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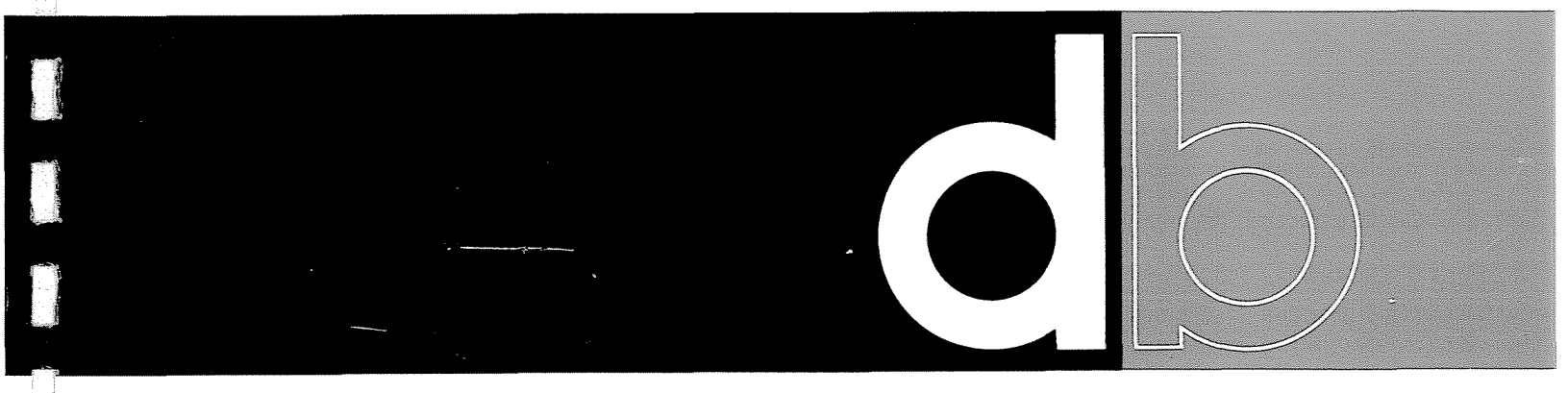
New York State Department of Environmental Conservation

PHASE I/PHASE II REMEDIAL INVESTIGATION REPORT

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

Booth Oil Site
City of North Tonawanda, Niagara County, New York
(Site Registry No. 9-32-100)



Dvirka and Bartilucci

Consulting Engineers

JULY 1991

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

PHASE I/PHASE II REMEDIAL INVESTIGATION REPORT

BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
NORTH TONAWANDA
NIAGARA COUNTY, NEW YORK

(SITE REGISTRY NO. 9-32-100)

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PREPARED FOR

THE NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

BY

DVIRKA AND BARTILUCCI
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SYOSSET, NEW YORK

JULY 1991

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BUREAU OF WESTERN REMEDIAL ACTION
DIVISION OF HAZARDOUS
WASTE REMEDIATION

Table of Contents

Section	Title	Page
S.0	EXECUTIVE SUMMARY	S-1
1.0	INTRODUCTION	1-1
1.1	Purpose	1-1
1.2	Site Background	1-2
1.2.1	Site Location, Ownership and Access	1-2
1.2.2	Environmental Setting	1-5
1.2.3	Land Use and Population	1-5
1.2.4	Climate	1-8
1.2.5	Topography	1-8
1.2.6	Soil	1-10
1.2.7	Surface Drainage	1-10
1.2.8	Floodplains	1-10
1.2.9	Wetlands	1-12
1.2.10	Endangered Species	1-12
1.2.11	Surface Water	1-14
1.2.12	Geology	1-14
1.2.13	Groundwater	1-15
1.2.14	Water Supply	1-16
1.2.15	Storm Water	1-16
1.2.16	Wastewater	1-16
1.2.17	Site History	1-17
1.2.18	Other Background Information	1-22
1.2.19	Response Actions to Date	1-22
1.2.20	Miscellaneous Areas of Concern	1-28
1.3	Overview of the Remedial Investigation and Report Organization	1-28
2.0	STUDY AREA INVESTIGATION	2-1
2.1	Site Facilities	2-1
2.2	Field Activities/Site Characterization	2-1
2.2.1	Surface Features	2-7
2.2.1.1	Aerial Photography and Topographic Mapping	2-7
2.2.1.2	Surveying Program	2-7
2.2.2	Geophysical Survey	2-7
2.2.3	Environmental Sampling Program	2-10
2.2.3.1	Phase I Surface Soil Sampling	2-10
2.2.3.2	Phase II Surface Soil Sampling	2-10
2.2.3.3	Catch Basin Sampling	2-14
2.2.3.4	Underground Pipe Sampling	2-19
2.2.3.5	Sanitary and Storm Sewer Sampling	2-19
2.2.3.6	Little River Sampling	2-23
2.2.4	Soil Investigations	2-23
2.2.4.1	Power Augering Program	2-25
2.2.4.2	Phase I Subsurface Borehole Soil Sampling	2-25
2.2.4.3	Phase II Subsurface Borehole Soil Sampling	2-28

Section		Title	Page
	2.2.5	Geological Investigation	2-28
		2.2.5.1 Borehole Logging	2-28
	2.2.6	Groundwater Monitoring	2-32
		2.2.6.1 Monitoring Well Installation	2-32
		2.2.6.2 Well Development	2-34
		2.2.6.3 Groundwater Level Measurement	2-34
		2.2.6.4 Phase I Groundwater and NAPL Sampling	2-34
		2.2.6.5 Phase II Groundwater and NAPL Sampling	2-35
		2.2.6.6 Aquifer Permeability/Slug Testing	2-36
	2.2.7	Volumetric Air Sampling	2-37
	2.2.8	Ambient Air Monitoring	2-37
	2.2.9	Health and Safety Program	2-40
	2.2.10	Analytical Program and Quality Assurance/Quality Control	2-41
	2.2.11	Data Validation	2-44
3.0	PHYSICAL CHARACTERISTICS OF STUDY AREA		3-1
	3.1	Results of Field Activities/Physical Characteristics	3-1
		3.1.1 Surface Features	3-1
		3.1.2 Geophysical Survey	3-2
		3.1.3 Geology	3-8
		3.1.3.1 Overburden	3-8
		3.1.3.2 Bedrock	3-17
		3.1.4 Hydrogeology	3-17
		3.1.4.1 Summary of Site Hydrogeology	3-17
		3.1.4.2 Slug Test Analyses	3-17
		3.1.4.3 Groundwater Flow Patterns	3-18
		3.1.4.3.1 Overburden	3-18
		3.1.4.3.2 Bedrock	3-26
		3.1.5 Surface Water	3-26
		3.1.6 Climate/Meteorology	3-27
	3.2	Habitat Assessment	3-30
		3.2.1 Ecological Communities On-site	3-30
		3.2.1.1 Major Habitat Types	3-30
		3.2.1.2 On-site Resource Characterization	3-34
		3.2.1.3 Animal and Vegetative Covertype Associations	3-39
		3.2.2 Special Resources	3-39
		3.2.2.1 Regulated Wetlands	3-39
		3.2.2.2 Open Water Systems	3-41
		3.2.2.3 Endangered Species and Significant Habitats	3-44
		3.2.2.4 Wild, Scenic and Recreational Rivers	3-48
		3.2.3 Site Resource Characterization	3-48
		3.2.3.1 Overall Habitat Quality	3-48
		3.2.3.2 Site Induced Stresses	3-48
		3.2.3.3 Habitat Values of Vegetative Zones	3-48

Table of Contents (continued)

Section	Title	Page
4.0	NATURE AND EXTENT OF CONTAMINATION	4-1
	4.1 Identification of Standards, Criteria and Guidance Values (SCGs)	4-1
	4.1.1 Groundwater	4-6
	4.1.2 Surface Water	4-6
	4.1.3 Soil	4-6
	4.1.4 Sediment	4-6
	4.1.5 Air	4-7
	4.2 Data Validation	4-7
	4.2.1 Phase I Data Validation	4-7
	4.2.2 Phase II Data Validation	4-12
	4.3 Results of Phase I Investigation Site Characterization	4-20
	4.3.1 Surface Soil	4-20
	4.3.2 Catch Basin Surface Water	4-27
	4.3.3 Catch Basin Sediment	4-32
	4.3.4 Underground Pipe Sampling	4-48
	4.3.5 Subsurface Soil	4-53
	4.3.5.1 Power Augering Program	4-53
	4.3.5.2 Boreholes	4-58
	4.3.6 Groundwater	4-86
	4.3.7 NAPL	4-106
	4.4 Results of Phase II Investigation Site Characterization	4-106
	4.4.1 Surface Soil	4-106
	4.4.2 Sanitary and Storm Sewer Surface Water Sampling	4-123
	4.4.3 Storm Sewer Sediment Sampling	4-128
	4.4.4 Little River Sampling	4-136
	4.4.5 Subsurface Soil	4-143
	4.4.5.1 Boreholes	4-143
	4.4.6 Groundwater	4-150
	4.4.7 NAPL	4-164
	4.4.8 Air	4-164
	4.4.8.1 Ambient Air Monitoring	4-164
	4.4.8.2 Volumetric Air Sampling	4-169
5.0	CONTAMINANT FATE AND TRANSPORT	5-1
	5.1 Surface Soil	5-8
	5.2 Subsurface Soil	5-15
	5.3 Groundwater	5-18
	5.4 Catch Basin/Storm Sewer System	5-23
	5.5 Little River Outfall	5-27
	5.6 Ambient Air	5-27
6.0	CONCLUSIONS AND RECOMMENDATIONS	6-1
	6.1 Waste Material	6-1
	6.2 Surface Soil	6-1
	6.3 Subsurface Soil	6-2

Table of Contents (continued)

Section		Title	Page
	6.4	Groundwater	6-6
	6.5	Catch Basin/Storm Sewer System	6-8
	6.6	Little River Outfall	6-10
	6.7	Air	6-10
	6.8	Recommendations for Additional Investigation	6-10
	6.9	Areas Recommended for Remedial Action	6-12

LIST OF APPENDICES

Appendix	Title
APPENDIX A -	Aerial Photograph of the Booth Oil Site and Surrounding Area
APPENDIX B -	Topographic Map of the Booth Oil Site
APPENDIX C -	Hager-Richter Geoscience, Inc. Surface Geophysical Survey Report - Booth Oil Site
APPENDIX D -	Slug Test Data - Booth Oil Site
APPENDIX E -	Results of Geotechnical Analysis - Booth Oil Site Soil Samples
APPENDIX F -	NYSDEC Division of Water Technical and Operational Guidance Series (TOGS)(1.1.1) Ambient Water Quality Standards and Guidance Values - September 25, 1990
APPENDIX G -	"Relationship Between Water Solubility, Soil Sorption, Octanol-Water Partitioning and Concentrations of Chemicals in Biota" and Determination of Soil Cleanup Criteria
APPENDIX H -	NYSDEC Division of Air Resources New York State Air Guide-1, Guidelines for the Control of Toxic Ambient Air Contaminants - 1985-86 Edition, September 1989 Printing and Air Cleanup Criteria - Division of Air Resources - January 8, 1990.
APPENDIX I -	Data Usability Report (Volume III)
APPENDIX J -	Data Validation Reports (Volume III)

LIST OF TABLES

Number	Title	Page
1-1	Select Laboratory Analysis from Previous Sampling Events	1-23
2-1	Summary of Phase I RI Field Activity Dates	2-5
2-2	Summary of Phase II RI Field Activity Dates	2-6
2-3	Summary of Phase I RI Surface Soil Sampling Collection and Analyses	2-13
2-4	Summary of Phase II RI Surface Soil Sampling Collection and Analyses	2-15
2-5	Summary of Phase I RI Catch Basin Surface Water Sampling Collection and Analyses	2-17
2-6	Summary of Phase I RI Catch Basin Sediment Sampling Collection and Analyses	2-18
2-7	Summary of Phase I RI Underground Pipe Sampling Collection and Analyses	2-20
2-8	Summary of Phase II RI Storm and Sanitary Sewer Surface Water Sampling Collection and Analyses	2-22
2-9	Summary of Phase II RI Storm Sewer and Little River Sediment Sampling Collection and Analyses	2-24
2-10	Summary of Phase I RI Subsurface/Borehole Soil Sampling Collection and Analyses	2-27
2-11	Summary of Phase II RI Subsurface/Borehole Soil Sampling Collection and Analyses	2-29
2-12	Summary of Phase I and Phase II RI Monitoring Well Information	2-33
2-13	Summary of Phase II RI Ambient Air Sampling Collection and Analyses	2-39
2-14	Summary of Phase I RI Analytical Requirements	2-42
2-15	Summary of Phase II RI Analytical Requirements	2-43
3-1	Slug Test Results	3-19
3-2	Perched Groundwater Elevations - August 7, 1990	3-20
3-3	Perched Groundwater Elevations - October 3, 1990	3-21
3-4	Perched Groundwater Elevations - December 10, 1990	3-24
3-5	Meteorological Data for Booth Oil Site	3-28
3-6	Meteorological Data for the Buffalo International Airport (1951 - 1980)	3-29
3-7	Plant Species Present at the Booth Oil Site	3-33
3-8	Mammals, Reptiles and Amphibians Inhabiting the Booth Oil Site	3-35
3-9	Bird Species Recorded in North Tonawanda and in the Vicinity of the Booth Oil Site	3-36
3-10	Animal and Vegetative Covertypes Within the Booth Oil Site	3-40
3-11	Fish Species Present in Tonawanda Creek in the Vicinity of the Booth Oil Site	3-43
3-12	Inactive Hazardous Waste Sites Located in the Vicinity of the Booth Oil Site	3-46
3-13	Qualitative Habitat Values - Booth Oil Site	3-51

LIST OF TABLES (Continued)

Number	Title	Page
4-1	New Jersey Department of Environmental Protection (NJDEP) Soil Cleanup Guidelines for Metals	4-3
4-2	Resource Conservation and Recovery Act (RCRA) Characteristic Waste - Regulatory Levels	4-4
4-3	TCLP Constituents and Regulatory Levels	4-5
4-4	Phase I Data Validation Summary	4-9
4-5	Phase II Data Validation Summary	4-13
4-6	Phase I Surface Soil Sampling - Volatile Organics	4-21
4-7	Phase I Surface Soil Sampling - Semivolatile Organics	4-24
4-8	Phase I RI Surface Soil Sampling - Total Concentration of Semivolatile Organic Compounds Present Above Soil Cleanup Criteria Guidelines	4-26
4-9	Phase I Surface Soil Sampling - Pesticides/PCBs	4-28
4-10	Phase I RI Surface Soil Sampling Total Concentration of PCBs Detected	4-29
4-11	Phase I Surface Soil Sampling - Metals	4-30
4-12	Phase I Surface Soil Sampling - RCRA Characteristics	4-31
4-13	Phase I Catch Basin Surface Water Sampling - Volatile Organics	4-33
4-14	Phase I Catch Basin Surface Water Sampling - Semivolatile Organics	4-35
4-15	Phase I Catch Basin Surface Water Sampling - Pesticides/PCBs	4-37
4-16	Phase I Catch Basin Surface Water Sampling - Inorganic Constituents	4-38
4-17	Phase I Catch Basin Sediment Sampling - Volatile Organics	4-40
4-18	Phase I Catch Basin Sediment Sampling - Semivolatile Organics	4-42
4-19	Phase I Catch Basin Sediment Sampling - Pesticides/PCBs	4-44
4-20	Phase I Catch Basin Sediment Sampling - Inorganic Constituents	4-45
4-21	Phase I Catch Basin Sediment Sampling - RCRA Characteristics	4-46
4-22	Phase I Catch Basin Sediment Sampling - Treatability Screening	4-47
4-23	Phase I Underground Pipe Sampling - Volatile Organics	4-49
4-24	Phase I Underground Pipe Sampling - Semivolatile Organics	4-51
4-25	Phase I Underground Pipe Sampling - Pesticides/PCBs	4-54
4-26	Phase I Underground Pipe Sampling - Inorganic Constituents	4-55
4-27	Phase I Underground Pipe Sampling - RCRA Characteristics	4-56
4-28	Phase I Soil Boring Sampling - Volatile Organics 7/10/90 - 7/11/90	4-59
4-29	Phase I Soil Boring Sampling - Volatile Organics 7/12/90 - 7/13/90	4-61
4-30	Phase I Soil Boring Sampling - Volatile Organics 7/16/90 - 7/18/90	4-63
4-31	Phase I RI Subsurface Soil Sampling - Total Concentration of Volatile Organic Compounds Present Above Soil Cleanup Criteria Guidelines	4-66
4-32	Phase I Soil Boring Sampling - Semivolatile Organics 7/10/90 - 7/11/90	4-67
4-33	Phase I Soil Boring Sampling - Semivolatile Organics 7/12/90 - 7/13/90	4-69
4-34	Phase I Soil Boring Sampling - Semivolatile Organics 7/16/90 - 7/18/90	4-71
4-35	Phase I RI Subsurface Soil Sampling - Concentration of Semivolatile Organic Compounds Present Above Soil Cleanup Criteria Guidelines	4-73
4-36	Phase I RI Subsurface Soil Sampling - Total Concentration of Semivolatile Organic Compounds Present Above Soil Cleanup Criteria Guidelines	4-74
4-37	Phase I Soil Boring Sampling - Pesticides/PCBs 7/10/90 - 7/11/90	4-75
4-38	Phase I Soil Boring Sampling - Pesticides/PCBs 7/12/90 - 7/13/90	4-76
4-39	Phase I Soil Boring Sampling - Pesticides/PCBs 7/16/90 - 7/18/90	4-77
4-40	Phase I RI Subsurface Soil Sampling - Total Concentration of PCBs Detected	4-78

LIST OF TABLES (Continued)

Number	Title	Page
4-41	Phase I Soil Boring Sampling - Inorganic Constituents 7/10/90 - 7/11/90	4-79
4-42	Phase I Soil Boring Sampling - Inorganic Constituents 7/12/90 - 7/13/90	4-80
4-43	Phase I Soil Boring Sampling - Inorganic Constituents 7/16/90 - 7/18/90	4-81
4-44	Phase I RI Subsurface Soil Sampling - Concentration of Metals Present Above Preliminary ARARs	4-82
4-45	Phase I Soil Boring Sampling - RCRA Characteristics 7/10/90 - 7/11/90	4-83
4-46	Phase I Soil Boring Sampling - RCRA Characteristics 7/12/90 - 7/13/90	4-84
4-47	Phase I Soil Boring Sampling - RCRA Characteristics 7/16/90 - 7/18/90	4-85
4-48	Phase I Soil Boring Sampling - Treatability Screening 7/18/90	4-87
4-49	Phase I Soil Boring Groundwater Sampling - Volatile Organics	4-88
4-50	Phase I Soil Boring Groundwater Sampling - Semivolatile Organics	4-90
4-51	Phase I Soil Boring Groundwater Sampling - Pesticides/PCBs	4-92
4-52	Phase I Groundwater Sampling - Volatile Organics	4-93
4-53	Phase I Groundwater Sampling - Concentration of Volatile Organic Compounds Present Above NYSDEC Class GA Groundwater Standards/ Guidance Values	4-96
4-54	Phase I RI Groundwater Sampling - Total Concentration of Volatile Organic Compounds Present Above NYSDEC Class GA Standards/Guidance Values	4-97
4-55	Phase I Groundwater Sampling - Semivolatile Organics	4-99
4-56	Phase I RI Groundwater Sampling - Total Concentration of Semivolatile Organic Compounds Present Above NYSDEC Class GA Groundwater Standards/Guidance Values	4-101
4-57	Phase I Groundwater Sampling - Pesticides/PCBs	4-103
4-58	Phase I Groundwater Sampling - Inorganic Constituents	4-104
4-59	Phase I Groundwater Sampling - Total Concentration of Metals Present Above New York State Class GA Groundwater Standards/Guidance Values	4-107
4-60	Phase I NAPL Sampling - Volatile Organics	4-108
4-61	Phase I NAPL Sampling - Semivolatile Organics	4-109
4-62	Phase I NAPL Sampling - Pesticides/PCBs	4-111
4-63	Phase I NAPL Sampling - Inorganic Constituents	4-112
4-64	Phase II Surface Soil Sampling - Volatile Organics	4-113
4-65	Phase II Surface Soil Sampling - Semivolatile Organics	4-116
4-66	Phase II Surface Soil Sampling - Total Concentration of Semivolatile Organic Compounds Present Above Soil Cleanup Criteria Guidelines	4-120
4-67	Phase II Surface Soil Sampling - Pesticides/PCBs	4-121
4-68	Phase II Surface Soil Sampling - Inorganic Constituents	4-122
4-69	Phase II Manhole Surface Water Sampling - Volatile Organics	4-124
4-70	Phase II Manhole Surface Water Sampling - Semivolatile Organics	4-126
4-71	Phase II Manhole Surface Water Sampling - Pesticides/PCBs	4-129
4-72	Phase II Manhole Sediment Sampling - Volatile Organics	4-130
4-73	Phase II Manhole Sediment Sampling - Semivolatile Organics	4-132
4-74	Phase II Manhole Sediment Sampling - Pesticides/PCBs	4-135
4-75	Phase II Little River Sediment Sampling - Volatile Organics	4-137
4-76	Phase II Little River Sediment Sampling - Semivolatile Organics	4-139
4-77	Phase II Little River Sediment Sampling - Pesticides/PCBs	4-141
4-78	Phase II Little River Sediment Sampling - Inorganic Constituents	4-142
4-79	Phase II Soil Boring Sampling - Volatile Organics	4-144
4-80	Phase II Soil Boring Sampling - Semivolatile Organics	4-146

LIST OF TABLES (Continued)

Number	Title	Page
4-81	Phase II Soil Boring Sampling - Pesticides/PCBs	4-148
4-82	Phase II Soil Boring Sampling - Inorganic Constituents	4-149
4-83	Phase II Soil Boring Sampling - TCLP Volatile Organics	4-151
4-84	Phase II Soil Boring Sampling - TCLP Semivolatile Organics	4-152
4-85	Phase II Soil Boring Sampling - Total Organic Carbon	4-153
4-86	Phase II Groundwater Sampling - Volatile Organics	4-154
4-87	Phase II Groundwater Sampling - Semivolatile Organics	4-159
4-88	Phase II Groundwater Sampling - Pesticides/PCBs	4-161
4-89	Phase II Groundwater Sampling - Inorganic Constituents	4-163
4-90	Phase II NAPL Sampling - Volatile Organics	4-165
4-91	Phase II NAPL Sampling - PCBs	4-167
4-92	Phase II NAPL Sampling - Inorganic Constituents	4-168
4-93	Phase II Air Sampling - TO1/TO2 Volatile Organic Compounds	4-171
4-94	Phase II RI Air Sampling - Volatile Organic Compounds Found and Corresponding Guidance Values	4-173
5-1	Categories of Organic Compounds Detected at the Booth Oil Site	5-3
5-2	Concentrations of Contaminants in Off-site Surface Soil Samples	5-5
5-3	Sample Results for RCRA Characteristic Ignitability and Total Petroleum Hydrocarbons	5-14

LIST OF FIGURES

Number	Title	Page
1-1	Site Location Map	1-3
1-2	Detailed Site Plan - Adjacent Areas	1-4
1-3	Facility Location Map	1-6
1-4	Zoning in the Vicinity of the Booth Oil Site	1-7
1-5	Annual Average Wind Rose (1948-1978) for Buffalo Airport	1-9
1-6	Flood Zone Mapping in the Vicinity of the Booth Oil Site	1-11
1-7	Wetlands in the Vicinity of the Booth Oil Site	1-13
1-8	Previous Surface and Subsurface Investigations	1-27
2-1	Field Office Trailer and Decontamination Area	2-2
2-2	Dimension Layout For Field Office Trailer	2-3
2-3	Fenced Equipment Staging, Decontamination Pad and Drum Storage Area	2-4
2-4	Terrain Conductivity Stations	2-9
2-5	GPR Survey Lines	2-11
2-6	Phase I and Phase II Surface Soil Sampling Locations	2-12
2-7	Catch Basin and Sewer Locations	2-16
2-8	Phase II Storm and Sanitary Sewer Manhole Sampling Locations	2-21
2-9	Phase I Power Auger Soil Boring Locations	2-26
2-10	Phase I and Phase II Soil Boring Locations	2-30
2-11	Phase I and Phase II Monitoring Well Locations	2-31
2-12	Phase II Ambient Air Sampling Locations	2-38
3-1	Terrain Conductivity Results (Quadrature Phase)	3-3
3-2	Terrain Conductivity Results (In Phase Component)	3-5
3-3	Geophysical Interpretation Map	3-6
3-4	Locations of Geologic Cross-Sections A-A', B-B', C-C' and D-D'	3-9
3-5	Geologic Cross-Section A-A'	3-10
3-6	Geologic Cross-Section B-B'	3-11
3-7	Geologic Cross-Section C-C'	3-12
3-8	Geologic Cross-Section D-D'	3-13
3-9	Clay Surface Elevation Map	3-15
3-10	3-D Clay Surface Elevation Map	3-16
3-11	Groundwater Contour Map (August 7, 1990)	3-22
3-12	Groundwater Contour Map (October 3, 1990)	3-23
3-13	Perched Groundwater Contour Map (December 10, 1990)	3-25
3-14	Vegetative Covertypes	3-31
3-15	Open Water Systems	3-42
3-16	Inactive Hazardous Waste Site Locations	3-45
4-1	Power Auger Soil Boring Interpretation Map	4-57
4-2	Total Concentration of Volatile Organics Exceeding NYSDEC Class GA Groundwater Standards/Guidance Values	4-98
4-3	Total Concentration of Semivolatile Organics Exceeding NYSDEC Class GA Groundwater Standards/Guidance Values	4-102
4-4	Total Concentration of Toxic Metals and Cyanide Exceeding NYSDEC Class GA Groundwater Standards/Guidance Values	4-105
4-5	Phase I Baseline Air Monitoring Locations	4-170

LIST OF FIGURES (Continued)

Number	Title	Page
5-1	Phase I Surface Soil Sampling Results for Specific Categories of Organic Compounds and Lead	5-9
5-2	Phase II Surface Soil Sampling Results for Specific Categories of Organic Compounds and Lead	5-10
5-3	Total Lead Concentration Contour Map for Surface Soils	5-13
5-4	Phase I Subsurface Soil Sampling Results for Specific Categories of Organic Compounds and Lead	5-16
5-5	Phase II Subsurface Soil Sampling Results for Specific Categories of Organic Compounds and Lead	5-17
5-6	Phase I Groundwater Monitoring Results for Specific Categories of Organic Compounds and Lead	5-19
5-7	Phase II Groundwater Monitoring Results for Specific Categories of Organic Compounds and Lead	5-20
5-8	Phase I Catch Basin Drainage Water and Sediment Sampling Results for Specific Categories of Organic Compounds and Lead	5-24
5-9	Phase II Storm Sewer and Little River Sampling Results for Specific Categories of Organic Compounds and Lead	5-25
6-1	Approximate Limits of Surface Soil Exceeding One or More Remediation Guidelines	6-3
6-2	Approximate Limits of Subsurface Soil Exceeding One or More Remediation Guidelines	6-4
6-3	Approximate Limits of Significant Perched Groundwater Contamination	6-7
6-4	Areas of Both Oil Site Recommended for Remedial Action Consideration	6-9

Summary

S.0 EXECUTIVE SUMMARY

As part of New York State's program to remediate inactive hazardous waste sites, the New York Department of Environmental Conservation (NYSDEC) entered into a contract with the firm of Dvirka and Bartilucci Consulting Engineers of Syosset, New York, to undertake a Remedial Investigation and Feasibility Study (RI/FS) at the Booth Oil Site located in North Tonawanda, Niagara County, New York. The Booth Oil Site was the former location of a waste oil collection, storage and reclamation facility that operated for more than 50 years. Processing of waste oil ceased in the early 1980s. The registry number for this Class 2 New York State Superfund Site is 9-32-100. The RI/FS for this site is being performed with funds allocated under the New York State Superfund Program.

The purpose of the overall RI/FS process is to perform a remedial investigation to determine the nature, extent and source(s) of a contamination at the site, as well as the risk to public health and the environment, and to perform a feasibility study to identify, evaluate and recommend a cost-effective, environmentally sound and long-term remedial action, if necessary.

This document, entitled, "Phase I/Phase II Remedial Investigation Report for the Booth Oil Site," presents a detailed description of the activities and results of the first and second phase of the field program of the remedial investigation portion of the project, as part of a multiphased RI/FS prepared in accordance with the NYSDEC Superfund Program and the Federal Superfund Amendments and Reauthorization Act (SARA).

The Phase I and II Remedial Investigations involved the analysis of existing information and environmental data in combination with a targeted field investigation/sampling program. The purpose of the remedial investigation is to provide information regarding the location and characterization of sources of contamination, and to identify migration pathways, the extent of contamination and exposed populations, as well as to present recommendations for remediation under the guidelines established for the contaminants and exposure pathways present at the site. Under the RI/FS process, data is also evaluated to determine if an imminent health hazard exists, and there is the need to consider select areas of the site as operable units to undertake interim remedial measures as defined under the National Contingency Plan. Interim measures may include temporary containment or removal consistent with long-term remedial action.

The Phase I/II field programs for the Booth Oil Site involved: aerial photography; topographic mapping; geophysical surveys; sampling and analysis of surface and subsurface soils, storm sewer sediment and drainage water; river sediment; and liquids from underground pipes; shallow subsurface investigation utilizing a power auger; drilling of soil borings and installation of monitoring wells; sampling and analysis of groundwater; subsurface geotechnical characterization; aquifer permeability testing; ambient air monitoring; volumetric air sampling; and a wildlife habitat survey.

The following is a summary of the findings and conclusions of the Phase I/II RI, recommendations for additional investigation, and areas and media at the site which should be considered for remediation.

The analytical data obtained from the RI was compared to various standards, criteria and guidelines (SCGs) for data evaluation and to determine the need for remediation. Groundwater and surface water SCGs identified for the Booth Oil Site were based on NYSDEC Ambient Water Quality Standards and Guidance Values. For the review and interpretation of soil and sediment analytical results, risk-based remediation criteria, NYSDEC Soil Cleanup Criteria for the Protection of Groundwater and background conditions were used to develop remediation guidelines. The guidelines for contaminants found in ambient air are those contained in NYSDEC's Air Guide-1: Guidelines for the Control of Toxic Air Contaminants. Hazardous waste characteristics including ignitability, corrosivity, reactivity and E.P. Toxicity metals, as defined by the Resource Conservation and Recovery Act (RCRA), were also used for review and interpretation of analytical data obtained from the analysis of soil, sediment and waste material.

Surface Soils

Although much of the area of the site has been regraded with clean fill, significant areas of surface soil were still detected above remediation guidelines selected for the site. The categories of compounds which have been determined to be present in significant concentrations include volatile organic compounds, polycyclic aromatic hydrocarbons (PAHs), semivolatile organic compounds, polychlorinated biphenyls (PCBs) and lead. Many surface soils were found to be ignitable and can be considered as a characteristic hazardous material. The surface soil samples obtained from the western parcel of the site were found to be contaminated with a number of volatile and semivolatile organic compounds. It is believed that the western parcel of the site is where Booth Oil operated a high temperature distillation process to refine oily, sludge-like material and stored waste oils in a number of tanks.

The presence of semivolatile organic compounds was found to be more widespread in surface soils than VOC compounds. This may be attributable to the release of VOCs to the atmosphere as a result of volatilization and the ability of semivolatile compounds to adsorb onto soil. PAHs were only detected at one location above remediation guidelines in site surface soils in the north central portion of the site, which is relatively close to former distillation processes.

PCBs were found at elevated concentrations in samples collected from both the western parcel of the site and the eastern parcel in close proximity to the railroad tracks which traverse the site. The most significant concentrations of PCBs were detected in the south central portion of the site. The presence of these compounds at this location may be attributable to facility operations related to distillation processes at the site.

The analytical data obtained from the analysis of metals indicated that soil remediation guidelines for lead were exceeded more predominantly than other contaminants present at the site and were also found in elevated concentrations immediately adjacent to the site. Due to the absence of other contaminants attributable to the site where elevated lead levels were found off-site, the source of lead may be both site and nonsite related.

Subsurface Soil

Volatile organic compounds were detected to a much greater extent in subsurface soil relative to surface soil at the site. Areas of the site with elevated concentrations of volatile and semivolatile organic compounds, PCBs and lead are located at the northwest portion of the site which is the former location of a number of underground storage tanks, the southwestern area of the site which was the location of a high temperature distillation facility and storage tanks, and in the vicinity of the former waste lagoons. The highest levels of VOCs were found in the subsurface soil sample collected in the south central portion of the site. The subsurface soil at this location was composed primarily of an oily sludge, possibly as a result of contaminants leaching from the lagoons, and has been visibly identified to be the most contaminated area with respect to subsurface soil. Additional samples taken from this location 2 feet and 4 feet into the clay layer underlying the site indicated the contaminants have not appreciably migrated into the clay and the clay effectively acts as a vertical barrier to contaminant migration.

SVOCs
?

PAHs and SSOCs were also more widespread in site subsurface soils exceeding remediation guidelines than in surface soils. The primary areas include the northwest portion and south central portion of the site. These are both locations of former storage tanks.

PCBs and lead were also found in significant concentrations at several subsurface locations. They were found most predominantly at the location of the former lagoon. In general, PCBs which exceeded remediation guidelines are located throughout the site making identification of a primary facility source for this constituent difficult. The distribution of PCBs throughout the site may be attributable to spills. A number of subsurface soil samples were determined to be ignitable utilizing the procedures established under RCRA.

Groundwater

Volatile and semivolatile organic compounds were detected above NYSDEC Class GA Groundwater Standards/Guidance Values in each of the groundwater samples obtained from the on-site monitoring wells installed as part of the remedial investigation. The highest total concentration exceeding standards/guidance values was found in the monitoring well located in the west-central area of the site (194,840 ug/l of VOCs). This well is located in the vicinity of a drainage ditch installed along the Conrail main track. This drainage ditch was constructed in order to contain and control runoff water from the site and was a probable location for the ponding of spilled oil materials.

Concentrations of VOCs are generally highest at the location of the highest groundwater elevation at the site and decrease in a downgradient direction and are lowest along the easternmost boundary of the site and off-site adjacent to the western boundary of the site. There are very significant differences in contaminant concentrations in groundwater on the site most likely due to the fact the perched groundwater underlying the site is relatively stagnant.

PAH concentrations were highest at the central portion of the site in close proximity to one of the locations of elevated subsurface soil concentrations and the only location of elevated surface soil concentrations.

The distribution of total semivolatile organic compounds exceeding NYSDEC Glass GA Groundwater Standards/Guidance Values is similar to the distribution of VOCs. Spills in the area of former storage tanks and processing operations in the the south-central portion of the site is the probable source of semivolatile organic compounds within the groundwater in this area of the site.

PCBs were detected in groundwater samples collected from monitoring wells essentially throughout the site. Concentrations of PCBs were generally two orders of magnitude higher in monitoring wells in the south-central area of the site, which were also found to contain nonaqueous phase liquid (NAPL). These wells are located along the same drainage channel located on a spur of the Penn Central Main Track.

Lead concentrations in groundwater are similar to concentration trends found in the surface soil at the site. This has lead to conclusions that the source of this contamination may be due to the leaching of lead contamination from surface soils at the site.

Catch Basin/Storm Sewer System

With regard to sediment samples obtained from storm water catch basins and manholes located immediately adjacent to the site, a number of volatile and semivolatile organic compounds were found in significant concentrations which have been attributed to the site. PAHs did not exceed remediation guidelines in any of the catch basin sediments samples. In addition, PCBs were detected in all sediment samples with a maximum concentration of 184 mg/kg. Lead was also detected in sediment at a significant concentration in one of the catch basins (611 mg/kg), and all three catch basin sediment samples were determined to be ignitable.

For drainage water samples collected from the catch basins, a number of volatile and semivolatile organic compounds were found to exceed NYSDEC Surface Water Standards/Guidance Values. PAH concentrations were relatively low in the drainage water from the catch basins but was elevated in the drainage water from the manholes. PCBs were not detected in any of the surface water samples collected from the catch basins. Although lead was detected in the drainage water, the values did not exceed NYSDEC Surface Water Standards/Guidance Values.

Sediment samples obtained from the Little River to which the storm water drainage system discharges exhibit the same contaminants found both in the sewer system and on the Booth Oil Site. Therefore, the storm sewer is a pathway for site contaminants to migrate to the Little River.

Ambient Air

Based upon air sampling conducted as part of the remedial investigation, no hazard associated with ambient air has been identified.

As a result of both the Phase I and II Remedial Investigations, areas of site surface soil, subsurface soil and groundwater have been identified which exceed remediation guidelines. The specific areas of the site which have been recommended for remediation are identified in Section 6.0 of this report. In addition, the catch basin and storm sewer system adjacent to the Booth Oil Site is also recommended for remedial action consideration.

Section 1

1.0 INTRODUCTION

1.1 Purpose

As part of the State of New York's program to clean up inactive hazardous waste sites, the New York State Department of Environmental Conservation (NYSDEC) entered into a contract with the firm of Dvirka and Bartilucci Consulting Engineers of Syosset, New York to undertake a Remedial Investigation and Feasibility Study (RI/FS) for the Booth Oil Site located in the City of North Tonawanda, Niagara County, New York. The Booth Oil Site was the former location of a waste oil collection, storage and reclamation facility that operated for more than 50 years. Processing of waste oil ceased in the early 1980s. The registry number for this New York State Superfund Site is 9-32-100. The RI/FS for this site is being performed with funds allocated under the New York State Superfund Program.

The purpose of the overall RI/FS process is to perform a Remedial Investigation (RI) to determine the nature, extent and source(s) of contamination at the site, as well as the risk to public health and the environment, if any, and to perform a Feasibility Study (FS) which will identify, evaluate and recommend a cost-effective, environmentally sound and long-term remedial action, if necessary.

This document, entitled, "Phase I/Phase II Remedial Investigation Report for the Booth Oil Site," presents a detailed description of both the activities and results of the first and second phases of the field investigation program of the RI portion of the project, as part of a multiphased RI/FS prepared in accordance with the NYSDEC Superfund Program and the Federal Superfund Amendments and Reauthorization Act (SARA).

The Phase I Remedial Investigation (Phase I RI) involved the analysis of existing information and environmental data in combination with a field investigation/sampling program. The purpose of the field program was to provide an initial determination regarding the location and characterization of sources of contamination and to begin defining migration pathways, extent of contamination and exposed populations, if any, as well as to assist in refining the type and location of additional sampling for the Phase II Remedial Investigation field program, as appropriate.

The Phase I RI field program for the Booth Oil Site involved: site mobilization; aerial photography; topographic mapping; geophysical surveys (terrain conductivity and magnetometry); sampling and analysis of surface and subsurface soils, surface water and sediment, and liquids from underground pipes protruding from the ground surface; shallow subsurface investigation utilizing a power auger; drilling of soil borings and installation of monitoring wells; sampling and analysis of groundwater; surveying of soil borings and monitoring wells; subsurface geotechnical characterizations; aquifer permeability testing; ambient air monitoring; and a wildlife habitat survey.

The Phase II Remedial Investigation was designed to provide additional field information necessary to refine and further characterize the site, and better determine the threat to public health and the environment, and the need for remediation. Data gaps identified by the Phase I Investigation were addressed and interim remedial action alternatives were identified and implemented.

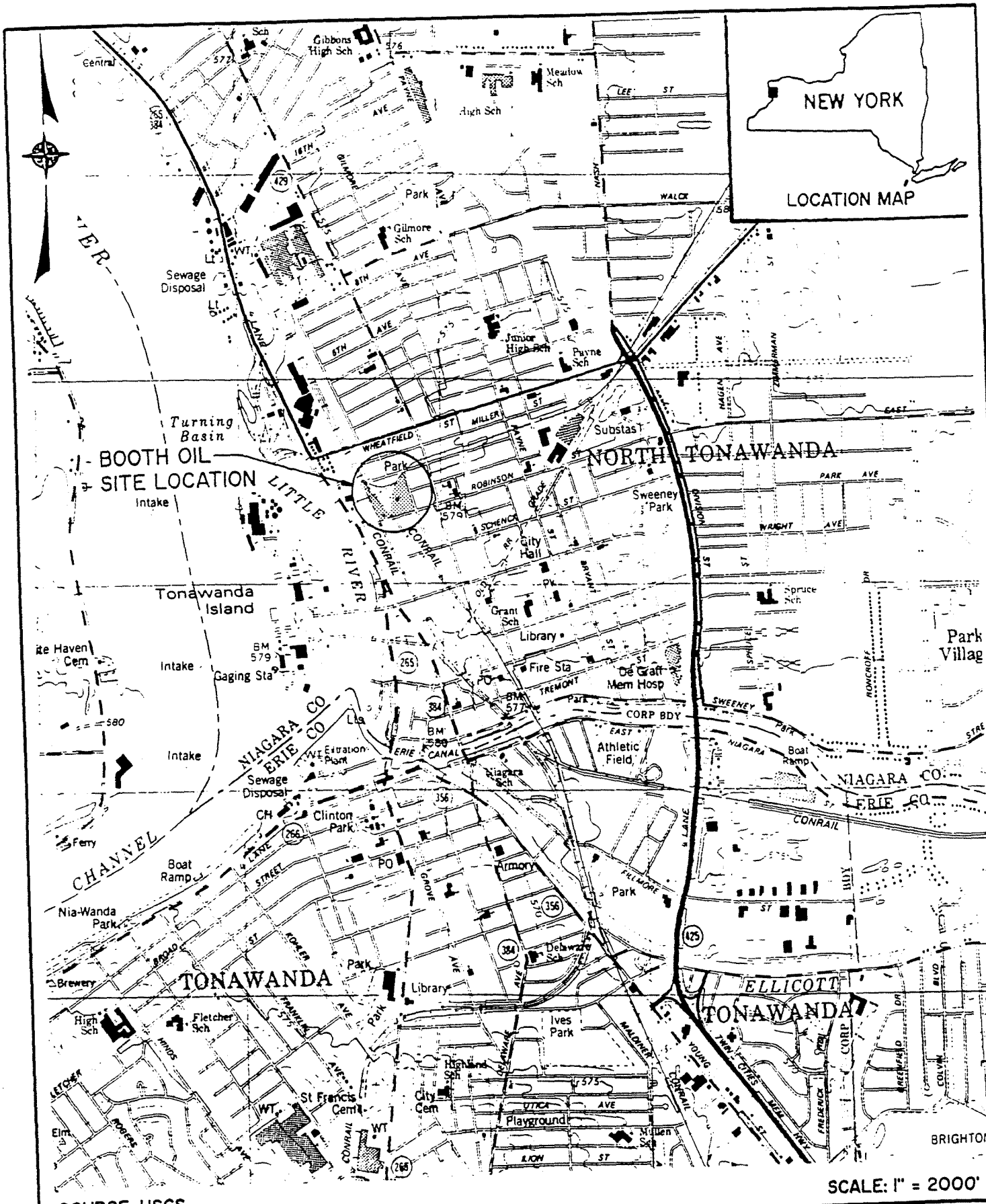
The Phase II field program for the Booth Oil Site involved site remobilization; additional sampling of surface soils, sampling of surface water and sediments from adjacent storm sewers, sanitary sewers and the Little River; construction of soil borings; installation of monitoring wells; sampling of borehole soil, groundwater and nonaqueous phase liquid (NAPL); and ambient air monitoring and sampling. The Phase II RI also included the construction of a security fence to prevent parking on a portion of the site.

1.2 Site Background

1.2.1 Site Location, Ownership and Access

The Booth Oil Site is located at 76 Robinson Street in North Tonawanda, Niagara County, New York and is shown on Figure 1-1.

The site occupies two parcels of land, which are bisected by tracks of the Erie Railroad (see Figure 1-2). The eastern parcel consists of approximately 1.9 acres. Part of the property is owned by Booth Oil, while the other portion of the property was leased to Booth Oil by the Consolidated Rail Corporation (Conrail). Conrail is the owner of the Erie Railroad and Penn Central Railroad lines. The western parcel consists of two sections (for a total area of approximately 2.6 acres) that were leased to Booth Oil by Conrail. The southwestern and northwestern sections are comprised of approximately 0.5 acres and 0.3 acres, respectively. The two sections of the western parcel are separated by a spur line of the Penn Central Main Track.



BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

SITE LOCATION MAP

FIGURE I-1

Dvirka and Bertlucci CONSULTING ENGINEERS

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

DETAILED SITE PLAN
ADJACENT AREAS

FIGURE I-2

Dvirka and Bartlucci
CONSULTING ENGINEERS

George T. Booth and Son, Inc., the owner/operator of the Booth Oil Site, engaged in the process of refining used oil at its Robinson Street Plant for more than 50 years, until ceasing operations in the early 1980's. During this period, waste oils were transported to the plant either by tanker truck or rail car. This oil was off-loaded and stored in numerous aboveground and underground tanks throughout the facility until processing of the oil was completed. Figure 1-3 presents a facility location map of the former operations at the Booth Oil Site. While the property comprising the Booth Oil Site is not secured, general access to the facility is via Robinson Street.

1.2.2 Environmental Setting

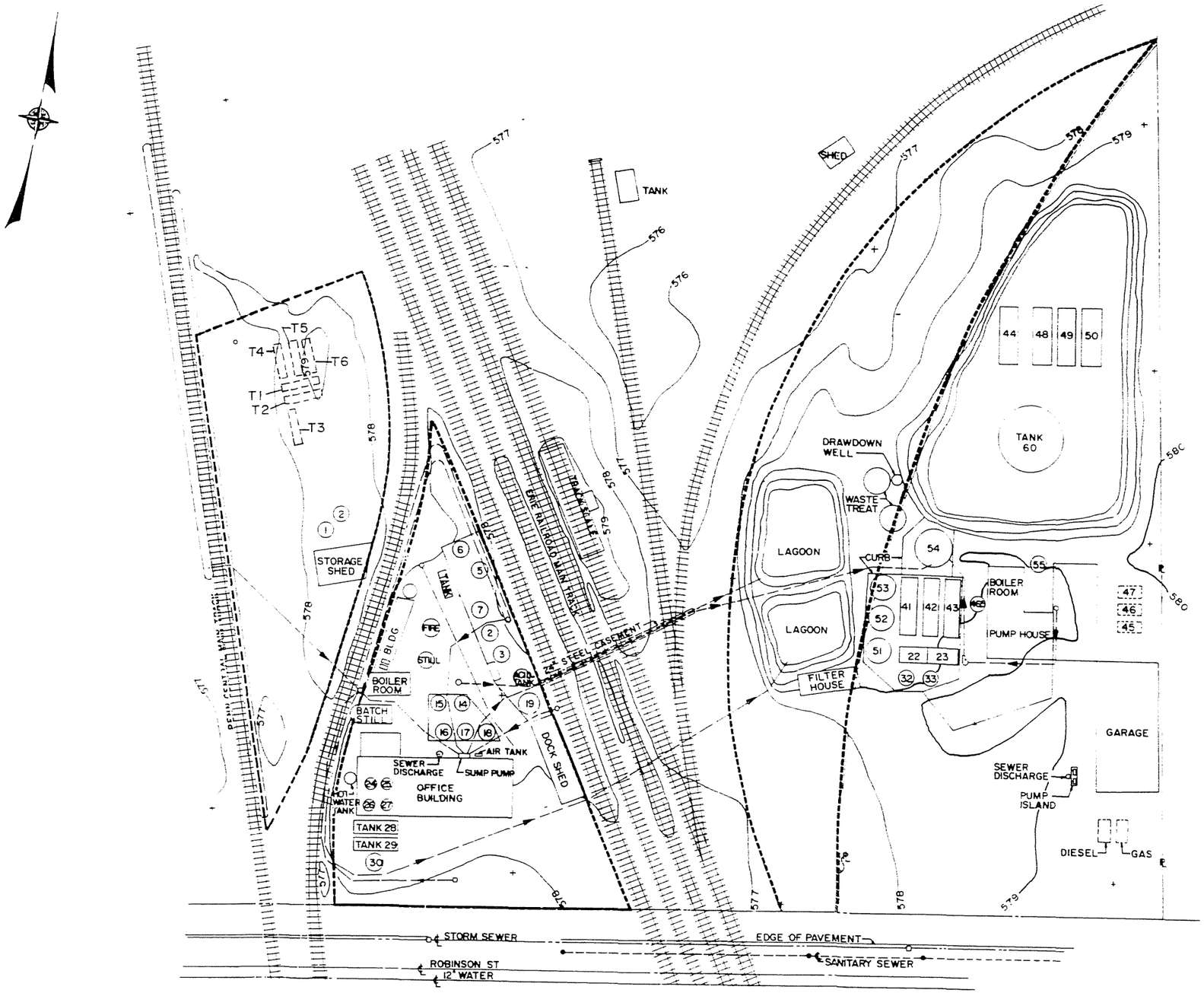
The area in which the Booth Oil Site is located consists primarily of areas zoned for commercial and industrial use; however, there are residential housing units in the area as well. Specifically, residential units exist at the northern and eastern boundary of the Booth Oil property. In addition, a playground area exists immediately to the north of the site. The site is located approximately 1/8 of a mile east of the Little River which is a water body separated from the Niagara River by Tonawanda Island.

1.2.3 Land Use and Population

Figure 1-4 illustrates the land use in the vicinity of the Booth Oil Site based on the City of North Tonawanda's current zoning map.

The zoning in the immediate vicinity of the site and for the study area consists of the following:

- R1-1 - Single Family Residence
- R1-2 - Single Family
- R2 - General Residence
- RC - Residence, Restricted Business
- C1 - Neighborhood Business
- C2 - General Commercial
- M1 - Light Manufacturing
- M2 - General Industrial
- WD - Waterfront District



SCALE: 1" = 60'

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

FACILITY LOCATION MAP

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 1-3

As illustrated in Figure 1-4, the Booth Oil Site is located in both Zone M1 and Zone R2. Dwellings are located immediately adjacent to the site on the eastern property line, as well as to the north of the site on Miller Street.

With respect to population, the City of North Tonawanda is comprised of seven Census Tracts (228.01, 228.02, 229, 230, 231, 232, and 233). The Booth Oil Site is located within Census Tract 231. This tract is bordered by Wheatfield Street on the north, the Little River on the west, Schenck Street on the south, and Division Street on the east. The total population for this tract, based upon the 1980 U.S. Census of Population and Housing, is 2,973 persons, which is approximately 8.3 percent of the city wide population of 35,760 persons.

1.2.4 Climate

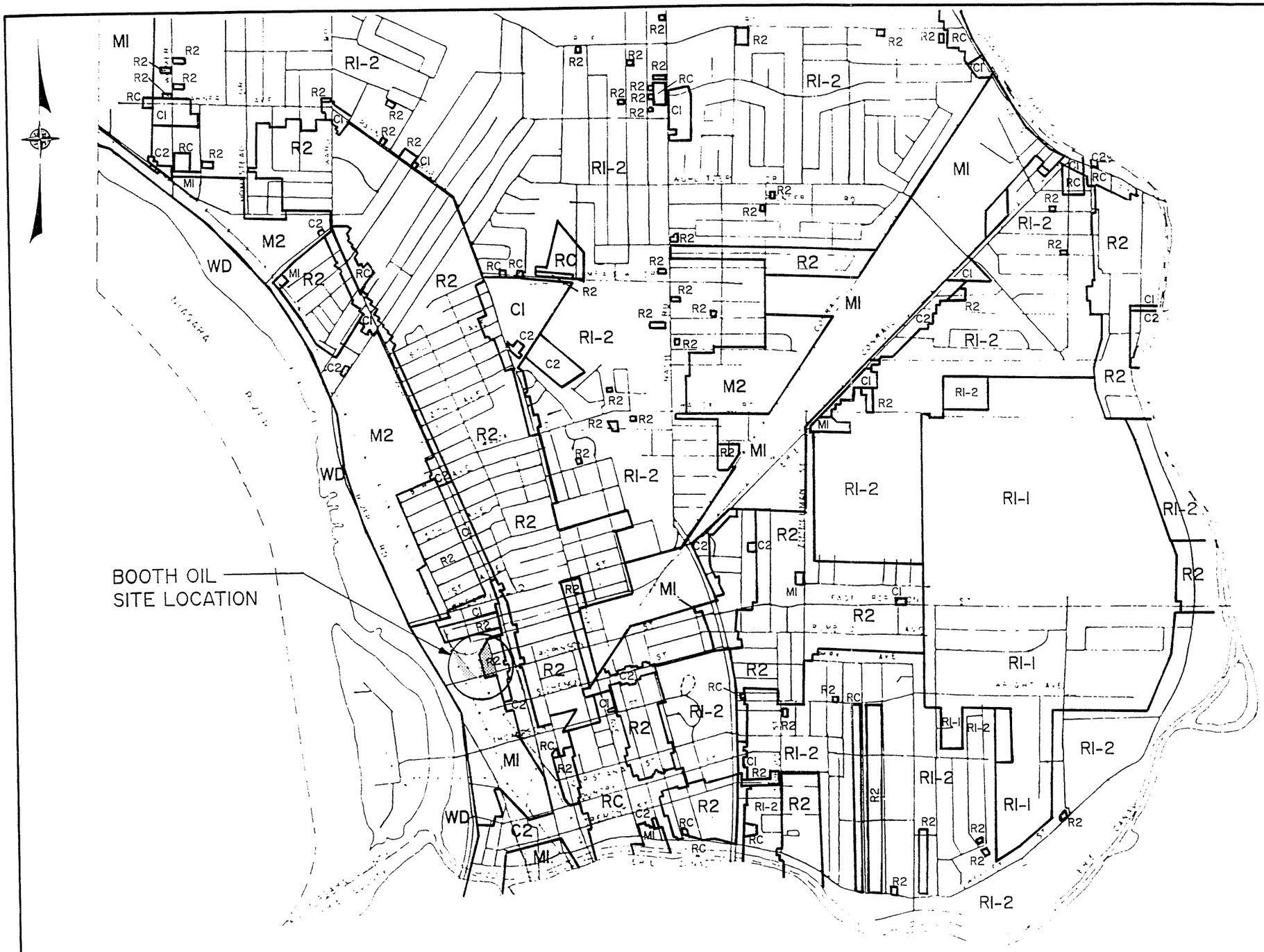
Based upon information collected at the Buffalo Airport during calendar year 1988, the average annual precipitation for the study area is approximately 39 inches. The range of monthly precipitation during 1988 varied from a low of 1.56 inches in June to a high of 6.35 inches in July. The average annual snowfall is approximately 56 inches. Of the monthly means, the highest snowfall was 31.9 inches which occurred during February of 1988.

The average annual temperature is approximately 48.8 degrees Fahrenheit (°F). July is the warmest month and February the coldest with average temperatures of 74.8°F and 24.3°F, respectively.

The annual average windrose for the years 1948 through 1978 is shown in Figure 1-5. The weather station from which these data were obtained is the Buffalo Airport, located approximately nine miles southeast of the Booth Oil Site.

1.2.5 Topography

The topography of the Booth Oil Site is generally flat, ranging from a low of 576 feet above mean sea level to a high of 580 feet above mean sea level. The elevation at the Little River, approximately 500 feet west of the site, is approximately 570 feet. East of the site similar variations in elevation occur at a distance of several miles.



LEGEND

RI-1	SINGLE FAMILY RESIDENCE
RI-2	SINGLE FAMILY
R2	GENERAL RESIDENCE
RC	RESIDENCE - RESTRICTED BUSINESS
CI	NEIGHBORHOOD BUSINESS
C2	GENERAL COMMERCIAL
MI	LIGHT MANUFACTURING
M2	GENERAL INDUSTRIAL
WD	WATERFRONT DISTRICT

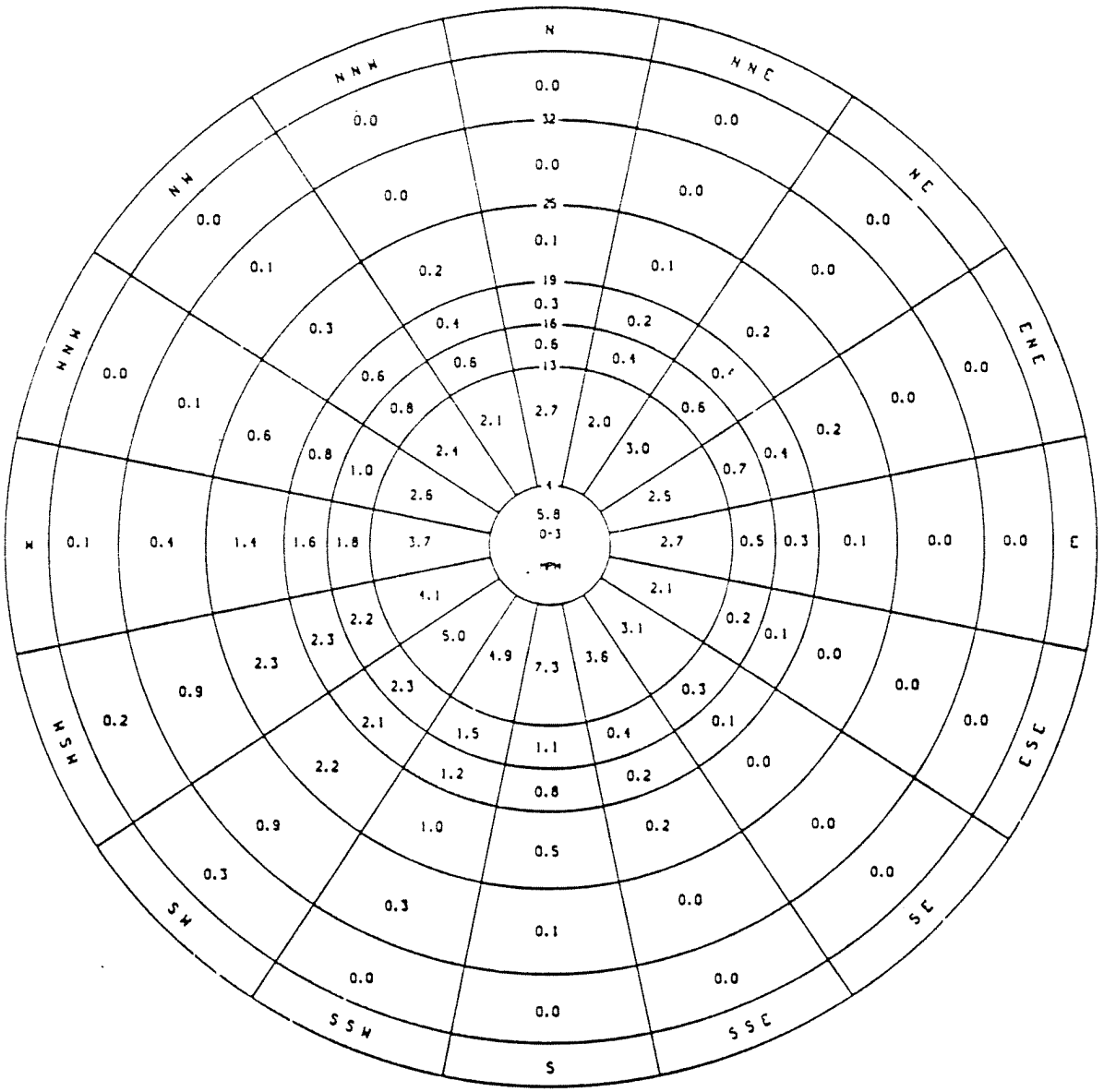
SCALE: 1" = 2000'

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

ZONING IN THE VICINITY OF THE BOOTH OIL SITE

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 1-4

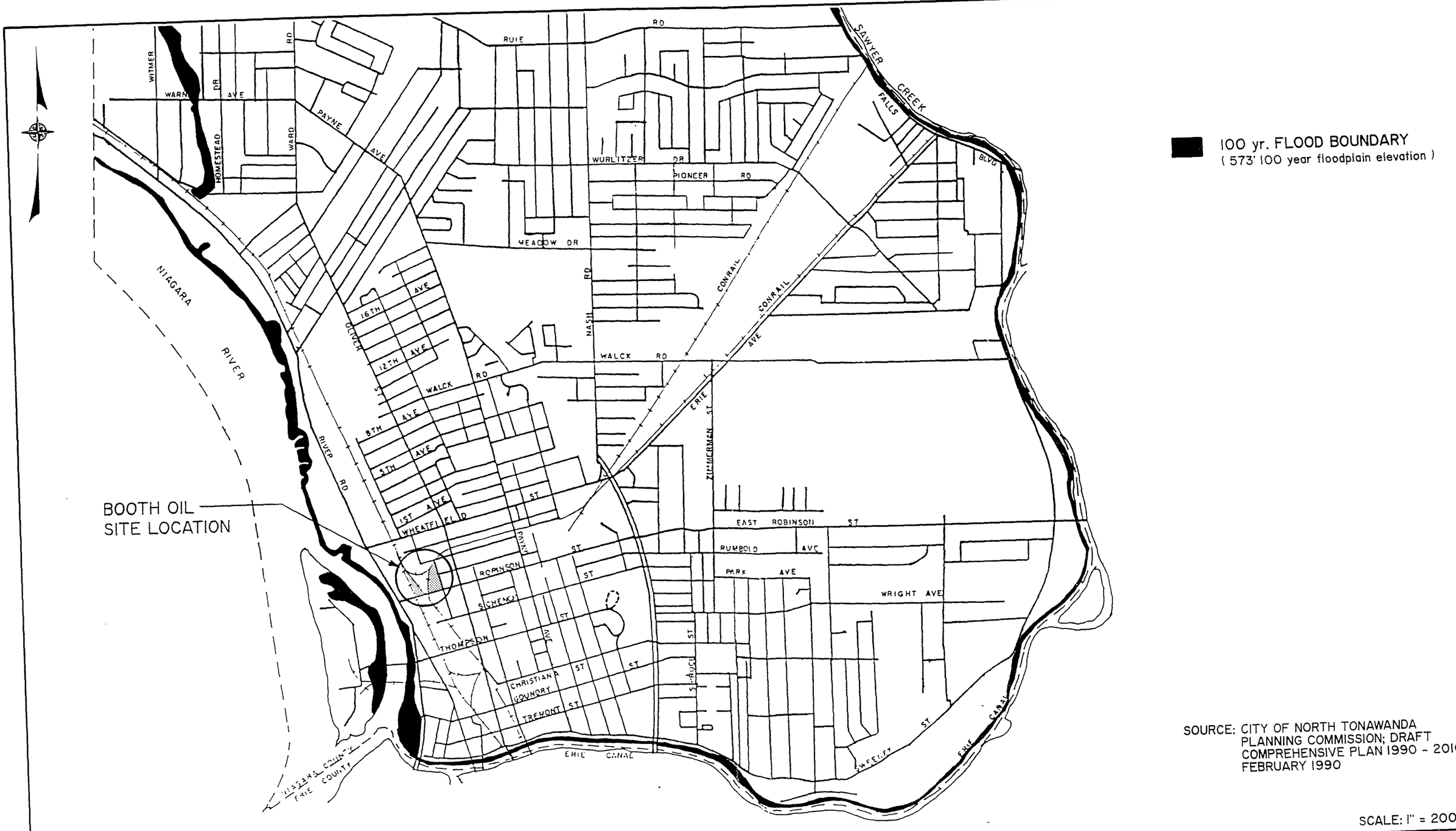


BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

ANNUAL AVERAGE WIND ROSE
(1948 - 1978)
FOR BUFFALO AIRPORT

Dvirka and Bartlucci CONSULTING ENGINEERS

FIGURE I-5



SOURCE: CITY OF NORTH TONAWANDA PLANNING COMMISSION; DRAFT COMPREHENSIVE PLAN 1990 - 2010, FEBRUARY 1990

SCALE: 1" = 2000'

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

FLOOD ZONE MAPPING IN THE VICINITY OF THE BOOTH OIL SITE

FIGURE 1-6

Dvirka and Bertilucci
CONSULTING ENGINEERS

1.2.6 Soil

The Soil Conservation Service has classified soils found in the area of the Booth Oil Site as primarily soils of the Canandaigua-Raynham-Rhinebeck Association. Generally, these soils are deep, somewhat poorly drained to very poorly drained having a dominantly medium-textured to fine-textured subsoil.

Approximately 26 percent is Canandaigua soils, 23 percent is Raynham soils, 17 percent is Rhinebeck soils, and the remaining 34 percent is comprised of minor soil types including those of the Lakemont, Madalin, Odessa, Niagara, Minoa and Lamson series.

Poor drainage and slow permeability are properties of the Canandaigua-Raynham-Rhinebeck Association. In addition, the soils in this association are formed in deep lacustrine deposits that normally contain wet, compressible, unstable layers.

According to information obtained from previous investigations, the site is underlain with cinder and gravel slag to an approximate depth of 3 feet. Below this layer is approximately 2 to 5 feet of sand and gravel with some silt, followed by a layer of silty-clay.

1.2.7 Surface Drainage

Based on the nature of the soils at the site, it is likely that significant surface runoff occurs. Based on a review of NYSDEC and Niagara County Health Department (NCHD) files, drainage ditches were constructed parallel to select portions of the railroad tracks at the site during the late 1960s or early 1970s. These drainage ditches led to sumps which were to be pumped to one of the lagoons at the site. Much of the drainage water at that time, as well as the storm water runoff from the site today, flows to the storm water sewer on Robinson Street which is designed to discharge to the Little River via the Robinson Street outfall.

1.2.8 Floodplains

Based on a review of the Federal Emergency Management Agency Flood Hazard Map for the City of North Tonawanda, as well as the 100-year Flood Boundary Map prepared by the City of North Tonawanda, the Booth Oil Site is not located within the 100-year floodplain or flood hazard areas (see Figure 1-6). The 100-year floodplain exists along the banks of the Little River

and Niagara River, on both the eastern area within the City of North Tonawanda, as well as the eastern portion of Tonawanda Island. In addition, the 100-year floodplain exists along the banks of the Erie Canal/Sawyer Creek. The nearest 100-year floodplain area is approximately 500 feet west of the Booth Oil Site, at an approximate elevation of 573 feet above mean sea level.

1.2.9 Wetlands

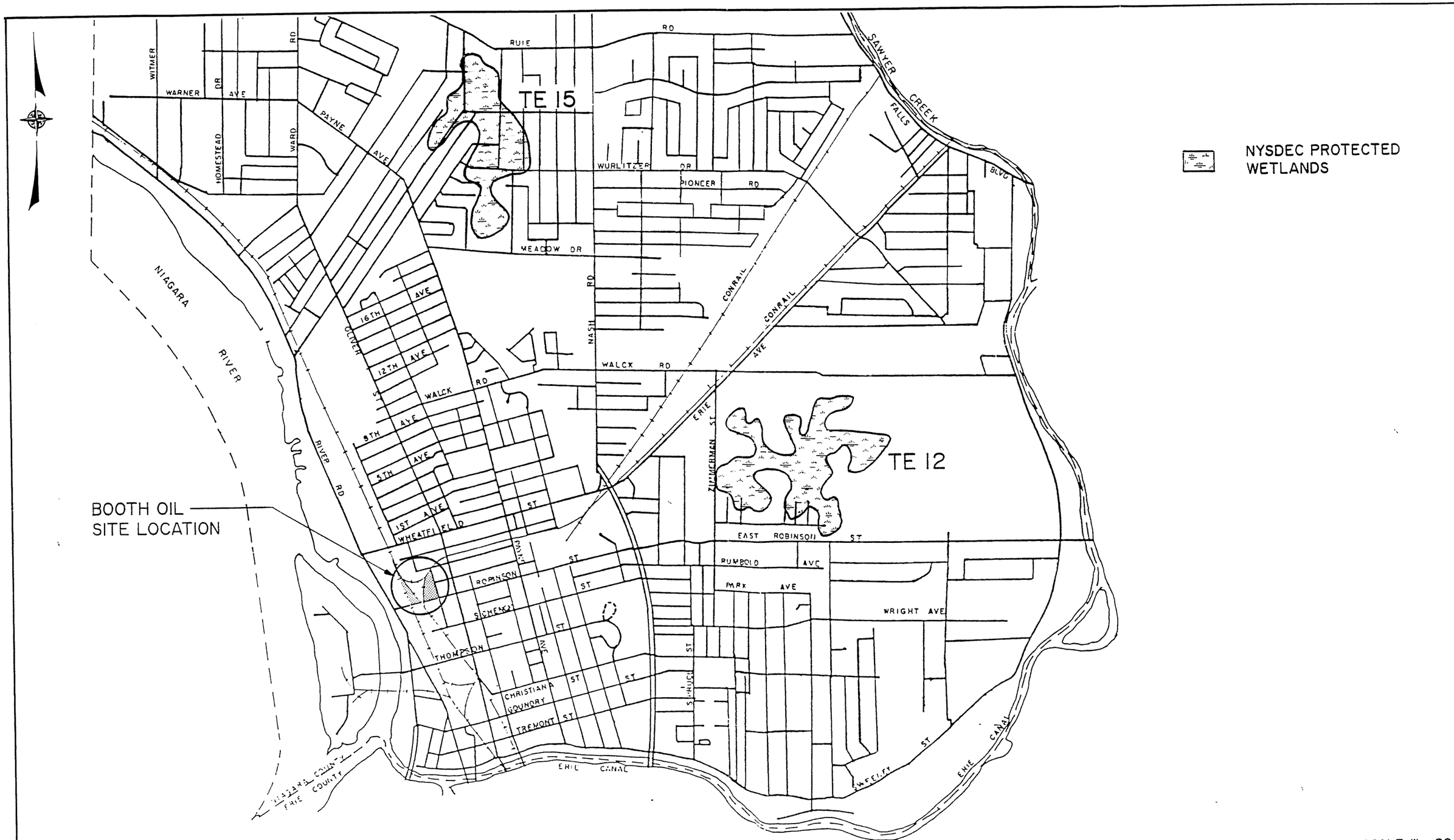
A review of the NYSDEC freshwater wetlands maps for Niagara County indicates that there are no protected wetlands located directly within the facility boundary or immediately contiguous to the Booth Oil Site. The nearest regulated New York State Wetlands are located approximately 7,000 feet east-northeast and 7,000 feet north-northeast of the site (see Figure 1-7). These wetland areas are classified TE-12 and TE-15, respectively.

1.2.10 Endangered Species

According to the New York Natural Heritage Program, critical habitats, as well as threatened and unprotected species, exist or may exist within a 3-mile radius of the Booth Oil Site.

Specifically, Solidago rigida (stiff-leaf goldenrod), a threatened botanical species, has been observed approximately 2 miles upstream along the eastern shore of the Niagara River, although the exact location at which it was observed is not known and could have occurred within a 1.5 mile radius. It is believed that there are very few, if any, remaining specimens in this range and any occurrences would be rare. This species was last observed in the area in 1927.

In addition, the botanical variety of Calamintha arkansana (Calamint), an unprotected species, had also been observed approximately 2 miles upstream along the eastern shore of the Niagara River. The exact location of this observance is unknown and could have occurred within a 1.5 mile radius. It is believed that there are very few, if any, remaining specimens in this range. Although this species is known to have been present historically in this area, it has not been observed within the past 15 years.



BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

WETLANDS
IN THE VICINITY OF THE
BOOTH OIL SITE

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE I-7

In addition to the above, there are several streams located to the west of the Niagara River on Grand Island that are part of the Grand Island Tributaries Unit, which represents a significant coastal fish and wildlife habitat. Included are portions of Woods Creek and Spicer Creek.

1.2.11 Surface Water

Ellicott Creek, Tonawanda Creek and the Little River/Niagara River are all significant surface water habitats within 3 miles of the Booth Oil Site.

From the mouth of Ellicott Creek to the Erie Railroad, this waterbody is classified by NYSDEC as Class "D," water suitable for fishing, as well as primary and secondary contact recreation. Beyond the Erie Railroad to Mill Road, this waterbody is classified as Class "C," water suitable for fishing and fish propagation, as well as primary and secondary contact recreation.

Tonawanda Creek is classified by NYSDEC as a Class "C" waterbody, while the Little River and the Niagara River are both classified as Class "A" - Special (International Boundary Waters); water suitable for drinking, culinary or food processing purposes, primary contact recreation and any other uses.

1.2.12 Geology

In general, the geology of the area in which the Booth Oil Site is located consists of unconsolidated deposits of clay, sand and till of the Pleistocene and Holocene age. These overburden deposits overlie Camillus Shale bedrock of Silurian age. The unconsolidated deposits consist of Holocene lacustrine material comprised primarily of clay with veins of sand and silt. Most veins are less than 3 inches thick and are discontinuous throughout the area. Depending upon the depth to bedrock, the unconsolidated deposits range in thickness from approximately 18 to 63 feet.

Two distinct aquifers are found in the study area; the overburden aquifer and the bedrock aquifer. Water within the bedrock aquifer flows through joints and fractures within the unit. Regionally, this groundwater moves in a westerly and southerly direction. Ground water in the shallow bedrock discharges into Tonawanda Creek, Ellicott Creek and the Niagara River. Reported information indicates that industrial wells in the bedrock aquifer can yield up to 1,200 gallons per minute. Ground water in the unconsolidated deposits is found within the clay units and also in the veins of permeable sand. The low vertical permeability of the unconsolidated deposits,

which have been reported in the range of 1×10^{-6} to 1×10^{-8} cm/sec, causes a seasonally perched water table. Shelby tube samples, collected as part of the Phase I RI confirm an average hydraulic conductivity of 5.3×10^{-8} cm/sec within the clay unit. It is believed that the horizontal permeability in this area is orders of magnitude greater than the vertical permeability. Thus, groundwater discharges into areas of low topography and, eventually, into nearby surface water bodies.

With respect to site-specific conditions, based upon soil borings installed at and immediately adjacent to the site during June and July of 1980 by Earth Dimensions, Inc., the site is underlain with cinder/gravel slag to a depth of approximately 3 feet below ground surface. Beneath this slag is approximately 2 feet of sand and gravel with some silt, which is followed with a layer of silty clay. This corresponds closely with the results obtained during the Phase I and Phase II RI boring programs. However, the results of this program indicate that the cinder/gravel slag layer is discontinuous throughout the site and that it does not represent a major soil unit. Although the borings installed by Earth Dimensions, Inc. did not encounter bedrock, research has indicated that bedrock occurs at approximately 40 feet below the ground surface. The water table at the site has been shown to be at a depth ranging from approximately 2 to 6 feet below the ground surface, although some borings drilled on-site as part of the Phase I and Phase II investigations did not encounter groundwater at depths in excess of 10 feet. This indicates that the groundwater overlying the clay on-site is in a localized perched condition.

1.2.13 Groundwater

Groundwater in the area of the Booth Oil Site does not appear to be used for potable or commercial purposes. As described below, water supplied from the Niagara River is provided for residential, commercial and industrial use.

Because of activities at the Booth Oil Site during its years of operation, a significant amount of oil migrated into the groundwater within the overburden strata underneath the site. As a result, Booth Oil implemented a program to remove this oil from the groundwater by installing and operating two drawdown wells at the site; one on the western parcel and one on the eastern parcel. Pumping began during July of 1982 and lasted for several months. In addition, a sample taken from one of the two drawdown wells (western-most drawdown well) indicated the presence of PCBs (as Arochlor 1260) at a concentration of 2.7 ppm.

1.2.14 Water Supply

The City of North Tonawanda owns and operates a 12 million gallon per day (MGD) Water Treatment Plant, located on Tonawanda Island. This plant, which is a conventional filtration system, provides water for consumption, fire protection, as well as commercial and industrial uses.

Raw water is obtained from the Niagara River through a 48-inch diameter intake line located approximately 2,800 feet from the shoreline of Tonawanda Island. This water is chemically treated, settled, filtered and chlorinated before it enters the city-wide distribution system.

The system includes a 1,000,000-gallon storage tank and a 4,000,000-gallon storage tank, which conforms to recommended standards for one day water supply, as well as providing for water pressure equalization, fire flow reserve and emergency reserve.

1.2.15 Storm Water

As previously discussed in Section 1.2.7, storm water runoff from the Booth Oil Site discharges primarily into the storm sewer located adjacent to the southern boundary of the Booth Oil Site, along Robinson Street. The water entering this sewer is subsequently discharged to the Little River via the Robinson Street outfall pipe.

1.2.16 Wastewater

The City of North Tonawanda is serviced by a sewage collection and conveyance system, which transports sanitary waste and industrial flow to the City's wastewater treatment plant prior to discharge to the Niagara River. The plant is located west of River Road, between East Avenue and 8th Street.

The City's plant is permitted and treats 13 MGD of sanitary and industrial waste utilizing a carbon treatment system. Typically, the plant treats approximately 7 MGD, of which less than 0.5 MGD is from industrial and commercial users.

Relative to the Booth Oil Site, sanitary wastewater flow is conveyed along Robinson Street to Oliver Street, north on Oliver to 8th Street, and west on 8th Street to the wastewater treatment plant for processing.

1.2.17 Site History

As previously described above, the Booth Oil Company operated a waste oil collection, storage and reclamation facility for more than 50 years at its plant on Robinson Street in North Tonawanda, Niagara County, New York. Processing of the waste oil ceased in the early 1980's when site closure was initiated; however, oil storage was continued until 1985. Removal of oil sludges and storage tanks commenced during 1986 and was terminated on October 12, 1987 with the removal of the last remaining aboveground storage tank. As a result of known and suspected contamination at the site, and the refusal of the property owner to undertake further action, the New York State Department of Environmental Conservation (NYSDEC) placed Booth Oil on its list of inactive hazardous waste sites as a facility at which a Remedial Investigation and Feasibility Study must be performed.

It appears that during plant operation, frequent spills occurred throughout the site. This has been documented by State and local (Niagara County Health Department) inspections which indicated the presence of oil-soaked ground and pools of oily material at various locations throughout the site. This spilled material was either discharged via surface runoff to storm water catch basins and storm drains adjacent to the facility, or infiltrated into the groundwater underlying the facility via percolation. An existing unlined, waste lagoon on-site was rebuilt during 1969 to receive the storm water runoff and other process wastes resulting from activities at the Booth Oil Site.

Storm sewers located on Robinson Street, which forms the southern boundary of the site, discharge directly into the Little River via a storm sewer outfall. On at least two occasions, NYSDEC determined, based upon sampling data, together with physical field evidence and observations, that Booth Oil was responsible for oil discharges into the Niagara River. At that time, NYSDEC requested the company to clean the catch basins adjacent to the facility, place sorbent material within these basins, monitor the sorbent material on a daily basis and replace it as necessary. In addition, Booth Oil was requested to implement a similar program at the first catch basin from the river, as well as install a functional oil containment boom at the storm sewer outfall with regular monitoring and replacement of the boom material as necessary.

During operations at the site, sanitary waste from the office building, as well as condenser water, were the only waste streams being directly discharged into the sanitary sewer system. There was the possibility that oil was entering the condenser water due to spills, resulting in an oil/water mixture being discharged into the sanitary sewer. Based on a review of the files of the NCHD, there is evidence that on numerous occasions during the late 1960s and early 1970s, the City of North Tonawanda Sewage Treatment Plant notified Booth Oil to cease the discharge of oily material into the sewer system.

As noted above, waste oil was delivered to the Booth Oil Site either by tanker trucker or rail cars. The oil was stored in numerous aboveground and underground tanks throughout the facility prior to processing. Oil and water were separated by means of a centrifuge with the resulting sludge from this process being sold for use as road oil. During the winter months when road maintenance was not practiced, this sludge was stored at the facility. The concentrate resulting from the centrifuge process was refined using a process similar to that used in the refining of crude oil. This process included high temperature distillation, cooling, and caustic treatment utilizing sulfuric acid followed by clay contacting. The acid tar residue (acid wastes) were transported off-site for landfilling.

Because of environmental concerns raised as a result of the handling of waste oil at the site, Booth Oil retained Hill and Hill Engineers, Inc. of North East, Pennsylvania to address certain operational problems. In January of 1969, Hill and Hill prepared a report recommending changes to the facility to better handle the waste associated with the oil reclamation processes. These modifications included the construction of several drainage ditches parallel to both the Penn Central Main Track and the Erie Railroad Tracks to contain and control runoff water, the construction of sumps within each drainage ditch to pump the water to the central sump located north of the office building on the western parcel, and the installation of a 24-inch steel encasement to house piping from the main sump, underneath the Erie tracks, for discharge to the lagoons. Recommendations were also made for process waste (acid waste and emulsified oils) to be pumped through this encasement to a process waste treatment plant rather than the lagoons. The treatment plant would break the emulsified oil and neutralize the acid waste, and subsequently discharge these materials to the same lagoon. Some of these recommendations are believed to have been implemented. It is unknown, however, whether the 24-inch steel casement or the process waste treatment plant were ever constructed.

The following chronology describes some pertinent events from the late 1970s to present regarding the Booth Oil Site. This chronology is based on the review of information from the Region 9 offices of the NYSDEC and interviews with NCDH personnel, as well as a review of files at the NCDH.

- o September 1978 - The NYSDEC investigated sources of waste oil collected by Booth Oil and concluded that the company had been receiving significant quantities of PCB-contaminated oils.

- o September 1978 - NCDH sampling of waste oil at the surface of Lagoon No. 3 indicates the presence of PCBs.

- o October 1978 - NCDH Inspection Report indicated that an oil slick in the Niagara River, identified by the U.S. Coast Guard, was the result of Booth Oil as well as discharges to the storm sewer adjacent to the site.

- o December 1978 - Sampling performed by NCDH indicated the presence of PCBs at a concentrations of 50 parts per million (ppm) from an "oil sample" taken from the lagoon at the Booth Oil Site.

- o May 1979 - NCDH Inspection Report indicated another oil slick in the Niagara River as a result of activities at the Booth Oil Site.

- o June 1979 - A letter from Booth Oil to the NCDH indicated that a containment boom has been placed at the Robinson Street outfall in the Little River.

- o September 1979 - An inspection by NYSDEC noted several problems at the Booth Oil Site: the western drainage collection sump was not working properly; the entire site was wet and oil-soaked, leading to concerns regarding groundwater; and the lagoons appeared to have overflowed as indicated by oil stains in the area.

- o November 1981 - A final closure plan was prepared by Waste Resource Associates, Inc. on behalf of the Booth Oil Company for full site closure. The plan indicated that the lagoon would be backfilled with gravel.

- o February 1982 - An Order on Consent (File No. 82-10, 9-0530) was issued by NYSDEC to Booth Oil to close the Robinson Street facility.

- o May 1982 - NCDH Inspection Report indicated that the site was saturated with oil, lagoons contained oily sludge material, 250 to 300 empty 55-gallon drums were present, and a tank was leaking. The tank was not identified in the inspection report.

- o August 1982 - NCDH Inspection Report indicated that oil and oil stained areas are still present at numerous locations throughout the site. Dewatering wells had apparently been pumped but were not working at time of inspection. Piping was being removed. Oil was still being stored at several tanks on-site. Sludge from the lagoon had not yet been removed. The western parcel was noted to be relatively clean, and oil was noted on the ballast along the railroad tracks.

- o September 1982 - A letter from NYSDEC to Booth Oil regarding the the ongoing site closure described the installation of a partial french drain along the east lagoon berm and discussed in situ solidification of semi-liquid materials with hydrated lime.

- **September 1982** - NCDH Inspection Report indicated that the western parcel had been cleaned for the most part; contaminated ballast was used as fill for the lagoon; debris (pipe, steel, other metals) had been sold as scrap; and the lagoon had been filled and graded (a french drain was installed and lime was used to solidify the materials in the lagoon). In addition, the report noted that the tank farm east of the lagoon appeared to be the major area remaining for cleanup.

- **November 1982** - A report was issued by Waste Resources Associates, Inc. on behalf of Booth Oil, describing and evaluating the drawdown well system installed as part of the closure plan.

- **September 1984** - NYSDEC inspection indicated pools of oil on the western parcel adjacent to the tracks and an underground tank full of oil was located at the western parcel.

- **September 1985** - A letter from NYSDEC to the City of North Tonawanda contained a proposal, prepared by Booth Oil, for the phased removal of all tanks and miscellaneous structures from the facility.

- **July 1986** - A letter from NYSDEC to Booth Oil indicated the presence of PCBs at a concentration of 650 ppm in an underground tank, T-5. It is unclear whether this is the same tank as that found in September of 1984. In addition, it is stated that this tank may be interconnected with several other underground tanks in the area.

- **September 1986** - A letter from Booth Oil to NYSDEC indicated that Tank T-5 was removed and transported to SCA for incineration. Recent analyses of the contents of Tank T-5 indicated the presence of PCBs in the range of 50 to 650 ppm.

- **October 1986** - EP toxicity analyses indicated lead at concentrations of 16 ppm and 8.7 ppm at test pit numbers 2 and 3, respectively, which were excavated in the two lagoon areas.

- **November 1986** - A letter from Booth Oil to NYSDEC indicated that tanks T-1 through T-6 were removed from the site.

- **June 1987** - Analysis of a spill sample taken from the Robinson Street storm sewer indicated that this material was ignitable, contained lead at 37.1 ppm, and also contained PCBs at levels of 113 ppm for Arochlor 1254 and 266 ppm for Arochlor 1242. Although it was determined that the spill originated from the Booth Oil property, the exact source of the spill could not be identified.

- **June 1987** - Booth Oil Company submitted to NYSDEC a closure plan for Tank No. 60, a 500,000 gallon tank and the last remaining above ground tank in use at the site. This tank was removed on October 12, 1987 and soil sampling was performed around the perimeter of the tank during October of that same year. The results of the sampling indicated the presence of PCBs.

- **September 1987** - The NYSDEC collected samples from a spill at the Booth Oil Site which indicated the presence of PCBs and lead. This spill apparently occurred within the southeastern leasehold parcel of the facility, adjacent to the tracks and just north of the drawdown well.

- o **October 1987** - A letter from Booth Oil to NYSDEC confirmed the removal of Tank 60 as of October 12, 1987.

- o **December 1987** - On behalf of USEPA, NUS Corporation prepared a preliminary assessment for the Booth Oil Site.

- o **February 1988** - An incident occurred at the Booth Oil Site in which a 13-year-old boy incurred burns from caustic soda.

- o **March 1988** - NYSDEC sent notification letters to potential responsible parties (PRPs) regarding the Booth Oil Site, including FN Burt, General Motors, General Electric, Allied Signal (Bendix), Conrail, GTE and Union Carbide.

- o **April 1988** - An internal NYSDEC memorandum notes that the Booth Oil Company is in bankruptcy and that all tanks and structures have been removed from the Robinson Street site.

- o **July 1989** - The New York State Department of Health performed surface soil sampling at six oil-stained areas at and immediately adjacent to the western parcel of the Booth Oil Site. Analyses for PCBs did not indicate any significant concentrations.

In addition, pursuant to the Resource Conservation and Recovery Act (RCRA), Booth Oil notified the U.S. Environmental Protection Agency (EPA) of hazardous waste activity at its North Tonawanda Facility on August 18, 1980. The hazardous waste listed on the notification form were K049 and K052, slop oil emulsion solids from the petroleum refining industry and tank bottoms (leaded) from the petroleum refining industry, respectively, both of which are listed wastes based on toxicity. This notification also listed Booth Oil as a generator and transporter, and a treatment, storage and disposal (TSD) facility. On November 19, 1980, Booth Oil submitted to EPA, a RCRA Part A Application, EPA I.D. No. NYD002131860. This application noted that Booth Oil handled ignitable wastes and corrosive wastes, among others. Booth Oil subsequently asserted that these applications were not required because hazardous waste oil received at the facility was being re-refined and, thus, falls under the exemptions promulgated under Title 40 of the Code of Federal Regulations, Part 261.6(a) regarding recycling. These applications were made by Booth Oil because of its intent to expand operations to process waste oils contaminated with listed waste solvents.

Based upon the soil borings undertaken by Earth Dimensions, Inc., during June and July of 1980, a geologic cross section of the Booth Oil Site was developed that indicated the amount and area of oil contamination in the groundwater underlying the site. Based upon that study, drawdown wells were installed at the facility (one well each installed in the eastern and western parcel). Each well was eight inches in diameter and approximately 20 feet deep. It is believed that these wells pumped oil for approximately 3 months. It is not known whether additional pumping occurred or whether additional groundwater remediation was required.

1.2.18 Other Background Information

Sampling was performed at the Booth Oil Site on numerous occasions by either NYSDEC, the New York State Department of Health, NCHD or by Booth Oil itself. Although not all of the analytical information associated with these sampling activities was reviewed, it is believed that past sampling has indicated the presence of polychlorinated biphenyls (PCBs) and lead in concentrations exceeding NYSDEC "action levels" previously utilized for these contaminants. Sampling media included soil from surface samples and test pits, and liquid samples from tanks and catch basins. Table 1-1 lists the previous sampling activities and results as reviewed by Dvirka and Bartilucci Consulting Engineers. The sampling locations are indicated on Figure 1-8, where known.

1.2.19 Response Actions to Date

Booth Oil and Son, Inc. terminated operations at its Robinson Street facility in the early 1980's, while continuing to operate at a second facility, located on Katherine Street in Buffalo, New York. This closure has resulted in the removal of all aboveground structures at the facility (storage tanks, process facilities, office building, etc.), with the exception of the garage located on the eastern parcel. It is reported that a number of underground storage tanks have also been removed; however, it is uncertain if this is the case.

Past activities performed at the Booth Oil Site include site closure, pumping and disposal of oil-contaminated groundwater, solidification of waste oil material in the lagoons and covering of same, and construction, monitoring and maintenance of a boom at the Robinson Street outfall at the Little River. The site also appears to have been regraded and covered with what appears to be clean soil.

The New York State Department of Environmental Conservation has entered into a contract with Dvirka and Bartilucci Consulting Engineers to undertake a Remedial Investigation and Feasibility Study for the Booth Oil Site. During the periods May through August, 1990, and November through December, 1990, Dvirka and Bartilucci Consulting Engineers conducted comprehensive field investigations (Phase I and II of the RI) at the Booth Oil Site. The results of these investigations are the subject of this report.

Table 1-1

Booth Oil Site
Select Laboratory Analysis From Previous Sampling Events

Organization	Sample Date	Matrix/Location	Contaminant/Concentration									
			PCBs (ppm)				Total Lead (ppm)	EP Tox Lead (ppm)	Petroleum Hydrocarbon (ppm)	Ignitability (°F)	Oil and Grease (ppm)	Halogenated Organic Scan (ppm)*
			Total PCBs	Arochlor 1242	Arochlor 1254	Arochlor 1260						
Niagara County Health Dept. (NCHD)	9/21/78	o Sediment/Lagoon No. 4		3		7						
		o Oil/Lagoon No. 3				50						
Booth Oil	8/84	o Fuel Oil from UST (unknown location)	780									
		o Soil/Spill of unknown location	Up to 700									
Booth Oil/NYSDEC (Split samples)	10/84	o Oil from UST (unknown location)	874** (Booth)	1,060 (DEC)		78 (DEC)						
		o Oil/Along Riverside Tracks	251**	ND		ND						
		o Waste Oil/Well on Western Parcel	<15***	197		167						
		o Soil/UST Area 1	69**	80		1						
		o Soil/Oil Stained Area North of Area 1	68**	40		0.5						
		o Soil/Riverside Tracks	49**	60		40						
		o Soil/Tracks west of Office	114**	120		60						
NYSDEC	5/86	o No. 2 Fuel Oil/Tank 5		670	ND							
		o Soil/Test Pit No. 1		3	3							
		o Soil/Test Pit No. 8		10	ND							

*As Chlorine; Lindane standard
**Combination of Arochlors 1248 and 1254
***Arochlor 1248 only

ND - Analyzed for but not detected.

Table 1-1 (continued)

Booth Oil Site
Select Laboratory Analysis From Previous Sampling Events

Organization	Sample Date	Matrix/Location	Contaminant/Concentration									
			PCBs (ppm)				Total Lead (ppm)	EP Tox Lead (ppm)	Petroleum Hydrocarbon (ppm)	Ignitability (°F)	Oil and Grease (ppm)	Halogenated Organic Scan (ppm)*
			Total PCBs	Arochlor 1242	Arochlor 1254	Arochlor 1260						
Booth Oil	6/86	Soil: Test Pit No. 1	2.5				402				4,060	1.8
		TP No. 2	5				2,540				24,700	2.8
		TP No. 3	3.3				851				15,100	2.6
		TP No. 4	4.9				283				12,500	2.7
		TP No. 5	0.83				34				1,220	0.53
		TP No. 6	3				255				5,910	1.4
		TP No. 7	10				84				5,160	4.2
		TP No. 8	2.4				26				628	0.99
		TP No. 9	5.9				24				8,980	2.2
NYSDEC	9/86	o No. 2 Fuel Oil/ unknown location		452								
		o Water below oil layer		0.26								
Booth Oil	10/86	o Soil/Oil:										
		Test Pit No. 1						0.23				
		TP No. 2						16				
		TP No. 3						8.7				
		TP No. 4						0.73				
		TP No. 5						<0.03				
		TP No. 6						0.07				
		TP No. 7						0.08				
		TP No. 8						0.05				
		TP No. 9						0.03				
Booth Oil	11/19/86	o Liquid/Composite of Tanks 1, 2, 3, 4, 6	16	14							37	
		o Liquid/Tank 5	-	-							464	

*As Chlorine; Lindane standard

Table 1-1 (continued)

Booth Oil Site
Select Laboratory Analysis From Previous Sampling Events

Organization	Sample Date	Matrix/Location	Contaminant/Concentration									
			PCBs (ppm)				Total Lead (ppm)	EP Tox Lead (ppm)	Petroleum Hydrocarbon (ppm)	Ignitability (°F)	Oil and Grease (ppm)	Halogenated Organic Scan (ppm)*
			Total PCBs	Arochlor 1242	Arochlor 1254	Arochlor 1260						
NYSDEC	3/87	o Soil/Composite at Test Pit No. 12		<0.01								
		o Soil/Composite at TP No. 13		<0.01								
		o Soil/Composite at TP No. 14		<0.01								
		o Soil/Composite at TP No. 15		0.94								
		o Soil/TP No. 15,1'		3.4								
		o Soil/TP No. 15,3'		1.4								
		o Soil/TP No. 15,5'		2.5								
Booth Oil	3/87	o Soil/Composite of TP No. 12, TP No. 13					-	0.02			1,600	0.13
		o Soil/Composite of TP No. 14, TP No. 15					0.1	0.04			3,300	0.23
Booth Oil	4/87	o Soil/Composite of TP No. 10, TP No. 11		4.2				0.03			16,600	1.1
		o Soil/Garage Area						0.09				
		o Soil/Lagoon Composite						0.2				
NYSDEC	5/87	o Soil/Composite of 4 Samples at TP No. 10		3.8								
		o Unknown/Composite of 5 Samples at Lagoon				0.53						
NYSDEC	6/22/87	Spill Sample/ Unknown/Location		266	113		37.1			100		
NYSDEC	7/87	Oil & Water Unknown Location		144	144							

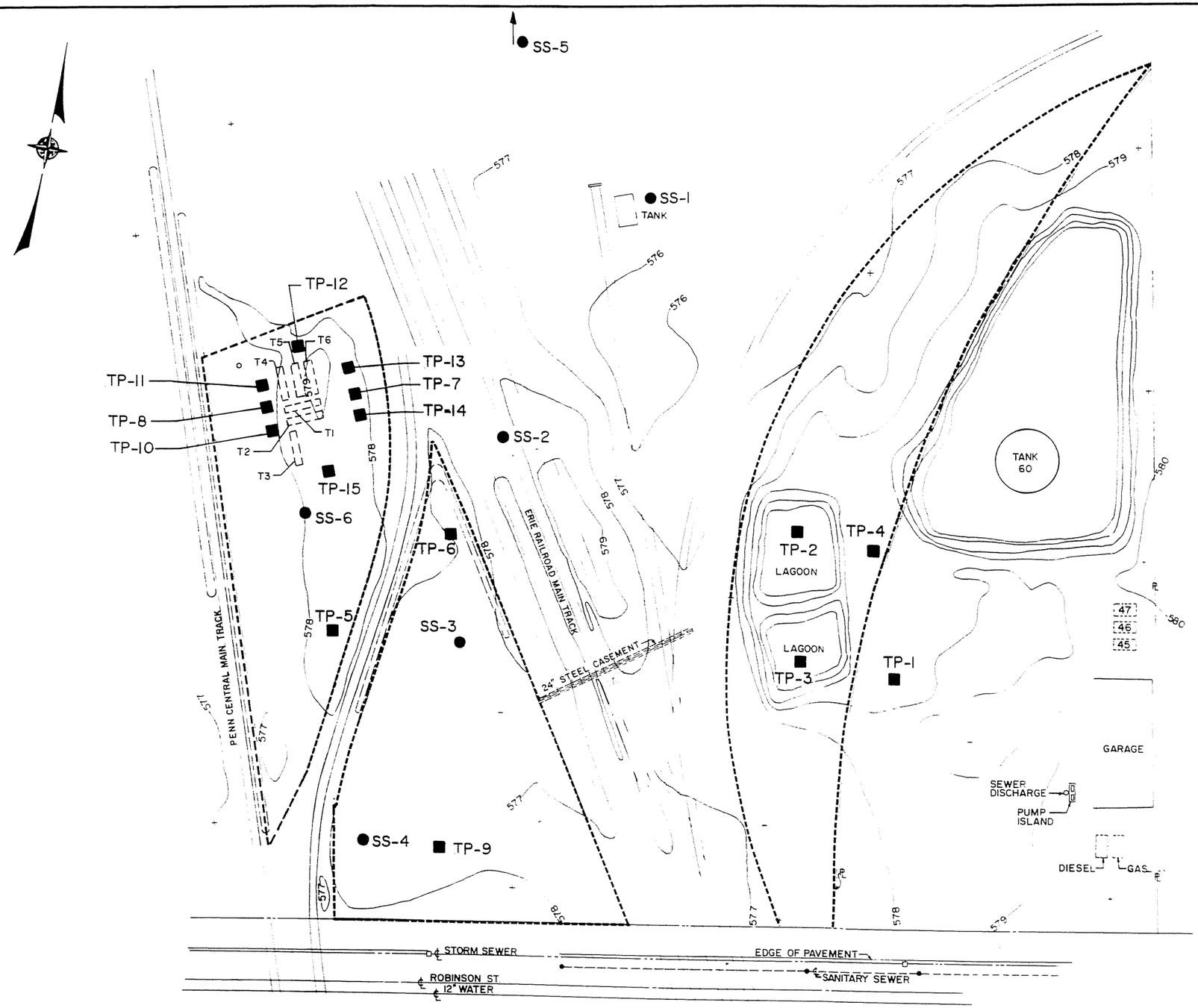
*As Chlorine; Lindane Standard

Table 1-1 (continued)

Booth Oil Site
Select Laboratory Analysis From Previous Sampling Events

Organization	Sample Date	Matrix/Location	Contaminant/Concentration									
			PCBs (ppm)				Total Lead (ppm)	EP Tox Lead (ppm)	Petroleum Hydrocarbon (ppm)	Ignitability (°F)	Oil and Grease (ppm)	Halogenated Organic Scan (ppm)*
			Total PCBs	Arochlor 1242	Arochlor 1254	Arochlor 1260						
NYSDEC - Spill Unit	9/9/87	Oil & Water/Robinson Street Outfall		263		40.3						
	9/18/87	Oil & Water/Outfall		229	98.3							
	9/29/87	Oil/Robinson St. Property Line		98.5	44.1							
	10/22/87	Oil & Water/Outfall		266	113		37.1			100		
NYSDEC	10/15/87	Unknown/Tank No. 60, Sample No. 1	7.5								13,000	
NYSDOH	7/26/89	Soil/6 Oil-Stained areas in southeastern parcel:										
		No. 1 (Soil/Sand)	0.13									
		No. 2 (Soil/Sand)		3.6		0.59						
		No. 3 (Soil/Sand)		1.9		0.36						
		No. 4 (Tar)		0.14								
		No. 5 (Tar)		-								
		No. 6 (Soil/Sand)		3.1								

*As Chlorine; Lindane standard



LEGEND

- NYSDOH 7/89 SURFACE SOIL SAMPLES
- TEST PITS
- LEASEHOLD BOUNDARY LINE (PROPERTY LEASED TO BOOTH OIL FROM CONRAIL)

SCALE: 1" = 60'

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

PREVIOUS SURFACE AND SUBSURFACE INVESTIGATIONS

Dvirka and Bartlucci CONSULTING ENGINEERS

FIGURE 1-8

In December of 1990, as part of the Phase II RI, Dvirka and Bartilucci Consulting Engineers contracted with Oneida Fence, Inc. to construct a chain-link fence along Robinson Street adjacent to the Southwestern Leasehold Property Area to prevent parking at this location. In addition, following fence construction, two hazardous waste warning signs were posted on the fence along with an additional six signs posted at locations around the site perimeter.

