Executive Summary for the Site Investigations and Focused Feasibility Study for Remediation of Impacts at the East Station Former MGP Site in Rochester, New York

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BACKGROUND

From approximately the mid-1800s to the mid-1900s, manufactured gas plants (MGP) provided a source of gaseous fuel for lighting the cities and towns nationwide until natural gas entered the marketplace. MGPs used various processes to convert coal and oil into usable gaseous fuel for consumers. Rochester Gas & Electric (RG&E) owns property at 84 Smith Street in Rochester, New York that was formerly operated as an MGP, referred to as the former East Station MGP. In 1871, a coal carbonization MGP facility was constructed at the East Station site. Later, a carbureted water gas plant was added to the site between 1892 and 1900. In 1917 a new MGP was constructed (West Station) across the Genesee River from East Station. The gas produced at the West Station was purified at East Station until coal-gas production ceased at the West Station MGP in the early 1950s. In 1952, facilities at East Station were modified to handle natural gas. This modification included the construction of a catalytic reforming plant on the southern portion of the site. The catalyst pellets were composed of nickel-coated ceramic.

In 1917, a light oil recovery plant was constructed at East Station to recover low molecular weight compounds for the production of TNT for World War I. Other byproducts from gas manufacturing were also recovered at the East Station including creosote, pitch, ammonium thiocyanate, and ammonium sulfate. After the war, the light oil plant recovered compounds used for the production of Bengas (a substitute auto fuel). A production plant was constructed and operated at East Station.

Against this historical background of MGP and other manufacturing activities at East Station, and following observance of NAPL on the shoreline in the Genesee River, RG&E initiated site investigations. RG&E retained Atlantic Environmental, Inc. (Atlantic) in 1992 to conduct a preliminary site investigation. In 1998, RG&E selected Ish Inc. with META Environmental Inc. (META) as a subcontractor to conduct a focused remedial investigation (FRI) and a focused feasibility study (FFS). The purpose of this Executive Summary is to synthesize and

summarize the information on the environmental conditions at the East Station site based on the investigations and evaluations completed to date.

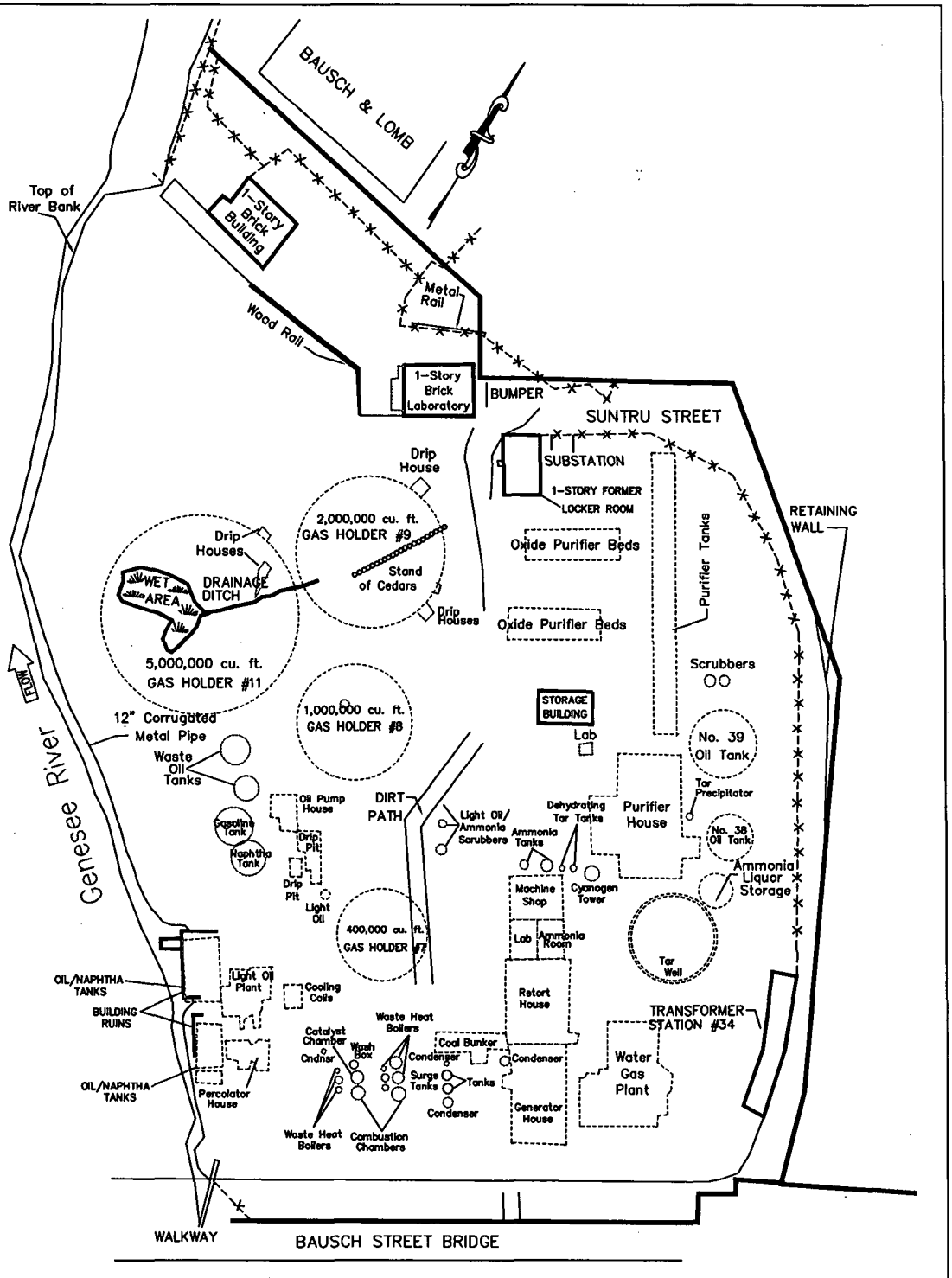
EAST STATION SITE DESCRIPTION

The East Station site covers approximately 13.4 acres and is located north of the business district in the city of Rochester, New York within the Genesee River Gorge. The Genesee River borders the western edge of the site, while Suntru Street forms the eastern boundary. The Bausch Street bridge forms the southern boundary of the site, while the property to the north and northeast is bounded by a property owned by Bausch and Lomb.

Currently there are four buildings on the northern portion of the site; one storage building and a fenced high-pressure gas main in the central part of the site; and two unused surge tanks are present in the southern portion of the site. Most of the site is covered with mixed vegetation.

Figure 1 is the base map, which shows the locations of the various features of the former MGP site. Since the cessation of all manufacturing activities in 1976, the central and southern portions of the East station site have remained vacant, and the northern portion of the site has been used as a fossil energy training center and as a laboratory to meet the chemical and environmental analytical needs of RG&E.

The East Station site slopes slightly upwards towards the southeast with the average elevation reported as 415 feet above NGVD. The subsurface is composed of a layer of fill covering stream alluvium that overlies the bedrock. The fill depth varies from a minimum of 8 feet to a maximum of 25 feet. The alluvial deposit ranges from less than one foot up to about 16 feet thick. Bedrock is encountered at 8 to 37 feet below grade at the site and tends to slope towards (west) the river with some troughs. The bedrock has been characterized as highly weathered and fractured.



160 80 40 0 160

Scale (ft)

Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.

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East Station; Rochester, NY	RG&E/EPRI	META

Figure 1
1998 Focused Remedial Investigation
Base Map

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The groundwater table at the site is generally 5 to 15 feet below grade and it generally flows from east to west towards the Genesee River.

COMPLETED SITE INVESTIGATIONS:

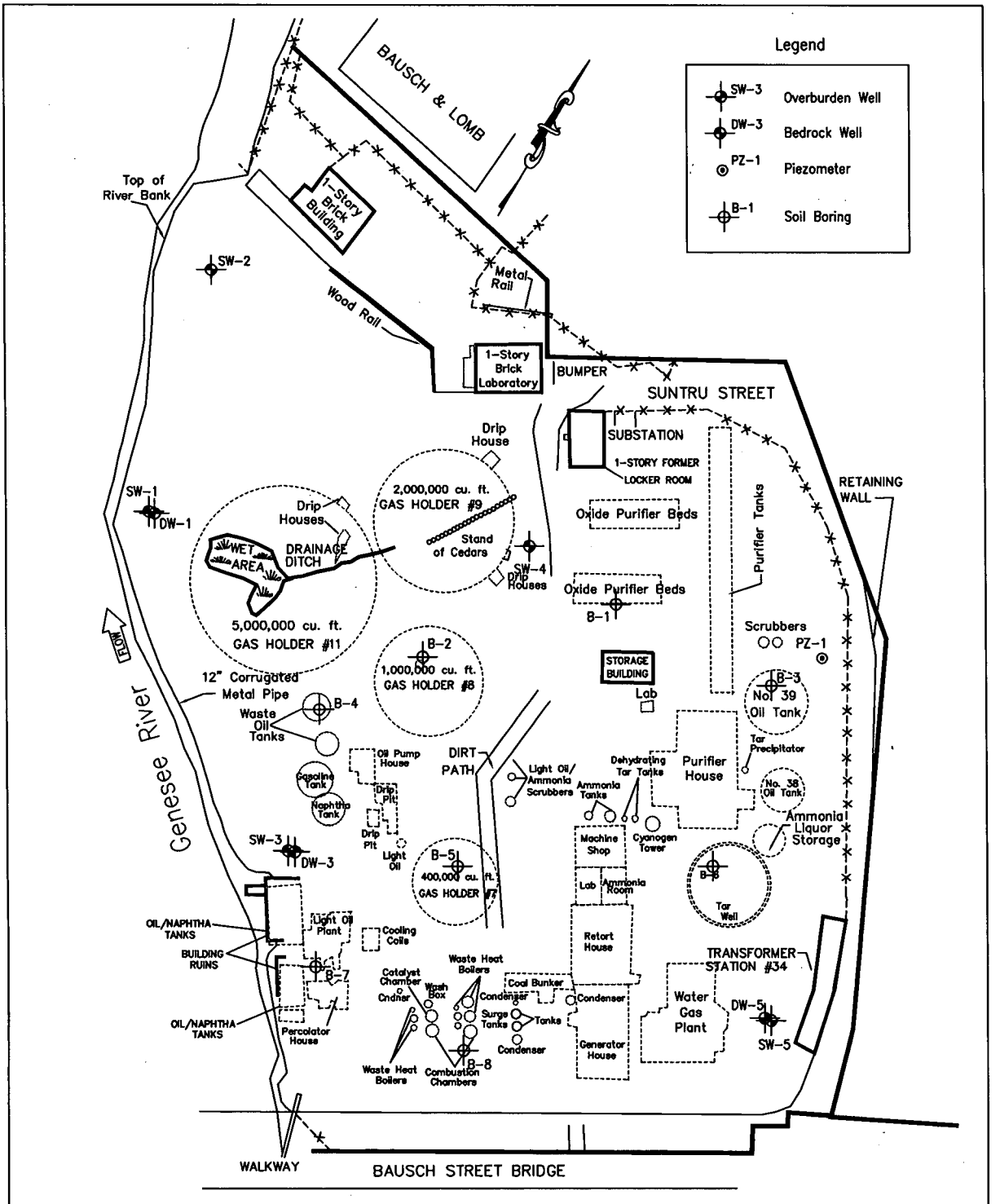
There were three site investigations and one FFS commissioned by RG&E between 1992 and 2001. The first site investigation was performed by Atlantic in 1992. The second investigation was a FRI performed by Ish Inc. and META in 1998. An addendum to the FRI was then completed in 1999 by Ish Inc. and META. The 1998 and 1999 FRI activities were summarized in a report dated April, 2000. A FFS for the development and screening of remediation alternatives for selected areas of the East Station was subsequently completed by Ish Inc. and META in 2001. In the following subsections, the activities and key results from the studies are summarized.

1992 Investigation by Atlantic Environmental Inc.

In June and July of 1992, Atlantic performed a site investigation at the East Station site. The field activities were comprised of a soil gas survey, test pit excavations, collection and analysis of surface soils, soil borings, and installation and sampling of monitoring wells and piezometers. (See Figure 2 for soil boring and monitoring well locations in the 1992 study report).

A total of 68 locations were sampled in the soil gas survey at depths of approximately 4 feet or less below surface grade. All but one of the soil gas samples showed detectable levels of volatile constituents (i.e., benzene, toluene, ethylbenzene, and xylene) at low or trace levels.

Thirteen test pits were excavated at East Station to examine shallow geology, identify buried structures, and assess shallow impacts visually. The test pit excavation program provided evidence of petroleum contamination at five locations. Tar (NAPL) impacts were noted at three locations in the vicinity of the tar well and the former purifier house. In addition, evidence of purifier waste was found at four locations.



Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.

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Figure 2
Previously Installed Wells, Soil Borings, and Piezometer by Atlantic Environmental

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Five surface soil samples were collected and analyzed for metals, cyanide, and polycyclic aromatic hydrocarbons (PAHs). Two of these samples showed elevated levels of total PAHs (over 1,200 mg/kg). A silt sample and a sample from a coke breeze area contained less than 3 mg/kg of total PAHs. The fifth sample was a composite that contained approximately 100 mg/kg of total PAHs. All surface soil samples had three or more metals at concentrations considered to be higher than expected background levels. The silt sample showed no elevated concentrations of any metals. Total cyanide concentrations were from 800 to 2,500 mg/kg level in the two soil samples with visible purifier waste material.

Sixteen soil/rock borings were completed by Atlantic at the East Station site. Three of the borings were completed as bedrock wells and five borings were completed as overburden wells. The remaining eight borings were advanced to the bedrock surface or to the bottom of MGP structures. A total of twelve samples plus two duplicates were collected for analysis from nine of the sixteen borings. All twelve samples contained detectable levels of volatile organic compounds (VOCs) and PAHs. Total Cyanide was detected in all samples except for the background sampling locations. Four of the samples contained elevated levels of arsenic and six other metals (copper, lead, magnesium, mercury, nickel and selenium).

Groundwater samples from the three bedrock and the five overburden wells were collected and analyzed. VOCs were detected in all samples except for the background bedrock and overburden wells. Similarly, all groundwater samples except for the two background wells contained detectable levels of one or more PAHs. Metals and total cyanide were also detected in all groundwater wells.

The 1992 site investigation by Atlantic determined that both MGP and non-MGP residues were present in various areas of the East Station property. These impacts included tar, middle distillate products, purifier waste, and metals. This investigation further identified the presence of tar and PAHs in soils below the water table at depths from 10 to 24 feet below ground surface. For more details, please refer to the site investigation report completed by Atlantic in 1993.

As a result of this 1992 study, an interim remedial measure (IRM) was completed by adding 2 feet or more of soil cap in the northwest corner of the site to eliminate potential risks from exposure to elevated levels of metals in the surface soils.

1998 Focused Remedial Investigation (FRI) by Ish Inc. and META:

In 1998, Ish Inc. and META were retained by RG&E to conduct an FRI at the East Station site. The investigation was conducted in two parts. Part I included a riverbank survey to look for NAPL seeps on the bank of the Genesee River, the installation and sampling of 20 direct push piezometers, and chemical characterization of NAPL, sediment, and aqueous samples. Part II consisted of advancing 23 soil and bedrock borings, collection of a total of 34 samples for chemical analysis; and installation of three 2-inch diameter bedrock monitoring wells, seven 2-inch diameter overburden wells and two 4-inch diameter wells. In addition, focused efforts were made to characterize the tar well contents, including the installation of two piezometers, one monitoring well, five overburden soil borings, three test pits, and two 4-inch wells.

The riverbank survey was performed in September 1998, while the river pool elevation was lowered for routine dam maintenance. The shoreline reconnaissance located the occurrence of NAPL by both visual observations and shallow intrusive sediment probing. NAPL-impacted sediments were collected using hand-augers and/or shovels. At some locations, NAPL-only samples were collected via a peristaltic pump.

