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letter._____._____-_____.File spillfile___.pdf

report.hw915026___.1996-02-16.RECOMMENDED REMEDIAL ACTION PLAN.pdf

Project Site numbers will be proceeded by the following:

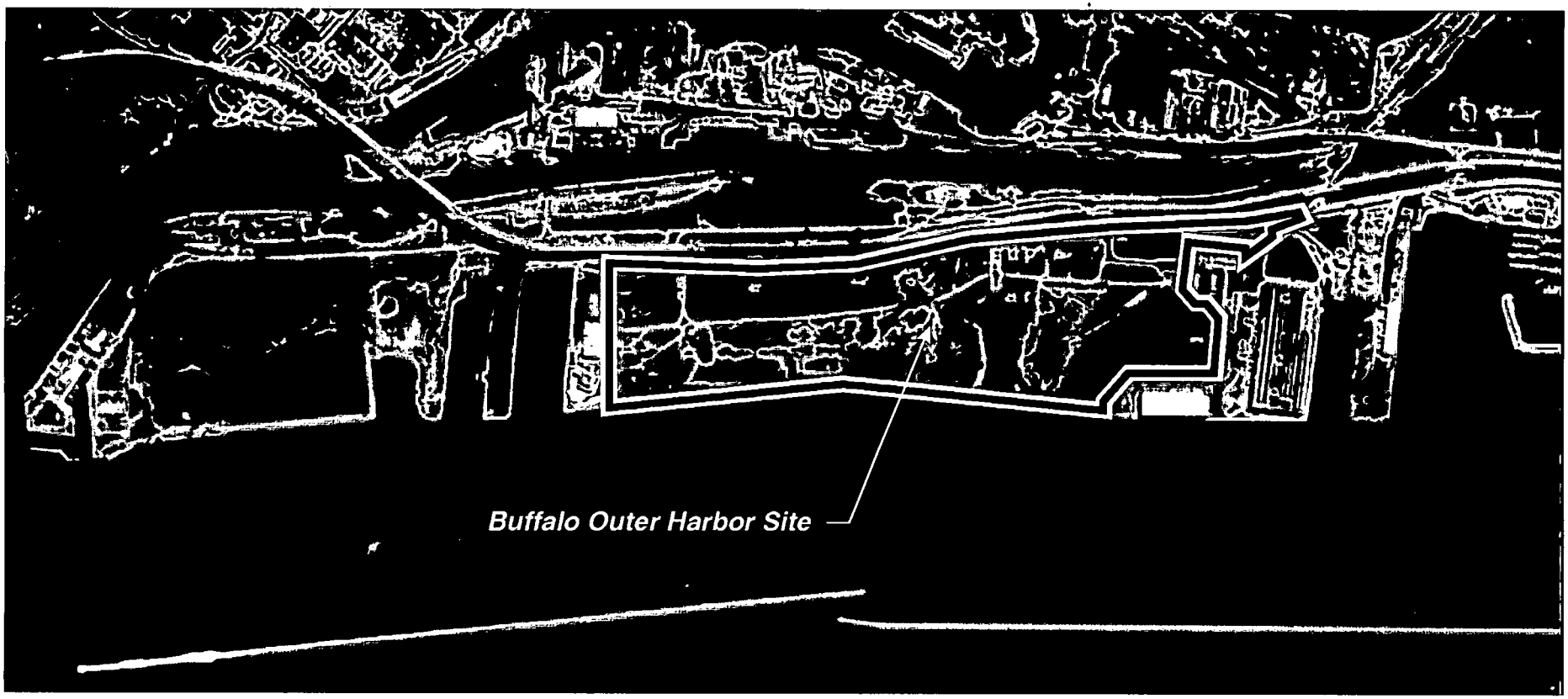
Municipal Brownfields - b
Superfund - hw
Spills - sp
ERP - e
VCP - v
BCP - c

non-releasable - put .nf.pdf
Example: letter.sp9875693.1998-01.Filespillfile.nf.pdf

REMEDIAL INVESTIGATION/FEASIBILITY STUDY RESULTS
AND RECOMMENDED REMEDIAL ACTION PLAN

Buffalo Outer Harbor Site

City of Buffalo, New York



PROJECT BRIEFING DOCUMENT

Dvirka and Bartilucci
CONSULTING ENGINEERS

9/30/96

MEETING AGENDA

- **Results of the Phase II Remedial Investigation**
- **Draft Feasibility Study/Remediation Matrix**
- **Details on the Radio Tower Area**
- **Land Use and Planning Issues**
- **Brownfields/Voluntary Cleanup**
- **Deed Restrictions**

OVERALL PROJECT OBJECTIVES

- **Determine Nature, Extent and Sources of Contamination**
- **Determine Risk to Public Health and the Environment**
- **Identify and Evaluate Remedial Alternatives**
- **Select a Remedial Action Plan**

PHASE II REMEDIAL INVESTIGATION OBJECTIVES

- **Further Define the Extent of Surface and Subsurface Soil Contamination in the Radio Tower Area**
- **Further Define the Extent of Surface Soil Contamination in the Eastern Gravel Parking Area**
- **Further Define the Extent of Subsurface Soil Contamination in the Vicinity of GW-3 and GW-9 (Areas with Elevated Lead Levels)**
- **Further Define the Extent of Groundwater Contamination and Flow Direction in the Radio Tower Area**
- **Confirm Groundwater Quality and Flow Direction Determined as a Result of the Phase I RI**

REMEDIAL INVESTIGATION PROGRAM

Program Element	Phase I	Phase II	Total
Surface Soil Samples			
On-Site	102 112	10	112
Off-Site	5	0	5
Borings	54	8	62
Subsurface Soil Samples	105	12	117
Test Pits (Radio Tower Area Only)	3	0	3
Monitoring Wells/Piezometers	16/12	4/0	20/12
Groundwater Samples	30	15	45
Surface Water and Sediment Samples	16	0	16
Ambient Air Samples (Radio Tower Area Only)	10	0	10

Wildlife Habitat Survey (completed during the Phase I RI)

STANDARDS, CRITERIA AND GUIDELINES

Soil

- **Screening Criteria Developed Based on Previous New York State Records of Decision, and Soil Cleanup Criteria for New Jersey, Massachusetts and USEPA (Proposed)**

Groundwater

- **NYSDEC Class GA Groundwater Standards/Guidelines**

Sediment

- **NYSDEC Division of Fish and Wildlife Technical Guidance for Screening Contaminated Sediment**

Surface Water

- **NYSDEC Class B Surface Water Standards/Guidelines**

CONCLUSIONS

Soil

South of the Bell Slip

- **Radio Tower Area - Highly Contaminated**
- **Remaining Area South of the Bell Slip - Moderately Contaminated**

North of the Bell Slip

- **Area East of the Gravel Parking Lot - Moderately Contaminated**
- **Area East of the Asphalt Road - Moderately Contaminated**
- **Area West of the Asphalt Road - Marginally Contaminated**

CONCLUSIONS (continued)

Groundwater

- Radio Tower Area - Significantly Contaminated
- Remaining Portions of Site - Moderately Contaminated

Surface Water

- Does Not Appear to Be Impacted by Site

Surface Water Sediment

- Sediment in Bell Slip May Be Impacted by Site (and/or Other Source)
- Sediment in Outer Harbor Does Not Appear to Be Impacted By Site

SHIP CANAL

ROUTE 5

FUHRMANN BLVD.