A baseline health risk and environmental assessment is being conducted, as well as a feasibility study to identify, evaluate and select remedial action alternatives as part of the overall RI/FS program.

1.2.20 Miscellaneous Areas of Concern

- Navigable Waters - Navigable waters within close proximity of the Booth Oil Site include the Niagara River, the Little River and Tonawanda Creek.
- Coastal Management - The City of North Tonawanda has in place a local Waterfront Revitalization Plan.
- Archaeological Sites - Based upon information included on the "New York State Archaeological Site Locations Map" for this area (revised July 1987), there are numerous archaeological sites throughout the City of North Tonawanda. This map was based upon information obtained from the New York State Museum of Archaeological Site File and/or the New York State Historic Preservation Office Archaeological Site File.
- Historical Sites - According to the NYSDEC Regulatory Affairs Office, Buffalo, New York, there are three historical sites within the City of North Tonawanda. These are:
  - Heschell, Allen Carousel Factory at 180 Thompson Street,
  - Riviera Theatre at 27 Webster Street, and
  - U.S. Post Office

1.3 Overview of the Remedial Investigation and Report Organization

The Remedial Investigation is designed as a phased sequence of multiple sampling events and data analysis. The objective of this strategy is to apply data generated from the Phase I RI to the design of future investigatory phases, as appropriate. In this way, a cost-effective, targeted program is implemented which generates meaningful data.

As an introduction to the report, Section 1.0 provides a general discussion of the purpose of the Remedial Investigation/Feasibility Study and the RI Report, as well as a description of the regional and physical features of the Booth Oil Site study area. This section also includes

an overview of the site history and nature and extent of the chemical contamination as documented primarily by previous investigations, as well as a discussion of waste types and characteristics as they pertain to the contaminants of concern in the study area. Other sections which comprise this report include the following:

Section 2.0 describes the various activities associated with the field work conducted during the Phase I and II Remedial Investigations which were performed in order to characterize the site. Associated elements of the program, including health and safety, quality assurance and control, and data validation and usability are also discussed.

Section 3.0 provides the results of the field activities to determine the physical, environmental and ecological characteristics of the site. This section contains the results obtained from aerial photography, topographic mapping, geophysical surveying, installation of soil borings and monitoring wells, flow measurement, and the wildlife habitat assessment conducted as part of the field investigation.

Section 4.0 discusses the results of the field activities, sampling, and the nature and extent of contamination. The results of the site characterization and contaminants in each of the media sampled are presented as reported by a NYSDEC approved and NYSDOH certified analytical laboratory. This section also includes a summary of preliminary Applicable or Relevant and Appropriate Requirements (ARARs) established for the site.

Section 5.0 discusses contaminant fate and transport. Physical, chemical and/or biological factors of importance for each media and potential routes of contaminant migration are presented, as well as factors affecting migration for each analyte/matrix of importance.

Section 6.0 provides conclusions resulting from the investigation of the site, as well as recommendations for future work and recommended interim and long-term remedial action objectives.

Section 2

2.0 STUDY AREA INVESTIGATION

2.1 Site Facilities

The initial field operations undertaken during the Remedial Investigation (as part of the Phase I RI) involved several site mobilization activities. A field office area was established at the site, which provided a secure location for the storage of equipment and supplies. In addition, a decontamination area was built in which a drum storage area was established, and a decontamination pad was constructed (see Figure 2-1).

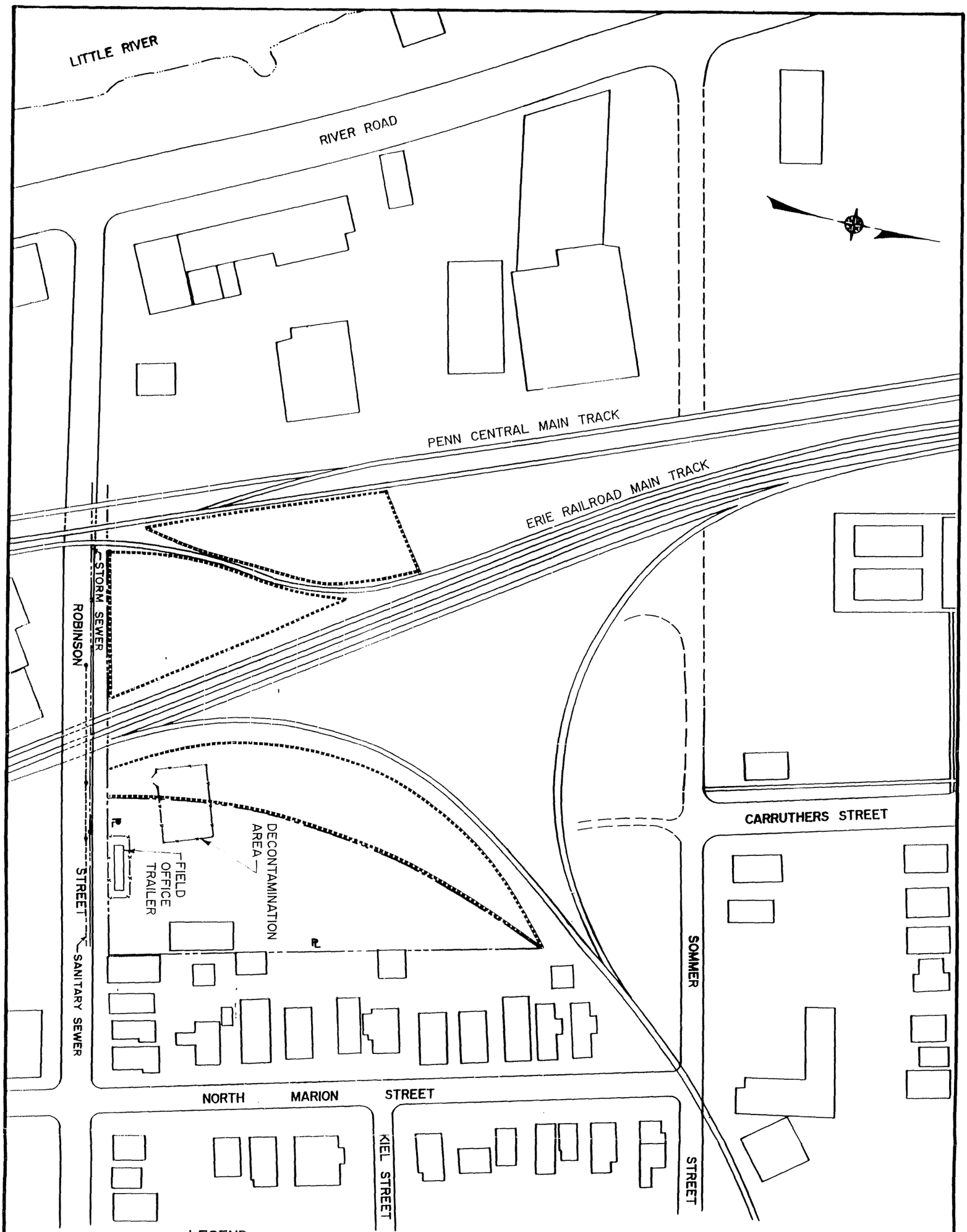
A trailer with dimensions of 10 feet by 50 feet served as the field office during implementation of Phase I and Phase II RI field activities. The trailer is located along Robinson Street at the entrance to the site (see Figure 2-2). Electricity and telephone service were provided to the trailer. The trailer was enclosed by an eight foot high chain-link fence with a pedestrian gate and a truck gate topped with barbed wire. A portable toilet facility was also provided for at the site.

The decontamination area was located on the Booth Oil and Leasehold Properties approximately 100 feet north of the Robinson Street entrance to the site (see Figure 2-1). This area, which measures 60 feet by 80 feet, was also enclosed by a chain-link fence and truck gate with barbed wire, as is illustrated in Figure 2-3. The decontamination pad was constructed of sand covered by a plastic liner and a wooden platform to support vehicles and drilling equipment requiring decontamination. Runoff that was generated as a result of steam cleaning was contained within the pad and pumped into drums.

2.2 Field Activities/Site Characterization

During the Phase I and Phase II RI field program, a wide range of field activities were undertaken to characterize the site with regard to the degree of contamination present, possible modes of transport and potential receptors of contamination. Tables 2-1 and 2-2 present a summary of activities performed during the Phase I and II RI field programs, respectively, along with the dates during which the activities were undertaken.

A description of the field/sampling program performed during the Phase I and Phase II RI is discussed below. The results of these field activities are presented in Sections 3.0 and 4.0, and the findings are discussed in Section 5.0.

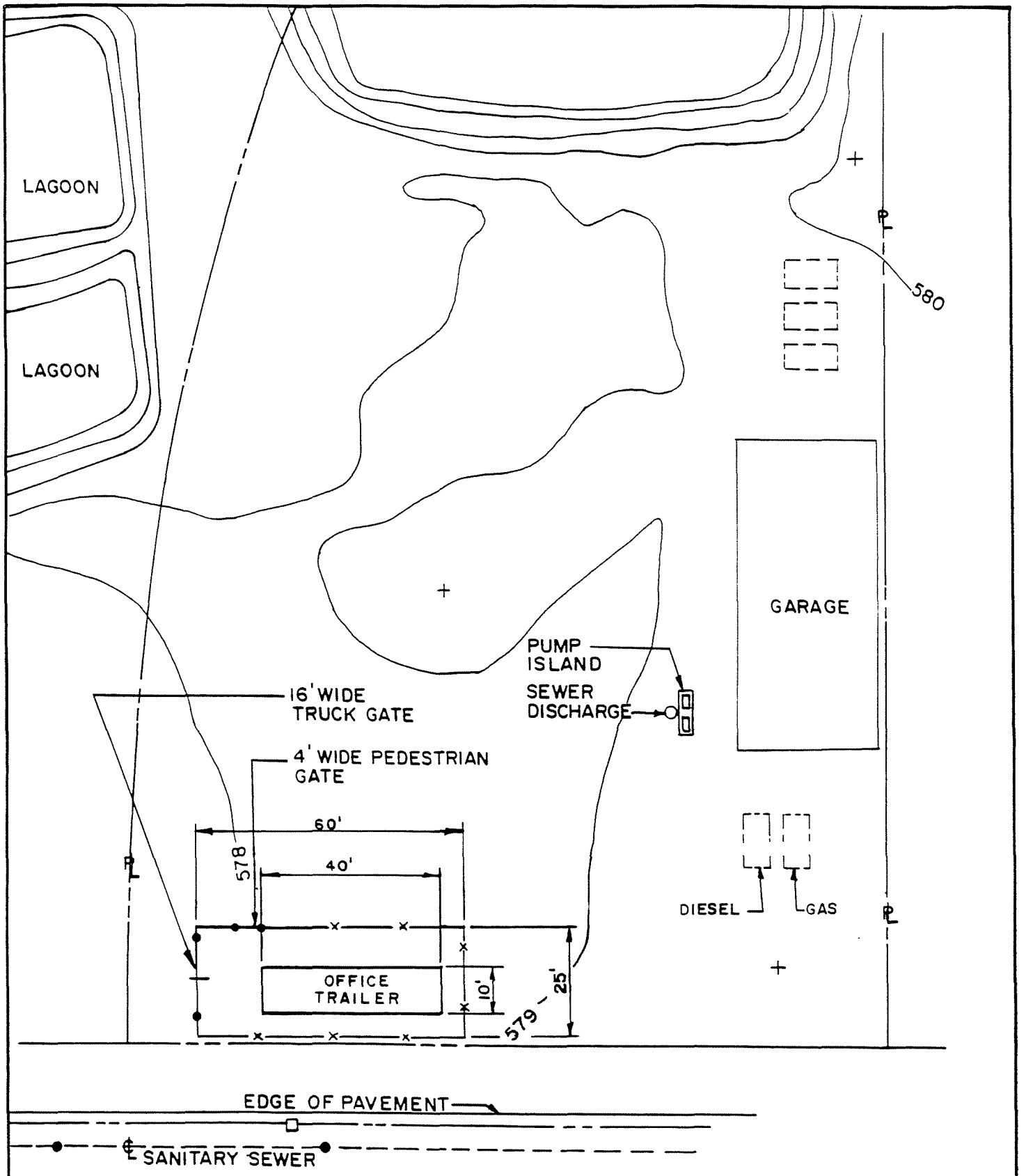


BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

FIELD OFFICE TRAILER
AND DECONTAMINATION AREA

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 2-1

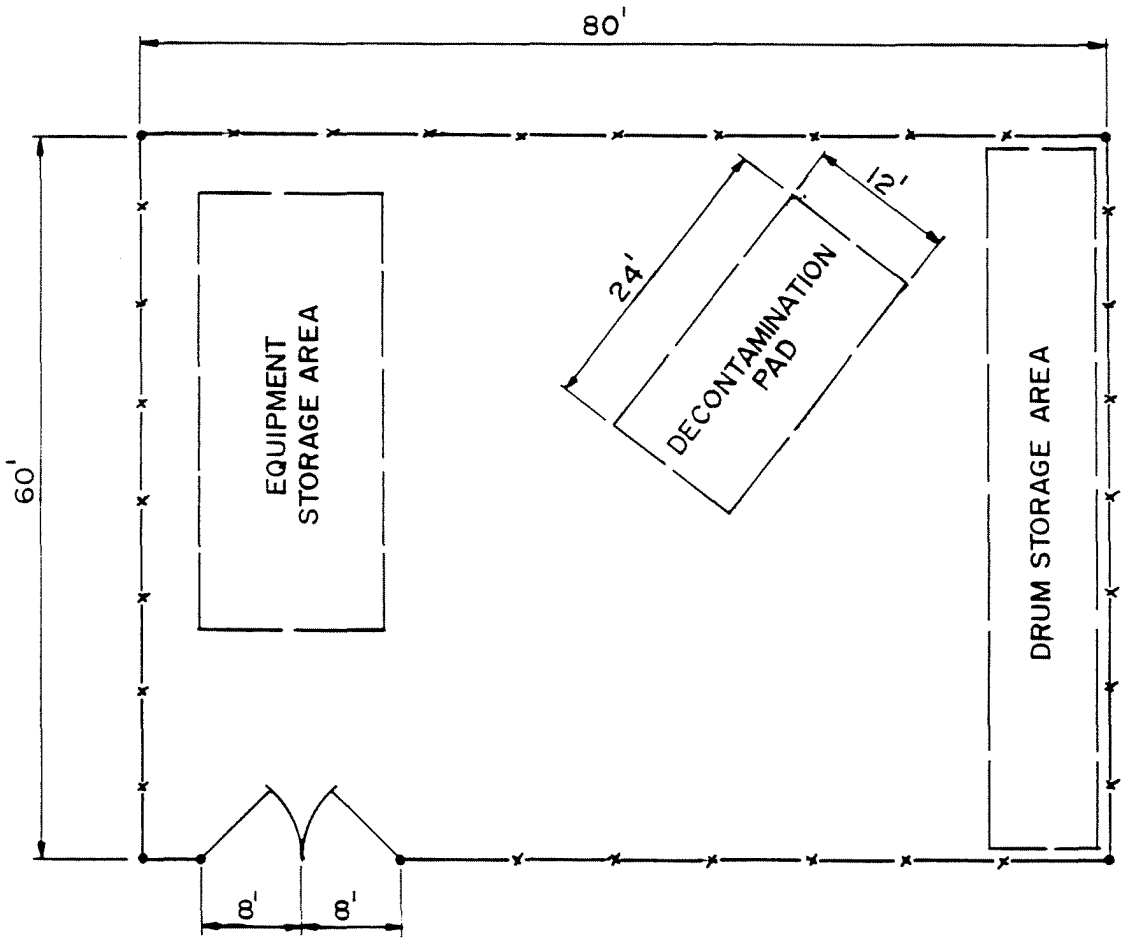


BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

Dvirka and Bartlucci CONSULTING ENGINEERS

DIMENSION LAYOUT FOR FIELD OFFICE TRAILER

FIGURE 2-2



SCALE: 1/16" = 1'-0"

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

Dvirka and Bartilucci CONSULTING ENGINEERS

FENCED EQUIPMENT STAGING, DECONTAMINATION PAD AND DRUM STORAGE AREA

FIGURE 2-3

Table 2-1

SUMMARY OF PHASE I RI FIELD ACTIVITY DATES

	Field Activity	Date(s)
1.	Establishment of the Site Grid	05/30/90-05/31/90
2.	Site Mobilization and Office Trailer Delivery and Setup	06/05/90-06/15/90
3.	Fence Construction for Trailer and Decontamination/Drum Storage Area	06/05/90-06/15/90
4.	Conduct of the Geophysical Survey	05/31/90-06/01/90
5.	Conduct of the Power Augering Program	06/18/90-06/22/90
6.	Performance of the Environmental Sampling Program	06/25/90-06/28/90
	a. Surficial Soil Sampling	06/26/90
	b. Catch Basin Sampling	06/27/90
	c. Underground Pipe Sampling	06/28/90
7.	Mobilization to the Site by the Driller	07/03/90
8.	Conduct of the Baseline Air Monitoring Program	07/03/90
9.	Monitoring Well/Boring Installation	07/09/90-07/15/90
10.	Well Development	07/19/90-07/20/90
11.	Groundwater Sampling	07/30/90-07/31/90
12.	Surveying of Aerial Topographic Controls, Monitoring Wells and Borings	07/30/90-07/31/90
13.	Slug Testing	08/06/90-08/07/90
14.	Nonaqueous Phase Liquid (NAPL) Sampling	08/07/90
15.	Site Demobilization	08/08/90

Table 2-2

SUMMARY OF PHASE II RI FIELD ACTIVITY DATES

	Field Activity	Date(s)
1.	Mobilization to the Site by the Driller	11/12/90
2.	Performance of the Environmental Sampling Program	
	a. Ambient Air Sampling	11/12/90 - 12/12/90
	b. Surficial Soil Sampling	11/13/90 - 11/14/90
	c. Storm Sewer Sampling	11/14/90
	d. Sanitary Sewer Sampling	11/15/90
	e. Surface Water Sampling	11/15/90-11/16/90
3.	Monitoring Well/Boring Installation	11/12/90 - 11/26/90
4.	Well Development	11/20/90 - 11/26/90
5.	Groundwater and NAPL Sampling	11/27/90 - 12/12/90
6.	Surveying of Monitoring Wells	12/11/90
7.	Fence Construction to Restrict Access to Southwest Leasehold Property Area	12/10/90 - 12/12/90
8.	Site Demobilization	12/12/90

2.2.1 Surface Features

2.2.1.1 - Aerial Photography and Topographic Mapping

As part of the Phase I RI, a flyover of the Booth Oil Site was conducted to obtain an aerial photograph (see Appendix A) and produce a 1 inch to 50 foot scale topographic map of the site. The topographic map was constructed with one-foot elevation contours (see Appendix B). The aerial photograph and topographic map were obtained to illustrate natural and man-made features of the site and identify surface drainage patterns.

2.2.1.2 - Surveying Program

In order to develop the topographic contour map, horizontal and vertical controls to within 0.01 feet were established at 7 locations surrounding the site. These elevations were tied into United States Geological Survey Datum, and the contour elevations on the topographic map were referenced to Mean Sea Level (MSL).

The surveying program provided the location coordinates for 12 Phase I and Phase II monitoring wells to the nearest foot, and top of well casings and ground surface elevations to the nearest 0.01 foot and 0.1 foot, respectively. Location coordinates of 27 Phase I and Phase II soil borings to the nearest foot and ground surface elevations to the nearest 0.1 foot were also established. The eight shallow borings installed in the vicinity of soil boring SB-5 during the Phase II RI were not surveyed since the primary purpose of these borings was to determine the extent of contaminated sludge in this area. These elevations established for the site were used to accurately measure groundwater levels referenced to MSL, determine flow direction, and prepare geologic cross sections of the site.

2.2.2 Geophysical Survey

A series of geophysical investigations were conducted by Hager-Richter Geoscience, Inc., as part of the Phase I Investigation, to assist in better understanding the vertical and horizontal components of fill material throughout the Booth Oil Site. The surveys were also performed to identify anomalous subsurface conditions indicative of buried drums and other large items, contaminant plumes, contaminated soil, buried petroleum products and other waste materials.

The geophysical survey involved the review of existing geologic information including local soil maps, evaluation of regional geology and a technical evaluation of existing boring logs. A survey team established a 50-foot by 50-foot orthogonal grid using an east-west trending baseline. The northern curb line of Robinson Street was used as the baseline.

The techniques used during the geophysical survey at the Booth Oil Site were terrain conductivity and ground penetrating radar. The terrain conductivity survey was performed over the entire site on a 10-foot by 10-foot grid. Ground penetrating radar (GPR) was targeted in areas of anomalous terrain conductivity, determined from an initial review of the raw data.

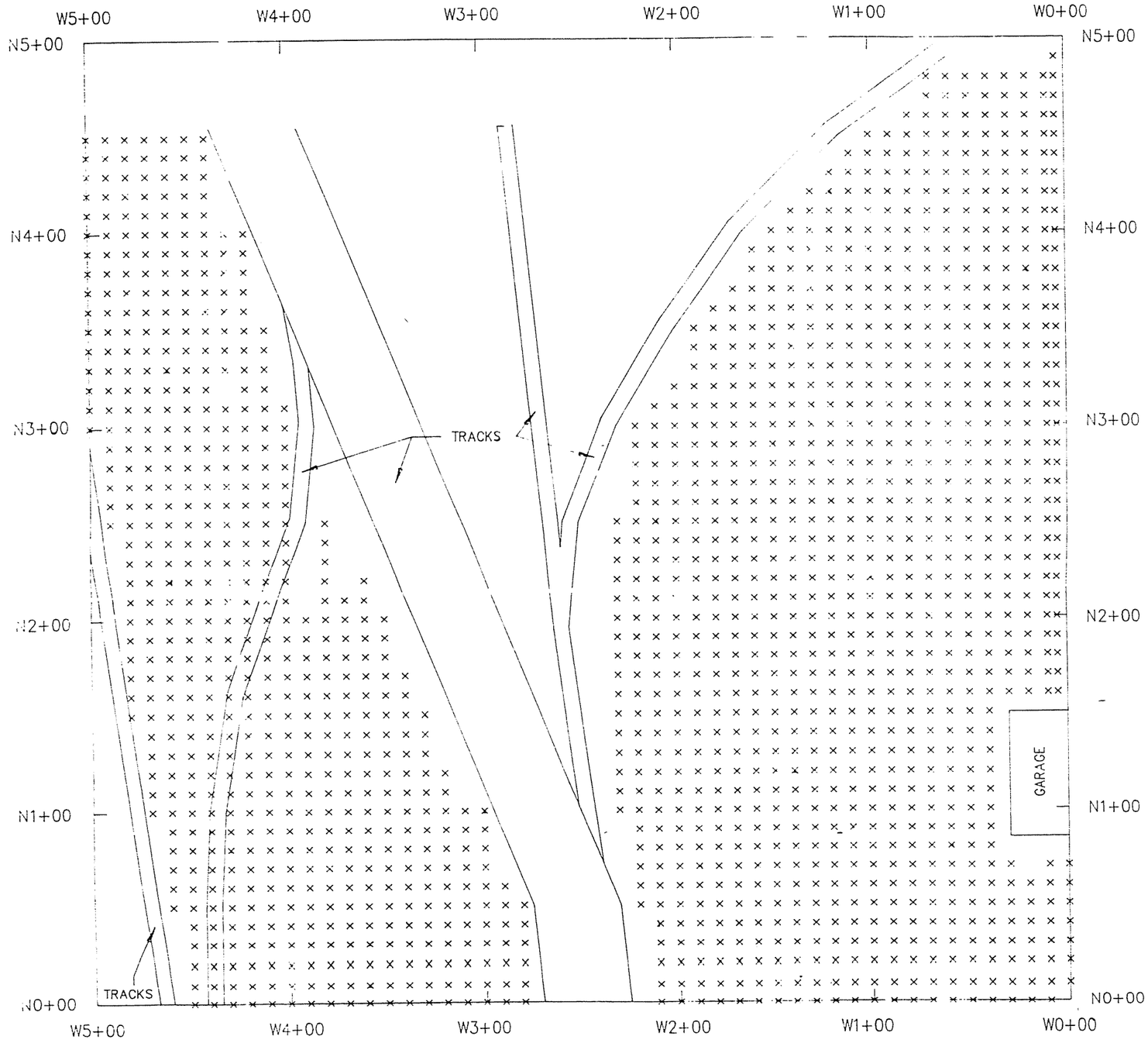
Data for the terrain conductivity survey were collected at approximately 1540 stations. Both surveys were orientated to the established site grid.

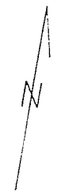
- Terrain Conductivity Profiling - Terrain conductivity profiling was conducted using a Geonics EM31-DL terrain conductivity meter. The EM31-DL is an induction type unit and provides measurement of both the quadrature-phase and in-phase components of terrain conductivity without ground electrodes or contact. The data for both phases were recorded on a digital data logger. The EM31-DL was calibrated to read ground conductivity directly in millimhos per meter with a resolution of 2% of full-scale and an accuracy of 1 mmho/meter. The in-phase component of terrain conductivity is particularly sensitive to the presence of metal objects in the subsurface. The nominal depth of earth sampled by the EM31-DL is approximately 18 feet. Terrain conductivity profiling was conducted at the Booth Oil Site with continuous operation of the instrument and with data recorded at 10-foot intervals. Figure 2-4 shows the locations of the terrain conductivity survey stations throughout the site.

- Ground Penetrating Radar - GPR profiling was conducted using a Geophysical Survey Systems, Inc. Model SIR-3:VDU-38 ground penetrating radar system. The system consists of an electronic unit, power supply, graphic recorder, color video display unit, and transmitting/receiving antenna.

  The GPR transmit/receive antenna is housed in a box that is moved across the ground surface. The data for this survey were collected with a 300 MHz antenna, after determining that signal penetration with the 500 MHz antenna was inadequate. The transmitted signal was directed into the ground, and reflected signals were transmitted in real-time to a graphic recorder and a color video display unit. The data were also recorded on a tape recorder. The horizontal axis of the raw data output is the distance across the surface, and the vertical axis is the round-trip travel time of the radar signal.

  The round-trip travel time was converted to approximate depth by correlating with reflections from targets of known depth or by using standard values of velocities for materials in the subsurface. For areas where the subsurface was heterogeneous in nature, the travel times of the radar signal would differ in various materials, and the vertical scale for the radar records would not be necessarily uniform with depth.





LEGEND

× STATION LOCATION

0 25 50 100

SCALE (FEET)

NOTE: LOCATIONS OF RAILROAD TRACKS ARE APPROXIMATE

SOURCE: HAGER RICHTER GEOSCIENCES, INC. JUNE 1990 REPORT

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

TERRAIN CONDUCTIVITY STATIONS

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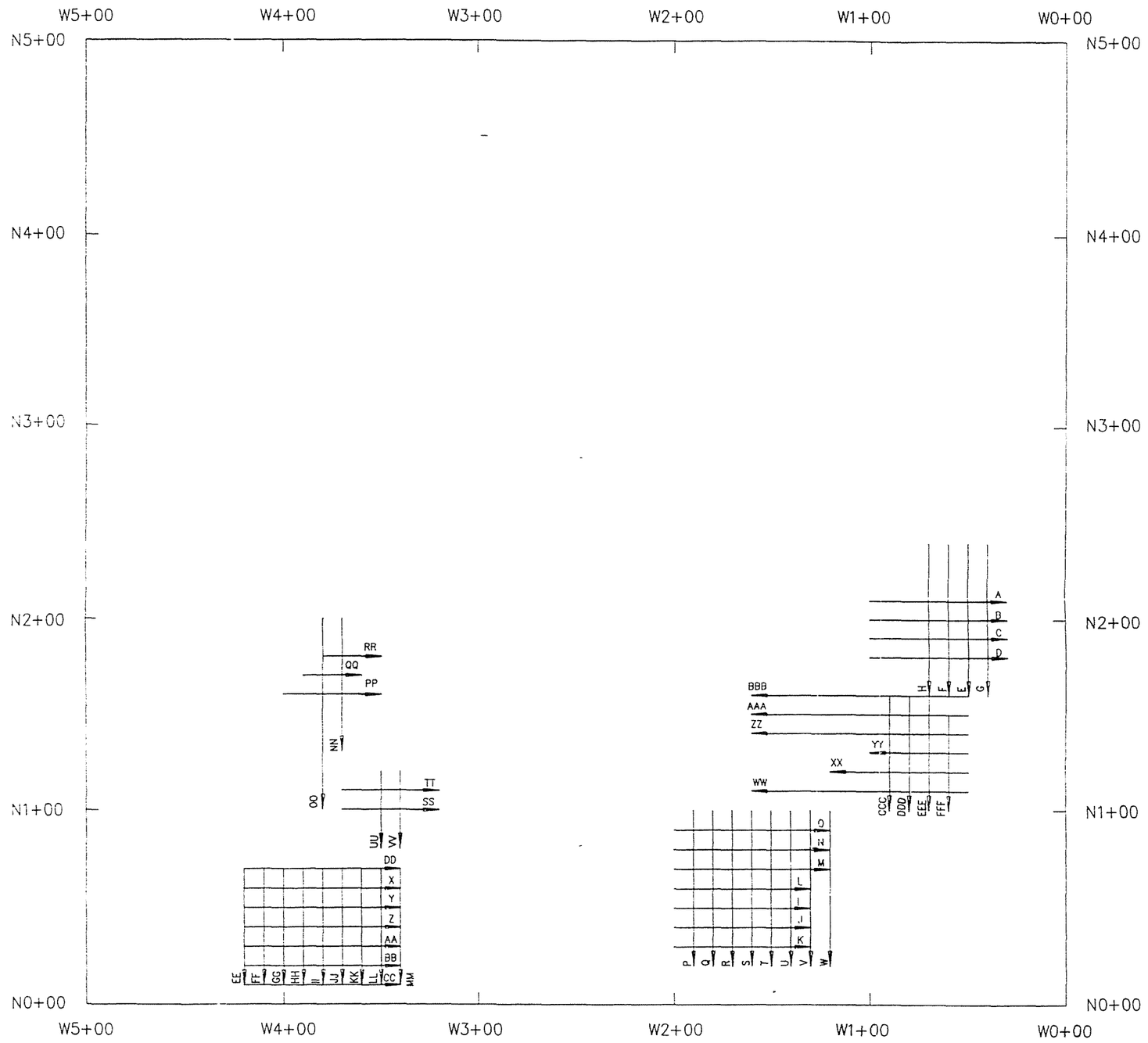
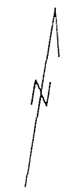
FIGURE 2-4





LEGEND

AA — GPR SURVEY LINE

0 25 50 100

SCALE (FEET)

SOURCE: HAGER RICHTER GEOSCIENCES, INC.
JUNE 1990 REPORT

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GPR SURVEY LINES

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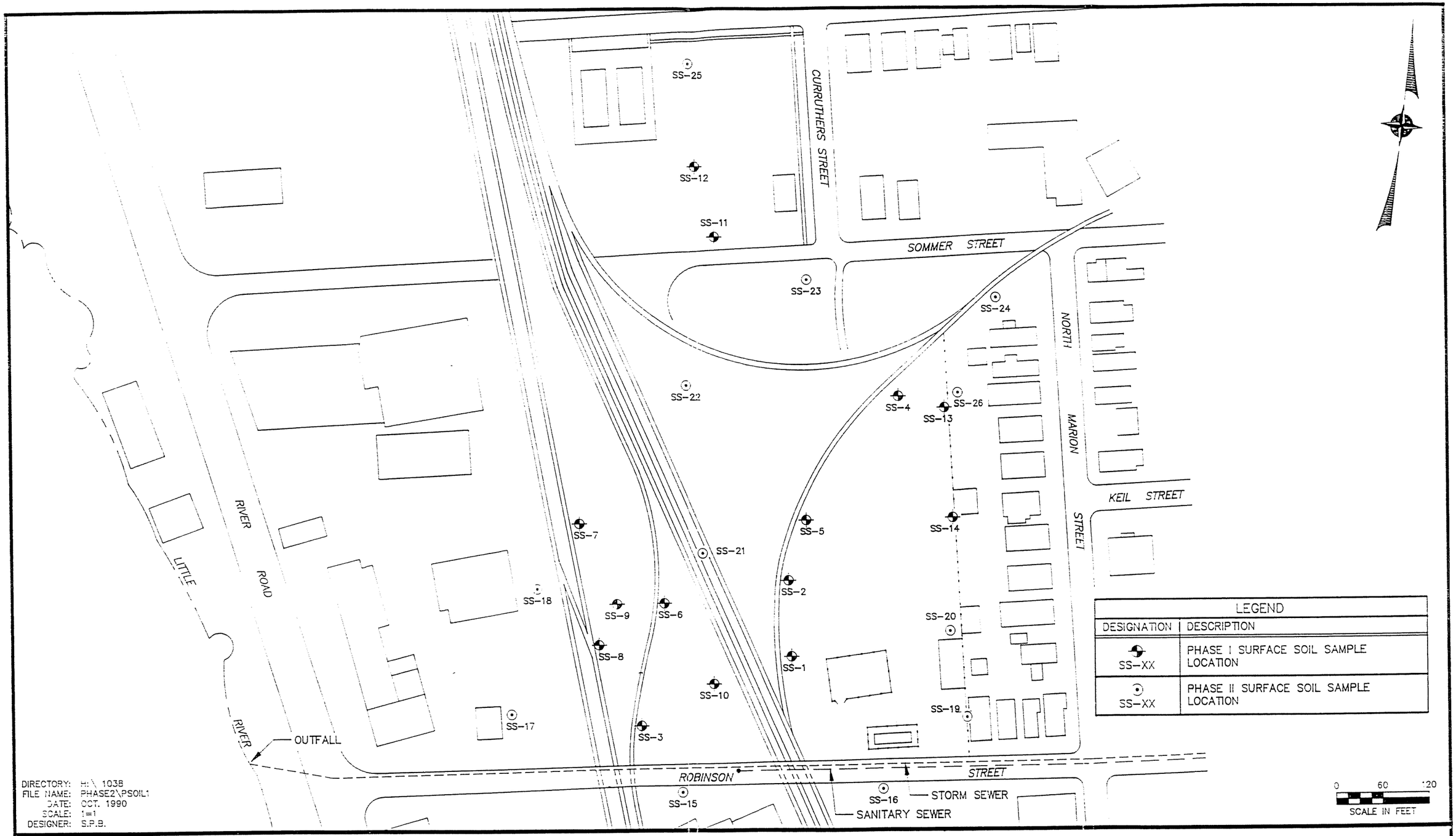
FIGURE 2-5



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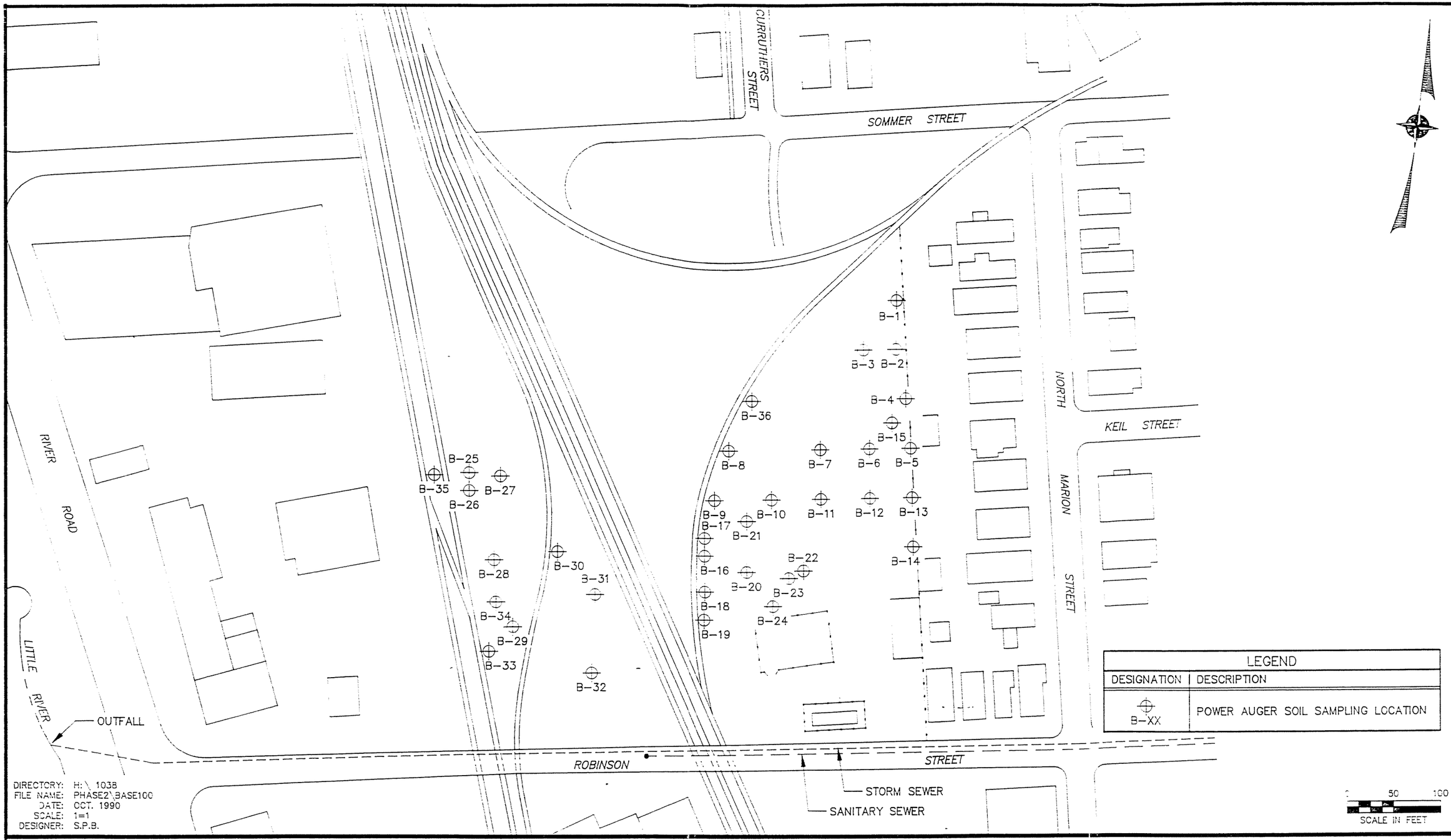
PHASE I AND PHASE II SURFACE SOIL SAMPLING LOCATIONS

FIGURE 2-6



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

PHASE I POWER AUGER SOIL BORING LOCATIONS

FIGURE 2-9

Figure 2-5 shows the locations of the GPR profiles at selected areas of the site. The Hager-Richter report, which summarizes the results of the geophysical investigation, can be found in Appendix C.

2.2.3 Environmental Sampling Program

An environmental sampling program was undertaken at the site which included the sampling and analyses of site surface soils, surface water and sediment from the catch basins and a storm sewer adjacent to the site, and nonaqueous phase liquids from underground pipes that extend above the ground surface. In addition, surface water samples were collected from a sanitary sewer adjacent to the site and sediments were collected from the Little River at the Robinson Street outfall. A discussion of each phase of the sampling program is discussed below.

2.2.3.1 - Phase I Surface Soil Sampling

Fourteen surface soil samples were collected during the Phase I RI program. Figure 2-6 shows the locations of surface soil samples obtained on-site, from residential properties east of the site, and from the playground area north of the site. The samples were generally collected at a depth of 0-6 inches below ground surface using a stainless steel trowel and/or a plastic scoop. At a few sampling locations where the surface soil was compact (gravel was mixed with the soil at some sampling locations), soil which was to be sampled was loosened by chiseling with a hammer and chisel. The analyses performed on each surface soil sample and the corresponding field sample identification number are listed in Table 2-3. Samples were transferred directly into glass sample jars and immediately put on ice, in accordance with the sampling procedures outlined in the project Work Plan (see the document entitled, "Remedial Investigation and Feasibility Study Work Plan, Booth Oil Site," for a detailed description of sampling procedures).

2.2.3.2 - Phase II Surface Soil Sampling

A total of 12 surface soil samples were obtained during the Phase II Remedial Investigation. As shown in Figure 2-6, nine of the Phase II surface soil samples were collected from Booth Oil or Leasehold Property Areas with the remaining samples taken from the adjacent playground and street areas.

Table 2-3

SUMMARY OF PHASE I RI
SURFACE SOIL SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Analyses Performed			
	TCL+30	TCL/PCB	RCRA Characteristics*	Total Petroleum Hydrocarbons
BO-SS-1-S		X	X	X
BO-SS-2-S		X	X	X
BO-SS-3-S		X	X	
BO-SS-4-S		X	X	
BO-SS-5-S	X		X	
BO-SS-6-S	X		X	X
BO-SS-7-S	X		X	X
BO-SS-8-S	X		X	X
BO-SS-9-S		X	X	
BO-SS-10-S	X		X	
BO-SS-11-S	X			
BO-SS-12-S	X			
BO-SS-13-S	X			
BO-SS-14-S		X		
BO-SS-15-S		X		
BO-SS-16-S		X		
BO-SS-17-S	X			
BO-SS-18-S	X			
BO-SS-19-S	X			
BO-SS-20-S	X			
BO-SS-21-S	X			
BO-SS-22-S	X			
BO-SS-23-S	X			
BO-SS-24-S	X			
BO-SS-25-S	X			
BO-SS-26-S				

*Includes ignitability, corrosivity and EP Toxicity (metals only).

Phase II surficial soil samples were collected in a similar manner to those collected during the Phase I RI. As was the case during Phase I surface soil sampling, a chisel and hammer were used to loosen hardened soils at several Phase II sampling locations prior to collection. All Phase II surface soil samples were analyzed for TCL+30 compounds with the exception of samples BO-SS-15-S and BO-SS-16-S, which were collected from curbside "sweepings" and analyzed only for TCL/PCB's, and BO-SS-26-S, which was analyzed for TCL metals. A summary of Phase II surface soil sample designations with the analysis performed for each sample is provided in Table 2-4.

2.2.3.3 - Catch Basin Sampling

Each of the five catch basin storm water drains located along Robinson Street, south of the site, were to be sampled for sediment, and two were to be sampled for surface water in accordance with the project Work Plan. These storm water drains are bounded by North Marion Street and River Road and are shown in Figure 2-7. The project Work Plan provided for a surface water sample to be taken from the storm water outfall at the Little River, as well as a sediment sample from the Little River at the discharge point of the storm water outfall.

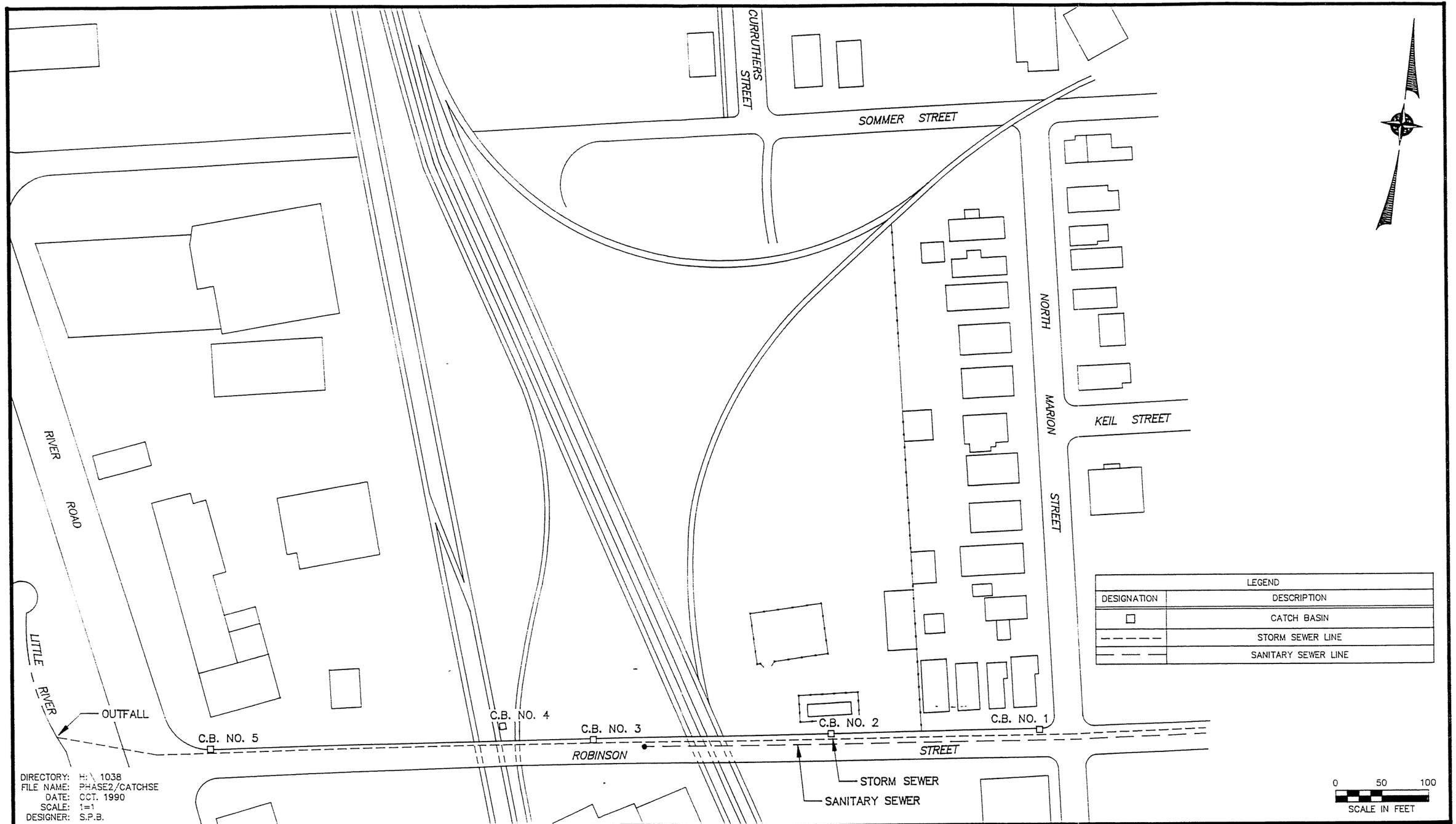
A surface water sample was collected from each of the three catch basin storm water drains. Although the project Work Plan provided for two surface water samples to be obtained from the catch basin storm water drains, a third sample was collected. This sample was collected in lieu of the surface water sample that was not collected from the storm water outfall at the Little River. Since at the time of sample collection the height of the Little River was higher than the storm water pipe outlet, a representative sample could not be obtained from the pipe at the discharge point. Samples were collected using a long-handle stainless steel ladle, with the sample aliquot being transferred directly into sample containers, and immediately stored in a cooler with ice in accordance with the project Work Plan. The analyses performed on each surface water sample and the corresponding field sample identification number are shown in Table 2-5.

The project Work Plan provided for the collection of a sediment sample from each of the five catch basin storm water drains and one from the Little River at the storm water outfall. Since there was no sediment present in one of the catch basin storm water drains or at the base of the Little River at the storm water outfall, a total of four sediment samples were collected. Samples were collected using a long-handle stainless steel ladle, transferred directly into sample jars, and stored in a cooler with ice in accordance with the project Work Plan. The analyses performed on each sediment sample and the corresponding field sample identification number are shown in Table 2-6.

Table 2-4

SUMMARY OF PHASE II RI
SURFACE SOIL SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Analyses Performed		
	TCL+30	TCL/PCB	TCL Metals
BO-SS-15-S		X	
BO-SS-16-S		X	
BO-SS-17-S	X		
BO-SS-18-S	X		
BO-SS-19-S	X		
BO-SS-20-S	X		
BO-SS-21-S	X		
BO-SS-22-S	X		
BO-SS-23-S	X		
BO-SS-24-S	X		
BO-SS-25-S	X		
BO-SS-26-S			X



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CATCH BASIN AND SEWER LOCATIONS

FIGURE 2-7

Table 2-5

SUMMARY OF PHASE I RI
CATCH BASIN SURFACE WATER SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Analyses Performed	
	TCL+30	Total Petroleum Hydrocarbons
BO-CB-1-SW	X	X
BO-CB-3-SW	X	X
BO-CB-5-SW	X	X

Table 2-6

SUMMARY OF PHASE I RI
CATCH BASIN SEDIMENT SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Analyses Performed: TCL+30	TCL/ PCB	RCRA Characteristics*	Total Petroleum Hydrocarbons	Treatability Screen
BO-CB-1-SD		X	X	X	
BO-CB-2-SD		X	X		
BO-CB-3-SD	X		X	X	X
BO-CB-4-SD		NO SAMPLE AVAILABLE			
BO-CB-5-SD		X	X	X	

*Includes ignitability, corrosivity and EP Toxicity (metals only).

2.2.3.4 - Underground Pipe Sampling

Provisions were made in the project Work Plan for the collection of five underground storage tank or underground pipe samples and the analyses of two phases, if present. Based on a preliminary review of the geophysical survey report prepared by Hager-Richter Geoscience, Inc., it was determined that underground storage tanks were not present on-site. As such, this sampling event only included the sampling of underground pipes that extended immediately above the ground surface. Three pipes containing liquids were identified. Two nonaqueous phase liquid (NAPL) samples and one aqueous phase liquid (APL) sample were collected using dedicated coliwasas. The NAPL samples were collected from pipes located in the Southwestern Leasehold Area and the APL sample (composite) was collected from two pipes located on the Booth Oil property, just west of the decontamination area. These samples were transferred directly into sample containers and immediately stored in a cooler with ice in accordance with the project Work Plan. Only NAPL samples were analyzed. The analyses performed and the corresponding field sample identification numbers for the samples collected are shown in Table 2-7.

2.2.3.5 - Sanitary and Storm Sewer Sampling

As part of the Phase II RI, three surface water and sediment samples were collected from the storm sewer system located along Robinson Street. Samples were collected from three manhole locations along the storm sewer system which is bounded by North Marion Street to the east and the Robinson Street outfall to the west. In addition, a surface water sample designated BO-MH-6 was collected from the sanitary sewer system at a manhole location north of the study site on Sommer Street near the intersection of Curruthers Street. Each of the sampling locations are shown in Figure 2-8.

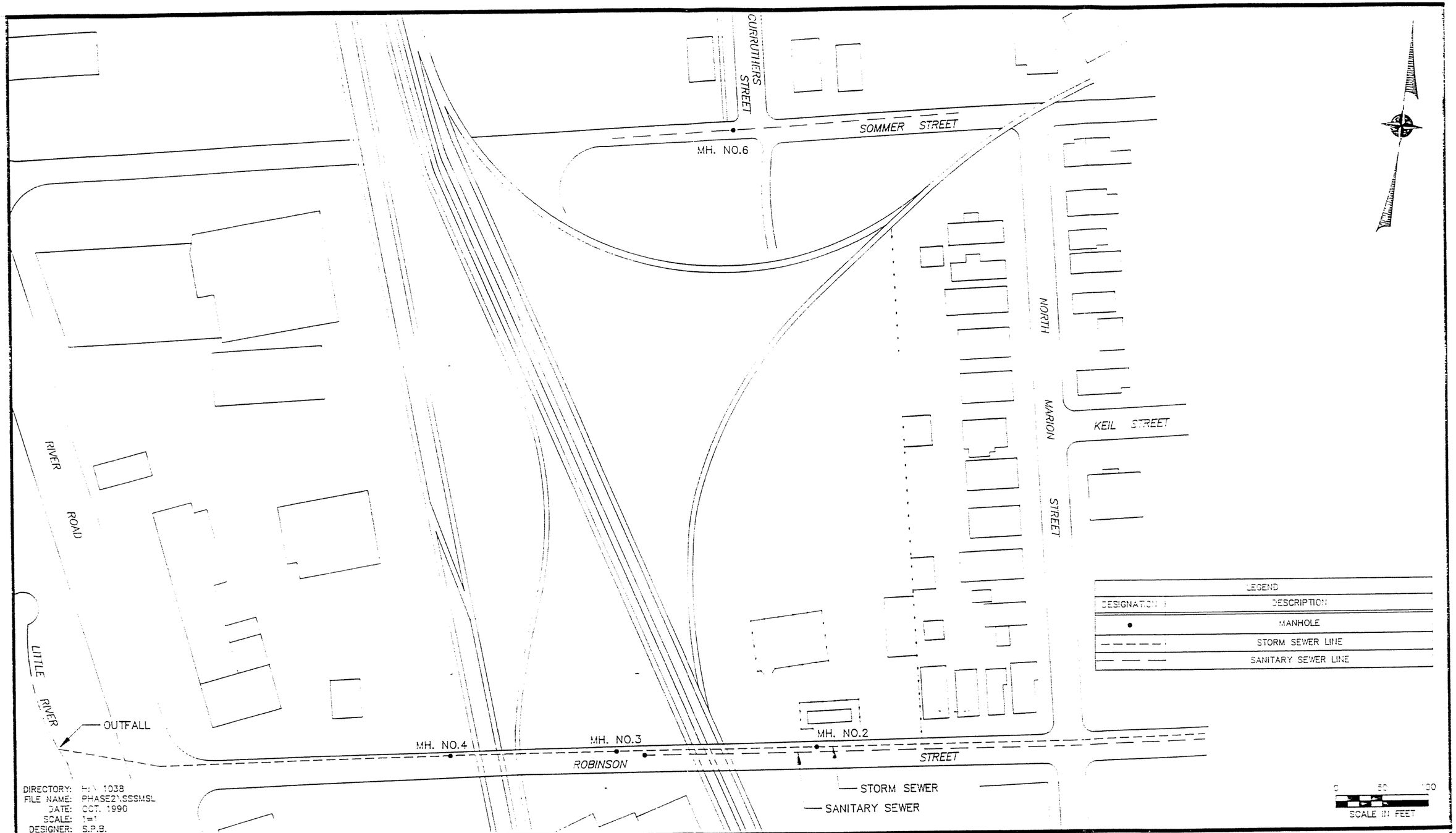
Surface water samples were collected prior to sediment sample collection at each location according to the procedures outlined in the Phase II Work Plan Addendum. Each surface water sample was collected using a long-handle stainless steel ladle, then transferred directly into sample jars and stored in a cooler with ice. The analysis performed on each surface water sample along with the corresponding field sample identification numbers are shown in Table 2-8.

Sediment samples were collected from each of the storm sewer sampling locations discussed above. As mentioned, a sediment sample was not collected from the sanitary sewer location on Sommer Street. All sediment samples were collected with a long-handle stainless steel ladle in

Table 2-7

SUMMARY OF PHASE I RI
UNDERGROUND PIPE SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Analyses Performed		
NAPL	TCL+30	RCRA Characteristics	Total Petroleum Hydrocarbons
BO-UST-1 (APL sample)	NO ANALYSES PERFORMED		
BO-UST-2	X	X	X
BO-UST-3	X	X	X



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PHASE II STORM AND SANITARY SEWER MANHOLE SAMPLING LOCATIONS

FIGURE 2-8

Table 2-8

SUMMARY OF PHASE II RI
STORM AND SANITARY SEWER SURFACE WATER SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Sample Location	Analyses Performed: TCL+30 (Organics)	Analyses Performed: TCL/VOA +10
BO-MH-2	Storm Sewer	X	
BO-MH-3	Storm Sewer	X	
BO-MH-4	Storm Sewer		X
BO-MH-6	Sanitary Sewer		X

accordance with procedures contained in the Work Plan Addendum. The analyses performed on each sediment sample and the corresponding field sample identification number are shown in Table 2-9.

2.2.3.6 - Little River Sampling

During the Phase II RI, two sediment samples were collected from the Little River in the vicinity of the Robinson Street storm sewer outfall. The first sediment sample, designated BO-LR-1-SD, was obtained using a long handle PVC ladle at the base of a concrete bulkhead which encloses the outfall pipe. The second sample (BO-LR-2-SD) was also collected at the bulkhead using a Wildco Sediment Sampler, which is a coring device with a tube and sediment catcher on the end. Both samples were transferred to glass sampling jars following collection and placed in a cooler with ice in accordance with the Phase II Work Plan Addendum. A summary of the Little River sediment samples, including their sample designations and types of analyses performed, is shown in Table 2-9.

Provisions were initially made, as outlined in the Phase II Work Plan Addendum, for the collection of three sediment samples from the Little River; two samples near the outfall and one upstream of the outfall. Numerous attempts to collect an upstream sediment sample were made from several locations along a dock near the outfall pipe using both the PVC ladle and the Wildco Sediment Sampler. However, due to the rocky nature of the river bank at this location, an adequate amount of sample aliquot could not be obtained and the sampling attempt was abandoned.

2.2.4 Soil Investigations

An extensive subsurface soil investigation program was performed as part of the Phase I and Phase II RI field investigations. The Phase I soil investigation, performed in two stages, was initiated to provide an initial determination concerning the nature and extent of contamination sources, as well as to provide geologic and hydrogeologic data concerning the Booth Oil Site. The first stage involved a power augering program to target areas for subsequent borehole drilling and monitoring well installation. The second stage involved the drilling and sampling of several borings throughout the site and the conversion of a number of these borings into monitoring wells.

The Phase II investigation was also performed in two stages. The first stage involved a preliminary review of all Phase I geological and chemical quality data to target areas for subsequent borehole drilling and monitoring well installation. The second stage involved the

Table 2-9

SUMMARY OF PHASE II RI
STORM SEWER AND LITTLE RIVER SEDIMENT SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Sample Location	Analyses Performed TCL+30 (Organics)
BO-MH-2	Storm Sewer	X
BO-MH-3	Storm Sewer	X
BO-MH-4	Storm Sewer	X
BO-LR-1	Little River	X
BO-LR-2	Little River	X

drilling and sampling of several additional borings throughout the site and the conversion of a number of these borings into monitoring wells.

2.2.4.1 - Power Augering Program

In order to optimize the locations of subsequent soil borings and/or monitoring wells at the Booth Oil Site, a series of 36 shallow subsurface borings were drilled using a hand-operated power auger. The borings were drilled at locations throughout the site and were intended to determine the areal extent of visually contaminated subsurface soils. The southeast portion of the site was not included in this survey because the auger was unable to penetrate the paved areas. The power auger boring locations are shown in Figure 2-9. Boring depths ranged from 0.5 feet to 6.5 feet and averaged approximately 4.5 feet in depth.

Notes were kept in a bound field book, and boring logs were constructed (see document entitled, "Phase I Remedial Investigation Field Record Report," Section 5 - Boring Logs), in accordance with the Field Operations and Quality Assurance/Quality Control (QA/QC) Plan outlined in the project Work Plan. The modified Burmister Classification System was used to describe soil samples collected from the borings.

2.2.4.2 - Phase I Subsurface Borehole Soil Sampling

Provisions were made for the collection and chemical analysis of split spoon soil samples obtained during the drilling of monitoring wells and soil borings. A total of 22 subsurface borehole samples were obtained during the Phase I RI for subsequent chemical and geotechnical analyses. A total of four Shelby tube samples were collected from the clay layer for geotechnical analyses.

All of the borehole samples, with the exception of the samples collected for geotechnical analyses, were obtained using a 2-inch diameter split spoon sampler, and samples were transferred from the split spoon to the sample containers using a wooden tongue depressor. Undisturbed samples for geotechnical analyses were collected using a thin-walled Shelby tube sampling device. All sampling was performed in accordance with the sampling procedures outlined in the project Work Plan. Phase I subsurface soil samples were collected for TCL+30, Total Petroleum Hydrocarbons (TPH), RCRA characteristics (ignitability, corrosivity, and EP Toxicity [metals only]) and TCL/PCB analyses. In addition, four undisturbed samples were collected from the clay layer for geotechnical analyses. The subsurface/borehole soil sample designations, depths of each sample, and the types of analyses performed are shown in Table 2-10.

Table 2-10

SUMMARY OF PHASE I RI
SUBSURFACE/BOREHOLE SOIL SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Sample Depth	Analyses Performed			
		TCL+30	TCL/PCB	RCRA Characteristics	Total Petroleum Hydrocarbons
BO-MW-1-S	0-2 ft.	X		X	X
BO-MW-4-S	0-2 ft.		X	X	
BO-MW-5-S	4-6 ft.	X		X	
BO-MW-6-S	1-4 ft.	X		X	X
BO-MW-7-S	5-7 ft.	X		X	
BO-MW-8-S	2-4 ft.		X	X	
BO-MW-9-S	0-2 ft.		X	X	
BO-SB-1-S	7-9 ft.	X		X	X
BO-SB-1-S	9-11 ft.				X
BO-SB-2-S	6-8 ft.		X	X	
BO-SB-4-S	6-8 ft.		X	X	
BO-SB-4-S	9-11 ft.				X
BO-SB-4-S	11-13 ft.	X			
BO-SB-5-S	3-7.5 ft.	X		X	X
BO-SB-5-S	9.5-11.5 ft.				X
BO-SB-6-S	9-11 ft.				X
BO-SB-7-S	2-4 ft.	X		X	
BO-SB-8-S	2-4 ft.		X	X	
BO-SB-9-S	11-13 ft.	X		X	
BO-SB-10-S	0-2 ft.	X		X	
BO-SB-11-S	2-4 ft.			X	X
BO-SB-12-S	2-4 ft.	X		X	

2.2.4.3 - Phase II Subsurface Borehole Soil Sampling

A total of 12 subsurface soil samples were obtained during the Phase II RI from among 28 soil borings. Four of these borings were converted into monitoring wells, 8 soil borings were drilled in the vicinity of SB-5 (A through H), 3 soil borings were completed within the sewer trench, and 13 soil borings were drilled at locations throughout the site. One of the subsurface soil samples (BO-MW-14-S) was taken from a monitoring well boring and the remainder were obtained from 11 soil boring locations throughout the site. Two successive soil samples were collected at soil boring location SB-5C from the clay layer to determine whether contaminants have migrated into the clay layer.

All of the Phase II borehole samples were obtained using a 2-inch diameter split spoon sampler and the samples were transferred from the split spoon to the sample bottles using a wooden tongue depressor. Sampling was performed in accordance with procedures outlined in the Phase II Work Plan Addendum. Phase II subsurface soil samples were collected for TCL+30, TCL organics, Toxicity Characteristic Leaching Procedure Volatile Organic Analyses (TCLP VOA), TCLP Base Neutral Extractables (BNA), and Total Organic Carbons (TOC). The subsurface/borehole soil sample designations, depths of each sample, and types of analyses performed are shown in Table 2-11.

2.2.5 Geological Investigation

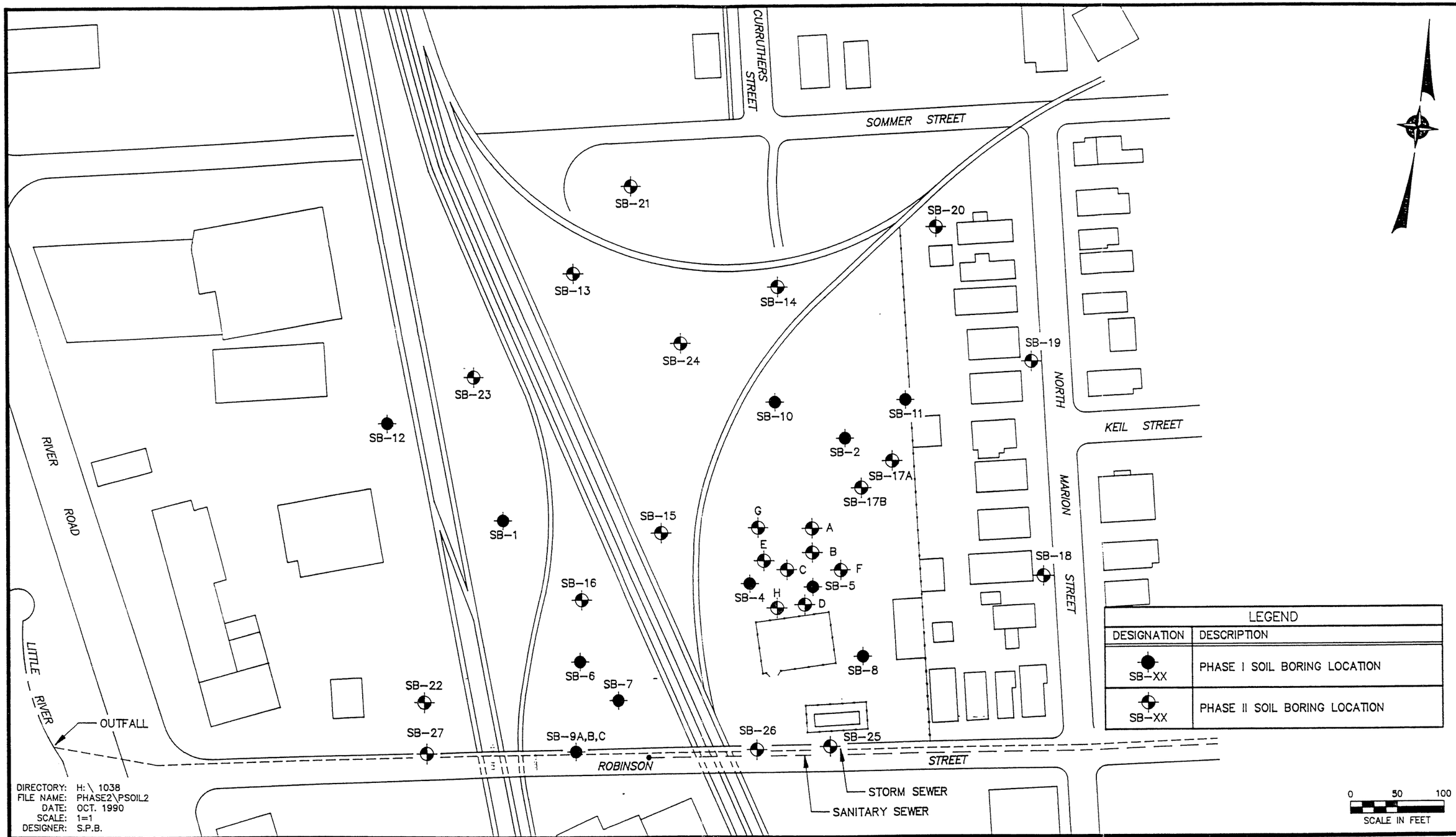
2.2.5.1 - Borehole Logging

All boreholes and monitoring wells were logged by a geologist. The locations of Phase I and Phase II boreholes and monitoring wells are shown in Figures 2-10 and 2-11, respectively. Notes were kept in a bound field book or transcribed directly on boring and well construction logs, in accordance with procedures outlined in the project Work Plan. The Modified Burmister Classification System was used to describe soil samples collected from the borings. A Daily Field Activity Report was completed whenever drilling activities (or any other field activities) were undertaken during the Phase I and Phase II RI programs. Geologic data from the borehole drilling effort was used to prepare geologic cross sections of the site which show stratigraphy.

Table 2-11

SUMMARY OF PHASE II RI
SUBSURFACE/BOREHOLE SOIL SAMPLING
COLLECTION AND ANALYSES

Sample Identification Number	Sample Depth	Analyses Performed: TCLP VOA	TCLP BNA	TCL+30	TCL Organics	TOC
BO-MW-14-S	2-4 ft.					X
BO-SB-5B-S	6-8 ft.	X				
BO-SB-5C-S	8-10 ft.			X		
BO-SB-5CA-S	10-12 ft.			X		
BO-SB-15-S	1-2 ft.				X	X
BO-SB-16-S	1-2 ft.		X			
BO-SB-17A-S	4-6 ft.					X
BO-SB-20-S	2-4 ft.					X
BO-SB-22-S	2-4 ft.					X
BO-SB-23-S	1-2 ft.				X	
BO-SB-24-S	2-4 ft				X	X



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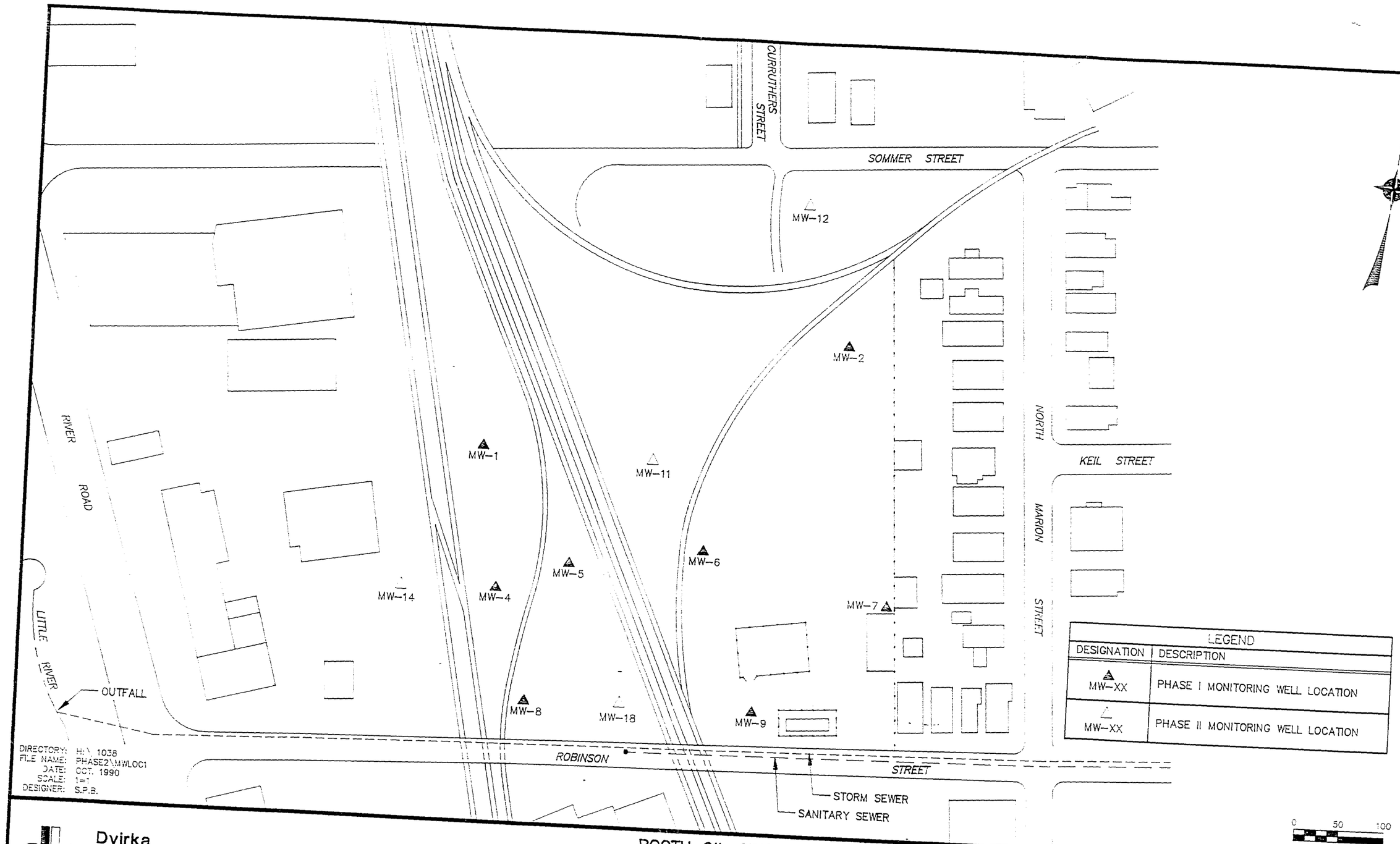
PHASE I AND PHASE II SOIL BORING LOCATIONS

FIGURE 2-10



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

PHASE I AND PHASE II MONITORING WELL LOCATIONS

FIGURE 2-11

2.2.6 Groundwater Monitoring

While groundwater, according to all available information, is not used as a source of potable water by the communities surrounding the site, a hydrogeological investigation is important to determine the nature and extent of contaminant migration, if any, from the site. In order to achieve this objective, an investigation was undertaken to define the hydrogeological characteristics and groundwater quality at the site. Considerations such as soil permeability, stratigraphy, depth to the saturated zone and depth to the confining layer were addressed.

2.2.6.1 - Monitoring Well Installation

As part of the Phase I and Phase II hydrogeological investigations, a groundwater monitoring well program was implemented consisting of the installation of water table overburden wells. Eight monitoring wells were installed at the site during the Phase I RI while an additional four wells were installed during the Phase II portion (see Figure 2-11). Table 2-12 lists each monitoring well by its designation and includes elevation information, well construction materials, depth of screened interval, and total depth of each well. All monitoring wells were constructed of 2-inch diameter stainless steel riser pipe and screens in order to ensure well integrity. All boreholes were advanced using hollow stem augers.

All wells installed during the Phase I field program were installed with flush mount protective vaults. Three of the four Phase II monitoring wells were completed with two-foot stick-up protective steel casing. Monitoring well MW-18 was completed as a flush mount well since it was located in an area of vehicular traffic.

Monitoring wells were installed in accordance with procedures outlined in the project Work Plan and Phase II Work Plan Addendum. Based on the well specifications provided in these project Work Plans, the thickness of sandpack extending above the top of the installed well screen was to be one foot. This was to be followed by a two-foot thickness of bentonite and at least a two-foot thickness of cement grout to hold the protective flush mount vault or stick-up casing in place. Since the top of the well screen installed as part of this program was between 2.5 to 4.5 feet in depth, it became necessary to appropriately modify each well construction to allow for an adequate length of grout to hold the protective vault or casing. All final well designs were approved by the NYSDEC. Monitoring well construction diagrams were prepared in the field and are presented in the remedial investigation Field Record Reports dated September 1990 and March 1991.

Table 2-12

SUMMARY OF PHASE I AND PHASE II RI
MONITORING WELL INFORMATION

Well Designation	Construction Materials	Top of Riser[1] Elevation (ft MSL)	Screened Interval (ft)[2]	Total Depth[2] (ft)
MW-1	Stainless Steel	576.99	2.5-7.5	7.5
MW-2	Stainless Steel	575.78	4.0-9.0	9.0
MW-4	Stainless Steel	576.48	4.5-9.5	9.5
MW-5	Stainless Steel	578.70	4.5-9.5	9.5
MW-6	Stainless Steel	577.11	4.0-9.0	9.0
MW-7	Stainless Steel	579.11	4.0-9.0	9.0
MW-8	Stainless Steel	577.78	4.0-9.0	9.0
MW-9	Stainless Steel	577.85	2.5-7.5	7.5
MW-11[3]	Stainless Steel	577.96	3.0-8.0	8.0
MW-12[3]	Stainless Steel	578.82	4.5-9.5	9.5
MW-14[3]	Stainless Steel	579.82	4.5-9.5	9.5
MW-18	Stainless Steel	577.58	4.5-9.5	9.5

[1]Measurements taken from north side of riser.

[2]Below ground surface.

[3]Wells were constructed with two foot stick-up steel protective casings. All other wells were constructed with flush mount steel protective casings.

2.2.6.2 - Well Development

All monitoring wells installed as part of the Phase I and Phase II RI were developed using a combination of pumping and/or bailing. All development water was contained in drums and was staged at the drum storage area. Measurements of turbidity, temperature, pH and specific conductance were performed periodically during development. Each well was pumped and/or bailed for a period of at least 2 hours.

While the approved project Work Plan called for the development of each well until turbidity was reduced to less than 50 NTUs, due to the silty and/or contaminated nature of the site soils, lowering the turbidity to less than 50 NTU's was determined to be impractical at all Phase I monitoring wells, except for wells MW-6 and MW-1. The remaining wells were determined to be developed when pH, specific conductance, temperature and observed turbidity had stabilized. Turbidity levels were visually monitored by filling glass bottles at regular intervals with development water and visually comparing the clarity of successive aliquots.

For Phase II monitoring wells, development continued until all measured parameters were stable and the turbidity was measured at less than 50 NTUs, as described in the Phase II Work Plan Addendum.

2.2.6.3 - Groundwater Level Measurement

Water level measurements were obtained at each of the monitoring wells to determine groundwater elevations and the groundwater flow direction at the site. Groundwater level measurements were taken electronically using a Sinco Water Level Indicator Model No. 51453. Measurements were made to within 0.01 of a foot. The Phase I monitoring wells were measured three times (once during the first phase, once after the completion of the first phase and once during the second phase), and the Phase II wells were measured once. Based upon these measurements, potentiometric surface maps of the site showing water level elevations and groundwater flow direction, were prepared.

2.2.6.4 - Phase I Groundwater and NAPL Sampling

As a part of the Phase I RI, a groundwater sample was obtained from each of the eight monitoring wells installed during the Phase I field program. Figure 2-11 shows the locations of each monitoring well. Groundwater samples were collected no earlier than seven days following well development. Each well was purged of three to four well volumes prior to sample collection,

with temperature, pH and conductivity measurements taken periodically during purging. Sample collection commenced once these parameters had stabilized. Samples were obtained using dedicated disposable polyethylene bailers (one for each well) and transferred directly from the bailer to the sample bottles. Samples were then immediately placed in coolers containing ice. Groundwater sampling was performed in accordance with the sampling procedures and QA/QC Plan contained in the project Work Plan. The groundwater samples were shipped to the laboratory for TCL+30 organics and Total Petroleum Hydrocarbon (TPH) analyses.

In accordance with the project Work Plan, NAPL (Nonaqueous Phase Liquid) was collected from monitoring well MW-8 and analyzed for TCL+30 organics and TPH analyses. An attempt to collect a NAPL sample from MW-5 was unsuccessful because the relatively thin lens of NAPL at this sampling location (<0.1 foot) presented an insufficient amount for analysis.

The NAPL sample collected for volatile organic compound analysis from MW-8 was obtained by using a dedicated, clean glass coliwasa sampling device to prevent the loss of any volatiles. The remaining portion of the sample was collected utilizing a peristaltic pump fitted with a clean length of dedicated silicon tubing. A total of approximately 0.6 liters of NAPL was collected from the well.

2.2.6.5 Phase II Groundwater and NAPL Sampling

As a part of the Phase II RI, one groundwater sample was obtained from each of the eight monitoring wells installed during the Phase I RI and from each of the four newly installed Phase II monitoring wells. Figure 2-11 shows the locations of each monitoring well. Samples were collected no earlier than seven days after development. Each monitoring well was purged of three to four well volumes prior to sample collection. Temperature, pH and conductivity readings were periodically monitored during purging and were allowed to stabilize prior to sampling. Samples were obtained using dedicated disposable polyethylene bailers (one for each well) and transferred directly from the bailer to the sample bottles. Samples were then immediately placed in coolers containing ice. Groundwater sampling was performed in accordance with the sampling procedures and QA/QC Plan contained in the project Work Plan. During the Phase II field investigation, the groundwater samples collected from the Phase I monitoring wells were analyzed for volatile organic compounds and PCBs. The groundwater samples collected from the Phase II monitoring wells were analyzed for TCL+30 analyses.

In accordance with the project Phase II Work Plan Addendum, NAPL was collected from monitoring well MW-8 and shipped to the laboratory for VOA/PCBs and metals analyses. An attempt to collect a NAPL sample from MW-5 was again unsuccessful because the relatively thin lens of NAPL at this sampling location (<0.1 foot) represented an insufficient amount for analysis.

The NAPL sample collected for analyses from monitoring well MW-8 was obtained using a peristaltic pump fitted with a clean length of dedicated silicon tubing. Approximately 3.5 liters of NAPL were extracted from the well during sampling, representing the total volume of NAPL in the well at that time.

2.2.6.6 - Aquifer Permeability/Slug Testing

In order to determine the hydrogeologic characteristics at the Booth Oil Site, slug tests were performed on five of the overburden wells constructed as part of the Phase I RI (monitoring wells MW-1, MW-5, MW-6, MW-7 and MW-9). The location of these wells are shown in Figure 2-11. No slug tests were performed on any of the Phase II monitoring wells as per NYSDEC recommendations. The slugs used to perform the aquifer testing were constructed of PVC, measured 2.24 feet in length, and had a diameter of 0.135 feet. The slugs were decontaminated prior to each test in accordance with the QA/QC Plan contained in the project Work Plan. Dedicated nylon cord was used to lower and extract the slug at each monitoring well tested.

Procedures followed for each slug test consisted of the following:

1. Obtain initial water level reading.
2. Introduce pressure transducer into well.
3. Achieve water table equilibration.
4. Start Electro-Piezo Recorder.
5. Introduce PVC slug and perform falling head test.
6. End test after well equilibriates to within 90% of initial static water level.
7. Remove slug from well and repeat above procedures for rising head test.

The Bouwer and Rice method (Bouwer and Rice, 1976) was used to analyze the slug test data because of its applicability in determining hydraulic conductivities, using either fully or partially penetrating wells in both confined and unconfined aquifers. The Bouwer and Rice model assumes that the aquifer is homogeneous and isotropic, with no aquifer storage and finite wellbore storage. The results obtained implementing the Bouwer and Rice model is an estimation of the hydraulic conductivity within the immediate vicinity of the well. Appendix D contains the graphs and calculations used to derive hydraulic conductivities for each slug test conducted.

In addition, during borehole drilling four undisturbed Shelby tube soil samples were obtained from the silty clay layer underlying the overburden and analyzed for grain size, moisture content, Atterburg Limits and permeability. These samples were obtained from borehole locations SB-1, SB-4, SB-5 and SB-6 (see Figure 2-10 for locations).

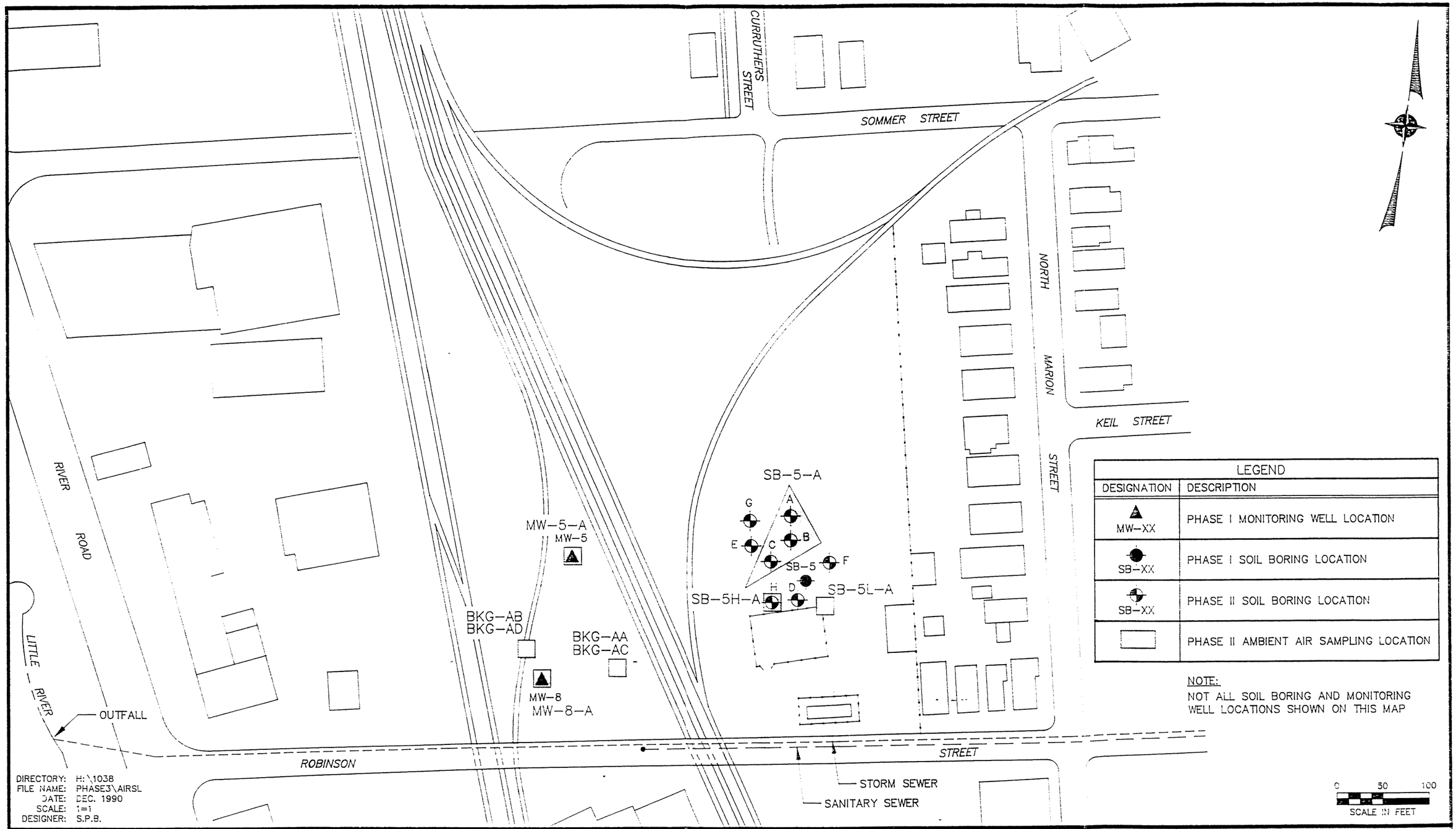
2.2.7 - Volumetric Air Sampling

During the Phase II RI, nine volumetric air samples were collected within the Booth Oil Site and Leasehold Property boundaries for analyses to determine the concentration of specific volatile compounds in the ambient air. Volumetric air samples were collected using sorbent Tenex tubes connected to a Gillian low flow air sampling pump. Samples included both background samples taken from within the Southwest Leasehold Property area and borehole specific samples collected during drilling operations or from within existing monitoring wells.

The locations where volumetric air sampling was performed are presented in Figure 2-12 and described in Table 2-13. Three of the air samples were collected during the shallow soil boring installations performed in the vicinity of SB-5. Samples were collected downwind from the borings as drilling occurred. An additional two samples were collected from within monitoring wells previously installed during the Phase I RI (MW-5 and MW-8). The remaining four air samples were background samples collected from within the Southwest Leasehold Property Area at two separate locations approved by NYSDEC. All air samples were placed on ice following collection and shipped to the contract laboratory where they were analyzed for specific volatile organic compounds.

2.2.8 Ambient Air Monitoring

This portion of the Phase I and Phase II RI entailed the implementation of an air monitoring program designed to measure total organic vapors and dust emissions during field activities, as



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BOOTH OIL SITE
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PHASE II AMBIENT AIR SAMPLING LOCATIONS

FIGURE 2-12

Table 2-13

SUMMARY OF PHASE II RI
AMBIENT AIR SAMPLING COLLECTION AND ANALYSES

Sample Identification Number	Sample Location	Analyses Performed
BO-SB-5-A	Intermittent sample collected during drilling of SB-5A, SB-5B and SB-5C	Volatile Organic Compounds (modified TO1/TO2)
BO-SB-SH-A	Collected during drilling of SB-5H	Volatile Organic Compounds (modified TO1/TO2)
BO-SB-SL-A	Long-term sample collected from northeast corner of decontamination area during drilling of shallow soil borings near SB-5	Volatile Organic Compounds (modified TO1/TO2)
BO-MW-5-A	Collected within MW-5	Volatile Organic Compounds (modified TO1/TO2)
BO-MW-8-A	Collected within MW-8	Volatile Organic Compounds (modified TO1/TO2)
BO-BKG-AA	Background sample collected within SW Leasehold Property	Volatile Organic Compounds (modified TO1/TO2)
BO-BKG-AB	Background sample collected within SW Leasehold Property	Volatile Organic Compounds (modified TO1/TO2)
BO-BKG-AC	Background sample collected within SW Leasehold Property	Volatile Organic Compounds (modified TO1/TO2)
BO-BKG-AD	Background sample collected within SW Leasehold Property	Volatile Organic Compounds (modified TO1/TO2)

well as a baseline ambient air monitoring survey. Also, basic climatological and meteorological data, such as general weather conditions, wind speed and direction, and temperature were recorded during the Phase I and Phase II RI to complement the air monitoring program. The purpose of the air monitoring program was to monitor ambient air conditions at various locations within the boundary of the site, along the site perimeter, and adjacent areas, as necessary during investigation activities.

The air monitoring program utilized a variety of portable field instruments to determine ambient air conditions. A photoionization organic vapor detector (PhotoVac MicroTip) and flame ionization organic vapor detector (Century OVA) were used to measure total volatile organic vapors. Particulates were measured with a Miniram Aerosol Monitor (model PDM-3). In addition, an EXOTOX Model 400 FH multi-gas monitor was used to measure percent oxygen, toxicity and explosive levels during the drilling program. Finally, a Ludlum Measurements, Inc. Model 14C Geiger Counter was used during the baseline air monitoring survey.

2.2.9 Health and Safety Program

A Health and Safety Plan was prepared as part of the project Work Plan in order to establish occupational health and safety requirements, responsibilities and procedures to protect workers during the Phase I and Phase II RI program at the Booth Oil Site. The requirements for worker health and safety were based on the following:

- The Standard Operating Safety Guides; US Environmental Protection Agency (EPA), Office of Emergency and Remedial Response, November, 1984;
- The Occupational Health and Safety Administration (OSHA) Regulations, 29 CFR Parts 1019.120 and 1926;
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities; NIOSH, OSHA, USCG and EPA, October, 1985;
- Health and Safety Procedures for Hazardous Waste Sites; Dvirka and Bartilucci Consulting Engineers, September, 1986; and
- Superfund Amendments and Reauthorization Act (SARA), Title I, Section 126.

All activities associated with the Phase I and Phase II RI were performed in accordance with this Health and Safety Plan. A detailed description of the Health and Safety Plan is contained in Section 7.0 of the project Work Plan.

2.2.10 Analytical Program and Quality Assurance/Quality Control

As part of the Phase I and Phase II RI, various environmental samples were collected and analyzed in accordance with the 1989 NYSDEC Analytical Services Protocol (ASP). York Laboratories (which was purchased and renamed IEA Laboratories subsequent to the Phase II RI) was contracted to perform all analyses during both phases of the remedial investigation. York Laboratories is a New York State Department of Health certified laboratory.

Surface and subsurface soil, surface water, sediment, air, groundwater and NAPL samples were collected during the Phase I and Phase II RI. All required analyses performed during the Phase I and Phase II RI are summarized in Table 2-14 and Table 2-15, respectively.

All results of the Phase I and Phase II RI environmental sampling program are located in Section 4.0 of this report. The validation of sample analyses is summarized in subsection 4.2 of this report.

As part of the Phase I RI project Work Plan, a Quality Assurance and Quality Control (QA/QC) Plan was prepared which describes the details of sample collection and analytical procedures used to ensure that high quality, valid data are collected as part of this project. This QA/QC Plan included detailed descriptions of the following:

- Objective and Scope
- Data Usage
- Monitoring Network Design and Rationale
- Monitoring Parameters
- Schedule of Tasks and Products
- Project Organization and Responsibilities
- Data Quality Requirements and Assessments
- Detailed Sampling Procedures
- Decontamination Procedures
- Laboratory Sample Custody Procedures
- Field Management Documentation
- Calibration Procedures and Preventive Maintenance
- Documentation, Data Reduction and Reporting

Table 2-14

SUMMARY OF PHASE I RI
ANALYTICAL REQUIREMENTS

Matrix	Total # of Samples	TCL+30	TCL/PCB	RCRA* Characteristics	Total Petroleum Hydrocarbons	Treatability Screening**	TCL/VOA	TCL Organics (ONLY)
Surface Soil	14	8+MS/MSD	6	10+MS/MSD	5	--	--	--
Surface Water	3	3+MS/MSD	--	--	3+MS/MSD	--	--	--
Sediment	4	1	3	4	3	1	--	--
Subsurface Soil	19	11	6+MS/MSD	15	9	1	--	--
Groundwater	9	8+MS/MSD	--	--	8+MS/MSD	--	--	1
NAPL	3	3+MS/MSD	--	2+	3	--	--	1
Field Blank	4	3	--	--	3	--	--	1
Trip Blank	6	--	--	--	--	--	6	--

* RCRA: Includes ignitability, corrosivity and EP Toxicity (metals only).

**Includes: Oil and grease, pH, melting point, ash content, sulfur content, BTU content, viscosity, texture, solvent extractable material content, organic material content, moisture content, combustible content, paint filter test, flashpoint, specific gravity, organic chlorine, percent solids and carbon and hydrogen content.

MS/MSD: Matrix Spike/Matrix Spike Duplicate

--: Not Applicable.

+ NAPL: Including reactivity.

Table 2-15

SUMMARY OF PHASE II RI
ANALYTICAL REQUIREMENTS

Matrix	Total # of Samples	TCL+30	TCL/PCB	TCLP VOA	TCLP BNA	Total Organic Carbon	TCL/VOA	TCL Metals	TCL Organics (ONLY)
Surface Soil	12	9+MS/MSD	2	--	--	--	--	1	--
Surface Water	4	--	--	--	--	--	2	--	2+MS/MSD
Sediment	5	2	--	--	--	--	--	--	3
Subsurface Soil	12	3+MS/MSD	--	1+MS	1+MS	7	--	--	3
Groundwater	13	4+MS/MSD	9	--	8+MS/MSD	--	8	--	1
NAPL	1	--	1	2+	3	--	1	1	1
Air	10	--	--	--	--	--	--	10	--
Trip Blank	5	--	--	--	--	--	--	5	--

* RCRA: Includes ignitability, corrosivity and EP Toxicity (metals only).

**Includes: Oil and grease, pH, melting point, ash content, sulfur content, BTU content, viscosity, texture, solvent extractable material content, organic material content, moisture content, combustible content, paint filter test, flashpoint, specific gravity, organic chlorine, percent solids and carbon and hydrogen content.

MS/MSD: Matrix Spike/Matrix Spike Duplicate

--: Not Applicable.

+ NAPL: Including reactivity.

- o Data Validation
- o Performance and System Audits
- o Corrective Action
- o Trip Blanks
- o Field Blanks
- o Matrix Spike/Matrix Spike Duplicates
- o Method Blanks
- o Field and Sample Management Forms
- o NYSDEC Sample Identification, Preparation and Analysis Summary Forms
- o Data Validation Reporting Forms

All work undertaken during the Phase I and Phase II RI was performed in accordance with the procedures outlined in the QA/QC Plan contained in the project Work Plan. For a detailed description of the QA/QC Plan, see Section 6.0 of the project Work Plan.

2.2.11 Data Validation

York Laboratories (IEA Laboratories), which is a NYSDOH certified laboratory meeting all requirements for performing sample analysis according to the NYSDEC 1989 Analytical Services Protocol (ASP), was utilized to perform all the chemical analyses for the samples obtained during the Phase I and Phase II RI program. Summary documentation was completed by the laboratory using standard NYSDEC Summary Forms and submitted with the data package, as required in the project QA/QC Plan.

Data validation, undertaken by Dvirka and Bartilucci Consulting Engineers and subconsultant, C.C. Johnson and Malhotra, P.C., was performed to determine and document analytical data quality in accordance with the NYSDEC ASP requirements. The analytical and data validation processes were conducted in conformance with the ASP and are based on the United States Environmental Protection Agency's (USEPA) Contract Laboratory Protocol "Statement of Work" documents and the associated "CLP Functional Guidelines for Data Validation" documents.

Throughout the Phase I/Phase II RI, all aspects of the data validation process were followed in accordance with the procedures outlined in the QA/QC Plan included in the project Work Plan. For a detailed description of data validation procedures, see Section 6.0 of the project Work Plan.

Section 3

3.0 PHYSICAL CHARACTERISTICS OF STUDY AREA

3.1 Results of Field Activities/Physical Characteristics

3.1.1 Surface Features

The Booth Oil Site study area, as shown in Figure 1-2, occupies two parcels of land, which are bisected by tracks of the Erie Railroad. The eastern parcel, which comprises approximately 1.9 acres, consists of one section owned by Booth Oil and a second section leased to Booth Oil by the Consolidated Rail Corporation (Conrail), owner of the Erie Railroad and Penn Central Railroad lines. The western parcel consists of two sections that were leased to Booth Oil by Conrail; the southeastern section is comprised of approximately 0.5 acres and the northwestern section is comprised of approximately 0.3 acres (for a total area comprising both parcels of approximately 2.6 acres). The two sections of the western parcel are separated by a spur line of the Penn Central Main Track.

Although this area of North Tonawanda consists primarily of areas zoned for commercial and industrial use, there are residential housing units in the area as well. Specifically, residential units exist at the northern and eastern boundary of the Booth Oil property. In addition, a playground area exists immediately to the north of the site. The site is located approximately 1/8 of a mile east of the Little River, a water body which is separated from the Niagara River by Tonawanda Island.

The Booth Oil Site is characterized by generally flat topography with surface elevations ranging from 576 feet to 581 feet above Mean Sea Level (MSL). The maximum slopes are found along the easternmost railroad spur. (See Appendix B for topographic map of the Site and immediate surrounding area.) Elevation highs of approximately 580 feet above MSL are also found in the southwestern leasehold area in the vicinity of MW-5 and near the center of the triangular shaped Conrail property separating the southwestern leasehold area from the eastern leasehold area. Elevations approximately 576 feet above MSL exist in the southern portion of the western parcel as well as the center of the Conrail parcel.

The only structures currently present on site include railroad track, a garage, concrete foundations and a few protruding pipes, some of which contain oil. All aboveground structures, except for the garage, have since been removed. The former lagoon within the eastern parcel as well as the drainage ditch along the western boundary of the site have been filled.

Based on the site topography, runoff from the eastern half of the site would be directed primarily westward toward the rail spur. Although no information regarding the depth of the balasts below the railroad ties has been obtained, the high permeability of the gravel in the balast may act as a french drain directing surface water and possibly perched groundwater away from the site. It appears that a significant portion of runoff would drain to the low spot located on the Conrail property. Runoff from the Southwestern Leasehold Property Area appears to be directed primarily to the west and south leading into the drainage ditch and the storm sewer line, respectively. Runoff from the western parcel would be directed primarily to a topographic low located in the vicinity of MW-1.