The riverbank survey provided evidence of NAPL at several locations on the exposed riverbank as well as within the shallow sediments, particularly northward from Bausch Street to approximately 750 feet downriver (see Figure 3). The observed rate of NAPL discharge from these seeps varied. The analytical results from the six sediments and three NAPL samples are shown in Table 1. These sediment samples had detectable levels of MAHs and PAHs (see Table 1). Chemical fingerprinting analyses, which were performed using gas chromatography with flame ionization detection (GC/FID), determined that the sediment samples were "tar containing" with no evidence of petroleum products.

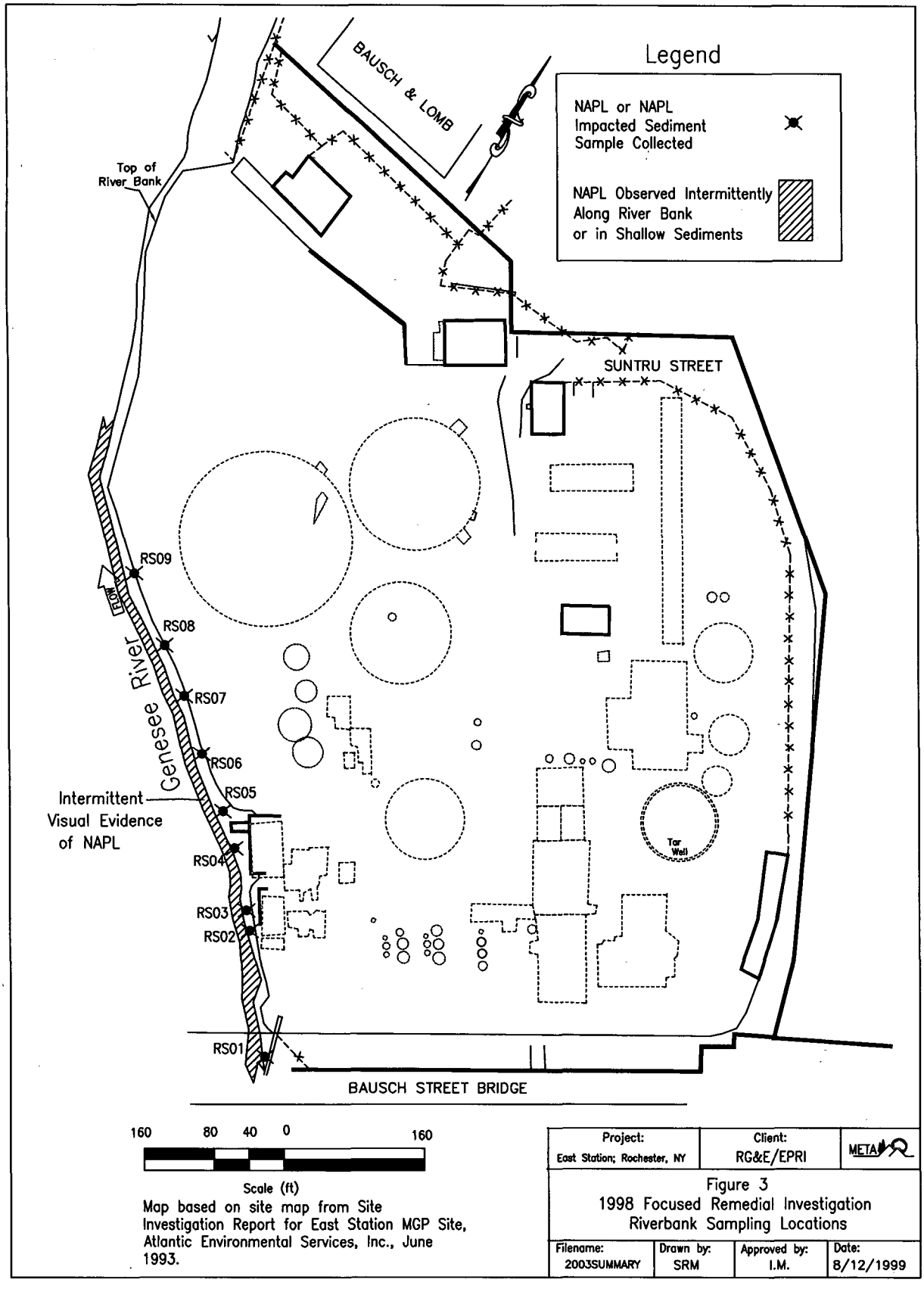
Legend
NAPL or NAPL Impacted Sediment Sample Collected
NAPL Observed Intermittently Along River Bank or in Shallow Sediments
BAUSCH & LOMB
Top of River Bank
SUNTRU STREET
RS09
RS08
RS07
RS06
RS05
RS04
RS03
RS02
RS01
Genesee River
Intermittent Visual Evidence of NAPL
Tar Well
BAUSCH STREET BRIDGE
160 80 40 0 160
Scale (ft)
Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.
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Figure 3
1998 Focused Remedial Investigation
Riverbank Sampling Locations
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Date: 8/12/1999

Table 1 Riverbank Survey Results (September 1998)

Sample Location	Sample Type	Fingerprint	Total MAHs, mg/kg	Total PAHs, mg/kg
RS01	DNAPL	T	8,400	190,000
RS02	sediment	TC	10	180
RS03	sediment	TC	41	1,700
RS04	DNAPL	T	12,000	170,000
RS05	sediment	TC	66	580
RS06	sediment	TC	5.2	37
RS07	sediment	TC	5.4	63
RS08	DNAPL	T	14,000	200,000
RS09	sediment	TC	6.6	150

T (tar with no evidence of refined petroleum or light oil)
TC (tar-containing sediment with no evidence of refined petroleum or light oil)

Note: While the chromatographic patterns were very similar among the samples, there were some small differences. However, no other hydrocarbon substances, such as refined petroleum product or light oil, were indicated by the chromatographic fingerprints.

In addition, a total of 19 liquid samples were collected from selected piezometers and monitoring wells for GC/FID fingerprinting. Samples from the bottom of three piezometers contained denser-than-water non-aqueous phase liquids (DNAPLs), while lighter-than-water non-aqueous phase liquid (LNAPL) samples were collected from the top of two piezometers. Analytical results indicate that 13 of the 19 samples had tar-like signature, two samples had petroleum-related signature, two samples had a mixture of tar and petroleum signature, one sample had no measurable concentrations of MAHs or PAHs, and the remaining one sample had very low amount of PAHs and other organics with no discernable signature. Table 2 summarizes the concentration data for MAHs and PAHs for the 19 samples.

Twenty-seven split-spoon soil samples from 14 overburden borings at selected depth intervals were collected and analyzed for MAHs and PAHs. Also, one sample was analyzed for mercury. The analytical results are shown in Table 3. In general, little evidence of odor or staining was found in 0 to 10 ft zone in the central and western portions and in 0 to 6 ft zone in

Table 2 Piezometer Sampling Results (December 1998)

Location	Fingerprint	Total MAHs	Total PAHs
PZ-01 top	Predominantly MAHs and naphthalene, much less PAHs, no UCM (unresolved complex mixture) or alkanes	8.5 mg/L	5.6 mg/L
APZ-1 bot.	predominantly MAHs and PAHs, slight UCM [NAPL]	190 mg/kg	4,300 mg/kg
PZ-02 top	predominantly MAHs and naphthalene and large high molecular weight UCM [LNAPL]	11,000 mg/kg	40,000 mg/kg
PZ-03 bot.	predominantly MAHs and PAHs, no UCM [DNAPL]	16,000 mg/kg	240,000 mg/kg
PZ-04 bot.	predominantly 3-, 4-, 5-, and 6-ring PAHs, less MAHs and 2-ring PAHs, moderate mid-range UCM	1.5 mg/L	1.6 mg/L
PZ-06 top	predominantly MAHs and naphthalene, much less PAHs, no UCM or alkanes	4.4 mg/L	6.8 mg/L
PZ-06 bot.	predominantly MAHs and PAHs, slight UCM	6.7 mg/L	26 mg/L
PZ-07 top	predominantly MAHs and PAHs, slight UCM	20 mg/L	650 mg/L
PZ-07 bot.	predominantly MAHs and PAHs, slight UCM [DNAPL]	4,300 mg/kg	140,000 mg/kg
PZ-09 bot.	no detected MAHs/PAHs, UCM, or other features	< 0.01 mg/L	< 0.01 mg/L
PZ-12 bot.	predominantly MAHs and low molecular weight PAHs, less high molecular weight PAHs, slight UCM and no alkanes	1.7 mg/L	2.7 mg/L
PZ-13 top	predominantly MAHs and low molecular weight PAHs, less high molecular weight PAHs, no UCM or alkanes	1.2 mg/L	1.5 mg/L
PZ-13 bot	low concentrations of MAHs and PAHs, slight UCM [NAPL]	6.6 mg/kg	140 mg/kg
PZ-16 top	predominantly PAHs and prominent UCM, notable isoprenoid hydrocarbons [LNAPL]	1,100 mg/kg	39,000 mg/kg
PZ-17 bot.	predominantly MAHs and PAHs, slight UCM [DNAPL]	11,000 mg/kg	180,000 mg/kg
PZ-19 top	predominantly MAHs and PAHs, slight UCM	7.6 mg/L	90 mg/L
PZ-19 bot.	predominantly MAHs and PAHs, slight UCM	15 mg/L	190 mg/L
PZ-20 top	predominantly MAHs/PAHs, prominent late eluting UCM	26 mg/L	830 mg/L
DW-3B	predominantly MAHs and PAHs, slight UCM	160 mg/L	2,500 mg/L

Table 3 Split-spoon Soil Sample Results (October 1998)

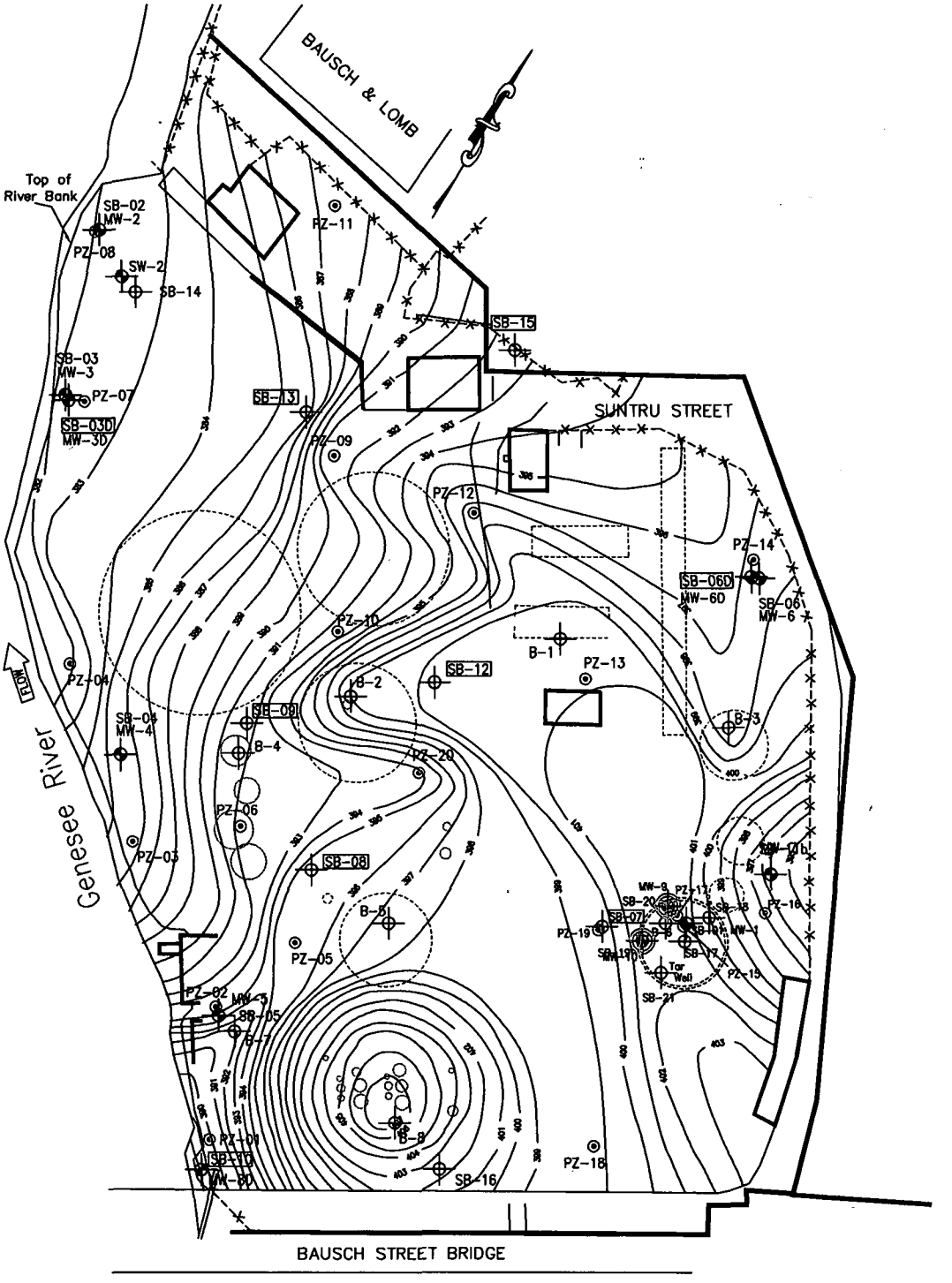
Location	Fingerprint	Total MAHs, mg/kg	Total PAHs, mg/kg
SB-01 (12.6-12.8)	predominantly MAHs and PAHs, no UCM	1,400	88,000
SB-01 (21.6-22)	predominantly MAHs and PAHs, no UCM	340	5,000
SB-01 (22.9-23.3)	predominantly MAHs and PAHs, no UCM	530	14,000
SB-02 (15.4-15.7)	predominantly 3-, 4-, 5-, and 6-ring PAHs, less MAHs and 2-ring PAHs, moderate late- eluting UCM, possible alkane series	23	190
SB-02 (19-19.3)	predominantly 3-, 4-, 5-, and 6-ring PAHs, less MAHs and 2-ring PAHs, prominent late- eluting UCM	5.8	70
SB-03 (11.7-12)	prominent mid-weight bell-shaped UCM, no normal alkane series, visible isoprenoid hydrocarbons, little MAHs and PAHs	11	interferences
SB-03 (13.7-14.0)	prominent mid-weight bell-shaped UCM, no normal alkane series, visible isoprenoid hydrocarbons, little MAHs and PAHs	3.4	270
SB-04 (7.7-8.0)	STC (soil w/tar contam)	300	2,400
SB-04 (11.4-11.7)	predominantly 3-, 4-, 5-, and 6-ring PAHs, less MAHs and 2-ring PAHs, moderate late- eluting UCM	240	1,500
SB-05 (11.3-11.7)	predominantly MAHs and PAHs, prominent late eluting UCM	280	5,100
SB-06 (11.8-12)	predominantly MAHs and PAHs, no UCM	1.6	48
SB-06 (20.9-21.3)	predominantly 3-, 4-, 5-, and 6-ring PAHs, less MAHs and 2-ring PAHs, moderate mid-weight UCM, possible isoprenoid hydrocarbons	25	540
SB-6D (36.1-36.3)	predominantly MAHs and PAHs, no UCM	1.2	480
SB-07 (15.8-16)	predominantly MAHs and PAHs, no UCM	61	2,600
SB-07B (25.4-25.7)	predominantly MAHs and PAHs, no UCM	210	5,600
SB-08 (20.9-21.2)	predominantly MAHs and PAHs, no UCM	400	4,100
SB-09 (22.8-23)	predominantly MAHs and PAHs, large mid-weight UCM, isoprenoid hydrocarbons	63	940
SB-10 (19.3-20.0)	predominantly MAHs and PAHs, slight UCM	21	2,700
SB-10 (22.2-2.5)	predominantly MAHs and PAHs, slight UCM	54	2,000
SB-11B (19.5-19.7)	predominantly gasoline-range hydrocarbons, prominent gas oil-range UCM, isoprenoid hydrocarbons, low amounts of PAHs	7.0	96
SB-11B (31.5-31.8)	predominantly MAHs and PAHs, slight UCM	31	2,700
SB-13 (18.7-18.9)	unknown	4.5	21
SB-14 (2.0-6.0)	0.72 mg/kg Hg		
SB-15 (9.6-9.8)	nothing detected	0.37	1.9
SB-15 (15.5-15.7)	predominantly PAHs, no UCM	0.92	14
SB-16 (19.4-19.6)	predominantly 4-, 5-, and 6-ring PAHs, no MAHs and 2- and 3-ring PAHs, moderate mid-weight UCM, possible isoprenoid hydrocarbons	1.5	110
SB-16 (22.8-23)	predominantly MAHs and PAHs, slight UCM	39	2,400

the eastern portion of the site. In most borings, a thin layer of DNAPL was observed near the overburden/bedrock interface. Of the 27 samples analyzed, 17 contained tar or evidence of tar, three samples presented evidence of one or more petroleum types, four samples contained both tar and petroleum, and the remaining two samples did not show any discernable chemical patterns.

