUNDS					
Acenaphthene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Acenaphthylene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Anthracene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Benzo(a)anthracene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Benzo(b)fluoranthene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Benzo(k)fluoranthene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Benzo(a)pyrene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Benzo(ghi)perylene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Chrysene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Dibenzo(a,h)anthracene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Fluoranthene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Fluorene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Indeno(1,2,3-cd)pyrene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Napthalene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Phenanthrene	<5.0	ug/L	05/19/1993	wad	8270 (1)
Pyrene	<5.0	ug/L	05/19/1993	wad	8270 (1)

Bruce E. Brown
Project Manager

OCEAN GROUP

EPA 1993 REPORT

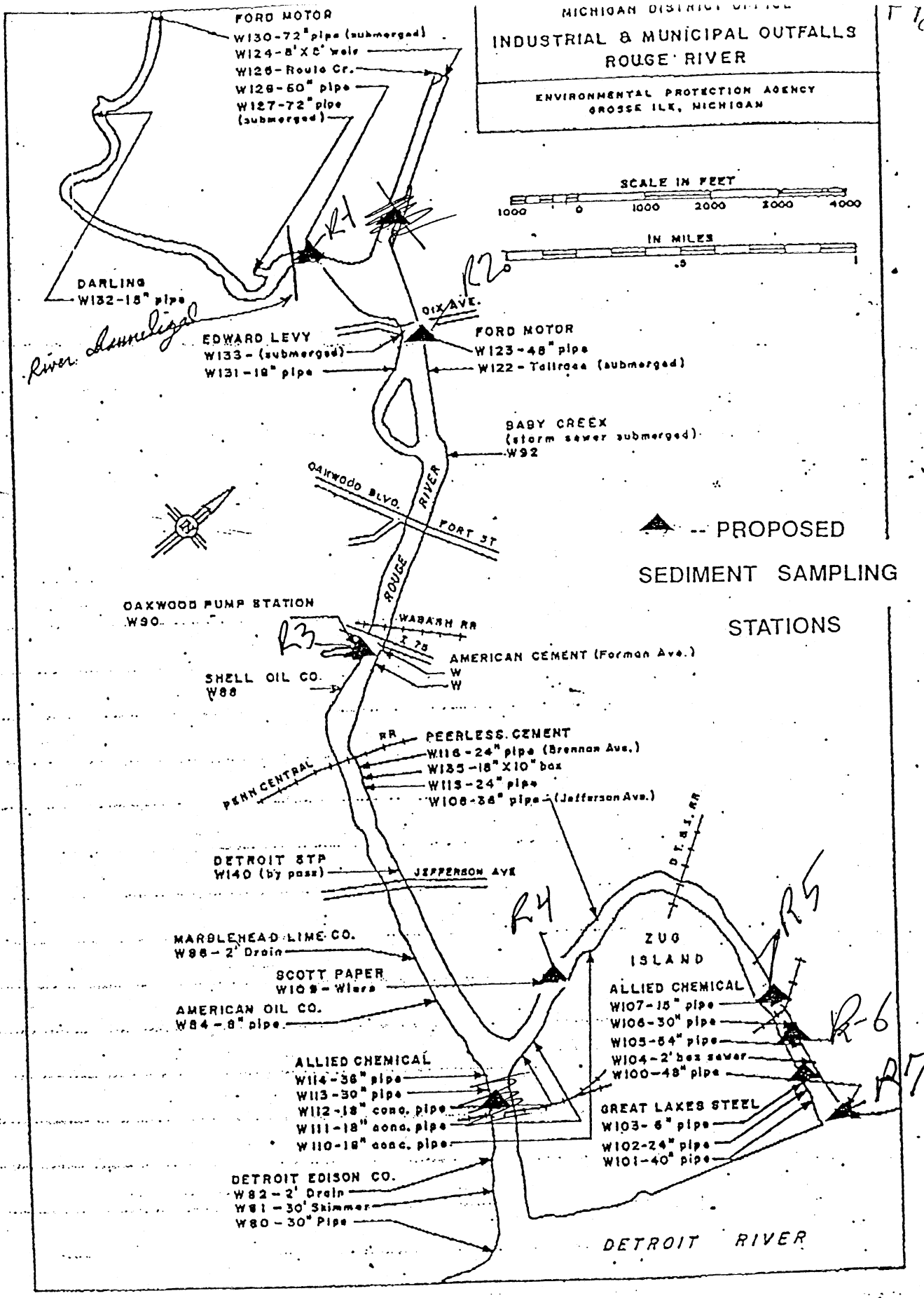

FIGURE 4-1

SAMPLE LOCATION MAP

Appendix A: Unpublished Scientific Information.

16. TMA 1994 Report "Thermo Analytical/ERG Field Report Pte. Mouillee CDF". 32 pp.

ENCLOSURE #2

TMA 1994 Report

THERMO ANALYTICAL/ERG
FIELD REPORT
PTE. MOUILLEE CDF
DELIVERY ORDER NO. 0026
FEBRUARY 15-17, 1994

THERMO ANALYTICAL/ERG
MATERIAL CLASSIFICATION STUDY
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
DELIVERY ORDER NO. 0026

INTRODUCTION

On the following dates, February 15, 16, and 17, 1994 Thermo Analytical conducted a sediment sampling program at the Pte. Mouillee Confined Disposal Facility (CDF) located near Monroe, Michigan. The sampling was conducted to complete the characterization of the material that has been deposited within the CDF during dredging operations. The stations that were sampled during this program were those that weren't completed during the July 1993 sampling. Of the fifteen stations sampled (15) only three, PTM-6, PTM-13 and PTM-26, were marked and staked by survey personnel from the Corps of Engineers. The sampling locations of the remaining twelve (12) stations were located using the blue prints provided to TMA by the Detroit District Corps of Engineers. Direction and distances were estimated from known land marks by compass bearings and measuring distances by pacing. The following lists the remaining stations sampled from each cell:

CELL NUMBER	STATIONS	STATIONS COLLECTED
Cell No.1	1-10	5,6,7
Cell No.2	11-20	11,12,13
Cell No.3	20-35	21,26,28,29,30,31,32,33,34

SAMPLE COLLECTION

Sampling was conducted using an all terrain drill rig equipped with 4" flight augers and a 24" long x 2" O.D. stainless steel split-spoon sampler. At each location, composite samples were to be collected that represented 0'-5', 5'-10' and 10'-15'. At a few stations, the 15.0' depth was not reached due to encountering material that appeared to be a clay liner or natural bottom material.

Samples for each composite were collected at 24" increments by driving the split-spoon sampler with a 140 lb. hammer dropping 30". After retrieving the sampler it was cracked open and a measurement was made of the sample in order to calculate the percent recovery. A physical description was then made of the sample and it was transferred into a clean stainless steel bowl. This procedure was conducted for each

composite interval (i.e. 0'-5.0'). Once the required depth had been reached, for each composite, the resultant material was thoroughly mixed and transferred into clean one-quart sample containers equipped with teflon lined lids. Between each composited interval the sampling equipment was thoroughly scrubbed with a Liqui-Nox solution followed by a thorough rinsing with deionized water. Refer to the attached Drilling Logs for a description of each sample collected.

SAMPLE HANDLING

All resultant samples from this project were stored on ice within a cooler for transport back to TMA/ERG's Ann Arbor Laboratory. All sample preservation was in accordance with "Test Methods for Evaluating Solid Waste" 3rd. Ed., U.S. EPA No. SW-846.

THERMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
TERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 16, 1993

SAMPLE PTM-21		MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM21-1	0'-2.0'	surface frozen, sampled from auger, dk. gray/black compact silts	n.a.	100%
	2.0'-4.0'	all sticky dk. gray/black silts - 22"	1/24"	92%
	4.0'-5.0'	very thick sticky dk. gray/ black silts - 9"	0/12"	75%
PTM21-2	5.0'-6.0'	thick sticky dk. gray/black silts - 9"	0/12"	75%
	6.0'-8.0'	dk. gray/black sticky silts very little fine sand <5% 24"	0/24" hand pushed	100%
	8.0'-10.0'	top 21" thick gray/black silts bottom 3" gray med. sand with shells - 24"	1/18" 3/6"	100%
PTM21-3	10.0'-12.0'	fine to med. gray sand with shell fragments - 12"	2/6" 2/6" 2/6" 3/6"	50%
	12.0'-14.0'	top 12" fine to med. gray sand with shells, bottom 6" peat over gray/white marl - 18"	1/12" 1/12"	75%
	14.0'-16.0'	primarily 12" fibrous brwn peat over 2" gray marl - 14"	1/18" 1/6"	58%

THERMO ANALYTICAL
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 28,1993

SAMPLE PTM-22		MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM22-1	0'-2.0'	minimal recovery in split spoon collected sample from auger sticky gray silts with gravel and sand 20%	1/24"	100%
	2.0'-5.0'	1 blow sampler fell 3.0' 24" all dark gray sticky silts	1/3.0'	100%
PTM22-2	5.0'-6.0'	12" all dark gray silts	1/12"	100%
	6.0'-8.0'	top 19" dk. gray smooth silts bottom 5" med. coarse dark gray sand	1/18" 3/6"	100%
	8.0'-10.0'	all 18" gray medium to fine coarse sand with small stones and shell fragments	3/6" 1/12" 3/6"	75%
PTM22-3	10.0'-12.0'	21" fine to med. coarse gray sand 90% light silts 10% and some decomposed vegetation	1/6" 1/6" 2/6" 3/6"	87%
	12.0'-14.0'	top 7" loose wet gray sand bottom 12" coarse gray sand with shells and light peat	1/6" 1/6" 1/6" 1/6"	79%
	14.0'-16.0'	top 5" coarse gray sand with fragments of shells, bottom 11" dark gray silts and peat	1/18" 1/6"	66%

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PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 28,1993

SAMPLE	PTM-23	MATERIAL CLASSIFICATION	BLOWS/6"	% Recovery
PTM23-1	0'-2.0'	top 8" dk. gray smooth silts with vegetation bottom 8" brown sand 60% and silts 40% some vegetation	1/18" 2/6"	66%
	2.0'-4.0'	21" compact dry brown to dark brown silts with approximately 10% fine sand	1/6" 2/6" 2/6" 2/6"	87%
	4.0'-5.0'	10" compact dry gray silts	1/12"	83%
PTM23-2	5.0'-6.0'	11" compact gray silts with a 2" layer of med. coarse sand at 8" from bottom	1/6" 1/6"	92%
	6.0'-8.0'	top 14" dk. gray smooth silts bottom 6" gray to black fine to medium coarse sand	1/12" 3/6" 6/6"	83%
	8.0'-10.0'	top 13" gray to brown sand 70% and silts 30%, over 7" of fine brown sand with light peat	2/6" 4/6" 6/6" 4/6"	83%
PTM23-3	10.0'-12.0'	top 12" gray fine to medium coarse sand bottom 8" medium coarse sand with shell fragments and decomposed vegetation	1/6" 2/6" 1/6" 1/6"	83%
	12.0'-14.0'	top 10" moist med. coarse brown sand with shells over 8" of brown peat, natural bottom	1/6" 1/6" 1/6" 1/6"	

THERMO ANALYTICAL
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 28,1993

SAMPLE PTM-24		MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM24-1	0'-2.0'	10" fine brown sand with gray striations 80% sand 20% silts	2/24"	42%
	2.0'-4.0'	top 4" gray sandy silts 50:50 bottom 13" dark brown silts with peat and decomposed roots	1/6" 1/6" 1/6" 3/6"	71%
	4.0'-5.0'	8" dark brown silts 60% with fine sand 40%	1/6" 2/6"	66%
PTM24-2	5.0'-6.0'	10" dark brown fine sand with peat mixed throughout	2/6" 2/6"	83%
	6.0'-8.0'	10" very moist mixture of fine dark brown sand and silts 50:50	1/24"	83%
	8.0'-10.0'	24" all dark gray to brown thick silts with (<10%) fine sand	1/24"	100%
PTM24-3	10.0'-12.0'	top 9" loose gray silts 80% and fine sand 20% middle 5" gray med. coarse sand bottom 6" med. coarse brown sand with decomposed roots and peat	2/6" 3/6" 4/6" 3/6"	83%
	12.0'-14.0'	top 11" gray silts and sand 80:20 bottom 12" gray to brown sandy peat	1/6" 1/6" 2/6" 2/6"	96%
	14.0'-16.0'	17" all brown peat with plant fibers, natural material	1/6" 1/6" 2/6" 1/6"	71%

THERMO ANALYTICAL
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 29,1993

SAMPLE	PTM-25	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
NOTE: all samples at this station were collected using a hand auger could not access the location with the drilling rig.				
PTM25-1	0'-4.0'	thick gray silts no sand	auger	100%
	4.0'-5.0'	gray/brown thick silts with some fine sand 30%	auger	100%
**********				
PTM25-2	5.0'-8.0'	smooth compact very sticky gray to brown silts	auger	100%
	8.0'-10.0'	fine to medium coarse gray sand with light silts <10%	auger	100%
**********				
PTM25-3	10.0'-11.0'	gray fine sand lt. silts <10%	auger	100%
	11.0'-13.0'	brown to gray compact sand peat and marl	auger	100%
	13.0'-15.0'	dark brown peat, marl and a very light amount of fine sand	auger	100%

:RMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 17, 1993

SAMPLE	PTM-26	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM26-1	0'-2.0'	brown compact silts - 15"	1/6" 1/12"	62%
	2.0'-4.0'	gray to dark gray compact sticky silts - 24"	1/18" 1/6"	100%
	4.0'-5.0'	all thick sticky gray silts 12"	1/12"	100%
PTM26-2	5.0'-6.0'	dark gray sticky silts - 12"	1/12"	100%
	6.0'-8.0'	top 18" gray to dark gray silts bottom 4" fine to med. dark gray sand	1/18" 4/6"	92%
	8.0'-10.0'	fine to medium gray sand	2/6" 4/6" 5/6" 6/6"	75%
PTM26-3	10.0'-12.0'	top 6" fine to med. moist gray sand, remaining 10" all blackish brown peat - 16"	3/6" 2/6" 1/6" 1/6"	67%

Stopped, no sample collected for PTM26-3 from the 10.0' to 15.0' level.

THERMO ANALYTICAL
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 28,1993

SAMPLE	PTM-27	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM27-1	0'-2.0'	no sample in split-spoon took sample directly from auger top 12" dry flaky gray silts bottom 12" moist dark gray silts	1/6" 1/18"	100%
	2.0'-4.0'	24" gray to dark gray compact sticky silts	2/12" 1/12"	100%
	4.0'-5.0'	11" gray compact smooth silts	1/12"	92%
PTM27-2	5.0'-6.0'	top 5" gray silts over 5" of moist medium coarse gray sand	1/6" 2/6"	83%
	6.0'-8.0'	top 11" dark gray smooth silts with 10% fine sand, bottom 10" gray medium coarse sand	1/12" 2/6" 3/6"	87%
	8.0'-10.0'	22" of gray wet medium to coarse sand with shell fragments and approximately 20% silts	4/6" 4/6" 4/6" 3/6"	92%
PTM27-3	10.0'-12.0'	fine gray sand 70% and silts 30% 20"	1/12" 1/12"	83%
	12.0'-14.0'	13" medium to coarse dark gray sand with gravel,stones and shells	1/12" 1/6" 1/6"	54%%
	14.0'-16.0'	top 8" medium to coarse gray sand middle 4" brown peat bottom 6" gray marl	1/12" 1/6" 1/6"	75%

THERMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
.TERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 16, 1993

SAMPLE	PTM-28	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM28-1	0'-2.0'	frozen dark black/gray silts sample from auger	n.a.	100%
	2.0'-4.0'	top 18" sticky compact gray to dk. black silts, bottom 6" med. gray/brwn. sand - 24"	0/18" 3/6"	100%
	4.0'-5.0'	gray med. wet sand - 8.5"	1/6" 3/6"	71%
PTM28-2	5.0'-6.0'	more compact wet gray med. sand 8.5"	4/6" 5/6"	71%
	6.0'-8.0'	gay med. sand with some shell fragments - 18"	3/6" 4/6" 4/6" 4/6"	75%
	8.0'-10.0'	gray med. to coarse sand with shell fragments - 16"	2/6" 2/6" 5/6" 3/6"	67%
PTM28-3	10.0'-12.0'	gray med. to coarse sand with the coarse sand near bottom, lots of shell fragments - 17"	2/6" 2/6" 3/6" 4/6"	71%
	12.0'-14.0'	top 9" coarse to med. gray sand bottom 6" compact sticky gray/ brown marl and silts - 15"	1/6" 1/12" 1/6"	62%
	14.0'-16.0'	all gray marl with shells and some med. to coarse sand - 16"	1/12" 1/12"	67%

THERMO ANALYTICAL
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TERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 16, 1993

SAMPLE PTM-29		MATERIAL CLASSIFICATION	BLOWS/6"	RECOVERY
PTM29-1	NOTE:	Augered down to see the depth of overburden. Hit gray marl at 10.5' and thick clay at 14.6'. Moved rig and collected samples from a new hole. Samples were collected to a depth of 10.0' from the auger flight, due to collapsing hole, caused by 1.0' of water over boring.		
	0'-4.0'	dark gray silts with fine sand 20%		100%
PTM29-2	4.0'-7.0'	fine to med. gray sand with shell fragments and light silts (10%)		100%
PTM29-3	7.0'-10.0'	fine to med. gray sand with shell fragments and approximately 30% silts		100%

ERMO ANALYTICAL
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MATERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 16, 1993

SAMPLE	PTM-30	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM30-1	0'-2.0'	moist somewhat compact dk. gray to black silts - 24"	0/24" hand pushed	100%
	2.0'-4.0'	4" black silts over dk. black to gray fine sand - 16"	2/6" 3/6" 3/6" 4/6"	66%
	4.0'-5.0'	dark gray fine to medium sand - 10"	1/6" 2/6"	83%
PTM30-2	5.0'-6.0'	dark gray med. sand with coarser sand near the bottom - 10"	3/6" 3/6"	83%
	6.0'-8.0'	gray med. sand with a very light amount of silts <20% - 21"	3/6" 3/6" 4/6" 4/6"	66%
	8.0'-10.0'	med. to coarse gray sand with shell fragments - 20"	1/18" 2/6"	83%
PTM30-3	10.0'-12.0'	top 6" gray med. to coarse sand, bottom 10" coarse gray sand with small stones and shells - 16"	1/6" 1/6" 2/6" 4/6"	67%
	12.0'-14.0'	top 8" coarse gray sand with shells over 7" brwn. gray marl with shells and vegetation 15"	1/6" 1/12" 1/6"	62%
	14.0'-16.0'	all gray marl very soft - 16"	1/18" 1/6"	67%

THERMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
TERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 17, 1993

SAMPLE PTM-31		MATERIAL CLASSIFICATION	BLOWS/6"	% Recovery
PTM31-1	0'-2.0'	7" frozen and collected from auger 6" collected in split spoon, all compact brwn. silts	1/17"	54%
	2.0'-4.0'	gray smooth sticky silts - 18"	0/24" hand pushed	75%
	4.0'-5.0'	sticky gray/brown silts - 11"	1/12"	92%
PTM31-2	5.0'-6.0'	sticky gray/brown silts with 2" fine black sand plug - 11"	1/12"	92%
	6.0'-8.0'	fine to med. black/gray sand with some shells - 16"	2/6" 2/6" 2/6" 4/6"	100%
	8.0'-10.0'	fine to med. gray sand with some roots and shells - 14"	3/6" 3/6" 4/6" 3/6"	58%
PTM31-3		No sample for the 10.0' to 15.0' section, hit fibrous peat at 11.2'		

ERMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 17, 1993

SAMPLE	PTM-32	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM32-1	0'-2.0'	top 7" frozen collected from auger, 8" collected in split spoon, all brwn. compact silts	0/17" hand pushed	62%
	2.0'-4.0'	all sticky gray silts - 18"	0/24" hand pushed	75%
	4.0'-5.0'	gray thick sticky silts - 12"	1/12"	100%
**********				
PTM32-2	5.0'-6.0'	gray sticky silts bottom 4" gray/black silts - 12"	1/12"	100%
	6.0'-8.0'	top 8" lose wet silts with a light amount of silts, bottom 8" dk. gray fine to medium sand - 16"	1/6" 2/6" 2/6" 2/6"	67%
	8.0'-10.0'	fine to med. gray sand with streaks of peat and shells -16"	2/6" 2/6" 3/6" 1/6"	67%

Hit fibrous brown peat just below the 10.0' level, no sample collected for PTM32-3, 10.0' to 15.0' section.

ERMO ANALYTICAL
E. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 17, 1993

SAMPLE PTM-33		MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM33-1	0'-2.0'	brown/gray compact sticky silts 18"	0/24" hand pushed	75%
	2.0'-4.0'	all dark gray to gray smooth sticky silts - 16"	0/24" hand pushed	67%
	4.0'-5.0'	gray sticky smooth silts 9"	1/12"	75%
PTM33-2	5.0'-6.0'	3" gray sticky silts over 6" of med. gray sand - 9"	1/6" 4/6"	75%
	6.0'-8.0'	6" fine gray sand over 12" med. to coarse gray sand with flecks of peat - 18"	1/6" 2/6" 2/6" 3/6"	67%
	8.0'-10.0'	primarily coarse gray/brown coarse sand with some sandy peat near bottom - 19"	1/6" 1/6" 2/6" 1/6"	79%
PTM33-3	10.0'-12.0'	coarse gray sand over a 4" plug of black peat and marl 12"	1/12" 1/6" 1/6"	50%
	12.0'-14.0'	gray to dark gray soft marl with streaks of coarse to med. sand - 24"	2/24"	100%

Stopped at 14.0 feet.

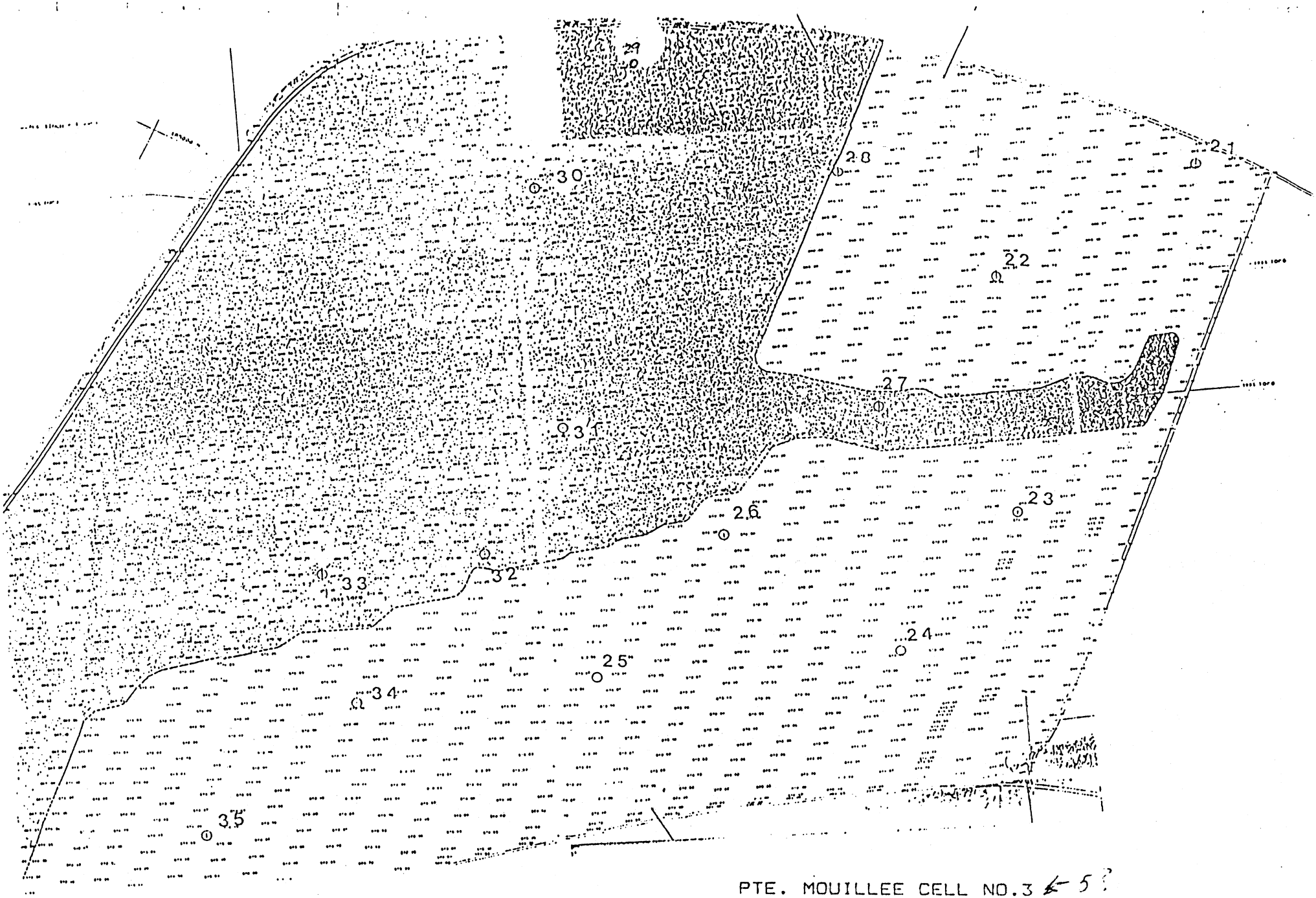
THERMO ANALYTICAL
T. MOUILLEE CONFINED DISPOSAL FACILITY
TERIAL CLASSIFICATION
CELL NO. 5
FEBRUARY 17, 1993

SAMPLE	PTM-34	MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
PTM34-1	0'-2.0'	top 1.0' frozen sample taken from auger, recovered 8" in split spoon, all compact dry brown silts	1/12"	83%
	2.0'-4.0'	gray to dark gray sticky silts 24"	1/24"	100%
	4.0'-5.0'	all gray to dark gray sticky silts - 12"	0/12" hand pushed	100%
PTM34-2	5.0'-6.0'	gray to dark gray silts with very light fine sand <10% - 12"	0/12" hand pushed	100%
	6.0'-8.0'	top 4" gray silts bottom 10" med. to fine gray sand with some shells - 14"	1/6" 2/6" 2/6" 2/6"	58%
	8.0'-10.0'	med. to coarse gray sand with a 1" plug of fine sandy peat, shells throughout - 16"	1/12" 1/6" 1/6"	67%
PTM34-3	10.0'-12.0'	top 18" coarse gray sand bottom 6" fine gray silty sand - 24"	1/12" 1/12"	100%
	12.0'-14.0'	gray marl with traces of fine sand - 22"	1/24"	92%

Stopped at 14.0 feet.

.HERMO ANALYTICAL
PTE. MOUILLEE CONFINED DISPOSAL FACILITY
MATERIAL CLASSIFICATION
CELL NO. 5
JULY 29,1993

SAMPLE PTM-35		MATERIAL CLASSIFICATION	BLOWS/6"	% RECOVERY
NOTE: Could not access this location with drilling rig, used hand auger to collect samples.				
PTM35-1	0'-2.0'	dark brown sand 80% with 20% silts	auger	100%
	2.0'-5.0'	dark black/gray thick silts 90% with a very light amount of fine sand	auger	100%
PTM35-2	5.0'-6.0'	lighter gray moist smooth sticky silts with fine sand 20% .	auger	100%
	6.0'-8.0'	dark black to gray fine to medium coarse sand with light silts and shell fragments	auger	100%
	8.0'-10.0'	very fine compact gray/brown sand with light silts 10%	auger	100%
PTM35-3	10.0'-12.0'	a mixture of moist brown compact fine sand, marl and silts	auger	100%
	12.0'-14.0'	very compact fine brown sand with peat a light amount of silts	auger	100%
	14.0'-15.0'	moist fine brown sand and peat 50:50	auger	100%



PTE. MOUILLEE CELL NO.3 ← 5?
SAMPLE STATIONS

PTE. MOUILLEE SEDIMENT DATA (COLLECTED 8/4/93)

PARAMETERS (ug/Kg)	PTM 22-1	PTM 22-2	PTM 22-3	PTM 23-1	PTM 23-2	PTM 23-3	PTM 24-1	PTM 24-2	PTM 24-3	PTM 25-1
RIN	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
LORDANE	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
DIELDRIN	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
ENDIN ALDEHYDE	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
ENDOSULFAN S.	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
ENDRIN	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
HEPTACHLOR EPOX	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
HEPTACHLOR	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
METHOXYCHLOR	<0.060	<0.050	<0.050	<0.060	<0.040	<0.040	<0.050	<0.040	<0.060	<0.060
PCB1016	<0.020	<0.016	<0.016	<0.018	<0.015	<0.013	<0.016	<0.015	<0.020	<0.021
PCB1221	<0.020	<0.016	<0.016	<0.018	<0.015	<0.013	<0.016	<0.015	<0.020	<0.021
PCB1232	<0.020	<0.016	<0.016	<0.018	<0.015	<0.013	<0.016	<0.015	<0.020	<0.021
PCB1242	<0.020	<0.016	<0.016	<0.018	<0.015	<0.013	<0.016	<0.015	<0.020	<0.021
PCB1248	1.5	0.98	<0.016	0.34	0.60	0.045	0.50	0.60	0.34	0.30
PCB1254	<0.020	<0.016	<0.016	<0.018	<0.015	<0.013	<0.016	<0.015	<0.020	<0.021
PCB1260	0.54	0.30	<0/016	0.48	0.38	0.016	0.44	0.38	0.32	0.31
TOXAPHENE	<0.40	<0.32	<0.33	<0.37	<0.30	<0.27	<0.33	<0.30	<0.40	<0.42
a-BHC	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
a-ENDOSULFAN	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
b-BHC	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
b-ENDOSULFAN	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
d-BHC	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
g-BHC	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
p,p'-DDD	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
p,p'-DDE	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
p,p'DDT	<0.0060	<0.0050	<0.0050	<0.0060	<0.0040	<0.0040	<0.0050	<0.0040	<0.0060	<0.0060
ARSENIC	10	5.3	4.9	9.6	3.7	3.1	8	6.7	5.4	8.0
BARIUM	130	70	35	120	46	15	110	100	42	87
CADMIUM	5.3	2.1	<1.0	3.2	<1.3	<1.2	<1.2	4.1	<1.6	3.2
CHROMIUM	110	62	9.7	110	44	10	85	110	23	80
COPPER	140	55	8.8	110	34	5.6	97	110	21	88
IRON	30000	16000	7700	33000	12000	4200	32000	25000	9800	25000
LEAD	200	75	8.9	140	45	7.9	160	140	26	110
MERCURY	0.76	0.53	0.08	0.76	0.56	0.04	0.48	0.8	0.19	0.71
NICKEL	58	34	9.1	56	27	6.6	37	58	20	48
SELENIUM	<0.62	<0.044	<0.45	<0.53	<0.37	<0.44	<0.50	<0.42	<0.60	<0.62
SILVER	<1.7	<1.2	<1.0	1.7	<1.3	<1.2	<1.2	1.8	<1.6	1.4
ZINC	640	230	33	430	140	25	450	350	96	330
AMMONIA	130	170	58	120	50	28	48	99	110	180
TKN	430	1300	1900	420	140	1600	1200	1100	650	940
T.PHOS.	1400	980	350	1400	840	300	1100	1300	810	1500
COD	130000	78000	49000	110000	59000	46000	110000	100000	120000	100000
CYANIDE	2.0	<0.50	<0.50	0.66	0.64	<0.50	1.2	<0.50	1.8	2.1
O&G	6200	3000	560	2600	1900	180	2000	3300	1200	2800
TVS	7.9	3.5	3.1	7.4	2	6.8	6.3	5.4	10	6.5
TOC	31000	15000	6800	51000	9700	21000	43000	36000	40000	54000
% SOLIDS	58	70	71	68	75	75	74	66	55	61
SP. GRAVITY	1.5	1.6	1.8	1.7	1.3	1.5	1.8	1.6	1.5	1.5
	15	6	2	12	3	4	9	9	4	1

PIE. MOUILLEE SEDIMENT DATA

PARAMETERS (ug/Kg)	PTM 25-2	PTM 25-3	PTM 27-1	PTM 27-2	PTM 27-3	PTM 35-1	PTM 35-2	PTM 35-3
RIN	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
ORDANE	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
DIELDRIN	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
ENDIN ALDEHYDE	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
ENDOSULFAN S.	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
ENDRIN	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
HEPTACHLOR EPOX	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
HEPTACHLOR	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
METHOXYCHLOR	<0.050	<0.050	<0.060	<0.050	<0.050	<0.050	<0.050	<0.060
PCB1016	<0.017	<0.017	<0.020	<0.016	<0.020	<0.040	<0.040	<0.020
PCB1221	<0.017	<0.017	<0.020	<0.016	<0.020	<0.040	<0.040	<0.020
PCB1232	<0.017	<0.017	<0.020	<0.016	<0.020	<0.040	<0.040	<0.020
PCB1242	<0.017	<0.017	<0.020	<0.016	<0.020	<0.040	<0.040	<0.020
PCB1248	0.48	0.084	1.2	0.29	<0.020	0.87	0.36	0.043
PCB1254	<0.017	<0.017	<0.020	<0.016	<0.020	<0.040	<0.040	<0.020
PCB1260	0.54	0.034	0.57	0.20	<0.020	0.97	0.21	0.060
TOXAPHENE	<0.33	<0.35	<0.39	<0.32	<0.40	<0.40	<0.40	<0.41
a-BHC	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
a-ENDOSULFAN	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
b-BHC	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
b-ENDOSULFAN	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
d-BHC	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
g-BHC	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
p,p'-DDD	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
p,p'-DDE	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
p'DDT	<0.0050	<0.0050	<0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0060
ARSENIC	5.9	4.3	9.1	3.8	4.8	8.2	6.9	5.2
BARIUM	79	39	120	37	37	140	67	41
CADMIUM	2.4	<1.4	3.2	<0.95	<1.2	5.1	2.0	<1.4
CHROMIUM	72	12	100	31	4.6	98	54	9.6
COPPER	65	13	110	25	5.6	140	58	12
IRON	19000	9200	30000	10000	6700	24000	16000	9700
LEAD	82	<8.6	140	30	<7.1	230	87	<8.6
MERCURY	0.78	0.06	0.86	0.35	0.03	0.47	0.43	0.06
NICKEL	44	13	64	21	8.1	50	36	13
SELENIUM	<0.46	<0.40	<0.58	<0.39	0.36	0.72	<0.51	0.75
SILVER	<1.2	<1.4	2.4	<0.95	<1.2	2.2	<1.4	<1.4
ZINC	260	47	460	100	25	520	300	46
AMMONIA	19	6.4	140	120	57	73	120	88
TKN	560	600	480	520	770	310	730	1000
T.PHOS.	900	360	1600	650	250	840	810	390
COD	66000	64000	130000	74000	34000	150000	52000	110000
CYANIDE	1.1	0.65	2.3	0.69	<0.50	3.4	0.9	<0.50
O&G	4000	470	6800	130	250	5300	190	440
TVS	4.6	5.6	7.8	2.1	2.4	12	4.9	6.8
TOC	23000	33000	30000	8000	11000	81000	29000	27000
% SOLIDS	68	68	57	74	75	74	68	61
SP. GRAVITY	1.7	1.6	1.5	1.9	1.8	1.8	1.6	1.8
	6	1	11	1	0	10	4	1

.OUILLEE SEDIMENT DATA (INORGANICS) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

PARAMETERS (mg/Kg)	PTM 11-1	PTM 11-2	PTM 12-1	PTM 12-2	PTM 13-1	PTM 13-2	PTM 13-3	PTM 21-1	PTM 21-2
ARSENIC	11	8.3	8.2	8.3	6.7	5.2	7.0	12	9.1
BARIUM	110	86	75	86	46	35	64	180	110
CADMIUM	6.2	2.1	4.6	2.6	1.6	1.1	2.6	9.6	4.3
CHROMIUM	96	84	63	82	32	24	78	150	110
COPPER	93	66	63	67	33	24	58	200	91
IRON	29000	25000	19000	21000	16000	11000	16000	31000	24000
LEAD	110	75	73	79	36	24	71	270	110
MERCURY	0.81	1.0	0.58	0.73	0.47	0.27	1.0	0.60	0.92
NICKEL	62	56	42	53	27	19	45	58	62
SELENIUM	<0.84	<0.61	<0.56	<0.68	<0.42	<0.44	<0.42	0.78	<0.53
SILVER	<2.1	<1.4	<1.6	<1.6	<1.4	<1.0	<1.3	2.7	<1.6
ZINC	530	270	350	260	160	93	250	850	380
AMMONIA	320	170	180	220	56	30	180	340	360
TKN	6600	1100	2600	2500	1400	580	1800	2000	2900
T.PHOS.	890	600	750	580	630	820	920	1100	710
COD	160000	98000	110000	76000	43000	36000	70000	190000	120000
CYANIDE	1.2	<1.0	1.6	1.1	<1.0	<1.0	1.5	5.0	1.7
O&G	4000	3900	3200	3800	750	580	4100	15000	4600
TVS	9.2	5.7	8.6	5.8	3.0	3.0	4.0	11	6.7
	44000	27000	40000	24000	16000	14000	16000	56000	31000
LIDS	45	56	52	57	70	72	69	52	58
DENSITY	1.8	1.9	2.0	2.1	2.1	2.3	2.5	1.9	2.1

GRAIN SIZE (%)

<4750 um	100	100	100	100	100	95	99	100	98
<2000 um	100	100	100	100	100	90	96	100	98
<850 um	100	100	100	100	98	84	91	100	97
<425 um	100	100	100	100	96	78	86	100	94
<180 um	98	98	99	98	88	60	64	99	91
<75 um	93	97	96	92	75	47	54	95	79
<53 um	86	86	91	88	67	42	49	89	76

21-3

MOUILLEE SEDIMENT DATA (INORGANICS) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

PARAMETERS (mg/Kg)	PTM 21-3	PTM 28-1	PTM 28-2	PTM 28-3	PTM 29-1	PTM 29-2	PTM 29-3	PTM 30-1	PTM 30-2
ARSENIC	7.3	6.0	2.8	5.9	6.0	2.7	5.9	4.7	4.6
BARIUM	35	47	11	95	68	16	41	30	24
CADMIUM	0.38	2.2	0.22	0.24	3.0	0.18	1.0	1.7	0.27
CHROMIUM	9.7	45	4.4	7.0	63	6.3	25	27	8.7
COPPER	11	43	<2.6	10	62	4.7	20	27	5.0
IRON	9700	14000	4300	11000	16000	6000	12000	9800	7400
LEAD	10	55	4.5	6.9	83	4.7	20	30	6.4
MERCURY	0.05	0.32	0.05	0.02	0.36	0.02	0.22	0.28	0.02
NICKEL	11	28	7.2	13	32	6.0	16	21	7.0
SELENIUM	<0.52	<0.56	<0.45	<0.41	<0.48	<0.52	<0.48	0.56	0.56
SILVER	<1.2	<1.3	<1.3	<1.0	0.40	<1.2	<1.3	1.4	<1.1
ZINC	42	220	27	41	270	24	91	130	26
AMMONIA	40	160	39	56	170	39	120	130	41
TKN	670	1400	190	570	840	920	1300	1200	1500
T.PHOS.	220	530	190	260	560	180	450	620	210
COD	47000	52000	7400	29000	61000	8800	31000	39000	18000
CYANIDE	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
O&G	890	3100	260	480	4100	170	880	820	140
TVS	3.3	3.8	0.6	2.2	4.0	1.0	2.8	2.9	1.3
	18000	12000	2100	8500	19000	4800	6000	28000	2700
LIDS	69	60	74	76	60	76	64	63	76
DENSITY	2.4	1.8	2.3	2.4	2.0	2.1	2.4	2.0	2.1

GRAIN SIZE (%)

<4750 um	100	100	100	100	100	100	100	100	100
<2000 um	97	100	100	98	100	100	99	100	99
<850 um	87	99	98	91	99	95	92	99	88
<425 um	69	94	92	78	98	81	79	97	66
<180 um	53	57	41	57	79	45	52	62	46
<75 um	34	44	10	40	48	10	29	28	18
<53 um	28	40	8	34	44	8	25	25	13

..c. MOUILLEE SEDIMENT DATA (INORGANICS) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

PARAMETERS (mg/Kg)	PTM 34-2	PTM 34-3	PTM 26-1	PTM 26-2
ARSENIC	5.4	4.2	7.8	5.0
BARIUM	43	32	62	72
CADMIUM	1.1	0.38	2.0	2.6
CHROMIUM	38	14	53	76
COPPER	28	12	58	59
IRON	12000	8200	20000	16000
LEAD	38	13	65	72
MERCURY	0.37	0.04	0.64	0.65
NICKEL	22	9.9	32	39
SELENIUM	<0.48	<0.83	<0.64	<0.46
SILVER	<1.2	<1.2	<1.5	<1.5
ZINC	130	49	230	250
AMMONIA	110	42	110	96
TKN	1700	840	2100	860
T.PHOS.	440	230	300	400
COD	47000	45000	96000	67000
CYANIDE	<1.0	<1.0	<1.0	<1.0
O&G	1500	330	3100	2800
TVS	3.4	2.6	8.6	4.6
	12000	11000	28000	14000
SOLIDS	63	71	60	46
DENSITY	2.1	2.1	1.8	1.9

GRAIN SIZE (%)

<4750 um	98	98	100	100
<2000 um	96	96	100	100
<850 um	87	83	99	99
<425 um	75	73	99	98
<180 um	61	68	95	87
<75 um	31	39	90	52
<53 um	22	27	80	47

. MOUILLEE SEDIMENT DATA (INORGANICS) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

PARAMETERS (ug/Kg)	PTM 30-3	PTM 31-1	PTM 31-2	PTM 32-1	PTM 32-2	PTM 33-1	PTM 33-2	PTM 33-3	PTM 34-1
ARSENIC	5.8	10	4.9	8.5	5.0	8.4	3.9	5.2	9.6
BARIUM	46	86	27	93	45	96	17	50	89
CADMIUM	0.23	3.2	0.80	3.1	1.3	3.0	0.28	0.23	3.3
CHROMIUM	8.9	72	20	80	40	92	7.2	9.1	89
COPPER	8.1	77	19	78.	33	83	3.3	9.9	81
IRON	9700	25000	8100	26000	11000	26000	5800	8700	26000
LEAD	5.5	93	17	94	43	110	5.7	5.6	100
MERCURY	<0.01	0.63	0.17	0.65	0.31	0.76	0.05	0.01	0.66
NICKEL	9.6	46	13	50	22	53	5.9	11	53
SELENIUM	<0.51	<1.2	<0.48	<1.2	<0.42	<0.61	<0.45	<0.88	<0.50
SILVER	<1.0	<1.4	<1.3	<1.7	<1.2	<1.6	<1.2	<1.0	<1.6
ZINC	33	330	72	330	140	360	25	36	330
AMMONIA	33	240	110	120	120	180	55	31	110
TKN	1100	2900	760	2800	1200	1800	520	920	2600
T.PHOS.	160	710	330	650	620	690	200	170	520
COD	26000	110000	36000	120000	62000	100000	30000	34000	110000
CYANIDE	<1.0	1.2	<1.0	1.4	1.1	1.5	<1.0	<1.0	<1.0
O&G	180	2600	1000	3400	2100	3700	430	270	2100
TVS	1.9	7.7	2.3	7.3	3.1	6.4	1.3	1.7	6.5
	7800	29000	8100	30000	14000	30000	5300	6100	24800
JLIDS	78	57	70	54	69	53	76	76	57
DENSITY	2.3	1.8	2.2	2.0	2.2	1.8	2.4	2.6	1.5
GRAIN SIZE (%)									
<4750 um	98	100	99	100	100	100	99	99	100
<2000 um	93	100	99	100	100	100	96	96	99
<850 um	80	99	97	100	97	100	75	82	98
<425 um	66	99	91	99	94	99	63	69	97
<180 um	51	95	62	97	74	98	50	57	96
<75 um	31	89	19	89	42	92	18	48	91
<53 um	26	83	15	85	35	86	11	42	86

. NO. 5

PTE. MOUILLEE SEDIMENT DATA--(PAH ANALYSIS) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

PARAMETERS (mg/Kg)	PTM 21-1	PTM 28-1	PTM 29-1	PTM 30-1	PTM 31-1	PTM 32-1	PTM 33-1	PTM 34-1	PTM 26-1
ACENAPHTHENE	<0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
ACENAPHTHYLENE	<0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
ANTHRACENE	0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
BENZO(a)AMTHRACENE	0.57	<0.20	<0.20	<0.19	0.51	<0.23	<0.23	<0.22	<0.21
BENZO(a)PYRENE	0.76	<0.20	<0.20	<0.19	0.62	0.30	<0.23	<0.22	<0.21
BENZO(b)FLUORANTHENE	0.92	<0.20	<0.20	<0.19	0.62	<0.23	<0.23	<0.22	<0.21
BENZO(ghi)PERYLENE	<0.24	<0.20	<0.20	<0.19	0.49	<0.23	<0.23	<0.22	<0.21
BENZO(k)FLUORANTHENE	0.50	<0.20	<0.20	<0.19	0.23	<0.23	<0.23	<0.22	<0.21
CHRYSENE	0.83	<0.20	<0.20	<0.19	0.75	0.28	<0.23	<0.22	<0.21
DIBENZO(a,h)ANTHRACENE	<0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
FLUORANTHENE	1.7	<0.20	0.22	<0.19	0.86	0.42	<0.23	<0.22	<0.21
FLUORENE	<0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
INDENO(1,2,3-cd)PYRENE	<0.24	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
NAPHTHALENE	0.38	<0.20	<0.20	<0.19	<0.21	<0.23	<0.23	<0.22	<0.21
PHENATHRENE	1.6	<0.20	<0.20	<0.19	0.41	0.25	<0.23	<0.22	<0.21
PYRENE	1.6	<0.20	0.22	<0.19	0.83	0.46	0.25	<0.22	<0.21

PTE. MOUILLEE SEDIMENT DATA--(PCBs AND PESTICIDES) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

.AMETERS (ug/Kg)	PTM 5-1	PTM 5-2	PTM 5-3	PTM 6-1	PTM 6-2	PTM 6-3	PTM 7-1	PTM 7-2	PTM 7-3
PCB 1016	<0.056	<0.059	<0.063	<0.063	<0.059	<0.066	<0.064	<0.061	<0.060
PCB 1221	<0.056	<0.059	<0.063	<0.063	<0.059	<0.066	<0.064	<0.061	<0.060
PCB 1232	<0.056	<0.059	<0.063	<0.063	<0.059	<0.066	<0.064	<0.061	<0.060
PCB 1242	<0.056	<0.059	<0.063	<0.063	<0.059	<0.066	<0.064	<0.061	<0.060
PCB 1248	<0.056	<0.059	<0.063	0.22	0.098	<0.066	0.44	0.083	<0.060
PCB 1254	<0.056	<0.059	<0.063	<0.063	<0.059	<0.066	<0.064	<0.061	<0.060
PCB 1260	<0.056	<0.059	<0.063	0.12	0.128	<0.066	0.20	<0.061	<0.060
ALDRIN	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
CHLORDANE	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
DIELDRIN	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
ENDIN ALDEHYDE	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
ENDOSULFAN S.	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
ENDRIN	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
HEPTACHLOR EPOX.	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
HEPTACHLOR	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
METHOXYCHLOR	<0.084	<0.089	<0.094	<0.095	<0.088	<0.099	<0.096	<0.091	<0.090
TOXAPHENE	<0.56	<0.59	<0.63	<0.63	<0.59	<0.66	<0.64	<0.61	<0.60
a-BHC	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
'NDOSULFAN	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
-BHC	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
b-ENDOSULFAN	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
d-BHC	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
g-BHC	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
p,p'-DDD	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
p,p'-DDE	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090
p,p'-DDT	<0.0084	<0.0089	<0.0094	<0.0095	<0.0088	<0.0099	<0.0096	<0.0091	<0.0090

PTE. MOUILLEE SEDIMENT DATA--(PCBs AND PESTICIDES) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

..RAMETERS (ug/Kg)	PTM 11-1	PTM 11-2	PTM 12-1	PTM 12-2	PTM 13-1	PTM 13-2	PTM 13-3	PTM 21-1	PTM 21-2
PCB 1016	<0.11	<0.088	<0.096	<0.082	<0.069	<0.062	<0.071	<0.082	<0.085
PCB 1221	<0.11	<0.088	<0.096	<0.082	<0.069	<0.062	<0.071	<0.082	<0.085
PCB 1232	<0.11	<0.088	<0.096	<0.082	<0.069	<0.062	<0.071	<0.082	<0.085
PCB 1242	<0.11	<0.088	<0.096	<0.082	<0.069	<0.062	<0.071	<0.082	<0.085
PCB 1248	0.39	0.71	0.60	0.84	0.42	0.14	1.5	2.9	1.4
PCB 1254	<0.11	<0.088	<0.096	<0.082	<0.069	<0.062	<0.071	<0.082	<0.085
PCB 1260	0.24	0.26	0.39	0.35	0.16	0.065	0.42	0.90	0.55
ALDRIN	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
CHLORDANE	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
DIELDRIN	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
ENDIN ALDEHYDE	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
ENDOSULFAN S.	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
ENDRIN	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
HEPTACHLOR EPOX.	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
HEPTACHLOR	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
METHOXYCHLOR	<0.16	<0.13	<0.14	<0.12	<0.10	<0.092	<0.11	<0.12	<0.13
TOXAPHENE	<1.1	<0.88	<0.96	<0.82	<0.69	<0.62	<0.71	<0.82	<0.85
a-BHC	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
ENDOSULFAN	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
b-BHC	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
b-ENDOSULFAN	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
d-BHC	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
g-BHC	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
p,p'-DDD	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
p,p'-DDE	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013
p,p'-DDT	<0.016	<0.013	<0.014	<0.012	<0.010	<0.0092	<0.011	<0.012	<0.013

PTE. MOUILLEE SEDIMENT DATA--(PCBs AND PESTICIDES) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

....AMETERS (ug/Kg)	PTM 21-3	PTM 28-1	PTM 28-2	PTM 28-3	PTM 29-1	PTM 29-2	PTM 29-3	PTM 30-1	PTM 30-2
PCB 1016	<0.072	<0.079	<0.065	<0.062	<0.069	<0.058	<0.075	<0.061	<0.064
PCB 1221	<0.072	<0.079	<0.065	<0.062	<0.069	<0.058	<0.075	<0.061	<0.064
PCB 1232	<0.072	<0.079	<0.065	<0.062	<0.069	<0.058	<0.075	<0.061	<0.064
PCB 1242	<0.072	<0.079	<0.065	<0.062	<0.069	<0.058	<0.075	<0.061	<0.064
PCB 1248	<0.072	0.27	<0.065	<0.062	1.7	0.28	0.47	0.58	0.28
PCB 1254	<0.072	<0.079	<0.065	<0.062	<0.069	<0.058	<0.075	<0.061	<0.064
PCB 1260	<0.072	0.13	<0.065	<0.062	0.22	0.076	0.42	0.14	0.044
ALDRIN	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
CHLORDANE	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
DIELDRIN	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
ENDIN ALDEHYDE	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
ENDOSULFAN S.	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
ENDRIN	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
HEPTACHLOR EPOX.	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
HEPTACHLOR	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
METHOXYCHLOR	<0.11	<0.12	<0.097	<0.094	<0.10	<0.087	<0.11	<0.092	<0.096
TOXAPHENE	<0.72	<0.79	<0.65	<0.62	<0.69	<0.58	<0.75	<0.61	<0.64
a-BHC	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
IDOSULFAN	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
ɔ-BHC	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
b-ENDOSULFAN	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
d-BHC	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
g-BHC	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
p,p'-DDD	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
p,p'-DDE	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096
p,p'-DDT	<0.011	<0.012	<0.0097	<0.0094	<0.010	<0.0087	<0.011	<0.0092	<0.0096

PTE. MOUILLEE SEDIMENT DATA--(PCBs AND PESTICIDES) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

..RAMETERS (ug/Kg)	PTM 30-3	PTM 31-1	PTM 31-2	PTM 32-1	PTM 32-2	PTM 33-1	PTM 33-2	PTM 33-3	PTM 34-1
PCB 1016	<0.058	<0.086	<0.070	<0.090	<0.067	<0.083	<0.065	<0.055	<0.086
PCB 1221	<0.058	<0.086	<0.070	<0.090	<0.067	<0.083	<0.065	<0.055	<0.086
PCB 1232	<0.058	<0.086	<0.070	<0.090	<0.067	<0.083	<0.065	<0.055	<0.086
PCB 1242	<0.058	<0.086	<0.070	<0.090	<0.067	<0.083	<0.065	<0.055	<0.086
PCB 1248	<0.058	0.65	0.10	0.54	0.43	0.74	0.24	<0.055	0.48
PCB 1254	<0.058	<0.086	<0.070	<0.090	<0.067	<0.083	<0.065	<0.055	<0.086
PCB 1260	<0.058	0.28	0.068	0.45	0.20	0.30	0.038	<0.055	0.28
ALDRIN	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
CHLORDANE	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
DIELDRIN	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
ENDIN ALDEHYDE	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
ENDOSULFAN S.	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
ENDRIN	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
HEPTACHLOR EPOX.	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
HEPTACHLOR	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
METHOXYCHLOR	<0.087	<0.13	<0.10	<0.14	<0.10	<0.12	<0.097	<0.082	<0.13
TOXAPHENE	<0.58	<0.86	<0.70	<0.90	<0.67	<0.83	<0.065	<0.55	<0.86
a-BHC	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
NDOSULFAN	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
b-BHC	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
b-ENDOSULFAN	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
d-BHC	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
g-BHC	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
p,p'-DDD	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
p,p'-DDE	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013
p,p'-DDT	<0.0087	<0.013	<0.010	<0.014	<0.010	<0.012	<0.0097	<0.0082	<0.013

PTE. MOUILLEE SEDIMENT DATA--(PCBs AND PESTICIDES) DELIVERY ORDER NO. 0026 DATE COMPLETED FEBRUARY 17, 1994

..AMETERS (ug/Kg)	PTM 34-2	PTM 34-3	PTM 26-1	PTM 26-2
PCB 1016	<0.078	<0.065	<0.083	<0.077
PCB 1221	<0.078	<0.065	<0.083	<0.077
PCB 1232	<0.078	<0.065	<0.083	<0.077
PCB 1242	<0.078	<0.065	<0.083	<0.077
PCB 1248	0.32	0.056	0.47	0.58
PCB 1254	<0.078	<0.065	<0.083	<0.077
PCB 1260	0.15	0.041	0.24	0.15
ALDRIN	<0.012	<0.0097	<0.012	<0.012
CHLORDANE	<0.012	<0.0097	<0.012	<0.012
DIELDRIN	<0.012	<0.0097	<0.012	<0.012
ENDIN ALDEHYDE	<0.012	<0.0097	<0.012	<0.012
ENDOSULFAN S.	<0.012	<0.0097	<0.012	<0.012
ENDRIN	<0.012	<0.0097	<0.012	<0.012
HEPTACHLOR EPOX.	<0.012	<0.0097	<0.012	<0.012
HEPTACHLOR	<0.012	<0.0097	<0.012	<0.012
METHOXYCHLOR	<0.12	<0.097	<0.12	<0.12
TOXAPHENE	<0.78	<0.065	<0.83	<0.77
a-BHC	<0.012	<0.0097	<0.012	<0.012
NDOSULFAN	<0.012	<0.0097	<0.012	<0.012
J-BHC	<0.012	<0.0097	<0.012	<0.012
b-ENDOSULFAN	<0.012	<0.0097	<0.012	<0.012
d-BHC	<0.012	<0.0097	<0.012	<0.012
g-BHC	<0.012	<0.0097	<0.012	<0.012
p,p'-DDD	<0.012	<0.0097	<0.012	<0.012
p,p'-DDE	<0.012	<0.0097	<0.012	<0.012
p,p'-DDT	<0.012	<0.0097	<0.012	<0.012

. MOUILLEE CDF 7-POINT PARTICLE SIZE DELIVERY NO. 0018

PTM 22-1
SIEVE SIZE

4750 um - 100%
<2000 um - 100%
<850 um - 100%
<425 um - 99%
<180 um - 97%
<75 um - 95%
<53 um - 91%

PTM 22-2
SIEVE SIZE

<4750 um - 96%
<2000 um - 94%
<850 um - 92%
<425 um - 89%
<180 um - 72%
<75 um - 57%
<53 um - 46%

PTM 22-3
SIEVE SIZE

<4750 um - 99%
<2000 um - 97%
<850 um - 91%
<425 um - 78%
<180 um - 65%
<75 um - 45%
<53 um - 30%

PTM 23-1
SIEVE SIZE

<4750 um - 100%
<2000 um - 99%
<850 um - 98%
<425 um - 97%
<180 um - 94%
<75 um - 93%
<53 um - 81%

PTM 23-2
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 98%
<425 um - 94%
<180 um - 76%
<75 um - 51%
<53 um - 38%

PTM 23-3
SIEVE SIZE

<4750 um - 100%
<2000 um - 98%
<850 um - 94%
<425 um - 87%
<180 um - 64%
<75 um - 17%
<53 um - 13%

PTM 24-1
SIEVE SIZE

<4750 um - 99%
<2000 um - 98%
<850 um - 97%
<425 um - 96%
<180 um - 90%
<75 um - 89%
<53 um - 70%

PTM 24-2
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 100%
<425 um - 99%
<180 um - 92%
<75 um - 85%
<53 um - 68%

PTM 24-3
SIEVE SIZE

4750 um - 100%
2000 um - 98%
<850 um - 96%
<425 um - 94%
<180 um - 68%
<75 um - 20%
<53 um - 11%

PTM 25-1
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 100%
<425 um - 99%
<180 um - 94%
<75 um - 85%
<53 um - 77%

PTM 25-2
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 100%
<425 um - 99%
<180 um - 88%
<75 um - 76%
<53 um - 60%

PTM 25-3
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 98%
<425 um - 92%
<180 um - 81%
<75 um - 51%
<53 um - 42%

PTM 27-1
SIEVE SIZE

<4750 um - 100%
<2000 um - 100%
<850 um - 100%
<425 um - 100%
<180 um - 99%
<75 um - 99%
<53 um - 93%

PTM 27-2
SIEVE SIZE

<4750 um - 97%
<2000 um - 95%
<850 um - 92%
<425 um - 89%
<180 um - 63%
<75 um - 42%
<53 um - 28%

PTM 27-3
SIEVE SIZE

<4750 um - 99%
<2000 um - 97%
<850 um - 85%
<425 um - 62%
<180 um - 44%
<75 um - 23%
<53 um - 17%

PTM 35-1
SIEVE SIZE

<4750 um - 99%
<2000 um - 98%
<850 um - 94%
<425 um - 89%
<180 um - 79%
<75 um - 63%
<53 um - 42%

PTM 35-2
SIEVE SIZE

<4750 um - 100%
<2000 um - 99%
<850 um - 98%
<425 um - 94%
<180 um - 83%
<75 um - 55%
<53 um - 44%

PTML 35-3
SIEVE SIZE

<4750 um - 100%
<2000 um - 99%
<850 um - 98%
<425 um - 96%
<180 um - 86%
<75 um - 44%
<53 um - 34%

Appendix A: Unpublished Scientific Information.

17. ACOE 1980 Report "Water Quality Monitoring of Grassy Island CDF Dec 1980". 13 pp.

ACOE 1980 Report

1980 WATER QUALITY MONITORING OF THE GRASSY ISLAND CONFINED DISPOSAL FACILITY

DECEMBER 1980

U.S. ARMY CORPS OF ENGINEERS

DETROIT DISTRICT

1980 WATER QUALITY MONITORING OF THE GRASSY ISLAND CONFINED DISPOSAL FACILITY

BACKGROUND

River Rouge, Michigan, is located in the east-central side of Wayne County and approximately 5 1/2 miles south of Detroit, Michigan. The project was authorized by the River and Harbor Act of 8 August 1917 and various subsequent laws. The law provides (a) a main channel 25 feet deep from that depth in the Detroit River through the Short-Cut Canal upstream about one mile, then 21 feet deep for about two miles to the turning basin above Dix Avenue Bridge; and (b) the old channel 25 feet deep from that depth in the Detroit River through the old channel mouth upstream for about 1/4 mile, then 18 feet deep for about 1/4 mile, then 17 feet deep over 1/4 mile, and 21 feet deep to the widened and flared junction of the Old Channel with the Short Cut Canal.

DISPOSAL SITE

The Grassy Island disposal facility, covering an area of about 80 acres, is located approximately 3 miles south of the mouth of the River Rouge. An earth dike of clay material 6 feet high was completed around the perimeter of the disposal area to contain the material from the Rouge River dredging. The dikes restrain leaching and the return of the pollutants into the adjacent hydrologic system. A wier to control excess water is located at the northeast corner, 200 feet from the north channel facing the main channel of the Detroit River.

In 1973, a sediment sampling and analysis program conducted by the United States Environmental Protection Agency (EPA) revealed that sediments from River Rouge must be classified as contaminated and unsuitable for open water disposal. The data indicates all areas of the project contain consentrations of pollutants in levels that exceed the EPA suggested criteria.

These pollutants seem to be higher in the main channel and are dominated by extremely high total volatile solids and chemical oxygen demand. The pollutants are attributed to contaminants in solution and suspension derived from untreated and partially treated domestic, agricultural, and industrial wastes, urban storm runoff; particulary the runoff from the combined sanitary/storm sewers in the Metropolitan Detroit Area.

From 31 July to 30 September 1980, the Corps Hopper Dredge LYMAN dredged 177,997 cubic yards, bin measure, of river sediments and discharged them into the Grassy Island Confined Disposal Facility. After the dredged materials were discharged into the CDF, the bulk of the sediments settled and the excess water flowed into the Detroit River. The CDF and the Detroit River were monitored on 13 August, 5 September, 17 September, and 3 November 1980 to ascertain if the river's ambient water quality was being significantly impacted by the CDF discharge.

MONITORING METHODOLOGY

A total of 5 stations were sampled during the CDF monitoring. These were located at the LYMAN's pipeline discharge (station 1), that is, the material being discharged into the CDF; the disposal facility overflow (station 2), that is, the wier; the plume sample at the discharge's mixing zone (station 3) within 50 feet of the point of discharge; the Detroit River downstream (station 4) located about 250 feet downstream from the wier discharge; and the Detroit River upstream (station 5) located about 250 feet upstream from the wier discharge. Station 1 was not sampled on 3 November because the LYMAN had discontinued operations at that time. E.P.A. prescribed methodology was utilizied in obtaining, preserving, and analyzing the samples. A commercial testing laboratory collected the samples and performed the analysis. All samples were analyzed for 27 parameters.

DISCUSSION

Sample analysis results were compared to one another and to Michigan Department of Natural Resourses (MDNR) and EPA water quality standards to determine if the discharge of excess water from the CDF was causing significant water quality degregation in the Detroit River. These water quality standards were promulgated in the D.N.R. Water Resourses Commission General Rules and the E.P.A. publication Quality Criteria for Water to provide for the protection and propagation of fish and other aquatic life and for recreation in and on the water in accord with the 1983 goals of P.L. 92-500.

If a parameter was found to be present in greater amounts in the wier discharge then in the upstream ambient, the discharge was affecting the Detroit River's water quality. To determine how significant this affect was, the mixing zone and upstream sample analysis results were reviewed. If the level of a parameter in the downstream sample approached that of the upstream sample, the CDF's discharge impact was not considered significant. A determination of both the existing river water quality and the quality of the wier overflow was made by comparing the level of the various parameters to the E.P.A. and D.N.R. criteria for them. If a particular parameter in the wier discharge did not exceed the E.P.A. or D.N.R. criteria for that parameter, then it was unlikely that any significant, negative impact to the river's water quality would occur even if the parameter's level in the overflow did exceed the level in the river.

RESULTS

Dissolved oxygen, pH, conductivity, and temperature were measured at stations 2,3,4, and 5 because changes in these parameters can be indicative of major changes in water quality. Conductivity varied from 1000 umhos to 450 umhos from 13 August 1980 to 03 November 1980 at the wier. Dissolved oxygen (mg/l) was low at the wier on the the two middle sampling dates-perhaps because the wier boards were all the way to the top of the wier and samples could only be collected by surface skim. The pH varied from 6.6 (S.U.) at the dredge and 6.7 (S.U.) at the wier (second sampling) to 8.1 (S.U.) thus staying within the E.P.A.'s criteria of 6.5 to 8.8. To comply with Canadian law, pH must be between 6.7 and 8.5. The lowest pH was 6.7 at station 2 sampled on 05 September 1980. Temperature varied from 6.1°C to 24.8°C. Twice the current was to strong for accurate Secchi readings.

P.C.B.

P.C.B. 1242 was found at station 1 to be 1.5 mg/kg on 13 August 1980. P.C.B. 1254 and 1260 were found on the 1st, 2d, and 3d sampling dates but at such a low level (<0.18 and 0.31) mg/kg on 13 August 1980) that P.C.B.'s were not tested for on the 4th sampling date. P.C.B.'s were always found in greater consentrations at station 1 (dredge discharge). E.P.A. guidelines allow 0.001 ug/l before it is considered detrimental to aquatic life. No P.C.B. 1254 and 1260 were found in measureable limits at station, 2,3,4, and 5 on 5 September 1980, thus indicating that P.C.B.'s are effectively trapped in the confined disposal facility since P.C.B.'s could not be measured at the wier.