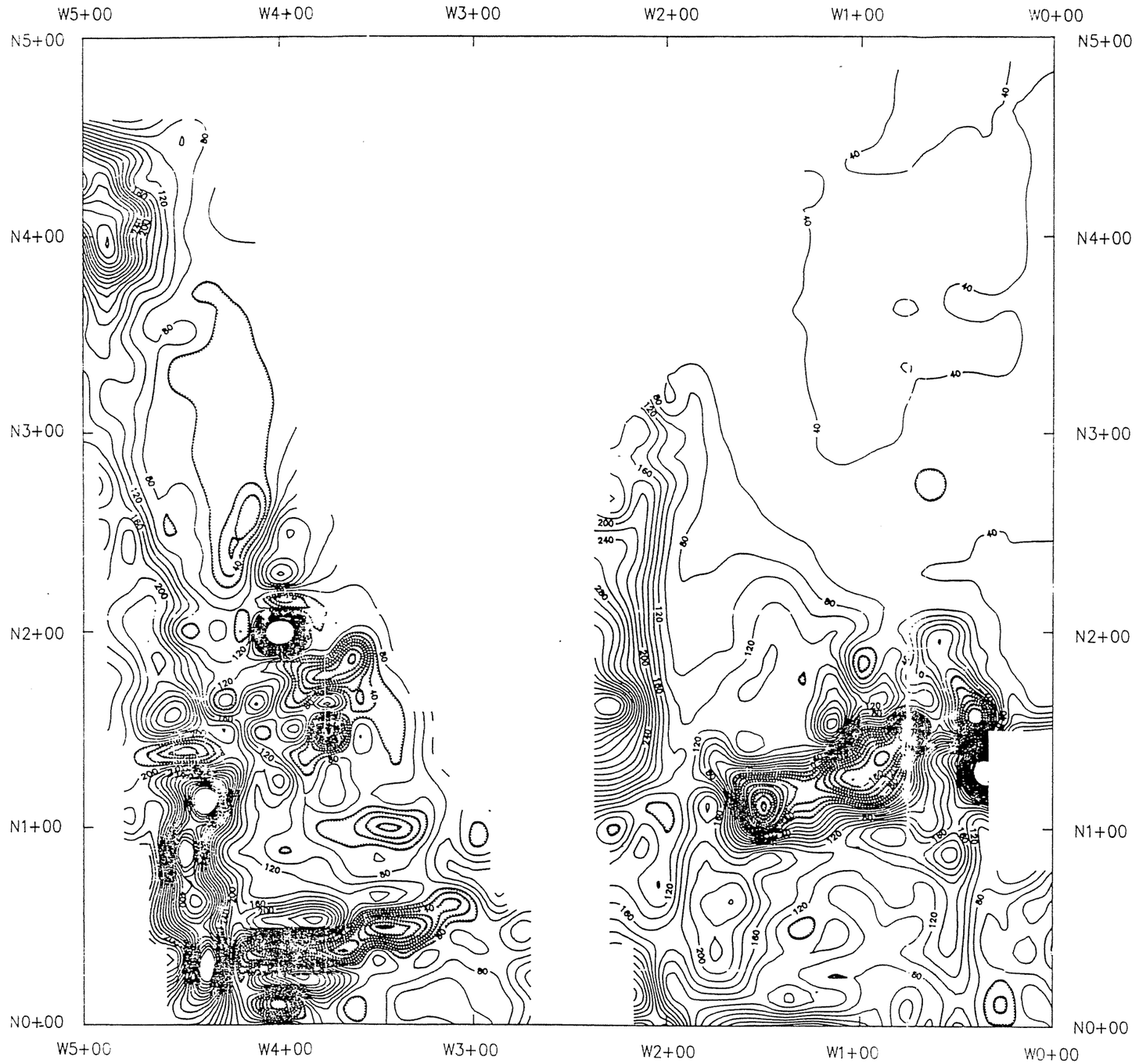
3.1.2 Geophysical Survey

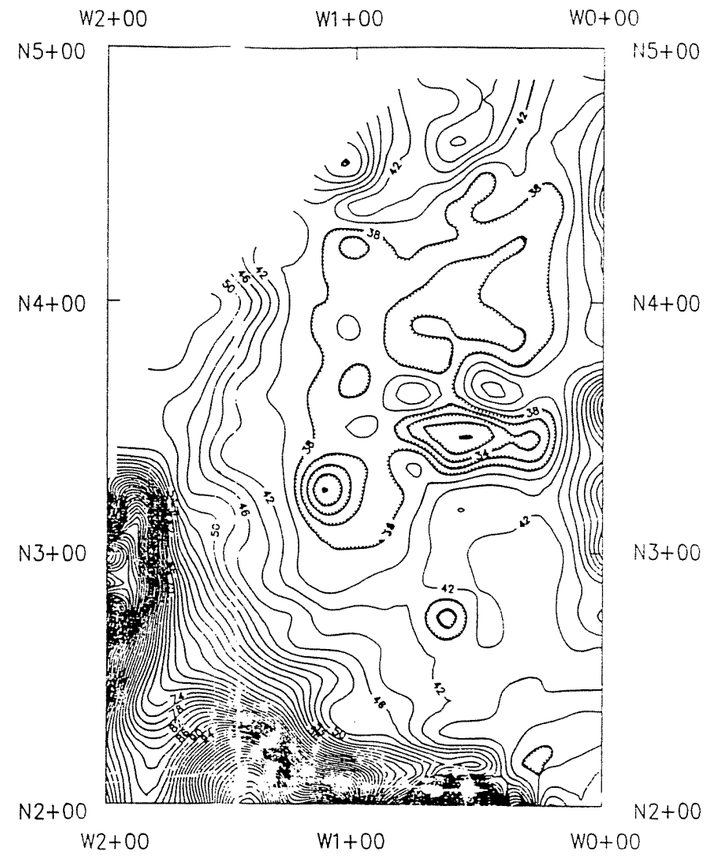
Surface geophysical surveys were conducted by Hager-Richter Geoscience, Inc. at the Booth Oil Site on May 31 and June 1, 1990, as part of the Phase I investigation. The geophysical techniques utilized during the investigation included terrain conductivity profiling and a ground penetrating radar (GPR) survey. As explained in Section 2.2.2, not all planned stations were accessible for surveying. The following is a summary of results derived from the surface geophysical survey report prepared by Hager-Richter Geoscience, Inc. (Appendix C).

Figure 3-1 shows the terrain conductivity (quadrature-phase component) plotted with a contour interval of 20 mmhos/meter and an inset of the northeast corner of the site contoured at 2 mmhos/meter. The Booth Oil Site is characterized by terrain conductivity that is highly variable over very short distances, and is apparently affected by the cultural features of the site.

There were several areas of the site with terrain conductivity higher than 100 mmhos/meter, which is typical of areas containing buried metal. However, the precise cause of such high conductivity anomalies is uncertain. Many of the anomalies are near features such as the railroad tracks, but the anomalies are too high and wide to be caused by the metal in the rails alone. There is an overhead power line located along the railroad tracks along the southwestern edge of the eastern parcel, approximate coordinates (W2+20, N0+00) to (W2+50, N1+50), which probably contributes to the apparently high terrain conductivity in that region.

A high conductivity anomaly located near (N0+90, W0+50) correlates with a sewer discharge noted on the Facility Location Map (see Figure 1-3). A north-south high between it and the street is most likely caused by a connecting sewer pipe.





Inset Map

CONTOUR INTERVAL = 2 mmhos/meter

LEGEND

60 — CONTOUR LINE SHOWING TERRAIN CONDUCTIVITY (mmhos/meter)

CONTOUR INTERVAL = 20 mmhos/meter

NOTE: CONTOURS GREATER THAN 460 mmhos/meter HAVE BEEN OMITTED.

SOURCE: HAGER RICHTER GEOSCIENCES, INC. JUNE 1990 REPORT

0 25 50 100

SCALE (FEET)

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

SHALLOW TERRAIN CONDUCTIVITY QUADRATURE-PHASE COMPONENT

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 3-1

The inset map on Figure 3-1 is the approximate area of the earthen containment for a 500,000 gallon and other aboveground storage tanks. This area has lower values of terrain conductivity than most of the site and is indicative of fill material. A distinct east-west low is present in an area immediately north of the location of tanks numbered 48 to 50, which may be attributable to concentrated hydrocarbons in the subsurface. The increasing contours at the southwestern corner of the inset map are "edge effects" from anomalies associated with reinforced concrete and the large terrain conductivity high located near the railroad tracks.

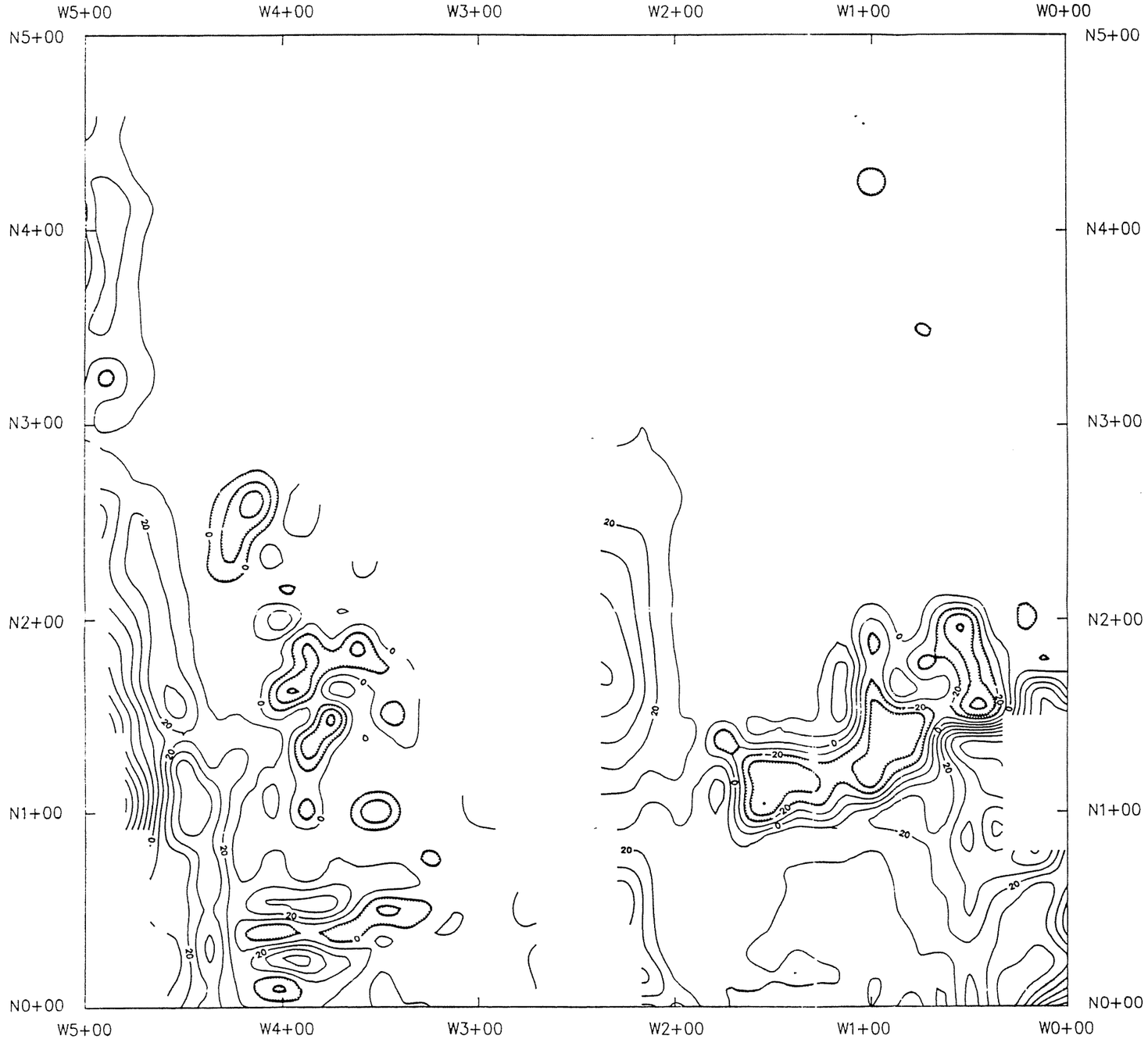
Figure 3-2 also shows several areas of the site with apparently negative terrain conductivity values. Such areas are interpreted to contain buried metal and are further defined in Figure 3-3, which is a contour map of the in-phase component of the terrain conductivity contoured at an interval of 10 parts per thousand. The in-phase component of the terrain conductivity is more sensitive to both ferrous and nonferrous subsurface metal objects. An example of such an anomaly is located from (N1+50, W0+70) to (N1+10, W1+60). This negative in-phase component anomaly, as well as the anomaly between (N1+00, W3+90) to (N2+00, W3+60), can be interpreted to be caused by reinforced concrete slabs that are partially exposed in those areas.

Another negative anomaly extends from (N0+50, W3+25) to (N0+40, W4+20). This linear feature can be interpreted to be a shallow buried pipe that correlates closely with one shown on the Facility Location Map (Figure 1-3). The negative anomaly centered at (N2+60, W4+15) appears to be the result of the loose stockpile of railroad tracks and other metallic debris on the surface.

Plumes of hydrocarbons or other contamination commonly affect the measured terrain conductivity by 2 to 30 mmhos/m. Therefore, the very steep gradients in terrain conductivity exhibited at the Booth Oil Site prevent the recognition of such subtle features, if present, at this site.

The GPR survey at this site consisted of approximately 2,200 feet of GPR profiling obtained on 58 transects. Profiles were obtained in six areas of anomalous terrain conductivity using an orthogonal grid with a spacing of 10 feet between lines.

GPR signal penetration at the site was generally 20 nanoseconds round-trip travel time. Assuming a velocity of 5 to 7 nanoseconds per foot which are typical values for concrete, sand and fill material, the effective depth of penetration of the radar signal was approximately 3 to 4 feet.



LEGEND

10

CONTOUR LINE SHOWING TERRAIN CONDUCTIVITY IN-PHASE COMPONENT (mmhos/meter)

CONTOUR INTERVAL = 10 ppt.

0 25 50 100

SCALE (FEET)

SOURCE: HAGER RICHTER GEOSCIENCES, INC. JUNE 1990 REPORT

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

SHALLOW TERRAIN CONDUCTIVITY IN-PHASE COMPONENT

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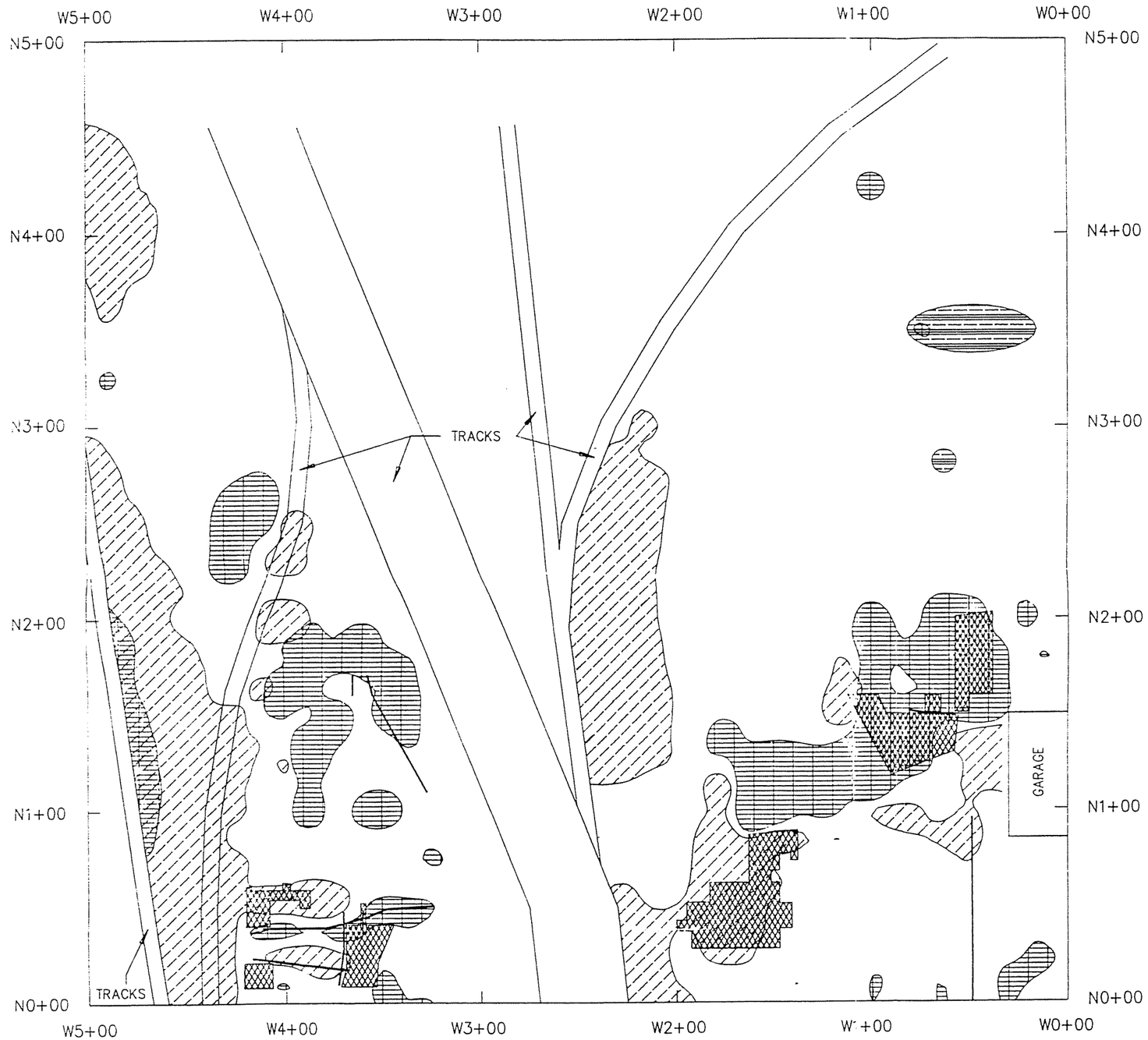
FIGURE 3-2



LEGEND

POSSIBLE PIPE OR SEWER LINE

AREA WITH REVERBERATIONS FROM A STRONG SHALLOW REFLECTOR (? CONCRETE PAD ?)

REGION OF HIGH CONDUCTIVITY MATERIALS

REGION OF METALLIC OBJECTS

REGION OF LOW CONDUCTIVITY MATERIALS

0 25 50 100
SCALE (FEET)

NOTE: LOCATIONS OF RAILROAD TRACKS ARE APPROXIMATE

SOURCE: HAGER RICHTER GEOSCIENCES, INC. JUNE 1990 REPORT

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GEOPHYSICAL INTERPRETATION MAP

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FIGURE 3-3

The GPR profiles were focused mainly in areas of apparent negative terrain conductivity, which are typically produced by metal objects, in order to determine whether the causative objects include an underground storage tank. GPR profiles were over locations of previously known underground storage tanks because there was no indication of the presence of buried metal in the terrain conductivity data for those areas.

There is no evidence to support the presence of underground storage tanks in the GPR data acquired in the six areas targeted for the GPR investigation. Four buried pipes and a sewer line were tentatively identified on the basis of the GPR records. The approximate depth of burial for the pipes is 2 to 3 feet.

Several of the areas surveyed by GPR exhibited reverberations from a strong, apparently continuous reflector at 7 to 10 nanoseconds, masking any deeper reflections, if present. The reverberations may be due to reinforced concrete pads, partially exposed at the surface or buried at shallow depth.

An interpretation map, utilizing data from both the terrain conductivity and GPR surveys was prepared by Hager-Richter Geosciences, Inc. and is included in Figure 3-3.

On the basis of the geophysical surveys conducted at the Booth Oil Site, it was concluded that:

1. The measured terrain conductivity of the site is highly variable and apparently strongly influenced by both visible and buried cultural features.

2. Steep apparent conductivity gradients due to such features mask the presence, if any, of contaminant plumes. No plumes were identified in this survey.

3. Regions of the site with apparent negative terrain conductivity are interpreted to contain buried metal and reinforced concrete. The GPR data confirm the presence of pipes in four such areas and probable reinforced concrete pads in other areas. However, there is no evidence for the presence of underground storage tanks in the GPR data for the areas surveyed.

4. Several regions of the site exhibit apparent conductivity two to five times higher than elsewhere on site. The precise nature of the material causing the increase in conductivity is not known.

5. The northeast corner of the site contains a small area of relatively low terrain conductivity that may represent a concentration of hydrocarbon contamination.

3.1.3 Geology

3.1.3.1 - Overburden

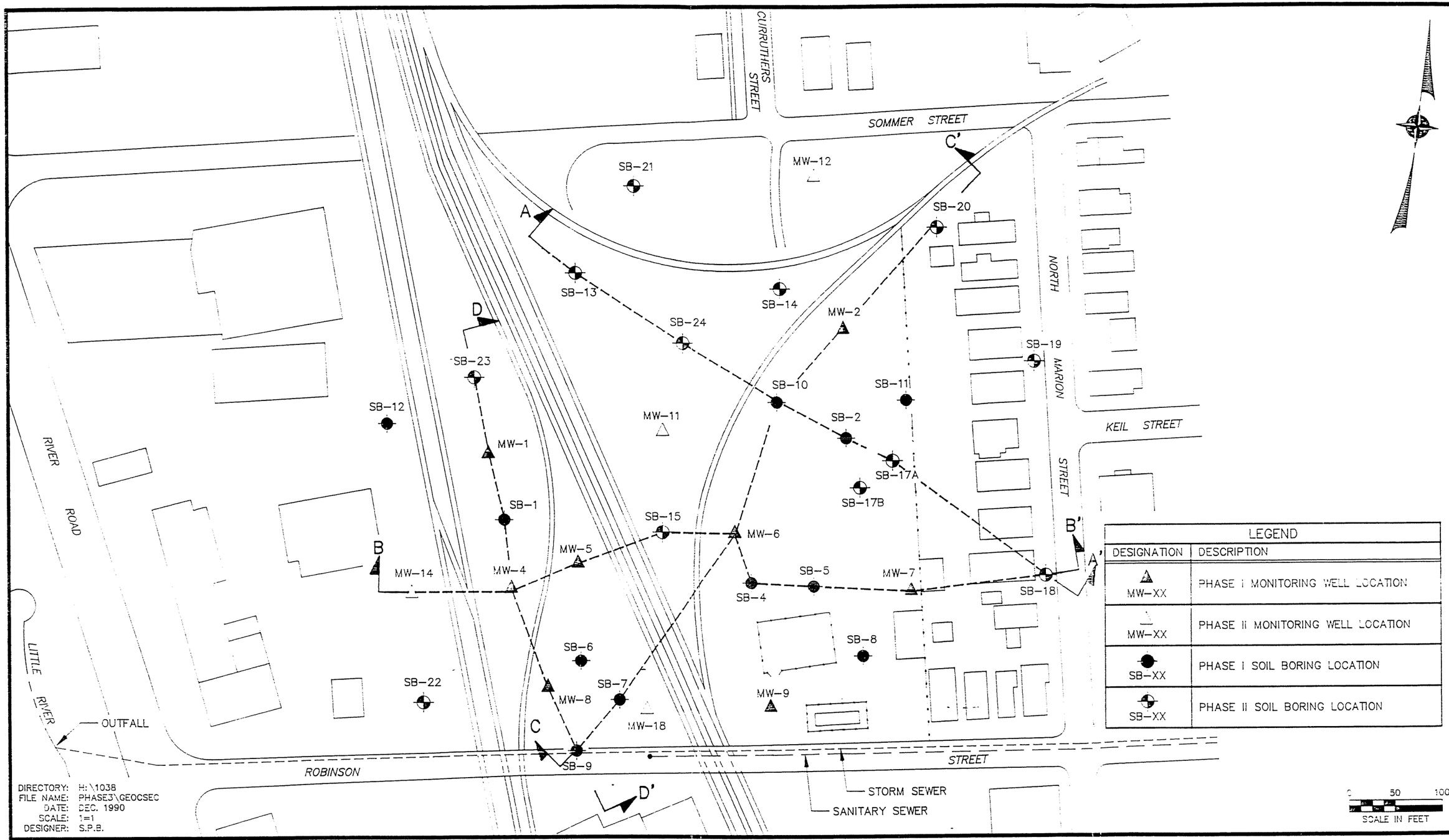
In general, the geology of the area in which the Booth Oil Site is located consists of unconsolidated deposits of clay, sand and till of the Pleistocene and Holocene age. These overburden deposits overlie Camillus Shale bedrock of Silurian age. The unconsolidated deposits consist of Holocene lacustrine material comprised primarily of clay with veins of sand and silt. Most veins are less than 3 inches thick and are discontinuous throughout the area. Depending upon the depth to bedrock, the unconsolidated deposits range in thickness from approximately 30 to 63 feet.

Based upon previous soil borings installed at and immediately adjacent to the site during June and July of 1980 by Earth Dimensions, Inc., the site is underlain with cinder/gravel slag to a depth of approximately 3 feet below ground surface. Beneath this slag is approximately 2 feet of sand and gravel with some silt, which is followed by a layer of silty clay. Although these borings did not encounter bedrock, research has indicated that bedrock occurs at approximately 40 feet below the ground surface. A perched water table at the site has been shown to be at a depth ranging from approximately 2 to 6 feet below the ground surface.

Although none of the borings or monitoring wells installed during the Phase I or Phase II investigations penetrated through the clay layer, investigations performed by Earth Dimensions, Inc., suggest that the clay is underlain by a layer of brown sandy-silt loam. This layer was encountered in two of three 30 foot borings at depths of 24.5 and 28.0 feet. These data indicate that the thickness of the clay unit can range from approximately 15 feet to 26 feet thick depending on the location.

A series of four geologic cross sections were prepared for the Booth Oil Site utilizing stratigraphic data obtained during the Phase I and Phase II RI investigations. The locations of these cross sections are illustrated in Figure 3-4. The following discussion on site stratigraphy was derived from soil borings and the resulting geologic cross sections (Figures 3-5, 3-6, 3-7 and 3-8).

The overburden at the Booth Oil Site is generally composed of sand and gravel fill with varying amounts of silt and is underlain by gray-brown silty clay or in some cases brown silt. The fill thickness throughout the site varies from approximately 2 feet in boring SB-9 to 9.5 feet in boring SB-5. The fill material encountered throughout most of the site was black as a result of contamination by petroleum hydrocarbons and their constituents. A black sludge-like material



DIRECTORY: H:\1038
FILE NAME: PHASE3\GEOCSEC
DATE: DEC. 1990
SCALE: 1=1
DESIGNER: S.P.B.

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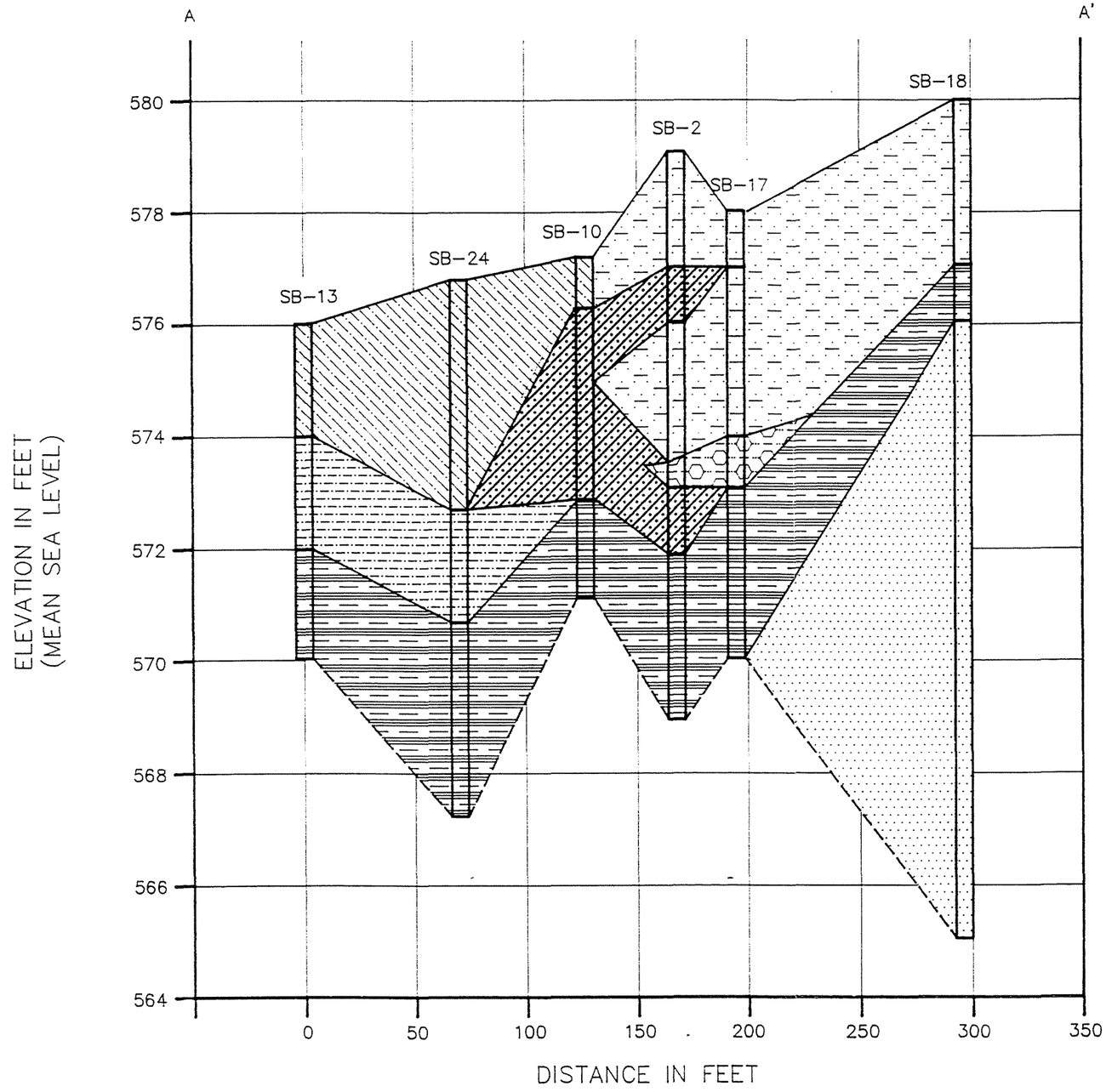
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

LOCATIONS OF GEOLOGIC CROSS-SECTIONS A-A', B-B', C-C' AND D-D'

FIGURE 3-4



LEGEND

- BROWN FINE SAND AND SILT FILL. FREE OF VISIBLE PRODUCT
- BROWN SILTY SAND AND GRAVEL FILL. FREE OF VISIBLE PRODUCT
- BLACK SILTY SAND AND GRAVEL FILL. VISIBLY CONTAMINATED WITH PETROLEUM PRODUCT
- BROWN CLAYEY SILT FILL
- BROWN SILT
- GREY TO BROWN SILTY CLAY
- RED TO BROWN GLACIAL TILL

H:\1038\CSEC-AA

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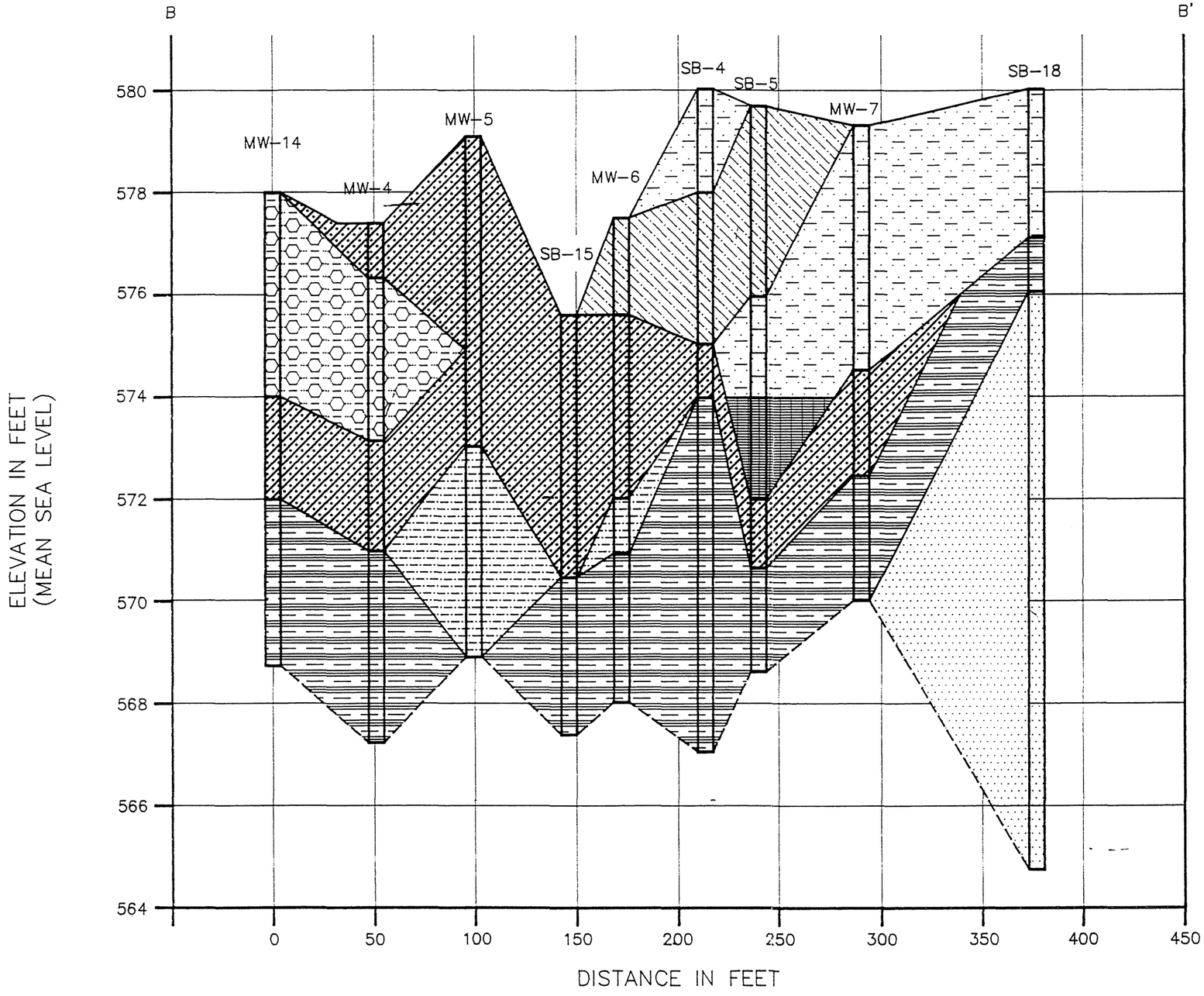
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GEOLOGIC CROSS SECTION A–A'

FIGURE 3–5



LEGEND

- BROWN FINE SAND AND SILT FILL. FREE OF VISIBLE PRODUCT
- GRAVEL FILL. FREE OF VISIBLE PRODUCT
- BLACK SILTY SAND AND GRAVEL FILL. VISIBLY CONTAMINATED WITH PETROLEUM PRODUCT
- SAND AND GRAVEL WITH BLACK PETROLEUM SLUDGE
- BROWN CLAYEY SILT FILL
- BROWN SILT
- GREY TO BROWN SILTY CLAY
- RED TO BROWN GLACIAL TILL

H:\1038\CSEC-BB

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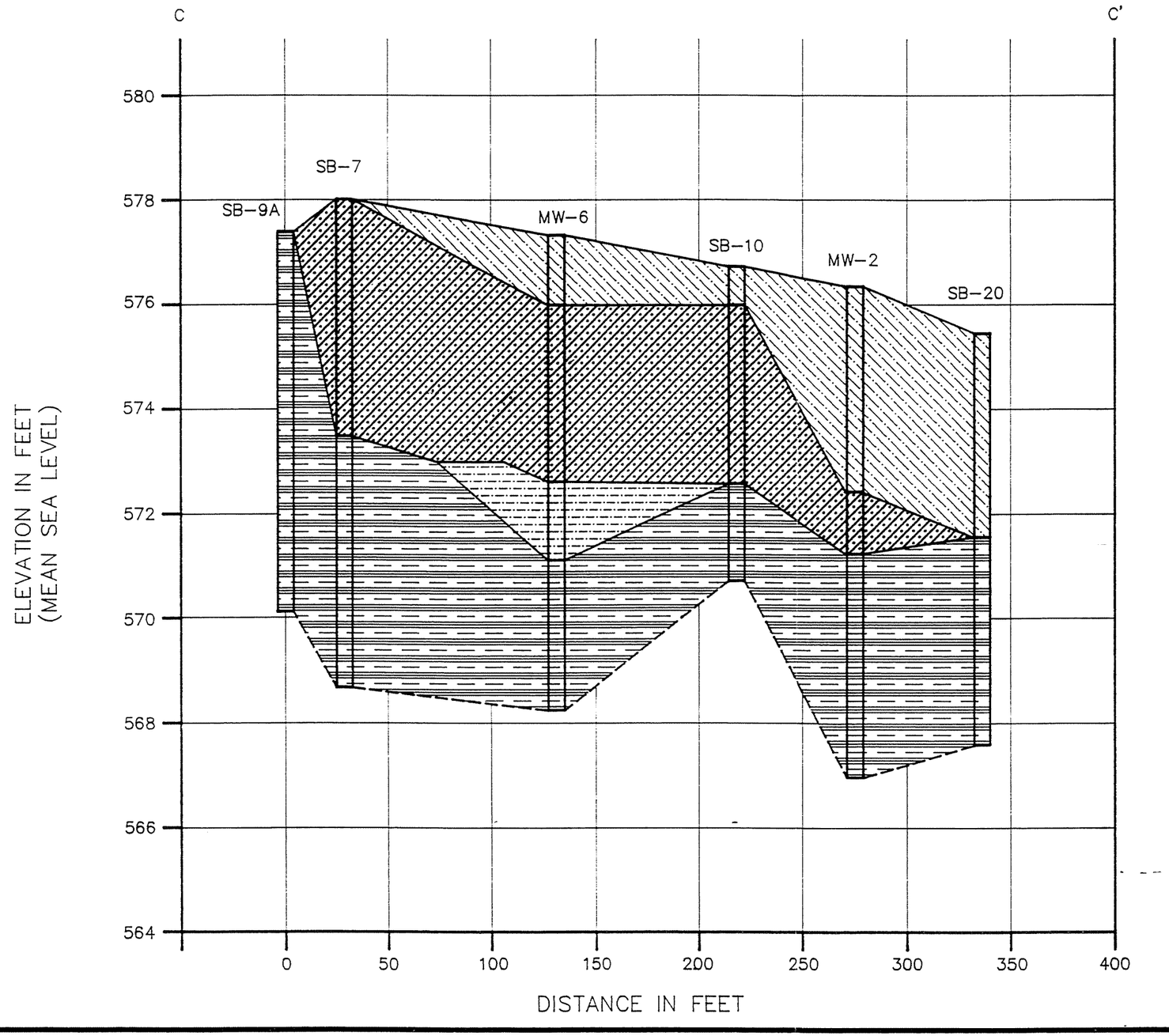
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GEOLOGIC CROSS-SECTION B-B'

FIGURE 3-6



LEGEND

- BROWN SILTY SAND AND GRAVEL FILL. FREE OF VISIBLE PRODUCT
- BLACK SILTY SAND AND GRAVEL FILL. VISIBLY CONTAMINATED WITH PETROLEUM PRODUCT.
- BROWN SILT
- GREY TO BROWN SILTY CLAY

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GEOLOGIC CROSS-SECTION C-C'

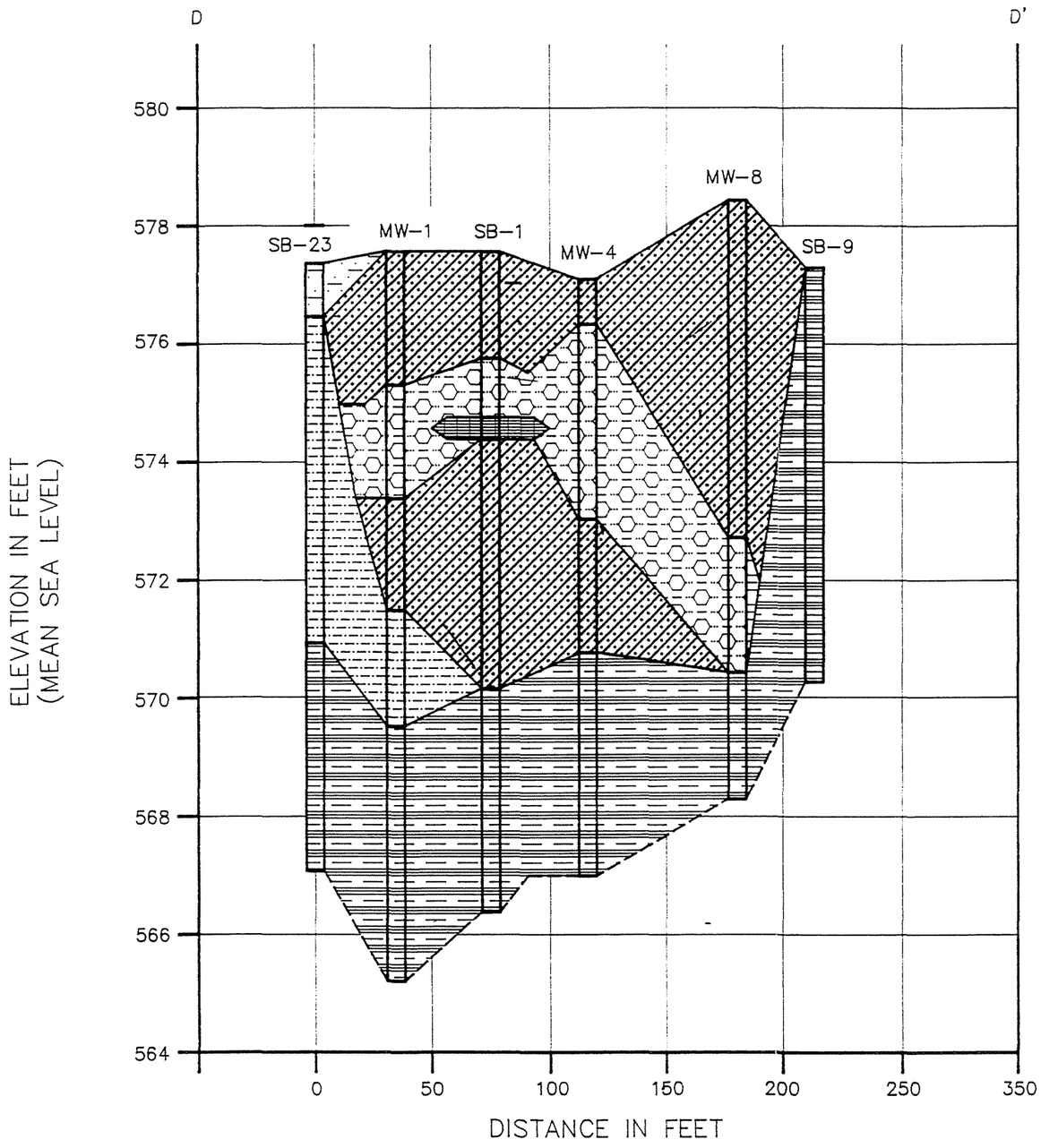
FIGURE 3-7

was encountered in Phase I soil boring SB-5 and was investigated further with a series of eight shallow borings as part of the Phase II investigation. The results of this investigation indicate that the bulk of the sludge is located between borings SB-5 and SB-4 in a roughly circular area with a diameter of approximately 80 feet. The sludge layer was approximately one to five feet thick where encountered.

Contaminated groundwater infiltration in a downward direction is limited by a clay layer which exists throughout most of the site. A map showing the elevation of the clay surface is presented in Figure 3-9. A three dimensional representation of the clay surface is provided in Figure 3-10. The view in Figure 3-10 is of the site looking towards the northeast with a downward view angle of 30 degrees. The vertical exaggeration depicted in the figure is 20X.

In general, the clay surface at the site slopes inward toward the northern portion of the southwestern leasehold area roughly forming a depression. Just off-site and to the east along North Marion Street, the clay surface seems to drop sharply and is replaced by glacial till. A small seam of clay, approximately one to two feet thick, was encountered in boring SB-18 at a depth of three feet. Whether this clay correlates with the major clay unit underlying the site has not been determined. Boring SB-18 was then advanced to a depth of 15 feet through glacial till without encountering groundwater and was thus abandoned. As can be seen in Figure 3-10, it appears that this boring location may be at a high point of the clay layer and may account for the lack of perched water present. Areas of localized depressions in the clay, such as in proximity to boring SB-5, may allow accumulation of dense nonaqueous phase liquids (DNAPLs). A black sludge-like material was encountered during the drilling of boring SB-5 which coincides with this localized depression in the clay surface. Heavy contamination was also found in boring/monitoring wells MW-5, MW-8 and boring SB-7 which are located in a depressed area of the clay surface in the south-central portion of the site. Free product was encountered during the installation of monitoring wells MW-5 and MW-8 and was confirmed by the presence of a floating product within both monitoring wells after installation. No NAPL was detected in Phase II monitoring well MW-18 located in close proximity to soil boring SB-7 and vertically downgradient on the clay surface.

A total of four Shelby tube samples were obtained during the Phase I RI from within the clay layer for geotechnical analysis. The samples were analyzed during the Phase I investigation by CME Associates, Inc., for grain size (ASTM D422), Atterberg limits (ASTM 4318), moisture content (ASTM 2216), and hydraulic conductivity (ASTM Technical Provisions Section 1-G.L.T.1.05).



LEGEND

- BROWN FINE SAND AND SILT FILL. FREE OF VISIBLE PRODUCT
- BLACK SILTY SAND AND GRAVEL FILL. VISIBLY CONTAMINATED WITH PETROLEUM PRODUCT
- SAND AND GRAVEL WITH BLACK PETROLEUM SLUDGE
- BROWN CLAYEY SILT FILL
- BROWN SILT
- GREY TO BROWN SILTY CLAY

H:\1038\CSEC-DD

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GEOLOGIC CROSS-SECTION D-D'

FIGURE 3-8

LEGEND	
DESIGNATION	DESCRIPTION
(XXX.X) MW-XX	PHASE I MONITORING WELL LOCATION (AND CLAY ELEVATION)
(XXX.X) MW-XX	PHASE II MONITORING WELL LOCATION (AND CLAY ELEVATION)
(XXX.X) SB-XX	PHASE I SOIL BORING LOCATION (AND CLAY ELEVATION)
(XXX.X) SB-XX	PHASE II SOIL BORING LOCATION (AND CLAY ELEVATION)
XXX	CLAY ELEVATION CONTOUR LINE

DIRECTORY: H:\1038
FILE NAME: PHASE3\MONSOIL
DATE: MARCH 1991
SCALE: 1=1
DESIGNER: S.P.B.

0 50 100
SCALE IN FEET

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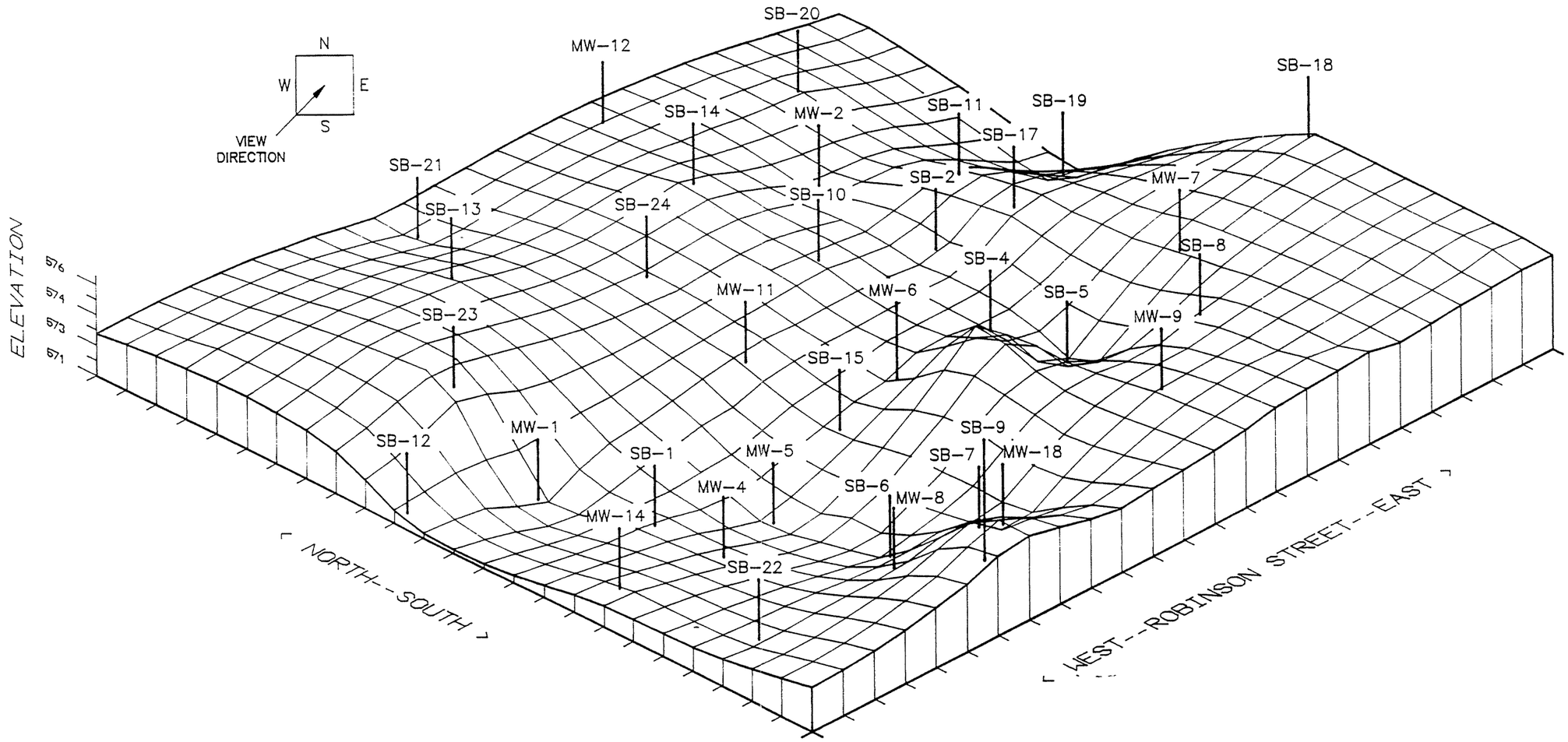
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

CLAY SURFACE ELEVATION MAP

FIGURE 3-9



DIRECTORY: H:\1038
FILE NAME: PHASE3\3DCLAYM
DATE: DEC. 1990
SCALE: 1=1
DESIGNER: S.P.B.

NOTE: VIEWING ANGLE = 30° FROM HORIZONTAL.

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NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

3-D CLAY SURFACE ELEVATION MAP

FIGURE 3-10

Results from the geotechnical testing of the Shelby tube samples can be found in Appendix E. The Shelby tube sample collected from soil boring SB-1 was damaged during the sampling procedure and was subsequently recompacted at the natural moisture content to 97.9 pcf. All samples were composed primarily of silt and clay size particles. The Shelby tube sample from SB-1 differed from the other samples in that it contained coarse to medium gravel and trace sand within the predominantly silt/clay matrix. Values obtained for moisture content, Atterberg Limits and hydraulic conductivity all indicate that the physical properties of the clay are generally uniform throughout the site.

3.1.3.2 - Bedrock

Although all borings installed during the Phase I and Phase II RI at the Booth Oil Site were not drilled to bedrock, research has indicated that bedrock occurs at approximately 40 feet below the ground surface. As mentioned previously, bedrock at the site is composed of the Camillus Shale of the Silurian age.

3.1.4 Hydrogeology

3.1.4.1 - Summary of Site Hydrogeology

Two distinct aquifers are found in the study area; the perched overburden aquifer and the bedrock aquifer. Water within the bedrock flows through joints and fractures. Reported information indicates that industrial wells in the bedrock aquifer can yield up to 1,200 gallons per minute. The perched overburden aquifer at the site is found primarily within the clay unit described in Section 3.1.3.1, with a small portion existing within the silty sand and gravel fill material overlying the clay. Since the permeability of the fill is expected to be greater than the underlying clay unit, and, therefore, would represent the most likely conduit for off-site migration of contaminants, the following discussion on hydrogeology is focused on this zone.

3.1.4.2 - Slug Test Analyses

Slug tests were performed on five of the shallow Phase I monitoring wells during the Phase I investigation in order to calculate hydraulic conductivities within the aquifer. In addition, four Shelby tube samples were obtained during the Phase I soil boring and monitoring well installation program and analyzed by CME Associates, Inc. for grain size, moisture content, Atterberg limits and hydraulic conductivity, as discussed previously in Section 3.1.3.1. Because all Phase I and

Phase II monitoring wells were located in the same general vicinity and, based upon observations during drilling, were installed in similar geologic materials as the Phase I monitoring wells, no additional slug testing or geotechnical analyses were performed during the Phase II investigation.

Results of the slug tests are shown in Table 3-1. The hydraulic conductivities at monitoring wells MW-1, MW-5 and MW-6 were relatively uniform, ranging from 1.5×10^{-3} cm/sec to 3.4×10^{-3} cm/sec. The calculated hydraulic conductivities for monitoring wells MW-7 and MW-9 ranged from 1.1×10^{-4} cm/sec to 3.4×10^{-4} cm/sec, respectively. The lower conductivity values in these two monitoring wells is consistent with the fact that the majority of the well screen at these two locations was screened within the less permeable clay unit. Appendix D contains the graphs and calculations used to derive hydraulic conductivities for each slug test conducted.

For the purposes of these calculations, the portion of the monitoring well screen within the clay layer was omitted from the calculations. This is believed to yield more accurate slug test results because the average hydraulic conductivity calculated from the Shelby tube samples collected from the clay layer is 5.3×10^{-8} cm/sec which is from four to five orders of magnitude less than the overlying fill material. Therefore, the effect of water flowing through the clay is negligible.

3.1.4.3 - Groundwater Flow Patterns

3.1.4.3.1 - Overburden

Measurements of perched groundwater elevations in all Phase I monitoring wells was obtained on August 7, 1990 and October 3, 1990 and are presented in Table 3-2 and Table 3-3, respectively. Based on these data, groundwater contour maps were prepared for each round of elevations collected and are illustrated in Figures 3-11 and 3-12. In addition, perched groundwater elevation measurements were obtained from all of the Phase I and Phase II monitoring wells on December 10, 1990, and are presented in Table 3-4. This data was combined with groundwater data derived from the Phase I and Phase II soil boring programs. The soil boring data was important due to the indications of no perched groundwater present at many of the soil boring locations. A perched groundwater contour map based on this data is illustrated in Figure 3-13. It must be noted that the contours are based on monitoring well measurements and interpretation of data derived from soil borings which in many cases were dry.

Analysis of the perched groundwater contour maps discussed above would reveal a general north to northeasterly flow of groundwater through the site, at a velocity of approximately 76 feet per year if the dry soil borings are not included in the analysis of the data. The perched

Table 3-1

SLUG TEST RESULTS

Monitoring Well	Rising Head Test Hydraulic Conductivity (K) (cm/s)	Falling Head Test Hydraulic Conductivity (K) (cm/s)	Average Hydraulic Conductivity (K) (cm/s)
MW-1[1]	2.8×10^{-3}	--	2.8×10^{-3}
MW-5	1.5×10^{-3}	2.2×10^{-3}	1.85×10^{-3}
MW-6	2.9×10^{-3}	3.4×10^{-3}	3.15×10^{-3}
MW-7[2]	1.1×10^{-4}	--	1.1×10^{-4}
MW-9	3.4×10^{-4}	3.4×10^{-4}	3.4×10^{-4}

1 Falling head test not performed because the water level was within 1 foot of the top of casing.

2 Falling head test not performed because screen interval extended above the water table surface.

Table 3-2

PERCHED GROUNDWATER ELEVATIONS
AUGUST 7, 1990
(Measured in Feet)

Monitoring Well	Depth of Well Below Ground Surface	Depth to Groundwater (from Top of Riser)	Well Elevation (MSL) Top of Riser	Groundwater Elevation (MSL)
MW-1	7.5	0.45	576.99	576.54
MW-2	9.0	3.60	575.78	572.18
MW-4	9.5	-0.05*	576.48	576.53
MW-5	9.5	2.10	578.70	576.60
MW-6	9.0	2.03	577.11	575.08
MW-7	9.0	4.65	579.11	574.46
MW-8	9.0	2.30	577.78	575.48
MW-9	7.5	1.90	577.85	575.95

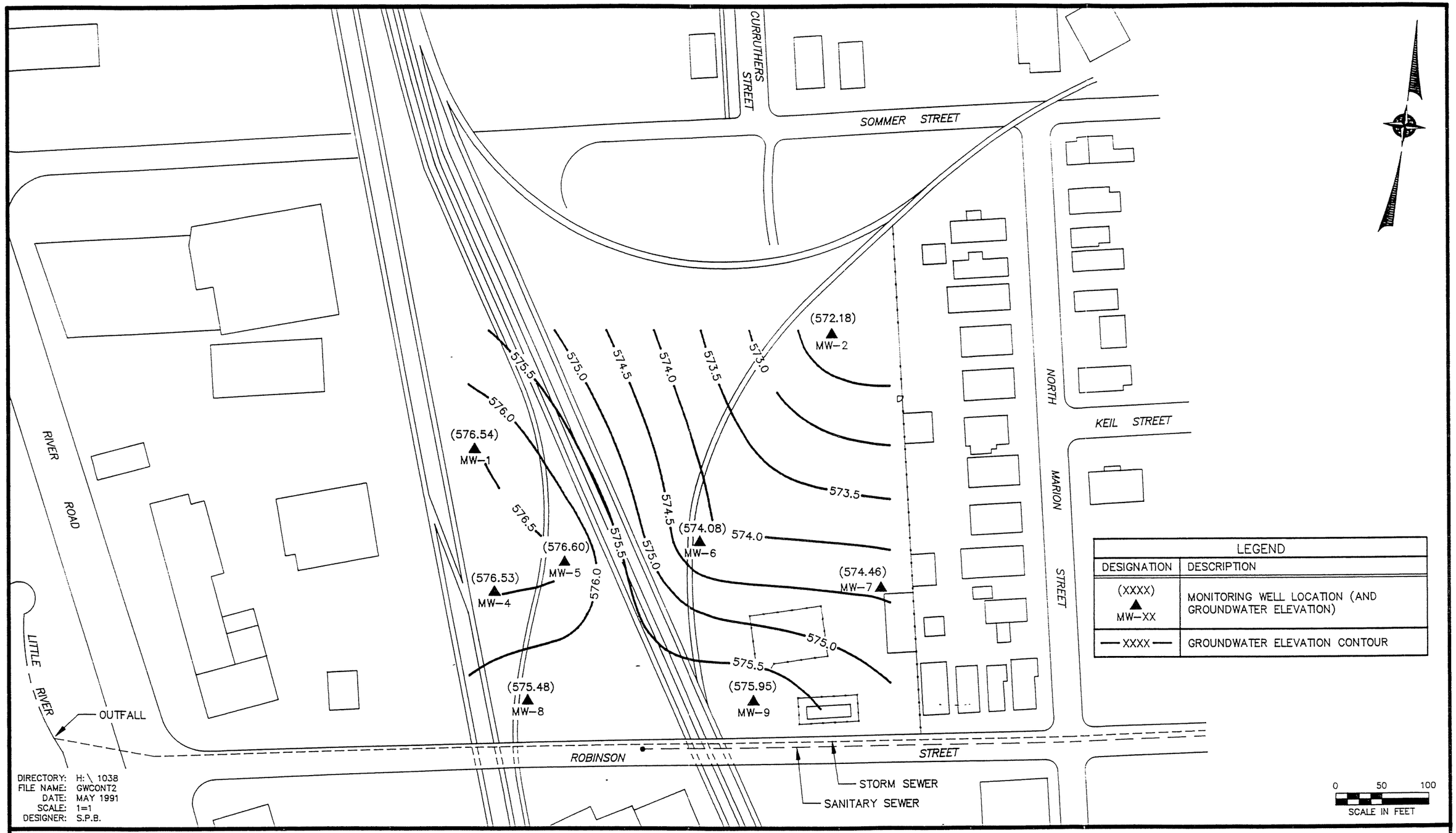
* Groundwater in MW-4 was at a higher elevation than the top of the riser pipe but contained within the flush mount protective casing for measurement.

Table 3-3

PERCHED GROUNDWATER ELEVATIONS
OCTOBER 3, 1990
(Measured in Feet)

Monitoring Well	Depth of Well Below Ground Surface	Depth to Groundwater (from Top of Riser)	Well Elevation (MSL) Top of Riser	Groundwater Elevation (MSL)
MW-1	7.5	0.50	576.99	576.49
MW-2	9.0	3.36	575.78	572.42
MW-4	9.5	-0.05*	576.48	576.53
MW-5	9.5	2.15	578.70	576.55
MW-6	9.0	2.23	577.11	574.88
MW-7	9.0	4.50	579.11	574.61
MW-8	9.0	2.25	577.78	575.53
MW-9	7.5	2.17	577.85	575.68

* Groundwater in MW-4 was at a higher elevation than the top of the riser pipe but contained within the flush mount protective casing for measurement.



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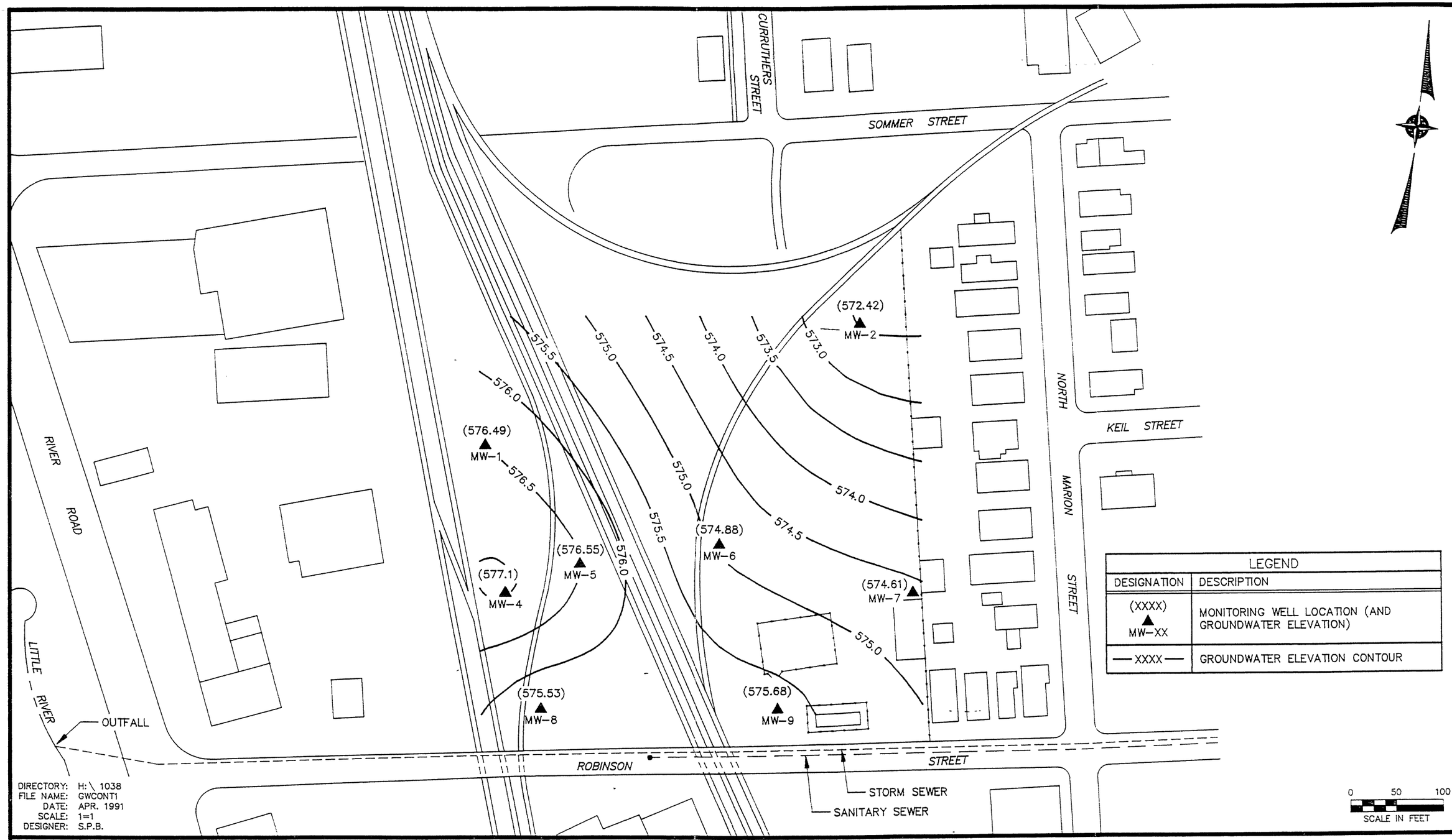
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

GROUNDWATER CONTOUR MAP FOR PHASE I MONITORING WELLS
(AUGUST 7, 1990)

FIGURE 3–11



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NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

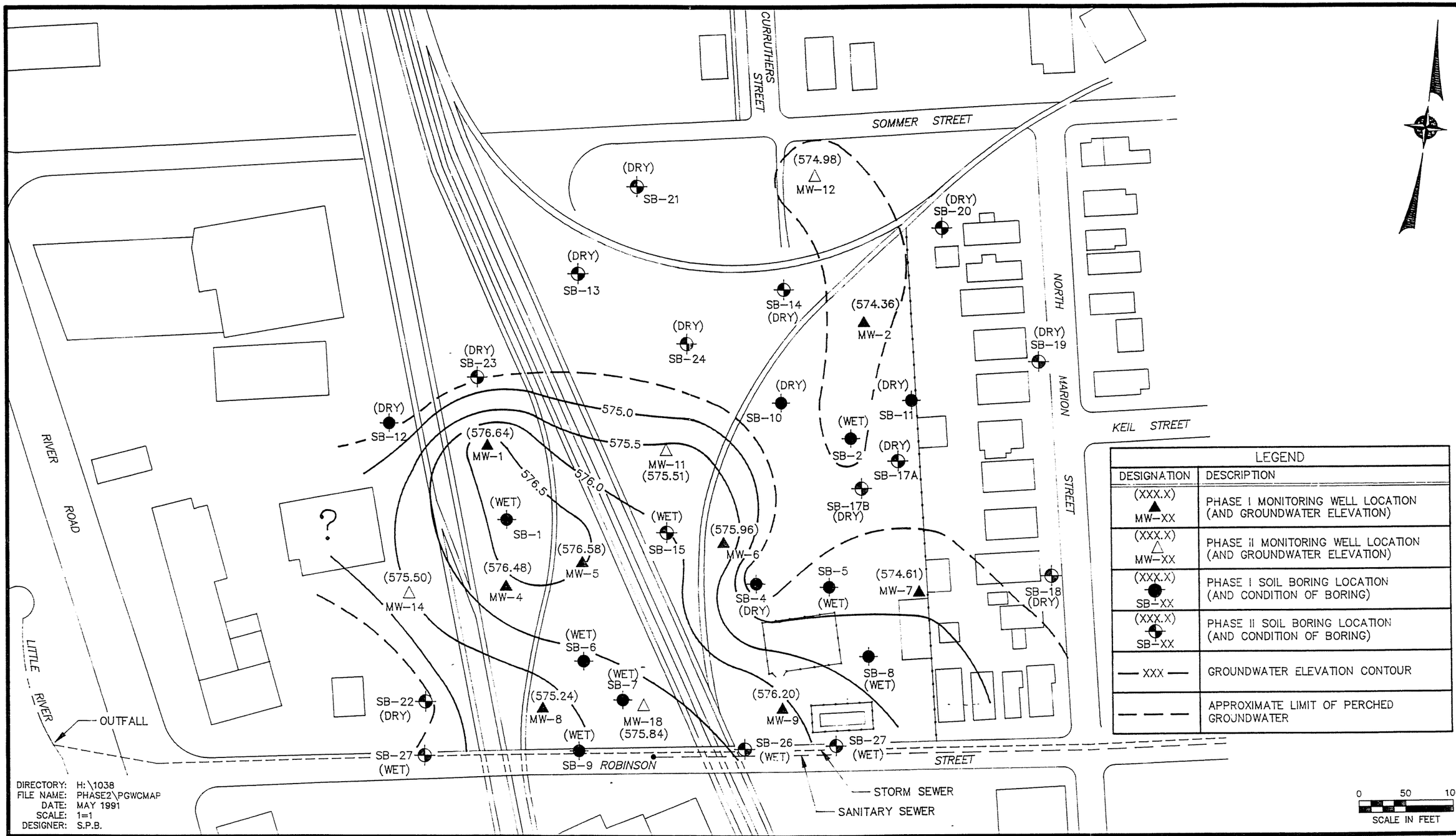
GROUNDWATER CONTOUR MAP FOR PHASE I MONITORING WELLS
(OCTOBER 3, 1990)

FIGURE 3-12

Table 3-4

PERCHED GROUNDWATER ELEVATIONS
DECEMBER 10, 1990
(Measured in Feet)

Monitoring Well	Depth of Well Below Ground Surface	Depth to Groundwater (from Top of Riser)	Well Elevation (MSL) Top of Riser	Groundwater Elevation (MSL)
MW-1	7.5	0.35	576.99	576.64
MW-2	9.0	1.42	575.78	574.36
MW-4	9.5	0.00	576.48	576.48
MW-5	9.5	2.12	578.70	576.58
MW-6	9.0	1.15	577.11	575.96
MW-7	9.0	4.50	579.11	574.61
MW-8	9.0	2.54	577.78	575.24
MW-9	7.5	1.65	577.85	576.20
MW-11	9.0	2.45	577.96	575.51
MW-12	9.5	3.84	578.82	574.98
MW-14	9.5	4.32	579.82	575.50
MW-18	9.5	1.74	577.58	575.84



LEGEND	
DESIGNATION	DESCRIPTION
(XXX.X) ▲ MW-XX	PHASE I MONITORING WELL LOCATION (AND GROUNDWATER ELEVATION)
(XXX.X) △ MW-XX	PHASE II MONITORING WELL LOCATION (AND GROUNDWATER ELEVATION)
(XXX.X) ● SB-XX	PHASE I SOIL BORING LOCATION (AND CONDITION OF BORING)
(XXX.X) ⊕ SB-XX	PHASE II SOIL BORING LOCATION (AND CONDITION OF BORING)
— XXX —	GROUNDWATER ELEVATION CONTOUR
— — —	APPROXIMATE LIMIT OF PERCHED GROUNDWATER

DIRECTORY: H:\1038
FILE NAME: PHASE2\PGWCMAP
DATE: MAY 1991
SCALE: 1=1
DESIGNER: S.P.B.

0 50 100
SCALE IN FEET

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PERCHED GROUNDWATER CONTOUR MAP FOR PHASE I AND PHASE II MONITORING WELLS AND SOIL BORING LOCATIONS

FIGURE 3-13

groundwater gradient would be approximately 0.011 foot of head loss per foot of horizontal distance. These gradients, however, do not account for the dry soil borings which are located throughout the site. The most significant finding is a perched groundwater mound located in the southwestern portion of the site at the location of a significant depression in the clay layer (shown on Figure 3-10). Figures 3-11 and 3-12 show almost identical perched groundwater elevation patterns hinting at possible groundwater mounding just west to northwest of the southeastern leasehold area. Two additional monitoring wells installed in this area as part of the Phase II investigation (MW-14 and MW-18) defines the mound further as being centered roughly between monitoring wells MW-1, MW-4 and MW-5 (see Figure 3-13). The lack of groundwater encountered in borings located in the west, north and east portions of the site leads to the hypothesis that the geometry of the clay layer is, in effect, preventing perched groundwater from exiting the site in a manner as would be interpreted by looking at the monitoring well data alone.

It appears that low points in the clay layer at the site are the primary locations of saturated conditions. High points in the clay layer are generally dry and may provide area limits to the perched groundwater table and influence directions by which perched groundwater may migrate. Manmade structures, such as the railroad tracks as will be discussed in Section 5, may also have an impact on groundwater migration.

Field observations made during the Phase II investigation indicate that numerous boring locations were essentially dry at depths well below where groundwater was expected to be encountered. An example of this is boring SB-22 where the predicted depth to water based on the groundwater contour map (Figure 3-13) is approximately two feet below grade. Boring SB-22 was advanced to a depth of 10 feet without encountering groundwater. Similar observations were made in soil borings SB-4, SB-10. SB-11, SB-12, SB-13, SB-14, SB-17, SB-18, SB-19, SB-20, SB-21, SB-22, SB-23 and SB-24. This indicates that the groundwater at the site overlying the clay layer is in a localized perched condition and, due to the low permeability overburden, limited in the direction by which it can migrate.

3.1.4.3.2 - Bedrock

Although no site specific information exists for the bedrock underlying the Booth Oil Site, reported information indicates a westerly to southerly flow.

3.1.5 Surface Water

Ellicott Creek, Tonawanda Creek and the Little River/Niagara River are all significant surface water habitats within 3 miles of the Booth Oil Site.

Ellicott Creek, from its mouth to the Erie Railroad, is classified by NYSDEC as Class "D," indicating waters suitable for fishing, as well as primary and secondary contact recreation. Beyond the Erie Railroad to Mill Road, this waterbody is classified as Class "C," designating the waters as suitable for fishing and fish propagation, as well as primary and secondary contact recreation.

Tonawanda Creek is a NYSDEC designated Class "C" waterbody, while the Little River and the Niagara River are both classified as Class "A" - Special (International Boundary Waters), indicating water suitable for drinking, culinary or food processing purposes, primary contact recreation and any other uses.

3.1.6 Climate/Meteorology

Weather conditions were recorded twice daily at the Booth Oil Site during the Phase I and Phase II RI and documented on Daily Field Activity Reports. These reports are compiled in the Phase I and Phase II Remedial Investigation Field Record Reports, dated September 1990 and March 1991, respectively. Table 3-5 provides a summary of recorded weather conditions for the Booth Oil Site as recorded on-site during the Phase I and Phase II field investigations. In addition, weather conditions recorded at the Buffalo International Airport, located 9 miles southeast of the Booth Oil Site, were obtained for the 30-year period 1951 through 1980 and are summarized in Table 3-6.

As noted in Tables 3-5 and 3-6, mean temperatures experienced at the Booth Oil Site were near normal during the Phase I RI and slightly above normal during the Phase II RI when compared with historical temperatures recorded at the Buffalo Airport. Average prevailing wind directions recorded at the site were from the west, northwest, southwest and southeast. A breakdown of average prevailing wind direction and the total number of site recordings of wind direction noted during the Phase I and Phase II RI is as follows:

	Total Number of Recordings	
Prevailing Wind Direction	Phase I RI	Phase II RI
W	13	0
NW	9	3
SW	8	3
N	6	1
SE	5	4
NNW	2	0
E	1	1
WSW	1	0
NE	0	1
Variable	2	6

Table 3-5

METEOROLOGICAL DATA FOR BOOTH OIL SITE

Phase I Remedial Investigation (May 30 - August 8, 1990)

Month	Number of Days Recorded	Mean Temperature	Prevailing Wind Direction	Prevailing Wind Speed (mph)
May	2	63	NR	NR
June	19	74	W	5-10
July	13	76	W	5-10
August	3	70	SW	0-5
Phase II Remedial Investigation (November 12 - December 12, 1990)				
November	10	45	SW	5-15
December	3	42	Variable	0-5

Table 3-6

METEOROLOGICAL DATA FOR THE BUFFALO INTERNATIONAL AIRPORT (1951-1980)

Temperature

	J	F	M	A	M	J	J	A	S	O	N	D	ANN
Max	30.0	31.4	40.4	54.4	65.9	75.6	80.2	78.2	71.4	60.2	47.0	22.5	88.8
Min	17.0	17.5	25.6	36.3	46.3	56.4	61.2	59.6	52.7	42.7	33.6	22.5	39.3
Mean	23.5	24.5	33.0	45.4	56.1	66.0	70.7	68.9	62.1	51.5	40.3	28.8	47.6

Precipitation

Avg	3.02	2.40	2.97	3.06	2.89	2.72	2.96	4.16	3.37	2.93	3.62	3.42	37.52
Max 24hr	2.40	2.31	2.14	1.49	2.03	3.04	3.38	3.88	3.63	3.49	2.51	2.16	

Wind

Mean Speed	14.3	13.7	13.4	12.4	11.5	11.0	10.4	9.8	10.4	11.1	12.7	13.4	12.0
Prevailing Direction	SW	SW	SW	SW	SW	SW	SW	SW	S	S	S	WSW	SW

Approximate average wind velocity recorded at the Booth Oil Site was between 5 and 10 mph. Prevailing wind speeds recorded at the site are consistent with the long-term averages recorded at the Buffalo Airport. The somewhat more northerly wind direction at the site may be due to the influence of the Niagara River located just west of the site. Precipitation was not recorded at the Booth Oil Site, however, averages for the area are provided in Table 3-6.

3.2 Habitat Assessment

3.2.1 Ecological Communities On-Site

This section provides an initial characterization of the terrestrial ecology at the Booth Oil Site and is incorporated as part of an overall site habitat based assessment. Because of the small site size and proximity to nearby inactive sites undergoing remedial investigations, the NYSDEC requested that the Habitat Assessment study area be reduced to within the site boundaries only. The purpose of this section is to provide a description of the existing ecology of the site. Included is a site specific description of major habitat types with associated wildlife populations and the identification of any other significant on-site resources. The information provided in this section and subsequent sections concerning study area ecology was obtained during the Phase I RI field investigation and supplemented with data from outside sources including the NYSDEC, the City of North Tonawanda and the Niagara County Health Department.

3.2.1.1 - Major Habitat Types

The Booth Oil Site is predominantly an upland area located approximately 1,500 feet east of the Niagara River. Land surrounding the site can be considered mainly urban consisting of commercial and industrial land uses intermixed with residential housing units.

Past activities at the site consisted of a waste oil collection, storage and reclamation operation resulting in on-site disturbances and contamination. The site is now predominantly disturbed lands with grassland growth and minor vegetative zonation of rudimentary scrub/shrub habitats (see Figure 3-14 for the approximate locations of each community). The following is a more thorough discussion of vegetative cover types found at the Booth Oil Site.

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

VEGETATIVE COVERTYPES

Dvirka and Bartilucci CONSULTING ENGINEERS

FIGURE 3-14

o Disturbed Lands

Although the entire study site has been disturbed in the past by man's activities, for the purposes of this survey disturbed lands are considered to be those areas which exhibit outward signs of past use. Disturbed land at the Booth Oil Site includes paved areas, railroad corridors including associated maintenance/storage areas, and other areas of disruption due to past site activities. Disturbed lands support plant species such as grasses and weeds which can reproduce quickly and colonize a small area between disturbances. Such plants include clover and chicory (Cichorium intybus). Approximately 40 percent of the Booth Oil Site is comprised of disturbed lands.

o Grassland Habitats

Grassland habitats exist over several areas of the site that were previously disturbed and have since been abandoned. The grassland habitat at the eastern and northern portions of the site is maintained by mowing, preventing the establishment of many mid-successional plant species. The central portion of the site, which is not presently maintained, exhibits a variety of upland grasses and wildflowers. Such species identified at the Booth Oil Site include goldenrod (Soldago spp.), purple loosestrife (Lythrum salicanria), and queen anne's lace (Dancus carota).

o Scrub/Shrub Habitats

Scrub/shrub areas consist of vacant grassland fields which have been allowed to grow out. At the Booth Oil Site, a small area of a scrub/shrub habitat was noted in the central portion of the site between the Erie Railroad lines. This habitat consists of several woody plant species, including American elm (Ulmas americana) and red maple (Acer rubrum) saplings, together with a variety of wildflower and grass species.

A complete listing of plant species noted to occur at the Booth Oil Site is provided in Table 3-7.

o Ponded Water Habitat

In addition to the above, several small areas of ponded water were noted during site reconnaissance. The ponded water areas, which lacked any form of hydrophillic vegetation or aquatic life, are characterized as transient in nature and are not considered a defined habitat feature on the site. As such, these systems will not be considered further in later discussions.

Table 3-7

PLANT SPECIES PRESENT AT THE
BOOTH OIL SITE

Common Name	Scientific Name
Queen Anne's Lace	Daucus carola
Chicory	Cichorium intybus
Field Bindweed	Convolvulus arvenisis
Rough Dandelion	Taraxacum officinale
Smooth Dandelion	Taraxacum spp.
Virginia Creeper	Parthenocissus quinquefolia
Blue Lettuce	Lactuca spp.
Field Sow Thistle	Sonchus aruensis
Burs	Xanthium spp.
Populars	Populus spp.
Red Maple	Acer rubrum (sapling)
Goldenrod	Soldago spp.
Clover	Trifolium spp.
American Elm	Ulmus americana (sapling)
Broad Leaf Plantain	Plantago spp.
Peppermint	Pycnanthemum spp.
Fools Parsley	Aethusa cynapium
Narrow Leaf Plantain	Plantago spp.
Tree of Heaven	Alanthus spp.
Black Locust	Roninia pseudocacia
Clotbur	Xanthium spp.
Sumac	Rhus spp.
Yellow Vetching	Lathurus spp.

3.2.1.2 - On-Site Resource Characterization

This section provides a description of wildlife resources observed on-site during the reconnaissance or presumed to occur based upon vegetative associations and NYSDEC file records.

o Mammals

The open and disturbed nature of the Booth Oil Site precludes its habitation by most larger mammal species. However, a number of smaller mammals were observed by sight or sign including grey squirrels (Sciuius carolinensis), cottontail rabbits (Sylvagius spp.) and moles. These species may inhabit the site year round. In addition, although not observed, species indigenous to the area including field mice (Peromyscus spp.), mice (mus musculus), and shrews (Sorex spp.), probably occupy the site during portions of the year. Table 3-8 presents a list of mammal species which may inhabit the study area or were confirmed on-site during the Phase I RI field investigation.

o Birds

The site and its surroundings hosts a number of common bird species which typically frequent disturbed lands. Varieties of sparrow including field sparrow (Spizella pusilla) and house sparrow (Passer domesticus) were observed. Other birds identified on-site include American crow (Corvus brachyrhynchos), Herring gull (Larus argentatus), and European Starling (Sturnus vulgaris). Table 3-9 presents information concerning birds noted to occur within Niagara County and those confirmed on-site during field reconnaissance activities.

o Reptiles and Amphibians

Although no reptiles or amphibians were observed on-site, the disturbed portions of the study area containing rock, rubble and cement structures provide a suitable habitat for common varieties of snakes, particularly during the warmer months. Also, toads may inhabit the open grasslands and scrub/shrub areas of the site.

Table 3-8

MAMMALS, REPTILES AND AMPHIBIANS INHABITING THE BOOTH OIL SITE

Common Name	Scientific Name	Occurrence	
		Probable	Confirmed
Grey Squirrel	Sciurus carolinensis		X
Rabbits	Sylvilagus floridanus		X
Field Mouse	Peromyscus spp.	X	
House Mouse	Mus musculus	X	
Vole	Microtus pennsylanicus	X	
Garter Snake	Thamnophis sirtalis	X	
Moles			X
Shrew	Sorex spp.	X	
American Toad	Bufo americanus	X	

Table 3-9

BIRD SPECIES RECORDED* IN NORTH TONAWANDA
AND IN THE VICINITY OF THE BOOTH OIL SITE

Common Name	Scientific Name	Possible Breeding	Probable Breeding	Confirmed Breeding	Confirmed On-site
Green-backed Heron	Butorides striatus			X	
Mallard	Anas platyrhynchos			X	
Wood Duck	Aix sponsa		X		
Red-tailed Hawk	Buteo jamaicensis		X		
Northern Harrier	Circus cyaneus		X		
American Kestrel	Falco sparverius			X	
Ring-necked Pheasant	Phasianus colchicus			X	P
Killdeer	Charadrius vociferus			X	P
Spotted Sandpiper	Actitis macularia			X	
Rock Dove	Columba livia			X	
Mourning Dove	Zenaida macroura			X	N
Yellow-billed Cuckoo	Coccyzus americanus		X		
Eastern Screech-Owl	Otus asio			X	
Great Horned Owl	Bubo Virginianus			X	
Chimney Swift	Chaetura pelagica	X			N
Belted Kingfisher	Ceryle alcyon		X		
Northern Flicker	Colaptes auratus			X	
Hairy Woodpecker	Picoides villosus	X			
Downy Woodpecker	Picoides pubescens			X	
Eastern Kingbird	Tyrannus tyrannus			X	
Eastern Phoebe	Sayornis Phoebe		X		
Willow Flycatcher	Empidonax traillii		X		
Eastern Wood-Pewee	Contopus virens		X		
Tree Swallow	Tachycineta bicolor			X	
Bank Swallow	Riparia riparia			X	
Northern Rough-winged Swallow	Stelgidopteryx serripennis			X	
Barn Swallow	Hirundo rustica			X	

Table 3-9 (continued)

BIRD SPECIES RECORDED* IN NORTH TONAWANDA
AND IN THE VICINITY OF THE BOOTH OIL SITE

Common Name	Scientific Name	Possible Breeding	Probable Breeding	Confirmed Breeding	Confirmed On-site
Purple Martin	Progne subis			X	
Blue Jay	Cyanocitta cristata			X	P
American Crow	Corvus brachyrhynchos			X	N
Black-capped Chickadee	Parus atricapillus			X	
Brown Creeper	Certhia americana	X			
House Wren	Troglodytes aedon		X		N
Gray Catbird	Dumetella carolinensis			X	
Brown Thrasher	Toxostoma rufum			X	
American Robin	Turdus migratorius			X	P
Wood Thrush	Hylocichla mustelina		X		
Cedar Waxwing	Bombycilla cedrorum	X			P
European Starling	Sturnus vulgaris			X	N
Red-eyed Vireo	Vireo olivaceus		X		
Warbling Vireo	Vireo gilvus		X		
Blue-winged Warbler	Vermivora pinus		X		
Yellow Warbler	Dendroica petechia			X	
Common Yellowthroat	Geothlypis trichas			X	
House Sparrow	Passer domesticus			X	N
Eastern Meadowlark	Sturnella magna		X		
Red-winged Blackbird	Agelaius phoeniceus			X	N
Northern Oriole	Icterus galbula			X	P
Common Grackle	Quiscalus quiscula			X	
Brown-headed Cowbird	Molothrus ater			X	
Scarlet Tanager	Piranga olivacea			X	
Northern Cardinal	Cardinalis cardinalis			X	
Rose-breasted Grosbeak	Pheucticus ludovicianus		X		
House Finch	Carpodacus mexicanus	X			

Table 3-9 (continued)

BIRD SPECIES RECORDED* IN NORTH TONAWANDA
AND IN THE VICINITY OF THE BOOTH OIL SITE

Common Name	Scientific Name	Possible Breeding	Probable Breeding	Confirmed Breeding	Confirmed On-site
American Goldfinch	Carduelis tristis			X	
Rufous-sided Towhee	Pipilo erythrophthalmus		X		
Savannah Sparrow	Passerculus sandwichensis		X		
Chipping Sparrow	Spizella passerina			X	
Field Sparrow	Spizella pusilla		X		N
Swamp Sparrow	Melospiza georgiana			X	
Song Sparrow	Melospiza melodia			X	
Herring Gull	Larus argentatus				N

*Source NYS Breeding Bird Atlas

P - Probable on-site
N - Noted on-site during August 17, 1990 Habitat Survey

3.2.1.3 - Animal and Vegetative Covertype Associations

As noted above, three distinctive vegetative covertype communities were identified at the Booth Oil Site. Specifically, these vegetative communities are:

- o Disturbed lands
- o Grassland habitat
- o Scrub/Shrub habitat

Although quantitative data relating animal and plant abundance to the vegetative covertypes was beyond the scope of the remedial investigation, qualitative associations can be made based upon plant and animals noted at the site, assumptions on the presence of species not observed, and NYSDEC file records. A presentation of these associations is presented in Table 3-10.

In general, the original habitat types at the site have been modified by several instances of clearing for industrial uses. Some portions of the site continue to be maintained or used while other portions have been abandoned. As a result, several successional stages of plant growth are now present as secondary plant species become established at the site.

The intrusion of development at the Booth Oil Site has resulted in considerable on-site disturbance and habitat disruption. None of the site or the surrounding area appears to contain enough cover for large mammals or forest inhabiting bird species. As a result, these species have left the area. Some animal species, however, may have maintained viable populations including field mice, rabbits, snakes and a variety of bird species.

3.2.2 Special Resources

The following sections describe special ecological resources located adjacent to the Booth Oil Site including regulated wetlands, open water systems, significant habitats, endangered species and Wild, Scenic and Recreational River designations.

3.2.2.1 - Regulated Wetlands

There are no NYSDEC classified wetlands on or adjacent to the site. Regulated wetlands in the vicinity of the study site are identified based on the NYSDEC classification system (Article 24, Environmental Conservation Law). The NYSDEC classifies wetlands according to a value system

Table 3-10

ANIMAL AND VEGETATIVE COVERTYPES*
WITHIN THE BOOTH OIL SITE

Type	Disturbed Lands	Grasslands (Mowed Areas)	(Overgrown) Grasslands)	Shrub
Plants				
Queen Anne's Lace	X		X	
Purple Loosestrife			X	X
Clover	X	X		
Chicory	X		X	
Goldenrod	X		X	X
Thistle		X		
Fescues		X		
Trees				
Tree of Heaven				X
Sumacs				X
Red Maple (sapling)				X
American Elm (sapling)				X
Animals				
Rabbits			X	X
Mice	X		X	
Vole		X		
Crow			X	X
Mourning Dove		X	X	
Robin		X	X	X
Starling			X	X
Snakes	X		X	
Sparrows			X	X
Frogs	X	X	X	X

*Animal and plant lists refer to the most abundant types only.

** Although a major portion of the site can be considered "disturbed land," in this context these lands include portions of the site which still have extant structures or debris piles which are largely unvegetated.

with Class I wetlands being the most valuable and Class IV wetlands of least value. These designations are currently based on vegetative characteristics. Also, only wetlands 12.4 acres (1 hectare) or greater in size are classified by the NYSDEC.

As noted previously, there are no regulated wetlands located directly within the boundary of the Booth Oil Site. There are, however, two NYSDEC regulated wetlands located in the general area. TE-12 is a Class II wetland located approximately 7,000 feet east-northeast of the site. The second wetland, TE-15, is also a Class II wetland and is located approximately 7,000 feet north-northeast of the site. The locations of these regulated wetlands are shown in Figure 1-7, found in Section 1.2.9 of this report.

3.2.2.2 - Open Water Systems

There are no open water systems located directly within the property boundaries of the Booth Oil Site. As noted previously, the ponded water habitats are considered transient in nature and do not provide significant habitat value. The primary open flowing water systems in the vicinity of the site consist of the Little/Niagara River, Ellicott Creek and Tonawanda Creek. NYSDEC usage classifications for these river/creek systems are described in Section 1.2.11 of this report. In addition, numerous smaller tributaries also traverse the area before discharging into the larger open water systems. The locations of these water bodies, all of which can be characterized as moderate to fast moving, are shown in Figure 3-15.

NYSDEC records on fish surveys and stockings in steams in Tonawanda Creek suggest that the open water systems in the vicinity of the Booth Oil Site support a number of fish species. Table 3-11 presents a listing of fish known to inhabit Tonawanda Creek. Presumably, individuals of those species listed would also be found in the other larger water bodies located in the area.

The NYSDEC has issued a health advisory concerning the consumption of carp (Cyprinus carpio) for the entire Niagara River above (south) of Niagara Falls. The advisory recommends that no more than one meal (1/2 pound) of carp taken from the designated portion of the Niagara River be consumed per month. No additional health advisories concerning fish consumption exist for open waters in the vicinity of the Booth Oil Site. The existing health advisory is not directly related to the site.

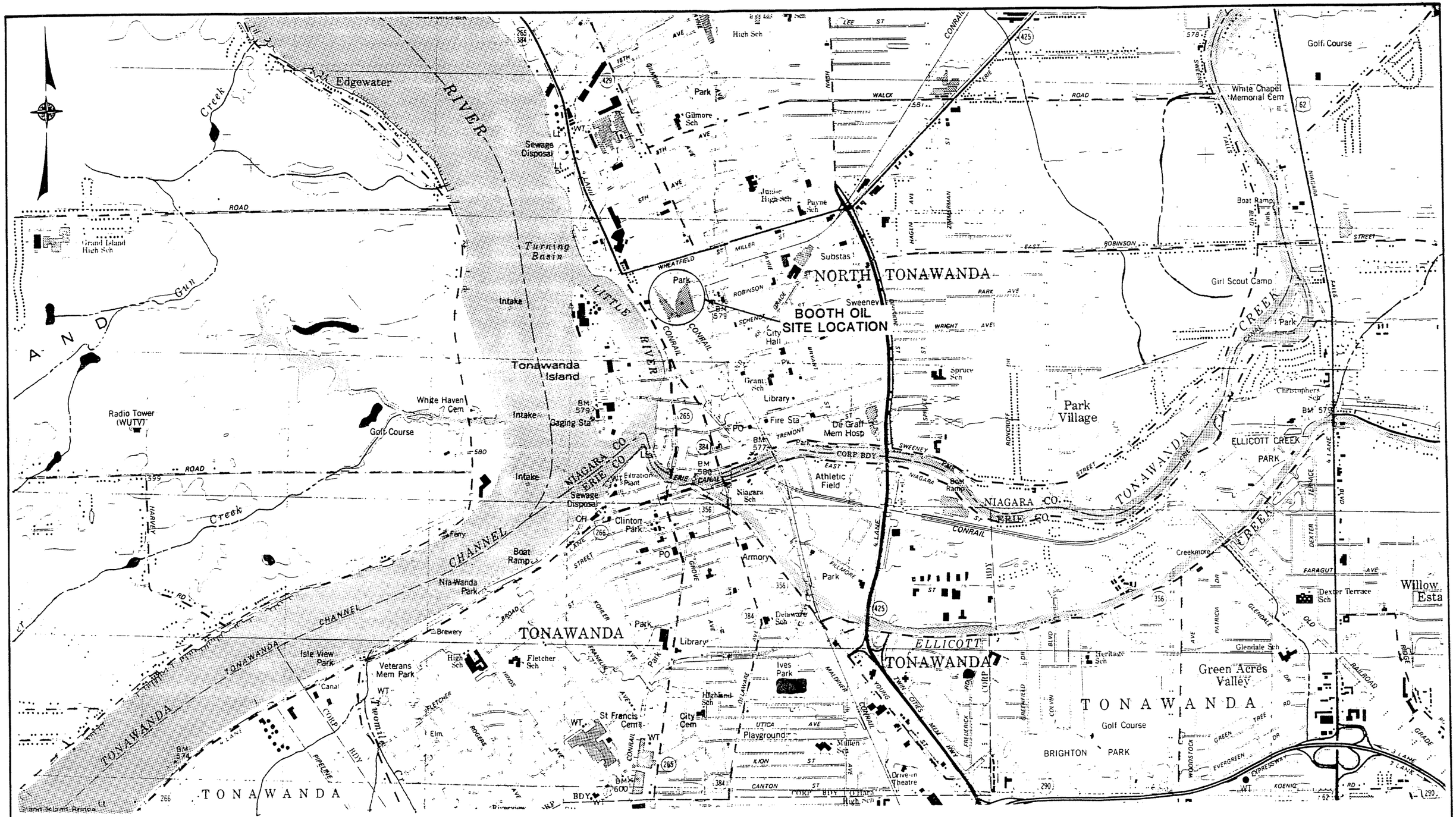

BOOTH OIL
SITE LOCATION
NORTH TONAWANDA
TONAWANDA
TONAWANDA
ELLICOTT
TONAWANDA
TONAWANDA
Tonawanda Island
Grand Island High Sch
Edgewater
Golf Course
Radio Tower (WUTV)
White Haven Cem
Intake
Intake
Intake
Gaging Sta
Sewage Disposal
Sewage Disposal
Turning Basin
Gilmore Sch
Junior High Sch
Payne Sch
Substas
Park
Sweeney
City Hall
Grant Sch
Library
Fire Sta
PO
De Graff Mem Hosp
Athletic Field
Niagara Sch
Spruce Sch
Park Village
White Chapel Memorial Cem
Golf Course
Boat Ramp
Girl Scout Camp
Park
Christophers
ELLICOTT CREEK PARK
Creekmore
Dexter Terrace Sch
Willow Esta
Clinton Park
Boat Ramp
Nia-Wanda Park
Armory
Park
Brewery
Isle View Park
Veterans Mem Park
Canal
High Sch
Fletcher Sch
Park
Library
Delaware Sch
Ives Park
Highland Sch
St Francis Cems
City Cem
Mullen Sup
Playground
Drive-In Theatre
Heritage Sch
Glendale Sch
Green Acres Valley
Golf Course
BRIGHTON PARK
Grand Island Bridge
Turning Basin
Creek
Creek
CHANNEL
CHANNEL
LITTLE RIVER
CREEK
CREEK
RIVER
AND
GUN
ROAD
ROAD
ROAD
ROAD
WHEATFIELD ST
MILLER ST
ROBINSON ST
PARK AVE
WRIGHT AVE
GRADE ST
SCHENCK ST
SPRUCE ST
RONCROFF LN
TREMONT ST
SWEENEY ST
CORP BDY
EAST CORP BDY
NIAGARA ST
CONRAIL
CONRAIL
CONRAIL
CONRAIL
LEE ST
WALCK ROAD
HAGEM AVE
ZIMMERMAN AVE
ROBINSON STREET
EAST ROBINSON STREET
PARK AVE
WRIGHT AVE
ELLICOTT CREEK PARK
FARAGUT AVE
GLENDALE AVE
PATRICIA BLVD
COLVIN BLVD
GREENFIELD DR
WOODSTOCK DR
EVERGREEN DR
GREEN TREE DR
TWIN CITIES MEM HWY
EXPRESSWAY
KOENIG
RAILROAD GRADE
OLD 5 LANE RIDGE RD
DEXTER TERRACE
OLD 5 LANE RIDGE RD
NIAGARA CO.
ERIE CO.
NIAGARA CO.
ERIE CO.
NIAGARA-ERIE CO.
ERIE CANAL
ERIE CANAL
ERIE CANAL
ERIE CANAL
Filtration Plant
Ferry
Ferry
PIPELINE
PIPELINE
PIPELINE
PIPELINE
BM 579
BM 577
BM 580
BM 574
BM 600
BM 579
BM 578
WT
WT
WT

Table 3-11

FISH SPECIES PRESENT IN
TONAWANDA CREEK IN THE VICINITY OF THE
BOOTH OIL SITE

Common Name	Scientific Name	Relative Abundance
Largemouth Bass	Micropterus salimoides	Common
Smallmouth Bass	Micropterus dolomieui	Common
Northern Pike	Esox lucius	Common
Muskellunge	Esox masquinongy	Present
Wallege	Stizostedion vitreum	Rare
White Crappie	Pomoxis annularis	Variable
Black Crappie	Pomoxis nigromaculatus	Variable
Yellow Perch	Perca flavescens	Variable
Brown Bullhead	Ictalusos nebulosus	Variable
Rock Bass	Ambloplites rupestris	Variable
White Bass	Morone chrysops	Present
Carp	Cyprinus carpio	Common
Rednose Sucker	Moxostoma carinatum	Common
Common Sucker	Catostomus commersoni	Common
Emerald Shiner	Notropis atherinoides	Common
Golden Shiner	Notemigonus crysoleucas	Common
Darters	Etheostoma spp.	Common
Bluntnose Minnows	Pimephales notratus	Common
Logperch	Percina caproides	Rare
Pumpkinseed Sunfish	Lepomis gibbosus	Common
Bluegill Sunfish	Lepomis macrochirus	Common
Daces	Clinostomus spp.	Common
Daces	Rhinichthys spp.	Common
American Eel	Anguilla rostrata	Common
Rainbow Trout	Salmo gairdnerl	Present
Brown Trout	Salmo trutta	Seasonal
Coho Salmon	Oncorhynchus kitsutch	Seasonal
Goldfish	Carassius auratus	Present
Grizzard Shad	Dorosoma cepedianium	Present
American Shad	Alosa sapidissium	Present
Lake Whitefish	Loregonus clupeaformis	Present
Smelts	Osmerus spp.	Common

Source: Personal communication with NYSDEC Region 9 biologists.