Altogether 9 bedrock corings were installed during the 1998 FRI activities and Table 4 identifies 6 borings cored to 10' deep, 2 cored to 15' deep and 1 cored to 20' deep. Three of these locations were finished as bedrock monitoring wells.. In addition, the bedrock borings also identified/confirmed the presence of fractures. Table 4 summarizes the extent of fractures and NAPL in the bedrock fractures noted during the 1998 fieldwork. This table provides evidence of NAPL present in at least one or more fractures in all bedrock borings, and in six of the nine borings 25% or more of the fractures contained NAPL. Although most of the fractures were horizontal, some vertical fractures were also present. The NAPL observations from bedrock fractures across the site are consistent with NAPL movement along the horizontal and vertical slopes of the fractures.

Based on the combined Atlantic (1992) and Ish Inc./META (1998) site investigations, a bedrock contour map of East Station was developed, as shown in Figure 4. This map indicates that the tar well is located on bedrock high and that the bedrock drops off both towards the river and north/northeast towards the retaining wall.

NAPL was found to be widespread at the site in the overburden and bedrock. In addition, NAPL was observed at several locations in the near-shore riverbed sediments. Various thicknesses of NAPL were observed in the overburden. However, in most overburden locations, the NAPL occupied a relatively narrow zone near the bedrock surface. Furthermore, the thickness of the weathered bedrock was observed to vary at different locations. This weathered bedrock also contained NAPL when it was present underneath the overburden material.



Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.

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Figure 4
1998 Focused Remedial Investigation
Bedrock Contour Map

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Table 4 Extent of NAPL in Bedrock Fractures (October 1998)

Bedrock Boring	Elevation Range, feet MSL	No. of Fractures	No. of Fractures w/DNAPL	% Fractures w/DNAPL
SB-03D	382-377	10	1	10
	377-372	12	0	0
	372-367	13	0	0
SB-06D	398-393	17	0	0
	393-388	11	0	0
	388-383	15	14	93
	383-378	19	19	100
SB-07	399-394	17	15	88
	394-389	11	4	36
SB-08	396-391	18	10	56
	391-386	11	4	36
SB-09	391-386	17	11	65
	386-381	18	3	17
SB-10	388-383	18	1	5.6
	383-378	12	3	25
	378-373	14	3	21
SB-12	400-395	17	0	0
	395-390	15	11	73
SB-13	386-381	14	0	0
	381-376	14	1	7.1
SB-15	393-388	13	0	0
	388-383	19	1	5.3

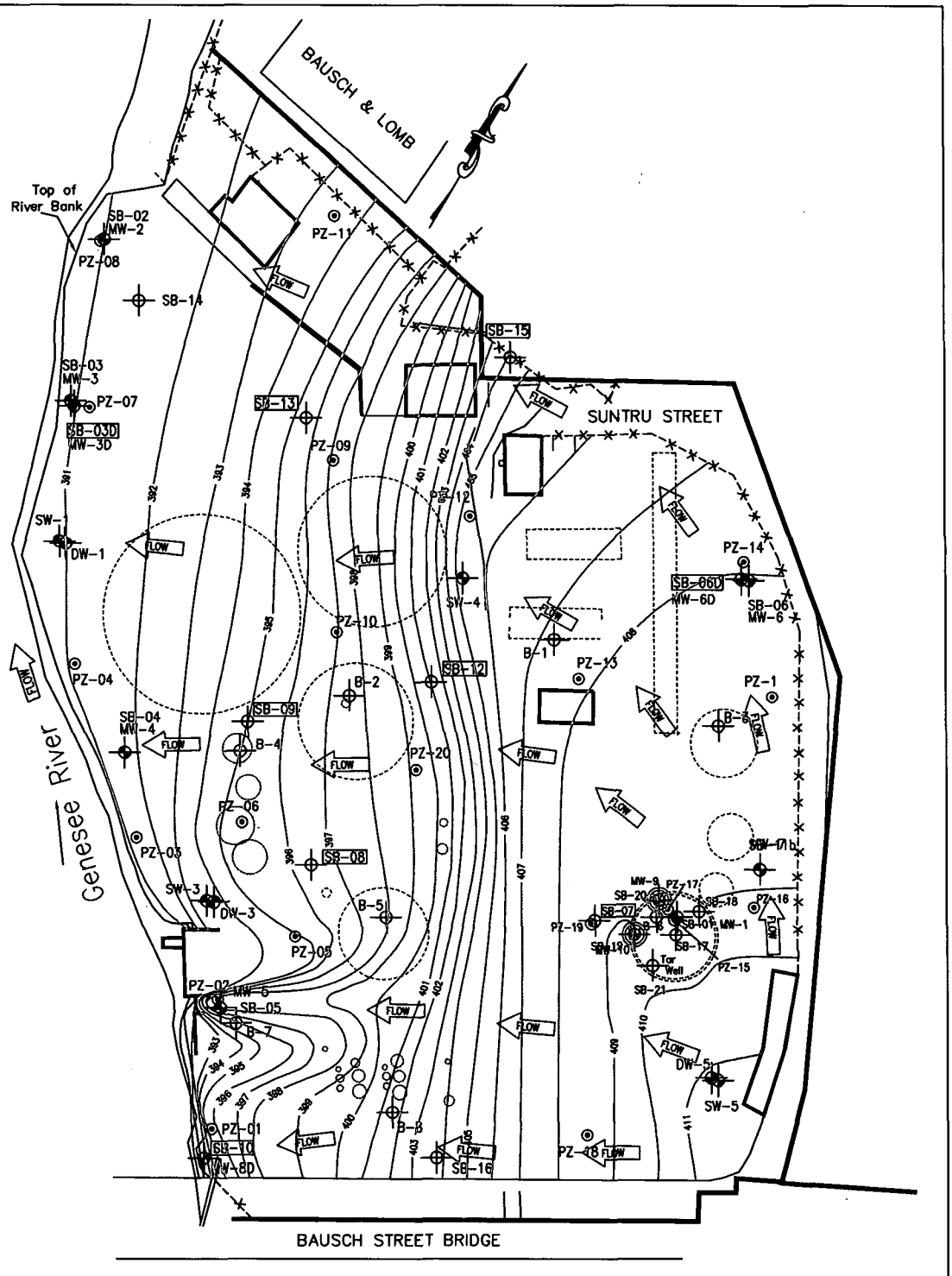
There were two different types of LNAPL observed floating on groundwater on-site during this field investigation. At PZ-16 located along the southeastern site boundary, LNAPL was present and identified as weathered gas oil. On the southwestern portion of the site, in the vicinity of the former light oil plant and the riverbank, another type of LNAPL, consistent with light oil plant residuals, was found in PZ-02 In addition, soils containing a few petroleum

products, such as lube oil, gasoline, and gas oil were observed at a number of on-site locations. For example, boring SB-03 contained a weathered middleweight fuel oil and SB-09 contained heavy lubricating oil, and SB-11B contained a second type of middle distillate fuel oil. However, these locations appeared to be small, discrete areas of impact.

The site was surveyed on November 20, 1998 and static water table elevations were measured on December 1, 1998. The groundwater contour map and the flow directions are shown in Figure 5. The groundwater contour map shows an area of steep gradient near the former Light Oil Plant, perhaps due to existence of subsurface foundations obstructing the flow. Based on the average hydraulic gradient values, the hydraulic conductivity data from tests performed at three well locations, and an assumed porosity of 40%, an average seepage velocity for the site of 1.27 ft/day was calculated.

Piezometers were installed by the direct push method in October 1998. During development of the piezometers, NAPL was observed in 9 of the 20 piezometers (Figure 6). These nine piezometers were APZ-01, PZ-02, PZ-03, PZ-04, PZ-07, PZ-13, PZ-16, PZ-17, and PZ-20. NAPL samples from 7 of those piezometers, including a sample from the piezometers in the tar well, were "fingerprinted" using GC/FID analysis method.

All new and previously installed monitoring wells were sampled and the groundwater samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), metals, and total cyanide. Due to the presence of tar in well DW-3, no samples for VOCs or SVOCs were collected from that well. All analytical results are reported in Appendix F of the FRI report prepared by Ish Inc. and META (2000). Table 5 shows all of the VOCs that were detected in groundwater samples from one or more of the monitoring wells sampled in 1998. Several VOCs were found in groundwater monitoring wells at concentrations that exceed NYSDEC Class GA groundwater standards or guidance values. For more details, see the FRI report prepared by Ish Inc/META, dated April 2000.



Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.

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Figure 5
1998 Focused Remedial Investigation
Groundwater Contour Map

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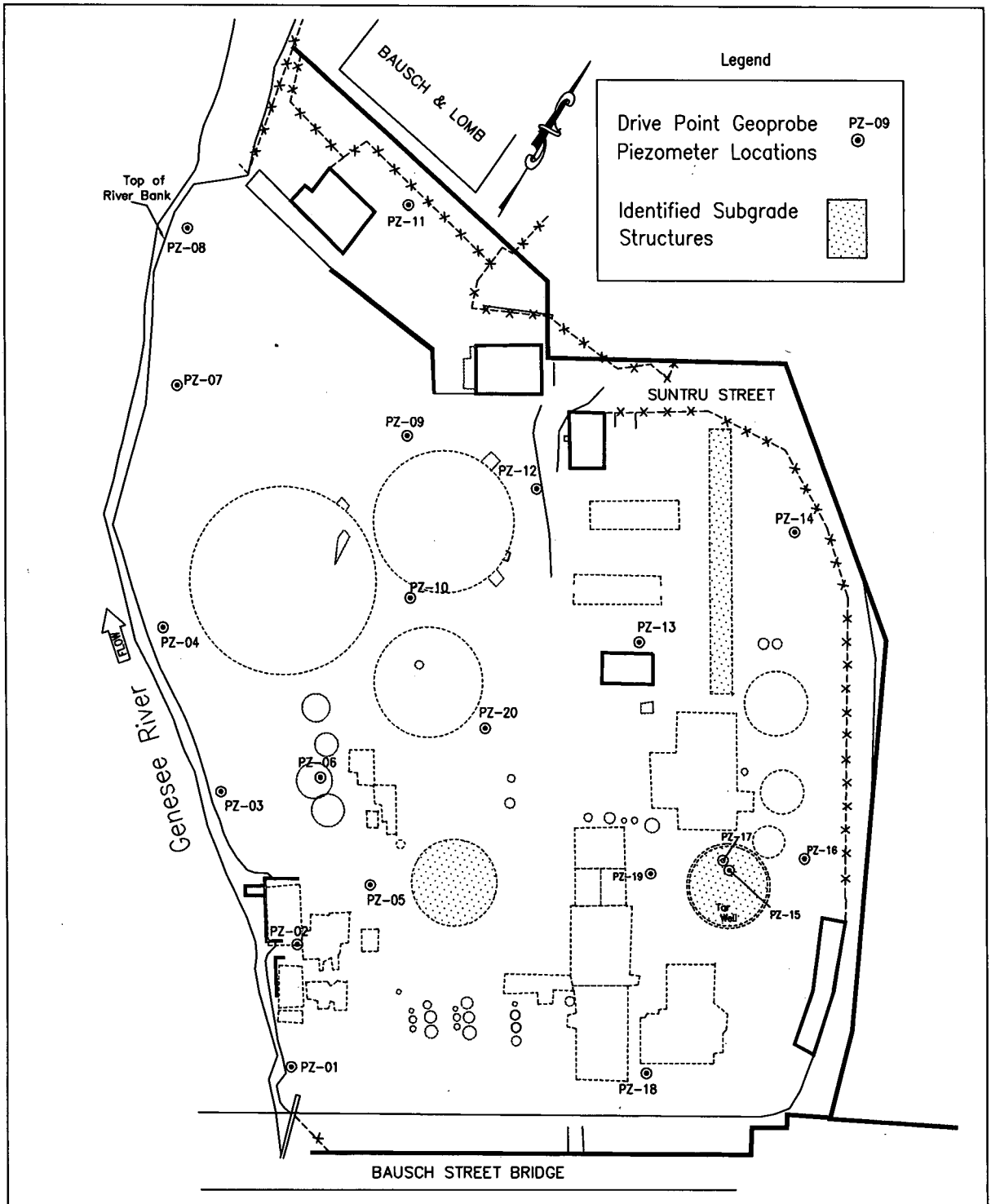
Legend
Drive Point Geoprobe Piezometer Locations
PZ-09
Identified Subgrade Structures
BAUSCH & LOMB
Top of River Bank
PZ-08
PZ-11
PZ-07
SUNTRU STREET
PZ-09
PZ-12
PZ-14
PZ-10
PZ-13
PZ-04
FLOW
Genesee River
PZ-20
PZ-06
PZ-03
PZ-17
PZ-16
PZ-19
PZ-05
Tar Well
PZ-15
PZ-02
PZ-01
PZ-18
BAUSCH STREET BRIDGE
160 80 40 0 160
Scale (ft)
Map based on site map from Site Investigation Report for East Station MGP Site, Atlantic Environmental Services, Inc., June 1993.
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Figure 6
1998 Focused Remedial Investigation
Piezometer Locations
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Date: 8/12/1999

