INTERIM SITE INVESTIGATION REPORT
BARRETTO POINT SITE
BRONX, NEW YORK

PREPARED FOR

NEW YORK CITY ECONOMIC
DEVELOPMENT CORPORATION
AND
NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
UNDER CONTRACT WITH THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
CLEAN WATER/CLEAN AIR BOND ACT

PREPARED BY

DVIRKA AND BARTILUCCI
CONSULTING ENGINEERS
WOODBURY, NEW YORK

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1.0 INTRODUCTION

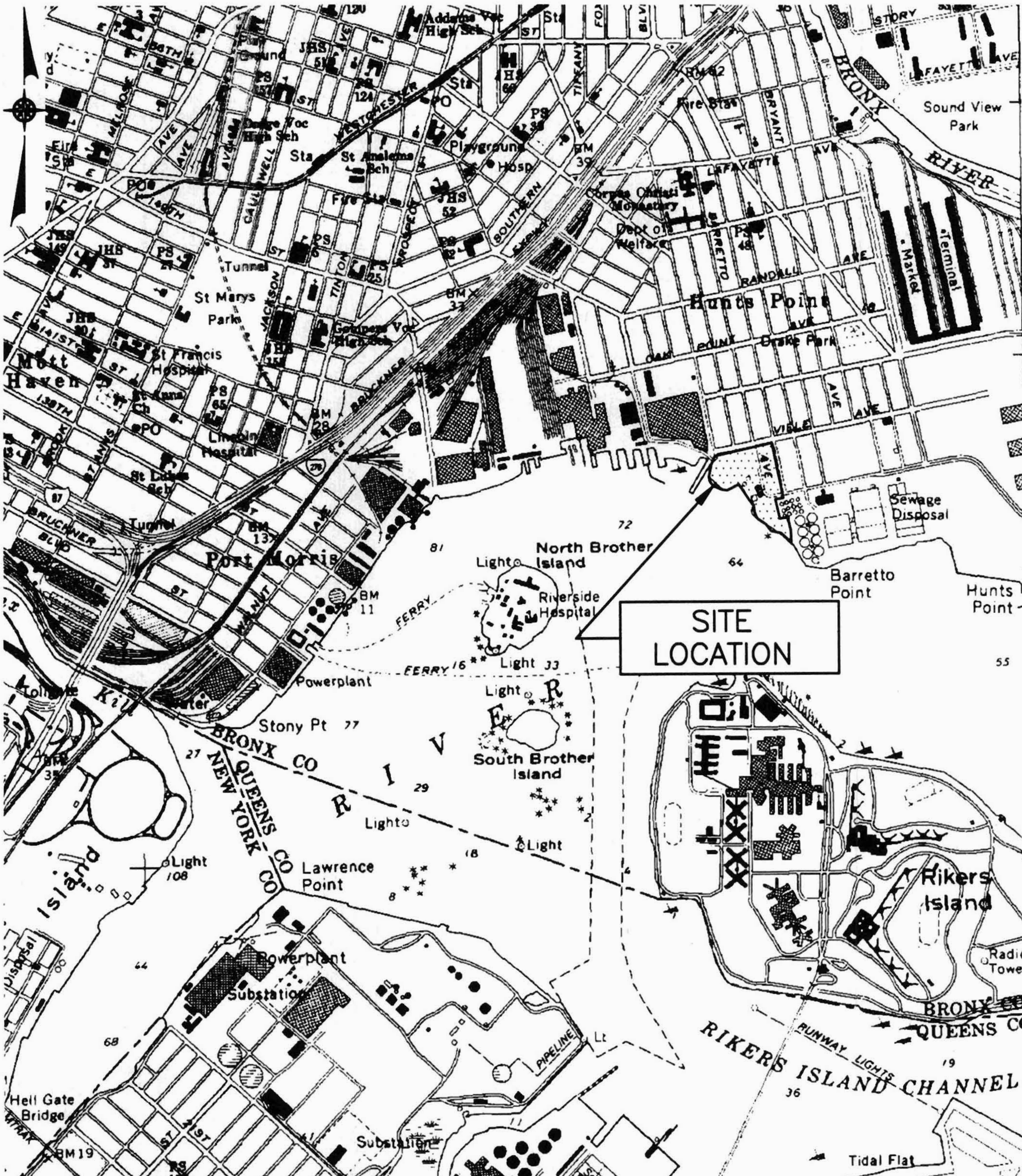
The purpose of this report is to provide the results of the initial phase of the Site Investigation (SI) being conducted for the Barretto Point Site (see Figure 1 for site location). The initial phase of activities included site reconnaissance, site clearing, surveying, geophysical survey and collection and analysis of soil gas and groundwater samples. Each of these activities and the results is described below.

Based on the results of the initial SI activities, it does not appear that the Barretto Point Site is significantly contaminated except for one area in which elevated levels of volatile organic compounds (VOCs) were detected in soil gas samples. This area, formerly occupied by a paint and varnish manufacturer, will be further investigated during the second phase of the SI field activities.

2.0 SITE RECONNAISSANCE

As described in the letter report dated September 15, 1999 from Dvirka and Bartilucci Consulting Engineers (D&B) (included as Appendix A), a site reconnaissance survey was performed by D&B personnel on September 1, 1999. The results of the site reconnaissance identified two additional areas of potential environmental concern. These include an area of apparently stressed vegetation in the western portion of the site and an area of ponded water with a red color in the southeastern portion of the site. For these areas, collection and analysis of one additional surface soil sample and one additional water sample were recommended. The additional labor and analytical costs resulting from these additional samples were included in the revised cost estimate letter from D&B to Ms. Kay Zias dated November 10, 1999 (included as Appendix B).

In addition, an existing monitoring well and several open boreholes were identified in the northeastern portion of the site. No information regarding any previous drilling or sampling activities at the site could be obtained, so the purpose for the construction of the borings and the well is unknown. The depth of the existing monitoring well was measured at approximately 31



SOURCE: N.Y.S.D.O.T. CENTRAL PARK QUADRANGLE

BARRETTO POINT
BRONX, NEW YORK

SITE LOCATION MAP

Dvirka and Bartilucci
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FIGURE 1