RAILROAD TRACKS

GATE

ASPHALT PARKING AREA

FUHRMANN BLVD.

ROUTE 5

FUHRMANN BLVD.

GATE

CONCRETE PAD

ALLEN BOAT CO.

FORMER HELIPORT

GATE

GUARD HOUSE

ASPHALT

ONE STORY BRICK BLDG.

GRAVEL ROAD

RADIO TOWER AREA

RADIO TOWER

PORT TERMINAL "A"

CONC. DOCK

STONE

ASPHALT PARKING AREA

TIMBER SALE THEORY

GRAVEL PARKING AREA

EASTERN GRAVEL PARKING AREA

AREA EAST OF ASPHALT ROAD

ASPHALT ROAD

GRAVEL AREA

AREA NORTH OF THE BELL SLIP

AREA WEST OF ASPHALT ROAD

BELL SLIP

REMAINING AREA SOUTH OF THE BELL SLIP

LOADING DOCK

PORT TERMINAL "B"

CEMENT SILO

MICHIGAN AVENUE SLIP

GRAVEL PARKING AREA

TOP OF BANK

GATE

BOTTOM OF BANK

UNITED STATES HARBOR LINE

SLIP

THE PIER RESTUARANT

UNITED STATES HARBOR LINE

BUFFALO OUTER HARBOR

LEGEND

FENCE LINES

SITE BOUNDARY

BREAKWALL

BREAKWALL

LAKE ERIE

0 200 400

SCALE IN FEET

DIRECTORY: 1307
FILE NAME: 1307-GA2
DATE: R2S-110/13/96

NO.	DATE	REVISION

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DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS

BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

SITE AREAS

PROJECT NO. 1307

DATE MARCH 1996

SCALE 1"=200'