Table 5 Groundwater Results for VOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID					
		DW-1	DW-5	MW-1	MW-2	MW-2Dup	MW-3
1,2,4-Trimethylbenzene	0.005	**0.410 D**	ND	**0.140**	0.003	**0.006**	ND
1,3,5-Trimethylbenzene	0.005	**0.073**	ND	**0.043**	0.005	ND	ND
2-Hexanone	0.050 *	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	**0.008**	ND	ND	ND	0.002	ND
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND	ND
Acetone	0.050 *	ND	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**6.40 D**	ND	**3.50 D**	**0.024**	**0.036**	**0.015**
Carbon Disulfide	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.005	**1.60 D**	ND	**0.360 D**	**0.011**	**0.017**	ND
Isopropylbenzene	0.005	**0.055**	ND	**0.006**	0.004	**0.007**	**0.013**
1,3-Xylene + 1,4-Xylene	0.010 **	**1.20 D**	ND	**0.60 D**	ND	0.003	ND
1,2-Xylene	0.005	**0.760 D**	ND	**0.30 D**	ND	0.002	ND
Methylene Chloride	0.005	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	**0.025**	ND	0.004	0.003	0.005	ND
Naphthalene	0.010 *	**3.80 D**	ND	**9.30 D**	**0.020**	**0.032**	**0.089**
sec-Butylbenzene	0.005	ND	ND	ND	ND	0.003	ND
Styrene	0.005	**0.022**	ND	**0.260 D**	ND	ND	ND
Toluene	0.005	**0.680 D**	ND	**1.80 D**	0.002	0.003	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 5 (Contd.) Groundwater Results for VOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID					
		MW-3D	MW-4	MW-5	MW-6	MW-6D	MW-7
1,2,4-Trimethylbenzene	0.005	**0.023**	**0.780 D**	**0.120**	**0.270 D**	**0.078**	**0.049**
1,3,5-Trimethylbenzene	0.005	**0.008**	**0.180**	**0.064**	**0.490 D**	**0.023**	0.002
2-Hexanone	0.050 *	ND	ND	0.002 J	ND	ND	ND
4-Isopropyltoluene	0.005	ND	**0.008**	ND	**0.007**	0.005	0.002
4-Methyl-2-Pentanone	NA	ND	ND	0.002 J	ND	ND	ND
Acetone	0.050 *	ND	0.008	0.008	0.005	0.005	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**0.990 D**	**16.0 D**	**5.30 D**	**3.10 D**	**0.160**	ND
Carbon Disulfide	NA	ND	0.004 J	ND	ND	ND	ND
Ethylbenzene	0.005	**0.310 D**	**1.50 D**	**0.280 D**	**0.940 D**	**0.350 D**	**0.009**
Isopropylbenzene	0.005	0.005	**0.068**	**0.007**	**0.03**	**0.016**	**0.016**
1,3-Xylene + 1,4-Xylene	0.010 **	**0.110**	**3.60 D**	**0.470 D**	**0.930 D**	**0.190**	ND
1,2-Xylene	0.005	**0.084**	**1.60 D**	**0.260 D**	**0.820 D**	**0.130**	ND
Methylene Chloride	0.005	ND	ND	ND	ND	0.003	0.002
n-Propylbenzene	0.005	ND	**0.032**	0.002	**0.025**	**0.006**	**0.012**
Naphthalene	0.010 *	**0.430 D**	**7.60 D**	**3.30 D**	**4.40 D**	**1.90 D**	**0.260 D**
sec-Butylbenzene	0.005	ND	ND	ND	ND	ND	ND
Styrene	0.005	**0.008**	ND	ND	ND	ND	ND
Toluene	0.005	**0.067**	**7.10 D**	**0.096**	**0.330 D**	**0.110**	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 5 (Contd.) Groundwater Results for VOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID				
		MW-8D	SW-1	SW-3	SW-4	SW-5
1,2,4-Trimethylbenzene	0.005	**0.190**	**0.400 D**	**0.009**	**0.310 D**	ND
1,3,5-Trimethylbenzene	0.005	**0.042**	ND	0.004	ND	ND
2-Hexanone	0.050 *	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	0.005	0.004	ND	**0.008**	ND
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND
Acetone	0.050 *	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	0.004 J
Acrylonitrile	0.005	ND	ND	ND	ND	0.005 J
Benzene	0.001	**2.40**	**0.38**	**0.051**	**0.160**	ND
Carbon Disulfide	NA	ND	0.015	ND	ND	ND
Ethylbenzene	0.005	ND	**0.430 D**	**0.021**	**0.290 D**	ND
Isopropylbenzene	0.005	**0.044**	**0.016**	ND	**0.034**	ND
1,3-Xylene + 1,4-Xylene	0.010 **	**0.096**	**0.013**	0.010	**0.21**	ND
1,2-Xylene	0.005	**0.150**	**0.024**	**0.011**	**0.010**	ND
Methylene Chloride	0.005	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	**0.011**	**0.029**	ND	**0.036**	ND
Naphthalene	0.010 *	**1.50 E**	ND	**0.049**	**0.077**	ND
sec-Butylbenzene	0.005	ND	ND	ND	0.003	ND
Styrene	0.005	ND	ND	ND	ND	ND
Toluene	0.005	**0.025**	**0.006**	ND	0.002	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Similarly, Table 6 shows a summary of all SVOCs that were detected in one or more of the monitoring wells at concentrations that exceed NYSDEC Class GA guidance value.

The 1998 groundwater sampling and analysis results indicated that four overburden wells (MW-1, MW-4, MW-5 and MW-6) contain the highest concentrations of MAHs and PAHs as shown in Table 7. Six overburden wells (MW-2, MW-3, MW-7, SW-1, SW-3, and SW-4) show minimal impact by MAHs/PAHs as given in Table 8. Impacts on groundwater in bedrock are variable as summarized in Table 9. The background wells, SW-5 and DW-5, had non-detectable levels of MAHs and PAHs in groundwater. Overall, the groundwater quality in the northwestern quadrant of the site and in the southeast corner of the site at SW 5 & DW-5 is least affected by MAHs and PAHs.

Groundwater quality data from 11 monitoring wells were used to prepare star plots for a chemometric-based interpretation of relationships between NAPL and the observed groundwater quality. Benzene, ethylbenzene, xylene, toluene, and naphthalene concentrations measured during the FRI sampling effort have been utilized for this chemometric evaluation. Star plots, also known as multivariate and radar plots, fall into the category of exploratory data analysis methods. Using star plots, data sets with three or more independent parameters can be plotted to show patterns in the chemical composition. In the plot, each variable (parameter) has an axis radiating from the center point. The concentration value for each chemical is plotted as a datum on each respective axis and the points are connected to form a polygon. The shape of the polygon is the signature for a particular contaminant source. Star plots provide a quick visual indication of the relative concentration of each constituent in a group of constituents.

Based on the chemometric analysis of the groundwater quality data, it is clear that there are a number of potential sources contributing to the groundwater impacts at the site. This analysis clearly indicates that while the tar well is the largest reservoir of NAPL at the site, it is certainly not the sole source of groundwater quality impacts at the site.

Table 6 Groundwater Results for SVOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID					
		DW-1	DW-5	MW-1	MW-2	MW-2Dup	MW-3
2,4-Dimethylphenol	0.050 *	0.018	ND	**0.370 JD**	0.003 J	0.002 J	ND
2-Methylphenol	NA	0.007 J	ND	0.039	ND	ND	ND
3+4 Methylphenol	NA	ND	ND	0.054	ND	ND	ND
Sum of All Phenolic	0.001	**0.025**	ND	**0.463**	**0.003**	**0.002**	ND
2-Methylnaphthalene	NA	0.280 JD	ND	0.930 JD	0.001 J	ND	0.001 J
Acenaphthene	0.020 *	**0.039**	ND	**0.068**	0.008 J	0.006 J	0.004 J
Acenaphthylene	NA	0.004 J	ND	0.370 JD	ND	ND	0.001 J
Anthracene	0.050 *	0.006 J	ND	0.012	0.002 J	0.001 J	ND
Benzoic Acid	NA	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	**0.013**	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.004 J	ND	0.024	0.002 J	0.002 J	0.002 J
Diethyl phthalate	0.050 *	ND	0.001 J	ND	ND	ND	ND
Fluoranthene	0.050 *	0.002 J	ND	0.005 J	ND	ND	ND
Fluorene	0.050 *	0.018	ND	**0.052**	0.005 J	0.004 J	0.004 J
Naphthalene	0.010 *	**1.90 D**	ND	**9.00 D**	**0.016**	**0.013**	**0.024**
Phenanthrene	0.050 *	0.024	ND	**0.066**	0.007 J	0.005 J	ND
Pyrene	0.050 *	0.002 J	ND	0.006 J	ND	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 6 (Contd.) Groundwater Results for SVOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID					
		MW-3D	MW-4	MW-5	MW-6	MW-6D	MW-7
2,4-Dimethylphenol	0.050 *	ND	**0.100 JD**	0.006 J	0.023	ND	ND
2-Methylphenol	NA	ND	0.077 JD	ND	ND	ND	ND
3+4 Methylphenol	NA	ND	0.08	ND	ND	ND	ND
Sum of All Phenolic	0.001	ND	**0.257**	**0.006**	**0.023**	ND	ND
2-Methylnaphthalene	NA	ND	0.250 JD	0.012	0.110 JD	0.180 JD	0.062
Acenaphthene	0.020 *	0.004 J	**0.038**	0.004 J	**0.052**	**0.058**	**0.058**
Acenaphthylene	NA	ND	0.008 J	ND	0.032	0.038 JD	ND
Anthracene	0.050 *	ND	0.007 J	ND	0.008 J	0.006 J	0.010 J
Benzoic Acid	NA	ND	0.010 J	0.008 J	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND	ND
Dibenzofuran	NA	ND	0.004 J	ND	0.004 J	0.002 J	0.002 J
Diethyl phthalate	0.050 *	ND	ND	ND	ND	ND	ND
Fluoranthene	0.050 *	ND	0.002 J	ND	0.003 J	0.002 J	0.004 J
Fluorene	0.050 *	ND	0.019	ND	0.026	0.025	0.019
Naphthalene	0.010 *	ND	**1.70 D**	**0.390 D**	**4.50 D**	**0.57**	**0.088 D**
Phenanthrene	0.050 *	ND	0.03	ND	0.034	0.031	0.026
Pyrene	0.050 *	ND	0.002 J	ND	0.004 J	0.002 J	0.006 J

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" *indicates that criterion is not available.*
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 6 (Contd.) Groundwater Results for SVOCs in mg/L (Detected Compounds Only, December 1998)

Analyte	Class GA Standard	Well ID				
		MW-8D	SW-1	SW-3	SW-4	SW-5
2,4-Dimethylphenol	0.050 *	0.005 J	0.001 J	0.012	ND	ND
2-Methylphenol	NA	ND	ND	ND	ND	ND
3+4 Methylphenol	NA	ND	ND	ND	ND	ND
Sum of All Phenolic	0.001	**0.005**	0.001	**0.012**	ND	ND
2-Methylnaphthalene	NA	0.870 JD	0.090 D	0.140 JD	0.079	ND
Acenaphthene	0.020 *	**0.064**	0.012	**0.076**	0.017	ND
Acenaphthylene	NA	0.002 J	ND	0.063	0.003 J	ND
Anthracene	0.050 *	0.002 J	0.003 J	0.006 J	ND	ND
Benzoic Acid	NA	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.004 J	0.003 J	0.026	0.005 J	ND
Diethyl phthalate	0.050 *	ND	ND	ND	ND	ND
Fluoranthene	0.050 *	ND	0.001 J	0.003 J	0.001 J	ND
Fluorene	0.050 *	0.018	0.014	0.03	0.008 J	ND
Naphthalene	0.010 *	**7.00 D**	0.003 J	**1.40 D**	**0.016**	ND
Phenanthrene	0.050 *	0.014	0.011	0.019	0.008 J	ND
Pyrene	0.050 *	ND	0.001 J	0.002 J	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 7 Overburden Wells Heavily Impacted by MAH/PAHs, mg/L (December 1998)

Compound	MW-1	MW-4	MW-5	MW-6
Benzene	3.5	16	5.3	3.1
Ethylbenzene	0.36	1.5	0.28	0.94
1,3 + 1,4 Xylene	0.60	3.6	0.47	0.93
1,2 Xylene	0.30	1.6	0.26	0.82
Toluene	1.8	7.1	0.096	0.33
Naphthalene (VOC data)	9.3	7.6	3.3	4.4
2-Methylnaphthalene	0.93	0.25	0.012	0.11
Fluorene	0.052	0.019	<0.01	0.026
Naphthalene (SVOC data)	9.0	1.7	0.39	4.5
Phenanthrene	0.066	0.03	<0.01	0.0034
Pyrene	0.006	0.002	<0.01	0.004

Table 8 Overburden Wells Minimally Impacted by MAH/PAHs, mg/L (Sampled in Dec 1998)

Compound	MW-2	MW-3	MW-7	SW-1	SW-3	SW-4
Benzene	0.024	0.015	ND	ND	0.051	0.16
Ethylbenzene	0.011	ND	0.009	0.043	0.021	0.29
1,3 + 1,4 Xylene	ND	ND	ND	0.013	0.01	0.21
1,2 Xylene	ND	ND	ND	0.024	0.011	0.01
Toluene	0.002	ND	ND	ND	ND	0.002
Naphthalene (VOC data)	0.02	0.089	0.26	ND	0.049	0.077
2-Methylnaphthalene	0.001	ND	0.062	0.09	0.14	0.079
Fluorene	0.005	0.004	0.019	0.014	0.03	0.008
Naphthalene (SVOC data)	0.016	0.024	0.088	0.003	1.4	0.016
Phenanthrene	0.007	ND	0.026	0.011	0.019	0.008
Pyrene	ND	ND	0.006	0.001	0.002	ND

Table 9 Bedrock Wells Impacted by MAH/PAHs, mg/L (December 1998)

Compound	MW-3D	MW-6D	MW-8D	DW-1
Benzene	0.99	0.16	ND	6.4
Ethylbenzene	0.31	0.35	ND	1.6
1,3 + 1,4 Xylene	0.11	0.19	0.096	1.2
1,2 Xylene	0.084	0.13	0.15	0.76
Toluene	0.067	0.11	0.025	0.68
Naphthalene (VOC data)	0.43	1.9	5.7	3.8
2-Methylnaphthalene	ND	0.18	0.87	0.28
Fluorene	ND	0.025	0.018	0.018
Naphthalene (SVOC data)	ND	0.57	7.0	1.9
Phenanthrene	ND	0.031	0.14	0.024
Pyrene	ND	0.002	ND	0.002

Metals analysis results for groundwater are summarized in Table 10. Arsenic, iron, magnesium, manganese, nickel, sodium and thallium were found at concentrations above NYDEC Class GA groundwater standards or guidance values. For more details see the Focused Remedial Investigation Report (April 2000).

Total cyanide was detected in every well except DW-5, MW-4, MW-5, MW-7, SW-3 and SW-5. These results are shown in Table 11. Total cyanide concentrations in excess of 0.9 mg/L were found primarily in the northeast corner of the site, the northwest corner of the site, and at the tar well.

As part of the 1998 investigations, the tar well was characterized. As a result, Figure 7 was developed to show the presence of tar, sheen & odors, and the overburden fill material in the tar well. For more details, please see the FRI report of April2000.