VOLATILE SOLIDS AND CHEMICAL OXYGEN DEMAND

C.O.D. and volatile solids limits are not specified by the E.P.A. or the D.N.R. for water samples. The E.P.A. specifies volitle solids limits for sediment samples to be between 50,000-80,000 mg/kg dry weight. C.O.D. allowable limits are between 40,000 and 80,000 mg/kg dry weight. 320 mg/l were measured in the supernatent fraction at station 1; 68, 74, 4, and 52 mg/l were measured at station 2,3,4, and 5 respectively. C.O.D. was 80 times higher at station 1 (dredge discharge) than station 4 (downstream). Volatile solids at the plume were found to be about equal to the amount of volitile solids at the upstream station.

CYANIDE

The limit of cyanide is 5 mg/l as stated by the E.P.A. No detectable limits of cyanide were found on the first 3 sampling dates. Cyanide was not tested for on 3 November.

MANGANESE

The pollution limit of manganse in the water fraction is 50 mg/l as designated by the D.N.R. standards of 1974. Manganese was high at station 1 but met the D.N.R. standard at station 2 with an average of .47 mg/l over the last three sampling dates.

TOTAL SUSPENDED SOLIDS

The E.P.A. and the D.N.R. have set no guidelines for total suspended solids in the water fraction. Suspended solids were checked at the wier and compared to the upstream, downstream, and plume sampling stations. The first sampling indicated total suspended solids of 3 mg/kg at the wier, 9 mg/kg upstream, 17 mg/kg at the plume, and 11 mg/kg downstream. The second sampling indicated 9 mg/kg at the wier, 6 mg/kg upstream, 7 mg/kg at the plume, and 5 mg/kg downstream. The third sampling indicated 4 mg/kg at the wier, 9 mg/kg upstream, 8 mg/kg at the plume, and 10 mg/kg downstream. The last sampling indicated 6 mg/kg at the wier, 6 mg/kg upstream, 8 at the plume, and 8 mg/kg downstream, Generally, the amount of total suspended solids at the wier seemed to be close to the amount, or in two cases, less then the amount of total suspended solids upstream so it is believed that the quantity of T.S.S. does not significantly affect the quality of the Detroit River.

ZINC

There are no established limits for zinc so the amount of zinc was compared to the amount measured at stations 3,4, and 5. The amount of zinc varied from 0.026 mg/l at the wier (4th sampling) to 0.005 mg/l at station 3 (first sampling) to 0.024 mg/l upstream (4th sampling). Generally, it is felt that the amount of zinc passing the wier is representative of the amount in the Detroit River.

NICKEL

The E.P.A. has established guidelines for nickel in the water fraction at 100 ug/l. Nickel tested at 0.010 mg/l on the 2d and 3d sampling-the same as the upstream and downstream amount. Nickel tested higher in the first sampling (0.022 mg/l) but this was not considered significant or dangerous to human or aquatic life.

CONCLUSION

Based upon the evidence of the parameters tested (results attached) on 4 different dates, it appears that the Grassy Island CDF does not significantly impact the quality of the Detroit River. It can be argued that the dredging of the Rouge River is the most direct, fastest, and least expensive method to improve the quality of the sediment since contaminated material is directly removed.

In many cases, no specific guidelines have been issued, so only an interpretation of the reported data can be made. It appears that the contaminated material is for the most part contained in the Grassy Island CDF and any part of the Detroit River affected by the wier overflow is small and of a short duration.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
8/13/80

Parameters and units	STATION 1 (Dredge Discharge) SOLIDS* AA51695	STATION 1 (Dredge Discharge) SUPERNATANT AA51697	STATION 2 Weir AA51698	STATION 3 Plume AA51699	STATION 4 Detroit River Upstream AA51700	STATION 5 Detroit River Downstream AA51701
Ammonia nitrogen, mg/l	590	100	19	0.13	0.08	0.04
Arsenic, mg/l	110	0.013	0.003	<0.001	<0.001	<0.001
Barium, mg/l	230	0.38	0.06	0.03	0.03	0.03
Chemical oxygen demand, mg/l	250,000	340	77	12	9	11
Chromium, mg/l	430	0.21	<0.005	<0.005	<0.005	<0.005
Copper, mg/l	410	0.26	0.047	0.032	<0.005	<0.005
Cyanide, mg/kg	3.6	----	----	----	----	----
Fecal coliform, col./100 ml	----	53,000	2,450	320	20	260
Total Kjeldahl nitrogen, mg/l	1,600	100	15	0.26	0.13	0.13
Lead, mg/l	530	0.29	0.011	<0.010	<0.010	<0.010
Manganese, mg/l	930	0.94	0.89	0.014	0.008	0.006
Mercury, mg/l	1.2	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel, mg/l	80	0.061	0.022	<0.010	<0.010	<0.010
Oil and grease, mg/l	4,900	10	3	7	2	1
Total organic carbon, mg/l	55,000		25		3	4
Phenol, mg/l	----	<0.003	<0.003	<0.003	<0.003	<0.003
PCB 1242, mg/kg	1.5	----	----	----	----	----
PCB 1254, mg/kg	<0.18	----	----	----	----	----
PCB 1260, mg/kg	<0.31	----	----	----	----	----
Total phosphorus, mg/l	1,500	2.8	0.25	<0.02	<0.02	<0.02
Dissolved solids, mg/l	----	590	590	140	140	130
Total solids, %	35.7	----	----	----	----	----
Suspended solids, mg/l	----	500	3	17	9	11
Volatile solids, mg/l	86	350	160	24	13	12
Zinc, mg/l	1,300	0.81	0.026	<0.005	<0.005	<0.005
Grain size, %:						
>0.850 mm	<0.2	----	----	----	----	----
>0.430 mm	0.3	----	----	----	----	----
>0.074 mm	4.0	----	----	----	----	----
<0.074 mm	96.0	----	----	----	----	----
Eh, mv, relative to N.H.E.	+4	----	----	----	----	----
pH	7.1	7.0	7.4	7.3	7.3	7.3

*Units are in milligrams per kilogram (dry weight basis) with the exception of Total Solids and Volatile Solids, which are given as a percent.

FIELD DATA
Delivery Order 0013
Grassy Island
Sampling No. 1

Date	Station number	Depth (ft.)	Water Collected (depth) (ft.)	Cond. (µmhos)	D.O. (mg/l)	Temp. (°C)	pH (S.U.)	Secchi (avg.) (ft.)	Weather Conditions and Ancillary Observations
8/13/80	1 Dredge Discharge	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Discharge material very oily (visible). Strong hydrocarbon odor and septic odor. Dark black in color.
8/13/80	2 Weir	H.A. .25	C.F.S. 1.08	1000	7.2	24.2	7.4	N.A.	
8/13/80	3 Plume	13.0	4.0	265	7.9	23.0	7.3	3.2	
8/13/80	4 Upstream	22.0	5.0	255	8.1	22.5	7.3	N.A.	Current was too swift for accurate Secchi reading.
8/13/80	5 Downstream	12.0	4.0	250	8.3	23.0	7.3	3.7	Weather at 12:30: water calm, winds SSW at 3-5 mph, 70% cloud cover, ambient temperature 24.5°C. Weather at 14:10: wave height increasing to more than 1'; winds SSW gusting to 10 mph, 70% cloud cover, ambient temperature 25°C.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
1980

Parameters and units	STATION 1 (Dredge Discharge) SOLIDS* AA52632	STATION 1 (Dredge Discharge) SUPERNATANT AA52626	STATION 2 Weir AA52627	STATION 3 Plume AA52623	STATION 4 Detroit River Upstream AA52629	STATION 5 Detroit River Downstream A52631
Ammonia Nitrogen, mg/l	230	14	17	0.05	0.10	0.02
Arsenic, mg/l	17	0.006	0.009	0.002	0.001	0.001
Barium, mg/l	200	0.13	0.12	<0.02	0.03	0.03
Chemical oxygen demand, mg/l	390,000	220	100	52	49	51
Chromium, mg/l	290	0.022	0.009	<0.005	0.005	<0.005
Copper, mg/l	200	0.012	0.010	<0.005	0.005	<0.005
Cyanide, mg/l	5.7	----	----	----	----	----
Fecal coliform, col./100 ml	----	180,000	200	17	17	18
Total Kjeldahl nitrogen, mg/l	4800	15	18	0.32	0.28	0.33
Lead, mg/l	440	0.022	0.010	<0.010	0.010	<0.010
Manganese, mg/l	1,800	0.32	0.52	0.007	0.005	0.006
Mercury, mg/l	<0.44	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel, mg/l	28	<0.010	<0.010	<0.010	<0.010	<0.010
Oil and grease, mg/l	<900	2	2	<1	<1	1
Total organic carbon, mg/l	33,000	19	36	8	8	3
Phenol, mg/l	----	0.074	0.005	0.004	<0.003	<0.003
PCB 1242, mg/kg	12	----	----	----	----	----
PCB 1254, mg/kg	ND	----	----	----	----	----
PCB 1260, mg/kg	ND	----	----	----	----	----
Total phosphorus, mg/l	2800	0.14	0.50	0.06	0.05	0.03
Dissolved solids, mg/l	----	380	450	200	170	190
Total solids, %	22.8	----	----	----	----	----
Suspended solids, mg/l	----	20	9	7	6	5
Volatile solids, mg/l	86.8	170	120	60	60	190
Zinc, mg/l	1,200	0.10	0.021	0.013	0.008	0.006
Grain size, %:						
<0.850 mm	<0.2	----	----	----	----	----
<0.430 mm	<0.2	----	----	----	----	----
<0.074 mm	0.6	----	----	----	----	----
>0.074 mm	99.4	----	----	----	----	----
Eh, mv, relative to N.H.E.	+126	----	----	----	----	----
pH	7.8	6.6	6.7	7.1	7.2	7.1

*Results are in milligrams per kilogram (dry weight basis) with the exception of Total Solids and Volatile Solids, which are given as a percent.

FIELD DATA
Delivery Order 0013
Grassy Island
Sampling No. 2

Date	Station number	Depth (ft.)	Water Collected (depth) (ft.)	Cond. (μmhos)	D.O. (mg/l)	Temp. (°C)	pH (S.U.)	Secchi (avg.) (ft.)	Weather Conditions and Ancillary Observations
9/5/80	1 Dredge	N.A.	N.A.	600	N.A.	N.A.	6.6	N.A.	Discharge material oily, strong hydrocarbon odor, dark black in color.
9/5/80	2 Weir	N.A.	N.A.	700	1.9	24.8	6.7	N.A.	Weir was not overflowing its cre In-situ measurements except for taken from holding lagoon. See attached sheet for explanation.
9/5/80	3 Plume	6.0	3.0	211	8.2	23.8	7.1	3.55	
9/5/80	4 Upstream	14.5	4.0	219	8.0	23.8	7.2	3.6	Weather conditions at 11:20: cle and sunny, 0% cloud cover, ambi temperature 25°C, winds calm, waves less than 1/4'.
9/5/80	5 Downstream	12.5	4.0	200	7.9	24.8	7.1	4.55	Weather conditions at 13:30: cle and sunny, 0% cloud cover, ambi temperature 25.5°C, winds gusti 5-10 mph out of NW, waves >1/2' and increasing.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
9/17/80

Parameters and units	STATION 1 (Dredge Discharge) SOLIDS* AA53728	STATION 1 (Dredge Discharge) SUPERNATANT AA53727	STATION 2 Weir AA53729	STATION 3 Plume AA53730	STATION 4 Detroit River Upstream AA53732	STATION 5 Detroit River Downstream AA53733
Ammonia nitrogen, mg/l	370	41	15	0.56	0.07	0.04
Arsenic, mg/l	66	0.006	0.003	<0.001	<0.001	<0.001
Barium, mg/l	210	0.12	0.07	0.03	0.04	0.03
Chemical oxygen demand, mg/l	250,000	320	68	74	4	52
Chromium, mg/l	1250	0.013	<0.005	<0.005	0.006	<0.005
Copper, mg/l	240	0.014	<0.005	<0.005	<0.005	<0.005
Cyanide, mg/l	<0.70	---	---	--	---	---
Fecal coliform, col/100 ml	---	200,000	430	270	190	220
Total Kjeldahl nitrogen, mg/l	2500	46	17	0.70	0.27	0.19
Lead, mg/l	530	0.027	<0.010	<0.010	<0.010	<0.010
Manganese, mg/l	970	0.77	0.35	0.043	0.012	0.010
Mercury, mg/l	1.1	<0.0002	0.0003	<0.0002	<0.0002	<0.0002
Nickel, mg/l	68	0.029	<0.010	<0.010	<0.010	<0.010
Oil and grease, mg/l	2300	1	<1	<1	4	<1
Total organic carbon, mg/l	66,000	25	11	8	6	12
Phenol, mg/l	---	<0.003	<0.003	<0.003	<0.003	<0.003
PCB 1242, µg/l	6.7	---	---	---	---	---
PCB 1254, µg/l	2.2	---	---	---	---	---
PCB 1260, µg/l	<0.93	---	---	---	---	---
Total phosphorus, mg/l	2100	0.32	0.41	0.05	0.04	0.04
Dissolved solids, mg/l	---	620	350	150	140	140
Total solids, %	30.1	---	---	---	---	---
Suspended solids, mg/l	---	41	4	8	9	10
Volatile solids, mg/l	86.1	340	240	17	40	12
Zinc, mg/l	1300	0.081	<0.005	<0.005	<0.005	0.014
Grain size, %:						
>0.850 mm	0.2	---	---	---	---	---
>0.430 mm	1.9	---	---	---	---	---
>0.074 mm	4.4	---	---	---	---	---
<0.074 mm	95.6	---	---	---	---	---
Eh, mv relative to N.H.E.	+31	---	---	---	---	---
pH	7.4	---	7.4	8.1	8.1	8.1

FIELD DATA
Delivery Order 0013
Grassy Island
Sampling No. 3

Date	Station number	Depth (ft.)	Water Collected (depth) (ft.)	Cond. (µmhos)	D.O. (mg/l)	Temp. (°C)	pH (S.U.)	Secchi (avg.) (ft.)	Weather Conditions and Ancillary Observations
9/17/80	1 Dredge	NA	NA	1100	NA	NA	NA	NA	Boat named Lyman arrived at 1:4 Sample dark black, strong hydro carbon odor.
9/17/80	2 Weir	NA	surface	610	3.4	18.0	7.4	NA	Weir was overflowing its crest. strument measurements and sampl collected at surface just befor the water entered the weir. See below for explanation***.
9/17/80	3 Plume*	5	2	265	8.8	18.8	8.1	4.4	Less current, Secchi possible. Weather cleared at 1:00 pm. Wir 5-8 mph N, overcast, 85% cloud cover.
9/17/80	4 Upstream	21	2	200	9.2	18.5	8.1	**	Winds N 10-15 mph. Overcast, 1 rain off and on. Air temperatur 14°C.
9/17/80	5 Downstream	16	2	205	9.7	18.5	8.1	**	

*Replicate collected.
**Current too swift: no data.
***All boards were in place on weir. Due to the grid welded in place and the weir boards all the way up to the top of th weir, samples could only be collected from a surface skim before the water entered the weir.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
11/03/80

Parameters and Units	STATION 1 (Dredge Discharge) SOLIDS*	STATION 1 (Dredge Discharge) Supernatant	STATION 2 Weir 55733	STATION 3 Plume 55734	STATION 4 Detroit River Upstream 55735	STATION 5 Detroit River Downstream 55736
Ammonia nitrogen, mg/l	NOT IN OPERATION		0.79	0.31	0.11	0.06
Arsenic, mg/l			0.001	0.001	<0.001	<0.001
Barium, mg/l			0.08	<0.02	<0.02	0.02
Chemical oxygen demand, mg/l			54	38	21	37
Chromium, mg/l			<0.005	<0.005	<0.005	<0.005
Copper, mg/l			<0.005	<0.005	<0.005	<0.005
Fecal coliform, col/100 ml			<10	<10	18	20
Total Kjeldahl nitrogen, mg/l			2.6	0.79	0.16	0.19
Lead, mg/l			<0.010	0.010	<0.010	<0.010
Manganese, mg/l			0.11	0.039	<0.005	0.007
Mercury, mg/l			0.015	0.010	<0.010	<0.010
Nickel, mg/l			<1	1	2	<1
Oil and grease, mg/l			7.8	3.0	1.6	2.1
Total organic carbon, mg/l			<0.004	<0.004	<0.004	<0.004
Phenol, mg/l			0.10	<0.02	<0.02	<0.02
Total phosphorus, mg/l			460	260	120	130
Dissolved solids, mg/l			6	8	6	8
Suspended solids, mg/l			120	64	23	57
Volatile solids, mg/l			0.026	0.19	0.024	0.013
Zinc, mg/l			7.65	7.8	8.0	7.9
pH			450	175	140	145
Specific conductance, µmhos/cm			10.1	11.5	11.7	11.7
Dissolved oxygen, mg/l						

FIELD DATA
GRASSY ISLAND
Sampling No. 4
11/03/80

Date	Station number	Depth (ft.)	Water Collected (depth) (ft.)	Cond. (µmhos)	D.O. (mg/l)	Temp. (°C)	pH (S.U.)	Secchi (avg.) (ft.)	Weather Conditions and Ancillary Observations
11/03/80	#2 Weir	H.A. =12'1/4"	0.2	450	10.1	6.1	7.65	N.A.	60% cloud cover; winds SSE at 8-15mph; waves 1'- 2'
11/03/80	#3 Plume	3.7	0.2	175	11.5	7.5	7.8	2.55	60% cloud cover; winds SSE at 8-15mph; waves 1'- 2'
11/03/80	#4 Upstream	18.0	0.2	140	11.7	7.3	8.0	3.3	35% cloud cover; winds SSE at 15-20mph; waves 1'- 3'
11/03/80	#5 * Downstream	11.0	0.2	145	11.7	7.0	7.9	3.25	35% cloud cover, winds SSE at 15-20mph; waves 1'- 3'
									35% cloud cover; winds SSE at 15-20mph; waves 1'- 3'

* Replicate collected by Field Crew

NOTE: Army Corp of Engineers dredge did not appear to be operating. It was not present during sampling survey. Wier discharge was extremely clear.

Appendix A: Unpublished Scientific Information.

18. ACOE 1981 Report "Water Quality Monitoring of Grassy Island Disposal Facility". 12 pp.

ACOE 1981 Report

1981 WATER QUALITY MONITORING OF GRASSY ISLAND DISPOSAL FACILITY DETROIT RIVER, MICHIGAN

U.S. Army Corps of Engineers
Detroit District

GRASSY ISLAND CONFINED DISPOSAL FACILITY
FIELD REPORT
5 JUNE 1981

Weather

Clear, sunny, 81 °F, west wind at six miles per hour.

Observations

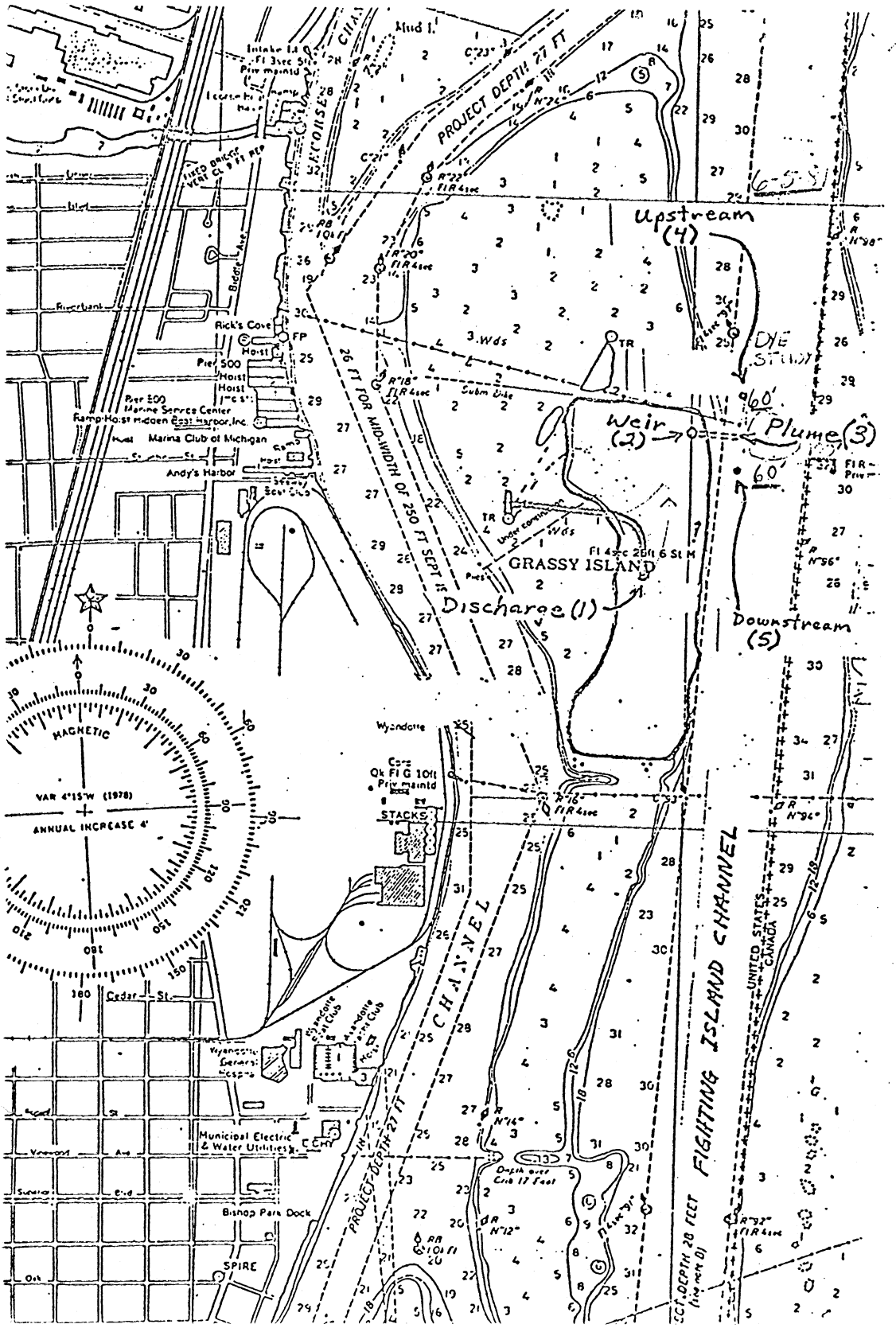
Heavy vegetation covered both the dike and surrounding area. This consisted primarily of marsh grasses. Several small trees were also noted growing on the island.

There were many birds present. However not all were visible for identification. Those sited included Killdeer, gulls and blackbirds.

Data obtained on site:

Parameter	Upstream	Downstream	Plume	Weir	Dredge Discharge
Dissolved Oxygen	8.0	10.8	10.8	1.6	1.6
pH	8.3	8.2	8.2	7.5	7.1
Temperature °C	18°	18.5°	19°	21°	20°
Conductivity umhos/cm	235	235	230	750	970
Secchi Depth	3'	5'	4.5'	-	-

Flow over Weir = 2.46 C.F.S.


PROJECT DEPTH 27 FT
Upstream (4)
DYE STUDY
960'
60'
Weir (2)
Plume (3)
Discharge (1)
Downstream (5)
GRASSY ISLAND
26 FT FOR MIDWIDTH OF 250 FT SEPT 15
Rick's Cove
Pier 500
Marina Club of Michigan
Andy's Harbor
Wyandotte
STACKS
CHANNEL
FIGHTING ISLAND CHANNEL
UNITED STATES
CANADA
Municipal Electric & Water Utilities
Bishop Park Dock
SPIRE
Cedar St
MAGNETIC
VAR 4°15'W (1978)
ANNUAL INCREASE 4'
PROJECT DEPTH 27 FT
DEPTH 28 FEET

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
5 JUNE 1981

Parameters	STATION 1 (Hoffman Discharge) Solids*	STATION 1 (Hoffman Discharge) Supernatant	STATION 2 (Weir)	STATION 3 (Plume)	STATION 4 (Upstream)	STATION 5 (Downstream)
pH	-	-	7.5	8.2	8.3	8.2
Dissolved Oxygen, mg/l	-	-	1.6	10.8	8.0	10.8
Water Temperature, °C	-	-	21	19	18	18.5
Conductivity, umhos/cm	-	-	750	230	235	235
Secchi Disk, ft.	-	-	-	4.5	3	5
Odor of Sediment	septic, oily		-	-	-	-
Sediment Type	silt		-	-	-	-
Solid/Liquid Ratio by volume	1/4		-	-	-	-
Solid/Liquid Ratio by weight	1/12		-	-	-	-
PCB 1242	≤ 3	-	-	-	-	-
PCB 1254	-	-	-	-	-	-
PCB 1260	0.8	-	-	-	-	-
Grain Size, %:						
> 10 mm	0.0	-	-	-	-	-
> #4 mesh	0.3	-	-	-	-	-
> #20 mesh	1.1	-	-	-	-	-
> #40 mesh	1.9	-	-	-	-	-
> #200 mesh	16.1	-	-	-	-	-

*Units are in mg/kg on a dried weight basis.

WATER QUALITY MONITORING
5 JUNE 1981

Parameters	STATION 1 (Hoffman Discharge) Solids*	STATION 1 (Hoffman Discharge) Supernatant	STATION 2 (Weir)	STATION 3 (Plume)	STATION 4 (Upstream)	STATION 5 (Downstream)
Total Volatile Solids, mg/l	111,000	124	98	24	34	38
Suspended Solids, mg/l	--	98	36	4	4	6
Total Dissolved Solids, mg/l	--	488	360	122	122	120
Chemical Oxygen Demand, mg/l	234,000	64	80	< 4	< 4	< 4
Oil & Grease, mg/l	145,000	2.9	2.0	0.6	1.7	1.6
Zinc, mg/l	970	0.12	0.056	< 0.002	< 0.002	< 0.002
Total Phosphorus, mg/l	2,110	0.66	0.15	0.04	0.02	0.02
Total Kjeldahl Nitrogen, mg/l	3,300	47	20	1.7	1.5	1.4
Ammonia Nitrogen, mg/l	460	41	19	0.46	0.47	0.25
Arsenic, mg/l	10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Copper, mg/l	290	< 0.002	< 0.002	< 0.002	0.018	< 0.002
Total Chromium, mg/l	240	0.009	< 0.002	< 0.002	< 0.002	< 0.002
Lead, mg/l	470	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Mercury, mg/l	0.32	< 0.0005	< 0.0005	< 0.0005	0.0006	< 0.0005
Phenol, mg/l	--	< 0.002	0.002	0.561	< 0.002	0.002
Total Organic Carbon, mg/l	43,300	35	55	5	< 5	< 5
Nickel, mg/l	100	< 0.02	< 0.002	< 0.002	< 0.002	< 0.002
Manganese, mg/l	880	0.55	0.30	< 0.002	< 0.002	< 0.002
Barium, mg/l	< 30	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fecal Coliform, colonies/100 ml	--	12,600	600	20	40	50
Total Cyanide	1.4	-	-	-	-	-

*Units are in mg/kg on a dried weight basis.

[illegible] CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
5 JUNE 1981

Parameters	STATION 4 (Upstream) Replicate Sample	Reference Sample Concentration	Laboratory Results
Total Volatile Solids, mg/l	34	-	-
Suspended Solids, mg/l	4	-	-
Total Dissolved Solids, mg/l	124	-	-
Chemical Oxygen Demand, mg/l	< 4	340	321
Oil & Grease, mg/l	1.4	-	-
Zinc, mg/l	< 0.002	0.5	*
Total Phosphorus, mg/l	0.02	0.50	0.51
Total Kjeldahl Nitrogen, mg/l	2.0	3.0	3.0
Ammonia Nitrogen, mg/l	0.69	1.5	1.7
Arsenic, mg/l	< 0.01	0.5 ug	*
Copper, mg/l	0.015	1	*
Total Chromium, mg/l	< 0.002	1	*
Lead, mg/l	< 0.02	10	*
Mercury, mg/l	< 0.0005	0.5 ug	*
Phenol, mg/l	< 0.002	-	-
Total Organic Carbon, mg/l	< 5	141	*
Nickel, mg/l	< 0.002	1	*
Manganese, mg/l	< 0.002	1	*
Barium, mg/l	< 0.1	10	*
Fecal Coliform, colonies/100 ml	60	-	-

*Standard is used for calibration.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
FIELD REPORT
9 JUNE 1981

Weather

Partly Cloudy, 30 to 40% Cloud Cover. Winds WSW at 13 m.p.h. gusting to 19 m.p.h.

Observations

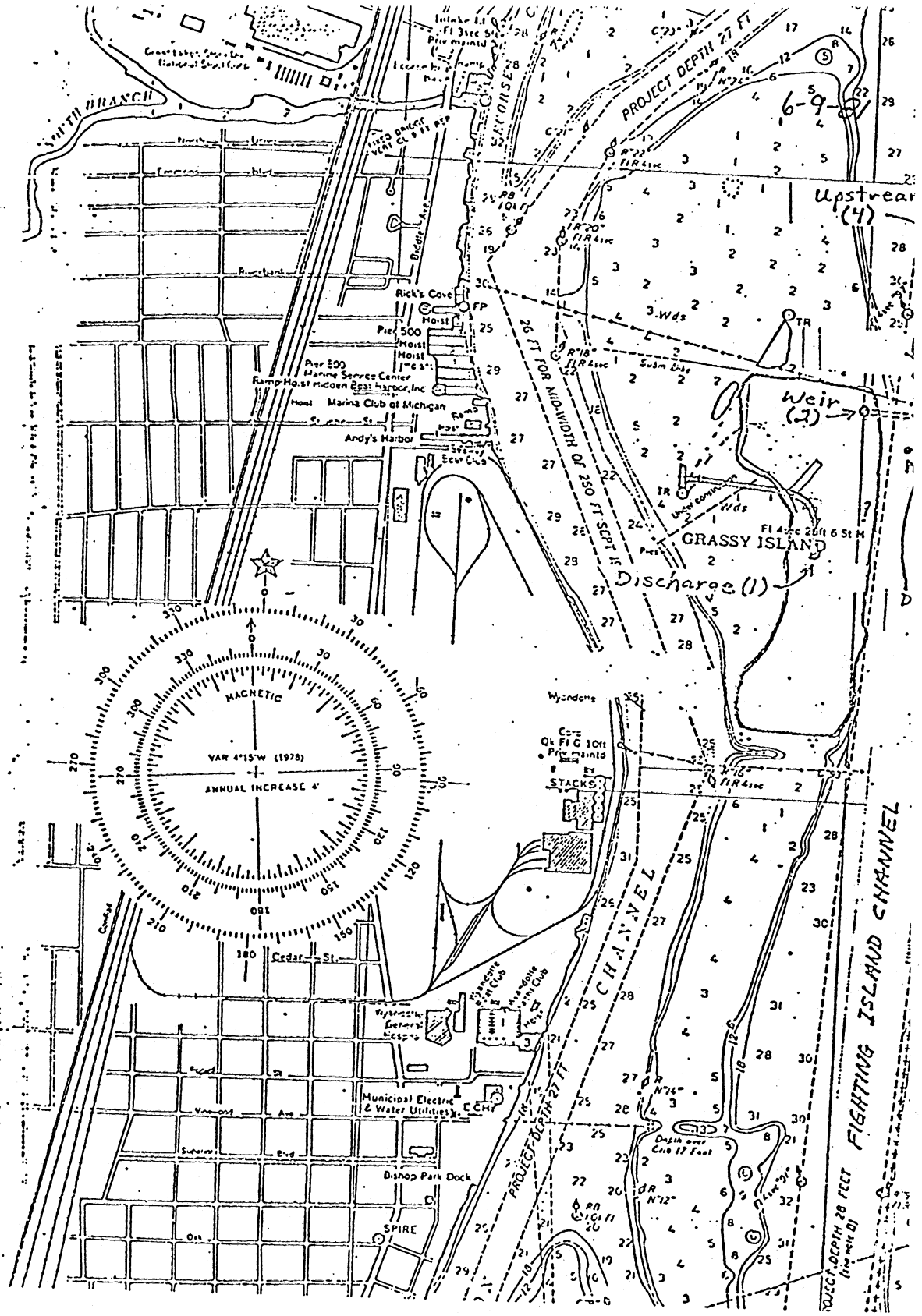
Heavy vegetation covered both the dike and surrounding area. This consisted primarily of tall marsh grasses. Several small trees were also noted growing on the island.

There were many birds present, however, not all were visible for identification. Those sited included Killdear, gulls and blackbirds.

Weir boards had been placed at a height causing weir crest to flow over the top of the discharge. Because of this condition the flow over the weir could not be calculated.

Data obtained on site:

	Upstream	Downstream	Plume	Weir	Dredge Discharge
Dissolved Oxygen	7.8	9.6	9.4	3.5	---
pH	7.4	7.7	8.0	7.4	6.4
Conductivity umhos/cm	200	200	200	700	1,800
Temperature °C	18.5°	19°	19.8°	22°	21°
Secchi depth	5'	5'	4'	---	---


SOUTH BRANCH
PROJECT DEPTH 27 FT
6-9-
Upstream
(4)
Rick's Cove
Pier 500
Marina Service Center
Marina Club of Michigan
Andy's Harbor
26 FT FOR MIDWIDTH OF 250 FT SCPT
Weir
(2)
GRASSY ISLAND
Discharge (1)
MAGNETIC
VAR 4°15'W (1978)
ANNUAL INCREASE 4'
Wyandotte
STACKS
Cedar St.
Municipal Electric & Water Utilities
Bishop Park Dock
SPIRE
CHANNEL
PROJECT DEPTH 27 FT
FIGHTING ISLAND CHANNEL

9 JUNE 1981

Parameters	STATION 1 (Hoffman Discharge) Solids*	Supernatant	STATION 2 (Weir)	STATION 3 (Plume)	STATION 4 (Upstream)	STATION 5 (Downstream)
pH	--	--	7.4	8.0	7.4	7.7
Water Temperature C	--	--	22	19.8	18.5	19
Conductivity, umhos/cm	--	--	700	200	200	200
Secchi Disk, ft.	--	--	--	4	5	5
Dissolved Oxygen, mg/l	--	--	3.5	9.4	7.8	9.6
Grain Size, %:						
>10 mm	0.0	--	--	--	--	--
>#4 mesh	0.5	--	--	--	--	--
>#20 mesh	2.4	--	--	--	--	--
>#40 mesh	3.9	--	--	--	--	--
>#200 mesh	19.4	--	--	--	--	--
PCB, mg/kg:						
Aroclor 1242	< 1	--	--	--	--	--
Aroclor 1254	--	--	--	--	--	--
Aroclor 1260	3	--	--	--	--	--
Solid/Liquid Ratio by volume	1/2		--	--	--	--
Solid/Liquid Ratio by weight	1/10		--	--	--	--
Total Cyanide, mg/l	0.71	--	--	--	--	--

*Units are in mg/kg on a dried weight basis.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
9 JUNE 1981

Parameters	STATION 1 (Hoffman Discharge) Solids*	STATION 1 (Hoffman Discharge) Supernatant	STATION 2 (Weir)	STATION 3 (Plume)	STATION 4 (Upstream)	STATION 5 (Downstream)
Total Volatile Solids, mg/l	99,000	320	112	< 1	92	16
Suspended Solids, mg/l	--	75	79	7	8	8
Total Dissolved Solids, mg/l	--	1,080	355	121	126	128
Chemical Oxygen Demand, mg/l	140,000	40	48	< 4	< 4	< 4
Oil & Grease, mg/l	3,650	1.5	2.0	1.4	1.5	1.3
Total Phosphorus, mg/l	970	0.46	0.18	0.10	0.05	0.05
Total Kjeldahl Nitrogen, mg/l	2,400	35	27	1.0	1.2	1.0
Ammonia, Nitrogen, mg/l	270	34	19	0.46	0.33	0.43
Fecal coliform, colonies/100 ml.	--	4,000	100	1,060	670	1,100
Phenol, mg/l	--	0.009	0.004	0.003	0.002	0.004
Zinc, mg/l	490	0.11	0.050	< 0.002	0.021	< 0.002
Arsenic, mg/l	9.2	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Copper, mg/l	120	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Total Chromium, mg/l	75	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Lead, mg/l	270	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Mercury, mg/l	0.18	< 0.0005	< 0.0005	< 0.0005	0.0007	< 0.0005
Nickel, mg/l	100	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Manganese, mg/l	490	0.73	0.22	< 0.002	< 0.002	< 0.002
Barium, mg/l	< 30	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total Organic Carbon, mg/l	23,500	20	8	6	< 5	< 5

*Units are in mg/kg on a dried weight basis.

GRASSY ISLAND CONFINED DISPOSAL FACILITY
WATER QUALITY MONITORING
9 JUNE 1981

Parameters	STATION 1 (Hoffman Discharge) Replicate Sample-Supernatant	Reference Sample Concentration	Laboratory Results
Total Volatile Solids, mg/l	280	--	--
Suspended Solids, mg/l	74	--	--
Total Dissolved Solids, mg/l	1,090	--	--
Chemical Oxygen Demand, mg/l	36	340	321
Oil & Grease, mg/l	2.6	--	--
Total Phosphorus	0.45	0.50	0.49
Nitrogen Kjeldahl, mg/l	35	3.0	2.9
Nitrogen Ammonia, mg/l	34	1.5	1.4
Phenol, mg/l	< 0.002	--	--
Zinc, mg/l	0.02	0.5	*
Arsenic, mg/l	< 0.01	0.5 ug	*
Copper, mg/l	< 0.002	1	*
Total Chromium, mg/l	< 0.002	1	*
Lead, mg/l	< 0.02	10	*
Mercury, mg/l	< 0.0005	0.5 ug	*
Nickel, mg/l	< 0.02	1	*
Manganese, mg/l	0.73	1	*
Barium, mg/l	< 0.1	10	*
Total Organic Carbon, mg/l	20	141	*
Fecal coliform, colonies/100 ml.	5,000	--	--

* Standard is used for calibration.

Parameters	STATION 1 (Hoffman Discharge) Replicate Sample-Solids	Reference Sample Concentration	Laboratory Results
Total Volatile Solids, mg/kg	101,000	--	--
Chemical Oxygen Demand, mg/kg	149,000	340	321
Oil & Grease, mg/kg	3,300	--	--
Total Phosphorus, mg/kg	940	0.50	0.49
Nitrogen Kjeldahl, mg/kg	2,100	3.0	2.9
Nitrogen Ammonia, mg/kg	230	1.5	1.4
Total Cyanide, mg/kg	0.80	1.0	0.90
Zinc, mg/kg	460	0.5	*
Arsenic, mg/kg	12	0.5 ug	*
Copper, mg/kg	130	1	*
Total Chromium, mg/kg	78	1	*
Manganese, mg/kg	490	1	*
Lead, mg/kg	270	10	*
Mercury, mg/kg	0.11	0.5 ug	*
Barium, mg/kg	< 30	10	*
Nickel, mg/kg	95	1	*
Total Organic Carbon, mg/kg	29,400	--	--
Grain Size, %:			
> 10 mm	0.0	--	--
> #4 mesh	0.6	--	--
> #20 mesh	2.7	--	--
> #40 mesh	4.4	--	--
> #200 mesh	18.4	--	--
PCB, mg/kg:			
Aroclor 1242	< 1	552 ug/l	*
Aroclor 1254	--	720 ug/l	*
Aroclor 1260	2	800 ug/l	*
Solid/Liquid ratio by volume	1/2	--	--
Solid/Liquid ratio by weight	1/13	--	--

*Standard is used for calibration.

Appendix A: Unpublished Scientific Information.

19. ACOE 1982 Report "Grassy Island Confined Disposal Facility Water Qual. Monitoring". 18 pp.

ACOE 1982b REPORT

U.S. Army Corps of Engineers

Detroit District

Rouge River

Grassy Island Confined Disposal Facility

Water Quality Monitoring

1982

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MAP 15

BACKGROUND

The Grassy Island Confined Disposal Facility (CDF) is located in the Detroit River adjacent to Fighting Island, at approximately 42°13' N latitude and 83°08' W longitude. The facility has a north and south cell separated by an earth berm. The weir located at the northeastern corner of the north cell, discharges into the Fighting Island Channel.

Disposal operations commenced in the second week in November and continued through until December 10, 1982, during which three sampling events were accomplished.

Dredged material was brought to the CDF by barge from the dredging site. The material was pumped off the barge from an anchorage located adjacent to the CDF within the Fighting Island Channel.

MONITORING METHODS

Five sampling stations were chosen by the Corps to be sampled during each event. The five stations are designated and described as follows: Station 1 - Dredge Discharge, located approximately in the center of the CDF north cell; Station 2 - Weir, located at the northeast corner of the dike inside the CDF; Station 3 - Plume (mixing zone), approximately 50 ft. out from the weir discharge pipe; Station 4 - Upstream (background), approximately 250 ft. upstream of the plume

site; Station 5 - Downstream, approximately 250 ft. downstream of the plume site. All sites are located and identified on the attached map.

The dredge discharge sample was collected using a 5-gallon PVC constructed bucket attached to polypropylene line. The discharge sample was composited over a two-hour period with sample portions collected every 15 minutes.

The weir and stream samples were collected using a non-metallic Kemmerer sampler of PVC construction. The weir samples were obtained from just below the water surface to best represent the quality of water passing over the crest of the weir. Stream samples were obtained from mid-depth in the water column.

Weir measurements were made using a carpenter's rule. Weir flows were then calculated from these measurements and are exhibited on the field observations sheets.

Dissolved oxygen and temperature were determined by using a YSI Model 57 Dissolved Oxygen/Temperature meter. YSI Model S-C-T 33 Conductivity meter and an Orion portable pH meter were used to determine conductivity and pH respectively. A Hach ratio turbidimeter was used to determine turbidity in NTUs.

All samples were placed in the proper containers, plastic or glass, preserved if necessary, iced and delivered to the laboratory within 4 hours of collection.

RESULTS

Three sampling events were held on the following dates: 17 November, 30 November and 10 December, 1982. Analytical results are exhibited on the attached data tables.

The upstream sample (Station 4) is representative of the ambient receiving stream water quality. Comparisons can be made between the various stations and the upstream station data to determine the effectiveness of the CDF and its impact on the receiving waters.

The weir samples were consistently higher than the upstream samples for almost all the parameters investigated on all sampling occasions. Most notably higher were the ammonia nitrogen, chemical oxygen demand, fecal coliform counts, total Kjeldahl nitrogen (TKN) and suspended solids concentrations. Fecal coliform counts were highest during the 17 November sampling at 1300/100 ml, however the plume had only 30/100 ml. The MDNR maximum for total body contact is 200/100 ml (30 day average).

Various parameters for the plume samples were higher in concentration than the upstream samples, however only ammonia nitrogen, TKN and suspended solids were consistently higher at the plume on all occasions. Ammonia N and TKN concentrations at the plume ranged from two to four times greater than the upstream levels although the absolute magnitude of the concentrations of all these parameters were low.

Downstream samples compared very favorably with the upstream samples. None of the downstream sample concentrations were consistently higher over the period of disposal activities. Metal concentrations from the stream samples are at or below the detectability limits.

The dredge discharge slurry was very oily and had a strong septic odor on all occasions. The sediment analysis did indicate very high oil concentrations for all occasions with the highest concentration from the 17 November sample. The dredge supernatant does not show the gross oil and grease contamination as does the sediments, however, due to a laboratory oversight, the supernatant was not analyzed until 4 weeks after the sediments.

DISCUSSION

The CDF was found to be close to its retention capacity upon the first visit. The weir was within six inches of becoming submerged. However due to a very slow pumping rate, by the last sampling, the weir still had not been submerged.

The dredging and disposal contractor and Corps personnel had altered the placement of the dredge discharge pipe due to the fullness of the CDF resulting in a 'short circuit' flow pattern for the effluent within the dike. Corps personnel expressed concern over the possibility of increased suspended solids in the receiving waters as a result of the 'short circuited' route. However, only very minimal increases were detected. No other unusual conditions were noted on any of the sampling events.

The stream sample data does not indicate any significant alteration of the receiving water's quality. Several of the downstream parameter concentrations were less than the comparable upstream levels on the different days. The plume and downstream parameter concentrations which did exceed the usptream levels were not of a magnitude great enough to warrant concern.

CONCLUSIONS

No significant alteration of the ambient stream water quality was detected on any of the three sampling occasions. The 'short circuited' flow pattern within the dike did not result in increased suspended solids in the receiving stream.

Grassy Island Confined Disposal Facility
Field Observations
17 November 1982

Parameters	Station 1 Dredge Dis.	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
D.O. ppm		13.2	16.2	16.3	16.1
Temp ^{o}C		*	*	*	*
Conductivity (umhos)		340	145	130	135
pH (s.u.)		7.6	8.0	8.0	8.0
Turbidity (NTU)		120	12	10	3
Odor	Fishy/ Septic	N/O	N/O	N/O	N/O
Comments	Very oily, sediments fine silt like black in color	Flow= 4.75cfs			
Weather	0% cloud cover, wind S 5-10 mph, air temp 40°F No wildlife observed within vacinity of the sampling stations. Dike close to breaching, weir almost submerged				

* Temperature meter malfunction

Grassy Island Confined Disposal Facility
Water Quality Monitoring
17 November 1982

Parameters*	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
Ammonia Nitrogen	0.23	2.3	0.88	0.62
Ammonia (unionized)	<0.01	<0.01	<0.01	<0.01
Arsenic	0.0040	<0.001	<0.001	<0.001
Barium	<0.10	<0.10	<0.10	<0.10
Chemical Oxygen Demand	9.6	<1	1.6	<1
Chromium	0.02	<0.02	<0.02	<0.02
Copper	0.05	<0.01	<0.01	<0.01
Fecal Coliform #/100ml	1300	30	10	<10
Total Kjeldahl Nitrogen	19	3.2	1.6	2.3
Lead	0.12	<0.05	<0.05	<0.05
Manganese	0.27	0.03	<0.01	<0.01
Mercury	0.0011	<0.001	<0.001	<0.001
Nickel	0.05	0.05	0.02	0.03
Zinc	0.15	0.04	0.02	0.02
Oil & Grease	1.0	<0.2	<0.2	<0.2
Phenol	<0.002	<0.002	<0.002	<0.002
Total Phosphorus	0.052	0.016	0.020	<0.003
Dissolved Solids	340	140	140	150
Suspended Solids	96	10	<1	4
Volatile Solids	180	81	81	81

*All units in mg/l except as noted

Grassy Island Confined Disposal Facility
Field Observations
30 November 1982

Parameters	Station 1 Dredge Dis.	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
D.O. ppm		12.1	15.2	14.1	14.2
Temp ^{o}C		1	1	1	1
Conductivity (umhos)		270	140	120	120
pH (s.u.)		7.2	7.6	7.8	7.5
Turbidity (NTU)		122	48	5	8
Odor	Fishy/Septic	N/O	N/O	N/O	N/O
Comments	Very Oily, sediments very fine, silt like black in color	Flow = 6.18cfs			
Weather	90% cloud cover, air temp 32°F, wind S 5-10 mph				

Weir almost submerged, no other unusual conditions noted.

N/O = no odor

	1 Dredge Dis. Sediments	1 Dredge Dis. Supernatant
Ammonia Nitrogen	1200	8.5
Arsenic	2.3	0.0021
Barium	92	<0.10
Chemical Oxygen Demand	54,000	38
Chromium	94	<0.02
Copper	120	0.01
Cyanide	<0.3	-
Fecal Coliform	-	<10
Total Kjeldahl Nitrogen	1300	51
Lead	250	0.06
Manganese	420	0.92
Mercury	0.84	<0.001
Nickel	32	0.02
Zinc	730	0.11
Oil & Grease	12,000	<0.2
Phenol	-	<0.002
PCB	2.6	-
Total Phosphorus	212	0.48
Dissolved Solids	-	380
Suspended Solids	-	60
Volatile Solids	7.6 %	200
Grain size; % retained		
2.00mm	0.0	
0.425	0.2	
0.149	2.7	
0.075	5.2	
% passed 0.075	91.9	

*Units in mg/kg except as noted

**Units in mg/l except as noted

Dredge Slurry Mass and Volume

Settleable matter as % volume

15min	19%
1hr	16.5%
3hr	13.5
8hr	11
24hr	9
48hr	8
72hr	8

Suspended Solids

48hr	26 mg/l
72hr	10.5 mg/l

Centrifuge Analysis as % volume, centrifuged at 2500 rpm for 10 min

5%

Total Residue of slurry aliquot

19,560 mg/l

Specific Gravity

1.00

Parameters*	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
Ammonia Nitrogen	4.7	2.5	0.08	0.10
Ammonia (unionized)	<0.01	<0.01	<0.01	<0.01
Arsenic	0.0012	<0.001	<0.001	<0.001
Barium	<0.10	<0.10	<0.10	<0.10
Chemical Oxygen Demand	5.6	1.6	<1	1.6
Chromium	0.03	<0.02	<0.02	<0.02
Copper	0.06	0.03	0.02	0.02
Fecal Coliform #/100ml	200	50	110	40
Total Kjeldahl Nitrogen	4.8	4.8	1.0	1.4
Lead	0.09	<0.05	<0.05	<0.05
Manganese	0.19	0.05	<0.01	0.01
Mercury	0.0024	0.0028	0.0023	0.0016
Nickel	0.03	<0.02	<0.02	0.02
Zinc	0.25	0.12	0.02	0.04
Oil & Grease	<0.2	<0.2	<0.2	<0.2
Phenol	0.010	0.005	0.005	0.005
Total Phosphorus	0.056	0.013	<0.002	<0.002
Dissolved Solids	230	280	170	180
Suspended Solids	100	35	7	6
Volatile Solids	200	120	94	120

*All units in mg/l except as noted

Grassy Island Confined Disposal Facility
Field Observations
10 December 1982

Parameters	Station 1 Dredge Dis.	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
D.O. ppm		13.1	15.1	15.0	14.9
Temp ^{o}C		0	0	0	0
Conductivity (umhos)		250	140	125	125
pH (s.u.)		6.5	6.8	6.8	6.4
Turbidity (NTU)		153	16	12	13
Odor	Fishy/Septic	N/O	N/O	N/O	N/O
Comments	Very oily, sediments very fine, silt like black in color	Flow = 6.18cfs			
Weather	100% cloud cover, air temp 27°F, wind SW 10-20 mph				
	Weir almost submerged, no other unusual conditions noted.				

N/O = no odor

Grassy Island Confined Disposal Facility
Water Quality Monitoring
10 December 1982

Parameters	Station* Dredge Dis. Sediments	Station** Dredge Dis. Supernatant
Ammonia Nitrogen	2100	0.13
Arsenic	2.6	0.0023
Barium	31.3	<0.10
Chemical Oxygen Demand	34,000	29
Chromium	63	0.02
Copper	61	0.04
Cyanide	0.3	-
Fecal Coliform	-	<10
Total Kjeldahl Nitrogen	2800	13
Lead	120	<0.05
Manganese	96	0.50
Mercury	0.44	<0.001
Nickel	33	<0.02
Zinc	340	0.14
Oil & Grease	7120	2.0
Phenol	-	<0.002
PCB	1.2	-
Total Phosphorus	244	0.43
Dissolved Solids	-	360
Suspended Solids	-	40
Volatile Solids	6.8 %	120
Grain size; % retained		
2.00mm	0.0	
0.425	1.7	
0.149	2.8	
0.075	3.1	
% passed 0.075	92.4	

*Units in mg/kg except as noted

**Units in mg/l except as noted

Dredge Slurry Mass and Volume

Settleable matter as % volume

15min	62%
1hr	39%
3hr	31.5
8hr	26
24hr	20
48hr	18.5
72hr	17.5

Suspended Solids

48hr	51 mg/l
72hr	6 mg/l

Centrifuge Analysis as % volume, centrifuged at 2500 rpm at 10min

10%

Total Residue of slurry aliquot

53,210 mg/l

Specific Gravity

1.01

Grassy Island Confined Disposal Facility

Water Quality Monitoring

10 December 1982

Parameters*	Station 2 Weir	Station 3 Plume	Station 4 Upstream	Station 5 Downstream
Ammonia Nitrogen	10.5	1.7	0.52	0.02
Ammonia (unionized)	0.01	<0.01	<0.01	<0.01
Arsenic	0.0012	0.0016	<0.001	<0.001
Barium	<0.10	<0.10	<0.10	<0.10
Chemical Oxygen Demand	14	4.8	6.4	3.2
Chromium	0.02	0.02	<0.02	<0.02
Copper	0.02	<0.01	<0.01	<0.01
Fecal Coliform #/100ml	91	7	<1	1
Total Kjeldahl Nitrogen	15	2.7	1.2	1.2
Lead	<0.05	0.66	<0.05	<0.05
Manganese	0.33	0.04	<0.01	<0.01
Mercury	0.0015	0.0010	0.0019	<0.001
Nickel	0.05	0.04	0.02	0.04
Zinc	0.15	0.03	0.01	0.01
Oil & Grease	0.2	<0.2	<0.2	<0.2
Phenol	0.010	<0.002	0.019	<0.002
Total Phosphorus	0.139	0.036	0.016	0.023
Dissolved Solids	460	340	330	220
Suspended Solids	78	8	<2	<2
Volatile Solids	110	130	92	57

* All units in mg/l except as noted

Grassy Island Confined Disposal Facility
Water Quality Monitoring
Quality Control Data
1982

Parameters*	17 November		30 November		10 December	
	Station 3 Plume**	Station Field Blank	Station 5 Downstream**	Station Field Blank	Station 2 Weir**	Station Field Blank
Ammonia Nitrogen	2.3	0.07	0.10	0.02	10.5	0.38
Ammonia (unionized)	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Arsenic	<0.001	<0.001	<0.001	<0.001	0.001	<0.001
Barium	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Chemical Oxygen Demand	3.2	<1	<1	<1	14	4
Chromium	0.02	<0.02	<0.02	<0.02	0.02	<0.02
Copper	0.01	<0.01	0.01	0.01	0.03	<0.01
Fecal Coliform #/100ml	290	<10	30	<10	104	<10
Total Kjeldahl Nitrogen	3.9	1.0	1.2	<0.1	15	0.8
Lead	<0.05	<0.05	0.15	<0.05	0.06	<0.05
Manganese	0.03	<0.01	<0.01	<0.01	0.34	<0.01
Mercury	0.0012	<0.001	0.0036	<0.001	0.0067	<0.001
Nickel	<0.02	<0.02	0.02	<0.02	0.06	0.03
Zinc	<0.01	<0.01	0.04	0.01	0.15	0.01
Oil & Grease	1.8	<0.2	<0.2	<0.2	<0.2	<0.2
Phenol	<0.002	<0.002	0.010	0.005	0.014	0.016
Total Phosphorus	<0.003	0.078	<0.002	<0.002	0.130	0.007
Dissolved Solids	150	8	146	<1	430	160
Suspended Solids	37	<1	8	<1	58	<2
Volatile Solids	100	8	110	<1	89	20

*All units in mg/l except as noted

** Replicates

Parameters	Station* 1 Dredge Dis. Sediments	Station** 1 Dredge Dis. Supernatant
Ammonia Nitrogen	1500	0.15
Arsenic	5.0	<0.002
Barium	95	0.11
Chemical Oxygen Demand	45,000	3.2
Chromium	120	0.02
Copper	170	0.01
Cyanide	0.3	-
Total Kjeldahl Nitrogen	3500	8.2
Lead	260	<0.05
Manganese	500	0.49
Mercury	0.022	<0.001
Nickel	37	0.02
Zinc	700	0.08
Oil & Grease	16,000	0.4
Phenol	-	<0.002
PCB	2	-
Total Phosphorus	210	0.30
Dissolved Solids	-	300
Suspended Solids	-	18
Volatile Solids	6.2%	93
Grain size; % retained		
2.00mm	0.0	
0.425mm	0.7	
0.149	2.8	
0.075	5.9	
% passed 0.075	90.6	

*Units in mg/kg except as noted

**Units in mg/l except as noted

Dredge Slurry Mass and Volume

Settleable matter as % volume

15min	20%
1hr	16%
3hr	13
8hr	10
24hr	9
48	8
72hr	8

Suspended Solids
48hr 59 mg/l
72hr 5.4 mg/l

Centrifuge Analysis as % volume, centrifuged at 2500 rpm for 10 min

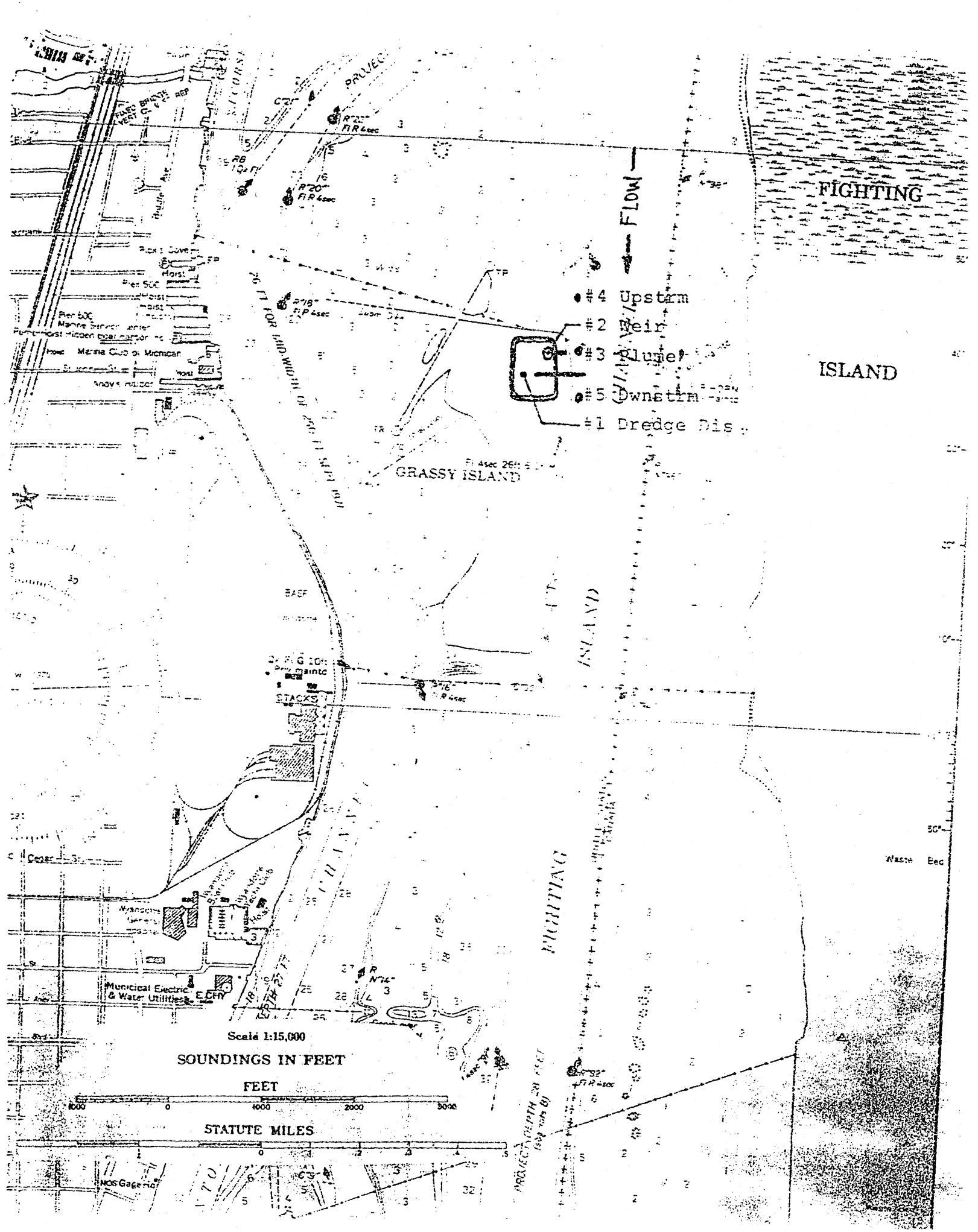
5%

Total Residue of Slurry aliquot

18,660 mg/l

Specific Gravity

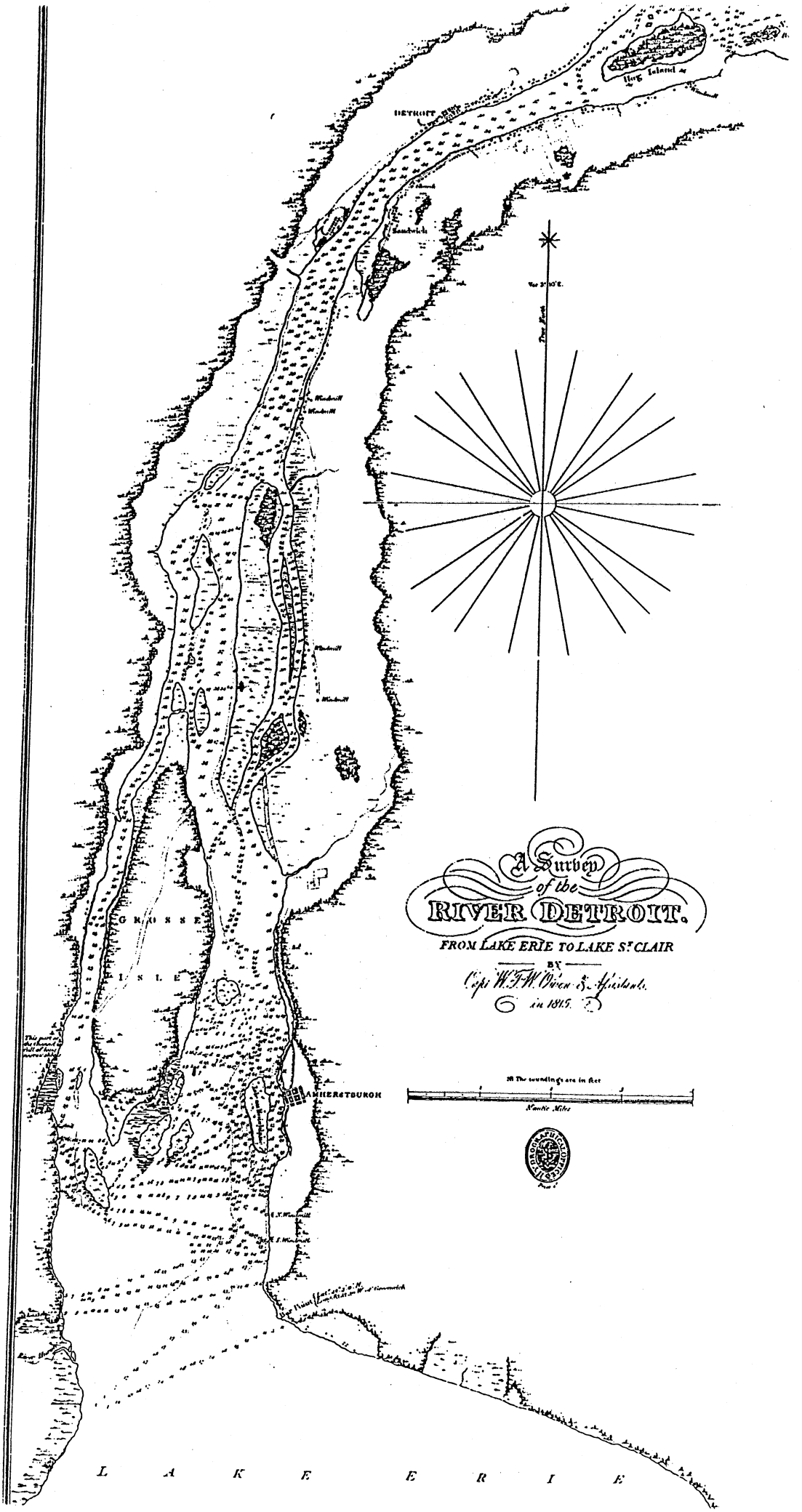
1.00


FLOW
#4 Upstrm
#2 Weir
#3 Plume
#5 Dwnstrm
#1 Dredge Dis.
FIGHTING
ISLAND
GRASSY ISLAND
STACKS
Municipal Electric & Water Utilities
Scale 1:15,000
SOUNDINGS IN FEET
FEET
STATUTE MILES

Appendix A: Unpublished Scientific Information.