The City of North Tonawanda is serviced by separate storm water and sanitary sewer systems. Storm water runoff in the City is collected in storm sewers, which discharge into surface water bodies via numerous outfalls. Runoff from the Booth Oil Site discharges into a catch basin located along the southern property boundary of the site and empties into the Little River via the Robinson Street outfall pipe. This may be a source of contaminant migration from the site which might impact upon surface water quality in the area.

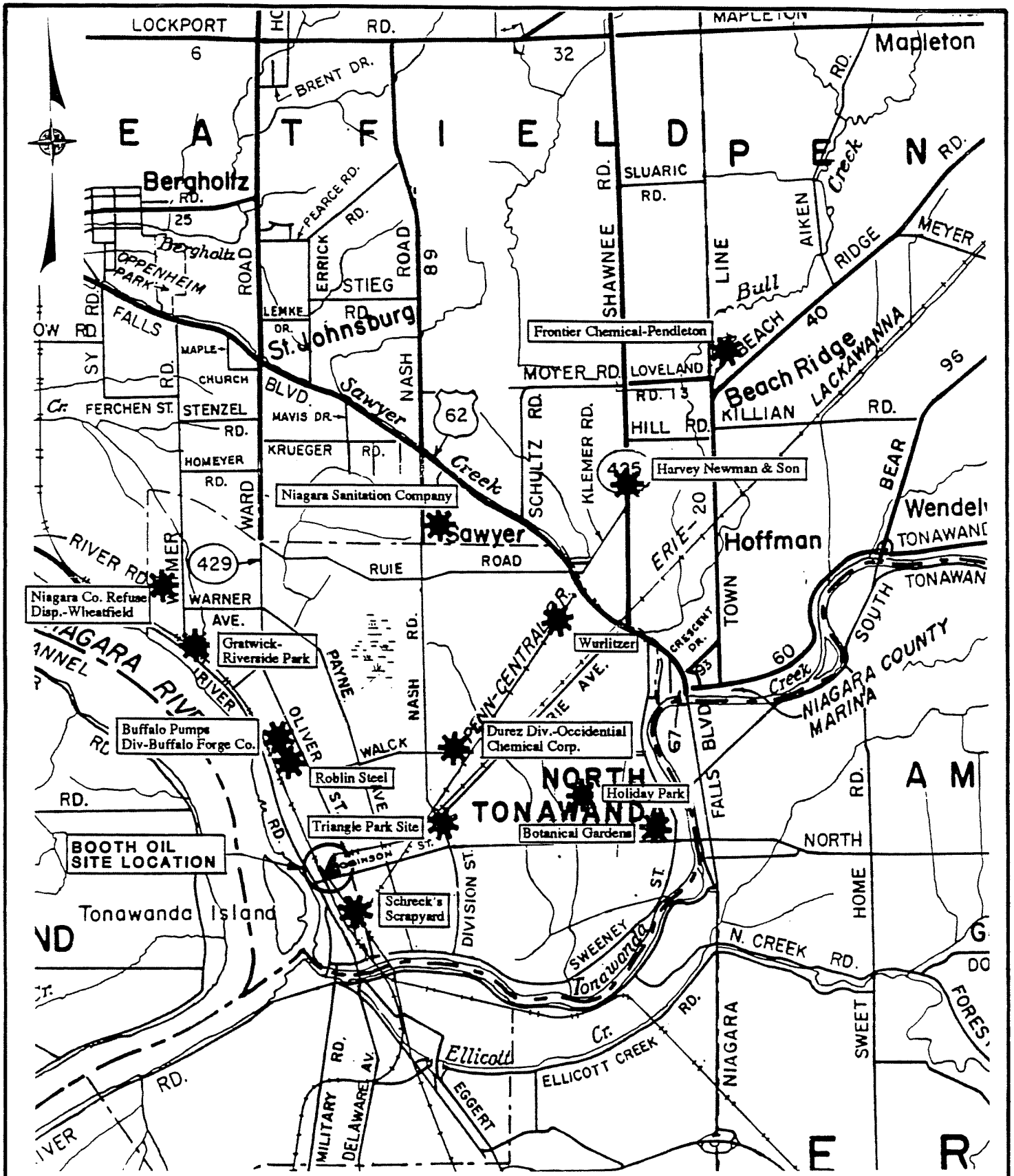
In addition to the Booth Oil Site, there are 12 listed hazardous waste sites in the general vicinity (see Figure 3-16). Although the degree is not known, these sites, as well as non-point runoff, may contribute to the degradation of water quality in area surface waters due to storm water runoff and groundwater discharges. A description of the inactive hazardous waste sites in the vicinity of the Booth Oil Site is presented in Table 3-12.

3.2.2.3 - Endangered Species and Significant Habitats

There were no threatened or endangered plant or animal species noted on-site within the study area. In addition, the Booth Oil Site does not contain any critical habitats as designated by the NYSDEC.

Section 1.2.2.9 of this report summarizes the results of a New York Natural Heritage Program file review requested for this investigation. As noted in that section, one critical habitat (Grand Island Tributaries), a threatened botanical species (Stiff-leaf Goldenrod) and an unprotected species (Calamint) are known to exist or have existed near the site.

As noted previously, the Grand Island Tributaries is a significant fish and wildlife habitat located west of the Booth Oil Site on Grand Island. This habitat unit consists of portions of four major tributary streams (Woods Creek, Gun Creek, Spicer Creek and Big Sixmite Creek) and their associated wetlands. These creeks and wetlands provide important spawning and nursery areas for warm water fish species, especially northern pike. Other fish species inhabiting the tributary system include black crappie (Pomoxis nigromaculatus), bullheads (Ictalurus spp.), rock bass (Ambloplites rupestris), white sucker (Catostomus commersoni), smelt (Osmerus spp.) and muskellunge (Esox masquinongy). In addition, some locally significant wildlife may use the area, including nesting by mallard and wood ducks, feeding or resting by migrant waterfowl, and habitation by furbearers such as muskrat and raccoon.



SOURCE: NYSDEC

SCALE: 1" = 1 MILE

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

Dvirka and Bartlucci CONSULTING ENGINEERS

INACTIVE HAZARDOUS WASTE SITE LOCATIONS

FIGURE 3-16

Table 3-12

INACTIVE HAZARDOUS WASTE SITES
LOCATED IN THE VICINITY OF THE BOOTH OIL SITE

Site Number	Site Name	Classification Code	Period Associated with Hazardous Waste	Contents	Distance to Surface Water Course
932054	Niagara Sanitation Company	2a	1964-1968	Caustics, plating tank sludges, municipal waste	Approximately 1500 feet from Sawyer Creek
932041	Wurlitzer	2a	unknown	Possibly heavy metal sludges	Approximately 1500 feet from Sawyer Creek
932033	Holiday Park	2a	1960-1974	Municipal waste, industrial waste, including phenolic resins and molding compounds, incinerator ash	Approximately .75 miles from Tonawanda Creek
932068	Botanical Gardens	2a	1950s-1965	Municipal refuse, phenolic resins, molding compounds	Approximately 1500 feet from Tonawanda Creek
932018	Durez Div.-Occidental Chemical Corp.	2	1930-1973	Chemical wastes (type not listed)	Approximately 1.5 miles from Niagara River
932059	Roblin Steel	2a	1961-1983	Phosphate sludge, waste oil, pickle liquor	Approximately 1000 feet Niagara River
932044	Buffalo Pumps Div.-Buffalo Forge Co.	2a	unknown-1970	Coal ash	Approximately 1000 feet from Niagara River

Table 3-12 (continued)

INACTIVE HAZARDOUS WASTE SITES
LOCATED IN THE VICINITY OF THE BOOTH OIL SITE

Site Number	Site Name	Classification Code	Period Associated with Hazardous Waste	Contents	Distance to Surface Water Course
932060	Gratwick-Riverside Park	2	1962-1968	Metallurgical sludge, municipal and industrial waste	Approximately 1000 feet from Niagara River
932026	Niagara Co. Refuse Disp.-Wheatfield	2	1968-1976	Municipal refuse, sewage sludge, industrial wastes	Approximately 0.5 miles from Niagara River
932099	Schrecks Scrapyard	2	1940's-1950's	Phenolic waste, scrap metals	Approximately 2000 feet from Little River
932043	Frontier Chemical-Pendleton	2a	No information available.		Approximately .75 miles from Sawyer Creek
932062	Harvey Newman & Son	2a	No information available.		Approximately 2 miles from Tonawanda Creek

Two New York State Natural Heritage plant species have been known to occur approximately 2 miles upstream from the Booth Oil Site along the eastern shore of the Niagara River. Stiff-leaf Goldenrod (Solidago rigida) is a New York threatened species last observed in the area in 1924. Also observed in the area is the unprotected plant species Calamint (Calamintha arkansana) which has been listed due to its rarity in northwestern New York State.

3.2.2.4 - Wild, Scenic and Recreational Rivers

None on the rivers, streams or tributaries in the vicinity of the Booth Oil Site have been designated by the New York State Legislature as Wild, Scenic or Recreational Rivers.

3.2.3 Site Resource Characterization

This section provides, in a qualitative fashion, an assessment of the environmental resources and resource value of the habitats found at the Booth Oil Site.

3.2.3.1 - Overall Habitat Quality

The overall habitat quality of the site must be considered poor. The majority of the overall habitat on site is degraded precluding extensive use by wildlife.

3.2.3.2 - Site Induced Stresses

The entire site has been previously stressed by site development including past Booth Oil structures and activities, railroad track development and other aspects of past site use. Vegetative clearing for these activities is the major site induced stress to previous ecological communities. In addition, areas of soil discoloration and attendant lack of vegetative growth, noted during field reconnaissance activities, signifies continued site induced stresses to revegetation.

3.2.3.3 - Habitat Values of Vegetative Zones

The complete assessment of habitat values of the respective vegetative covertypes encountered in the former Booth Oil Site is an involved process and is outside the scope of the present effort. In general, the assessment of habitat value provides for assessments of primary functions, such as food chain production, specialized habitat and hydrologic interactions. As part of the analysis, cultural values concerning recreation, aesthetics or other special features must also be taken into consideration.

Notwithstanding the above, based on the information gathered during the Phase I RI, a simple qualitative approach can be taken to establish a hierarchy of habitat values for the vegetative covertypes found at the Booth Oil Site. It should be noted that this approach is a very subjective process; those functions assumed to be valuable in relative efficiency or importance are ranked as a 3 - high, 2 - moderate, 1 - low, and 0 - none. Specific factors and brief descriptions which were utilized in the habitat value analysis of the Booth Oil Site qualitative evaluation are as follows:

- Food Chain Production - This factor determines the growth of vegetation in a habitat and influences the populations and secondary productivity of animals that feed on the plants, or that feed at high trophic levels in the community.

- Primary Productivity - Primary productivity is a measure of the stored food potential of the vegetation in excess of that used by the plants in metabolism. This determination provides an overall measure of the energy input directly available to the consumer species. It should be noted that the possible range of productivity values, both within and between particular environments, is extremely variable and dependent on a number of local conditions. For the present analysis, literature values for primary productivity as a function of biomass were utilized.

- Nutrient Transport Function - Transport of nutrients in detrital-based food chains is strongly dependent on the hydrologic characteristics of the particular ecosystem. For example, wetlands located in lower lying areas export more detrital material than do the higher marsh areas infrequently affected by creek/river overflow. Similarly, detrital transport in riverine systems is dependent on the river flow regime, especially during periods of peak discharge. In contrast, very little detrital material is exported from isolated ponds and marshes, except during periods of episodic overflow resulting from exceptionally high precipitation.

- Food Chain Support - This function refers to the secondary productivity values of consumer species that a particular ecosystem can support. Secondary productivity is an overall measure of the efficiency of the habitat in terms of available nutrients to higher trophic levels.

- Hydroperiod - This factor refers to the frequency of inundation either by river flow runoff or direct precipitation. Areas of good hydrologic linkage help maintain a regular interchange of nutrients and other materials necessary to support diverse flora and fauna.

- Elevational Location - From the above, it is apparent that hydrologic relationships will progressively deteriorate as the depth of flooding decreases. The weakest hydrologic linkages exist in those areas physically isolated from other areas in the system.

- Vegetative Characteristics - The effectiveness of wetland vegetation to abate erosion depends in part on the width of the vegetated area and its ability to reduce water energy through buffering. However, it must be emphasized that this factor is extremely variable and dependent upon location, width of the buffer zone, and vegetation type.

- o Cultural Evaluation - This particular factor is difficult to assess in specific detail because of the number of socio-economic considerations which may be involved. Hence, the evaluation in relation to local residential, commercial or industrial development is largely left to the professional judgment of the field personnel on a specific case-by-case basis.

- o Recreation - Recreation is a vital personal and social need which provides opportunity for self expression, physical exercise and a change of pace from normal or routine activities. Outdoor recreation is a major leisure activity and is growing in national importance with a trend towards a higher standard of living. A significant portion of the total recreational output is water-based or water-related. As such, greater weight is given to those types of habitats.

- o Socio - Economic - This factor pertains to benefits which can be attributed directly to renewable resources, recreational enjoyment or other features associated with a particular habitat.

- o Aesthetics - Selected types of habitats are distinctive landscape features which can please the aesthetic sense through the intrinsic appreciation of natural beauty. Wetlands, or any other type of natural landscape, can also be offensive if their features have been adversely modified by incompatible human activities. Aesthetic value can be largely determined by the degree of visual diversity and contrast between the physical elements, such as landforms, waterbodies, vegetation types and land use types.

- o Water Purification Factor - Through a variety of physical, biological and chemical processes, some habitats function to naturally purify water by removing organic and mineral particulate matter from runoff and/or rivers and streams. For example, wetlands may be significant in minimizing some of the harmful effects of pollutants introduced into natural ecological systems by the activities of man. Thus, wetlands, especially when part of riverine or estuarine systems, can be an integral part of water quality and pollution control objectives.

Based upon the above factors, an attempt to provide a qualitative analysis of the habitat value of the vegetative communities at the Booth Oil Site is presented in Table No. 3-13. Based upon these results, those habitats in descending order from high to low value are as follows:

- o Unmowed grassland habitat,
- o Mowed grassland habitat,
- o Scrub/shrub communities; and
- o Disturbed lands.

Table No. 3-13

QUALITATIVE HABITAT VALUES*
BOOTH OIL SITE

Evaluation Factors	Disturbed Lands	Grasslands (Mowed Areas)	Grasslands (Unmowed Areas)	Scrub/ Shrub
Food Chain Production				
Primary Productivity	0	1	2	1
Nutrient Transport	0	1	1	1
Food Chain Support (i.e., Nesting, etc.)	0	1	1	1
Hydroperiod	0	0	0	0
Elevational Location	0	0	0	0
Vegetative Characteristics	0	1	1	1
Cultural Evaluation	0	1	1	1
Recreation	0	1	1	0
Socio - Economic	0	1	1	0
Aesthetics	0	1	1	0
Water Purification Factor	0	0	0	0
TOTALS	0	8	9	5

*Scoring is as follows:

3 - high value
2 - moderate value
1 - low value
0 - none

Section 4

4.0 NATURE AND EXTENT OF CONTAMINATION

4.1 Identification of Standards, Criteria and Guidance Values (SCGs)

The National Contingency Plan (NCP) requires a determination of the extent to which federal, state or local public health and environmental standards are applicable or relevant and appropriate to each National Priorities List (NPL) site. Federal and state advisories, criteria and guidance must be reviewed to determine if they are applicable, relevant or appropriate with respect to the development and selection of remedial actions at an NPL site. These applicale or relevant and appropriate requirements are commonly referred to as ARARs. Although the Booth Oil Site is a New York State Superfund site and not an NPL site, this RI/FS is being conducted in accordance with CERCLA and SARA. Therefore, ARARs or SCGs (standards, criteria and guidelines) as specified by the New York State Department of Environmental Conservation will be identified and used, as appropriate. Since NYSDEC is the lead agency managing the Booth Oil project, only New York State standards and guidelines, where applicable, will be presented and discussed in this report.

Groundwater and surface water standards and guidance values identified for the Booth Oil Site are taken from the NYSDEC Technical and Operational Guidance Series (TOGS) - Ambient Water Quality Standards and Guidance Values. (A copy of the September 25, 1990 TOGS is contained in Appendix F.) The NYSDEC TOGS Water Quality Standards (ST) and Guidance Values (GV) provide ambient pollutant concentrations developed to protect New York State groundwater and surface water and refers to their best classified usage. Analytical results obtained for surface water and groundwater samples are compared to Class C and D and Class GA Groundwater Standards and Guidance Values, respectively. The Phase I analytical results have been compared to the April 1, 1987 TOGS and the Phase II analytical results have been compared to the September 25, 1990 TOGS. No difference in conclusions related to the use of the different TOGS have been identified.

For the review and interpretation of soil and a majority of the sediment analytical results, soil cleanup criteria guidelines have been determined for many of the Target Compound List (TCL)+30 volatile and semivolatile organic compounds. Soil cleanup criteria guidelines are established to ensure that NYSDEC Class GA Groundwater Standards or Guidance Values are not exceeded. Soil cleanup criteria guidelines are but one factor in considering cleanup levels for compounds for soil. The health risk assessment also provides guidance in selecting final

cleanup criteria for the soil and sediment medium. The soil cleanup criteria guideline for a particular compound is a function of the organic content fraction of the soil at the site, compound solubility, soil sorption coefficient (Koc) and the Class GA Groundwater Standard or Guidance Value from the TOGS dated April 1, 1987. The soil at the Booth Oil Site is classified by the Soil Conservation Service of Niagara County, New York as primarily soils of the Canandaigua-Raynham-Rhinebeck Association. In Niagara County, the soils so classified contain approximately 4 to 6 percent organic content. During the Phase II RI field program, eight subsurface soil samples were collected and analyzed for total organic carbon (TOC). The results indicate that the soils contain approximately 3 to 8 percent TOC. A 5 percent organic content in the soil is determined to represent a reasonable concentration for use in determining soil cleanup criteria guidelines for compounds present at the site. The methodology used to calculate the guidelines was obtained from a technical publication entitled, "Relationship Between Water Solubility, Soil Sorption, Octanol-Water Partitioning and Concentration of Chemicals in Biota," by E.E. Kenaga and G.A.F. Goring. Appendix G provides a copy of this publication and the method of calculation and tabulated results.

Soil cleanup criteria guidelines were also determined for several PCB arochlors and pesticide compounds. Although the Class GA Groundwater Standards/Guidance Values for these compounds are quite low (i.e. typically less than 1 ug/l), the Koc values yield substantially high cleanup guidelines. For PCBs and pesticides, action levels based on a health risk evaluation will likely provide appropriate cleanup levels, protective of human health and the environment.

With respect to metals present at the site, the New Jersey Department of Environmental Protection (NJDEP) has established soil cleanup guidelines. These guidelines will be used for the interpretation of analytical data for metals for the soil medium at the Booth Oil Site. The guidelines are presetned in Table 4-1.

The hazardous waste characteristics including ignitability, corrosivity, reactivity and E.P. Toxicity metals as defined by the Resource Conservation and Recovery Act (RCRA) provide regulatory levels for use in reviewing and interpreting analytical data obtained from the analysis of soil and sediment. Table 4-2 provides a list of these levels. The United States Environmental Protection Agency instituted the Toxicity Characteristic Leaching Procedure (TCLP) rule as the primary mechanism used to determine characteristic hazardous waste in lieu of utilizing the

Table 4-1

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION (NJDEP)
SOIL CLEANUP GUIDELINES FOR METALS

Metals	Soil Concentration (mg/kg)
Arsenic	20
Barium	--
Cadmium	3
Chromium	100
Copper	170
Lead	250
Mercury	1
Nickel	100
Selenium	4
Silver	5
Zinc	350

Table 4-2

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA) CHARACTERISTIC WASTE - REGULATORY LEVELS

Parameter	Limit
Ignitability	Flash Point less than 60°C (140°F)
Corrosivity	pH less than or equal to 2.0 or greater than or equal to 12.5
Reactivity	Cyanide or sulfide bearing waste, which when exposed to pH conditions between 2.0 and 12.5 generates toxic gases

E.P. Toxicity

Compounds	Regulatory Levels (mg/l)
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0
Endrin	0.02
Lindane	0.4
Methoxychlor	10.0
Toxaphene	0.5
2,4-D	10.0
2,4,5-TP (silvex)	1.0

Table 4-3

TCLP CONSTITUENTS AND REGULATORY LEVELS

Constituent	Regulatory Levels (mg/1)
Arsenic[1]	5.0
Barium[1]	100.0
Benzene	0.5
Cadmium[1]	1.0
Carbon tetrachloride	0.5
Chlordane	0.03
Chlorobenzene	100.0
Chloroform	6.0
Chromium	5.0
o-Cresol	200.0
m-Cresol	200.0
p-Cresol	200.0
Creosol	200.0
2,4-D1	10.0
1,4-Dichlorobenzene	7.5
1,2-Dichloroethane	0.5
1,1-Dichloroethylene	0.7
2,4-Dinitrotoluene	0.13
Endrin[1]	0.02
Heptachlor (and its hydroxide)	0.008
Hexachlorobenzene	0.13
Hexachloro-,3-butadiene	0.5
Hexachloroethane	3.0
Lead[1]	5.0
Lindane[1]	0.4
Mercury[1]	0.2
Methoxychlor[1]	10.0
Methyl ethyl ketone	200.0
Nitrobenzene	2.0
Pentachlorophenol	100.0
Pyridine	5.0
Selenium[1]	1.0
Silver[1]	5.0
Tetrachloroethylene	0.7
Toxaphene[1]	0.5
Trichloroethene	0.5
2,4,5-Trichlorophenol	400.0
2,4,6-Trichlorophenol	2.0
2,4,5-TP (Silvex)[1]	1.0
Vinyl chloride	0.2

[1] Constituents identified with the Extraction Procedure (EP) Toxicity Test

Extraction Procedure Toxicity Test. The impact of this rule for Superfund sites will be primarily on the management requirements for soil and debris generated during investigation or remediation activities. The performance of this test may be appropriate prior to disposal of investigation and construction related wastes. Table 4-3 lists the TCLP constituents and corresponding regulatory levels.

4.1.1 Groundwater

With respect to groundwater, the NYSDEC Class GA Groundwater Standards and Guidance Values provide regulatory levels for compounds which exist in groundwater. These standards and guidance values are listed with the analytical data reported in data tables presented in subsections 4.3 and 4.4.

4.1.2 Surface Water

With respect to surface water, the NYSDEC Classes A, C, and D Surface Water Standards and Guidance Values provide regulatory levels for compounds which exist in surface water. These standards and guidance values are listed with the analytical data reported in data tables presented in subsections 4.3 and 4.4.

4.1.3 Soil

With respect to soils, the soil cleanup criteria guidelines determined using the partition coefficient theory and the methodology available from E.E. Kenaga and G.A.I. Goring provide guidelines for the protection of Class GA groundwater. These values are tabulated and appear with the analytical data reported in data tables presented in subsections 4.3 and 4.4. The calculations used to establish the values are contained in Appendix G.

4.1.4 Sediment

With respect to sediment, the soil cleanup criteria guidelines determined using the partition coefficient theory and the methodology available from E.E. Kenaga and G.A.I. Goring provide guidelines for the protection of Class GA groundwater. These values are tabulated and appear with the analytical data reported in data tables presented in subsections 4.3 and 4.4. In consultation with the NYSDEC with regard to compounds found in sediment samples obtained from the Little River, the analytical data are presented to provide the NYSDEC with information to draw conclusions and make recommendations concerning remediation of River sediments, as appropriate.

4.1.5 Air

Regulatory levels for contaminants found in ambient air are those listed in the NYSDEC's Air Guide-1: Guidelines for the Control of Toxic Ambient Air Contaminants. This document lists Ambient Guideline Concentrations (AGCs) to be utilized as guidance values, not standards. These guideline values have been determined either by the NYSDEC or the New York State Department of Health (NYSDOH), or are derived from the American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Value - Time Weighted Averages (TLV-TWA, or TLV). The Air Guide-1 document also incorporates federal standards for criteria pollutants, and National Emission Standards for Hazardous Air Pollutants (NESHAPs). A copy of the Air Guide-1 is presented in Appendix H. The document entitled "Air Cleanup Criteria," prepared by the NYSDEC's Division of Air Resources, provides action limits for a number of volatile organic compounds and parameters to be used to assess health and safety impacts during remediation activities. Air samples collected during the Phase II RI are compared to both of these guidance documents as appropriate.

All SCGs identified at this time are subject to modification based on the results of the final health risk assessment for the Booth Oil Site.

4.2 Data Validation

4.2.1 Phase I Data Validation

All data resulting from samples analyzed for the Target Compound List (TCL+30) parameters, corrosivity, ignitability, EP Toxicity metals, total petroleum hydrocarbons and treatability study parameters were validated according to the 1989 New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP). However, due to the difficulty in meeting the NYSDEC 1989 ASP calibration criteria for a number of compounds in certain media, the criteria listed in the "Statement of Work 3/90 CLP" was followed instead. This remedy was discussed with the NYSDEC and was approved.

As a result of data validation, all 62 environmental samples collected as part of the Phase I RI field program (including 10 field/trip blanks) were found to be in compliance with ASP Quality Assurance and Quality Control (QA/QC) procedures.

Due to poor (generally low) surrogate compound and/or internal standard recoveries, re-extraction and/or reanalysis of 13 samples was required. Sometimes these procedures occurred after the expiration of ASP holding times. In these instances, both sets of results were reviewed with a formal validation performed only on the "best" set of data, which is discussed in detail below. (This procedure was conducted with the NYSDEC approval.) A number of these samples experienced low or no surrogate spike recoveries and low internal standard area counts due to matrix interference. A summary of the results of the data validation is presented in Table 4-4.

The samples characterized as nonaqueous phase liquids (NAPL), BO-UST-2, BO-UST-3 and BO-MW-8-GW0, were not analyzed within the strict ASP guidelines. All deviations were approved by the NYSDEC based upon the nature of the sample matrices. Each deviation is explained in the data usability report, which is included in Appendix I, Volume III.

As mentioned above, the results of a number of samples were found not to be in compliance with the ASP. The reasons for noncompliance included poor surrogate/standard recoveries, violation of holding times due to re-extraction and/or reanalysis, or that samples were in compliance with the ASP but experienced matrix interference. In each case, both the results of the first and second extraction and/or analysis were reviewed to determine data usability. Data usability was based primarily upon a determination of which sample analysis exhibited the best surrogate spike and internal standard recoveries and therefore, would be most accurate. Less importance was given to holding times (as long as the holding time did not exceed seven to ten days beyond ASP requirements, in particular for solid samples). In instances where the sample spike recoveries were approximately the same for the initial analysis and reanalysis, the initial analysis was selected for environmental assessment. For those samples where the recoveries were significantly better for the re-extraction/reanalysis, the second set of analytical data was chosen as being more accurate and used for assessment purposes. The data validation reports, from which the data usability report is based, can be found in Appendix J, Volume III.

As shown in the data tables contained in this Section 4.0, the data obtained from the initial analysis and reanalysis sometimes provided different results. However, none of the differences were sufficient to alter the basic findings regarding environmental assessment, or should influence the recommended remedial action for this project. (It should also be noted that, because of the nonhomogeneity of many of the sample matrices at the site, in particular, waste oil, soil, sediment and groundwater, and possible differences in laboratory conditions and equipment between the initial sample analysis and reanalysis, variation in the analytical results is expected.)

Table 4-4

BOOTH OIL PHASE I RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group Number	Sample Number	Matrix	VOA	BNA	Pest/PCB	TCL Metals	RCRA	TPHC
JB1354	BOSS1S	Soil	NA	NA	OK*	NA	OK	OK
	BOSS2S	Soil	NA	NA	OK*	NA	OK	OK
	BOSS3S	Soil	NA	NA	OK*	NA	OK	NA
	BOSS4S	Soil	NA	NA	OK*	NA	OK	NA
	BOSS5S	Soil	OK see note 1	OK	OK	OK see notes 2,3,4	OK	NA
	BOSS6S	Soil	OK	OK	OK	OK see notes 2,3,4	OK	NA
	BOSS7S	Soil	OK	OK	OK	OK see notes 2,3,4	OK	OK
	BOSS8S	Soil	OK	OK	OK	OK see notes 2,3,4	OK	OK
	BOSS9S	Soil	NA	NA	OK*	NA	OK	NA
	BOSS10S	Soil	OK see note 5	OK see note 5	OK	OK see notes 2,3,4	OK	NA
	BOSS11S	Soil	OK see note 6	OK	OK	OK see notes 2,3,4	NA	NA
	BOSS12S	Soil	OK	OK	OK	OK see notes 2,3,4	NA	NA
	BOSS13S	Soil	OK	OK	OK	OK see notes 2,3,4	NA	NA
	BOSS14S	Soil	NA	NA	OK*	NA	NA	NA
	BOSSFB	Water	OK	OK	OK	OK see notes 2,4	NA	OK
	BOCB1SD	Soil	NA	NA	OK*	NA	OK	OK
	BOCB2SD	Soil	NA	NA	OK*	NA	OK	NA
	BOCB3SD	Soil	OK see note 6	OK see note 5	OK	OK see notes 2,3,4	OK	OK
	BOCB5SD	Soil	NA	NA	OK*	NA	OK	OK
	BOCB1SN	Water	OK	OK	OK	OK see notes 2,4	NA	OK
	BOCB3SW	Water	OK	OK	OK	OK see notes 2,4	NA	OK
	BOCB5SW	Water	OK	OK	OK	OK see notes 2,4	NA	OK
	BOCBFB	Water	OK	OK	OK	OK see notes 2,4	NA	OK
	Trip Blank 6/26	Water	OK	NA	NA	NA	NA	NA
	Trip Blank 6/27	Water	OK	NA	NA	NA	NA	NA
SDG1354A	BOUST2	NAPL	OK	OK see note 9	OK see note 9	OK see notes 2,4,7,8	OK	OK
	BOUST3	NAPL	OK see note 6	OK see note 9	OK see note 9	OK see notes 2,4,7	OK	OK
	BOMW6S (1-4)	Soil	OK	OK see note 1	OK	OK see notes 2,3	OK	OK
	BOMW7S (5-7)	Soil	OK	OK see note 6	OK	OK see notes 2,3	OK see note 10	OK
	BOSB2S (6-8)	Soil	NA	NA	OK*	NA	OK see note 10	NA
	BOSB5S (3-7.5)	Soil	OK	OK see note 5	OK	OK see notes 2,3	OK	OK
	BOSB8S (2-4)	Soil	NA	NA	OK*	NA	OK see note 10	OK
	BOSB10S (0-2)	Soil	OK	OK see note 5	OK	OK see notes 2,3	OK	OK
	BOSB11S (2-4)	Soil	NA	NA	NA	NA	OK see note 10	OK
	Trip Blank 6/28	Water	OK	NA	NA	NA	NA	NA

Table 4-4 (continued)

BOOTH OIL PHASE I RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group Number	Sample Number	Matrix	VOA	BNA	Pest/PCB	TCL Metals	RCRA	TPHC
SDG1354B	BOMW1S (0-2)	Soil	OK	OK see note 5	OK	OK see note 2	OK see note 10	OK
	BOMW9S (0-2)	Soil	NA	NA	OK*	NA	OK see note 10	OK
	BOSB4S (6-8)	Soil	NA	NA	OK*	NA	OK see note 10	OK
	BOSB9S (11-13)	Soil	OK	OK see note 5	OK	OK see note 2	OK see note 10	OK
	BOSB1S (7-9)	Soil	OK	OK see note 6	OK	OK see note 2	OK see note 10	OK
	BOSB4S (11-13)	Soil	OK	OK	OK	OK see note 2	NA	NA
	BOMW9GW	Water	OK	OK see note 5	OK	NA	NA	NA
	BOSBFB	Water	OK	OK	OK	NA	NA	NA
	Trip Blank 7/13	Water	OK	NA	NA	NA	NA	NA
SDG1354C	BOMW8S (2-4)	Soil	NA	NA	OK*	NA	OK	NA
	BOMW5S (4-6)	Soil	OK	OK see note 6	OK	OK see note 2,3,4	OK	NA
	BOMW4S (0-2)	Soil	NA	NA	OK*	NA	OK	NA
	BOSSTS	Soil	----------Treatability Study----------					
	BOSB12S (2-4)	Soil	OK see note 6	OK	OK	OK see notes 2,3,4	OK	NA
	BOSB7S (2-4)	Soil	OK	OK see note 5	OK	OK see notes 2,3,4	OK	NA
	Trip Blank 7/16	Water	OK	NA	NA	NA	NA	NA
1529	BOMW1GW	Water	OK	OK	OK	OK see note 2	NA	OK
	BOMW2GW	Water	OK	OK	OK	OK see note 2	NA	OK
	BOMW4GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW5GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW6GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW7GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW8GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW9GW	Water	OK	OK	OK	OK see notes 2,7	NA	OK
	BOMW8GW0	Water	OK see note 11	OK	OK	OK see note 2	NA	OK
	BOFBGW	Water	OK	OK	OK	OK	NA	OK
	BOTB	Water	OK	NA	NA	NA	NA	NA

While both sets of results are presented in the data tables, only the results determined to be the most accurate and/or in compliance with the ASP are used in the presentation/discussion of the results of site characterization in subsection 4.3.

Estimated data which has been qualified follows a certain trend. Organic data, specifically that involving BNA analysis, is typically biased low because of low internal standard area counts and low surrogate recoveries. Metal results are biased either high or low based on matrix spike recoveries. However, the results reported for both organic and data are believed to be accurate within $\pm$20%.

Table Qualifiers:

OK - No problems were found with the data.

OK - See Note # - The data contractually complies 100% with the NYSDEC 1989 ASP. However, the sample was analyzed twice because of matrix interference which required a determination as to which sample set provides the more accurate data. Check the listing below for a more detailed explanation.

Notes:

*Only PCB analysis was required.

1. Internal standard area counts were below QC limits, but the sample was analyzed as the matrix spike and matrix spike duplicate. No reanalysis was required.
2. Poor matrix spike recoveries. Data is estimated.
3. Poor duplicate recoveries. Data is estimated.
4. High percent differences for serial dilutions. Data is estimated.
5. Both initial analysis and reanalysis had internal standard area counts below QC limits, with the initial analysis achieving a higher level of compliance with the ASP.
6. Both initial analysis and reanalysis had internal standard area counts outside QC limits, with the reanalysis achieving a higher level of compliance with the ASP.
7. Compounds present in blank. Data is estimated.
8. Graphite Furnace Atomic Absorption (GFAA) analysis spike below QC limits. Data is estimated for matrix spike compounds.
9. Extraction holding time exceeded by one day.
10. Poor Initial Calibration Standard (ICS) results. Data is estimated.
11. Analyzed one day outside of holding times.

4.2.2 Phase II Data Validation

All data resulting from samples collected during the Phase II Remedial Investigation and analyzed for the Target Compound List (TCL+30) parameters, PCBs, TCLP VOA, TCLP BNA and total organic carbon were validated according to the 1989 New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP). However, due to the difficulty in meeting the NYSDEC 1989 ASP calibration criteria for a number of compounds, the criteria listed in the "Statement of Work 3/90 CLP" was followed instead. This remedy was discussed with NYSDEC and was approved.

As a result of data validation, all 56 environmental samples collected as part of the Phase II RI field program (including 6 field/trip blanks) were found to be in compliance with ASP Quality Assurance and Quality Control (QA/QC) procedures.

Due to poor (generally low) surrogate compound and/or internal standard recoveries, re-extraction and/or reanalysis of 11 samples was required. In these instances, both sets of results were reviewed with a formal validation performed only on the "best" set of data which is discussed in detail below. A number of these samples experienced low or no surrogate spike recoveries and low internal standard area counts due to matrix interference. A summary of the results of the data validation is presented in Table 4-5.

The sample characterized as a nonaqueous phase liquid (NAPL), BO-MW-8-GW0, was not analyzed within the strict ASP guidelines. All deviations were approved by the NYSDEC based upon the nature of the sample matrix.

As mentioned above, the results of the initial analysis of a number of samples were found not to be in complete compliance with the ASP. The reasons for noncompliance included poor surrogate/standard recoveries, or that samples were in compliance with the ASP but experienced matrix interference. For all noncompliant samples reanalysis and/or re-extraction was performed. In each case, both the results of the first and second extraction and/or analysis were reviewed to determine data usability. Data usability was based primarily upon a determination of which sample analysis exhibited the best surrogate spike and internal standard recoveries and therefore, would be most accurate. In instances where the sample spike recoveries were approximately the same for the initial analysis and reanalysis, the initial analysis was selected for environmental assessment. For those samples where the recoveries were significantly better for the re-extraction/reanalysis, the second set of analytical data was chosen as being more accurate and used for assessment purposes. The data validation reports for the Phase II RI, from which the data usability report is based, can be found in Appendix J, Volume III.

Table 4-5

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0231	BOMW15S	Soil	NA	NA	NA	NA	NA	NA	OK
	BOSB5A	Air	OK	NA	NA	NA	NA	NA	NA
	BOSB5BS	Soil	NA	NA	NA	NA	NA	OK	NA
	BOSB5CS	Soil	OK	OK	OK	NA	OK (see note 1,2)	NA	NA
	BOSB5CAS	Soil	OK	OK	OK	OK	OK (see note 1,2)	NA	NA
	BOSB5HA	Air	OK see note 3	NA	NA	NA	NA	NA	NA
	BOSB5LA	Air	OK	NA	NA	NA	NA	NA	NA
	BOSS15S	Soil	NA	NA	OK*	NA	NA	NA	NA
	BOSS16S	Soil	NA	NA	OK*	NA	NA	NA	NA
	BOSS19S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS20S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS21S	Soil	OK	OK (see note 5)	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS22S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA

Table 4-5 (continued)

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0231	BOSS23S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS24S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS25S	Soil	OK	OK (see note 6)	OK (see note 7)	OK (see note 1,2,4)	NA	NA	NA
	BOSS26S	Soil	NA	NA	NA	OK (see note 1,2,4)	NA	NA	NA
	BOTB1113	Water	OK	NA	NA	NA	NA	NA	NA

Table 4-5 (continued)

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0231A	BOLR1SD	Soil	OK (see note 8)	OK (see note 9)	OK	OK (see note 1,2,4)	NA	NA	NA
	BOLR2SD	Soil	OK (see note 8)	OK (see note 9)	OK	OK (see note 1,2,4)	NA	NA	NA
	BOMH2SD	Soil	OK	OK (see note 9)	OK	NA	NA	NA	NA
	BOMH3SD	Soil	OK (see note 8)	OK (see note 9)	OK	NA	NA	NA	NA
	BOMH4SD	Soil	OK (see note 8)	OK (see note 5)	OK	NA	NA	NA	NA
	BOMH2SW	Water	OK	OK (see note 3)	OK	NA	NA	NA	NA
	BOMH3SW	Water	OK	OK (see note 10)	OK	NA	NA	NA	NA
	BOMH4SW	Water	OK	NA	NA	NA	NA	NA	NA
	BOMH6SW	Water	OK	NA	NA	NA	NA	NA	NA
	BOMW5A	Air	OK	NA	NA	NA	NA	NA	NA
	BOMW8A	Air	OK	NA	NA	NA	NA	NA	NA
	BOMW14S	Soil	NA	NA	NA	NA	NA	NA	OK
	BOSB15S	Soil	OK (see note 8)	OK (see note 6)	OK	NA	NA	NA	OK

Table 4-5 (continued)

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0231A	BOSB16S	Soil	NA	NA	NA	NA	OK	NA	NA
	BOSB20S	Soil	NA	NA	NA	NA	NA	NA	OK
	BOSB22S	Soil	NA	NA	NA	NA	NA	NA	OK
	BOSB23S	Soil	OK	OK (see note 3)	OK	NA	NA	NA	NA
	BOSS17S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOSS18S	Soil	OK	OK	OK	OK (see note 1,2,4)	NA	NA	NA
	BOFBA	Air	OK	NA	NA	NA	NA	NA	NA

Table 4-5 (continued)

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0231B	BOMW1GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW26W	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW4GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW5GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW6GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW7GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOMW9GW	Water	OK (see note 8)	NA	OK	NA	NA	NA	NA
	BOSB13S	Soil	NA	NA	NA	NA	NA	NA	OK
	BOSB24S	Soil	OK (see note 3)	OK	OK	NA	NA	NA	OK
	BOTB1116	Water	OK	NA	NA	NA	NA	NA	NA
	BOTB1120	Water	OK	NA	NA	NA	NA	NA	NA
	BOTB1128	Water	OK	NA	NA	NA	NA	Na	NA

Table 4-5 (continued)

BOOTH OIL PHASE II RI DATA VALIDATION SUMMARY
(CONTRACTUAL COMPLIANCE WITH 1989 NYSDEC ASP)

Group No.	Sample No.	Matrix	VOA	BNA	PEST/PCB	TCL Metal	TCLP BNA	TCLP VOA	TOC
0363	BOBKGAA	Air	OK	NA	NA	NA	NA	NA	NA
	BOBKGAB	Air	OK (see note 3)	NA	NA	NA	NA	NA	NA
	BOBKGAC	Air	OK	NA	NA	NA	NA	NA	NA
	BOBKGAD	Air	OK	NA	NA	NA	NA	NA	NA
	BOMW5GW	Water	NA	NA	OK	NA	NA	NA	NA
	BOMW8GW	Water	OK	NA	OK	NA	NA	NA	NA
	BOMW8GWO	NAPL	OK	NA	OK	OK (see note 4)	NA	NA	NA
	BOMW11GN	Water	OK	OK (see note 8)	OK	OK (see note 1)	NA	NA	NA
	BOMW12GW	Water	OK	OK	OK	OK (see note 1)	NA	NA	NA
	BOMW14GN	Water	OK	OK	OK	OK (see note 1)	NA	NA	NA
	BOMW18GN	Water	OK	OK	OK	OK (see note 1)	NA	NA	NA
	BOTB1212	Water	OK	NA	NA	NA	NA	NA	NA

NA = Not Applicable

As shown in the data tables contained in this section, the data obtained from the initial analysis and reanalysis sometimes provided different results. However, none of the differences were sufficient to alter the basic findings regarding environmental assessment, or should influence the recommended investigation/remedial action for this project. (It should also be noted that, because of the nonhomogeneity of many of the sample matrices at the site, in particular, waste oil, soil, sediment and groundwater, and possible differences in laboratory conditions and equipment between the initial sample analysis and reanalysis, variation in the analytical results is expected.) While both sets of results are presented in the data tables, only the results determined to be the most accurate and/or in compliance with the ASP are used in the presentation/discussion of the results of site characterization in subsection 4.4.

Estimated data which has been qualified follows a certain trend. Organic data, specifically that involving BNA analysis, is typically biased low because of low internal standard area counts and low surrogate recoveries. Metal results are biased either high or low based on matrix spike recoveries. However, the results reported for both organic and data are believed to be accurate within $\pm$20%.

Table Qualifiers:

OK - No problems were found with the data.

OK - See Note # - The data contractually complies 100% with the NYSDEC 1989 ASP. However, the sample may have been analyzed twice because of matrix interference which required a determination as to which sample set provides the more accurate data or there were specific QC requirements that were not met but no action was required. Check the listing below for a more detailed explanation.

Notes:

*Only PCB analysis was required.

1. Poor matrix spike recoveries. Data is estimated.
2. Poor duplicate recoveries. Data is estimated.
3. Both initial analysis and reanalysis had internal standard area counts below QC limits, with the initial analysis achieving a higher level of compliance with the ASP.
4. Compounds present in blank. Data is estimated.

5. Due to matrix interference acid/base partitioning was performed.

6. Continuing calibration did not meet "SOW 3/90" criteria. Data for fluorine is estimated.

7. Calibration criteria for confirmation column did not meet "SOW 3/90" criteria. Data for Aroclor 1248 and Aroclor 1260 is estimated.

8. Continuing calibration did not meet "SOW 3/90" requirements. Data is not effected.

9. Both initial analysis and reanalysis had internal standard area counts outside QC limits, with the reanalysis achieving a higher level of compliance with the ASP.

10. Internal standard area counts were below QC limits, but the sample was analyzed as the matrix spike and matrix spike duplicate. No reanalysis was required.

4.3 Results of Phase I Investigation Site Characterization

The analytical data for all sampling activities, which includes the analyses for TCL+30 organic compounds (volatile and semivolatile organic compounds, pesticides and PCBs), metals, Total Petroleum Hydrocarbons (TPH), RCRA Characteristics, and treatability screening, are presented in this subsection.

4.3.1 Surface Soil

A total of 14 surface soil samples were collected for analysis during the Phase I RI field program. The analytical data obtained for the surface soil sampling effort are presented in Tables 4-6 to 4-11. The locations of the surface soil samples collected during the Phase I RI field program are shown on Figure 2-6.

The analytical data obtained from the analysis of volatile organic compounds are presented in Table 4-6. Of the ten on-site soil samples collected, five were analyzed for TCL+30 organic compounds. Soil cleanup criteria guidelines were exceeded for several compounds in three of the ten on-site samples collected: BO-SS-5-S, BO-SS-6-S and BO-SS-8-S. The following volatile organic compounds were found to exist above the guidelines and were found in samples BO-SS-6-S and BO-SS-8-S at similar concentrations: 2-butanone, 1,2-dichloroethene (total), ethylbenzene, methylene chloride, tetrachloroethene, toluene and xylene (total). The compound

Table 4-6
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSS5S 6/26/90 (ug/kg)	BOSS6S* 6/26/90 (ug/kg)	BOSS7S 6/26/90 (ug/kg)	BOSS8S* 6/26/90 (ug/kg)	BOSS10S 6/26/90 (ug/kg)	BOSS10SRE 6/26/90 (ug/kg)	BOSS11S 6/26/90 (ug/kg)	BOSS11SRE 6/26/90 (ug/kg)	BOSS12S 6/26/90 (ug/kg)	BOSS13S 6/26/90 (ug/kg)	BOSSFB 6/26/90 (ug/l)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	35 B	1200 JB	27 B	1700 B	19 B	65 B	28 B	46 B	48 B	28 B	U	---
Benzene	4 J	370 J	U	U	U	U	U	U	U	U	U	---
Bromodichloromethane	U	U	U	U	U	U	U	U	U	U	U	---
Bromoform	U	U	U	U	U	U	U	U	U	U	U	245
Bromomethane	U	U	U	U	U	U	U	U	U	U	U	---
2-Butanone	7 J	1000 JB+	U	1100 JB+	U	U	U	U	U	U	U	10
Carbon Disulfide	5 J	U	U	90 J	U	U	U	U	U	U	U	168
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U	U	28
Chlorobenzene	U	U	U	U	U	U	U	U	U	U	U	152
Chloroethane	U	U	U	U	U	U	U	U	U	U	U	93
Chloroform	U	U	U	U	U	U	U	U	U	U	U	155
Chloromethane	U	U	U	U	U	U	U	U	U	U	U	85
Dibromochloromethane	U	U	U	U	U	U	U	U	U	U	U	---
1,1-Dichloroethane	U	U	U	780 +	U	U	U	U	U	U	U	100
1,1-Dichloroethene	U	230 J+	U	U	U	U	U	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U	U	1.24
1,2-Dichloroethene (total)	65 +	500 J+	U	160 +	7	12	U	U	U	U	U	32
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	142
Ethylbenzene	6	220 JB+	U	490 JB+	U	U	U	U	U	U	U	67
2-Hexanone	U	U	U	U	U	U	U	U	U	U	U	---
Methylene Chloride	U	310 JB+	4 JB	470 JB+	U	7 B+	5 JB	5 JB	6 JB+	4 JB	U	5
4-Methyl-2-pentanone	U	U	U	U	U	U	U	U	U	U	U	---
Styrene	U	U	U	U	U	U	U	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	U	U	U	0.54
Tetrachloroethene	7	1300 +	U	140 J+	3 J	5 J	U	U	U	U	U	8
Toluene	14	800 B+	U	860 B+	U	U	U	U	U	U	U	36
Trichloroethene	19	2300 +	U	U	U	U	U	U	U	U	U	24
1,1,1-Trichloroethane	U	U	U	68 J	U	U	U	U	U	U	U	150
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	U	U	U	U	U	U	U	48
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U	U	23
Xylene (total)	36	1200 B+	U	10000 B+	U	U	U	U	U	U	U	67

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
*: Samples analyzed at medium level
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-6 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSS5S 6/26/90 (ug/kg)	BOSS6S* 6/26/90 (ug/kg)	BOSS7S 6/26/90 (ug/kg)	BOSS8S* 6/26/90 (ug/kg)	BOSS10S 6/26/90 (ug/kg)	BOSS10SRE 6/26/90 (ug/kg)	BOSS11S 6/26/90 (ug/kg)	BOSS11SRE 6/26/90 (ug/kg)	BOSS12S 6/26/90 (ug/kg)	BOSS13S 6/26/90 (ug/kg)	BOSSFB 6/26/90 (ug/l)
Unknown	400 J	1000 J	ND	ND	12 J	14 J	ND	ND	ND	ND	ND
Unknown naphthalene	150 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkane	140 J	2000 J	ND	18000 J	11 J	ND	ND	ND	ND	ND	ND
Unknown alkene	130 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown naphthalene	100 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkane	100 J	1800 J	ND	15000 J	ND	ND	ND	ND	ND	ND	ND
Unknown alkene	89 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkane	80 J	950 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkene	77 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown cycloalkane	74 J	1100 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown freon	ND	ND	ND	ND	12 J	ND	ND	ND	ND	ND	ND
1-Propanol	ND	ND	ND	ND	ND	ND	ND	7 J	ND	ND	ND
Unknown alcohol	ND	ND	ND	ND	ND	ND	ND	ND	9 J	ND	ND
Unknown benzene	ND	1900 J	ND	17000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	1800 J	ND	15000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	1600 J	ND	15000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	1600 J	ND	13000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	1500 J	ND	12000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	ND	11000 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	ND	9200 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	ND	8600 J	ND	ND	ND	ND	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis
*: Samples analyzed at medium level

1,2-dichloroethene (total) was detected at 65 ug/kg in sample BO-SS-5-S, above the soil cleanup criteria guideline of 32 ug/kg. In addition, sample BO-SS-6-S had a level of trichloroethene of 2,300 ug/kg, which significantly exceeds the cleanup criter of 24 ug/kg. The total concentrations of all volatile organic compounds found in surface soil samples BO-SS-6-S and BO-SS-8-S which were found to exceed the guidelines are 7,640 ug/kg and 13,510 ug/kg, respectively. In the surface soil samples collected from the playground and residential areas (BO-SS-11-S, BO-SS-12-S and BO-SS-13-S), acetone and methylene chloride were the only two volatile organic compounds found. The results of these analyses were flagged with a "B" indicating that acetone and methylene chloride were found in the laboratory method blank. Since the concentrations of the compounds are quite low and no other volatile organic compounds were detected, it is likely that the presence of these compounds are due to laboratory contamination. Additionally, in sample BO-SS-8-S, there were relatively high levels of tentatively identified benzene compounds (8,600 ug/kg to 17,000 ug/kg).

The analytical data obtained from the analysis of semivolatile organic compounds are presented in Table 4-7. The soil cleanup criteria guidelines established for semivolatile organic compounds were exceeded at seven sampling locations. The semivolatile organic compounds which were found to exceed the guidelines that were predominantly found at a number of the sampling points include: benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, 2,4-dimethylphenol and indeno(1,2,3-cd)pyrene. Other compounds found above the guidelines include: benzo(a)anthracene, benzoic acid, 1,2-dichlorobenzene, naphthalene and phenol. Table 4-8 lists each surface soil sample collected for analysis of semivolatiles and the total concentration of semivolatile organic compounds in each sample in excess of the guidelines. (See Figure 2-6 which shows the locations of the surface soil sample locations.) In sample BO-SS-6-S, it should be noted that 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol and phenol were detected at concentrations of 66,000 ug/kg, 48,000 ug/kg, 360,000 ug/kg, and 210,000 ug/kg, respectively. From Table 4-7 it is determined that for the samples collected from the playground and residential areas (BO-SS-11-S, BO-SS-12-S and BO-SS-13-S), most of the compounds that were found to be present are polynuclear aromatic hydrocarbons (PAHs). It is important to note that the PAH compounds found in the playground are those typically encountered at many residential and commercial properties in the Buffalo, North Tonawanda and Niagara Falls areas. Based on a review of the data for tentatively identified semivolatile organic compounds, sample BO-SS-6-S contained the highest approximate total concentration of tentatively identified compounds (1,685 mg/kg). Samples BO-SS-8-S and BO-SS-10-S also contained high concentrations of tentatively identified compounds (174,000 ug/kg and 141,000 ug/kg, respectively).

Table 4-7
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOSS5S 6/26/90 (ug/kg)	BOSS6S 6/26/90 (ug/kg)	BOSS7S 6/26/90 (ug/kg)	BOSS8S 6/26/90 (ug/kg)	BOSS10S 6/26/90 (ug/kg)	BOSS10SRE 6/26/90 (ug/kg)	BOSS11S 6/26/90 (ug/kg)	BOSS12S 6/26/90 (ug/kg)	BOSS13S 6/26/90 (ug/kg)	BOSSFB 6/26/90 (ug/l)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene	U	U	170 J	1600 J	U	U	43 J	U	U	U	2220
Acenaphthylene	U	U	460 J	U	U	U	92 J	U	140 J	U	5140
Anthracene	U	U	400 J	U	U	U	82 J	U	87 J	U	65000
Benzo(a)anthracene	U	U	1100 +	U	U	U	660 J+	U	U	U	5
Benzo(b)fluoranthene	1800 J+	U	1600 +	U	U	U	740 J+	300 J+	1500 +	U	55
Benzo(k)fluoranthene	810 J+	U	U	U	U	U	720 J+	190 J+	U	U	55
Benzoic acid	U	U	U	U	U	U	120 J	63 J	200 J+	U	167
Benzo(g,h,i)perylene	U	U	430 J	U	U	U	560 J	230 J	360 J	U	593110
Benzo(a)pyrene	U	U	1000	U	U	U	650 J	210 J	990	U	---
Benzyl alcohol	U	U	U	U	U	U	U	U	U	U	32
4-Bromophenyl-phenylether	U	U	U	U	U	U	U	U	U	U	---
Butylbenzylphthalate	U	U	U	750 J	U	U	U	U	U	U	---
4-Chloroaniline	U	U	U	U	U	U	U	U	U	U	---
bis(2-Chloroethoxy)methane	U	U	U	U	U	U	U	U	U	U	---
bis(2-Chloroethyl)ether	U	U	U	U	U	U	U	U	U	U	68
bis(2-Chloroisopropyl)ether	U	U	U	U	U	U	U	U	U	U	---
4-Chloro-3-methylphenol	U	U	U	U	U	U	U	U	U	U	115
2-Chloronaphthalene	U	U	U	U	U	U	U	U	U	U	---
2-Chlorophenol	U	U	U	U	U	U	U	U	U	U	38
4-Chlorophenyl-phenylether	U	U	U	U	U	U	U	U	U	U	---
Chrysene	1100 J+	U	910 +	1300 J+	U	U	960 +	330 J+	1200 +	U	20
Dibenzo(a,h)anthracene	U	U	U	U	U	U	120 J	U	120 J	U	713680
Dibenzofuran	U	U	440 J	U	U	U	120 J	U	42 J	U	---
Di-n-butylphthalate	1100 JB	1500 JB	81 JB	350 JB	870 J	U	130 JB	180 JB	260 JB	0.9 J	41000
1,2-Dichlorobenzene	U	U	160 J+	U	U	U	U	U	U	U	66
1,3-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	73
1,4-Dichlorobenzene	U	U	U	U	U	U	U	U	U	U	92
3,3'-Dichlorobenzidine	U	U	U	U	U	U	U	U	U	U	---
2,4-Dichlorophenol	U	U	U	U	U	U	U	U	U	U	0.65
Diethylphthalate	U	U	58 JB	U	U	U	32 JB	42 JB	87 JB	U	260
2,4-Dimethylphenol	750 J+	66000+	240 J+	U	6100 +	5500 J+	U	U	U	U	50
Dimethylphthalate	U	U	U	U	U	U	U	U	U	U	---
4,6-Dinitro-2-methylphenol	U	U	U	U	U	U	U	U	U	U	---
2,4-Dinitrophenol	U	U	U	U	U	U	U	U	U	U	---
2,4-Dinitrotoluene	U	U	U	U	U	U	U	U	U	U	---
2,6-Dinitrotoluene	U	U	U	U	U	U	U	U	U	U	---
bis(2-Ethylhexyl)phthalate	8200 B	8200 JB	450 JB	2600 JB	39000	84000 B	560 JB	570 JB	3300 B	3 JB	1517325
Fluoranthene	1500 J	U	1300	2500 J	U	U	2000	550 J	2200	U	22892
Fluorene	U	U	220 J	U	U	U	170 J	U	U	U	8180
Hexachlorobenzene	U	U	U	U	U	U	U	U	U	U	68
Hexachlorobutadiene	U	U	U	U	U	U	U	U	U	U	74
Hexachlorocyclopentadiene	U	U	U	U	U	U	U	U	U	U	---
Hexachloroethane	U	U	U	U	U	U	U	U	U	U	1270
Indeno(1,2,3-cd)pyrene	U	U	420 J+	U	U	U	620 J+	230 J+	900 +	U	28
Isophorone	U	U	U	U	U	U	U	U	U	U	---
2-Methylnaphthalene	1100 J	3800 J	2000	6000	2000 J	1300 J	190 J	89 J	120 J	U	21250
2-Methylphenol	U	48000	U	U	U	U	U	U	U	U	---
4-Methylphenol	U	360000	410 J	U	13000	13000	U	U	U	U	---
Naphthalene	U	U	1200 +	U	910 J+	U	100 J	52 J	68 J	U	650
2-Nitroaniline	U	U	U	U	U	U	U	U	U	U	---
3-Nitroaniline	U	U	U	U	U	U	U	U	U	U	232
4-Nitroaniline	U	U	U	U	U	U	U	U	U	U	275
Nitrobenzene	U	U	U	U	U	U	U	U	U	U	104
2-Nitrophenol	U	U	U	U	U	U	U	U	U	U	162
4-Nitrophenol	U	U	U	U	U	U	U	U	U	U	162
N-Nitrosodiphenylamine (1)	U	U	U	U	U	U	U	U	U	U	---
N-Nitroso-di-n-propylamine	U	U	U	U	U	U	U	U	U	U	---
Di-n-octylphthalate	U	U	150 J	U	3400 J	U	U	U	U	U	5965
Pentachlorophenol	U	U	U	U	U	U	U	U	U	U	2555
Phenanthrene	1700 J	2400 J	1400	3100	U	U	2000	370 J	620 J	U	57500
Phenol	U	210000+	U	U	U	U	U	U	U	U	0.4
Pyrene	1900 J	U	1100	2000 J	3500 J	U	1400	340 J	1300	U	210000
1,2,4-Trichlorobenzene	U	U	170 J	U	U	U	U	U	U	U	336
2,4,6-Trichlorophenol	U	U	U	U	U	U	U	U	U	U	---
2,4,5-Trichlorophenol	U	U	U	U	U	U	U	U	U	U	62

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-7 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	B0SS5S 6/26/90 (ug/kg)	B0SS6S 6/26/90 (ug/kg)	B0SS7S 6/26/90 (ug/kg)	B0SS8S 6/26/90 (ug/kg)	B0SS10S 6/26/90 (ug/kg)	B0SS10SRE 6/26/90 (ug/kg)	B0SS11S 6/26/90 (ug/kg)	B0SS12S 6/26/90 (ug/kg)	B0SS13S 6/26/90 (ug/kg)	B0SSFB 6/26/90 (ug/l)
Unknown	60000 JAB	89000 J	59000 JAB	33000 JAB	37000 JA	49000 JAB	37000 JAB	64000 JAB	80000 JAB	ND
Unknown alkane	8500 J	110000 J	390 J	34000 J	21000 J	17000 J	2000 J	1500 J	ND	ND
Unknown alkane	3800 J	89000 J	350 J	16000 J	15000 J	16000 J	ND	1100 J	ND	ND
Unknown acid	2200 JB	93000 J	5100 JB	ND	1900 JB	ND	2700 JB	4800 JB	4300 JB	ND
Unknown alkane	2000 J	87000 J	ND	11000 J	17000 J	10000 J	ND	640 J	ND	ND
Unknown alkane	2000 J	68000 J	ND	9500 J	7600 J	12000 J	ND	ND	ND	ND
Unknown cycloalkane	1700 J	ND	ND	11000 J	4200 J	13000 J	ND	ND	21000 J	ND
Unknown cycloalkane	1300 J	ND	ND	8200 J	2900 J	7400 J	ND	ND	12000 J	ND
Unknown aromatic	ND	130000 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown aromatic	ND	130000 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown aromatic	ND	130000 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown acid	ND	82000 J	1800 JB	ND	ND	ND	2300 JB	2400 JB	3000 JB	ND
Unknown	ND	76000 J	3700 J	4600 J	4700 J	17000 J	490 J	6200 J	500 J	ND
Unknown phenol	ND	73000 J	420 J	ND	ND	ND	ND	ND	ND	ND
Unknown phenol	ND	68000 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkane	ND	67000 J	ND	9100 J	3500 J	10000 J	ND	ND	ND	ND
Unknown	ND	66000 JAB	820 J	ND	ND	14000 J	450 J	4500 J	420 J	ND
Unknown alkane	ND	66000 J	ND	6800 J	2000 J	7600 J	ND	ND	ND	ND
Unknown alkane	ND	60000 J	ND	6600 J	ND	6600 J	ND	ND	ND	ND
Unknown alkane	ND	59000 J	ND	4100 J	ND	ND	ND	ND	ND	ND
Unknown	ND	55000 J	810 J	ND	ND	7800 J	310 J	470 J	390 J	ND
Unknown alkane	ND	45000 J	ND	2500 J	ND	5600 J	ND	ND	ND	ND
Unknown alkane	ND	42000 J	ND	2300 J	ND	ND	ND	ND	ND	ND
Unknown dimethyl naphthalene	ND	ND	1500 J	ND	ND	ND	ND	ND	440 J	ND
Unknown benzene	ND	ND	1100 J	7100 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	960 J	5100 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	930 J	4600 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	850 J	3200 J	ND	ND	ND	ND	ND	ND
Unknown dimethyl naphthalene	ND	ND	840 J	ND	ND	ND	550 J	ND	ND	ND
Unknown methyl naphthalene	ND	ND	750 J	ND	ND	ND	ND	ND	ND	ND
Unknown acid	ND	ND	660 JB	ND	ND	ND	1200 JB	990 J	1100 JB	ND
Unknown	ND	ND	610 J	ND	ND	6300 J	ND	ND	390 JAB	ND
Unknown dimethyl naphthalene	ND	ND	550 J	ND	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	430 J	3000 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	ND	420 J	2600 J	ND	ND	ND	ND	ND	ND
Unknown naphthalene	ND	ND	ND	ND	26000 J	13000 J	ND	ND	ND	ND
Unknown PAH	ND	ND	ND	ND	11000 J	ND	ND	ND	ND	ND
Unknown PAH	ND	ND	ND	ND	10000 J	ND	ND	ND	ND	ND
Unknown alkene	ND	ND	ND	ND	8100 J	6500 J	ND	ND	ND	ND
Unknown alkene	ND	ND	ND	ND	6600 J	ND	ND	ND	ND	ND
Unknown alcohol	ND	ND	ND	ND	5200 J	ND	19000 J	ND	ND	ND
Unknown alcohol	ND	ND	ND	ND	2300 J	ND	10000 J	ND	ND	ND
Unknown cycloalkane	ND	ND	ND	3900 J	ND	ND	ND	ND	10000 J	ND
Unknown naphthalene	ND	ND	ND	ND	ND	13000 J	ND	ND	ND	ND
Unknown naphthalene	ND	ND	ND	ND	ND	6500 J	ND	ND	ND	ND
Unknown naphthalene	ND	ND	ND	ND	ND	5600 J	ND	ND	ND	ND
Unknown cycloalkane	ND	ND	ND	ND	ND	5300 J	ND	ND	ND	ND
Unknown alcohol	ND	ND	ND	ND	ND	ND	6800 J	ND	ND	ND
Octadecanal	ND	ND	ND	ND	ND	ND	930 J	2300 J	ND	ND
Unknown acid	ND	ND	ND	ND	ND	ND	350 J	780 JB	340 J	ND
Unknown acid	ND	ND	ND	ND	ND	ND	ND	ND	340 J	ND
Unknown	ND	ND	ND	ND	ND	ND	ND	ND	330 J	ND

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis

Table 4-8

PHASE I RI SURFACE SOIL SAMPLING

TOTAL CONCENTRATION OF SEMIVOLATILE ORGANIC COMPOUNDS
PRESENT ABOVE SOIL CLEANUP CRITERIA GUIDELINES

Sample Designation	Total Concentration (ug/l)
BO-SS-5-S	4,460
BO-SS-6-S	276,000
BO-SS-7-S	5,630
BO-SS-8-S	1,300
BO-SS-10-S	7,010
BO-SS-11-S	3,700
BO-SS-12-S	1,050
BO-SS-13-S	3,800

Analytical data for the pesticide and PCB analyses are presented in Table 4-9. Pesticide compounds were not detected in any of the surface soil samples. The PCB arochlors most frequently detected were found to include PCB-1248, PCB-1254 and PCB-1260. In samples BO-SS-1-S, BO-SS-6-S and BO-SS-10-S the total PCB concentration was found to be 82,000 ug/kg, 51,000 ug/kg and 112,000 ug/kg, respectively. In samples BO-SS-5-S and BO-SS-8-S, total PCBs were detected at 43,000 ug/kg. No PCBs were detected in the samples obtained from the playground or residential areas. Table 4-10 lists each surface soil sample obtained for PCB analysis and the total concentration of PCBs detected.

The analytical data from metals analysis are presented in Table 4-11. The NJDEP soil cleanup guidelines were exceeded in all samples for lead. Arsenic and zinc were the other two metals frequently detected above the guidelines. In samples BO-SS-5-S, BO-SS-7-S BO-SS-8-S and BO-SS-13-S, the levels of arsenic were found to be 21.2 mg/kg, 26.2 mg/kg 22.4 mg/kg and 80.7 mg/kg, respectively. Zinc was detected above the 350 mg/kg guideline in samples BO-SS-6-S, BO-SS-10-S, and BO-SS-13-S at concentrations of 358 mg/kg, 1,200 mg/kg and 940 mg/kg, respectively. In sample BO-SS-10-S, cadmium and chromium exceeded the guidelines. In the samples obtained from the playground and residential areas, only lead exceeded the guideline.

The results of RCRA Characteristic testing are presented in Table 4-12. None of the samples were found to be corrosive; however, eight of the ten samples tested were determined to be ignitable. With respect to EP Toxicity for metals, the results show that none of the soil samples were found to be hazardous.

4.3.2 Catch Basin Surface Water

As part of the Phase I RI, three surface water samples, designated BO-CB-1-SW, BO-CB-3-SW and BO-CB-5-SW, were collected from catch basins located on Robinson Street immediately adjacent to the site. The analytical data obtained for these samples are presented in Tables 4-13 to 4-15. The locations of the catch basins are shown in Figure 2-7. It must be noted that the water within the catch basins is not a Class A, C or D surface water system. The data obtained from the analysis are compared to Class A, C or D surface water standards to facilitate data interpretation.

Table 4-9
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
PESTICIDES/PCBS

PESTICIDES/PCB COMPOUNDS	BOSS5S 6/26/90 (ug/kg)	BOSS6S 6/26/90 (ug/kg)	BOSS7S 6/26/90 (ug/kg)	BOSS8S 6/26/90 (ug/kg)	BOSS10S 6/26/90 (ug/kg)	BOSS11S 6/26/90 (ug/kg)	BOSS12S 6/26/90 (ug/kg)	BOSS13S 6/26/90 (ug/kg)	BOSSFB 6/27/90 (ug/l)	BOSS1S 6/26/90 (ug/kg)	BOSS2S 6/26/90 (ug/kg)	BOSS3S 6/26/90 (ug/kg)	BOSS4S 6/26/90 (ug/kg)	BOSS9S 6/26/90 (ug/kg)	BOSS14S 6/26/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
PCB - 1242	U	19000+	U	U	U	U	U	U	U	U	U	U	U	U	U	85
PCB - 1016	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	---
PCB - 1254	U	U	9100+	15000+	44000+	U	U	U	U	82000+	U	U	U	11000+	U	275
PCB - 1260	8000	32000+	5700	12000	31000	U	U	U	U	U	U	5900	1300	6100	U	---
PCB - 1221	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	---
PCB - 1248	35000+	U	4100+	16000+	37000+	U	U	U	U	U	32000+	15000+	U	13000+	U	205
alpha-BHC	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
beta-BHC	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
delta-BHC	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
gamma-BHC	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
alpha-Chlordane	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	22
gamma-Chlordane	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	22
4,4'-DDD	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
4,4'-DDE	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
4,4'-DDT	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Dieldrin	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Endosulfan I	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Endosulfan II	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Endosulfan Sulfate	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Endrin	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Endrin-Ketone	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Heptachlor	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Heptachlor Epoxide	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Methoxychlor	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---
Toxaphene	U	U	U	U	U	U	U	U	U	NA	NA	NA	NA	NA	NA	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

NA: Not Applicable
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-10

PHASE I RI SURFACE SOIL SAMPLING
TOTAL CONCENTRATION OF PCBs DETECTED

Sample	Total Concentration (ug/kg)
BO-SS-1-S	82,000
BO-SS-2-S	32,000
BO-SS-3-S	20,900
BO-SS-4-S	1,300
BO-SS-5-S	43,000
BO-SS-6-S	51,000
BO-SS-7-S	18,900
BO-SS-8-S	43,000
BO-SS-9-S	30,100
BO-SS-10-S	112,000

Table 4-11
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
INORGANIC METALS

METALS	BOSS5S 6/26/90 (mg/kg)	BOSS6S 6/26/90 (mg/kg)	BOSS7S 6/26/90 (mg/kg)	BOSS8S 6/26/90 (mg/kg)	BOSS10S 6/26/90 (mg/kg)	BOSS11S 6/26/90 (mg/kg)	BOSS12S 6/26/90 (mg/kg)	BOSS13S 6/26/90 (mg/kg)	BOSSFB 6/26/90 (ug/l)	NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	13300	31600	11100	10800	19300	14600	16700	15400	193 B	----
Antimony	4.8 B	U	6.6 B	5.6 B	156	U	U	U	U	----
Arsenic	21.2+	4.1	26.2+	22.4+	12.3	16.6	8.8	80.7+	U	20
Barium	237	345	118	188	2600	134	120	281	3.4 BE	----
Beryllium	0.97 B	5.6	1.1 B	1.4	2	0.86 B	1.1 B	0.99 B	U	----
Cadmium	2.4	1.1	1.3	1.6	8+	0.97 B	0.92 B	2.9	U	3
Calcium	73300	187000	107000	85200	73600	12300	14200	25800	99.7 B	----
Chromium	29.7	39.8	20.6	23	152	22.9	26.1	31.2	U	100
Cobalt	8.1 B	2.8 B	6.9 B	6.6 B	11.6	10.1 B	9.8 B	15.4	U	----
Copper	73.9 E	54.7 E	75.6 E	83 E	541 E+	68.8 E	39 E	89.9 E	U	170
Cyanide	U	1.9	U	7.6	5.5	U	U	0.75	U	12
Iron	23800	13700	27000	28300	45300	34600	29700	56500	U	----
Lead	744+	1390+	300+	801+	2280+	133+	103+	469+	1.4 B	100
Magnesium	25300	57100	51900	24900	13700	6990	8260	12400	U	----
Manganese	745	2550	946	876	1040	660	751	751	1.2 B	----
Mercury	0.23	0.16	0.18	0.27	0.17	0.12	U	0.31	U	1
Nickel	22.4	10	16.8	19.2	40.1	26.6	28.2	29	U	100
Potassium	1990	2390	1730	1270	1540	2270	2500	2420	U	----
Selenium	0.67 B	0.46 B	1 B	1.5	1.9	1.5 B	1.1 B	1.5 B	U	4
Silver	U	U	U	U	U	U	U	U	U	5
Sodium	301 B	1440	443	473 B	733 B	214 B	270 B	286 B	922 B	----
Thallium	U	0.51 B	443 B	0.51 B	0.67 B	0.54 B	0.49 B	0.62 B	U	----
Vanadium	21.7 E	13.7 E	22.5 E	19.5 E	26.4 E	35 E	38.4 E	45.6 E	U	----
Zinc	343	358+	235	336	1200+	279	215	940+	U	350

QUALIFIERS

B : Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E : Value is estimated due to interference
U : Analyzed for but not detected

NOTES

----: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-12
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SURFACE SOIL SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOSS1S 6/26/90	BOSS2S 6/26/90	BOSS3S 6/26/90	BOSS4S 6/26/90	BOSS5S 6/26/90	BOSS6S 6/26/90	BOSS7S 6/26/90	BOSS8S 6/26/90	BOSS9S 6/26/90	BOSS10S 6/26/90	BOSSFB 6/26/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	N	N	N	N	N	N	N	N	NR	----
Ignitability	Y	Y	Y	N	Y	Y	N	Y	Y	Y	NR	----
Petroleum Hydrocarbons,mg/kg	39800	36800	NR	NR	NR	9340	4150	35600	NR	NR	3.52*	----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)												
Arsenic	U	U	U	U	U	U	U	U	U	U	NR	5
Barium	0.343 E	0.206 E	0.200 BE	0.125 BE	0.206 BE	0.0973 BE	0.190 BE	0.241 E	0.139 BE	0.184 B	NR	100
Cadmium	U	U	U	U	U	U	U	U	U	U	NR	1
Chromium	U	U	U	U	U	U	U	U	U	U	NR	5
Lead	U	U	U	U	U	U	U	U	U	U	NR	5
Mercury	U	U	U	U	U	U	U	U	U	U	NR	0.2
Selenium	U	U	U	U	U	U	U	U	U	U	NR	1
Silver	U	U	U	U	U	U	U	U	U	U	NR	5

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

NR: Not Required
N: Non-corrosive or non-ignitable
Y: Corrosive or ignitable
----: Not applicable
*: Value is in mg/l

The data for volatile organic compounds are presented in Table 4-13. The volatile organic compound acetone was the only compound detected in sample BO-CB-1-SW. Volatile organic compounds were not found in sample BO-CB-5-SW. With respect to sample number BO-CB-3-SW collected from the catch basin located along Robinson Street, adjacent to the Southwestern Leasehold Area (Catch Basin No. 3), NYSDEC Surface Water Standards/Guidance Values were exceeded for seven compounds. These compounds were found to be benzene, 1,2-dichloroethane, 1,2-dichloroethene (total), ethylbenzene, toluene, vinyl chloride and xylene (total).

The results obtained from the analysis of semivolatile organic compounds are presented in Table 4-14. The surface water sample collected from Catch Basin No. 3 contained four compounds which exceeded NYSDEC Surface Water Standards/Guidance Values. The compounds 2,4-dimethylphenol, 2-methylphenol and 4-methylphenol were detected at 52 ug/l, 12 ug/l and 69 ug/l, respectively, exceeding the NYSDEC Class C and D Surface Water Standard of 5 ug/l for each of these compounds. Bis(2-ethylhexyl)phthalate was also detected above standards/guidelines but was also found in the field blank and method blank.

With respect to pesticides and PCBs, the analytical data are presented in Table 4-15. The only pesticide compound detected in the three surface water samples collected was gamma-chlordane. This compound was found to be present in Catch Basin No. 3 at 0.63 ug/l. At this present time, a surface water standard or guidance value does not exist for gamma-chlordane. PCBs were not detected in any of the surface water samples collected from the catch basins.

Results from the analysis of metals are presented in Table 4-16. From this table it is determined that the following five metals were found to exceed surface water standards/guidance values: aluminum, iron, manganese, sodium, as well as cyanide. Aluminum and cyanide exceeded Class C standards in all three surface water samples collected. However, aluminum was found exceeding hte Class C standard in the field blank. Iron was found to be above the Class A standard of 300 ug/l in all samples. Sodium was detected above the Class A standard of 20,000 ug/l in one sample.

4.3.3 Catch Basin Sediment

Sediment samples were obtained from four catch basins immediately adjacent to the site along Robinson Street and were designated BO-CB-1-SD, BO-CB-2-SD, BO-CB-3-SD and BO-CB-5-SD. The analytical data are presented in Tables 4-17 to 4-22. The locations of the catch basins are shown on Figure 2-7.

Table 4-13
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOCB1SW 6/27/90 (ug/l)	BOCB3SW 6/27/90 (ug/l)	BOCB5SW 6/27/90 (ug/l)	BOCBFB 6/27/90 (ug/l)	BOTB627 6/27/90 (ug/l)	BOHB627 6/27/90 (ug/l)	BOTB628 6/28/90 (ug/l)	BOHB628 6/28/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Acetone	12	17 JB	U	U	U	U	U	U	----	----	----
Benzene	U	25 +	U	U	U	U	U	U	0.7 GV	6 GV	6 GV
Bromodichloromethane	U	U	U	U	U	U	U	U	50 GV	----	----
Bromoform	U	U	U	U	U	U	U	U	50 GV	----	----
Bromomethane	U	U	U	U	U	U	U	U	----	----	----
2-Butanone	U	U	U	U	U	U	U	U	----	----	----
Carbon Disulfide	U	U	U	U	U	U	U	U	----	----	----
Carbon Tetrachloride	U	U	U	U	U	U	U	U	0.4 GV	----	----
Chlorobenzene	U	U	U	U	U	U	U	U	20 ST	5 ST	50 ST
Chloroethane	U	U	U	U	U	U	U	U	----	----	----
Chloroform	U	U	U	U	U	U	U	U	0.2 ST	----	----
Chloromethane	U	U	U	U	U	U	U	U	----	----	----
Dibromochloromethane	U	U	U	U	U	U	U	U	50 GV	----	----
1,1-Dichloroethane	U	49 +	U	U	U	U	U	U	5 GV	----	----
1,1-Dichloroethene	U	U	U	U	U	U	U	U	0.07 GV	----	----
1,2-Dichloroethane	U	U	U	U	U	U	U	U	0.8 ST	----	----
1,2-Dichloroethene (total)	U	270 +	U	U	U	U	U	U	5 GV	----	----
1,2-Dichloropropane	U	U	U	U	U	U	U	U	5 GV *	----	----
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	----	----	----
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	----	----	----
Ethylbenzene	U	19 +	U	U	U	U	U	U	5 GV	----	----
2-Hexanone	U	U	U	U	U	U	U	U	50 GV	----	----
Methylene Chloride	U	U	U	U	U	U	U	U	5 GV	----	----
4-Methyl-2-pentanone	U	U	U	U	U	U	U	U	----	----	----
Styrene	U	U	U	U	U	U	U	U	50 ST	----	----
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	0.2 GV	----	----
Tetrachloroethene	U	U	U	U	U	U	U	U	0.7 GV	1 GV	1 GV
Toluene	U	89 +	U	U	U	U	U	U	5 GV	----	----
Trichloroethene	U	U	U	U	U	U	U	U	3 GV	11 GV	11 GV
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	5 GV	----	----
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	0.6 GV	----	----
Vinyl Acetate	U	U	U	U	U	U	U	U	----	----	----
Vinyl Chloride	U	320 +	U	U	U	U	U	U	0.3 GV	----	----
Xylene (total)	U	85 +	U	U	U	U	U	U	50 GV *	----	----

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Applies to each xylene isomer individually
+: Value exceeds Surface Water Standards/Guidelines

Table 4-13 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOCB1SW 6/27/90 (ug/l)	BOCB3SW 6/27/90 (ug/l)	BOCB5SW 6/27/90 (ug/l)	BOCBFB 6/27/90 (ug/l)	BOTB627 6/27/90 (ug/l)	BOHB627 6/27/90 (ug/l)	BOTB628 6/28/90 (ug/l)	BOHB628 6/28/90 (ug/l)
Unknown benzene	ND	59 J	ND	ND	ND	ND	ND	ND
Unknown alkane	ND	33 J	ND	ND	ND	17 J	ND	ND
Unknown alkane	ND	30 J	ND	ND	ND	14 J	ND	ND
Unknown benzene	ND	28 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	22 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	21 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	19 J	ND	ND	ND	ND	ND	ND
Unknown benzene	ND	18 J	ND	ND	ND	ND	ND	ND
Unknown alkane	ND	14 J	ND	ND	ND	6 J	ND	ND
Unknown benzene	ND	14 J	ND	ND	ND	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
----: Not established

Table 4-14
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOCB1SW 6/27/90 (ug/l)	BOCB3SW 6/27/90 (ug/l)	BOCB5SW 6/27/90 (ug/l)	BOCBFB 6/27/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Acenaphthene	U	U	U	U	20 ST	----	----
Acenaphthylene	U	U	U	U	----	----	----
Anthracene	U	1 J	U	U	50 GV	----	----
Benzo(a)anthracene	U	U	U	U	0.002 GV	----	----
Benzo(b)fluoranthene	U	U	U	U	0.002 GV	----	----
Benzo(k)fluoranthene	U	U	U	U	0.002 GV	----	----
Benzoic acid	10 J	U	10 J	U	----	----	----
Benzo(g,h,i)perylene	U	U	U	U	----	----	----
Benzo(a)pyrene	U	U	U	U	0.002 GV	0.0012 GV	0.0012 GV
Benzyl alcohol	U	U	U	U	----	----	----
4-Bromophenyl-phenylether	U	U	U	U	----	----	----
Butylbenzylphthalate	U	U	U	U	50 GV	----	----
4-Chloroaniline	U	U	U	U	----	----	----
bis(2-Chloroethoxy)methane	U	U	U	U	----	----	----
bis(2-Chloroethyl)ether	U	U	U	U	0.03 GV	----	----
bis(2-Chloroisopropyl)ether	U	U	U	U	----	----	----
4-Chloro-3-methylphenol	U	U	U	U	----	----	----
2-Chloronaphthalene	U	U	U	U	----	----	----
2-Chlorophenol	U	U	U	U	1 ST **	1 ST ***	1 ST ***
4-Chlorophenyl-phenylether	U	U	U	U	1 ST **	1 ST ***	1 ST ***
Chrysene	U	U	U	U	0.002 GV	----	----
Dibenzo(a,h)anthracene	U	U	U	U	----	----	----
Dibenzofuran	U	U	U	U	----	----	----
Di-n-butylphthalate	1 J	1 J	2 J	0.9 J	50 GV	----	----
1,2-Dichlorobenzene	U	U	U	U	----	5 ST *	50 ST *
1,3-Dichlorobenzene	U	U	U	U	20 ST	5 ST *	50 ST *
1,4-Dichlorobenzene	U	U	U	U	30 ST	5 ST *	50 ST *
3,3'-Dichlorobenzidine	U	U	U	U	----	----	----
2,4-Dichlorophenol	U	U	U	U	1 ST **	1 ST ***	1 ST ***
Diethylphthalate	U	U	U	U	50 GV	----	----
2,4-Dimethylphenol	U	52 +	U	U	----	5 ST ****	5 ST ****
Dimethylphthalate	U	U	U	U	50 GV	----	----
4,6-Dinitro-2-methylphenol	U	U	U	U	----	5 ST ****	5 ST ****
2,4-Dinitrophenol	U	U	U	U	----	5 ST ****	5 ST ****
2,4-Dinitrotoluene	U	U	U	U	----	----	----
2,6-Dinitrotoluene	U	U	U	U	0.07 GV	----	----
bis(2-Ethylhexyl)phthalate	4 JB	7 JB+	5 JB+	2 JB	4 GV	0.6 ST	----
Fluoranthene	0.6 J	U	0.8 J	U	50 GV	----	----
Fluorene	U	U	U	U	50 GV	----	----
Hexachlorobenzene	U	U	U	U	0.02 GV	----	----
Hexachlorobutadiene	U	U	U	U	0.5 ST	1 ST	10 ST
Hexachlorocyclopentadiene	U	U	U	U	1 ST	0.45 ST	4.5 ST
Hexachloroethane	U	U	U	U	----	----	----
Indeno(1,2,3-cd)pyrene	U	U	U	U	0.002 GV	----	----
Isophorone	U	U	U	U	50 GV	----	----
2-Methylnaphthalene	U	4 J	U	U	----	----	----
2-Methylphenol	2 J	12 +	U	U	----	5 ST ****	5 ST ****
4-Methylphenol	U	69 +	U	U	----	5 ST ****	5 ST ****
Naphthalene	U	U	U	U	10 ST	----	----
2-Nitroaniline	U	U	U	U	----	----	----
3-Nitroaniline	U	U	U	U	----	----	----
4-Nitroaniline	U	U	U	U	----	----	----
Nitrobenzene	U	U	U	U	30 ST	----	----
2-Nitrophenol	U	U	U	U	----	5 ST ****	5 ST ****
4-Nitrophenol	U	U	U	U	----	5 ST ****	5 ST ****
N-Nitrosodiphenylamine (1)	U	U	U	U	50 GV	----	----
N-Nitroso-di-n-propylamine	U	U	U	U	----	----	----
Di-n-octylphthalate	U	0.8 J	1 J	U	50 GV	----	----
Pentachlorophenol	U	U	U	U	1 ST **	0.4 ST	1 ST **
Phenanthrene	U	1 J	U	U	50 GV	----	----
Phenol	U	U	U	U	1 ST **	5 ST ****	5 ST ****
Pyrene	U	U	0.9 J	U	50 GV	----	----
1,2,4-Trichlorobenzene	U	U	U	U	10 ST	5 ST	50 ST
2,4,6-Trichlorophenol	U	U	U	U	1 ST **	1 ST **	1 ST **
2,4,5-Trichlorophenol	U	U	U	U	1 ST **	1 ST **	1 ST **

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit

NOTES

ST: Standard
GV: Guidance Value
----: Not established
*: Value pertains to sum of the isomers
**: Value pertains to total phenols
***: Value pertains to total chlorinated phenols
****: Value pertains to total non-chlorinated phenols
+: Value exceeds Surface Water Standards/Guidelines

Table 4-14 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOCB1SW 6/27/90 (ug/l)	BOCB3SW 6/27/90 (ug/l)	BOCB5SW 6/27/90 (ug/l)	BOCBFB 6/27/90 (ug/l)
Unknown	22 JA	89 J	46 J	ND
Unknown	22 J	47 J	41 J	ND
Unknown	12 J	26 J	15 J	ND
Unknown acid	12 J	ND	10 J	ND
Unknown alcohol	11 J	150 J	83 J	ND
Unknown	9 J	15 J	14 J	ND
Unknown	8 J	11 J	14 J	ND
Unknown	8 J	ND	13 J	ND
Unknown cycloalkane	ND	170 J	ND	ND
Unknown alcohol	ND	ND	16 J	ND
Unknown	ND	ND	11 J	ND
Unknown	ND	ND	10 J	ND
Unknown	ND	ND	8 J	ND
Unknown phenol	ND	42 J	ND	ND
Unknown phenol	ND	40 J	ND	ND
Unknown benzene	ND	38 J	ND	ND
Unknown benzene	ND	29 J	ND	ND
Unknown aromatic	ND	27 J	ND	ND
Unknown aromatic	ND	18 J	ND	ND
Unknown phenol	ND	14 J	ND	ND
Unknown aromatic	ND	14 J	ND	ND
Unknown benzene	ND	13 J	ND	ND
Unknown benzene	ND	13 J	ND	ND
Unknown benzene	ND	11 J	ND	ND
Unknown naphthalene	ND	11 J	ND	ND
Unknown phenol	ND	9 J	ND	ND

QUALIFIERS

A: Aldo-condensation peak
J: Estimated value

NOTES

ND: Not Detected

Table 4-15
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
PESTICIDES/PCBS

PESTICIDES/PCB COMPOUNDS	BOCB1SW 6/27/90 (ug/kg)	BOCB3SW 6/27/90 (ug/kg)	BOCB5SW 6/27/90 (ug/kg)	BOCBFB 6/27/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Aldrin	U	U	U	U	0.002 GV	0.001 ST*	0.001 ST*
PCB - 1242	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1016	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1232	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1254	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1260	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1221	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1248	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
alpha-BHC	U	U	U	U	0.02 ST**	0.01 ST**	2 ST**
beta-BHC	U	U	U	U	0.02 ST**	0.01 ST**	2 ST**
delta-BHC	U	U	U	U	0.02 ST**	0.01 ST**	2 ST**
gamma-BHC	U	U	U	U	0.02 ST**	0.01 ST**	2 ST**
alpha-Chlordane	U	U	U	U	----	----	----
gamma-Chlordane	U	0.63	U	U	----	----	----
4,4'-DDD	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
4,4'-DDE	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
4,4'-DDT	U	U	U	U	0.01 ST	0.001 ST	0.001 ST
Dieldrin	U	U	U	U	0.0009 GV	0.001 ST*	0.001 ST*
Endosulfan I	U	U	U	U	----	----	----
Endosulfan II	U	U	U	U	----	----	----
Endosulfan Sulfate	U	U	U	U	----	----	----
Endrin	U	U	U	U	0.2 ST	0.002 ST	0.002 ST
Endrin-Ketone	U	U	U	U	----	----	----
Heptachlor	U	U	U	U	0.009 ST	0.001 ST	0.001 ST
Heptachlor Epoxide	U	U	U	U	0.009 ST	0.001 ST	0.001 ST
Methoxychlor	U	U	U	U	35 ST	0.03 ST	----
Toxaphene	U	U	U	U	0.01 GV	0.005 ST	1.6 ST

QUALIFIERS

U: Analyzed for but not detected

NOTES

----: Not established
*: Applies to sum of aldrin & dieldrin
**: Applies to sum of all isomers

Table 4-16
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SURFACE WATER SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOCB1SW 6/27/90 (ug/l)	BOCB3SW 6/27/90 (ug/l)	BOCB5SW 6/27/90 (ug/l)	BOCBFB 6/27/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Aluminum	336 +	121 B+	432 +	171 B+	----	100 ST	----
Antimony	U	U	U	U	3 GV	----	----
Arsenic	U	8.5 B	U	U	50 ST	190 ST	360 ST
Barium	28.3 BE	208 E	31 7 BE	3.4 BE	1000 ST	----	----
Beryllium	U	U	U	U	3 GV	*	----
Cadmium	U	U	U	U	10 ST	*	*
Calcium	24700	143000	26400	133 B	----	----	----
Chromium	3.2 B	U	7.3 B	U	50 ST	*	*
Cobalt	U	U	U	U	----	5 ST	110 GV
Copper	30.2	5.8 B	36.9	U	200 ST	*	*
Cyanide	18.5 +	U	5.8 +	U	100 ST	5.2 ST	22 GV
Iron	2570 +	2660 +	938 +	59.9 B	300 ST	300 ST	300 ST
Lead	9.7	3.6	12.1	U	50 ST	*	*
Magnesium	3020 B	33000	3150 B	U	35000 ST	----	----
Manganese	183	447 +	91.2	U	300 ST	----	----
Mercury	U	U	U	U	2 ST	0.2 GV	0.2 GV
Nickel	5 B	U	6.2 B	U	----	*	*
Potassium	2110 B	7270	1770 B	U	----	----	----
Selenium	U	U	U	U	10 ST	1 ST	----
Silver	U	U	U	U	50 ST	0.1 ST	*
Sodium	19400	335000+	12600	1030 B	20000 ST	----	----
Thallium	U	U	U	U	4 GV	8 ST	20 ST
Vanadium	5 B	6 B	U	U	----	14 GV	190 GV
Zinc	76.7 +	4.8 B	145 +	11.1 B	300 ST	30 ST	*
Petroleum Hydrocarbons	5.63	4.76	5.01	4.2	----		

QUALIFIERS

B : Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E : Value is estimated due to interference
U : Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Value is hardness dependent
+: Value exceeds Surface Water Standards/Guidelines

Table 4-17 presents the data obtained from volatile organic compound analysis. The sample designated BO-CB-3-SD contained eight compounds that were found above soil cleanup criteria guidelines. These compounds are 2-butanone, 1,1-dichloroethane, 1,2-dichloroethene (total), ethylbenzene, methylene chloride, toluene, vinyl chloride and xylene (total), which were found to be present at 1,100 ug/kg, 140 ug/kg, 1,400 ug/kg, 1,200 ug/kg, 590 ug/kg, 1,500 ug/kg, 850 ug/kg and 3,300 ug/kg, respectively. The corresponding soil cleanup criteria guidelines for these compounds are 10 ug/kg, 100 ug/kg, 32 ug/kg, 67 ug/kg, 5 ug/kg, 36 ug/kg, 23 ug/kg and 67 ug/kg, respectively. Estimated values of tentatively identified benzene compounds in sample BO-CB-3-SD were typically in the 3,000 ug/kg to 6,000 ug/kg range, as reported in Table 4-17. Reanalysis of the sample indicated that 1,2-dichloroethane, trans 1,3-dichloropropene and tetrachloroethene were also present above soil cleanup criteria guidelines as can be seen in the table.

The data resulting from the analysis of semivolatile organic compounds are presented in Table 4-18. Only benzo(a)anthracene, benzo(b)fluoranthene and chrysene, which were detected at 2,000 ug/kg, 3,700 ug/kg and 2,300 ug/kg, respectively in sample BO-CB-3-SD, were found above corresponding guidelines of 5 ug/kg, 55 ug/kg and 20 ug/kg. The compound benzo(k)fluoranthene was detected during sample reanalysis at 1,200 ug/kg, which was also above soil cleanup criteria guidelines. Several tentatively identified semivolatile organic compounds were found at levels approximately between 3,000 ug/kg and 6,000 ug/kg.

Analytical data for pesticides and PCBs are presented in Table 4-19. One sample, BO-CB-3-SD, was selected for pesticide analysis and no pesticide compounds were detected in the sample. The PCB arochlors detected were found to include PCB-1242, PCB-1254 and PCB-1260. The total concentrations of PCBs detected in samples BO-CB-1-SD, BO-CB-2-SD, BO-CB-3-SD and BO-CB-5-SD were 4,500 ug/kg, 184,000 ug/kg, 24,400 ug/kg and 5,300 ug/kg, respectively.

Analytical data for metals analysis are presented in Table 4-20. Lead and zinc, which were detected at 611 mg/kg and 388 mg/kg, respectively, in sample BO-CB-3-SD, exceeded corresponding NJDEP soil cleanup guidelines of 100 mg/kg and 350 mg/kg. No other metals were found above these guidelines.

The results of RCRA Characteristics analyses are presented in Table 4-21. While none of the samples were determined to be corrosive, all samples were found to be ignitable. With respect to EP Toxicity for metals, the results indicate that none of the levels detected were above the regulatory levels and as such, the samples were found not to be hazardous by definition. Table 4-22 presents the results of treatability screening performed on sample BO-CB-3-SD.