Table 10 Groundwater Results for Metals and Total Cyanide in mg/L (Detected Compounds Only, 12/98)

Analyte	Class GA Standard	Well ID					
		DW-1	DW-3	DW-5	MW-1	MW-2	MW-2Dup
Aluminum	NA	ND	ND	ND	ND	0.015 B	0.026 B
Arsenic	0.025	ND	0.012	ND	0.004 B	0.009 B	0.013
Barium	1.0	0.246 E	0.352 E	0.078 BE	0.064 BE	0.019 BE	0.012 BE
Calcium	NA	34.5 E	90.5 E	70.8 E	163 E	356 E	357 E
Chromium	0.05	ND	ND	0.011	ND	0.004 B	0.005 B
Cobalt	NA	ND	ND	ND	ND	ND	ND
Copper	0.20	0.023 B	0.014 B	0.015 B	0.013 B	ND	0.008 B
Iron (Fe)	0.3	**0.758 E**	**0.573 E**	0.177 E	**7.15 E**	**99.8 E**	**99.6 E**
Magnesium	35 *	24.1	**216**	31.1	**37.2**	**132**	**133**
Manganese (Mn)	0.003	**0.016 E**	**0.140 E**	**0.028 E**	**0.436 E**	**2.06 E**	**2.09 E**
Fe + Mn	0.5	**0.774**	**0.713**	0.205	**7.59**	**102**	**102**
Nickel	0.10	0.002 B	0.001 B	**0.164**	0.004 B	ND	ND
Potassium	NA	24.4 E	9.70 E	17.9 E	5.56 E	17.3 E	17.6 E
Selenium	0.010	ND	ND	ND	ND	ND	ND
Sodium	20.0	**527**	**329**	**739**	**95.1**	**375**	**389**
Thallium	0.0005 *	ND	ND	ND	ND	**0.003 B**	**0.005 B**
Vanadium	NA	ND	0.004 B	ND	ND	0.007 B	0.007 B
Zinc	2 *	0.045	0.030	0.033	0.036	0.021	0.022
Cyanide	0.20	**0.974**	0.028	ND	**0.902**	**1.49**	**1.51**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 10 (Contd.) Groundwater Results for Metals and Total Cyanide, mg/L (Detected Compounds Only, 12/98)

Analyte	Class GA Standard	Well ID					
		MW-3	MW-3D	MW-4	MW-5	MW-6	MW-6D
Aluminum	NA	ND	ND	0.038 B	ND	0.009 B	ND
Arsenic	0.025	**3.69**	ND	0.007 B	ND	**0.734**	ND
Barium	1.0	0.040 BE	0.022 BE	0.036 BE	0.111 BE	0.428 E	0.150 BE
Calcium	NA	186 E	9.98 E	201 E	141 E	92.7 E	237 E
Chromium	0.05	0.003 B	ND	0.005 B	ND	ND	ND
Cobalt	NA	0.006 B	ND	ND	ND	ND	ND
Copper	0.20	0.009 B	0.017 B	ND	0.021 B	0.025	0.015 B
Iron (Fe)	0.3	**58.5 E**	**0.493 E**	**133 E**	**6.55 E**	**5.13 E**	**1.86 E**
Magnesium	35 *	**55.0**	8.20	**35.3**	**79.4**	**108**	**109**
Manganese (Mn)	0.003	**2.02 E**	0.003 BE	**1.67 E**	**0.295 E**	**0.410 E**	**0.085 E**
Fe + Mn	0.5	**60.5**	0.496	**135**	**6.85**	**5.54**	**1.95**
Nickel	0.10	0.002 B	ND	0.002 B	0.002 B	0.002 B	ND
Potassium	NA	9.69 E	13.3 E	10.5 E	5.22 E	14.9 E	21.8 E
Selenium	0.010	ND	ND	ND	ND	**0.007**	ND
Sodium	20.0	**425**	**391**	**214**	**31.2**	**1,640**	**196**
Thallium	0.0005 *	ND	ND	ND	ND	**0.002 B**	ND
Vanadium	NA	0.004 B	ND	0.008 B	0.003 B	0.006 B	ND
Zinc	2 *	0.042	0.040	0.026	0.035	0.031	0.033
Cyanide	0.20	**2.42**	**2.03**	ND	ND	**2.54**	0.153

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 10 (Contd.) Groundwater Results for Metals and Total Cyanide, mg/L (Detected Compounds Only, 12/98)

Analyte	Class GA Standard	Well ID					
		MW-7	MW-8D	SW-1	SW-3	SW-4	SW-5
Aluminum	NA	ND	ND	ND	ND	ND	ND
Arsenic	0.025	ND	ND	**0.298**	0.012	**0.244**	ND
Barium	1.0	0.087 BE	0.472 E	0.048 BE	0.416 E	0.114 BE	0.066 BE
Calcium	NA	51.6 E	74.8 E	96.6 E	96.6 E	101 E	65.8 E
Chromium	0.05	0.004 B	ND	0.002 B	ND	ND	0.015
Cobalt	NA	ND	ND	0.009 B	ND	ND	0.003 B
Copper	0.20	0.015 B	0.020 B	0.019 B	0.017 B	0.006 B	0.018 B
Iron (Fe)	0.3	**1.46 E**	**1.870 E**	**1.47 E**	**0.912 E**	**1.01 E**	**2.26 E**
Magnesium	35 *	19.6	**61.8**	**55.1**	**206**	**68.0**	29.3
Manganese (Mn)	0.003	**0.117 E**	**0.068 E**	**0.087 E**	**0.164 E**	**0.059 E**	**0.060 E**
Fe + Mn	0.5	**1.58**	**1.94**	**1.56**	**1.08**	**1.07**	**2.32**
Nickel	0.10	0.003 B	0.001 B	0.001 B	0.003 B	0.009 B	**0.336**
Potassium	NA	6.48 E	8.69 E	9.67 E	7.96 E	17.8 E	17.1 E
Selenium	0.010	ND	ND	ND	ND	ND	ND
Sodium	20.0	**618**	**176**	**664**	**348**	**2,370**	**639**
Thallium	0.0005 *	ND	ND	ND	**0.004 B**	ND	ND
Vanadium	NA	ND	ND	0.005 B	0.003 B	ND	ND
Zinc	2 *	0.031	0.034	0.036	0.027	0.025	0.036
Cyanide	0.20	ND	0.108	0.193	ND	**1.71**	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

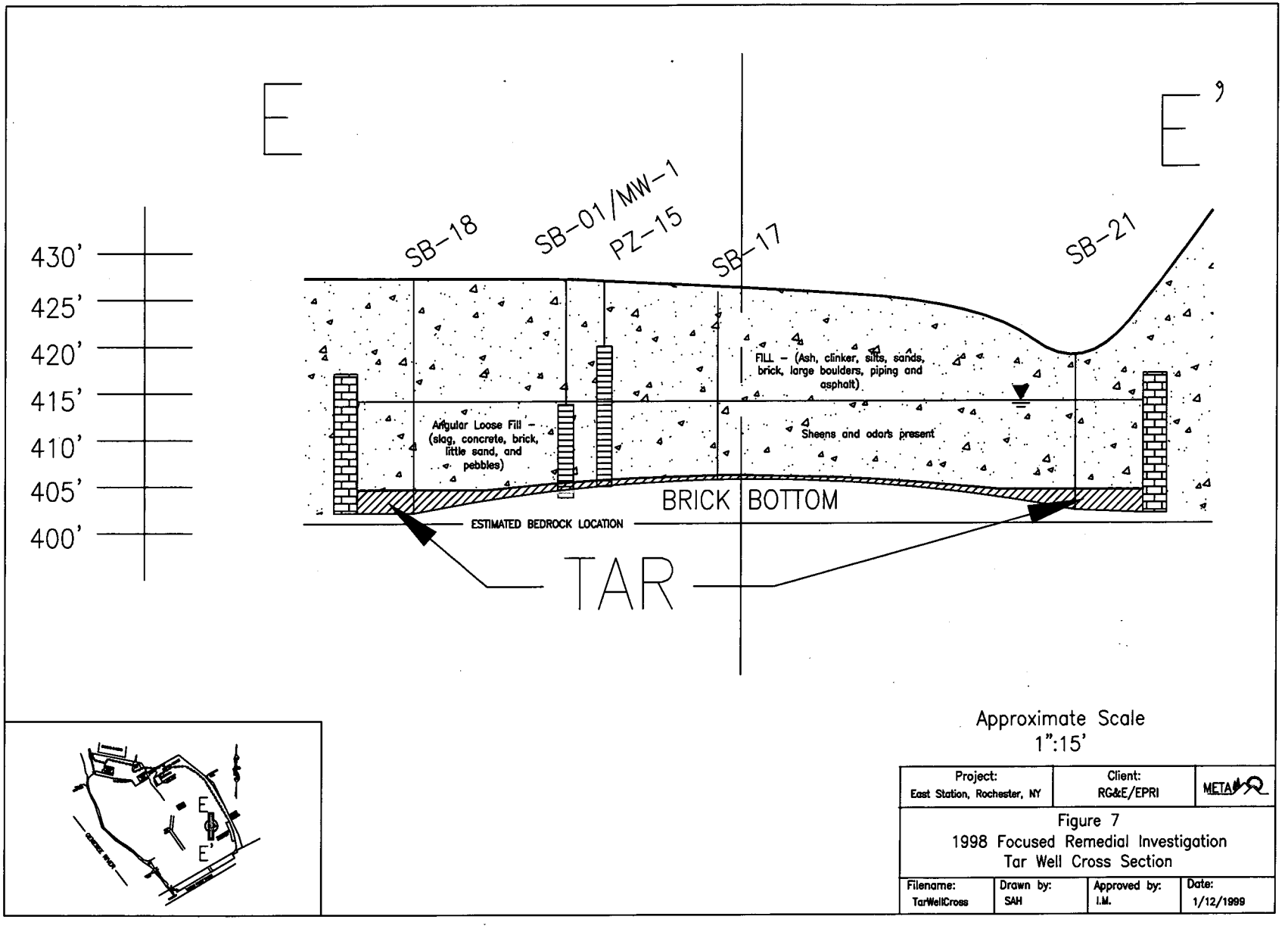

E
E'
SB-18
SB-01/MW-1
PZ-15
SB-17
SB-21
430'
425'
420'
415'
410'
405'
400'
FILL - (Ash, clinker, silts, sands, brick, large boulders, piping and asphalt)
Angular Loose Fill - (slag, concrete, brick, little sand, and pebbles)
Sheens and odors present
BRICK BOTTOM
ESTIMATED BEDROCK LOCATION
TAR
Approximate Scale
1":15'
Project:
East Station, Rochester, NY
Client:
RG&E/EPRI
META
Figure 7
1998 Focused Remedial Investigation
Tar Well Cross Section
Filename:
TarWellCross
Drawn by:
SAH
Approved by:
I.M.
Date:
1/12/1999

Table 11 Cyanide in Overburden and Bedrock Wells, mg/L (12/98)

Well No.	Total Cyanide
Overburden Wells	
MW-1	0.902
MW-2	1.49
MW-3	2.42
MW-4	ND
MW-6	2.54
MW-7	ND
SW-1	0.193
SW-3	ND
SW-4	1.71
SW-5	ND
Bedrock Wells	
MW-3D	2.03
MW-6D	0.153
MW-8D	0.108
DW-1	0.974
DW-3	0.028
DW-5	ND

ND = Not detected

The FRI generated the following conclusions:

1. The tar well appears to have been a significant source of tar NAPL for the overburden and shallow bedrock occurrences.
2. The tar well contains a significant amount of tar that can continue to be a source of NAPL.
3. The presence of horizontal and vertical fractures in the bedrock allows for the potential lateral and vertical migration of tar NAPL.

4. Little evidence of odors or contamination was found for 0 to 10 feet below grade in the central and western portions of the site as well as from 0 to 6 feet below grade in the eastern portion of the site.
5. The groundwater generally flows from east to west towards the river at a seepage velocity of approximately 150 ft/year.
6. Groundwater is impacted at the site and exceeds NYDEC Class GA groundwater standards and guidance values for 16 VOCs and SVOCs, seven metals, and total cyanide. Benzene and naphthalene appear to be the constituents most frequently present at elevated levels.
7. Intermittent tar seeps are present in the nearby Genesee River.

1999 Addendum to the Focused Remedial Investigation (FRI):

In March 1999, Ish Inc. and META completed a second round of sampling and analysis of monitoring wells and piezometers for VOCs, SVOCs, metals, and cyanide. Prior to sampling, static water level elevations were measured to prepare an updated groundwater contour map. Also, the cyanide characterization effort was expanded to include diffusible (free) cyanide, metal cyanide complexes, weak acid dissociable (WAD) cyanide, as well as total cyanide in groundwater.

VOCs and SVOCs were determined by multiple analytical methods to compare the results obtained. Enough groundwater samples were collected as split samples for analysis by EPA Methods 8260 and 8270 and by the then draft SW-846 Method 3511 (**now an EPA approved method**) for the simultaneous analysis of monocyclic and polycyclic aromatic hydrocarbons in water.

Groundwater samples from selected monitoring wells were obtained and analyzed for total cyanide, weak acid dissociable cyanide, diffusible cyanide, and metal cyanide complexes.

This addendum provided a second contour for examining groundwater flow, and delineation of the distribution of VOCs, SVOCs and metals. This work also provided an in-depth understanding of cyanide species that are found in groundwater at the site.

Tables 12 and 13 present a summary of the groundwater elevations data for both the December 98 and March 99 sampling events. An increase in saturated thickness was observed across the site between the Round 1 and Round 2 measurements. Figure 8 shows the March 1999 groundwater contour map. Both the 1998 and 1999 groundwater contour maps are quite similar and indicate that the groundwater gradient in the eastern portion of the site is quite flat, but increases in the central portion of the site, and then lessens in the western portion of the site. The general groundwater flow direction is from east to west.

All analytical results for VOCs, SVOCs, metals, and cyanide speciation for the Round 2 groundwater samples are listed in Appendices B and C of the Addendum report dated April 2000. Table 14 shows concentration data for all VOC compounds detected in groundwater samples during both Round 1 and Round 2 sampling events. Some variability in measured concentrations is apparent in this table. For more details, please see the Addendum Report dated April 2000.

Table 15 presents the concentrations data for SVOCs detected in both the Round 1 and Round 2 sampling efforts. This table shows that the detected SVOCs are essentially the same between two sampling rounds. Naphthalene was the most prevalent SVOC compound, while benzene was the dominant VOC compound.

Both VOC and SVOC data for the two rounds indicate that concentrations of a number of compounds exceed the NYSDEC Class GA groundwater standards or guidance values. Figure 9 provides a spatial distribution summary of benzene, naphthalene and total cyanide concentrations measured during the two groundwater sampling and analysis efforts.

Table 12 Monitoring Well Groundwater Elevations, Round 1 and Round 2

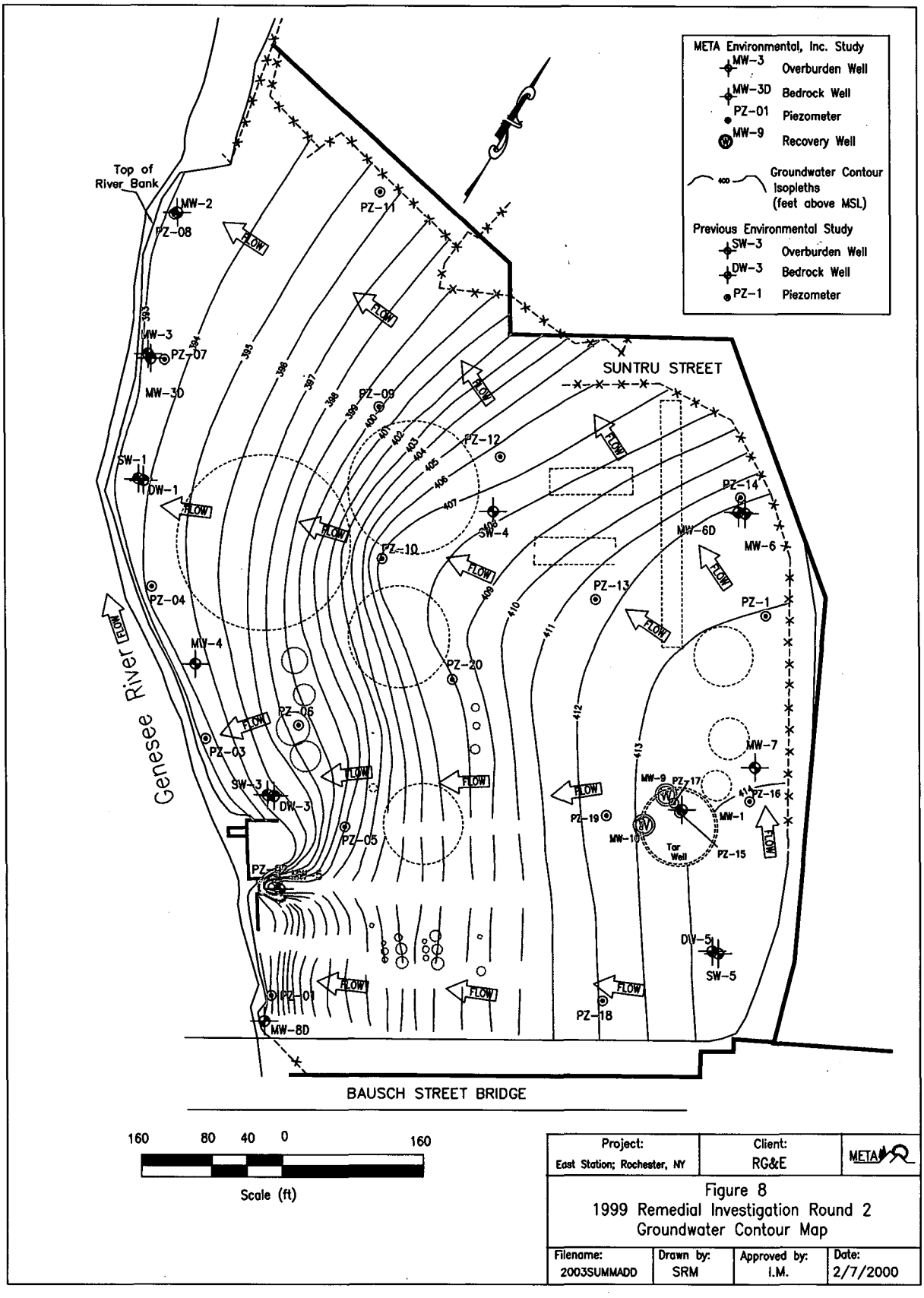
Monitoring Well I.D.	Round 1 Groundwater Elevations 12/1/98 (Feet Above MSL)	Round 2 Groundwater Elevations 3/26/99 (Feet Above MSL)
New Wells		
MW-1	414.14	414.34
MW-2	390.99	393.17
MW-3	391.08	393.23
MW-3D	390.64	391.79
MW-4	391.64	394.23
MW-5	398.50	401.73
MW-6	408.02	412.68
MW-6D	407.94	409.52
MW-7	408.76	413.76
MW-8D	392.33	394.65
MW-9 (recovery)	NA	NA
MW-10 (recovery)	NA	NA
Existing Wells		
SW-1	390.91	393.44
DW-1	390.67	391.78
SW-3	393.75	395.64
DW-3	391.85	393.46
SW-4	405.88	407.80
SW-5	411.88	414.44
DW-5	411.96	414.54