FIGURE 1-4

BUFFALO OUTER HARBOR
LAND USE AND REMEDIATION MATRIX

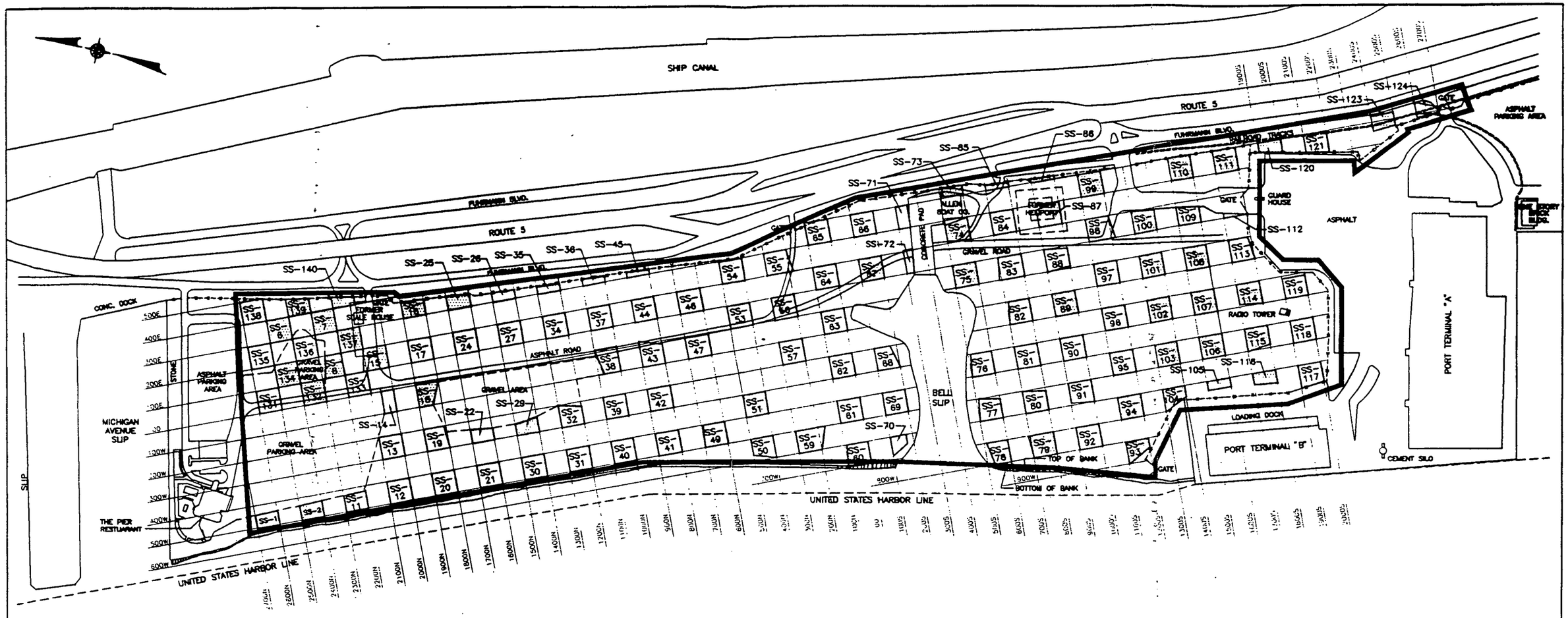
SITE AREAS	MATRIX	TOTAL NO. OF EXCEEDANCES	CONTAMINANT SUMMARY					LAND USE AND POTENTIAL REMEDIAL ALTERNATIVES		
			CONTAMINANT	HIGHEST LEVELS (3)	AVERAGE LEVELS	NO. OF EXCEEDANCES	SCREENING LEVELS	RESIDENTIAL	RECREATIONAL	COMMERCIAL/INDUSTRIAL
SOUTH OF BELL SLIP Radio Tower Area	Surface soil (0 to 6 inches)	5 out of 8 samples above the screening level	PCBs	8.2 mg/kg	2.4 mg/kg	4 out of 8	1 mg/kg	Removal (0-2 feet) (1) or Treatment	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap
			Cadmium	12 mg/kg	5.8 mg/kg	1 out of 8	10 mg/kg			
			Lead	777 mg/kg	390 mg/kg	4 out of 8	500 mg/kg			
			Zinc	2350 mg/kg	1184 mg/kg	5 out of 8	500 mg/kg			
			Nickel	47.9 mg/kg	24.6 mg/kg	1 out of 8	40 mg/kg			
	Shallow Subsurface soil (6 inches to 8 feet)	5 out of 13 samples above the screening level	CaPAHs	112 mg/kg	15.2 mg/kg	2 out of 13	10 mg/kg	Removal (2-8 feet) (1) or Treatment	No Action	No Action
			Lead	1170 mg/kg	314 mg/kg	2 out of 13	500 mg/kg			
			Antimony	29 mg/kg	11.5 mg/kg	1 out of 13	20 mg/kg			
	Deep Subsurface soil (8 to 20 feet)	7 out of 15 samples above the screening level	Total VOCs	351 mg/kg	92.7 mg/kg	2 out of 7	10 mg/kg	Removal (8-20 feet) (1) or Treatment	Removal (8-20 feet)* or Treatment or Containment	Removal (8-20 feet)* or Treatment or Containment
			Nitrobenzene	13,000 mg/kg	79.4 mg/kg	5 out of 15	1 mg/kg			
			PAHs	5600 mg/kg	406 mg/kg	2 out of 15	100 mg/kg			
			CaPAHs	16 mg/kg	2.9 mg/kg	1 out of 15	10 mg/kg			
			Antimony	5470 mg/kg	439 mg/kg	6 out of 15	20 mg/kg			
			Lead	1720 mg/kg	296 mg/kg	2 out of 15	500 mg/kg			
			Chromium	2820 mg/kg	218 mg/kg	2 out of 15	100 mg/kg			
			Nickel	123 mg/kg	23 mg/kg	1 out of 15	40 mg/kg			
			Copper	1480 mg/kg	140 mg/kg	1 out of 15	200 mg/kg			
			Zinc	1290 mg/kg	253 mg/kg	1 out of 15	500 mg/kg			
			TCLP Nitrobenzene	91 mg/l	--	1 out of 2	2 mg/l			
			TCLP 2,4 - Dinitrotoluene	0.6 mg/l	--	1 out of 2	0.3 mg/l			
	Groundwater (depth to groundwater 8 feet)	1 out of 1 samples above the screening level for the Phase I investigation (2) 3 out of 5 samples above the screening level for the Phase II investigation (2)	Benzene	15 ug/l (Phase I)	--	--	0.7 ug/l	Monitoring	Monitoring	Monitoring
			Toluene	7 ug/l (Phase I)	--	--	5 ug/l			
			Chlorobenzene	170 ug/l (Phase I)	--	--	5 ug/l			
			1,3 Dichlorobenzene	150 ug/l (Phase II)	--	--	5 ug/l			
			1,4 Dichlorobenzene	33 ug/l (Phase II)	--	--	4.7 ug/l			
			1,2 Dichlorobenzene	150 ug/l (Phase II)	--	--	4.7 ug/l			
			Napthalene	890 ug/l (Phase I)	--	--	10 ug/l			
			4-Chloroaniline	3600 ug/l (Phase II)	--	--	5 ug/l			
			Antimony	244 ug/l (Phase I)	--	--	3 ug/l			
			Lead	28.4 ug/l (Phase II)	--	--	25 ug/l			
			Arsenic	159 ug/l (Phase II)	--	--	25 ug/l			
Remaining Area	Surface soil (0 to 6 inches)	20 out of 43 samples above the screening level	CaPAHs	80 mg/kg	10 mg/kg	11 out of 43	10 mg/kg	Removal (0-2 feet) (1) or Soil Cover (2 feet) or Pavement/Structure Cap	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap or No Action
			Arsenic	1301 mg/kg	8 mg/kg (4)	2 out of 43	20 mg/kg			
			Zinc	3080 mg/kg	414 mg/kg	8 out of 43	500 mg/kg			
			Lead	834 mg/kg	220 mg/kg	4 out of 43	500 mg/kg			
			Cadmium	27 mg/kg	2.7 mg/kg	1 out of 43	10 mg/kg			
			Chromium	133 mg/kg	29 mg/kg	2 out of 43	100 mg/kg			
			Copper	458 mg/kg	81 mg/kg	3 out of 43	200 mg/kg			
	Shallow Subsurface soil (6 inches to 8 feet)	8 out of 12 samples above the screening level	CaPAHs	18 mg/kg	5.7 mg/kg	4 out of 12	10 mg/kg	Removal (2-4 feet) (1)	No Action	No Action
			Arsenic	36 mg/kg	8.7 mg/kg	1 out of 12	20 mg/kg			
			Lead	1260 mg/kg	345 mg/kg	2 out of 12	500 mg/kg			
			Nickel	63 mg/kg	24 mg/kg	1 out of 12	40 mg/kg			
			Zinc	834 mg/kg	372 mg/kg	4 out of 12	500 mg/kg			
	Deep Subsurface soil (8 to 20 feet)	8 out of 13 samples above the screening level	CaPAHs	31 mg/kg	9.6 mg/kg	4 out of 13	10 mg/kg	No Action	No Action	No Action
			PAHs	104 mg/kg	25.8 mg/kg	1 out of 13	100 mg/kg			
			Lead	2200 mg/kg	283 mg/kg	2 out of 13	500 mg/kg			
			Antimony	74 mg/kg	19 mg/kg	1 out of 13	20 mg/kg			
			Arsenic	21.4 mg/kg	7.8 mg/kg	1 out of 13	20 mg/kg			
			Copper	247 mg/kg	43 mg/kg	1 out of 13	200 mg/kg			
			Nickel	53 mg/kg	23 mg/kg	1 out of 13	40 mg/kg			
			Zinc	1880 mg/kg	317 mg/kg	1 out of 13	500 mg/kg			
	Groundwater (depth to groundwater 8 feet)	5 out of 11 samples above the screening level for the Phase I investigation (2) 0 out of 1 samples above the screening level for the Phase II investigation (2)	Chloroform	15 ug/l (Phase I)	--	--	7 ug/l	No Action	No Action	No Action
			Endrin	0.024 ug/l (Phase I)	--	--	Non-detect			
			4,4 - DDT	0.039 ug/l (Phase I)	--	--	Non-detect			
			4,4 - DDD	0.069 ug/l (Phase I)	--	--	Non-detect			
			Arsenic	95 ug/l (Phase I)	--	--	25 ug/l			
NORTH OF BELL SLIP West of Asphalt Road	Surface soil (0 to 6 inches)	4 out of 34 samples above the screening level	CaPAHs	18 mg/kg	3.6 mg/kg	3 out of 34	10 mg/kg	Removal (0-2 feet) (1) or Soil Cover (2 feet) or Pavement/Structure Cap or No Action	Removal (0-2 feet) (1) or Soil Cover (2 feet) or Pavement/Structure Cap or No Action	No Action
			Lead	815 mg/kg	157 mg/kg	2 out of 34	500 mg/kg			
			Zinc	871 mg/kg	151 mg/kg	1 out of 34	500 mg/kg			
	Shallow Subsurface soil (6 inches to 8 feet)	8 out of 19 samples above the screening level	CaPAHs	18.4 mg/kg	3.8 mg/kg	3 out of 19	10 mg/kg	No Action	No Action	No Action
			Lead	1160 mg/kg	173 mg/kg	1 out of 19	500 mg/kg			
			Copper	753 mg/kg	123 mg/kg	2 out of 19	200 mg/kg			
			Nickel	55.6 mg/kg	15.4 mg/kg	1 out of 19	40 mg/kg			
			Zinc	1010 mg/kg	190 mg/kg	1 out of 19	500 mg/kg			