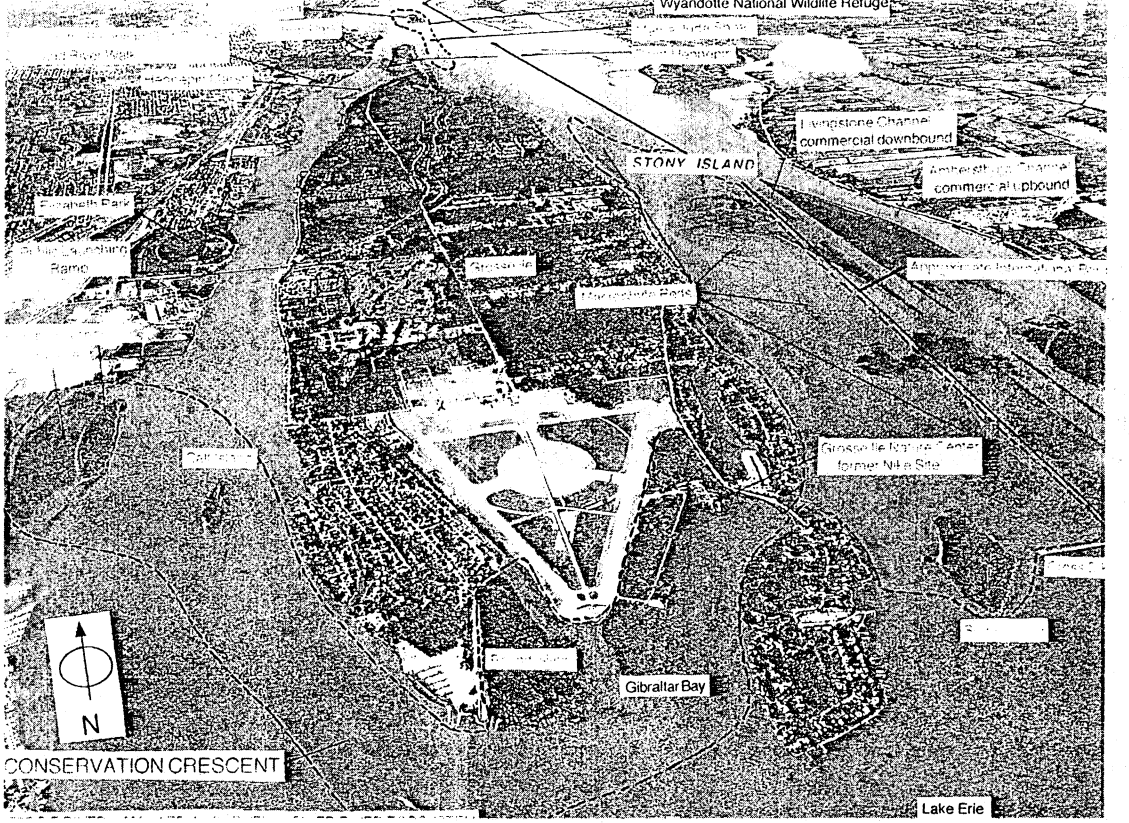
20. 1815 Map of the Detroit River. 1 pp.

1815 Map of the Detroit River



Appendix A: Unpublished Scientific Information.

21. Jones (1997) FOCUS article on the "Conservation Crescent". 2 pp.



REMEDIAL ACTION PLAN RAPSHEET

A Local Group's Solutions to the Protection of a Resource

by Bruce D. Jones

am sorry to inform you that ... the nomination of the Stony Island Natural Area was eliminated from further consideration this year ..."

Not again!

So ended the third year of high expectations and countless hours of effort by the **Grosse Ile Nature and Land Conservancy (GINLC)**. We hear many dire pronouncements over the loss habit and biodiversity in the Great Lakes. At the same time, we have been unable to protect the largest remaining ecosystem in the Detroit River. Neither have we found funds to plan the rebuilding of the Hennepin Marsh.

The nomination was for the protection of Stony Island. The bigger issue is the preservation of the "Conservation Crescent," the major part of the lower Detroit River ecosystem.

This ecosystem is a traditional resting area for migratory waterfowl traveling the eastern Great Lakes flyway. Naturally occurring thermal air currents make it a major flyway for migrating raptors. With a cleaner river, bald eagles and osprey have returned along with sport fishing. It is the river's most productive natural area and is second only to Lake St. Clair in public use for hunting, fishing and recreational boating. In past years, the locale was a favorite for commercial duck hunting and boot-legging.

The crescent is the lower part of the ecosystem and lies around the southern end of Grosse Ile. It contains 90 percent of the wildlife habitat and fish spawning areas remaining in the river. The crescent has the greatest biological diversity in the river.

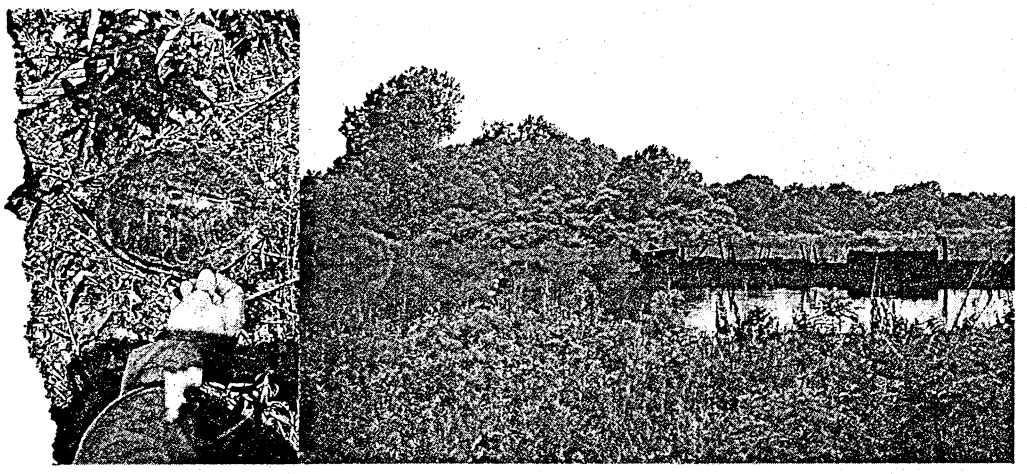
The remaining 10 percent lies north of Grosse Ile. It includes the Wyandotte National Wildlife Refuge, the BASF Corporation-owned Point Hennepin and the GINLC-owned Hennepin Marsh. This area is not in jeopardy.

The challenge to preserve the area came to the attention of the newly formed Grosse Ile Nature and Land Conservancy in 1993. A local newspaper proposed Stony Island for a gambling casino. Growth projections for the "downriver" area predicted a 40 percent increase in development. We quickly recognized the fragility of the lower river ecosystem and its vulnerability to future development.

We spent hours studying the crescent with marsh experts from the Michigan Natural Resources Inventory. Although no threatened species were located and loosestrife has invaded several marshes, we were advised that the area should be protected. It contains large submergent plant beds unlike most of the shoreline in the river and in western Lake Erie.

Stony Island is the largest undeveloped island in the area. Its preservation is the key to protecting the crescent.

March / April 1997



Detroit river map turtle, left, Stony Island. Marsh and jetties at Stony Island, right. Credit: D. Albert

The GINLC first tried convincing both federal and state agencies to acquire Stony Island. This approach did not work partly due to the difficulty of managing an urban island.

We recognized that traditional approaches to conservation are no longer the standards of practice because of governmental funding cuts. We concluded that partnerships are essential if natural areas are to be acquired and maintained. We also realized that local volunteer organizations must assume a leadership role in protecting sensitive areas. They also must carry much of the burden of stewardship once areas are protected.

The first step in our strategy was education -- for ourselves and then others. We researched the ecosystem. Then we set up a slide show and have been speaking to every person and group that would listen. This includes the school board, service clubs, federal agencies, universities and state and private conservation agencies. We have led church environmental seminars and have taken our message to all levels of elected officials. As a result we created a network of organizations that understood and shared our concerns about the river.

Purchase money is the thorniest problem. Instead of one agency purchasing Stony Island, we are now seeking support from public foundations and private sources to reduce governmental outlays. Because the conservancy is a "501C3 organization" under U.S. tax code, we are also hoping for tax-deductable donations.

We have been active locally. With help from the **U.S. Environmental Protection Agency's (U.S. EPA)** Large Lakes Research Station, we created a community nature center on the U.S. EPA property on Gibraltar Bay. At our request, Grosse Ile Township requested the Federal Government to transfer ownership of the site to the township. The request is in its last stages of approval. We then convinced the township to protect the entire Gibraltar Bay by designating it as a natural area.

The GINLC is now designing several innovative management programs. First is our Adopt an Island program. This concept is patterned after the Michigan Department of Transportation's Adopt a Highway program in which local groups agree to "adopt" a stretch of highway and keep it policed. The idea will involve the local power squadron, yacht clubs and conservation groups who agree to periodically oversee the local islands.

We have proposed a pilot program for raising loosestrife beetles as a science project in the school system for distribution in local marshes.

Another volunteer group is developing a limnology educational program for grades six-12. The centerpiece of this project is a 40-foot pontoon boat outfitted for basic research. The plan is to use Stony Island and the crescent as an outdoor biology classroom. This idea is currently undergoing feasibility studies.

John Donne wrote, "No man is an island entire of itself." We will continue to use our imagination, time and talents today to protect the crescent for the generations to come.

Bruce Jones is a practicing dentist and a founder of the Grosse Ile Nature and Land Conservancy. He was president from 1992-1996 and is currently vice president in charge of special projects. For more information, contact Bruce D. Jones, D.D.S., Grosse Ile Nature and Land Conservancy, 20940 Thorofare, Grosse Ile, Michigan 48138. Home telephone (313)676-6657; Office telephone (313)676-5868; email bjones6657@aol.com.

Appendix A: Unpublished Scientific Information.

22. Holiday Beach Migration Observatory, Almanacs for October. and November 1997 and The North Wind (Winter 1998) Vol. 13. No. 1. Migration Reports. 12 pp.

26th Hawkwatch Season — ALMANAC — October 1997

Holiday Beach Migration Observatory — **Holiday Beach Conservation Area, Malden Centre, ON, Canada**

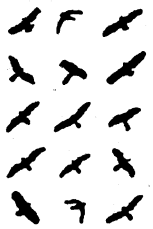
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Selective Non-Raptor Yearly Totals. 89-AMGO 37,122 89-AMRO 2,248 89-COCR 169,483 89-PUFI 5,315 91-BLJA 422,660		**Buy Raffle Tickets** Support Raptor Research and Education	**1** 74-AK-934 86-AK-1,059 95-ML-8 95-PG-18* 86-PG-5	**2** 86-OS-10 91-ML-3 89-ML-3 89-PG-4 81-PG-4 91-GRYE-18	**3** 95-OS-14 94-TV-2,558 95-NH-45 87-CH-53 87-RL-2 91-ML-4 92-PG-7	**4** Hawk Weekend 89-AK-218 91-ML-5 85-PG-3 91-HUGO-1
5 86-TV-1,761 91-PG-5 91-STSA-11	**6** 86-TV-1,379 86-CH-166 83-AK-443 91-ML-4 83-PG-11 91-PG-5	**7** 76-OS-8 88-TV-1,546 91-AK-522	**8** 87-TV-1,447 91-AK-572 91-ML-5 95-AMGO-4,548 91-NSWO-74	**9** 83-TV-1,854 95-TV-2,106 86-CH-210 90-AK-689 91-ML-9 95-ML-7 94-PG-6	**10** 91-TV-2,457 93-TV-1,500 94-TV-1,391 83-BE-3 79-AK-543 91-ML-4	**11** 90-TV-1,842 95-TV-2,047 87-BE-3 84-CH-110 87-RS-62 89-PISI-4,293
12 88-TV-1,014 94-TV-1,590 95-SS-555 RS Peak	**13** Canadian Thanksgiving 87-TV-1,741 91-TV-2,717 93-TV-2,594 91-BE-4 91-CH-144	**14** 94-RS-67 89-PUFI-1,654	**15** 95-TV-1,202 95-SS-1,104 94-RS-100 95-AK-711 89-ML-4	**16** 95-TV-1,880 95-SS-1,358 95-AK-530	**17** 86-TV-1,601 92-TV-1,691 78-RS-430* 89-AK-1,105* 91-PUFI-163	**18** 91-TV-3,200* 79-CH-227* 91-CH-107 91-RS-403 91-RT-963
19 92-TV-1,902 77-BE-3	**20** 85-NH-142 88-CH-140 83-RS-283 85-RS-364 83-RT-985 88-RT-542	**21** 82-GE-3 91-OCWA-1	**22** 84-NG-9 77-RS-323 Red-tails peak in early November 86-CEWA- 10,866	**23** 78-RL-71* 93-TUTI-4 91-FRGU-1 89-BBPL-264	**24** 82-RT-880 89-AMRO-651 91-NOPI-38 92-COCR- 44,000	**25** 82-NG-25 No. Goshawk 82-RS-262 Red Shoul 90-RS-321 87-RT-737 Red Tail 90-RT-1,002 87-GE-9 Golden Eagle
26 89-TV-536 89-CH-114 88-RT-786 87-RT-353 92-GE-12 89-COCR- 46,712	**27** 91-EABL-825 91-KILL-122 91-HOLA-547	**28** 87-NG-4 91-RS-144 81-RL-33 91-GE-9 81-GE-5 92-GE-7 91-EABL-1,348	**29** 87-RS-268 81-RT-1,390 83-RL-35 88-GE-11 84-GE-8	**30** 86-NG-8 88-RT-871 86-GE-11 91-SEOW-3 90-NOMO-1	**31** Halloween 91-BV-1* 84-RS-253 87-RT-579 91-GE-10 90-GE-13 93-COLO-15 89-GBHE-89	Wind direction and clear skies become more important as the season progresses!

Four letter codes for important non-raptor species.

- ABDU = American Black Duck
- AMAV = American Avocet
- AMCO = American Coot
- AMGO = American Goldfinch
- BBPL = Black-Bellied Plover
- BLJA = Blue Jay
- BOBO = Bobolink
- BOGU = Bonaparte's Gull
- BWTE = Blue-winged Teal
- CAEG = Cattle Egret
- CEWA = Cedar Waxwing
- CHSW = Chimney Swift
- COCR = Common Crow
- COLO = Common Loon
- CORE = Common Redpoll
- COTE = Common Tern
- DCCO = Double-crested Cormorant
- EABL = Eastern Bluebird
- EAME = Eastern Meadowlark
- FRGU = Franklin's Gull
- GBBG = Greater Black-backed Gull
- GBHE = Great Blue Heron
- GLIB = Glossy Ibis
- GRYE = Greater Yellowlegs
- HEGU = Herring Gull
- HOLA = Horned Lark
- HUGO = Hudsonian Godwit
- KILL = Killdeer
- LALO = Lapland Longspur
- NOMO = Northern Mockingbird
- NOPI = Northern Pintail
- NSWO = Northern Saw-whet Owl
- OCWA = Orange-crowned Warbler
- PISI = Pine Siskin
- PUFI = Purple Finch
- RBGU = Ring-billed Gull
- RBME = Red-breasted Merganser
- RNPH = Ring-necked Pheasant
- RTHU = Ruby-throated Hummingbird
- RTLO = Red-throated Loon
- RUBL = Rusty Blackbird
- SACR = Sandhill Crane
- SAGU = Sabine's Gull
- SEOW = Short-eared Owl
- SNBU = Snow Bunting
- STSA = Stilt Sandpiper
- TUSW = Tundra Swan
- TUTI = Tufted Titmouse

26th Hawkwatch Season — ALMANAC — November 1997

Holiday Beach Migration Observatory — **Holiday Beach Conservation Area, Malden Centre, ON, Canada**



Join the Adopt-a-Raptor Program

This program is sponsored the Holiday Beach Migration Observatory and the Holiday Beach Raptor Banding Station.

Adoptions are available on site or inquire by e-mail.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 91-RL-14 92-GE-4 92-RTLO-3 93-TUSW-359
2 89-NH-36 87-RS-47 86-COLO-14	**3** 89-RS-148 89-RL-16 89-GE-8 81-GE-5 87-KILL-90	**4** 95-TV-665 95-NH-23 95-RS-71 95-RT-1,605 95-GE-6	**5** 77-NH-77 95-NG-7 80-RS-67 95-RT-951 87-GE-4 92-RBME-195,000*	**6** 87-RT-381 87-RL-47 87-GE-10 90-GE-8 95-GE-5 95-PG-2	**7** 94-RS-42 95-GE-3 RT Peak	**8** 91-TV-78 95-NH-23 95-RS-67 95-GE-8 87-BOGU-8,808
9 87-RT-1,028 95-RL-15 87-GE-6 89-SAGU-1 91-ABDU-1,000 92-SNBU-250	**10** 95-BE-9 91-NG-28* 91-RS-119 80-RT-2,724* 94-RT-1,264 91-GE-24* 94-GE-21	**11** Remembrance & Veterans Days 94-RT-3,002 80-RL-48 94-GE-8 86-TUSW-672	**12** 89-RS-211 89-RT-1,591 90-RL-37 89-GE-7 90-GE-17	**13** 79-RT-1,040 77-RL-61 92-CEWA-2,000 90-NOSH-1	**14** 95-CH-24 95-RS-118 95-RT-1,347 75-RL-40 95-GE-8 91-LALO-222 89-AMAV-1	**15** 94-RS-72 95-RT-606 94-RT-1,178 77-RL-61 95-RL-44 95-GE-8 94-GE-19
16 94-RT-906 94-GE-4 89-DCCO-1 (late)	**17** 94-RT-52 86-RUBL-535	**18** 86-NH-155 92-RT-265 86-RL-26 92-GE-4 86-LALO-186 86-SEOW-5	**19** 95-RS-55 84-RL-22 87-PISI-85	**20** 84-RT-1,563 95-GE-2 Large gull activity in late November	**21** 89-RT-695 89-GE-7	**22** 89-NH-77 89-RS-148 89-RL-68 95-GE-3 93-RNPH-1
23 88-RT-583 89-RT-422 95-GE-4 88-SACR-41	**24** 89-RT-763 95-GE-2 91-HEGU-500 91-RBGU-1,655	**25** 88-GE-2 94-GE-2 89-GBBG-53	**26** 89-RT-223 87-RL-20 89-GE-7 94-GE-6 93-GBBG-35 89-CORE-23	**27** American Thanksgiving 89-RT-158	**28** 95-RS-74 95-RT-333 85-RL-27 92-AMCO-1	**29** 95-RS-34 95-RT-348 89-RT-115 95-GE-3
30 89-GE-1 END OF SEASON						

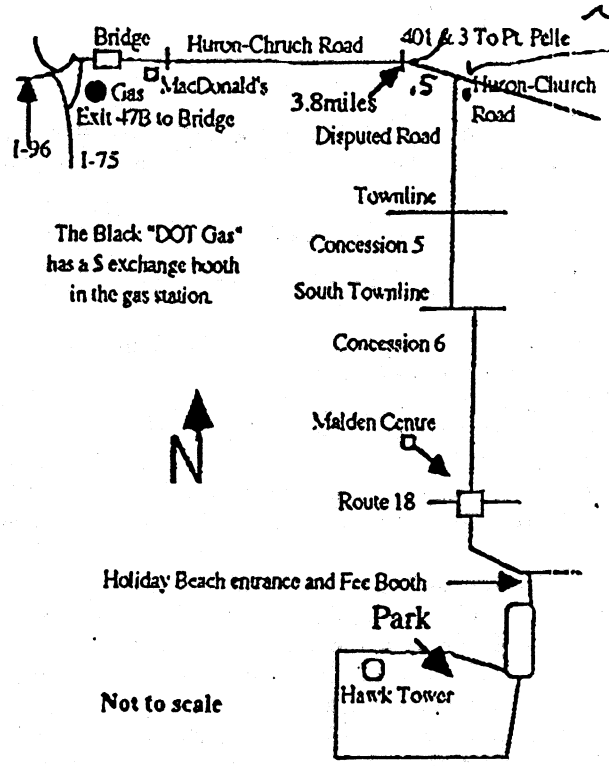
The common migrant diurnal raptors of Holiday Beach Conservation Area

BV..... Black Vulture	RS.... Red-shouldered Hawk
TV..... Turkey Vulture	SW... Swainson's Hawk
OS..... Osprey	BW... Broad-winged Hawk
BE..... Bald Eagle	RT.... Red-tailed Hawk
NH..... Northern Harrier	RL.... Rough-legged Hawk
SS..... Sharp-shinned Hawk	GE.... Golden Eagle
CH..... Cooper's Hawk	AK... American Kestrel
NG ..... Northern Goshawk	ML... Merlin
	PG.... Peregrine Falcon

Directions to Holiday Beach Conservation Area and Hawk Tower

1. Enter Canada at the **Ambassador Bridge** From **South I-75** use **Exit 47B**, stay to the left through the light. (Bridge to Canada and Lafayette St. exit.) Stay right to new bridge entrance on side of bridge.
2. After Canadian Customs, **stay left** 50 yards and take Routes **401** and **3**.
3. Pass over railroad tracks. You are now on **Huron-Church Road** (401, 3) and 3.8 miles from turn off road; see below. At the first intersection (20 yards after the **RR tracks**) is **College Ave.** **Mac Donald's** is on the **Right** corner, — a good place for quick food, rest rooms, and a common meeting place.
4. **Continue EAST** on 401 and 3 to the intersection with Todd and Cabana roads. Go through intersection and **STAYING TO THE RIGHT**. In less than 100 yards the main road **splits**; 401 and 3 continue as the main road **LEFT** and **Huron-Church angles RIGHT. Follow Huron-Church Right. (This turn is 3.8 miles from College Ave.)**
5. The 401 and 3 route goes toward Pt. Pelee.
6. Continue on this section of Huron-Church for **0.5 miles. TURN (angle) RIGHT** on to **Disputed Rd.** and travel **SOUTH.** A convenience/gas store, with a triangular parking lot, is located on your left after the turn south.
7. Continue on Disputed Rd. At 4 miles it intersects with Townline Rd. and its name changes to **CON 5, (Concession) 5.** Continue **South** 5 miles and Con 5 "T's" with **South Townline Rd. Turn Left.**
8. Travel **EAST** on **South Townline Rd. 0.2 miles** and **TURN RIGHT** on to **CON 6.**
9. Continue south on Con 6 for **3.4 miles** to intersection with **Rt. 18** at **Malden Centre.** (O. P. Police on the right and restaurant-store-gas station diagonal left.)
10. Continue **through the intersection** south on to Rt. 50 **for 1.3 miles.** Entrance to the **Conservation Area** is on the **RIGHT. Pay entry fee** and continue to the **Hawk Tower** at the south. Park and walk to the tower. Parking will be limited this season near the tower due to new wetland construction.

Look for a "MAC's" on this corner as you veer right. (7-11 type store on Disputed Road)



What to take along with you?

1. **ID** for all **children and you.**
2. **Lawn chair**; Yes, it will be easier to view hawks, for a long time, while sitting at the base of the tower.
3. **Binoculars,** Scopes, Camera, or Camcorder (Have proof of purchase or register at U.S. customs before you enter Canada).
4. **Bird and Flower ID books.**
5. **Food, Drink.** During the Hawk Festivals (2nd, 3rd, 4th, weekends in September and 1st weekend of October) a food concession will be available for early morning coffee/homemade muffins and a barbecued lunch. There is a small restaurant-store-gas station at Malden Centre just north of the conservation area.
6. It may be cool on the tower since it is near the water. Dress for the weather. Be prepared for anything! **Gloves.** Warm **footwear.** Raingear. Bring all "kinds of weather" gear.
7. **HAT or Ball Cap!**
8. **Sunglasses!** Sun block!
9. A port-a-john is at the tower.

NEWSLETTER OF THE HOLIDAY BEACH MIGRATION OBSERVATORY — Winter 1998 Vol. 13 No. 1

The Northwind

ERCA Internet Success

Hawkwatchers access Web Page

HBMO Raptor Migration Highlighted

Essex Region Conservation Authority (ERCA) Biologist Dan Lebedyk and ERCA Land Management Supervisor Richard Wyma set up the ERCA home page in mid June 1997. During early fall additional pages were developed that provided up-to-date Holiday Beach Conservation Area hawk migration information. The timely summaries were much appreciated by area hawk watchers and those planning visits to the hawk watch site.

Visitors "clicking" on the Holiday Beach portion of the home page found background information concerning the history of the migration census at Holiday Beach, as well as suggestions as to what to bring to the site for comfortable and optimum raptor viewing. Peak dates of raptor migration and average migration numbers of each raptor species were shown. Daily summaries of raptor migration organized by month with commentary concerning each day's migration was nicely done. All information was carefully prepared for easy access by visitors to the ERCA home page.

Many thanks to Dan and Richard for their attention to the Holiday Beach raptor migration summaries throughout the fall. The 1997 migration summaries will continue to be useful to hawk watchers and birders planning visits to Holiday Beach.

ERCA's home page address is http://www.wincom.net/~erca or type the subject "Essex Region Conservation Authority" into a web guide "new search" box for instant access to the ERCA home page.

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notable for its northeast winds. After ten hours of observation, the Monarch Butterfly count reached 299.

Oddly, no mention of Monarch Butterflies was made between September 9 and September 14. September 15's weather was recorded as a day with very hazy conditions, temperatures reaching 26°C in the afternoon with winds light to nonexistent from the southwest. Monarch Butterflies were everywhere on this date with hawk watchers and visitors commenting upon the numbers seen at all heights. Monarchs, singly and in small groups of three to four individuals, were observed moving towards Lake Erie and in a westerly direction over Big Creek Marsh. Visiting hawk watcher Esther Gossel coordinated the count for this insect that totaled 5,844 by 4:00 p.m. Visitors walking along the Lake Erie shoreline reported another three hundred Monarchs.

The following day, September 16, 1997, just 1,186 Monarchs were counted. Hazy conditions persisted with southeast winds, the temperature reaching 24°C. Numbers of Monarchs climbed to 3,700 on September 18, 1997, under sunny conditions with light southerly winds.

Monarch Butterflies had to compete for hawk watchers' attention on September 20 as strong northerly winds brought both Broad-winged Hawks and good numbers of Monarch Butterflies. An official count pegged the Monarch Butterfly migration at 12,000 with the comment that two or three times more were missed on the Lake Erie shoreline to the south of the tower. Six thousand Monarch Butterflies were recorded on September 21. Winds shifted to the south at noon which could account for the lower count. No further mention of Monarchs was recorded until October 4 when just two Monarchs were seen.

Upon examining the above account of this past fall's Monarch Butterfly migration through Holiday Beach Conservation Area, it can be seen that the Monarch migration can be spectacular as daily counts can be remarkably high, but likely well below the actual migration numbers. The extra effort of tracking this insect during the first three weeks of September can be very rewarding when it is realized that the passage of these colourful insects is a major natural occurrence, certainly worthy of hawk watchers' and visitors' attention.

At Point Pelee National Park, early morning walks were offered by Park naturalists to view Monarch Butterflies as well as to participate in the daily morning count of Monarchs at the Tip. Interpreter Dan Dufour provided statistics for the census that began August 25 and continued through October10. High numbers of Monarchs at Point Pelee's early morning counts coincided with several Holiday Beach high count days as the table below indicates.

Long Point Bird Observatory, Port Rowan, ON noted in its Fall 1997 *Newsletter*, that "numbers of Monarch Butterflies were also quite exceptional this fall, with several daily counts involving upwards of 10,000 migrating butterflies."

Selected Point Pelee N.P. Monarch Counts

Date	Temperature	Winds speed/direction	Number of Monarchs
Sept 15	20 ¤C	W 15 km/hour	675
Sept 18	20 ¤C	SW 10 km/hour	715
Sept 19	21 ¤C	SW 58 km/hour	1,504
Sept 20	17 ¤C	N 44 km/hour	1,268
Sept 21	11 ¤C	Calm	227

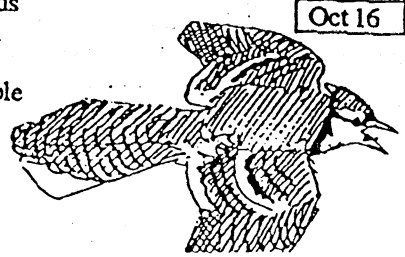
Blue Jay Migration, Fall 1997

Visitors at Holiday Beach Conservation Area are often surprised to learn that a very significant migration of Blue Jays occurs through Southwestern Ontario, especially when one considers Blue Jays are common backyard birds seen year round. Due to the circumstances of geography through configuration of nearby bodies of water, this natural spectacle of hundreds of thousands of Blue Jays exiting Ontario is very much in evidence from the hawk tower. Over several weeks, flocks of Blue Jays head out over Big Creek Marsh or choose to migrate close to tree tops along the Lake Erie shoreline. Blue Jays tend to be nervous travelers, constantly checking in all directions for predators, ie Cooper's Hawks, calling alarms that send all nearby Blue Jays into a quick dive towards the closest clump of trees.

This year's Blue Jay migration was considerably larger than last year's migration. Numbers of migrating Blue Jays were consistently higher on a series of days, giving good overall numbers for the 1997 migration and more in line with an expected Blue Jay migration through Holiday Beach. The numbers given in the table were obtained from the daily records book, an unofficial source. HBMO Non-Raptor Compiler Paul Pratt will be examining submitted species sheets, then will assemble an official migration summary that should be available in Summer 1998.

HBCA Blue Jay Migration Summary

Date	Blue Jays
Sept 18	706
Sept 21	2,000
Sept 25	59,800
Sept 26	43,000
Sept 27	39,500
Sept 28	31,530
Sept 30	30,060
Oct 3	10,014
Oct 4	12,500
Oct 5	1,490
Oct 6	42,660
Oct 7	30,520
Oct 8	32,950
Oct 9	27,500
Oct 11	10,300
Oct 15	1,180
Oct 16	200



Impressive Dragonfly Migration Observed at Holiday Beach C.A.

Paul Pratt, HBMO Non-Raptor Compiler, submitted this report following an afternoon of dragonfly watching: On Sunday, September 21, we decided to watch dragonflies at Holiday Beach instead of hawks and found an impressive variety along the beach between the hawk tower and tent area, a stretch of about 300 metres. We did not check any ponds or the marsh edge. Elaine Sinnott and myself recorded the following 20 species in three hours.

Many of the small meadows along the beach were well protected from the cool winds and literally swarmed with dragonflies. None of the green darners or black saddlebags were observed in any kind of mating behaviour, typical of migrating individuals. However, no one really knows where these dragonflies are headed each fall. It was also interesting to find the remains of two green darners in the large webs of banded argiope spiders. With such impressive concentrations of dragonflies, Holiday Beach may become as well known among dragonfly enthusiasts as it is with hawk watchers.

Common Name	Latin Name	Observed	Comment
Slender Spreadwing	*Lestes* cf. *rectangularis*	1	Not netted
Familiar Bluet	*Enallagma civile*	60 plus	
Eastern Forktail	*Ishnura verticalis*	3	
Lance-tipped Darner	*Aeshna constricta*	4	One pair mating
Green-striped Darner	*Aeshna Verticalis*	1 male	Paul's first for Ontario
Common Green Darner	*Anax junius*	2,000 plus!	Largest concentration seen this fall
Swamp Darner	*Epiaeschna heros*	1 female	Ontario's largest dragonfly
Elusive Clubtail	*Stylurus notatus*	1 male	First record for Holiday Beach
Calico Pennant	*Celithemis elisa*	1	
Eastern Pondhawk	*Erythemis simplicollis*	25	
Twelve-spotted Skimmer	*Libellula pulchella*	25	
Blue Dasher	*Pachydiplax longipennis*	8	
Wandering Glider	*Pantala flavascens*	3	
Spot-winged Glider	*Pantala hymenea*	5	
White-faced Meadowhawk	*Sympetrum obstrusum*	4	First record for Holiday Beach
Ruby Meadowhawk	*Sympetrum rubicundulum*	40	
Yellow-legged Meadowhawk	*Sympetrum vicinum*	40	
Carolina Saddlebags	*Tramea carolina*	2	Rare in Ontario
Black Saddlebags	*Tramea lacerata*	400 plus!!	Largest concentration seen this fall
Red-mantled Saddlebags	*Tramea onusta*	2-4	Rare in Ontario

Ruby-throated Hummingbird Fall 1997 Migration

Hawk watchers are attuned to the migration of the Ruby-throated Hummingbird which at times seems to swirl about the hawk tower. The approach of a diminutive Ruby-throated Hummingbird is usually announced by someone calling out a single word, "Hummer!" Those who do not see the "Hummer" are mystified as they do not realize that the bird must be seen on its approach to the tower as by the time the hawk watcher or spotter calls "Hummer," the opportunity for seeing the migrating hummingbird usually has been lost. It is always a pleasure to show the uninitiated Ruby-throated Hummingbird watchers their very first "Hummer." Often the response is an incredulous question, "That's a bird?"

If visitors expect good views of the numerous Ruby-throated Hummingbirds that migrate past the tower, they will be disappointed. The birds fly swiftly past the tower, thus the overall impression of a Ruby-throated Hummingbird at Holiday Beach is that of a tiny, slightly wavering blur that passes at varying heights around the hawk tower. Visitors must just accept that all those blurs are Ruby-throated Hummingbirds undertaking a long migration to the extreme southern U.S., Mexico and Costa Rica.

1997 Ruby-throated Daily Totals at HBCA

Date	Hummers
Sept 5	10
Sept 6	2
Sept 7	22
Sept 8	47
Sept 9	8
Sept 10	8
Sept 11	56
Sept 12	72
Sept 13	~~504~~ 604
Sept 14	351
Sept 15	15
Sept 16	15
Sept 17	9
Sept 18	21
Sept 24	2

Daily High Record Set

Non-Raptor Compiler Paul Pratt officially declared January 8, 1998 that a new season daily high for Ruby-throated Hummingbird migration was set this past season. Hawk watchers on September 13, 1997 counted 604 Hummers, breaking the former record of 520, tallied by Esther Cusick's watch in 1984.

Season daily high counts for migrating Ruby-throated Hummingbirds were recorded on September 13 and 14, 1997. Between 2:00 p.m. and 3:00 p.m. on September 13, watchers tallied 113 Ruby-throated Hummingbirds with another 263 seen between 3:00 p.m. and 4:00 p.m. Hawk watchers recorded 437 Ruby-throated Hummingbirds at 5:00 p.m EST after a 9 1/2 hour

vatch. Watchers stayed until 7:00 p.m. to record the migration vith another 167 individual Ruby-throated Hummingbirds seen. Veather for the day was warm and sunny with light winds from ıe west, swinging to the southwest, then becoming cloudy later ı the afternoon.

Watchers at the tower on September 14, 1997 recorded a total aptor migration of 3,348 compared to the total of 960 seen on ieptember 13, 1997. The weather was clear, then overcast with a ight shower and some clearing in the late afternoon. Winds were ight from the west southwest, then changing to light southwest vinds. As hawk watchers departed the hawk tower at 5:10 p.m., he Ruby-throated Hummingbird tally stood at 351 with Ruby-hroated Hummingbirds still flying. Sightings of Ruby-throated Hummingbirds dropped off dramatically following those days of ;ood numbers.

Ruby-throated Hummingbird numbers mentioned are ınofficial numbers gleaned from the tower entry book naintained by the daily volunteer hawk watchers. The daily ntry book is intended to give an unofficial quick summary of ach day's migration. Non-Raptor Compiler Paul Pratt will be preparing an annual migration summary which will look more closely at the Ruby-throated Hummingbird migration this season. Certainly this year's migration appears to be a strong one, but not a record breaking year.

Warbling Watching, Fall 1997

Local birder and HBMO member Fred Urie undertook a 1997 fall birding quest that monitored the woodland warbler migration throughout the region at such local birding hotspots as Holiday Beach Conservation Area, Point Pelee National Park, Rondeau Provincial Park in Kent County and selected natural areas close to Fred's home within the City of Windsor including Ojibway Nature Centre, the Black Oak Heritage Park (a segment of the Ojibway Prairie Complex) and Fred's neighborhood Memorial Park. Fred's daily plan was to travel to a potentially productive area, then monitor particular sections that had proven worthwhile in the past. Usually a full day at several locations was devoted to seeking migrant warblers. This year Fred began his fall woodland warbler census on August 16, 1997 with sightings well into October.

Several weeks into this fall woodland warbler migration Fred felt the migration was not producing the numbers of warblers as experienced in the fall of 1996 which was spectacular for its large "fall outs" of migrants. A pleasant discovery this season was the activity at Memorial Park which is located between Howard and Walker Road on Ypres in the City of Windsor. A portion of this park, dominated by oak tree species, has been allowed to regenerate, thus thickets of green ash have developed over the eleven years of this experiment. Memorial Park's wood chip pathways are very appealing to feeding warblers which will descend onto the pathways, resembling so many pieces of popcorn as these tiny active birds feed on insects within the wood chips.

Perhaps the most productive birding in Essex County this past fall was the Black Oak Heritage Park, a section of the Ojibway Prairie Complex within the City of Windsor. Fred consistently reported good numbers of warblers from this area which is not particularly well known to birders. Much edge habitat with weedy areas seemed to have favoured good warbler numbers.

The Northwind has attempted to highlight some of Fred's excellent sightings from his many days of hectic birding around Essex and Kent Counties. HBMO Non-Raptor Compiler Paul Pratt will be looking at Fred's Holiday Beach Conservation Area sightings in more detail with those sightings to appear in the upcoming HBMO's Fourteenth Annual Fall Migration Summary 1997.

August 18, 1997 was memorable for Fred's record number of 27 Northern Waterthrush found at various locations around Point Pelee National Park such as Tilden's Woods and the Woodland Trail behind the Interpretive Centre. The Northern Waterthrush's distinctive call would alert Fred to the presence of a Northern Waterthrush nearby. If Fred was lucky, the Waterthrushes would hop up to see the intruder or Fred would see the birds on the path. Fred encountered nine Canada and four Mourning Warblers on that day.

On August 19, 1997, three hours of birding activity at Holiday Beach Conservation Area yielded six Blackburnian, three Black-and-white Warblers and a single male Prothonotary Warbler, a species considered threatened within Ontario. The Prothonotary was in the woodlands south of the hawk tower near the paved road loop. Fred also found a Least Flycatcher, identified by its call, along with eighteen Empidonax flycatchers species plus nine early Red-breasted Nuthatches and three Northern Waterthrushes.

Prothonotary Warbler sightings were noteworthy in late August and early September. On August 25, 1997, two Prothonotary Warblers, a single female and one immature, were observed at Rondeau Provincial Park. At Holiday Beach Conservation Area on August 26, 1997, three Prothonotary Warblers, two adult males and an immature male, were seen in the flooded woodlands south of the hawk tower. When Fred returned to Rondeau Provincial Park on August 27, 1997, a single male Prothonotary Warbler was discovered singing in the mid part of South Point's wet area. Six Northern Waterthrushes were seen along with four adult Red-headed Woodpeckers which were exhibiting aggressive behaviour towards each other. September 1, 1997 was the date on which Fred found a female Prothonotary Warbler preening in the flooded woodland to the south of the hawk tower at Holiday Beach.

August 28 was a day with north winds that brought numbers of migrants through Holiday Beach Conservation Area. Some samplings of Fred's sightings include twenty-nine Chestnut-sided, sixteen Magnolia, thirty-three Blackburnian, seven Canada, nine Black-throated Green, and twelve Black-and-white Warblers. A raptor movement was noted with these sightings seen between 12:40 p.m. and 2:10 p.m.: nineteen Turkey Vultures, eleven Northern Harriers, including one adult male, one Cooper's Hawk, nine Sharp-shinned Hawks, seven American Kestrels and one Red-tailed Hawk.

Fred birded regularly through September, reporting good sightings from all locations, particularly Black Oak Heritage Park. For instance, at overgrown agricultural land within Black Oak on September 28, 1997, Fred observed twenty-nine Tennessee, forty-one Nashville, six Palm Warblers, one female Connecticut Warbler (remarkably this bird chipped in full view for several minutes), two Scarlet Tanagers (fall yellow-green plumage noted) and two Lincoln Sparrows.

Fred noted that October 1, 1997 was a "big day" at Holiday Beach, Black Oak and Ojibway. Fred reported a movement of six hundred and thirty-two Yellow-rumped and thirty-five Blackpoll Warblers through the Holiday Beach Conservation Area with an additional one hundred warbler species observed.

Birding along the Lake Erie shoreline was particularly productive with warblers on every tree. Fred found a Parula Warbler on the beach and another of the same species at Ojibway at 6:40 p.m. for a day's tally of eight hundred and eighty-eight warbler species individuals.

Fred continued to watch warblers through mid October, recording two hundred and seventy-four warbler individuals representing sixteen species seen on October 8, 1997 at Memorial Park, Ojibway and Black Oak Heritage Park. Highlights were forty-eight Nashville, thirty Black-throated Green Warblers and a Parula Warbler. Another highlight at Holiday Beach were two Blue-headed Vireos seen on October 11, 1997 for a total of five for the day. Mostly Yellow-rumped Warblers were observed at Holiday Beach on October 14 and October 17, 1997. At season's end, Fred's tally of warblers observed was nearly eighteen thousand (18,000) wood warbler individuals.

Fred has some suggestions for warbler watching at Holiday Beach Conservation Area. The cedars on either side of the park road before Carp Crossing can be productive. If you are driving a vehicle, slow to listen for bird calls. Fall warbler watching can be enjoyable and rewarding, especially viewing the plumages of Blackpoll, Tennessee, and Bay-breasted Warblers which are particularly lovely.

An Extraordinary Day in the Life of a Hawk Watcher

Hawk watcher Hank Hunt headed out early to the Holiday Beach hawk tower on Friday, October 17, 1997, after listening to the weather forecast which mentioned the northerly component in the wind. As Hank drove by the lake banding station at 6:45 a.m., Hank noticed that at least one bander was on duty, causing Hank to stop and drop in on the bander, John St. Louis. Hank described John as "busy," with a back log of birds awaiting processing. Hank stayed to assist, including aiding with the transporting of birds to the tower for adoption and release.

Hank's first trip to the tower was between 7:30 a.m. and 8:00 a.m. when Hank carried an adult Goshawk, an immature Goshawk, an immature Cooper's Hawk, and an immature Sharp-shinned Hawk, each notable for representing an accipiter found in North America. There was lots of excitement on the tower as hawk watchers Paul Pratt, Fred Urie, Sylvia and Wayne Telesco, Dorothy McLeer, Bob Pettit and Jim McCoy took photos and admired the birds. The immature Northern Goshawk, previously banded at another station, thought to be Hawk Cliff, was adopted by Bob Pettit. Banders have checked with the Hawk Cliff Station, but the raptor was not banded at that station. It may be several months before confirmation of the original banding site.

The second trip back to the tower involved bringing a requested Red-tailed Hawk for identification examination. Despite a special request, no one adopted this bird.

Hank's third trip back was with an immature Swainson's Hawk which was lured into the banding station's traps at 11:10 a.m. on a lure that Hank was operating. The bird was transported in two large, somewhat rusty, juice cans that had been taped together. Hawk watchers at the tower knew something special was on its way, especially Wayne Telesco who rushed past Hank on the tower stairway to retrieve his camcorder from his vehicle.

The excited hawkwatchers took photos of the bird in the can even before it was removed. Hank had been shown by Bander John St. Louis how to safely remove the bird's talons as the can was slipped away from the bird. Of course, Hank had his name written on the adoption sheet even before Hank left the blind with the bird. This raptor was the second Swainson's Hawk to be captured and banded at the Holiday Beach banding station, the first Swainson's hawk captured and banded on September 13, 1996.

By three o'clock, the migration had slowed. Hank reported that John St. Louis banded thirty-two birds on a day that proved to be exceedingly busy and memorable.

CBC Radio's Nature Guy

CBC radio's fall radio programming made a giant step forward this past fall when Barbara Peacock, *Across Town's* hostess announced that Phil Roberts, known to radio listeners as the CBC's Nature Guy, would henceforth be heard regularly at 1550 on the am dial at 5:45 p.m. every Thursday afternoon. Progams that highlighted Holiday Beach Conservation Area are summarized below.

Hawk Festival Promotion

As promised, CBC radio's program *Across Town* featured an interview on Thursday, September 11, 1997 with Principal Bander Phil Roberts which had previously been recorded on Monday, September 8, 1997 with program hostess Barbara Peacock. Phil mentioned a new fund raising initiative that the Holiday Beach Raptor Banding Association would be undertaking. Lori Nicholas, Phil's wife and a talented amateur artist, had donated 250 Red-tailed Hawk numbered prints which would include an accompanying Red-tailed Hawk feather. Proceeds from the sale of the prints at $25.00 per print would go towards the restoration of an old building at Holiday Beach to be used as a banding laboratory. The print would be available for sale at the upcoming Hawk Festival and Hawk Weekends which would feature banding demonstrations, guided hawk watching and photo opportunities of various species of raptors.

The interview concluded with Barbara and Phil tramping up the tower stairs for an intended release of a Northern Harrier. Phil spent a few moments discussing this beautiful raptor, a snatch and grab hunter. Northern Harrier gyroscopic vision was demonstrated as the bird's body was rotated while everyone noted that the Northern Harrier maintained its head on a level plane. Northern Harriers hover while hunting, thus the birds must be able to maintain its eyes precisely on its prey. Age and sex of individual Northern Harriers can be determined by eye colour. Numbers of photographs were taken, then one lucky visitor was asked to release the newly banded hawk.

Holiday Beach Banding Activities

Principal bander, Phil Roberts, and CBC radio hostess of the afternoon program *Across Town*, Barbara Peacock, met at the banding station for an interview which was aired at 5:45 p.m. on October 16, 1997. As an opener to the interview, Phil introduced apprentice bander Cory Balkwill who had just captured a Sharp-shinned Hawk with an eye deformity. The iris of one eye appeared not be a perfect sphere when compared to the bird's other eye. The small hawk with its orange eyes was an older bird in full adult plumage that was an obviously successful predator despite its eye abnormality.

Phil gave a summary of the banding station's activities. At the half way mark in the season, banders had had good weather on

the weekends with generally a good migration overall. Support by the persons attending the Hawk Festival and Hawk Weekends was very much appreciated.

So far into the season banders had successfully caught and banded two Peregrine Falcons. More Merlins had been captured and banded than previously. The large hawks still to come in migration were Red-tailed Hawks, Red-shouldered Hawks and Golden Eagles. Hawk watchers would still continue to see Sharp-shinned Hawks and Northern Harriers. Sharp-shinned Hawks being caught at interview time were mainly adults which had stayed on territory and were just migrating.

Holiday Beach C.A.'s Owls

A pretaped interview with CBC's Nature Guy, Phil Roberts, and CBC's weekday afternoon programme *Across Town* hostess Barbara Peacock was aired on Thursday, November 20, 1997. The interview had been taped November 5, 1997, following a successful night of owl capture and banding to which Barbara had been invited. Phil began the interview by expressing how delighted the banders were at the success of the evening's activities. Eleven owls had been captured and banded. In contrast, fall owl banding last year throughout Ontario had been very slow.

Phil reached into a carrying case to withdraw a Northern Saw-whet Owl which he and Barbara discussed. Phil explained that this species is Ontario's smallest owl. As Phil held the little owl, it seemed remarkably tame and mild mannered. The owl's tiny size means it can not consume a mouse or vole at one sitting, but must save one half of its prey for later consumption.

Phil spent a few moments pointing out certain characteristics of this appealing owl. The Saw-whet Owl's facial features include yellow eyes, spots around the facial disk, with no ear tufts. Basically, the Saw-whet Owl is a looking and listening hunter. Phil showed Barbara the owl's ears which are located behind the eyes and are actually twice the size of its eyes. When the feathers were blown aside, Barbara felt she was looking right into the skull of the owl. In fact, Phil said that most of this small owl's skull is occupied by its eyes and ears.

Phil explained that the tiny owl was a female, based on the wing cord measurement which for a female Northern Saw-whet Owl is 143 mm. This particular bird's wing cord measurement was 152 mm. A wing cord measurement of 131 mm. or less indicates a male Saw-whet Owl. Phil then opened the owl's wing which displayed a pinkish wash, indicating the bird was a hatch year individual.

Phil and Barbara discussed how the Saw-whet Owl had received its name. Apparently, the old term for sharpening a saw was called "whetting." The owl's call is felt to resemble that sound. For trapping purposes, the call is played on a tape recorder with the owl attracted to the area and subsequently caught.

Phil then brought another small owl into the discussion, an Eastern Screech-Owl that had also been trapped that evening. Barbara remarked on a clacking sound, an alarm sound made by the small owl. Phil pointed out that this tiny gray phase owl had ear tufts, yellow eyes and bill. Barbara was familiar with the Screech-Owl's call as she had heard it in her neighborhood. Phil wanted to release the Saw-whet Owl well before the Screech-Owl as the Screech-Owl is a known predator of the Saw-whet Owl.

Wrapping up the interview, Phil suggested that owl watchers look along the Lake Erie shoreline in the Kingsville and Holiday Beach area, both of which have good Saw-whet Owl habitat such as evergreens and grapevine tangles. Banders note that during this time period the same bird is rarely caught twice as the migration is underway. During the winter, banders will catch the same bird time and again, as the bird winters in a particular spot. Upon completion of the interview, Phil released the Northern Saw-whet Owl, which silently departed the interview.

Hawk Tower Visitors, Fall 1997

A visitors' log book provided by HBMO member Bob Hall-Brooks was signed by visitors to the hawk tower. Visitors, with the total number from that county, province or state in brackets, came from Essex County (57), Ontario (68), British Columbia (2), Michigan (177), Ohio (84), Pennsylvania (8), California (2), New York State (8), Kentucky (1), Indiana (8), Maryland (3), Arizona (3), Florida (5), Illinois (7), Rhode Island (2), Kansas (1), Texas (3), Georgia (1), Massachusetts (1), New Hampshire (3), Louisiana (2), New Jersey (2) and Tennessee (2). A single visitor came from England for a total of 451 visitors who left a record of their visit. There were many others who did not sign the visitors' book, for instance, the names of some of those who supported the Adopt-a-Bird of Prey programme did not appear in the visitors book.

HBMO Marks Twenty-fourth Hawk Watch

Holiday Beach was the site of another exciting season of hawk watching. The site marked its twenty-fourth year as a raptor count site with the forty foot observation tower at the centre of activities for the ninth year. This year's coverage continued daily from September 1 through November 30, 1997.

Success at the tower can be attributed to the volunteers who faithfully looked after the hawk watch on their designated days. Bob Hall-Brooks, in his sixth season, and Steve Greidanus, in his first season, were on the tower Sundays. Fred McDonald returned to the tower on Mondays for his second season, along with Nancy Tar in her first season. Esther Cusick, in her twenty-third season, and Sylvia Telesco, in her first season, looked after the Tuesday watch. Wednesday's were coordinated by Hank Hunt is his eighth season. Hank was assisted by first season hawk watchers Dave Llewellyn and Betty Learmouth. Jack Boxer and Ray Seng, both in their sixth season, looked after the Thursday watch. Official counter on Fridays was Bob Pettit, in his eleventh season, assisted by Allison McCormick, Dorothy McLeer and Marge Johnston, all first year hawk watchers. Sue Tanner, celebrating her second year as a hawk watcher, coordinated the Saturday watches with Steve Greidanus' assistance.

A number of hawk watchers assisted at the tower over the fall season: Denis Boulay, Fred Urie, Paul Pratt, Allen Chartier, Eric Marshbien, Valerie Karhu, Jim McCoy, Will Weber, Esther and Chuck Gossel, Bob Lindsay, Andy and Mark Dettling, Bill Purcell, Judy Anderson, Leonard De Francisco, Earl Dafoe, Richard Fauteux, Carl Latta, Mercer Patriache, John Bieganowski, Mike Fitzpatrick, Robert Sokolowski, Al Maley, Bea Lazar, Greg Coleman and many others helped to make this season a success.

Unofficial summary estimate of the season's count.

Species	83 - 96 Average	1997 Total (Unofficial)	1997 Change
Turkey Vulture	12,318	17,845	45%
Osprey	106	154	45%
Bald Eagle	36	85	136%
Northern Harrier	971	1,038	7%
Sharp-shinned Hawk	14,167	15,478	9%
Cooper's Hawk	711	352	-50%
Northern Goshawk	38	48	26%
Red-shouldered Hawk	1,082	1,030	-5%
Broad-winged Hawk	48,608	31,356	-35%
Red-tailed Hawk	7,410	7,103	-4%
Rough-legged Hawk	140	96	-31%
Golden Eagle	55	50	-9%
American Kestrel	3,716	2,868	-23%
Merlin	53	93	74%
Peregrine Falcon	36	51	40%
Unidentified Raptor	215	181	-16%
Total	89,664	77,828	-13%

Unofficial Holiday Beach Banding Stations Report, 1997

As the 1997 fall banding season progressed, the Holiday Beach banders were pleased to share their successes. Certainly, visitors and hawk watchers were thrilled to see the successfully captured and banded raptors that were brought to the hawk banding demonstrations and talks over the four Hawk Festival and Hawk Weekends. The excitement of an excellent banding season was shared throughout the season with hawk watchers and visitors.

The season started well. Principal Bander Martin Wernaart supplied a banding summary as of September 8, 1997: 2 Northern Harriers, 25 Sharp-shinned Hawks, 2 Red-tailed Hawks, 10 American Kestrel, 1 Merlin for a total of 40 raptors. An immature Northern Harrier was taken to the tower for release on Monday, September 8 which was a treat for several visitors on the tower.

Bander John St. Louis reported on September 14, 1997 that the banding year had been extremely busy. On Thursday, September 11, 1997, banders banded 125 raptors, including 5 Merlins with an observed Peregrine Falcon which came into the station but was not captured, a further 50 birds of prey were banded on Saturday, September 13, 1997 and by mid afternoon of Sunday, September 14, 1997, the tally stood at 60 plus birds of prey with a female hatch year Merlin as the special bird of the day.

On September 15, 1997, banders brought a Sharp-shinned Hawk and an American Kestrel to the tower in the morning for release while the six North American receptive tour operators and local hosts were on the hawk tower. An afternoon treat from the banders was an immature male Northern Harrier. Banders reported three Cooper's Hawks which had bounced from the rim of the clap trap, avoiding capture.

Banders provided special midweek programs on Wednesday, September 24, 1997. Members of the Oakland Audubon Society from Michigan visited the banding station with Grades 7 and 8 students of Colchester North Elementary School, Gesto, Essex County, enjoying a raptor banding demonstration in the afternoon.

On September 29, 1997, Bander John St. Lewis was in the Holiday Beach raptor banding station when he captured the banding station's third ever Peregrine Falcon, a huge hatch year female. Luckily, John had assistance from Dorothy and Gary Balkwill who were assisting at the blind. After photographs were taken, the bird was released from the hawk tower.

As of September 30, 1997, the banding station had banded 1,012 hawks compared to the best year's entire total of 994 hawks which occurred during the 1996 banding season. Banders' time devoted to banding was only ten hours above that of last year, but some changes had been made in the banding station set up with an excellent capture of raptors resulting. More Northern Harriers have been banded this year than had ever been banded previously. Seven Merlins were banded in one day, establishing a new record for that species. A record nineteen of this species had been captured, banded and released as of September 30, 1997. Generally, the success of hawk and passerine banding coincide, although this year passerine banding had been slow at all passerine banding stations, including the newly established Holiday Beach passerine station.

Following a slow start due to fog on October 5, 1997, Bander John St. Louis captured, banded and released a hatch year male Peregrine Falcon from the hawk tower, much to the delight of hawk watchers. Shortly after, John captured and banded a hatch year female Merlin which was also released from the hawk tower.

On October 17, 1997 light to moderate north winds brought raptors through Holiday Beach with the notable capture, banding and release of an immature Swainson's Hawk at the banding station. Bander John St. Louis was kept busy with the capture and release of thirty-two birds of prey with hawk watcher Hank Hunt's assistance. (See Extraordinary Day, page 13).

Banders report that as of October 29, 1997, 1,500 birds of prey had been trapped, banded and released at Holiday Beach this fall. On October 29, Bander Phil Roberts captured four Northern Goshawks and banded three as one was a retrap from another banding site. A Red-tailed Hawk was also captured, banded and released.

Bander Steve Dickson was in the marsh banding station on Sunday, November 2, 1997 when Steve lured and captured a Golden Eagle at 11:30 a.m. Luckily, a number of the senior banders and apprentices arrived to enjoy the bird and obtain photographs. This is the third capture of a Golden Eagle at the Holiday Beach site. One Golden Eagle was released unbanded in 1989, with another captured, banded and released during the 1995 season.

Early November reports from the banding station indicate that the banders were quite overwhelmed with the success of their banding activities from November 5 through November 8, 1997. Ten Northern Saw-whet Owls and one Eastern Screech-Owl were banded on November 5, 1997. Twenty-two and forty-six Red-tailed Hawks were captured, banded and released on November 6 and November 7, 1997 respectively. Fifty-two birds of prey were trapped on November 8, 1997 with fifty-one banded as one raptor was a retrap. Highlights of the trapping were a female hatch year Northern Goshawk, and two female hatch year Cooper's Hawks. All the Red-tailed Hawks trapped and banded were hatch year birds, except for a second year bird.

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Three Golden Eagles were seen as these birds passed the blind. An interesting note were the five Red-tailed Hawks that landed near the lures, then actually ran at the lures, resembling vultures in their actions. The day's last bird was trapped, banded and released at 4:45 p.m.

On November 15, 1997, Bander John St. Louis reported one immature Golden Eagle which passed the banding station at about 1:00 p.m. with another just ten minutes later. The second bird came into the banding station and actually picked up the lur, but dropped it when the line tightened. Despite this close encounter, the lure was unharmed.

Anticipating a Red-tailed Hawk migration on December 1, 1997, assisted by light northerly winds, Bander Steve Dickson reported six Red-tails trapped and banded during a three hour visit to the blind. At the end of November, banders indicated that nearly 2,000 birds of prey had been captured, banded and released during the fall migration. HBMO members look forward to an official summary, including tables, indicating the highlights of the season.

Memorable Sightings at HBCA, Fall 1997

Strong north winds on September 3, 1997 brought the season's first push of 92 Sharp-shinned Hawks and 99 American Kestrels through Holiday Beach C. A. (D. Boulay, B. Learmouth, D. Llewellyn, P. Pratt, F. Urie)

Small kettles of Broad-winged Hawks seen on September 8, 1997 brought the day's total for this species to 137. Principal Bander Phil Roberts brought an immature Northern Harrier to the tower for release, the first of a record number of this species to be captured and banded this past fall. (D. Boulay, F. McDonald, E. Marshbein)

An excellent migration of 1,124 Sharp-shinned Hawks was observed on September 14, 1997 with light WSW to SW winds. Total migration for the day was 3,348 raptors with 1,795 Broad-wings tallied. (D. Boulay, B. Hall-Brooks, J. McCoy, B. Pettit, F. Urie)

A female Merlin spent the afternoon of September 15, 1997 resting in poplars beside the newly created wetland with occasional forays over the pond to snatch at dragonflies. Another Merlin was observed in a downward aerial swoop with a Sharp-shinned Hawk over the Trout Pond. (D. Boulay, E. and C. Gossel, H. Hunt, B. Learmouth, B. Lindsay, F. Urie, W. Weber and many others)

A Ruby-throated Hummingbird survived an attack by a Merlin on September 19, 1997. (M. Johnston, A. McCormick, B. Pettit)

Migrating Northern Harriers totaled 123 individuals with another strong Sharp-shinned Hawk migration of 1,031 on September 20, 1997. The season's second highest total of 5,847 Broad-winged Hawks seen on this day. (S. Tanner and many others)

Sharp-shinned Hawks observed on September 21, 1997, the second day of the first Hawk Weekend, totaled 1,051, another excellent migration for this species, with the season's highest one day count of 16,874 Broad-winged Hawks. (B. Hall-Brooks and many others)

Early in the morning of September 21, 1997, Northern Harriers were sighted flying several feet over the lake at a distance to the curve of the water formed horizon. Their flight path was west or south southwest toward Monroe County, Michigan, USA or to Ohio, USA. This was not seen from the tower but from the lake shore. (A. Chartier)

Six hundred and seventy Chimney Swifts migrated through the Holiday Beach Conservation Area on September 23, 1997. (E. Cusick and many others)

Watchers on September 26, 1997 witnessed two different Peregrine Falcons take Blue Jays. One knocked the prey into the water and when the Blue Jay took flight out of the water, the Peregrine took it. The other falcon was eating a Jay while flying to the west. All of a sudden, the Peregrine lost hold of the Jay and it fell into the water. The falcon couldn't retrieve it and just flew off westward. (B. Pettit, A. McCormick)

September 29, 1997 was a special date for Bander John St. Louis who caught and banded a huge female Peregrine Falcon, only the third Peregrine Falcon caught at the banding stations during their ten year operation. The Peregrine was released from the tower. (F. McDonald and others)

On October 3, 1997 students from Mount Carmel School enjoyed viewing an adult Peregrine Falcon that perched on the tall dead tree before it flew south along the park's woodland, then out over Lake Erie. (M. Johnston, B. Learmouth, F. Urie)

HBMO Bob Pettit wrote the following on BirdHawk Listserv for October 11, 1997: My words today were, "This will be a rewarding day." I was on the money. My adult education Hawk Watching class was with me at the tower. I promised them a Bald Eagle and we had two adults within fifty yards of the tower at 9:30 a.m. Paul Pratt spotted and identified a light-phase Rough-legged Hawk late morning. Hawk watchers at Lake Erie Metro Park (8.24 miles west of our site) spotted the same bird 20 minutes later. Sue Tanner predicted a Golden Eagle at 4:00 p.m. bird time (EST). Everyone left the site except five of us. The juvenile Golden Eagle arrive at 4:00 p.m. bird time! We danced a victory jig and called Lake Erie Metro Park to give them the news. They spotted the Golden Eagle twenty minutes later. That's 27.5 mph! (J. McCoy, B. Pettit, S. Tanner, F. Urie)

October 12, 1997 was the watch on which a single White-winged Crossbill was seen. (B. Hall-Brooks, B. Pettit, J. McCoy, S. Tanner)

Watchers on October 13, 1997 (Canadian Thanksgiving) spotted a special bird flying towards the tower. Its distinctive wings and manner identified it as a sub adult Jaeger, the first Jaeger to be observed at Holiday Beach C.A. This individual was observed for about a minute as it harassed the Big Creek Marsh gulls. (R. Fauteux, H. Hunt, F. MacDonald, N. Tar, F. Urie)

Light NW to NNW winds on October 15, 1997 brought a steady stream of migrating raptors past the hawk tower, including one immature/female Northern Harrier that flushed three Common Snipe as the harrier flew low over Purple Loosestrife Island within Big Creek Marsh. A migrating Bald Eagle was intercepted by the resident Bald Eagles over the tower, resulting in the birds circling and calling above the tower. (C. Latta, H. Hunt, B. Learmouth, D. Llewellyn, M. Patriarche, W. and S. Telesco)

October 17, 1997 was an excellent migration day with north winds, light to moderate all day. The season's daily high count of 2,267 Turkey Vultures was recorded. Thirty-two Northern Harriers, mostly immatures, migrated low through the area in the early morning, frequently in groups of twos. Birds captured, banded and subsequently released from the tower included an immature Swainson's hawk (the banding station's second

capture in as many years), an immature Northern Goshawk, a second year Sharp-shinned Hawk and a Red-tailed Hawk. (J. McCoy, E. Dafoe, D. McLeer, B. Pettit, P. Pratt, W. and S. Telesco)

October 25, 1997 is notable for a exceptional all day non-stop migration past 6:00 p.m. of blackbirds and crows that did not receive counting as hawk watchers were busy with raptors including eight Golden Eagles that passed the tower in ten minutes from 2:40 p.m. to 2:50 p.m. EST, for that day's total of ten Golden Eagles. Four Sandhill Cranes were seen. (D. Boulay, M. Fitzpatrick, S. Greidanus, J. McCoy, P. Pratt, R. Sobolowski, W. and S. Telesco, S. Tanner, F. Urie)

Weather conditions on October 26, 1997 included gale force winds from the northwest with rain. Despite trying conditions, the migration was varied with 895 raptors at low heights. (D. Boulay, S. Greidanus, B. Hall-Brooks)

Watchers noted good numbers of migrating passerines such as Horned Larks, American Pipits, Lapland Longspurs, Brown-headed Cowbirds, Blackbird sp., Common Redpolls, Pine Siskins, American Goldfinches, and finch sp. throughout November.

November 6, 1997 was another non stop migration day with an estimated 300,000 American Crows and 200, 000 blackbirds passing through Holiday Beach, including 985 Red-tailed Hawks. (J. Boxer, J. McCoy, R. Seng, F. Urie)

Five late in the season Peregrine Falcons were seen on November 7, 1997, including one Peregrine Falcon that passed over the trees "at the point," flew low over Big Creek Marsh, flushing the gulls as it passed. Another Peregrine Falcon flew past the tower with a flock of American Crows. Eighty-one Northern Harriers were observed, with forty-four seen between 7:00 p.m. and 9:00 p.m. (B. Lazar, A. McCormick, D. McLeer, B. Pettit, F. Urie and visitors)

November 8, 1997 was another remarkable migration day with 1,927 Red-tailed Hawks, 118 Red-shouldered Hawks and 13 Northern Goshawks passing the tower. (D. Boulay, A. Chartier, M. Fitzpatrick, S. Greidanus, J. McCoy, F. Urie and visitors)

The season's last Peregrine Falcon was observed on November 17, 1997 as it flew past the tower over Big Creek Marsh, rested in the second tree from the right on Eagle Tree Island for five minutes, then continued on over the marsh in a westerly direction. (B. Learmouth, D. Llewellyn, F. Urie)

The season's last Merlin was observed at 9:39 a.m. on November 18, 1997 as it flew by the hawk tower behind a flock of starlings. Big Creek Marsh's adult Bald Eagles were observed actively flying together, possibly in courtship, for twenty-five minutes before flying off to the east. (G. Balkwill, B. Learmouth, F. Urie)

Northerly winds on December 1 brought an anticipated late season Red-tailed Hawk migration through Holiday Beach Conservation Area. Bander Steve Dickson captured and banded six Red-tailed Hawks over the noon hour.