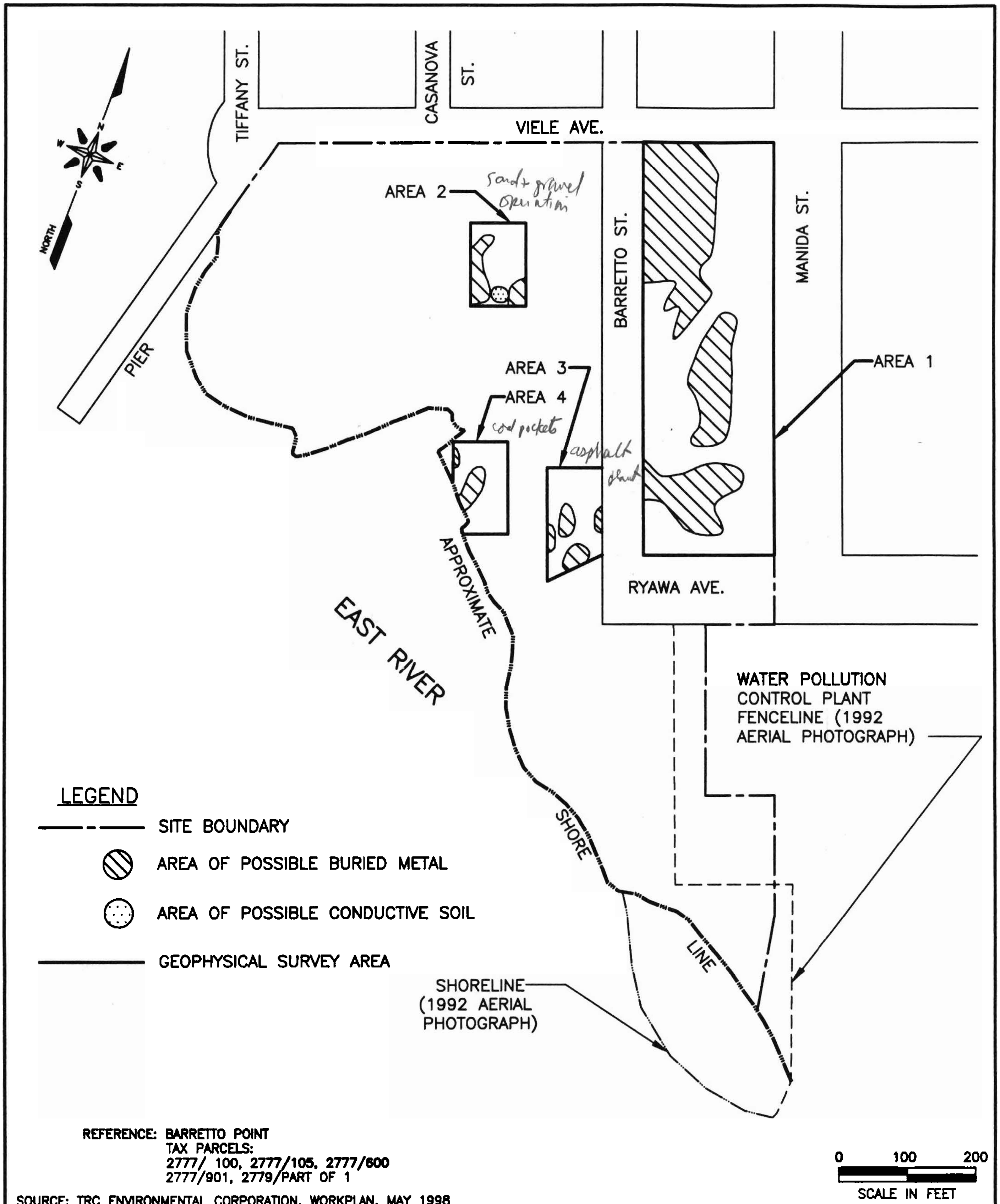
DIR: 1616 FILE: 1616-SITE DGC/01-19-00

feet below ground surface with groundwater measured at approximately 15 feet. The New York State Department of Environmental Conservation (NYSDEC) requested that the open boreholes be abandoned in accordance with NYSDEC requirements. The NYSDEC also requested that the existing monitoring well be sampled as part of the SI field program. The sample collected from this well can be considered as one of three contingency groundwater samples included in the Site Investigation/Remedial Alternatives Report (SI/RAR) Work Plan. Therefore, no additional labor or analytical costs will be incurred.

3.0 SITE CLEARING

In order to provide access to the areas to be investigated, site clearing was conducted on October 20 and 21, 1999 by Uni-Tech Drilling Company using a John Deere 555A track loader. The geophysical survey areas (see Figure 2) were cleared to simplify access for the geophysical equipment. Access to the general vicinity of the proposed soil gas points was also cleared (the actual soil gas sample locations were subsequently marked as part of the surveying activities). The southeastern portion of the site was inaccessible to the track loader due to standing water.

During the clearing activities, it was noted that the southeastern portion of the site appeared larger than shown on the figures in the SI/RAR Work Plan. In addition, the fence surrounding the Hunts Point Water Pollution Control Plant (HPWPCP) appeared to be located within the Barretto Point Site boundaries (as shown on the SI/RAR Work Plan figures). The shoreline configuration and the HPWPCP fence as determined from a 1992 aerial photograph are shown on the figures referenced in this report. These apparent discrepancies are being addressed by the New York City Department of Environmental Protection (NYCDEP). In addition, since the original location of surface soil sample SS-9 is within the HPWPCP fence, it is recommended that this sample be relocated to a location on the Barretto Point Site.



BARRETTO POINT SITE
BRONX, NEW YORK

GEOPHYSICAL SURVEY MAP &
SURVEY RESULTS SUMMARY

Dvirka and Bartilucci
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FIGURE 2

In order to evaluate subsurface conditions and possible contamination in the southeastern portion of the site, excavation and sampling of two test pits are recommended for the southeastern portion of the site. In addition, it is recommended that one of the three contingency soil borings/monitoring wells be constructed in this area. Test pit excavation, monitoring well construction, and collection and analysis of soil and groundwater samples will be conducted as described in the SI/RAR Work Plan.

4.0 LAND SURVEYING

After clearing was completed, the grids for the geophysical survey areas (20-foot spacing) and for the soil gas/groundwater screening program (50-foot and 150-foot spacing) were measured and marked by Municipal Land Survey, P.C., a New York State-licensed surveyor. The surveying activities were conducted on November 1 through 3, 1999.

5.0 GEOPHYSICAL SURVEY

5.1 Scope of Work

As described in the SI/RAR Work Plan, geophysical surveys were conducted in four areas of the site by Hager-Richter Geoscience, Inc. (Hager-Richter) on November 4 and 5, 1999. Area 1 was the historical industrial area bounded by Barretto Street, Manida Street, Viele Avenue and Ryawa Avenue (including the former location of a paint and varnish manufacturer). Area 2 included that portion of the site historically occupied by a sand and gravel operation boiler and compressor building. The former location of an asphalt plant was included in Area 3 and Area 4 was the area formerly occupied by coal pockets. The locations of these areas are shown on Figure 2. Geophysical data were not collected in small portions of Areas 1, 3 and 4 due to large debris piles or vegetation that could not be moved during the site clearing activities. In addition, the proposed locations of test pit TP-5 and monitoring wells MW-2 and MW-4 were surveyed for subsurface utilities.

For Areas 1 through 4, two geophysical methods, electromagnetic induction terrain conductivity (EITC) and ground penetrating radar (GPR) were utilized. The geophysical surveys were conducted along lines spaced 20 feet apart in an approximately north-south direction parallel to Barretto Street. As noted above, the grid lines had been previously measured and marked by the surveyor. The instruments used were an EM31 terrain conductivity meter manufactured by Geonics (EITC) and a SIR-2 manufactured by Geophysical Survey Systems, Inc. (GPR). Clearance of the one test pit and two monitoring well locations was performed using GPR and a Precision Utility Locator Model 400.

5.2 Results and Recommendations

The report from Hager-Richter is included as Appendix C. The GPR data in Area 1 was limited to less than 2 feet due to limited signal penetration. Since this area was historically developed, the limited GPR signal penetration may be due to a large amount of subsurface construction debris. In Areas 2, 3 and 4, GPR data were collected to a depth of approximately 4 to 5 feet. Small objects detected throughout Areas 2, 3 and 4 were interpreted to represent construction debris.

Data for the EITC survey were recorded at approximately 2.5-foot intervals along the gridlines in both horizontal and vertical dipole modes. This allowed evaluation of two general depth intervals, 0 to 9 feet (horizontal dipole mode) and 0 to 18 feet (vertical dipole mode). Both apparent conductivity and in-phase component data were measured to evaluate anomalous conductive ground and buried metallic objects, respectively. Detailed results of the EITC survey with data contour plots are included in the Hager-Richter report (see Appendix C). In summary, the EITC results indicated eleven separate zones of possible buried metal in the four areas investigated, which is not inconsistent with the industrial history of the site. In addition, one area of possible anomalous conductive soil was detected in Area 2 at a depth of greater than 9 feet. The areas of possible buried metal and conductive soil identified during the geophysical survey are shown on Figure 2. The area of anomalous conductive soil is located approximately 20 feet from the proposed location for test pit TP-3. It is therefore recommended to move the location of TP-3 approximately 20 feet southeast to investigate the area of conductive soil.

No subsurface utilities or significant subsurface objects were detected at the proposed locations of TP-5, MW-2 or MW-4. Two possible nonmetallic objects were detected by the GPR near the TP-5 location. It was the conclusion of the Hager-Richter field crew that these objects were small and shallow. Relocation of the test pit is therefore not warranted.