Table 4-17
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOCB3SD* 6/27/90 (ug/kg)	BOCB3SDRE* 6/27/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	2300 B	6600 B	---
Benzene	U	U	---
Bromodichloromethane	U	U	---
Bromoform	U	U	245
Bromomethane	U	U	---
2-Butanone	1100 J+	2800 +	10
Carbon Disulfide	U	U	168
Carbon Tetrachloride	U	U	28
Chlorobenzene	U	U	152
Chloroethane	U	U	93
Chloroform	U	U	155
Chloromethane	U	U	85
Dibromochloromethane	U	U	---
1,1-Dichloroethane	140 J+	230 J+	100
1,1-Dichloroethene	U	U	41
1,2-Dichloroethane	U	190 J+	1.24
1,2-Dichloroethene (total)	1400 +	2000 +	32
1,2-Dichloropropane	U	U	142
cis-1,3-Dichloropropene	U	U	142
trans-1,3-Dichloropropene	U	210 J+	142
Ethylbenzene	1200 +	1700 +	67
2-Hexanone	U	2300	---
Methylene Chloride	590 JB+	1400 B+	5
4-Methyl-2-pentanone	U	U	---
Styrene	U	U	---
1,1,2,2-Tetrachloroethane	U	U	0.54
Tetrachloroethene	U	680 J+	8
Toluene	1500 +	1600 +	36
Trichloroethene	U	U	24
1,1,1-Trichloroethane	U	U	150
1,1,2-Trichloroethane	U	U	1.3
Vinyl Acetate	U	U	48
Vinyl Chloride	850 J+	2400 +	23
Xylene (total)	3300 +	5500 B+	67

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
*: Samples analyzed at medium level
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-17 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOCB3SD* 6/27/90 (ug/kg)	BOCB3SDRE* 6/27/90 (ug/kg)
Unknown benzene	6000 J	7000 J
Unknown benzene	5400 J	6400 J
Unknown alkane	5200 J	8500 J
Unknown benzene	5000 J	6300 J
Unknown benzene	4800 J	5900 J
Unknown benzene	4700 J	5600 J
Unknown benzene	4500 J	5100 J
Unknown benzene	3900 J	ND
Unknown benzene	3500 J	ND
Unknown cycloalkene	3100 J	ND
Unknown alkane	ND	6300 J
Unknown	ND	5000 J
Unknown alkane	ND	4300 J

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis
*: Samples analyzed at medium level

Table 4-18
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	BOCB3SD 6/27/90 (ug/kg)		BOCB3SDRE 6/27/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene		U		U	2220
Acenapnthylene		U		U	5140
Anthracene		U		U	65000
Benzo(a)anthracene	2000	+	1600	J+	5
Benzo(b)fluoranthene	3700	+	1500	J+	55
Benzo(k)fluoranthene		U	1200	J+	55
Benzoic acid		U		U	167
Benzo(g,h,i)perylene	830	J		U	593110
Benzo(a)pyrene		U		U	---
Benzyl alcohol		U		U	32
4-Bromophenyl-phenylether		U		U	---
Butylbenzylphthalate		U		U	---
4-Chloroaniline		U		U	---
bis(2-Chloroethoxy)methane		U		U	---
bis(2-Chloroethyl)ether		U		U	68
bis(2-Chloroisopropyl)ether		U		U	---
4-Chloro-3-methylphenol		U		U	115
2-Chloronaphthalene		U		U	---
2-Chlorophenol		U		U	38
4-Chlorophenyl-phenylether		U		U	---
Chrysene	2300	+	2100	+	20
Dibenzo(a,h)anthracene		U		U	713680
Dibenzofuran		U		U	---
Di-n-butylphthalate		U		U	41000
1,2-Dichlorobenzene		U		U	66
1,3-Dichlorobenzene		U		U	73
1,4-Dichlorobenzene		U		U	92
3,3'-Dichlorobenzidine		U		U	---
2,4-Dichlorophenol		U		U	0.65
Diethylphthalate		U		U	260
2,4-Dimethylphenol		U		U	50
Dimethylphthalate		U		U	---
4,6-Dinitro-2-methylphenol		U		U	---
2,4-Dinitrophenol		U		U	---
2,4-Dinitrotoluene		U		U	---
2,6-Dinitrotoluene		U		U	---
bis(2-Ethylhexyl)phthalate	9800	B	11000	B	1517325
Fluoranthene	4300		2500		22892
Fluorene		U		U	8180
Hexachlorobenzene		U		U	68
Hexachlorobutadiene		U		U	74
Hexachlorocyclopentadiene		U		U	---
Hexachloroethane		U		U	1270
Indeno(1,2,3-cd)pyrene		U		U	28
Isophorone		U		U	---
2-Methylnaphthalene	5200		5100		21250
2-Methylphenol		U		U	---
4-Methylphenol		U		U	---
Naphthalene		U		U	650
2-Nitroaniline		U		U	---
3-Nitroaniline		U		U	232
4-Nitroaniline		U		U	275
Nitrobenzene		U		U	104
2-Nitrophenol		U		U	162
4-Nitrophenol		U		U	162
N-Nitrosodiphenylamine (1)		U		U	---
N-Nitroso-di-n-propylamine		U		U	---
Di-n-octylphthalate	1600	J		U	5965
Pentachlorophenol		U		U	2555
Phenanthrene	6100		4900		57500
Phenol		U		U	0.4
Pyrene	1500	J	2000		210000
1,2,4-Trichlorobenzene		U		U	336
2,4,6-Trichlorophenol		U		U	---
2,4,5-Trichlorophenol		U		U	62

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-18 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOCB3SD 6/27/90 (ug/kg)	BOCB3SDRE 6/27/90 (ug/kg)
Unknown	66000 JAB	62000 JAB
Unknown alkane	42000 J	32000 J
Unknown alkane	37000 J	32000 J
Unknown cycloalkane	21000 J	6900 J
Unknown cycloalkane	18000 J	4300 J
Unknown alkane	16000 J	28000 J
Unknown alkane	16000 J	17000 J
Unknown alkane	13000 J	15000 J
Unknown alkane	11000 J	14000 J
Unknown alkane	9200 J	14000 J
Unknown cycloalkane	7600 J	ND
Unknown benzene	7300 J	6400 J
Unknown alkane	6100 J	9000 J
Unknown alkane	5400 J	7600 J
Unknown benzene	4300 J	4600 J
Unknown alkane	4100 J	4300 J
Unknown benzene	4000 J	ND
Unknown cycloalkane	3700 J	ND
Unknown acid	3700 JB	ND
Unknown alkane	3500 J	4200 J
Unknown alkane	2900 J	ND
Unknown	ND	22000 J
Unknown	ND	20000 J
Unknown naphthalene	ND	5000 J
Unknown	ND	3600 J

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis

Table 4-19
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
PESTICIDES/PCBS

PESTICIDES/PCB COMPOUNDS	BOCB1SD 6/27/90 (ug/kg)	BOCB2SD 6/27/90 (ug/kg)	BOCB3SD 6/27/90 (ug/kg)	BOCB5SD 6/27/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	NA	NA	U	NA	---
PCB - 1242	U	13000+	13000+	1900+	85
PCB - 1016	U	U	U	U	85
PCB - 1232	U	U	U	U	---
PCB - 1254	U	31000+	4600+	1200+	275
PCB - 1260	4500	140000	6800	2200	---
PCB - 1221	U	U	U	U	---
PCB - 1248	U	U	U	U	205
alpha-BHC	NA	NA	U	NA	---
beta-BHC	NA	NA	U	NA	---
delta-BHC	NA	NA	U	NA	---
gamma-BHC	NA	NA	U	NA	---
alpha-Chlordane	NA	NA	U	NA	22
gamma-Chlordane	NA	NA	U	NA	22
4,4'-DDD	NA	NA	U	NA	---
4,4'-DDE	NA	NA	U	NA	---
4,4'-DDT	NA	NA	U	NA	---
Dieldrin	NA	NA	U	NA	---
Endosulfan I	NA	NA	U	NA	---
Endosulfan II	NA	NA	U	NA	---
Endosulfan Sulfate	NA	NA	U	NA	---
Endrin	NA	NA	U	NA	---
Endrin-Ketone	NA	NA	U	NA	---
Heptachlor	NA	NA	U	NA	---
Heptachlor Epoxide	NA	NA	U	NA	---
Methoxychlor	NA	NA	U	NA	---
Toxaphene	NA	NA	U	NA	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

NA: Not Applicable
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-20

BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOCB3SD 6/27/90 (mg/kg)		NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	8760		----
Antimony		U	----
Arsenic	7.1		20
Barium	141		----
Beryllium	1	B	----
Cadmium	2.7		3
Calcium	126000		----
Chromium	64.5		100
Cobalt	3.8	B	----
Copper	76.9	E	170
Cyanide	1.5		12
Iron	18100		----
Lead	611	+	100
Magnesium	33300		----
Manganese	701		----
Mercury		U	1
Nickel	16.8		100
Potassium	1300	B	----
Selenium	0.91	B	4
Silver		U	5
Sodium	1350	B	----
Thallium		U	----
Vanadium	16.8	E	----
Zinc	388	+	350

QUALIFIERS

B : Compound found at a concentration less than contract required detection limit (CRDL but greater than instrument detection limit (IDL)
E : Value is estimated due to interference
U : Analyzed for but not detected

NOTES

----: Not established
+: Value exceeds NJDEP Soil Cleanup Guidelines

Table 4-21
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOCB1SD 6/27/90	BOCB2SD 6/27/90	BOCB3SD 6/27/90	BOCB5SD 6/27/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	N	N	----
Ignitability	Y	Y	Y	Y	----
Petroleum Hydrocarbons, mg/kg	17500	NR	47300	15700	----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)					
Arsenic	U	U	0.0454	U	5
Barium	0.110 BE	0.214 E	0.448 E	0.161 BE	100
Cadmium	U	0.0019 B	U	U	1
Chromium	0.010	U	U	U	5
Lead	U	U	0.0342	U	5
Mercury	U	U	U	U	0.2
Selenium	U	U	U	U	1
Silver	U	U	U	U	5

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

N: Non-corrosive or non-ignitable
Y: Corrosive or ignitable
NR: Not Required
----: Not applicable

Table 4-22
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I CATCH BASIN SEDIMENT SAMPLING
TREATABILITY SCREENING RESULTS

PARAMETERS	BOCB3SD 6/27/90
Flash Point, P.M.C.C.	62.6 F
Oil & Grease, ppm	54300
pH, S.U.	7.8
Specific Gravity	2.62
Total Solids, wt/wt%	61.9%
Moisture Content, vol/wt %	38.1%
Paint Filter Test	No free liquid
Texture	Medium

4.3.4 Underground Pipe Sampling

During the implementation of the Phase I RI field program, one nonaqueous phase liquid (NAPL) sample was obtained from each of two underground pipes, which immediately extend the ground surface and are located in the Southwestern Leasehold Property Area. These samples had the appearance of oil which was recycled at the facility. Since the samples have the appearance of "product" of the facility, and are therefore highly concentrated, units of mg/kg will be used in some instances for presentation purposes and they will not be compared to cleanup criteria guidance values. These samples were analyzed for TCL+30 organic compounds, petroleum hydrocarbons and RCRA Characteristics. The two samples obtained were designated BO-UST-2 and BO-UST-3. Tables 4-23 to 4-27 present the analytical data for these NAPL samples.

The results for the analysis of volatile organic compounds are presented in Table 4-23. In sample BO-UST-2, 12 compounds were found to be present at various levels between 650 ug/kg and 47,000 ug/kg. Acetone, tetrachloroethene, toluene and xylene (total) were found at levels greater than or equal to 10,000 ug/kg. The total volatile organic compound concentration present in sample BO-UST-2 was found to be 113,850 ug/kg. In sample BO-UST-3, acetone, 2-butanone and xylene (total) were found at 2,400 ug/kg, 330 ug/kg and 100 ug/kg, respectively. It should be noted that xylene (total) and acetone were found in the method blank at approximately 150 ug/kg and 1,100 ug/kg, respectively. It is possible that the presence of xylene in sample BO-UST-3 is from laboratory contamination. Reanalysis of sample BO-UST-3 indicated the presence of methylene chloride and toluene which were not present in the initial analysis. Tentatively identified benzene compounds were detected at levels approximately between 65,000 ug/kg and 140,000 ug/kg in sample BO-UST-2. In sample BO-UST-3, tentatively identified compounds were detected between 760 ug/kg and 10,000 ug/kg.

Analytical data resulting from the analysis of semivolatile organic compounds are presented in Table 4-24. In sample BO-UST-2, 14 compounds were found at levels between 45 mg/kg and 4,700 mg/kg. Compounds present at elevated levels include bis(2-ethylhexyl)phthalate, 2-methyl-naphthalene, naphthalene and 4-nitrophenol at approximately 300 mg/kg, 590 mg/kg, 140 mg/kg and 4,700 mg/kg, respectively. The total concentration of semivolatile organic compounds in sample BO-UST-2 was found to be 6,750 mg/kg. In sample BO-UST-3, di-n-butylphthalate, fluoranthene, fluorene and pyrene were found at approximately 49 mg/kg, 260 mg/kg, 50 mg/kg and 48 mg/kg, respectively. The concentrations of tentatively identified compounds found in both samples BO-UST-2 and BO-UST-3 were found to be 33,470 mg/kg and 58,300 mg/kg, respectively.

Table 4-23
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOUST2* 6/28/90 (ug/kg)	BOUST3* 6/28/90 (ug/kg)	BOUST3RE* 6/28/90 (ug/kg)	HB 6/29/90 (ug/l)	TB 6/29/90 (ug/l)
Acetone	16000 B	2400 B	1900 B	U	U
Benzene	650 J	U	U	U	U
Bromodichloromethane	U	U	U	U	U
Bromoform	U	U	U	U	U
Bromomethane	U	U	U	U	U
2-Butanone	3600 J	330 J	860 J	U	U
Carbon Disulfide	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U
Chlorobenzene	U	U	U	U	U
Chloroethane	U	U	U	U	U
Chloroform	U	U	U	U	U
Chloromethane	U	U	U	U	U
Dibromochloromethane	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U
1,2-Dichloroethene (total)	U	U	U	U	U
1,2-Dichloropropane	U	U	U	U	U
cis-1,3-Dichloropropene	U	U	U	U	U
trans-1,3-Dichloropropene	U	U	U	U	U
Ethylbenzene	7000	U	U	U	U
2-Hexanone	2300 J	U	U	U	U
Methylene Chloride	3100	U	310 J	U	U
4-Methyl-2-pentanone	3700 J	U	U	U	U
Styrene	U	U	U	U	U
1,1,2,2-Tetrachloroethane	U	U	U	U	U
Tetrachloroethene	10000	U	U	U	U
Toluene	11000	U	150 J	U	U
Trichloroethene	5100	U	U	U	U
1,1,1-Trichloroethane	4400	U	U	U	U
1,1,2-Trichloroethane	U	U	U	U	U
Vinyl Acetate	U	U	U	U	U
Vinyl Chloride	U	U	U	U	U
Xylene (total)	47000	100 JB	U	U	U

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found but below the detection limit
U: Analyzed for but not detected

NOTES

HB: Holding Blank
RE: Reanalysis
TB: Trip Blank
*: Samples analyzed at medium level

Table 4-23 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOUST2* 6/28/90 (ug/kg)	BOUST3* 6/28/90 (ug/kg)	BOUST3RE* 6/28/90 (ug/kg)	HB 6/29/90 (ug/l)	TB 6/29/90 (ug/l)
Unknown benzene	140000 J	2000 J	1500 J	ND	ND
Unknown benzene	120000 J	1300 J	1100 J	ND	ND
Unknown benzene	98000 J	1100 J	1000 J	ND	ND
Unknown benzene	90000 J	770 J	ND	ND	ND
Unknown benzene	85000 J	760 J	ND	ND	ND
Unknown benzene	85000 J	ND	ND	ND	ND
Unknown benzene	83000 J	ND	ND	ND	ND
Unknown benzene	78000 J	ND	ND	ND	ND
Unknown benzene	74000 J	ND	ND	ND	ND
Unknown benzene	65000 J	ND	ND	ND	ND
Unknown PAH	ND	10000 J	2200 J	ND	ND
Unknown PAH	ND	4800 J	2100 J	ND	ND
Unknown alkane	ND	1200 J	1800 J	ND	ND
Unknown aromatic	ND	1000 J	1200 J	ND	ND
Unknown aromatic	ND	970 J	1200 J	ND	ND
Unknown	ND	ND	950 J	ND	ND
Unknown PAH	ND	ND	890 J	ND	ND

QUALIFIERS

J: Estimated value

NOTES

HB: Holding Blank
ND: Not Detected
TB: Trip Blank
RE: Re-analysis
*: Samples analyzed at medium level

Table 4-24
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOUST2 6/28/90 (mg/kg)		BOUST3 6/28/90 (mg/kg)	
Acenaphthene		U		U
Acenaphthylene		U		U
Anthracene		U		U
Benzo(a)anthracene	130	J		U
Benzo(b)fluoranthene	92	J		U
Benzo(k)fluoranthene				U
Benzoic acid		U		U
Benzo(g,h,i)perylene		U		U
Benzo(a)pyrene		U		U
Benzyl alcohol		U		U
4-Bromophenyl-phenylether		U		U
Butylbenzylphthalate	110	J		U
4-Chloroaniline		U		U
bis(2-Chloroethoxy)methane		U		U
bis(2-Chloroethyl)ether		U		U
bis(2-Chloroisopropyl)ether		U		U
4-Chloro-3-methylphenol		U		U
2-Chloronaphthalene		U		U
2-Chlorophenol		U		U
4-Chlorophenyl-phenylether		U		U
Chrysene	88	J		U
Dibenzo(a,h)anthracene		U		U
Dibenzofuran		U		U
Di-n-butylphthalate	91	JB	49	JB
1,2-Dichlorobenzene		U		U
1,3-Dichlorobenzene		U		U
1,4-Dichlorobenzene		U		U
3,3'-Dichlorobenzidine		U		U
2,4-Dichlorophenol		U		U
Diethylphthalate		U		U
2,4-Dimethylphenol		U		U
Dimethylphthalate		U		U
4,6-Dinitro-2-methylphenol		U		U
2,4-Dinitrophenol		U		U
2,4-Dinitrotoluene		U		U
2,6-Dinitrotoluene		U		U
bis(2-Ethylhexyl)phthalate	300	JB	260	JB
Fluoranthene	91	J	50	J
Fluorene	45	J		U
Hexachlorobenzene		U		U
Hexachlorobutadiene		U		U
Hexachlorocyclopentadiene		U		U
Hexachloroethane		U		U
Indeno(1,2,3-cd)pyrene		U		U
Isophorone		U		U
2-Methylnaphthalene	590	J		U
2-Methylphenol		U		U
4-Methylphenol		U		U
Naphthalene	140	J		U
2-Nitroaniline		U		U
3-Nitroaniline		U		U
4-Nitroaniline		U		U
Nitrobenzene		U		U
2-Nitrophenol		U		U
4-Nitrophenol	4700			U
N-Nitrosodiphenylamine (1)		U		U
N-Nitroso-di-n-propylamine		U		U
Di-n-octylphthalate	93	J		U
Pentachlorophenol		U		U
Phenanthrene	150	J		U
Phenol		U		U
Pyrene	130	J	48	J
1,2,4-Trichlorobenzene		U		U
2,4,6-Trichlorophenol		U		U
2,4,5-Trichlorophenol		U		U

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Value found below the detection limit
U: Analyzed for but not detected

Table 4-24 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY INDENTIFED COMPOUNDS	BOUST2 6/28/90 (mg/kg)	BOUST3 6/28/90 (mg/kg)
Unknown alkane	3700 J	5100 J
Unknown alkane	3200 J	5100 J
Unknown alkane	2900 J	5000 J
Unknown alkane	2400 J	4100 J
Unknown alkane	2300 J	3400 J
Unknown alkane	2200 J	3400 J
Unknown alkane	2000 J	3300 J
Undecane	1900 J	ND
Unknown alkane	1800 J	3200 J
Unknown alkane	1500 J	3000 J
Unknown alkane	1400 J	2500 J
Unknown alkane	1300 J	2000 J
Unknown alkane	1200 J	1500 J
Unknown alkane	1100 J	1500 J
Unknown alkane	800 J	1500 J
Unknown alkane	800 J	1400 J
Unknown alkane	790 J	1300 J
Unknown alkane	790 J	1100 J
Unknown alkane	780 J	1000 J
Unknown alkane	610 J	ND
Heptadecane	ND	7600 J
Unknown trimethyl naphthalene	ND	1300 J

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
There are no cleanup standards for NAPL constituents.
NAPL is required to be cleaned up.

The analytical data obtained for the PCB/pesticide fraction is reported in Table 4-25. Pesticides and PCBs were not detected in sample BO-UST-2. Pesticides were not detected in sample BO-UST-3; however, PCB-1242 and PCB-1260 were detected at 280,000 ug/kg and 180,000 ug/kg, respectively. The total PCB concentration in sample BO-UST-3 was found to be 460,000 ug/kg.

The results for metals and RCRA characteristic analyses are presented in Tables 4-26 and 4-27, respectively. Samples BO-UST-2 and BO-UST-3 were not found to be corrosive, but were found to be ignitable. The results for EP Toxicity metals indicated that both samples were found not to be hazardous.

4.3.5 Subsurface Soil

The following presents results for the Phase I Remedial Investigation power augering and soil boring programs.

4.3.5.1 - Power Augering Program

A series of 36 power auger borings were drilled as part of the Phase I RI field program. The borings were distributed throughout the site and were intended to determine the aerial extent of visually contaminated soils. Boring depths ranged from 0.5 feet to 6.5 feet and averaged approximately 4.5 feet in depth. The power augering locations are shown in Figure 2-9.

In order to evaluate the information obtained during the power augering program, a map was developed showing the distribution of petroleum hydrocarbons in the surface to near surface soils (see Figure 4-1). Three categories were defined including: 1) borings with no visual evidence of contamination; 2) borings with trace evidence of contamination; and 3) borings in areas of clearly contaminated soils. Clean soils were encountered in three borings. Two of these borings were located in the area of the former lagoons (B-21 and B-24). These lagoons may have been filled with clean soil as part of closure operations and, therefore, no contamination was present in the overlying soils. The third clean boring was located near Tank 60 (B-15). Trace contamination was found in 14 borings, 13 of which were located in the northeast area of the site. Boring B-33 showed contamination in the top three feet, with clean soils encountered below three feet. Oil saturated and/or sludge-like soils were found in 19 soil borings.

Based upon the results of the power augering program, it appears that the surface and near surface soils throughout the western half of the site have been contaminated by petroleum

Table 4-25
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOUST2 6/28/90 (ug/kg)	BOUST3 6/28/90 (ug/kg)
Aldrin	U	U
PCB - 1242	U	280000
PCB - 1016	U	U
PCB - 1232	U	U
PCB - 1254	U	U
PCB - 1260	U	180000
PCB - 1221	U	U
PCB - 1248	U	U
alpha-BHC	U	U
beta-BHC	U	U
delta-BHC	U	U
gamma-BHC	U	U
alpha-Chlordane	U	U
gamma-Chlordane	U	U
4,4'-DDD	U	U
4,4'-DDE	U	U
4,4'-DDT	U	U
Dieldrin	U	U
Endosulfan I	U	U
Endosulfan II	U	U
Endosulfan Sulfate	U	U
Endrin	U	U
Endrin-Ketone	U	U
Heptachlor	U	U
Heptachlor Epoxide	U	U
Methoxychlor	U	U
Toxaphene	U	U

QUALIFIERS

U: Analyzed for but not detected

Table 4-26
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOUST2 6/28/90 (mg/kg)		BOUST3 6/28/90 (mg/kg)	
Aluminum	114		44.1	
Antimony		U		U
Arsenic	1.1		1.9	
Barium	9.6	B	106	E
Beryllium		U		U
Cadmium	0.18	B		U
Calcium	136	BE	197	BE
Chromium	5.9		3.7	
Cobalt	0.22	B		U
Copper	10.8		1.7	B
Iron	785		346	
Lead	51.9		67.3	
Magnesium	6.8	B	15.9	B
Manganese	4.7		3.7	
Mercury		U		U
Nickel	4.5		1.2	B
Potassium		U	40.7	B
Selenium		U	0.31	B
Silver		U		U
Sodium	61.4	B	62.1	B
Thallium		U		U
Vanadium	2.1	B	3.7	B
Zinc	58.1		14.7	
Cyanide		U		U

QUALIFERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

Table 4-27
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I UNDERGROUND PIPE SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOUST2 6/28/90	BOUST3 6/28/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	----
Ignitability	Y	Y	----
Total Cyanide, (mg/kg)	ND	ND	----
Petroleum Hydrocarbons, (mg/kg)	768000	798000	----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)			
Arsenic	U	U	5
Barium	0.031 B	0.0405 B	100
Cadmium	U	U	1
Chromium	U	U	5
Lead	U	U	5
Mercury	U	U	0.2
Selenium	U	U	1
Silver	U	U	5

QUALIFERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
U: Analyzed for but not detected

NOTES

N: Non-corrosive or non-ignitable
Y: Corrosive or ignitable
ND: Not Detected
----: Not applicable

hydrocarbons. Contaminated soils found on the eastern half of the site appear to be primarily distributed along the railroad spur.

4.3.5.2 - Boreholes

During the Phase I RI field program, eighteen soil boring samples were collected for chemical analyses. The results of such analyses are presented in Tables 4-28 to 4-47. Figure 2-9 shows the locations of the soil borings installed as part of the Phase I RI field program.

The data obtained from the analysis of volatile organic compounds are presented in Tables 4-28 to 4-30. Eleven samples were analyzed for volatile organic compounds, of which nine samples contained compounds above soil cleanup criteria guidelines. The most predominant of these compounds were found to include: 2-butanone, 1,2-dichloroethene (total), ethylbenzene, methylene chloride, tetrachloroethene, toluene and xylene (total). Other compounds found above the guidelines include: 1,1-dichloroethane, trichloroethene and 1,1,1-trichloroethane. Table 4-31 lists each subsurface soil sample collected for analysis of volatile organic compounds and the total concentration of all volatile organic compounds which were found to exceed the guidelines. Sample BO-SB-5-S contained the highest total concentration of volatile organic compounds that were found to exceed the soil cleanup criteria guidelines (1,373 mg/kg), which is indicative of NAPL contamination.

Based on a review of the results from the analysis of method blank data (not included in the data tables), the following volatile organic compounds were found in the laboratory method blank and at the following concentrations in the samples collected: toluene at 7,800 ug/kg; 2,200 ug/kg; and 7 ug/kg in samples BO-MW-5-S, BO-SB-7-S and BO-SB-4-S (11-13 ft.), respectively; xylene (total) at 390,000 ug/kg in sample BO-SB-5-S; and acetone at 12,000 ug/kg and 180 ug/kg in samples BO-SB-5-S and BO-SB-4-S (11-13 ft.), respectively. Based on the levels found for toluene and xylene, it is determined that these compounds are present in the environmental samples, and the blank data does not affect the results. Since acetone is a common lab contaminant in all the samples collected for the site, it will not be considered as present in the environmental samples.

The trend for tentatively identified volatile organic compounds (TICs) generally follows the hot spot sampling points presented in Table 4-30. The total concentration of TICs found in samples BO-SB-5-S, BO-MW-1-S and BO-MW-5-S was found to be 593,000 ug/kg, 187,600 ug/kg and 160,000 ug/kg, respectively. Samples BO-MW-6-S, BO-SB-1-S and BO-SB-7-S also contained high levels of TICs at concentrations of 10,700 ug/kg, 96,400 ug/kg and 94,300 ug/kg, respectively. Although this data confirms the hot spots with respect to volatile

Table 4-28
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

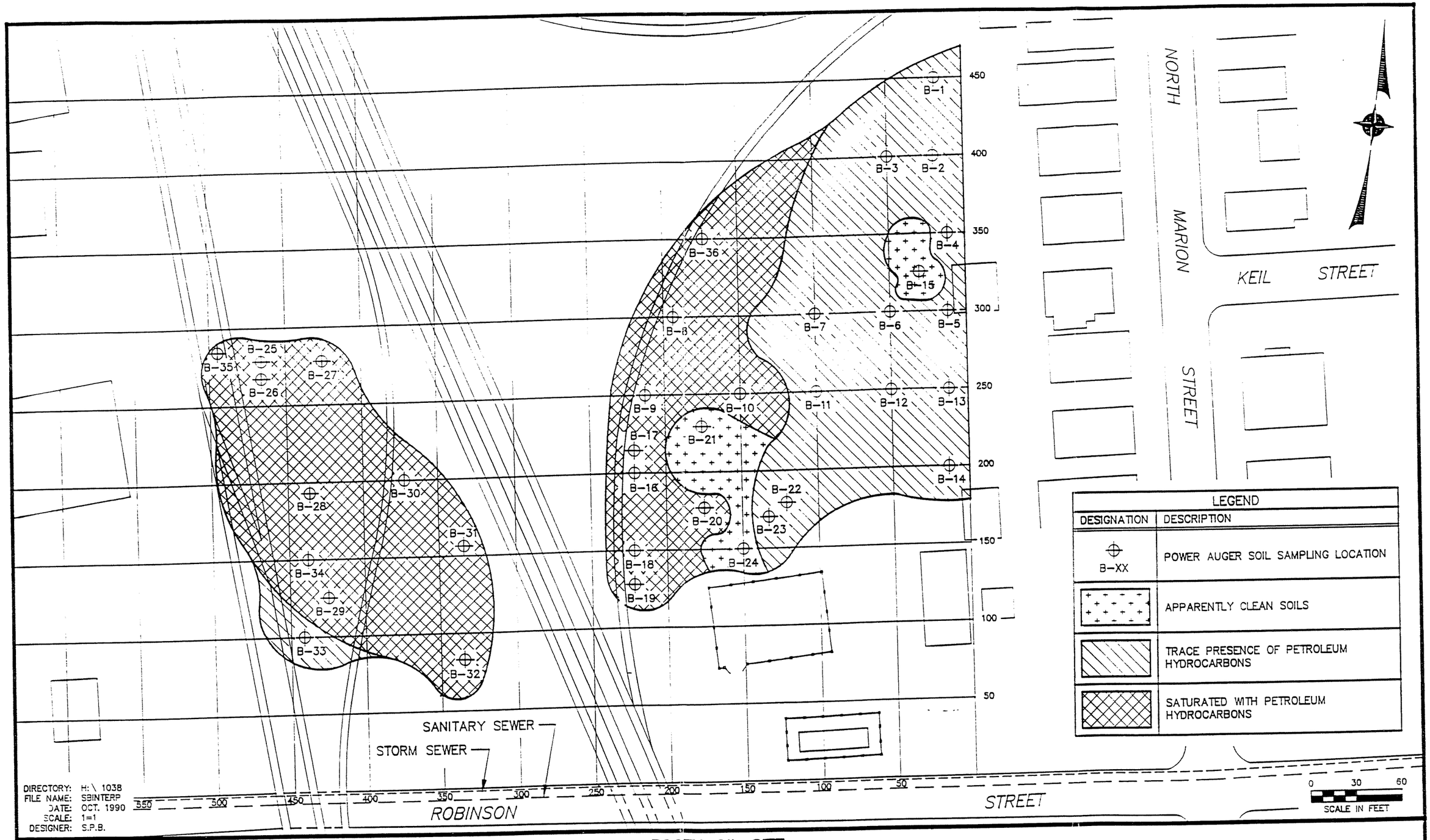
VOLATILE ORGANICS	BOMW6S* (1-4 ft) 7/11/90 (ug/kg)	BOMW7S (5-7 ft) 7/11/90 (ug/kg)	BOSB5S* (3-7.5 ft) 7/10/90 (ug/kg)	BOSB10S (0-2 ft) 7/10/90 (ug/kg)	HB 7/12/90 (ug/l)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	3300 B	23 B	12000 JB	41 B	5J	---
Benzene	U	U	3000 J	1 J	U	---
Bromodichloromethane	U	U	U	U	U	---
Bromoform	U	U	U	U	U	245
Bromomethane	U	U	U	U	U	---
2-Butanone	1000 JB+	2 J	U	U	U	10
Carbon Disulfide	U	U	U	3 J	U	168
Carbon Tetrachloride	U	U	U	U	U	28
Chlorobenzene	U	U	U	U	U	152
Chloroethane	U	U	U	U	U	93
Chloroform	U	U	U	U	U	155
Chloromethane	U	U	U	U	U	85
Dibromochloromethane	U	U	U	U	U	---
1,1-Dichloroethane	U	5 J	15000+	U	U	100
1,1-Dichloroethene	U	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	U	1.24
1,2-Dichloroethene (total)	630 J+	U	160000+	47 +	U	32
1,2-Dichloropropane	U	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	U	142
Ethylbenzene	200 J+	9 J	75000+	2 J	U	67
2-Hexanone	U	U	U	U	U	---
Methylene Chloride	930 B+	U	6400 J+	6 +	2 J	5
4-Methyl-2-pentanone	U	U	U	U	U	---
Styrene	U	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	U	0.54
Tetrachloroethene	U	U	220000+	120 +	U	8
Toluene	300 J+	U	300000+	6	U	36
Trichloroethene	U	U	170000+	44 +	U	24
1,1,1-Trichloroethane	U	U	22000+	U	U	150
1,1,2-Trichloroethane	U	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	U	48
Vinyl Chloride	U	U	U	U	U	23
Xylene (total)	1200 +	8	390000 B+	20	U	67

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

HB: Holding Blank
---: Not established
*: Samples analyzed at medium level
+: Value exceeds Soil Cleanup Criteria Guidelines



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

POWER AUGER SOIL BORING INTERPRETATION MAP

FIGURE 4-1

Table 4-28 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

TENTATIVELY INDENTIFIED COMPOUNDS	BOMW6S* (1-4 ft) 7/11/90 (ug/kg)	BOMW7S (5-7 ft) 7/11/90 (ug/kg)	BOSB5S* (3-7.5 ft) 7/10/90 (ug/kg)	BOSB10S (0-2 ft) 7/10/90 (ug/kg)	HB 7/12/90 (ug/l)
Unknown benzene	1700 J	79 J	92000 J	80 J	ND
Unknown cycloalkane	ND	49 J	ND	36 J	ND
Unknown benzene	1400 J	49 J	60000 J	56 J	ND
Unknown benzene	1400 J	41 J	56000 J	32 J	ND
Unknown alkane	960 J	39 J	78000 J	99 J	ND
Unknown benzene	1400 J	34 J	55000 J	ND	ND
Unknown cycloalkane	ND	30 J	ND	ND	ND
Unknown benzene	1200 J	28 J	48000 J	ND	ND
Unknown alkene	ND	27 J	ND	62 J	ND
Unknown benzene	1000 J	26 J	43000 J	ND	ND
Naphthalene decahydro-trani-	ND	ND	ND	66 J	ND
Unknown alkane	ND	ND	71000 J	51 J	ND
Unknown alkane	ND	ND	49000 J	45 J	ND
Unknown alkene	ND	ND	ND	35 J	ND
Unknown benzene	840 J	ND	41000 J	ND	ND
Unknown aromatic	800 J	ND	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

HB: Holding Blank
ND: Not Detected
*: Samples analyzed at medium level

Table 4-29
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSB9S (11-13 ft) 7/12/90 (ug/kg)	BOMW1S * (0-2 ft) 7/12/90 (ug/kg)	BOSB1S * (7-9 ft) 7/13/90 (ug/kg)	BOSB4S (11-13 ft) 7/12/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	67 B	5300 B	2800 B	180 B	---
Benzene	5 J	U	U	U	---
Bromodichloromethane	U	U	U	U	---
Bromoform	U	U	U	U	245
Bromomethane	U	U	U	U	---
2-Butanone	27 J+	1000 JB+	1200 JB+	21 JB+	10
Carbon Disulfide	U	U	U	2 J	168
Carbon Tetrachloride	U	U	U	U	28
Chlorobenzene	U	U	U	U	152
Chloroethane	U	U	U	U	93
Chloroform	U	U	U	U	155
Chloromethane	U	U	U	U	85
Dibromochloromethane	U	U	U	U	---
1,1-Dichloroethane	7 J	U	U	5 J	100
1,1-Dichloroethene	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	1.24
1,2-Dichloroethene (total)	73 +	U	640 J+	8 J	32
1,2-Dichloropropane	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	142
Ethylbenzene	41	3800 +	2300 +	20	67
2-Hexanone	U	U	U	U	---
Methylene Chloride	9 J+	830 B+	430 JB+	U	5
4-Methyl-2-pentanone	U	U	U	13 J	---
Styrene	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	0.54
Tetrachloroethene	U	U	U	19 +	8
Toluene	81 +	U	U	7 JB	36
Trichloroethene	U	U	220 J+	32 +	24
1,1,1-Trichloroethane	U	U	U	6 J	150
1,1,2-Trichloroethane	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	48
Vinyl Chloride	U	U	U	U	23
Xylene (total)	230 +	27000+	8100 +	50	67

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: Not established
*: Samples analyzed at medium level
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-29 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB9S (11-13 ft) 7/12/90 (ug/kg)	BOMW1S * (0-2 ft) 7/12/90 (ug/kg)	BOSB1S * (7-9 ft) 7/13/90 (ug/kg)	BOSB4S (11-13 ft) 7/12/90 (ug/kg)
Unknown alkane	980 J	ND	11000 J	65 J
Unknown alkane	680 J	ND	ND	ND
Unknown alkane	540 J	ND	ND	ND
Unknown benzene	430 J	33000 J	15000 J	110 J
Unknown benzene	430 J	26000 J	11000 J	110 J
Unknown alkane	420 J	ND	ND	ND
Unknown alkyl indene	360 J	ND	ND	ND
Unknown benzene	310 J	26000 J	9700 J	100 J
Unknown benzene	290 J	22000 J	8500 J	89 J
Unknown cycloalkane	280 J	8600 J	8300 J	ND
Unknown benzene	ND	22000 J	8100 J	85 J
Unknown benzene	ND	21000 J	ND	80 J
Unknown benzene	ND	16000 J	ND	55 J
Unknown benzene	ND	13000 J	ND	45 J
Unknown benzene	ND	8600 J	ND	43 J
Cyclohexane, methyl-	ND	ND	9400 J	ND
Unknown decahydro naphthalene	ND	ND	7700 J	ND
Unknown cycloalkane	ND	ND	7700 J	ND

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
*: Samples analyzed at medium level

Table 4-30
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSB7S* (2-4 ft) 7/18/90 (ug/kg)	BOMW5S* (4-6 ft) 7/16/90 (ug/kg)	BOSB12S (2-4 ft) 7/18/90 (ug/kg)	BOSB12SRE (2-4 ft) 7/18/90 (ug/kg)	BODW1 7/16/90 (ug/l)	HBREF34 (ug/l)	HBREF35 (ug/l)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	1700 B	1700 B	35 B	38 B	19 B	U	8 JB	---
Benzene	U	U	1 J	1 J	U	U	U	---
Bromodichloromethane	U	U	U	U	U	U	U	---
Bromoform	U	U	U	U	U	U	U	245
Bromomethane	U	U	U	U	U	U	U	---
2-Butanone	740 JB+	1600 B+	4 J	5 JB	U	U	U	10
Carbon Disulfide	U	U	1 J	U	U	U	U	168
Carbon Tetrachloride	U	U	U	U	U	U	U	28
Chlorobenzene	U	U	U	U	U	U	U	152
Chloroethane	U	U	U	U	U	U	U	93
Chloroform	U	U	U	U	5	U	0.8 J	155
Chloromethane	U	U	U	U	U	U	U	85
Dibromochloromethane	U	U	U	U	U	U	U	---
1,1-Dichloroethane	U	U	U	U	U	U	U	100
1,1-Dichloroethene	U	U	1 J	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	U	U	U	1.24
1,2-Dichloroethene (total)	3000 +	8300 +	2 J	U	U	U	U	32
1,2-Dichloropropane	U	U	U	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	142
Ethylbenzene	2800 +	6800 +	U	U	U	U	U	67
2-Hexanone	U	U	U	U	U	U	U	---
Methylene Chloride	390 JB+	410 JB+	5 JB	6 B+	U	2 JB	2 JB	5
4-Methyl-2-pentanone	U	U	U	U	U	U	U	---
Styrene	U	U	U	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	0.54
Tetrachloroethene	200 J+	1800 +	U	U	U	U	U	8
Toluene	2200 B+	7800 B+	2 J	2 J	U	U	0.5 J	36
Trichloroethene	U	U	U	U	U	U	U	24
1,1,1-Trichloroethane	U	1200 +	U	U	U	U	U	150
1,1,2-Trichloroethane	U	U	U	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	U	U	U	48
Vinyl Chloride	U	U	3 J	U	U	U	U	23
Xylene (total)	14000+	38000+	U	2 J	U	U	U	67

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

DW: Distilled Water
HB: Holding Blank
RE: Reanalysis
---: Not established
*: Samples analyzed at medium level
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-30 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB7S* (2-4 ft) 7/18/90 (ug/kg)	BOMW5S* (4-6 ft) 7/16/90 (ug/kg)	BOSB12S (2-4 ft) 7/18/90 (ug/kg)	BOSB12SRE (2-4 ft) 7/18/90 (ug/kg)	BODW1 7/16/90 (ug/l)	HBREF34 (ug/l)	HBREF35 (ug/l)
Unknown benzene	13000 J	23000 J	ND	ND	ND	ND	ND
Unknown benzene	12000 J	18000 J	ND	ND	ND	ND	ND
Unknown alkane	11000 J	21000 J	ND	ND	ND	ND	ND
Unknown benzene	9800 J	15000 J	ND	ND	ND	ND	ND
Unknown benzene	9400 J	13000 J	ND	ND	ND	ND	ND
Unknown benzene	8300 J	13000 J	ND	ND	ND	ND	ND
Unknown benzene	8200 J	13000 J	ND	ND	ND	ND	ND
Unknown benzene	8000 J	13000 J	ND	ND	ND	ND	ND
Unknown benzene	7600 J	11000 J	ND	ND	ND	ND	ND
Unknown alkane	7000 J	12000 J	ND	ND	ND	ND	ND
Unknown	ND	ND	11 J	19 J	ND	ND	ND
Unknown aromatic	ND	ND	ND	42 J	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

HB: Holding Blank
ND: Not Detected
RE: Reanalysis
*: Samples analyzed at medium level

organic contamination in subsurface soils, Table 4-31 indicates substantial levels of compounds in samples BO-MW-6-S, BO-SB-1-S and BO-SB-7-S, which is further confirmed by the TIC data.

Results from the analysis of semivolatile organic compounds are presented in Tables 4-32 to 4-34. Of the eleven samples collected and analyzed for semivolatile organic compounds, eight of these samples contained compounds at levels above soil cleanup criteria guidelines. Those semivolatile compounds that were predominantly found in subsurface soils include: benzo(a)anthracene, chrysene, and naphthalene. Table 4-35 includes these compounds, as well as others and the corresponding concentrations which were found above the guidelines. (See Figure 2-10 for locations of the Phase I RI soil borings.) Sample BO-SB-5-S was found to contain the highest concentration of total semivolatile organic compounds that exceed the guidelines (886,190 ug/kg), which is indicative of NAPL contamination. Table 4-36 lists the total concentration of semivolatile organic compounds which were found to exceed the guidelines. With respect to tentatively identified semivolatile organic compounds, those samples which were found to contain elevated concentrations of compounds in excess of the guidelines were also the samples that contained the highest levels of TICs.

Tables 4-37 to 4-39 present the data from the analysis of the pesticide/PCB fraction. The only pesticides detected were aldrin and 4,4'-DDD at concentrations of 6.7 ug/kg in sample BO-MW-7-S and 50 ug/kg in sample BO-SB-10-S, respectively. The predominant PCB arochlors detected in subsurface soil include PCB-1242, PCB-1260 and PCB-1248. The total PCB concentration detected in samples BO-MW-6-S, BO-SB-5-S, BO-MW-1-S, BO-MW-9-S and BO-MW-4-S was found to be 67,000 ug/kg, 122,000 ug/kg, 13,000 ug/kg, 24,100 ug/kg and 30,200 ug/kg, respectively. Table 4-40 presents each subsurface soil sample analyzed for PCBs and the total concentration of PCBs detected in each sample.

The results from metals analysis are presented in Tables 4-41 to 4-43. Compounds present in samples BO-MW-5-S, BO-MW-6-S, BO-SB-5-S, BO-SB-10-S, BO-SB-2-S and BO-MW-1-S were found to exceed the NJDEP soil cleanup guidelines. Table 4-44 presents those compounds and corresponding concentrations which were found to exist above these guidelines.

Results from RCRA Characteristic testing are presented in Tables 4-45 to 4-47. Ten samples were tested for corrosivity and ignitability. While none of the samples exhibited corrosive characteristics, six of the ten samples were found to be ignitable. With respect to EP Toxicity analyses for metals, chromium in sample BO-SB-5-S was the only contaminant and location that exceeded RCRA regulatory levels.

Table 4-31

PHASE I RI SUBSURFACE SOIL SAMPLING

TOTAL CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS PRESENT ABOVE SOIL CLEANUP CRITERIA GUIDELINES

Sample Designation	Sample Depth	Total Concentration (ug/kg)
BO-MW-1-S	0-2 ft.	32,630
BO-MW-5-S	4-6 ft.	65,910
BO-MW-6-S	1-4 ft.	4,260
BO-SB-1-S	7-9 ft.	12,890
BO-SB-4-S	11-13 ft.	72
BO-SB-5-S	3-7.5 ft.	1,358 (mg/kg)
BO-SB-7-S	2-4 ft.	23,330
BO-SB-9-S	11-13 ft.	420
BO-SB-10-S	0-2 ft.	217

Table 4-32
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	B0SB5S (3-7.5 ft) 7/10/90 (ug/kg)		B0SB5SDL (3-7.5 ft) 7/10/90 (ug/kg)		B0MW6S (1-4 ft) 7/11/90 (ug/kg)		B0MW7S (5-7 ft) 7/11/90 (ug/kg)		B0MW7SRE (5-7 ft) 7/11/90 (ug/kg)		B0SB10S (0-2 ft) 7/10/90 (ug/kg)		B0SB10SRE (0-2 ft) 7/10/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
enaphthene	16000	+	15000	JD+		U		U		U		U		U	2220
enaphthylene		U		U		U		U		U		U		U	5140
thracene		U		U		U	190	J	140	J		U	24	J	65000
Benzo(a)anthracene		U		U		U	270	J+	260	J+		U		U	5
Benzo(b)fluoranthene		U		U		U		U	140	J+		U	140	J+	55
nzo(k)fluoranthene		U		U		U		U		U		U		U	55
nzoic acid		U		U		U		U		U		U		U	167
nzo(g,h,i)perylene		U		U		U		U		U		U		U	593110
enzo(a)pyrene		U		U		U		U		U		U		U	---
Benzyl alcohol		U		U		U	18	J		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U		U		U		U	---
tylbenzylphthalate	9900		2600	JD		U		U		U		U		U	---
Chloroaniline		U		U		U		U		U		U		U	---
s(2-Chloroethoxy)methane		U		U		U		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U		U		U		U	---
Chloro-3-methylphenol		U		U		U		U		U		U		U	115
Chloronaphthalene		U		U		U		U		U		U		U	---
Chlorophenol		U		U		U		U		U		U		U	38
Chlorophenyl-phenylether		U		U		U		U		U		U		U	---
Chrysene	6800	J+	8400	JD+	1500	J+	320	J+	310	J+		U		U	20
Dibenzo(a,h)anthracene		U		U		U		U		U		U		U	713680
benzofuran		U		U		U		U		U		U		U	---
-n-butylphthalate	4000	JB	6700	JDB	3700	JB	120	JB	150	JB	58	JB	65	JB	41000
2-Dichlorobenzene	6500	J	6000	JD	420	J		U		U		U		U	66
3-Dichlorobenzene		U		U		U		U		U		U		U	73
4-Dichlorobenzene	890	J+		U	140	J+		U	17	J		U		U	92
3'-Dichlorobenzidine		U		U		U		U		U		U		U	---
4-Dichlorophenol		U		U		U		U		U		U		U	0.65
ethylphthalate		U		U		U		U		U	28	JB	29	JB	260
4-Dimethylphenol	250000	E+	270000	D+		U		U		U		U		U	50
Dimethylphthalate		U		U		U		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U		U		U		U	---
4-Dinitrophenol		U		U		U		U		U		U		U	---
4-Dinitrotoluene		U		U		U		U		U		U		U	---
6-Dinitrotoluene		U		U		U		U		U		U		U	---
bis(2-Ethylhexyl)phthalate	37000	B	64000	JDB	23000	B	910	B	850	B	590	JB	760	B	1517325
Fluoranthene	6000	J	11000	JD	590	J	510	J	540	J	59	J	68	J	22892
Fluorene		U		U		U		U		U		U		U	8180
xachlorobenzene		U		U		U		U		U		U		U	68
xachlorobutadiene		U		U		U		U		U		U		U	74
xachlorocyclopentadiene		U		U		U		U		U		U		U	---
Hexachloroethane		U		U		U		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene		U		U		U		U		U		U		U	28
rophorone		U		U		U		U		U		U		U	---
Methylnaphthalene	140000	+	190000	D+	4100	J	760		780		42	J	41	J	21250
Methylphenol	78000		81000	JD		U	87	J		U		U		U	---
Methylphenol	600000	E	1000000	D	610	J		U		U		U		U	---
Naphthalene	76000	+	89000	JD+	2000	J+		U	300	J	25	J	28	J	650
2-Nitroaniline		U		U		U		U		U		U		U	---
Nitroaniline		U		U		U		U		U		U		U	232
Nitroaniline		U		U		U		U		U		U		U	275
tropenzene		U		U		U		U		U		U		U	104
2-Nitrophenol		U		U		U		U		U		U		U	162
4-Nitrophenol		U		U		U		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U	3800		3500			U		U	---
-Nitroso-di-n-propylamine		U		U		U		U		U		U		U	---
-n-octylphthalate		U		U		U		U	260	JB	260	JB	280	JB	5965
entachlorophenol		U		U		U		U		U		U		U	2555
Phenanthrene	54000		53000	JD	3500	J	2000		1900		54	J	62	J	57500
Phenol	390000	E+	520000	D+	600	J+		U		U		U		U	0.4
rene	55000		20000	JD		U	1400		1500		210	J	180	J	210000
2,4-Trichlorobenzene		U		U		U		U		U		U		U	336
4,6-Trichlorophenol		U		U		U		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U		U		U		U	62

JALIFIERS

B: Compound found in method blank as well as in sample
D: Value from diluted run
E: Value exceeds calibration range
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

DL: Sample reanalyzed at a dilution
RE: Reanalysis
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-32 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

TENATIVELY IDENTIFIED COMPOUNDS	B0SB5S (3-7.5 ft) 7/10/90 (ug/kg)	B0SB5SDL (3-7.5 ft) 7/10/90 (ug/kg)	B0MW6S (1-4 ft) 7/11/90 (ug/kg)	B0MW7S (5-7 ft) 7/11/90 (ug/kg)	B0MW7SRE (5-7 ft) 7/11/90 (ug/kg)	B0SB10S (0-2 ft) 7/10/90 (ug/kg)	B0SB10SRE (0-2 ft) 7/10/90 (ug/kg)
Unknown	ND	550000 J	52000 JAB	39000 JAB	32000 JAB	48000 JAB	47000 JAB
Unknown alkane	220000 J	470000 J	36000 J	9600 J	8200 J	4300 J	3500 J
Unknown alkane	200000 J	440000 J	30000 J	8800 J	6900 J	4100 JB	3000 J
Unknown alkane	190000 J	440000 J	25000 J	5700 J	4500 J	3800 J	1500 J
Unknown acid	190000 J	400000 J	ND	ND	2500 JB	3500 JB	3500 JB
Unknown alkane	150000 J	350000 J	14000 J	4300 J	3800 J	1300 J	1300 J
Phenol, 2,3-dimethyl-	120000 J	ND	ND	ND	ND	ND	ND
Unknown alkane	120000 J	310000 J	12000 J	4200 J	3100 J	ND	1200 J
Unknown acid	120000 J	210000 J	ND	2700 JB	ND	1400 JB	3500 JB
Unknown acid	110000 J	200000 J	ND	ND	ND	600 JB	1300 JB
Unknown acid	110000 J	200000 J	ND	ND	ND	ND	570 JB
Unknown alkane	110000 J	300000 J	11000 J	3500 J	3000 J	1300 J	1000 J
Unknown alkane	97000 J	270000 J	9500 J	2100 J	2800 J	1100 J	690 J
Unknown alkane	91000 J	270000 J	8300 J	2000 J	2500 J	770 J	ND
Unknown alkane	88000 J	260000 J	7900 J	1900 J	2500 J	500 J	ND
Unknown alkane	86000 J	250000 J	6000 J	ND	2000 J	ND	480 J
Unknown dimethyl naphthalene	85000 J	400000 J	6100 J	3100 J	2300 J	ND	ND
Unknown cycloalkane	78000 J	ND	16000 J	1800 J	3000 J	500 J	ND
Unknown benzene	76000 J	ND	14000 J	ND	ND	ND	ND
Unknown alkane	63000 J	200000 J	6000 J	ND	ND	ND	440 J
Unknown alkane	62000 J	ND	5600 J	ND	ND	ND	430 J
Unknown	ND	ND	6900 J	3800 JB	8000 JB	2500 J	1000 J
Unknown	ND	ND	6200 J	2900 J	4700 J	1200 J	940 J
Unknown	ND	ND	5800 J	ND	ND	1000 J	760 J
Unknown	ND	ND	5600 J	ND	ND	770 J	670 J
Unknown	ND	ND	ND	ND	ND	610 J	480 J
Unknown alkene	ND	ND	7100 J	ND	3600 J	590 J	ND
Unknown	ND	ND	ND	ND	ND	550 JA	ND
Unknown	ND	ND	ND	ND	ND	470 J	ND
Unknown	ND	ND	ND	ND	ND	420 J	ND
Unknown trimethyl naphthalene	ND	ND	ND	5600 J	3700 J	ND	ND
Unknown trimethyl naphthalene	ND	ND	ND	2800 J	3200 J	ND	ND
Unknown trimethyl naphthalene	ND	ND	ND	2600 J	2900 J	ND	ND
Unknown trimethyl naphthalene	ND	ND	ND	2400 J	ND	ND	ND
Unknown methyl fluorene	ND	ND	ND	2200 J	ND	ND	ND
Unknown naphthalene isomer	ND	ND	ND	1800 J	ND	ND	ND
Unknown	ND	ND	ND	ND	ND	ND	ND
Unknown dimethyl naphthalene	ND	ND	ND	ND	2200 J	ND	ND
Undecane	ND	360000 J	ND	ND	ND	ND	ND
Ethyl phenol	ND	210000 J	ND	ND	ND	ND	ND
Decane	ND	190000 J	ND	ND	ND	ND	ND

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

DL: Sample reanalyzed at a dilution
RE: Reanalysis

Table 4-33
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	BOMW1S (0-2 ft) 7/12/90 (ug/kg)		BOSB4S (11-13 ft) 7/12/90 (ug/kg)		BOSB9S (11-13 ft) 7/13/90 (ug/kg)		BOSB9SRE (11-13 ft) 7/13/90 (ug/kg)		BOSB1S (7-9 ft) 7/13/90 (ug/kg)		BOSB1SRE (7-9 ft) 7/13/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene		U		U		U		U		U		U	2220
Acenaphthylene		U		U		U		U		U		U	5140
Anthracene		U		U		U		U		U	310	J	65000
Benzo(a)anthracene	1500	J+		U		U		U	480	J+	440	J+	5
Benzo(b)fluoranthene	2900	J+	7	J		U		U		U		U	55
Benzo(k)fluoranthene	1800	J+		U		U		U		U		U	55
Benzoic acid		U	21	JB		U		U		U		U	167
Benzo(g,h,i)perylene		U		U		U		U		U		U	593110
Benzo(a)pyrene		U		U		U		U		U		U	---
Benzyl alcohol		U		U		U		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U		U		U	---
Butylbenzylphthalate		U		U		U	170	J		U		U	---
4-Chloroaniline		U		U		U		U		U		U	---
bis(2-Chloroethoxy)methane		U		U		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U		U		U	---
4-Chloro-3-methylphenol		U		U		U		U		U		U	115
2-Chloronaphthalene		U		U		U		U		U		U	---
2-Chlorophenol		U	14	JB		U		U		U		U	38
4-Chlorophenyl-phenylether		U		U		U		U		U		U	---
Chrysene	2400	J+		U		U		U	700	J+	610	J+	20
Dibenzo(a,h)anthracene		U		U		U		U		U		U	713680
Dibenzofuran		U		U		U		U		U		U	---
Di-n-butylphthalate		U	62	JB		U	150	JB		U	270	JB	41000
1,2-Dichlorobenzene		U		U		U		U		U		U	66
1,3-Dichlorobenzene		U		U		U		U		U		U	73
1,4-Dichlorobenzene		U		U		U		U		U		U	92
3,3'-Dichlorobenzidine		U		U		U		U		U		U	---
2,4-Dichlorophenol		U		U		U		U		U		U	0.65
Diethylphthalate		U	35	JB		U		U		U		U	260
2,4-Dimethylphenol		U		U		U		U		U		U	50
Dimethylphthalate		U		U		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U		U		U	---
2,4-Dinitrophenol		U		U		U		U		U		U	---
2,4-Dinitrotoluene		U		U		U		U		U		U	---
2,6-Dinitrotoluene		U		U		U		U		U		U	---
bis(2-Ethylhexyl)phthalate	2400	JB	280	JB	1800	B	1900	B	750	JB	570	JB	1517325
Fluoranthene	3700		13	J	210	J	260	J	960		1000		22892
Fluorene	4200		7	J		U		U		U	1200		8180
Hexachlorobenzene		U		U		U		U		U		U	68
Hexachlorobutadiene		U		U		U		U		U		U	74
Hexachlorocyclopentadiene		U		U		U		U		U		U	---
Hexachloroethane		U		U		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene		U		U		U		U		U		U	28
Isophorone		U		U		U		U		U		U	---
2-Methylnaphthalene	36000	+	46	J	630	J	660	J	13000		9900		21250
2-Methylphenol		U		U		U		U		U		U	---
4-Methylphenol		U	18	J		U		U	1800		1500		---
Naphthalene	8500	+	33	J		U	560	J		U		U	650
2-Nitroaniline		U		U		U		U		U		U	---
3-Nitroaniline		U		U		U		U		U		U	232
4-Nitroaniline		U		U		U		U		U		U	275
Nitrobenzene		U		U		U		U		U		U	104
2-Nitrophenol		U		U		U		U		U		U	162
4-Nitrophenol		U		U		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U		U		U		U	---
N-Nitroso-di-n-propylamine		U		U		U		U		U		U	---
Di-n-octylphthalate		U	8	JB		U		U	200	JB	160	JB	5965
Pentachlorophenol		U	25	JB		U		U		U		U	2555
Phenanthrene	13000			U	690	J	740	J	3400		2600		57500
Phenol		U		U		U		U		U		U	0.4
Pyrene	5100		14	J	220	J	330	J	2600		3100		210000
1,2,4-Trichlorobenzene		U		U		U		U		U		U	336
2,4,6-Trichlorophenol		U		U		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U		U		U	62

QUALIFIERS

B: Compound found in method blank as well as in sample
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-33 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW1S (0-2 ft) 7/12/90 (ug/kg)	BOSB4S (11-13 ft) 7/12/90 (ug/kg)	BOSB9S (11-13 ft) 7/13/90 (ug/kg)	BOSB9SRE (11-13 ft) 7/13/90 (ug/kg)	BOSB1S (7-9 ft) 7/13/90 (ug/kg)	BOSB1SRE (7-9 ft) 7/13/90 (ug/kg)
Unknown alkane	39000 J	410 J	16000 J	13000 J	22000 J	7800 J
Unknown alkane	35000 J	410 J	12000 J	9200 J	7400 J	5100 J
Unknown alkane	33000 J	390 J	10000 J	7500 J	4200 J	3300 J
Unknown benzene	25000 J	ND	ND	ND	8900 J	5900 J
Unknown alkane	20000 J	380 J	9000 J	7400 J	3400 J	2900 J
Unknown benzene	20000 J	ND	ND	ND	8400 J	2700 J
Unknown cycloalkane	18000 J	ND	ND	ND	9300 J	8400 J
Unknown alkane	18000 J	380 J	8400 J	7100 J	3000 J	2800 J
Unknown alkane	17000 J	370 J	8300 J	7100 J	2900 J	2700 J
Unknown alkane	16000 J	ND	7100 J	6600 J	ND	2000 J
Unknown benzene	14000 J	ND	ND	ND	6300 J	2400 J
Unknown dimethyl naphthalene	14000 J	ND	ND	ND	ND	ND
Unknown alkane	14000 J	430 J	7100 J	6300 J	ND	1600 J
Unknown benzene	13000 J	ND	ND	ND	4900 J	2400 J
Unknown	13000 JAB	64000 JAB	43000 JAB	36000 JAB	35000 JAB	20000 JAB
Unknown benzene	12000 J	ND	ND	ND	ND	ND
Unknown benzene	12000 J	ND	ND	ND	ND	ND
Unknown cycloalkane	11000 J	ND	ND	ND	ND	5900 J
Unknown cycloalkane	11000 J	ND	ND	ND	ND	5800 J
Unknown benzene	9600 J	ND	3700 J	ND	ND	ND
Unknown cycloalkane	9400 J	ND	3400 J	4100 J	ND	ND
Unknown acid	ND	5000 JB	ND	ND	5000 J	2900 J
Unknown	ND	4100 J	9100 J	6300 J	37000 J	15000 J
Unknown acid	ND	2500 JB	ND	ND	2600 JB	ND
Unknown	ND	1400 J	3700 J	3800 J	18000 J	6900 J
Unknown	ND	820 J	ND	ND	12000 J	2500 J
Unknown acid	ND	820 JB	ND	ND	2400 JB	ND
Unknown	ND	450 J	ND	ND	6600 J	ND
Unknown alkene	ND	440 J	ND	ND	18000 J	ND
Unknown	ND	420 JA	ND	ND	3100 J	ND
Undecane	ND	ND	8300 J	7100 J	ND	ND
Unknown alkane	ND	ND	7100 J	ND	ND	1600 J
Unknown alkane	ND	ND	6900 J	ND	ND	ND
Tridecane	ND	ND	6700 J	8300 J	ND	ND
Dodecane	ND	ND	6400 J	8000 J	ND	ND
Unknown alkane	ND	ND	6000 J	6200 J	ND	ND
Unknown alkane	ND	ND	5200 J	5200 J	ND	ND
Unknown alkane	ND	ND	3800 J	5000 J	ND	ND
Unknown alkane	ND	ND	3700 J	4400 J	ND	ND
Pentadecane	ND	ND	ND	11000 J	ND	ND

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis

Table 4-34
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOSB12S (2-4 ft) 7/18/90 (ug/kg)	BOSB7S (2-4 ft) 7/18/90 (ug/kg)	BOSB7SRE (2-4 ft) 7/18/90 (ug/kg)	BOMW5S (4-6 ft) 7/16/90 (ug/kg)	BOMW5SRE (4-6 ft) 7/16/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene	U	U	U	U	U	2220
Acenaphthylene	49 J	U	U	U	U	5140
Anthracene	41 J	U	U	U	U	65000
Benzo(a)anthracene	160 J+	U	U	U	U	5
Benzo(b)fluoranthene	220 J+	U	U	U	U	55
Benzo(k)fluoranthene	170 J+	U	U	U	U	55
Benzoic acid	260 JB+	U	U	U	U	167
Benzo(g,h,i)perylene	120 J	U	U	U	U	593110
Benzo(a)pyrene	130 J	U	U	U	U	---
Benzyl alcohol	U	U	U	U	U	32
4-Bromophenyl-phenylether	U	U	U	U	U	---
Butylbenzylphthalate	U	U	U	U	U	---
4-Chloroaniline	U	U	U	U	U	---
bis(2-Chloroethoxy)methane	U	U	U	U	U	---
bis(2-Chloroethyl)ether	U	U	U	U	U	68
bis(2-Chloroisopropyl)ether	U	U	U	U	U	---
4-Chloro-3-methylphenol	U	U	U	U	U	115
2-Chloronaphthalene	U	U	U	U	U	---
2-Chlorophenol	U	U	U	U	U	38
4-Chlorophenyl-phenylether	U	U	U	U	U	---
Chrysene	330 J+	U	U	U	U	20
Dibenzo(a,h)anthracene	24 J	U	U	U	U	713680
Dibenzofuran	210 J	U	U	U	U	---
Di-n-butylphthalate	170 JB	490 JB	U	U	300 JB	41000
1,2-Dichlorobenzene	U	U	U	U	U	66
1,3-Dichlorobenzene	U	U	U	U	U	73
1,4-Dichlorobenzene	U	U	U	U	U	92
3,3'-Dichlorobenzidine	U	U	U	U	U	---
2,4-Dichlorophenol	U	U	U	U	U	0.65
Diethylphthalate	150 JB	U	U	U	U	260
2,4-Dimethylphenol	U	U	U	U	U	50
Dimethylphthalate	U	U	U	U	U	---
4,6-Dinitro-2-methylphenol	U	U	U	U	U	---
2,4-Dinitrophenol	U	U	U	U	U	---
2,4-Dinitrotoluene	U	U	U	U	U	---
2,6-Dinitrotoluene	U	U	U	U	U	---
bis(2-Ethylhexyl)phthalate	520 JB	1700 B	1800 B	1700 B	1800 JB	1517325
Fluoranthene	260 J	U	U	U	U	22892
Fluorene	52 J	990 J	900 J	960	1000 J	8180
Hexachlorobenzene	U	U	U	U	U	68
Hexachlorobutadiene	U	U	U	U	U	74
Hexachlorocyclopentadiene	U	U	U	U	U	---
Hexachloroethane	U	U	U	U	U	1270
Indeno(1,2,3-cd)pyrene	110 J+	U	U	U	U	28
Isophorone	U	U	U	2900	U	---
2-Methylnaphthalene	420 J	11000	11000	17000 E	16000	21250
2-Methylphenol	U	U	U	U	U	---
4-Methylphenol	U	U	U	U	1900	---
Naphthalene	310 J	4800 +	4800 +	11000+	9900 +	650
2-Nitroaniline	U	U	U	U	U	---
3-Nitroaniline	U	U	U	U	U	232
4-Nitroaniline	U	U	U	U	U	275
Nitrobenzene	U	U	U	U	U	104
2-Nitrophenol	U	U	U	U	U	162
4-Nitrophenol	U	U	U	U	U	162
N-Nitrosodiphenylamine (1)	U	1600	1100 J	1100	U	---
N-Nitroso-di-n-propylamine	U	U	U	U	U	---
Di-n-octylphthalate	21 J	340 J	300 J	U	U	5965
Pentachlorophenol	U	U	U	U	U	2555
Phenanthrene	310 J	1800	1700	1800	2000	57500
Phenol	U	U	U	U	U	0.4
Pyrene	230 J	U	U	280 J	U	210000
1,2,4-Trichlorobenzene	U	U	U	1000 +	870 J+	336
2,4,6-Trichlorophenol	U	U	U	U	U	---
2,4,5-Trichlorophenol	U	U	U	U	U	62

QUALIFIERS

B: Compound found in method blank as well as in sample
E: Value is greater than the calibration range; hence estimated
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

RE: Reanalysis
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-34 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	B0SB12S (2-4 ft) 7/18/90 (ug/kg)	B0SB7S (2-4 ft) 7/18/90 (ug/kg)	B0SB7SRE (2-4 ft) 7/18/90 (ug/kg)	B0MW5S (4-6 ft) 7/16/90 (ug/kg)	B0MW5SRE (4-6 ft) 7/16/90 (ug/kg)
Unknown	72000 JAB	62000 JAB	46000 JAB	42000 JAB	55000 JAB
Unknown	24000 J	ND	ND	ND	ND
Unknown	12000 J	ND	ND	ND	ND
Unknown	4100 J	ND	ND	ND	ND
Unknown acid	1800 JB	ND	ND	ND	ND
Unknown alkane	1700 J	36000 J	29000 J	36000 J	33000 J
Unknown alkane	1300 J	36000 J	29000 J	23000 J	27000 J
Unknown alkane	1300 J	34000 J	28000 J	19000 J	26000 J
Unknown dimethyl naphthalene	1300 J	24000 J	16000 J	16000 J	14000 J
Unknown alkane	1300 J	29000 J	28000 J	13000 J	24000 J
Unknown alkane	1200 J	21000 J	25000 J	13000 J	17000 J
Unknown acid	1200 JB	ND	ND	ND	ND
Unknown alkane	1200 J	20000 J	17000 J	8700 J	14000 J
Unknown acid	1200 J	ND	ND	ND	ND
Unknown alkane	1100 J	17000 J	17000 J	8600 J	13000 J
Unknown alkane	1000 J	16000 J	12000 J	ND	12000 J
Unknown	980 J	ND	ND	ND	ND
Unknown	950 J	ND	ND	ND	ND
Unknown acid	940 J	ND	ND	ND	ND
Unknown alkane	890 J	14000 J	11000 J	ND	11000 J
Unknown cycloalkane	810 J	ND	7600 J	ND	ND
Pentadecane	ND	34000 J	ND	20000 J	25000 J
Unknown benzene	ND	15000 J	13000 J	19000 J	53000 J
Unknown trimethyl naphthalene	ND	13000 J	8400 J	ND	ND
Unknown alkane	ND	13000 J	9800 J	ND	ND
Unknown alkane	ND	12000 J	9400 J	ND	ND
Unknown alkane	ND	9600 J	8300 J	ND	ND
Unknown alkane	ND	9100 J	ND	ND	ND
Unknown alkane	ND	8800 J	ND	ND	ND
Unknown benzene	ND	9300 J	9800 J	15000 J	18000 J
Undecane	ND	ND	29000 J	34000 J	49000 J
Unknown benzene	ND	ND	8200 J	15000 J	18000 J
Unknown benzene	ND	ND	8000 J	13000 J	17000 J
Hexadecane	ND	ND	ND	21000 J	ND
Unknown benzene	ND	ND	ND	12000 J	16000 J
Unknown aromatic	ND	ND	ND	12000 J	ND
Unknown aromatic	ND	ND	ND	12000 J	ND
Unknown benzene	ND	ND	ND	9400 J	13000 J
Unknown benzene	ND	ND	ND	9200 J	12000 J
Unknown benzene	ND	ND	ND	ND	11000 J

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis

Table 4–35

PHASE I RI SUBSURFACE SOIL SAMPLING
CONCENTRATION* OF SEMIVOLATILE ORGANIC COMPOUNDS PRESENT ABOVE
SOIL CLEANUP CRITERIA GUIDELINES

Compound	Sample	BO–MW–1–S	BO–MW–5–S	BO–MW–6–S	BO–MW–7–S	BO–SB–1–S	BO–SB–5–S	BO–SB–7–S	BO–SB–12–S
Acenaphthene							16,000		
Benzo(a)anthracene		1,500			270	480			160
Benzo(b)fluoranthene		2,900							220
Benzo(k)fluoranthene		1,800							170
Benzoic Acid									260
Chrysene		2,400		1,500	320	700	6,800		330
1,2–Dichlorobenzene				420			6,500		
1,4–Dichlorobenzene				140			890		
2,4–Dimethylphenol							250,000		
Indeno(1,2,3–cd)pyrene									710
2–Methylnaphthalene		36,000					140,000		
Naphthalene		8,500	11,000	2,000			76,000	4,800	
Phenol				600			390,000		
1,2,4–Trichlorobenzene			1,000						

*Concentration is in ug/kg.

Table 4-36

PHASE I RI SUBSURFACE SOIL SAMPLING

TOTAL CONCENTRATION OF SEMIVOLATILE ORGANIC COMPOUNDS
PRESENT ABOVE SOIL CLEANUP CRITERIA GUIDELINES

Sample Designation	Total Concentration (ug/kg)
BO-MW-1-S	53,100
BO-MW-5-S	12,000
BO-MW-6-S	4,660
BO-MW-7-S	590
BO-SB-1-S	1,180
BO-SB-5-S	886,190
BO-SB-7-S	4,800
BO-SB-12-S	1,250

Table 4-37
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOSB8S (2-4 ft) 7/10/90 (ug/kg)	BOMW6S (1-4 ft) 7/11/90 (ug/kg)	BOMW7S (5-7 ft) 7/11/90 (ug/kg)	BOSB10S (0-2 ft) 7/10/90 (ug/kg)	BOSB2S (6-8 ft) 7/10/90 (ug/kg)	BOSB5S (3-7.5 ft) 7/10/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	6.7 J	U	U	U	---
PCB - 1242	U	U	U	U	U	U	85
PCB - 1016	U	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	U	---
PCB - 1254	U	23000+	U	U	U	39000+	275
PCB - 1260	1100	13000	2000	960	U	U	---
PCB - 1221	U	U	U	U	U	U	---
PCB - 1248	330 +	31000+	340 +	930 +	U	83000+	205
alpha-BHC	U	U	U	U	U	U	---
beta-BHC	U	U	U	U	U	U	---
delta-BHC	U	U	U	U	U	U	---
gamma-BHC	U	U	U	U	U	U	---
alpha-Chlordane	U	U	U	U	U	U	22
gamma-Chlordane	U	U	U	U	U	U	22
4,4'-DDD	U	U	U	50	U	U	---
4,4'-DDE	U	U	U	U	U	U	---
4,4'-DDT	U	U	U	U	U	U	---
Dieldrin	U	U	U	U	U	U	---
Endosulfan I	U	U	U	U	U	U	---
Endosulfan II	U	U	U	U	U	U	---
Endosulfan Sulfate	U	U	U	U	U	U	---
Endrin	U	U	U	U	U	U	---
Endrin-Ketone	U	U	U	U	U	U	---
Heptachlor	U	U	U	U	U	U	---
Heptachlor Epoxide	U	U	U	U	U	U	---
Methoxychlor	U	U	U	U	U	U	---
Toxaphene	U	U	U	U	U	U	---

QUALIFIERS

J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-38
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOMW1S (0-2 ft) 7/12/90 (ug/kg)	BOSB1S (7-9 ft) 7/13/90 (ug/kg)	BOSB4S (11-13 ft) 7/12/90 (ug/kg)	BOSB9S (11-13 ft) 7/13/90 (ug/kg)	BOMW9S (0-2 ft) 7/12/90 (ug/kg)	BOSB4S (6-8 ft) 7/12/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	U	U	NA	NA	---
PCB - 1242	13000 +	U	U	U	18000+	U	85
PCB - 1016	U	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	U	---
PCB - 1254	U	U	U	U	U	U	275
PCB - 1260	U	2000	U	1200	6100	3700	---
PCB - 1221	U	U	U	U	U	U	---
PCB - 1248	U	7000 +	U	3000 +	U	U	205
alpha-BHC	U	U	U	U	NA	NA	---
beta-BHC	U	U	U	U	NA	NA	---
delta-BHC	U	U	U	U	NA	NA	---
gamma-BHC	U	U	U	U	NA	NA	---
alpha-Chlordane	U	U	U	U	NA	NA	22
gamma-Chlordane	U	U	U	U	NA	NA	22
4,4'-DDD	U	U	U	U	NA	NA	---
4,4'-DDE	U	U	U	U	NA	NA	---
4,4'-DDT	U	U	U	U	NA	NA	---
Dieldrin	U	U	U	U	NA	NA	---
Endosulfan I	U	U	U	U	NA	NA	---
Endosulfan II	U	U	U	U	NA	NA	---
Endosulfan Sulfate	U	U	U	U	NA	NA	---
Endrin	U	U	U	U	NA	NA	---
Endrin-Ketone	U	U	U	U	NA	NA	---
Heptachlor	U	U	U	U	NA	NA	---
Heptachlor Epoxide	U	U	U	U	NA	NA	---
Methoxychlor	U	U	U	U	NA	NA	---
Toxaphene	U	U	U	U	NA	NA	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

NA: Not Applicable
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-39
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOMW5S (4-6 ft) 7/16/90 (ug/kg)	BOSB12S (2-4 ft) 7/18/90 (ug/kg)	BOSB7S (2-4 ft) 7/18/90 (ug/kg)	BOMW8S (2-4 ft) 7/17/90 (ug/kg)	BOMW4S (0-2 ft) 7/16/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	U	NA	NA	---
PCB - 1242	1400 +	U	3500 +	6600 +	25000+	85
PCB - 1016	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	---
PCB - 1254	U	U	U	1700 +	U	275
PCB - 1260	1100	U	1600	U	5200	---
PCB - 1221	U	U	U	U	U	---
PCB - 1248	U	U	U	U	U	205
alpha-BHC	U	U	U	NA	NA	---
beta-BHC	U	U	U	NA	NA	---
delta-BHC	U	U	U	NA	NA	---
gamma-BHC	U	U	U	NA	NA	---
alpha-Chlordane	U	U	U	NA	NA	22
gamma-Chlordane	U	U	U	NA	NA	22
4,4'-DDD	U	U	U	NA	NA	---
4,4'-DDE	U	U	U	NA	NA	---
4,4'-DDT	U	U	U	NA	NA	---
Dieldrin	U	U	U	NA	NA	---
Endosulfan I	U	U	U	NA	NA	---
Endosulfan II	U	U	U	NA	NA	---
Endosulfan Sulfate	U	U	U	NA	NA	---
Endrin	U	U	U	NA	NA	---
Endrin-Ketone	U	U	U	NA	NA	---
Heptachlor	U	U	U	NA	NA	---
Heptachlor Epoxide	U	U	U	NA	NA	---
Methoxychlor	U	U	U	NA	NA	---
Toxaphene	U	U	U	NA	NA	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

NA: Not Applicable
---: Not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-40

PHASE I RI SUBSURFACE SOIL SAMPLING
TOTAL CONCENTRATION OF PCBs DETECTED

Sample Designation	Sample Depth	Total Concentration (ug/kg)
BO-MW-1-S	(0-2 ft.)	13,000
BO-MW-4-S	(0-2 ft.)	30,200
BO-MW-5-S	(4-6 ft.)	2,500
BO-MW-6-S	(1-4 ft.)	67,000
BO-MW-7-S	(5-7 ft.)	2,340
BO-MW-8-S	(2-4 ft.)	8,300
BO-MW-9-S	(0-2 ft.)	24,100
BO-SB-1-S	(7-9 ft.)	9,000
BO-SB-2-S	(6-8 ft.)	0
BO-SB-4-S	(6-8 ft.)	3,700
BO-SB-4-S	(11-13 ft.)	4,200
BO-SB-5-S	(3-7.5 ft.)	112,000
BO-SB-7-S	(2-4 ft.)	5,100
BO-SB-8-S	(2-4 ft.)	1,430
BO-SB-9-S	(11-13 ft.)	4,200
BO-SB-10-S	(0-2 ft.)	1,890
BO-SB-12-S	(2-4 ft.)	0

Table 4-41
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
INORGANIC METALS

METALS	BOSB5S (3-7.5 ft) 7/10/90 (mg/kg)		BOSB10S (0-2 ft) 7/10/90 (mg/kg)		BOMW7S (5-7 ft) 7/11/90 (mg/kg)		BOMW6S (1-4 ft) 7/11/90 (mg/kg)		NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	7350		11200		11500		13500		----
Antimony	10.5	B	4.8	B		U	10.4	B	----
Arsenic	27.4	+	5.6		2.8		17.2		20
Barium	3170		109		115		599		----
Beryllium	0.35	B	1.2		0.49	B	1.5		----
Cadmium	19.3	+	0.78	B	0.53	B	2.4		3
Calcium	54000		84400		84800		62500		----
Chromium	200	+	12.5		13		84.9		100
Cobalt	11	B	4.8	B	6.4	B	7.4	B	----
Copper	1160	+	28.5		30.3		138		170
Iron	30500		14500		16200		25400		----
Lead	27700	+	171	+	90		1350	+	100
Magnesium	14000		39500		44500		19200		----
Manganese	389		792		565		705		----
Mercury	1.7	+		U		U	0.15		1
Nickel	182	+	10.7		14.2		21.1		100
Potassium	1280		1800		3410		1580		----
Selenium	0.46	B	0.67	B	0.45	B	1.5		4
Silver	2	B		U		U		U	5
Sodium	1540		510	B	397	B	651		----
Thallium		U		U		U		U	----
Vanadium	21.1		17.4		21.7		21.6		----
Zinc	3040	+	103		108		417	+	350
Cyanide	8.9		0.66			U	0.72		12

QUALIFERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

----: Not established
+: Value exceeds NJDEP Soil Cleanup Guidelines

Table 4-42
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
INORGANIC METALS

METALS	B0MW1S (0-2 ft) 7/12/90 (mg/kg)	B0SB4S (11-13 ft) 7/12/90 (mg/kg)	B0SB9S (11-13 ft) 7/13/90 (mg/kg)	B0SB1S (7-9 ft) 7/13/90 (mg/kg)	NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	5690	25000	20500	12500	----
Antimony	U	U	4.7 B	U	----
Arsenic	42.2 +	1.4 B	3 B	7.6	20
Barium	107	252	121	117	----
Beryllium	0.73 B	1.2	0.82 B	0.88 B	----
Cadmium	1.4	0.29 B	0.34 B	1.2	3
Calcium	19300	72100	78500	68700	----
Chromium	16.6	33.2	27.6	16.9	100
Cobalt	11.1	16.8	14.2	6.4 B	----
Copper	106 E	31.1 E	25.6 E	37.9 E	170
Iron	53700	34400	30200	20800	----
Lead	286 +	11.5	11.2	157 +	100
Magnesium	6480	16400	16700	29500	----
Manganese	499	658	560	685	----
Mercury	0.11	U	U	U	1
Nickel	26.3	33.8	28.6	12.9	100
Potassium	733 B	5980	5350	1710	----
Selenium	1.8	U	U	0.7 B	4
Silver	U	U	U	U	5
Sodium	328 B	777 B	609 B	424 B	----
Thallium	0.48 B	U	U	U	----
Vanadium	17.5	47.4	36.8	19.9	----
Zinc	190	74.8	75.2	249	350
Cyanide	U	U	U	3.8	12

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

----: Not established
+: Value exceeds NJDEP Soil Cleanup Guidelines

Table 4-43
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOMW5S (4-6 ft) 7/16/90 (mg/kg)		BOSB12S (2-4 ft) 7/18/90 (mg/kg)		BOSB7S (2-4 ft) 7/18/90 (mg/kg)		NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	11600		12700		14800		----
Antimony		U		U		U	----
Arsenic	1.7	B	14.2		2.3		20
Barium	95.7		130		130		----
Beryllium	1.5		0.94	B	1.7		----
Cadmium	0.67	B	0.97		0.63	B	3
Calcium	115000		26300		118000		----
Chromium	6.6		47.1		10.1		100
Cobalt	3.3	B	9.4	B	3.7	B	----
Copper	29.8	E	81.4	E	23.4	E	170
Iron	14800		23900		18900		----
Lead	107	+	119	+	99.1		100
Magnesium	44500		10200		47300		----
Manganese	1040		542		1110		----
Mercury		U	0.18			U	1
Nickel	4.8	B	17.5		6.2	B	100
Potassium	1300		1840		1720		----
Selenium		U	0.91	B		U	4
Silver		U		U		U	5
Sodium	593	B	472	B	701	B	----
Thallium	0.21	B	0.64	B	0.18	B	----
Vanadium	9.4	E	25.7	E	13.8	E	----
Zinc	76.2		220		74.2		350
Cyanide		U		U	2.3		12

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

----: Not established
+: Value exceeds NJDEP Soil Cleanup Guidelines

Table 4-44

PHASE I RI SUBSURFACE SOIL SAMPLING
CONCENTRATION* OF METALS PRESENT ABOVE
SOIL CLEANUP GUIDELINES

Compound	Sample	BO-MW-1-S	BO-MW-5-S	BO-MW-6-S	BO-SB-5-S	BO-SB-10-S	BO-SB-12-S
Arsenic		42.2			27.4		
Cadmium					19.3		
Chromium					200		
Copper					1,160		
Lead		286	107	1,350	27,700	171	119
Mercury					1.7		
Nickel					182		
Zinc				417	3,040		

*Concentration is in mg/kg (ppm).

Table 4-45
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOSB2S (6-8 ft) 7/10/90	BOSB5S (3-7.5 ft) 7/10/90	BOSB8S (2-4 ft) 7/10/90	BOSB10S (0-2 ft) 7/10/90	BOSB11S (2-4 ft) 7/11/90	BOMW7S (5-7 ft) 7/11/90	BOMW6S (1-4 ft) 7/11/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	N	N	N	N	N	----
Ignitability	N	Y	N	N	N	N	Y	----
Total Cyanide, (mg/kg)	NR	8.9	NR	0.66	NR	ND	0.72	----
Petroleum Hydrocarbons, (mg/kg)	NR	94300	NR	NR	117	NR	53800	----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)								
Arsenic	U	0.0213	U	0.0264	U	U	0.0205	5
Barium	1.050	1.240	0.671	0.866	0.706	0.988	1.050	100
Cadmium	0.0056	0.0133	0.0019 B	0.0023 B	0.0056	0.0011 B	U	1
Chromium	U	U	U	U	U	U	U	5
Lead	U	7.090 +	0.166	0.145	0.0347	0.0382	0.549	5
Mercury	U	U	U	U	U	U	U	0.2
Selenium	U	U	U	U	U	U	U	1
Silver	U	U	U	U	U	U	U	5

QUALIFERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
U: Analyzed for but not detected

NOTES

NR: Not Requested
N: Non-corrosive or non-ignitable
Y: Corrosive or ignitable
----: Not applicable
+: Value exceeds RCRA Regulatory Level

Table 4-46
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOMW1S (0-2 ft) 7/12/90	BOMW9S (0-2 ft) 7/12/90	BOSB4S (6-8 ft) 7/12/90	BOSB9S (11-13 ft) 7/13/90	BOSB1S (7-9 ft) 7/13/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	N	N	N	----
Ignitability	Y	Y	N	N	N	----
Petroleum Hydrocarbons, (mg/kg)	21100	NR	24300	2030	61600	----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)						
Arsenic	U	U	U	U	U	5
Barium	0.435	0.384	0.605	0.910	0.444	100
Cadmium	0.0016 B	U	U	U	0.0013 B	1
Chromium	U	0.0032 B	U	U	U	5
Lead	0.0665	0.0348	0.0192	U	0.0298	5
Mercury	U	U	U	U	U	0.2
Selenium	U	U	U	U	U	1
Silver	U	U	U	U	U	5

QUALIFIERS

B: Compound found at a concentration lesss than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
U: Analyzed for but not detected

NOTES

NR: Not Required
N : Non-corrosive or non-ignitable
Y : Corrosive or ignitable
----: Not applicable

Table 4-47
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING SAMPLING
RCRA CHARACTERISTICS

PARAMETERS	BOMW8S (2-4 ft) 7/17/90	BOMW5S (4-6 ft) 7/16/90	BOMW4S (0-2 ft) 7/16/90	BOSB12S (2-4 ft) 7/18/90	BOSB7S (2-4 ft) 7/18/90	RCRA REGULATORY LEVELS (mg/l)
Corrosivity	N	N	N	N	N	-----
Ignitability	Y	Y	Y	N	Y	-----
EP TOXICITY PROCEDURE COMPOUNDS (Results in mg/l)						
Arsenic	U	U	U	U	U	5
Barium	0.871	0.366	0.593	0.445	0.503	100
Cadmium	U	0.0019 B	0.0011 B	0.0018 B	U	1
Chromium	U	U	U	U	U	5
Lead	0.0203	0.0198	0.0534	0.0328	0.0184	5
Mercury	U	U	U	U	U	0.2
Selenium	U	U	U	U	U	1
Silver	U	U	U	U	U	5

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
U: Analyzed for but not detected

NOTES

N: Non-corrosive or non-ignitable
Y: Corrosive or ignitable
-----: Not applicable

Results for petroleum hydrocarbon analysis are also contained in Tables 4-45 to 4-47. Table 4-48 presents the results for the treatability screening conducted on sample BO-SS-TS.

As part of the Phase I RI subsurface soil boring program, a series of borings were drilled in proximity to the storm sewer bedding adjacent to Catch Basin No. 3, as shown in Figure 2-10, Section 2.0. During the drilling operation, petroleum contamination was observed by field representatives to be present in the borings, above the sewer bedding. One of these borings penetrated the sewer bedding (coarse gravel). NAPL was found to be present floating on the groundwater, subsequent to auger removal at these two borings. At the direction of NYSDEC, a composite sample of this water was collected from two borings and was designated BO-SB-9-GW. Chemical analysis was performed on the sample for TCL+30 organic compounds, the results of which are found in Tables 4-49 to 4-51. Among the volatile organic compounds detected, benzene, 1,1-dichloroethane, 1,2-dichloroethene (total), ethylbenzene, toluene, vinyl chloride and xylene (total) were found to be above NYSDEC Class GA Groundwater Standards or Guidance Values. There were also significant concentrations of tentatively identified volatile compounds in this sample. With respect to the semivolatile organic compounds, 1,2-dichlorobenzene, 2,4-dimethylphenol, bis(2-ethylhexyl)phthalate, 4-methylphenol, naphthalene and phenanthrene were found above NYSDEC Class GA Groundwater Standards or Guidance Values. There were also a significant number of tentatively identified semivolatile compounds detected in this sample. PCB arochlors 1242, 1254 and 1260 were detected at 3,300 ug/l, 1,500 ug/l and 870 ug/l, respectively and Endrin was found at 0.19 ug/l also in sample BO-SB-9-GW. The other samples shown on Tables 4-49 to 4-51 are trip blanks, field blanks, holding blanks or reanalysis as indicated in the notes on the data tables.

4.3.6 Groundwater

A groundwater sample was collected from each of the eight monitoring wells installed at the Booth Oil Site during the Phase I RI field program. The analytical data obtained from the analysis of groundwater samples are presented in Tables 4-52 to 4-59. Figure 2-11 shows the locations of the Phase I RI groundwater monitoring wells installed during the Phase I RI field program.

The analytical data obtained from the analysis of volatile organic compounds are presented in Table 4-52. The NYSDEC Class GA Groundwater Standards/Guidance Values were exceeded for several compounds at each well location. The most predominant compounds found in groundwater were found to be benzene, 1,1-dichloroethane, 1,2-dichloroethene (total), toluene, vinyl chloride and xylene (total). Other compounds found in groundwater above the NYSDEC Class GA Standards/Guidance Values include chloroform, 1,1-dichloroethene, 1,2-dichloroethane, ethylbenzene, methylene chloride, tetrachloroethene, trichloroethene, 1,1,1-trichloroethane and

Table 4-48
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SUBSURFACE SOIL SAMPLING
TREATABILITY SCREENING RESULTS

PARAMETERS	BO-SS-TS 7/18/90
BTU/lb	6661
Sulfur, wt/wt %	0.55
Chlorine, ppm	244
Ash, wt/wt %	59.64
Loss at 102øC (moisture), wt/wt %	7 68
Loss on ignition, wt/wt %	40 36
Organic Material Content, wt/wt %	32 25
Solvent Extractable Material, wt/wt %	14 77
Flashpoint, P.M.C.C.	>212f
Free Liquid, vol/wt %	<0 5
Texture	Fine, oily material
Oil & Grease, ppm	50200
pH, S U	7 73
Specific Gravity	0 64
Total Solids (102øC), wt/wt %	92 3

Table 4-49
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING GROUNDWATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSB9GW 7/13/90 (ug/l)	BOTB713 7/13/90 (ug/l)	BOSBFB 7/12/90 (ug/l)	BOHB 7/13/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acetone	39 JB	4 JB	3 JB	U	50 ST
Benzene	30 +	U	U	U	ND ST
Bromodichloromethane	U	U	U	U	50 GV
Bromoform	U	U	U	U	50 GV
Bromomethane	U	U	U	U	----
2-Butanone	U	U	U	U	----
Carbon Disulfide	U	U	U	U	50 ST
Carbon Tetrachloride	U	U	U	U	5 ST
Chlorobenzene	U	U	U	U	5 ST
Chloroethane	U	U	U	U	----
Chloroform	U	0.7 J	U	U	100 ST
Chloromethane	U	U	U	U	----
Dibromochloromethane	U	U	U	U	50 GV
1,1-Dichloroethane	110 +	U	U	U	50 GV
1,1-Dichloroethene	U	U	U	U	0.07 GV
1,2-Dichloroethane	U	U	U	U	0.8 GV
1,2-Dichloroethene (total)	610 +	U	U	U	50 GV
1,2-Dichloropropane	U	U	U	U	50 GV
cis-1,3-Dichloropropene	U	U	U	U	----
trans-1,3-Dichloropropene	U	U	U	U	----
Ethylbenzene	69 +	U	U	U	5 ST
2-Hexanone	U	U	U	U	50 GV
Methylene Chloride	U	1 JB	1 JB	U	5 ST
4-Methyl-2-pentanone	U	U	U	U	----
Styrene	U	U	U	U	931 GV
1,1,2,2-Tetrachloroethane	U	U	U	U	0.2 GV
Tetrachloroethene	U	U	U	U	0.7 GV
Toluene	240 B+	U	U	U	5 ST
Trichloroethene	U	U	U	U	10 ST
1,1,1-Trichloroethane	U	U	U	U	50 GV
1,1,2-Trichloroethane	U	U	U	U	0.6 GV
Vinyl Acetate	U	U	U	U	----
Vinyl Chloride	890 +	U	U	U	5 ST
Xylene (total)	330 +	U	U	U	5 ST *

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

FB: Field Blank
GV: Guidance Value
HB: Holding Blank
ST: Standard
TB: Trip Blank
----: Not established
*: Applies to each xylene isomer individually
+: Value exceeds Groundwater Standards/Guidelines

Table 4-49 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING GROUNDWATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB9GW 7/13/90 (ug/l)	BOTB713 7/13/90 (ug/l)	BOSBFB 7/12/90 (ug/l)	BOHB 7/13/90 (ug/l)
Unknown alkane	59000 J	ND	ND	ND
Unknown alkane	42000 J	ND	ND	ND
Unknown alkane	41000 J	ND	ND	ND
Unknown alkene	40000 J	ND	ND	ND
Unknown alkane	37000 J	ND	ND	ND
Unknown alkane	34000 J	ND	ND	ND
Unknown benzene	25000 J	ND	ND	ND
Unknown cycloalkane	23000 J	ND	ND	ND
Unknown benzene	19000 J	ND	ND	ND
Unknown alkane	18000 J	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

FB: Field Blank
HB: Holding Blank
ND: Not Detected
TB: Trip Blank

Table 4-50
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	BOSB9GW 7/12/90 (ug/l)	BOSB9GWRE 7/12/90 (ug/l)	BOSBFB 7/12/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acenaphthene	U	U	U	20 GV
Acenaphthylene	U	U	U	----
Anthracene	U	U	U	50 GV
Benzo(a)anthracene	U	U	U	0.002 GV
Benzo(b)fluoranthene	U	U	U	0.002 GV
Benzo(k)fluoranthene	U	U	U	0.002 GV
Benzoic acid	U	U	U	----
Benzo(g,h,i)perylene	U	U	U	----
Benzo(a)pyrene	U	U	U	ND
Benzyl alcohol	U	U	U	----
4-Bromophenyl-phenylether	U	U	U	----
Butylbenzylphthalate	U	U	U	50 GV
4-Chloroaniline	U	U	U	----
bis(2-Chloroethoxy)methane	U	U	U	----
bis(2-Chloroethyl)ether	U	U	U	----
bis(2-Chloroisopropyl)ether	U	U	U	----
4-Chloro-3-methylphenol	U	U	U	----
2-Chloronaphthalene	U	U	U	----
2-Chlorophenol	U	U	U	----
4-Chlorophenyl-phenylether	U	U	U	----
Chrysene	U	U	U	0.002 GV
Dibenzo(a,h)anthracene	U	U	U	----
Dibenzofuran	U	U	U	----
Di-n-butylphthalate	U	U	0.8 JB	50 ST
1,2-Dichlorobenzene	19 J+	U	U	4.7 ST*
1,3-Dichlorobenzene	U	U	U	4.7 ST*
1,4-Dichlorobenzene	3 J	U	U	4.7 ST*
3,3'-Dichlorobenzidine	U	U	U	----
2,4-Dichlorophenol	U	U	U	0.3 GV
Diethylphthalate	U	U	0.3 JB	50 GV
2,4-Dimethylphenol	66 +	U	U	50 ST
Dimetnylphthalate	U	U	U	50 GV
4,6-Dinitro-2-methylphenol	U	U	U	----
2,4-Dinitrophenol	U	U	U	----
2,4-Dinitrotoluene	U	U	U	----
2,6-Dinitrotoluene	U	U	U	0.07 GV
bis(2-Ethylhexyl)phthalate	69 B+	77 B+	18 B	50 ST
Fluoranthene	22 J	18 J	U	50 GV
Fluorene	U	U	U	50 GV
Hexachlorobenzene	U	U	U	0.35 ST
Hexachlorobutadiene	U	U	U	0.5 GV
Hexachlorocyclopentadiene	U	U	U	1 GV
Hexachloroethane	U	U	U	----
Indeno(1,2,3-cd)pyrene	U	U	U	0.002 GV
Isophorone	U	U	U	50 GV
2-Methylnaphthalene	94	96	U	----
2-Methylphenol	U	U	U	----
4-Methylphenol	120 +	U	U	50 ST
Naphthalene	110 +	110 +	U	10 GV
2-Nitroaniline	U	U	U	----
3-Nitroaniline	U	U	U	----
4-Nitroaniline	U	U	U	----
Nitrobenzene	U	U	U	30 GV
2-Nitrophenol	U	U	U	----
4-Nitrophenol	U	U	U	----
N-Nitrosodiphenylamine (1)	U	U	U	----
N-Nitroso-di-n-propylamine	U	U	U	50 GV
Di-n-octylphthalate	17 JB	18 JB	0.2 JB	50 GV
Pentachlorophenol	U	U	U	21 ST
Phenanthrene	84 +	80 +	U	50 ST
Phenol	U	U	U	1 ST**
Pyrene	37	28	U	50 GV
1,2,4-Trichlorobenzene	U	37	U	10 GV***
2,4,6-Trichlorophenol	U	U	U	----
2,4,5-Trichlorophenol	U	U	U	----

QUALIFIERS

B: Compound found in method blank as well as in sample
U: Analyzed for but not detected

NOTES

GV: Guidance Value
RE: Reanalysis
ST: Standard
----: Not established
*: Value applies to sum of 1,4 and 1,2 isomers
**: Value pertains to total phenols
***: Applies to sum of isomers
+: Value exceeds Groundwater Standards/Guidelines

Table 4-50 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB9GW 7/12/90 (ug/l)	BOSB9GWRE 7/12/90 (ug/l)	BOSBFB 7/12/90 (ug/l)
Unknown alkane	710 J	780 J	ND
Unknown alkane	690 J	670 J	ND
Unknown alkane	590 J	550 J	ND
Unknown alkane	530 J	370 J	ND
Unknown alkane	410 J	350 J	ND
Unknown benzene	370 J	370 J	ND
Unknown alkane	350 J	280 J	ND
Unknown alkane	300 J	270 J	ND
Unknown alkane	270 J	200 J	ND
Unknown alkane	200 J	190 J	ND
Unknown alkane	190 J	140 J	ND
Unknown benzene	190 J	220 J	ND
Unknown cycloalkane	190 J	160 J	ND
Unknown cycloalkane	180 J	ND	ND
Unknown benzene	180 J	190 J	ND
Unknown alkene	170 J	ND	ND
Unknown alkane	170 J	ND	ND
Unknown benzene	160 J	180 J	ND
Unknown benzene	160 J	180 J	ND
Unknown benzene	160 J	160 J	ND
Undecane	ND	770 J	ND
Unknown	ND	430 J	ND
Unknown	ND	150 J	ND

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected
RE: Reanalysis

Table 4-51
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I SOIL BORING GROUND WATER SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOSB9GW 7/13/90 (ug/l)	BOSBFB 7/12/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Aldrin	U	U	ND ST
PCB - 1242	3300 +	U	0.1 ST
PCB - 1016	U	U	0.1 ST
PCB - 1232	U	U	0.1 ST
PCB - 1254	1500 +	U	0.1 ST
PCB - 1260	870 +	U	0.1 ST
PCB - 1221	U	U	0.1 ST
PCB - 1248	U	U	0.1 ST
alpha-BHC	U	U	ND ST
beta-BHC	U	U	ND ST
delta-BHC	U	U	ND ST
gamma-BHC	U	U	ND ST
alpha-Chlordane	U	U	----
gamma-Chlordane	U	U	----
4,4'-DDD	U	U	ND ST
4,4'-DDE	U	U	ND ST
4,4'-DDT	U	U	ND ST
Dieldrin	U	U	ND ST
Endosulfan I	U	U	----
Endosulfan II	U	U	----
Endosulfan Sulfate	U	U	----
Endrin	0.19 J+	U	ND ST
Endrin-Ketone	U	U	----
Heptachlor	U	U	ND ST
Heptachlor Epoxide	U	U	ND ST
Methoxychlor	U	U	35 ST
Toxaphene	U	U	ND ST

QUALIFIERS

J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

ST: Standard
ND: Not Detectable
----: Not established
+: Value exceeds Groundwater Standards/Guidelines

Table 4-52
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMW1GW 7/31/90 (ug/l)	BOMW2GW 7/30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)	BOTB 7/31/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acetone	U	3 J	U	4500 JB+	520 B+	5 JB	38 B	U	10 B	3 J	50 ST
Benzene	35 +	8 +	310 J+	230 J+	45 J+	0.7 J+	9 J+	44 J+	U	U	ND ST
Bromodichloromethane	U	1 J	U	U	U	U	U	U	U	U	50 GV
Bromoform	U	U	U	U	U	U	U	U	U	U	50 GV
Bromomethane	U	U	U	U	U	U	U	U	U	U	----
2-Butanone	U	U	U	U	U	U	U	U	U	U	----
Carbon Disulfide	0.5 J	1 J	U	U	U	U	U	U	U	U	50 ST
Carbon Tetrachloride	U	1 J	U	U	U	U	U	U	U	U	5 ST
Chlorobenzene	U	U	U	U	U	U	U	U	U	U	5 ST
Chloroethane	U	U	U	U	U	U	U	U	U	U	----
Chloroform	9	1 J	360 J+	U	U	U	U	U	U	U	100 ST
Chloromethane	U	U	U	U	U	U	U	U	U	U	----
Dibromochloromethane	U	U	U	U	U	U	U	U	U	U	50 GV
1,1-Dichloroethane	81 +	140 +	1800 +	1300 J+	98 J+	140 +	U	U	U	U	50 GV
1,1-Dichloroethene	28 +	2 J+	600 +	U	U	U	U	U	U	U	0.07 GV
1,2-Dichloroethane	U	2 J+	U	U	U	U	U	U	U	U	0.8 GV
1,2-Dichloroethene (total)	730 E+	200 +	62000 E+	64000 +	2900 +	49	85 +	3200 +	U	U	50 GV
1,2-Dichloropropane	U	0.9 J	U	U	U	U	U	U	U	U	50 GV
cis-1,3-Dichloropropene	U	1 J	U	U	U	U	U	U	U	U	----
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	----
Ethylbenzene	45 +	U	270 J+	750 J+	U	U	13 +	U	U	U	5 ST
2-Hexanone	U	U	U	U	U	1 JB	U	42 J	U	U	50 GV
Methylene Chloride	U	2 J	260 J+	630 JB+	57 J+	U	4 J	89 J+	2 J	U	5 ST
4-Methyl-2-pentanone	U	0.7 J	180 J	U	U	U	U	U	U	U	----
Styrene	U	2 J	U	U	U	U	U	U	U	U	931 GV
1,1,2,2-Tetrachloroethane	U	2 J+	U	U	U	U	U	U	U	U	0.2 GV
Tetrachloroethene	32 +	2 J+	1200 +	2000 J+	U	U	U	1300 +	U	U	0.7 GV
Toluene	99 B+	2 JB	4100 B+	2200 JB+	99 J+	U	4 J	140 +	U	U	5 ST
Trichloroethene	51 +	2 J	2000 +	570 J+	U	4 J	U	810 +	U	U	10 ST
1,1,1-Trichloroethane	U	38	660 +	1400 J+	U	0.7 J	U	U	U	U	50 GV
1,1,2-Trichloroethane	U	1 J+	U	U	U	U	U	U	U	U	0.6 GV
Vinyl Acetate	U	U	U	U	U	U	U	U	U	U	----
Vinyl Chloride	3000 E+	110 +	120000E+	7300 J+	850 +	36 +	100 +	530 +	U	U	5 ST
Xylene (total)	70 +	6 +	1100 +	4700 +	76 J+	U	230 +	U	U	U	5 ST *

QUALIFIERS

B: Compund found in method blank as well as in sample
E: Value exceeds instrument calibration range
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Applies to each xylene isomer individually
+: Value exceeds Groundwater Standards/Guidelines

Table 4-52 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW1GW 7/31/90 (ug/l)	BOMW2GW 7/30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)	BOTB 7/31/90 (ug/l)
Cyclohexane	220 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown cycloalkane	180 J	ND	ND	ND	ND	16 J	160 J	ND	ND	ND
Cyclohexane, methyl	170 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Unknown alkane	130 J	ND	ND	4300 J	ND	22 J	140 J	1600 J	ND	ND
Unknown indene	120 J	ND	ND	ND	ND	ND	110 J	ND	ND	ND
Unknown alkene	100 J	ND	ND	ND	ND	11 J	ND	ND	ND	ND
Unknown alkane	100 J	ND	ND	ND	ND	13 J	140 J	220 J	ND	ND
Unknown alkane	97 J	ND	ND	ND	ND	12 J	120 J	110 J	ND	ND
Unknown alkane	96 J	ND	ND	ND	ND	11 J	110 J	ND	ND	ND
Unknown alkyl benzene	89 J	ND	ND	2800 J	ND	ND	220 J	ND	ND	ND
Unknown siloxane	ND	ND	2100 J	ND	ND	ND	ND	ND	ND	ND
Unknown siloxane	ND	ND	1900 J	ND	ND	ND	ND	ND	ND	ND
Unknown siloxane	ND	ND	1200 J	ND	ND	ND	ND	ND	ND	ND
Undecane	ND	ND	ND	8200 J	ND	ND	ND	ND	ND	ND
Decane	ND	ND	ND	6300 J	ND	ND	ND	ND	ND	ND
Unknown alkyl benzene	ND	ND	ND	2600 J	ND	ND	160 J	ND	ND	ND
Unknown alkane	ND	ND	ND	ND	ND	11 J	ND	ND	ND	ND
Unknown cycloalkane	ND	ND	ND	ND	ND	11 J	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	ND	ND	10 J	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	ND	ND	8 J	ND	ND	ND	ND
Unknown methyl benzene	ND	ND	ND	ND	ND	ND	120 J	ND	ND	ND
Unknown alkyl benzene	ND	ND	ND	ND	ND	ND	100 J	ND	ND	ND

QUALIFIERS

J: Estimated value

NOTES

ND: Not Detected

1,1,2-trichloroethane. Table 4-53 includes each volatile organic compound and corresponding concentration which was found above standards or guidance values in each monitoring well, and Table 4-54 lists each groundwater sample and the total concentration of volatile organic compounds which were found above NYSDEC Class GA Groundwater Standards/Guidance Values. Samples obtained from monitoring wells BO-MW-4-GW and BO-MW-5-GW were found to contain the highest concentrations of total volatile organic compounds at approximately 195,000 ug/l and 85,000 ug/l, respectively. It is noted that method and field blank contamination are not significant and do not affect the results. Figure 4-2 shows contours for total concentration of volatile organics exceeding standards or guidance values in groundwater. Samples BO-MW-4-GW and BO-MW-5-GW were also found to contain the highest levels of tentatively identified volatile organic compounds, at approximately 5,000 ug/l and 24,000 ug/l, respectively.