Hawk Tower Profiles

Denis Boulay, Fund Raiser Extraordinaire

If you were a visitor at the Holiday Beach Conservation Area during the first three 1997 Festival and Hawk Weekends, your chances of encountering Denis Boulay were statistically rather high as Denis estimates that he spoke with 95% of the visitors on those weekends. Why did Denis say a few words to all our visitors? Because Denis was offering everyone an opportunity to be a lucky HBMO raffle winner!

Denis' amazing perseverance as a fund raiser has resulted in an astonishing 1,008 tickets being sold by Denis which is a tremendous boast towards HBMO's fundraising. Denis even sold raffle tickets to HBMO members who had their own raffle tickets to sell! Denis' fall 1997 raffle tickets sales far surpass his 1996 fall raffle ticket sales effort when Denis sold 186 tickets, mainly to the members of his bowling league. During Denis' annual Northern Ontario fall visit to Hurst, Denis managed to sell two books of tickets.

Denis has been a regular at the Holiday Beach hawk watch site since 1994. Denis was fortunate to visit the site in mid September 1994 when he witnessed 36,000 Broad-winged Hawks in migration, an event which Denis said he could hardly believe. That migration spectacle "hooked" Denis on hawk watching.

It seems that Denis has had a special project each year at Holiday Beach. In 1995, Denis volunteered to assist Phil Roberts with the entrance design of the Education Building. Denis' thirty-seven years of dry walling experience has made the entrance way to the classroom most attractive.

Denis has had a busy fall schedule. Euchre occupies Denis on Thursday with bowling leagues on Friday and cribbage on Sunday. On days when Denis is not busy, Denis can be found at Holiday Beach where he will pitch in as needed, although his favourite task is as "spotter" for the hawk watchers on the tower. If Denis arrives early at the tower, he will watch the site for early morning migrants. During the Hawk Festival and Hawk Weekends, Denis helped with the early morning display set-ups at the food concession. Many thanks, Denis, for your assistance this past season.

Esther Cusick, HBMO's Senior Hawk Watcher

HBMO's most senior hawk watcher is Esther Cusick, a veteran of twenty-three seasons at HBMO's Lake Erie hawk watch site. Before the hawk watch at Holiday Beach was officially formed, Ellie Cox introduced Esther to the site. When Joe Kliemann became the site's compiler, Esther was encouraged to sign up for an official day at an Oakland Audubon Society meeting. Audrey Weir, another Oakland Audubon Society member, declared that she too wished to participate in the hawk watch, thus Esther and Audrey decided to travel and conduct a watch together. In addition to the fall hawk watch, these two enthusiastic birders conducted a heronry count together for several years.

From that initial commitment, Esther and Audrey regularly participated for many years in the Holiday Beach hawk watch. Sadly, Audrey passed away a few years ago. Esther took a year off from the hawk watch, then returned, accompanied by Bea

Appendix A: Unpublished Scientific Information.

23. Anonymous. 1998. "Beavers reportedly returning to area". Ann Arbor News, January 18. 1 pp.

Beavers reportedly returning to area

■ DNR official says signs showing up in Washtenaw, Livingston, Oakland counties.

FROM THE ASSOCIATED PRESS

DETROIT — Gnawed trees, flooded lawns and roads. It could be only one thing.

"Beavers are back — and building without permits," said Jonathan Schechter, naturalist for Oakland County's West Bloomfield Township.

A dead beaver was found in neighboring Bloomfield Township, and chiseled trees have been spotted at Cass Lake — just a mile or two southwest of Pontiac.

"If we had one in Bloomfield Township and they're in Cass Lake, there's no doubt they're moving in," Tim Payne, district wildlife director for the Department of Natural Resources, told a Detroit newspaper recently.

Beavers also are living in Washtenaw and Livingston counties, Payne said.

But why would beavers move into Cass Lake, a well-developed area of human occupation where there is little natural shoreline?

"I think more of their habitat up north is being dwindled," said Dr. James Mangner, a veterinarian. "You go north 10 miles from here, and all that area that was remote five years ago is now suburbs. That's why there's hundreds of complaints of raccoons in people's attics — where else are they going to go?"

Michigan still has a lengthy trapping season — Dec. 1 to March 31 in the southern Lower Peninsula — to control the beaver population. But the market for beaver pelts is depressed, said Chris Normandine, a Port Huron trapper.

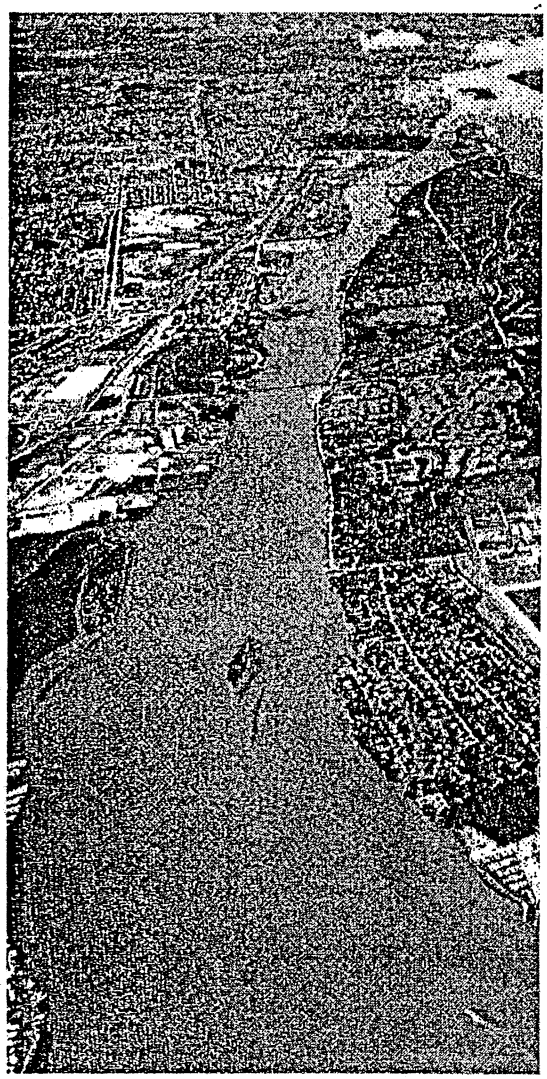
Normandine said the St. Clair County Road Commission pays him $35 for every beaver carcass he removes from road culverts. Even with the price he receives for the fur, it's barely a profitable business, he said.

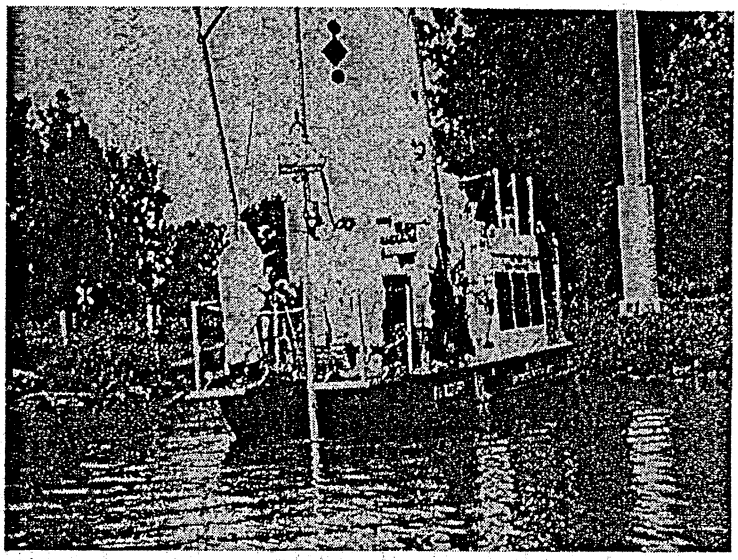
A2 News 1-18-98

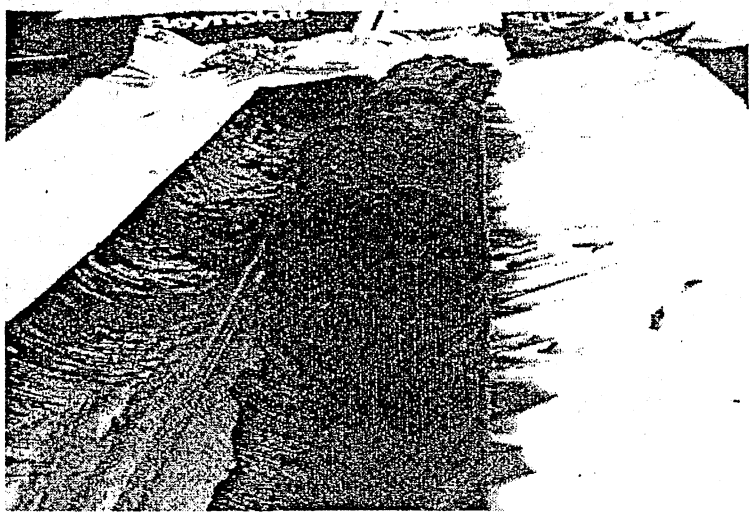
Appendix A: Unpublished Scientific Information.

24. Copy of Ostaszewski (1997) "Results of Trenton Channel Project Sediment Surveys 1993-1996". 96 pp.

Results of the Trenton Channel Project Sediment Surveys 1993-1996







July 1997

Arthur Ostaszewski
Michigan Department of Environmental Quality
Surface Water Quality Division
U.S. EPA-GLNPO Grant # GL-995960-02-0
MI/DEQ/SWQ-97/084

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ABSTRACT

The Trenton Channel of the Detroit River has been identified in several studies as containing contaminated sediments that impair beneficial uses. From 1993 to 1996, the MDEQ and USEPA surveyed depositional areas of the Trenton Channel to determine horizontal and vertical distribution of contaminated sediments. Using the Rossfelder coring unit of the USEPA-GLNPO R/V Mudpuppy along with ponar and eckman dredges, 84 stations were sampled. Results show that 6 major areas harbor the bulk of contamination, an estimated 483,000 cubic yards. They are: Allied Fuel Oil Slip, Nicholson South Slip, Firestone Steel Area, Black Lagoon, Elizabeth Park North Canal, and Elizabeth Park South Canal-Inlet. Mercury, PCBs, PAHs, Heavy Metals, and Oil and Grease are the primary parameters of concern. Contamination is concentrated on the Michigan mainland side in depositional pockets primarily of fine sand and silt.

INTRODUCTION

The Trenton Channel is a 9 mile stretch of the lower Detroit River that is bound by the Michigan mainland on its western shore, and a series of islands of which Grosse Ile is the largest on the east. The Trenton Channel is defined as beginning at a line running west northwest from the head of Fighting Island to the Michigan mainland, and continuing downstream to Celeron Island. The top half of the Trenton Channel has a defined navigational channel that is dredged periodically for commercial shipping by the U. S. Army Corp of Engineers. All dredge material is sent to the Pt. Mouillee Confined Disposal Facility. The Michigan mainland (nearshore) area of the Trenton Channel has been industrially developed with several steel mills, chemical facilities, coal-generated power plants and landfill/disposal sites. Approximately half of the facilities that once operated with discharges to the river have been either abandoned or demolished.

Several municipalities are located along the Trenton Channel including the cities of Ecorse, Wyandotte, Riverview, Trenton, and the townships of Gibralter and Grosse Ile. The industrial nature of land use along the nearshore Trenton Channel has tended toward recreation. Today, these municipalities provide a multitude of public access points on the river, including walkways, fishing piers, parks, and boat launching facilities. There are also numerous private marinas, restaurants, apartment complexes and homes that line the Channel. In 1996, a public golf course was opened on the site of a former chemical alkali/resin facility.

The Trenton Channel has been identified as harboring the majority of contaminated sediments in the Detroit River Area of Concern (Michigan Department of Environmental Quality, 1987). The Michigan Department of Environmental Quality-Surface Water Quality Division (MDEQ-SWQD) with assistance from United States Environmental Protection Agency-Great Lakes National Program Office (USEPA-GLNPO), USEPA Region 5 Office of Water (R5), USEPA Large Lakes and Rivers Research Station (LLRS) and United States Army Corps of Engineers (USACE) conducted sediment surveys of the Trenton Channel, between 1993 and 1996 to further identify sediment depositional areas and delineate contaminated sediment zones in the Trenton Channel (Figure 1. Chronology).

Contaminated sediment sites have been identified in previous surveys (Fallon and Horvath 1985, MDEQ 1987, U.S. EPA and Env. Can 1988, Geisy et.al. 1988, Farara and Burt 1993), using primarily surficial (ponar, eckman) and shallow core techniques, (Table C. Known contaminated sites identified in the Trenton Channel). The Trenton Channel Project Surveys conducted for this report concentrated on determining the vertical and horizontal extent of contamination in known contaminated areas and characterization of unsurveyed depositional zones throughout the Channel.

Sediment assessment was a major part of the overall Trenton Channel Project. The Trenton Channel Project is a cooperative project between MDEQ and USEPA with the goal of applying innovative methods and procedures for addressing sediment contamination in large river systems. Other studies of the Trenton Channel Project include measurements of resuspension potential (Lick et.al., 1995), hydroacoustic profiling (Caulfield, 1985), response of dredging activities (Besser et.al., 1996), fish contaminant monitoring (USEPA Region 5, 1996 unpublished), low-level contaminant loading estimates (Froese et.al. 1996), data archive and retrieval (USEPA-FIELDS, unpublished) (MDEQ-SWQD DARTS, unpublished), bench-scale remedial technology evaluation (MDEQ ongoing), and full-scale remedial feasibility studies (MDEQ ongoing).

METHODS

Using the USEPA-GLNPO Research Vessel (R/V) Mudpuppy, 4 inch diameter sediment cores were taken using a Rossfelder Vibracoring Unit in depositional areas encompassing the entire portion of the Trenton Channel over a 3 year period, 1993-1996, (Figure 2, Map of Sample Areas). Cores were taken to refusal. MDEQ-SWQD also collected surfical petite ponar and eckman sediment samples in certain locations inaccessible to the 32' R/V Mudpuppy. Data from Michigan State University (Besser et. al., 1996) was also used. Depositional zones were determined by reviewing historical outfall and sampling records, and presurvey reconnaissance of soft sediments (fine sand and silt) using a petite ponar dredge and/or 12 ft. PVC poles.

To address trends in surficial depositing sediments, Michigan State University (Besser et.al., 1996), collected ponar sediment samples in a dredged portion of the Channel that included clean and contaminated reference sites. In 1994 and 1996, ponar and eckman dredge samples were taken at the same reference depositional sites by MDEQ to better characterize the trend contaminant levels in undisturbed surficial sediments.

The primary suite of parameters measured for all surveys included heavy metals, PCBs and PAHs. Depending on specific survey objectives (Figure 1. Chronology), analysis for TOC, Oil and Grease, Grain-size, Acid Volatile Sulfides-Simultaneously Extractable Metals, Density, Pesticides, Base Neutral Scans, and Mass Spec-Library Searches (Appendix A. Mass Spec-Library Search Interpretations) were also conducted. All lab analyses used standard USEPA methodology or ASTM protocol as identified in the Trenton Channel Sediment Assessment Quality Assurance Project Plan, (Ostaszewski and Benzie, 1993).

For comparing the results to established levels of high contamination to aquatic life, the Effects Range Median Guidelines (ERM - Long and Morgan, 1990), as outlined in the USEPA Sediment Classification Methods Compendium (USEPA, 1992) were used. For those parameters without established ERMs, results were compared to the Ontario Ministry of the Environments Severe Effect Levels (SEL - Persaud, 1993). For the bioaccumulative parameters PCBs and Mercury, we compared results to the quantification limit (QL) as outlined by the MDEQ-Environmental Response Division Target Method Detection Limit using respective EPA Analytical methods, (Table A. Parameters and Guidelines Used to Evaluate Trenton Channel Project Sediment Results). The magnitude of exceedances for bioaccumulatives (QL) and toxics (ERM/SEL) were summed and used in identifying those sites which were the most contaminated (Table B. Classification of Contaminated Sediment Sites as applied to the Trenton Channel Project Sediment Survey Results (1993-1996)), (Graph B (a). Classification and Distribution of Trenton Channel Project Sediment Results (annotated)). Dredging volumes for "extremely" contaminated areas where estimated taking the surface area of the depositional site, and depth of QL and/or ERM/SEL exceedances. Where QL and ERM/SELs were still exceeded at bottom intervals, professional judgment was used to determine depth of contamination (rate of decline). The volumes are based on in place measurements, and do not take into account percent solids.

RESULTS

From the period 1993 to 1996, a total of 84 sediment stations were surveyed in the Trenton Channel and vicinity under the auspices of Trenton Channel Project (Figure 2. Map of Sample Areas). The sediment surveys main objectives were to delineate known contaminated areas, characterize unsampled depositional zones, and depict the range of contamination present in the system, (Appendix B. Data Results) (DARTS-Date Archive and Retrieval Transfer System Compact-Disk, SWQD).

Upper Trenton Channel - Confluence of Rouge River to Ecorse Creek
Figure 3. Upper Trenton Channel Rouge River to Ecorse Creek

The Trenton Channel starts at a line cutting across the top of Fighting Island, west northwest to the Michigan shoreline. At the upstream end, it splits briefly between Mud and Grassy Islands, former Confined Disposal Facilities (CDFs) then joins together and continues downstream between Grosse Ile and the Michigan mainland.

Areas where sediments deposit in this upper area of the Trenton Channel begin with the Allied Fuel Oil Slip and include Nicholson South Slip, the area above Mud Island CDF, and the area below Mud Island CDF. Minor depositional zones include the marinas such as the Stenson Club slips and at the mouth of the Ecorse Creek. The area immediately between the Stenson Club and Ecorse Creek has fast current velocity (>2 feet per second) and a boardwalk/park along the mainland shore.

Sediment sampling for the Trenton Channel Project began upstream of the Channel in the Allied (a.k.a. Dana) Fuel Oil Slip and Nicholson Terminal-South Boat Slip. Sediments in the upstream portion of the Upper Trenton Channel showed varied levels of contamination, with the worst contamination beginning in both the Allied and Nicholson Boat Slips and continuing downstream primarily along the Michigan mainland side.

Heavy metals were present above QL and ERM/SEL levels at both the Allied and Nicholson Boat Slips, as well as the first depositional zone accessible downstream of them, (Stenson Club slip). Metals and Organics that exceeded QL or ERM/SEL values at Allied and/or Nicholson-South are presented below:

Allied/Nicholson South Slips Maximum
Metals (ppm-dw)
Cd=35 Cr=300 Cu=630 Fe=120,000 Hg=3.0 Mn=2090 Ni=240 Pb=580 Zn=1200

Organics (ppm-dw)
PCBs=12.7 PAHs=93 Oil and Grease=71,000

Figure 4. Upper Trenton Channel PCB levels
Figure 5. Upper Trenton Channel Oil and Grease levels

Downstream at the Stenson Club, PCBs on the surface decrease to 7.2 ppm. At the mouth of Ecorse Creek levels of PCBs decreased to 3.5 ppm on the surface.

PAHs were also above ERM levels at the Allied, Nicholson, and Stetson sites. Oil and Grease levels were extremely high (42,000 - 71,000 ppm) in the Allied and Nicholson Slips. Oil and Grease levels gradually diminish downstream from those 2 sites, though continued to exceed SEL levels down past Ecorse Creek (8000 ppm) along the mainland shoreline.

The pattern of contamination in the upstream portion of the upper Trenton Channel appears to be highest at the most upstream stations and decreases downstream. The contamination is also much greater for those stations along the Michigan shoreline. Allied and Nicholson Slips have the highest levels of most contaminants. Core samples at these two freighter slips show the vertical distribution of all contaminants to be variable with no discernible pattern. Contamination was present down to the bottom of the core, 218 cm.

Downstream at the Stenson Site, levels of Cd, Cr, Fe, Mn, Ni, Zn, PCBs and Oil and Grease are highest on the surface, and decrease down through the sediments. This is very clear with PCBs at the Stenson site. PCB levels on the surface (0-30cm) were at 7.2 ppm and decrease to 7.0 ppm (30-91cm), 5.6 ppm (91-152cm), 1.3 ppm (152-213cm) and 1.5 ppm (213-224cm). PCBs were also lower with depth at the Nicholson Slip Site.

Levels of Cu, Hg and PAHs showed an increase with depth to 213cm at the Stenson site, then decreased at the 213-224 cm interval. Just offshore at the three Mud Island CDF sample sites, contaminants were much lower. ERM/SEL guidelines were exceeded only for organic contaminants. The highest level around the CDF for PCBs was 1.6 ppm. Oil and Grease (2760 ppm) and PAHs (48 ppm) were highest for the west side of the island (nearest the mainland) than on the east side (Oil and Grease=1200ppm, PAHs=18.6 ppm).

Upper Trenton-Grassy Island to Pt. Hennepin

Figure 6. Upper Trenton Channel Grassy Island to Pt. Hennepin

There are few depositional zones in the area downstream from Ecorse Creek to the Grosse Ile Toll Bridge. Areas sampled in this stretch included five samples around Grassy Island (another former CDF), off the southern tip of BASF Northworks, in a boat slip of the Wyandotte Yacht Club, in the shallow region between Grassy Island and Pt. Hennepin, and off the west side of Fighting Island (also a former CDF).

Heavy Metals exceeded QL and ERM/SEL levels only at the BASF-Lower and/or Wyandotte Yacht Club sites. The highest values are presented below:

BASF-Lower/Wyandotte Yacht Club Maximum Values
Metals (ppm-dw)
Hg=1.5 Ni=67 Pb=150 Zn=330

Organics (ppm-dw)
PCBs=3.3 PAHs=88.7 Oil and Grease=11,000

Figure 7. PCBs in the Upper Trenton Channel
Figure 8. Hg in the Upper Trenton Channel

Levels of Cd, Cr, Cu, Fe and Mn did not exceed ERM/SEL levels as did sites upstream. Heavy metals were relatively low for the sites around Grassy Island and the one site off Fighting Island. PCBs continued to be elevated above QL levels, are greater at nearshore stations, and increase with depth,. At the BASF-Lower site, PCB concentrations ranged from 1.93 ppm near the surface (0-30 cm) , 1.3 (30-91cm), 0.42 ppm (91-152cm), and non-detected at lower depths (152-213cm) and (213-218cm) in the core.

PCBs exceeded QL levels at the upper easternmost Grassy Island station (0.67 ppm), and both downstream island stations (0.43-0.41 ppm), Other sites around Grassy Island and at Fighting Island were low or below detection for PCBs. PAHs only exceeded ERM levels in buried sediments (30-213cm) at the BASF-Lower site (37.2 to 88.7 ppm). Sites at the southern end of Grassy Island showed greater levels of PAHs than others around the island. Oil and Grease exceeded SEL levels at BASF-Lower (11,000 ppm), Wyandotte Yacht Club (9000 ppm), and the two stations at the south end of Grassy Island (~~eastside=220~~ ppm, ~~westside=1900~~ ppm).

Portofino/Point Hennepin to Grosse Ile Toll Bridge

Figure 9. Upper Trenton Channel: Point Hennepin to Grosse Ile Toll Bridge

There are few depositional zones in the area between Point Hennepin downstream to the Grosse Ile Toll Bridge. The Grosse Ile side is primarily rock/rip rap, with the upper portion of the Island used formally for the landfilling of caustic soda and flyash. The mainland side is primarily concrete breakwall where the old BASF-Southworks and Pennwalt Chemical plants used to operate. The Trenton Channel Project sampled at the Portofino Restaurant Boat slip immediately above the old BASF plant, across from the Portofino Slip along the Grosse Ile shore, in the marshy area along the Grosse Ile side of the Channel above the Toll Bridge, and in the only other depositional zone in the upper Trenton, sediments off Firestone Steel/MPC (Materials Processing Corp) and Federal Marine Terminal.

Only Ni (50 ppm), Pb (288 ppm), and Zn (350 ppm) exceeded ERMs for heavy metals above the Firestone Steel site in the Trenton Channel. PCBs were non-detect along the Grosse Ile side, though a level of 1.9 ppm was recorded at the Portofino slip (0-30 cm). No sites exceeded PAH ERMs above Firestone, though Oil and Grease levels of 7000 ppm were found at the Portofino site. Levels of Oil and Grease along the Grosse Ile side ranged from non-detect to 367 ppm.

Firestone Steel Site-

The Firestone Steel site is the first large sheltered depositional area along the mainland side of the Trenton Channel downstream of Allied and Nicholson Slips. Compared with samples taken upstream, levels of contamination increase for all heavy metal parameters at the Firestone Steel site, with levels of Cd (19 ppm), Cr (260 ppm), Fe (44000 ppm), Hg (16 ppm), Ni (130 ppm) , Pb (300 ppm), and Zn (790 ppm), exceeding QL and or ERM/SEL levels. Highest concentrations generally appear on the surface, though QL, ERM/SEL levels are exceeded as far down as 152-194cm.

Firestone Steel Site Maximums
Metals (ppm-dw)
Cd=19 Cr=260 Fe=44,000 Hg=16 Ni=130 Pb=300 Zn=790

Organics (ppm-dw)
PCBs=18.4 PAHs=204 Oil and Grease=21,000

Figure 10. Cd at Firestone Steel Site
Figure 11. Hg at Firestone Steel Site
Figure 12. PCBs at Firestone Steel Site
Figure 13. Oil and Grease at Firestone Steel Site

Besides having the highest Hg (16 ppm) of any Trenton Channel Project Site, Firestone Steel also had the highest levels of PCBs (18.4 ppm), and very high levels of PAHs (204 ppm) and Oil and Grease (21000 ppm). These high levels were on the surface. All samples at all depths at the Firestone Steel site were above the QL for PCBs. PAHs appeared concentrated at the downstream end of the site. Oil and Grease levels were above SELs at the surface and at depth.

Immediately downstream of Firestone Steel is the Federal Marine Terminal (BASF Landfill) Site. Sediments off this site had levels similar to the Firestone Steel site, with elevated levels of Cd (40 ppm), Cr (500 ppm), Fe (45,000 ppm), Hg (9.9 ppm), Ni (210 ppm), Pb (352 ppm), Zn (846 ppm), PCBs (11.2 ppm), and Oil and Grease (41,200 ppm).

Federal Marine Terminal (a.k.a. Monguagon Creek-Upstream) Site Maximums
Metals (ppm-dw)
Cd=40 Cr=500 Fe=45,000 Hg=9.9 Ni=210 Pb=352 Zn=846

Organics (ppm-dw)
PCBs=11.2 Oil and Grease=41,200

Figure 14. Federal Marine Terminal / Monguagon Creek Area Cd levels
Figure 15. Federal Marine Terminal / Monguagon Creek Area Hg levels

With the exception of cadmium, the highest levels of contaminants were found below the surface at the Federal Marine Terminal site, though surfical sediments still exceeded QL and ERM/SEL levels. Cadmium at this site was the highest of the survey (40 ppm) and located in the surface core interval (0-30cm).

Middle Trenton Channel - Monguagon Creek/Gross Ile Toll Bridge to Elizabeth Park-North
Figure 16. Middle Trenton Channel: Monguagon Creek to Elizabeth Park North Canal

There are 2 sediment depositional areas in the Middle Trenton Channel. Immediately downstream of the Grosse Ile Toll Bridge at the mouth of Monguagon Creek, sediments showed similar patterns of contamination as the Federal Marine Terminal Site, with QL and ERM/SEL levels exceeded for Cd (30 ppm), Cr (456 ppm), Fe (57,000), Hg, (3.9 ppm), Ni (251 ppm), Pb (424 ppm), Zn (1200 ppm), and PCBs (12.3 ppm). The mouth of Monguagon Creek showed high levels of PAHs (218 ppm) and Oil and Grease (9000 ppm).

Monguagon Creek Area Maximums
Metals (ppm-dw)
Cd=30 Cr=456 Fe=57,000 Hg=3.9 Ni=251 Pb=424 Zn=1200

Organics (ppm-dw)
PCBs=12.3 PAHs=218 Oil and Grease=9000

Figure 17. Pb in the Federal Marine Terminal / Monguagon Creek Area.
Figure 18. Zn in the Federal Marine Terminal / Monguagon Creek Area

One small depositional pocket along the Grosse Ile shoreline, downstream and across from Monguagon Creek, did not exceed any ERM/SEL levels for heavy metals. Only PCBs (0.6 ppm) exceeded QL levels.

Black Lagoon-
Downstream from the Monguagon Creek area, running the length of McLouth Steel-Trenton, the Trenton Channel constricts and no depositional zones exist for approximately 1 mile. Black Lagoon is a depositional zone below the former McLouth Steel-Trenton Plant (closed 1995). Sediments have historically been found to exceed QL and ERM/SEL levels (Pranckevicius, P.E. 1987, USEPA 1988, Farara and Burt 1993, MDEQ 1995). The Trenton Channel Project Sediment Surveys defined the horizontal and vertical extent of contamination in the Black Lagoon area. Metal levels of Cd (30 ppm), Cr (418), Fe (137,000 ppm), Hg (11.0 ppm), Mn (2060 ppm), Ni (206 ppm), Pb (547 ppm), and Zn (3320 ppm) all exceeded QL and ERM/SEL levels. Organic contaminants such as PCBs (6.5 ppm), PAHs (70.5 ppm), and Oil and Grease (19700 ppm) also exceeded QL and ERM/SEL levels.

Black Lagoon Maximums
Metals (ppm-dw)
Cd=30 Cr=418 Fe=137,000 Hg=11 Mn=2060 Ni=206 Pb=547 Zn=3320

Organics (ppm-dw)
PCBs=6.5 PAHs=70.5 Oil and Grease=19700

Figure 19. Black Lagoon Hg levels
Figure 20. Black Lagoon Zn levels
Figure 21. Black Lagoon Oil and Grease levels

Downstream of Black Lagoon there are only small pockets where sediments can deposit, due to the current velocity of the Trenton Channel and straight shoreline contour.

Approximately 300 feet downstream from Black Lagoon, a small depositional zone located at the foot of Riverside Hospital did not exceed heavy metal ERM/SEL levels except for Pb (130 ppm) and Zn (738 ppm). No exceedances were found for any organic parameter. Approximately 800 feet downstream from Black Lagoon, at a site along the mainland shore at the foot of the Trenton Towers Apartments, heavy metals exceeded QL and ERM/SEL levels for Cd (10 ppm), Cr (220 ppm), Fe (52, 000 ppm), Hg (6.4 ppm), Ni (88 ppm), Pb (261 ppm), and Zn (945 ppm). No Organic parameters exceeded QL or ERM/SEL levels. The area itself is very small (approximately 30 cu yards).

Trenton Towers Maximums
Metals (ppm-dw)
Cd=10 Cr=220 Fe=52,000 Hg=6.4 Ni=88 Pb=261 Zn=945

Organics (ppm-dw)
None

Figure 22. Trenton Towers Hg levels

Lower Trenton Channel: Elizabeth Park North to Celeron Island

Figure 23. Lower Trenton Channel: Elizabeth Park North Canal to Celeron Island

Downstream of the Trenton Towers, homes, marinas, and boat launches dot the mainland shoreline until the beginning of Elizabeth Park. Elizabeth Park is a 500 acre municipal park administered by the Wayne County Parks Department. It is actually an island, with a canal running the length of it. At the north end of the park a depositional zone known as Elizabeth Park-North Canal is located. Elizabeth Park-North Canal is bound by a Mobil Oil Terminal to the north, and the park itself on the South. The Trenton Channel flows to the east, and the canal constricts to pass around the island on the west.

Just upstream of the Mobil Oil Terminal, sediments were sampled in a small cove. Only Zn (683 ppm) exceeded ERM levels. No other metals or organics exceeded QL or ERM/ SEL levels. In Elizabeth Park-North Canal, Cd (15 ppm), Cr (270 ppm), Fe (48700 ppm), Hg (7.4 ppm), Ni (100 ppm), Pb (279 ppm), and Zn (842 ppm) exceeded ERM/SEL levels. Organics also exceed QL and ERM/SEL levels for PCBs (10.3 ppm), PAHs (57 ppm), and Oil and Grease (26,200 ppm).

Elizabeth Park-North Canal (EPNC) Maximums
Metals (ppm-dw)
Cd=15 Cr=270 Fe=48,700 Hg=7.4 Ni=100 Pb=279 Zn=842

Organics (ppm-dw)
PCBs=10.3 PAHs=57 Oil and Grease=26,200

Figure 24. EPNC Hg levels
Figure 25. EPNC PCB levels
Figure 26. EPNC PAH levels

With the exception of PAHs, levels of contamination were highest on the surface. Other contaminants decreased with depth down to 330 cm. At the eastern end of the Elizabeth Park-North Canal depositional zone, contaminants exceeded ERM levels for only Pb (129 ppm) and Zn (795 ppm), with no exceedances for organics.

Continuing along the canal, there are 5 small public bridges which cross its upper half. These bridges attach the park to the mainland. Surficial sediments were collected behind each bridge. Exceedances of QL and ERM/SEL levels are outlined as follows:

Bridge (Upstream to Downstream)
All values above ERM/SEL (ppm d.w.)

EPC-1					Pb=129	Zn=795	
EPC-2 no exceedances							
EPC-3			Hg=1.7		Pb=137	Zn=750	
EPC-4	Cr=146	Fe=43,000		Ni=75	Pb=189	Zn=870	PCBs=5.5
EPC-5	Cd=9.9	Fe=43,000			Pb=187	Zn=1020	PCBs=0.8

Downstream of EPC-2, there is an increase in contamination in the sediments. PCBs are found in the canal only below the area where dredge spoils from the Elizabeth Park Marina excavation were land deposited (EPC-4, Bridge 4).

Along the Trenton Channel length of Elizabeth Park, downstream of the Mobil Oil/North Canal area, there is rock riprap and no further area of deposition until the Elizabeth Park Marina. In 1993, a portion of the nearshore Trenton Channel along with a portion of upland area was dredged/excavated to build a 50 slip boat marina for the park. Being secluded from strong current and wave action and once having upland soils, the Trenton Channel Project used this marina as a study site to determine the quality of sediments depositing on the surface in the Lower Trenton Channel. In 1993, initial sediment chemistry, benthic community and toxicity were measured in relation to reference sites in the Trenton Channel, (Besser, 1996). Subsequent sediment chemistry sampling in 1994 and 1996 has tentatively shown levels of surficial contaminants decreasing, with Cd, Cr, PCBs, and PAHs falling below QL and ERM/SEL levels. Other heavy metal contaminant levels also fell in 1996 but continued to exceeded QL and ERM/SEL levels in the Marina for Fe (45,000 ppm), Hg (3.8 ppm), Ni (68 ppm), Pb (153 ppm), and Zn (782 ppm). (1997 MDEQ-SWQD, ongoing).

Elizabeth Park Marina 1996 Surface ERM/SEL Exceedances
Metals (ppm-dw)
Fe=45,000 Hg=3.8 Ni=68 Pb=153 Zn=782

Figure 27. Elizabeth Park Marina Zn levels

A station across the Marina on the Grosse Ile side of the channel had no QL and or ERM/SEL exceedances of any parameter.

Downstream of Elizabeth Park Marina and the Grosse Ile "Free" Bridge, the Detroit Edison-Trenton Coal Fired Power Plant dominates the mainland shoreline. The next zones of deposition occur in the south end of Elizabeth Park Canal and in sheltered areas along Monsanto Chemical Property.

QL and ERM/SEL sediment level exceedance in this region are concentrated primarily around the Monsanto Chemical Property. At the south end of Elizabeth Park Canal before it re-enters the Trenton Channel, at the foot of Monsanto's northern most outfall, heavy metals Cd (13 ppm), Cr (205 ppm), Fe (58,900 ppm), Hg (1.6 ppm), Pb (272 ppm), and Zn (1010 ppm) exceeded ERM/SEL levels. PCBs (0.8 ppm) were also above the ERM.

Monsanto Outfall (a.k.a. EPSC dock) Surface ERM/SEL Exceedances
Metals (ppm-dw)
Cd=13 Cr=205 Fe=58,000 Hg=1.6 Pb=272 Zn=1010

Organics (ppm-dw)
PCBs=0.8

Figure 28. EPSC Area Hg levels
Figure 29. EPSC Area Zn levels

Just downstream of where Elizabeth Park South Canal rejoins the Trenton Channel, Monsanto has an abandoned water intake inlet/slip. Contaminants in this inlet exceeded QL and ERM/SEL levels for Cd (13 ppm), Cr (225 ppm), Fe (82,700 ppm), Hg (5.1 ppm), Ni (102 ppm), Pb (347 ppm), Zn (1200 ppm), PCBs (2.4 ppm), PAHs (35 ppm), and Oil and Grease (10,000 ppm). The intake appears to have a solid base at approximately 88cm below the surface.

Elizabeth Park South Canal-Inlet: QL and ERM/SEL Exceedances
Metals (ppm-dw)
Cd=13 Cr=225 Fe=82,700 Hg=5.1 Ni=102 Pb=347 Zn=1200

Organics (ppm-dw)
PCBs=2.4 PAHs=35 Oil and Grease=10,000

Monsanto also has several lagoons along the nearshore bank, including one which is accessible from the Trenton Channel by boat. In the southern most lagoon, Cd (16 ppm), Cr (193 ppm), Fe (80200 ppm), Hg (3.9 ppm), Ni (89 ppm), Pb (246 ppm), Zn (996 ppm), and PCBs (0.9 ppm) exceeded QL and ERM/SEL levels.

Monsanto Lagoon ERM/SEL Exceedances
Metals (ppm-dw)
Cd=16 Cr=193 Fe=80,200 Hg=3.9 Ni=89 Pb=246 Zn=996

Organics (ppm-dw)
PCBs=0.9

Figure 30. Lower Trenton PCB levels
Figure 31. Lower Trenton Pb levels

In the Trenton Channel on the downstream side of the Monsanto Lagoons, along the Michigan mainland and in the vicinity of a Chrysler outfall, levels of Cr (150 ppm), Fe (66300 ppm), Hg (3.9 ppm), Ni (71 ppm), Pb (222 ppm), Zn (701 ppm), PCBs (2.4 ppm), and Oil and Grease (3010) exceed QL and ERM/SEL levels.

Sites sampled at the upper-inner end of Chrysler Bay, downstream of the Chrysler outfall, had exceedances for Fe (55,200 ppm), Ni (56 ppm), Zn (765 ppm), PCBs (1.4 ppm), and Oil and Grease (2000 ppm). This site also had high TOC (30.7%). Furthermore downstream in the bay, Ni (54 ppm), and Zn (661 ppm) exceeded ERMs at the site above Humbug Marina.

For the most downstream station along the Grosse Ile side of the Trenton Channel, at the north end of Swan Island, no QL or ERM/SEL exceedances occurred. The most downstream sediment site of the surveys was the middle bay of Celeron Island. Celeron Island is located at the fringe of Lake Erie, in the middle of the channel. Sediments here showed high % TOC and no QL or ERM/SEL exceedances.

DISCUSSION

As identified in the 1985 Upper Great Lakes Connecting Channel Studies (U.S. EPA, 1988), sediment contamination in the Trenton continues to show a distinct gradient across the channel. Contamination is primarily present only along the Michigan mainland shore where depositional areas exist. The Allied Fuel Oil Slip and Nicholson South Slip mark the beginning of sediment contamination in the Trenton Channel. Levels in these two areas are much higher than those in immediate depositional zones downstream. Organic contaminants PCBs and Oil and Grease show a distinct decreasing trend of contamination from upstream (Allied/Nicholson) down to Wyandotte Yacht Club (3.5 miles).

Downstream of the Ecorse Creek mouth and out from shore lies the closed CDF (now a National Wildlife Refuge), Grassy Island. The contaminants Hg, PAHs and O&G are elevated at the south end of Grassy Island compared to north and west island sites. The closed CDF is currently the subject of study, (Manny, 1997).

There is no major depositional area along the Michigan Mainland shore from the Wyandotte Yacht Club to the site of the former Firestone Steel, now operating as the warehouse of Materials Processing Corp (MPC), a distance of 2.5 miles. A substantial increase in contamination begins at Firestone Steel and continues downstream to Monguagon Creek. The Firestone Steel Area is a large depositional area of heavy metals, PCBs, Hg, and Oil and Grease. Highest concentrations are found primarily on the surface, suggesting recent or continuing sources. The depositional area continuing downstream of Firestone Steel shows extreme contamination though less elevated, with the highest contamination found primarily below the surface, though surficial concentrations also exceeding QL and ERM/SEL levels.

Cadmium levels were generally low upstream of Firestone Steel (non-detect to 13 ppm). Just downstream of Firestone Steel at the Federal Marine Terminal station, levels increase to 40 ppm and were found highest on the surface. Cadmium levels continue to be predominantly higher on the surface and decrease downstream from the Federal Marine Terminal Area to Lake Erie.

The distribution of contaminants (2-4 DTP) from Monguagon Creek to the Lower Trenton Channel and Lake Erie has been well documented (Carter and Hites, 1992). In Trenton Channel Project sediments surveys, the mouth of Monguagon Creek had increased levels of PAHs and Oil and Grease compared to surrounding sites. Monguagon Creek is now in the process of remediation (Conestoga, 1996). This action will prevent Monguagon Creek from further being a primary source of PAHs and Oil and Grease to the sediments of the Lower Trenton Channel. The size of the large contaminated zone in the middle Trenton extends from Firestone Steel to the Upper McLouth Property, encompassing the Federal Marine Terminal site and mouth of Monguagon Creek.

The swift laminar current in the Trenton Channel has kept sediment contamination in a tight lens along the Michigan mainland and has also kept it from crossing over to the Grosse Ile side. Transect sediment core sampling (3 stations-nearshore, midshore, offshore) across from the upper property area of McLouth Steel shows the contamination to be in a band extending from the mainland to the west bank of the navigation channel, basically hugging the shore. The highest contaminant levels in this area downstream of Monguagon creek are found now in a lens hugging the mainland shore with the greatest concentrations below surficial layered sediments.

Downstream of Monguagon Creek, the next area of contamination is below the former McLouth Steel-Trenton facility, the depositional area known as Black Lagoon. Our sediment surveys have determined that contamination in Black Lagoon is bound by the shoreline and a shoal area. Depth of contamination extends to approximately 230cm, where clean native clays are found. The surficial sediments of Black Lagoon have been surveyed for over 10 years. Contamination on the surface has decreased, though still above ERM/SEL levels. The cause of this decrease is most likely due to resuspension of sediments and subsequent redeposition of new material (thus dilution).

Horizontally, contaminant distribution in Black Lagoon is bound on the north, west and south by the shoreline. To the east of Black Lagoon, a shoal runs the length of the depositional zone with the effect of creating a quasi-breakwall. Levels of contamination along the shoal did not exceed any QL or ERM/SEL for either metals or organics. The shoreline and the shoal effectively bound the contaminated area of Black Lagoon.

Vertically, contamination varied within Black Lagoon. Sample sites located deeper in the lagoon generally had the greatest level of contaminants buried at depths from 30 to 210 cm. Samples in the south region had higher contamination on the surface. Below 210cm, contaminant levels did not exceed QL or ERM/SEL levels except for Hg (1.4 ppm) and Oil and Grease (2970 ppm). The estimated volume of contaminated sediments in Black Lagoon is 20,000 cu. yards.

Downstream of Black Lagoon, the next major depositional area is Elizabeth Park North Canal. Elizabeth Park North Canal is a contaminated depositional zone bound by the shoreline to the north, east and south. Deposition is bound to the east by the flow velocity and scour of the Trenton Channel. Contamination was primarily greatest on the surface at this site, though extended below 330 cm. Surficial samples from 1996 were generally less contaminated than surficial core samples collected in 1993 and 1994 at Elizabeth Park North Canal. Highest PAHs levels (57 ppm) were found buried in cores.

At Elizabeth Park Marina, 3 years of surficial sediment sampling show depositional rates in the lower Trenton to be on the order 1-3 cm/yr. (Kreis, 1996). Surficial contaminant levels have declined but still exceeded QL and ERM/SEL levels for Fe, Hg, Ni. Pb, and Zn in the Marina.

Below Elizabeth Park Marina and the Grosse Ile "Free" Bridge, the Trenton Channel begins to widen and velocities decrease. Several islands dot this area as it opens up to Lake Erie. Wind and waves play a predominant role in moving the sediments. Sand predominates in this region in contrast to silt in upstream sheltered areas. The Lower Trenton is a dynamic area with waves reaching much higher peak heights than upstream. It is also more prevalent to partial reverse flow seiche effects from Lake Erie that happen with sustained east winds (Quinn, 1976).

At Celeron Island, Pb was found highest on the surface. Also, Hg and PAHs were found only on the surface interval of sediment cores and not detected below the surface. Resuspension of upstream contaminants are one of the mechanisms of how contaminants relocate to the Western Basin of Lake Erie (Schloesser, 1995).

Conclusions-

In two separate prioritization rankings of contaminated sediment sites in the Trenton Channel and Detroit River, the Firestone/Monguagon/McLouth area, along with Black Lagoon and Elizabeth Park North Canal ranked "Severely Contaminated" (Kreis, 1989) and "Severely Contaminated and Impacted" (Farara and Burt, 1993). These areas had exhibited degraded bethos, high toxicity, and exceed highly polluted sediment guidelines. These and other previous sediment sites studied compare well to Trenton Channel Project sediment results. (Table C. Known contaminated sites identified in the Trenton Channel with Comparisons to 1993-1996 Sampling Results).

The results of the Trenton Channel Project sediments sampling 1993-1996 has led to the conclusion that six major depositional areas are extremely contaminated in the Trenton Channel. Several minor areas are also extremely contaminated. Due to current velocity and navigational channel morphology, these depositional zones are horizontally defined in the Trenton Channel. Core sampling and/or hydroacoustic profiling (Caulfield, 1995) has determined the depth of contamination in these zones.

The six major depositional zones are, (with estimated volumes* CY=cubic yards):

Site	Surface Area (yards)	Depth of Contamination* (yards)	Volume
Allied Fuel Oil Slip	730x120	2.75	241,000 CY
Nicholson Terminal South Slip	365x85	2.75	85,000 CY
Firestone Steel Area-primary	42x530	2.75	61,200 CY
Area in front of Monguagon Creek-secondary	42x660	2.10	58,000 CY
Black Lagoon	50x150	2.75	20,600 CY
Elizabeth Park North Canal	65x65	3.80	16,000 CY
Elizabeth Park South Canal	75x12	1.25	1100 CY
Total			483,000 CY

* Where QL or ERM/SELs were still exceeded at bottom intervals, professional judgment was used to determine depth of contamination. Note-these volumes are based on in place measurements, and do not take into account % solids.

Smaller depositional zones (<1000 CY) that are extremely contaminated include:

Site	Surface Area (yards)	Depth of Contamination* (yards)	Volume
Stenson Club	15x20	2.75	825 CY
Trenton Towers	10x10	0.30	30 CY
Total			855 CY

Sediment QL and ERM/SEL exceedances in these zones (and throughout the study area) were predominantly found only on the grain size of sediments consisting of fine sands or silt. Native clay lines the sides and bottom of the Channel. This was observed at the base of several cores in contaminated areas (Black Lagoon, Elizabeth Park North Canal), on our anchors during sampling near the navigational channel, and during hydroacoustic profiling (strong signal reflectivity). The clays are non contaminated and appear to make a suitable physical cleanup standard for future remediation.

The east shore of the Trenton Channel along Grosse Ile is relatively free of contamination. The depositional areas along the Michigan mainland shore that exceed QL and ERM/SEL sediment guidelines contain the largest mass of contaminants in the Detroit River AOC (Detroit River RAP Biennial Report, 1995). These sediments present the most likely route of bioaccumulative and toxic contaminant exposure to biota and the ecosystem.

With assessment complete, the focus of the Trenton Channel Project now shifts towards remediation. The next steps include examining remedial options for the six zones of the Trenton Channel determined to be extremely contaminated. With the Sediment Treatability Study nearing completion (Snell Environmental and MDEQ-SWQD, 1996), the feasibility of applying treatment technologies will be investigated alongside more conventional disposal techniques.

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TABLE A. Parameters and Guideline Levels Used to Evaluate Trenton Channel Project Sediment Results.

Bioaccumulative Parameters	Symbol	QL (ppm d.w.)	Note
Mercury	Hg	0.1	EPA Method 245.1/7470.7471
Polychlorinated Biphenols	PCBs	0.33	EPA Method 608/8081

Toxic Parameters		Aquatic Life Guidelines (ppm d.w.)		
Parameter	Symbol	ERM	SEL	Note
Arsenic	As	85		
Cadmium	Cd	9.6		
Chromium	Cr	145		
Copper	Cu	390		
Iron	Fe		40000	
Nickel	Ni	50		
Manganese	Mn		1100	
Lead	Pb	110		
Zinc	Zn	270		
Oil and Grease	O&G		1500	
Polyaromatic Hydrocarbons	PAHs	35		Sum of 12 PAH's

TABLE B. Classifications of Contaminated Sediment Sites as applied to the Trenton Channel Project Sediment Survey Results (1993-1996).

Not Impacted

Summed Toxic ERM/SEL and Bioaccumulative QL exeedances less than one, (<1)

Impacted

Summed Toxic ERM/SEL and Bioaccumulative QL exeedances between 1 and 15

Moderately Impacted

Summed Toxic ERM/SEL and Bioaccumulative QL exeedances between 15 and 30

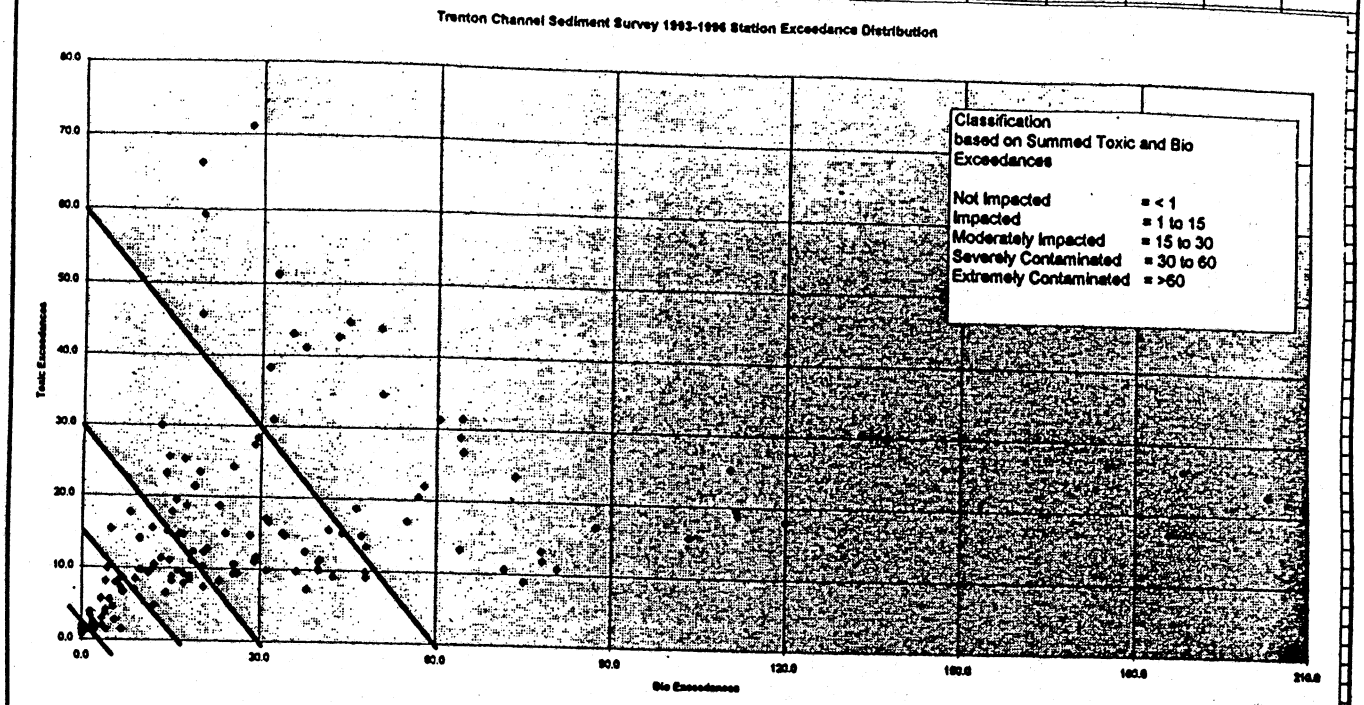
Severely Contaminated

Summed Toxic ERM/SEL and Bioaccumulative QL exeedances between 30 and 60

Extremely Contaminated

Summed Toxic ERM/SEL and Bioaccumulative QL exceedances greater than sixty, (> 60)

Graph B. Classification and Distribution of Trenton Channel Project Sediment Results.



Graph B (a). Classification and Distribution of Trenton Channel Project Sediment Results (annotated).

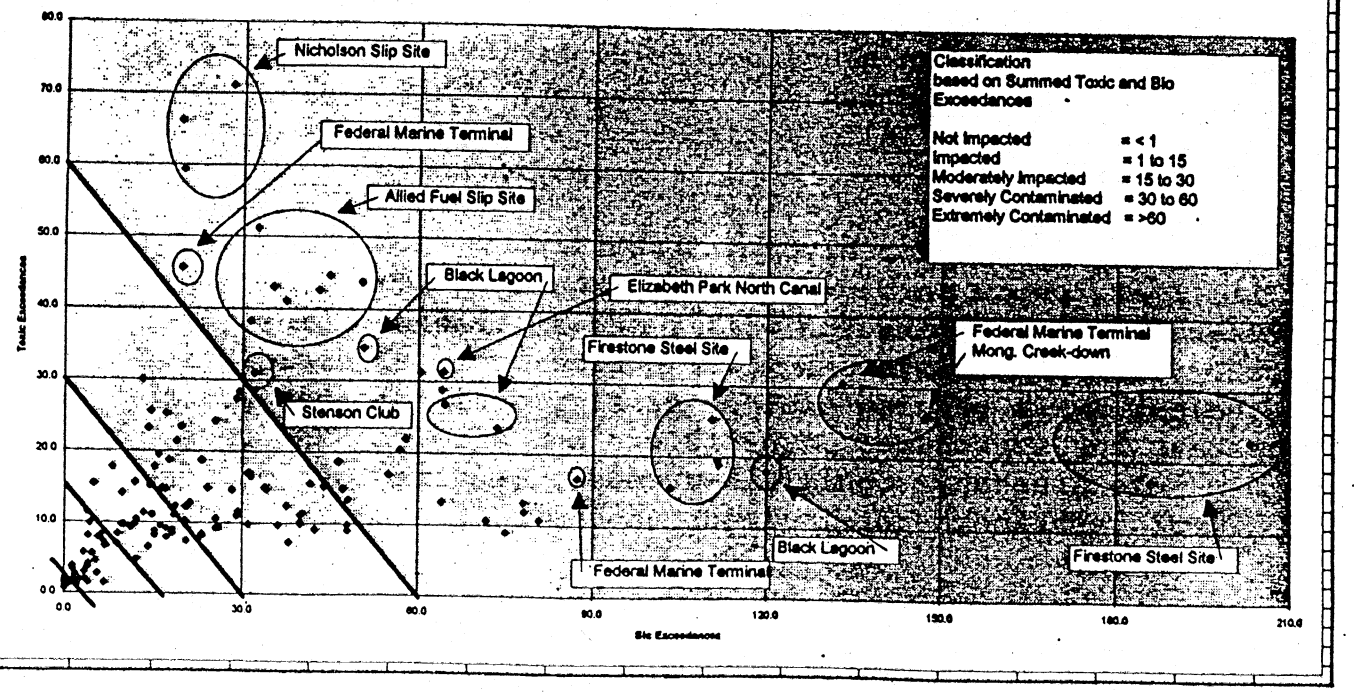


TABLE C.

Known Contaminated Sites Identified the Trenton Channel with Comparisons to 1993-1996 Sampling Results

	Fallon and Horvath , 1983		
	Criteria:	Sediment Chemistry	1993-1996 Trenton Channel Project Classification
Location	Results		Criteria: Sediment Guideline Exceedances (see Table B. Classification of Sites)
Mud Island	First Priority Station		Impacted
Upper Grassy Island	First Priority Station		Impacted
Pt. Hennepin	First Priority Station		Impacted
Elizabeth Park North Canal	First Priority Station		Extremely Contaminated
Stag Island	First Priority Station		Impacted
Swan Island	First Priority Station		Impacted
East Celeron Island	First Priority Station		Impacted
Gibralter Bay	First Priority Station		Not Specifically Sampled

	Rosiu, Giesy and Kreis, 1989		
	Criteria:	C. tentans Bioassay	
Location	Results		1993-1996 Trenton Channel Project Classification
Wyandotte	> 25 % reduction in weight: Bioassay		Not specifically Sampled, areas nearby were Severely Contaminated
Pt. Hennepin	> 25 % reduction in weight: Bioassay		Impacted
Monguagon Creek Mouth	> 25 % reduction in weight: Bioassay		Extremely Contaminated
North Marsh Area	> 25 % reduction in weight: Bioassay		Impacted
Black Lagoon	> 25 % reduction in weight: Bioassay		Extremely Contaminated
Chrysler Bay Outer	> 25 % reduction in weight: Bioassay		Extremely Contaminated
Gibralter Bay	> 25 % reduction in weight: Bioassay		Not Specifically Sampled
Lake Erie State Park	> 25 % reduction in weight: Bioassay		Not Specifically Sampled

	Kreis, 1989		
	Criteria:	Sediment Chemistry, Toxicity, Resuspension Potential, Mutagenicity	
Location	Results		1993-1996 Trenton Channel Project Classification
Firestone Steel	Severe Degradation		Extremely Contaminated
Above Monguagon Creek	Severe Degradation		Extremely Contaminated
Monguagon Creek	Severe Degradation		Extremely Contaminated
Below Monguagon Cr	Severe Degradation		Extremely Contaminated
Black Lagoon	Severe Degradation		Extremely Contaminated
Trenton Towers	Severe Degradation		Extremely Contaminated
Deadhead cove	Severe Degradation		Impacted
Elizabeth Park North Canal	Severe Degradation		Extremely Contaminated

	Farara and Burt , 1993		
	Criteria:	Sediment Chemistry, Benthic Communities	
Location	Results		1993-1996 Trenton Channel Project Classification
Off Great Lakes Steel	Severely Impacted		Site is not significantly depositional, nearby sites=Extremely Contaminat
Off E.C. Levy	Severely Impacted		Site is not significantly depositional, nearby sites=Extremely Contaminat
Ecorse River Mouth	Severely Impacted		Moderately Contaminated
Downstream of Ecorse River mouth	Severely Impacted		Site is not significantly depositional, nearby sites=Extremely Contaminat
Wyandotte	Severely Impacted		Site is not significantly depositional, nearby sites=Extremely Contaminat
Firestone Steel	Severely Impacted		Extremely Contaminated
Downstream of Monguagon Creek	Severely Impacted		Extremely Contaminated
Black Lagoon	Severely Impacted		Extremely Contaminated
Across Channel from McLouth Steel	Severely Impacted		Impacted
Monsanto Bay	Severely Impacted		Severely Contaminated
East of Horse Island	Severely Impacted		Not Sampled, Lake Erie

Newly Identified Extremely Contaminated Sediment Sites in the Trenton Channel

	1993-1996 Trenton Channel Project	
	Criteria:	Sediment Guideline Exceedances (see figure B. Classification of Sites)
Location		
Allied Fuel Oil Slip	Extremely Contaminated	
Nicholson South Slip	Extremely Contaminated	
Stenson Club	Extremely Contaminated	
Trenton Towers	Extremely Contaminated	
Elizabeth Park Marina	Extremely Contaminated	
Elizabeth Park South Canal	Extremely Contaminated	

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1996 (Table B:)
Not-Impacted <1 < Impacted < 15 < Moderately Impacted < 30 < Severely Contaminated < 60 < Extremely Contaminated

Figure 1. Trenton Channel Project: Sediment Survey Chronology

October 1993 (GLNPO/SWQD/UCSB)

Primary Objectives	Vertical and horizontal hotspot delineation
	Contaminant distribution in Lower TC
Secondary Objectives	Resuspension measurements

November 1993 (GLNPO/SWQD/MSU)

Primary Objective	Elizabeth Park Marina study

April 1994 (GLNPO/LLRS/SWQD)

Primary Objective	Vertical and horizontal hotspot delineation
Secondary Objective	Baseline data for hydroacoustic profiling

May 1994 (SWQD)

Primary Objective	Surficial contaminant distribution in mid and lower Trenton Channel

June 1994 (GLNPO/LLRS/SWQD)

Primary Objective	Hydroacoustic profiling-Trenton Channel (Caulfield Eng.)

November 1994 (SWQD)

Primary Objective	Elizabeth Park Marina surfical contaminant trends

April 1996 (LLRS)

Primary objective	Elizabeth Park Marina depositional rates

May 1996 (GLNPO/SWQD)

Primary Objective	Hotspot delineation and characterization of Upper TC Sediments
Secondary Objective	Support of Grassy Island NWR study

June 1996 (SWQD)

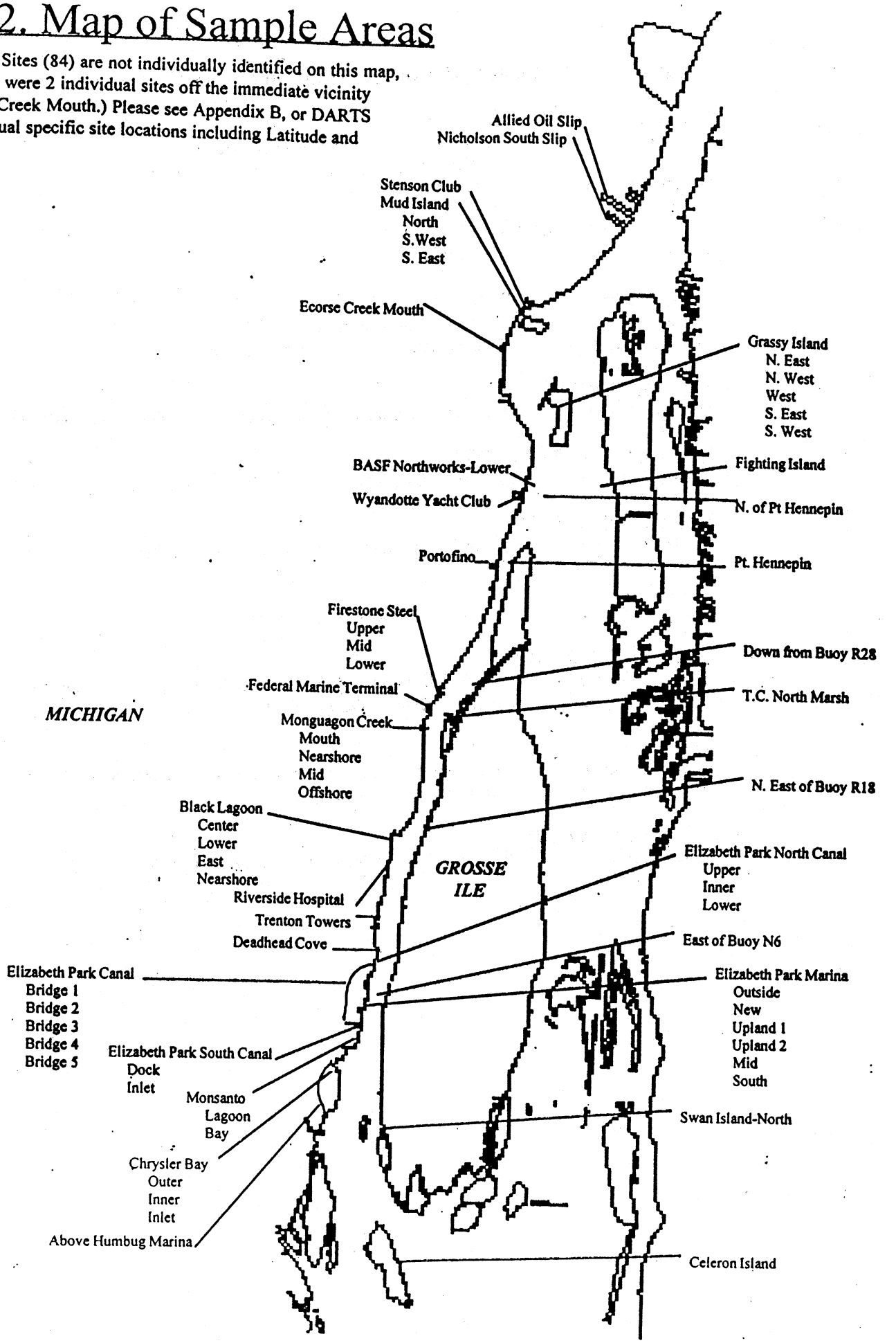
Primary Objectives	Ponar sediment sampling at tributaries to the Detroit River
	Confirmation of RAP hotspots

December 1996 (SWQD)

Primary Objective	Elizabeth Park Marina surfical contaminant trends

Figure 2. Map of Sample Areas

Note- All Sample Sites (84) are not individually identified on this map, (i.e... there were 2 individual sites off the immediate vicinity of Ecorse Creek Mouth.) Please see Appendix B, or DARTS for individual specific site locations including Latitude and Longitude.