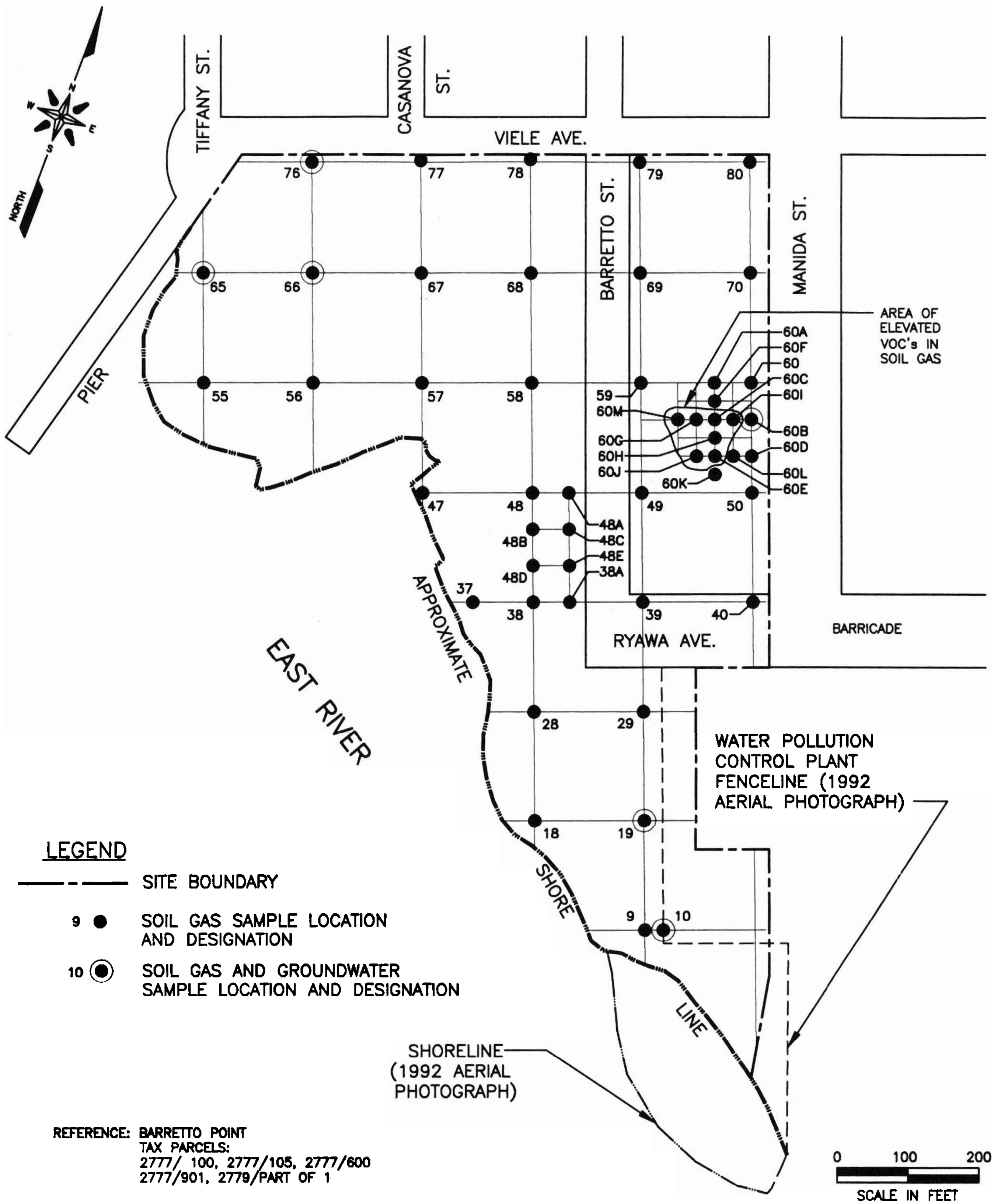
6.0 SOIL GAS/GROUNDWATER SCREENING PROGRAM

6.1 Scope of Work

In accordance with the SI/RAR Work Plan, the soil gas/groundwater screening sample locations were constructed on a 150-foot grid across the site. Samples were also collected on a 50-foot grid in two areas corresponding to the historic locations of an asphalt plant (in the south-central portion of the site), and a paint and varnish manufacturing facility (in the eastern portion of the site). Marked sample locations in wet areas were relocated to nearby dry areas with NYSDEC concurrence. The sample locations and designations are shown on Figure 3.

The SI/RAR Work Plan included up to 10 contingency sample locations for further investigation of elevated soil gas readings. Nine of the contingency locations were utilized. Eight of these (60F through 60M) were located in the eastern portion of the site around locations with elevated readings. The ninth contingency location (37) was constructed near the shoreline in the western portion of the site to ensure adequate spatial coverage in this area. As noted in the site clearing discussion above, the southeastern portion of the site was inaccessible due to standing water, therefore no soil gas/groundwater screening samples were located in this area.

The soil gas and groundwater screening samples were collected using a Geoprobe direct-push rig by Zebra Environmental Corporation (Zebra). Soil gas samples were collected at most locations from a depth of 3 feet below ground surface. At two locations, samples were collected from a depth of 2 feet due to water encountered at 3 feet (location 10) and probe refusal at 2 feet (location 48C). In other locations (48E, 60, 60D, 60L and 70), the clearing activities or destruction of squatter dwellings had spread one to 2 feet of debris and/or additional soil.



REFERENCE: BARRETTO POINT
TAX PARCELS:
2777/ 100, 2777/105, 2777/600
2777/901, 2779/PART OF 1

SOURCE: TRC ENVIRONMENTAL CORPERATION WORK PLAN, MAY 1998

DGC/01-19-00

DIR:

BARRETTO POINT SITE
BRONX, NEW YORK

SOIL GAS/GROUNDWATER SCREENING SURVEY MAP

Dvirka and Bartilucci
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FIGURE 3

Therefore, at these locations, samples were collected from depths of 4 or 5 feet to account for the additional surface material so that the samples were collected from approximately 3 feet below original ground surface.

Fifty soil gas samples were collected for on-site VOC analysis utilizing a mobile laboratory on November 29, 1999 through December 7, 1999. Samples were analyzed using the mobile laboratory's protocol that was approved by NYCDEP and NYSDEC prior to mobilization for the soil gas/groundwater screening survey. Five soil gas samples were also submitted to an off-site laboratory for confirmatory analysis.

At each soil gas sample location, the Geoprobe rods were driven to the required depth and then raised several inches to release the disposable drive point. The annular space around the outside of the rods was sealed using bentonite powder. A length of new dedicated tubing with a soil gas sampling tip was inserted into the rods and connected to an organic vapor analyzer equipped with a photoionization detector (PID). The PID was used to purge atmospheric air from the sample tubing for approximately 1 minute. PID readings measured during purging are summarized in Table 1. Table 1 also shows the ambient air temperature and barometric pressure at the time of soil gas sample collection. The soil gas sample was collected into a dedicated 1-liter sample bag using Zebra's sampling apparatus. This equipment consists of an airtight container with two fittings through one side. A labeled sample bag was placed inside the container and connected to the sample tubing via one of the container fittings. A vacuum pump connected to the second fitting was used to create a vacuum inside the sealed container which caused the sample bag to passively fill with soil gas. The filled sample bag was delivered to the on-site laboratory under chain of custody procedures.

Samples to be submitted to an off-site laboratory were collected on charcoal tubes. After the sample for on-site analysis was collected, the tubing from the Geoprobe rods was connected to a charcoal air sample tube. An air sampling pump was used to draw 5 liters of soil gas through the charcoal tube. After sample collection, the charcoal was sealed for shipment under chain of custody procedures to the off-site laboratory for analysis.

TABLE 1
SUMMARY OF VOLATILE ORGANIC SCREENING AND WEATHER DATA
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION	PID READING	AIR TEMPERATURE	BAROMETRIC PRESSURE	SAMPLE LOCATION	PID READING	AIR TEMPERATURE	BAROMETRIC PRESSURE
SG-09	0.0	42.8	30.12	SG-60	0.0	46.4	30.27
SG-10	NM	57.2	29.68	SG-60A	1.0	40.1	30.24
SG-18	0.0	46.0	30.15	SG-60B	0.0	50.9	30.27
SG-19	0.0	30.0	30.18	SG-60C	220	43.0	30.24
SG-28	1.1	38.7	30.15	SG-60D	1.8	41.0	30.24
SG-29	2.2	29.5	30.24	SG-60E	145	44.4	30.24
SG-37	1.8	55.9	29.71	SG-60F	0.0	49.8	29.80
SG-38	2.0	55.0	29.71	SG-60G	850	51.1	29.80
SG-38A	3.0	55.9	29.71	SG-60H	80	56.8	29.85
SG-39	0.0	34.0	30.24	SG-60I	92	51.3	29.85
SG-40	0.0	26.6	30.14	SG-60J	75	60.5	29.85
SG-47	10.2	57.7	30.03	SG-60K	0.0	54.0	29.85
SG-48	1.0	59.0	30.03	SG-60L	0.0	58.6	29.88
SG-48A	0.5	66.0	30.00	SG-60M	1,900	52.3	29.94
SG-48B	11.2	67.0	30.00	SG-65	0.0	40.6	30.18
SG-48C	1.4	69.3	29.74	SG-66	0.5	46.5	30.12
SG-48D	8.0	69.4	30.00	SG-67	2.8	45.0	30.06
SG-48E	0.0	59.7	27.74	SG-68	0.4	47.8	30.06
SG-49	0.0	43.7	30.30	SG-69	0.0	42.1	30.23
SG-50	0.0	38.3	30.27	SG-70	0.0	43.9	30.27
SG-55	0.3	58.5	30.06	SG-76	0.4	36.0	30.18
SG-56	1.5	54.0	30.06	SG-77	0.8	30.9	30.18
SG-57	0.1	48.6	30.06	SG-78	0.0	31.6	30.15
SG-58	0.5	44.6	30.06	SG-79	0.0	44.1	30.22
SG-59	0.6	46.4	30.27	SG-80	0.0	44.1	30.23

NOTES:
Units are parts per million for PID readings,degrees Fahrenheit for air temperature and inches of mercury for barometric pressure.
NM: Not measured.

Groundwater samples were collected using a groundwater sampler attached to the Geoprobe rods. Where samples could be collected, the rods were driven to the sample depth and retracted, exposing the sampler's screen. A length of dedicated tubing with a check valve installed at the end was then inserted into the rods. Oscillation of the tubing/check valve assembly allows retrieval of the groundwater for analysis.