Results from the analysis of semivolatile organic compounds are presented in Table 4-55. NYSDEC Class GA Groundwater Standards/Guidance Values were exceeded at six well locations. The most predominant semivolatile organic compounds detected above the NYSDEC Class GA Groundwater Standards/Guidance Values include: 2,4-dimethylphenol, 2-methylphenol, 4-methylphenol, naphthalene, and phenol. Other compounds detected above the NYSDEC Class GA Groundwater Standards/Guidance Values were di-n-butylphthalate, 1,2-dichloro- benzene, phenanthene and 1,2,4-trichlorobenzene. Table 4-56 lists each groundwater sample and the corresponding total concentration of semivolatile organic compounds found to be present above NYSDEC Class GA Groundwater Standards/Guidance Values. Method and field blank analysis indicate the environmental samples are not affected by contamination introduced in the laboratory or the field. Figure 4-3 shows contours for total concentration of semivolatile organic compounds exceeding standards or guidance values in groundwater. The highest levels of tentatively identified semivolatile organic compounds were found in samples BO-MW-4-GW (3,800 ug/l), BO-MW-5-GW (14,400 ug/l), which is generally consistent with the data presented above. However, sample BO-MW-9-GW contained approximately 4,700 ug/l of TICs and also had a relatively high concentration of targeted semivolatile compounds.

Analytical data from the analysis of the pesticide/PCB fraction is presented in Table 4-57. No pesticide compounds were detected; however, PCB arochlors 1242, 1254 and 1260 were detected. In sample BO-MW-5-GW, the total concentration of PCBs was found to be 690 ug/l.

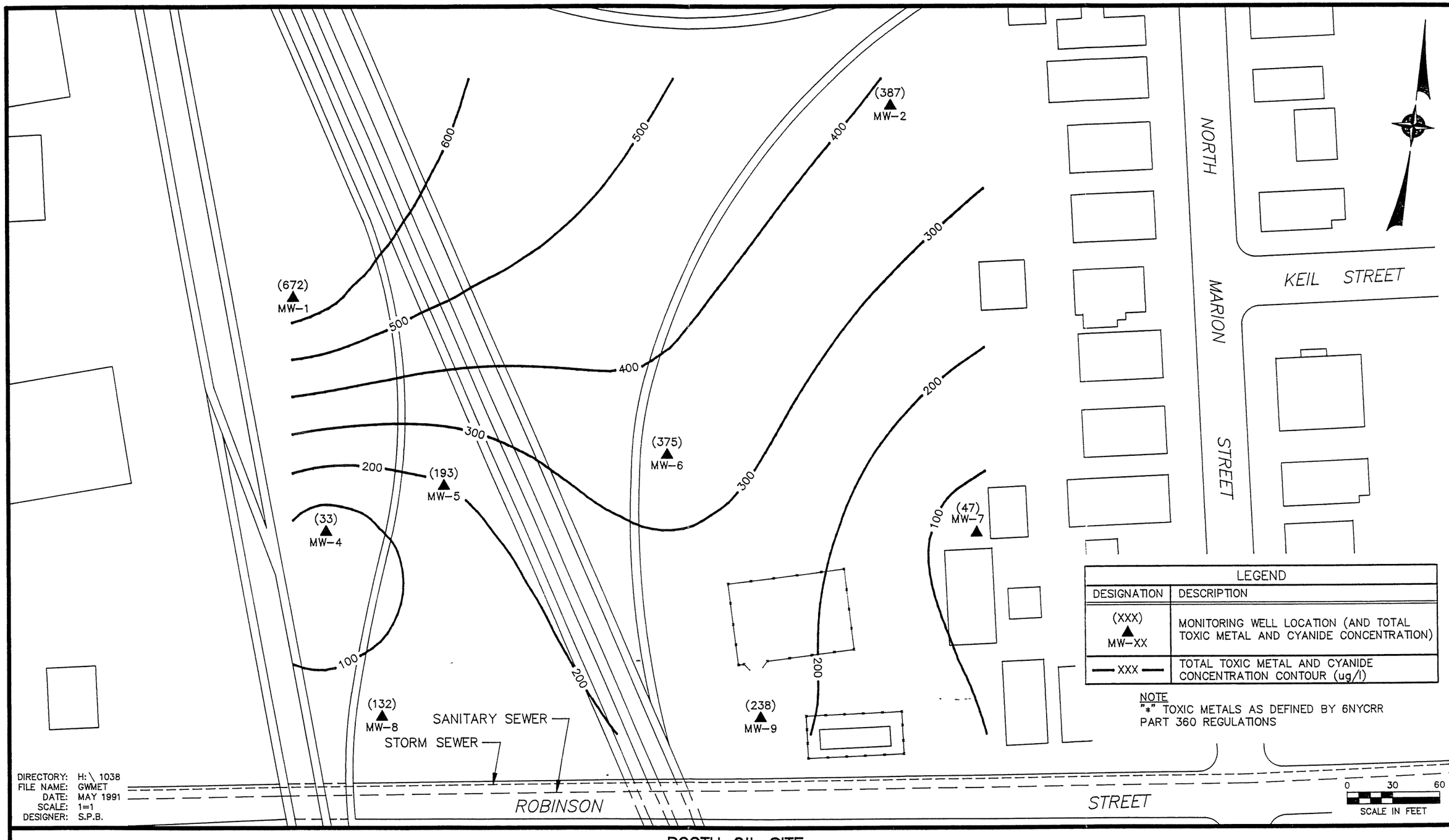
The results for metals are presented in Table 4-58. The NYSDEC Class GA Groundwater Guidance Standards were exceeded in all samples for lead, iron, magnesium, manganese and sodium. In addition antimony and chromium exceeded the Guidance Value in one sample and arsenic and zinc exceeded the Guidance Value in two samples. Figure 4-4 shows contours for

Table 4-53

PHASE I RI GROUNDWATER SAMPLING
CONCENTRATION* OF VOLATILE ORGANIC COMPOUNDS PRESENT ABOVE
NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

	Sample							
Compound	BO-MW-1-GW	BO-MW-2-GW	BO-MW-4-GW	BO-MW-5-GW	BO-MW-6-GW	BO-MW-7-GW	BO-MW-8-GW	BO-MW-9-GW
Benzene	35	8	310	230	45	0.7	9	44
Chloroform			360					
1,1-Dichloroethane	81	140	1,800	1,300	98	140		
1,1-Dichloroethene	28	2	600					
1,2-Dichloroethane		2						
1,2-Dichloroethene (total)	730	200	62,000	64,000	2,900		85	3,200
Ethylbenzene	45		270	750			13	
Methylene Chloride			260	630	57			89
1,1,2,2-Tetrachloroethane		2						
Tetrachloroethene	32	2	1,200	2,000				1,300
Toluene	99		4,100	2,200	99			140
Trichloroethene	51		2,000	570				810
1,1,1-Trichloroethane			660	1,400				
1,1,2-Trichloroethane		1						
Vinyl Chloride	3,000	110	120,000	7,300	850	36	100	530
Xylene (total)	70		1,100	4,700	76		230	

*Concentration is in ug/l.



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

TOTAL CONCENTRATION OF TOXIC* METALS AND CYANIDE EXCEEDING NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

FIGURE 4–4

Table 4-57
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOMW1GW 7/31/90 (ug/l)	BOMW2GW 7/30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Aldrin	U	U	U	U	U	U	U	U	U	ND ST
PCB - 1242	U	U	U	350 +	U	U	160 +	U	U	0.1 ST
PCB - 1016	U	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1232	U	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1254	U	U	U	U	1.9 +	U	34 +	U	U	0.1 ST
PCB - 1260	U	U	U	340 +	U	3.2 +	U	U	U	0.1 ST
PCB - 1221	U	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1248	U	U	U	U	U	U	U	U	U	0.1 ST
alpha-BHC	U	U	U	U	U	U	U	U	U	ND ST
beta-BHC	U	U	U	U	U	U	U	U	U	ND ST
delta-BHC	U	U	U	U	U	U	U	U	U	ND ST
gamma-BHC	U	U	U	U	U	U	U	U	U	ND ST
alpha-Chlordane	U	U	U	U	U	U	U	U	U	----
gamma-Chlordane	U	U	U	U	U	U	U	U	U	----
4,4'-DDD	U	U	U	U	U	U	U	U	U	ND ST
4,4'-DDE	U	U	U	U	U	U	U	U	U	ND ST
4,4'-DDT	U	U	U	U	U	U	U	U	U	ND ST
Dieldrin	U	U	U	U	U	U	U	U	U	ND ST
Endosulfan I	U	U	U	U	U	U	U	U	U	----
Endosulfan II	U	U	U	U	U	U	U	U	U	----
Endosulfan Sulfate	U	U	U	U	U	U	U	U	U	----
Endrin	U	U	U	U	U	U	U	U	U	ND ST
Endrin-Ketone	U	U	U	U	U	U	U	U	U	----
Heptachlor	U	U	U	U	U	U	U	U	U	ND ST
Heptachlor Epoxide	U	U	U	U	U	U	U	U	U	ND ST
Methoxychlor	U	U	U	U	U	U	U	U	U	35 ST
Toxaphene	U	U	U	U	U	U	U	U	U	ND ST

QUALIFIERS

U: Analyzed for but not detected

NOTES

ST: Standard
ND: Not Detectable
----: Not established
+: Value exceeds Groundwater Standards/Guidelines

Table 4-58
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
INORGANIC CONSTITUENTS

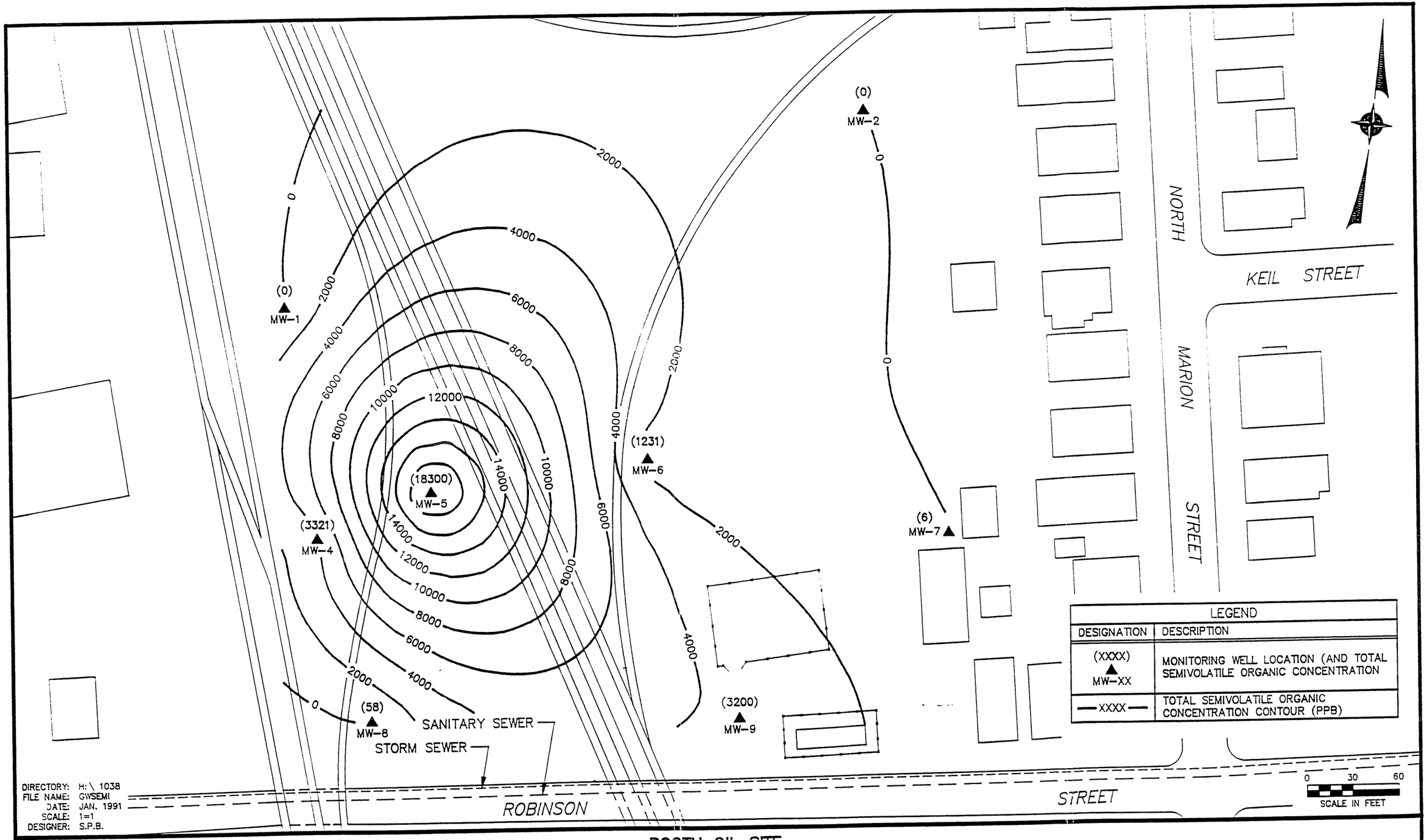
CONSTITUENTS	BOMW1GW 7/31/90 (ug/l)	BOMW2GW 7/30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Aluminum	41700	26600	7360	15100	5760	7710	38800	5810	U	----
Antimony	27.6 B+	U	U	U	U	U	U	U	U	3 GV
Arsenic	26.7 +	11.8	25	45.7 +	16.1	5.2 B	19.4	16.3	U	25 ST
Barium	378	196 B	660	301	476	236	912	496	U	1000 ST
Beryllium	2 B	1.4 B	1.1 B	1 B	U	U	1.2 B	U	U	3 GV
Cadmium	4.8 B	1.7 B	1.1 B	3.8 B	2.4 B	1.6 B	2.5 B	1.3 B	1.8 B	10 ST
Calcium	339000	213000	331000	591000	163000	194000	406000	191000	1010 B	----
Chromium	58.8 +	48.9	7.7 B	25.2	14.6	15.6	57.1 +	28.8	U	50 ST
Cobalt	32.4 B	23 B	5.4 B	17.2 B	6.7 B	7.7 B	32.7 B	7 B	U	----
Copper	177	175	22 B	30.6	32.9	17.1 B	120	47.5	U	1000 ST
Iron	71000 +	42400 +	19600 +	36900 +	22800 +	11300 +	78700 +	20300 +	U	300 ST
Lead	168 +	57.9 +	32.6 +	147 +	375 +	46.7 +	75.1 +	238 +	U	25 ST
Magnesium	138000 +	95700 +	117000 +	169000 +	59000 +	51700 +	128000 +	53800 +	983 B	35000 GV
Manganese	2300 +	1520 +	692 +	3210 +	1080 +	667 +	2730 +	743 +	U	300 ST
Mercury	U	0.24	U	U	U	U	U	U	U	2 ST
Nickel	75.7	69.7	21.4 B	52.6	30.5 B	31.3 B	83.1	42.1	U	----
Potassium	13000	15300	14500	16500	13900	16300	23100	30600	U	----
Selenium	U	U	2.4 B	U	U	U	U	U	U	20 ST
Silver	U	U	U	U	U	U	U	U	U	50 ST
Sodium	26500 +	93400 +	129000 +	229000 +	171000 +	54000 +	178000 +	475000 +	2120 B	20000 ST
Thallium	U	U	U	U	U	U	U	U	U	4 GV
Vanadium	77.5	55.6	14.8 B	44.2 B	9.8 B	18.7 B	72.4	18 B	U	----
Zinc	559 E+	329 E+	85.7 E	265 E	134 E	87.6 E	297 E	143 E	10.5 BE	300 ST
Cyanide	U	U	U	U	U	U	U	U	U	200 ST
Petroleum Hydrocarbons, (mg/l)	16	34	13.9	552	14.9	5.38	239	9	U	----

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
+: Value exceeds Groundwater Standards/Guidelines



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
TOTAL CONCENTRATION OF SEMIVOLATILE ORGANICS EXCEEDING
NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

FIGURE 4-3

Table 4-55
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	BOMW1GW 7/31/90 (ug/l)	BOMW2GW 7/30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acenaphthene	2 J	U	U	U	U	U	U	U	U	20 GV
Acenaphthylene	U	U	U	U	U	U	U	U	U	----
Anthracene	U	U	U	U	U	U	U	U	U	50 GV
Benzo(a)anthracene	U	U	U	U	U	U	U	U	U	0.002 GV
Benzo(b)fluoranthene	U	U	U	U	U	U	U	U	U	0.002 GV
Benzo(k)fluoranthene	U	U	U	U	U	U	U	U	U	0.002 GV
Benzoic acid	U	5 J+	U	U	U	U	U	U	U	----
Benzo(g,h,i)perylene	U	U	U	U	U	U	U	U	U	----
Benzo(a)pyrene	U	U	U	U	U	U	U	U	U	ND
Benzyl alcohol	U	U	U	U	U	U	U	U	U	----
4-Bromophenyl-phenylether	U	U	U	U	U	U	U	U	U	----
Butylbenzylphthalate	U	U	U	U	U	U	U	U	U	50 GV
4-Chloroaniline	U	U	U	U	U	U	U	U	U	----
bis(2-Chloroethoxy)methane	U	U	U	U	U	U	U	U	U	----
bis(2-Chloroethyl)ether	U	U	U	U	U	U	U	U	U	----
bis(2-Chloroisopropyl)ether	U	U	U	U	U	U	U	U	U	----
4-Chloro-3-methylphenol	U	U	U	U	U	U	U	U	U	----
2-Chloronaphthalene	U	U	U	U	U	U	U	U	U	----
2-Chlorophenol	U	U	U	U	U	U	U	U	U	----
4-Chlorophenyl-phenylether	U	U	U	U	U	U	U	U	U	----
Chrysene	U	U	U	U	U	U	U	U	U	0.002 GV
Dibenzo(a,h)anthracene	U	U	U	U	U	U	U	U	U	----
Dibenzofuran	2 J	U	U	U	U	U	U	U	U	----
Di-n-butylphthalate	U	U	U	U	U	0.9 J	U	3200 +	3 J	50 ST
1,2-Dichlorobenzene	U	U	U	U	U	6 J+	U	U	U	4.7 ST*
1,3-Dichlorobenzene	U	U	U	U	U	U	U	U	U	4.7 ST*
1,4-Dichlorobenzene	U	U	U	U	U	U	U	U	U	4.7 ST*
3,3'-Dichlorobenzidine	U	U	U	U	U	U	U	U	U	----
2,4-Dichlorophenol	U	U	U	U	U	U	U	U	U	0.3 GV
Diethylphthalate	U	U	U	U	U	U	U	U	U	50 GV
2,4-Dimethylphenol	U	U	1500 +	3100 +	650 +	U	U	U	U	50 ST
Dimethylphthalate	U	U	U	U	U	U	U	U	U	50 GV
4,6-Dinitro-2-methylphenol	U	U	U	U	U	U	U	U	U	----
2,4-Dinitrophenol	U	U	U	U	U	U	U	U	U	----
2,4-Dinitrotoluene	U	U	U	U	U	U	U	U	U	----
2,6-Dinitrotoluene	U	U	U	U	U	U	U	U	U	0.07 GV
bis(2-Ethylhexyl)phthalate	4 JB	4 JB	U	130 JB+	32 B	6 JB	17 B	42 JB	4 JB	50 ST
Fluoranthene	U	U	U	U	U	U	2 J	U	U	50 GV
Fluorene	2 J	U	U	U	U	U	U	U	U	50 GV
Hexachlorobenzene	U	U	U	U	U	U	U	U	U	0.35 ST
Hexachlorobutadiene	U	U	U	U	U	U	U	U	U	0.5 GV
Hexachlorocyclopentadiene	U	U	U	U	U	U	U	U	U	1 GV
Hexachloroethane	U	U	U	U	U	U	U	U	U	----
Indeno(1,2,3-cd)pyrene	U	U	U	U	U	U	U	U	U	0.002 GV
Isophorone	U	U	14 J	U	U	U	U	U	U	50 GV
2-Methylnaphthalene	13	U	U	370 J	10 J	U	59	U	U	----
2-Methylphenol	U	U	160	2800	280	U	U	U	U	----
4-Methylphenol	U	U	1600 +	12000 +	290 +	U	U	U	U	50 ST
Naphthalene	7 J	U	61 +	400 J+	11 J+	U	58 +	U	U	10 GV
2-Nitroaniline	U	U	U	U	U	U	U	U	U	----
3-Nitroaniline	U	U	U	U	U	U	U	U	U	----
4-Nitroaniline	U	U	U	U	U	U	U	U	U	----
Nitrobenzene	U	U	U	U	U	U	U	U	U	30 GV
2-Nitrophenol	U	U	U	U	U	U	U	U	U	----
4-Nitrophenol	U	U	U	U	U	U	U	U	U	----
N-Nitrosodiphenylamine (1)	U	U	U	U	U	U	U	U	U	----
N-Nitroso-di-n-propylamine	U	U	U	U	U	U	U	U	U	50 GV
Di-n-octylphthalate	U	U	U	U	U	U	U	U	U	50 GV
Pentachlorophenol	U	U	U	U	U	U	U	U	U	21 ST
Phenanthrene	U	U	U	73 J+	U	U	14	U	U	50 ST
Phenol	U	U	110 +	3800 +	U	U	U	U	U	1 ST**
Pyrene	U	U	U	16 J	U	U	3 J	13 J	U	50 GV
1,2,4-Trichlorobenzene	U	U	U	27 J+	U	U	U	U	U	10 GV***
2,4,6-Trichlorophenol	U	U	U	U	U	U	U	U	U	----
2,4,5-Trichlorophenol	U	U	U	U	U	U	U	U	U	----

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Value applies to sum of1,4 and 1,2 isomers
**: Value pertains to total phenols
***: Applies to sum of isomers
+: Value exceeds Groundwater Standards/Guidelines

Table 4-55 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW1GW //31/90 (ug/l)	BOMW2GW //30/90 (ug/l)	BOMW4GW 7/31/90 (ug/l)	BOMW5GW 7/31/90 (ug/l)	BOMW6GW 7/31/90 (ug/l)	BOMW7GW 7/31/90 (ug/l)	BOMW8GW 7/31/90 (ug/l)	BOMW9GW 7/30/90 (ug/l)	BOFBGW 7/30/90 (ug/l)
Unknown benzene	130 J	ND	150 J	ND	ND	ND	230 J	ND	ND
Unknown cycloalkane	130 J	ND	ND	ND	ND	ND	150 J	180 J	ND
Unknown benzene	85 J	ND	ND	ND	ND	ND	220 J	ND	ND
Unknown	84 J	17 JB	280 J	ND	59 J	31 J	ND	430 J	12 JB
Unknown cycloalkane	66 J	ND	ND	ND	ND	ND	ND	150 J	ND
Unknown benzene	51 J	ND	ND	ND	ND	9 J	130 J	ND	ND
Unknown naphthalene	48 J	ND	ND	500 J	ND	39 J	ND	ND	ND
Unknown indene	47 J	ND	ND	ND	ND	9 J	ND	ND	ND
Unknown cycloalkane	43 J	ND	ND	ND	160 J	ND	ND	140 J	ND
Unknown cycloalkane	43 J	ND	ND	ND	89 J	ND	ND	ND	ND
Unknown benzene	41 J	ND	ND	ND	53 J	28 J	110 J	ND	ND
Unknown cycloketone	37 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown	33 J	14 J	220 J	ND	220 J	ND	ND	340 J	9 JB
Unknown naphthalene	30 J	ND	ND	ND	ND	12 J	ND	ND	ND
Unknown benzene	30 J	ND	ND	ND	ND	16 J	77 J	ND	ND
Unknown benzene	29 J	ND	ND	ND	ND	20 J	130 J	ND	ND
Unknown benzene	28 J	ND	ND	ND	ND	16 J	120 J	ND	ND
Unknown alkane	27 J	ND	140 J	1200 J	ND	81 J	180 J	430 J	ND
Unknown cycloalkane	23 J	ND	ND	ND	ND	ND	64 J	ND	ND
Benzene, propyl	22 J	ND	ND	ND	ND	ND	ND	ND	ND
Unknown	ND	11 JB	150 J	ND	72 J	ND	ND	330 J	9 JB
Unknown acid	ND	11 J	110 J	ND	ND	58 J	ND	ND	ND
Unknown	ND	9 J	110 J	ND	59 J	ND	ND	250 J	ND
1,4-Dioxane	ND	ND	960 J	ND	2000 J	ND	ND	ND	ND
Unknown cycloalkene	ND	ND	270 J	ND	ND	ND	ND	ND	ND
Unknown alkene	ND	ND	110 J	ND	ND	51 J	99 J	130 J	ND
Unknown phenol	ND	ND	250 J	1900 J	78 J	29 J	ND	190 J	ND
Unknown phenol	ND	ND	250 J	940 J	65 J	20 J	ND	140 J	ND
Unknown phenol	ND	ND	220 J	630 J	63 J	ND	ND	ND	ND
Unknown phenol	ND	ND	190 J	ND	59 J	ND	ND	ND	ND
Unknown phenol	ND	ND	150 J	ND	37 J	ND	ND	ND	ND
Unknown phenol	ND	ND	120 J	ND	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	100 J	1100 J	ND	21 J	130 J	ND	ND
Unknown alkane	ND	ND	ND	1000 J	ND	ND	120 J	ND	ND
Unknown alkane	ND	ND	ND	1000 J	ND	ND	110 J	ND	ND
Unknown alkane	ND	ND	ND	970 J	ND	ND	94 J	ND	ND
Unknown alkane	ND	ND	ND	700 J	ND	ND	80 J	ND	ND
Unknown alkane	ND	ND	ND	690 J	ND	ND	55 J	ND	ND
Unknown alkane	ND	ND	ND	630 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	610 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	540 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	540 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	530 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	480 J	ND	ND	ND	ND	ND
Unknown alkane	ND	ND	ND	460 J	ND	ND	ND	ND	ND
Unknown alcohol	ND	ND	ND	ND	540 J	22 J	770 J	440 J	ND
Unknown	ND	ND	ND	ND	59 J	ND	ND	240 J	ND
Unknown	ND	ND	ND	ND	47 J	ND	ND	220 J	ND
1,4-Dithiane	ND	ND	ND	ND	46 J	ND	ND	ND	ND
Unknown	ND	ND	ND	ND	46 J	ND	ND	160 J	ND
Unknown	ND	ND	ND	ND	42 J	ND	ND	160 J	ND
Unknown	ND	ND	ND	ND	41 J	ND	ND	150 J	ND
Unknown phthalate	ND	ND	ND	ND	ND	17 J	ND	ND	ND
Unknown naphthalene	ND	ND	ND	ND	ND	12 J	ND	ND	ND
Unknown benzene	ND	ND	ND	ND	ND	ND	62 J	ND	ND
Unknown benzene	ND	ND	ND	ND	ND	ND	50 J	ND	ND
1,8-Naphthalic anhydride	ND	ND	ND	ND	ND	ND	ND	400 J	ND
Unknown	ND	ND	ND	ND	ND	ND	ND	130 JB	ND
Unknown	ND	ND	ND	ND	ND	ND	ND	120 J	ND

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Estimated value

NOTES

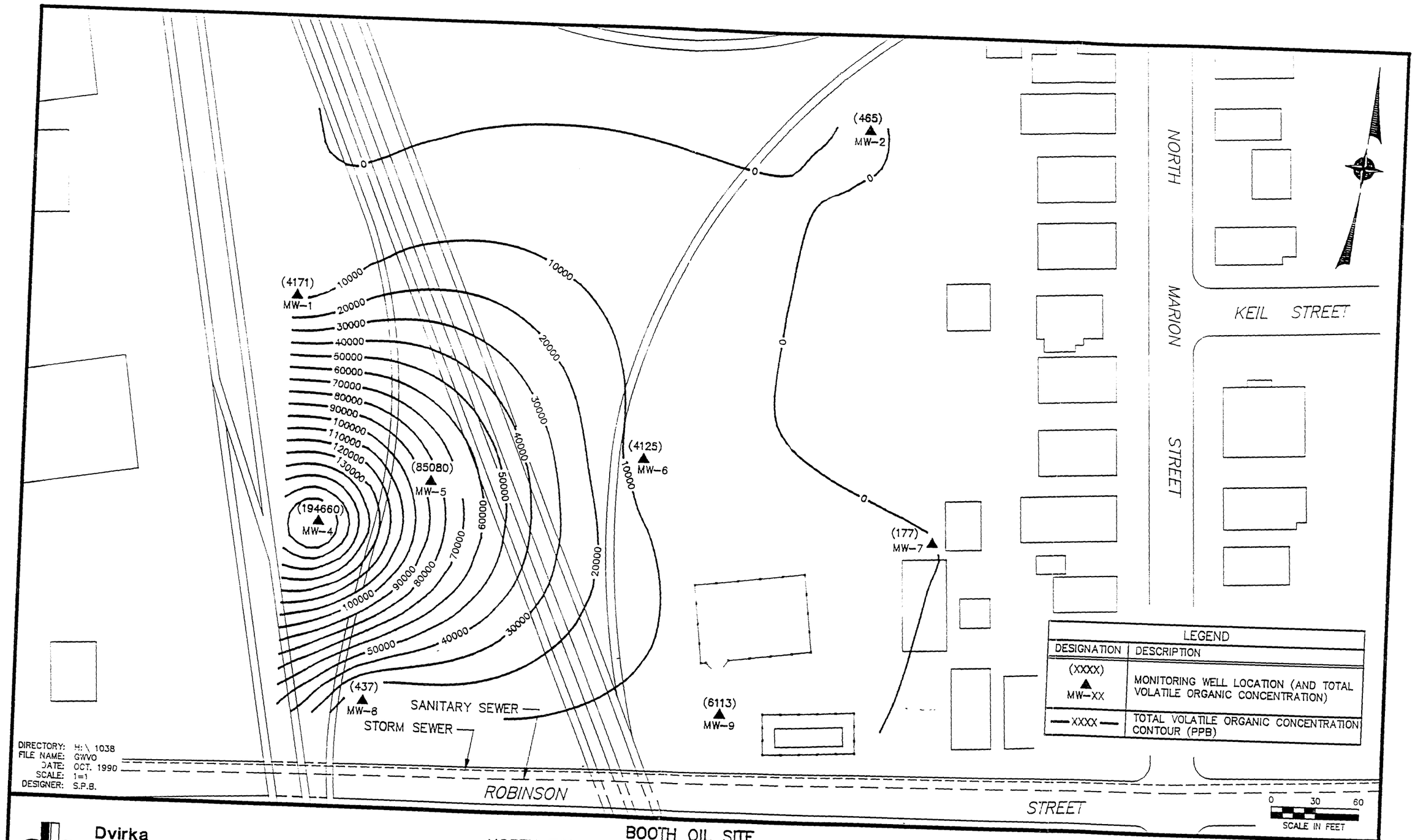
ND: Not Detected

Table 4-56

PHASE I RI GROUNDWATER SAMPLING

TOTAL CONCENTRATION OF SEMIVOLATILE ORGANIC COMPOUNDS PRESENT ABOVE NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

Sample Designation	Total Concentration (ug/l)
BO-MW-4-GW	3,431
BO-MW-5-GW	22,330
BO-MW-6-GW	1,231
BO-MW-7-GW	6
BO-MW-8-GW	58
BO-MW-9-GW	3,200



Dvirka and Bartilucci
CONSULTING ENGINEERS

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
TOTAL CONCENTRATION OF VOLATILE ORGANICS EXCEEDING
NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

FIGURE 4-2

Table 4-54

PHASE I RI GROUNDWATER SAMPLING

TOTAL CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS PRESENT ABOVE NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

Sample Designation	Total Concentration (ug/l)
BO-MW-1-GW	4,171
BO-MW-2-GW	467
BO-MW-4-GW	194,660
BO-MW-5-GW	85,080
BO-MW-6-GW	4,125
BO-MW-7-GW	177
BO-MW-8-GW	437
BO-MW-9-GW	6,113

total concentration of metals exceeding standards or guidance values. While specific contaminant plumes are not identified, Table 4-59 presents each groundwater sample and the corresponding concentration of each compound which was found to exceed standards or guidance values.

4.3.7 NAPL

The data from the analysis of NAPL sample BO-MW-8-GWO is presented in Tables 4-60 to 4-63. Acetone and xylene (total) were found at the highest concentrations (540 mg/kg and 500 mg/kg) among the volatile organic compounds detected. Blank contamination is associated with the acetone results, and since the level present is consistent with other lab contamination from site environmental samples, it will not be further considered. In addition, ethylbenzene, toluene and vinyl acetate were detected in significant concentrations. Approximately 380 mg/kg to 860 mg/kg of tentatively identified volatile organic compounds were found to be present. High concentrations of tentatively identified compounds were also present in other suspected NAPL samples. Seven semivolatile organic compounds were found in sample BO-MW-8-GWO and of these seven, 2-methylnaphthalene and naphthalene were detected at the highest concentrations, 620 mg/kg and 290 mg/kg, respectively. The approximate concentrations of tentatively identified semivolatile organic compounds were between 660 mg/kg and 23,000 mg/kg. No pesticide compounds were detected; however, PCB arochlors 1242 and 1254 were detected at concentrations of 820 mg/kg and 190 mg/kg, respectively. The metals barium and lead were detected at 44.4 mg/kg and 50.1 mg/kg, respectively.

4.4 Results of Phase II Investigation Site Characterization

4.4.1 Surface Soil

A total of 12 surface soil samples (seven on-site, two south of Robinson Street, two west of railroad tracks and one in playground) were collected for analysis during the Phase II RI field program (see Figure 2-6). The purpose of these samples was to confirm the Phase I RI data and to further define the extent of contamination in the surface soil. The analytical data obtained for the surface soil medium are presented in Tables 4-64 to 4-68.

The analytical data obtained from the analysis of volatile organic compounds are presented in Table 4-64. Of the 12 surface soil samples, 9 were analyzed for TCL+30 compounds. The sample designated BO-SS-21-S was the only sample found to contain several compounds above soil cleanup criteria guidelines as indicated in Table 4-64. The other surface soil samples collected for volatile organic compounds contained virtually no contamination.

Table 4-59

GROUNDWATER SAMPLING
TOTAL CONCENTRATION* OF TOXIC** METALS PRESENT ABOVE
NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDANCE VALUES

Compound	Sample							
	BO-MW-1-GW	BO-MW-2-GW	BO-MW-4-GW	BO-MW-5-GW	BO-MW-6-GW	BO-MW-7-GW	BO-MW-8-GW	BO-MW-9-GW
Antimony	27.6							
Arsenic	26.7			45.7				
Chromium	58.8						57.1	
Lead	168	57.9	32.6	147	375	46.7	75.1	238
Zinc	559	329	—	—	—	—	—	—
TOTAL	672.1	386.9	32.6	192.7	375	46.7	132.2	238

*Concentration is in ug/l.

**Toxic as defined by 6NYCRR Part 360 Requirements.

B0800G

Table 4-60
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I NAPL SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMW8GW0 8/7/90 (ug/kg)	
Acetone	540000	B
Benzene		U
Bromodichloromethane		U
Bromoform		U
Bromomethane		U
2-Butanone		U
Carbon Disulfide		U
Carbon Tetrachloride		U
Chlorobenzene		U
Chloroethane		U
Chloroform		U
Chloromethane		U
Dibromochloromethane		U
1,1-Dichloroethane		U
1,1-Dichloroethene		U
1,2-Dichloroethane		U
1,2-Dichloroethene (total)		U
1,2-Dichloropropane		U
cis-1,3-Dichloropropene		U
trans-1,3-Dichloropropene		U
Ethylbenzene	75000	J
2-Hexanone		U
Methylene Chloride		U
4-Methyl-2-pentanone		U
Styrene		U
1,1,2,2-Tetrachloroethane		U
Tetrachloroethene		U
Toluene	38000	J
Trichloroethene		U
1,1,1-Trichloroethane		U
1,1,2-Trichloroethane		U
Vinyl Acetate	34000	J
Vinyl Chloride		U
Xylene (total)	500000	
TENTATIVELY IDENTIFIED COMPOUNDS		
Unknown trimethyl benzene	860000	J*
Unknown ethyl-dimethyl benzene	720000	J*
Unknown methyl benzene	690000	J*
Unknown alkyl benzene	490000	J*
Unknown alkyl benzene	480000	J*
Unknown alkyl benzene	470000	J*
Unknown cycloalkane	390000	J*
Unknown indene	390000	J*
Unknown	380000	J*
Unknown cycloalkane	380000	J*

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
J*: Estimated value
U: Analyzed for but not detected

Table 4-61
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I NAPL SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE ORGANIC COMPOUNDS	BOMW8GW0 8/7/90 (mg/kg)	
Acenaphthene		U
Acenaphthylene		U
Anthracene		U
Benzo(a)anthracene		U
Benzo(b)fluoranthene		U
Benzo(k)fluoranthene		U
Benzoic acid		U
Benzo(g,h,i)perylene		U
Benzo(a)pyrene		U
Benzyl alcohol		U
4-Bromophenyl-phenylether		U
Butylbenzylphthalate		U
4-Chloroaniline		U
bis(2-Chloroethoxy)methane		U
bis(2-Chloroethyl)ether		U
bis(2-Chloroisopropyl)ether		U
4-Chloro-3-methylphenol		U
2-Chloronaphthalene		U
2-Chlorophenol		U
4-Chlorophenyl-phenylether		U
Chrysene		U
Dibenzo(a,h)anthracene		U
Dibenzofuran		U
Di-n-butylphthalate		U
1,2-Dichlorobenzene		U
1,3-Dichlorobenzene		U
1,4-Dichlorobenzene		U
3,3'-Dichlorobenzidine		U
2,4-Dichlorophenol		U
Diethylphthalate		U
2,4-Dimethylphenol		U
Dimethylphthalate		U
4,6-Dinitro-2-methylphenol		U
2,4-Dinitrophenol		U
2,4-Dinitrotoluene		U
2,6-Dinitrotoluene		U
bis(2-Ethylhexyl)phthalate	130	B
Fluoranthene	30	J
Fluorene	75	J
Hexachlorobenzene		U
Hexachlorobutadiene		U
Hexachlorocyclopentadiene		U
Hexachloroethane		U
Indeno(1,2,3-cd)pyrene		U
Isophorone		U
2-Methylnaphthalene	620	
2-Methylphenol		U
4-Methylphenol		U
Naphthalene	290	
2-Nitroaniline		U
3-Nitroaniline		U
4-Nitroaniline		U
Nitrobenzene		U
2-Nitrophenol		U
4-Nitrophenol		U
N-Nitrosodiphenylamine (1)	42	J
N-Nitroso-di-n-propylamine		U
Di-n-octylphthalate		U
Pentachlorophenol		U
Phenanthrene		U
Phenol		U
Pyrene	29	J
1,2,4-Trichlorobenzene		U
2,4,6-Trichlorophenol		U
2,4,5-Trichlorophenol		U

QUALIFIERS

B: Compound found in method blank as well as in sample
J: Compound found below the detection limit
U: Analyzed for but not detected

Table 4-61 (continued)

BOOTH OIL INACTIVE HAZARDOUS WASTE SITE

PHASE I NAPL SAMPLING

SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW8GW0 8/7/90 (ug/kg)
Unknown alkane	23000000 J
Unknown alkane	2000000 J
Unknown benzene	1500000 J
Unknown benzene	1300000 J
Unknown naphthalene	1200000 J
Benzene,1-methyl-3-propyl	1200000 J
Unknown benzene	1200000 J
Unknown benzene	1100000 J
Unknown alkane	1100000 J
Unknown	900000 J
Unknown benzene	880000 J
Unknown cycloalkane	850000 J
Unknown alkane	850000 J
Unknown alkane	830000 J
Unknown alkane	800000 J
Unknown benzene	740000 J
Unknown alkane	710000 J
Naphthalene, 1,4,6-trimethyl	690000 J
Unknown alkane	670000 J
Unknown cyclohexane	660000 J

QUALIFIERS

J: Estimated value

Table 4-62
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I NAPL SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOMWBGW0 8/7/90 (mg/kg)
Aldrin	U
PCB - 1242	820
PCB - 1016	U
PCB - 1232	U
PCB - 1254	190 J
PCB - 1260	U
PCB - 1221	U
PCB - 1248	U
alpha-BHC	U
beta-BHC	U
delta-BHC	U
gamma-BHC	U
alpha-Chlordane	U
gamma-Chlordane	U
4,4'-DDD	U
4,4'-DDE	U
4,4'-DDT	U
Dieldrin	U
Endosulfan I	U
Endosulfan II	U
Endosulfan Sulfate	U
Endrin	U
Endrin-Ketone	U
Heptachlor	U
Heptachlor Epoxide	U
Methoxychlor	U
Toxaphene	U

QUALIFIERS

J: Compound found below the detection limit
U: Analyzed for but not detected

Table 4-63
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE I NAPL SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOMW8GW0 8/7/90 (mg/kg)	
Aluminum	54.6	
Antimony		U
Arsenic	4.5	
Barium	44.4	
Beryllium		U
Cadmium	0.21	B
Calcium	183	B
Chromium	3.8	
Cobalt	0.43	B
Copper	4.1	B
Iron	88.3	
Lead	50.1	
Magnesium	8.7	B
Manganese	2	B
Mercury		U
Nickel	1.5	B
Potassium		U
Selenium	0.56	B
Silver		U
Sodium	153	B
Thallium		U
Vanadium	1.9	B
Zinc	6.1	
Cyanide		U
Petroleum Hydrocarbons, (mg/l)	700000	

QUALIFIERS

B: Compound found at a concentration less than contract required detection limit (CRDL) but greater than instrument detection limit (IDL)
U: Analyzed for but not detected

Table 4-64
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSS17S 11/14/90 (ug/kg)	BOSS18S 11/14/90 (ug/kg)	BOSS19S 11/13/90 (ug/kg)	BOSS20S 11/13/90 (ug/kg)	BOSS21S 11/13/90 (ug/kg)	BOSS22S 11/13/90 (ug/kg)	BOSS23S 11/13/90 (ug/kg)	BOSS24S 11/13/90 (ug/kg)	BOSS25S 11/13/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	23 B	25 B	21 B	15 B	11000 B	21 B	21 B	12 JB	20 B	---
Benzene	U	U	U	U	7900	U	U	U	U	---
Bromodichloromethane	U	U	U	U	U	U	U	U	U	---
Bromoform	U	U	U	U	U	U	U	U	U	245
Bromomethane	U	U	U	U	U	U	U	U	U	---
2-Butanone	U	U	0.8 J	2 J	U	U	3 JB	U	U	10
Carbon Disulfide	U	U	U	U	U	U	U	U	U	168
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	28
Chlorobenzene	U	U	U	U	6700 +	U	U	U	U	152
Chloroethane	U	U	U	U	U	U	U	U	U	93
Chloroform	U	U	U	U	U	U	U	U	U	155
Chloromethane	U	U	U	U	U	U	U	U	U	85
Dibromochloromethane	U	U	U	U	U	U	U	U	U	---
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	100
1,1-Dichloroethene	U	U	U	U	8600 +	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	1.24
1,2-Dichloroethene (total)	U	U	U	U	U	U	U	U	U	32
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	142
Ethylbenzene	U	U	U	U	3300 J+	U	U	U	U	67
2-Hexanone	U	U	U	U	U	U	U	U	U	---
Methylene Chloride	U	U	3 J	4 J	5600 +	U	10 +	7 +	U	5
4-Methyl-2-pentanone	U	U	U	U	U	U	U	U	U	---
Styrene	U	U	U	U	U	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	U	0.54
Tetrachloroethene	U	U	U	U	U	U	U	U	U	8
Toluene	U	U	U	U	19000 +	U	U	U	U	36
Trichloroethene	U	U	U	12	6900 +	U	U	U	U	24
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	150
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	U	U	U	U	U	48
Vinyl Chloride	U	U	U	U	U	U	U	U	U	23
Xylene (total)	U	U	U	3 J	95000 +	U	U	U	U	67

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-64 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSS17S 11/14/90 (ug/kg)	BOSS18S 11/14/90 (ug/kg)	BOSS19S 11/13/90 (ug/kg)	BOSS20S 11/13/90 (ug/kg)	BOSS21S 11/13/90 (ug/kg)	BOSS22S 11/13/90 (ug/kg)	BOSS23S 11/13/90 (ug/kg)	BOSS24S 11/13/90 (ug/kg)	BOSS25S 11/13/90 (ug/kg)
Unknown branched alkane	NA	NA	12 J	18 J	110000 J	12 J	NA	NA	NA
Unknown branched alkane	NA	NA	NA	17 J	100000 J	NA	NA	NA	NA
Unknown siloxane	NA	10 J	NA	10 J	NA	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	110000 J	NA	NA	NA	NA
Unknown branched alkane	NA	NA	NA	NA	87000 J	NA	NA	NA	NA
Unknown aromatic	6 J	9 J	NA	NA	79000 J	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	60000 J	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	60000 J	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	59000 J	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	58000 J	NA	NA	NA	NA
Unknown benzene	NA	NA	NA	NA	58000 J	NA	NA	NA	NA
Unknown dimethyl naphthalene	26 J	46 J	NA	NA	NA	NA	NA	NA	34 J
Unknown dimethyl naphthalene	23 J	41 J	NA	NA	NA	NA	NA	NA	31 J
Unknown methyl naphthalene	18 J	NA	NA	NA	NA	NA	NA	NA	11 J
Unknown ethyl naphthalene	7 J	16 J	NA	NA	NA	NA	NA	NA	11 J
Unknown dimethyl naphthalene	13 J	18 J	NA	NA	NA	NA	NA	NA	11 J
Unknown methyl naphthalene	14 J	NA	NA	NA	NA	NA	NA	NA	8 J
Unknown dimethyl naphthalene	7 J	15 J	NA	NA	NA	NA	NA	NA	NA
Unknown	7 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown aromatic	NA	8 J	NA	NA	NA	NA	NA	NA	NA
Unknown dimethyl naphthalene	NA	8 J	NA	NA	NA	NA	NA	NA	NA

QUALIFIERS

J: Estimated value

NOTES

NA: Not Applicable

The results from the analysis of semivolatile organic compounds are presented in Table 4-65. The semivolatile organic compounds that were predominantly found to exceed the soil cleanup criteria guidelines include: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd)pyrene. Table 4-66 provides a list of each surface soil sample and the total concentration of semivolatile organic compounds present above soil cleanup criteria guidelines. Based on a comparison of the Phase I RI data to the Phase II RI data, it is determined that similar compounds were found to exceed the guidelines.

Analytical data for the pesticides/PCB fraction are presented in Table 4-67. Several pesticide compounds were detected in a number of samples including gamma-BHC, 4,4'-DDD, 4,4'-DDE and 4,4'-DDT. The Phase I RI data indicated that pesticide compounds were not detected in any of the surface soil samples. The Phase II RI data indicate that pesticides were found primarily in samples collected west of the railroad tracks (BO-SS-17-S and BO-SS-18-S) and in samples collected to the north and east (BO-SS-23-S and BO-SS-24-S). In addition, gamma-BHC and 4,4'-DDE were detected at 1 ug/kg and 20 ug/kg, respectively, in a sample collected in proximity to the garage (BO-SS-20-S). With respect to PCBs, the total concentration of samples BO-SS-19-S, BO-SS-20-S, BO-SS-21-S and BO-SS-25-S was found to be 1,300 ug/kg, 750 ug/kg, 143,000 ug/kg and 3,500 ug/kg, respectively. During the Phase I RI, no PCBs were detected in samples collected from the playground; however, sample BO-SS-25-S, which was taken from the northern portion of the playground, indicates that 3,500 ug/kg was detected.

The results for metals analysis are presented in Table 4-68. NJDEP soil cleanup guidelines were exceeded in all samples for lead. The highest concentration of lead detected was in sample BO-SS-20-S (563 mg/kg) which was obtained along the eastern edge of the property boundry. A significant lead concentration of 442 mg/kg was detected in a sample collected from a residential property ajacent to the east property boundry of the site. These findings are consistent with those of the Phase I RI regarding the widespread presence of lead in excess of soil cleanup guidelines. Arsenic was found in four samples in excess of the 20 mg/kg guidelines at concentrations of 41 mg/kg, 60.6 mg/kg, 77.9 mg/kg and 69.9 mg/kg, as indicated in Table 4-68. Zinc was found in samples BO-SS-20-S and BO-SS-26-S at concentrations of 467 mg/kg and 821 mg/kg, respectively, in excess of the 350 mg/kg guideline. The Phase II RI data for arsenic and zinc are consistent with the Phase I RI data in that both data sets show these two compounds to be present above the guidelines at several locations across the site.

Table 4-65
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOSS17S 11/14/90 (ug/kg)		BOSS18S 11/14/90 (ug/kg)		BOSS19S 11/13/90 (ug/kg)		BOSS20S 11/13/90 (ug/kg)		BOSS21S 11/13/90 (ug/kg)		BOSS21SA 11/13/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene	82	J	100	J		U	120	J		U		U	2220
Acenaphthylene	820		310	J		U	94	J		U		U	5140
Anthracene	470	J	230	J		U	250	J		U		U	65000
Benzo(a)anthracene	2000	+	800	+	130	J+	1300	+	5800	+		U	5
Benzo(b)fluoranthene	2800	+	970	+	330	J+	2500	+	13000	+	450	J+	55
Benzo(k)fluoranthene	2700	+		U		U	220	J+		U		U	55
Benzoic acid	78	J	58	J	210	JB+		U		U		U	167
Benzo(g,h,i)perylene	310	J	200	J		U		U	2800			U	593110
Benzo(a)pyrene	1800		810		130	J	1000		2800			U	---
Benzyl alcohol		U		U		U		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U		U		U	---
Butylbenzylphthalate	290	J		U		U	270	J		U		U	---
4-Chloroaniline		U		U		U		U		U		U	---
bis(2-Chloroethoxy)methane		U		U		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U		U		U	---
4-Chloro-3-methylphenol		U		U		U		U		U		U	115
2-Chloronaphthalene		U		U		U		U		U		U	---
2-Chlorophenol		U		U		U		U		U		U	38
4-Chlorophenyl-phenylether		U		U		U		U		U		U	---
Chrysene	2200	+	910	+	160	J+	1100	+	4700	+	220	J+	20
Dibenzo(a,h)anthracene		U		U		U		U		U		U	713680
Dibenzofuran	250	J	160	J		U	78	J		U		U	---
Di-n-butylphthalate	95	JB	39	JB	92	J	150	J		U		U	41000
1,2-Dichlorobenzene	35	J		U		U		U		U		U	66
1,3-Dichlorobenzene		U		U		U		U		U		U	73
1,4-Dichlorobenzene		U		U		U		U		U		U	92
3,3'-Dichlorobenzidine		U		U		U		U		U		U	---
2,4-Dichlorophenol		U		U		U		U		U		U	0.65
Diethylphthalate		U		U		U		U		U		U	260
2,4-Dimethylphenol		U		U		U		U	1700	J+	1200	J+	50
Dimethylphthalate		U		U		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U		U		U	---
2,4-Dinitrophenol		U		U		U		U		U		U	---
2,4-Dinitrotoluene		U		U		U		U		U		U	---
2,6-Dinitrotoluene		U		U		U		U		U		U	---
bis(2-Ethylhexyl)phthalate		U	300	JB	1000	B	890	B	9400	B	1100	J	1517325
Fluoranthene	3800		1500		310	J	3000			U	710	J	22892
Fluorene	140	J	97	J		U	140	J		U		U	8180
Hexachlorobenzene		U		U		U		U		U		U	68
Hexachlorobutadiene		U		U		U		U		U		U	74
Hexachlorocyclopentadiene		U		U		U		U		U		U	---
Hexachloroethane		U		U		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene	420	J+	250	J+		U		U	3300	+		U	28
Isophorone		U		U		U		U		U		U	---
2-Methylnaphthalene	360	J	150	J		U		U	6900		240	J	21250
2-Methylphenol		U		U		U		U		U		U	---
4-Methylphenol		U		U		U		U	6600		3300		---
Naphthalene	290	J	190	J		U		U	6800	+		U	650
2-Nitroaniline		U		U		U		U		U		U	---
3-Nitroaniline		U		U		U		U		U		U	232
4-Nitroaniline		U		U		U		U		U		U	275
Nitrobenzene		U		U		U		U		U		U	104
2-Nitrophenol		U		U		U		U		U		U	162
4-Nitrophenol		U		U		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U		U		U		U	---
N-Nitroso-di-n-propylamine		U		U		U		U		U		U	---
Di-n-octylphthalate	21	J		U		U	110	J		U	180	J	5965
Pentachlorophenol		U		U	230	JB		U		U		U	2555
Phenanthrene	1500		770		150	J	1600			U		U	57300
Phenol		U		U		U		U	2400	+	1000	J+	0.4
Pyrene	2900		1200		180	J	1900		21000		750	J	210000
1,2,4-Trichlorobenzene		U		U		U		U		U		U	336
2,4,6-Trichlorophenol		U		U		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U		U		U	62

QUALIFIERS

B: Compound found in the method blank as well as the sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
A: Acid partition
+: Value exceeds Soil Cleanup Critera Guidelines

Table 4-65 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	B0SS17S 11/14/90 (ug/kg)	B0SS18S 11/14/90 (ug/kg)	B0SS19S 11/13/90 (ug/kg)	B0SS20S 11/13/90 (ug/kg)	B0SS21S 11/13/90 (ug/kg)	B0SS21SA 11/13/90 (ug/kg)
Aldo-condensation product	41000 JAB	35000 JAB	32000 JAB	33000 JAB	5900 JAB	NA
Unknown acid	3100 JB	2700 JB	1900 JB	1900 JB	NA	NA
Unknown acid	1700 JB	1500 JB	800 JB	940 JB	NA	NA
Unknown hydrocarbon	NA	NA	790 JB	NA	NA	NA
Unknown acid	1000 JB	860 JB	740 JB	790 JB	NA	NA
Unknown benzene	NA	NA	590 J	NA	12000 J	930 J
Unknown	520 JAB	420 JAB	300 JB	300 J	870 J	1200 J
Unknown acid	680 JB	570 JB	NA	430 JB	NA	NA
Unknown cycloalkane	NA	NA	NA	880 JB	NA	NA
Unknown benzene	NA	NA	NA	NA	7300 J	NA
Unknown benzene	NA	NA	NA	NA	4800 J	NA
Unknown benzene	NA	NA	NA	NA	2600 J	NA
Unknown alkane	3300 J	1300 J	NA	NA	5100 J	10000 J
Unknown alkane	1700 J	590 J	NA	NA	NA	10000 J
Unknown alkane	640 J	NA	NA	NA	NA	3100 J
Unknown alkane	570 JB	NA	NA	NA	NA	1400 J
3-ethylphenol	NA	NA	NA	NA	NA	3500 J
Unknown phenol	NA	NA	NA	NA	NA	880 J
Unknown phenol	NA	NA	NA	NA	NA	880 J
Unknown naphthalene	440 J	NA	NA	NA	NA	NA
Unknown alkane	540 J	NA	NA	NA	NA	NA
Unknown alkane	500 J	NA	NA	NA	NA	NA
Unknown	470 J	330 JB	NA	NA	NA	NA
Unknown	430 J	NA	NA	NA	NA	NA
Unknown	420 JB	420 JB	NA	NA	NA	NA
Unknown	410 JB	NA	NA	NA	NA	NA
Unknown	390 J	NA	NA	NA	NA	NA
Unknown alkene	NA	470 JB	NA	NA	NA	NA
Unknown PAH	1000 J	700 J	NA	NA	NA	NA
Unknown PAH	NA	410 J	NA	NA	NA	NA
Unknown alkane	440 J	NA	NA	NA	NA	NA
Unknown alkane	350 J	NA	NA	NA	NA	NA
Unknown naphthalene	360 J	NA	NA	NA	NA	NA

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable
A: Acid partition

Table 4-65 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	B0SS21SBM 11/13/90 (ug/kg)		B0SS21SBH 11/13/90 (ug/kg)		B0SS22S 11/13/90 (ug/kg)		B0SS23S 11/13/90 (ug/kg)		B0SS24S 11/13/90 (ug/kg)		B0SS25S 11/13/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene		U		U		U		U		U		U	2220
Acenaphthylene		U		U	2500		260	J		U	130	J	5140
Anthracene		U		U	1500		180	J		U	170	J	65000
Benzo(a)anthracene	6100	+		U	6500	+	790	+	390	J+	390	J+	5
Benzo(b)fluoranthene	13000	+		U	10000	+	1900	+	640	J+	1200	+	55
Benzo(k)fluoranthene	940	J+		U	1600	+	250	J+		U		U	55
Benzoic acid		U		U	310	JB+	170	JB+	430	JB+		U	167
Benzo(g,h,i)perylene	1600	J		U	940	J		U	450	J		U	593110
Benzo(a)pyrene	2600			U	5400		790	J	390	J	400	J	---
Benzyl alcohol		U		U		U		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U		U		U	---
Butylbenzylphthalate		U		U		U		U		U		U	---
4-Chloroaniline		U		U		U		U		U		U	---
bis(2-Chloroethoxy)methane		U		U		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U		U		U	---
4-Chloro-3-methylphenol		U		U		U		U		U		U	115
2-Chloronaphthalene		U		U		U		U		U		U	---
2-Chlorophenol		U		U		U		U		U		U	38
4-Chloropnenyl-phenylether		U		U		U		U		U		U	---
Chrysene	6500	+		U	6700	+	920	+	560	J+	450	J+	20
Dibenzo(a,h)anthracene	1100	J		U	590	J		U		U		U	713680
Dibenzofuran		U		U	320	J		U		U	180	J	---
Di-n-butylphthalate		U		U	170	J	200	J		U	59	J	41000
1,2-Dichlorobenzene		U		U		U		U		U		U	66
1,3-Dichlorobenzene		U		U		U		U		U		U	73
1,4-Dichlorobenzene		U		U		U		U		U		U	92
3,3'-Dichlorobenzidine		U		U		U		U		U		U	---
2,4-Dichlorophenol		U		U		U		U		U		U	0.65
Diethylphthalate		U		U		U		U		U	110	J	260
2,4-Dimethylphenol		U		U		U		U		U		U	50
Dimethylphthalate		U		U		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U		U		U	---
2,4-Dinitrophenol		U		U		U		U		U		U	---
2,4-Dinitrotoluene		U		U		U		U		U		U	---
2,6-Dinitrotoluene		U		U		U		U		U		U	---
bis(2-Ethylhexyl)phthalate	13000			U	980	JB	730	JB	600	JB	530	JB	1517325
Fluoranthene	23000	+		U	13000		1600		500	J	640	J	22892
Fluorene		U		U	530	J		U		U	140	J	8180
Hexachlorobenzene		U		U		U		U		U		U	68
Hexachlorobutadiene		U		U		U		U		U		U	74
Hexachlorocyclopentadiene		U		U		U		U		U		U	---
Hexachloroethane		U		U		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene	2400	+		U	1400	+	180	J+	430	J+		U	28
Isophorone		U		U		U		U		U		U	---
2-Methylnaphthalene	6600			U	330	J	170	J		U	970		21250
2-Methylphenol		U		U		U		U		U		U	---
4-Methylphenol		U		U		U		U		U		U	---
Naphthalene	3200	+		U	340	J	120	J		U	520	J	650
2-Nitroaniline		U		U		U		U		U		U	---
3-Nitroaniline		U		U		U		U		U		U	232
4-Nitroaniline		U		U		U		U		U		U	275
Nitrobenzene		U		U		U		U		U		U	104
2-Nitrophenol		U		U		U		U		U		U	162
4-Nitrophenol		U		U		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U		U		U		U	---
N-Nitroso-di-n-propylamine		U		U		U		U		U		U	---
Di-n-octylphthalate	340	J		U		U		U		U		U	5965
Pentachlorophenol		U		U		U		U		U		U	2555
Phenanthrene	6200			U	5200		580	J	350	J	820	J	57300
Phenol		U		U		U		U		U		U	0.4
Pyrene	20000			U	8000		950		620	J	820	J	210000
1,2,4-Trichlorobenzene		U		U		U		U		U		U	336
2,4,6-Trichlorophenol		U		U		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U		U		U	62

QUALIFIERS

B: Compound found in the method blank as well as the sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
BM: Base Neutral partition (methylene chloride)
BH: Base Neutral partition (hexane)
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-65 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSS21SBM 11/13/90 (ug/kg)	BOSS21SBH 11/13/90 (ug/kg)	BOSS22S 11/13/90 (ug/kg)	BOSS23S 11/13/90 (ug/kg)	BOSS24S 11/13/90 (ug/kg)	BOSS25S 11/13/90 (ug/kg)
Aldo-condensation product	NA	NA	42000 JAB	39000 JAB	31000 JAB	41000 JAB
Unknown acid	NA	NA	2300 JB	2300 J	3000 J	2200 JB
Unknown acid	NA	NA	980 JB	1000 JB	1600 JB	900 JB
Unknown acid	NA	NA	1100 JB	880 J	700 JB	520 JB
Unknown benzene	20000 J	NA	NA	NA	NA	570 J
Unknown	3200 J	4000 J	1800 J	930 J	500 J	620 J
Unknown acid	NA	NA	NA	NA	670 JB	450 J
Unknown cycloalkane	NA	4700 J	NA	NA	NA	NA
Unknown benzene	9900 J	NA	NA	NA	NA	570 J
Unknown benzene	9300 J	NA	NA	NA	NA	NA
Unknown benzene	8000 J	NA	NA	NA	NA	NA
Unknown alkane	NA	15000 J	1400 J	2400 J	1300 J	830 J
Unknown alkane	NA	11000 J	830 J	2100 J	500 J	560 J
Unknown alkane	NA	3700 J	NA	1300 J	430 J	400 J
Unknown alkane	NA	3200 J	NA	680 J	NA	NA
Unknown naphthalene	15000 J	1800 J	NA	NA	NA	1400 J
Unknown benzene	2800 J	NA	NA	NA	NA	NA
Unknown benzene	2500 J	NA	NA	NA	NA	NA
Unknown benzene	2200 J	NA	NA	NA	NA	NA
Unknown benzene	2100 J	NA	NA	NA	NA	NA
Unknown benzene	1900 J	NA	NA	NA	NA	NA
Unknown benzene	1700 J	NA	NA	NA	NA	NA
Unknown benzene	1600 J	NA	NA	NA	NA	NA
Unknown benzene	1600 J	NA	NA	NA	NA	NA
Unknown benzene	1500 J	NA	NA	NA	NA	NA
Unknown benzene	1300 J	NA	NA	NA	NA	NA
Unknown benzene	1200 J	NA	NA	NA	NA	NA
Unknown benzene	1200 J	NA	NA	NA	NA	NA
Unknown benzene	1100 J	NA	NA	NA	NA	NA
Unknown benzene	1000 J	NA	NA	NA	NA	NA
Unknown cycloalkane	NA	4100 J	NA	NA	NA	NA
Unknown alkane	NA	1700 J	NA	660 J	NA	NA
Unknown alkane	NA	1700 J	NA	640 J	NA	NA
Unknown	NA	1700 J	1300 J	650 J	420 JB	NA
Unknown	NA	1500 J	1100 J	560 J	370 J	NA
Unknown	NA	1400 J	970 J	510 JB	NA	NA
Unknown dimethyl undecane	NA	1200 J	NA	NA	NA	NA
Unknown cycloalkane	NA	980 J	NA	NA	NA	NA
Unknown	NA	NA	960 J	510 J	NA	NA
Unknown	NA	NA	880 J	430 J	NA	NA
Ethanol,2-(tetra)	NA	NA	8700 J	NA	NA	NA
Unknown alkene	NA	NA	1300 JB	830 J	NA	NA
Unknown benzoflourene isome	NA	NA	1300 J	NA	NA	NA
Unknown PAH	NA	NA	1200 J	NA	NA	NA
Unknown PAH	NA	NA	1000 J	NA	NA	NA
Unknown PAH	NA	NA	860 J	NA	NA	NA
Unknown PAH	NA	NA	830 J	NA	NA	NA
Unknown phenanthrene	NA	NA	860 J	NA	NA	NA
Unknown aromatic	NA	NA	840 J	NA	NA	720 J
Unknown ketone	NA	NA	NA	470 J	430 J	NA
Unknown alkane	NA	NA	NA	460 J	NA	NA
Unknown alkane	NA	NA	NA	420 J	NA	NA
Unknown naphthalene	NA	NA	NA	NA	NA	850 J
Unknown naphthalene	NA	NA	NA	NA	NA	650 J
Unknown naphthalene	NA	NA	NA	NA	NA	620 J
Unknown naphthalene	NA	NA	NA	NA	NA	590 J
Unknown aromatic	NA	NA	NA	NA	NA	510 J

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable
BM: Base Neutral partition (methylene chloride)
BH: Base Neutral partition (hexane)

Table 4-66

PHASE II SURFACE SOIL SAMPLING
TOTAL CONCENTRATION OF SEMIVOLATILE ORGANIC COMPOUNDS
PRESENT ABOVE SOIL CLEANUP CRITERIA GUIDELINES

Sample Designation	Total Concentration (ug/kg)
BO-SS-17-S	10,120
BO-SS-18-S	2,930
BO-SS-19-S	830
BO-SS-20-S	5,120
BO-SS-21-S (including acid and base neutral partitioning)	57,340
BO-SS-22-S	26,510
BO-SS-23-S	4,210
BO-SS-24-S	2,450
BO-SS-25-S	2,040

Table 4-67
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOSS15S 11/13/90 (ug/kg)	BOSS16S 11/13/90 (ug/kg)	BOSS17S 11/14/90 (ug/kg)	BOSS18S 11/14/90 (ug/kg)	BOSS19S 11/13/90 (ug/kg)	BOSS20S 11/13/90 (ug/kg)	BOSS21S 11/13/90 (ug/kg)	BOSS22S 11/13/90 (ug/kg)	BOSS23S 11/13/90 (ug/kg)	BOSS24S 11/13/90 (ug/kg)	BOSS25S 11/13/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	NA	NA	U	U	U	U	U	U	U	U	U	---
PCB - 1242	U	U	U	U	U	U	U	U	U	U	U	85
PCB - 1016	U	U	U	U	U	U	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	U	U	U	U	U	U	---
PCB - 1254	U	U	U	U	U	U	U	U	U	U	U	275
PCB - 1260	U	U	U	U	1300	750	33000	U	U	U	1500	---
PCB - 1221	U	U	U	U	U	U	U	U	U	U	U	---
PCB - 1248	U	U	U	U	U	U	110000 +	U	U	U	2000 +	205
alpha-BHC	NA	NA	U	U	U	U	U	U	U	U	U	---
beta-BHC	NA	NA	U	U	U	U	U	U	U	U	U	---
delta-BHC	NA	NA	U	U	U	U	U	U	U	U	U	---
gamma-BHC	NA	NA	U	U	U	1 J	U	U	U	U	U	---
alpha-Chlordane	NA	NA	U	U	U	U	U	U	U	U	U	22
gamma-Chlordane	NA	NA	U	U	U	U	U	U	U	U	U	22
4,4'-DDD	NA	NA	11 J	60	U	U	U	U	U	U	U	---
4,4'-DDE	NA	NA	U	97	U	20 J	U	U	160	96	U	---
4,4'-DDT	NA	NA	97	630	U	U	U	U	54	190	U	---
Dieldrin	NA	NA	U	U	U	U	U	U	U	U	U	---
Endosulfan I	NA	NA	U	U	U	U	U	U	U	U	U	---
Endosulfan II	NA	NA	U	U	U	U	U	U	U	U	U	---
Endosulfan Sulfate	NA	NA	U	U	U	U	U	U	U	U	U	---
Endrin	NA	NA	U	U	U	U	U	U	U	U	U	---
Endrin-Ketone	NA	NA	U	U	U	U	U	U	U	U	U	---
Heptachlor	NA	NA	U	U	U	U	U	U	U	U	U	---
Heptachlor Epoxide	NA	NA	U	U	U	U	U	U	U	U	U	---
Methoxychlor	NA	NA	U	U	U	U	U	U	U	U	U	---
Toxaphene	NA	NA	U	U	U	U	U	U	U	U	U	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

---: not established
NA: Not Applicable
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-68
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SURFACE SOIL SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOSS17S 11/14/90 (mg/kg)	BOSS18S 11/14/90 (mg/kg)	BOSS19S 11/13/90 (mg/kg)	BOSS20S 11/13/90 (mg/kg)	BOSS21S 11/13/90 (mg/kg)	BOSS22S 11/13/90 (mg/kg)	BOSS23S 11/13/90 (mg/kg)	BOSS24S 11/13/90 (mg/kg)	BOSS25S 11/13/90 (mg/kg)	BOSS26S 11/13/90 (mg/kg)	NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	5220	8230	18600	10800	3250	9820	7010	12300	14000	12200	----
Antimony	8.3 B	5 B	U	U	10.6 B	U	6.6 B	U	U	4.4 B	----
Arsenic	41 +	13.4	4	7.7	60.6 +	18.8	77.9 +	17.7	11.8	69.9 +	20
Barium	118	72.9	255	169	160	187	107	128	193	250	400
Beryllium	1.3 +	1.2 +	3 +	0.38 B	1 B	1.9 +	0.97 B	1.6 +	1.5 +	1.7 +	1
Cadmium	0.97 B	0.76 B	2.3	1.7	1.2	0.84 B	0.79 B	2.6	1.1	1.8	3
Calcium	80500	81200	109000	56900	53500	10500	54100	18600	7290	31800	----
Chromium	18.8	16.4	381 +	23.5	20.9	30.4	23.3	30.1	25	25.2	100
Cobalt	4.2 B	5 B	3.4 B	5.6 B	3 B	8.6 B	5.8 B	8 B	8.7 B	8 B	----
Copper	67.1	44.7	34.7	42	254 +	90.7	75.4	143	41.2	72.8	170
Iron	30000	20800	20200	19000	23800	38400	24200	42700	29400	28200	----
Lead	202	102	427 +	563 +	372 +	175	244	248	186	442 +	250-1000
Magnesium	31100	26600	16000	28300	28900	3640	25100	9940	3610	15900	----
Manganese	667	463	7010	589	283	493	541	643	862	681	----
Mercury	0.4	0.33	0.3	0.48	0.41	0.34	0.74	0.35	0.28	0.37	1
Nickel	20	14.9	15.1	18.9	14.6	35.1	20.8	24.7	27.2	24.5	100
Potassium	1080 B	1060	2130	1930	682 B	1650	1260	2040	1720	1910	----
Selenium	0.79 B	0.61 B	1.5 B	1.1 B	1.9 B	2.2	1.2	1.4	1.3 B	1	4
Silver	U	U	U	U	U	U	U	U	U	U	5
Sodium	384 B	372 B	795 B	340 B	354 B	407 B	388 B	450 B	284 B	329 B	----
Thallium	U	U	U	U	U	0.53 B	U	U	U	U	----
Vanadium	16.1	21	26.8	23.6	12.5	38.7	19.6	33.6	34	32.4	----
Zinc	287	261	217	467 +	312	260	236	296	280	821 +	350
Cyanide	U	U	U	U	U	U	U	U	U	NR	----

QUALIFIERS

B: Value is between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL)
U: Analyzed for but not detected

NOTES

NR: Not Required
----: not available
+: Value exceeds NJDEP Soil Cleanup Guidelines

4.4.2 Sanitary and Storm Sewer Surface Water Sampling

As part of the Phase II RI, surface water samples were collected from three manholes of the Robinson Street storm sewer system and from one manhole of the Sommer Street sanitary sewer system. The analytical data obtained are presented in Tables 4-69 to 4-72. The locations of the manhole sampling points are shown in Figure 2-8. It must be noted that the water within the manhole is not a Class A, C or D surface water system. However, the data obtained are compared to the NYSDEC Class A, C and D surface water standards/guidance values to facilitate data interpretation.

Table 4-69 presents the data obtained from volatile organic compound analysis. Virtually no volatile organic compounds were found in samples BO-MH-2-SW, BO-MH-4-SW and BO-MH-6-SW. Data derived from sampling the storm sewer in the Phase II RI (BO-MH-3-SW) relative to the data obtained for sampling the catch basin as part of the Phase I RI (BO-CB-3-SW) indicates similar concentrations and contaminants present. It should be noted that the Robinson Street storm sewer system and adjacent catch basins are connected, and that manholes and catch basins are located in close proximity to each other which allows for data comparisons to be made. NYSDEC Surface Water Standards/Guidance Values were exceeded for the same six compounds in samples BO-CB-3-SW and BO-MH-3-SW including benzene, 1,1-dichloroethane, 1,2-dichloroethene (total), toluene, vinyl chloride and xylene (total). However, it is noted that the concentrations of these compounds in sample BO-MH-3-SW are approximately half those in sample BO-CB-3-SW. During rainfall events, water accumulates in the catch basin and subsequently overflows into the storm sewer system. Since other, less contaminated catch basins also discharge into the storm sewer, effects such as dillution are likely to occur, resulting in lower concentrations of volatile organic compounds in the storm sewer.

The results obtained from the analysis of semivolatile organic compounds are presented in Table 4-70. The data indicate that a number of PAHs were detected in the samples obtained from the storm sewer system. The compounds benzo(b)fluoranthene, benzo(a)pyrene, chrysene and indeno(1,2,3-cd)pyrene were found in sample BO-MH-2-SW at concentrations of 37 ug/l, 18 ug/l, 20 ug/l and 4 ug/l, respectively, and were found above standards/guidance values. Some of these compounds and at lesser concentrations were also detected in BO-MH-3-SW. During the Phase I RI, one surface water sample was obtained (BO-CB-3-SW) for semivolatile analysis and none of the PAHs noted above were detected in that sample.

Table 4-69
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SURFACE WATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMH2SW 11/14/90 (ug/l)	BOMH3SW 11/14/90 (ug/l)	BOMH4SW 11/14/90 (ug/l)	BOMH6SW 11/15/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Acetone	U	U	U	25	----	----	----
Benzene	U	11 +	U	U	0.7 GV	6 GV	6 GV
Bromodichloromethane	U	U	U	U	50 GV	----	----
Bromoform	U	U	U	U	50 GV	----	----
Bromomethane	U	U	U	U	----	----	----
2-Butanone	U	U	U	U	----	----	----
Carbon Disulfide	U	3 J	U	1 J	----	----	----
Carbon Tetrachloride	U	U	U	U	0.4 GV	----	----
Chlorobenzene	U	U	U	U	20 ST	5 ST	50 ST
Chloroethane	U	U	U	U	----	----	----
Chloroform	U	U	U	15 +	0.2 ST	----	----
Chloromethane	U	U	U	U	5 GV	----	----
Dibromochloromethane	U	U	U	U	50 GV	----	----
1,1-Dichloroethane	U	29 +	3 J	U	5 ST	----	----
1,1-Dichloroethene	U	U	U	U	0.07 GV	----	----
1,2-Dichloroethane	U	U	U	U	0.8 ST	----	----
1,2-Dichloroethene (total)	U	120 +	6 +	U	5 GV	----	----
1,2-Dichloropropane	U	U	U	U	5 GV *	----	----
cis-1,3-Dichloropropene	U	U	U	U	----	----	----
trans-1,3-Dichloropropene	U	U	U	U	----	----	----
Ethylbenzene	U	5 J	U	U	5 GV	----	----
2-Hexanone	U	U	U	U	50 GV	----	----
Methylene Chloride	U	3 JB	U	4 JB	5 GV	----	----
4-Methyl-2-pentanone	U	U	U	U	----	----	----
Styrene	U	U	U	U	50 ST	----	----
1,1,2,2-Tetrachloroethane	U	U	U	U	0.2 GV	----	----
Tetrachloroethene	U	U	U	U	0.7 GV	1 GV	1 GV
Toluene	U	49 +	U	2 J	5 GV	----	----
Trichloroethene	U	U	U	U	3 GV	11 GV	11 GV
1,1,1-Trichloroethane	U	U	U	U	5 GV	----	----
1,1,2-Trichloroethane	U	U	U	U	0.6 GV	----	----
Vinyl Acetate	U	U	U	U	----	----	----
Vinyl Chloride	U	190 +	U	U	0.3 GV	----	----
Xylene (total)	U	55 +	U	U	5 GV *	----	----

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Applies to each isomer individually
+: Value exceeds Surface Water Standards/Guidelines

Table 4-69 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SURFACE WATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMH2SW 11/14/90 (ug/l)	BOMW3SW 11/14/90 (ug/l)	BOMH4SW 11/14/90 (ug/l)	BOMH6SW 11/15/90 (ug/l)
Unknown cycloalkene	NA	NA	NA	6 J
Unknown alkyl benzene	NA	23 J	NA	NA
Unknown alkyl benzene	NA	13 J	NA	NA
Unknown alkyl benzene	NA	13 J	NA	NA
Unknown siloxane	NA	18 J	NA	NA
Unknown alkene	NA	12 J	NA	NA
Unknown	NA	11 J	NA	NA

QUALIFIERS

J: Estimated value

NOTES

NA: Not Applicable

Table 4-70
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SURFACE WATER SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOMH2SW 11/14/90 (ug/l)		BOMH2SWRE 11/14/90 (ug/l)		BOMH3SW 11/14/90 (ug/l)		NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Acenaphthene	0.8	J	0.8	J	1	J	20 ST	----	----
Acenaphthylene	0.9	J	1	J		U	----	----	----
Anthracene	3	J	3	J	0.7	J	50 GV	----	----
Benzo(a)anthracene		U		U		U	0.002 GV	----	----
Benzo(b)fluoranthene	37	J+	36	J+	5	J+	0.002 GV	----	----
Benzo(k)fluoranthene		U		U		U	0.002 GV	----	----
Benzoic acid		U		U		U	----	----	----
Benzo(g,h,i)perylene		U		U		U	----	----	----
Benzo(a)pyrene	18	J+	17	J+		U	0.002 GV	0.0012 GV	0.0012 GV
Benzyl alcohol		U		U		U	----	----	----
4-Bromophenyl-phenylether		U		U		U	----	----	----
Butylbenzylphthalate	4	J	3	J		U	50 GV	----	----
4-Chloroaniline		U		U		U	----	----	----
Bis(2-Chloroethoxy)methane		U		U		U	----	----	----
Bis(2-Chloroethyl)ether		U		U		U	0.03 GV	----	----
Bis(2-Chloroisopropyl)ether		U		U		U	----	----	----
4-Chloro-3-methylphenol	2	J+	2	J+		U	1 ST *****	1 ST ***	1 ST ***
2-Chloronaphthalene		U		U		U	10 ST	----	----
2-Chlorophenol		U		U		U	1 ST *****	1 ST ***	1 ST ***
4-Chlorophenyl-phenylether		U		U		U	----	----	----
Chrysene	20	J+	19	J+	4	J+	0.002 GV	----	----
Dibenzo(a,h)anthracene		U		U		U	----	----	----
Dibenzofuran	0.9	J	0.8	J		U	----	----	----
Di-n-butylphthalate	2	J	1	J	1	J	50 GV	----	----
1,2-Dichlorobenzene		U		U		U	----	5 ST *	50 ST *
1,3-Dichlorobenzene		U		U		U	20 ST	5 ST *	50 ST *
1,4-Dichlorobenzene		U		U		U	30 ST	5 ST *	50 ST *
3,3'-Dichlorobenzidine		U		U		U	----	----	----
2,4-Dichlorophenol		U		U		U	0.3 ST	1 ST ***	1 ST ***
Diethylphthalate	0.8	J		U		U	50 GV	----	----
2,4-Dimethylphenol	0.3	J		U	9	J+	----	5 ST ****	5 ST ****
Dimethylphthalate		U		U		U	50 GV	----	----
4,6-Dinitro-2-methylphenol		U		U		U	----	5 ST ****	5 ST ****
2,4-Dinitrophenol		U		U		U	----	5 ST ****	5 ST ****
2,4-Dinitrotoluene		U		U		U	----	----	----
2,6-Dinitrotoluene		U		U		U	0.07 GV	----	----
Bis(2-Ethylhexyl)phthalate	49	B+	42	B+	19	B+	4 GV	0.6 ST	----
Fluoranthene	36		33		7	J	50 GV	----	----
Fluorene	1	J	1	J		U	50 GV	----	----
Hexachlorobenzene		U		U		U	0.02 GV	----	----
Hexachlorobutadiene		U		U		U	0.5 ST	1 ST	10 ST
Hexachlorocyclopentadiene		U		U		U	1 ST	0.45 ST	4.5 ST
Hexachloroethane		U		U		U	----	----	----
Indeno(1,2,3-cd)pyrene	4	J+		U		U	0.002 GV	----	----
Isophorone		U		U		U	50 GV	----	----
2-Methylnaphthalene	1	J	1	J	2	J	----	----	----
2-Methylphenol		U		U		U	----	5 ST ****	5 ST ****
4-Methylphenol		U	1	J	1	J	----	5 ST ****	5 ST ****
Naphthalene		U	1	J	7	J	10 ST	----	----
2-Nitroaniline		U		U		U	----	----	----
3-Nitroaniline		U		U		U	----	----	----
4-Nitroaniline		U		U		U	----	----	----
Nitrobenzene		U		U		U	30 ST	----	----
2-Nitrophenol		U		U		U	----	5 ST ****	5 ST ****
4-Nitrophenol	2	J	3	J		U	----	5 ST ****	5 ST ****
N-Nitrosodiphenylamine (1)	0.7	J	0.7	J		U	50 GV	----	----
N-Nitroso-di-n-propylamine		U		U		U	----	----	----
Di-n-octylphthalate	9	J	8	J	4	J	50 GV	----	----
Pentachlorophenol		U		U		U	1 ST *****	0.4 ST	1 ST **
Phenanthrene	15		14		4	J	50 GV	----	----
Phenol		U		U		U	1 ST *****	1 ST ***	1 ST ***
Pyrene	40		31		6	J	50 GV	----	----
1,2,4-Trichlorobenzene		U		U		U	10 ST	5 ST	50 ST
2,4,6-Trichlorophenol		U		U		U	1 ST *****	1 ST **	1 ST **
2,4,5-Trichlorophenol		U		U		U	1 ST *****	1 ST **	1 ST **

QUALIFIERS

- +: Compound found in method blank as well as sample
- J: Compound found below the detection limit
- U: Analyzed for but not detected

NOTES

- ST: Standard
- GV: Guidance Value
- ----: Not established
- *: Value pertains to sum of the isomers
- **: Value pertains to total chlorinated phenols
- ***: Value pertains to total non-chlorinated phenols
- ****: Value pertains to total phenols
- +: Value exceeds Surface Water Standards/Guidelines

Table 4-70 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SURFACE WATER SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMH2SW 11/14/90 (ug/l)	BOMH2SWRE 11/14/90 (ug/l)	BOMH3SW 11/14/90 (ug/l)
Unknown acid ester	NA	NA	200 J
Unknown alkene	NA	NA	200 J
Unknown dimethylethylphenol isomer	NA	NA	100 J
Unknown dimethylphenol isomer	NA	NA	92 J
Unknown alkane	8 J	8 J	84 J
Unknown dimethylbenzoicacid isomer	NA	NA	74 J
Unknown alkylbenzene	NA	NA	59 J
Unknown alkylbenzene	NA	NA	56 J
Unknown alkane	24 J	NA	50 J
Unknown methylnaphthalene isomer	NA	NA	46 J
Unknown alkane	NA	NA	44 J
Unknown alkane	NA	NA	44 J
Unknown	19 J	30 J	42 J
Unknown alkylbenzene	NA	NA	37 J
Unknown alkane	NA	NA	37 J
Unknown alkene	NA	NA	36 J
Unknown trimethylbenzene isomer	NA	NA	32 J
Unknonw trimethylphenol isomer	NA	NA	31 J
Unknown alkane	NA	NA	28 J
Unknown cycloalkane	NA	NA	28 J
Unknown	NA	18 J	NA

QUALIFIERS

J: Estimated value

NOTES

NA: Not Applicable

With respect to pesticides and PCBs, the analytical data are presented in Table 4-71. No pesticide compounds were found in the surface water samples obtained from the storm sewer system, which is consistent with the findings of the Phase I RI. While no PCBs were detected in samples collected from the catch basin system during the Phase I RI, PCBs were detected in excess of standards/guidance values in sample BO-MH-3-SW, as reported in Table 4-71.

4.4.3 Storm Sewer Sediment Sampling

Sediment samples were obtained from the storm sewer system at three manhole location and were designated BO-MH-2-SD, BO-MH-3-SD and BO-MH-4-SD. The analytical data are presented in Tables 4-72 to 4-74. The locations of each sampling point are shown in Figure 2-8.

Table 4-72 presents data obtained from volatile organic compound analysis. As indicated from this table, samples BO-MH-2-SD and BO-MH-4-SD contained virtually no contamination. In comparing the results for sample BO-MH-3-SD to those of sediment sample BO-CB-3-SD collected and analyzed during the Phase I RI, it is noted that many of the same volatile organic compounds were found in both samples at similar concentrations. (See Table 4-16, which contains the analytical results from the analysis of sample BO-CB-3-SD).

The data resulting from the analysis of semivolatile organic compounds are presented in Table 4-73. In comparing the data from the analysis of sample BO-MH-3-SD to sample BO-CB-3-SD collected and analyzed as part of the Phase I RI, it is noted that benzo(a)anthracene, benzo(b)fluoranthene and chrysene were found in both samples at similar concentrations (see Table 4-17, which contains the analytical results from the analysis of sample BO-CB-3-SD).

Analytical data for pesticides and PCBs are presented in Table 4-74. No pesticide compounds were found in any of the sediment samples obtained from the sewer system. PCB arochlors 1260 and 1248 were detected and corresponding levels were confirmed by GC/MS as indicated in Table 4-73. Sampling and analysis of catch basin sediment as part of the Phase I RI indicated that PCB arochlors 1242, 1254 and 1260 were detected at concentrations ranging between 1,900 ug/l to 13,000 ug/l; 1,200 ug/l to 31,000 ug/l; and 2,200 ug/l to 140,000 ug/l, respectively. These data are presented in Table 4-18 and are generally higher than the results from the Phase II RI.