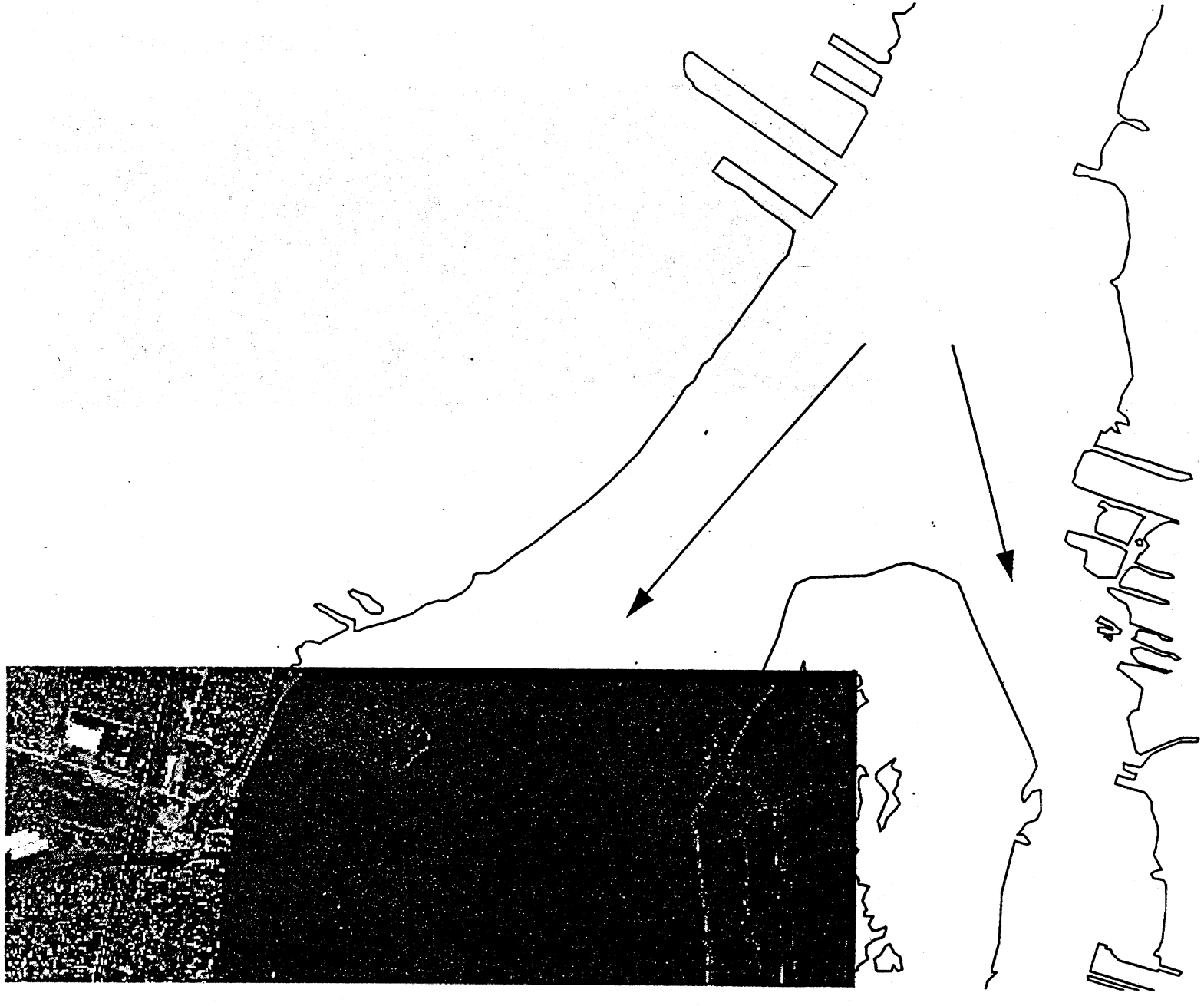


Figure 3. Upper Trenton Channel
Rouge River to Ecorse Creek

TOTAL PCBS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

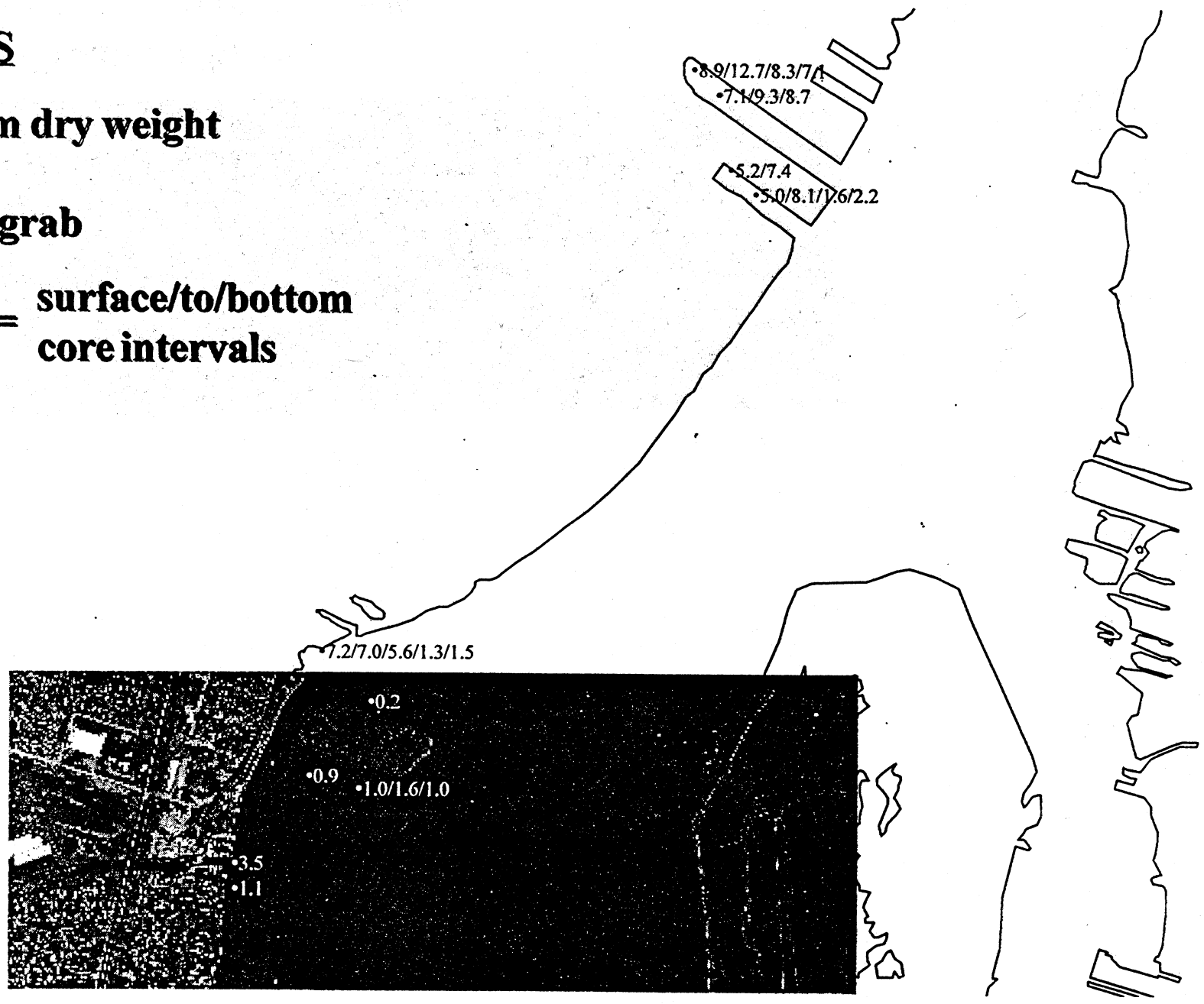


Figure 4. Upper Trenton Channel
Rouge River to EcorseCreek

OIL and GREASE

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

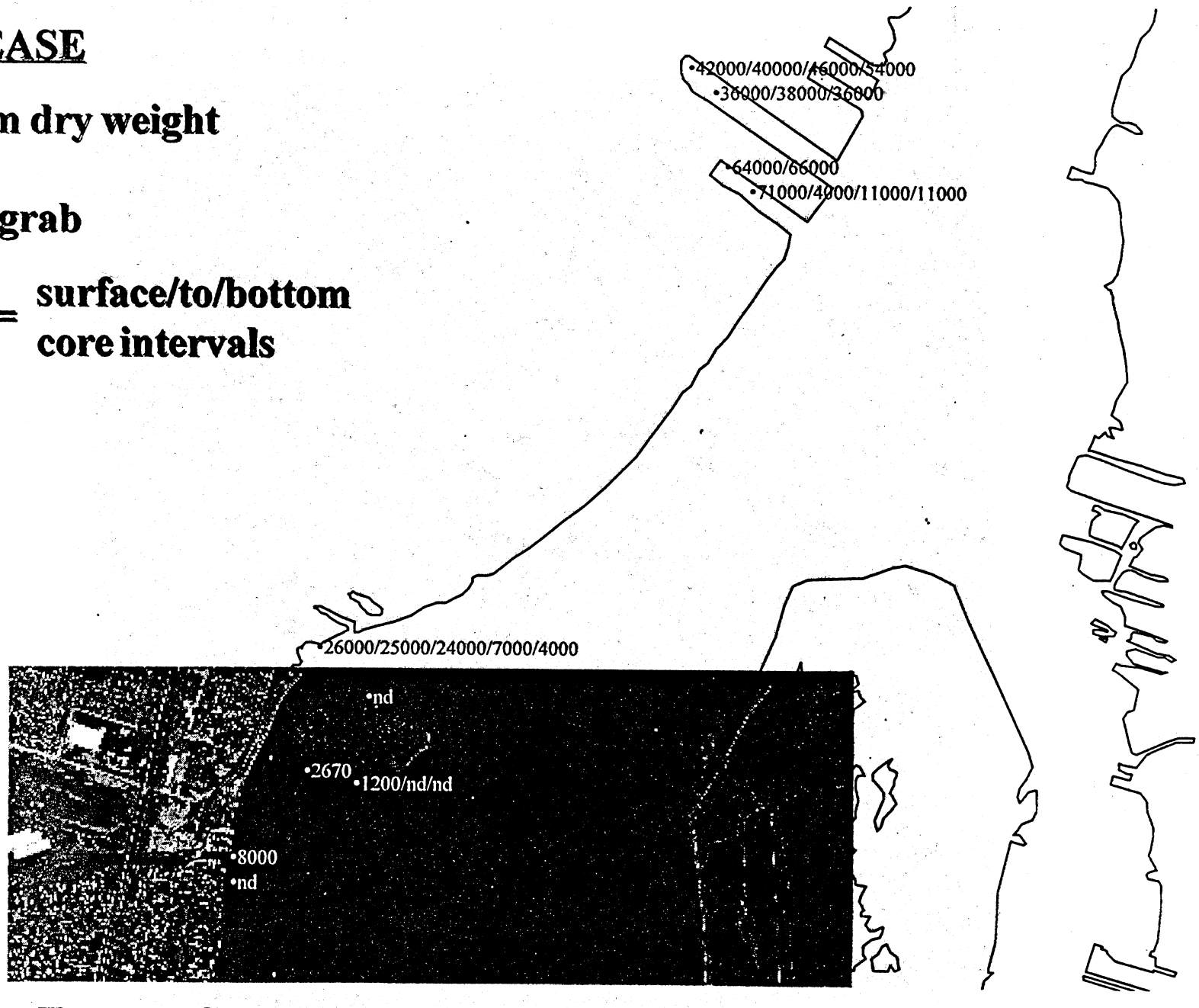


Figure 5. Upper Trenton Channel
Rouge River to EcorseCreek

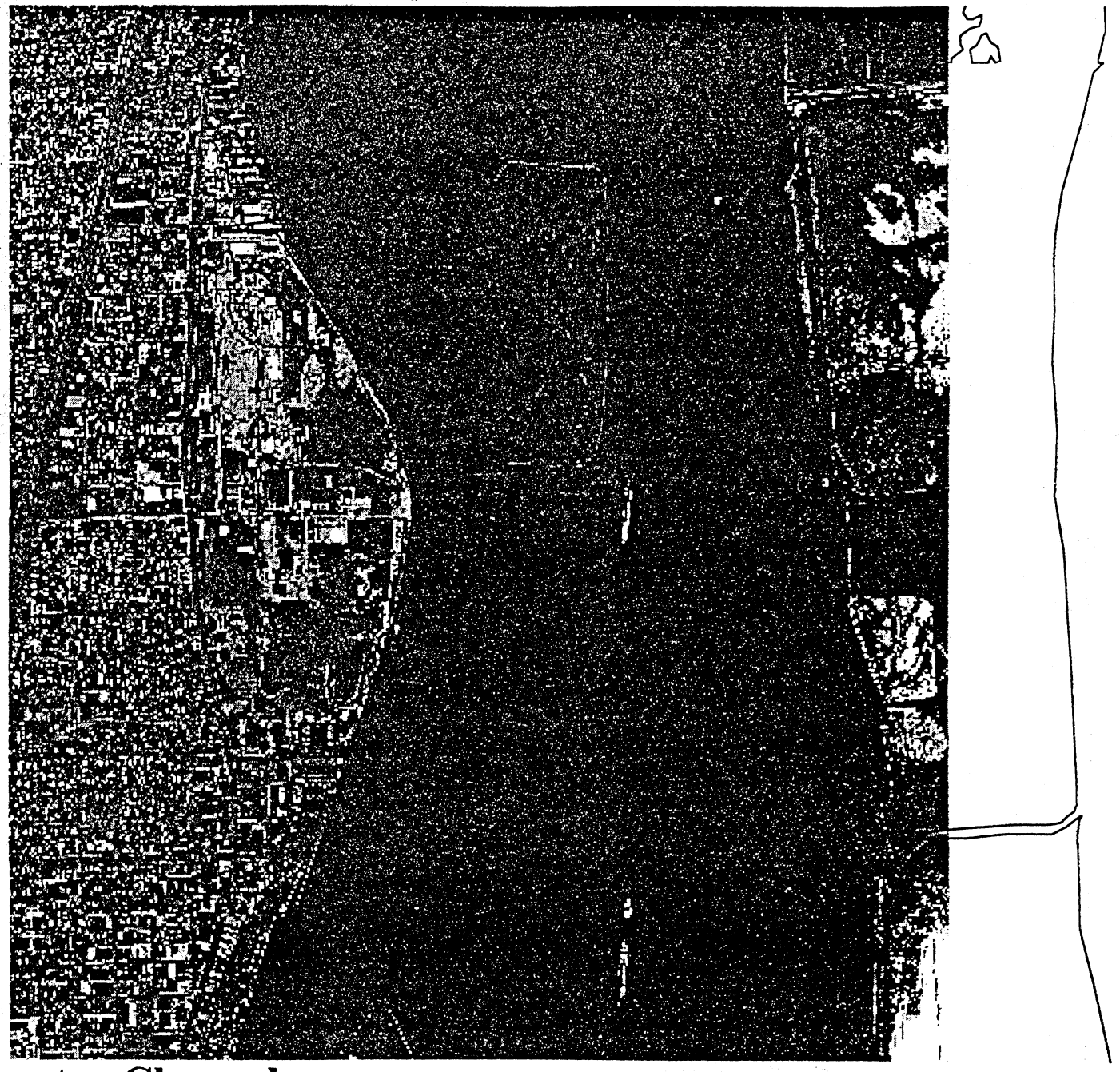


Figure 6. Upper Trenton Channel
Grassy Island toPt. Hennepin

TOTAL PCBS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

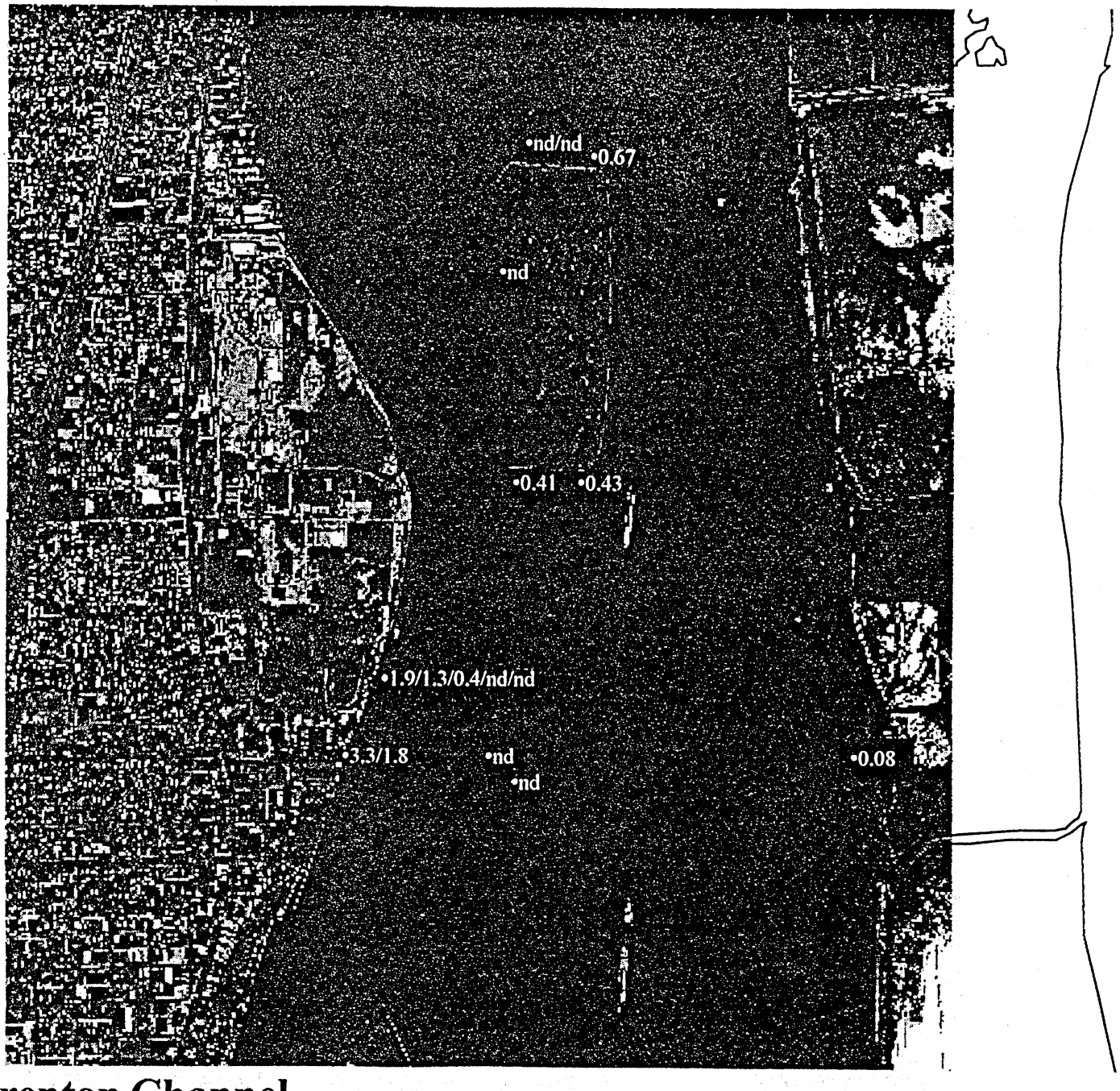


Figure 7. Upper Trenton Channel Grassy Island toPt. Hennepin

MERCURY

all values ppm
dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 =
surface/to/bottom
core intervals

Figure 8. Upper Trenton Channel
Grassy Island to Ft. Hennepin

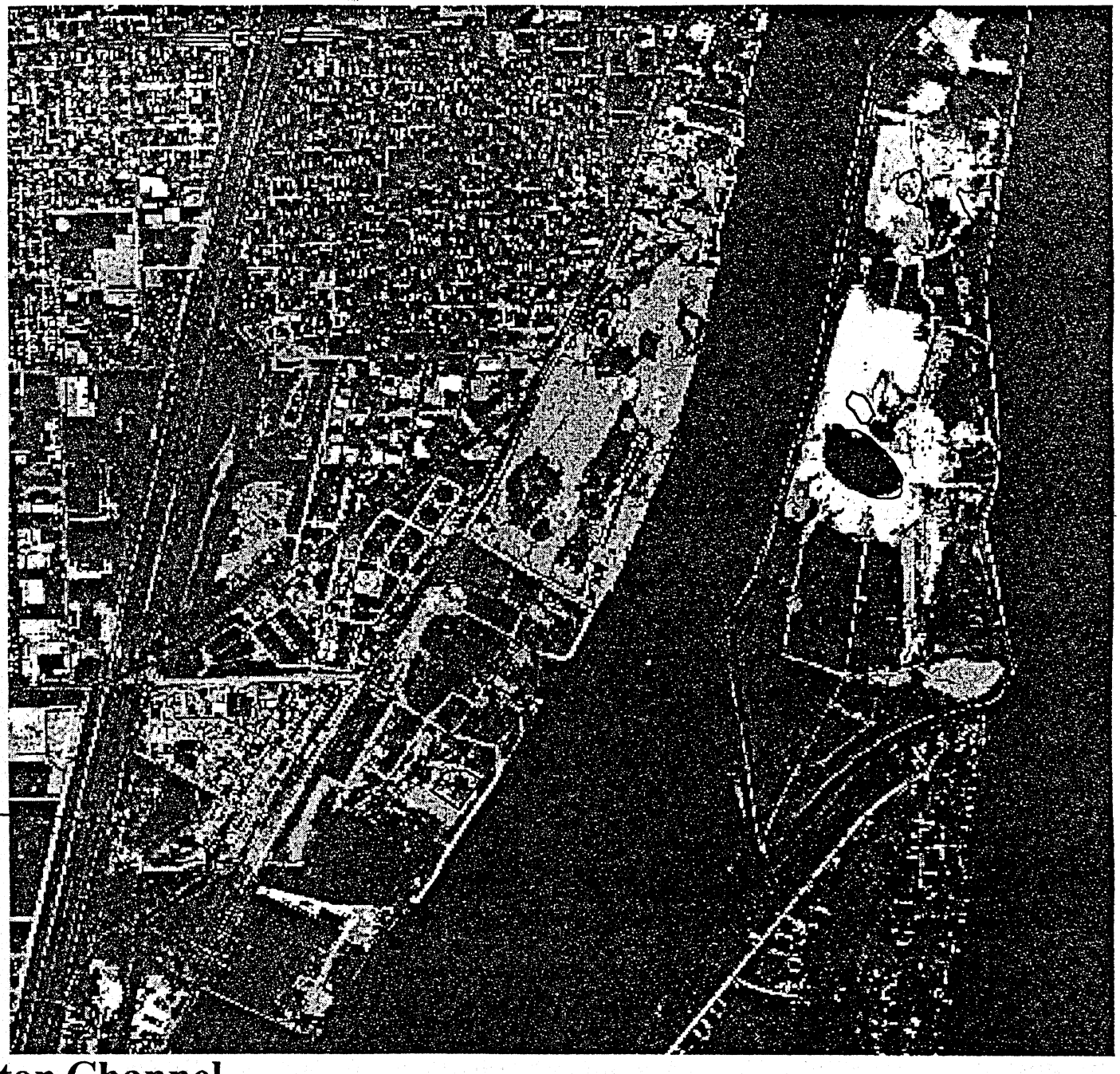


Figure 9. Upper Trenton Channel
Pt. Hennepin to Grosse Ile Toll Bridge

CADMIUM

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

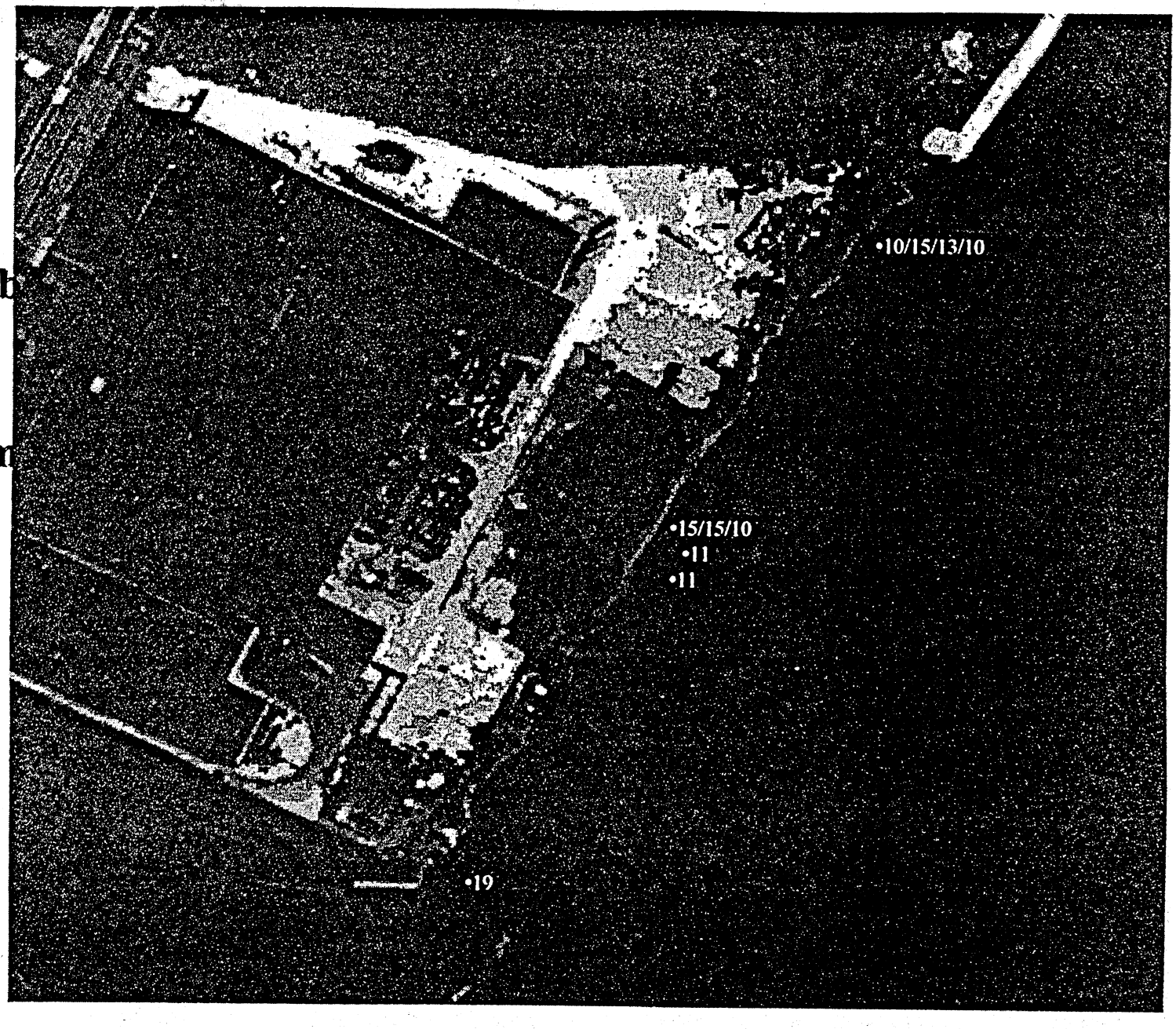


Figure 10. Firestone Steel Site

MERCURY

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

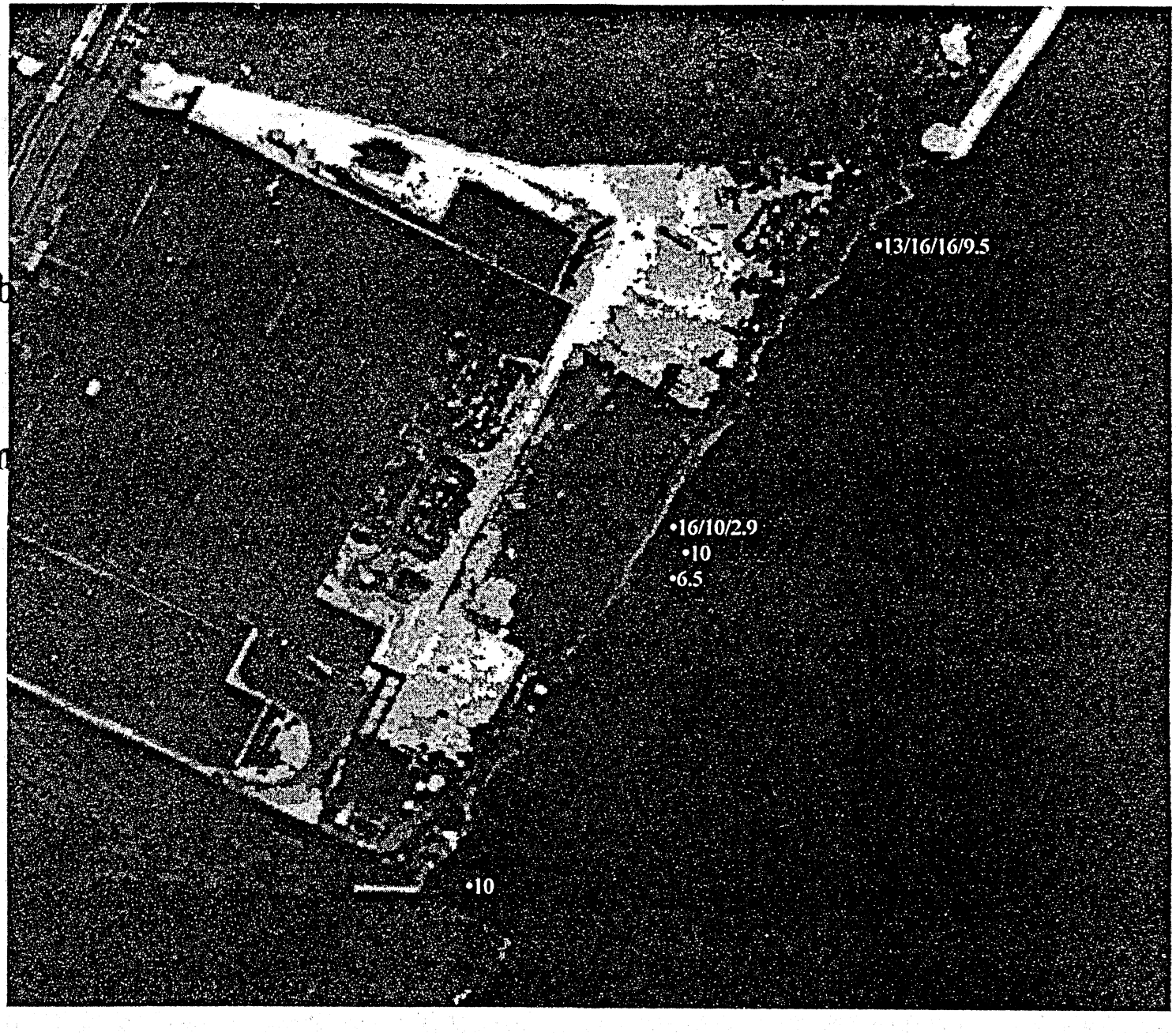


Figure 11. Firestone Steel Site

TOTAL PCBS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

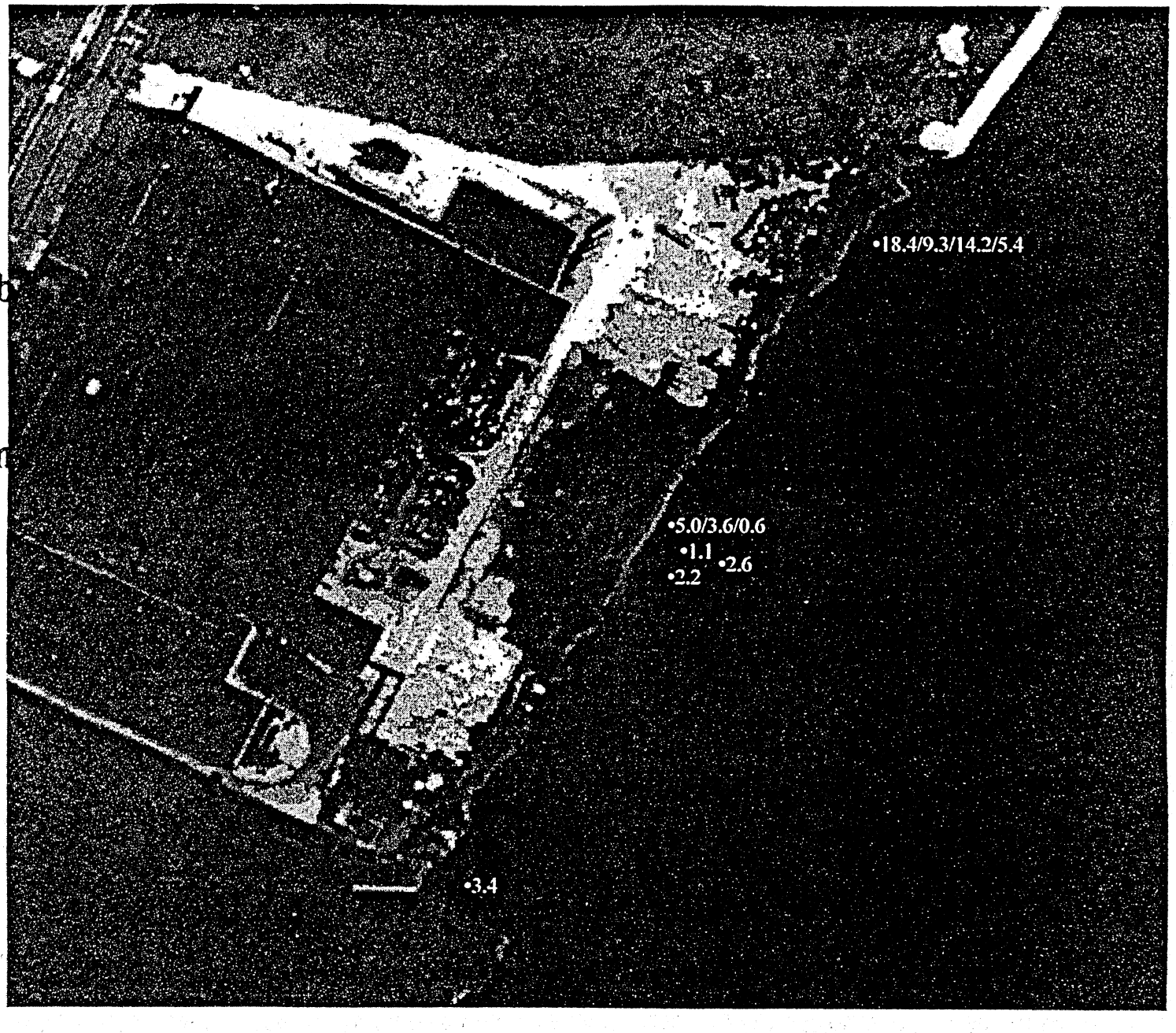


Figure 12. Firestone Steel Site

OIL and GREAS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

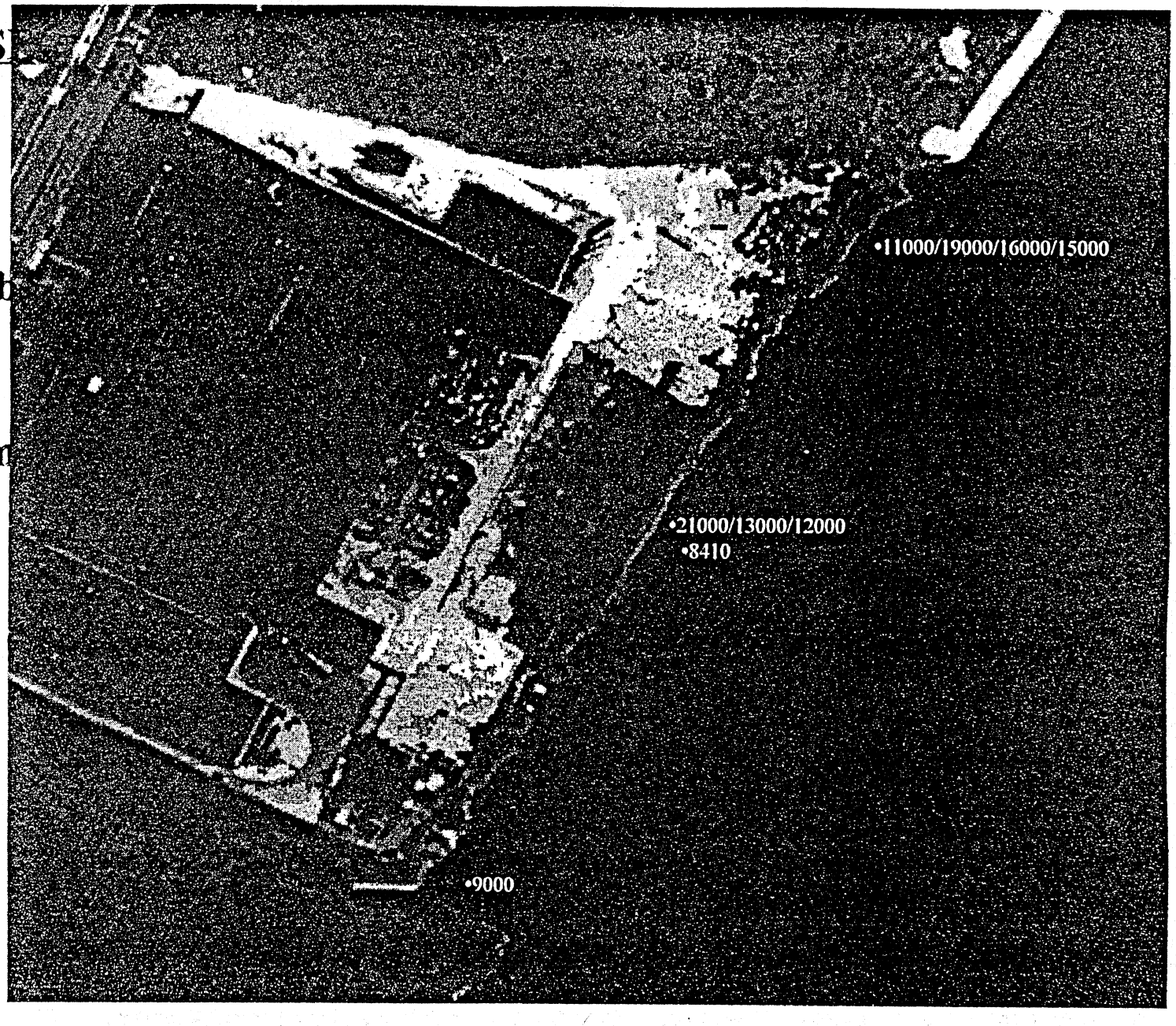


Figure 13. Firestone Steel Site

CADMIUM

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

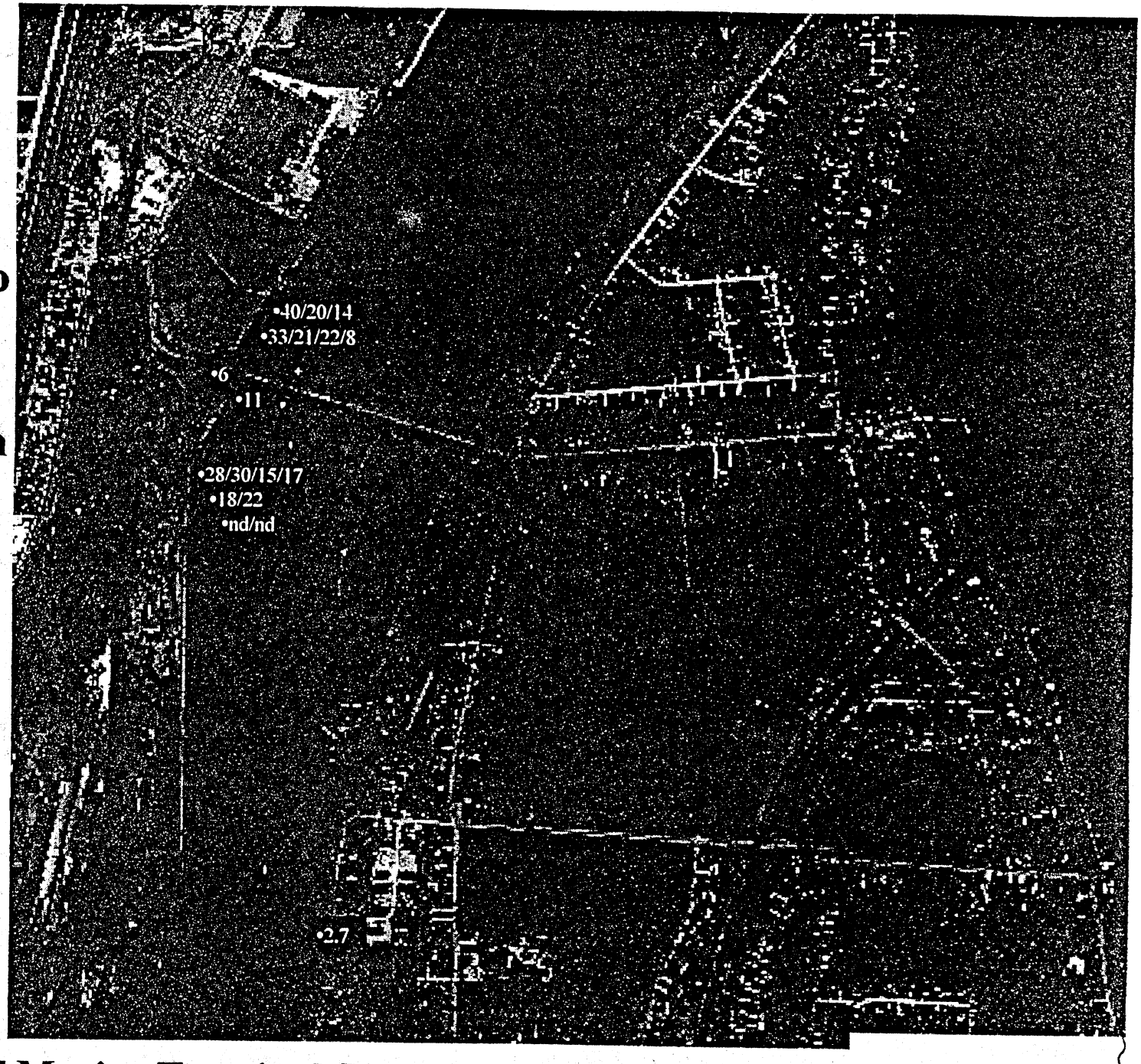


Figure 14. Federal Marine Terminal /Monguagon Creek Area

MERCURY

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

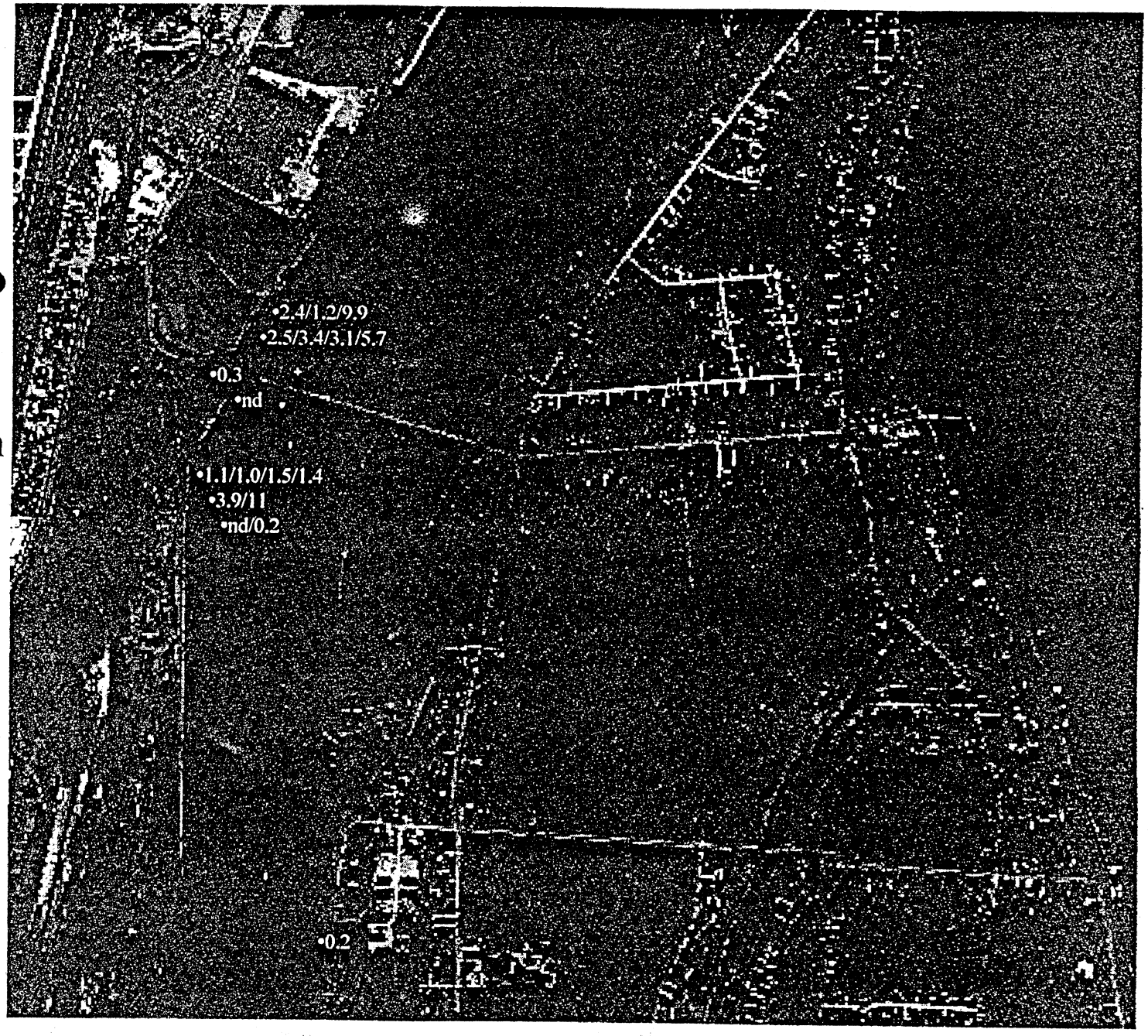


Figure 15. Federal Marine Terminal /Monguagon Creek Area

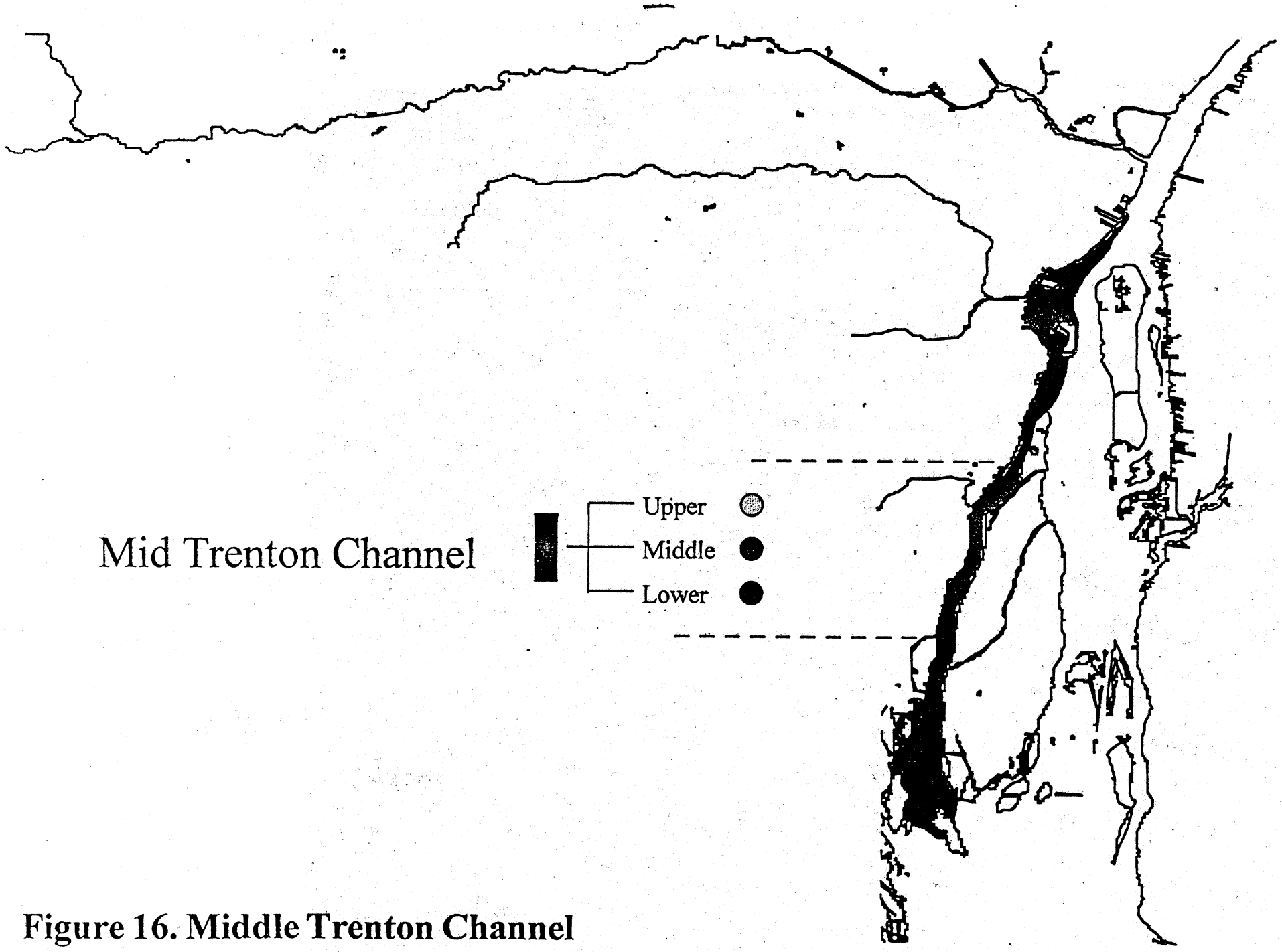


Figure 16. Middle Trenton Channel
Monguagon Creek to Elizabeth Park North Canal

LEAD

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

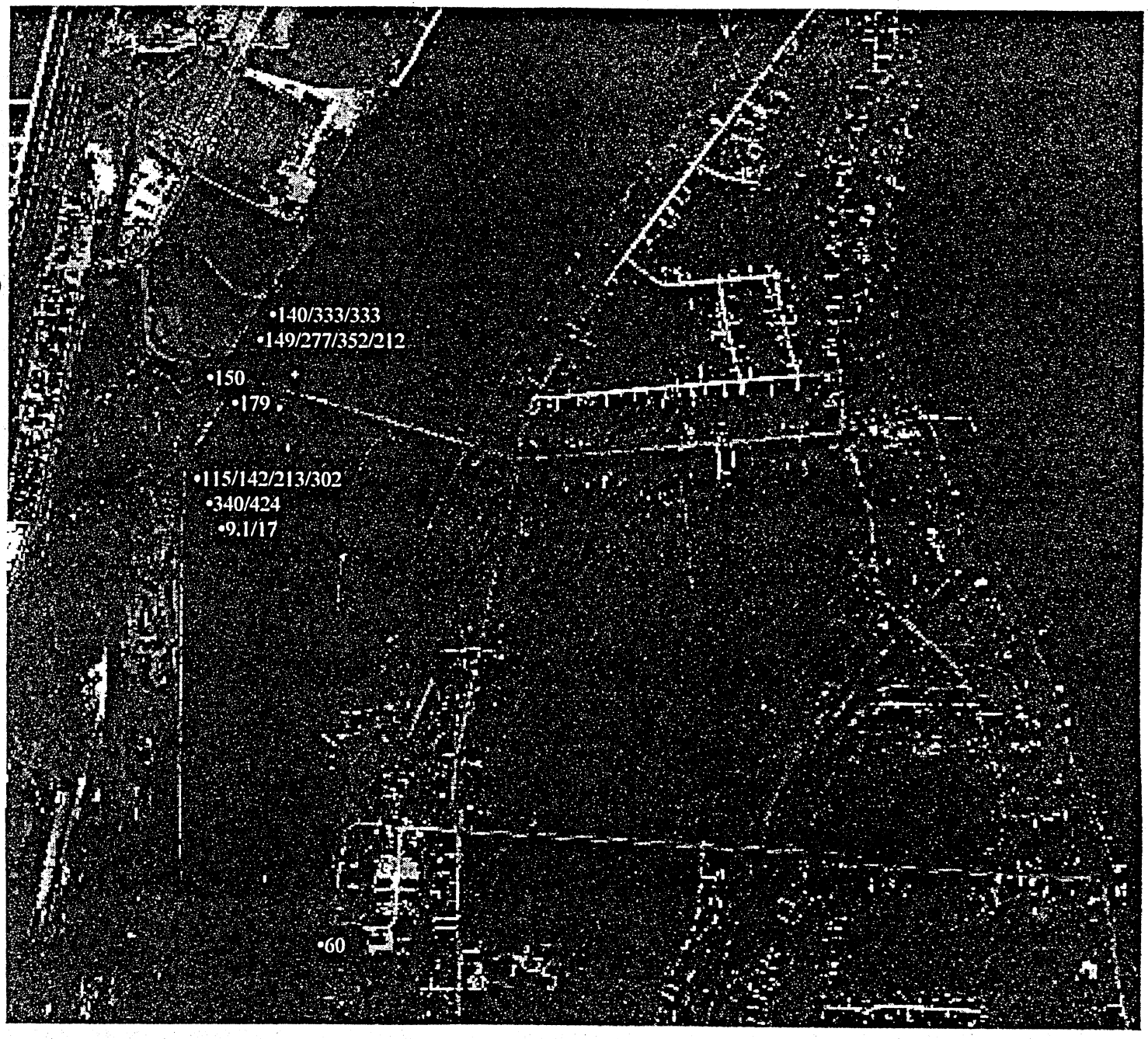


Figure 17. Federal Marine Terminal /Monguagon Creek Area

ZINC

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

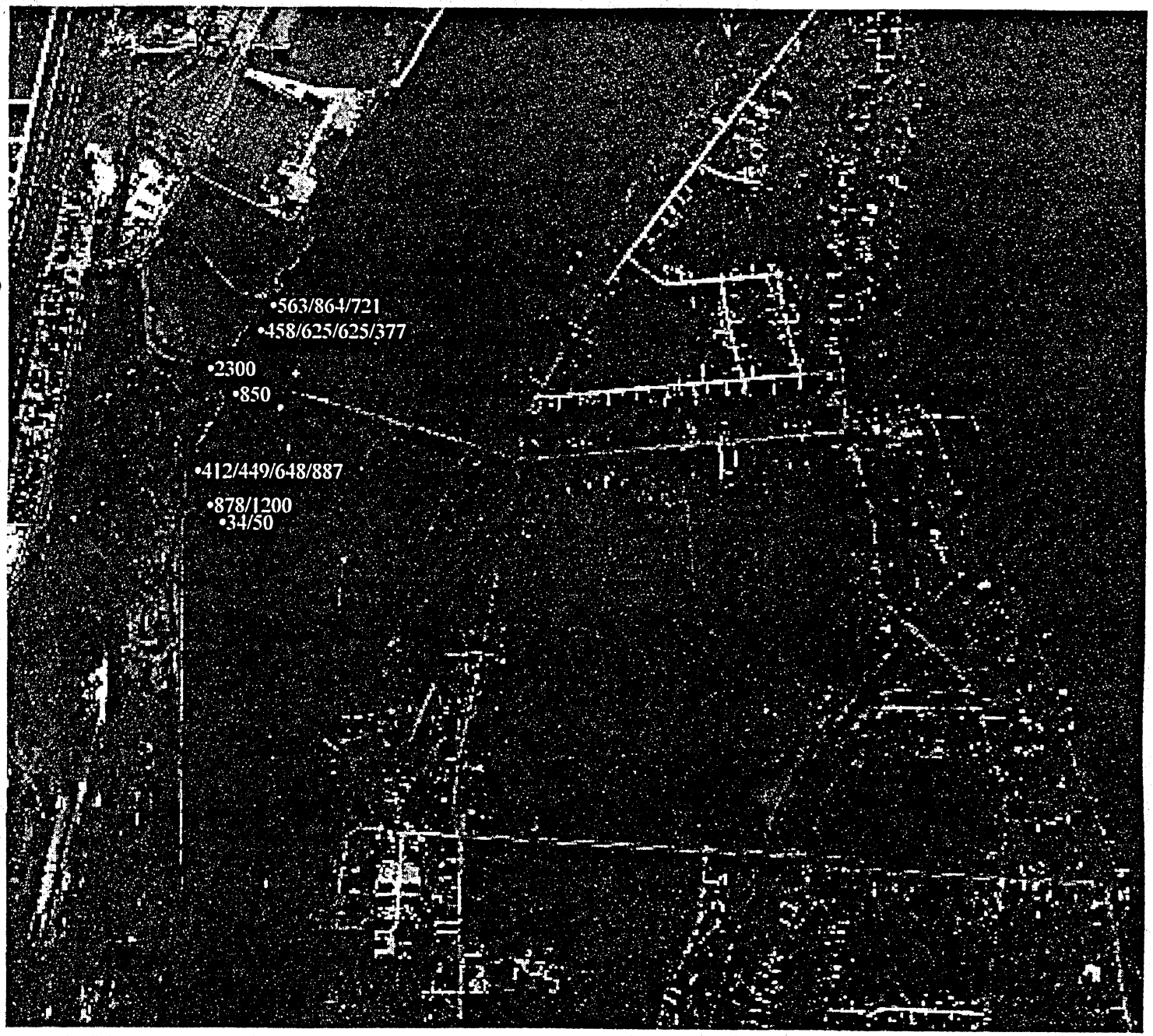


Figure 18. Federal Marine Terminal /Monguagon Creek Area

MERCURY

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

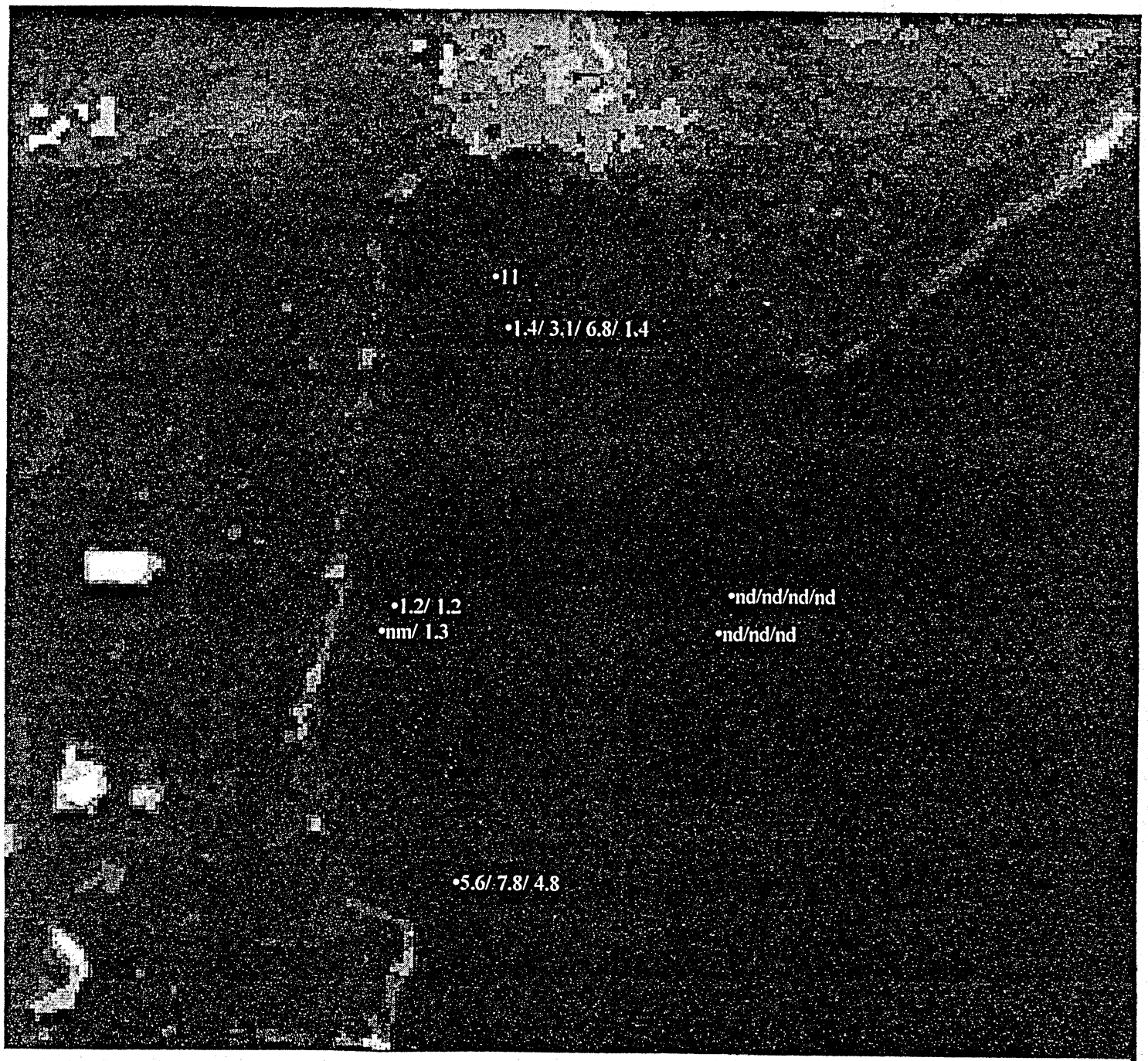


Figure 19. Black Lagoon

ZINC

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

Figure 20. Black Lagoon

OIL and GREASE

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

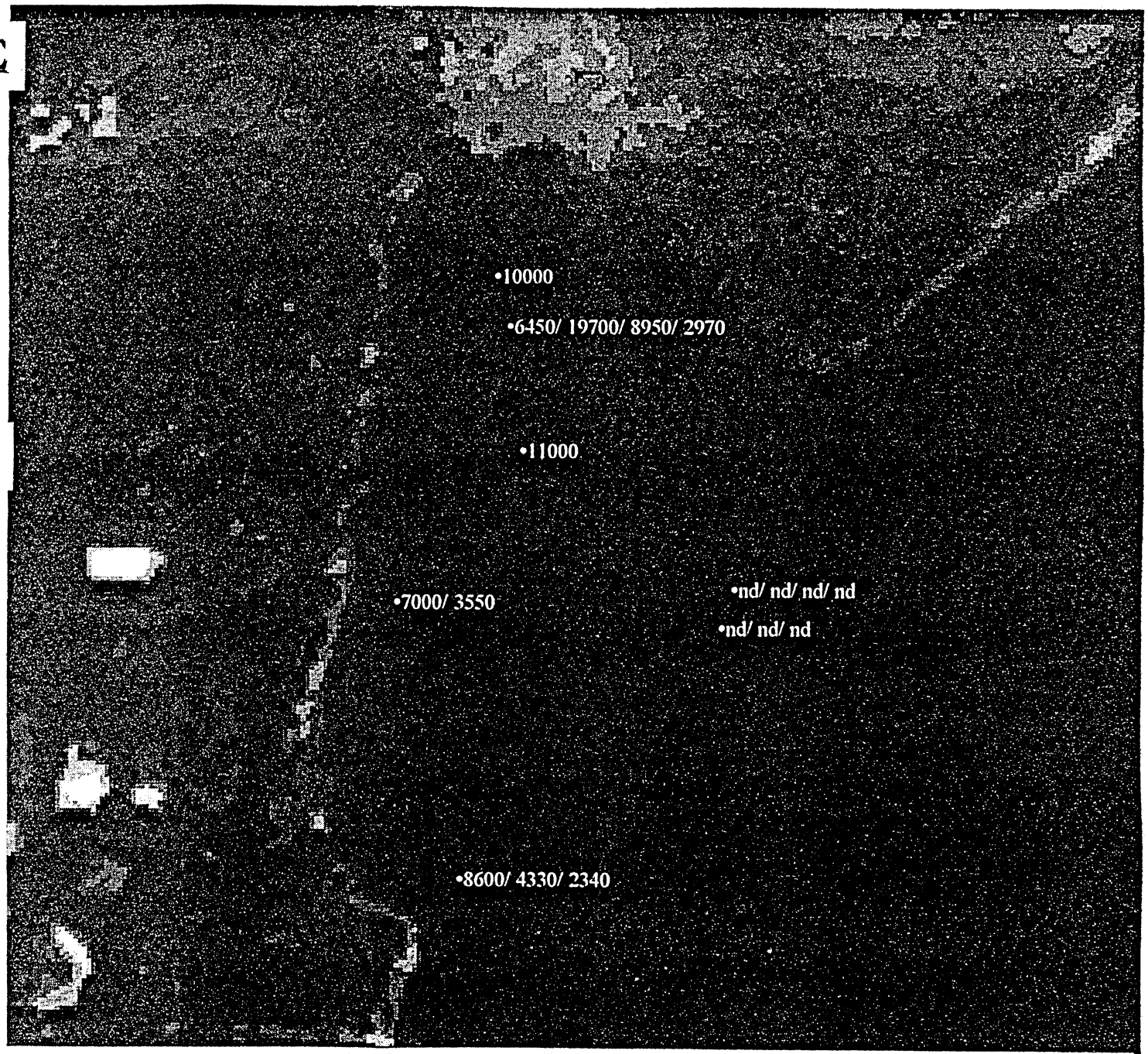


Figure 21. Black Lagoon

MERCURY

all values ppm
dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 =
surface/to/bottom
core intervals