All Geoprobe locations were backfilled using native material and bentonite powder.

6.2 Results and Recommendations

Analytical results are summarized in Table 2 (soil gas analyses from on-site laboratory), Table 3 (comparison of soil gas analyses from on-site and off-site laboratories) and Table 4 (groundwater analyses from on-site laboratory). The sample locations and designations are shown on Figure 3. As shown in Table 2, volatile organic compounds (VOCs) were not detected in the soil gas over most of the site. Trace levels (total VOCs less than 5 milligrams per cubic meter) of VOCs were detected in the west-central portion of the site (toluene and xylenes at sample locations 28, 47, 48B, 48D, 65, 67 and 68, and tetrachloroethene at sample location 58). A trace xylene concentration was also detected in the northern portion of the site at location 78. The relatively low levels and sporadic distribution of these VOCs may indicate the presence of contaminated fill or the detected VOCs may be emanating from contaminated groundwater at the site.

Toluene, ethylbenzene and xylenes were also detected in the east-central portion of the site that was historically occupied by a paint and varnish manufacturer. Low levels (total VOCs up to 10 milligrams per cubic meter [mg/m^3]) of these compounds were detected in the northern and eastern portions of the area (sample locations 59, 60, 60A and 60B), with greater concentrations (total VOCs up to 150 mg/m^3) detected at sample locations 60C and 60E (see Figure 3 and Table 2). Based on these results, eight additional samples were collected from locations surrounding the initial locations with elevated VOCs (locations 60F through 60M). These additional locations were constructed at a spacing of approximately 25 feet surrounding locations 60C and 60E (see Figure 3). Low levels of toluene, ethylbenzene and xylenes (total

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION	SG-09	SG-10	SG-18	SG-19	SG-28	SG-29	SG-37	SG-38	SG-38A	SG-39
SAMPLE DEPTH	3 feet	2 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet
SAMPLE DATE	12/2/99	12/6/99	12/1/99	12/1/99	12/1/99	12/1/99	12/6/99	12/6/99	12/6/99	12/1/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U	U	U	U
m&p-Xylene	U	U	U	U	**1.4**	U	U	U	U	U
o-Xylene	U	U	U	U	**0.7** 0.16	U	U	U	U	U
TOTAL VOCs	**U**	**U**	**U**	**U**	**2.1**	**U**	**U**	**U**	**U**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

mg/m³

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION	SG-40	SG-47	SG-48	SG-48A	SG-48B	SG-48C	SG-48D	SG-48E	SG-49	SG-50
SAMPLE DEPTH	3 feet	3 feet	3 feet	3 feet	3 feet	2 feet	3 feet	4 feet	3 feet	3 feet
SAMPLE DATE	12/1/99	12/3/99	12/3/99	12/3/99	12/3/99	12/6/99	12/3/99	12/6/99	11/30/99	11/30/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	U	**0.6**	U	U	**0.6**	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U	U	U	U
m&p-Xylene	U	**0.9**	U	U	**1.1**	U	U	U	U	U
o-Xylene	U	U	U	U	U	U	**3.8** 0.86	U	U	U
TOTAL VOCs	**U**	**1.5**	**U**	**U**	**1.7**	**U**	**3.8**	**U**	**U**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION **SAMPLE DEPTH** **SAMPLE DATE**	SG-55 3 feet 12/3/99	SG-56 3 feet 12/3/99	SG-57 3 feet 12/3/99	SG-58 3 feet 12/3/99	SG-59 3 feet 11/30/99	SG-60 5 feet 11/30/99	SG-60A 3 feet 11/30/99	SG-60B 3 feet 11/30/99	SG-60C 3 feet 11/30/99	SG-60D 5 feet 11/30/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	**0.05**	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U	**0.6**	**30**	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U	U	**17**	U
m&p-Xylene	U	U	U	U	**1.0**	**1.0**	**1.1**	U	**49**	U
o-Xylene	U	U	U	U	U	U	U	U	**46**	U
TOTAL VOCs	**U**	**U**	**U**	**0.05**	**1.0**	**1.0**	**1.1**	**0.6**	**142**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION **SAMPLE DEPTH** **SAMPLE DATE**	SG-60E 3 feet 11/30/99	SG-60F 3 feet 12/7/99	SG-60G 3 feet 12/7/99	SG-60H 3 feet 12/7/99	SG-60I 3 feet 12/7/99	SG-60J 3 feet 12/7/99	SG-60K 3 feet 12/7/99	SG-60L 5 feet 12/7/99	SG-60M 3 feet 12/7/99	SG-65 3 feet 12/2/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	**0.2**	U	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	**7.6**	U	**11**	**1.9**	**2.1**	**3.4**	**2.1**	U	**38**	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	**20**	**0.7**	**12**	**2.9**	**2.2**	**10**	**0.9**	U	**620**	U
m&p-Xylene	**35**	**1.6**	**48**	**6.4**	**5.9**	**13**	**2.8**	U	**2100**	**1.0**
o-Xylene	**36**	**0.7**	**66**	**2.9**	**1.6**	**5.8**	**1.2**	U	**360**	U
TOTAL VOCs	**99**	**3.2**	**137**	**14.1**	**11.8**	**32.2**	**7.0**	**U**	**3,118**	**1.0**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION **SAMPLE DEPTH** **SAMPLE DATE**	SG-66 3 feet 12/2/99	SG-67 3 feet 12/3/99	SG-68 3 feet 12/3/99	SG-69 3 feet 11/29/99	SG-70 5 feet 11/30/99	SG-76 3 feet 12/2/99	SG-77 3 feet 12/2/99	SG-78 3 feet 12/2/99	SG-79 3 feet 11/29/99	SG-80 3 feet 11/29/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	U	U	**0.4**	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U	U	U	U
m&p-Xylene	U	U	**1.0**	U	U	U	U	**1.0**	U	U
o-Xylene	U	**0.8**	U	U	U	U	U	U	U	U
TOTAL VOCs	**U**	**0.8**	**1.4**	**U**	**U**	**U**	**U**	**1.0**	**U**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

TABLE 2
SOIL GAS ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION	FB-1	FB-2	FB-3	FB-4	FB-5	FB-6	FB-7	FB-8	FB-9
SAMPLE DEPTH	---	---	---	---	---	---	---	---	---
SAMPLE DATE	11/29/99	11/30/99	12/1/99	12/1/99	12/1/99	12/2/99	12/3/99	12/6/99	12/7/99
Vinyl Chloride	U	U	U	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U	U	U	U
Benzene	U	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	U	U	U	U	U
Chlorobenzene	U	U	U	U	U	U	U	U	U
Ethylbenzene	U	U	U	U	U	U	U	U	U
m&p-Xylene	U	U	U	U	U	U	U	U	U
o-Xylene	U	U	U	U	U	U	U	U	U
TOTAL VOCs	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
FB: Field blank.
Units are milligrams per cubic meter.

TABLE 3
COMPARISON OF SOIL GAS ANALYTICAL RESULTS FROM ON-SITE AND OFF-SITE LABORATORIES
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION	SG-28	SG-28	SG-29	SG-29	SG-47	SG-47	SG-67	SG-67	SG-77	SG-77
LABORATORY	On-site	Off-site	On-site	Off-site	On-site	Off-site	On-site	Off-site	On-site	Off-site
SAMPLE DEPTH	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet	3 feet
SAMPLE DATE	12/1/99	12/1/99	12/1/99	12/1/99	12/3/99	12/3/99	12/3/99	12/3/99	12/2/99	12/2/99
Vinyl Chloride	U	NA	U	NA	U	NA	U	NA	U	NA
1,1-Dichloroethene	U	NA	U	NA	U	NA	U	NA	U	NA
Methylene Chloride	U	NA	U	NA	U	NA	U	NA	U	NA
trans-1,2-Dichloroethene	U	NA	U	NA	U	NA	U	NA	U	NA
1,1-Dichloroethane	U	NA	U	NA	U	NA	U	NA	U	NA
cis-1,2-Dichloroethene	U	NA	U	NA	U	NA	U	NA	U	NA
1,1,1-Trichloroethane	U	NA	U	NA	U	NA	U	NA	U	NA
Carbon Tetrachloride	U	NA	U	NA	U	NA	U	NA	U	NA
1,2-Dichloroethane	U	NA	U	NA	U	NA	U	NA	U	NA
Trichloroethene	U	NA	U	NA	U	NA	U	NA	U	NA
Tetrachloroethene	U	NA	U	NA	U	NA	U	NA	U	NA
Benzene	U	U	U	U	U	U	U	U	U	U
Toluene	U	U	U	U	**0.6**	U	U	U	U	U
Chlorobenzene	U	NA	U	NA	U	NA	U	NA	U	NA
Ethylbenzene	U	U	U	U	U	U	U	U	U	U
Styrene	NA	U	NA	U	NA	U	NA	U	NA	U
Naphthalene	NA	U	NA	U	NA	U	NA	U	NA	U
m&p-Xylene	**1.4**	U	U	U	**0.9**	U	U	U	U	U
o-Xylene	**0.7**	**0.2**	U	U	U	U	**0.8**	U	U	U
TOTAL VOCs	**2.1**	**0.2**	**U**	**U**	**1.5**	**U**	**0.8**	**U**	**U**	**U**

NOTES:
U: Undetected.
SG: Soil gas sample location.
Units are milligrams per cubic meter.
NA: Not analyzed.