Table 4-71
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SURFACE WATER SAMPLING
PESTICIDE/PCB COMPOUNDS

PESTICIDE/PCB COMPOUNDS	BOMH2SW 11/14/90 (ug/l)	BOMH3SW 11/14/90 (ug/l)	NYSDEC CLASS A SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS C SURFACE WATER STANDARDS/GUIDELINES (ug/l)	NYSDEC CLASS D SURFACE WATER STANDARDS/GUIDELINES (ug/l)
Aldrin	U	U	0.002 GV	0.001 ST*	0.001 ST*
PCB - 1242	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1016	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1232	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1254	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1260	U	4.4 +	0.01 ST	0.001 ST	0.001 ST
PCB - 1221	U	U	0.01 ST	0.001 ST	0.001 ST
PCB - 1248	U	14 +	0.01 ST	0.001 ST	0.001 ST
alpha-BHC	U	U	0.02 ST	0.01 ST	2 ST
beta-BHC	U	U	0.02 ST	0.01 ST	2 ST
delta-BHC	U	U	0.02 ST	0.01 ST	2 ST
gamma-BHC	U	U	0.02 ST	0.01 ST	2 ST
alpha-Chlordane	U	U	----	----	----
gamma-Chlordane	U	U	----	----	----
4,4'-DDD	U	U	0.01 ST	0.001 ST	0.001 ST
4,4'-DDE	U	U	0.01 ST	0.001 ST	0.001 ST
4,4'-DDT	U	U	0.01 ST	0.001 ST	0.001 ST
Dieldrin	U	U	0.0009 GV	0.001 ST*	0.001 ST*
Endosulfan I	U	U	----	----	----
Endosulfan II	U	U	----	----	----
Endosulfan Sulfate	U	U	----	----	----
Endrin	U	U	0.2 ST	0.002 ST	0.002 ST
Endrin-Ketone	U	U	----	----	----
Heptachlor	U	U	0.009 ST	0.001 ST	0.001 ST
Heptachlor Epoxide	U	U	0.009 ST	0.001 ST	0.001 ST
Methoxychlor	U	U	35 ST	0.03 ST	----
Toxaphene	U	U	0.01 GV	0.005 ST	1.6 ST

QUALIFIERS

U: Analyzed for but not detected

NOTES

GV:Guidance Value
ST: Standard
----: not available
*: applies to sum of aldrin & dieldrin
+: Value exceeds Surface Water Standards/Guidelines

Table 4-72
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMH2SD 11/14/90 (ug/kg)	BOMH3SD 11/14/90 (ug/kg)	BOMH4SD 11/14/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	28 B	1900 JB	3900 B	---
Benzene	U	U	U	---
Bromodichloromethane	U	U	U	---
Bromoform	U	U	U	245
Bromomethane	U	U	U	---
2-Butanone	U	U	U	10
Carbon Disulfide	U	U	U	168
Carbon Tetrachloride	U	U	U	28
Chlorobenzene	U	U	U	152
Chloroethane	U	U	U	93
Chloroform	U	U	U	155
Chloromethane	U	U	U	85
Dibromochloromethane	U	U	U	---
1,1-Dichloroethane	U	U	U	100
1,1-Dichloroethene	U	U	U	0.57
1,2-Dichloroethane	U	U	U	1.24
1,2-Dichloroethene (total)	U	U	U	32
1,2-Dichloropropane	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	142
Ethylbenzene	U	1300 +	U	67
2-Hexanone	U	U	U	---
Methylene Chloride	4 JB	U	U	5
4-Methyl-2-pentanone	U	U	U	---
Styrene	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	0.54
Tetrachloroethene	U	U	U	8
Toluene	U	1200 +	U	36
Trichloroethene	U	1600 +	U	24
1,1,1-Trichloroethane	U	U	U	150
1,1,2-Trichloroethane	U	U	U	1.3
Vinyl Acetate	U	U	U	48
Vinyl Chloride	U	U	U	23
Xylene (total)	U	3600 +	U	67

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below detection limit
U: Analyzed for but not detected

NOTES

---: not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-72 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMH2SD 11/14/90 (ug/kg)	BOMH3SD 11/14/90 (ug/kg)	BOMH4SD 11/14/90 (ug/kg)
Unknown siloxane	NA	NA	50000 J
Unknown siloxane	NA	NA	4500 J
Unknown siloxane	NA	NA	1800 J
Unknown	NA	NA	2300 J
Unknown aromatic	NA	3500 J	NA
Unknown alkyl benzene	NA	3900 J	NA
Unknown alkyl benzene	NA	3900 J	NA
Unknown alkyl benzene	NA	3800 J	NA
Unknown alkyl benzene	NA	3600 J	NA
Unknown alkyl benzene	NA	3500 J	NA
Unknown alkyl benzene	NA	3300 J	NA
Unknown alkyl benzene	NA	2800 J	NA
Unknown alkyl benzene	NA	2700 J	NA
Unknown alkyl benzene	NA	2400 J	NA

QUALIFIERS

J: Estimated value

NOTES

NA: Not Applicable

Table 4-73
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOMH2SD 11/14/90 (ug/kg)		BOMH2SDRE 11/14/90 (ug/kg)		BOMH3SD 11/14/90 (ug/kg)		BOMH3SDDL 11/14/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene	71	J	68	J	1200		1200	JD	2220
Acenaphthylene		U	32	J		U	180	JD	5140
Anthracene	180	J	140	J	1600		1600	JD	65000
Benzo(a)anthracene	620	J+		U	3800	+	4000	D+	5
Benzo(b)fluoranthene	1700	+	1500	+	11000	+	8700	D+	55
Benzo(k)fluoranthene		U		U		U		U	55
Benzoic acid	330	J+	69	J		U		U	167
Benzo(g,h,i)perylene		U		U		U		U	593110
Benzo(a)pyrene	650	J	620	J	3400		3800	D	---
Benzyl alcohol		U		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U	---
Butylbenzylphthalate	590	J	980		3300		4000	D	---
4-Chloroaniline		U		U		U		U	---
bis(2-Chloroethoxy)methane		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U	---
4-Chloro-3-methylphenol		U		U		U		U	115
2-Chloronaphthalene		U		U		U		U	---
2-Chlorophenol		U		U		U		U	38
4-Chlorophenyl-phenylether		U		U		U		U	---
Chrysene	850	+	830	+	5100	+	5000	D+	20
Dibenzo(a,h)anthracene		U		U		U		U	713680
Dibenzofuran		U	57	J	1100		970	JD	---
Di-n-butylphthalate	150	J	94	J		U		U	41000
1,2-Dichlorobenzene		U		U	300	J+	290	JD+	66
1,3-Dichlorobenzene		U		U		U		U	73
1,4-Dichlorobenzene		U		U		U		U	92
3,3'-Dichlorobenzidine		U		U		U		U	---
2,4-Dichlorophenol		U		U		U		U	0.65
Diethylphthalate		U	35	J		U		U	260
2,4-Dimethylphenol		U		U	450	J+	440	JD+	50
Dimethylphthalate		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U	---
2,4-Dinitrophenol		U		U		U		U	---
2,4-Dinitrotoluene		U		U		U		U	---
2,6-Dinitrotoluene		U		U		U		U	---
bis(2-Ethylhexyl)phthalate	1300	B	2100	B	15000	B	14000	BD	1517325
Fluoranthene	1400		1500		4900		7600	D	22892
Fluorene		U	120	J	1200		1500	JD	8180
Hexachlorobenzene		U		U		U		U	68
Hexachlorobutadiene		U		U		U		U	74
Hexachlorocyclopentadiene		U		U		U		U	---
Hexachloroethane		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene		U		U		U		U	28
Isophorone		U		U		U		U	---
2-Methylnaphthalene	69	J	52	J	1200		1300	JD	21250
2-Methylphenol		U		U		U		U	---
4-Methylphenol		U	22	J	450	J	410	JD	---
Naphthalene		U	29	J	2000	+	2000	D+	650
2-Nitroaniline		U		U		U		U	---
3-Nitroaniline		U		U		U		U	232
4-Nitroaniline		U		U		U		U	275
Nitrobenzene		U		U		U		U	104
2-Nitrophenol		U		U		U		U	162
4-Nitrophenol		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U		U	---
N-Nitroso-di-n-propylamine		U		U		U		U	---
Di-n-octylphthalate	300	J	790	J	1700		4500	D	5965
Pentachlorophenol		U		U		U		U	2555
Phenanthrene	840		870		6700		7100	D	57300
Phenol		U		U		U		U	0.4
Pyrene	1500		2100			U	10000	D	210000
1,2,4-Trichlorobenzene		U		U	580	J+		U	336
2,4,6-Trichlorophenol		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U	62

QUALIFIERS

B: Compound found in method blank as well as sample
D: Value from the diluted run
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
DL: Diluted run
RE: Reanalysis
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-73 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOMH4SD 11/14/90 (ug/kg)		BOMH4SDA 11/14/90 (ug/kg)		BOMH4SDBH 11/14/90 (ug/kg)		BOMH4SDBM 11/14/90 (ug/kg)		SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthene	390	J		U		U	350	J	2220
Acenaphthylene	270	J		U		U		U	5140
Anthracene	860	J		U		U	340	J	65000
Benzo(a)anthracene	3400	+		U		U	4100	+	5
Benzo(b)fluoranthene	13000	+	700	J+		U	8000	+	55
Benzo(k)fluoranthene		U		U		U	460	J+	55
Benzoic acid		U		U		U		U	167
Benzo(g,h,i)perylene		U	290	J		U	2200		593110
Benzo(a)pyrene	3800		260	J		U	3000		---
Benzyl alcohol		U		U		U		U	32
4-Bromophenyl-phenylether		U		U		U		U	---
Butylbenzylphthalate		U		U		U	470	J	---
4-Chloroaniline		U		U		U		U	---
bis(2-Chloroethoxy)methane		U		U		U		U	---
bis(2-Chloroethyl)ether		U		U		U		U	68
bis(2-Chloroisopropyl)ether		U		U		U		U	---
4-Chloro-3-methylphenol		U		U		U		U	115
2-Chloronaphthalene		U		U		U		U	---
2-Chlorophenol		U		U		U		U	38
4-Chlorophenyl-phenylether		U		U		U		U	---
Chrysene	5700	+	420	J+		U	4300	+	20
Dibenzo(a,h)anthracene		U		U		U	1100	J	713680
Dibenzofuran	410	J		U		U	330	J	---
Di-n-butylphthalate		U	93	J		U	340	J	41000
1,2-Dichlorobenzene		U		U		U		U	66
1,3-Dichlorobenzene		U		U		U		U	73
1,4-Dichlorobenzene	100	J		U		U		U	92
3,3'-Dichlorobenzidine		U		U		U		U	---
2,4-Dichlorophenol		U		U		U		U	0.65
Diethylphthalate		U	100	J		U		U	260
2,4-Dimethylphenol	270	J+		U		U		U	50
Dimethylphthalate		U		U		U		U	---
4,6-Dinitro-2-methylphenol		U		U		U		U	---
2,4-Dinitrophenol		U		U		U		U	---
2,4-Dinitrotoluene		U		U		U		U	---
2,6-Dinitrotoluene		U		U		U		U	---
bis(2-Ethylhexyl)phthalate	14000	B	1800	B		U	14000	B	1517325
Fluoranthene	4600		1000	J		U	11000		22892
Fluorene	420	J		U		U	540	J	8180
Hexachlorobenzene		U		U		U		U	68
Hexachlorobutadiene		U		U		U		U	74
Hexachlorocyclopentadiene		U		U		U		U	---
Hexachloroethane		U		U		U		U	1270
Indeno(1,2,3-cd)pyrene		U	320	J+		U	2300	+	28
Isophorone		U		U		U		U	---
2-Methylnaphthalene	500	J		U		U	290	J	21250
2-Methylphenol		U		U		U		U	---
4-Methylphenol	220	J		U		U		U	---
Naphthalene	400	J		U		U	160	J	650
2-Nitroaniline		U		U		U		U	---
3-Nitroaniline		U		U		U		U	232
4-Nitroaniline		U		U		U		U	275
Nitrobenzene		U		U		U		U	104
2-Nitrophenol		U		U		U		U	162
4-Nitrophenol		U		U		U		U	162
N-Nitrosodiphenylamine (1)		U		U		U		U	---
N-Nitroso-di-n-propylamine		U		U		U		U	---
Di-n-octylphthalate	1700		190	J		U	1000	J	5965
Pentachlorophenol		U		U		U		U	2555
Phenanthrene	3500		390	J		U	4300		57300
Phenol		U		U		U		U	0.4
Pyrene		U	650	J		U	7400		210000
1,2,4-Trichlorobenzene	620	J+		U		U		U	336
2,4,6-Trichlorophenol		U		U		U		U	---
2,4,5-Trichlorophenol		U		U		U		U	62

QUALIFIERS

B: Compound found in method blank as well as sample
D: Value from the diluted run
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
A: Acid partition
BH: Base neutral partition (hexane)
BM: Base neutral partition (methylene chloride)
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-73 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMH2SD 11/14/90 (ug/kg)	BOMH2SDRE 11/14/90 (ug/kg)	BOMH3SD 11/14/90 (ug/kg)	BOMH3SDDL 11/14/90 (ug/kg)	BOMH4SD 11/14/90 (ug/kg)	BOMH4SDA 11/14/90 (ug/kg)	BOMH4SDBH 11/14/90 (ug/kg)	BOMH4SDBM 11/14/90 (ug/kg)
Aldol condensation product	42000 JAB	30000 JAB	64000 JAB	41000 JAB	52000 JAB	940 J	NA	NA
Unknown acid	2600 JB	2400 JB	5400 JB	NA	3900 JB	1400 J	NA	NA
Unknown	2500 J	1400 JB	8400 J	9400 J	11000 J	700 J	5200 J	1600 J
Unknown	1700 J	890 JB	4000 J	NA	8700 J	700 J	NA	1300 J
Unknown ketone	1500 JB	NA	NA	NA	NA	500 JB	NA	NA
Unknown	1000 JB	560 J	3100 J	NA	3900 J	NA	NA	540 J
Unknown	1000 J	500 J	2900 JB	NA	3700 J	NA	NA	NA
Unknown	800 J	450 J	4400 J	NA	2600 J	NA	NA	NA
Unknown	800 J	NA	NA	NA	2500 J	NA	NA	NA
Unknown alkane	690 J	760 J	6300 J	23000 J	7100 J	2900 J	18000 J	NA
Unknown alkane	660 J	500 J	4800 J	19000 J	4000 J	1900 J	11000 J	NA
Unknown alkane	510 J	480 J	4200 J	13000 J	3300 J	900 J	11000 J	NA
Unknown	510 J	NA	NA	4600 J	2300 J	NA	NA	NA
Unknown alkane	490 J	480 J	4000 J	10000 J	1800 J	NA	9100 J	NA
Unknown alkane	440 J	470 J	3200 J	10000 J	1600 J	NA	7700 J	NA
Unknown alkane	360 J	460 J	3000 J	8200 J	1400 J	NA	4300 J	NA
Unknown	360 J	NA	NA	NA	2000 J	NA	NA	NA
Unknown alkane	350 J	430 J	2600 J	7500 J	NA	NA	970 J	NA
Unknown alkane	340 J	330 J	NA	7300 J	NA	NA	740 J	NA
Unknown alkane	340 J	NA	NA	5600 J	NA	NA	730 J	NA
Unknown alkene	NA	570 J	NA	5000 J	3700 J	NA	NA	NA
Unknown alkyl benzene	NA	NA	8300 J	6400 J	NA	NA	NA	840 J
Unknown alkyl benzene	NA	NA	6800 J	4300 J	NA	NA	NA	500 J
Unknown alkyl benzene	NA	NA	4000 J	NA	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	3800 J	NA	NA	NA	NA	NA
Unknown indene isomer	NA	NA	5200 J	NA	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	2600 J	NA	NA	NA	NA	NA
Unknown trimethylbenzene is	NA	NA	NA	6100 J	NA	NA	NA	NA
Unknown alkane	NA	NA	NA	4900 J	NA	NA	NA	NA
Unknown alkane	NA	NA	NA	4700 J	NA	NA	NA	NA
Unknown alkane	NA	NA	NA	4500 J	NA	NA	NA	NA
Unknown alkane	NA	NA	NA	4400 J	NA	NA	NA	NA
Unknown naphthalene isomer	NA	NA	NA	3400 J	NA	NA	NA	NA
Unknown alkene	NA	NA	NA	NA	2200 J	NA	NA	NA
Unknown alkene	NA	NA	NA	NA	1500 J	NA	NA	NA
Unknown	NA	NA	NA	NA	1400 J	NA	NA	NA
Unknown cycloalkane	NA	NA	NA	NA	NA	NA	2600 J	NA
Unknown cycloalkane	NA	NA	NA	NA	NA	NA	1300 J	NA
Unknown trimethyl naphthale	NA	NA	NA	NA	NA	NA	NA	3600 J
Unknown trimethyl naphthale	NA	NA	NA	NA	NA	NA	NA	2400 J
Unknown dimethyl naphthalen	NA	NA	NA	NA	NA	NA	NA	2400 J
Unknown dimethyl naphthalen	NA	NA	NA	NA	NA	NA	NA	1400 J
Unknown dimethyl naphthalen	NA	NA	NA	NA	NA	NA	NA	930 J

QUALIFIERS

Aldol condensation product
B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable
A: Acid partition
BH: Base neutral partition (hexane)
BM: Base neutral partition (methylene chloride)
DL: Diluted run
RE: Reanalysis

Table 4-74
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II MANHOLE SEDIMENT SAMPLING
PESTICIDE/PCB COMPOUNDS

PESTICIDE/PCB COMPOUNDS	BOMH2SD 11/14/90 (ug/kg)	BOMH3SD 11/14/90 (ug/kg)	BOMH4SD 11/14/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	U	---
PCB - 1242	U	U	U	85
PCB - 1016	U	U	U	85
PCB - 1232	U	U	U	---
PCB - 1254	U	U	U	275
PCB - 1260	1500 C	4200 C	8600 C	---
PCB - 1221	U	U	U	---
PCB - 1248	U	5300 C+	10000 C+	205
alpha-BHC	U	U	U	---
beta-BHC	U	U	U	---
delta-BHC	U	U	U	---
gamma-BHC	U	U	U	---
alpha-Chlordane	U	U	U	22
gamma-Chlordane	U	U	U	22
4,4'-DDD	U	U	U	---
4,4'-DDE	U	U	U	---
4,4'-DDT	U	U	U	---
Dieldrin	U	U	U	---
Endosulfan I	U	U	U	---
Endosulfan II	U	U	U	---
Endosulfan Sulfate	U	U	U	---
Endrin	U	U	U	---
Endrin-Ketone	U	U	U	---
Heptachlor	U	U	U	---
Heptachlor Epoxide	U	U	U	---
Methoxychlor	U	U	U	---
Toxaphene	U	U	U	---

QUALIFIERS

C: Compound confirmed by GC/MS
U: Analyzed for but not detected

NOTES

---: not established
+: Value exceeds Soil Cleanup Criteria Guidelines

4.4.4 Little River Sampling

During the Phase II RI field program, two sediment samples were collected from the Little River in the vicinity of the Robinson Street outfall, which is located approximately one-quarter mile west of the Booth Oil Site. The samples were analyzed for TCL+30 compounds, and the results may be found in Tables 4-75 to 4-78. In consultation with the New York State Department of Environmental Conservation, data is being presented to provide NYSDEC with information to draw conclusions and make a decision regarding remediation of river sediments, as appropriate. Since the Robinson Street storm sewer may provide a direct pathway for contaminants to migrate into the Little River, it is useful to compare storm sewer sediment data to the data obtained from the analysis of the Little River sediment samples.

The volatile organic data is presented in Table 4-75. The only volatile organic compounds found in either of the two samples taken were 2-butanone in sample BO-LR-2-SD at a concentration of 27 ug/kg and trichloroethene in sample BO-LR-1-SD at a concentration of 810 ug/kg. The presence of acetone and methylene chloride in these samples are attributed to laboratory contamination. A number of volatile organic compounds were detected in sewer sediment sample BO-MH-3-SD as shown on Table 4-72, including ethylbenzene, toluene, trichloroethene and xylene (total). Since these compounds are highly volatile and probably in contact with less contaminated river water, it is probable that they desorbed from the sediment possibly explaining their absence from the Little River sediment samples.

The data obtained from the analysis of semivolatile organic compounds are presented in Table 4-76. Comparison of the manhole sediment data to the Little River sediment data, indicates that many of the same semivolatile organic compounds were found at similar levels in both samples, as provided in Table 4-73 and 4-76. A number of these compounds include the PAHs anthracene, benzo(k)fluoranthene, chrysene, fluoranthene and pyrene. In summary, compounds found in sediment samples obtained from the storm sewer system appear to be entering the Little River.

The pesticide and PCB data for the Little River samples are presented in Table 4-77. No pesticide compounds were detected in the Little River sediment samples or in those obtained from the storm sewer system (see Table 4-74). However, PCB-1260 and PCB-1248 were found in river and storm sewer samples at concentrations generally within the same order of magnitude. Analytical data for metals for the Little River sediment samples are presented in Table 4-78. Metals analysis was not performed on storm sewer sediment.

Table 4-75
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOLR1SD 11/16/90 (ug/kg)	BOLR2SD 11/15/90 (ug/kg)
Acetone	2000 JB	120 B
Benzene	U	U
Bromodichloromethane	U	U
Bromoform	U	U
Bromomethane	U	U
2-Butanone	U	27 J
Carbon Disulfide	U	U
Carbon Tetrachloride	U	U
Chlorobenzene	U	U
Chloroethane	U	U
Chloroform	U	U
Chloromethane	U	U
Dibromochloromethane	U	U
1,1-Dichloroethane	U	U
1,1-Dichloroethene	U	U
1,2-Dichloroethane	U	U
1,2-Dichloroethene (total)	U	U
1,2-Dichloropropane	U	U
cis-1,3-Dichloropropene	U	U
trans-1,3-Dichloropropene	U	U
Ethylbenzene	U	U
2-Hexanone	U	U
Methylene Chloride	U	14 JB
4-Methyl-2-pentanone	U	U
Styrene	U	U
1,1,2,2-Tetrachloroethane	U	U
Tetrachloroethene	U	U
Toluene	U	U
Trichloroethene	810 J	U
1,1,1-Trichloroethane	U	U
1,1,2-Trichloroethane	U	U
Vinyl Acetate	U	U
Vinyl Chloride	U	U
Xylene (total)	U	U

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below detection limit
U: Analyzed for but not detected

NOTES

---: not established

Table 4-75 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOLR1SD 11/16/90 (ug/kg)	BOLR2SD 11/15/90 (ug/kg)
Unknown	8500 J	NA
Unknown siloxane	4400 J	NA
Unknown	1700 J	NA
Unknown aromatic	1200 J	NA
Unknown	1200 J	NA

QUALIFIERS	NOTES
J: Estimated value	NA: Not Applicable

Table 4-76
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOLR1SD 11/16/90 (ug/kg)		BOLR1SDRE 11/16/90 (ug/kg)		BOLR2SD 11/15/90 (ug/kg)		BOLR2SDRE 11/15/90 (ug/kg)	
Acenaphthene		U		U	160	J		U
Acenaphthylene		U		U	180	J	150	J
Anthracene		U	290	J	280	J	350	J
Benzo(a)anthracene		U		U	1300	J		U
Benzo(b)fluoranthene		U	1400		3800		1500	J
Benzo(k)fluoranthene		U		U		U		U
Benzoic acid		U	140	J		U	170	J
Benzo(g,h,i)perylene		U		U		U		U
Benzo(a)pyrene		U		U	1200	J	1100	J
Benzyl alcohol		U		U		U		U
4-Bromophenyl-phenylether		U		U		U		U
Butylbenzylphthalate		U	2600			U		U
4-Chloroaniline		U		U		U		U
bis(2-Chloroethoxy)methane		U		U		U		U
bis(2-Chloroethyl)ether		U		U		U		U
bis(2-Chloroisopropyl)ether		U		U		U		U
4-Chloro-3-methylphenol		U		U		U		U
2-Chloronaphthalene		U		U		U		U
2-Chlorophenol		U		U		U		U
4-Chlorophenyl-phenylether		U		U		U		U
Chrysene		U	830	J	1500	J	1300	J
Dibenzo(a,h)anthracene		U		U		U		U
Dibenzofuran		U		U		U	160	J
Di-n-butylphthalate		U	7400			U	240	J
1,2-Dichlorobenzene		U		U		U		U
1,3-Dichlorobenzene		U		U		U		U
1,4-Dichlorobenzene		U		U		U		U
3,3'-Dichlorobenzidine		U		U		U		U
2,4-Dichlorophenol		U		U		U		U
Diethylphthalate		U		U	180	J		U
2,4-Dimethylphenol		U		U		U		U
Dimethylphthalate		U		U		U	30	J
4,6-Dinitro-2-methylphenol		U		U		U		U
2,4-Dinitrophenol		U		U		U		U
2,4-Dinitrotoluene		U		U		U		U
2,6-Dinitrotoluene		U		U		U		U
bis(2-Ethylhexyl)phthalate	7200	B	5600	B	4000	B	4600	B
Fluoranthene		U	1600		2000		2700	
Fluorene	700	J		U	190	J	200	J
Hexachlorobenzene		U		U		U		U
Hexachlorobutadiene		U		U		U		U
Hexachlorocyclopentadiene		U		U		U		U
Hexachloroethane		U		U		U		U
Indeno(1,2,3-cd)pyrene		U		U		U		U
Isophorone		U		U		U		U
2-Methylnaphthalene	5000		80	J	93	J	98	J
2-Methylphenol		U		U		U		U
4-Methylphenol		U		U		U	90	J
Naphthalene	2300		110	J	220	J	220	J
2-Nitroaniline		U		U		U		U
3-Nitroaniline		U		U		U		U
4-Nitroaniline		U		U		U		U
Nitrobenzene		U		U		U		U
2-Nitrophenol		U		U		U		U
4-Nitrophenol		U		U		U		U
N-Nitrosodiphenylamine (1)		U		U		U		U
N-Nitroso-di-n-propylamine		U		U		U		U
Di-n-octylphthalate		U		U	810	J		U
Pentachlorophenol		U		U		U		U
Phenanthrene	1700		1100		1500	J	1500	J
Phenol		U		U		U		U
Pyrene	1000	J	1800		2900		2700	
1,2,4-Trichlorobenzene		U		U		U		U
2,4,6-Trichlorophenol		U		U		U		U
2,4,5-Trichlorophenol		U		U		U		U

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: Not established
RE: Reanalysis

Table 4-76 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOLR1SD 11/16/90 (ug/kg)	BOLR1SDRE 11/16/90 (ug/kg)	BOLR2SD 11/15/90 (ug/kg)	BOLR2SDRE 11/15/90 (ug/kg)
Aldol condensation product	16000 JAB	42000 JAB	93000 JAB	73000 JAB
Unknown acid	NA	3000 JB	7600 JB	160000 J
Unknown alkane	41000 J	8700 J	4200 J	4100 J
Unknown acid	NA	NA	3900 JB	NA
Unknown acid	NA	NA	3700 JB	NA
Unknown	5400 J	3300 J	2100 J	5300 J
Unknown alkane	9100 J	6400 J	1600 J	3700 J
Unknown alkene	21000 J	1900 J	1300 J	1600 J
Unknown alkene	2800 J	1200 J	1300 J	1100 J
Aldol condensation product	NA	NA	1200 JA	NA
Unknown acid	NA	NA	1100 J	NA
Unknown	3500 J	2900 J	900 J	2700 J
Unknown alkene	NA	2700 J	890 J	NA
Unknown alkane	8300 J	5800 J	830 J	2600 J
Unknown alkene	NA	1700 J	710 J	NA
Unknown cycloalkene	NA	NA	1200 J	NA
Unknown ketone	NA	NA	NA	3100 JB
Unknown	2900 J	2200 J	NA	2500 J
Unknown alkane	6400 J	5300 J	NA	2400 J
Unknown alkane	5000 J	3000 J	NA	2300 J
Unknown	2500 J	1800 J	NA	1900 J
Unknown alkane	5000 J	2600 J	NA	1800 J
Unknown diene	NA	NA	NA	1700 J
Unknown	NA	1700 JB	NA	1300 J
Unknown	NA	1100 J	NA	1300 J
Unknown	NA	NA	NA	1100 J
Unknown	NA	NA	NA	950 J
Phthalic anhydride	NA	NA	NA	990 J
Unknown alkyl benzene	14000 J	NA	NA	NA
Unknown alkyl benzene	6700 J	NA	NA	NA
Unknown alkyl benzene	4900 J	NA	NA	NA
Unknown alkyl benzene	4200 J	NA	NA	NA
Unknown alkane	4100 J	1800 J	NA	NA
Unknown alkane	4100 J	1600 J	NA	NA
Unknown alkane	2800 J	1000 J	NA	NA
Unknown alkyl benzene	4000 J	NA	NA	NA

QUALIFIERS

A: Aldol condensation product
B: Compound found in method blank as well as sample

NOTES

NA: Not Applicable

Table 4-89
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOMW11GW 12/12/90 (ug/l)		BOMW12GW 12/12/90 (ug/l)		BOMW14GW 12/12/90 (ug/l)		BOMW18GW 12/11/90 (ug/l)		NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)	
Aluminum	52500		50100		25100		57100		----	
Antimony	U		U		U		U		3	GV
Arsenic	29.7	+	26.4	+	18.4		32.5	+	25	ST
Barium	508		403		248		630		1000	ST
Beryllium	4.7	B+	2.7	B	1.6	B	3.4	B+	3	GV
Cadmium	U		U		U		2.1	B	10	ST
Calcium	220000		325000		196000		436000		-----	
Chromium	87.5	+	77.3	+	43.9		90.7	+	50	ST
Cobalt	40.8	B	32	B	16.3	B	38.4	B	----	
Copper	163		135		108		133		200	ST
Iron	101000	+	81700	+	43200	+	105000	+	300	ST*
Lead	759	+	113	+	77.1	+	91.2	+	25	ST
Magnesium	60100	+	111000	+	55900	+	134000	+	35000	GV
Manganese	1840	+	3120	+	1460	+	2720	+	300	ST*
Mercury	0.32		0.28		0.24		0.24		2	ST
Nickel	111		87.6		43.9		98.9		----	
Potassium	12000		13300		10100		18200		----	
Selenium	U		U		U		U		10	ST
Silver	U		U		U		U		50	ST
Sodium	18900		60400	+	47400	+	163000	+	20000	ST
Thallium	U		U		U		U		4	GV
Vanadium	112		97.9		55.8		112		----	
Zinc	654	+	370	+	281		419	+	300	ST
Cyanide	U		U		U		U		200	ST

QUALIFIERS

B: Value is between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL)
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Standard for Iron and Manganese is 500 ug/l
+: Value exceeds Groundwater Standards/Guidelines

4.4.7 NAPL

The data from the analysis of a NAPL sample taken from monitoring well MW-8 are presented in Tables 4-90 to 4-92. This sample was analyzed for the same parameters as the Phase I Investigation (volatile organic compounds, PCBs and metals). A comparison of the analytical results indicates the same volatile organic compounds were found to be present including acetone, ethylbenzene, tolvene and xylene (total)(see Table 4-60 for Phase I results). However, vinyl acetate was detected in the well during the Phase I program but not the Phase II program and benzene was detected in the Phase II program, but not the Phase I program. With regard to PCBs, arochlor 1242 and 1254 were detected in both samples; however, the levels detected in the sample analyzed as part of the Phase II RI indicated lower levels to be present. The levels of metals found are generally consistent between both data sets.

4.4.8 Air

4.4.8.1 - Ambient Air Monitoring

Air monitoring for organic vapors was performed almost continuously at the Booth Oil Site to ensure worker safety with respect to selection of proper clothing and respiratory equipment during RI field activity. Air monitoring was performed during all sampling, borehole drilling and on-site inspections using a Photovac Tip, MicroTip and/or a Century Organic Vapor Analyzer (OVA). Also, a Miniram Digital Dust Indicator was used to measure particulates during all drilling operations because of potential PCB and lead contaminated soils. The results of daily on-site air monitoring were recorded on Daily Air Monitoring Forms and are compiled in separate documents, entitled "Phase I Remedial Investigation Field Record Report," and "Phase II Remedial Investigation Field Record Report."

The results of on-site monitoring during field operations periodically indicated the presence of volatile organic compounds (VOCs) within boreholes, drill cuttings and groundwater. Levels recorded were generally below 100 ppb although several Tip readings considerably higher (400-500 ppb) were noted in the borehole and cuttings of well MW-9. In addition, total VOC levels of 150 ppb were encountered during the drilling of soil boring SB-5D. Periodic OVA readings were recorded above the maximum detection limit of 100 ppb at several borehole and cuttings. Readings within worker breathing zones indicated less than detectable limits for organic vapors. Dust emissions during all RI activities were below the 150 ppb guideline/limit established by NYSDEC, rendering dust mitigation measures unnecessary.

Table 4-90
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II NAPL SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMW8GW0 12/11/90 (ug/kg)	
Acetone	19000	B
Benzene	210	J
Bromodichloromethane		U
Bromoform		U
Bromomethane		U
2-Butanone		U
Carbon Disulfide		U
Carbon Tetrachloride		U
Chlorobenzene		U
Chloroethane		U
Chloroform		U
Chloromethane		U
Dibromochloromethane		U
1,1-Dichloroethane		U
1,1-Dichloroethene		U
1,2-Dichloroethane		U
1,2-Dichloroethene (total)		U
1,2-Dichloropropane		U
cis-1,3-Dichloropropene		U
trans-1,3-Dichloropropene		U
Ethylbenzene	37000	
2-Hexanone		U
Methylene Chloride		U
4-Methyl-2-pentanone		U
Styrene		U
1,1,2,2-Tetrachloroethane		U
Tetrachloroethene		U
Toluene	5900	JB
Trichloroethene		U
1,1,1-Trichloroethane		U
1,1,2-Trichloroethane		U
Vinyl Acetate		U
Vinyl Chloride		U
Xylene (total)	230000	

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below detection limit
U: Analyzed for but not detected

Table 4-90 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II NAPL SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW8GWO 12/11/90 (ug/kg)
Unknown	130000 J
Unknown alkyl benzene	190000 J
Unknown alkyl benzene	180000 J
Unknown alkyl benzene	160000 J
Unknown alkyl benzene	150000 J
Unknown alkyl benzene	140000 J
Unknown alkyl benzene	130000 J
Unknown alkyl benzene	110000 J
Unknown alkyl benzene	110000 J
Unknown alkyl benzene	98000 J

QUALIFIERS

J: Estimated value

Table 4-91
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II NAPL SAMPLING
PCBs

PCB COMPOUNDS	BOMW8GW0 12/11/90 (ug/kg)
PCB - 1016	U
PCB - 1221	U
PCB - 1232	U
PCB - 1242	120000
PCB - 1248	U
PCB - 1254	24000 J
PCB - 1260	U

QUALIFIERS

J: Compound found below detection limit
U: Analyzed for but not detected

Table 4-92
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II NAPL SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOMW8GWO 12/11/90 (mg/kg)	
Aluminum	49.1	
Antimony		U
Arsenic	4.8	
Barium	50.7	
Beryllium		U
Cadmium		U
Calcium	180	BE
Chromium	3.9	
Cobalt		U
Copper	3.2	B
Iron	97.9	
Lead	46.7	
Magnesium	6	B
Manganese	2.3	B
Mercury		U
Nickel	1.9	B
Potassium		U
Selenium	0.56	B
Silver		U
Sodium	106	B
Thallium		U
Vanadium		U
Zinc	6.1	
Cyanide	NR	

QUALIFIERS

B: Value is between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL)
E: Value is estimated due to interference
U: Analyzed for but not detected

NOTES

NR: Not Required

In addition to the monitoring described above, a baseline ambient air monitoring survey was performed prior to the drilling portion of the Phase I field investigation in order to establish ambient air levels both-on-site and at various locations outside the site perimeter. Monitoring was conducted using a Photovac Tip and MicroTip to measure organic vapors, a Miniram Digital Dust Indicator to measure dust emissions and a Geiger Counter to measure ionizing radiation. Measurements were taken at established stationary points on-site (see Figure 4-5) and beyond the site boundary. Off-site air monitoring locations are as follows:

- o NE corner of Robinson Street and River Road
- o SW corner of Leasehold Area
- o Corner of North Marion Street and Robinson Street
- o Playground Area north of site

Measurements were recorded below detectable limits at all stationary on-site and off-site locations during the air monitoring survey. In addition, the entire perimeter and various tangents through the site were walked with instrumentation providing continuous readings. All readings were also below detection limits for the mobile monitoring.

Due to the minimal detection of background VOCs both on-site and off-site, interim measures to address air releases were not necessary. Additional air monitoring would be performed during any remedial actions undertaken to mitigate hazards associated with the site. Ambient air monitoring performed during the Phase I and Phase II Remedial Investigation did not indicate a need for interim corrective measures to address ambient air at the Booth Oil Site. However, since excavation of contaminated soil is a potential remedial alternative, volumetric air sampling was performed on-site to establishes baseline for potential volatilization of contaminants into the ambient air. A discussion regarding the volumetric air sampling program follows.

4.4.8.2 - Volumetric Air Sampling

During the Phase II RI field program, and specifically during the drilling program, nine air samples were collected and analyzed in the laboratory for volatile organic compounds to achieve lower detection limits. The analytical data is presented in Table 4-93. Note that two of the samples represented in the table are for reanalysis and one of the samples is a field blank. Table

Table 4-77
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
PESTICIDE/PCB COMPOUNDS

PESTICIDE/PCB COMPOUNDS	BOLR1SD 11/16/90 (ug/kg)	BOLR2SD 11/15/90 (ug/kg)
Aldrin	U	U
PCB - 1242	U	U
PCB - 1016	U	U
PCB - 1232	U	U
PCB - 1254	U	U
PCB - 1260	2200 C	1300 C
PCB - 1221	U	U
PCB - 1248	4100 C	3100 C
alpha-BHC	U	U
beta-BHC	U	U
delta-BHC	U	U
gamma-BHC	U	U
alpha-Chlordane	U	U
gamma-Chlordane	U	U
4,4'-DDD	U	U
4,4'-DDE	U	U
4,4'-DDT	U	U
Dieldrin	U	U
Endosulfan I	U	U
Endosulfan II	U	U
Endosulfan Sulfate	U	U
Endrin	U	U
Endrin-Ketone	U	U
Heptachlor	U	U
Heptachlor Epoxide	U	U
Methoxychlor	U	U
Toxaphene	U	U

QUALIFIERS

C: Compound confirmed by GC/MS
U: Analyzed for but not detected

NOTES

---: not established

Table 4-78
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II LITTLE RIVER SEDIMENT SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOLR2SD 11/15/90 (mg/kg)		BOLR1SD 11/16/90 (mg/kg)	
Aluminum	7950		12700	
Antimony		U	7.5	B
Arsenic	5.3		4.3	
Barium	48.2	B	117	
Beryllium	0.82	B	1.6	
Cadmium	0.56	B	0.94	B
Calcium	20500		88600	
Chromium	28.6		27.1	
Cobalt	6.1	B	6.6	B
Copper	47.4		34.6	
Iron	17900		21200	
Lead	90.7		63.3	
Magnesium	6700		19500	
Manganese	321		653	
Mercury	0.24		0.38	
Nickel	20.4		18.9	
Potassium	1630		2390	
Selenium		U		U
Silver		U		U
Sodium	385	B	534	B
Thallium		U		U
Vanadium	17.5		24.3	
Zinc	186		132	
Cyanide		U		U

QUALIFIERS

B: Value is greater than Instrument Detection Limit (IDL)
but less than Contract Required Detection Limit (CRDL)
U: Analyzed for but not detected

NOTES

----: not available

4.4.5 Subsurface Soil

4.4.5.1 - Boreholes

During the Phase II RI field program, 11 soil boring samples were collected for chemical analyses. The results of analyses are presented in Tables 4-79 to 4-85. Figure 2-10 shows the location of the soil borings installed as part of the Phase II RI field program.

Analytical data from volatile organic compound analysis are presented in Table 4-79. Sample BO-SB-15-S was the only subsurface soil sample found to contain levels of volatile organic compounds substantially above soil cleanup criteria guidelines. The volatile compounds detected in this sample include ethylbenzene, toluene and xylene (total). It is important to note that this sample was obtained from the triangular-shaped Conrail property as shown on Figure 2-10.

Results from the analysis of semivolatile organic compounds are presented in Table 4-80. A number of PAH compounds were found in the subsurface soil medium in excess of soil cleanup criteria guidelines including benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd)pyrene. These compounds were found at their highest levels in samples BO-SB-15-S and BO-SB-23-S during the Phase II RI. This data generally confirms the levels at which these compounds were found during the Phase I RI.

Results of subsurface soil sampling and analysis of PCBs and pesticides are presented in Table 4-81. PCB-1248 was detected at 11,000 ug/kg in sample BO-SB-23-S, which was obtained from the location of a number of former storage tanks in the Northwestern Leasehold Property Area. This was the only sample parameter that exceeded soil cleanup criteria guidelines. It is also noted that 4,4'-DDE was found at approximately 10 ug/kg in sample BO-SS-15-S obtained from the Conrail property as shown in Figure 2-10.

The analytical data obtained from metals analysis is presented in Table 4-82. Two samples were analyzed for TCL metals, BO-SB-5-C-S and BO-SB-5-CA-S. These samples were obtained from the clay layer at 8 to 10 feet and 10 to 12 feet, respectively, in proximity to soil boring BO-SB-5 as shown on Figure 2-10. No metals were detected above NJDEP soil cleanup guidelines.

Table 4-79
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSB5CAS (10-12') 11/13/90 (ug/kg)	BOSB5CS (8-10') 11/13/90 (ug/kg)	BOSB15S (1-2') 11/14/90 (ug/kg)	BOSB23S (1-2') 11/16/90 (ug/kg)	BOSB24S (2-4') 11/20/90 (ug/kg)	BOSB24SRE (2-4') 11/20/90 (ug/kg)	BOTB1113 11/13/90 (ug/l)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acetone	59 B	220 B	2200 B	35 B	20 B	16 B	U	---
Benzene	U	22	U	U	U	U	U	---
Bromodichloromethane	U	U	U	U	U	U	U	---
Bromoform	U	U	U	U	U	U	U	245
Bromomethane	U	U	U	U	U	U	U	---
2-Butanone	5 J	28 +	U	2 J	U	U	U	10
Carbon Disulfide	U	3 J	U	U	U	U	U	168
Carbon Tetrachloride	U	U	U	U	U	U	U	28
Chlorobenzene	U	U	U	U	U	U	U	152
Chloroethane	U	U	U	U	U	U	U	93
Chloroform	U	U	U	U	U	U	U	155
Chloromethane	U	U	U	U	U	U	U	85
Dibromochloromethane	U	U	U	U	U	U	U	---
1,1-Dichloroethane	U	28	U	U	U	U	U	100
1,1-Dichloroethene	U	U	U	U	U	U	U	41
1,2-Dichloroethane	U	U	U	U	U	U	U	1.24
1,2-Dichloroethene (total)	U	U	U	U	U	U	U	32
1,2-Dichloropropane	U	U	U	U	U	U	U	142
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	142
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	142
Ethylbenzene	U	4 J	380 J+	U	U	U	U	67
2-Hexanone	U	U	U	U	U	U	U	---
Methylene Chloride	5 J	6 J+	U	7 JB+	10 B+	8 B+	U	5
4-Methyl-2-pentanone	U	16	U	U	U	U	U	---
Styrene	U	U	U	U	U	U	U	---
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	0.54
Tetrachloroethene	U	U	U	6 J	U	U	U	8
Toluene	2 J	15	280 J+	U	3 J	U	U	36
Trichloroethene	U	2 J	U	U	U	U	U	24
1,1,1-Trichloroethane	U	U	U	U	U	U	U	150
1,1,2-Trichloroethane	U	U	U	U	U	U	U	1.3
Vinyl Acetate	U	U	U	U	U	U	U	48
Vinyl Chloride	U	U	U	U	U	U	U	23
Xylene (total)	2 J	16	2400 +	U	U	U	U	67

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below the detection limit

NOTES

---: not established
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-79 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB5CAS 11/13/90 (ug/kg)	BOSB5CS 11/13/90 (ug/kg)	BOSB15S 11/14/90 (ug/kg)	BOSB23S 11/16/90 (ug/kg)	BOSB24S 11/20/90 (ug/kg)	BOSB24SRE 11/20/90 (ug/kg)	BOTB1113 11/13/90 (ug/l)
Unknown	NA	24 J	NA	22 J	6 J	9 J	NA
Unknown	NA	15 J	NA	18 J	NA	NA	NA
Unknown	NA	15 J	NA	11 J	NA	NA	NA
Unknown	NA	10 J	NA	NA	NA	NA	NA
Unknown alkane	23 J	NA	4200 J	NA	NA	NA	NA
Unknown aromatic	NA	NA	4900 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	9200 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	7800 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	5900 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	5200 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	4700 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	4700 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	4500 J	NA	NA	NA	NA
Unknown alkyl benzene	NA	NA	4300 J	NA	NA	NA	NA
Limonene	NA	NA	NA	35 J	NA	NA	NA
Unknown cycloalkane	NA	NA	NA	10 J	NA	NA	NA
Methyl tert butylether	NA	NA	NA	NA	48 J	42 J	NA
Unknown terpene isomer	NA	NA	NA	NA	4 JB	16 J	NA

QUALIFIERS

B: Compund found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable

Table 4-80
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	B0SB5CAS 11/13/90 (ug/kg)	B0SB5CS 11/13/90 (ug/kg)	B0SB15S 11/14/90 (ug/kg)	B0SB23S 11/16/90 (ug/kg)	B0SB23SRE 11/16/90 (ug/kg)	B0SB24S 11/20/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Acenaphthylene							
Acenaphthene	U	U	16 J	U	U	U	2220
Acenaphthylene	U	U	U	U	U	16 J	5140
Anthracene	U	U	130 J	220 J	U	U	65000
Benzo(a)anthracene	U	U	680 J+	710 J+	270 J+	U	5
Benzo(b)fluoranthene	U	U	1500 +	1500 +	U	66 J+	55
Benzo(k)fluoranthene	U	U	240 J+	U	U	60 J+	55
Benzoic acid	310 JB	U	U	U	U	U	167
Benzo(g,h,i)perylene	U	U	360 J	U	U	U	593110
Benzo(a)pyrene	U	U	650 J	480 J	U	U	---
Benzyl alcohol	U	U	U	U	U	U	32
4-Bromophenyl-phenylether	U	U	U	U	U	U	---
Butylbenzylphthalate	U	U	U	1800	U	U	---
4-Chloroaniline	U	U	U	U	U	U	---
bis(2-Chloroethoxy)methane	U	U	U	U	U	U	---
bis(2-Chloroethyl)ether	U	U	U	U	U	U	68
bis(2-Chloroisopropyl)ether	U	U	U	U	U	U	---
4-Chloro-3-methylphenol	U	U	U	U	U	U	115
2-Chloronaphthalene	U	U	U	U	U	U	---
2-Chlorophenol	U	U	U	U	U	U	38
4-Chlorophenyl-phenylether	U	U	U	U	U	U	---
Chrysene	U	U	790 J+	840 J+	610 J+	86 J+	20
Dibenzo(a,h)anthracene	U	U	170 J	U	U	U	713680
Dibenzofuran	U	U	63 J	U	U	U	---
Di-n-butylphthalate	U	U	U	6900	U	39 JB	41000
1,2-Dichlorobenzene	U	U	U	U	U	U	66
1,3-Dichlorobenzene	U	U	U	U	U	U	73
1,4-Dichlorobenzene	U	U	U	U	U	U	92
3,3'-Dichlorobenzidine	U	U	U	U	U	U	---
2,4-Dichlorophenol	U	U	U	U	U	U	0.65
Diethylphthalate	U	U	U	U	U	U	260
2,4-Dimethylphenol	U	2700 +	U	U	U	U	50
Dimethylphthalate	U	U	U	U	U	U	---
4,6-Dinitro-2-methylphenol	U	U	U	U	U	U	---
2,4-Dinitrophenol	U	U	U	U	U	U	---
2,4-Dinitrotoluene	U	U	U	U	U	U	---
2,6-Dinitrotoluene	U	U	U	U	U	U	---
bis(2-Ethylhexyl)phthalate	790 JB	740 JB	480 JB	4500 B	5200 B	640 JB	1517325
Fluoranthene	U	U	1300	1100	710 J	110 J	22892
Fluorene	U	U	37 J	U	840 J	U	8180
Hexachlorobenzene	U	U	U	U	U	U	68
Hexachlorobutadiene	U	U	U	U	U	U	74
Hexachlorocyclopentadiene	U	U	U	U	U	U	---
Hexachloroethane	U	U	U	U	U	U	1270
Indeno(1,2,3-cd)pyrene	U	U	400 J+	U	U	U	28
Isophorone	U	U	U	U	U	U	---
2-Methylnaphthalene	U	U	120 J	U	4900	U	21250
2-Methylphenol	U	U	U	U	U	U	---
4-Methylphenol	450 J	420 J	U	U	460 J	U	---
Naphthalene	U	U	74 J	80 J	1800 +	U	650
2-Nitroaniline	U	U	U	U	U	U	---
3-Nitroaniline	U	U	U	U	U	U	232
4-Nitroaniline	U	U	U	U	U	U	275
Nitrobenzene	U	U	U	U	U	U	104
2-Nitrophenol	U	U	U	U	U	U	162
4-Nitrophenol	U	U	U	U	U	U	162
N-Nitrosodiphenylamine (1)	U	U	U	U	U	U	---
N-Nitroso-di-n-propylamine	U	U	U	U	U	U	---
Di-n-octylphthalate	U	U	35 J	400 J	U	60 J	5965
Pentachlorophenol	U	U	U	U	U	U	2555
Phenanthrene	U	U	730 J	870 J	2000	51 J	57300
Phenol	U	U	U	U	390 J+	U	0.4
Pyrene	U	U	1000	1600	2600	100 J	210000
1,2,4-Trichlorobenzene	U	U	U	U	U	U	336
2,4,6-Trichlorophenol	U	U	U	U	U	U	---
2,4,5-Trichlorophenol	U	U	U	U	U	U	62

QUALIFIERS

B: Compound found in the method blank as well as the sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

---: not established
RE: Reanalysis
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-80 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOSB5CAS 11/13/90 (ug/kg)	BOSB5CS 11/13/90 (ug/kg)	BOSB15S 11/14/90 (ug/kg)	BOSB23S 11/16/90 (ug/kg)	BOSB23SRE 11/16/90 (ug/kg)	BOSB24S 11/20/90 (ug/kg)
Aldo-condensation product	34000 JAB	94000 JAB	26000 JAB	45000 JAB	6000 JAB	30000 JAB
Aldo-condensation product	1300 JAB	NA	NA	NA	NA	380 JAB
Unknown acid	2000 JB	5400 JB	1800 JB	3900 JB	NA	2400 JB
Unknown alkane	800 JB	380 J	1400 J	2600 J	38000 J	NA
Unknown alkane	790 J	NA	1300 J	2100 J	6500 J	NA
Unknown acid	760 JB	2400 JB	790 J	NA	NA	1300 JB
Unknown	710 J	500 J	1100 J	1400 J	3300 J	NA
Unknown alkane	650 J	NA	NA	1300 J	5000 J	NA
Unknown acid	640 J	2200 JB	NA	NA	NA	1200 JB
Unknown alkane	630 J	NA	NA	720 J	3600 J	NA
Unknown alkane	620 J	NA	NA	580 J	3200 J	NA
Unknown alkane	600 J	NA	NA	560 J	2900 J	NA
Unknown alkane	600 J	NA	NA	NA	2300 J	NA
Unknown	590 J	690 J	1100 J	1400 J	2000 J	NA
Unknown alkane	590 J	NA	NA	NA	2100 J	NA
Unknown alkane	510 J	NA	NA	NA	NA	NA
Unknown alkane	510 J	NA	NA	NA	NA	NA
Unknown alkane	500 J	NA	NA	NA	NA	NA
Unknown alkane	500 J	NA	NA	NA	NA	NA
Unknown alkane	440 J	NA	NA	NA	NA	NA
Unknown alkane	420 J	NA	NA	NA	NA	NA
Aldo-condensation product	370 J	NA	NA	NA	NA	NA
Unknown alkane	370 J	NA	NA	NA	NA	NA
Unknown cycloalkane	NA	1700 J	NA	NA	6100 J	NA
Unknown benzene	NA	1200 J	NA	NA	5800 J	NA
Unknown acid	NA	1100 JB	NA	NA	NA	920 JB
Unknown benzene	NA	650 J	NA	NA	4200 J	NA
Unknown phenol	NA	630 J	NA	NA	NA	NA
Unknown cycloketone	NA	620 J	NA	NA	NA	NA
Unknown ketone	NA	510 J	NA	1800 JB	NA	NA
1(3H)-Isobenzofuranone	NA	500 J	NA	NA	NA	NA
Unknown phenol	NA	480 J	NA	NA	NA	NA
Unknown benzene	NA	480 J	NA	NA	2900 J	NA
Unknown	NA	420 J	790 J	1100 J	NA	NA
Unknown acid	NA	410 J	NA	NA	NA	530 JB
Unknown phenol	NA	410 J	NA	NA	NA	NA
Unknown acid	NA	380 J	NA	NA	NA	340 JB
Unknown alkene	NA	NA	NA	640 J	18000 J	420 JB
Unknown alkene	NA	NA	NA	560 J	8100 J	420 JB
Octadecanal	NA	NA	2400 J	NA	NA	NA
Unknown PAH	NA	NA	870 J	NA	NA	NA
Unknown PAH	NA	NA	360 J	NA	NA	NA
Unknown PAH	NA	NA	340 J	NA	NA	NA
Unknown	NA	NA	740 JB	1000 JB	NA	NA
Unknown	NA	NA	360 J	740 JB	NA	NA
Unknown	NA	NA	360 J	630 J	NA	NA
Unknown	NA	NA	340 J	600 J	NA	NA
Unknown	NA	NA	NA	540 J	NA	NA
Unknown	NA	NA	NA	530 J	NA	NA
Unknown	NA	NA	NA	480 J	NA	NA
Unknown alkene	NA	NA	NA	NA	4700 J	NA
Unknown alkene	NA	NA	NA	NA	3400 J	NA
Unknown naphthalene	NA	NA	NA	NA	3000 J	NA
Unknown benzene	NA	NA	NA	NA	2500 J	NA

QUALIFIERS

A: Aldo-condensation peak
B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable

Table 4-81
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
PESTICIDES/PCBS

PESTICIDE/PCB COMPOUNDS	BOSB5CAS 11/13/90 (ug/kg)	BOSB5CS 11/13/90 (ug/kg)	BOSB15S 11/14/90 (ug/kg)	BOSB23S 11/16/90 (ug/kg)	BOSB24S 11/20/90 (ug/kg)	SOIL CLEANUP CRITERIA GUIDELINES (ug/kg)
Aldrin	U	U	U	U	U	---
PCB - 1242	U	U	U	U	U	85
PCB - 1016	U	U	U	U	U	85
PCB - 1232	U	U	U	U	U	---
PCB - 1254	110 J	U	U	U	U	275
PCB - 1260	U	U	U	U	U	---
PCB - 1221	U	U	U	U	U	---
PCB - 1248	U	U	U	11000 +	U	205
alpha-BHC	U	U	U	U	U	---
beta-BHC	U	13 J	U	U	U	---
delta-BHC	U	U	U	U	U	---
gamma-BHC	U	U	U	U	U	---
alpha-Chlordane	U	U	U	U	U	22
gamma-Chlordane	U	U	U	U	U	22
4,4'-DDD	U	U	U	U	U	---
4,4'-DDE	U	U	9.9 J	U	U	---
4,4'-DDT	U	U	U	U	U	---
Dieldrin	U	U	U	U	U	---
Endosulfan I	U	U	U	U	U	---
Endosulfan II	U	U	U	U	U	---
Endosulfan Sulfate	U	U	U	U	U	---
Endrin	U	U	U	U	U	---
Endrin-Ketone	U	U	U	U	U	---
Heptachlor	U	U	U	U	U	---
Heptachlor Epoxide	U	U	U	U	U	---
Methoxychlor	U	U	U	U	U	---
Toxaphene	U	U	U	U	U	---

QUALIFIERS

U: Analyzed for but not detected

NOTES

---: not established
NA: Not Applicable
+: Value exceeds Soil Cleanup Criteria Guidelines

Table 4-82
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
INORGANIC CONSTITUENTS

CONSTITUENTS	BOSB5CAS 11/13/90 (mg/kg)		BOSB5CS 11/13/90 (mg/kg)		NJDEP SOIL CLEANUP GUIDELINES (mg/kg)
Aluminum	22500		20500		----
Antimony		U		U	----
Arsenic	4.3		5.4		20
Barium	214		126		400
Beryllium	0.95		1.4	+	1
Cadmium		U		U	3
Calcium	67400		64400		----
Chromium	33.2		30.4		100
Cobalt	13.2		12.4		----
Copper	30.9		28.1		170
Iron	30500		33300		----
Lead	26.7		16.8		250-1000
Magnesium	14500		16600		----
Manganese	509		549		----
Mercury		U		U	1
Nickel	34.4		31.4		100
Potassium	4910		4880		----
Selenium		U		U	4
Silver		U		U	5
Sodium	1240		1550		----
Thallium		U		U	----
Vanadium	40.6		45.4		----
Zinc	76.4		73.9		350
Cyanide		U		U	----

QUALIFIERS

B: Value is between the Instrument Detection Limit (IDL) and the Contract Required Detection Limit (CRDL)
U: Analyzed for but not detected

NOTES

----: not available
+: Value exceeds NJDEP Soil Cleanup Guidelines

Tables 4-83 and 4-84 present the results of TCLP testing on subsurface soil samples BO-SB-5B-S and BO-SB-16-S for volatile and semivolatile organic compounds, respectively. Based on these results, these samples were not found to be hazardous. Table 4-85 presents results for total organic carbon analysis (TOC).

4.4.6 Groundwater

As part of the Phase II RI field program, one groundwater sample was obtained from each of the eight monitoring wells installed during the Phase I RI and analyzed for TCL volatile organic compounds and PCBs. The Phase I groundwater data are presented in Table 4-52 to 4-59. In addition, one groundwater sample was collected from each of the four monitoring wells installed during the Phase II RI and analyzed for TCL+30 compounds. The results of the analyses are presented in Tables 4-86 to 4-89. The locations of all monitoring wells are shown on Figure 2-11.

The data obtained from the analysis of volatile organic compounds are presented in Table 4-86. In comparing the Phase I groundwater data to the Phase II data for those monitoring wells installed during the Phase I RI, it is important to make several observations. During the Phase II RI, similar volatile organic compounds were found to exceed NYSDEC Class GA Groundwater Standards/Guidance Values; however, differences are noted. Both the Phase I and Phase II data indicate that acetone was found above standards/guidance values. Acetone is a common lab contaminent and is not believed to be present in environmental samples attributable to site contamination. The Phase II data also show that the compounds 1,1-dichloroethene, tetrachloroethene and trichloroethene were not detected, and that ethylbenzene was virtually not detected as well. The fate of 1,1-dichloroethene, tetrachloroethene and trichloroethene may be attributed to additional volatilization and/or degradation to other lower order molecules. When comparing the Phase I data to that obtained from Phase II for 1,1-dichloroethane and 1,2-dichloroethene (total), the concentrations did not differ significantly.

Several other similarities are noted between the Phase I and II groundwater data. The samples obtained during the Phase II RI from monitoring wells MW-4, MW-5 and MW-9 were found to contain the highest levels of volatile organic compounds, including 1,2-dichloroethene (total) and vinyl chloride which were found at the highest concentrations. This is generally consistent with the Phase I data.

Table 4-83
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
TCLP VOLATILE ORGANICS

COMPOUNDS	BOSB5BS (6-8') 11/13/90 (ug/l)		REGULATORY LIMITS (ug/l)
Benzene		U	0.5
2-Butanone		U	200
Carbon Tetrachloride		U	0.5
Chlorobenzene		U	0.03
Chloroform		U	6
1,2-Dichloroethane		U	0.5
1,1-Dichloroethylene		U	0.7
Tetrachloroethylene		U	0.7
Trichloroethylene		U	0.5
Vinyl Chloride		U	0.2

QUALIFIERS

U: Analyzed for but not detected

Table 4-84
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
TCLP SEMIVOLATILE ORGANICS

COMPOUNDS	BOSB16S (1-2') 11/15/90 (ug/l)	REGULATORY LIMITS (ug/l)
1,2-Dichlorobenzene	U	4300
1,4-Dichlorobenzene	U	7500
2,4-Dinitrotoluene	U	130
Hexachlorobenzene	U	130
Hexachlorobutadiene	U	500
Hexachloroethane	U	3000
2-Methylphenol	12 J	200000
3&4-Methylphenol (total)	49	200000
Nitrobenzene	U	2000
Pentachlorophenol	U	100000
Pyridine	U	5000
2,4,5-Trichlorophenol	U	400000
2,4,6-Trichlorophenol	U	2000

QUALIFIERS

J: Compound found below the detection limit
U: Analyzed for but not detected

Table 4-85
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II SOIL BORING SAMPLING
TOTAL ORGANIC CARBON

CONSTITUENT	BOMW14S 11/16/90 (mg/kg)	BOMW15S 11/16/90 (mg/kg)	BOSB13S 11/20/90 (mg/kg)	BOSB15S 11/14/90 (mg/kg)	BOSB20S 11/15/90 (mg/kg)	BOSB22S 11/16/90 (mg/kg)	BOSB24S 11/20/90 (mg/kg)
Total Organic Carbon	> 80000	46750	80000	> 80000	64750	> 80000	31500

NOTES

>: Greater than

Table 4-86
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMW1GW 11/27/90 (ug/l)	BOMW2GW 11/27/90 (ug/l)	BOMW4GW 11/27/90 (ug/l)	BOMW5GW 11/28/90 (ug/l)	BOMW6GW 11/27/90 (ug/l)	BOMW7GW 11/27/90 (ug/l)	BOMW8GW 12/11/90 (ug/l)	BOMW9GW 11/27/90 (ug/l)	BOMW11GW 12/11/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acetone	45 B	130 B	7300 B	9500 B	230 B	26 B	17 B	2200 B	10 B	----
Benzene	23 +	13 +	U	U	45 J+	U	7 +	U	U	ND ST
Bromodichloromethane	U	U	U	U	U	U	U	U	U	50 GV
Bromoform	U	U	U	U	U	U	U	U	U	50 GV
Bromomethane	U	U	U	U	U	U	U	U	U	5 ST
2-Butanone	15	26	U	U	U	U	U	U	U	----
Carbon Disulfide	U	2 J	U	U	U	4 J	9	U	5	----
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	5 ST
Chlorobenzene	U	U	U	U	U	U	U	U	U	5 ST
Chloroethane	U	U	U	U	U	U	U	U	U	5 ST
Chloroform	U	U	U	U	U	U	U	U	U	100 ST
Chloromethane	12 +	U	U	U	U	U	U	U	U	5 ST
Dibromochloromethane	U	U	U	U	U	U	U	U	U	50 GV
1,1-Dichloroethane	21 +	310 +	920 J+	1200 J+	89 J+	68 +	U	U	2 J	5 ST
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	5 ST
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	5 ST
1,2-Dichloroethene (total)	11 +	40 +	48000 +	64000 +	2400 +	4 J	2 J	9400 +	2 J	5 ST
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	5 ST*
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	----
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	----
Ethylbenzene	U	3 J	U	U	U	U	U	U	U	5 ST
2-Hexanone	U	U	U	U	U	U	U	U	U	50 GV
Methylene Chloride	U	7 JB+	3400 +	1600 JB+	74 JB+	3 JB	U	U	U	5 ST
4-Methyl-2-pentanone	U	U	U	U	U	U	U	U	U	----
Styrene	U	U	U	U	U	U	U	U	U	5 ST
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	U	U	5 ST
Tetrachloroethene	U	U	U	U	U	U	U	U	U	5 ST
Toluene	10 +	22 +	3700 +	2000 J+	89 J+	U	2 J	340 J+	1 J	5 ST
Trichloroethene	U	U	U	U	U	U	U	U	U	5 ST
1,1,1-Trichloroethane	U	62 +	U	U	U	U	U	U	U	5 ST
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	5 ST
Vinyl Acetate	U	U	U	U	U	U	U	U	U	----
Vinyl Chloride	U	200 +	67000 +	U	670 +	U	U	3400 +	U	2 ST
Xylene (total)	19 +	13 +	710 J+	1200 J+	48 J+	1 J	140 +	U	7 +	5 ST*

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Applies to each isomer individually
+: Value exceeds Groundwater Standards/Guidelines

Table 4-86 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW1GW 11/27/90 (ug/l)	BOMW2GW 11/27/90 (ug/l)	BOMW4GW 11/27/90 (ug/l)	BOMW5GW 11/28/90 (ug/l)	BOMW6GW 11/27/90 (ug/l)	BOMW7GW 11/27/90 (ug/l)	BOMW8GW 12/11/90 (ug/l)	BOMW9GW 11/27/90 (ug/l)	BOMW11GW 12/11/90 (ug/l)
Unknown alkane	87 J	NA	NA	NA	NA	NA	NA	NA	NA
Ethanol	NA	31 J	NA	8200 J	310 J	21 JB	NA	7700 J	NA
Unknown terpene isomer	NA	26 JB	12000 JB	17000 JB	130 JB	18 JB	NA	7700 JB	NA
Unknown	NA	17 J	NA	8600 J	NA	12 J	21 J	NA	NA
1,4-Dioxane	NA	11 J	NA	NA	NA	NA	NA	NA	NA
Unknown alkene	270 J	NA	NA	4900 J	NA	NA	NA	NA	NA
Unknown alkyl benzene	51 J	NA	NA	NA	NA	11 J	100 J	NA	14 J
Unknown alkyl benzene	NA	NA	NA	NA	NA	9 J	65 J	NA	10 J
Unknown alkyl benzene	NA	NA	NA	NA	NA	8 J	47 J	NA	8 J
Unknown alkyl benzene	NA	NA	NA	NA	NA	9 J	42 J	NA	8 J
Unknown	NA	NA	NA	NA	NA	7 J	NA	NA	NA
Unknown	NA	NA	NA	NA	NA	6 J	NA	NA	NA
Unknown	NA	NA	NA	NA	NA	6 J	NA	NA	NA
Unknown alkene	230 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown alkene	92 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown alkene	90 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown alkane	67 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown alkane	54 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown metylcyclopentene	53 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown cycloalkene	45 J	NA	NA	NA	NA	NA	NA	NA	NA
Unknown dihydroindene	NA	NA	NA	NA	NA	NA	43 J	NA	NA
Unknown alkylbenzene	NA	NA	NA	NA	NA	NA	32 J	NA	7 J
Unknown alkylbenzene	NA	NA	NA	NA	NA	NA	29 J	NA	7 J
Unknown alkylbenzene	NA	NA	NA	NA	NA	NA	24 J	NA	6 J
Unknown alkylbenzene	NA	NA	NA	NA	NA	NA	20 J	NA	5 J
Unknown methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	15 J

QUALIFIERS

B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable

Table 4-86 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOMW12GW 12/12/90 (ug/l)	BOMW14GW 12/12/90 (ug/l)	BOMW18GW 12/11/90 (ug/l)	BOTB1116 11/16/90 (ug/l)	BOTB1120 11/20/90 (ug/l)	BOTB1128 11/28/90 (ug/l)	BOTB1212 12/12/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acetone	27 B	14 B	190 B	U	U	U	13 B	----
Benzene	3 J+	U	52 +	U	U	U	U	ND ST
Bromodichloromethane	U	U	U	U	U	U	U	50 GV
Bromoform	U	U	U	U	U	U	U	50 GV
Bromomethane	U	U	U	U	U	U	U	5 ST
2-Butanone	U	U	U	U	U	U	U	----
Carbon Disulfide	3 J	U	U	U	U	U	U	----
Carbon Tetrachloride	U	U	U	U	U	U	U	5 ST
Chlorobenzene	U	U	U	U	U	U	U	5 ST
Chloroethane	U	U	U	U	U	U	U	5 ST
Chloroform	U	U	U	U	2 J	U	U	100 ST
Chloromethane	U	U	U	U	U	U	U	5 ST
Dibromochloromethane	U	U	U	U	U	U	U	50 GV
1,1-Dichloroethane	15 +	U	1100 +	U	U	U	U	5 ST
1,1-Dichloroethene	U	U	110 +	U	U	U	U	5 ST
1,2-Dichloroethane	U	U	U	U	U	U	U	5 ST
1,2-Dichloroethene (total)	14 +	U	U	U	U	U	U	5 ST
1,2-Dichloropropane	U	U	U	U	U	U	U	5 ST*
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	----
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	----
Ethylbenzene	U	U	100 +	U	U	U	U	5 ST
2-Hexanone	U	U	U	U	U	U	U	50 GV
Methylene Chloride	U	U	22 J+	U	3 JB	3 JB	U	5 ST
4-Methyl-2-pentanone	U	U	U	U	U	U	U	----
Styrene	U	U	U	U	U	U	U	5 ST
1,1,2,2-Tetrachloroethane	U	U	U	U	U	U	U	5 ST
Tetrachloroethene	U	U	U	U	U	U	U	5 ST
Toluene	1 J	U	420 +	U	U	U	U	5 ST
Trichloroethene	U	U	U	U	2 J	U	U	5 ST
1,1,1-Trichloroethane	U	U	U	U	U	U	U	5 ST
1,1,2-Trichloroethane	U	U	U	U	U	U	U	5 ST
Vinyl Acetate	U	U	U	U	U	U	U	----
Vinyl Chloride	18 +	U	870 +	U	U	U	U	2 ST
Xylene (total)	2 J	U	400 +	U	U	U	U	5 ST*

QUALIFIERS

B: Compound found in method blank as well as sample
J: Compound found below detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Applies to each xylene isomer individually
+: Value exceeds Groundwater Standards/Guidelines

Table 4-86 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
VOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW12GW 12/12/90 (ug/l)	BOMW14GW 12/12/90 (ug/l)	BOMW18GW 12/11/90 (ug/l)	BOTB1116 11/16/90 (ug/l)	BOTB1120 11/20/90 (ug/l)	BOTB1128 11/28/90 (ug/l)	BOTB1212 12/12/90 (ug/l)
Unknown alkane	NA	NA	240 J	8 J	NA	NA	NA
Ethanol	NA	NA	NA	NA	NA	18 J	NA
Unknown terpene isomer	NA	NA	NA	NA	NA	9 JB	6 J
Unknown siloxane	16 J	6 J	NA	NA	NA	NA	10 J
Unknown alkylbenzene	NA	NA	220 J	NA	NA	NA	NA
Unknown alkane	NA	NA	220 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	140 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	120 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	110 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	100 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	99 J	NA	NA	NA	NA
Unknown alkylbenzene	NA	NA	98 J	NA	NA	NA	NA
Unknown	NA	NA	90 J	NA	NA	NA	NA

QUALIFIERS

B: Compound found in method blank as well as sample
J: Estimated value

NOTES

NA: Not Applicable

Groundwater samples obtained from the monitoring wells installed during the Phase II RI field program, only sample BO-MW-18-GW was found to be significantly contaminated as shown in Table 4-86. The compounds which were found in this sample above standards/guidance values are similar to those compounds found in samples obtained from the monitoring wells installed during the Phase I RI.

Results from the analysis of semivolatile compounds are presented in Table 4-87. Only those samples obtained from the monitoring wells installed during the Phase II RI were analyzed for semivolatile organic compounds. Sample BO-MW-18-GW was the only sample to contain any compounds above standards/guidance values. The compounds 2,4-dimethylphenol and naphthalene were detected at 110 ug/l and 74 ug/l, respectively.

The analytical data for pesticides and PCBs are presented in Tables 4-88. During the Phase II RI field program, a groundwater sample was collected from each of the eight monitoring wells installed during the Phase I RI field program and analyzed for PCBs. In addition, a sample was taken from each of the four monitoring wells installed during the Phase II RI field program and analyzed for pesticides and PCBs.

Based on a comparison of the Phase I data to that of Phase II for samples taken from the Phase I wells, a few observations are made. While PCBs were detected in sample BO-MW-5-GW and BO-MW-7-GW during the Phase I RI, no PCBs were detected in these wells during the Phase II RI as shown in Table 4-88. With respect to the samples obtained from monitoring well MW-8, the results of data from the sampling of both phases are consistent.

Phase II sampling results of analysis performed for pesticides and PCBs from monitoring wells installed during the Phase II RI field program were above standards/guidelines in three of four wells. Samples BO-MW-11-GW and BO-MW-18-GW were found to contain PCB arochlor 1242 and 1254 at concentrations of 18 ug/l and 10 ug/l and 6.2 ug/l and 4 ug/l, respectively. The only pesticide compound found was heptachlor, which was found in sample BO-MW-12-GW and PCBs were not detected in this sample.

The results for metals are presented in Table 4-89. Only those samples obtained from the monitoring wells installed during the Phase II RI were analyzed for metals. The standards/guidance values were exceeded in all sampled wells for lead, iron, magnesium, manganese and sodium. This was also the case for samples collected from the Phase I wells during the Phase I RI field program. Arsenic, beryllium, chromium and zinc were also detected above standards/guidance values.

Table 4-87
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

SEMIVOLATILE COMPOUNDS	BOMW11GW 12/12/90 (ug/l)	BOMW12GW 12/12/90 (ug/l)	BOMW14GW 12/12/90 (ug/l)	BOMW18GW 12/11/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Acenaphthene	1 J	U	U	U	20 GV
Acenaphthylene	U	U	U	U	----
Anthracene	U	U	U	U	50 GV
Benzo(a)anthracene	U	U	U	U	0.002 GV
Benzo(b)fluoranthene	U	U	U	U	0.002 GV
Benzo(k)fluoranthene	U	U	U	U	0.002 GV
Benzoic acid	U	U	U	U	----
Benzo(g,h,i)perylene	U	U	U	U	----
Benzo(a)pyrene	U	U	U	U	ND ST
Benzyl alcohol	U	U	U	U	----
4-Bromophenyl-phenylether	U	U	U	U	----
Butylbenzylphthalate	U	U	U	U	50 GV
4-Chloroaniline	U	U	U	U	5 ST
bis(2-Chloroethoxy)methane	U	U	U	U	----
bis(2-Chloroethyl)ether	U	U	U	U	1.0 ST
bis(2-Chloroisopropyl)ether	U	U	U	U	----
4-Chloro-3-methylphenol	U	U	U	U	1 ST **
2-Chloronaphthalene	U	U	U	U	----
2-Chlorophenol	U	U	U	U	1 ST **
4-Chlorophenyl-phenylether	U	U	U	U	----
Chrysene	U	U	U	U	0.002 GV
Dibenzo(a,h)anthracene	U	U	U	U	----
Dibenzofuran	U	U	U	U	----
Di-n-butylphthalate	2 J	1 J	U	U	50 ST
1,2-Dichlorobenzene	U	U	U	U	4.7 ST
1,3-Dichlorobenzene	U	U	U	U	5 ST
1,4-Dichlorobenzene	U	U	U	U	4.7 ST
3,3'-Dichlorobenzidine	U	U	U	U	5 ST
2,4-Dichlorophenol	U	U	U	U	1 ST **
Diethylphthalate	U	U	U	U	50 GV
2,4-Dimethylphenol	U	U	U	110	----
Dimethylphthalate	U	U	U	U	50 GV
4,6-Dinitro-2-methylphenol	U	U	U	U	----
2,4-Dinitrophenol	U	U	U	U	----
2,4-Dinitrotoluene	U	U	U	U	5 ST
2,6-Dinitrotoluene	U	U	U	U	5 ST
bis(2-Ethylhexyl)phthalate	12 B	6 JB	7 JB	11 B	50 ST
Fluoranthene	0.9 J	U	U	U	50 GV
Fluorene	3 J	U	U	6 J	50 GV
Hexachlorobenzene	U	U	U	U	0.35 ST
Hexachlorobutadiene	U	U	U	U	5 ST
Hexachlorocyclopentadiene	U	U	U	U	5 ST
Hexachloroethane	U	U	U	U	5 ST
Indeno(1,2,3-cd)pyrene	U	U	U	U	0.002 GV
Isophorone	U	U	U	U	50 GV
2-Methylnaphthalene	U	U	U	72	----
2-Methylphenol	U	U	U	22	----
4-Methylphenol	U	U	U	U	----
Naphthalene	2 J	U	U	74 +	10 GV
2-Nitroaniline	U	U	U	U	5 ST
3-Nitroaniline	U	U	U	U	5 ST
4-Nitroaniline	U	U	U	U	5 ST
Nitrobenzene	U	U	U	U	5 ST
2-Nitrophenol	U	U	U	U	----
4-Nitrophenol	U	U	U	U	----
N-Nitrosodiphenylamine (1)	U	U	U	U	50 GV
N-Nitroso-di-n-propylamine	U	U	U	U	----
Di-n-octylphthalate	2 J	U	U	3 J	50 GV
Pentachlorophenol	U	U	U	U	1 ST **
Phenanthrene	1 J	U	U	13	50 GV
Phenol	U	U	U	U	1 ST **
Pyrene	1 J	U	U	U	50 GV
1,2,4-Trichlorobenzene	U	U	U	U	5 ST *
2,4,6-Trichlorophenol	U	U	U	U	1 ST **
2,4,5-Trichlorophenol	U	U	U	U	1 ST **

QUALIFIERS

B: Compound found in the method blank as well as the sample
J: Compound found below the detection limit
U: Analyzed for but not detected

NOTES

GV: Guidance Value
ST: Standard
----: Not established
*: Value pertains to each isomer individually
**: Value pertains to total phenols
+: Value exceeds Groundwater Standards/Guidelines

Table 4-87 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
SEMIVOLATILE ORGANICS

TENTATIVELY IDENTIFIED COMPOUNDS	BOMW11GW 12/12/90 (ug/l)	BOMW12GW 12/12/90 (ug/l)	BOMW14GW 12/12/90 (ug/l)	BOMW18GW 12/11/90 (ug/l)
1,4-Dioxane	NA	64 J	NA	NA
Unknown	38 J	23 J	NA	240 J
Dedecanoic acid	NA	9 J	NA	NA
Unknown dimethylphenol isomer	NA	NA	NA	840 J
Unknown alkane	56 J	NA	NA	810 J
Unknown alkane	39 J	NA	NA	690 J
Unknown alkylbenzene	12 J	NA	NA	430 J
1-Methylnapnthalene	NA	NA	NA	380 J
Unknown alkane	34 J	NA	NA	350 J
Unknown alkane	28 J	NA	NA	330 J
Unknown alkane	18 J	NA	NA	260 J
Unknown alkane	NA	NA	NA	250 J
Unknown	37 J	NA	NA	210 J
Unknown alcohol	NA	NA	NA	200 J
Unknown alkane	NA	NA	NA	180 J
Unknown dimethylphenol isomer	NA	NA	NA	170 J
Unknown dimethylphenol isomer	NA	NA	NA	160 J
Unknown alkylbenzene	NA	NA	NA	150 J
Unknown trimethylphenol	NA	NA	NA	150 J
Unknown alkane	NA	NA	NA	140 J
Unknown trimethylnaphthalene isomer	NA	NA	NA	130 J
Unknown alkylbenzene	NA	NA	NA	130 J
Unknown alkene	17 J	NA	NA	NA
Unknown alkene	12 J	NA	NA	NA
Unknown	24 J	NA	NA	NA
Unknown	21 J	NA	NA	NA
Unknown	18 J	NA	NA	NA
Unknown	17 J	NA	NA	NA
Unknown	17 J	NA	NA	NA
Unknown	13 J	NA	NA	NA
Unknown	13 J	NA	NA	NA
Unknown	12 J	NA	NA	NA
Unknown	11 J	NA	NA	NA
Unknown	11 J	NA	NA	NA

QUALIFIERS

B: Compound found in method blank as well as sample

NOTES

NA: Not Applicable

Table 4-88
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
PCBs

PCB COMPOUNDS	BOMW1GW 11/27/90 (ug/l)	BOMW2GW 11/27/90 (ug/l)	BOMW4GW 11/27/90 (ug/l)	BOMW5GW 12/12/90 (ug/l)	BOMW6GW 11/27/90 (ug/l)	BOMW7GW 11/27/90 (ug/l)	BOMW8GW 12/11/90 (ug/l)	BOMW9GW 11/27/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
PCB - 1016	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1221	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1232	U	U	U	U	U	U	U	U	0.1 ST
PCB - 1242	U	U	U	U	U	U	350 C	U	0.1 ST
PCB - 1248	U	U	U	U	8.4	U	U	U	0.1 ST
PCB - 1254	U	U	U	U	U	U	79 C	U	0.1 ST
PCB - 1260	U	U	U	U	2.6	U	U	U	0.1 ST

QUALIFIERS

C: Confirmed by GC/MS
U: Analyzed for but not detected

NOTES

ST: Standard
----: Not established

Table 4-88 (continued)
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II GROUNDWATER SAMPLING
PESTICIDE/PCBs

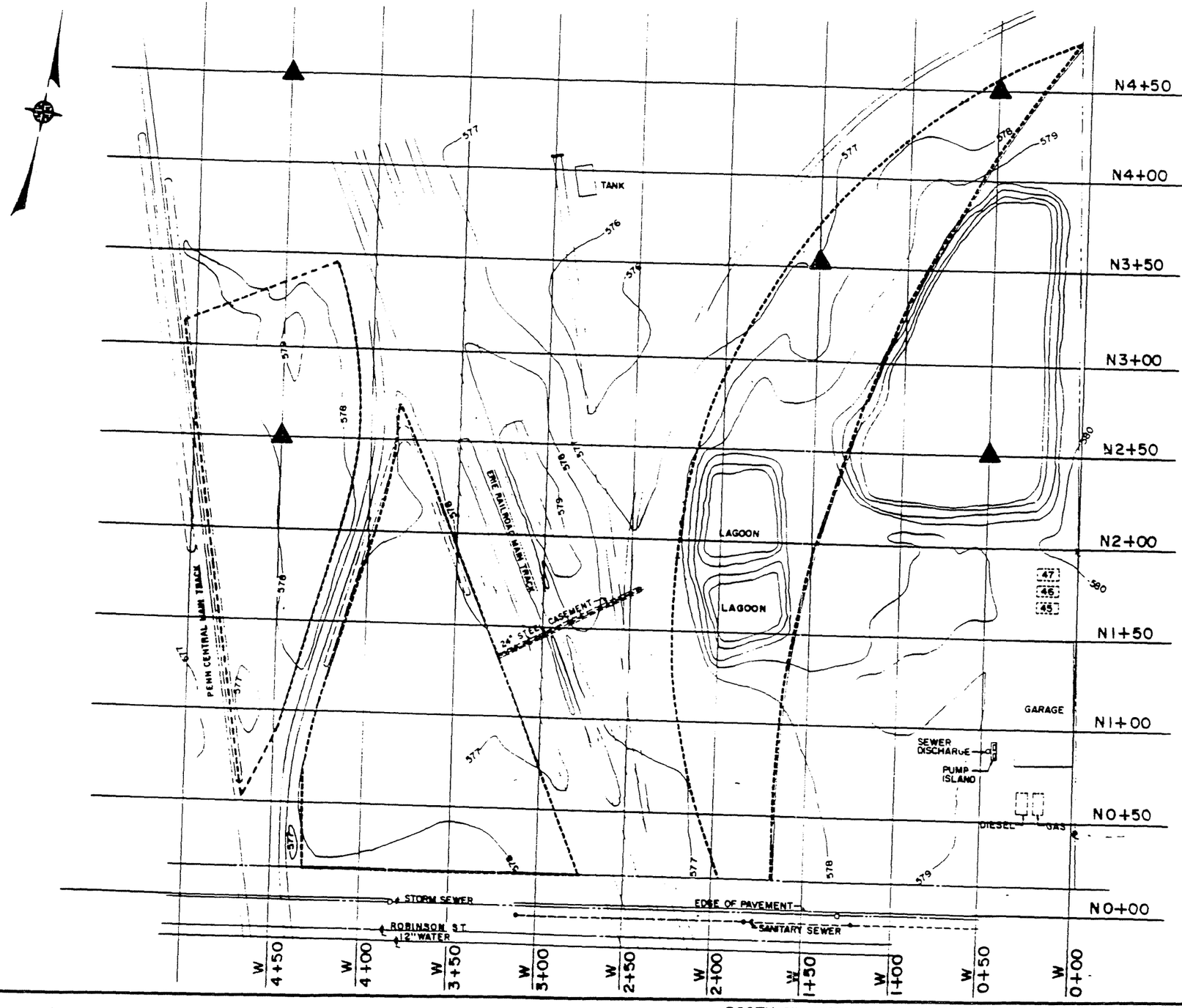
PESTICIDE/PCB COMPOUNDS	BOMW11GW 12/12/90 (ug/l)	BOMW12GW 12/12/90 (ug/l)	BOMW14GW 12/12/90 (ug/l)	BOMW18GW 12/11/90 (ug/l)	NYSDEC CLASS GA GROUNDWATER STANDARDS/GUIDELINES (ug/l)
Aldrin	U	U	U	U	ND ST
PCB - 1242	18	U	U	10	0.1 ST
PCB - 1016	U	U	U	U	0.1 ST
PCB - 1232	U	U	U	U	0.1 ST
PCB - 1254	6.2	U	U	4	0.1 ST
PCB - 1260	U	U	U	U	0.1 ST
PCB - 1221	U	U	U	U	0.1 ST
PCB - 1248	U	U	U	U	0.1 ST
alpha-BHC	U	U	U	U	ND ST
beta-BHC	U	U	U	U	ND ST
delta-BHC	U	U	U	U	ND ST
gamma-BHC	U	U	U	U	ND ST
alpha-Chlordane	U	U	U	U	----
gamma-Chlordane	U	U	U	U	----
4,4'-DDD	U	U	U	U	ND ST
4,4'-DDE	U	U	U	U	ND ST
4,4'-DDT	U	U	U	U	ND ST
Dieldrin	U	U	U	U	ND ST
Endosulfan I	U	U	U	U	----
Endosulfan II	U	U	U	U	----
Endosulfan Sulfate	U	U	U	U	----
Endrin	U	U	U	U	ND ST
Endrin-Ketone	U	U	U	U	----
Heptachlor	U	0.04 J	U	U	ND ST
Heptachlor Epoxide	U	U	U	U	ND ST
Methoxychlor	U	U	U	U	35 ST
Toxaphene	U	U	U	U	ND ST

QUALIFIERS

J: Compound found below detection limit
U: Analyzed for but not detected

NOTES

ST: Standard
ND: Not Detectable
----: not established



LEGEND

- LEASEHOLD BOUNDARY LINE (PROPERTY LEASED TO BOOTH OIL FROM CONRAIL)
- BOOTH OIL PROPERTY LINE
- CATCH BASIN
- DRAINAGE SUMP
- SANITARY SEWER MANHOLE
- DRAINAGE DITCH
- POTENTIAL UNDERGROUND STORAGE TANKS
- BASELINE AIR MONITORING LOCATION (ALL LOCATIONS MONITORED DO NOT APPEAR WITHIN THE LIMITS OF THIS MAP) (ZERO READINGS WERE OBSERVED AT ALL LOCATIONS MONITORED)

SCALE: 1" = 60'

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

PHASE I BASELINE AIR MONITORING LOCATIONS

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FIGURE 4-5

Table 4-93
BOOTH OIL INACTIVE HAZARDOUS WASTE SITE
PHASE II AIR SAMPLING
METHOD TO1/TO2 VOLATILE ORGANICS

VOLATILE COMPOUNDS	BOSB5HA 11/14/90 (ug/m3)	BOSB5HARE 11/14/90 (ug/m3)	BOSB5A 11/13/90 (ug/m3)	BOSB5LA 11/13/90 (ug/m3)	BOMW5A 11/15/90 (ug/m3)	BOMW8A 11/16/90 (ug/m3)	BOBKGAA 12/11/90 (ug/m3)	BOBKGAB 12/11/90 (ug/m3)	BOBKGABRE 12/11/90 (ug/m3)	BOBKGAC 12/11/90 (ug/m3)	BOBKGAD 12/11/90 (ug/m3)	BOFBBA 11/15/90 (ug/m3)
Benzene	1060 BE	1600 E	43 B	14 B	U	300 BE	5.7	9.5	10	10	9.3	5 JB
Bromodichloromethane	U	U	U	U	U	U	U	U	U	U	U	U
Bromoform	U	U	U	U	U	U	U	U	U	U	U	U
Bromomethane	U	U	2.9 J	U	U	U	U	U	U	U	U	U
Carbon Disulfide	U	U	1.5 JB	0.6 JB	120 BJE	U	0.2 J	0.2 J	0.3 J	5.4	4.9	2 JB
Carbon Tetrachloride	U	U	U	U	U	U	0.8 J	0.9 J	0.7 J	1.3 J	1.1 J	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U	U	U
Chloroethane	420 JE	U	U	U	U	U	U	U	U	U	U	U
Chloroform	U	U	11	U	U	U	U	U	U	U	0.2 J	U
Chloromethane	210 BJE	360 JE	27 B	18 B	19 JB	U	7.6 B	9.5 B	7.1 B	10 B	6.1 B	19 JB
Dibromochloromethane	U	U	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	69 E	10	U	U	U	U	U	1.7	0.9 J	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	130 E	13	U	U	1.5	5.2	1.8	39	43 E	3 J
c-1,2-Dichloroethene	U	U	820 E	270 E	U	U	U	U	U	U	U	U
t-1,2-Dichloroethene	U	U	66 E	U	U	340 JE	U	U	U	U	U	U
1,2-Dichloropropane	U	U	U	U	U	U	U	U	U	U	U	U
cis-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	U
trans-1,3-Dichloropropene	U	U	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	920 E	U	46	14	U	340 E	2.6	2.6	2.7	3.9	3.2	4 J
Methylene Chloride	U	U	U	8	U	U	4.2	3.2	5.2	11	2.4	72
Styrene	U	U	4.9	1.7	U	U	1	0.9	1.2	U	U	1 J
1,1,2,2-Tetrachloroethane	U	U	U	U	670 E	270 E	U	U	U	U	U	U
Tetrachloroethene	670 E	U	130 E	48 E	U	U	3.9	3.8	0.5	5.4	1.9	2
Toluene	890 E	U	220 E	80 E	U	360 E	17.6	13	5.2	28	21	49
1,1,1-Trichloroethane	330 E	360 E	18	3.8	890 JE	U	4.3 J	8.6 J	4.6 J	250 E	170 E	43
1,1,2-Trichloroethane	U	U	U	U	U	U	U	U	U	U	U	U
Trichloroethene	1900 E	4700 E	90 E	25	U	300 E	0.8	0.6 J	0.8	1 J	0.9 J	U
Vinyl Chloride	6900 JE	33000 JE	38	14	710 JE	U	U	U	U	U	U	U
m&p Xylene (total)	240 E	U	110 E	43 E	U	520 E	9	10	10.5	14.2	11	16 J
o-Xylene	830 E	2200 JE	59 E	20	550 E	430 E	3.5	4.1	4.2	5	4.3	4 J

QUALIFIERS

B: Compound found in the method blank as well as the sample
E: Value exceeds the calibration range
J: Value is estimated
U: Analyzed for but not detected

NOTES

RE: Reanalysis

4-94 presents compounds found and corresponding guidance values. The sampling locations of these air samples are shown on Figure 2-12. The volumetric air sampling program was undertaken to:

A. Investigate the potential for subsurface contaminants to volatilize during remedial activities and to impact the air quality of remedial site workers;

B. Determine the ambient air quality at the site; and

C. Investigate the potential of health and safety impacts during remedial activities.

Three of the nine samples were collected to address A above. These samples include BO-SB-5H-A, BO-MW-5A and BO-MW-8A and were obtained directly over open borehole/monitoring wells. Five samples were taken to address B above. These samples include BO-SB-5A, which was collected from the breathing zone in the vicinity of drilling operations at soil boring SB-5A, and samples BO-BKG-AA, BO-BKG-AB, BO-BKG-AC and BO-BKG-AD, which were collected during groundwater sampling activities but were taken at locations to represent background at the site. One sample, BO-SB-5L-A was collected to address C above. This sample was collected for 6.25 hours at approximately 50-100 feet from drilling operations around soil boring SB-5 during the Phase II RI field program.

For each sample type (A, B or C) different NYSDEC guidelines can be used for data interpretation, as per recommendation by NYSDEC. The results obtained from samples collected to investigate potential air impacts of remedial site workers (type A) are compared to Occupational Values as listed in the New York State Air Guide-1, January 8, 1990, which is found in Appendix H. Results for samples taken to determine ambient air quality (type B) are compared to the ambient guideline concentrations (AGCs) listed in Air Guide-1. Analytical data for the sample collected to investigate health and safety impacts during remedial activities (type C) are compared to the action limits listed in the NYSDEC's Division of Air Resources' document entitled, "Air Cleanup Criteria," January 8, 1990.

Based on a comparison of the analytical data obtained from the analysis of samples BO-SB-5H-A, BO-MW-5A and BO-MW-8A to the occupational guidelines listed in Air Guide-1, none of the compounds detected in the above samples to exceed the guidelines. However, reanalysis of sample BO-SB-5H-A (B0-SB-5H-A-RE) indicated vinyl chloride exceeded the guideline. Based on the data collected, there would not appear to be a significant air impact to site workers during remedial actions; however, additional sampling would be warranted.

Table 4-94

PHASE II RI AIR SAMPLING
VOLATILE ORGANIC COMPOUNDS FOUND AND
CORRESPONDING GUIDANCE VALUES

Compound	Occupational Value ug/m^3	Proposed AGCs ug/m^3	AGCs ug/m^3	Action Limits ug/m^3
Benzene	30,000	0.12	100	60
Carbon Disulfide	12,000	2.9	100	N/A
Carbon Tetrachloride	N/A	0.07	100	600
Chloroform	N/A	23.3	167	1,000
Chloromethane	105,000	2,500	2,100	N/A
1,1-Dichloroethane	N/A	9,524	--	N/A
1,1-Dichloroethene	N/A	0.02	66.7	N/A
cis-1,2-dichloroethene	N/A	1,880	--	N/A
trans-1,2-dichloroethene	--	360	--	N/A
Ethylbenzene	435,000	1,036	1,450	N/A
Methylene Chloride	N/A	27	1,167	N/A
Styrene	N/A	512	716	N/A
1,1,2,2-Tetrachloroethene	7,000	0.02	23.3	N/A
Tetrachloroethene	170,000	0.075	1,116	6,700
Toluene	375,000	8,929	7,500	7,500
1,1,1-Trichloroethane	1,900,000	45,238	3,800	N/A
1,1,2-Trichloroethane	45,000	0.06	150	900
Trichloroethene	270,000	0.45	900	n/a
Vinyl Chloride	10,000	0.4	0.4	40
MBP Xylene (total)	435,000	1,036	1,450	8,700
O-Xylene	435,000	1,036	1,450	8,700

N/A: Not Available

--: Not Established

As stated above, results for samples BO-SB-5A, BO-BKG-AA, BO-BKG-AB, BO-BKG-AC and BO-BKG-AD are compared to AGCs listed in Air Guide-1. Based on this comparison, two compounds were detected above AGCs in sample BO-SB-5A. These compounds were 1,1-dichloroethene and vinyl chloride, which were detected at 130 ug/m^3 and 38 ug/m^3, respectively. In comparing the data to the proposed AGCs, a number of compounds were found to exceed the proposed guidelines. These compounds include benzene, carbon disulfide, carbon tetrachloride, 1,1-dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride. Therefore, the data indicates that control measures may be required to mitigate the effects of remedial actions on ambient air quality at the site most predominantly with the proposed AGCs.

The results obtained from the analysis of sample BO-SB-5L-A are compared to the action limits listed in the NYSDEC's Air Cleanup Criteria document. Based on this comparison, none of the compounds were found to be present at levels above the action limits. Therefore, the potential of health and safety impacts during remedial activities (Item C) appears to comply with action limits although additional sampling would be prudent during remedial activities.

Section 5

5.0 CONTAMINANT FATE AND TRANSPORT

The data obtained during the Phase I and Phase II RI field programs at the Booth Oil Site, as presented in Section 4.0 of this report, were evaluated against standards, criteria and guidelines (SCGs) selected for the site. In addition, analysis was performed to determine if samples met RCRA definitions of a characteristic hazardous waste and were also supported by tests, such as total petroleum hydrocarbons to identify areas of significant contamination. This evaluation, as well as comparison to background conditions surrounding the site, highlights contaminants of concern so that decisions regarding remedial actions at the site can target those compounds and media which have been identified as exceeding SCGs and ambient conditions, and define areas of the site which should be considered for remediation. In addition, as part of the Remedial Investigation/Feasibility Study process, a risk assessment was performed which identifies both the contaminants which are of concern and the exposure routes by which the risk is established. Both the "Preliminary Baseline Health Risk Assessment" and "Environmental Assessment" have been prepared for the Booth Oil Site based on Phase I Remedial Investigation data. Since the results of the Phase II Remedial Investigation appear to confirm both the contaminants of concern and the media in which the contaminants are present, the conclusions of the preliminary risk assessment can be used to evaluate those areas of the site which should be considered for remediation to prevent unacceptable risk to human health and the environment.

The results of the preliminary risk assessment indicate that there are several groups of compounds which pose unacceptable risks on-site where specific exposure pathways exist. These groups of compounds have been supplemented by additional groups that were determined through further consideration to cause contamination of groundwater, or are in significant concentrations for which there is a lack of toxicity factors or no well-established exposure pathway has been determined at the site. The identified four categories of compounds of concern are:

- Volatile Organic Compounds (VOCs)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Polychlorinated Biphenols (PCBs)
- Supplemental Semivolatile Organic Compounds (SSOCs)

In addition to the groups of organic compounds identified above, the metal, lead, has also been identified as a contaminant of concern due to its high toxicity factor and elevated concentrations found on the site. Lead can be present in site soils as an organic compound and/or an inorganic compound. The risk associated with organic lead is significantly higher than the risk

associated with inorganic lead. Because the analytical procedure used to identify and quantitate lead at the site is based upon total lead, the composition of organic versus inorganic lead has not been established. The different risk factors for organic and inorganic lead have a significant effect on establishing risk-based remediation guidelines at the site, which will be discussed subsequently in this section. Since organic and inorganic composition of lead are not able to be identified, total lead will be treated as a distinct contaminant of concern. Table 5-1 lists the specific compounds included in the selected organic contaminant categories which have been detected at the site.

The groups and lead as discussed above have also been supplemented by evaluations of ignitability as defined under RCRA and the presence of total petroleum hydrocarbons to further identify those portions of the site which are most significantly contaminated. Since these parameters were not evaluated at every sampling location in which other evaluations were made, they have not been used as a detailed analysis, but to further highlight conclusions drawn resulting from remediation guidelines used at the site.

The groups designated on Table 5-1 as polycyclic aromatic hydrocarbons (PAHs) and supplemental semivolatile organic compounds (SSOCs) are actually subgroups of a larger class of compounds known as semivolatile organic compounds or base neutral/acid extractables. Since most of the compounds in the semivolatile groups were not detected at the site, it was determined to establish subcategories of this group to provide more pertinent evaluation of the data.

The use of the contaminant categories allows the constituents to be added and guidelines for site remediation established based on the sum of all the individual contaminants. The risk assessment established criteria based on total known and suspected carcinogenic PAHs, total PCBs and lead in surface soil. VOCs, even though present in site surface soils at elevated levels at three locations, were not determined to be contaminants of concern based upon the risk assessment. This is attributable to the methodologies employed to calculate risk which use average concentration values in the surface soils, and the volatilization and dispersion mechanisms which occur as they relate to exposure routes, primarily inhalation, prior to contact with the receptor.

NYSDEC guidelines for cleanup of soil based on protection of groundwater uses individual parameters for calculating remediation guidelines based on groundwater standards and the organic content of the soil. Since perched groundwater at the site is not used for potable purposes, this exposure pathway was not identified as a source of risk. However, the concentration of VOCs in groundwater is significantly high in both the perched groundwater and subsurface soil at the site to warrant consideration of remediation of these compounds in the soil.

Table 5-1

CATEGORIES OF ORGANIC COMPOUNDS DETECTED AT THE BOOTH OIL SITE

Volatile Organic Compounds (VOCs)

Acetone
Benzene
Bromomethane
2-Butanone
Carbon Disulfide
Carbon Tetrachloride
Chloroethane
Chloroform
Chloromethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethane
1,2-Dichloroethene (total)
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
Ethylbenzene
2-Hexanone
Methylene Chloride
4-Methyl-1,2-pentanone
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
Trichloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Vinyl Acetate
Vinyl Chloride
Xylene (total)

Polycyclic Aromatic Hydrocarbons (PAHs)

Acenaphthene
Acenaphthylene
Anthracene
Benzo(a)anthracene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzo(g,h,i)perylene
Benzo(a)pyrene
Chrysene
Dibenzo(a,n)anthracene
Fluoranthene
Fluorene
Indeno(1,2,3-cd)pyrene
Naphthalene
Phenanthrene
Pyrene

Polychlorinated Biphenols (PCBs)

PCB Arochlor - 1242
PCB Arochlor - 1248
PCB Arochlor - 1254
PCB Arochlor - 1260

Supplemental Semivolatile Organic Compounds (SSOCs)

2,4-Dimethylphenol
2-Methylnaphthalene
2-Methylphenol
4-Methylphenol

The guidelines which will be used to designate areas with VOCs to be considered for remediation of soil is based on the soil partition theory which has been adjusted to account for additional physical, chemical and biological effects of natural attenuation (volatilization, decomposition and dispersion) after the soil contaminants have solubilized and migrated to perched groundwater. The value of total VOCs selected as a remediation guideline for both site surface and subsurface soils is also consistent with the New Jersey Department of Environmental Protection (NJDEP) guideline for evaluating possible cleanup requirements. The guideline established for total volatile organic compounds in soil is 1 mg/kg. This level is well above the highest concentration of VOCs found in off-site surface samples of 0.05 mg/kg (see Table 5-2).

The approach used to select a remediation guideline for the category of compounds comprising polycyclic aromatic hydrocarbons utilizes a risk assessment derived cleanup criteria which has been modified to account for total PAHs and regional anthropogenic (generated by man) concentrations. Based on the evaluation of exposure pathways and an acceptable carcinogenic risk factor of 1×10^{-6} established by the New York State Department of Health, a remediation guideline of 3.6 mg/kg for carcinogenic and suspected carcinogenic PAHs has been established for surface soil at the site. Possibly due to the adsorption of the PAHs into the organic material found in the soil at the Booth Oil Site, significant PAH contamination of the perched groundwater at the site has not been identified. In addition, PAHs are widely dispersed in nature and are formed during combustion of organic material and high-temperature processing of crude oil, coal, coke or other industrial carbon-containing compounds. Therefore, a high background anthropogenic concentration is likely to be present in the Niagara County region and in surface soils on and surrounding the site. Based on sampling of surface soils conducted in off-site areas where concentrations present are probably attributable to airborne depositional sources, either site or non-site related (see Table 5-2), a concentration of total PAHs of 25 mg/kg has been established as a remediation guideline capable of being achieved at the site without attempting to remediate contamination which may be from other regional sources and considered as ambient conditions. The highest concentration of PAHs found off-site is 22.2 mg/kg.

PCBs have been in commercial use since 1929, employed in capacitors and transformers; as plasticizers in paints, inks and paper; as hydraulic fluids; and as heat-transfer fluids. It is unlikely that there would be a high anthropogenic concentration of PCBs in the vicinity of the Booth Oil Site. A preliminary risk assessment value of 5.9 mg/kg in surface soil has been established as a remediation guideline for total PCBs at the Booth Oil Site. PCBs can be adsorbed to a significant extent onto the organic material in the soil at the site. As a result, the concentration of total PCBs in the perched groundwater at the site is low and, because groundwater in the area of the Booth Oil

Table 5-2

CONCENTRATIONS OF CONTAMINANTS
IN OFF-SITE SURFACE SOIL SAMPLES
(mg/kg)

	Sample Number							
Contaminant	SS-11	SS-12	SS-17	SS-18	SS-23	SS-24	SS-25	Range
Total VOCs	0.05	0.05	0.02	0.02	0.03	0.02	0.02	0.02-0.05
Total PAHs	10.9	2.8	22.2	8.3	8.5	4.3	5.7	2.8-22.2
Total SSOCs	0.2	0.09	0.04	0.02	0.2	ND	1.0	0.02-1.0
Total PCBs	ND	ND	ND	ND	ND	ND	3.5	ND-3.5
Total Lead	133	103	202	102	244	248	186	102-248

Note: SS-26 is immediately contiguous to the site.

ND - Not detected

Site is not used for potable purposes, it is not considered to be a risk to human health or the environment. A concentration of 10 mg/kg, based primarily on consideration of health risk, will be used for a guidance value for determining areas recommended for remediation of soil at the Booth Oil Site. This level is also substantially above the highest concentration of PCBs detected off-site of 3.5 mg/kg. All other off-site samples were nondetectable for PCBs.

The contaminants included in the category described as supplemental semivolatile organic compounds were derived from those semivolatile organic compounds in addition to PAHs, which were detected in significant concentrations throughout the site soil and are also present in groundwater possibly due to solubilization. This group is comprised of 2-methylnaphthalene, which is derived from coal tar; 2-methylphenol and 4-methylphenol, which are commonly known as cresols and are obtained from coal tar or petroleum; and 2,4-dimethylphenol, also known as xylenol which is used as an additive to lubricants and gasolines, and is also derived from coal tar. No risk based remediation guidelines were developed for 2-methylnaphthalene since toxicity factors for carcinogenic or noncarcinogenic risk for this compound have not been established by the USEPA.

The other compounds in this group (2-methylphenol, 4-methylphenol and 2,4-dimethylphenol) also do not have established toxicity factors for carcinogenic risk. Although these other compounds do have reference doses for noncarcinogenic risks, the exposure scenarios which have been developed for the site indicate that noncarcinogenic exposures from these compounds do not drive overall site remediation goals. 2-Methylnaphthalene and 2,4-dimethylphenol both exceeded NYSDEC soil cleanup guidelines for protection of groundwater, but 2-methylphenol and 4-methylphenol have no groundwater standards or guidance values and, therefore, no means for calculating soil cleanup values. Since 2-methylphenol and 4-methylphenol were found at higher concentrations than 2,4-dimethylphenol in on-site soils, it was determined to be appropriate to include these cresol compounds in the supplemental semivolatile organic compound category. Compounds included in this category can be classified as base neutrals or acid extractables. The guideline used for establishing remediation goals for surface and subsurface soils at the site is 10 mg/kg. This value is consistent with NJDEP cleanup guidelines for these categories of compounds, and well above the maximum off-site concentration of 1 mg/kg (see Table 5-2). These supplemental semivolatile organic compounds also adsorb to a large extent into the organic content of soil present at the site; however, these compounds have also been found to be present in significant concentrations in the perched groundwater at the site.