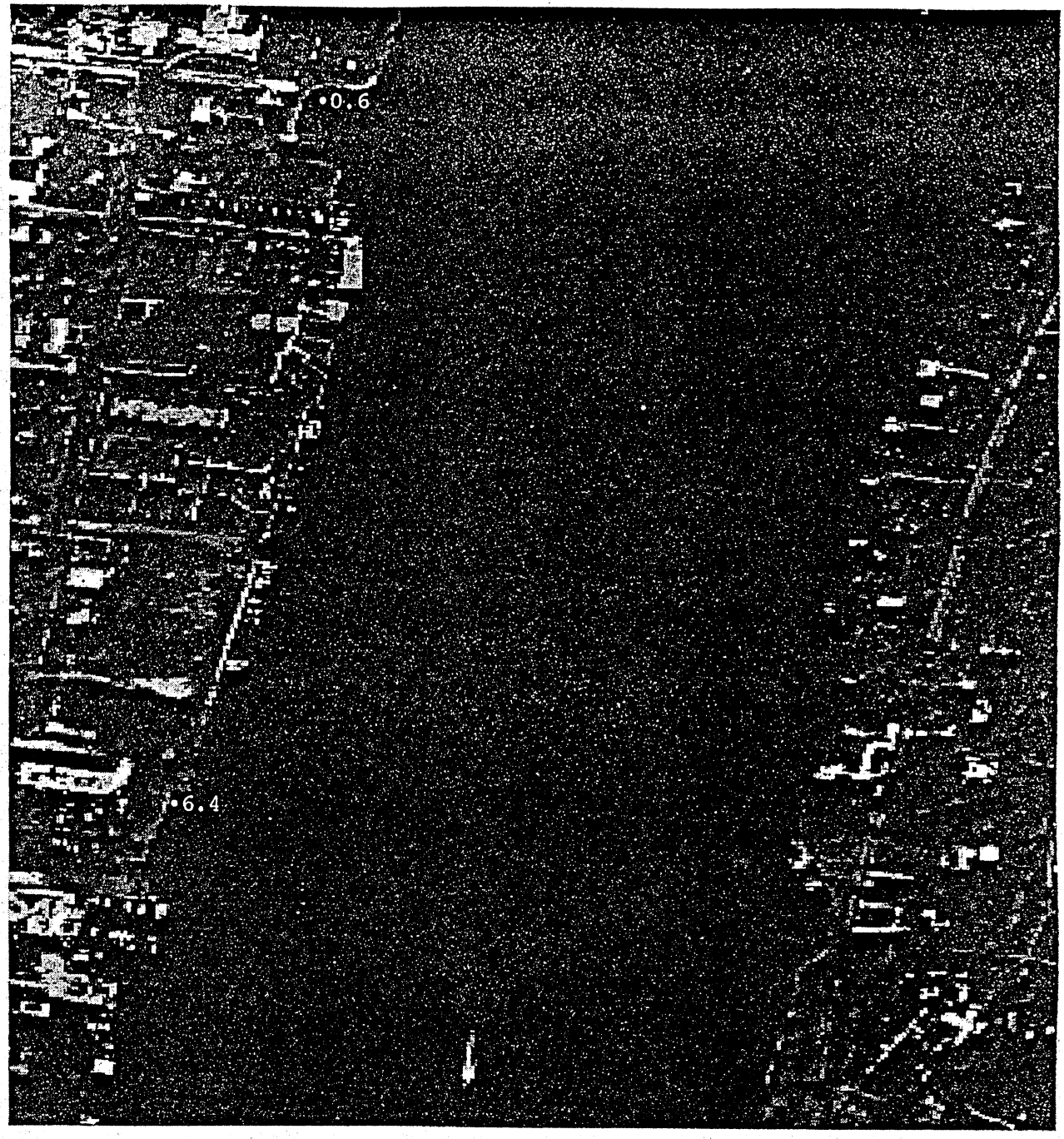


Figure 22. Trenton Towers

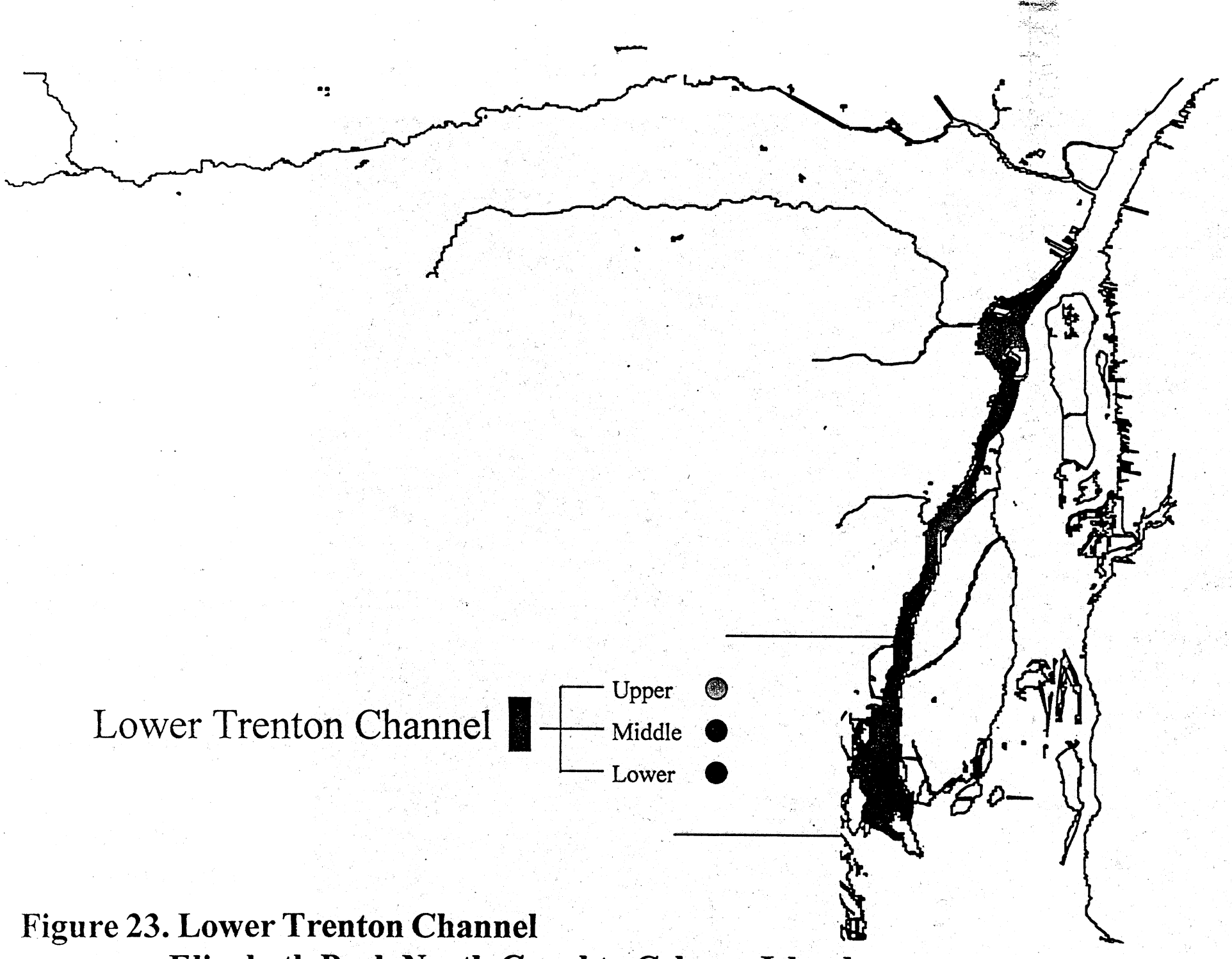


Figure 23. Lower Trenton Channel
Elizabeth Park North Canal to Celeron Island

MERCURY

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

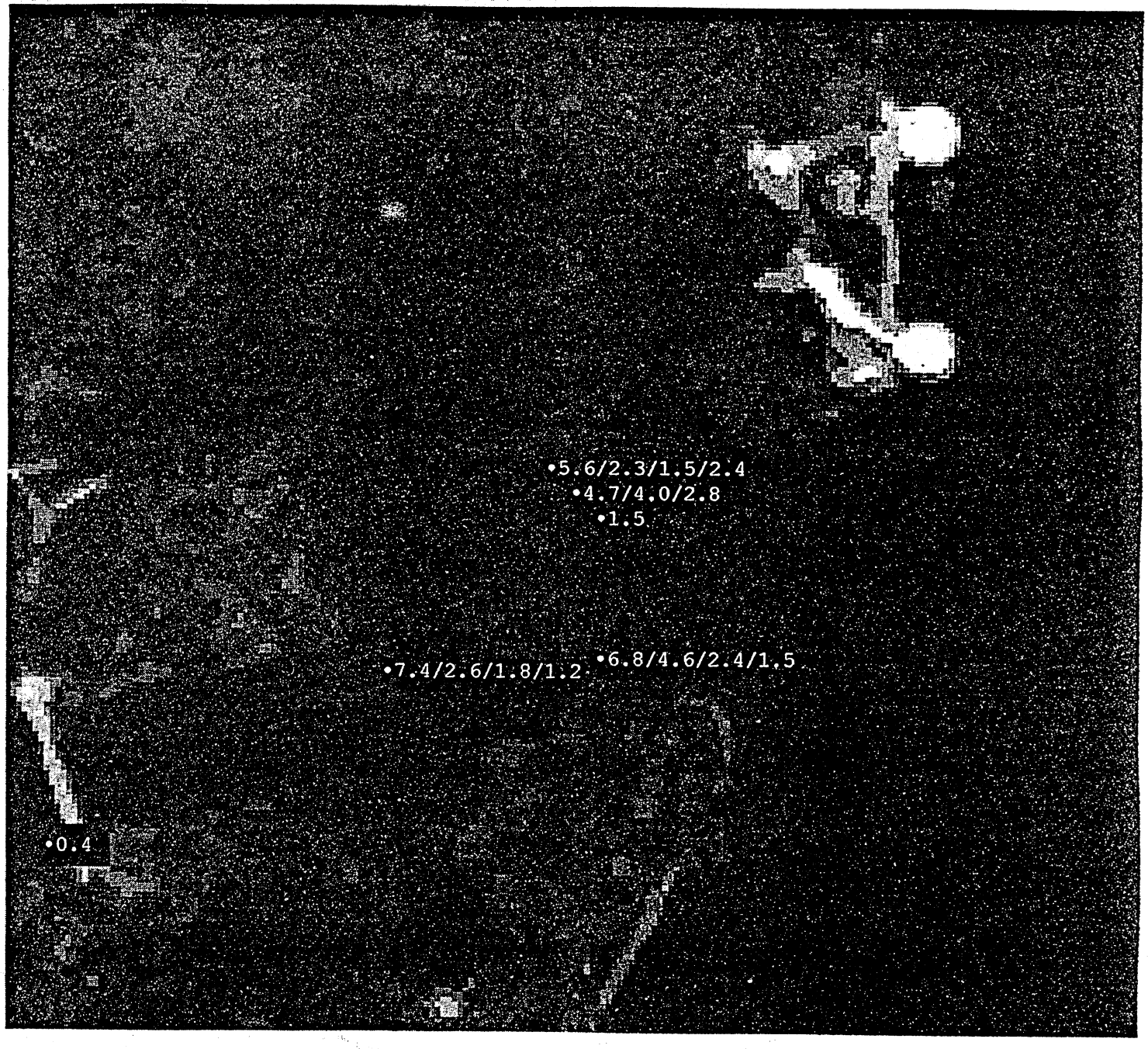


Figure 24. Elizabeth Park North Canal

TOTAL PCBS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

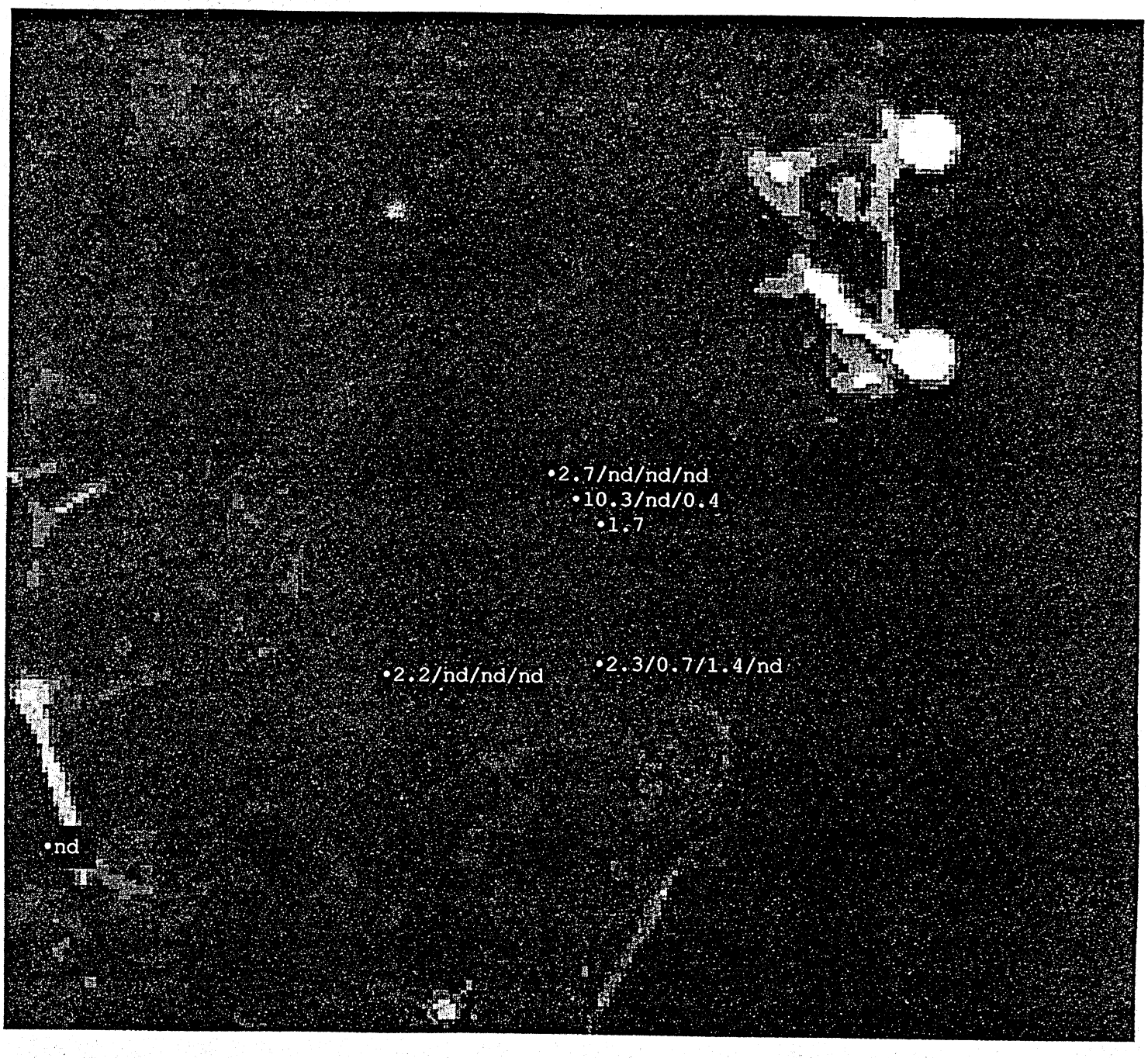


Figure 25. Elizabeth Park North Canal

TOTAL PAHS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

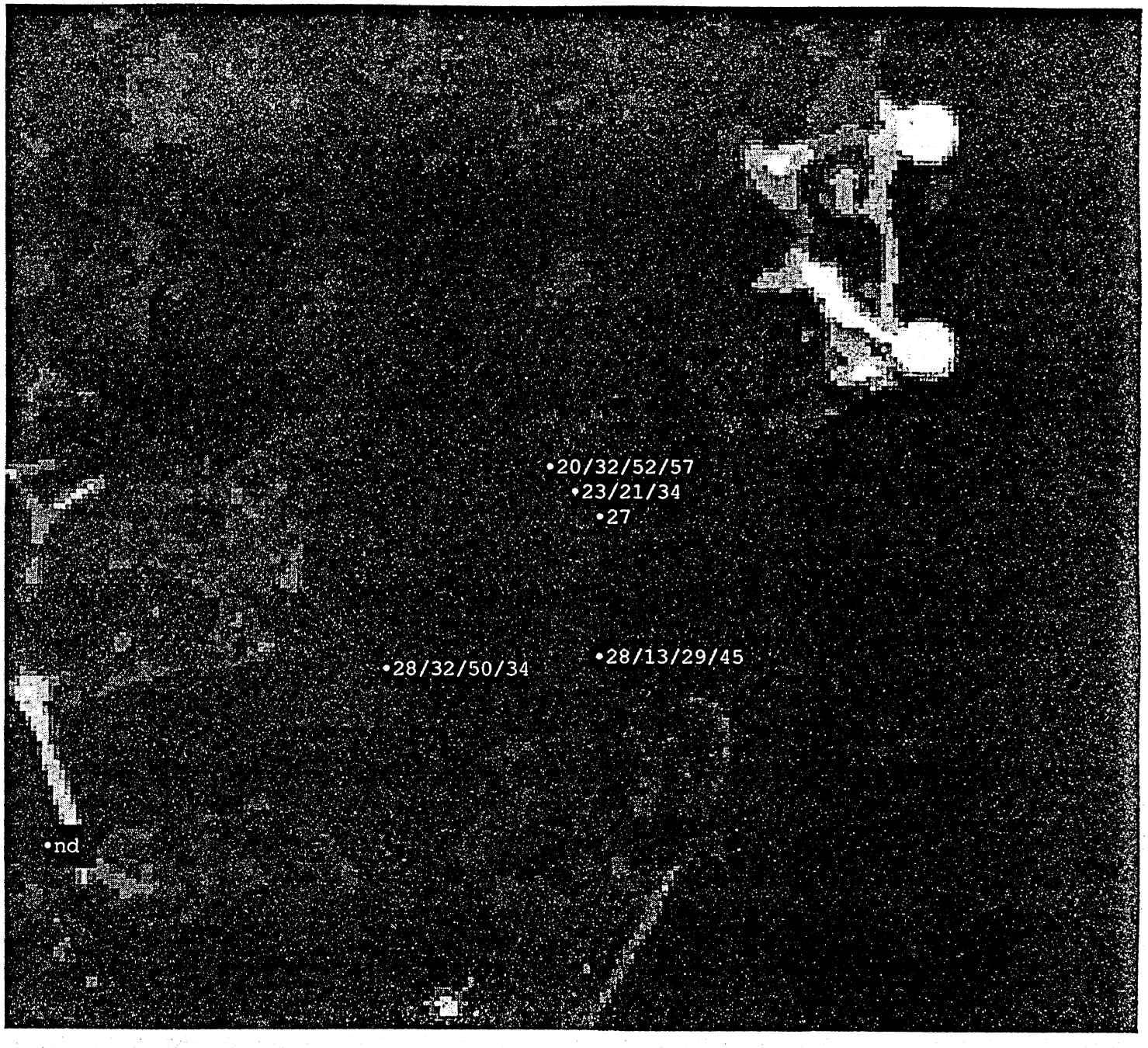


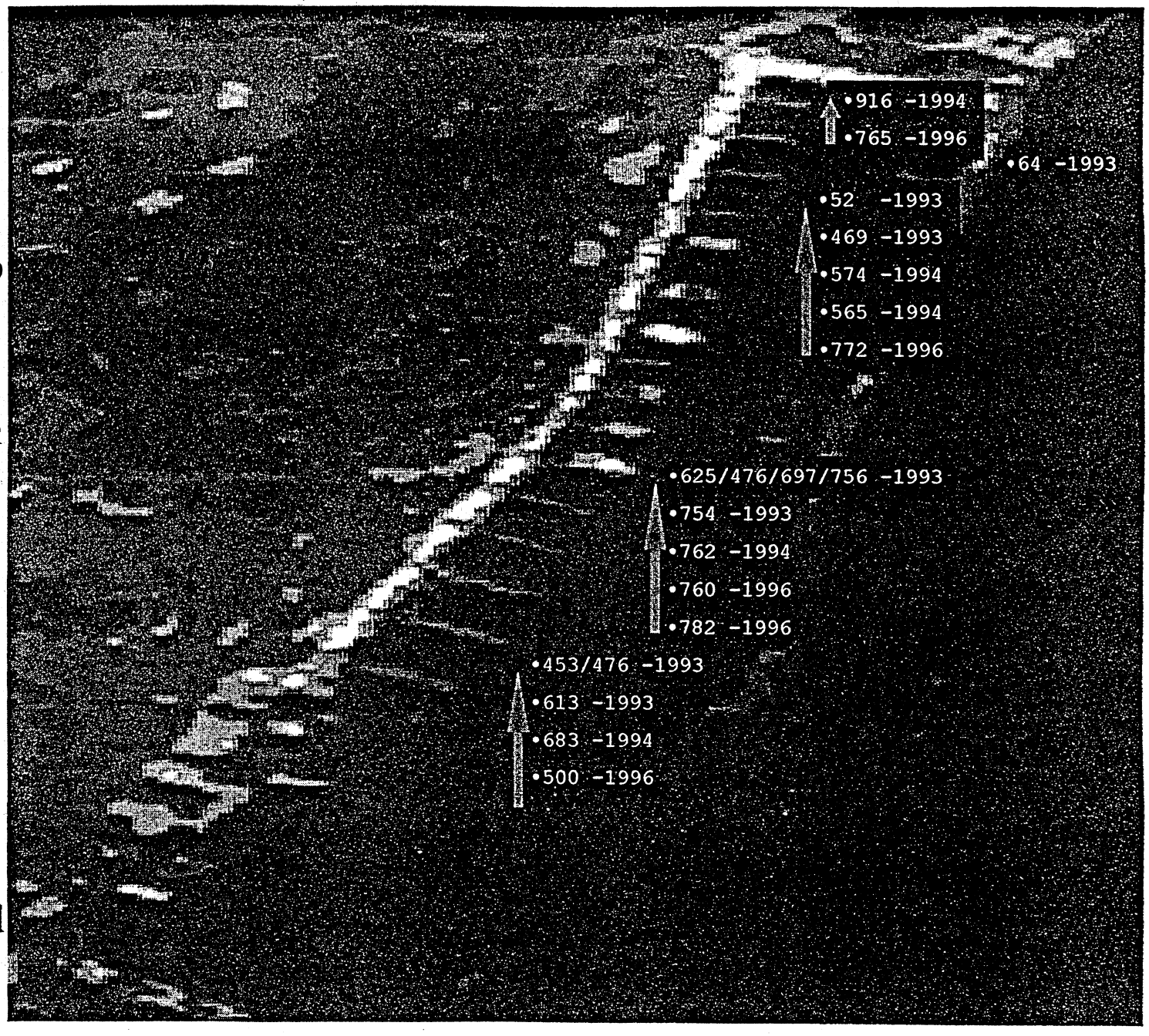
Figure 26. Elizabeth Park North Canal

ZINC

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals



↑ -Site location

-1993 **Year sampled**

Figure 27. Elizabeth Park Marina

MERCURY

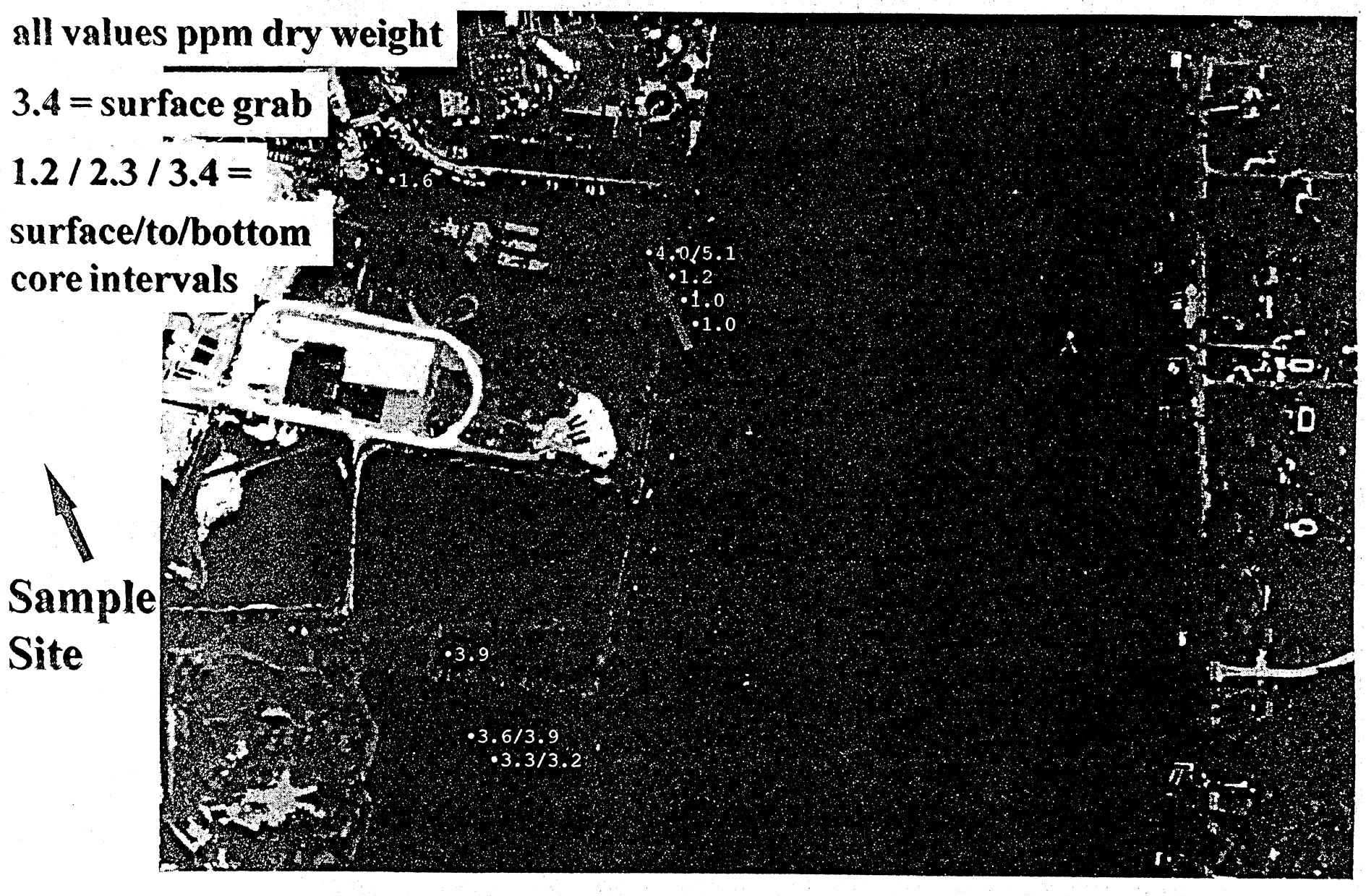


Figure 28. Elizabeth Park South Canal Area

ZINC

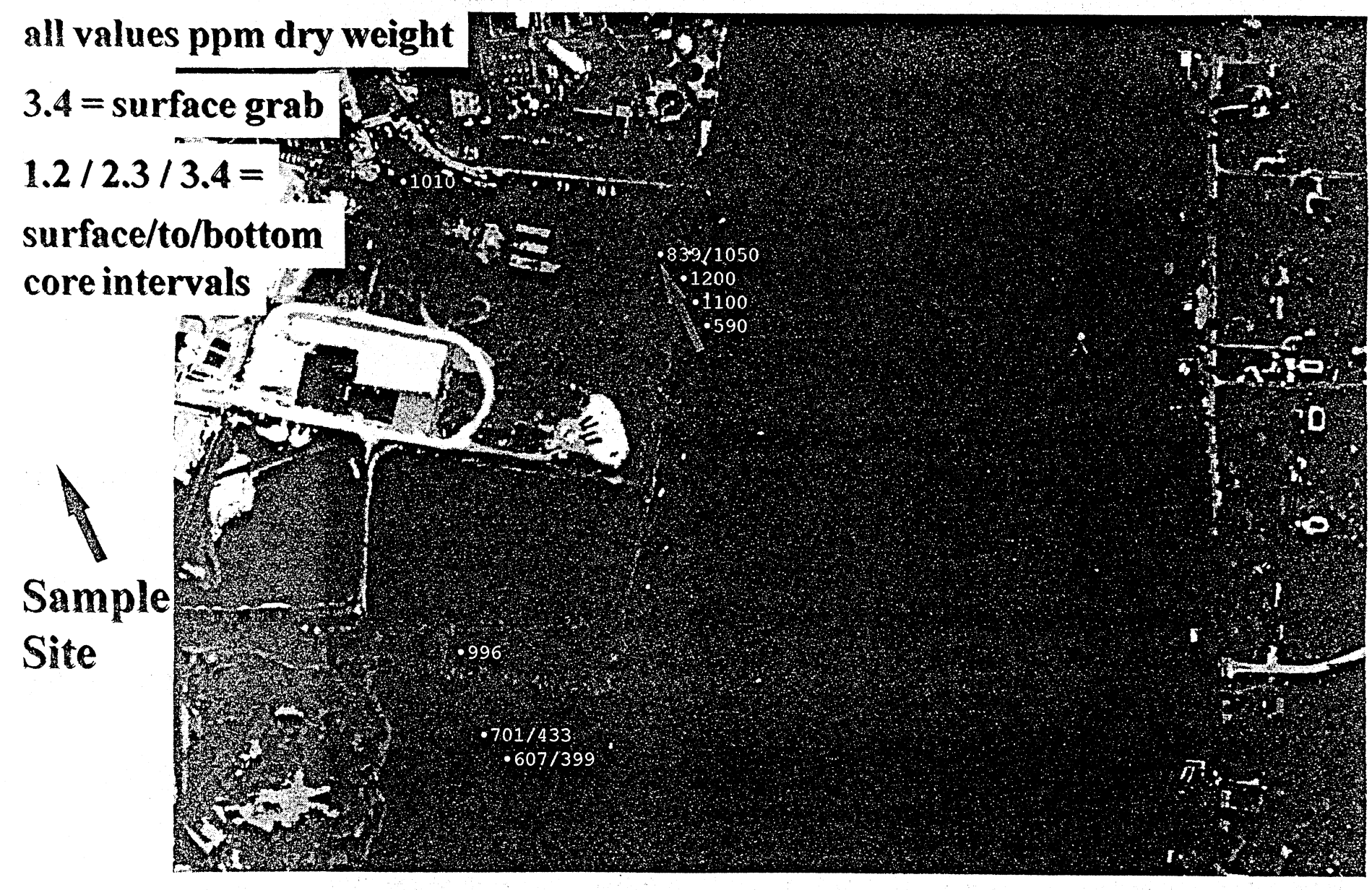


Figure 29. Elizabeth Park South Canal Area

TOTAL PCBS

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

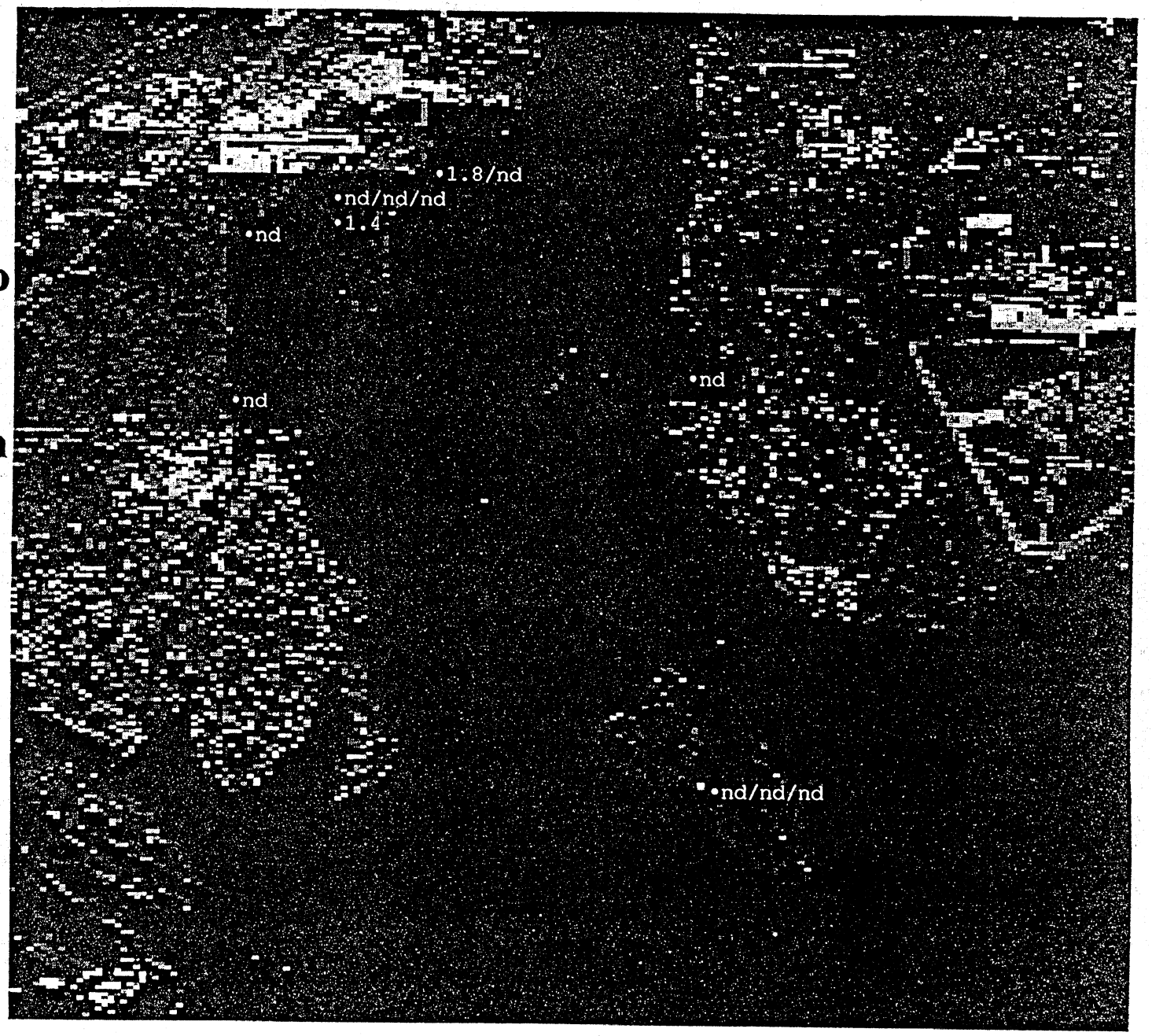


Figure 30. Lower Trenton Channel

LEAD

all values ppm dry weight

3.4 = surface grab

1.2 / 2.3 / 3.4 = surface/to/bottom core intervals

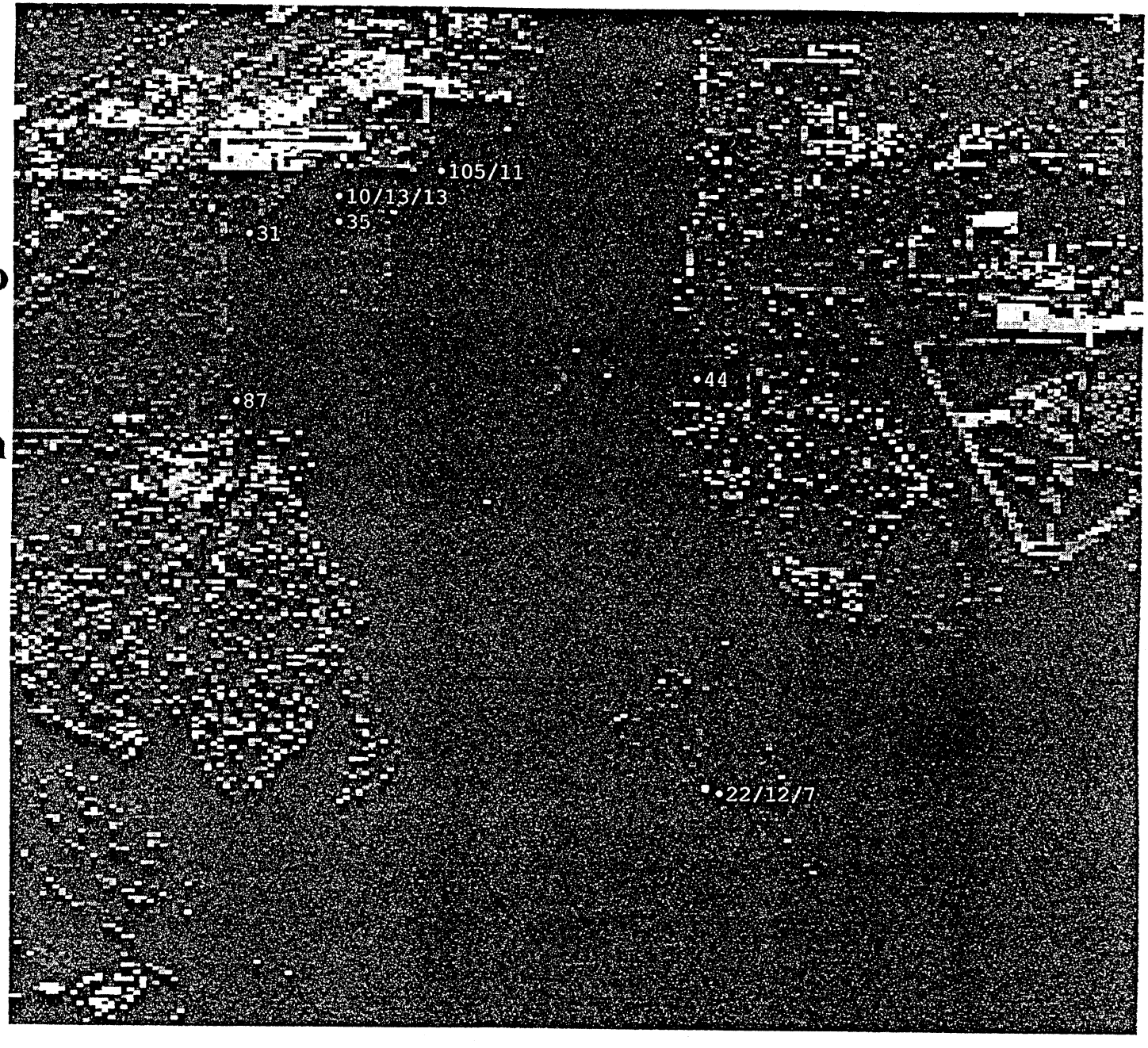


Figure 31. Lower Trenton Channel

Appendix A. Mass Spec-Library Search Interpretations

The following is a brief overview and analysis of a number of identified constituents of the several sediment samples collected from the Trenton Channel. On generalization, it appears the numerous chemicals identified may occur as constituents of heavy oils and lubricants, components of naturally occurring substances such as fats and oils or as possible components of plasticizers, rubber, nylon or other similar synthetic compounds.

1. Polycyclic Aromatic Hydrocarbons (PAHs) and Cresol:

   1,4,6-Trimethyl-naphthalene
   1,6,7-Trimethyl-naphthalene
   1,2,3-Trimethyl-naphthalene
   methyl phenanthrene
   methyl anthracene
   4-methyl phenol (p-cresol)

   common constituents of coal tar and heavy oils (bunker C or #6 Fuel Oil)

2. Hexadecanoic acid (palmitic acid):

   A saturated fatty acid which occurs in natural fats and oils and in "tall oil" (see below). It has been used commercially in soaps, lubricating oils, waterproofing and in food grade additives.

   Note: tall oil is a mixture of rosin acids, fatty acids and other materials obtained from pulping pine wood. Tall oil fatty acids consist of the following: palmitic 0.1%, stearic 2.1%, oleic 48.5%, linoleic 35.3% and eicosenoic 1.1%. Some of the use of tall oil is in vehicle paints, alkyl resins, soaps, cutting oils and emulsifiers, lubricants and greases, asphalt derivatives, rubber reclaiming, synthesis of cortisone and sex hormones, chemical intermediates, etc.

3. Hexane dioic acid (adipic acid) mono (ethyl hexyl) ester:

90% of adipic acid esters are commercially used as plasticizers. 10% are used commercially as high performance lubricants. 2-ethyl hexyl adipates are reported to be excellent low temperature lubricants. They also offer low temperature flexibility in PVC formulations.

4. Isopentane/Isoprene, Terpene and Steroid Type Compounds

Many chemical components/compounds of plants and animals have the common characteristic of their carbon skeletons being evenly divisible into iso-C_5 units, i.e. isoprene or isopentane units. These units may be joined in regular sequences head-to-tail, or, in head-to-tail groupings that are joined tail-to-tail. Many of these compounds or fragments of compounds were detected in the sediment analysis.

a. isopentane sequencing:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Dodecane
Pentadecane
Hexadecane
eicosane

chemicals identified in this grouping include:

2-methyl eicosane
2,6,10 and 2,6,11-trimethyl dodecanes
1,6,10,14 and 2,6,10,14-tetramethylpentadecanes (pristane)
2,6,10,14 tetramethylhexadecane (phytane)

Both pristane and phytane are found in rock specimens 2.5-3 billion years old, are derivatives of chlorophyll and are commonly used as biomakers in identifying particular crude oils. Because of these compounds ability to withstand heat and pressure, commercial uses of these compounds have been as precision lubricants, chromatographic oil and as anticorrosive agents.

Eicosane and eicosanoic acid are used in refining, rubber manufacturing, paper processing, cosmetics, lubricants, plasticizers and in organic synthesis.

b. isoprene sequencing

The isoprene unit is a common natural building block of more complex biological compounds. It occurs in a wide variety of compounds isolated from plant and animals, including natural rubber. Exudates from conifers and oils from citus fruits and eucalyptus trees have abundant $C_{10}H_{16}$ alicyclic hydrocarbon composition. The term terpene (turpentine tree) has commonly been applied to these compounds. Triterpenes (C_{30}) are widely distributed in nature, especially in plants. Trans-squalene has been identified as the precursor in the biosynthesis of all triterpenes through a series of cyclization and rearrangement. Squalene is an intermediate in the biosynthesis of cholesterol and other steroids (see attached) via the intermediate, lanosterol (note: wool fat or lanolin contains cholesterol esters of higher fatty acids). Cholestane is a steroid of the same ring structure as cholesterol (and cortisone and the sex hormones) and has also been identified with wool fat. There was no identified occurrence or use for 4,5 epoxy (alpha, alpha) cholestane noted in the literature reviewed, however, there was note of 5 alpha cholestanol identified as a member of the cholestane group related to the common saturated sterols. Sterols are solid alcohols having from 27-29 carbons (steroid means sterol-like). Sterols are widely distributed in plants and animals both in the free form and esterified to fatty acids. Coprostanol, 5 beta-cholestan-3 beta ol, is a cholestanol produced in the intestines of mammals by microbial reduction of cholesterol and excreted along with cholesterol. This sterol has been identified as a sediment contaminant at concentrations up to 500 ppb.

Squalene is a common naturally occurring substance that is also used as a commercial chemical intermediate in steroid production. Lanolin (containing sterols including lanosterol which may be derived from squalene) is used in ointments, soaps, face and hand creams, suntan preparations, hair-sets and leather finishing.

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Appendix B. Sediment Survey Results-Data Tables

- Metals
- PCBs
- PAHs
- Oil and Grease
- Grain Size
- Acid Volatile Sulfides
- TOC, Density
- Lat-Long
- Classification A: Upstream to Downstream
- Classification B: Most Contaminated to Least Contaminated

TRENTON CHANNEL PROJECT		HEAVY METALS mg/kg										
SEDIMENT CHEMISTRY RESULTS	Core length in cm	% SOLIDS	TOT. As	TOT Cd	TOT. Cr	TOT. Cu	TOT. Fe	TOT. Pb	TOT. Mn	TOT. Hg	TOT. Ni	TOT. Zn
ERM (Long and Morgan, 1990)			85	9.6	145	390		110		1.3	50	270
SEL (Persuad et. al. OME, 1993)							40000		1100			
Quantification Level (EPA Method 245.1/7470.7471)										0.1		
55C1 Allied Oil Slip NW	000-030	43	10	15	260	230	48000	340	620	1.8	120	930
	030-091	48	14	17	280	280	53000	350	590	1.2	96	1100
	091-152	52	16	16	220	270	50000	360	590	1	79	88
	152-218	54	16	16	210	270	50000	340	490	1.1	72	710
55C2 Allied Oil Slip NW - dup	000-030	43	9.2	12	180	160	43000	350	690	0.99	84	670
	030-091	48	12	16	260	250	48000	390	620	1.5	110	1200
	091-147	50	15	16	280	280	52000	350	550	1.1	100	960
56C1 Nickelson South Slip	000-030	36	19	21	170	360	99000	250	1400	0.41	140	720
	030-043	42	41	35	300	630	120000	580	2000	0.56	240	710
56C2 Nickelson South Slip -dup	000-030	37	26	25	210	450	100000	310	1500	0.42	160	740
	030-091	45	29	27	300	410	94000	520	1400	0.07	170	960
	091-152	56	8	10	90	120	26000	200	480	0.7	35	440
	152-201	57	11	18	110	190	39000	330	490	0.91	42	730
59C1 Stenson Club	000-030	44	6.3	10	170	130	32000	160	740	0.73	81	600
	030-091	52	7.8	12	180	190	34000	210	690	0.83	87	600
	091-152	54	10	13	190	250	33000	230	540	1.5	110	650
	152-213	53	14	3.6	47	300	18000	250	410	3	19	390
	213-224	57	13	2.5	28	160	14000	130	290	2.1	16	210
64P Mud Island Northside	Ponar	66	3.4	3.3	28	23	23000	22	250	0.08	24	97
65P Mud Island SW	Ponar	64	4.1	7.1	54	71	38000	71	500	0.33	35	250
60C1 Mud Island -South side	000-030	59	2.5	2	17	18	13000	12	190	0.23	13	48
	030-091	61	2.9	1.9	15	15	13000	10	250	0.17	15	50
	091-137	65	2.4	2.1	16	14	14000	9	320	0.08	14	35
53C1 Grassy Island NW	000-030	38	4.5	3.3	29	35	17000	31	350	0.33	44	100
	030-071	77	4	1.4	13	14	9400	9.1	230	0.031	18	38
54C1 Grassy Island NE	000-034	55	4.6	2.2	18	20	13000	20	260	0.16	21	61
63P Grassy Island W	Ponar	66	2.6	2.3	22	27	15000	20	180	0.14	26	73
61P Grassy Isalnd SW	Ponar	60	5.3	3.3	24	44	14000	39	350	0.39	18	120
62P Grassy Island SE	Ponar	57	4.5	3.4	83	32	16000	33	260	0.33	49	110
57P Mouth of Ecorse Creek	Ponar	34	7.1	5.6	57	66	30000	81	590	0.4	37	270
58C1 Mouth of Ecorse Creek	000-030	72	3.1	1.9	16	25	13000	11	160	<0.1	39	45
52C1 BASF Northworks lower	000-030	54	9.9	9.4	120	120	30000	120	420	0.84	67	290
	030-091	51	15	10	110	160	30000	110	460	1.3	59	320
	091-152	56	15	13	77	130	27000	140	420	1.5	44	360
	152-213	59	7.4	4	23	74	13000	90	280	0.89	17	180
69C1 Wyandotte Yatch Club	000-030	43	8.2	5.9	85	120	19000	150	260	1.1	44	330
	030-066	53	8.5	5.5	68	110	19000	150	250	1.5	35	310
68P N of Pt. Hennepin	Ponar	76	5.2	1.2	12	10	8800	9	120	0.07	8.5	37
68E N of Pt. Hennepin	Eckman	76	2.1	1.3	12	10	8800	14	150	0.08	10	49
67C1 Portofino	000-030	45	7.5	5.7	68	83	22000	220	310	0.75	39	350
43P Portofino Slip	PONAR	56	5.8	2.9	40	49	25900	143	455	0.32	27	245
42P Pt. Hennepin	PONAR	58	4.9	1.5	20	24	14300	27	183	0.22	17	106
15 C1 T.C. North Marsh	000-022	63	2.4	0.43	20	21	21600	19	161	<0.1	27	78
15 C1	022-062	73	2.6	0.12	17	24	21600	13	158	<0.1	25	62
15 C1	062-100	70	3.2	<0.05	22	20	26000	12	183	<0.1	31	83

TRENTON CHANNEL PROJECT		HEAVY METALS mg/kg										
SEDIMENT CHEMISTRY RESULTS	Core											
	Length											
SITE DESCRIPTION	in-cm	SOLIDS	TOT. As	TOT Cd	TOT. Cr	TOT. Cu	TOT. Fe	TOT. Pb	TOT. Mn	TOT. Hg	TOT. Ni	TOT. Zn
ERM (Long and Morgan, 1990)			85	9.6	145	390		110		1.3	50	270
SEL (Persuad et. al. OME, 1993)							40000		1100			
Quantification Level (EPA Method 245.1/7470.7471)										0.1		
51 C 1 Firestone upper	000-030	43	9.4	10	150	140	30000	200	410	13	80	490
	030-091	53	13	15	230	300	32000	300	470	16	100	660
	091-152	51	12	13	190	250	26000	260	430	16	84	570
	152-194	48	13	10	140	190	25000	180	410	9.5	70	460
66C1 Firestone Steel -Mid (45P site)	000-030	43	12	15	260	300	31000	240	550	16	100	590
	030-091	54	11	15	140	210	25000	190	420	10	67	520
	091-104	57	8.2	10	58	190	18000	160	310	2.9	39	430
45P Firestone Steel	PONAR	45	7.6	11	165	199	44000	180	733	10	76	592
	PONAR	47	13	11	166	221	41000	211	574	6.5	86.8	662
50P Firestone lower	Ponar	42	9.4	19	250	150	35000	260	500	10	130	790
MONGUAGON CREEK-UPSTREAM	000-030	41	8.5	40	118	140	37500	140	590	2.4	68	563
MONGUAGON CREEK-UPSTREAM	030-104	47	9.9	20	467	246	44100	333	551	1.2	210	864
MONGUAGON CREEK-UPSTREAM	104-142	53	11	14	303	217	41500	333	520	9.9	160	721
MONGUAGON CREEK-UPSTREAM	000-030	41	7.8	33	109	118	38800	149	569	2.5	70	458
MONGUAGON CREEK-UPSTREAM	030-076	43	8.1	21	248	183	45900	277	546	3.4	160	625
MONGUAGON CREEK-UPSTREAM	076-150	47	8.9	22	500	255	42900	352	554	3.1	160	625
MONGUAGON CREEK-UPSTREAM	150-180	60	12	7.6	170	122	24400	212	476	5.7	73	377
48E Monguagon Creek	Eckman	48	7.4	6.2	77	70	22000	150	440	0.29	64	2300
S5 - Monguagon Creek	Ponar	58	nm	11.2	178	123	45900	179	655	<0.1	103	850
FI - Fighting Island	Ponar	33	nm	nd	21	14	14200	nd	236	<0.1	17	32
25 C1 MNCK DNS-Nearshore	000-027	70	6.1	28	78	91	27700	115	429	1.1	46	412
25 C1	027-051	61	6.5	30	99	101	28900	142	484	0.95	56	449
25 C1	051-095	58	6.7	15	167	131	35700	213	486	1.5	90	648
25 C1	095-132	71	8	17	405	239	48300	302	542	1.4	251	887
21 C1 MNCK DNS-Offshore	000-027	80	3.5	<0.05	9.2	14	14100	9.1	251	<0.1	15	34
21 C1	027-051	84	3.9	<0.05	13	15	14900	17	285	0.23	17	50
MONGUAGON CREEK-DOWN	000-150	48	8.5	18	437	252	42000	340	556	3.9	200	878
MONGUAGON CREEK-DOWN	150-168	50	10	22	456	281	51700	424	632	11	210	1200
BLACK LAGOON-CENTER	000-030	38	6.5	14	102	99	53200	193	746	1.4	49	3090
BLACK LAGOON-CENTER	030-120	34	9	17	345	218	70100	449	1070	3.1	160	1720
BLACK LAGOON-CENTER	120-210	40	22	11	162	236	112000	439	1640	6.8	90	1030
BLACK LAGOON-CENTER	210-229	75	4.9	3.7	45	99	19800	76	330	1.4	41	225
BLACK LAGOON-LOWER	000-060	42	24	12	191	226	137000	574	2060	5.6	100	1340
BLACK LAGOON-LOWER	060-152	51	10	11	183	247	35800	187	488	7.8	72	554
BLACK LAGOON-LOWER	152-203	54	10	9.8	121	166	29000	118	397	4.8	56	444
BLACK LAGOON-EAST	000-055	81	8.1	<0.050	9.8	5.2	7430	3.9	148	<0.1	8.5	27
BLACK LAGOON-EAST	055-103	80	1.9	<0.050	8.6	3.7	8150	3.4	173	<0.1	7.1	17
BLACK LAGOON-EAST	103-166	78	2.3	<0.050	9.6	5.6	7260	4.1	162	<0.1	7.9	17
BLACK LAGOON-EAST	166-229	80	2.6	0.067	9.7	7	7480	3.9	175	<0.1	8.6	23
BLACK LAGOON-EAST	000-035	80	1.8	<0.050	9	4.7	6840	3.6	128	<0.1	7.6	26
BLACK LAGOON-EAST	035-133	77	1.9	<0.050	9.3	4.2	7190	3.6	161	<0.1	7.9	21
BLACK LAGOON-EAST	133-182	76	3.2	<0.050	11	8.6	8380	4	201	<0.1	9.5	29
24 C1 BLLG-Nearshore	000-030	40	7.1	16	121	110	53300	218	743	1.2	58	3320
24 C1 (WWES Lab)	030-075	32	7.3	11	315	200	57000	337	827	1.2	144	2410
24 C1 BLLG-Nearshore (MDNR Lab)	030-075	32	12	30	418	233	76500	468	1100	1.3	206	3200
47E BLLG	Eckman	35	7	9.9	88	96	43000	160	620	11	52	1300
S7 - Black Lagoon	Ponar	55	nm	8.7	156	111	73000	254	873	<0.1	71	2060

TRENTON CHANNEL PROJECT		HEAVY METALS mg/kg										
SEDIMENT CHEMISTRY RESULTS	Core											
	length	%										
SITE DESCRIPTION	in cm	SOLIDS	TOT. As	TOT Cd	TOT. Cr	TOT. Cu	TOT. Fe	TOT. Pb	TOT. Mn	TOT. Hg	TOT. Ni	TOT. Zn
ERM (Long and Morgan, 1990)			85	9.6	145	390		110		1.3	50	270
SEL (Persuad et. al. OME, 1993)							40000		1100			
Quantification Level (EPA Method 245.1/7470.7471)										0.1		
40P East of Bouy N "6"	PONAR	48.1	4.7	<2	31	35	15500	36	270	0.18	25	130
41P NE of Bouy R "18"	PONAR	36	4.7	2.7	40	39	23400	60	403	0.23	30	221
44P DNS from Bouy R "28"	PONAR	28.9	13	3.5	62	92.5	37000	288	580	0.65	50	290
26P Riverside Hospital	PONAR	59.5	5.5	4.5	77	67.8	33000	130	545	0.56	44	730
27P Trenton Towers	PONAR	37.1	13	10	220	290	52000	261	760	6.4	88	945
28P Deadhead Cove	PONAR	36.9	6	3.5	60	57.9	39000	97.5	549	0.7	35	683
28PC2	PONAR	38.8	5.9	3.5	58	59.5	37000	98.5	530	0.67	36	680
ELIZABETH PARK CANAL	000-079	47	9.8	14	270	224	45700	279	610	5.6	100	842
ELIZABETH PARK CANAL	079-180	53	9.4	15	147	197	36500	218	510	2.3	48	711
ELIZABETH PARK CANAL	180-260	51	6.3	6.9	82	214	22000	183	400	1.5	36	537
ELIZABETH PARK CANAL	260-330	53	7.1	4.5	59	326	24700	279	369	2.4	33	742
16 C1 EPNC-Upper	000-080	54	11	8.9	167	164	48700	195	544	4.7	81	693
16 C1	080-120	49	11	14	172	196	26600	169	334	4	46	571
16 C1	120-157	56	12	15	124	201	35700	200	453	2.8	46	682
17 C1 EPNC-Inner	000-040	50	10	10	148	186	31000	164	328	7.4	62	552
17 C1	040-080	50	9.6	11	98	173	31300	154	375	2.6	38	554
17 C1	080-140	58	8.1	5.1	39	190	20300	162	274	1.8	31	534
17 C1	140-175	60	8.7	0.88	19	110	19100	100	239	1.2	24	305
18 C1 EPNC-Lower	000-055	44	9	5.8	129	159	23000	139	336	6.8	51	437
18 C1	055-125	47	9.8	12	163	194	25800	171	359	4.6	67	572
18 C1	125-170	52	7.5	8.3	102	167	24400	156	360	2.4	40	496
18 C1	170-217	59	5.3	2.1	24	170	16200	139	235	1.5	22	415
46E EPNC	Eckman	50	5.6	9.5	110	81	44000	120	650	1.5	70	460
29P EPC Bridge 1	PONAR	18.4	9	7	72	107	39000	129	580	0.4	43	795
30P EPC Bridge 2	PONAR	41.2	5.3	<0.05	27	27	13600	31	190	0.18	19	160
31P EPC Bridge 3	PONAR	36.8	7.9	4.5	73	68.5	38000	137	595	1.7	43	750
32P EPC Bridge 4	PONAR	25.7	8.2	9	146	114	43000	189	545	0.88	74.5	870
33P EPC Bridge 5	PONAR	54.4	9.9	9.9	100	106	43000	177	639	0.91	8.4	1020
EP MARINA - OUTSIDE	000-020	85	4	<0.050	20	17	15600	8.9	353	<0.1	21	64
EP MARINA - UPLAND	000-006	86	4.5	0.091	19	14	16000	6.4	333	<0.1	20	52
EP MARINA - RIVER BED UP.	000-010	59	6.2	7.4	220	113	37900	191	620	3	87	625
EP MARINA - RIVER BED UP.	010-020	60	7.3	9	276	148	51300	240	479	4.2	74	476
EP MARINA - RIVER BED UP.	020-028	57	7.5	9.3	278	125	39000	245	564	5.2	103	697
EP MARINA - RIVER BED UP.	028-038	58	6.5	10	304	144	47900	247	640	4.3	113	756
EP MARINA - RIVER BED DN.	000-013	68	5.9	4.1	125	70	36000	132	564	4	64	453
EP MARINA - RIVER BED DN.	013-018	71	5.3	4.2	134	72	47200	146	638	4	62	476
EP1 - Upland (S11)	Ponar	49	nm	6.5	131	108	38500	172	557	<0.1	66	469
EP2 - Mid Marina (S12)	Ponar	43	nm	7.7	188	102	56000	179	672	<0.1	99	754
EP3 - South Marina (S13)	Ponar	31	nm	5.1	149	77	79200	177	806	<0.1	87	613

TRENTON CHANNEL PROJECT		HEAVY METALS mg/kg										
SEDIMENT CHEMISTRY RESULTS	Core											
	Length	%										
SITE DESCRIPTION	in cm	SOLIDS	TOT. As	TOT Cd	TOT. Cr	TOT. Cu	TOT. Fe	TOT. Pb	TOT. Mn	TOT. Hg	TOT. Ni	TOT. Zn
ERM (Long and Morgan, 1990)			85	9.6	145	390		110		1.3	50	270
SEL (Persuad et. al. OME, 1993)							40000		1100			
Quantification Level (EPA Method 245.1/7470.7471)										0.1		
EPM (new site)	Ponar		12	13	340	167	47000	258	723	4.4	148	916
EPM-N	Eckman	24	10	5.5	110	147	43000	141	575	1.5	60.5	765
S11-EPM Upland	Ponar		12	6.9	114	116	36000	149	589	2.3	62.4	574
S11D- EPM Upland Dup.	Ponar		12	7	113	117	36000	139	600	2.3	62	565
EPM-1 (S11-EPM Upland)	Eckman	32	10	5.9	112	137	43000	153	589	1.8	60.9	772
S12-EPM Mid	Ponar		10	8.4	187	125	40000	175	649	2.9	90.6	762
EPM-2 (S12-EPM Mid)	Eckman	36	10	6	121	139	45000	147	670	1.6	68.5	760
EPM2-dup (S12- EPM Upland)	Eckman	36	11	5.9	117	136	43000	149	653	1.7	67.8	782
S13-EPM South	Ponar		13	7.4	128	129	45000	177	718	3.1	64.4	683
EPM-3 (S13-EPM South)	Eckman	54	9.1	2.5	64	65	41000	100	695	3.8	49	500
34P EPSC DOCK	PONAR	42.4	12	13	205	165	58900	272	777	1.6	8.4	1010
35P EPSC-Inlet	PONAR	44.9	11	11	100	126	49000	149	658	1.2	8.4	1200
35PC2	PONAR	44.9	8.4	9.5	93	118	47000	139	660	1	8.5	1100
20 C1 EPSC-Inlet	000-083	53	13	13	225	160	58700	273	658	4	102	839
20 C1	083-088	55	22	11	186	153	82700	347	942	5.1	86	1050
49E EPSC	Eckman	20	7.6	7.2	71	100	34000	100	530	0.96	48	590
36P Monsanto Lagoon	PONAR	42	23	16	193	194	80200	246	1080	3.9	89	996
19 C1 Monsanto Bay	000-053	52	8.8	8.2	150	165	59100	222	736	3.6	71	701
19 C1	053-085	63	8.8	3.6	86	125	66300	148	729	3.9	55	433
19 C2 Monsanto Bay	000-051	51	9.3	7.6	135	145	44300	201	622	3.3	63	607
19 C2	051-085	65	8.9	3.4	77	113	59800	139	709	3.2	49	399
CHRYSLER BAY-INNER	000-030	15	3.6	0.55	7.1	17	7930	10	80	0.2	11	88
CHRYSLER BAY-INNER	030-058	69	3.6	0.15	15	29	13700	13	75	<0.10	21	72
CHRYSLER BAY-INNER	058-079	78	7.7	<0.05	12	17	19800	13	123	<0.10	23	88
CHRYSLER BAY-OUTER	000-013	65	5.9	4.4	78	82	27100	105	508	1.5	53	523
CHRYSLER BAY-OUTER	013-061	70	7.1	0.28	14	19	16100	11	350	<0.10	27	67
37P Chry Bay Marsh Inlet	PONAR	52.8	4.9	<0.05	28.5	33	17300	31	310	0.18	25	250
39P Swan Island-North	PONAR	41	4.3	3.2	37	46	17700	44	286	0.38	29	178
38P Above Humbug Marina	PONAR	25	4.6	7.4	73	94	25200	87	349	0.87	54	661
S9 - Chrysler Bay	Ponar	73	nm	4.2	77	61	55200	95	620	<0.1	56	765
CELERON ISLAND	000-043	51	4.1	0.3	9.7	34	10600	22	162	0.16	16	68
CELERON ISLAND	043-074	72	4.3	0.22	15	23	14500	12	100	<0.10	22	76
CELERON ISLAND	074-107	80	7.1	0.12	6.1	18	17500	7.1	359	<0.10	19	61

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS			PCBs SCAN mg/kg d.w.						
SITE DESCRIPTION	Core Length in cm	TOT. PCB	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
ERM (Long and Morgan, 1990)		0.4							
Quantification Level (EPA Method 608/8081)		0.33							
55C1 Allied Oil Slip NW	000-030	8.87							
	030-091	12.65					4.24	2.71	1.32
	091-152	8.32					6.89	4.05	1.71
	152-218	7.10					3.07	3.9	1.35
							1.86	5.24	<0.33
55C2 Allied Oil Slip NW - dup	000-030	7.06							
	030-091	9.25					3.11	3.95	<0.33
	091-147	8.70					5.21	4.04	<0.33
							3.75	4.95	<0.33
56C1 Nickelson South Slip	000-030	5.17							
	030-043	7.39					1.77	1.79	1.61
							2.39	2.27	2.73
56C2 Nickelson South Slip -dup	000-030	4.98							
	030-091	8.11					1.53	1.61	1.84
	091-152	1.57					4.44	2.33	1.34
	152-201	2.18					0.61	0.66	0.3
							0.58	0.63	0.97
59C1 Stenson Club	000-030	7.15							
	030-091	6.98					2.71	2.08	2.36
	091-152	5.61					3.29	1.99	1.7
	152-213	1.25					2.97	1.67	0.97
	213-224	1.45					0.68	0.57	< 0.33
							0.77	0.68	< 0.33
64P Mud Island Northside	Ponar	0.17							
							0.17	< 0.33	< 0.33
65P Mud Island SW	Ponar	0.91							
							0.37	0.28	0.26
60C1 Mud Island -South side	000-030	1.04							
	030-091	1.61					0.54	0.5	< 0.33
	091-137	1.03					0.65	0.53	0.43
							0.54	0.49	< 0.33
53C1 Grassy Island NW	000-030	< 0.33							
	030-071	< 0.33							
54C1 Grassy Island NE	000-034	0.61							
							0.37	0.24	< 0.33
63P Grassy Island W	Ponar	0.00							
							< 0.33	< 0.33	< 0.33
61P Grassy Isalnd SW	Ponar	0.41							
							0.19	0.22	< 0.33
62P Grassy Island SE	Ponar	0.43							
							0.25	0.18	< 0.33
57P Mouth of Ecorse Creek	Ponar	3.49							
							1.3	1.1	1.09
58C1 Mouth of Ecorse Creek	000-030	1.11							
							0.58	0.53	< 0.33
52C1 BASF Northworks lower	000-030	1.93							
	030-091	1.30					0.74	0.75	0.44
	091-152	0.42					0.36	0.66	0.28
	152-213	0.00					0.18	0.24	< 0.33
	213-218	0.00					< 0.33	< 0.33	< 0.33
							< 0.33	< 0.33	< 0.33
69C1 Wyandotte Yacht Club	000-030	3.29							
	030-066	1.77					1.62	1.05	0.62
							0.65	0.59	0.53
68P N of Pt. Hennepin	Ponar	< 0.33							
68E N of Pt. Hennepin	Eckman	< 0.33							
67C1 Portofino	000-030	1.88							
							0.66	0.62	0.6
43P Portofino Slip	PONAR		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
42P Pt. Hennepin	PONAR		<0.33	<0.46	<0.33	<0.33	<0.33	<0.33	<0.33