TABLE 4
GROUNDWATER ANALYTICAL RESULTS FROM ON-SITE LABORATORY
BARRETTO POINT SITE INVESTIGATION

SAMPLE LOCATION SAMPLE DEPTH SAMPLE DATE	GW-10 15-16 feet 12/6/99	GW-19 13-16 feet 12/1/99	GW-60B 14-18 feet 11/30/99	GW-65 8-12 feet 12/2/99	GW-66 14-18 feet 12/2/99	GW-76 8-12 feet 12/2/99
Vinyl Chloride	U	U	U	U	U	U
1,1-Dichloroethene	U	U	U	U	U	U
Methylene Chloride	U	U	U	U	U	U
trans-1,2-Dichloroethene	U	U	U	U	U	U
1,1-Dichloroethane	U	U	U	U	U	U
cis-1,2-Dichloroethene	U	U	U	U	U	U
1,1,1-Trichloroethane	U	U	U	U	U	U
Carbon Tetrachloride	U	U	U	U	U	U
1,2-Dichloroethane	U	U	U	U	U	U
Trichloroethene	U	U	U	U	U	U
Tetrachloroethene	U	U	U	U	U	U
Benzene 1	**1.4**	**2.0**	U	**1.2**	U	U
Toluene 5	**7.0**	**17**	**27**	**12**	**5.2**	**2.7**
Chlorobenzene	U	U	U	U	U	U
Ethylbenzene 5	**1.9**	**4.1**	**7.1**	**2.5**	**1.4**	U
m&p-Xylene 5	**6.4**	**12**	**22**	**8.0**	**4.8**	**2.0**
o-Xylene 5	**3.2**	**5.2**	**9.5**	**3.4**	**2.2**	**1.1**
TOTAL VOCs	**19.9**	**40.3**	**65.6**	**27.1**	**13.6**	**5.8**

NOTES:
U: Undetected.
Units are micrograms per liter. ug/l ⇒ ppb

VOCs up to 15 mg/m^3) were detected at locations 60F, 60H, 60I and 60K, and no VOCs were detected at location 60L. In addition, a trace concentration of tetrachloroethene (0.2 mg/m^3) was detected at 60F. These sample locations were north, south and east of 60C and 60E. Greater concentrations of toluene and/or xylenes (total VOCs up to 133 mg/m^3) were detected to the west at locations 60G and 60J. The soil gas sample collected from 60M contained the greatest concentration of toluene, ethylbenzene and xylenes, totaling 3,118 mg/m^3. This location was just west of the large boulder in the central portion of this area.

Table 3 shows that similar results were obtained from the on-site and off-site laboratories.

The scope of work in the SI/RAR Work Plan includes collection of soil samples from two test pits (TP-1 and TP-2) and one surface location (SS-1) in the area of the former paint and varnish manufacturer. It is recommended that test pit TP-2 be excavated as close to soil gas point 60M as possible to evaluate the elevated VOCs detected at this location. It is also recommended that TP-1 be excavated in the vicinity of sample locations 60C, 60E and 60G, since the samples from these locations contained elevated VOC concentrations relative to the rest of the site. In addition, to ensure that this area is thoroughly investigated, it is recommended that excavation and sampling of a third test pit be conducted in this area.

At most locations, probe refusal was encountered before groundwater was reached. Although several attempts were made at each such location, groundwater samples were only collected from six locations (10, 19, 60B, 65, 66 and 76). It appeared that collection of groundwater samples was most successful during periods of high tide, suggesting that the presence of groundwater in the unconsolidated materials at the site may be a function of tidal conditions. This may impact the ability to construct overburden monitoring well MW-1 in the northeastern portion of the site.

As shown in Table 4, VOCs detected in the six groundwater samples were benzene, toluene, ethylbenzene and xylenes. The detected concentrations in all of the samples are similar, indicating that the detected groundwater contamination may be due to regional conditions, possibly including contaminated fill material or historic gasoline spills/leaking tanks at the site or off-site sources.

7.0 SUMMARY OF RECOMMENDATIONS AND SCHEDULE

A summary of the Site Investigation sampling program is shown on Figure 4. The sample locations shown on this figure include the additional and modified sample locations as recommended in the sections above. The following is an overview of the recommendations resulting from the SI/RAR investigation activities performed to date at the Barretto Point Site:

1. Addition of one surface soil sample to be collected and analyzed from the area of apparently stressed vegetation in the western portion of the site (shown as SS-10 on Figure 4).

2. Addition of one water sample to be collected and analyzed from the ponded water observed in the southeastern portion of the site (shown as SW-1 on Figure 4).

3. Collection and analysis of one additional groundwater sample from the existing monitoring well in the northeastern portion of the site (shown as MW-A on Figure 4).

4. Relocation of surface soil sample SS-9.

5. Excavation and sampling of two additional test pits in the southeastern portion of the site (shown as TP-9 and TP-10 on Figure 4).

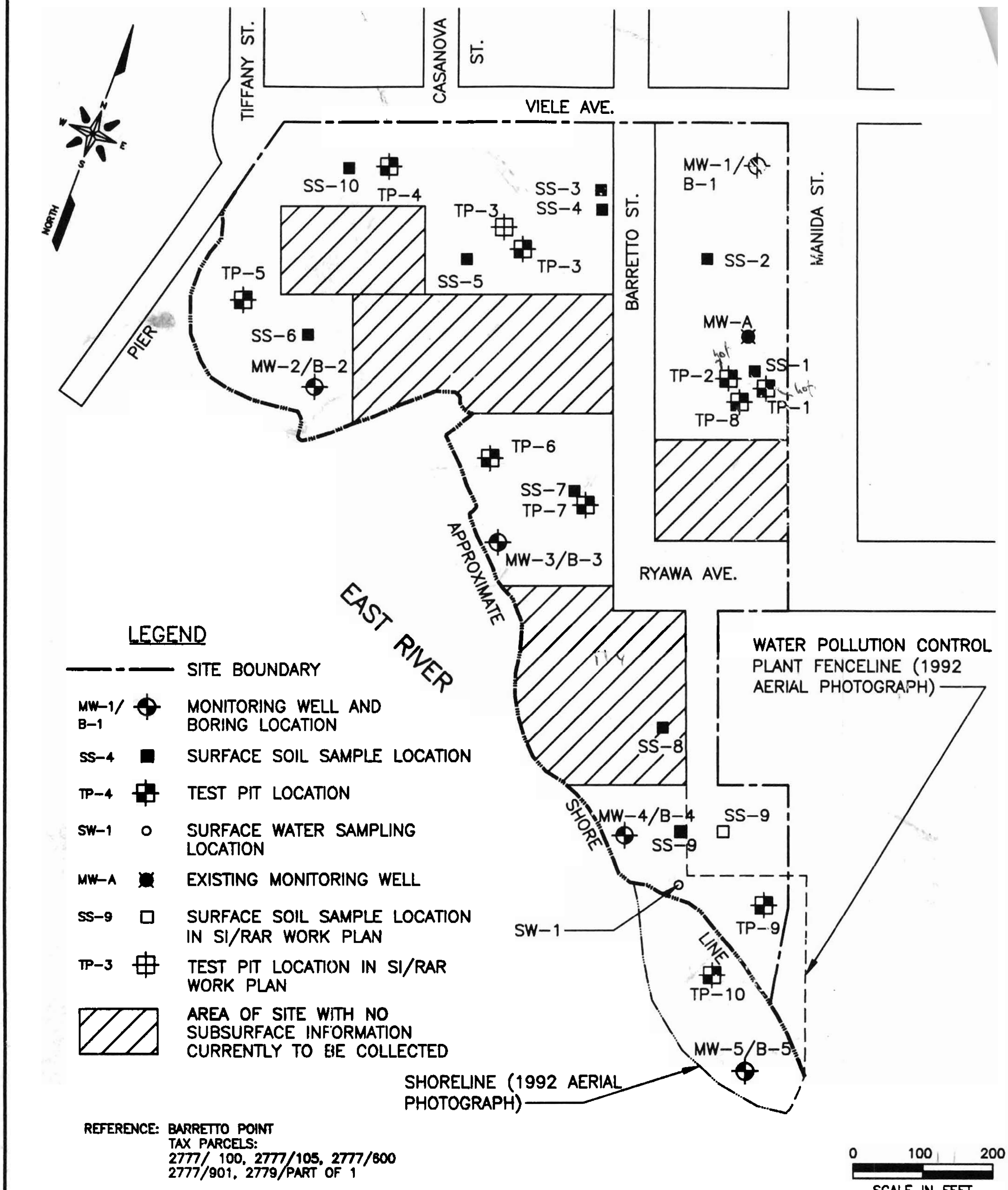
6. Construction and sampling of one contingency soil boring/monitoring well in the southeastern portion of the site (shown as MW-5/B-5 on Figure 4).