MSL = Mean Sea Level
NA = Not Available

Table 13 Piezometer Groundwater Elevations, Round 1 and Round 2

Piezometer I.D.	Round 1 Groundwater Elevations 12/1/98 (Feet Above MSL)	Round 2 Groundwater Elevations 3/26/99 (Feet Above MSL)
PZ-01	395.34	NA (Frozen at Ground Surface)
PZ-02	396.72	398.44
PZ-03	391.11	393.24
PZ-04	391.31	394.29
PZ-05	Dry	401.32
PZ-06	395.54	398.51
PZ-07	390.85	393.05
PZ-08	390.93	393.15
PZ-09	397.03	399.92
PZ-10	396.98	407.63
PZ-11	393.36	395.76
PZ-12	405.46	406.59
PZ-13	407.71	411.24
PZ-14	NA (abandoned)	NA (abandoned)
PZ-15	414.03	414.23
PZ-16	407.44	414.64
PZ-17	414.04	414.23
PZ-18	408.54	412.09
PZ-19	408.86	412.90
PZ-20	398.80	NA
A-PZ-1	408.15	413.16

MSL = Mean Sea Level
NA = Not Available



Project: East Station; Rochester, NY	Client: RG&E	META

Figure 8
1999 Remedial Investigation Round 2
Groundwater Contour Map

Filename:	Drawn by:	Approved by:	Date:
2003SUMMADD	SRM	I.M.	2/7/2000

Table 14 Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	DW-1		DW-5		MW-1	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	**0.410 D**	**0.450**	ND	ND	**0.140**	**0.160**
1,3,5-Trimethylbenzene	0.005	**0.073**	**0.062**	ND	ND	**0.043**	**0.052**
2-Hexanone	0.050 *	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	**0.008**	**0.008**	ND	ND	ND	ND
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND	ND
Acetone	0.050 *	ND	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**6.40 D**	**4.90**	ND	ND	**3.50 D**	**1.20**
Carbon Disulfide	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.005	**1.60 D**	**1.60**	ND	ND	**0.360 D**	**0.390**
Isopropylbenzene	0.005	**0.055**	**0.044**	ND	ND	**0.006**	**0.008**
1,3-Xylene + 1,4-Xylene	0.010 **	**1.20 D**	**1.40**	ND	ND	**0.600 D**	**0.750**
1,2-Xylene	0.005	**0.760 D**	**0.890**	ND	ND	**0.300 D**	**0.340**
Methylene Chloride	0.005	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	**0.025**	ND	ND	ND	0.004	ND
Naphthalene	0.010 *	**3.80 D**	**3.80**	ND	ND	**9.30 D**	**9.10**
sec-Butylbenzene	0.005	ND	ND	ND	ND	ND	ND
Styrene	0.005	**0.022**	ND	ND	ND	**0.260 D**	**0.290**
Toluene	0.005	**0.680 D**	**0.480**	ND	ND	**1.80 D**	**1.30**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detecte

Table 14 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-2		MW-3		MW-3D	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	0.003	ND	ND	0.001	**0.023**	**0.012**
1,3,5-Trimethylbenzene	0.005	0.005	ND	ND	ND	**0.008**	0.004
2-Hexanone	0.050 *	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	ND	ND	ND	ND	ND	ND
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND	ND
Acetone	0.050 *	ND	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**0.024**	ND	**0.015**	**0.032**	**0.990 D**	**0.420**
Carbon Disulfide	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.005	**0.011**	ND	ND	0.001	**0.310 D**	**0.160**
Isopropylbenzene	0.005	0.004	ND	**0.013**	ND	0.005	0.003
1,3-Xylene + 1,4-Xylene	0.010 **	ND	ND	ND	ND	**0.110**	**0.054**
1,2-Xylene	0.005	ND	ND	ND	ND	**0.084**	**0.043**
Methylene Chloride	0.005	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	0.003	ND	ND	ND	ND	ND
Naphthalene	0.010 *	**0.020**	ND	**0.089**	**0.025**	**0.430 D**	**0.200**
sec-Butylbenzene	0.005	ND	ND	ND	ND	ND	ND
Styrene	0.005	ND	ND	ND	ND	**0.008**	0.002
Toluene	0.005	0.002	ND	ND	ND	**0.067**	**0.026**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 14 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-4		MW-5		MW-6	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	**0.780 D**	**0.370**	**0.120**	**0.270**	**0.270 D**	**0.390**
1,3,5-Trimethylbenzene	0.005	**0.180**	**0.061**	**0.064**	**0.090**	**0.490 D**	**0.100**
2-Hexanone	0.050 *	ND	ND	0.002 J	ND	ND	ND
4-Isopropyltoluene	0.005	**0.008**	ND	ND	ND	**0.007**	**0.014**
4-Methyl-2-Pentanone	NA	ND	ND	0.002 J	ND	ND	ND
Acetone	0.050 *	0.008	ND	0.008	ND	0.005	0.007
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**16.0 D**	**2.60**	**5.30 D**	**14.3**	**3.10 D**	**2.90**
Carbon Disulfide	NA	0.004 J	ND	ND	ND	ND	ND
Ethylbenzene	0.005	**1.50 D**	**0.500**	**0.280 D**	**0.700**	**0.940 D**	**1.10**
Isopropylbenzene	0.005	**0.068**	**0.027**	**0.007**	**0.032**	**0.030**	**0.041**
1,3-Xylene + 1,4-Xylene	0.010 **	**3.60 D**	**0.620**	**0.470 D**	**0.250**	**0.930 D**	**1.20**
1,2-Xylene	0.005	**1.60 D**	**0.260**	**0.260 D**	**0.230**	**0.820 D**	**0.890**
Methylene Chloride	0.005	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	**0.032**	**0.018**	0.002	**0.011**	**0.025**	**0.043**
Naphthalene	0.010 *	**7.60 D**	**1.10**	**3.30 D**	**2.60**	**4.40 D**	**5.70**
sec-Butylbenzene	0.005	ND	ND	ND	ND	ND	ND
Styrene	0.005	ND	ND	ND	ND	ND	ND
Toluene	0.005	**7.10 D**	**0.710**	**0.096**	**0.032**	**0.330 D**	**0.300**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 14 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-6D		MW-7		MW-8D	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	**0.078**	**0.035**	**0.049**	**0.011**	**0.190**	**0.420**
1,3,5-Trimethylbenzene	0.005	**0.023**	**0.011**	0.002	ND	**0.042**	**0.082**
2-Hexanone	0.050 *	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	0.005	0.001	0.002	ND	0.005	**0.010**
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND	ND
Acetone	0.050 *	0.005	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**0.160**	**0.097**	ND	**0.002**	**2.40**	**4.60**
Carbon Disulfide	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.005	**0.350 D**	**0.200**	**0.009**	0.002	ND	1.20
Isopropylbenzene	0.005	**0.016**	**0.009**	**0.016**	**0.008**	**0.044**	**0.081**
1,3-Xylene + 1,4-Xylene	0.010 **	**0.190**	**0.080**	ND	ND	**0.096**	**0.190**
1,2-Xylene	0.005	**0.130**	**0.065**	ND	ND	**0.150**	**0.320**
Methylene Chloride	0.005	0.003	ND	0.002	ND	ND	ND
n-Propylbenzene	0.005	**0.006**	**0.009**	**0.012**	**0.008**	**0.011**	**0.084**
Naphthalene	0.010 *	**1.90 D**	**0.970**	**0.260 D**	**0.044**	**1.50 E**	**7.20**
sec-Butylbenzene	0.005	ND	ND	ND	ND	ND	ND
Styrene	0.005	ND	ND	ND	ND	ND	ND
Toluene	0.005	**0.110**	**0.019**	ND	ND	**0.025**	**0.023**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 14 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	SW-1		SW-3		SW-4	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	**0.400 D**	**0.390**	**0.009**	**0.900**	**0.310 D**	**0.054**
1,3,5-Trimethylbenzene	0.005	ND	0.001 J	0.004	0.370	ND	ND
2-Hexanone	0.050 *	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	0.005	0.004	0.005	ND	**0.015**	**0.008**	0.002
4-Methyl-2-Pentanone	NA	ND	ND	ND	ND	ND	ND
Acetone	0.050 *	ND	ND	ND	ND	ND	ND
Acrolein	0.005	ND	ND	ND	ND	ND	ND
Acrylonitrile	0.005	ND	ND	ND	ND	ND	ND
Benzene	0.001	**0.380**	**0.280**	**0.051**	**5.10**	**0.160**	**0.075**
Carbon Disulfide	NA	0.015	0.025	ND	ND	ND	ND
Ethylbenzene	0.005	**0.430 D**	**0.380**	**0.021**	**2.40**	**0.290 D**	**0.088**
Isopropylbenzene	0.005	**0.016**	**0.019**	ND	**0.150**	**0.034**	**0.007**
1,3-Xylene + 1,4-Xylene	0.010 **	**0.013**	**0.043**	0.010	**0.970**	**0.210**	0.003
1,2-Xylene	0.005	**0.024**	**0.057**	**0.011**	**0.960**	**0.010**	0.003
Methylene Chloride	0.005	ND	ND	ND	ND	ND	ND
n-Propylbenzene	0.005	**0.029**	**0.020**	ND	**0.052**	**0.036**	**0.007**
Naphthalene	0.010 *	ND	**0.021**	**0.049**	**5.80**	**0.077**	**0.013**
sec-Butylbenzene	0.005	ND	ND	ND	ND	0.003	ND
Styrene	0.005	ND	ND	ND	ND	ND	ND
Toluene	0.005	**0.006**	**0.010**	ND	**0.070**	0.002	0.001

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 14 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for VOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	SW-5	
		Round 1	Round 2
1,2,4-Trimethylbenzene	0.005	ND	ND
1,3,5-Trimethylbenzene	0.005	ND	ND
2-Hexanone	0.050 *	ND	ND
4-Isopropyltoluene	0.005	ND	ND
4-Methyl-2-Pentanone	NA	ND	ND
Acetone	0.050 *	ND	ND
Acrolein	0.005	0.004 J	ND
Acrylonitrile	0.005	0.005 J	ND
Benzene	0.001	ND	ND
Carbon Disulfide	NA	ND	ND
Ethylbenzene	0.005	ND	ND
Isopropylbenzene	0.005	ND	ND
1,3-Xylene + 1,4-Xylene	0.010 **	ND	ND
1,2-Xylene	0.005	ND	ND
Methylene Chloride	0.005	ND	ND
n-Propylbenzene	0.005	ND	ND
Naphthalene	0.010 *	ND	0.002
sec-Butylbenzene	0.005	ND	ND
Styrene	0.005	ND	ND
Toluene	0.005	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
** Standard based on sum of Standard for 1,3-Xylene and 1,4-Xylene, as data was reported.
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	DW-1		DW-5		MW-1	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
2,4-Dimethylphenol	0.050 *	0.018	ND	ND	ND	**0.370 JD**	ND
2-Methylphenol	NA	0.007 J	0.005 J	ND	ND	0.039	0.012
3+4 Methylphenol	NA	ND	ND	ND	ND	0.054	0.015
Sum of All Phenolic	0.001	**0.025**	**0.005**	ND	ND	**0.463**	**0.027**
2-Methylnaphthalene	NA	0.280 JD	0.160 J	ND	ND	0.930 JD	0.330 J
Acenaphthene	0.020 *	**0.039**	**0.032**	ND	ND	**0.068**	**0.075**
Acenaphthylene	NA	0.004 J	0.003 J	ND	ND	0.370 JD	0.150 J
Anthracene	0.050 *	0.006 J	0.004 J	ND	ND	0.012	0.010
Benzoic Acid	NA	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	**0.013**	**0.010**	ND	ND	ND	ND
Dibenzofuran	NA	0.004 J	0.003 J	ND	ND	0.024	0.025
Diethyl phthalate	0.050 *	ND	0.001 J	0.001 J	ND	ND	ND
Fluoranthene	0.050 *	0.002 J	0.002 J	ND	ND	0.005 J	0.004 J
Fluorene	0.050 *	0.018	0.017	ND	ND	**0.052**	**0.052**
Naphthalene	0.010 *	**1.90 D**	**1.10**	ND	0.001 J	**9.00 D**	**3.10**
Phenanthrene	0.050 *	0.024	0.020	ND	ND	**0.066**	**0.056**
Pyrene	0.050 *	0.002 J	0.003 J	ND	ND	0.006 J	0.005 J

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-2		MW-3		MW-3D	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
2,4-Dimethylphenol	0.050 *	0.003 J	ND	ND	ND	ND	ND
2-Methylphenol	NA	ND	ND	ND	ND	ND	ND
3+4 Methylphenol	NA	ND	ND	ND	ND	ND	ND
Sum of All Phenolic	0.001	**0.003**	ND	ND	ND	ND	ND
2-Methylnaphthalene	NA	0.001 J	ND	0.001 J	ND	ND	0.005 J
Acenaphthene	0.020 *	0.008 J	ND	0.004 J	ND	0.004 J	0.002 J
Acenaphthylene	NA	ND	ND	0.001 J	ND	ND	ND
Anthracene	0.050 *	0.002 J	ND	ND	ND	ND	ND
Benzoic Acid	NA	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.002 J	ND	0.002 J	ND	ND	ND
Diethyl phthalate	0.050 *	ND	0.001 J	ND	ND	ND	ND
Fluoranthene	0.050 *	ND	ND	ND	ND	ND	ND
Fluorene	0.050 *	0.005 J	ND	0.004 J	ND	ND	ND
Naphthalene	0.010 *	**0.016**	ND	**0.024**	ND	ND	0.073
Phenanthrene	0.050 *	0.007 J	ND	ND	ND	ND	ND
Pyrene	0.050 *	ND	ND	ND	ND	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-4		MW-5		MW-6	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
2,4-Dimethylphenol	0.050 *	**0.100 JD**	0.030	0.006 J	ND	0.023	0.012 J
2-Methylphenol	NA	0.077 JD	0.013	ND	ND	ND	ND
3+4 Methylphenol	NA	0.08	0.014	ND	ND	ND	ND
Sum of All Phenolic	0.001	**0.257**	**0.057**	**0.006**	ND	**0.023**	**0.012**
2-Methylnaphthalene	NA	0.250 JD	0.090 J	0.012	0.089 J	0.110 JD	0.024 J
Acenaphthene	0.020 *	**0.038**	**0.035**	0.004 J	0.011	**0.052**	**0.051**
Acenaphthylene	NA	0.008 J	0.013	ND	0.002 J	0.032	0.028
Anthracene	0.050 *	0.007 J	0.006 J	ND	0.002 J	0.008 J	0.007 J
Benzoic Acid	NA	0.010 J	ND	0.008 J	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.004 J	0.005 J	ND	0.002 J	0.004 J	0.004 J
Diethyl phthalate	0.050 *	ND	ND	ND	ND	ND	ND
Fluoranthene	0.050 *	0.002 J	0.002 J	ND	ND	0.003 J	0.002 J
Fluorene	0.050 *	0.019	0.019	ND	0.004 J	0.026	0.022
Naphthalene	0.010 *	**1.70 D**	**0.490**	**0.390 D**	**1.30**	**4.50 D**	**1.60**
Phenanthrene	0.050 *	0.030	0.027	ND	0.003 J	0.034	0.026
Pyrene	0.050 *	0.002 J	0.002 J	ND	ND	0.004 J	0.003 J