BUFFALO OUTER HARBOR
LAND USE AND REMEDIATION MATRIX

SITE AREAS	MATRIX	TOTAL NO. OF EXCEEDANCES	CONTAMINANT SUMMARY					LAND USE AND POTENTIAL REMEDIAL ALTERNATIVES		
			CONTAMINANT	HIGHEST LEVELS (3)	AVERAGE LEVELS	NO. OF EXCEEDANCES	SCREENING LEVELS	RESIDENTIAL	RECREATIONAL	COMMERCIAL/INDUSTRIAL
West of Asphalt Road (continued)	Deep Subsurface soil (8 to 20 feet)	10 out of 20 samples above the screening level	CaPAHs	38 mg/kg	9.1 mg/kg	5 out of 18	10 mg/kg	No Action	No Action	No Action
			Lead	2850 mg/kg	648 mg/kg	8 out of 20	500 mg/kg			
			Antimony	89 mg/kg	19.4 mg/kg	2 out of 18	20 mg/kg			
			Copper	12900 mg/kg	902 mg/kg	10 out of 20	200 mg/kg			
			Chromium	569 mg/kg	66 mg/kg	2 out of 18	100 mg/kg			
			Arsenic	57.8 mg/kg	16.2 mg/kg	5 out of 18	20 mg/kg			
			Cadmium	32.6 mg/kg	4.8 mg/kg	2 out of 18	10 mg/kg			
			Nickel	747 mg/kg	75 mg/kg	4 out of 18	40 mg/kg			
			Zinc	5290 mg/kg	923 mg/kg	10 out of 20	500 mg/kg			
	Groundwater (depth to groundwater ranges from 5 to 15 feet)	6 out of 12 samples above the screening level for the Phase I investigation (2) 3 out of 6 samples above the screening level for the Phase II investigation (2)	Antimony	124 ug/l (Phase I)	--	--	3 ug/l	No Action	No Action	No Action
			Barium	4050 ug/l (Phase I)	--	--	25 ug/l			
			Trichloroethene	7 ug/l (Phase I)	--	--	1000 ug/l			
			Cyanide	892 ug/l (Phase II)	--	--	5 ug/l			
			Dieldrin	0.032 ug/l (Phase I)	--	--	100 ug/l			
			Endrin	0.018 ug/l (Phase I)	--	--	Non detect			
			Heptachlor Epoxide	0.026 ug/l (Phase I)	--	--	Non detect			
			Beta BHC	0.011 ug/l (Phase I)	--	--	Non detect			
East of Asphalt Road	Surface soil (0 to 6 inches)	4 out of 23 samples above the screening level	CaPAHs	18 mg/kg	2.2 mg/kg	1 out of 23	10 mg/kg	Removal (0-2 feet) (1) (8) or Treatment	Removal (0-2 feet) (1) or Soil Cover (2 feet) or Pavement/Structure Cap	No Action
			Copper	29,500 mg/kg	62 mg/kg (5)	1 out of 23	200 mg/kg			
			Zinc	874 mg/kg	205 mg/kg	2 out of 23	500 mg/kg			
	Shallow Subsurface soil (6 inches to 8 feet)	8 out of 15 samples above the screening level	CaPAHs	17 mg/kg	2.7 mg/kg	1 out of 13	10 mg/kg	Removal (2-8 feet) (1) or Treatment	No Action	No Action
			Antimony	37 mg/kg	16.7 mg/kg	2 out of 13	20 mg/kg			
			Arsenic	34 mg/kg	10.6 mg/kg	3 out of 13	20 mg/kg			
			Lead	1200 mg/kg	389 mg/kg	6 out of 15	500 mg/kg			
			Copper	1460 mg/kg	673 mg/kg	5 out of 15	200 mg/kg			
			Nickel	48.1 mg/kg	19.2 mg/kg	2 out of 13	40 mg/kg			
			Zinc	4230 mg/kg	968 mg/kg	5 out of 15	500 mg/kg			
	Deep Subsurface soil (8 to 20 feet)	12 out of 15 samples above the screening level	CaPAHs	38 mg/kg	9.1 mg/kg	3 out of 15	10 mg/kg	Removal (8-20 feet) (1) or Treatment	No Action	No Action
			Arsenic	412 mg/kg	41.7 mg/kg	5 out of 15	20 mg/kg			
			Antimony	1170 mg/kg	133 mg/kg	6 out of 15	20 mg/kg			
			Cadmium	27 mg/kg	6.4 mg/kg	3 out of 15	10 mg/kg			
			Chromium	343 mg/kg	58 mg/kg	2 out of 15	100 mg/kg			
			Copper	1560 mg/kg	432 mg/kg	5 out of 15	200 mg/kg			
			Lead	4860 mg/kg	1165 mg/kg	10 out of 15	500 mg/kg			
			Nickel	141 mg/kg	38 mg/kg	4 out of 15	40 mg/kg			
			Zinc	4330 mg/kg	1036 mg/kg	7 out of 15	500 mg/kg			
	Groundwater (depth to groundwater 10 feet)	3 out of 5 samples above the screening level for the Phase I investigation (2) 1 out of 2 samples above the screening level for the Phase II investigation (2)	VOCs	Low levels of VOCs (Less than 10 ug/l Phase I)	--	--	Various Class GA groundwater standards/guidelines	No Action	No Action	No Action
			PAHs	Low levels of PAHs (less than 5 ug/l Phase I and Phase II)	--	--				
			Zinc	349 ug/l (Phase I)	--	--	300 ug/l			
			Lead	410 ug/l (Phase II unfiltered)	--	--	25 ug/l			
			Thallium	7.2 ug/l (Phase II unfiltered)	--	--	4 ug/l			
			Barium	1090 ug/l (Phase II unfiltered)	--	--	1000 ug/l			
Eastern Gravel Parking Area	Surface soil (0 to 6 inches)	8 out of 14 samples above the screening level	PCBs	12 mg/kg	1.3 mg/kg	2 out of 14	1 mg/kg	Removal (0-2 feet) (1) (8)	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap	Removal (0-2 feet)* or Soil Cover (2 feet) or Pavement/Structure Cap
			CaPAHs	14.8 mg/kg	6.1 mg/kg	3 out of 14	10 mg/kg			
			Arsenic	21.3 mg/kg	8.6 mg/kg	1 out of 14	20 mg/kg			
			Cadmium	323 mg/kg	26.9 mg/kg	2 out of 14	10 mg/kg			
			Chromium	113 mg/kg	32 mg/kg	1 out of 14	100 mg/kg			
			Lead	14,000 mg/kg	823 mg/kg (6)	6 out of 14	500 mg/kg			
			Nickel	62.8 mg/kg	19.4 mg/kg	1 out of 14	40 mg/kg			
			Zinc	29800 mg/kg	946 mg/kg (7)	5 out of 14	500 mg/kg			
	Groundwater (depth to groundwater 17 feet)	1 out of 1 sample above the screening level for the Phase I and Phase II investigation(2)	Chrysene	0.6 ug/l (Phase II)	--	--	0.002 ug/l	No Action	No Action	No Action
			Lead	500 ug/l (Phase II)	--	--	25 ug/l			
			Thallium	6.3 ug/l (Phase II)	--	--	4 ug/l			

NOTES:
(1) Removal includes replacement with clean soil
(2) Does not include exceedances for iron, manganese, magnesium or sodium
(3) Highest level encountered during the Phase I and II Investigation
(4) Does not include 1301 mg/kg (detected in only one sample) in average. Average with 1301 mg/kg is 38 mg/kg
(5) Does not include 29500 mg/kg (detected in only one sample) in average. Average with 29500 mg/kg is 1342 mg/kg
(6) Does not include 14000 mg/kg (detected in only one sample) in average. Average with 14000 mg/kg is 1485 mg/kg
(7)Does not include 29800 mg/kg (detected in only one sample) in average. Average with 29800 mg/kg is 3007 mg/kg
(8) Removal of the soil in this area is recommended due to the presence of the former Furhmann Boulevard Landfill in this area.