7. Relocation of test pit TP-3 by approximately 20 feet to the southeast to investigate the area of apparently high conductivity soil identified during the geophysical survey in Area 2.

8. Excavation of test pits TP-1 and TP-2 at the locations where elevated concentrations of VOCs in soil gas were detected.

9. Excavation and sampling of one additional test pit (TP-8 on Figure 4) in the area of the former paint and varnish manufacturing facility.

The costs for all of these activities, except the three additional test pits (TP-8, TP-9 and TP-10), were included in either the original scope of work and budget (those added as contingency locations) or in our revised cost estimate letter (see Appendix B). The estimated



SOURCE: TRC ENVIRONMENTAL CORPORATION, WORKPLAN, MAY 1998

DIR: 1616 FILE: 1616-2.DWG DGC/01-26-00

BARRETTO POINT SITE
BRONX, NEW YORK

SITE INVESTIGATION SUMMARY

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

FIGURE 4

cost for test pits TP-8, TP-9 and TP-10 is $4,600, which includes $800 for D&B labor and expenses, $2,500 for laboratory analysis of six additional soil samples (two per test pit) and $1,300 for the test pit subcontractor.

As noted on Figure 4, there are four areas of the site from which no subsurface data will be collected during the SI. In order to provide a comprehensive evaluation of the Barretto Point Site, excavation and sampling of one test pit in each of these areas is suggested. The estimated cost for these additional test pits is $5,400, including $800 for D&B labor and expenses, $3,300 for laboratory analysis of eight additional soil samples (two per test pit) and $1,300 for the test pit subcontractor.

The next phase of the Site Investigation field program, including test pit excavation, surface and subsurface soil sampling, soil boring and monitoring well construction, and surface water and groundwater sampling, will begin upon review and approval of this report by the NYCDEP, the New York City Economic Development Corporation and the NYSDEC.

4,600
5,400
10,000

Appendix A

APPENDIX A

SITE RECONNAISSANCE REPORT

Dvirka
and
Bartilucci
CONSULTING ENGINEERS

330 Crossways Park Drive, Woodbury, New York, 11797-2015
516-364-9890 • 718-460-3634 • Fax: 516-364-9045
e-mail: db-eng@worldnet.att.net

September 15, 1999

Ms. Jacqueline Ritchie Tansey
New York City Department of
Environmental Protection
Office of Environmental Planning and Assessment
59-17 Junction Boulevard, 11th Floor
Corona, NY 11368

Re: Barretto Point Site Investigation/Remedial Alternatives Report
Site Reconnaissance Survey September 1, 1999
D&B No. 1616

Dear Ms. Tansey:

The purpose of this letter is to provide the findings of the site reconnaissance survey performed at the Barretto Point Site on September 1, 1999.

The site reconnaissance survey was conducted by Dvirka and Bartilucci Consulting Engineers (D&B) personnel (Mr. Kenneth Wenz and Mr. Keith Robins). The work was performed in accordance with TRC Environmental Corporation (TRC) Site Investigation/Remedial Alternatives Report Work Plan, dated May 1998. The purpose of the site reconnaissance was to familiarize the field team with current site conditions. The site was visually surveyed with respect to site access restrictions relative to the planned site investigation activities. Site-specific health and safety considerations were also reviewed. Other features, such as overhead utilities and visible locations of subsurface utilities, and other potential hazards were also reviewed with respect to the planned sampling activities.

Health and Safety

Site-specific health and safety considerations were reviewed, in particular access to sample locations and personal protective equipment. Working in the areas of uneven, mounded soil, metal, wood and concrete debris, and high, dense vegetation could cause a potential safety problem. In addition, working in areas of squatter dwellings could pose a concern due to the squatters or dogs.

Emergency evacuation procedures for the site were reviewed in accordance with the site specific Health and Safety Plan prepared by D&B, dated April 1999. Based on current site conditions, no modifications to these procedures are warranted.

Utilities

On August 27, 1999 D&B contacted the New York City and Long Island One Call Center to markout utilities for the Barrett Point Site. The One Call Center marked out the following utilities: gas, electric, cable and telephone. These markouts were confirmed in the field by D&B personnel. Information regarding the location of sanitary sewers, storm sewers and water lines will be provided by the Department of Environmental Protection and will be reviewed by D&B personnel and the subcontractors prior to conducting the field investigation activities. Relevant observations regarding utilities that were observed during the site reconnaissance are described in the sections below.

Reconnaissance Survey

The following provides a summary of observations made during the reconnaissance survey.

The site is bordered to the north by Viele Avenue, to the east by Manida Street, to the southeast by Ryawa Avenue, and to the west and south by the East River (refer to Figure 1). Closed portions of Barretto Street and Ryawa Avenue bisect the site. Concrete barriers block access to the site at the intersections of Barretto Street and Viele Avenue, and Ryawa Avenue and Manida Street.

As part of the site walkover, the shoreline along the East River was accessed to identify any potential environmental concerns or possible impacts from the site. No apparent environmental impacts such as leachate seeps or sheen on the water surface were noted. The shoreline consisted of riprap (piles of rocks and concrete) and was approximately fifteen feet in height. Three abandoned cars were noted along with various amounts of scattered debris along the shoreline. Also, a small portion of the shoreline consisted of metal and wooden bulkhead.

Northeastern Portion of Site

The northeastern portion of the site is bounded by Manida Street, Ryawa Avenue, Viele Avenue and the closed segment of Barretto Street. The area is surrounded by 8-foot high chain-link fencing with an open gate on Barretto Street. This area of the site is currently vacant, consisting of fill material at grade and several elongated berms of what appears to be vegetated construction/demolition debris along the area's eastern and southwestern sides (see Photo 1). In addition, a very large boulder is present in the central portion of this area. The terrain in this portion of the site is generally flat and slopes slightly to the west, and to the southwestern and southeastern corners towards Ryawa Avenue.

In the northeastern portion of the area, asphalt is visibly present at grade (a possible former parking area). A 55-gallon open top drum containing household garbage was noted in the southwestern portion. Two open boreholes were located in the northeastern and west-central portions of the area. The borings were approximately 6-inches in diameter and were approximately 13 and 20 feet deep (see Figure 1). Both holes were not backfilled. In addition, a flush-mounted, 2-inch diameter monitoring well was located approximately 40 feet northeast of the large boulder in the central portion of the area. The monitoring well manhole appeared to be in good condition. The total depth of the well was measured at approximately 31 feet below grade and an approximate water level measurement was recorded at 15 feet below grade.

The lowest elevation in this area and at the site is in the southwestern corner near the intersection of Barretto Street and Ryawa Avenue. Barretto Street slopes significantly downward towards Ryawa Avenue. A storm drain and several sewer covers were observed along Barretto Street. At the intersection of Barretto Street and Ryawa Avenue is a large area of ponded water with various amounts of debris scattered around the perimeter (see Photo 2). The portion of Ryawa Avenue west of Barretto Street indicated in the TRC Work Plan does not exist.

Based on the site reconnaissance in the northeastern portion of the site, access for sampling is fairly good with only minor grading possibly needed in order to obtain access to sampling location TP-1. In addition, some soil gas points indicated in the Work Plan may need to be relocated due to the soil berms along the eastern and southwestern sides of this portion of the site. In addition, the soil berms in this area may prevent effective performance of the geophysical survey without regrading of the berms.

Western Portion of Site

The western portion of the site (west of Barretto Street) is covered with tall grass and heavy brush. There are several squatter dwelling units in this area along Barretto Street. These units appear to be fairly well developed, roofed structures constructed of wood and metal (see Photo 3). Many of these structures are surrounded by makeshift wooden and metal fences. Two fire hydrants were noted along Barretto Street. One fire hydrant was actively being used with a hose leading into a dwelling area. In addition, a squatter living in a tent was observed toward the shoreline. Several squatter dwellings were located in the tall grass and brush areas.