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-6D		MW-7		MW-8D	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
2,4-Dimethylphenol	0.050 *	ND	ND	ND	ND	0.005 J	ND
2-Methylphenol	NA	ND	ND	ND	ND	ND	ND
3+4 Methylphenol	NA	ND	ND	ND	ND	ND	ND
Sum of All Phenolic	0.001	ND	ND	ND	ND	**0.005**	ND
2-Methylnaphthalene	NA	0.180 JD	0.032	0.062	0.010 J	0.870 JD	0.220 J
Acenaphthene	0.020 *	**0.058**	**0.037**	**0.058**	**0.026**	**0.064**	**0.088 J**
Acenaphthylene	NA	0.038 JD	0.010	ND	ND	0.002 J	0.004 J
Anthracene	0.050 *	0.006 J	0.004 J	0.010 J	0.005 J	0.002 J	0.004 J
Benzoic Acid	NA	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.002 J	0.001 J	0.002 J	0.002 J	0.004 J	0.005 J
Diethyl phthalate	0.050 *	ND	ND	ND	ND	ND	ND
Fluoranthene	0.050 *	0.002 J	0.002 J	0.004 J	0.003 J	ND	ND
Fluorene	0.050 *	0.025	0.013	0.019	0.008 J	0.018	0.023
Naphthalene	0.010 *	**0.570**	**0.350**	**0.088 D**	**0.023**	**7.00 D**	**1.90**
Phenanthrene	0.050 *	0.031	0.021	0.026	0.018	0.014	0.021
Pyrene	0.050 *	0.002 J	0.003 J	0.006 J	0.004 J	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	SW-1		SW-3		SW-4	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
2,4-Dimethylphenol	0.050 *	0.001 J	ND	0.012	ND	ND	ND
2-Methylphenol	NA	ND	ND	ND	ND	ND	ND
3+4 Methylphenol	NA	ND	ND	ND	ND	ND	ND
Sum of All Phenolic	0.001	0.001	ND	0.012	ND	ND	ND
2-Methylnaphthalene	NA	0.090 D	0.067	0.140 JD	0.230	0.079	0.018
Acenaphthene	0.020 *	0.012	0.010	**0.076**	**0.093 J**	0.017	0.005 J
Acenaphthylene	NA	ND	ND	0.063	0.120 J	0.003 J	ND
Anthracene	0.050 *	0.003 J	0.002 J	0.006 J	0.006 J	ND	ND
Benzoic Acid	NA	ND	ND	ND	ND	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND	ND	ND	ND	ND
Dibenzofuran	NA	0.003 J	0.003 J	0.026	0.027	0.005 J	0.001 J
Diethyl phthalate	0.050 *	ND	ND	ND	ND	ND	ND
Fluoranthene	0.050 *	0.001 J	ND	0.003 J	0.002 J	0.001 J	ND
Fluorene	0.050 *	0.014	0.011	0.030	0.034	0.008 J	0.002 J
Naphthalene	0.010 *	0.003 J	0.008 J	**1.40 D**	**2.40**	**0.016**	0.004 J
Phenanthrene	0.050 *	0.011	0.010 J	0.019	0.034	0.008 J	0.005 J
Pyrene	0.050 *	0.001 J	0.001 J	0.002 J	0.002 J	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

Table 15 (Contd.) Two Rounds (12/98, 3/99) of Groundwater Results for SVOCs, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	SW-5	
		Round 1	Round 2
2,4-Dimethylphenol	0.050 *	ND	ND
2-Methylphenol	NA	ND	ND
3+4 Methylphenol	NA	ND	ND
Sum of All Phenolic	0.001	ND	ND
2-Methylnaphthalene	NA	ND	ND
Acenaphthene	0.020 *	ND	ND
Acenaphthylene	NA	ND	ND
Anthracene	0.050 *	ND	ND
Benzoic Acid	NA	ND	ND
bis(2-ethylhexyl)phthalate	0.005	ND	ND
Dibenzofuran	NA	ND	ND
Diethyl phthalate	0.050 *	ND	0.002 J
Fluoranthene	0.050 *	ND	ND
Fluorene	0.050 *	ND	ND
Naphthalene	0.010 *	ND	ND
Phenanthrene	0.050 *	ND	ND
Pyrene	0.050 *	ND	ND

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"J" values indicate that the concentration is below the method detection limit
"D" values indicate that the concentration is from secondary dilution analysis
"E" values indicate that a dilution was required, but not run
"ND" indicates that the analyte not detected

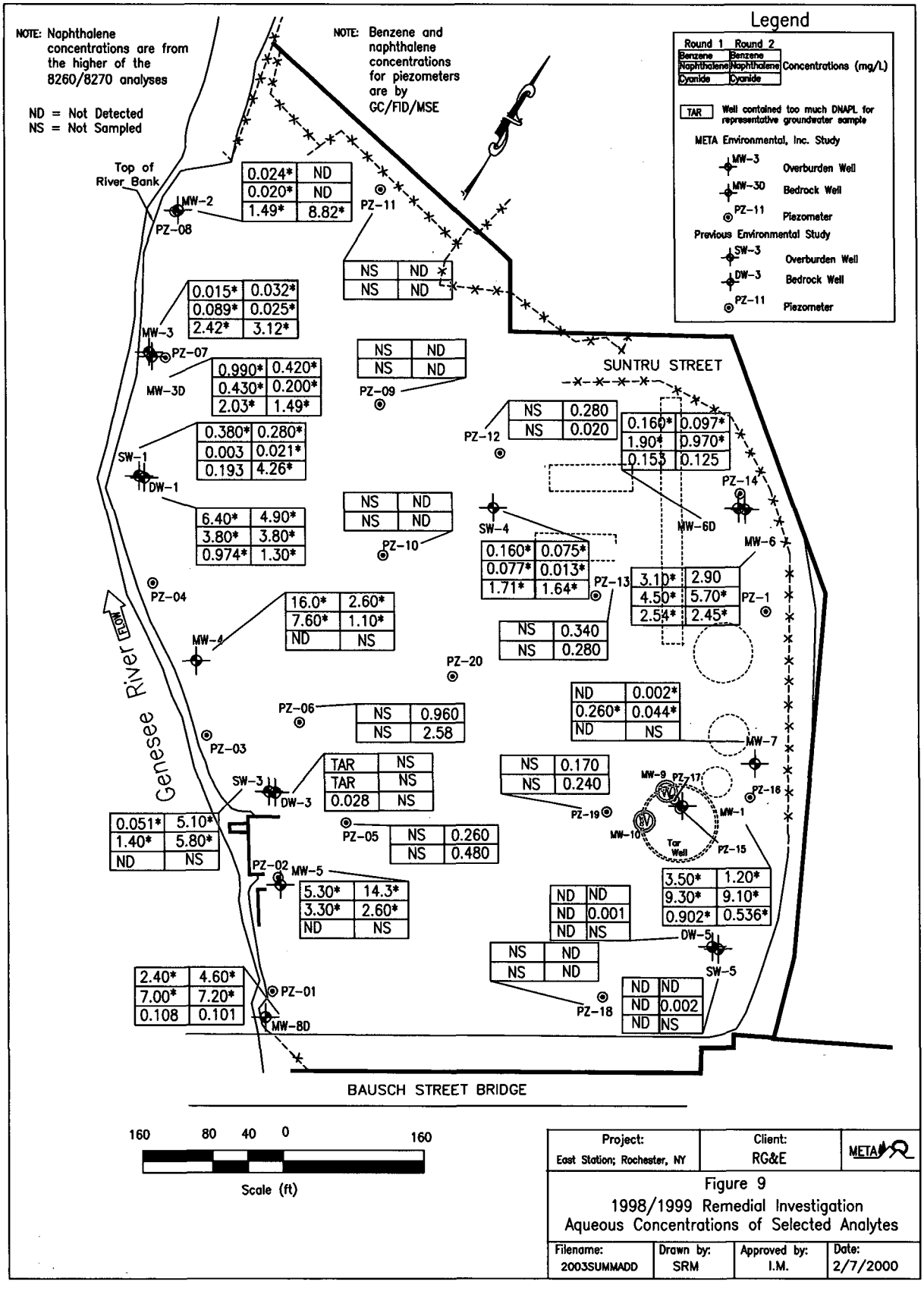

NOTE: Naphthalene concentrations are from the higher of the 8260/8270 analyses
ND = Not Detected
NS = Not Sampled
NOTE: Benzene and naphthalene concentrations for piezometers are by GC/FID/MSE
Legend
Round 1 Round 2
Benzene Benzene
Naphthalene Naphthalene Concentrations (mg/L)
Cyanide Cyanide
TAR Well contained too much DNAPL for representative groundwater sample
META Environmental, Inc. Study
MW-3 Overburden Well
MW-3D Bedrock Well
PZ-11 Piezometer
Previous Environmental Study
SW-3 Overburden Well
DW-3 Bedrock Well
PZ-11 Piezometer
Top of River Bank
MW-2
PZ-08
0.024* ND
0.020* ND
1.49* 8.82*
PZ-11
NS ND
NS ND
MW-3
PZ-07
0.015* 0.032*
0.089* 0.025*
2.42* 3.12*
MW-3D
0.990* 0.420*
0.430* 0.200*
2.03* 1.49*
NS ND
NS ND
PZ-09
SUNTRU STREET
NS 0.280
NS 0.020
PZ-12
0.160* 0.097*
1.90* 0.970*
0.153 0.125
PZ-14
SW-1
DW-1
0.380* 0.280*
0.003 0.021*
0.193 4.26*
6.40* 4.90*
3.80* 3.80*
0.974* 1.30*
NS ND
NS ND
PZ-10
SW-4
MW-6D
MW-6
0.160* 0.075*
0.077* 0.013*
1.71* 1.64*
PZ-13
3.10* 2.90
4.50* 5.70*
2.54* 2.45*
PZ-1
PZ-04
Genesee River FLOW
16.0* 2.60*
7.60* 1.10*
ND NS
MW-4
NS 0.340
NS 0.280
PZ-20
ND 0.002*
0.260* 0.044*
ND NS
MW-7
PZ-06
NS 0.960
NS 2.58
PZ-03
TAR NS
TAR NS
0.028 NS
SW-3
DW-3
NS 0.170
NS 0.240
PZ-19
MW-9
PZ-17
PZ-16
MW-1
MW-10
Tar Well
PZ-15
0.051* 5.10*
1.40* 5.80*
ND NS
PZ-05
NS 0.260
NS 0.480
PZ-02
MW-5
5.30* 14.3*
3.30* 2.60*
ND NS
3.50* 1.20*
9.30* 9.10*
0.902* 0.536*
ND ND
ND 0.001
ND NS
DW-5
SW-5
NS ND
NS ND
PZ-18
ND ND
ND 0.002
ND NS
2.40* 4.60*
7.00* 7.20*
0.108 0.101
PZ-01
MW-8D
BAUSCH STREET BRIDGE
160 80 40 0 160
Scale (ft)
Project: East Station; Rochester, NY
Client: RG&E
META
Figure 9
1998/1999 Remedial Investigation
Aqueous Concentrations of Selected Analytes
Filename: 2003SUMMADD
Drawn by: SRM
Approved by: I.M.
Date: 2/7/2000

Table 16 lists the metals data for groundwater samples from both sampling events. These data confirmed that a number of metals in groundwater at East Station site exceed their NYSDEC Class GA water quality standards or guidance values.

In addition to organic compounds and metals, groundwater samples from ten monitoring wells were analyzed for total cyanide, WAD cyanide, diffusible (free) cyanide, and metal cyanide complexes. The cyanide speciation analysis results are presented in Table 17, which shows that total cyanide concentrations were above detection limit for all ten groundwater samples. The groundwater samples were mostly comprised of ferrocyanide ($Fe(CN)_6$) and another iron-cyanide complex of undetermined composition. (Note: Ish Inc. research effort in conjunction with University of Illinois at Chicago (2003) recently identified this cyanide species as ($Fe(CN)_5CH_3NH$). No cobalt, copper or nickel cyanide complexes were found in groundwater samples from East Station. These results also confirm that diffusible (free) cyanide concentrations are extremely low (i.e., in ppb range) in the groundwater samples. For more details see the Addendum Report (April 2000). Interestingly, the shallow zone groundwater is equally dominated by both $Fe(CN)_6$ and the $Fe(CN)_5$ complexes, whereas the bedrock groundwater is dominated by the $Fe(CN)_5$ complex with very small amounts of $Fe(CN)_6$.

The most important finding from the cyanide speciation work is that less than 1% of the total cyanide is present as free (diffusible) cyanide, which is significant since free cyanide is the species that represents a human health concern. The measured concentrations of free cyanide are more then one order of magnitude lower than the United States Environmental Protection Agency (EPA) maximum contaminant level (MCL) for free cyanide in drinking water. Furthermore, iron cyanide complexes are known to be very stable and essentially non-toxic. Therefore, iron cyanide species in groundwater are not a significant human health concern at the East Station site.

The comparison of analytical methods for VOCs and SVOCs indicated that the new SW-846 Method 3511 results correlate very well with the data from the SW-846 old Methods 8260 and 8270.