TRENTON CHANNEL PROJECT									
SEDIMENT CHEMISTRY RESULTS			PCBs SCAN						
SITE DESCRIPTION	Core Length in cm	TOT. PCB	mg/kg d.w. PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
ERM (Long and Morgan, 1990)		0.4							
Quantification Level (EPA Method 608/8081)		0.33							
15 C1 T.C. North Marsh	000-022								
15 C1	022-062		<0.33	<0.42	<0.33	<0.33	<0.33	<0.33	<0.33
15 C1	062-100		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
			<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
51 C 1 Firestone upper	000-030	18.40							
	030-091	9.31					3.2	1.8	13.4
	091-152	14.20					4.39	1.95	2.97
	152-194	5.39					4.55	2.6	7.05
							2.96	2.43	< 0.33
66C1 Firestone Steel -Mid (45P si	000-030	4.99							
	030-091	3.85					1.96	1.36	1.67
	091-104	0.65					1.31	0.89	1.65
							< 0.33	0.18	0.47
45P Firestone Steel	PONAR	1.10	<4.4	<1.2	<4.4	<4.4	<4.4	<0.33	1.10
	PONAR	2.20	<1.1	<1.1	<1.1	<1.1	<1.1	2.20	<1.1
45PC2	PONAR	2.56	<1.1	<1.1	<1.1	<1.1	<1.1	1.70	0.87
50P Firestone lower	Ponar	3.43							
							1.26	1.31	0.86
MONGUAGON CREEK-UPSTREAM	000-030	2.4	<2.0	<1.3	<1.3	<2.0	<2.0	<2.6	2.4
MONGUAGON CREEK-UPSTREAM	030-104	2.5	<2.9	<2.9	<2.9	<2.9	<2.9	<2.9	2.5
MONGUAGON CREEK-UPSTREAM	104-142	11.2	<1.3	<1.3	<1.3	<1.3	5.7	5.5	<1.3
MONGUAGON CREEK-UPSTREAM	000-030	2.1	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	2.1
MONGUAGON CREEK-UPSTREAM	030-076	9.9	<3.1	<3.1	<3.1	<3.1	<3.1	<3.1	9.9
MONGUAGON CREEK-UPSTREAM	076-150	9.7	<2.8	<5.6	<2.8	<2.8	4.9	<4.8	4.8
MONGUAGON CREEK-UPSTREAM	150-180	10	<2.2	<4.4	<2.2	<2.2	5.7	4.3	<3.9
48E Monguagon Creek	Eckman	1.52							1.52
S5 - Monguagon Creek	Ponar	6.18							
FI - Fighting Island	Ponar	0.08							
25 C1 MNCK DNS-Nearshore	000-027		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
25 C1	027-051		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
25 C1	051-095	1.08	<0.33	<0.33	<0.33	<0.33	0.36	<0.33	0.72
25 C1	095-132	1.15	<0.33	<0.33	<0.33	<0.33	0.58	<0.33	0.57
21 C1 MNCK DNS-Offshore	000-027		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
21 C1	027-051		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
MONGUAGON CREEK-DOWN	000-150	5.9	<0.33	<2.8	<0.33	<0.33	2.3	<5.5	3.6
MONGUAGON CREEK-DOWN	150-168	12.3	<0.33	<5.3	<0.33	<0.33	9.6	<7.2	2.7
BLACK LAGOON-CENTER	000-030	0	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91	<0.91
BLACK LAGOON-CENTER	030-120	6.5	<2.0	<2.0	<2.0	<2.0	2.4	<3.9	4.1
BLACK LAGOON-CENTER	120-210	1.8	<1.1	<1.1	<1.1	<1.1	<1.1	1.8	<1.1
BLACK LAGOON-CENTER	210-229	0	<0.44	<1.3	<0.44	<0.44	<0.44	<0.44	<0.44
BLACK LAGOON-LOWER	000-060	2.8	<3.2	<3.2	<3.2	<3.2	<3.2	2.8	<1.3
BLACK LAGOON-LOWER	060-152	0	<4.0	<5.2	<4.0	<4.0	<4.0	<2.7	<1.3
BLACK LAGOON-LOWER	152-203	0	<1.7	<1.7	<2.5	<1.7	<1.7	<1.7	<0.81
BLACK LAGOON-EAST	000-055	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	055-103	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	103-166	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	166-229	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	000-035	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	035-133	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	133-182	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
24 C1 BLLG-Nearshore	000-030	1.64	<0.42	<2.8	<0.42	0.81	<0.42	0.83	<0.42
24 C1 (WWES Lab)	030-075	2.50	<0.51	<0.51	<0.51	<0.51	1.10	<0.51	1.40
24 C1 BLLG-Nearshore (MDNR Lab)	030-075								
47E BLLG	Eckman	3.27					1.2	0.92	1.15
S7 - Black Lagoon	Ponar	4.75							

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS			PCBs SCAN						
SITE DESCRIPTION	Core Length in cm	TOT. PCB	mg/kg d.w. PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
ERM (Long and Morgan, 1990)		0.4							
Quantification Level (EPA Method 608/8081)		0.33							
40P East of Bouy N "6"	PONAR		<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
41P NE of Bouy R "18"	PONAR	0.56	<1.1	<1.1	<1.1	<1.1	<1.1	<0.37	0.56
44P DNS from Bouy R "29"	PONAR		<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
26P Riverside Hospital	PONAR		<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
27P Trenton Towers	PONAR		<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
28P Deadhead Cove	PONAR		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
28PC2	PONAR		<0.9	<0.9	<0.9	<0.9	<0.9	<0.9	<0.9
ELIZABETH PARK CANAL	000-079	2.72	<0.71	<1.4	<0.71	<0.71	1.8	<0.71	0.92
ELIZABETH PARK CANAL	079-180	0	<0.33	<0.33	<0.33	<0.33	<0.66	<0.33	<0.33
ELIZABETH PARK CANAL	180-260	0	<0.52	<0.52	<0.65	<0.33	<0.33	<0.33	<0.33
ELIZABETH PARK CANAL	260-330								
16 C1 EPNC-Upper	000-080	10.30	<2.4	<2.4	<2.4	6.90	<2.4	3.40	<0.61
16 C1	080-120		<0.68	<2.7	<0.68	<0.68	<0.68	<0.68	<0.68
16 C1	120-157	0.41	<0.34	<3.57	<0.34	<0.34	<0.34	0.41	<0.34
17 C1 EPNC-Inner	000-040	2.24	<0.66	<2.64	<0.66	<0.66	<0.66	2.24	<0.66
17 C1	040-080		<2.8	<2.1	<2.8	<2.8	<2.8	<0.65	<0.65
17 C1	080-140		<0.33	<0.46	<0.33	<0.33	<0.33	<0.33	<0.33
17 C1	140-175		<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
18 C1 EPNC-Lower	000-055	2.30	<.4	<1.5	<0.4	<0.4	<0.4	2.30	<0.4
18 C1	055-125	0.66	<.71	<1.4	<0.71	<0.71	<0.71	0.66	<0.35
18 C1	125-170	1.40	<1.4	<2.1	<1.4	<1.4	<1.4	1.40	<1.4
18 C1	170-217		<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
46E EPNC	Eckman	1.71					0.58	0.47	0.66
29P EPC Bridge 1	PONAR	0.00	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2	<2.2
30P EPC Bridge 2	PONAR	0.00	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75	<0.75
31P EPC Bridge 3	PONAR	0.00	<1	<1	<1	<1.0	<1.0	<1.0	<1.0
32P EPC Bridge 4	PONAR	5.50	<1.7	<1.7	<1.7	2.30	<1.7	1.50	1.70
33P EPC Bridge 5	PONAR	0.84	<0.95	<0.95	<0.95	<0.95	<0.95	0.84	<0.95
EP MARINA - OUTSIDE	000-020	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
EP MARINA-UPLAnd	000-006	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
EP MARINA-RIVER BED UP.	000-010	1.37	<0.33	<0.45	<0.33	<0.33	0.82	<0.33	0.55
EP MARINA-RIVER BED UP.	010-020	1.43	<0.55	<1.7	<0.55	<0.55	0.96	<0.55	0.47
EP MARINA-RIVER BED UP.	020-028	1.94	<0.58	<0.58	<0.58	<0.58	1.4	<0.66	0.54
EP MARINA-RIVER BED UP.	028-038	1.68	<0.23	<0.45	<0.45	<0.45	1.3	<0.49	0.38
EP MARINA-RIVER BED DN.	000-013	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
EP MARINA-RIVER BED DN.	013-018	0	<1.8	<1.8	<1.8	<1.8	<1.8	<0.33	<0.33
EP1 - North Marina	Ponar	1.27							
EP2 - Mid Marina	Ponar	2.63							
EP3 - South Marina	Ponar	1.59							
EPN (new site)	Ponar	0							
EPM-N	Eckman	< 0.33							

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS			PCBs SCAN mg/kg d.w.						
SITE DESCRIPTION	Core Length in cm	TOT. PCB	PCB-1016	PCB-1221	PCB-1232	PCB-1242	PCB-1248	PCB-1254	PCB-1260
ERM (Long and Morgan, 1990)		0.4							
Quantification Level (EPA Method 608/8081)		0.33							
S11-EPM Upland	Ponar	0							
S11D- EPM Upland Dup.	Ponar	0							
EPM-1 (S11-EPM Upland)	Eckman	< 0.33							
S12-EPM Mid	Ponar	0							
EPM-2 (S12-EPM Mid)	Eckman	< 0.33							
EPM2-dup (S12- EPM Upland)	Eckman	0							
S13-EPM South	Ponar	0							
EPM-3 (S13-EPM South)	Eckman	< 0.33							
34P EPSC DOCK	PONAR	0.83	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	0.83
35P EPSC-Inlet	PONAR	0.00	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
35PC2	PONAR	0.00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
20 C1 EPSC-Inlet	000-083	2.40	<0.33	<0.33	<0.33	<0.33	1.30	1.10	<0.33
20 C1	083-088	1.33	<0.33	<0.33	<0.33	<0.33	0.54	0.79	<0.33
49E EPSC	Eckman	0							
36P Monsanto Lagoon	PONAR	0.90	<0.33	<0.33	<0.33	<0.33	0.57	<0.33	0.33
19 C1 Monsanto Bay	000-053	0.54	<0.33	<0.33	<0.33	<0.33	<0.33	0.54	<0.33
19 C1	053-085	1.15	<0.3	<1.0	<0.33	<0.33	0.36	0.79	<0.33
19 C2 Monsanto Bay	000-051	2.40	<0.33	<0.33	<0.33	<0.33	1.10	1.30	<0.33
19 C2	051-085	1.37	<0.33	<0.33	<0.33	<0.33	0.42	0.95	<0.33
CHRYSLER BAY-INNER	000-030	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CHRYSLER BAY-INNER	030-058	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CHRYSLER BAY-INNER	058-079	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CHRYSLER BAY-OUTER	000-013	1.79	<0.41	<0.81	<0.41	<0.41	0.98	0.81	<0.41
CHRYSLER BAY-OUTER	013-061	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
37P Chry Bay Marsh Inlet	PONAR	0.00	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8
39P Swan Island-North	PONAR	0.00	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
38P Above Humbug Marina	PONAR	0.00	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
S9 - Chrysler Bay	Ponar	1.39							
CELERON ISLAnd	000-043	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CELERON ISLAnd	043-074	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CELERON ISLAnd	074-107	0	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33

TRENTON CHANNEL PROJECT			acenaphthene			benzo(a)anthracene			chrysene					indendo(1,2,3-cd)pyrene			
SEDIMENT CHEMISTRY RESULTS				acenaphthylene		benzo(b&k)fluoranthene			dibenzo(a,h)anthracene					naphthalene			
						anthracene			benzo(a)pyrene			fluoranthene			phenanthrene		
ERM (Long and Morgan, 1990)		35							benzo(g,h,i)perylene			fluorene				pyrene	
			PAH SCAN														
SITE DESCRIPTION	ore Length		mg/kg d.w.														
	in cm	TOT. PAHS	A1	A2	A3	B1	B2	B3	B4	C1	D1	F1	F2	I1	N1	P1	P2
55C1 Allied Oil Slip NW	000-030	68.3			3.3	6.3	8.9	5.3	2.1	8.7		6		2.4	2.6	8.7	14
	030-091	53.2			2.7	4.5	6.3	3.7	2	4.8		4.6	1.6	2.3	2.1	7.6	11
	091-152	48.12	1.9	0.7	4.4	3.3	4	2.4	1.7	3.7		3.5	3	1.6	1.4	8.4	8.1
	152-218	83.2	2.8	1.1	9.3	7.8	6.5	4.6	2	5.6		4	8.6	1.7	2.2	16	11
55C2 Allied Oil Slip NW - d	000-030	77.63	0.93	1.2	3.2	7.3	9.8	6.5	3.7	9.3	1.1	8.6	1.8	3.4	2.8	8	12
	030-091	39.22	0.73		1.9	3.8	4.4	2.6	2.2	4.4		3.3	0.73	1.5	1.3	5.2	7.2
	091-147	73.19	1.4	0.9	4.3	6.3	7.1	4.4	7.9	5	0.72	5.7	4.4	2.2	1.9	10	11
56C1 Nickelson South Slip	000-030	24.45				2.1	4.1	2	1	2.8		3.4		1		2.1	6
	030-043	82.2			1.8	4.1	6.9	3.8	2.3	5.3		12				11	15
56C2 Nickelson South Slip -d	000-030	26.7				2.1	3	2	2	2.7		4.1		1.1		3.5	6.2
	030-091	92.97	1.5	0.8	3.1	6.2	9.5	5.2	3.9	7.2		18	2.5	2.3	1.8	16	15
	091-152	32.67			1.2	2.9	4.3	2.3	1.7	3.3		4.4	1.2	0.87	1.2	4.5	4.8
	152-201	31.2			1.1	2.9	4.5	2.5	1.6	3.5		4.3		1.1	1.7	3	5
59C1 Stenson Club	000-030	22.49				2.2	3.6	2.1	1.7	2.3		2.7		0.9	1	2.9	3.1
	030-091	44.49	0.79		2.2	3.9	5.7	3.4	1.8	4.5		5.2	1	1.1	1.3	6.7	6.9
	091-152	123.3	2.5	1.4	6.9	9.5	12	8.3	3.9	9.8		18	6	2.3	2.9	23	17
	152-213	131.96	2.2	1	7.1	11	13	9.1	5.3	11	0.86	20	3.5	2.8	4.5	22	19
	213-224	94.79	2.6	0.8	5.4	8.1	8.5	6.6	3.8	7.7		14	3.3	1.9	3.1	17	12
64P Mud Island Northside	Ponar	47.82	0.53	0.6	1.6	4.4	7.3	4.5	2.5	4.8	0.87	7.4	0.96	2.6	2.9	4.4	2.5
65P Mud Island SW	Ponar	47.69		0.6	1.6	4.4	7.3	4.8	2.5	4.8	0.73	5.8	0.79	2.6	2.1	4	5.7
60C1 Mud Island -South side	000-030	18.8			1.1	2.1	0.7	2.1	1	2		2.6		0.96	0.7	2.4	3
	030-091	0.56															0.56
	091-137																
53C1 Grassy Island NW	000-030	1.99										0.89					1.1
	030-071	5.33				0.65	0.7	0.6		0.8		0.89				0.71	1
54C1 Grassy Island NE	000-034	6.62				0.85	0.9	0.9		0.8		1.1				0.76	1.3
63P Grassy Island W	Ponar	16.07			0.7	1.6	2.7	1.8	0.7	1.8		2.6		0.72		1.4	2.2
61P Grassy Island SW	Ponar	23.1			0.86	2.2	3.5	2.3	0.9	2.4		3.6		0.99	1.1	2	3.4
62P Grassy Island SE	Ponar	32.1			1.1	2.9	5.3	3.5	1.5	3.3		4.3		1.5	2	2.8	3.9
57P Mouth of Ecorse Creek	Ponar	25.9				2	4.4	2.3	1.9	2.6		3.7		1.2	1.4	2.9	3.5
58C1 Mouth of Ecorse Creek	000-030	< 0.33															
52C1 BASF Northworks lower	000-030	32.1			1.5	2.8	3.6	2.4	1.7	3.2		3.2	0.66	1.5	2.6	4.6	4.3
	030-091	37.24			1.9	3.2	3.9	2.5	1.5	3.7	0.67	3.6	0.67	1.9	3.1	5.3	5.4
	091-152	88.1	1	1.3	5.2	7.6	9.2	6	3.2	7.5	1.1	8.2	3	3.6	4.2	13	14
	152-213	87.7	0.9	1.8	5.2	7.6	8.7	5.6	2.2	7.5	1.1	8.1	3.8	3.4	5.8	14	12
	213-218	6.36										0.96			3.4	1.3	0.73

TRENTON CHANNEL PROJECT				acenaphthene			benzo(a)anthracene		chrysene						indendo(1,2,3-cd)pyrene			
SEDIMENT CHEMISTRY RESULTS				acenaphthylene			benzo(b&k)fluoranthene			dibenzo(a,h)anthracene				napthalene				
					anthracene			benzo(a)pyrene				fluoranthene			phenanthrene			
ERM -Long and Morgan, 1990)		35							benzo(g,h,i)perylene				fluorene				pyrene	
SITE DESCRIPTION	ore Length		PAH SCAN	mg/kg d.w.														
	in cm	TOT. PAHS	A1	A2	A3	B1	B2	B3	B4	C1	D1	F1	F2	I1	N1	P1	P2	
69C1 Wyandotte Yatch Club	000-030	33.44			0.94	2.8	4.7	2.4	1.6	3.4		5.3		1.6	1.2	3.8	5.7	
	030-066	32.14			0.87	2.8	4.6	2.4	1.4	3.3		5.1		1.6	1.2	3.4	5.5	
68P N of Pt. Hennepin	Ponar	12.29				1	1.8	1.1	0.7	1.2		1.8		0.72	0.68	1.3	2	
68E N of Pt. Hennepin	Eckman	4.86				0.68		0.6		0.7		1.1				0.69	1.1	
67C1 Portofino	000-030	14.3				1.2	2.5	1.3	1	1.6		2.1		1		1.3	2.3	
43P Portofino Slip	PONAR	6.99	<0.33	<0.33	<0.33	0.61	1.3	<0.33	<0.3	0.8	<0.33	1.5	<0.33	0.42	<0.33	0.96	1.4	
42P Pt. Hennepin	PONAR	1.14	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	0.44	0.7	
15 C1 T.C. North Marsh	000-022	0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
15 C1	022-062	0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
15 C1	062-100	0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
51 C 1 Firestone upper	000-030	34.36			1.8	2.6	3.6	2.1	1.2	3.1		4.1	0.85	1.4	3	5.8	4.8	
	030-091	36.69			1.5	2.6	3.5	1.9	1.1	2.9		3.5	0.65	1.2	6.5	4.9	6.2	
	091-152	53.5	0.9		2.5	3.9	5.5	2.9	1.1	4.2		4.5	1.7	1.5	8.4	6	8.4	
	152-194	38.85			1.4	3.2	4.5	2.4	1.3	3.4		3.1	0.85	1.4	5.9	4.8	6.6	
66C1 Firestone Steel -Mid (	000-030	28.5			1.2	2.5	2.7	1.8	0.8	3.1		4.4	0.8	0.91	2.1	3.7	4.5	
	030-091	34.66			1.4	2.9	4.3	2.4	1	3.4		5	1.1	1.1	2.7	4.6	4.8	
	091-104	85.51	0.73	1	3.6	8.6	11	7.6	3.5	9.3	0.92	11	1.2	2.7	2.4	9.3	13	
50P Firestone lower	Ponar	204.2	2.8		4.3	17	28	12	4.6	18	1.9	36	2.7	7.9	2.1	32	35	
MONGUAGON CREEK-UPSTREAM	000-030	13.4	<0.41	<0.41	<0.41	1.1	2.1	1.1	1	1.5	<0.41	2	<0.41	0.71	0.52	1.3	2.1	
MONGUAGON CREEK-UPSTREAM	030-104	5.6	<0.36	<0.36	<0.36	0.51	0.8	0.4	0.4	0.7	<0.36	0.97	<0.36	<0.36	<0.36	0.81	1.1	
MONGUAGON CREEK-UPSTREAM	104-142	7.3	<0.33	<0.33	<0.33	0.59	0.8	0.4	0.3	0.8	<0.33	1.2	<0.33	<0.33	0.54	1.2	1.4	
MONGUAGON CREEK-UPSTREAM	000-030	8.8	<0.41	<0.41	<0.41	0.91	1.5	0.9	0.7	1	<0.41	1.3	<0.41	0.51	<0.41	0.81	1.3	
MONGUAGON CREEK-UPSTREAM	030-076	9.1	<0.39	<0.39	<0.39	0.87	1.4	0.8	0.6	1	<0.39	1.5	<0.39	0.47	<0.39	0.98	1.5	
MONGUAGON CREEK-UPSTREAM	076-150	2.7	<0.36	<0.36	<0.36	<0.36	0.5	<0.36	<0.3	0.4	<0.36	0.61	<0.36	<0.36	<0.36	0.5	0.65	
MONGUAGON CREEK-UPSTREAM	150-180	3.4	<0.33	<0.33	<0.33	0.33	0.6	<0.33	<0.3	0.5	<0.33	0.66	<0.33	<0.33	<0.33	0.69	0.67	
48E Monguagon Creek	Eckman	100.37		1.1	2.8	11	19	9.3	2.7	9.4	1.3	14	0.97	4.9	3.1	6.3	15	
SS - Monguagon Creek	Ponar	218.4																
FI - Fighting Island	Ponar	0																
25 C1 MNCK DNS-Nearshore	000-027	7.82	<0.33	<0.33	<0.33	0.77	0.8	0.9	0.5	0.9	<0.33	1.4	<0.33	0.47	<0.33	0.86	1.3	
25 C1	027-051	8.39	<0.33	<0.33	<0.33	0.75	1.3	0.8	0.5	0.9	<0.33	1.5	<0.33	0.41	<0.33	0.85	1.4	
25 C1	051-095	6.31	<0.33	<0.33	<0.33	0.62	0.9	0.6	0.4	0.7	<0.33	1.2	<0.33	<0.33	<0.33	0.73	1.2	
25 C1	095-132	3.58	<0.33	<0.33	<0.33	0.39	0.4	<0.33	<0.3	0.4	<0.33	0.83	<0.33	<0.33	<0.33	0.53	0.99	
21 C1 MNCK DNS-Offshore	000-027	0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
21 C1	027-051	0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	
MONGUAGON CREEK-DOWN	000-150	9.1	<0.35	<0.35	<0.35	0.71	1.2	0.6	0.4	1	<0.35	1.5	<0.35	<0.35	0.63	1.4	1.7	
MONGUAGON CREEK-DOWN	150-168	4.2	<0.33	<0.33	<0.33	0.36	0.6	<0.33	<0.3	0.5	<0.33	0.78	<0.33	<0.33	0.34	0.84	0.82	
BLACK LAGOON-CENTER	000-030	7.5	<0.44	<0.44	<0.44	0.73	1.3	0.7	0.7	1	<0.44	1.2	<0.44	<0.44	<0.44	0.65	1.3	
BLACK LAGOON-CENTER	030-120	10.9	<0.49	<0.49	<0.49	0.85	1.5	0.7	0.7	1.5	<0.49	1.8	<.49	<0.49	<0.49	1.8	2	
BLACK LAGOON-CENTER	120-210	19.1	<0.42	<0.42	0.58	1.4	1.8	0.9	0.7	2.1	<0.42	3.1	0.63	0.48	0.8	3.2	3.5	
BLACK LAGOON-CENTER	210-229	15.1	<0.33	<0.33	0.51	1.7	2.1	1.3	0.8	1.7	<0.33	2.4	<0.33	0.63	<0.33	1.4	2.6	

TRENTON CHANNEL PROJECT			acenaphthene			benzo(a)anthracene			chrysene					indeno(1,2,3-cd)pyrene			
SEDIMENT CHEMISTRY RESULTS				acenaphthylene			benzo(b&k)fluoranthene			dibenzo(a,h)anthracene			naphthalene				
					anthracene			benzo(a)pyrene			fluoranthene			phenanthrene			
ERM (Long and Morgan, 1990)		35							benzo(g,h,i)perylene			fluorene					pyrene
SITE DESCRIPTION	ore Length		PAH SCAN mg/kg d.w.														
	in cm	TOT. PAHS	A1	A2	A3	B1	B2	B3	B4	C1	D1	F1	F2	I1	N1	P1	P2
BLACK LAGOON-LOWER	000-060	5.0	<0.40	<0.4	<0.4	0.46	0.7	<0.4	<0.4	0.7	<0.4	1.1	<0.4	<0.4	<0.4	1	1.1
BLACK LAGOON-LOWER	060-152	20.0	<0.33	<0.33	0.74	1.6	2.2	1.1	0.8	2.2	<0.33	3.3	0.51	0.65	0.8	2.6	3.5
BLACK LAGOON-LOWER	152-203	8.1	<0.33	<0.33	<0.33	0.69	1	0.5	0.4	1	<0.33	1.4	<0.33	<0.33	0.49	1	1.6
BLACK LAGOON-EAST	000-055	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	055-103	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	103-166	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	166-229	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.83	<0.33	<0.33
BLACK LAGOON-EAST	000-035	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	035-133	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
BLACK LAGOON-EAST	133-182	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
24 C1 BLLG-Nearshore	000-030	9.09	<0.82	<0.82	<0.82	0.95	1.7	<0.82	0.8	1.2	<0.82	1.8	<0.82	<0.82	<0.82	0.92	1.7
24 C1 (WWES Lab)	030-075	3.24	<0.51	<0.51	<0.51	<0.51	0.7	<0.51	<0.5	<0.5	<0.51	0.94	<0.51	<0.51	<0.51	0.6	0.96
24 C1 BLLG-Nearshore (MDNR Lab)	030-075	3.02	<0.78	<0.78	<0.78	<0.78	<1.6	<1.6	<3.9	0.8	<3.9	1.1	<0.78	<3.9	<0.78	1.1	<0.78
47E BLLG	Eckman	14.97				1.4	2.3	1.5	1	1.7		1.9		1		1.4	2.8
S7 - Black Lagoon	Ponar	70.5															
40P East of Bouy N "6"	PONAR	7.38	<0.45	<0.45	<0.45	0.82	1.1	1.0	<2.3	1	<2.3	1.1	<0.45	<2.3	<0.45	0.5	1.1
41P NE of Bouy R "18"	PONAR	10.36	<0.46	<0.46	<0.46	0.91	1.8	1	0.6	1	<0.46	1.9	<0.46	0.5	<0.46	1.1	1.6
26P Riverside Hospital	PONAR	19.02	<0.4	<0.4	0.42	1.8	2.4	3.9	<2.0	2.6	<2.0	4.2	<0.4	1.7	<0.4	2	<0.4
27P Trenton Towers	PONAR	8	<0.65	<0.65	<0.65	1	<1.3	<1.3	<3.3	1.2	<3.3	1.2	<0.65	<3.3	<0.65	1.4	1.2
28P Deadhead Cove	PONAR	7.24	<0.5	<0.5	<0.5	1.1	<1	<1.0	<0.2	1.3	<2.5	1.7	<0.5	<2.5	0.44	1.2	1.5
28PC2	PONAR	6.54	<0.45	<0.45	<0.45	0.82	<.9	1.7	<2.3	1.6	<2.3	1.2	<0.45	<2.3	0.46	0.8	<0.46
ELIZABETH PARK CANAL	000-079	20.0	<0.363	0.36	0.42	2	1.9	1.2	0.8	2.8	<0.36	3.5	0.48	0.58	0.48	2.5	3.3
ELIZABETH PARK CANAL	079-180	31.9	<0.33	<0.33	1.1	3	3.8	2.2	1.4	3.8	<0.33	5.7	0.66	1	0.83	4	4.4
ELIZABETH PARK CANAL	180-260	51.5	0.42	<0.33	2.7	4.5	5.2	3.6	1.9	4.9	<0.33	8.8	1.3	1.4	1	8	7.8
ELIZABETH PARK CANAL	260-330	56.8	<1.65	<1.65	3	5.4	6	4	2.6	6.2	<1.65	8	1.7	1.9	<1.65	8	10
16 C1 EPNC-Upper	000-080	23.24	0.36	<0.33	0.58	3.1	2.5	<0.33	<0.3	5.2	<0.33	3.4	<0.33	<0.33	<0.33	2.8	5.3
16 C1	080-120	20.62	0.35	<0.34	0.83	2.1	2	<0.34	<0.3	2.4	<0.34	3.9	0.37	0.5	0.77	3.2	4.2
16 C1	120-157	34.99	0.39	<0.33	1	3.8	3.4	2.3	<0.3	4.6	<0.33	5.1	<0.33	0.99	0.61	5.8	7
17 C1 EPNC-Inner	000-040	27.87	<0.33	<0.33	0.7	3.5	2.7	2.2	1.1	5.7	<0.33	3.3	<0.33	0.77	<0.33	2.1	5.8
17 C1	040-080	31.8	<0.33	<0.33	1.3	3.8	4	1.9	1.6	4	<0.33	5.3	<0.33	1.2	<0.33	3.1	5.6
17 C1	080-140	49.62	0.51	<0.33	2.5	6.1	6.2	2.7	<0.3	5.9	<0.33	7.7	0.61	1.8	<0.33	5.6	10
17 C1	140-175	33.63	0.83	<0.33	2.1	2.8	3.6	1.6	1.4	3.2	<0.33	5.2	<0.33	1	<0.33	5.9	6
18 C1 EPNC-Lower	000-055	28.29	<0.38	<0.38	0.82	2.9	2.7	1.9	0.9	3.8	0.38	4.5	0.41	0.82	0.47	3.3	5.4
18 C1	055-125	12.86	<0.35	<0.35	<0.35	1.4	1.3	0.8	0.5	1.7	<0.35	2.3	<0.35	0.36	0.35	1.8	2.8
18 C1	125-170	29.39	<0.33	<0.33	0.82	3.1	3.3	2.3	1.3	3.6	0.44	4.8	0.38	1	0.36	3.1	5.1
18 C1	170-217	45.23	<0.33	<0.33	2	5.5	4.3	3.8	1.8	5.3	0.58	6.3	0.45	1.4	<0.33	4.3	9.5
46E EPNC	Eckman	27.17			0.67	2.3	4.6	2.4	1	3.1		3.1		1.8	1.1	2.8	4.5
29P EPC Bridge 1	PONAR	0	<1.1	<1.1	<1.1	<1.1	<2.2	<2.2	<5.5	<1.1	<5.5	<1.1	<1.1	<5.5	<1.1	<1.1	<1.1
30P EPC Bridge 2	PONAR	0.64	<0.38	<0.38	<0.38	<0.38	0.7	<0.75	<1.9	<0.3	<1.9	0.34	<0.38	<1.9	<0.38	<0.38	0.3

TRENTON CHANNEL PROJECT			acenaphthene			benzo(a)anthracene			chrysene					indeno(1,2,3-cd)pyrene			
SEDIMENT CHEMISTRY RESULTS				acenaphthylene			benzo(b&k)fluoranthene			dibenzo(a,h)anthracene			naphthalene				
					anthracene			benzo(a)pyrene			fluoranthene			phenanthrene			
ERM (Long and Morgan, 1990)		35							benzo(g,h,i)perylene			fluorene					pyrene
SITE DESCRIPTION	ore Length		PAH SCAN														
	in cm	TOT. PAHS	mg/kg d.w.														
			A1	A2	A3	B1	B2	B3	B4	C1	D1	F1	F2	I1	N1	P1	P2
J1P EPC Bridge 3	PONAR	10.3	<0.5	<0.5	<0.5	2	<1	<1.0	<2.5	3.4	<2.5	1.7	<0.5	<2.5	<0.5	1	2.2
J2P EPC Bridge 4	PONAR	8.1	<0.83	<0.83	<0.83	1.3	<1.7	<1.7	<.41	1.9	<4.1	1.9	<.83	<4.1	<0.83	1.1	1.9
J3P EPC Bridge 5	PONAR	14.8	<0.48	<0.48	0.42	2.4	<.95	<0.95	<2.4	3.4	<2.4	3.4	<0.48	<2.4	<0.48	2	3.2
EP MARINA-OUTSIDE	000-020	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
EP MARINA-UPLAnd	000-006	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
EP MARINA-RIVER BED UP.	000-010	8.3	<1.65	<1.65	<1.65	<1.65	2	<1.65	<1.6	2	<1.65	2	<1.65	<1.65	<1.65	<1.65	2.3
EP MARINA-RIVER BED UP.	010-020	19.7	<0.33	<0.33	0.44	2.2	2.6	1.6	1.3	3.6	<0.33	2.8	0.46	0.49	0.59	<0.33	3.6
EP MARINA-RIVER BED UP.	020-028	18.2	<0.33	<0.33	0.76	1.9	2.2	1.3	1.1	2.7	<0.33	2.7	<0.33	0.58	<0.33	2	3
EP MARINA-RIVER BED UP.	028-038	6.2	<0.66	<0.66	<0.66	0.66	1.1	<0.66	<0.6	1.1	<0.66	1.1	<0.66	<0.66	<0.66	0.96	1.3
EP MARINA-RIVER BED DN.	000-013	38.5	<0.66	<0.66	0.74	3.6	7.1	4.3	3.2	5.2	<0.66	4.5	<0.66	2.5	<0.66	2.2	5.2
EP MARINA-RIVER BED DN.	013-018	35.3	<0.66	<0.66	0.67	3.5	6.5	4	3	4.9	<0.66	3.8	<0.66	2.3	<0.66	2	4.6
EP1 - North Marina	Ponar	45.4															
EP2 - Mid Marina	Ponar	35.8															
EP3 - South Marina	Ponar	66.1															
EPN (new site)	Ponar	12.62				1.4	1.5	2.3		2		1.8				1.9	1.7
EPM-N	Eckman	3.02								1		0.92					1.1
S11-EPM Upland	Ponar	9.16				1.1	1.1	1.6		1.6		1.2				0.96	1.6
S11D- EPM Upland Dup.	Ponar	8.36				0.98	1	1.4		1.4		1.2				0.94	1.4
EPM-1 (S11-EPM Upland)	Eckman	2.19								0.7		0.69					0.81
S12-EPM Mid	Ponar	20.73			0.53	2.6	2.7	4.1		3.8		2.4				2	2.8
EPM-2 (S12-EPM Mid)	Eckman	14.54				1.2	2.6	1.6	1.2	1.8		1.8		0.94		1.2	2.2
S13-EPM South	Ponar	18.19			0.42	2.2	2.1	2.9	1.5	3.7		1.8				1.5	2.3
EPM-3 (S13-EPM South)	Eckman	33.11			0.56	2.8	6.4	4.4	3.3	3.7	0.67	2.7		2.8	0.48	1.6	3.7
34P EPSC DOCK	PONAR	13	<0.6	<0.6	<0.6	2	<1.2	3.2	<3.0	2.8	<3.0	3	<0.6	<3.0	<0.6	2	<0.6
35P EPSC-Inlet	PONAR	13.3	<0.55	<0.55	<0.55	1.9	<1.1	3.5	<2.8	2.6	<2.8	2.8	<0.55	<2.8	0.6	1.9	<0.55
35PC2	PONAR	13.84	<0.5	<0.5	<0.5	2	<1.0	3.8	<2.5	2.6	<2.5	3.2	<0.5	<2.5	0.54	1.7	<0.5
20 C1 EPSC-Inlet	000-083	22.21	<0.33	<0.33	<0.33	2.6	2.6	2	1.4	4.3	0.45	2.4	<0.33	0.66	<0.33	1.8	4
20 C1	083-088	34.75	<0.33	<0.33	0.48	4.5	3.7	3	2	6.7	<0.33	3.8	0.46	0.91	<0.33	2.9	6.3
49E EPSC	Eckman	15.5					3.1	1.8		2.5		2.6				1.9	3.6
36P Monsanto Lagoon	PONAR	8.35	<0.39	<0.39	<0.39	1	1.2	0.9	0.6	1.9	<0.39	1.1	<0.39	<0.39	<0.39	<0.39	1.7
19 C1 Monsanto Bay	000-053	15.57	<0.33	<0.33	<0.33	2	1.8	1.4	0.8	2.7	<0.33	2.3	<0.33	0.6	<0.33	1.1	3
19 C1	053-085	17.22	<0.33	<0.33	0.49	1.9	2.5	1.7	1.2	2.3	<0.33	2.5	<0.33	0.83	<0.33	1.2	2.8
19 C2 Monsanto Bay	000-051	13.64	<0.33	<0.33	<0.33	1.5	1.7	1.1	0.9	2.2	<0.33	2	<0.33	0.49	<0.33	1.2	2.52
19 C2	051-085	22.4	<0.33	<0.33	0.75	2.2	2.7	1.9	1.3	2.8	0.41	3.5	<0.33	0.94	<0.33	2.1	3.8
CHRYSLER BAY-INNER	000-030	0.0	<0.66	<0.66	<0.66	<0.66	0.6	<0.66	<0.6	<0.6	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66
CHRYSLER BAY-INNER	030-058	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CHRYSLER BAY-INNER	058-079	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CHRYSLER BAY-OUTER	000-013	29.9	<0.33	<0.33	0.64	4	5.7	3.1	1.1	3	0.89	3.6	<0.33	2	<0.33	1.9	4
CHRYSLER BAY-OUTER	013-061	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
37P Chry Bay Marsh Inlet	PONAR	0	<0.4	<0.4	<0.4	<0.4	<0.8	<0.8	<2.0	<0.4	<2.0	<0.4	<0.4	<2.0	<0.4	<0.4	<0.4
39P Swan Island-North	PONAR	9.9	<0.40	<0.40	<0.40	0.98	1.9	1.4	0.8	1.1	<0.40	1.4	<0.40	0.64	<0.40	0.42	1.3
38P Above Humbug Marina	PONAR	0	<0.66	<0.66	<0.66	<0.66	0.6	<0.66	<0.6	<0.6	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66	<0.66
S9 - Chrysler Bay	Ponar	24.3															
CELERON ISLAnd	000-043	3.0	<0.33	<0.33	<0.33	0.46	0.7	0.5	<0.3	0.4	<0.33	0.44	<0.33	<0.33	<0.33	<0.33	0.56
CELERON ISLAnd	043-074	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33
CELERON ISLAnd	074-107	0.0	<0.33	<0.33	<0.33	<0.33	0.3	<0.33	<0.3	<0.3	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33	<0.33

TRENTON CHANNEL PROJECT			
SEDIMENT CHEMISTRY RESULTS			
SEL (Persaud et. al. OME, 1993)		1500	
SITE DESCRIPTION	CORE LENGTH	OIL & GREASE	
	cm	mg/kg d.w.	
55C1 Allied Oil Slip NW	000-030	42000	
	030-091	40000	
	091-152	46000	
	152-218	54000	
55C2 Allied Oil Slip NW	000-030	36000	
	030-091	38000	
	091-147	36000	
56C1 Nickelson South Sli	000-030	64000	
	030-043	66000	
56C2 Nickelson South Slip	000-030	71000	
	030-091	<50	
	091-152	11000	
	152-201	11000	
59C1 Stenson Club	000-030	26000	
	030-091	25000	
	091-152	24000	
	152-213	7000	
	213-224	4000	
64P Mud Island Northside	Ponar	<50	
65P Mud Island SW	Ponar	2760	
60C1 Mud Island -South s	000-030	1200	
	030-091	<50	
	091-137	<50	
53C1 Grassy Island NW	000-030	<50	
	030-071	<50	
54C1 Grassy Island NE	000-034	<50	
63P Grassy Island W	Ponar	1400	
61P Grassy Isalnd SW	Ponar	2200	
62P Grassy Island SE	Ponar	1900	
57P Mouth of Ecorse Cree	Ponar	8000	
58C1 Mouth of Ecorse Cre	000-030	<50	
52C1 BASF Northworks lowe	000-030	11000	
	030-091	10000	
	091-152	8000	
	152-213	4000	
	213-218	0	

TRENTON CHANNEL PROJECT			
SEDIMENT CHEMISTRY RESULTS			
SEL (Persaud et. al. OME, 1993)		1500	
SITE DESCRIPTION	CORE LENGTH	OIL & GREASE	
	cm	mg/kg d.w.	
69C1 Wyandotte Yatch Cl	000-030	9000	
	030-066	9000	
68P N of Pt. Hennepin	Ponar	<50	
68E N of Pt. Hennepin	Eckman	<50	
67C1 Portofino	000-030	7000	
43P Portofino Slip	PONAR	1390	
42P Pt. Hennepin	PONAR	367	
15 C1 T.C. North Marsh	000-022	<50	
15 C1	022-062	<50	
15 C1	062-100	<50	
51 C 1 Firestone upper	000-030	11000	
	030-091	19000	
	091-152	16000	
	152-194	15000	
66C1 Firestone Steel -M	000-030	21000	
	030-091	13000	
	091-104	12000	
45P Firestone Steel	PONAR	8410	
	PONAR		
50P Firestone lower	Ponar	9000	
MONGUAGON CREEK-UPSTREAM	000-030	7290	
MONGUAGON CREEK-UPSTREAM	030-104	41200	
MONGUAGON CREEK-UPSTREAM	104-142	23500	
MONGUAGON CREEK-UPSTREAM	000-030	8630	
MONGUAGON CREEK-UPSTREAM	030-076	21600	
MONGUAGON CREEK-UPSTREAM	076-150	21600	
MONGUAGON CREEK-UPSTREAM	150-180	12400	
48E Monguagon Creek	Eckman	9000	
S5 - Monguagon Creek	Ponar	5800	
FI - Fighting Island	Ponar	200	
25 C1 MNCK DNS-Nearshor	000-027	1110	
25 C1	027-051	120	
25 C1	051-095	444	
25 C1	095-132	887	
21 C1 MNCK DNS-Offshore	000-027	<50	
21 C1	027-051	<50	
MONGUAGON CREEK-DOWN	000-150	3930	
MONGUAGON CREEK-DOWN	150-168	7640	
BLACK LAGOON-CENTER	000-030	6450	
BLACK LAGOON-CENTER	030-120	19700	
BLACK LAGOON-CENTER	120-210	8950	
BLACK LAGOON-CENTER	210-229	2970	

TRENTON CHANNEL PROJECT			
SEDIMENT CHEMISTRY RESULTS			
SEL (Persaud et. al. OME, 1993)		1500	
SITE DESCRIPTION	CORE LENGTH	OIL & GREASE	
	cm	mg/kg d.w.	
BLACK LAGOON-LOWER	000-060	8600	
BLACK LAGOON-LOWER	060-152	4330	
BLACK LAGOON-LOWER	152-203	2340	
BLACK LAGOON-EAST	000-055	<50	
BLACK LAGOON-EAST	055-103	<50	
BLACK LAGOON-EAST	103-166	<50	
BLACK LAGOON-EAST	166-229	<50	
BLACK LAGOON-EAST	000-035	<50	
BLACK LAGOON-EAST	035-133	<50	
BLACK LAGOON-EAST	133-182	<50	
24 C1 BLLG-Nearshore	000-030	7000	
24 C1 (WWES Lab)	030-075	3550	
47E - BLLG	Eckman	10000	
S7 - Black Lagoon	Ponar	11000	
40P East of Bouy N "6"	PONAR	nm	
41P NE of Bouy R "18"	PONAR	367	
44P DNS from Bouy R "28"	PONAR	nm	
26P Riverside Hospital	PONAR	nm	
27P Trenton Towers	PONAR	nm	
28P Deadhead Cove	PONAR	nm	
28PC2	PONAR	nm	
ELIZABETH PARK CANAL	000-079	26200	
ELIZABETH PARK CANAL	079-180	11500	
ELIZABETH PARK CANAL	180-260	13700	
ELIZABETH PARK CANAL	260-330	6890	
16 C1 EPNC-Upper	000-080	1360	
16 C1	080-120	1240	
16 C1	120-157	1490	
17 C1 EPNC-Inner	000-040	2180	
17 C1	040-080	1120	
17 C1	080-140	1380	
17 C1	140-175	116	
18 C1 EPNC-Lower	000-055	2040	
18 C1	055-125	813	
18 C1	125-170	10100	
18 C1	170-217	3290	
46E EPNC	Eckman	2400	
29P EPC Bridge 1	PONAR	nm	
30P EPC Bridge 2	PONAR	nm	

TRENTON CHANNEL PROJECT			
SEDIMENT CHEMISTRY RESULTS			
SEL (Persaud et. al. OME, 1993)		1500	
SITE DESCRIPTION	CORE LENGTH cm	OIL & GREASE mg/kg d.w.	
31P EPC Bridge 3	PONAR	nm	
32P EPC Bridge 4	PONAR	nm	
33P EPC Bridge 5	PONAR	nm	
EP MARINA - OUTSIDE	000-020	<50	
EP MARINA-UPLAnd	000-006	<50	
EP MARINA-RIVER BED UP.	000-010	6850	
EP MARINA-RIVER BED UP.	010-020	11500	
EP MARINA-RIVER BED UP.	020-028	14700	
EP MARINA-RIVER BED UP.	028-038	772	
EP MARINA-RIVER BED DN.	000-013	4480	
EP MARINA-RIVER BED DN.	013-018	1890	
EP1 - North Marina	Ponar	3300	
EP2 - Mid Marina	Ponar	8900	
EP3 - South Marina	Ponar	5100	
EPN (new site)	Ponar	nm	
EPM-N	Eckman	nm	
S11-EPM Upland	Ponar	nm	
S11D- EPM Upland Dup.	Ponar	nm	
EPM-1 (S11-EPM Upland)	Eckman	nm	
S12-EPM Mid	Ponar	nm	
EPM-2 (S12-EPM Mid)	Eckman	nm	
EPM2-dup (S12- EPM Upla	Eckman	nm	
S13-EPM South	Ponar	nm	
EPM-3 (S13-EPM South)	Eckman	nm	
34P EPSC DOCK	PONAR	nm	
35P EPSC-Inlet	PONAR	nm	
35PC2	PONAR	nm	
20 C1 EPSC-Inlet	000-083	1620	
20 C1	083-088	1890	
43E EPSC	Eckman	10000	
36P Monsanto Lagoon	PONAR	1320	
19 C1 Monsanto Bay	000-053	2150	
19 C1	053-085	1380	
19 C2 Monsanto Bay	000-051	2780	
19 C2	051-085	3010	
CHRYSLER BAY-INNER	000-030	<50	
CHRYSLER BAY-INNER	030-058	<50	
CHRYSLER BAY-INNER	058-079	<50	
CHRYSLER BAY-OUTER	000-013	348	
CHRYSLER BAY-OUTER	013-061	<50	
37P Chry Bay Marsh Inlet	PONAR	nm	
39P Swan Island-North	PONAR	454	
38P Above Humbug Marina	PONAR	298	
S9 - Chrysler Bay	Ponar	2000	
CELERON Island	000-043	<50	
CELERON Island	043-074	<50	
CELERON Island	074-107	<50	

TRENTON CHANNEL PROJECT		SIEVE					HYDROMETER				ATTERBERG LIMITS		
SEDIMENT CHEMISTRY RESULTS		% PASSING						%PASSING	FINE				
SITE DESCRIPTION	Core length	GRAVEL	GRAVEL	MED SAND	FINE SAND	FINE SAND	VF SAND	SILT	SILT	CLAY			
	cm	4.75mm	2	0.5	0.25	0.125	0.075	0.05	0.005	0.002	LIQUID LIM.	PLASTIC LIM	PLASTICITY INDEX
43P Portofino Slip	PONAR	87.5	80.2	50.3	44.3	41.9	19.5	12.8					
42P Pt. Hennepin	PONAR	80.3	64.9	42.5	33.5	30	13.8	10					
15 C1 T.C. North Marsh	000-022	98.1	95.7	86.6	79.4	77.1	41	28.8					
15 C1	022-062	99.2	98.8	98	96.7	94.5	51	38.5					
15 C1	062-100	99	97.6	95	93	90	69	53.5					
45P Firestone Steel	PONAR	94.3	90.5	79.7	69.7	64.5	20.5	12.5					
MONGUAGON CREEK-UPSTREAM	000-030	100	100	99.9	98.7	94.8	84.7	73.5	29.5	16.1	83.1	33.1	30.1
MONGUAGON CREEK-UPSTREAM	030-104	100	99.5	95.5	94.8	92.7	88.3	85	43.5	27.2	87.4	40.7	26.7
MONGUAGON CREEK-UPSTREAM	104-142	97	94.3	90.7	89.1	86.9	84.3	80	45	29	83.9	36.3	37.6
MONGUAGON CREEK-UPSTREAM	000-030	100	99.6	98.5	97.4	91.8	79.3	67.2	24.5	14.8	58.7	33	25.8
MONGUAGON CREEK-UPSTREAM	030-076	100	99.9	99	97.8	92.4	84.4	72.2	29.5	14.2	83.1	33	33.5
MONGUAGON CREEK-UPSTREAM	076-150	100	99.8	98.5	98	96.9	94.9	90.8	45.9	22	70.5	37	33.4
MONGUAGON CREEK-UPSTREAM	150-180	89	56.2	42.1	39.1	36.8	35.1	30.5	10.9	8	62.5	36.2	26.3
25 C1 MNCK DNS-Nearshore	000-027	99.5	98.6	95.4	87.7	84.7	60.7	50.6					
25 C1	027-051	100	99.3	97.1	91.9	73.9	68.8	57.7					
25 C1	051-095	99.8	99.2	98.8	90.9	73	62.8	51.7					
25 C1	095-132	99.5	99.4	98.4	95.9	87.6	60.4	49.1					
21 C1 MNCK DNS-Offshore	000-027	84.8	77.9	68.8	63.5	58.9	33.8	22.5					
21 C1	027-051	80.3	71	60.4	54	50	27	19					
MONGUAGON CREEK-DOWN	000-150	100	100	99.7	99.4	96	95.6	90.1	45.9	28	71.4	37.4	34
MONGUAGON CREEK-DOWN	150-168	100	100	99.6	99.3	98.1	95.9	88.9	46.9	28.9	68.4	38.5	29.9
BLACK LAGOON-CENTER	000-030	100	99.9	98.9	98.2	96.9	83	66.1	14.2	5.5	62.5	37.6	24.9
BLACK LAGOON-CENTER	030-120	100	99.9	83.9	82.3	82.1	81.9	68	13	3.5	73.7	50.6	23.1
BLACK LAGOON-CENTER	120-210	100	100	93.8	93.6	93.3	92.7	84.6	16.5	4	67.7	45	22.7
BLACK LAGOON-CENTER	210-229	99.9	99.6	89.7	76.5	45.6	30	29	13.5	7			NONPLASTIC
BLACK LAGOON-LOWER	000-060	100	100	96.3	95.7	94.5	90.7	76.1	14.5	4	58.7	43.5	15.2
BLACK LAGOON-LOWER	060-152	100	100	99.9	99.7	98	93.9	81	34.5	16	58	39.5	18.5
BLACK LAGOON-LOWER	152-203	100	100	98.5	96.9	93.4	87.9	64.2	47.8	23	54.9	42.8	12
BLACK LAGOON-EAST	000-055	99.7	99.2	92.8	87.7	53.8	34.5	25.5	7.5	4.1			NONPLASTIC
BLACK LAGOON-EAST	055-103	100	99.8	97.8	89.9	50	28.7	23.5	7.2	6			NONPLASTIC
BLACK LAGOON-EAST	103-186	99.6	99.3	97.7	94.2	62.1	34.7	29	9.8	6.9			NONPLASTIC
BLACK LAGOON-EAST	186-229	99.9	99.7	98.6	94	55.6	35.9	25.5	10.5	7.9			NONPLASTIC
BLACK LAGOON-EAST	000-035	99.3	98.6	97.3	93.4	56	36	27	8.9	6.9			NONPLASTIC
BLACK LAGOON-EAST	035-133	99.9	99.8	97.6	91.8	55.6	32.3	23	9	7.5			NONPLASTIC
BLACK LAGOON-EAST	133-182	100	99.9	99.8	98.4	48	32.9	25	7.9	5.9			NONPLASTIC
24 C1 BLLG-Nearshore	000-030	98.5	97.8	96.5	93.5	86.5	17.9	10					
24 C1 (WWES Lab)	030-075	99.7	99.6	99.5	99.3	82	19	8.5					
41P NE of Buoy R "18"	PONAR	97.6	95.2	89.4	78.2	70	22.5	12.2					

TRENTON CHANNEL PROJECT		SIEVE					HYDROMETER					ATTERBERG LIMITS		
SEDIMENT CHEMISTRY RESULTS		% PASSING						%PASSING	FINE					
SITE DESCRIPTION	Core length	GRAVEL	GRAVEL	MED SAND	FINE SAND	FINE SAND	VF SAND	SILT	SILT	CLAY				
	cm	4.75mm	2	0.5	0.25	0.125	0.075	0.05	0.005	0.002		LIQUID LIM.	PLASTIC LIM	PLASTICITY INDE
ELIZABETH PARK CANAL	000-079	99.8	99.7	99.1	98.5	96.6	93.3	88.5	42	23				
ELIZABETH PARK CANAL	079-180	100	100	99.7	99.4	98.4	95.5	89	40.8	21.5		63.1	39.6	23.5
ELIZABETH PARK CANAL	180-260	100	100	99.9	99.7	99.4	98	94	45.5	27		55.4	35.5	20
ELIZABETH PARK CANAL	260-330	100	100	99.9	99.8	99.6	98.9	95	39.5	25		59.4	38.6	20.7
												58.5	38.4	20.1
16 C1 EPNC-Upper	000-080	96.1	96.3	89.7	78.9	71.8	27	14.8						
16 C1	080-120	94.8	93.1	90.5	86.8	82	30	15						
16 C1	120-157	99.1	98.5	97.4	95.7	90	33.5	15						
17 C1 EPNC-Inner	000-040	94.9	94.1	92.1	88.1	82	33.9	17						
17 C1	040-080	99.2	98.3	96.5	92	83	27	14.8						
17 C1	080-140	98.8	98.2	96.8	93.9	86	26	11.8						
17 C1	140-175	96.1	97.4	96.5	95	87.5	41.5	27.5						
18 C1 EPNC-Lower	000-055	96.7	97.2	92.2	85.6	79.1	31.9	19.7						
18 C1	055-125	98	97	94.7	91.5	84.8	30.2	20.2						
18 C1	125-170	99	98.8	91	81.8	73.2	28.8	17						
18 C1	170-217	99.2	97.8	92.7	84.4	77.5	29.2	19						
20 C1 EPSC-Inlet	000-083	99.3	97.8	95.1	90.8	83.5	23	11						
20 C1	083-088													
36P Monsanto Lagoon	PONAR	96	92.3	88.7	82.4	77.5	8.2	5.9						
19 C1 Monsanto Bay	000-053	97.3	94.9	90.1	82	70.8	14.2	5.8						
19 C1	053-085	98.5	94.5	78.2	54.2	36	8.9	3.8						
19 C2 Monsanto Bay	000-051	95.8	93	88.1	80	68.9	15	5.5						
19 C2	051-085	96.1	93.4	75.5	51.8	34	7	2.9						
CHRYSLER BAY-INNER	000-030													
CHRYSLER BAY-INNER	030-058	99.3	98.3	94.4	88.1	77.4	70.9	63.9	43.5	33.1		46.3	19.7	25.6
CHRYSLER BAY-INNER	058-079	98.7	96.8	92.2	84.9	73.3	69	59.5	38	28.9		34.7	16.1	18.6
CHRYSLER BAY-OUTER	000-013													
CHRYSLER BAY-OUTER	013-061	96.7	95.1	90	84.7	77.1	72.9	68.5	46.5	36		43.9	19.1	24.8
39P Swan Island-North	PONAR	98.8	96.8	88.5	70.7	64.2	21	12.5						
38P Above Humbug Marina	PONAR	95.2	91	84.3	79.8	65.5	13.8	7.9						
CELERON ISLAND	000-043	98.2	96.1	84.7	61.1	48.8	46.8	41.5	17.9	12.9				
CELERON ISLAND	043-074	97.3	94.6	86	74.4	62.2	58	53.1	37.1	31.1				NONPLASTIC
CELERON ISLAND	074-107	86.4	84.5	76.7	68.2	57.2	52.1	51.9	24.8	18		51	22.7	28.3
												30.3	15.3	15

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS				SEM:AVS>1 Metals Presumed Available	Sulfide bufferring capacity
SITE DESCRIPTION		AVS/SEM ANALYSIS			
	Core length in cm	umol/g TOTAL METALS	umol/g SULFIDE	SEM:AVS	umol/g AVS-SEM
43P Portofino Slip	PONAR	100.6	5.5	18.3	
42P Pt. Hennepin	PONAR	49.8	6	8.3	
15 C1 T.C. North Marsh	000-022	88.3	3.8	23.2	
15 C1	022-062	93.7	<0.05		
15 C1	062-100	118.9	<0.05		
45P Firestone Steel	PONAR	302.4	73	4.1	
MONGUAGON CREEK-UPSTREAM	000-030	12.3	356.8	0.03	344.5
MONGUAGON CREEK-UPSTREAM	030-104	34.8	448.9	0.08	414.1
MONGUAGON CREEK-UPSTREAM	104-142	21.8	349.0	0.06	327.2
MONGUAGON CREEK-UPSTREAM	000-030	10.9	299.1	0.04	288.2
MONGUAGON CREEK-UPSTREAM	030-076	16.3	316.9	0.05	300.6
MONGUAGON CREEK-UPSTREAM	076-150	30.0	236.1	0.13	206.1
MONGUAGON CREEK-UPSTREAM	150-180	10.9	215.5	0.05	204.6
S5 - Monguagon Creek	Ponar	11.59	10.8	1.07	
FI - Fighting Island	Ponar	1.02	0.39	2.61	
25 C1 MNCK DNS-Nearshore	000-027	145.05	7	20.7	
25 C1	027-051	175.83	4.3	40.9	
25 C1	051-095	225.12	9.7	23.2	
25 C1	095-132	386.88	6	64.5	
21 C1 MNCK DNS-Offshore	000-027	94	<0.05		
21 C1	027-051	64.7	0.97	66.7	
MONGUAGON CREEK-DOWN	000-150	29.3	211.9	0.14	182.6
MONGUAGON CREEK-DOWN	150-168	33.0	142.5	0.23	109.5
BLACK LAGOON-CENTER	000-030	43.5	1189.0	0.04	1145.5
BLACK LAGOON-CENTER	030-120	31.3	719.1	0.04	687.8
BLACK LAGOON-CENTER	120-210	23.3	234.5	0.10	211.2
BLACK LAGOON-CENTER	210-229	5.4	88.6	0.06	83.2
BLACK LAGOON-LOWER	000-060	32.1	136.4	0.24	104.3
BLACK LAGOON-LOWER	060-152	16.1	128.4	0.13	112.3
BLACK LAGOON-LOWER	152-203	12.8	138.1	0.09	125.3
BLACK LAGOON-EAST	000-055	0.8	8.5	0.09	7.7
BLACK LAGOON-EAST	055-103	0.4	8.8	0.05	8.4
BLACK LAGOON-EAST	103-166	0.5	8.8	0.06	8.3
BLACK LAGOON-EAST	166-229	0.5	0.4	1.25	-0.1
BLACK LAGOON-EAST	000-035	0.5	7.3	0.07	6.8
BLACK LAGOON-EAST	035-133	0.5	4.7	0.11	4.2
BLACK LAGOON-EAST	133-182	0.5	1.3	0.38	0.8
24 C1 BLLG-Nearshore	000-030	252.8	55	4.6	
24 C1 (WWES Lab)	030-075	646.7	409	1.6	
S7 - Black Lagoon	Ponar	20.16	18.1	1.11	

TRENTON CHANNEL PROJECT				SEM:AVS>1	
SEDIMENT CHEMISTRY RESULTS				Metals	Sulfide
		AVS/SEM ANALYSIS		Presumed	bufferring
SITE DESCRIPTION				Available	capacity
	Core				
	length	umol/g	umol/g		umol/g
	in cm	TOTAL METALS	SULFIDE	SEM:AVS	AVS-SEM
41P NE of Bouy R "18"	PONAR	82.6	25	3.3	
ELIZABETH PARK CANAL	000-079	19.2	470.2	0.04	451.0
ELIZABETH PARK CANAL	079-180	17.0	135.5	0.13	118.5
ELIZABETH PARK CANAL	180-260	10.8	131.7	0.08	120.9
ELIZABETH PARK CANAL	260-330	14.1	167.5	0.08	153.4
16 C1 EPNC-Upper	000-080	200.4	11	18.2	
16 C1	080-120	171.3	30	5.7	
16 C1	120-157	296.4	5.9	50.2	
17 C1 EPNC-Inner	000-040	169.3	9.7	17.5	
17 C1	040-080	182.5	14	13.0	
17 C1	080-140	180	6.6	27.3	
17 C1	140-175	111.3	6.9	16.1	
18 C1 EPNC-Lower	000-055	198.5	8.6	23.1	
18 C1	055-125	169.6	7.5	22.6	
18 C1	125-170	170.5	12	14.2	
18 C1	170-217	109.1	5.2	21.0	
EP1 - North Marina	Ponar	7.31	4.4	1.66	
EP2 - Mid Marina	Ponar	11.25	6.04	1.84	
EP3 - South Marina	Ponar	8.79	4.19	2.1	
20 C1 EPSC-Inlet	000-083	253.68	16	15.9	
20 C1	083-088				
36P Monsanto Lagoon	PONAR	318.2	4.8	66.3	
19 C1 Monsanto Bay	000-053	277.8	12	221.9	
19 C1	053-085	201.1	7.9	25.5	
19 C2 Monsanto Bay	000-051	274.6	11	25.0	
19 C2	051-085	217.5	8.2	26.5	
CHRYSLER BAY-INNER	000-030	7.7	30.0	0.26	22.3
CHRYSLER BAY-INNER	030-058	1.5	1.1	1.36	-0.4
CHRYSLER BAY-INNER	058-079	1.5	2.3	0.65	0.8
CHRYSLER BAY-OUTER	000-013				
CHRYSLER BAY-OUTER	013-061	1.6	7.7	0.21	6.1
39P Swan Island-North	PONAR	59.4	12	5.0	
38P Above Humbug Marina	PONAR	70.3	11	6.4	
S9 - Chrysler Bay	Ponar	11.87	2.37	5.01	
CELERON ISLAND	000-043	3.7	49.5	0.07	45.8
CELERON ISLAND	043-074	1.1	1.9	0.58	0.8
CELERON ISLAND	074-107	1.1	1.4	0.79	0.3