SHADING
Average level exceeds screening level.
Number of exceedances exceeds 30 %



BUFFALO OUTER HARBOR

LEGEND

- FENCE LINES
- SITE BOUNDARY
- SAMPLES THAT EXCEEDED SCREENING CRITERIA

BREAKWALL

BREAKWALL

LAKE ERIE

0 200 400

SCALE IN FEET

NO.	DATE	REVISION	INIT.

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A DIVISION OF WILLIAM F. CRUILICH ASSOCIATES, P.C.

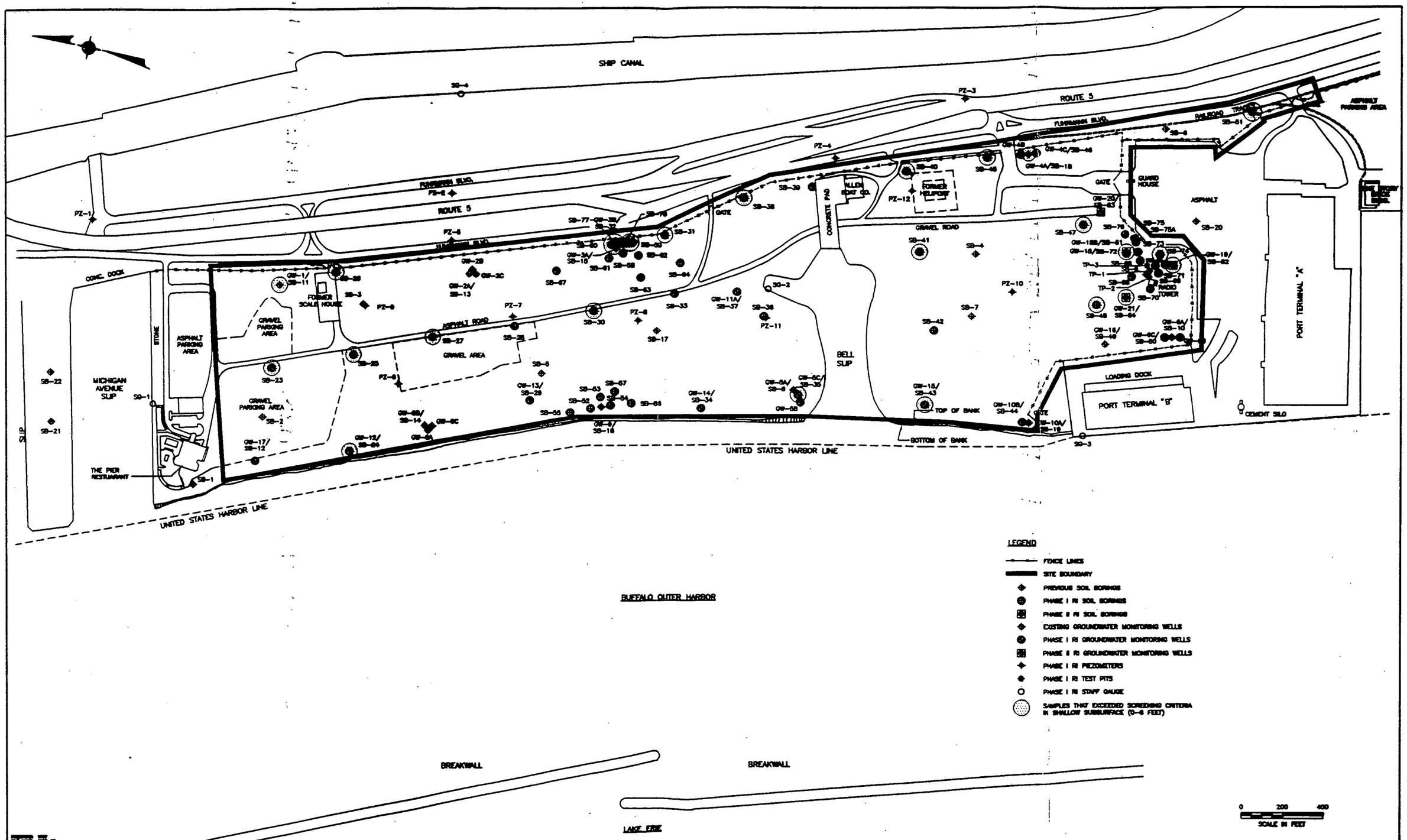
BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

SURFACE SOIL SAMPLING RESULTS

PROJECT NO. 1307

DATE JUNE 1984

SCALE 1"=200'



NO.	DATE	REVISION	BY.

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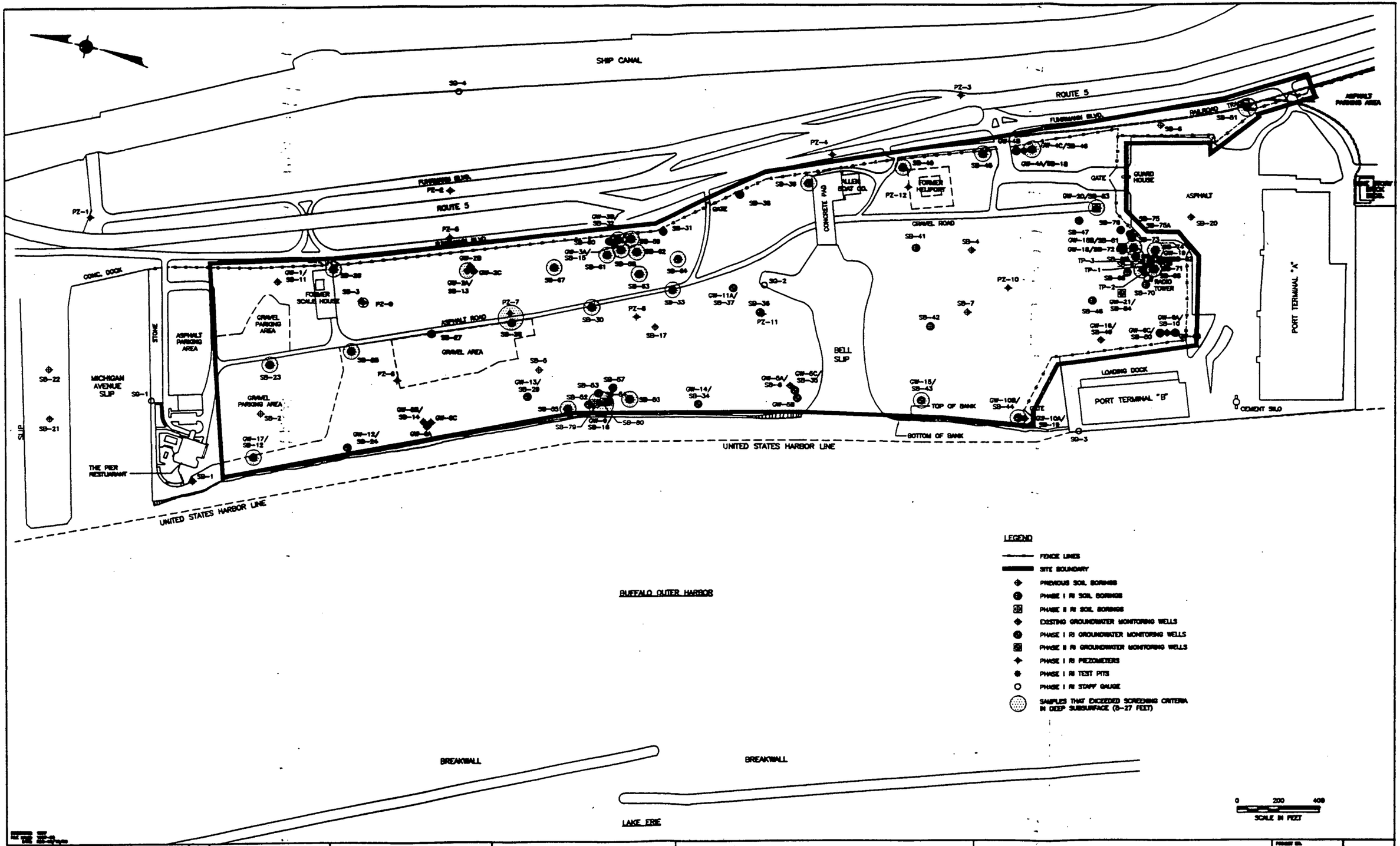
BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