In addition to the categories of compounds listed above, the risk assessment has also identified organic lead and inorganic lead as contaminants of concern. The risk derived remediation guideline value for inorganic lead is 11,500 mg/kg and for organic lead is 1 mg/kg. As previously discussed, the percent composition of organic lead versus inorganic lead has not been determined by the analytical procedure used for investigation of the site. Attempts at determining an appropriate analytical procedure by contacting the USEPA and analytical laboratories resulted in no known test method to distinguish between the two forms of lead. Because the differentiation between organic and inorganic lead cannot be made, a value of 500 mg/kg for total lead as a guideline for identifying areas of site soils recommended for remedial action has been adopted which is based on USEPA's lower limit guideline for cleanup of lead contaminated soil of 500 to 1,000 mg/kg. The level of 500 mg/kg is also twice the maximum concentration found in the off-site samples (see Table 5-2).

In summary, the following remediation guidelines will be used to evaluate surface soil, subsurface soil and catch basin and manhole sediment contamination at the site and recommend areas for remedial action consideration:

Total VOCs - 1 mg/kg
Total PAHs - 25 mg/kg
Total PCBs - 10 mg/kg
Total SSOCs - 10 mg/kg
Total Lead - 500 mg/kg

Media such as groundwater has been compared to individual NYSDEC Class GA Groundwater Standards/Guidance Values for evaluation in Section 4. However, the categories of total organic compounds and lead will be used in this section to evaluate those areas of the site which are most significantly contaminated and for identification of the migration pathway between contamination of surface and subsurface soils, and the underlying groundwater.

Since, as previously mentioned, perched groundwater is not used for potable purposes in the vicinity of the site and no other risks are associated with contamination of this media, areas recommended for remediation of groundwater for VOCs will be based on "hot spot" areas such as those containing nonaqueous phase liquid (NAPL) or where significant concentrations of contaminants are present which could be effectively remediated.

Water present in the catch basins adjacent to the site has also been compared to individual surface water standards as presented in Section 4. The water present in the catch basins, as well as the sediment in the catch basins, storm sewer manholes and Little River outfall, have been grouped into the same categories of organic compounds and lead as described above to identify contaminants and concentrations present relative to those found on-site. Based upon the concentrations present in the storm water system, recommendations for remedial action consideration may be warranted and are used in this section. Ultimately, however, guidelines used for the possible remediation of these structures will also be determined by the NYSDEC Department of Fish and Wildlife.

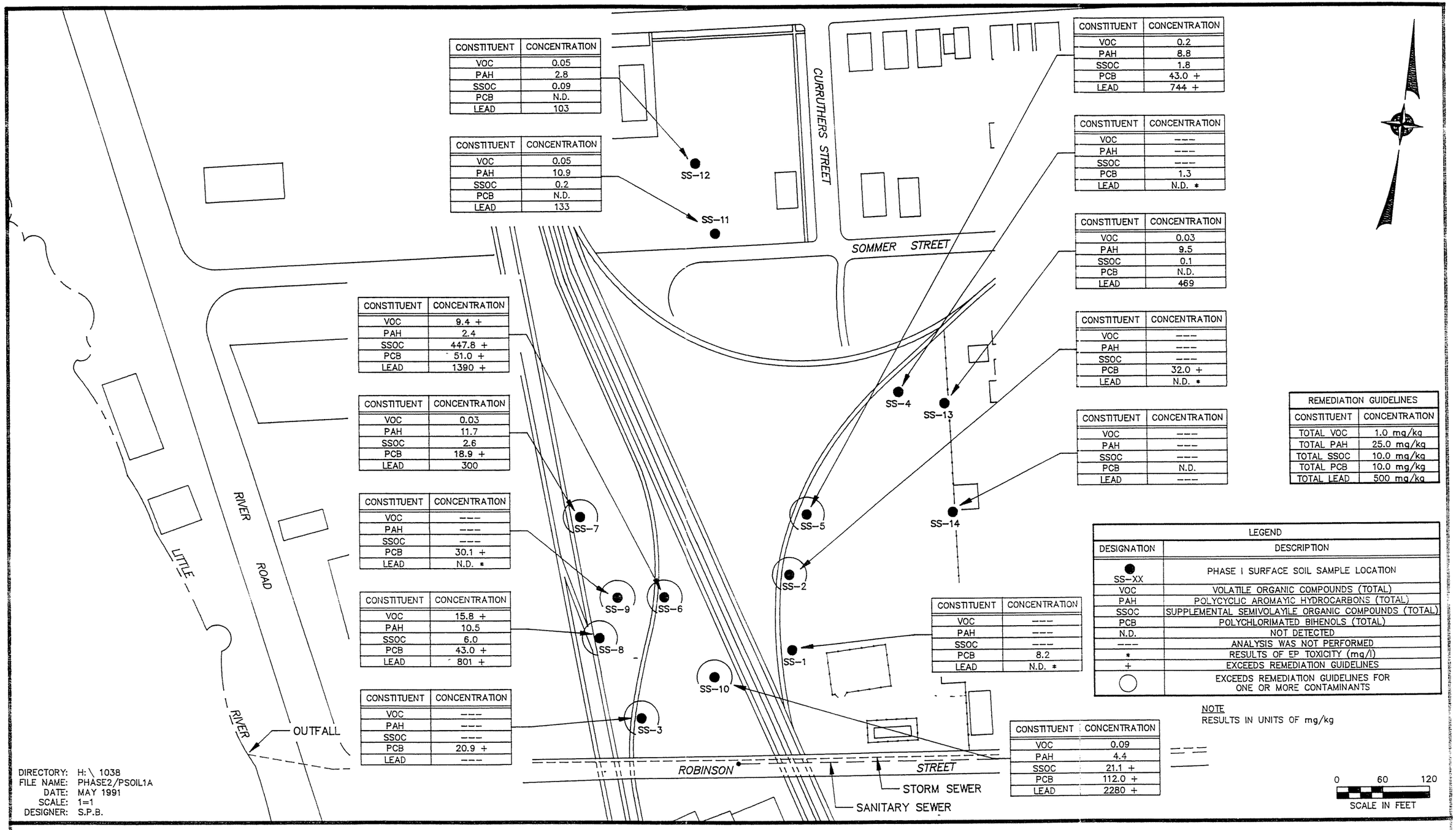
Waste that has been determined to be present as a result of sampling pipes was determined to be so concentrated as to not require comparison to remediation guidelines. As will be discussed in Section 6, this waste material has been recommended for remedial action consideration.

The following subsections provide a detailed analysis of the media evaluated on and adjacent to the site as compared to the remediation guidelines selected for the site.

5.1 Surface Soil

The surface soil sampling locations and total concentrations of contaminants of concern are presented in Figure 5-1 and Figure 5-2. The surface soil in various areas at the Booth Oil Site has been identified to contain all of the categories of compounds and lead (where analyzed) at higher than the established remediation guidelines. One surface sampling location (SS-21) contained all four categories of compounds and lead at values which exceeded the remediation guidelines (see Figure 5-2). The eastern portion of the site has been regraded and clean fill placed as a part of closure activities for the lagoons which were once present. Surface soil samples at the site generally avoided the clean fill areas.

Volatile organic compounds in the surface soil were found to exceed the soil remediation guideline of 1 mg/kg in 3 of 18 soil samples collected. These samples were SS-6 (total VOCs of 9.4 mg/kg) and SS-8 (total VOCs of 15.8 mg/kg) and SS-21 (total VOCs of 164.0 mg/kg). Subsurface soils, as will be discussed in the subsequent section, contained a significant increase in frequency of the number of samples which exceeded the VOC remediation guidelines. Assuming the source of contamination is the same for the surface and subsurface soils (spills), the significant



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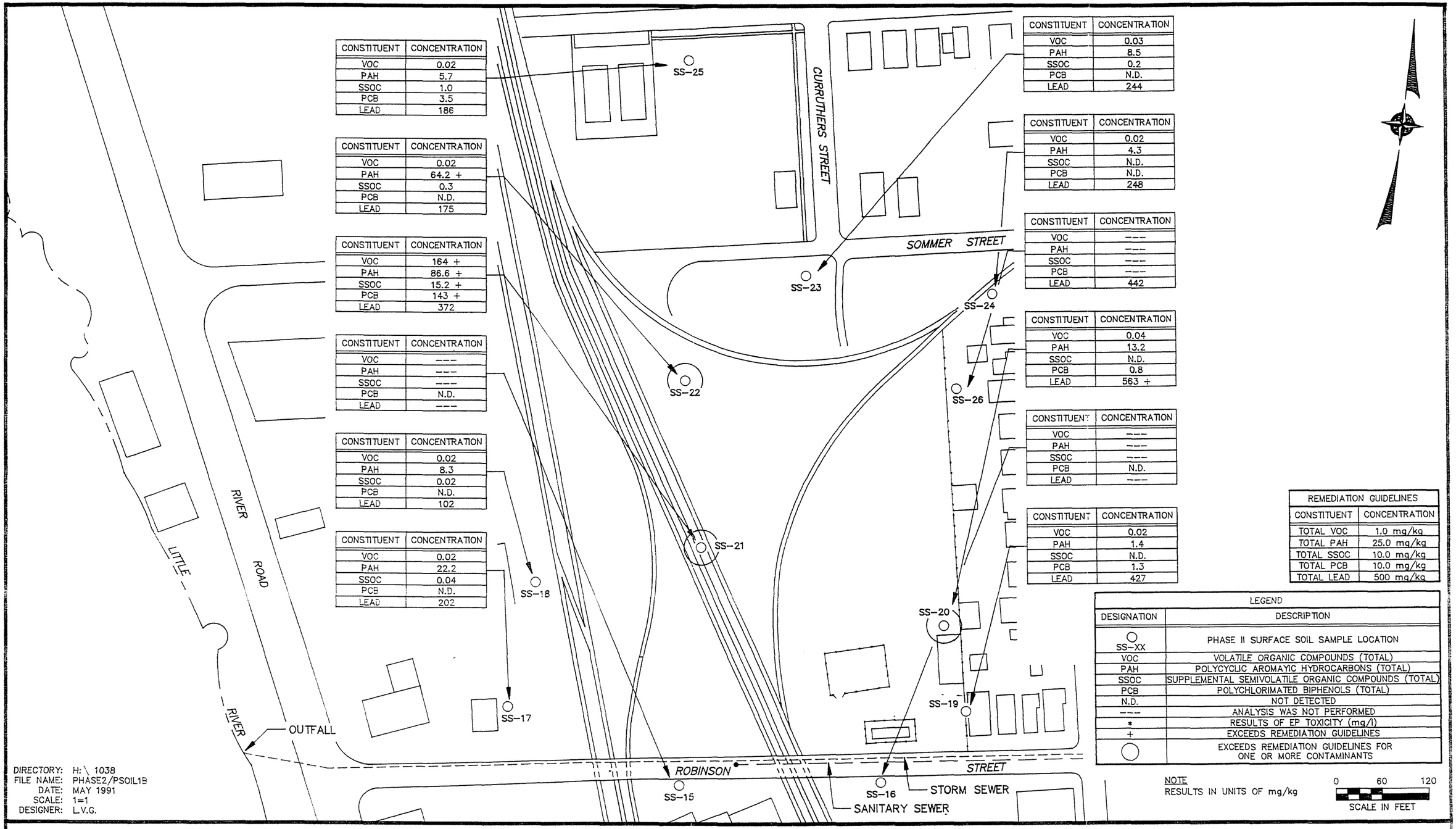
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE I SURFACE SOIL SAMPLING RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5-1



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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE II SURFACE SOIL SAMPLING RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5-2

difference in frequency of exceedance between surface and subsurface soils may be attributable to volatilization which has occurred over time and reduced the concentrations of VOCs in the surface soil. Subsurface soil on the site apparently has not been exposed to the same volatilization mechanism.

There were a total of 18 surface soil samples that were analyzed for PAHs during the remedial investigation field program. As indicated in Figure 5-2, only two of the samples collected exceeded the remediation guideline value of 25 mg/kg for PAHs. The samples which exceeded the remediation guideline are located in the central portion of the site. One of the samples, SS-21, exceeded the remediation guidelines for all of the categories of organic compounds and lead. In the other sample, SS-22 located north of SS-21, total PAHs was the only category of compounds which exceeded the remediation guidelines. It appears, based on data obtained from surface soil, as well as subsurface soil sampling, that the north-central area of the site is relatively free of contamination.

The number of surface soil samples with concentrations of supplemental semivolatile organic compounds which exceed the guidance value of 10 mg/kg is three samples. The total number of samples collected and analyzed for these compounds is 18. The samples which exceeded the remediation guideline were located in the same area (center of the site) and included two of the same samples which exceeded the remediation guideline for VOCs. The samples are SS-6, which had a concentration of 447.8 mg/kg, SS-10, which had a concentration of 21.9 mg/kg and SS-21, with a concentration of 15.2 mg/kg. It should be noted that although sample SS-8 did not exceed the guideline for SSOCs, it had the fourth highest concentration with a value of 6 mg/kg and was also the location at which the concentration of total VOCs exceeded the remediation guidelines.

A total of 25 surface soil samples were collected and analyzed for PCBs. Nine of the 25 samples exceeded the remediation guideline value of 10 mg/kg for total PCBs. All the samples which exceeded the guideline value were located in the south central portion of the site. It is likely that facility operations including distillation processes or spills in this area contributed to the relatively high localized concentrations.

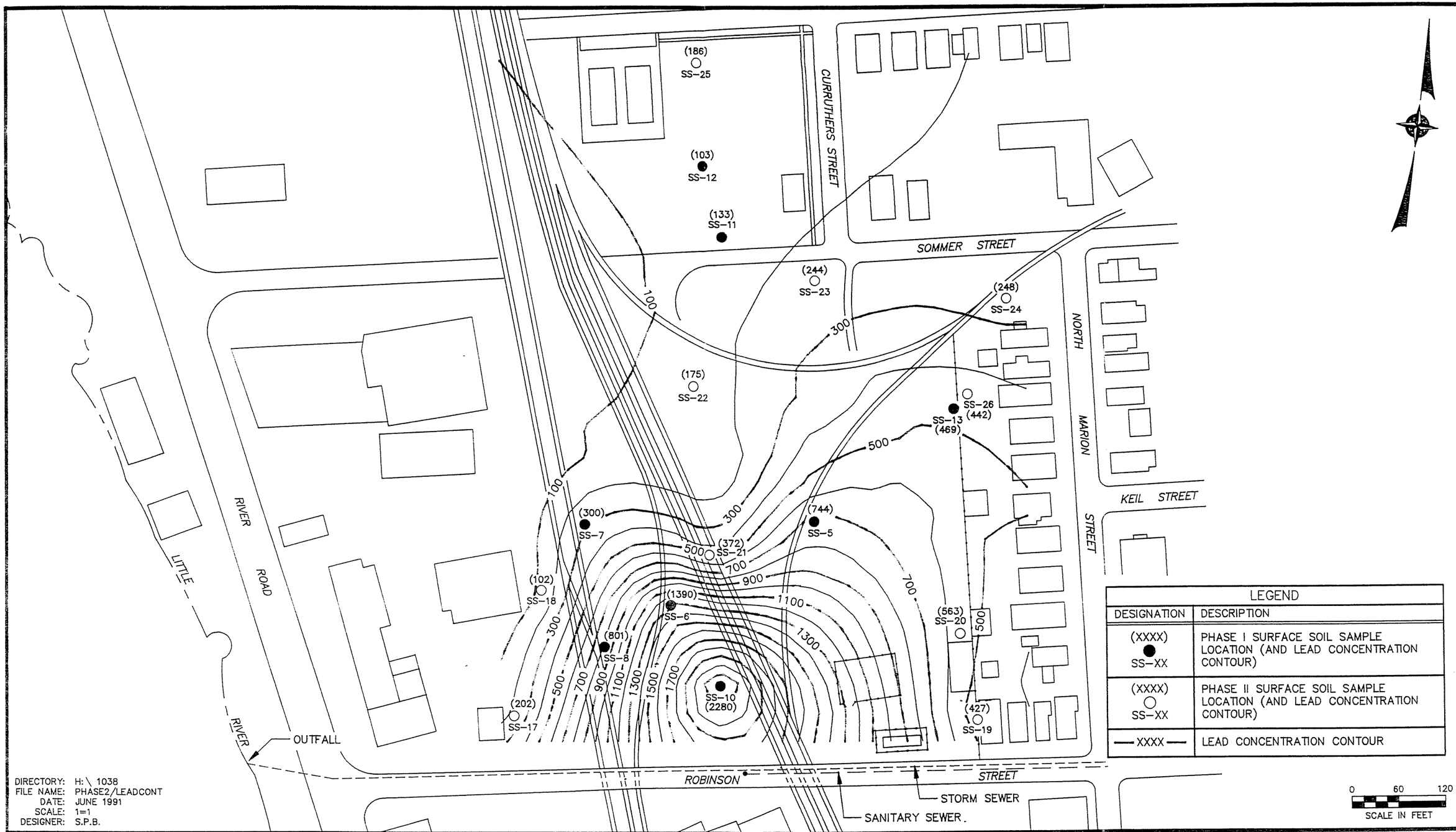
There were a total of 19 samples collected and analyzed for lead. An additional four samples (indicated on Figure 5-1 and 5-2) were analyzed by the EP Toxicity procedure. All of the EP Toxicity procedure tests indicated lead concentrations less than the limits which would characterize the soil as a hazardous waste. Five of the 19 samples collected for total lead analysis had concentrations which exceeded the remediation guideline value of 500 mg/kg.

Only one of the nine samples collected off-site exceeded the remediation guideline for lead. However, it should be noted that an off-site sample (442 mg/kg at SS-26) and two on-site samples were also near the guideline (469 mg/kg at SS-13 and 427 mg/kg at SS-19). Based upon the significant frequency of detection of surface soils which exceeded and were just below the remediation guideline for lead, Figure 5-3 was developed to demonstrate concentration trends for the site. As can be seen on the figure, sample location SS-10 near the center of the site, appears to be the primary location of surface soil lead contamination at the site with a concentration of 2280 mg/kg. Three other samples, SS-6, SS-8, and SS-21, with concentrations of 1390 mg/kg, 801 mg/kg, and 372 mg/kg, respectively, are also in the most significantly lead contaminated area/center of the site. This area is also the location of other contaminants of concern which significantly exceeded remediation guideline values. Two of the remaining locations, SS-5 and SS-7 with lead concentrations of 744 mg/kg and 300 mg/kg, respectively, also had concentrations of total PCBs which exceeded guidelines. In the far eastern portion of the site, including adjacent off-site areas, a number of samples which were collected for total lead analysis exceeded guideline values.

Since none of the selected groups of organic contaminants of concern attributable to the Booth Oil Site were found together with the elevated levels of lead found along the eastern boundary of the site and immediately off-site, an attempt was made to correlate the lead with total petroleum hydrocarbons (TPHCs). However, none of the samples taken in this area were analyzed for TPHCs, and therefore, no conclusion can be made with regard to the elevated levels of lead in the area of the eastern site boundary being attributable to runoff/spills from the Booth Oil Site.

The general concentration trends of lead in surface soils may possibly be explained by airborne depositional sources in the south-central portion of the site where a distillation facility was reported to be located. This source may be supplemented by lead based paints and lead additives in gasoline. In addition, several of these samples are located near the garage used for the Booth Oil facility. It is possible that activities at the garage may have contributed to a localized lead concentration which exceeds guidance values in the vicinity of this structure.

It should also be noted that eight of the ten soil samples tested for hazardous waste characteristics were ignitable, thus characterizing the material as hazardous. This appears to be attributable to the high levels of TPHCs in the samples (see Table 5-3).



LEGEND	
DESIGNATION	DESCRIPTION
(XXXX) ● SS-XX	PHASE I SURFACE SOIL SAMPLE LOCATION (AND LEAD CONCENTRATION CONTOUR)
(XXXX) ○ SS-XX	PHASE II SURFACE SOIL SAMPLE LOCATION (AND LEAD CONCENTRATION CONTOUR)
—XXXX—	LEAD CONCENTRATION CONTOUR

DIRECTORY: H:\ 1038
FILE NAME: PHASE2/LEADCONT
DATE: JUNE 1991
SCALE: 1=1
DESIGNER: S.P.B.

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
TOTAL LEAD CONCENTRATION CONTOUR MAP FOR SURFACE SOILS

FIGURE 5-3

Table 5-3

SAMPLE RESULTS FOR RCRA CHARACTERISTIC IGNITABILITY AND TOTAL PETROLEUM HYDROCARBONS

Sample Type	Sample Number	Ignitability	TPHC (mg/kg)
Surface Soil	SS1	Yes	39,800
	SS2	Yes	36,800
	SS3	Yes	NA
	SS4	No	NA
	SS5	Yes	NA
	SS6	Yes	9,340
	SS7	No	4,150
	SS8	Yes	35,600
	SS9	Yes	NA
	SS10	Yes	NA
Catch Basin Sediment	CB1	Yes	17,500
	CB2	Yes	NA
	CB3	Yes	47,300
	CB5	Yes	15,700
Underground Pipe Sampling	UST2	Yes	768,000
	UST3	Yes	798,000
Nonaqueous Phase Liquid	NAPL		700,000
Subsurface Soil	SB1	No	61,600
	SB2	No	NA
	SB4	No	24,300
	SB5	Yes	94,300
	SB8	No	NA
	SB9	No	2,030
	SB10	No	NA
	SB11	No	117
	MW1	Yes	21,100
	MW6	Yes	53,800
	MW7	No	NA
	MW9	Yes	NA

Note: TPHC - Total Petroleum Hydrocarbons
NA - Not Analyzed

5.2 Subsurface Soil

Six subsurface soil samples of the 15 collected for VOC analysis were identified as exceeding the remediation guideline value of 1 mg/kg for total volatile organic compounds as indicated in Figures 5-4 and 5-5. Although soil borings were not performed directly at the surface soil sampling locations, the area of the site identified as exceeding VOC guidelines in surface soil is in nearly the same area as that identified for subsurface soil. However, the aerial extent of subsurface soil which exceeded the guidelines extends beyond the area identified by surficial contamination.

PAH analytical data for the subsurface soil indicates that two samples exceeded remediation guideline values which was the same number of samples that exceeded the guideline in the surface soil although not located in the same areas. Both samples were also identified as exceeding guideline values for all other categories of organic compounds and lead. Sample SB-5, taken at the 3 to 7.5 foot depth interval, had a concentration of total PAHs of 213.8 mg/kg. The sample collected at the 0 to 2 foot depth during the soil boring for MW-1 had a concentration of total PAHs of 43.1 mg/kg (see Figure 5-4).

SSOC data for subsurface soil indicates five of 15 soil boring samples collected exceeded the remediation guideline value for this group of compounds. Only three of the surface samples exceeded the guideline value. The locations which exceeded the guideline for subsurface samples are generally in the same areas as those which exceeded the guideline for the surface samples. All of the subsurface sample locations also exceeded the guideline for a minimum of one of the other contaminants of concern.

PCB analytical data for the subsurface soil indicates seven of 22 soil samples exceeded the remediation guideline value of 10 mg/kg. All the samples which exceeded the PCB guideline were within four feet of the surface with the exception of SB-5 which was collected at the 3-7.5 foot depth interval. The samples which exceeded the guideline are located generally throughout the site and are interspersed with samples which were below guideline values or where PCBs in the subsurface soil were not detected. Sample SB-10, located in the northeast area of the site (Figure 5-4) SB-23, located in the northwest area (Figure 5-5), MW-4 located in southwest area, and MW-9, located in the south east portion (Figure 5-4) had no other contaminants in the samples other than PCBs which exceeded guideline values. MW-4 and MW-9 however, were only analyzed for lead by the EP Toxicity procedure other than the PCB analysis as indicated in the figures.

CONSTITUENT	CONCENTRATION
DEPTH	0–2 FT.
VOC	37.9 +
PAH	43.1 +
SSOC	36.0 +
PCB	13.0 +
LEAD	286

CONSTITUENT	CONCENTRATION
DEPTH	7–9 FT.
VOC	15.7 +
PAH	9.3
SSOC	1.8
PCB	9.0
LEAD	157

CONSTITUENT	CONCENTRATION
DEPTH	0–2 FT.
VOC	---
PAH	---
SSOC	---
PCB	30.2 +
LEAD	0.05 *

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	0.05
PAH	2.5
SSOC	0.4
PCB	N.D.
LEAD	119

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	25.0 +
PAH	7.6
SSOC	11.0 +
PCB	5.1
LEAD	100

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	---
PAH	---
SSOC	---
PCB	8.3
LEAD	0.02 *

SB–9

CONSTITUENT	CONCENTRATION
DEPTH	11–13 FT.
VOC	0.5
PAH	1.1
SSOC	0.7
PCB	4.2
LEAD	11.2

CONSTITUENT	CONCENTRATION
DEPTH	0–2 FT.
VOC	0.3
PAH	0.3
SSOC	0.04
PCB	1.9
LEAD	171

CONSTITUENT	CONCENTRATION	CONCENTRATION
DEPTH	6–8 FT.	11–13 FT.
VOC	---	0.4
PAH	---	0.07
SSOC	---	0.06
PCB	3.7	N.D.
LEAD	---	11.5

CONSTITUENT	CONCENTRATION
DEPTH	1–4 FT.
VOC	7.6 +
PAH	7.6
SSOC	4.7
PCB	67.0 +
LEAD	1350 +

CONSTITUENT	CONCENTRATION
DEPTH	4–6 FT.
VOC	67.6 +
PAH	14.0
SSOC	17.9 +
PCB	2.5
LEAD	107

CONSTITUENT	CONCENTRATION
DEPTH	6–8 FT.
VOC	---
PAH	---
SSOC	---
PCB	N.D.
LEAD	N.D.*

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	---
PAH	---
SSOC	---
PCB	---
LEAD	N.D. *

CONSTITUENT	CONCENTRATION	CONCENTRATION	CONCENTRATION
DEPTH	3–7.5 FT.	8–10 FT.	10–12 FT.
VOC	1373.4 +	0.4	0.07
PAH	213.8 +	N.D.	N.D.
SSOC	1541.0 +	3.1	0.5
PCB	122.0 +	N.D.	0.1
LEAD	27,700 +	16.8	26.7

CONSTITUENT	CONCENTRATION
DEPTH	5–7 FT.
VOC	0.05
PAH	5.1
SSOC	0.8
PCB	2.3
LEAD	90

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	---
PAH	---
SSOC	---
PCB	1.4
LEAD	0.17 *

CONSTITUENT	CONCENTRATION
DEPTH	0–2 FT.
VOC	---
PAH	---
SSOC	---
PCB	24.1 +
LEAD	0.03 *

REMEDIATION GUIDELINES	
CONSTITUENT	CONCENTRATION
TOTAL VOC	1.0 mg/kg
TOTAL PAH	25.0 mg/kg
TOTAL SSOC	10.0 mg/kg
TOTAL PCB	10.0 mg/kg
TOTAL LEAD	500 mg/kg

LEGEND	
DESIGNATION	DESCRIPTION
▲ MW–XX	PHASE I SUBSURFACE SOIL SAMPLE LOCATION
● SB–XX	PHASE I SUBSURFACE SOIL SAMPLE LOCATION
VOC	VOLATILE ORGANIC COMPOUNDS (TOTAL)
PAH	POLYCYCLIC AROMAYIC HYDROCARBONS (TOTAL)
SSOC	SUPPLEMENTAL SEMIVOLATILE ORGANIC COMPOUNDS (TOTAL)
PCB	POLYCHLORIMATED BIPHENOLS (TOTAL)
N.D.	NOT DETECTED
---	ANALYSIS WAS NOT PERFORMED
NAPL	NONAQUEOUS PHASE LIQUID
*	RESULTS OF EP TOXICITY (mg/l)
+	EXCEEDS REMEDIATION GUIDELINES
○	EXCEEDS REMEDIATION GUIDELINES FOR ONE OR MORE CONTAMINANTS

NOTE
RESULTS IN UNITS OF mg/kg

0 50 100
SCALE IN FEET

CURRUTHERS STREET
SOMMER STREET
RIVER ROAD
LITTLE RIVER
OUTFALL
ROBINSON STREET
STORM SEWER
SANITARY SEWER
SB–10
SB–11
SB–2
SB–12
MW–1
SB–1
MW–4
MW–5
MW–6
SB–4
SB–5
MW–7
SB–8
SB–7
MW–8
MW–9
SB–9

DIRECTORY: H:\1038
FILE NAME: PHASE2/GWCMAP1A
DATE: MAY 1991
SCALE: 1=1
DESIGNER: S.P.B.

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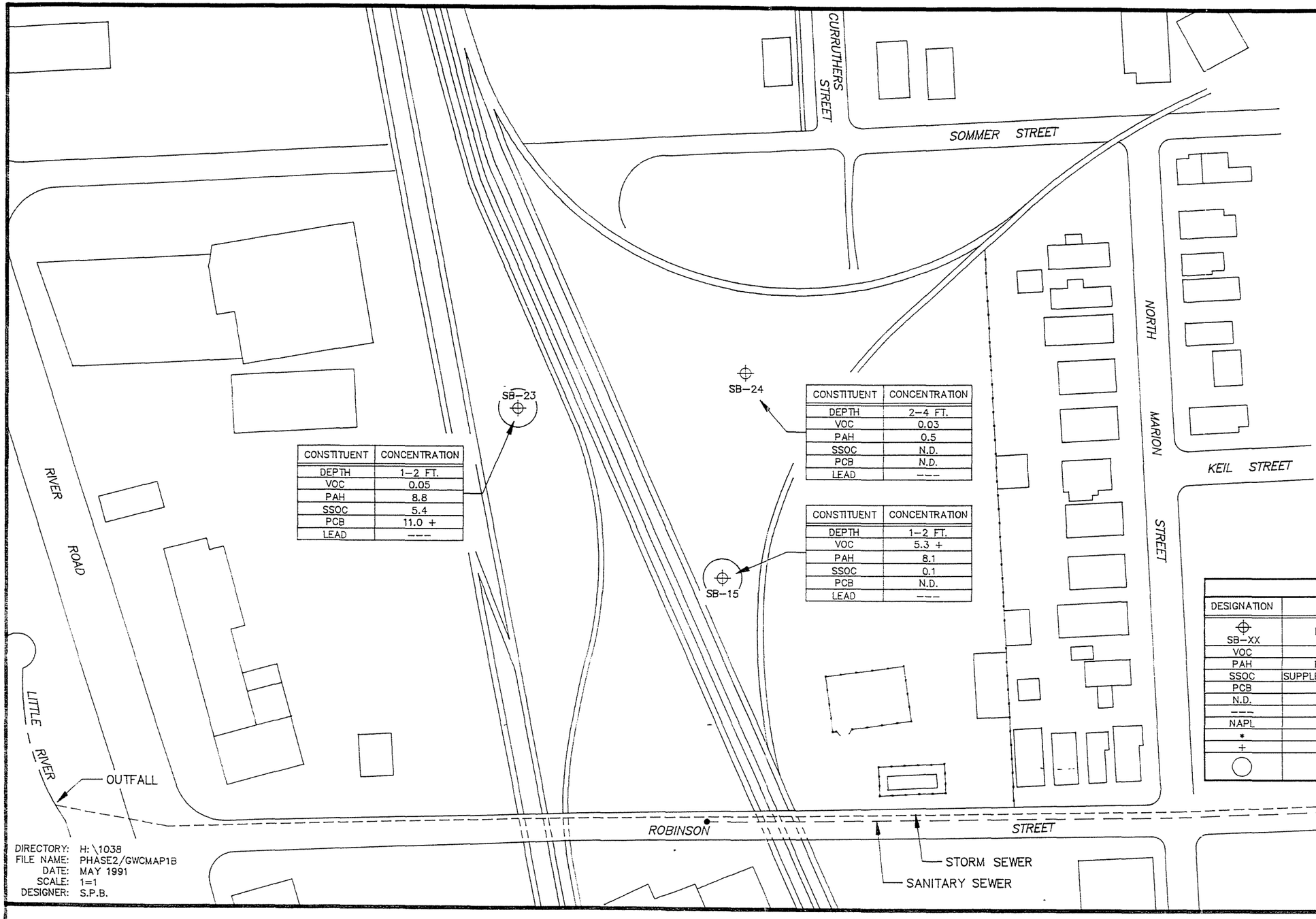
CONSULTING ENGINEERS

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE I SUBSURFACE SOIL SAMPLING RESULTS
FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5–4



CONSTITUENT	CONCENTRATION
DEPTH	1–2 FT.
VOC	0.05
PAH	8.8
SSOC	5.4
PCB	11.0 +
LEAD	---

CONSTITUENT	CONCENTRATION
DEPTH	2–4 FT.
VOC	0.03
PAH	0.5
SSOC	N.D.
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
DEPTH	1–2 FT.
VOC	5.3 +
PAH	8.1
SSOC	0.1
PCB	N.D.
LEAD	---

REMEDIATION GUIDELINES	
CONSTITUENT	CONCENTRATION
TOTAL VOC	1.0 mg/kg
TOTAL PAH	25.0 mg/kg
TOTAL SSOC	10.0 mg/kg
TOTAL PCB	10.0 mg/kg
TOTAL LEAD	500 mg/kg

LEGEND	
DESIGNATION	DESCRIPTION
⊕ SB–XX	PHASE II SUBSURFACE SOIL SAMPLE LOCATION
VOC	VOLATILE ORGANIC COMPOUNDS (TOTAL)
PAH	POLYCYCLIC AROMAYIC HYDROCARBONS (TOTAL)
SSOC	SUPPLEMENTAL SEMIVOLATILE ORGANIC COMPOUNDS (TOTAL)
PCB	POLYCHLORIMATED BIPHENOLS (TOTAL)
N.D.	NOT DETECTED
---	ANALYSIS WAS NOT PERFORMED
NAPL	NONAQUEOUS PHASE LIQUID
*	RESULTS OF EP TOXICITY (mg/l)
+	EXCEEDS REMEDIATION GUIDELINES
◯	EXCEEDS REMEDIATION GUIDELINES FOR ONE OR MORE CONTAMINANTS

NOTE
RESULTS IN mg/l

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE II SUBSURFACE SOIL SAMPLING RESULTS FOR SPECIFIC CATEGORIES OF COMPOUNDS AND METALS

FIGURE 5–5

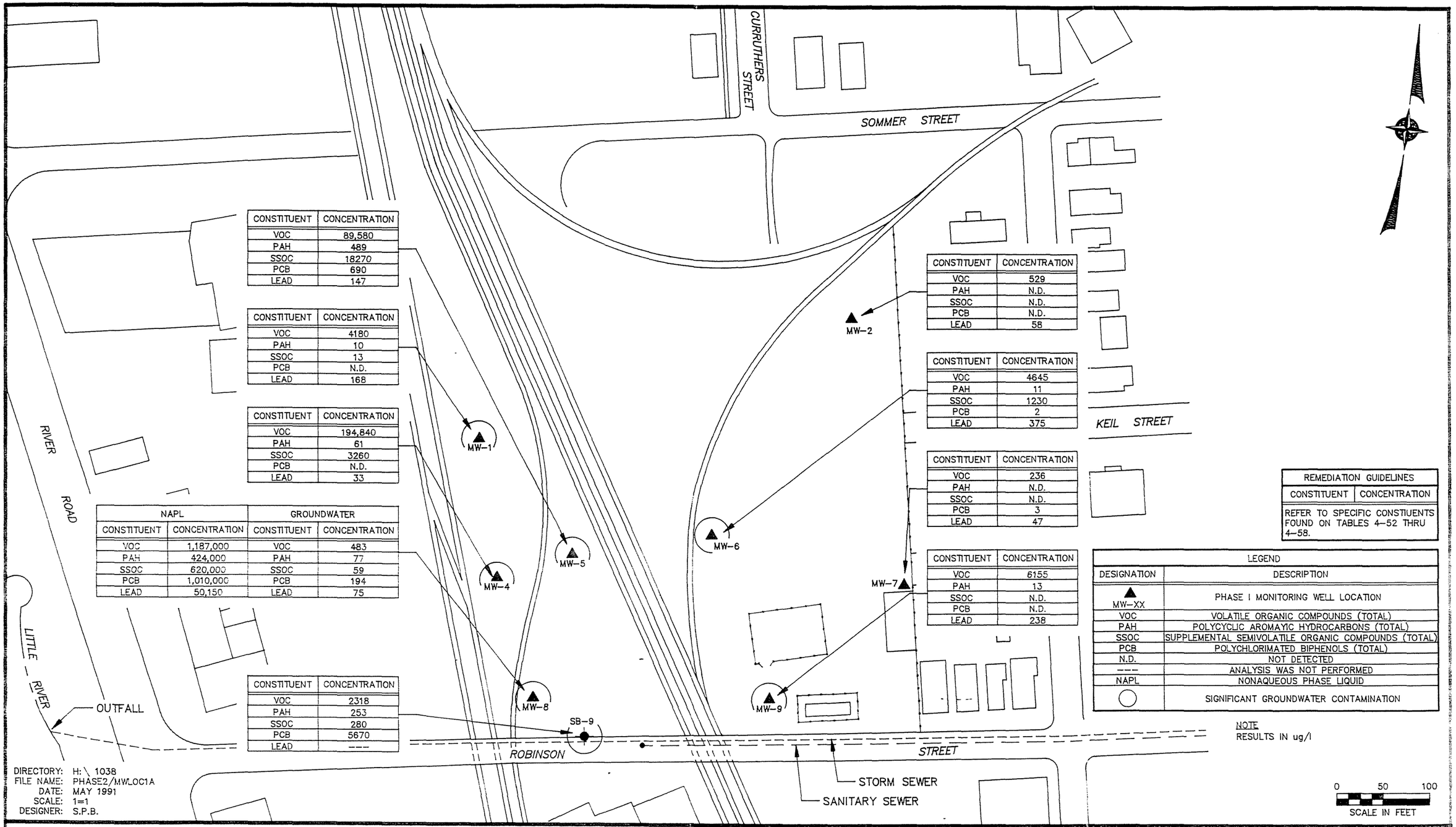
Because subsurface PCB samples which exceeded the guidelines are located throughout the site, it is difficult to determine the primary source to which the contamination may be attributed. PCBs are not likely to migrate in the subsurface soils since PCBs have a tendency to adhere to soil particles, especially the organic fraction. Possible explanations for the distribution of samples which exceed remediation guidelines may be localized spills, areas filled with PCB contaminated soil, or possibly migration pathways caused by manmade structures including product piping, railroad ballast or former surface drainage structures.

Analysis of the subsurface soil samples for total lead resulted in two of 13 samples exceeding remediation guideline values. An additional six samples analyzed by the EP Toxicity procedure (designated on Figures 5-4 and 5-5) were within the limits which would characterize the soil as a hazardous waste. The samples which exceeded the total lead guideline values were samples MW-1 and SB-5, which exceeded all guideline values for organic compound categories and MW-6 which also exceeded the remediation guidelines for VOCs and PCBs. Based upon these results, it is indicated that lead contamination is most predominant in surface soils on and adjacent to the site. Based on the prevalence of lead in surface soil as compared to subsurface soil, it appears that lead resulting from spills or deposition does not readily adsorb to the subsurface soil if it does solubilize and migrate. All the samples which exceeded guideline values in the subsurface soils were on-site and in areas where other compound groups were detected in significant concentrations.

Results of testing for RCRA ignitability indicated a lower frequency for positive results in subsurface soil samples relative to surface soil samples. In subsurface soil samples, 4 of 12 samples were found to be ignitable and as a result, can be characterized as a hazardous material (see Table 5-3).

5.3 Groundwater

NYSDEC Class GA Groundwater Standards/Guidance Values were exceeded for VOCs in all monitoring wells sampled during the RI program conducted at the Booth Oil Site. Figures 5-6 and 5-7 were generated to illustrate categories of total organic compounds present in the soil which may have leached to the groundwater. Although the individual contaminant standards and guidance values will be used for remediation guidelines, the presentation of data in this manner allows the most significantly contaminated groundwater areas of the site to be readily identified and routes of migration, if present, more easily determined. Total volatile organic compound concentrations found highest in MW-4 and MW-5 are located at the highest elevation of



CONSTITUENT	CONCENTRATION
VOC	89,580
PAH	489
SSOC	18270
PCB	690
LEAD	147

CONSTITUENT	CONCENTRATION
VOC	4180
PAH	10
SSOC	13
PCB	N.D.
LEAD	168

CONSTITUENT	CONCENTRATION
VOC	194,840
PAH	61
SSOC	3260
PCB	N.D.
LEAD	33

NAPL		GROUNDWATER	
CONSTITUENT	CONCENTRATION	CONSTITUENT	CONCENTRATION
VOC	1,187,000	VOC	483
PAH	424,000	PAH	77
SSOC	620,000	SSOC	59
PCB	1,010,000	PCB	194
LEAD	50,150	LEAD	75

CONSTITUENT	CONCENTRATION
VOC	2318
PAH	253
SSOC	280
PCB	5670
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	529
PAH	N.D.
SSOC	N.D.
PCB	N.D.
LEAD	58

CONSTITUENT	CONCENTRATION
VOC	4645
PAH	11
SSOC	1230
PCB	2
LEAD	375

CONSTITUENT	CONCENTRATION
VOC	236
PAH	N.D.
SSOC	N.D.
PCB	3
LEAD	47

CONSTITUENT	CONCENTRATION
VOC	6155
PAH	13
SSOC	N.D.
PCB	N.D.
LEAD	238

REMEDIATION GUIDELINES	
CONSTITUENT	CONCENTRATION
REFER TO SPECIFIC CONSTIUENTS FOUND ON TABLES 4-52 THRU 4-58.	

LEGEND	
DESIGNATION	DESCRIPTION
▲ MW-XX	PHASE I MONITORING WELL LOCATION
VOC	VOLATILE ORGANIC COMPOUNDS (TOTAL)
PAH	POLYCYCLIC AROMAYIC HYDROCARBONS (TOTAL)
SSOC	SUPPLEMENTAL SEMIVOLATILE ORGANIC COMPOUNDS (TOTAL)
PCB	POLYCHLORIMATED BIPHENOLS (TOTAL)
N.D.	NOT DETECTED
---	ANALYSIS WAS NOT PERFORMED
NAPL	NONAQUEOUS PHASE LIQUID
○	SIGNIFICANT GROUNDWATER CONTAMINATION

NOTE
RESULTS IN ug/l

0 50 100
SCALE IN FEET

DIRECTORY: H:\ 1038
FILE NAME: PHASE2/MWLOC1A
DATE: MAY 1991
SCALE: 1=1
DESIGNER: S.P.B.

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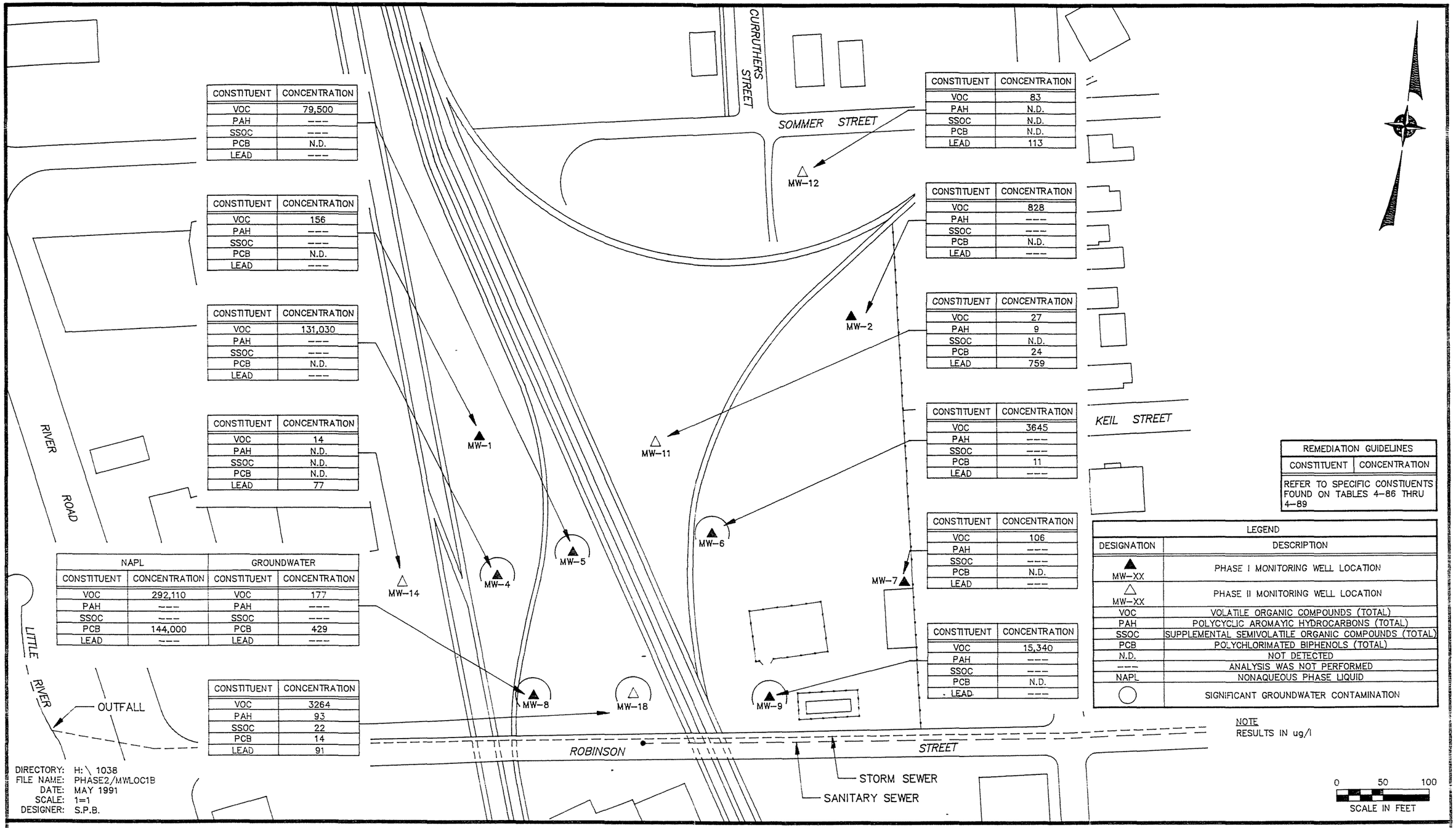
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE I GROUNDWATER MONITORING WELL RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5-6



CONSTITUENT	CONCENTRATION
VOC	79,500
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	156
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	131,030
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	14
PAH	N.D.
SSOC	N.D.
PCB	N.D.
LEAD	77

NAPL		GROUNDWATER	
CONSTITUENT	CONCENTRATION	CONSTITUENT	CONCENTRATION
VOC	292,110	VOC	177
PAH	---	PAH	---
SSOC	---	SSOC	---
PCB	144,000	PCB	429
LEAD	---	LEAD	---

CONSTITUENT	CONCENTRATION
VOC	3264
PAH	93
SSOC	22
PCB	14
LEAD	91

CONSTITUENT	CONCENTRATION
VOC	83
PAH	N.D.
SSOC	N.D.
PCB	N.D.
LEAD	113

CONSTITUENT	CONCENTRATION
VOC	828
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	27
PAH	9
SSOC	N.D.
PCB	24
LEAD	759

CONSTITUENT	CONCENTRATION
VOC	3645
PAH	---
SSOC	---
PCB	11
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	106
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

CONSTITUENT	CONCENTRATION
VOC	15,340
PAH	---
SSOC	---
PCB	N.D.
LEAD	---

REMEDIATION GUIDELINES	
CONSTITUENT	CONCENTRATION
REFER TO SPECIFIC CONSTIUENTS FOUND ON TABLES 4-86 THRU 4-89	

LEGEND	
DESIGNATION	DESCRIPTION
▲ MW-XX	PHASE I MONITORING WELL LOCATION
△ MW-XX	PHASE II MONITORING WELL LOCATION
VOC	VOLATILE ORGANIC COMPOUNDS (TOTAL)
PAH	POLYCYCLIC AROMAYIC HYDROCARBONS (TOTAL)
SSOC	SUPPLEMENTAL SEMIVOLATILE ORGANIC COMPOUNDS (TOTAL)
PCB	POLYCHLORIMATED BIPHENOLS (TOTAL)
N.D.	NOT DETECTED
---	ANALYSIS WAS NOT PERFORMED
NAPL	NONAQUEOUS PHASE LIQUID
◯	SIGNIFICANT GROUNDWATER CONTAMINATION

DIRECTORY: H:\ 1038
FILE NAME: PHASE2/MWLOC1B
DATE: MAY 1991
SCALE: 1=1
DESIGNER: S.P.B.

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE II GROUNDWATER MONITORING WELL RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5-7

the perched groundwater (Figure 3-13) beneath the site. Concentrations of contaminants generally decrease in a downgradient direction and are essentially lowest along the easternmost boundary of the site in monitoring wells MW-2 and MW-7, and off-site adjacent to the western boundary in well MW-14. It should be noted that NAPL found as part of the investigation of SB-5 and SB-9 has not adversely affected groundwater quality in close proximity to where it was found (MW-7 and MW-18 respectively). These results may indicate that the NAPL and groundwater at the site are not readily moving and are in a relatively stagnant perched condition. The contaminant concentration differences between MW-4 and MW-14 may indicate that man made structures such as the railroad ballast may create barriers or conduits for perched groundwater migration or surface water movement on the site.

With respect to semivolatile organic compounds found to exceed the NYSDEC Class GA Groundwater Standards/Guidance Values, the highest concentration of the category of supplemental semivolatile organic compounds was found in monitoring well MW-5 (18,270 ug/l). Concentrations in monitoring well MW-4 (3,260 ug/l), located in the vicinity of MW-5 and separated by a railroad track, were approximately one order of magnitude less, which may indicate that a source of the contamination may have been present in the vicinity of monitoring well MW-5 and was reduced by dilution effects or other natural attenuation mechanisms.

The PAHs and SSOCs in excess of the NYSDEC Class GA Groundwater Standards/Guidance Values approach less than detection limits along the eastern boundary of the site in monitoring wells MW-2 and MW-7. The large number of former storage tanks and processing operations in the vicinity of monitoring well MW-5 may have been the primary source of semivolatile organic compounds in the perched groundwater.

High concentrations of PCBs in groundwater at the site appear to have a direct correlation to the presence of NAPL. The relationship between PCBs and NAPL is highlighted by the difference in results between the Phase I and Phase II investigations for PCBs.

PCBs were detected in groundwater at four monitoring well locations during the Phase I RI (MW-5, MW-6, MW-7 and MW-8). Concentrations of PCBs were significantly elevated in monitoring wells MW-5 and MW-8, which comprise the two on-site wells found to contain NAPL during the Phase I RI field program, as compared to monitoring wells MW-6 and MW-7 which had concentrations close to detection limits. This is probably due to the high levels of PCBs detected within the NAPL layer at MW-8 (1,010 mg/l [total]) and MW-5 located along the same drainage pathway adjacent to a spur of the Penn Central Main Track. Phase II RI sampling for

PCBs included all the monitoring wells sampled during the Phase I RI and the wells installed during the Phase II RI. The results of sampling for PCBs in just the Phase II wells indicates that only two of the four additional wells installed contained detectable levels of PCBs and the concentrations present were relatively low.

Based on a comparison of the Phase I data to that of Phase II (refer to Figures 5-6 and 5-7), PCBs that were detected in wells MW-5 and MW-7 during the Phase I RI, were not detected in these wells during Phase II. The sample from well MW-7 during Phase I was very close to detection limits and therefore, can be considered consistent from Phase I to Phase II. The samples obtained from monitoring well MW-8 were also consistent between the two phases of sampling. MW-5 was the location of the NAPL layer and high PCB concentration in Phase I. During sampling conducted in Phase II, a thin NAPL layer was also detected in the well. The original sample collected from this well as a part of Phase II activities broke during shipment and was sampled again for PCBs two weeks later. Both of these sampling events for this well used a bailer. The replacement sample from this well was collected using a peristaltic pump which collected a sample of groundwater below and without disturbing any NAPL layer which may have been floating at the surface. As a result, no PCBs were detected in the second round of sampling from this well in the groundwater below the NAPL.

The locations where lead exceeded the NYSDEC Class GA Groundwater Standards/ Guidance Values for groundwater, appear to be similar to the trends for lead in surface soils of the site. The highest concentrations of lead are found in the central portion of the site, and decrease in a radial pattern throughout the remainder of the site. Monitoring well MW-11 was found to contain high levels of lead (759 ug/l), with high levels also detected in monitoring well MW-6 (375 ug/l) and MW-9 (238 ug/l). Monitoring well MW-11 may be located in the area of former distillation operations at the site, and MW-6 is located in the vicinity of the former lagoons. Monitoring well MW-9 does not appear to be located near any of the former facilities which operated at the Booth Oil Site (see Figure 1-3).

As discussed above, NAPL was found to be present in monitoring wells MW-5 and MW-8 during the Phase I RI. This coincides with the area of the site exhibiting the highest levels of volatile and semivolatile organic compounds and metals in groundwater. The presence of this nonaqueous phase material tends to confirm previous Niagara County Health Department site inspection findings which reported the presence of numerous spills and oil soaked soils throughout this area of the site. Since NAPL was not present in downgradient well MW-6, it appears that this material is primarily confined in the vicinity of wells MW-5 and MW-8, and borings SB-5 and

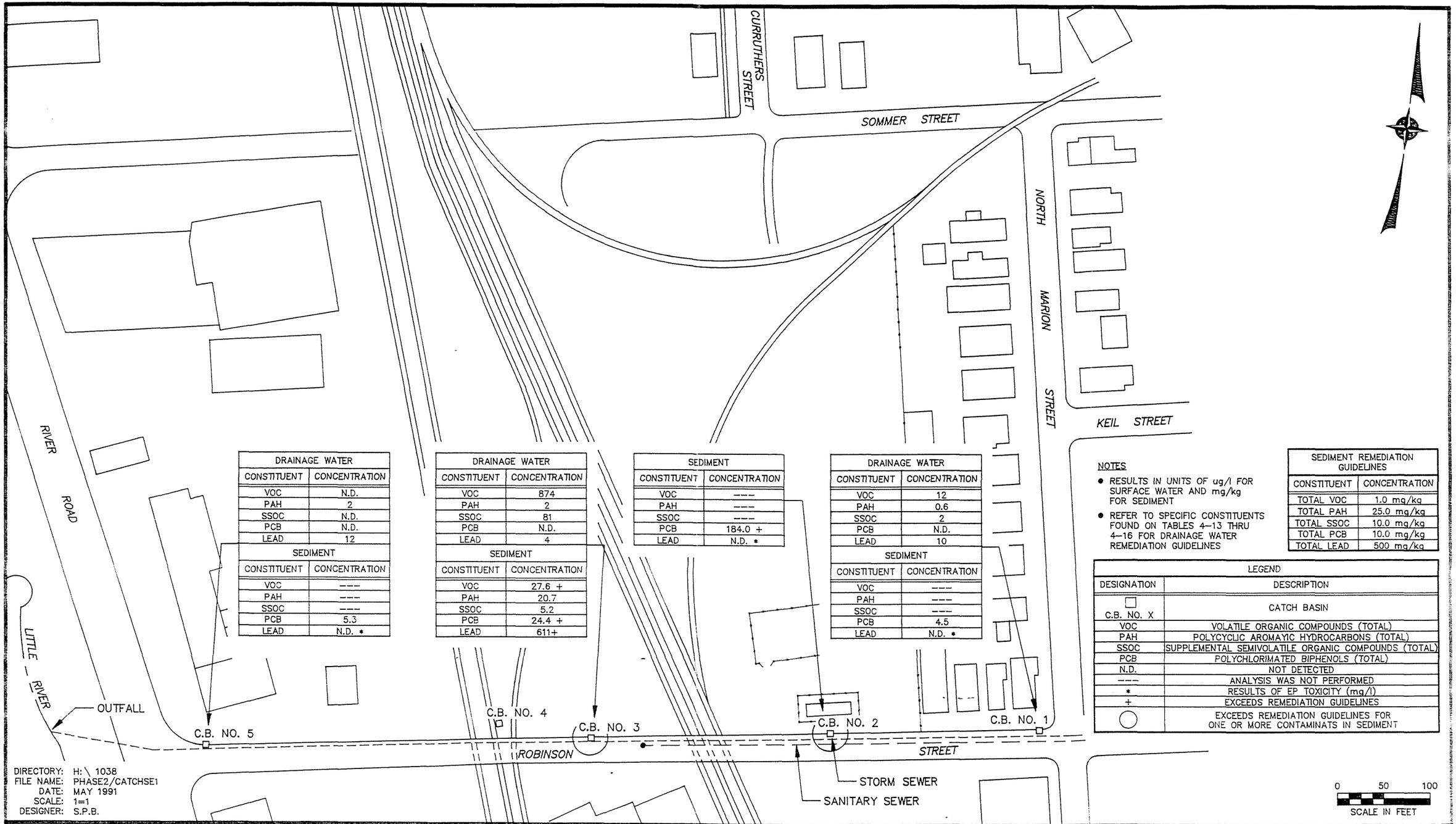
SB-9 in which it was also found, and has not migrated an appreciable distance downgradient. Free oil was also encountered in soil boring SB-7 which is located in proximity to monitoring wells MW-5 and MW-8. An additional shallow monitoring well (MW-18), installed as part of the Phase II RI, in proximity to soil boring SB-7 was found not to contain NAPL.

5.4 Catch Basin/Storm Sewer System

During the remedial investigation field program, three catch basins located on Robinson Street immediately adjacent to the site were sampled for drainage water and sediment. Figure 5-8 shows the locations of the catch basins in relation to the site and the results for the selected categories of organic compounds and lead. Also as part of the field program, three surface water and sediment samples were collected from the Robinson Street storm sewer system at three manhole locations, one drainage water and sediment sample from a manhole located on Sommer Street and two sediment samples were collected from the Little River (see Figure 5-9).

In general, the drainage water samples obtained from the catch basins were not significantly contaminated, but the constituents present are representative of contamination found on the Booth Oil Site. As noted above, when Booth Oil was operating the facility, the Niagara County Health Department documented the presence of oil soaked ground and pools of oily materials at various locations throughout the site. During active plant operations, it is likely that when precipitation events occurred, oil contaminated runoff probably migrated off-site into these catch basins and storm water sewer system adjacent to the site. Erosion of contaminated surface soil may have also contributed to the contamination of drainage water within the catch basin and storm sewer system adjacent to the site.

As contaminated surface water and soil discharged into the catch basin/storm sewer system, it is likely that the basin acted as a settling chamber during periods of low flow and prevented a portion of the contaminated soil from reaching the sewer lines. Contaminated runoff either directly from the site, or contaminant desorption and resuspension of sediments accumulated within the catch basin possibly flowed into the adjoining storm sewer system during high flows and migrated along the storm sewer system and were discharged via the outfall to the Little River. A petroleum odor was noted during the sampling of catch basin no. 3, and the presence of petroleum on the walls of the catch basin structure was recorded during the field investigation. As a result of the presence of this material, desorption of contaminated sediments or contamination which is adsorbed onto the drainage structures themselves may still be a source of contamination



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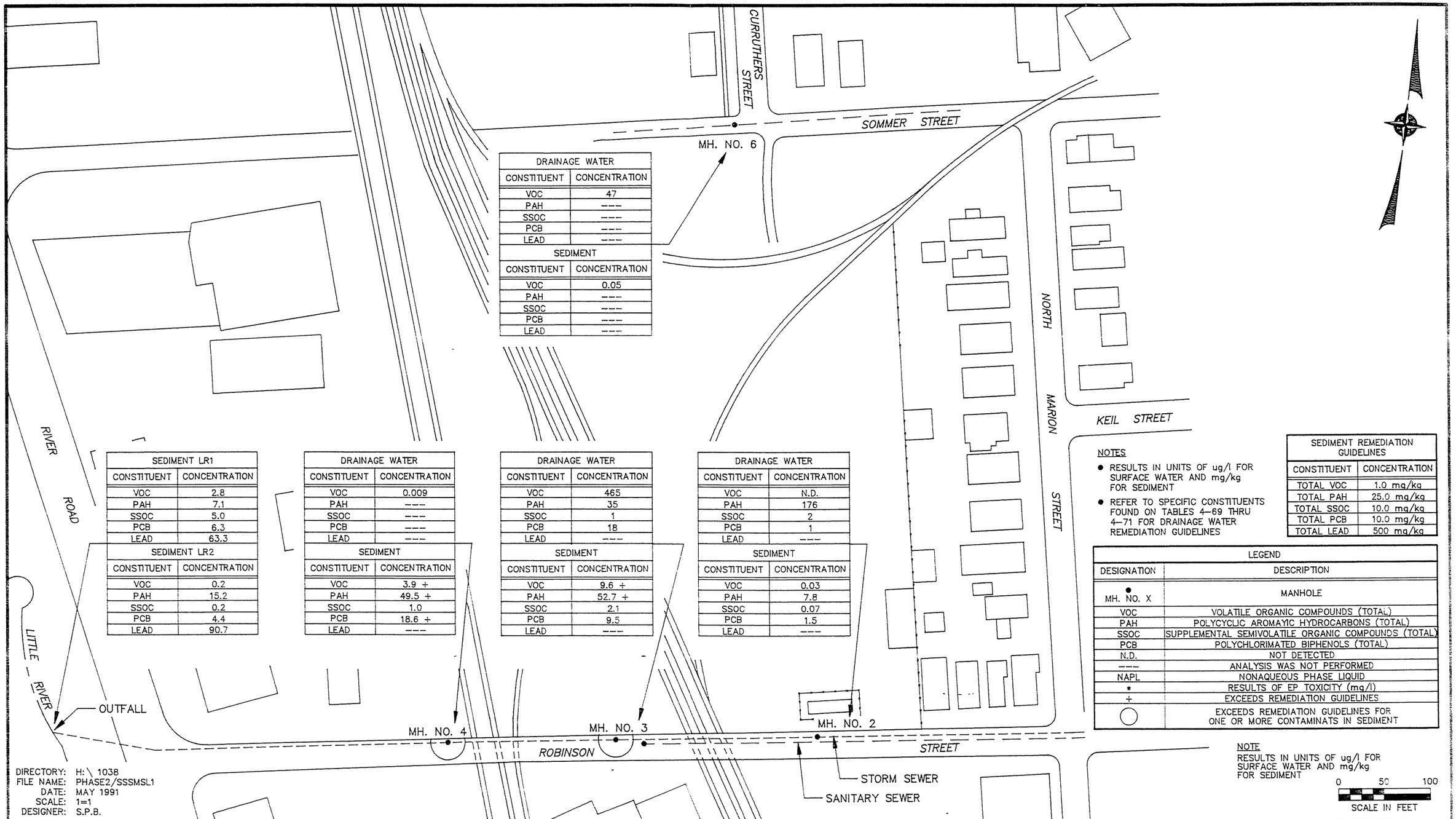
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

PHASE I CATCH BASIN DRAINAGE WATER AND SEDIMENT SAMPLING RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5–8



DRAINAGE WATER	
CONSTITUENT	CONCENTRATION
VOC	47
PAH	---
SSOC	---
PCB	---
LEAD	---
SEDIMENT	
CONSTITUENT	CONCENTRATION
VOC	0.05
PAH	---
SSOC	---
PCB	---
LEAD	---

SEDIMENT LR1	
CONSTITUENT	CONCENTRATION
VOC	2.8
PAH	7.1
SSOC	5.0
PCB	6.3
LEAD	63.3
SEDIMENT LR2	
CONSTITUENT	CONCENTRATION
VOC	0.2
PAH	15.2
SSOC	0.2
PCB	4.4
LEAD	90.7

DRAINAGE WATER	
CONSTITUENT	CONCENTRATION
VOC	0.009
PAH	---
SSOC	---
PCB	---
LEAD	---
SEDIMENT	
CONSTITUENT	CONCENTRATION
VOC	3.9 +
PAH	49.5 +
SSOC	1.0
PCB	18.6 +
LEAD	---

DRAINAGE WATER	
CONSTITUENT	CONCENTRATION
VOC	465
PAH	35
SSOC	1
PCB	18
LEAD	---
SEDIMENT	
CONSTITUENT	CONCENTRATION
VOC	9.6 +
PAH	52.7 +
SSOC	2.1
PCB	9.5
LEAD	---

DRAINAGE WATER	
CONSTITUENT	CONCENTRATION
VOC	N.D.
PAH	176
SSOC	2
PCB	1
LEAD	---
SEDIMENT	
CONSTITUENT	CONCENTRATION
VOC	0.03
PAH	7.8
SSOC	0.07
PCB	1.5
LEAD	---

NOTES

- RESULTS IN UNITS OF ug/l FOR SURFACE WATER AND mg/kg FOR SEDIMENT
- REFER TO SPECIFIC CONSTITUENTS FOUND ON TABLES 4-69 THRU 4-71 FOR DRAINAGE WATER REMEDIATION GUIDELINES

SEDIMENT REMEDIATION GUIDELINES	
CONSTITUENT	CONCENTRATION
TOTAL VOC	1.0 mg/kg
TOTAL PAH	25.0 mg/kg
TOTAL SSOC	10.0 mg/kg
TOTAL PCB	10.0 mg/kg
TOTAL LEAD	500 mg/kg

LEGEND	
DESIGNATION	DESCRIPTION
● MH. NO. X	MANHOLE
VOC	VOLATILE ORGANIC COMPOUNDS (TOTAL)
PAH	POLYCYCLIC AROMAYIC HYDROCARBONS (TOTAL)
SSOC	SUPPLEMENTAL SEMIVOLATILE ORGANIC COMPOUNDS (TOTAL)
PCB	POLYCHLORIMATED BIPHENOLS (TOTAL)
N.D.	NOT DETECTED
---	ANALYSIS WAS NOT PERFORMED
NAPL	NONAQUEOUS PHASE LIQUID
*	RESULTS OF EP TOXICITY (mg/l)
+	EXCEEDS REMEDIATION GUIDELINES
○	EXCEEDS REMEDIATION GUIDELINES FOR ONE OR MORE CONTAMINATS IN SEDIMENT

NOTE

RESULTS IN UNITS OF ug/l FOR SURFACE WATER AND mg/kg FOR SEDIMENT

0 50 100

SCALE IN FEET

DIRECTORY: H:\ 1038
FILE NAME: PHASE2/SSSMSL1
DATE: MAY 1991
SCALE: 1=1
DESIGNER: S.P.B.

Dvirka and Bartilucci
CONSULTING ENGINEERS

BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
PHASE II STORM SEWER AND LITTLE RIVER SAMPLING RESULTS FOR SPECIFIC CATEGORIES OF ORGANIC COMPOUNDS AND LEAD

FIGURE 5-9

to the Little River. It may also be possible that contaminated surface soil or runoff is still entering the storm water system during periods of significant rainfall. It is also possible that contaminated perched groundwater is infiltrating the storm sewer system.

Of the seven drainage water samples collected in both catch basins and manholes, only the samples in catch basin no. 3 and manholes nos. 2 and 3 contained significant contamination with respect to volatile and semivolatile organic compounds. No PCBs were detected in the catch basin drainage water samples. With respect to drainage water samples obtained from the storm sewer, PCBs were detected in manhole no. 3.

With regard to sediment collected from the storm water drainage samples, elevated concentrations of VOCs were found in catch basin no. 3 and manhole nos. 2 and 3. Elevated levels of PAHs were also found in manhole nos. 2 and 3. No significant concentration of semivolatile contaminants of concern were found in any of the basin or manhole sediment.

With respect to PCBs, three arochlors (PCB-1242, PCB-1254 and PCB-1260), which have also been predominately found on-site, were detected in samples from catch basin nos. 1, 2, 3 and 5 and two PCB arochlors, 1260 and 1248 (also found predominately on-site), were detected in sediment samples from the storm sewer system manhole nos. 2, 3 and 4.

Metals analysis was performed only in the sample from catch basin no. 3. This sample indicated an elevated lead concentration of 611 mg/kg.

Since overflow from the catch basins would be the primary means for sediment to enter the sewer (groundwater infiltration to the sewer may also occur), it is apparent that the settling velocities for the sediment particles are low enough, and turbulence and velocities in the catch basins high enough to carry the sediment particles into the sewer system. It is likely during periods of significant rainfall and increased storm water runoff, that settled sediment may be resuspended in the storm water and ultimately discharged to the Little River.

As a note, all of the catch basin samples (4 of 4) tested for hazardous waste characteristics, were found to be ignitable, and therefore, can be characterized as a hazardous material, again due to the high concentrations of TPHCs (see Table 5-3).

5.5 Little River Outfall

Two sediment samples were collected from the Little River in the vicinity of the Robinson Street outfall, which is located approximately one-quarter mile west of the Booth Oil Site and, as described above, is the ultimate discharge point for surface water runoff and soil erosion from the site which has entered the catch basins and storm sewer system along Robinson Street.

A number of volatile organic compounds, polycyclic aromatic hydrocarbons and semivolatile organic compounds were found in the sediment samples from the river. Based on a comparison of the analytical data from these sediment samples to those which were obtained from the storm sewer, many of the same compounds were found in similar concentrations in each sample set. In addition, PCBs were detected in sediment samples obtained from the Little River and the storm sewer system at concentrations generally within the same order of magnitude. Lead was also detected in the Little River sediment samples relatively consistent with the lead found in the sediment from the catch basins. Therefore, contaminants found in the sediment of the Little River (in the vicinity of the Robinson Street Outfall) likely originate from the Booth Oil Site.

5.6 Ambient Air

Nine volumetric air samples were collected and analyzed for volatile organic compounds as part of the remedial investigation. Three air samples were collected over open boreholes (SB-5, MW-5 and MW-8) to simulate conditions that site workers may encounter during remedial operations. The data obtained from the analysis of these samples is compared to the occupational guidelines listed in the NYSDEC's Air Guide-1. Based on this comparison, none of the compounds present in these samples were found to exceed the occupational guidelines. In addition, the concentrations of compounds in the samples were well below, and in most cases, three orders of magnitude less than the guidelines. Based on the concentrations found for these samples, no volatile organic contaminants of concern are identified in air at the site.

Five air samples were obtained to determine ambient air quality representative of background conditions at the site. One of these samples was collected from the breathing zone in the vicinity of drilling operations at soil boring location SB-5A, and the four other samples were collected during groundwater sampling activities at various locations in the Southwestern Leasehold Property Area.

Based on a comparison to the ambient guideline concentrations (AGCs) and proposed AGCs listed in the NYSDEC's Air Guide-1, only two compounds were detected above AGCs. These compounds were 1,1-dichloroethene and vinyl chloride, which were detected at 130 ug/m^3 and 38 ug/m^3, respectively. In comparing the data to the proposed AGCs, a number of compounds were found to exceed the proposed guidelines. These compounds include benzene, carbon disulfide, carbon tetrachloride, 1,1-dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride, which are identified as contaminants of concern. These contaminants were also generally detected in the surface soils, subsurface soils and groundwater of the site. The final health risk assessment will determine to what degree these compounds have a detrimental impact on air quality human health in the area of the site.

It should be noted that the Air Guide-1-Ambient Guidance Concentrations (AGCs) are annual standards and comparison of the concentrations detected over a few hours to these AGCs is very conservative (that is, the actual annual concentrations are likely to be significantly lower than the values generated by sampling during the remedial investigation).

It should be recognized that the samples mentioned above were collected during drilling and sampling activities, which may not accurately reflect conditions during remedial activities or baseline conditions. During remedial operations, ambient air monitoring will be conducted to ensure the safety of site workers and to ensure that no off-site contaminant migration is occurring.

Section 6

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are made based upon site observations, and features, chemical characteristics, including sample analytical results in comparison to New York State standards, guidance values and criteria and remediation guidelines established for the site and physical characteristics, including hydrological, meteorological and geological features, as well as data limitations identified as a result of the Phase II Remedial Investigation. Additional and/or modified conclusions and recommendations which are based upon the final baseline risk assessment of the site, if necessary, will be presented in the final report.

6.1 Waste Material

The principle operational facilities at the Booth Oil Site have been demolished and are no longer present on-site. Some of the piping network between the former process units at the site still exist in subsurface soil and has been sampled. The pipes were determined to contain NAPL which is associated with high concentrations of contaminants present on-site, including PCBs and lead. In addition, the waste material in the pipes sampled was found to be ignitable. Spills of the waste material related to site operations may also be responsible for NAPL presence in the subsurface soil and floating on the perched groundwater at the site. The presence of the NAPL in the pipes continues to pose a potential threat of additional contaminant migration and potential health risk as a result of direct contact.

6.2 Surface Soil

As a result of operational practices at the Booth Oil Site, surface soil in many areas of the site was found to exceed remediation guidelines for all four of the site established categories of organic compounds and lead. In addition, many of the surface soil samples were found to be ignitable due to elevated levels of petroleum hydrocarbons. The constituent which was found most predominately above or near to the guidelines in surface soil, both on-site and off-site along the eastern boundary of the site, was lead. Lead concentrations in subsurface soils were not as elevated leading to the conclusion that the lead present in the surface soil may result from surface spills or surface deposition of particulates from site distillation processes, possibly enhanced by auto emissions or lead-based paint which has been scraped and allowed to be deposited on the soil. Additional investigation of the source(s) of lead in on-site and off-site soils may be warranted.

Other contaminants which were found to predominate in surface soils are those which, due to their molecular structure and affinity to be adsorbed to site soils, are not readily subject to volatilization. This group includes PCBs and to a lesser extent, PAHs and SSOCs. Figure 6-1 shows the extent of the area in which the categories of organic compounds of concern and lead exceed remediation guidelines. VOCs exceed the remediation guideline in surface soils in a small area in the west-central portion of the site (samples SS-6, SS-8 and SS-21).

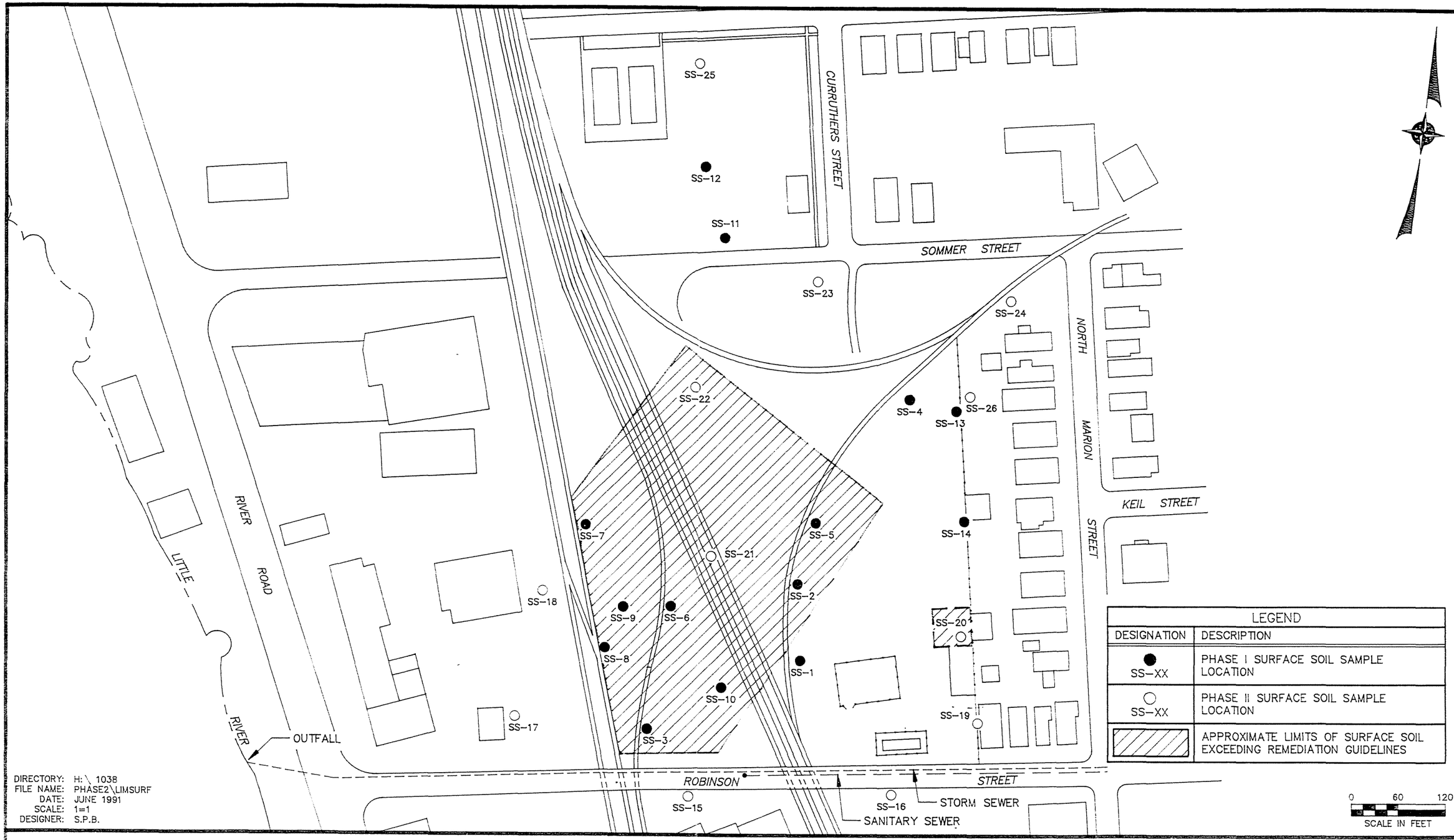
Lead has been indicated to exceed soil remediation guidelines both on-site and off-site. The USEPA has determined that soils adjacent to roadways may have been increased in lead concentration by as much as 10,000 mg/kg in soil since 1930, and that soils adjacent to houses with exterior lead-based paints may have lead concentrations of greater than 10,000 mg/kg (EPA 1986). Additional investigation may be required to establish sources and remediation goals at and adjacent to the site for lead.

The extent of surface soils which exceed remediation guidelines as indicated in Figure 6-1, results in an area of approximately 120,000 square feet. If surface soils at the site are considered to extend one foot in depth, the volume of surficial soil exceeding remediation guidelines is approximately 4,500 cubic yards.

It should be noted, however, that many contaminants found at the site are present to a larger aerial extent in the subsurface soil. Remediation efforts for soil at the site should be based on the extent of subsurface soil contamination since the same criteria for remediation has been used for this medium even though it has not been established as a primary exposure route. Therefore, the extent of surface soil which is determined by the aerial extent of significant contamination in both surface and subsurface soil is 187,000 square feet. Also note that this quantity of material includes manmade structures, such as railroad ballast and foundation structures, and does not include the additional quantities of materials which would need to be removed to insure stable side slopes during excavation of subsurface soils if implemented as an alternative.

6.3 Subsurface Soil

The extent of subsurface soil which exceeds remediation guidelines for the categories of organic compounds and lead is presented in Figure 6-2. As indicated in the figure, and as discussed above, the aerial extent of subsurface soil contamination is larger than that determined for surface soil. In particular, VOCs were found to be present to a much larger extent in the subsurface soil relative to the surface soil. Categories of organic compounds, which adsorb onto



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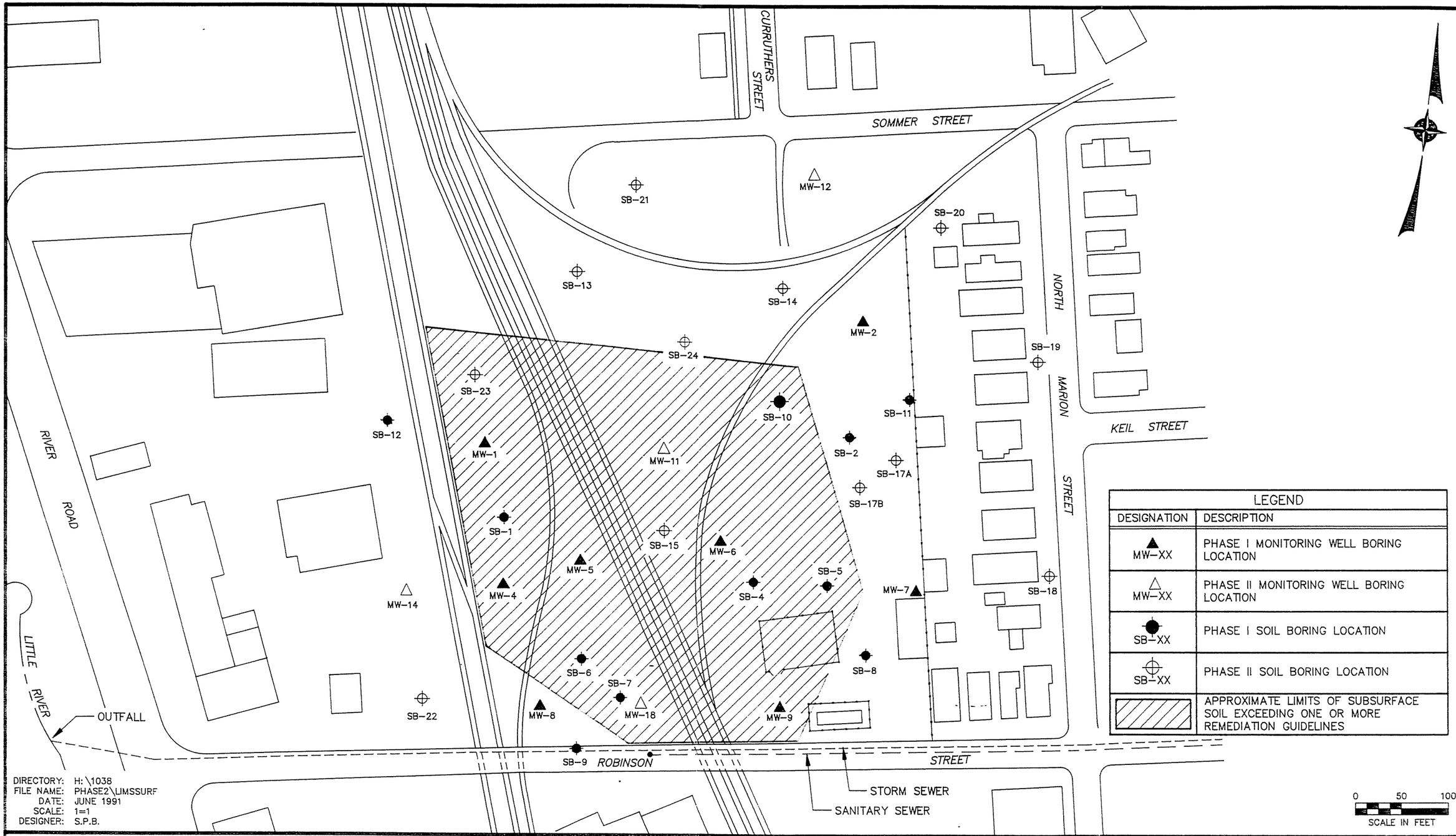
BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK
APPROXIMATE LIMITS OF SURFACE SOIL
EXCEEDING ONE OR MORE REMEDIATION GUIDELINES

FIGURE 6-1



LEGEND	
DESIGNATION	DESCRIPTION
▲ MW-XX	PHASE I MONITORING WELL BORING LOCATION
△ MW-XX	PHASE II MONITORING WELL BORING LOCATION
● SB-XX	PHASE I SOIL BORING LOCATION
⊕ SB-XX	PHASE II SOIL BORING LOCATION
▨	APPROXIMATE LIMITS OF SUBSURFACE SOIL EXCEEDING ONE OR MORE REMEDIATION GUIDELINES

DIRECTORY: H:\1038
FILE NAME: PHASE2\LIMSSURF
DATE: JUNE 1991
SCALE: 1=1
DESIGNER: S.P.B.

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NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

APPROXIMATE LIMITS OF SUBSURFACE SOIL EXCEEDING ONE OR MORE REMEDIATION GUIDELINES

FIGURE 6-2

the organic fraction of the soil and tend not to be mobile, are also present to a large extent in the subsurface soils. Since it is known through inspections by State and local agencies that repeated spills of oil occurred on-site, it is likely that the adsorptive capacity of the organic content of the surface soil was exceeded and migration of organic contaminants into the subsurface unsaturated and saturated soil occurred.

Nonaqueous phase liquid (NAPL) was determined to be present in the subsurface soil as indicated in Figure 4-1. It is probable that the percent fraction of organic content of the soil (average approximately 5%) would not be capable of restricting vertical migration of this material through adsorption capacity of the soil. Migration of contaminants at the site is limited in vertical extent by a clay layer underlying the site. A number of subsurface soil samples, due to high concentrations of PHCs, were ignitable.

Borings which were performed during the remedial investigation indicate that the depth of the clay layer extends from an average of approximately six feet below ground surface to more than ten feet below the surface at the site. Investigations performed by others indicate the clay layer may extend to depths of 28 feet below the ground surface in the vicinity of this site, with a thickness of approximately 15 to 26 feet. This clay layer has been identified as responsible for creating a perched groundwater condition at the site. Since the clay layer (as confirmed by visual observations and sampling during the boring program) has limited vertical migration, the surface of the clay layer can be used to define the vertical extent of subsurface contamination at the site.

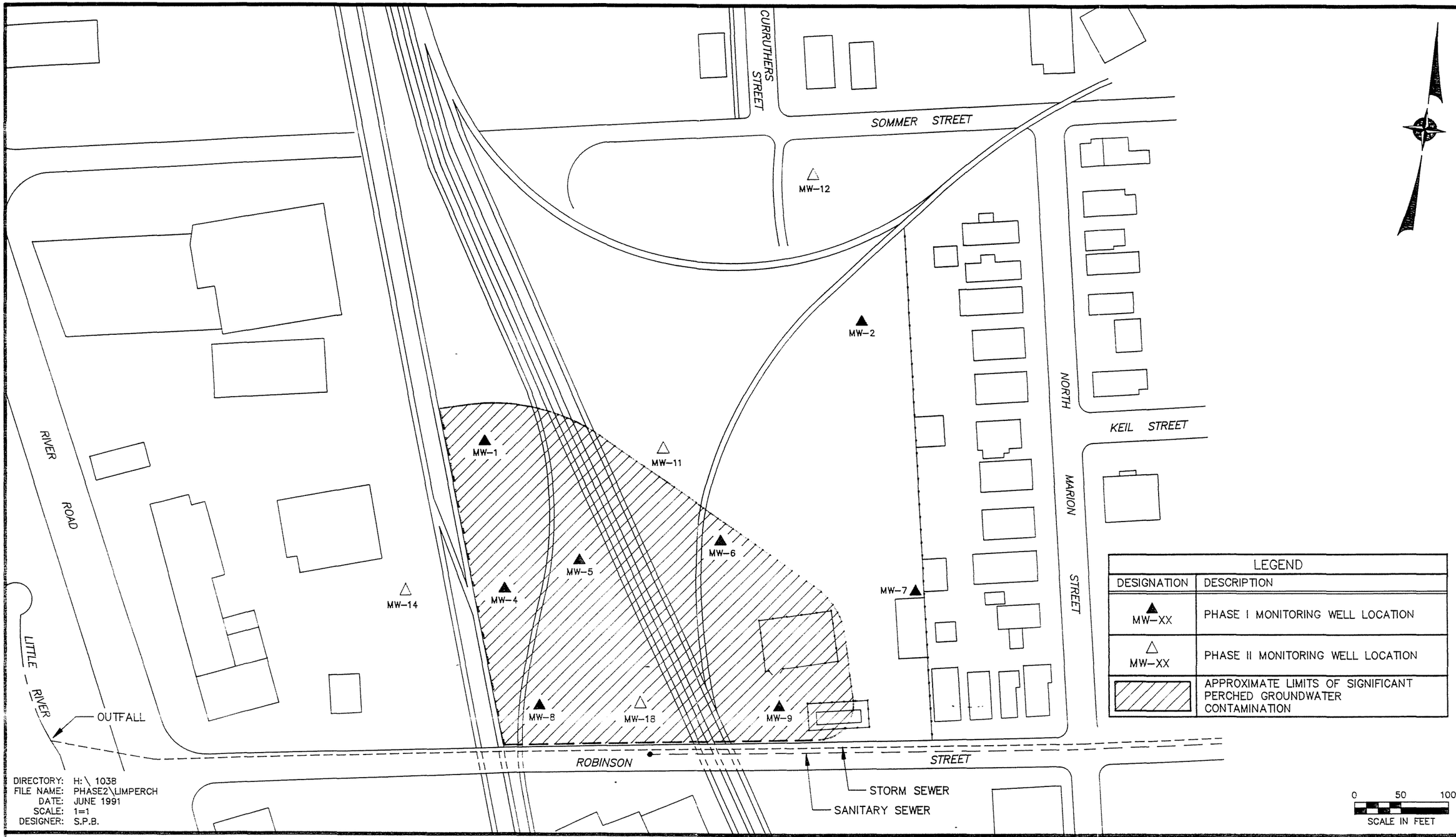
For estimation of quantities of subsurface soil (greater than one foot below ground surface) which exceed the remediation guidelines, the depth of soil will be the average depth to the clay layer which has been determined for the site to be approximately 6 feet below ground surface in the area designated as exceeding remediation guidelines for soil. In addition to the 5 feet of subsurface and excluding 1 foot of surface soil, 1 foot of the clay layer is also identified for remediation at the site to ensure all significant contamination which may be present in the top of the clay is remediated. Therefore, the total volume of subsurface soil including 1 foot of clay and excluding one foot of surficial soil, is approximately 30,000 cubic yards. This volume does not include additional material such as along side slopes which would require removal if excavation is identified as the recommended remedial alternative.

6.4 Groundwater

The subsurface horizontal migration of contaminants at the site appears to be limited. The clay layer at the site has been identified as being "bowl" shaped with the high points of the clay layer tending to be dry (based upon soil boring data) and the lower regions to be the predominant locations of perched groundwater. This effect of the clay layer, combined with the low permeability of the overlying soils, limits both vertical and horizontal subsurface migration of contaminated groundwater and nonaqueous phase liquid. Man-made structures at the site also may have a significant impact upon perched groundwater flow. These structures include the railroad track ballast which is a gravel type material extending approximately 1.5 feet below grade, graded drainage channels including sumps which were constructed on-site but are no longer visible due to demolition and regrading of the site, various pipe trenches which may have higher permeabilities associated with the backfilled soils, and facility foundation structures. These structures may enhance the ability of perched groundwater to migrate horizontally, possibly to off-site locations.

Addition investigation of the effects of surface/subsurface features such as the railroad track ballast, and the south and west adjacent off-site areas as indicated on Figure 3-13 is required to define the potential for groundwater migration off-site at these locations. Definition of these potential subsurface migration pathways may determine additional exposure routes or receptors which may come in contact with contamination resulting from site sources.

Perched groundwater exceeds Class GA Groundwater Standards/Guidelines for a minimum of one constituent in every monitoring well installed during the remedial investigation. The areas of the site which are identified as having the most significant concentrations which exceed groundwater standards/guidelines are identified in Figure 6-3. The criteria used to establish these areas are based on the same categories of organic compounds and lead as identified for surface and subsurface soil. As shown in Figure 6-3, the most significant contaminant concentrations are located in the area with both the most significant subsurface soil contamination (Figure 6-2) and the location of the predominant perched groundwater table as shown in Figure 3-13 (southwestern portion of the site). Those monitoring wells with much lower concentrations of contaminants are located in the secondary perched groundwater location also shown on Figure 3-13 (northeastern portion of the site).



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APPROXIMATE LIMITS OF SIGNIFICANT PERCHED GROUNDWATER CONTAMINATION

FIGURE 6-3

Based on the aerial extent of on-site perched groundwater at both the primary and secondary locations; the saturated thickness based on groundwater elevations as indicated in Figure 3-13 and the clay elevation contour map as indicated in Figure 3-9; a porosity factor of 35% based on the silt/sand soils present above the clay boundary; and a specific yield of 20% based on these soils, a volume of approximately 300,000 gallons of contaminated water is likely to be present on-site. Of this quantity, only about 60,000 gallons is likely to be able to be captured based on the specific yield of the soils.

6.5 Catch Basin/Storm Sewer System

The migration of contaminants from the site attributable to surface runoff and groundwater has been identified as being present in the sediments of the catch basins and the storm sewer adjacent to the site. In addition, the contaminants found in the water which has accumulated in the catch basin, although significantly lower in concentration, may also be attributable to site contamination. This migration pathway discharges to the Little River outfall into the Niagara River and the presence of contaminants in sediments in the river at the storm sewer outfall are similar to those found at the Booth Oil Site. All samples of catch basin sediment were found to be ignitable due to high levels of PHCs.

The migration of contaminants, including oil, had been identified by numerous inspections conducted on-site by State and local agencies. In addition, oil slicks on the Little River prompted the Niagara County Health Department to require the installation of an oil containment boom at the outfall to the Little River. Drainage ditches and collection sumps were installed at the site (when the site was operational) presumably to contain site surface water for subsequent on-site treatment. It has not been ascertained whether the implementation of the ditches and sumps was successful at eliminating this migration pathway or to what extent they were implemented. Subsequent to the termination of operations at the site, most man-made structures were demolished and the site was regraded. It is not known whether some man-made subsurface structures are still influencing site drainage and causing contamination of the catch basins/storm sewer system.

Based on known information, because of the potential for contaminant migration to the Little River, it is recommended that the sediment in the catch basins and storm basins in the area shown in Figure 6-4 be removed. Surface water present in either the catch basins or the storm sewer system should also be collected at the same time sediment is removed to assure this water does not discharge to the Little River. The volume of sediment and water in the catch basin/sewer system is unknown at the present time, but should not be extensive.

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BOOTH OIL SITE
NORTH TONAWANDA, NIAGARA COUNTY, NEW YORK

AREAS OF BOOTH OIL SITE RECOMMENDED FOR REMEDIAL ACTION CONSIDERATION

FIGURE 6–4

The final determination to remediate the catch basins and storm sewer system will be made by NYSDEC Division of Fish and Wildlife.

6.6 Little River Outfall

Sediment in the immediate vicinity of the Robinson Street outfall to the Little River was determined to have constituents present representative of site contamination. As discussed in Section 6.5, the catch basin/storm sewer system migration pathway has been documented. The contaminated sediments present in the Little River will be determined by the NYSDEC Division of Fish and Wildlife as to whether they represent a hazard to aquatic life and if remedial measures would be required. The extent of contaminated sediment in the Little River from the Booth Oil Site is unknown. Additional investigation would be required to determine the volume of sediment which would need to be remediated, if determined to be required.

6.7 Air

Air contamination at the Booth Oil Site is limited primarily to the contaminants which are adsorbed to soil particles and can migrate through wind erosion or as a result of site disturbances which generate particulate dust. Contaminants in vapors have not been detected above standards/guidelines at the site.

Any site disturbances which occur as a result of remedial actions at the site will be mitigated by the procedures contained within a site health and safety plan. The plan will detail air monitoring and specific control procedures to be implemented in the event ambient air concentrations reach action levels on-site.

6.8 Recommendations for Additional Investigation

As a result of the above conclusions regarding the nature and extent of contamination, and contaminant fate and transport at the Booth Oil Site, the following recommendations are provided for consideration in the final screening of alternatives and selection of the remedial action plan, as well as to address the need for additional information regarding off-site limits of perched groundwater contamination and contaminated surface soil, and the effects of man-made structures on contaminant migration.

Man-made Structures

Recommendations were made in 1969 to construct structures which would control surface water runoff from the site. The primary locations of the recommended collection ditches and sumps were along the main tracks traversing the site. It is not known to what extent the surface water control was effective and to what extent they were implemented. It is possible that as a part of site closure activities when facility structures were demolished, many diversion ditches were simply filled and graded, and collection sumps may not have been removed. It is possible that contaminants may still be present in these structures as well as piping which was used to transport the collected storm water to the lagoons or a treatment system. Remaining visible piping which was sampled as a part of the remedial investigation was found to contain nonaqueous phase liquid. Also, it is possible that, in addition to structures constructed to contain and control site surface water runoff, railroad track ballast due to its high porosity, and a portion being below grade, may have acted as a collection sump and/or french drain, for contaminated fluids. Investigation of the ballast material during the field program could not be performed due to easement restrictions stipulated by the railroad.

Additional investigation should be performed to determine the extent of contamination which may be present within the railroad ballast and how the ballast may be effecting the surface water runoff and, possibly subsurface/perched groundwater migration at and off the site. Additional investigation to locate other subsurface structures, such as sumps and piping, should also be considered to determine if all concentrated sources of waste materials and migration pathways have been identified.

Off-Site Sampling

The documentation of spills of oil waste materials on-site, together with the identification of off-site migration pathways including surface drainage structures/trenches and the possibility of subsurface manmade structures influencing contaminant migration as discussed above, may require additional soil sampling to determine the extent of off-site contaminant migration. These routes may include the railroad tracks traversing the site and area properties to the north and south of the site. Soil sampling in these adjacent off-site areas could evaluate whether these structures are active migration pathways or may have been pathways in the past. Discharge from these structures may ultimately affect residential areas in the vicinity of the site.

Perched Groundwater Migration

As has been previously discussed, two apparently separate perched groundwater tables have been identified on-site. The extent of the southwestern perched table has not been well defined in the adjacent south and west off-site areas. Although hydraulic conductivity data derived from slug tests performed in the monitoring wells indicates groundwater flow in the soil above the clay is extremely low, pathways such as the railroad ballast may enhance perched groundwater migration by many orders of magnitude. Recommendations for additional investigation of this and other man-made structures was provided above, however, additional investigation of the extent of perched groundwater in these adjacent off-site areas, as well as the extent of contamination, would be prudent in determining the need for and effects of implementation of groundwater remediation alternatives.

Ponded Water Sampling

Following periods of precipitation, due to the low permeability soils, standing water accumulates on-site. Some of this water, especially in the southern portion of the site, is discolored and has an oil sheen on the surface. Since human or animal contact with this water could pose a potential health risk, this water should be sampled to determine the degree of contamination and if remediation is necessary, either as an interim remedial measure or part of a long-term action.

6.9 Areas Recommended for Remedial Action

Media which has been identified at the Booth Oil Site as posing an unacceptable health risk and/or exceeding remediation guidelines include surface soil, subsurface soil and perched groundwater. Although no remediation guidelines for the catch basin/storm sewer system have been established by NYSDEC, if soil criteria are used for the sediment and water criteria used for the drainage water, the material in these structures also exceed remediation guidelines. Based upon these identified media, Figure 6-4 has been prepared to designate those areas both on and off-site recommended for remediation. Final determination of media and areas to be remediated will be based on the results of the final baseline risk assessment, and determination of NYSDEC Division of Fish and Wildlife and New York State Department of Health. The actual methods to be employed for the remediation for these media will be evaluated in the Phase III Feasibility Study along with costs associated with each alternative.