TRENTON CHANNEL PROJECT		%TOTAL ORG.	DENSITY	DENSITY
SEDIMENT CHEMISTRY RESUL	Core length	CARBON	LB/FT3	LB/FT3
	cm	DRY BASIS	WET	DRY
SEL (Persaud et. al. OME, 1993)		10		
55C1 Allied Oil Slip NW	000-030	2.9		
	030-091	3.2		
	091-152	3.4		
	152-218	2		
55C2 Allied Oil Slip NW	000-030	3		
	030-091	2.1		
	091-147	2.1		
56C1 Nickelson South Sl	000-030	2		
	030-043	1.7		
56C2 Nickelson South Sli	000-030	3		
	030-091	1.9		
	091-152	1.9		
	152-201	1.7		
59C1 Stenson Club	000-030	3.4		
	030-091	2.6		
	091-152	2.2		
	152-213	2.7		
	213-224	2		
64P Mud Island Northsid	Ponar	2.2		
65P Mud Island SW	Ponar	1.7		
60C1 Mud Island -South	000-030	2.2		
	030-091	2.3		
	091-137	2		
53C1 Grassy Island NW	000-030	3		
	030-071	0.74		
54C1 Grassy Island NE	000-034	1.8		
63P Grassy Island W	Ponar	2		
61P Grassy Isalnd SW	Ponar	1.6		
62P Grassy Island SE	Ponar	2.5		
57P Mouth of Ecorse Cre	Ponar	3		
58C1 Mouth of Ecorse Cr	000-030	1.1		
52C1 BASF Northworks low	000-030	1.3		
	030-091	1.6		
	091-152	3.2		
	152-213	1		
	213-218	0.9		

toc, density

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESUL	Core length cm	%TOTAL ORG. CARBON DRY BASIS	DENSITY LB/FT3 WET	DENSITY LB/FT3 DRY
SEL (Persaud et. al. OME, 1993)		10		
69C1 Wyandotte Yacht Cl	000-030	2.2		
	030-066	2.5		
68P N of Pt. Hennepin	Ponar	1.2		
68E N of Pt. Hennepin	Eckman	1		
67C1 Portofino	000-030	2.1		
43P Portofino Slip	PONAR	3.66	86.3	78.6
42P Pt. Hennepin	PONAR	1.69	94.2	88.7
15 C1 T.C. North Marsh	000-022	3.11	99.9	99.6
15 C1	022-062	2.33	100	100
15 C1	062-100	1.06	100	100
51 C 1 Firestone upper	000-030	2.5		
	030-091	2.6		
	091-152	2.6		
	152-194	2.1		
66C1 Firestone Steel -M	000-030	3		
	030-091	2.1		
	091-104	1.8		
45P Firestone Steel	PONAR	5.6	98.5	97.6
	PONAR			
50P Firestone lower	Ponar	4		
MONGUAGON CREEK-UPSTR	000-030	5.95	104.6	43.6
MONGUAGON CREEK-UPSTR	030-104	6.55	96.1	44.9
MONGUAGON CREEK-UPSTR	104-142	5.78	107.7	60.1
MONGUAGON CREEK-UPSTR	000-030	5.67	89.9	36.4
MONGUAGON CREEK-UPSTR	030-076	6.09	102.6	44
MONGUAGON CREEK-UPSTR	076-150	6.71	98.7	45
MONGUAGON CREEK-UPSTR	150-180	3.88	133	86.2
48E Monguagon Creek	Eckman	1.3		
S5 - Monguagon Creek	Ponar	5.1		
FI - Fighting Island	Ponar	1	NA	
25 C1 MNCK DNS-Nearshore	000-027	5.82	100	100
25 C1	027-051	3.77	100	100
25 C1	051-095	4.96	100	100
25 C1	095-132	5.88	100	100

toc, density

TRENTON CHANNEL PROJECT		%TOTAL ORG.	DENSITY	DENSITY
SEDIMENT CHEMISTRY RESUL	Core length	CARBON	LB/FT3	LB/FT3
	cm	DRY BASIS	WET	DRY
SEL (Persaud et. al. OME, 1993)		10		
21 C1 MNCK DNS-Offshore	000-027	1.18	95.9	92
21 C1	027-051	0.85	94.2	90.9
MONGUAGON CREEK-DOWN	000-150	6.58	100.8	48.8
MONGUAGON CREEK-DOWN	150-168	7.11	107.3	53.9
BLACK LAGOON-CENTER	000-030	5.22	141.7	55.4
BLACK LAGOON-CENTER	030-120	6.88	104.3	35.3
BLACK LAGOON-CENTER	120-210	6.94	113.6	45.8
BLACK LAGOON-CENTER	210-229	3.88	115.6	81.3
BLACK LAGOON-LOWER	000-060	6.96	92.9	39.7
BLACK LAGOON-LOWER	060-152	5.34	107.6	54.6
BLACK LAGOON-LOWER	152-203	4.84	102.2	52.2
BLACK LAGOON-EAST	000-055	0.82	128.2	102.5
BLACK LAGOON-EAST	055-103	0.57	119.5	94.3
BLACK LAGOON-EAST	103-166	0.6	118.9	92.5
BLACK LAGOON-EAST	166-229	1.18	116.1	90.8
BLACK LAGOON-EAST	000-035	0.7	171.3	137.2
BLACK LAGOON-EAST	035-133	0.66	116.4	91.5
BLACK LAGOON-EAST	133-182	0.94	115.4	89.9
24 C1 BLLG-Nearshore	000-030	4.64	100	100
24 C1 (WWES Lab)	030-075	4.87	100	99.9
47E BLLG	Eckman	4		
S7 - Black Lagoon	Ponar	5.1		
40P East of Bouy N "6"	PONAR			
41P NE of Bouy R "18"	PONAR	4.11	100	99.7
ELIZABETH PARK CANAL	000-079	5.93	94.6	46.4
ELIZABETH PARK CANAL	079-180	4.81	86.8	46.5
ELIZABETH PARK CANAL	180-260	5.79	72.9	37.6
ELIZABETH PARK CANAL	260-330	3.91	124.7	66.8
16 C1 EPNC-Upper	000-080	4.19	100	99.7
16 C1	080-120	4.77	100	100
16 C1	120-157	4.29	100	99.9
17 C1 EPNC-Inner	000-040	4.6	97.3	97.2
17 C1	040-080	3.83	100	100
17 C1	080-140	2.91	99.9	99.9
17 C1	140-175	4.63	100	99.4
18 C1 EPNC-Lower	000-055	3.95	100	99.8
18 C1	055-125	4.44	100	100
18 C1	125-170	3.81	100	100
18 C1	170-217	2.38	100	99.9
46E EPNC	Eckman	4.4		
EP1 - North Marina	Ponar	2.8		
EP2 - Mid Marina	Ponar	6		
EP3 - South Marina	Ponar	5.3		

toc, density

TRENTON CHANNEL PROJECT		%TOTAL ORG.	DENSITY	DENSITY
SEDIMENT CHEMISTRY RESUL	Core length	CARBON	LB/FT3	LB/FT3
	cm	DRY BASIS	WET	DRY
SEL (Persaud et. al. OME, 1993)		10		
20 C1 EPSC-Inlet	000-083	4.86	99.9	99.8
20 C1	083-088			
49E EPSC	Eckman	5		
36P Monsanto Lagoon	PONAR	5.02	100	99.3
19 C1 Monsanto Bay	000-053	4.72	100	99.6
19 C1	053-085	4.94	100	100
19 C2 Monsanto Bay	000-051	4.51	99.8	99.3
19 C2	051-085	4.11	100	99.9
CHRYSLER BAY-INNER	000-030	30.71		
CHRYSLER BAY-INNER	030-058	1.11	75.3	54.8
CHRYSLER BAY-INNER	058-079	0.436	161.6	125
CHRYSLER BAY-OUTER	000-013			
CHRYSLER BAY-OUTER	013-061	0.956	114.5	78.2
37P Chry Bay Marsh Inlet	PONAR			
39P Swan Island-North	PONAR	3.2	100	100
38P Above Humbug Marina	PONAR	8.62	100	96.5
S9 - Chrysler Bay	Ponar	18.7		
CELERON ISLAND	000-043	11.79	109.6	55.9
CELERON ISLAND	043-074	2.08	135.8	92.4
CELERON ISLAND	074-107	0.538	156	124.5

lat-long

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS SITE DESCRIPTION	Latitude	Longitude	Collection Method/ Agency	Estimated Accuracy
55C1 Allied Oil Slip NW	N 42 15 37	W 83 07 29	Mapping Software	+/- 150ft.
55C2 Allied Oil Slip NW - d	N 42 15 37	W 83 07 29	Mapping Software	+/- 150ft.
56C1 Nickelson South Slip	N 42 15 32	W 83 07 43	Loran	+/- 150ft.
56C2 Nickelson South Slip -d	N 42 15 32	W 83 07 44	Loran	+/- 150ft.
59C1 Stenson Club	N 42 14 36	W 83 08 55	Loran	+/- 150ft.
64P Mud Island Northside	N 42 14 4160	W 83 08 3987	Ashtech diff corr	+/- 5ft
65P Mud Island SW	N 42 14 1282	W 83 08 6581	Ashtech diff corr	+/- 5ft
60C1 Mud Island -South side	N 42 14 2701	W 83 08 5673	Ashtech diff corr	+/- 5ft
53C1 Grassy Island NW	N 42 13 6828	W 83 08 1324	Ashtech diff corr	+/- 5ft
54C1 Grassy Island NE	N 42 13 7018	W 83 08 0533	Ashtech diff corr	+/- 5ft
63P Grassy Island W	N 42 13 3979	W 83 08 1478	Ashtech diff corr	+/- 5ft
61P Grassy Isalnd SW	N 42 13 1423	W 83 08 2095	Ashtech diff corr	+/- 5ft
62P Grassy Island SE	N 42 13 1010	W 83 08 1263	Ashtech diff corr	+/- 5ft
57P Mouth of Ecorse Creek	N 42 13 94	W83 08 82	Loran	+/- 150ft.
58C1 Mouth of Ecorse Creek	N 42 13 94	W83 08 82	Loran	+/- 150ft.
52C1 BASF Northworks lower	N 42 12 7136	W 83 08 5514	Ashtech diff corr	+/- 5ft
69C1 Wyandotte Yatch Club	N 42 12 44	W 83 08 73	Loran	+/- 150ft.
68P N of Pt. Hennepin	N 42 12 35	W 83 08 27	Loran	+/- 150ft.
68E N of Pt. Hennepin	N 42 12 35	W 83 08 27	Loran	+/- 150ft.
67C1 Portofino	N 43 11 73	W83 09 00	Loran	+/- 150ft.
43P Portofino Slip	N 42 11 50	W 83 08 57	Mapping Software	+/- 150ft.
42P Pt. Hennepin	N 42 11 48	W 83 08 47	Mapping Software	+/- 150ft.
15 C1 T.C. North Marsh	N 42:10:26	W 83:09:29	Mapping Software	+/- 150ft.
51 C 1 Firestone upper	N 42 10 7916	W 83 09 5462	Ashtech diff corr	+/- 5ft
66C1 Firestone Steel -Mid (	N 42 10 56	W 83 09 60	Ashtech diff corr	+/- 5ft
45P Firestone Steel	N 42 10 23	W 83 09 55	Mapping Software	+/- 150ft.
50P Firestone lower	N 42 10 6264	W 83 09 6997	Ashtech diff corr	+/- 5ft

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS SITE DESCRIPTION	Latitude	Longitude	Collection Method/ Agency	Estimated Accuracy
MONGUAGON CREEK-UPSTREAM (aka Federal Marine Terminal)	N 42:10:31.36	W 83:09:45.44	Trimble-USEPA LLRS	+/- 1 meter
MONGUAGON CREEK-UPSTREAM (aka Federal Marine Terminal)	N 42:10:31.30	W 83:09:45.44	Trimble-USEPA LLRS	+/- 1 meter
48E Monguagon Creek	N 42 10 25	W 83 09 86	Loran	+/- 150ft.
S5 - Monguagon Creek	N 42 10 13	W 83 09 59	Mapping Software	+/- 150ft.
FI - Fighting Island	(260611.4)	(13460207.77)	ArcView-photo	+/- 2 ft.
25 C1 MNCK DNS-Nearshore	N 42:10.280	W 83:09.906	Hand Held GPS-MDNR	+/- 100 ft.
21 C1 MNCK DNS-Offshore	N 42:08.313	W 83:09.945	Hand Held GPS-MDNR	+/- 100 ft.
MONGUAGON CREEK-DOWN	N 42:10:17.73	W 83:09:53.72	Trimble-USEPA LLRS	+/- 1 meter
BLACK LAGOON-CENTER	N 42:09:08.37	W 83:10:20.13	Trimble-USEPA LLRS	+/- 1 meter
BLACK LAGOON-LOWER	N 42:09:02.45	W 83:10:19.23	Trimble-USEPA LLRS	+/- 1 meter
BLACK LAGOON-EAST	N 42:09:01.36	W 83:10:15.40	Trimble-USEPA LLRS	+/- 1 meter
24 C1 BLLG-Nearshore	N 42:09.164	W 83:10.325	Hand Held GPS-MDNR	+/- 100 ft.
47E BLLG	N 42 09 00	W 83 10 30	Loran	+/- 150ft.
S7 - Black Lagoon	N 42 09 09	W 83 10 19	Mapping Software	+/- 150ft.
40P East of Bouy N "6"	N 42 07 44	W 83 10 22	Mapping Software	+/- 150ft.
41P NE of Bouy R "18"	N 42 09 25	W 83 09 47	Mapping Software	+/- 150ft.
44P DNS from Bouy R "28"	N 42 11 11	W 83 09 14	Mapping Software	+/- 150ft.
26P Riverside Hospital	N 42:09:05	W 83:10:20	Mapping Software	+/- 150ft.
27P Trenton Towers	N 42:08:48	W 83:10:24	Mapping Software	+/- 150ft.
28P Deadhead Cove	N 42:01:18	W 83:10:33	Mapping Software	+/- 150ft.
28PC2	N 42:01:18	W 83:10:33	Mapping Software	+/- 150ft.
ELIZABETH PARK CANAL	N 42:08:12.93	W 83:10:34.26	Trimble-USEPA LLRS	+/- 1 meter
16 C1 EPNC-Upper	N 42:08:13	W 83:10:33	Mapping Software	+/- 150ft.
17 C1 EPNC-Inner	N 42:08.225	W 83:10.602	Hand Held GPS-MDNR	+/- 100 ft.
18 C1 EPNC-Lower	N 42:08.200	W 83:10.583	Hand Held GPS-MDNR	+/- 100 ft.
46E EPNC	N 42 98 12	W 83 10 33	Mapping Software	+/- 150ft.
29P EPC Bridge 1	N 42:08:10	W 83:10:44	Mapping Software	+/- 150ft.
3OP EPC Bridge 2	N 42:08:04	W 83:10:51	Mapping Software	+/- 150ft.
31P EPC Bridge 3	N 42:07:56	W 83:11:01	Mapping Software	+/- 150ft.
32P EPC Bridge 4	N 42:07:40	W 83:11:01	Mapping Software	+/- 150ft.
33P EPC Bridge 5	N 42:07:17	W 83:10:57	Mapping Software	+/- 150ft.

TRENTON CHANNEL PROJECT SEDIMENT CHEMISTRY RESULTS SITE DESCRIPTION	Latitude	Longitude	Collection Method/ Agency	Estimated Accuracy
EP MARINA - OUTSIDE	N 42:07:47.15	W 83:10:35.47	Trimble-USEPA LLRS	+/- 1 meter
EP MARINA - UPLAND	N 42:07:46.28	W 83:10:36.91	Trimble-USEPA LLRS	+/- 1 meter
EP MARINA - RIVER BED UP.	N 42:07:44.29	W 83:10:37.60	Trimble-USEPA LLRS	+/- 1 meter
EP MARINA - RIVER BED DN.	N 42:07:42.83	W 83:10:39.41	Trimble-USEPA LLRS	+/- 1 meter
EP1 - North Marina	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
EP2 - Mid Marina	(231498.13)	(13445947.77)	ArcView-photo	+/- 2 ft.
EP3 - South Marina	(231304.52)	(13445858.27)	ArcView-photo	+/- 2 ft.
EPN (new site)	(231830.54)	(13446000.74)	ArcView-photo	+/- 2 ft.
EPM-N	(231830.54)	(13446000.74)	ArcView-photo	+/- 2 ft.
S11-EPM Upland	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
S11D- EPM Upland Dup.	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
EPM-1 (S11-EPM Upland)	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
S12-EPM Mid	(231498.13)	(13445947.77)	ArcView-photo	+/- 2 ft.
EPM-2 (S12-EPM Mid)	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
EPM2-dup (S12- EPM Upland)	(231691.73)	(13446002.56)	ArcView-photo	+/- 2 ft.
S13-EPM South	(231304.52)	(13445858.27)	ArcView-photo	+/- 2 ft.
EPM-3 (S13-EPM South)	(231304.52)	(13445858.27)	ArcView-photo	+/- 2 ft.
34P EPSC DOCK	N 42:07:16	W 83:10:55	Mapping Software	+/- 150ft.
35P EPSC-Inlet	N 42:07:13	W 83:10:47	Mapping Software	+/- 150ft.
35PC2	N 42:07:13	W 83:10:47	Mapping Software	+/- 150ft.
20 C1 EPSC-Inlet	N 42:07.213	W 83:10.818	Hand Held GPS-MDNR	+/- 100 ft.
49E EPSC	N 42 07 19	W 83 11 05	Loran	+/- 150ft.
36P Monsanto Lagoon	N 42 07 03	W 83 10 57	Mapping Software	+/- 150ft.
19 C1 Monsanto Bay	N 42:07.000	W 83:10.881	Hand Held GPS-MDNR	+/- 100 ft.
19 C2 Monsanto Bay	N 42:07.000	W 83:10.881	Hand Held GPS-MDNR	+/- 100 ft.
CHRYSLER BAY-INNER	N 42:06:49.26	W 83:11:06.68	Trimble-USEPA LLRS	+/- 1 meter
CHRYSLER BAY-OUTER	N 42:06:47.91	W 83:11:02.65	Trimble-USEPA LLRS	+/- 1 meter
37P Chry Bay Marsh Inlet	N 42 06 49	W 83 11 06	Mapping Software	+/- 150ft.
39P Swan Island-North	N 42 06 10	W 83 10 28	Mapping Software	+/- 150ft.
38P Above Humbug Marina	N 42 06 03	W 83 11 22	Mapping Software	+/- 150ft.
S9 - Chrysler Bay	N 42 06 50	W 83 11 02	Mapping Software	+/- 150ft.
CELERON ISLAND	N 42:04:45.36	W 83:10:29.20	Trimble-USEPA LLRS	+/- 1 meter

DATA RESULTS. Classification - Upstream to Downstream

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1996

Summed Exceedances

Not-impacted <1 < Impacted < 15 < Moderately Impacted < 30 < Severely Contaminated < 60 < Extremely Contaminated

Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	BIO Exceedance	Tox Exceedance	EXCEEDANCES (x over guidelines) Toxics Metals	Organics	Bioaccum PCBs	Hg
1.1	55C1 Allied Oil Slip NW	000-030	Extremely Contaminated	89.6	44.9	44.7	14.8	30.0	26.9	16.0
1.2	55C1 Allied Oil Slip NW	030-091	Extremely Contaminated	94.1	50.3	43.8	15.6	26.2	36.3	12.0
1.3	55C1 Allied Oil Slip NW	091-152	Extremely Contaminated	78.3	35.2	43.1	11.0	32.0	25.2	10.0
1.4	55C1 Allied Oil Slip NW	152-218	Extremely Contaminated	83.7	32.5	51.2	12.9	36.4	21.5	11.0
1.45										
1.5	55C2 Allied Oil Slip NW - dup	000-030	Extremely Contaminated	69.6	31.3	38.3	12.1	26.2	21.4	9.9
1.6	55C2 Allied Oil Slip NW - dup	030-091	Extremely Contaminated	85.7	43.0	42.6	10.2	26.5	28.0	15.0
1.7	55C2 Allied Oil Slip NW - dup	091-147	Extremely Contaminated	78.5	37.4	41.1	15.0	26.1	26.4	11.0
1.75										
2.1	56C1 Nickelson South Slip	000-030	Extremely Contaminated	79.1	19.8	59.4	16.0	43.4	15.7	4.1
2.2	56C1 Nickelson South Slip	030-043	Extremely Contaminated	99.1	28.0	71.1	25.3	45.8	22.4	5.6
2.25										
2.3	56C2 Nickelson South Slip -dup	000-030	Extremely Contaminated	85.5	19.3	66.2	18.1	48.1	15.1	4.2
2.4	56C2 Nickelson South Slip -dup	030-091	Severely Contaminated	49.5	25.3	24.2	21.8	2.7	24.6	0.7
2.5	56C2 Nickelson South Slip -dup	091-152	Moderately Contaminated	27.3	11.8	15.6	7.3	8.3	4.8	7.0
2.6	56C2 Nickelson South Slip -dup	152-201	Severely Contaminated	35.1	15.7	19.4	11.2	8.2	6.6	9.1
2.65										
3.1	59C1 Stenson Club	000-030	Severely Contaminated	56.3	29.0	27.4	9.4	18.0	21.7	7.3
3.2	59C1 Stenson Club	030-091	Severely Contaminated	57.8	29.5	28.4	10.4	17.9	21.2	8.3
3.3	59C1 Stenson Club	091-152	Extremely Contaminated	63.0	32.0	31.0	11.4	19.6	17.0	15.0
3.4	59C1 Stenson Club	152-213	Severely Contaminated	48.8	33.8	15.0	6.6	8.4	3.8	30.0
3.5	59C1 Stenson Club	213-224	Severely Contaminated	34.7	25.4	9.3	3.9	5.4	4.4	21.0
3.55										
4.1	64P Mud Island Northside	Ponar	Impacted	5.2	1.3	3.9	2.5	1.4	0.5	0.8
4.15										
5.1	65P Mud Island SW	Ponar	Impacted	14.3	6.1	8.2	5.0	3.2	2.8	3.3
5.15										
6.1	60C1 Mud Island -South side	000-030	Impacted	8.2	5.5	2.8	1.4	1.3	3.2	2.3
6.2	60C1 Mud Island -South side	030-091	Impacted	8.1	6.6	1.5	1.5	0.0	4.9	1.7
6.3	60C1 Mud Island -South side	091-137	Impacted	5.4	3.9	1.5	1.5	0.0	3.1	0.8
6.35										
7	53C1 Grassy Island NW	000-030	Impacted	6.3	3.3	3.0	3.0	0.1	0.0	3.3
7.1	53C1 Grassy Island NW	030-071	Impacted	1.8	0.3	1.5	1.3	0.2	0.0	0.3
7.15										
8	54C1 Grassy Island NE	000-034	Impacted	5.5	3.4	2.0	1.8	0.2	1.8	1.6
8.5										
9	63P Grassy Island W	Ponar	Impacted	4.8	1.4	3.4	2.0	1.4	0.0	1.4
9.5										
10	61P Grassy Island SW	Ponar	Impacted	9.8	5.1	4.6	2.5	2.1	1.2	3.9
10.5										
11	62P Grassy Island SE	Ponar	Impacted	10.2	4.6	5.6	3.4	2.2	1.3	3.3
11.5										
12	57P Mouth of Ecorse Creek	Ponar	Moderately Contaminated	25.6	14.6	11.1	5.0	6.1	10.6	4.0
12.5										
13	58C1 Mouth of Ecorse Creek	000-030	Impacted	5.3	3.4	1.9	1.9	0.0	3.4	0.0
13.5										
14	52C1 BASF Northworks lower	000-030	Moderately Contaminated	29.4	14.2	15.1	6.9	8.3	5.8	8.4
14.1	52C1 BASF Northworks lower	030-091	Severely Contaminated	31.6	16.9	14.7	6.9	7.7	3.9	13.0
14.2	52C1 BASF Northworks lower	091-152	Severely Contaminated	31.1	16.3	14.8	6.9	7.9	1.3	15.0
14.3	52C1 BASF Northworks lower	152-213	Moderately Contaminated	17.3	8.9	8.4	3.3	5.2	0.0	6.9

DATA RESULTS: Classification - Upstream to Downstream

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1996

Summed Exceedances

Not-impacted <1 < Impacted < 15 < Moderately Impacted < 30 < Severely Contaminated < 60 < Extremely Contaminated

Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	EXCEEDANCES (x over guidelines)					
					BIO Exceedance	Tox Exceedance	Toxics Metals	Organics	Bioaccum PCBs	Hg
15	69C1 Wyandotte Yacht Club	000-030	Severely Contaminated	33.7	21.0	12.7	5.8	7.0	10.0	11.0
15.1	69C1 Wyandotte Yacht Club	030-066	Severely Contaminated	32.6	20.4	12.3	5.3	6.9	5.4	15.0
15.15										
16	68P N of Pt. Hennepin	Ponar	Impacted	2.1	0.7	1.4	1.0	0.4	0.0	0.7
16.5										
17	68E N of Pt. Hennepin	Eckman	Impacted	2.1	0.8	1.3	1.1	0.1	0.0	0.8
17.5										
18	67C1 Portofino	000-030	Moderately Contaminated	24.5	13.2	11.3	6.3	5.1	5.7	7.5
18.5										
19	43P Portofino Slip	PONAR	Impacted	8.9	3.2	5.7	4.6	1.1	0.0	3.2
19.5										
20	42P Pt. Hennepin	PONAR	Impacted	4.4	2.2	2.2	1.9	0.3	0.0	2.2
20.5										
21	15 C1 T.C. North Marsh	000-022	Impacted	2.0	0.0	2.0	2.0	0.0	0.0	0.0
21.1	15 C1 T.C. North Marsh	022-062	Impacted	1.8	0.0	1.8	1.8	0.0	0.0	0.0
21.2	15 C1 T.C. North Marsh	062-100	Impacted	2.1	0.0	2.1	2.1	0.0	0.0	0.0
21.5										
22	51 C 1 Firestone upper	000-030	Extremely Contaminated	203.0	185.8	17.2	8.9	8.3	55.8	130.0
22.1	51 C 1 Firestone upper	030-091	Extremely Contaminated	214.4	188.2	26.2	12.5	13.7	26.2	160.0
22.2	51 C 1 Firestone upper	091-152	Extremely Contaminated	225.9	203.0	22.9	10.8	12.2	43.0	160.0
22.3	51 C 1 Firestone upper	152-194	Extremely Contaminated	130.8	111.3	19.5	8.4	11.1	16.3	96.0
22.5										
23	66C1 Firestone Steel -Mid (45P site	000-030	Extremely Contaminated	201.8	175.1	26.7	11.9	14.8	15.1	160.0
23.1	66C1 Firestone Steel -Mid (45P site	030-091	Extremely Contaminated	130.5	111.7	18.9	9.2	9.7	11.7	100.0
23.2	66C1 Firestone Steel -Mid (45P site	091-104	Severely Contaminated	48.0	31.0	17.0	6.6	10.4	2.0	29.0
23.5										
24	45P Firestone Steel	PONAR	Extremely Contaminated	118.9	103.3	15.6	10.0	5.6	3.3	100.0
24.1	45P Firestone Steel	PONAR	Extremely Contaminated	82.3	71.7	10.7	10.7	0.0	6.7	66.0
24.5										
25	50P Firestone lower	Ponar	Extremely Contaminated	135.6	110.4	25.3	13.4	11.8	10.4	100.0
25.5										
27	MONGUAGON CREEK-UPSTREA	000-030	Severely Contaminated	48.1	31.3	16.9	11.6	5.2	7.3	24.0
27.1	MONGUAGON CREEK-UPSTREA	030-104	Extremely Contaminated	65.3	19.6	45.7	18.1	27.6	7.6	12.0
27.2	MONGUAGON CREEK-UPSTREA	104-142	Extremely Contaminated	163.5	132.9	30.6	14.9	15.9	33.9	99.0
27.5										
28	MONGUAGON CREEK-UPSTREA	000-030	Severely Contaminated	47.9	31.4	16.5	10.5	6.0	6.4	25.0
28.1	MONGUAGON CREEK-UPSTREA	030-076	Extremely Contaminated	92.8	64.0	28.8	14.1	14.7	30.0	34.0
28.2	MONGUAGON CREEK-UPSTREA	076-150	Extremely Contaminated	91.7	60.4	31.3	16.8	14.5	29.4	31.0
28.3	MONGUAGON CREEK-UPSTREA	150-180	Extremely Contaminated	103.9	87.3	16.6	8.2	8.4	30.3	57.0
28.5										
29	48E Monguagon Creek	Eckman	Moderately Contaminated	29.9	7.5	22.4	13.8	8.9	4.8	2.9
29.5										
30	S5 - Monguagon Creek	Ponar	Severely Contaminated	40.1	18.7	21.4	11.3	10.1	18.7	0.0
30.5										
31	FI - Fighting Island	Ponar	Impacted	1.8	0.2	1.3	1.2	0.1	0.2	0.0
31.5										
32	25 C1 MNCK DNS-Nearshore	000-027	Moderately Contaminated	20.3	11.0	9.3	8.3	1.0	0.0	11.0
32.1	25 C1 MNCK DNS-Nearshore	027-051	Moderately Contaminated	19.2	9.5	9.7	9.4	0.3	0.0	9.5
32.2	25 C1 MNCK DNS-Nearshore	051-095	Moderately Contaminated	29.3	18.3	11.1	10.6	0.5	3.3	15.0
32.3	25 C1 MNCK DNS-Nearshore	095-132	Severely Contaminated	36.2	17.5	18.7	18.0	0.7	3.5	14.0
32.5										
33	21 C1 MNCK DNS-Offshore	000-027	Impacted	1.2	0.0	1.2	1.2	0.0	0.0	0.0
33.1	21 C1 MNCK DNS-Offshore	027-051	Impacted	3.8	2.3	1.5	1.5	0.0	0.0	2.3
33.5										
34	MONGUAGON CREEK-DOWN	000-150	Extremely Contaminated	77.3	56.9	20.4	17.5	2.9	17.9	39.0
34.1	MONGUAGON CREEK-DOWN	150-168	Extremely Contaminated	173.1	147.3	25.9	20.6	5.2	37.3	110.0
34.5										

DATA RESULTS: Classification - Upstream to Downstream

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1996

Summed Exceedances

Not-impacted <1 < Impacted < 15 < Moderately Impacted < 30 < Severely Contaminated < 60 < Extremely Contaminated

Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	BIO Exceedance	Tox Exceedance	EXCEEDANCES (x over guidelines) Toxics Metals	Organics	Bioaccum PCBs	Hg
35	BLACK LAGOON-CENTER	000-030	Severely Contaminated	37.2	14.0	23.2	18.7	4.5	0.0	14.0
35.1	BLACK LAGOON-CENTER	030-120	Extremely Contaminated	85.3	50.7	34.6	21.2	13.4	19.7	31.0
35.2	BLACK LAGOON-CENTER	120-210	Extremely Contaminated	97.0	73.5	23.5	17.0	6.5	5.5	68.0
35.3	BLACK LAGOON-CENTER	210-229	Moderately Contaminated	20.6	14.0	6.6	4.1	2.4	0.0	14.0
35.5										
36	BLACK LAGOON-LOWER	000-060	Extremely Contaminated	91.3	64.5	26.8	20.9	5.9	8.5	56.0
36.1	BLACK LAGOON-LOWER	060-152	Extremely Contaminated	91.1	78.0	13.1	9.7	3.5	0.0	78.0
36.2	BLACK LAGOON-LOWER	152-203	Severely Contaminated	57.1	48.0	9.1	7.3	1.8	0.0	48.0
36.5										
37	BLACK LAGOON-EAST	000-055	Non-Impacted	0.8	0.0	0.8	0.8	0.0	0.0	0.0
37.1	BLACK LAGOON-EAST	055-103	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
37.2	BLACK LAGOON-EAST	103-166	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
37.3	BLACK LAGOON-EAST	166-229	Non-Impacted	0.8	0.0	0.8	0.8	0.0	0.0	0.0
37.5										
38	BLACK LAGOON-EAST	000-035	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
38.1	BLACK LAGOON-EAST	035-133	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
38.2	BLACK LAGOON-EAST	133-182	Non-Impacted	0.9	0.0	0.9	0.9	0.0	0.0	0.0
38.5										
39	24 C1 BLLG-Nearshore	000-030	Severely Contaminated	42.2	17.0	25.2	20.3	4.9	5.0	12.0
39.1	24 C1 BLLG-Nearshore	030-075	Severely Contaminated	43.0	19.6	23.4	21.0	2.5	7.6	12.0
39.5										
40	24 C1 BLLG-Nearshore	030-075	Severely Contaminated	43.0	13.0	30.0	29.9	0.1	0.0	13.0
40.5										
41	47E BLLG	Eckman	Extremely Contaminated	137.9	119.9	18.0	10.9	7.1	9.9	110.0
41.5										
42	S7 - Black Lagoon	Ponar	Severely Contaminated	40.0	14.4	25.6	16.2	9.3	14.4	0.0
42.5										
43	40P East of Bouy N "6"	PONAR	Impacted	4.3	1.8	2.5	2.3	0.2	0.0	1.8
43.5										
44	41P NE of Bouy R "16"	PONAR	Impacted	8.2	4.0	4.2	3.6	0.6	1.7	2.3
44.5										
45	44P DNS from Bouy R "26"	PONAR	Impacted	13.8	6.5	7.3	7.3	0.0	0.0	6.5
45.5										
46	26P Riverside Hospital	PONAR	Impacted	13.5	5.6	7.9	7.4	0.5	0.0	5.6
46.5										
47	27P Trenton Towers	PONAR	Extremely Contaminated	77.3	64.0	13.3	13.1	0.2	0.0	64.0
47.5										
48	28P Deadhead Cove	PONAR	Impacted	13.8	7.0	6.8	6.8	0.2	0.0	7.0
48.1	28PC2	PONAR	Impacted	13.4	6.7	6.7	6.5	0.2	0.0	6.7
48.5										
49	ELIZABETH PARK CANAL	000-079	Extremely Contaminated	95.6	64.2	31.4	13.4	18.0	8.2	56.0
49.1	ELIZABETH PARK CANAL	079-160	Severely Contaminated	41.7	23.0	18.7	10.1	8.6	0.0	23.0
49.2	ELIZABETH PARK CANAL	160-260	Severely Contaminated	32.8	15.0	17.8	7.2	10.6	0.0	15.0
49.3	ELIZABETH PARK CANAL	260-330	Severely Contaminated	38.9	24.0	14.9	8.7	6.2	0.0	24.0
49.5										
50	16 C1 EPNC-Upper	000-080	Extremely Contaminated	90.1	78.2	11.9	10.3	1.6	31.2	47.0
50.1	16 C1 EPNC-Upper	080-120	Severely Contaminated	50.2	40.0	10.2	8.8	1.4	0.0	40.0
50.2	16 C1 EPNC-Upper	120-157	Severely Contaminated	40.9	29.2	11.8	9.8	2.0	1.2	28.0
50.5										
51	17 C1 EPNC-Inner	000-040	Extremely Contaminated	91.5	80.8	10.8	8.5	2.2	6.8	74.0
51.1	17 C1 EPNC-Inner	040-080	Severely Contaminated	35.4	26.0	9.4	7.7	1.7	0.0	26.0
51.2	17 C1 EPNC-Inner	080-140	Moderately Contaminated	26.5	18.0	8.5	6.2	2.3	0.0	18.0
51.3	17 C1 EPNC-Inner	140-175	Moderately Contaminated	16.9	12.0	4.9	3.8	1.0	0.0	12.0
51.5										
52	18 C1 EPNC-Lower	000-055	Extremely Contaminated	83.9	75.0	9.0	6.8	2.2	7.0	68.0
52.1	18 C1 EPNC-Lower	055-125	Severely Contaminated	57.9	48.0	9.9	9.0	0.9	2.0	46.0
52.2	18 C1 EPNC-Lower	125-170	Severely Contaminated	42.9	28.2	14.7	7.1	7.6	4.2	24.0
52.3	18 C1 EPNC-Lower	170-217	Moderately Contaminated	23.2	15.0	8.2	4.7	3.5	0.0	15.0
52.5										
53	46E EPNC	Eckman	Severely Contaminated	30.5	20.2	10.3	7.9	2.4	5.2	15.0
53.5										
55	29P EPC Bridge 1	PONAR	Impacted	12.1	4.0	8.1	8.1	0.0	0.0	4.0
55.5										
56	30P EPC Bridge 2	PONAR	Impacted	3.9	1.8	2.1	2.1	0.0	0.0	1.8
56.5										
57	31P EPC Bridge 3	PONAR	Moderately Contaminated	24.9	17.0	7.9	7.6	0.3	0.0	17.0
57.5										
58	32P EPC Bridge 4	PONAR	Severely Contaminated	36.0	25.5	10.6	10.3	0.2	16.7	8.8
58.5										

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Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1996

Summed Exceedances

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Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	EXCEEDANCES (x over guidelines)					
					BIO Exceedance	Tox Exceedance	Toxics Metals	Organics	Bioaccum PCBs	Hg
59	33P EPC Bridge 5	PONAR	Moderately Contaminated	21.4	11.8	9.7	9.3	0.4	2.5	9.1
59.5										
60	EP MARINA - OUTSIDE	000-020	Impacted	1.7	0.0	1.7	1.7	0.0	0.0	0.0
60.5										
61	EP MARINA - UPLAND	000-006	Impacted	1.6	0.0	1.6	1.6	0.0	0.0	0.0
61.5										
62	EP MARINA - RIVER BED UP.	000-010	Severely Contaminated	48.9	34.2	14.8	10.0	4.8	4.2	30.0
62.1	EP MARINA - RIVER BED UP.	010-020	Extremely Contaminated	65.0	46.3	18.7	10.4	8.2	4.3	42.0
62.2	EP MARINA - RIVER BED UP.	020-028	Extremely Contaminated	79.9	57.9	22.0	11.7	10.3	5.9	52.0
62.3	EP MARINA - RIVER BED UP.	028-036	Extremely Contaminated	61.5	48.1	13.4	12.7	0.7	5.1	43.0
62.5										
63	EP MARINA - RIVER BED DN.	000-013	Severely Contaminated	51.2	40.0	11.2	7.1	4.1	0.0	40.0
63.1	EP MARINA - RIVER BED DN.	013-018	Severely Contaminated	50.0	40.0	10.0	7.7	2.3	0.0	40.0
63.5										
65	EP1 - Upland (S11)	Ponar	Moderately Contaminated	15.3	3.8	11.4	7.9	3.5	3.8	0.0
65.5										
66	EP2 - Mid Marina (S12)	Ponar	Moderately Contaminated	25.7	8.0	17.7	10.8	7.0	8.0	0.0
66.5										
67	EP3 - South Marina (S13)	Ponar	Moderately Contaminated	20.2	4.8	15.4	10.1	5.3	4.8	0.0
67.5										
68	EPN (new site)	Ponar	Severely Contaminated	59.2	44.0	15.2	14.8	0.4	0.0	44.0
68.05										
68.1	EPM-N	Eckman	Moderately Contaminated	23.8	15.0	8.8	8.7	0.1	0.0	15.0
68.5										
69	S11-EPM Upland	Ponar	Severely Contaminated	31.4	23.0	8.4	8.1	0.3	0.0	23.0
69.1	S11D- EPM Upland Dup.	Ponar	Severely Contaminated	31.2	23.0	8.2	8.0	0.2	0.0	23.0
69.15										
69.2	EPM-1 (S11-EPM Upland)	Eckman	Moderately Contaminated	27.0	18.0	9.0	8.9	0.1	0.0	18.0
69.5										
69.5										
70	S12-EPM Mid	Ponar	Severely Contaminated	40.0	29.0	11.0	10.4	0.6	0.0	29.0
70.05										
70.1	EPM-2 (S12-EPM Mid)	Eckman	Moderately Contaminated	25.6	16.0	9.6	9.2	0.4	0.0	16.0
70.15										
70.2	EPM2-dup (S12- EPM Upland)	Eckman	Moderately Contaminated	26.2	17.0	9.2	9.2	0.0	0.0	17.0
70.25										
71	S13-EPM South	Ponar	Severely Contaminated	40.9	31.0	9.9	9.3	0.6	0.0	31.0
71.05										
71.1	EPM-3 (S13-EPM South)	Eckman	Severely Contaminated	45.3	38.0	7.3	6.4	0.9	0.0	38.0
71.15										
72	34P EPSC DOCK	PONAR	Severely Contaminated	30.8	18.8	12.3	11.9	0.4	2.5	16.0
72.5										
73	35P EPSC-Inlet	PONAR	Moderately Contaminated	22.5	12.0	10.5	10.1	0.4	0.0	12.0
73.1	35P EPSC-Inlet	PONAR	Moderately Contaminated	19.7	10.0	9.7	9.3	0.4	0.0	10.0
73.15										
74	20 C1 EPSC-Inlet	000-083	Extremely Contaminated	62.2	47.3	14.9	13.2	1.7	7.3	40.0
74.1	20 C1 EPSC-Inlet	083-088	Extremely Contaminated	72.1	55.0	17.0	14.8	2.3	4.0	51.0
74.15										
74.2	49E EPSC	Eckman	Moderately Contaminated	23.7	9.6	14.1	7.0	7.1	0.0	9.6
74.25										
75	36P Monsanto Lagoon	PONAR	Severely Contaminated	57.3	41.7	15.6	14.6	1.1	2.7	39.0
75.5										
77	19 C1 Monsanto Bay	000-053	Severely Contaminated	50.1	37.6	12.5	10.6	1.9	1.6	36.0
77.1	19 C1 Monsanto Bay	053-085	Severely Contaminated	51.7	42.5	9.2	7.8	1.4	3.5	39.0
77.15										
77.2	19 C2 Monsanto Bay	000-051	Severely Contaminated	51.7	40.3	11.5	9.2	2.2	7.3	33.0
77.3	19 C2 Monsanto Bay	051-085	Severely Contaminated	45.9	36.2	9.8	7.1	2.6	4.2	32.0
77.35										
78	CHRYSLER BAY-INNER	000-030	Impacted	3.1	2.0	1.1	1.1	0.0	0.0	2.0
78.1	CHRYSLER BAY-INNER	030-058	Impacted	1.5	0.0	1.5	1.5	0.0	0.0	0.0
78.2	CHRYSLER BAY-INNER	058-079	Impacted	1.7	0.0	1.7	1.7	0.0	0.0	0.0
78.25										
79	CHRYSLER BAY-OUTER	000-013	Moderately Contaminated	27.9	20.4	7.5	6.4	1.1	5.4	15.0
79.1	CHRYSLER BAY-OUTER	013-061	Impacted	1.9	0.0	1.9	1.9	0.0	0.0	0.0
79.15										
80	37P Chry Bay Marsh Inlet	PONAR	Impacted	4.6	1.8	2.8	2.8	0.0	0.0	1.8
80.5										
81	39P Swan Island-North	PONAR	Impacted	7.5	3.8	3.7	3.1	0.6	0.0	3.8
81.5										
82	38P Above Humbug Marina	PONAR	Moderately Contaminated	15.7	8.7	7.0	6.8	0.2	0.0	8.7
82.5										
83	S9 - Chrysler Bay	Ponar	Impacted	14.1	4.2	9.9	7.9	2.0	4.2	0.0
83.5										
84	CELERON ISLAND	000-043	Impacted	3.1	1.6	1.5	1.4	0.1	0.0	1.6
84.1	CELERON ISLAND	043-074	Impacted	1.5	0.0	1.5	1.5	0.0	0.0	0.0
84.2	CELERON ISLAND	074-107	Impacted	1.8	0.0	1.8	1.8	0.0	0.0	0.0

DATA RESULTS: Classification - Most Contaminated to Least Contaminated

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1998

Summed Exceedances

Not-impacted <1 < Impacted < 15 < Moderately Impacted < 30 < Severely Contaminated < 60 < Extremely Contaminated

Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	BIO Exceedance	Tox Exceedance	EXCEEDANCES (x over guidelines) Toxics Metals	Organics	Bioaccum PCBs	Hg
22.2	51 C 1 Firestone upper	091-152	Extremely Contaminated	225.6	203.0	22.6				
22.1	51 C 1 Firestone upper	030-091	Extremely Contaminated	214.4	188.2	26.2	10.6	12.2	43.0	160.0
22	51 C 1 Firestone upper	000-030	Extremely Contaminated	203.0	185.8	17.2	12.5	13.7	26.2	160.0
23	66C1 Firestone Steel -Mid (45P site)	000-030	Extremely Contaminated	201.8	175.1	26.7	8.9	8.3	55.8	130.0
34.1	MONGUAGON CREEK-DOWN	150-166	Extremely Contaminated	173.1	147.3	25.8	11.9	14.8	15.1	160.0
27.2	MONGUAGON CREEK-UPSTREAM	104-142	Extremely Contaminated	163.5	132.9	30.5	20.6	5.2	37.3	110.0
41	47E BLLG	Eckman	Extremely Contaminated	137.9	119.9	18.0	14.6	15.9	33.9	99.0
25	50P Firestone lower	Ponar	Extremely Contaminated	135.8	110.4	25.3	10.8	7.1	8.9	110.0
22.3	51 C 1 Firestone upper	152-194	Extremely Contaminated	130.8	111.3	19.5	13.4	11.8	10.4	100.0
23.1	66C1 Firestone Steel -Mid (45P site)	030-091	Extremely Contaminated	130.5	111.7	18.8	8.4	11.1	16.3	95.0
24	45P Firestone Steel	PONAR	Extremely Contaminated	118.9	103.3	15.6	9.2	8.7	11.7	100.0
28.3	MONGUAGON CREEK-UPSTREAM	150-180	Extremely Contaminated	103.9	87.3	16.6	10.0	5.8	3.3	100.0
2.2	56C1 Nickelson South Slip	030-043	Extremely Contaminated	99.1	28.0	71.1	8.2	8.4	30.3	97.0
35.2	BLACK LAGOON-CENTER	120-210	Extremely Contaminated	97.0	73.5	23.5	25.3	45.8	22.4	5.8
40	ELIZABETH PARK CANAL	000-079	Extremely Contaminated	95.8	64.2	31.4	17.0	8.5	5.5	66.0
1.2	55C1 Allied Oil Slip NW	030-091	Extremely Contaminated	94.1	50.3	43.8	13.4	16.0	8.2	56.0
28.1	MONGUAGON CREEK-UPSTREAM	030-076	Extremely Contaminated	92.8	64.0	28.8	15.6	26.2	36.3	12.0
28.2	MONGUAGON CREEK-UPSTREAM	076-150	Extremely Contaminated	91.7	60.4	31.3	14.1	14.7	30.0	34.0
51	17 C1 EPNC-Inner	000-040	Extremely Contaminated	91.5	60.8	10.8	10.8	14.8	29.4	31.0
36	BLACK LAGOON-LOWER	000-060	Extremely Contaminated	91.3	64.5	26.8	8.8	2.2	8.8	74.0
36.1	BLACK LAGOON-LOWER	060-152	Extremely Contaminated	91.1	78.0	13.1	20.9	8.8	8.8	56.0
50	16 C1 EPNC-Upper	000-060	Extremely Contaminated	90.1	78.2	11.9	8.7	3.5	0.0	78.0
1.1	55C1 Allied Oil Slip NW	000-030	Extremely Contaminated	89.0	44.0	44.7	10.3	1.8	31.2	47.0
1.8	55C2 Allied Oil Slip NW - dup	030-091	Extremely Contaminated	85.7	43.0	42.6	14.8	30.0	26.8	18.0
2.3	56C2 Nickelson South Slip -dup	000-030	Extremely Contaminated	85.5	19.3	66.2	16.2	26.8	26.0	18.0
35.1	BLACK LAGOON-CENTER	030-120	Extremely Contaminated	85.3	50.7	34.8	18.1	48.1	15.1	4.2
52	18 C1 EPNC-Lower	000-055	Extremely Contaminated	83.8	75.0	8.8	21.2	13.4	19.7	31.0
1.4	55C1 Allied Oil Slip NW	152-218	Extremely Contaminated	83.7	32.5	51.2	8.8	2.2	7.0	66.0
24.1	45P Firestone Steel	PONAR	Extremely Contaminated	82.3	71.7	10.7	12.0	34.4	21.5	11.0
62.2	EP MARINA - RIVER BED UP.	020-028	Extremely Contaminated	79.0	57.0	22.0	10.7	0.0	8.7	66.0
2.1	56C1 Nickelson South Slip	000-030	Extremely Contaminated	79.1	19.8	59.4	11.7	10.3	5.8	52.0
1.7	55C2 Allied Oil Slip NW - dup	091-147	Extremely Contaminated	78.8	37.4	41.1	16.0	43.4	15.7	4.1
1.3	55C1 Allied Oil Slip NW	091-152	Extremely Contaminated	78.3	35.2	43.1	15.0	28.1	28.4	11.8
34	MONGUAGON CREEK-DOWN	000-150	Extremely Contaminated	77.3	56.8	20.4	11.0	32.0	25.2	10.8
47	27P Trenton Towers	PONAR	Extremely Contaminated	77.3	64.0	13.3	17.5	2.9	17.8	36.0
74.1	20 C1 EPSC-Inlet	083-088	Extremely Contaminated	72.1	55.0	17.0	13.1	0.2	0.0	64.0
1.5	55C2 Allied Oil Slip NW - dup	000-030	Extremely Contaminated	69.0	31.3	38.3	14.8	2.9	4.0	51.0
27.1	MONGUAGON CREEK-UPSTREAM	030-104	Extremely Contaminated	65.3	18.6	46.7	12.1	28.2	21.4	9.8
62.1	EP MARINA - RIVER BED UP.	010-020	Extremely Contaminated	65.0	48.3	16.7	18.1	27.8	7.8	12.0
3.3	59C1 Stenson Club	091-152	Extremely Contaminated	63.0	32.0	31.0	10.4	9.2	4.3	42.0
74	20 C1 EPSC-Inlet	000-083	Extremely Contaminated	62.2	47.3	14.9	11.4	18.9	17.0	15.0
62.3	EP MARINA - RIVER BED UP.	028-038	Extremely Contaminated	61.5	48.1	13.4	13.2	1.7	7.3	40.0
							12.7	0.7	5.7	43.0

DATA RESULTS: Classification - Most Contaminated to Least Contaminated

Classification of Contaminated Sediment Sites as applied to the Trenton Channel Sediment Survey Results 1993-1998

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Location Index	Trenton Channel Project Sediment Results SITE DESCRIPTION	Core length in cm	CLASSIFICATION	BIO + TOX EXCEEDANCE TOTAL	BIO Exceedance	Tox Exceedance	EXCEEDANCES (x over guidelines) Toxics Metals	Organics	Bioaccum PCBs	Hg
68	EPN (new site)	Ponar	Severely Contaminated	59.2	44.0	15.2	14.8	0.4	0.0	44.0
52.1	18 C1 EPNC-Lower	055-125	Severely Contaminated	57.9	48.0	9.9	9.0	0.9	2.0	46.0
3.2	59C1 Stenson Club	030-091	Severely Contaminated	57.8	36.5	28.4	10.4	17.9	21.2	8.3
75	36P Monsanto Lagoon	PONAR	Severely Contaminated	57.3	41.7	15.6	14.5	1.1	2.7	39.0
36.2	BLACK LAGOON-LOWER	152-203	Severely Contaminated	57.1	48.0	9.1	7.3	1.8	0.0	48.0
3.1	59C1 Stenson Club	000-030	Severely Contaminated	56.3	29.0	27.4	9.4	18.0	21.7	7.3
77.2	19 C2 Monsanto Bay	000-051	Severely Contaminated	51.7	40.3	11.5	9.2	2.2	7.3	33.0
77.1	19 C1 Monsanto Bay	053-085	Severely Contaminated	51.7	42.5	9.2	7.8	1.4	3.5	36.0
63	EP MARINA - RIVER BED DN.	000-013	Severely Contaminated	51.2	40.0	11.2	7.1	4.1	0.0	40.0
50.1	18 C1 EPNC-Upper	080-120	Severely Contaminated	50.2	40.0	10.2	8.8	1.4	0.0	40.0
77	19 C1 Monsanto Bay	000-053	Severely Contaminated	50.1	37.5	12.6	10.6	1.9	1.6	36.0
63.1	EP MARINA - RIVER BED DN.	013-018	Severely Contaminated	50.0	40.0	10.0	7.7	2.3	0.0	40.0
2.4	56C2 Nickelson South Slip -dup	030-091	Severely Contaminated	49.5	25.3	24.2	21.6	2.7	24.6	0.7
62	EP MARINA - RIVER BED UP.	000-010	Severely Contaminated	48.9	34.2	14.8	10.9	4.8	4.2	30.0
3.4	59C1 Stenson Club	152-213	Severely Contaminated	48.8	33.6	15.9	8.6	8.4	3.6	30.0
27	MONGUAGON CREEK-UPSTREAM	000-030	Severely Contaminated	48.1	31.3	16.9	11.6	5.2	7.3	24.0
23.2	66C1 Firestone Steel -Mid (45P site)	091-104	Severely Contaminated	48.0	31.0	17.0	9.6	10.4	2.0	29.0
26	MONGUAGON CREEK-UPSTREAM	000-030	Severely Contaminated	47.9	31.4	16.5	10.5	6.0	6.4	25.0
77.3	19 C2 Monsanto Bay	051-085	Severely Contaminated	45.6	36.2	9.6	7.1	2.6	4.2	32.0
71.1	EPM-3 (S13-EPM South)	Eckman	Severely Contaminated	45.3	38.0	7.3	6.4	0.9	0.0	38.0
39.1	24 C1 BLLG-Nearshore	030-075	Severely Contaminated	43.0	19.6	23.4	21.0	2.5	7.8	12.0
40	24 C1 BLLG-Nearshore	030-075	Severely Contaminated	43.0	13.0	30.0	29.9	0.1	0.0	13.0
52.2	18 C1 EPNC-Lower	125-170	Severely Contaminated	42.9	28.2	14.7	7.1	7.6	4.2	24.0
39	24 C1 BLLG-Nearshore	000-030	Severely Contaminated	42.2	17.0	25.2	20.3	4.9	5.0	12.0
49.1	ELIZABETH PARK CANAL	079-180	Severely Contaminated	41.7	23.0	18.7	10.1	8.8	0.0	23.0
50.2	18 C1 EPNC-Upper	120-157	Severely Contaminated	40.9	29.2	11.6	9.6	2.0	1.2	28.0
71	S13-EPM South	Ponar	Severely Contaminated	40.9	31.0	9.9	9.3	0.5	0.0	31.0
30	S5 - Monguagon Creek	Ponar	Severely Contaminated	40.1	18.7	21.4	11.3	10.1	18.7	0.0
-70	S12-EPM Mid	Ponar	Severely Contaminated	40.0	29.0	11.0	10.4	0.6	0.0	29.0
42	S7 - Black Lagoon	Ponar	Severely Contaminated	40.0	14.4	25.6	10.2	9.3	14.4	0.0
49.3	ELIZABETH PARK CANAL	260-330	Severely Contaminated	38.9	24.9	14.9	8.7	6.2	0.0	24.0
35	BLACK LAGOON-CENTER	000-030	Severely Contaminated	37.2	14.6	23.2	10.7	4.5	0.0	14.0
32.3	25 C1 MNCK DNS-Nearshore	095-132	Severely Contaminated	36.2	17.5	18.7	10.0	0.7	3.5	14.0
56	32P EPC Bridge 4	PONAR	Severely Contaminated	36.0	25.9	10.0	10.3	0.2	10.7	0.8
51.1	17 C1 EPNC-Inner	040-080	Severely Contaminated	35.4	28.9	6.4	7.7	1.7	0.0	28.0
2.6	56C2 Nickelson South Slip -dup	152-201	Severely Contaminated	35.1	15.7	19.4	11.2	8.2	6.6	9.1
3.5	59C1 Stenson Club	213-224	Severely Contaminated	34.7	25.4	9.3	3.9	5.4	4.4	21.0
15	69C1 Wyandotte Yacht Club	000-030	Severely Contaminated	33.7	21.0	12.7	5.0	7.0	10.0	11.0
49.2	ELIZABETH PARK CANAL	180-260	Severely Contaminated	32.6	15.0	17.6	7.2	10.4	0.0	15.0
15.1	69C1 Wyandotte Yacht Club	030-066	Severely Contaminated	32.6	20.4	12.3	5.3	6.9	5.4	15.0
14.1	52C1 BASF Northworks lower	030-091	Severely Contaminated	31.6	16.9	14.7	8.9	7.7	3.9	13.0
69	S11-EPM Upland	Ponar	Severely Contaminated	31.4	23.0	8.4	8.1	0.3	0.0	23.0
69.1	S11D- EPM Upland Dup.	Ponar	Severely Contaminated	31.2	23.0	8.2	8.0	0.2	0.0	23.0
14.2	52C1 BASF Northworks lower	091-152	Severely Contaminated	31.1	16.3	14.8	8.9	7.9	1.3	15.0
72	34P EPSC DOCK	PONAR	Severely Contaminated	30.8	18.5	12.3	11.9	0.4	2.5	16.0
53	46E EPNC	Eckman	Severely Contaminated	30.5	20.2	10.3	7.9	2.4	5.2	15.0

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29	48E Monguagon Creek	Eckman	Moderately Contaminated	29.9	7.5	22.4	13.9	8.9	4.9	2.9
14	52C1 BASF Northworks lower	000-030	Moderately Contaminated	29.4	14.2	15.1	6.9	8.3	5.9	8.4
32.2	25 C1 MNCK DNS-Nearshore	051-095	Moderately Contaminated	29.3	18.3	11.1	10.6	0.5	3.3	15.0
70	CHRYSLER BAY-OUTER	000-013	Moderately Contaminated	27.9	20.4	7.5	8.4	1.1	5.4	15.0
2.5	56C2 Nickelson South Slip -dup	091-152	Moderately Contaminated	27.3	11.8	15.6	7.3	8.3	4.8	7.0
69.2	EPM-1 (S11-EPM Upland)	Eckman	Moderately Contaminated	27.0	18.0	9.0	8.9	0.1	0.0	18.0
51.2	17 C1 EPNC-Inner	060-140	Moderately Contaminated	26.9	18.9	8.5	9.2	2.3	0.0	18.0
70.2	EPM2-dup (S12- EPM Upland)	Eckman	Moderately Contaminated	26.2	17.9	9.2	9.2	0.0	0.0	17.0
66	EP2 - Mid Marina (S12)	Ponar	Moderately Contaminated	25.7	8.9	17.7	10.9	7.0	8.0	0.0
12	57P Mouth of Ecorse Creek	Ponar	Moderately Contaminated	25.6	14.6	11.1	5.0	8.1	10.9	4.0
70.1	EPM-2 (S12-EPM Mid)	Eckman	Moderately Contaminated	25.6	16.9	8.9	9.2	0.4	0.0	16.0
57	31P EPC Bridge 3	PONAR	Moderately Contaminated	24.9	17.9	7.9	7.9	0.3	0.0	17.0
18	67C1 Portofino	000-030	Moderately Contaminated	24.5	13.2	11.3	8.3	5.1	5.7	7.9
68.1	EPM-N	Eckman	Moderately Contaminated	23.8	18.9	8.9	8.7	0.1	0.0	15.0
74.2	49E EPSC	Eckman	Moderately Contaminated	23.7	9.9	14.1	7.0	7.1	0.0	8.9
52.3	18 C1 EPNC-Lower	170-217	Moderately Contaminated	23.2	15.9	8.2	4.7	3.5	0.0	15.0
73	35P EPSC-Inlet	PONAR	Moderately Contaminated	22.5	12.9	10.5	10.1	0.4	0.0	12.0
58	33P EPC Bridge 5	PONAR	Moderately Contaminated	21.4	11.9	9.7	9.5	0.4	2.5	9.1
35.3	BLACK LAGOON-CENTER	210-229	Moderately Contaminated	20.9	14.9	8.9	4.1	2.4	0.0	14.0
32	25 C1 MNCK DNS-Nearshore	000-027	Moderately Contaminated	20.3	11.9	8.3	8.3	1.9	0.0	11.0
67	EP3 - South Marina (S13)	Ponar	Moderately Contaminated	20.2	4.9	15.4	10.1	9.3	4.8	0.0
73.1	35P EPSC-Inlet	PONAR	Moderately Contaminated	19.7	10.9	8.7	9.3	0.4	0.0	10.0
32.1	25 C1 MNCK DNS-Nearshore	027-051	Moderately Contaminated	19.2	9.5	9.7	9.4	0.3	0.0	9.5
14.3	52C1 BASF Northworks lower	152-213	Moderately Contaminated	17.3	8.9	8.4	3.3	9.2	0.0	8.9
51.3	17 C1 EPNC-Inner	140-175	Moderately Contaminated	16.9	12.9	4.9	3.9	1.9	0.0	12.0
82	34P Above Humbug Marina	PONAR	Moderately Contaminated	15.7	8.7	7.9	6.9	9.2	0.0	8.7
65	EP1 - Upland (S11)	Ponar	Moderately Contaminated	15.3	3.9	11.4	7.9	3.9	3.9	0.0

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5.1	65P Mud Island SW	Ponar	Impacted	14.3	8.1	8.2	5.0	3.2	2.8	3.3
83	S9 - Chrysler Bay	Ponar	Impacted	14.1	4.2	9.9	7.9	2.0	4.2	0.0
45	44P DNS from Bouy R "26"	PONAR	Impacted	13.8	6.5	7.3	7.3	0.0	0.0	6.5
48	26P Deadhead Cove	PONAR	Impacted	13.8	7.0	6.8	6.6	0.2	0.0	7.0
48.1	26PC2	PONAR	Impacted	13.5	5.6	7.9	7.4	0.5	0.0	5.6
55	29P EPC Bridge 1	PONAR	Impacted	13.4	6.7	6.7	6.5	0.2	0.0	6.7
11	62P Grassy Island SE	Ponar	Impacted	12.1	4.0	8.1	8.1	0.0	0.0	4.0
10	61P Grassy Island SW	Ponar	Impacted	10.2	4.6	5.6	3.4	2.2	1.3	3.3
19	43P Portofino Slip	PONAR	Impacted	9.8	5.1	4.6	2.5	2.1	1.2	3.9
8.1	60C1 Mud Island -South side	000-030	Impacted	8.9	3.2	5.7	4.6	1.1	0.0	3.2
84	41P NE of Bouy R "18"	PONAR	Impacted	8.2	5.5	2.8	1.4	1.3	3.2	2.3
8.2	60C1 Mud Island -South side	030-091	Impacted	8.2	4.0	4.2	3.6	0.5	1.7	2.3
81	39P Swan Island-North	PONAR	Impacted	8.1	6.6	1.5	1.5	0.0	4.9	1.7
7	53C1 Grassy Island NW	000-030	Impacted	7.5	3.8	3.7	3.1	0.6	0.0	3.8
8	54C1 Grassy Island NE	000-034	Impacted	6.3	3.3	3.0	3.0	0.1	0.0	3.3
8.3	60C1 Mud Island -South side	091-137	Impacted	5.5	3.4	2.0	1.8	0.2	1.8	1.8
13	58C1 Mouth of Ecorse Creek	000-030	Impacted	5.4	3.9	1.5	1.5	0.0	3.1	0.8
4.1	64P Mud Island Northside	Ponar	Impacted	5.3	3.4	1.9	1.9	0.0	3.4	0.0
9	63P Grassy Island W	Ponar	Impacted	5.2	1.3	3.8	2.5	1.4	0.5	0.8
80	37P Chry Bay Marsh Inlet	PONAR	Impacted	4.8	1.4	3.4	2.0	1.4	0.0	1.4
20	42P Pt. Hennepin	PONAR	Impacted	4.8	1.8	2.8	2.8	0.0	0.0	1.8
43	40P East of Bouy N "8"	PONAR	Impacted	4.4	2.2	2.2	1.9	0.3	0.0	2.2
56	30P EPC Bridge 2	PONAR	Impacted	4.3	1.8	2.5	2.3	0.2	0.0	1.8
33.1	21 C1 MNCK DNS-Offshore	027-051	Impacted	3.9	1.8	2.1	2.1	0.0	0.0	1.8
84	CELERON ISLAND	000-043	Impacted	3.8	2.3	1.5	1.5	0.0	0.0	2.3
78	CHRYSLER BAY-INNER	000-030	Impacted	3.1	1.6	1.5	1.4	0.1	0.0	1.6
21.2	15 C1 T.C. North Marsh	062-100	Impacted	3.1	2.0	1.1	1.1	0.0	0.0	2.0
47	68E N of Pt. Hennepin	Eckmen	Impacted	2.1	0.0	2.1	2.1	0.0	0.0	0.0
16	66P N of Pt. Hennepin	Ponar	Impacted	2.1	0.8	1.3	1.1	0.1	0.0	0.8
21	15 C1 T.C. North Marsh	000-022	Impacted	2.1	0.7	1.4	1.0	0.4	0.0	0.7
79.1	CHRYSLER BAY-OUTER	013-061	Impacted	2.0	0.0	2.0	2.0	0.0	0.0	0.0
7.1	53C1 Grassy Island NW	030-071	Impacted	1.8	0.0	1.8	1.8	0.0	0.0	0.0
21.1	15 C1 T.C. North Marsh	022-062	Impacted	1.8	0.3	1.5	1.3	0.2	0.0	0.3
78.2	CHRYSLER BAY-INNER	058-079	Impacted	1.8	0.0	1.8	1.8	0.0	0.0	0.0
80	EP MARINA - OUTSIDE	000-020	Impacted	1.7	0.0	1.7	1.7	0.0	0.0	0.0
84.2	CELERON ISLAND	074-107	Impacted	1.7	0.0	1.7	1.7	0.0	0.0	0.0
31	FI - Fighting Island	Ponar	Impacted	1.6	0.0	1.6	1.6	0.0	0.0	0.0
81	EP MARINA - UPLAND	000-006	Impacted	1.6	0.2	1.3	1.2	0.1	0.2	0.0
84.1	CELERON ISLAND	043-074	Impacted	1.6	0.0	1.6	1.6	0.0	0.0	0.0
78.1	CHRYSLER BAY-INNER	030-058	Impacted	1.5	0.0	1.5	1.5	0.0	0.0	0.0
33	21 C1 MNCK DNS-Offshore	000-027	Impacted	1.5	0.0	1.5	1.5	0.0	0.0	0.0
				1.2	0.0	1.2	1.2	0.0	0.0	0.0
38.2	BLACK LAGOON-EAST	133-182	Non-Impacted	0.9	0.0	0.9	0.9	0.0	0.0	0.0
37	BLACK LAGOON-EAST	000-055	Non-Impacted	0.8	0.0	0.8	0.8	0.0	0.0	0.0
37.3	BLACK LAGOON-EAST	166-229	Non-Impacted	0.8	0.0	0.8	0.8	0.0	0.0	0.0
37.2	BLACK LAGOON-EAST	103-166	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
38.1	BLACK LAGOON-EAST	035-133	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
37.1	BLACK LAGOON-EAST	055-103	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0
38	BLACK LAGOON-EAST	000-035	Non-Impacted	0.7	0.0	0.7	0.7	0.0	0.0	0.0