SHALLOW SUBSURFACE SOIL SAMPLING RESULTS (0-8 FEET)

PROJECT NO. 1307
DATE JUNE 1994
SCALE 1"=400'



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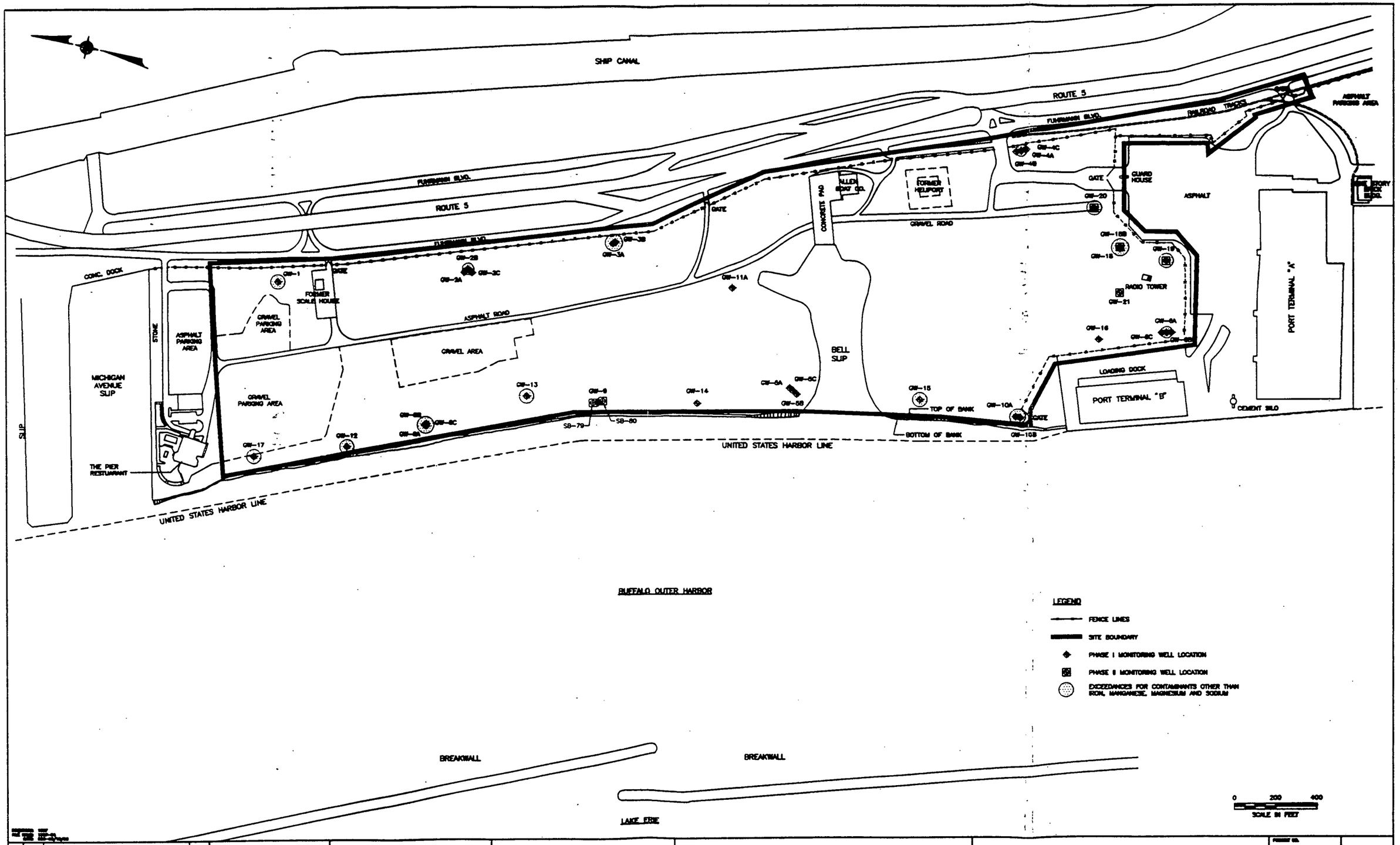
BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

DEEP SUBSURFACE SOIL SAMPLING RESULTS (8-27 FEET)

PROJECT NO. 1387
DATE JUNE 1994
SCALE 1"=400'