At several dwellings, dogs were observed. In addition, "Beware of Dog" signs were posted on the fences surrounding several dwellings along Barretto Street. There are various mounds of debris with tall weeds and brush in the area proposed for test pit TP-7 and monitoring well MW-3 (see Figure 2). Access to this portion of the site is extremely difficult due to dense vegetation and uneven terrain, and will not be accessible to vehicle without significant clearing and grading. The topographic relief in this area varies and is uneven with numerous areas of partially exposed debris and rubble (see Photo 4). The area southwest of Barretto Street and west of Ryawa Avenue consists of high soil berms consisting of construction and demolition (C&D) debris. This area will be extremely difficult to access for conducting the proposed geophysical survey (refer to Figure 3) and soil gas survey (Figure 4).

The western portion of the site south of Viele Avenue, contained bollards along the site perimeter. A wooden frame structure was noted near the corner of Viele Avenue and Barretto Street. Several piles of dirt and C&D debris with scattered garbage were noted along the site perimeter from Casanova Street to the pier. A visible concrete slab (15 x 15 feet) was noted south of Viele Avenue adjacent to a squatter dwelling. South of the concrete slab there appears to be a low-lying area of dead vegetation. This area appears to be stressed (see Photo 5) and consisted of fill material at grade with noticeable brick and concrete fragments. While the stressed vegetation may be the result of poor soils, collection of an additional surfical soil sample is recommended in this area.

Further south, the area consisted of taller grass and weeds with low lying brush, with varying amounts of fill material at grade consisting of bricks, concrete, scrap metal and C&D debris. Several abandoned and burned cars were observed on the western portion of this area. Also, piles of wood chips were noted on the western side of this area. Several dirt paths and remnants of several squatter dwellings were noted along the shoreline.

Based on site reconnaissance in the western portion of the site, access to sample locations is poor. For locations TP-5 and MW-2 (see Figure 2) a path needs to be cleared to gain access. TP-3 and TP-4 locations are accessible to a rubber tire backhoe. However, land clearing will be required in order to perform the geophysical survey in this area. Surfical soil samples SS-3 and SS-4 are located within the area of squatters dwellings.

For locations MW-3, TP-6 and TP-7, a path needs to be cleared for access to these locations. Due to the berms, the majority of soil gas points west of Barretto Street can not be accessed with a truck mounted rig (see Photo 6). In general, soil gas point locations in the northwestern portion of the site will be difficult to access due to the tall grass and weeds, as well as the squatter dwellings. Significant land clearing will be needed.

Southern Portion of Site

The southernmost portion of the site located south of Ryawa Avenue is vacant. This area gradually dips to the shoreline. The area immediately south of Ryawa Avenue is flat with low-lying grass and flattened disturbed area. During the site walk-over, a Con Edison representative was on-site. He informed D&B personnel that a horizontal drilling project is currently being performed to install a gas main from Rikers Island under the East River to Barretto Point (southern portion of the site). Active drilling was observed and drill rods were staged next to the exit pit for the drill stem (see Figure 1). The Con Edison representative also informed D&B that there is an active sewer line from Rikers Island to the site. The gas line installation appears to be in line with the proposed drilling location of MW-4 (refer to Figure 2). The gas line and sewer line locations will need to be marked out prior to subsurface drilling activities.

On the southwestern portion of the property (west of the drilling activities) some abandoned vehicles, including a truck trailer were identified. Along the edge of the property, numerous telephone poles randomly stacked on the ground and piles of concrete rubble were noted. Accessibility to this portion of the site is poor with uneven terrain and mounded soil piles of fill.

In the southernmost and southeastern portions of the site the area is very overgrown with tall grass and weeds. Access to the area is extremely difficult due to dense vegetation and will not be easily accessed by vehicle. A large area of ponded water was noted in the vicinity of SS-9 location (refer to

Figure 2). The northernmost area of ponded water had a dark red color on the surface (see Photo 7). No visible sheen was observed, but an apparent petroleum odor was noted in the air in this area. It was unclear whether this odor was due to site conditions or the adjacent sewage treatment plant. It is recommended that a sample be collected of this ponded water.

Immediately north of the ponded water was an abandoned concrete building. This building was also surrounded by the ponded water and therefore was not accessible. In the vicinity of the building was an abandoned car and pay loader. Also noted was what appeared to be trenches (possible truck tire tracks) in the ground leading towards the southern edge of the property and the red color ponded water. These trenches were filled with low vegetation and water.

The southeastern portion of the site contained numerous piles in varying heights, which appeared to consist of soil and debris material. In addition, small piles of concrete rubble with various pieces of metal debris were observed within the tall grass and weeded areas. The apparent tire tracks noted in the wet areas may indicate some form of dumping that has taken place in this area. The overgrown nature of the area suggests that any dumping has not occurred recently.

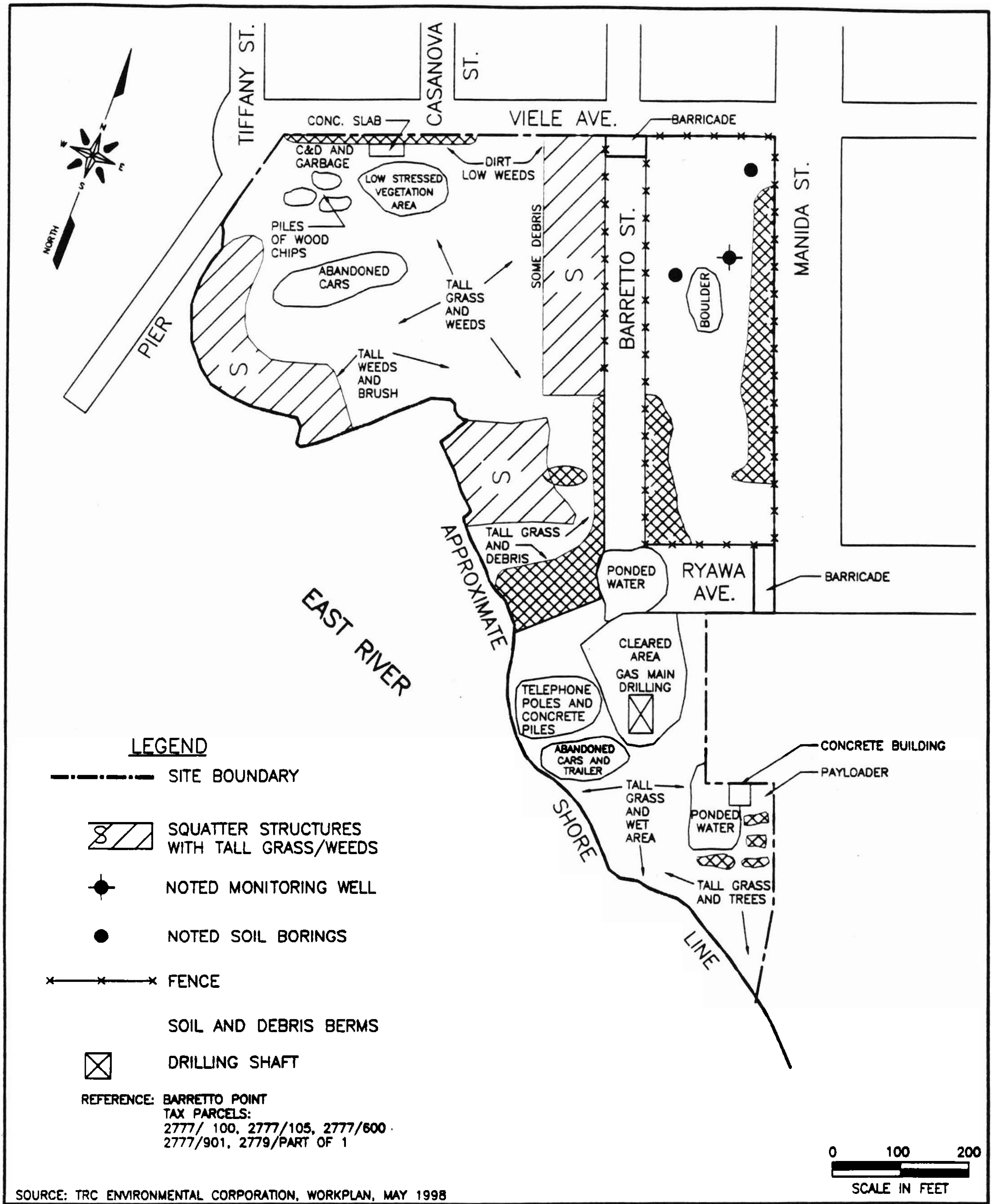
Some of the soil gas points in the southernmost portion of the site may be inaccessible to a truck mounted rig due to the high vegetation and wet areas. Soil gas points on the southwestern side may need to be relocated due to the concrete piles and telephone poles (see Figure 4).

If you have any questions or require any additional information, please do not hesitate to call me at (516) 364-9890.