Table 16 Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	DW-1		DW-3		DW-5	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Aluminum	NA	ND	0.077 B	ND	Not sampled	ND	0.056 B
Antimony	0.003	ND	ND	ND	Not sampled	ND	ND
Arsenic	0.025	ND	0.005 B	0.012	Not sampled	ND	0.009 B
Barium	1.0	0.246 E	0.245	0.352 E	Not sampled	0.078 BE	0.10 BE
Calcium	NA	34.5 E	46.9	90.5 E	Not sampled	70.8 E	92.9
Chromium	0.05	ND	ND	ND	Not sampled	0.011	0.049
Cobalt	NA	ND	0.002 B	ND	Not sampled	ND	0.002 B
Copper	0.20	0.023 B	0.025	0.014 B	Not sampled	0.015 B	0.020 B
Iron (Fe)	0.3	**0.758 E**	**1.24**	**0.573 E**	Not sampled	0.177 E	**0.692**
Lead	0.025	ND	0.002 B	ND	Not sampled	ND	ND
Magnesium	35 *	24.1	33.6	**216**	Not sampled	31.1	**36.5**
Manganese (Mn)	0.003	**0.016 E**	**0.018**	**0.140 E**	Not sampled	**0.028 E**	**0.043**
Fe + Mn	0.5	**0.774**	**1.26**	**0.713**	Not sampled	0.205	**0.735**
Nickel	0.10	0.002 B	0.001 B	0.001 B	Not sampled	**0.164**	**0.234**
Potassium	NA	24.4 E	22.3	9.70 E	Not sampled	17.9 E	18.7
Selenium	0.010	ND	ND	ND	Not sampled	ND	ND
Sodium	20.0	**527**	**428**	**329**	Not sampled	**739**	**772**
Thallium	0.0005 *	ND	ND	ND	Not sampled	ND	ND
Vanadium	NA	ND	ND	0.004 B	Not sampled	ND	ND
Zinc	2 *	0.045	0.024	0.030	Not sampled	0.033	0.024
Cyanide	0.20	**0.974**	**1.3**	0.028	Not sampled	ND	Not sampled

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 16 (Contd) Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-1		MW-2		MW-3	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Aluminum	NA	ND	0.080 B	0.015 B	0.123 B	ND	0.125 B
Antimony	0.003	ND	ND	ND	**0.011 B**	ND	**0.008 B**
Arsenic	0.025	0.004 B	0.007 BE	0.009 B	**0.066**	**3.69**	**0.599**
Barium	1.0	0.064 BE	0.081 BE	0.019 BE	0.025 BE	0.040 BE	0.043 BE
Calcium	NA	163 E	206	356 E	366	186 E	369
Chromium	0.05	ND	ND	0.004 B	0.004 B	0.003 B	ND
Cobalt	NA	ND	0.003 B	ND	0.010 B	0.006 B	0.016 B
Copper	0.20	0.013 B	0.016 B	ND	0.016 B	0.009 B	0.025 B
Iron (Fe)	0.3	**7.15 E**	**4.57**	**99.8 E**	**3.54**	**58.5 E**	**29.3**
Lead	0.025	ND	0.002 B	ND	ND	ND	0.005
Magnesium	35 *	**37.2**	**54.0**	**132**	**48.7**	**55.0**	**83.1**
Manganese (Mn)	0.003	**0.436 E**	**0.447**	**2.06 E**	**0.375**	**2.02 E**	**2.21**
Fe + Mn	0.5	**7.59**	**5.02**	**102**	**3.92**	**60.5**	**31.5**
Nickel	0.10	0.004 B	ND	ND	ND	0.002 B	0.004 B
Potassium	NA	5.56 E	8.19	17.3 E	11.2	9.69 E	13.0
Selenium	0.010	ND	ND	ND	ND	ND	ND
Sodium	20.0	**95.1**	**115**	**375**	**549**	**425**	**448**
Thallium	0.0005 *	ND	ND	**0.003 B**	ND	ND	ND
Vanadium	NA	ND	ND	0.007 B	ND	0.004 B	ND
Zinc	2 *	0.036	0.028	0.021	0.071	0.042	0.028
Cyanide	0.20	**0.902**	**0.536**	**1.49**	**8.82**	**2.42**	**3.12**

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
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"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 16 (Contd) Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-3D		MW-4		MW-5	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Aluminum	NA	ND	0.037 B	0.038 B	0.132 B	ND	0.099 B
Antimony	0.003	ND	**0.007 B**	ND	0.003 B	ND	ND
Arsenic	0.025	ND	0.005 B	0.007 B	0.018	ND	0.019
Barium	1.0	0.022 BE	0.016 BE	0.036 BE	0.015 B	0.111 BE	0.079 B
Calcium	NA	9.98 E	7.38	201 E	383	141 E	160
Chromium	0.05	ND	ND	0.005 B	0.002 B	ND	ND
Cobalt	NA	ND	0.002 B	ND	0.005 B	ND	ND
Copper	0.20	0.017 B	0.018 B	ND	0.045	0.021 B	0.017 B
Iron (Fe)	0.3	**0.493 E**	**0.661**	**133 E**	**199**	**6.55 E**	**1.92**
Lead	0.025	ND	ND	ND	0.004	ND	ND
Magnesium	35 *	8.20	5.11	**35.3**	33.0	**79.4**	**111**
Manganese (Mn)	0.003	0.003 BE	0.003 B	**1.67 E**	**2.61**	**0.295 E**	**0.219**
Fe + Mn	0.5	0.496	**0.664**	**135**	**201**	**6.85**	**2.14**
Nickel	0.10	ND	ND	0.002 B	ND	0.002 B	ND
Potassium	NA	13.3 E	12.2	10.5 E	9.00	5.22 E	4.69 B
Selenium	0.010	ND	0.004 B	ND	0.007	ND	ND
Sodium	20.0	**391**	**349**	**214**	**40**	**31.2**	**25.0**
Thallium	0.0005 *	ND	**0.004 B**	ND	ND	ND	**0.004 B**
Vanadium	NA	ND	ND	0.008 B	0.004 B	0.003 B	0.003 B
Zinc	2 *	0.040	0.030	0.026	0.049	0.035	0.020 B
Cyanide	0.20	**2.03**	**1.49**	ND	Not sampled	ND	Not sampled

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 16 (Contd) Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-6		MW-6D		MW-7	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Aluminum	NA	0.009 B	0.610 B	ND	0.063 B	ND	0.071 B
Antimony	0.003	ND	ND	ND	ND	ND	ND
Arsenic	0.025	**0.734**	**0.335**	ND	0.007 B	ND	0.009 B
Barium	1.0	0.428 E	0.449	0.150 BE	0.169 BE	0.087 BE	0.084 BE
Calcium	NA	92.7 E	136	237 E	243	51.6 E	79.0
Chromium	0.05	ND	ND	ND	ND	0.004 B	ND
Cobalt	NA	ND	0.001 B	ND	ND	ND	ND
Copper	0.20	0.025	0.011 B	0.015 B	0.010 B	0.015 B	0.019 B
Iron (Fe)	0.3	**5.13 E**	**3.74**	**1.86 E**	**1.79**	**1.46 E**	**5.29**
Lead	0.025	ND	ND	ND	ND	ND	ND
Magnesium	35 *	**108**	**144**	**109**	**101**	19.6	28.4
Manganese (Mn)	0.003	**0.410 E**	**0.680**	**0.085 E**	**0.065**	**0.117 E**	**0.156**
Fe + Mn	0.5	**5.54**	**4.42**	**1.95**	**1.86**	**1.58**	**5.45**
Nickel	0.10	0.002 B	ND	ND	ND	0.003 B	ND
Potassium	NA	14.9 E	10.4	21.8 E	22.3	6.48 E	6.43
Selenium	0.010	0.007	ND	ND	ND	ND	ND
Sodium	20.0	**1,640**	**1,310**	**196**	**285**	**618**	**503**
Thallium	0.0005 *	**0.002 B**	ND	ND	**0.004 B**	ND	ND
Vanadium	NA	0.006 B	0.005 B	ND	ND	ND	ND
Zinc	2 *	0.031	0.014 B	0.033	0.019 B	0.031	0.026
Cyanide	0.20	**2.54**	**2.45**	0.153	0.125	ND	Not sampled

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 16 (Contd) Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	MW-8D		SW-1		SW-3	
		Round 1	Round 2	Round 1	Round 2	Round 1	Round 2
Aluminum	NA	ND	0.061 B	ND	0.084 B	ND	0.059 B
Antimony	0.003	ND	ND	ND	ND	ND	ND
Arsenic	0.025	ND	0.007 B	**0.298**	**0.232**	0.012	0.016
Barium	1.0	0.472 E	0.567	0.048 BE	0.085	0.416 E	0.568
Calcium	NA	74.8 E	85.0	96.6 E	181	96.6 E	137
Chromium	0.05	ND	ND	0.002 B	ND	ND	ND
Cobalt	NA	ND	ND	0.009 B	0.008 B	ND	ND
Copper	0.20	0.020 B	0.016 B	0.019 B	0.030	0.017 B	0.017 B
Iron (Fe)	0.3	**1.87 E**	**1.97**	**1.47 E**	**3.46**	**0.912 E**	**1.15**
Lead	0.025	ND	ND	ND	0.003 B	ND	ND
Magnesium	35 *	**61.8**	**72.7**	**55.1**	**108**	**206**	**283**
Manganese (Mn)	0.003	**0.068 E**	**0.062**	**0.087 E**	**0.487**	**0.164 E**	**0.234**
Fe + Mn	0.5	**1.94**	**2.03**	**1.56**	**3.95**	**1.08**	**1.38**
Nickel	0.10	0.001 B	ND	0.001 B	ND	0.003 B	ND
Potassium	NA	8.69 E	13.0	9.67 E	10.0	7.96 E	9.89
Selenium	0.010	ND	ND	ND	ND	ND	ND
Sodium	20.0	**176**	**171**	**664**	**778**	**348**	**341**
Thallium	0.0005 *	ND	ND	ND	ND	**0.004 B**	ND
Vanadium	NA	ND	ND	0.005 B	0.004 B	0.003 B	ND
Zinc	2 *	0.034	0.022	0.036	0.014 B	0.027	0.016 B
Cyanide	0.20	0.108	0.101	0.193	**4.26**	ND	Not sampled

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 16 (Contd) Two Rounds (12/98, 3/99) of Groundwater for Metals and Total Cyanide, mg/L (Detected Compounds Only)

Analyte	Class GA Standard	SW-4		SW-5	
		Round 1	Round 2	Round 1	Round 2
Aluminum	NA	ND	0.056 B	ND	0.075 B
Antimony	0.003	ND	ND	ND	ND
Arsenic	0.025	**0.244**	**0.380**	ND	0.012
Barium	1.0	0.114 BE	0.037 BE	0.066 BE	0.097 BE
Calcium	NA	101 E	30.5	65.8 E	84.1
Chromium	0.05	ND	0.001 B	0.015	**0.434**
Cobalt	NA	ND	ND	0.003 B	0.002 B
Copper	0.20	0.006 B	0.011 B	0.018 B	0.019 B
Iron (Fe)	0.3	**1.01 E**	**0.872**	**2.26 E**	**1.39**
Lead	0.025	ND	ND	ND	ND
Magnesium	35 *	**68.0**	**299**	29.3	34.6
Manganese (Mn)	0.003	**0.059 E**	**0.014 B**	**0.060 E**	**0.013 B**
Fe + Mn	0.5	**1.07**	**0.886**	**2.32**	**1.40**
Nickel	0.10	0.009 B	0.008 B	**0.336**	0.053
Potassium	NA	17.8 E	14.9	17.1 E	16.2
Selenium	0.010	ND	ND	ND	ND
Sodium	20.0	**2,370**	**1,320**	**639**	**673**
Thallium	0.0005 *	ND	ND	ND	**0.003 B**
Vanadium	NA	ND	ND	ND	0.002 B
Zinc	2 *	0.025	0.012 B	0.036	0.023
Cyanide	0.20	**1.71**	**1.64**	ND	Not sampled

* Guidance Value rather than Standard from NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1 (Updated June 1998)
"NA" indicates that criterion is not available.
Bolded concentrations exceeded NYSDEC Class GA groundwater Standards or Guidance Values.
"B" values indicate that the concentration is less than the required detection limit, but greater than or equal to the instrument detection limit.
"E" values indicate that the concentration is estimated due to interferences.
"ND" indicates that the analyte not detected.

Table 17 Groundwater Cyanide Speciation Data (March 1999)

Sample ID	Total CN^-	WAD* CN^-	Diffusible CN^-	Unknown Complex	$Fe(CN)_6^{-4}$	pH
Shallow Wells						
MW-1	0.536	0.156	0.009	0.416	0.078	7.5
SW-1	4.26	0.234	0.012	1.33	3.47	6.6
MW-2	8.82	1.02	0.010	3.80	5.37	6.2
MW-3	3.12	0.344	0.015	2.34	1.10	6.1
SW-4	1.64	0.237	0.004	0.718	1.16	8.5
MW-6	2.45	0.797	0.017	2.42	0.251	7.5
Deep Wells						
DW-1	1.30	0.366	0.007	1.31	0.062	6.7
MW-3D	1.49	0.404	0.005	1.50	0.027	8.1
MW-6D	0.125	0.064	< 0.003	0.140	< 0.04	7.1
MW-8D	0.101	0.020	<0.003	0.098	< 0.04	7.5

WAD = Weak acid dissociable

2001 Focused Feasibility Study (FFS):

As a result of the site investigations completed by Atlantic Environmental and Ish Inc./META, it was determined that the principal environmental concerns for the East Station are the NAPL seeps at the riverbank, the NAPL in the tar well and contiguous soil, and the groundwater quality impacts in the shallow overburden and the bedrock aquifers. Ish Inc./META prepared the FFS in accordance with regulatory guidance in identifying, evaluating, and selecting preferred remedial alternatives for addressing the principal environmental concerns at the East Station. The preferred/recommended alternatives were derived by considering how well they met the appropriate regulatory standards, criteria, and guidelines (SCGs) of the NYSDEC. However, it does not appear that the SCGs can be feasibly attained, particularly the allowable soil concentration levels set forth in the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046 and groundwater levels in 6NYCRR parts 700-705 given the

circumstances of the site. Nevertheless, conditions protective of public health and the environment can still be achieved.

Areas of Concern

Based on the results of the field investigations, four immediate areas of concern have been identified. These include the surface soil, the tar well, the NAPL seeps in the Genesee River, and the groundwater. Preliminary remediation goals were developed and are summarized below:

Surface Soils

Preserve a minimum of 4 feet of the clean fill at the site presently in place above all soils containing site-related compounds of concern, after removing certain source areas impacted by hydrocarbons, through institutional controls, such as deed restrictions.

Tar Well

Remove, destroy or treat to stabilize the tar NAPL present in the tar well area to eliminate its potential for causing future releases to the environment.

NAPL Seeps

Abate or mitigate seepage of NAPL along the riverbank.

Groundwater

(1) Attain site-specific groundwater quality levels that are protective of the public health and the environment for the continued commercial/industrial use of the site, and (2) Address groundwater quality issues such that any discharge is protective of the surface water quality.

There were 6 alternatives identified and screened for the tar well remediation. There were 5 alternatives identified and screened for the NAPL seep area, and 7 alternatives were identified for groundwater remediation.

Screening of Remedial Alternatives

The detailed analysis identified the following alternatives to be the preferred remedial alternatives for use at the East Station site.

- Alternative TW-3 consisting of in-situ stabilization/solidification of the tar well area NAPL is recommended as the preferred remedial alternative.
- Alternative NS-5 consisting of in-situ stabilization/solidification of the NAPL seeps in the riverbank area is recommended as the preferred remedial alternative.
- Alternative GW-2, consisting of institutional controls for groundwater at the site is retained as the preferred remedial alterative because it is technically infeasible to achieve the SCGs for the groundwater at the site. In order to determine appropriate site-specific cleanup levels, a qualitative risk analysis will be performed based on site-specific information and exposure potentials. Following the risk analysis, feasibility analysis for the groundwater remediation to achieve site-specific cleanup levels will be redone.

Please refer to the FFS report dated June 2001for further details.

NEXT STEPS

As a result of the site characterization and focused feasibility study of the East Station former MGP site, the performance of IRMs at the site in conjunction with further analysis and development of the approaches is being pursued for managing the impacted soils and groundwater at the site. The first IRM to be pursued is an in-situ solidification/stabilization strategy to mitigate NAPL seeps from the riverbank and will involve carrying out additional remedial design investigations to develop the detailed engineering specifications and

construction plans. The second IRM is expected to deal with the tar well and the immediate contiguous soil where DNAPL is present as a source material. The focused feasibility study also recommended the use of in-situ stabilization/solidification as the remedy for tar well. Alternatively, excavation and removal of the tar well and DNAPL containing subsurface material surrounding the tar well may be considered for implementation. There is a need to refine the evaluation and selection of the IRM for tar well before an IRM can be successfully implemented.

However, we need to discuss these alternatives with the NYSDEC and obtain their concurrence in order to proceed with planning and implementing these IRMs.

REFERENCES

Atlantic Environmental Services Inc. and Remediation Technologies, Inc. Site Investigation Report for East Station MGP site. June, 1993

Ish Inc. and META Environmental Inc. Focused Remedial Investigation of Former Manufactured Gas Plant Site, East Station, Rochester, New York. Interim Report, April 2000.

Ish Inc. and META Environmental Inc. Addendum to the Focused Remedial Investigation Of Former Manufactured Gas Plant Site, East Station, Rochester, New York. Interim Report, April 2000.

Ish Inc. and META Environmental Inc. Focused Feasibility Study for the Development and Screening of Remediation Alternatives for Select Areas of the East Station Former Manufactured Gas Site in Rochester, New York. June 2001.