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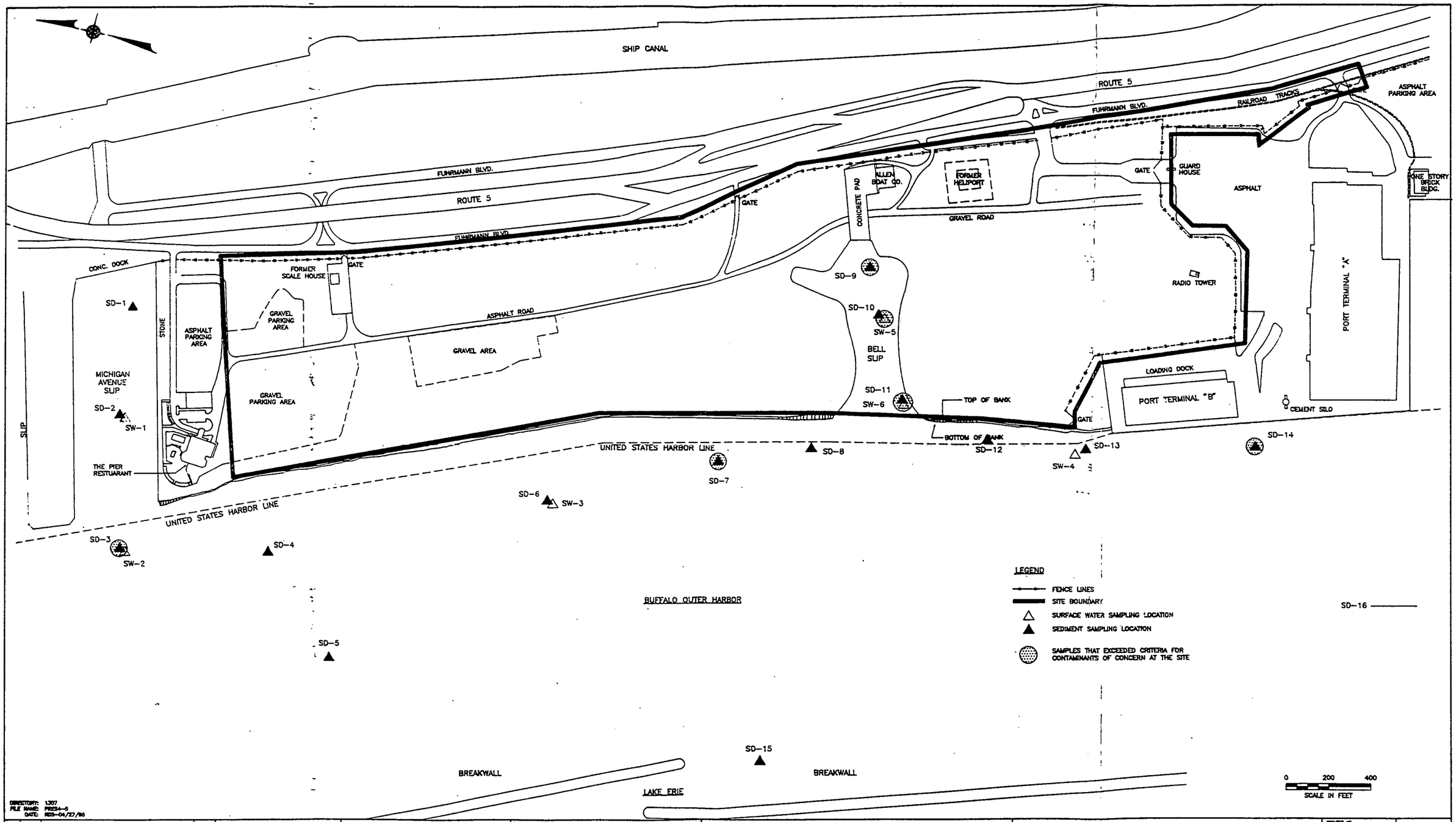
BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

GROUNDWATER SAMPLING RESULTS

PROJECT NO. 1357
DATE JUNE 1994
SCALE 1"=400'



DIRECTORY: 1307
FILE NAME: PRO34-6
DATE: RDS-06/27/96

NO.	DATE	REVISION	BY.

DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS

BUFFALO OUTER HARBOR
BUFFALO, NEW YORK

SURFACE WATER AND SURFACE WATER SEDIMENT SAMPLING RESULTS

PROJECT NO. 1307
DATE: MARCH 1995
SCALE: 1"=200'

AREAS OF CONCERN

Radio Tower Area

Surface, Subsurface Soil and Groundwater

- Volatile Organic Compounds
- Semivolatile Organic Compounds (Primarily Nitrobenzene and 4-Chloroaniline)
- PCBs
- Metals (Including Antimony and Lead)

Eastern Gravel Parking Area

Surface and Subsurface Soil

- Former Fuhrmann Boulevard Landfill
- PCBs
- Lead

AREAS OF CONCERN (continued)

East of the Asphalt Road

Subsurface Soil

- **Former Fuhrmann Boulevard Landfill**
- **Metals (Including Lead and Zinc)**

Remaining Area South of the Bell Slip

Surface and Shallow Subsurface Soil

- **Carcinogenic Polycyclic Aromatic Hydrocarbons**
- **Metals (Lead, Zinc and Arsenic)**

POTENTIAL AREA OF CONCERN

Bell Slip Sediment

- **Phenanthrene (up to 5.1 mg/kg)**
- **Endosulfan 11 (up to 0.0053 mg/kg)**
- **Copper (up to 168 mg/kg)**
- **Lead (up to 326 mg/kg)**
- **Zinc (up to 499 mg/kg)**

APPROACH TO FEASIBILITY STUDY AND SITE REMEDIATION

- **Except for Radio Tower Area, Approach was a Focused Feasibility Study Which Evaluated Presumptive Remedies Such as Limited Soil Removal, Soil Cover, and Pavement/Structure Cover**

- **Because of Severity of Contamination in Radio Tower Area, a more Conventional Feasibility Study Approach was Conducted for this Area**

- **Alternatives and Degree of Remediation were Developed as a Function of Potential Uses of the Site**

- **Future Land Use Considered Potential Receptors, Routes of Exposure and Migration Pathways**

- **Potential Future Land Uses Included:**

  - **Residential**
  - **Recreational**
  - **Commercial**
  - **Light Industrial**

BUFFALO OUTER HARBOR
LAND USE AND REMEDIATION MATRIX
FOR REMAINING AREAS OF THE SITE

SITE AREAS	MATRIX	TOTAL NO. OF EXCEEDANCES	LAND USE AND POTENTIAL REMEDIAL ALTERNATIVES		
			RESIDENTIAL	RECREATIONAL	COMMERCIAL/ INDUSTRIAL
SOUTH OF BELL SLIP Remaining Area	Surface soil (0 to 6 inches)	20 out of 43 samples above the screening level	Removal (0-3 feet) [1,2]	Pavement/Structure Cap[5]	No Action
	Shallow Subsurface soil (6 inches to 8 feet)	8 out of 12 samples above the screening level	Removal (3-8 feet) [1,2]	No Action	No Action
	Deep Subsurface soil (8 to 20 feet)	6 out of 13 samples above the screening level	No Action	No Action	No Action
	Groundwater (depth to groundwater ~ 8 feet)	5 out of 11 samples above the screening level for the Phase I investigation[3] 0 out of 1 samples above the screening level for the Phase II investigation[3]	No Action	No Action	No Action
NORTH OF BELL SLIP West of Asphalt Road	Surface soil (0 to 6 inches)	4 out of 34 samples above the screening level	No Action	No Action	No Action
	Shallow Subsurface soil (6 inches to 8 feet)	6 out of 19 samples above the screening level	No Action	No Action	No Action
	Deep Subsurface soil (8 to 20 feet)	10 out of 20 samples above the screening level	No Action	No Action	No Action
	Groundwater (depth to groundwater ranges from 5 to 15 feet)	6 out of 12 samples above the screening level for the Phase I investigation[3] 3 out of 6 samples above the screening level for the Phase II investigation[3]	No Action	No Action	No Action

BUFFALO OUTER HARBOR
LAND USE AND REMEDIATION MATRIX
FOR REMAINING AREAS OF THE SITE

SITE AREAS	MATRIX	TOTAL NO. OF EXCEEDANCES	LAND USE AND POTENTIAL REMEDIAL ALTERNATIVES		
			RESIDENTIAL	RECREATIONAL	COMMERCIAL/ INDUSTRIAL
East of Asphalt Road	Surface soil (0 to 6 inches)	4 out of 23 samples above the screening level	Removal (0-3 feet) [1,4]	Pavement/Structure Cap[5]	No Action
	Shallow Subsurface soil (6 inches to 8 feet)	8 out of 15 samples above the screening level	Removal (3-8 feet) [1,4]	No Action	No Action
	Deep Subsurface soil(8 to 20 feet)	12 out of 15 samples above the screening level	Removal (8-10 feet) [1,4]	No Action	No Action
	Groundwater (depth to groundwater ~ 10 feet)	3 out of 5 samples above the screening level for the Phase I investigation[3] 1 out of 2 samples above the screening level for the Phase II investigation[3]	No Action	No Action	No Action
Eastern Gravel Parking Area	Surface soil (0 to 6 inches)	8 out of 14 samples above the screening level	Removal (0-17 feet)[1,4]	Pavement/Structure Cap[5]	Pavement/Structure Cap[5]
	Groundwater (depth to groundwater ~ 17 feet)	1 out of 1 sample above the screening level for the Phase I and Phase II investigation[3]	No Action	No Action	No Action

NOTES:

[1] Removal of surface soil to 3 feet is recommended to preclude contact with shallow subsurface soils during planting of shrubs and trees and minor utility excavation. Removal includes replacement with clean soil.

[2] Removal of the shallow subsurface soil in this area is recommended due to the number of exceedances and the potential for exposure in residential areas.

[3] Does not include exceedances for Iron and Manganese.

[4] Removal of soil in this area is recommended to the depth of groundwater due to the presence of the former Furhmann Boulevard Landfill in this area.

[5] The Pavement/Structure Cap has been selected based upon the results of the draft Feasibility Study as the recommended alternative; this does not preclude installation of the Soil Cover or Removal of 3 feet of soil as possible options, if warranted.

RADIO TOWER AREA

Surface Soil

- **PCBs (up to 8.2 mg/kg)**
- **Lead (up to 777 mg/kg)**

Subsurface Soil

- **Total Volatile Organic Compounds (up to 351 mg/kg)**
- **Nitrobenzene (up to 13,000 mg/kg)**
- **Antimony (up to 5,470 mg/kg)**
- **TCLP Analysis Indicated Nitrobenzene at 91 mg/l.**

Groundwater

- **Total Volatile Organics (up to 197 ug/l)**
- **4-Chloroaniline (up to 3,600 ug/l)**
- **Antimony (up to 244 ug/l)**

REMEDIAL TECHNOLOGIES EVALUATED FOR RADIO TOWER AREA

- **Isolation/Containment (Including Surface and Subsurface Barriers)**
- **Soil Removal**
- **Soil Treatment**
  - **Bioremediation**
  - **Solvent/Acid Extraction**
  - **Soil Washing**
  - **Thermal Separation/Desorption**
  - **In Situ Soil Washing**
- **Soil Stabilization/Solidification**

ALTERNATIVES SELECTED FOR DETAILED EVALUATION FOR RADIO TOWER AREA

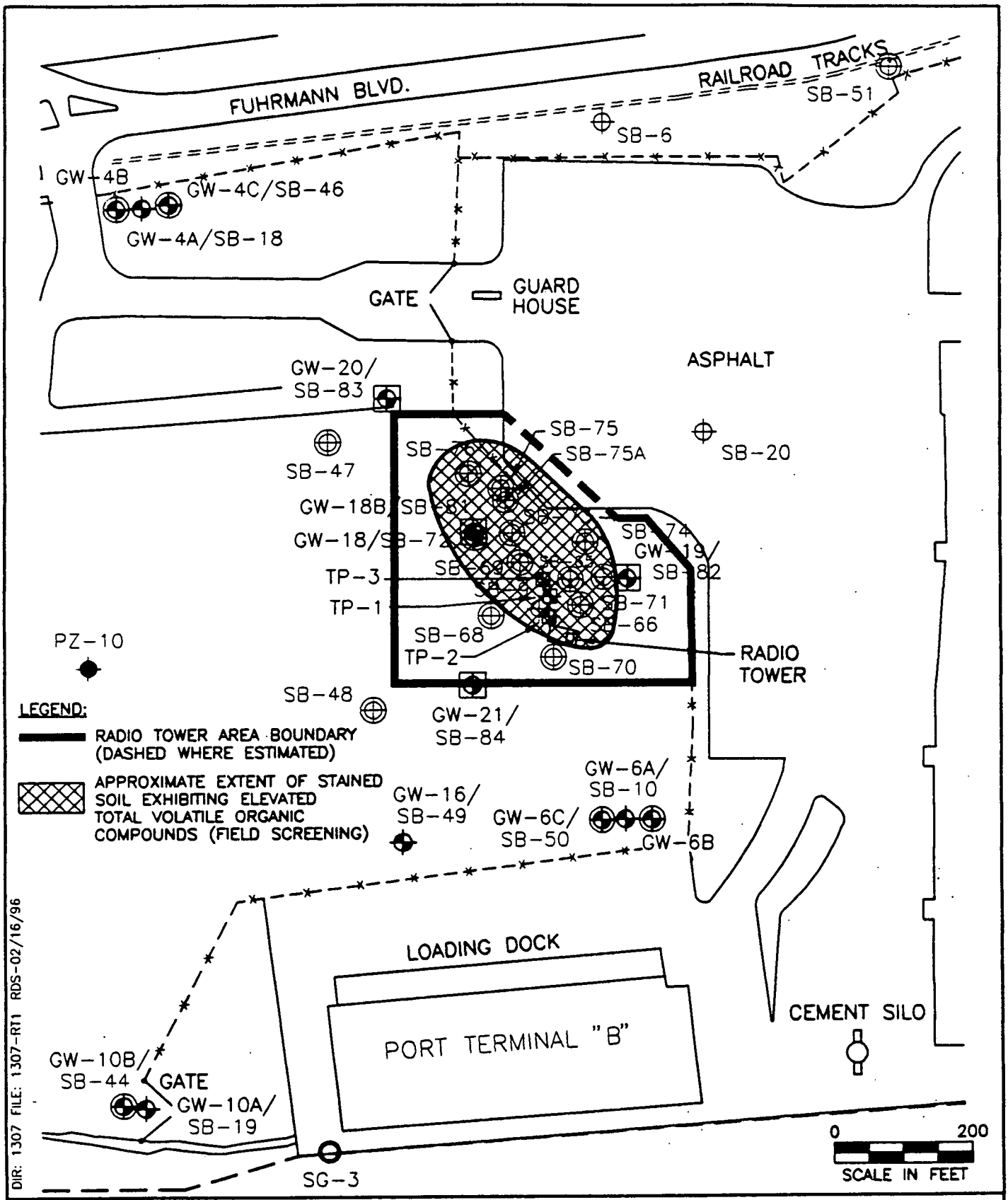
- No Action
- Soil Excavation and Off-site Disposal
- Slurry Wall and RCRA Cap
- Thermal Desorption

EVALUATION CRITERIA

- **Compliance with New York State Standards, Criteria and Guidelines**
- **Overall Protection of Human Health and the Environment**
- **Short-term Impact and Effectiveness**
- **Long-term Effectiveness and Permanence**
- **Reduction of Toxicity, Mobility and Volume**
- **Implementability**
- **Cost**

RECOMMENDED REMEDIAL ACTION FOR RADIO TOWER AREA

- **Installation of Slurry Wall and RCRA Cap Over the "Primary Area of Concern"**
- **Groundwater Extraction and Treatment (within the Slurry Wall) to Control Groundwater Migration**
- **Soil Cover (3 Feet) Over the Remaining Area**
- **Continued Groundwater Monitoring**



BUFFALO OUTER HARBOR
FEASIBILITY STUDY

RADIO TOWER AREA

Dvirka and Bartilucci
Consulting Engineers
A Division of William F. Cosulich Associates, P.C.

FIGURE 1-5