Very truly yours,

Thomas F. Maher, P.E.
Vice President

TFM/KSR/bl,kd,ld
cc: D. Glass (D&B)
♦ 1616/TFM09029JRT.ltr.doc(R05)



REFERENCE: BARRETTO POINT
TAX PARCELS:
2777/ 100, 2777/105, 2777/600
2777/901, 2779/PART OF 1

SOURCE: TRC ENVIRONMENTAL CORPORATION, WORKPLAN, MAY 1998

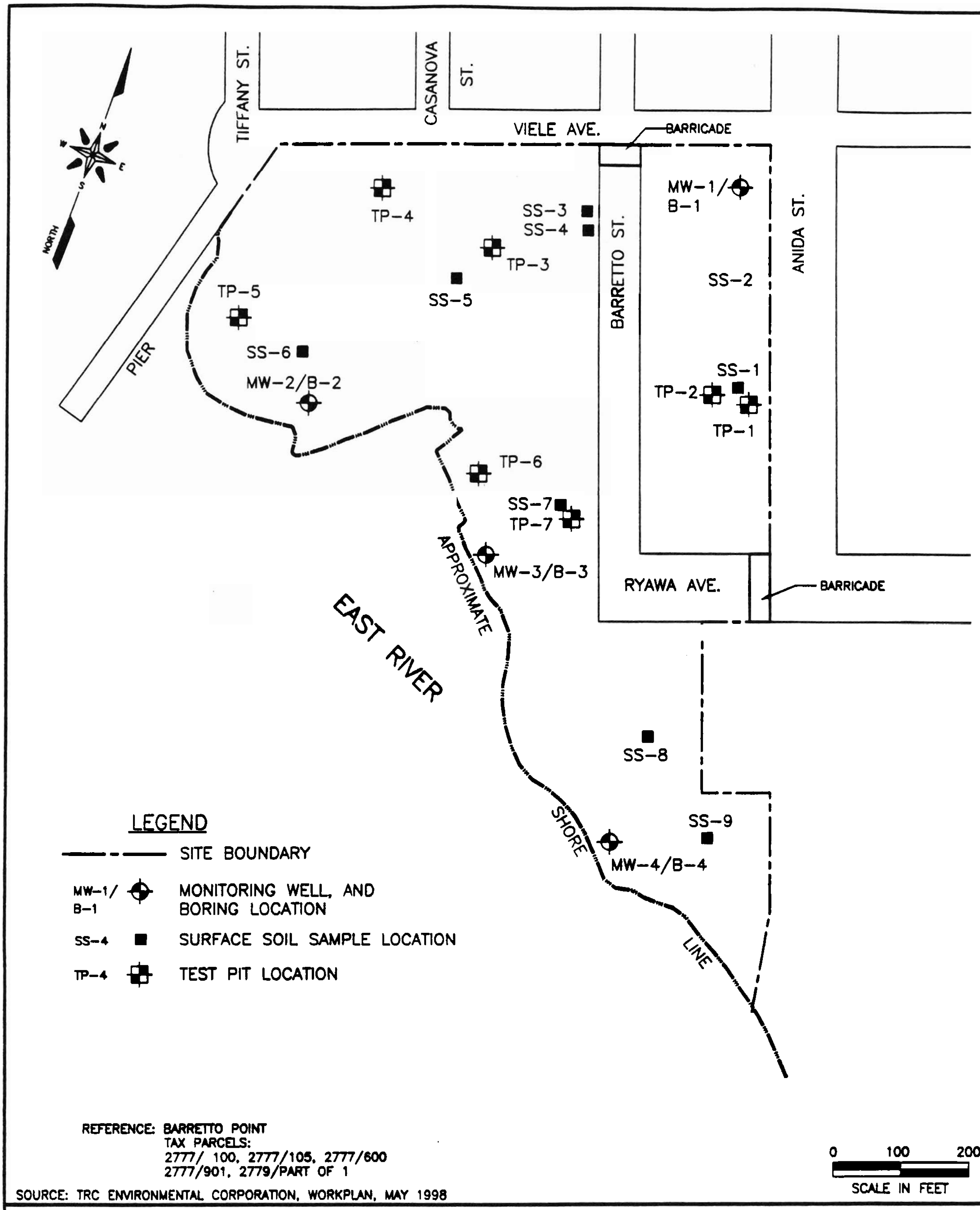
DIR: 1616 FILE: 1616-1.DWG LVG/09-15-99

BARRETTO POINT SITE
BRONX, NEW YORK

SITE MAP AND OBSERVED SURFACE FEATURES

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

FIGURE 1



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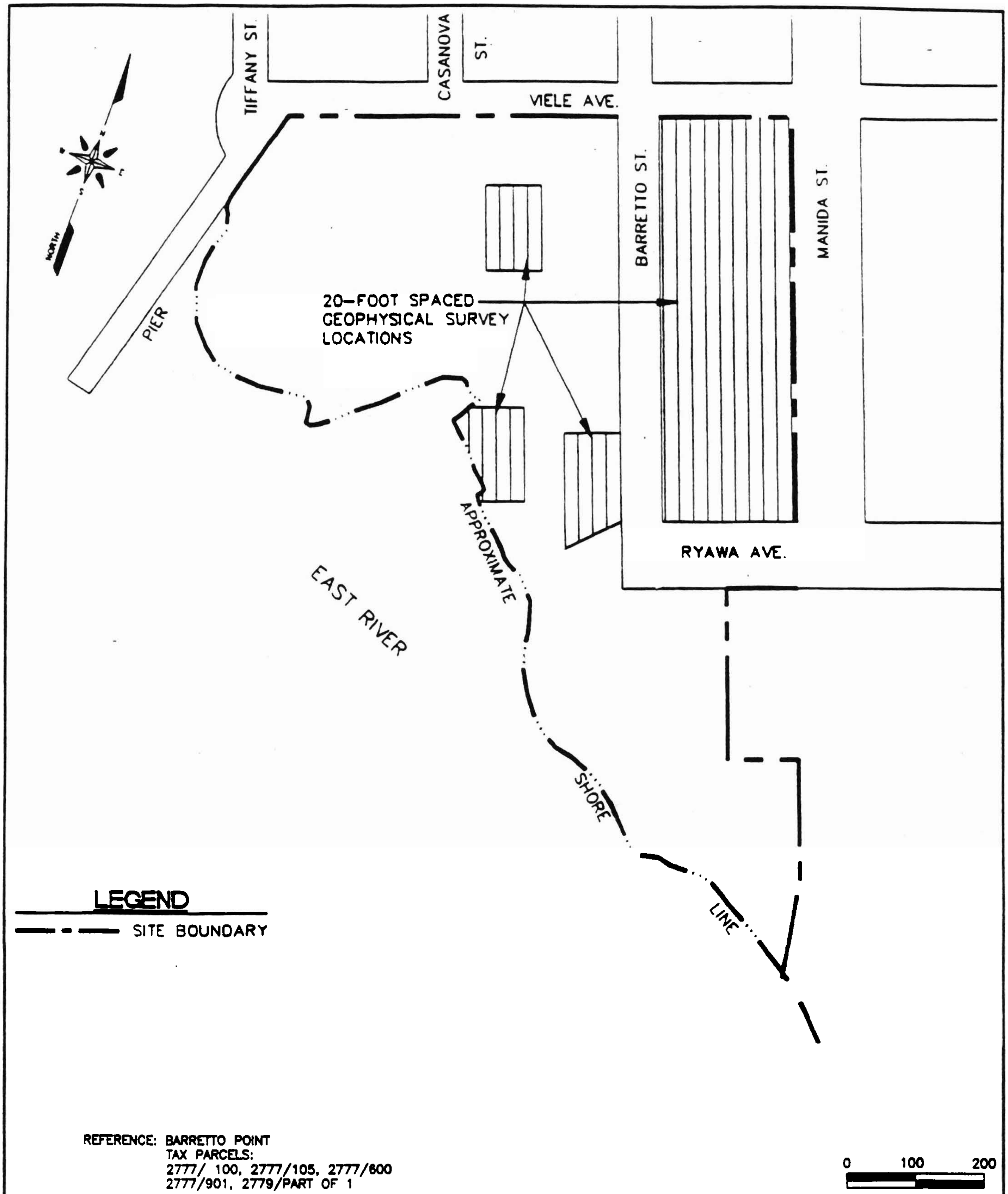
BARRETTO POINT SITE
BRONX, NEW YORK

SITE INVESTIGATION SUMMARY

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

FIGURE 2



REFERENCE: BARRETTO POINT
TAX PARCELS:
2777/ 100, 2777/105, 2777/600
2777/901, 2779/PART OF 1

SOURCE: TRC ENVIRONMENTAL CORPORATION, WORKPLAN, MAY 1998

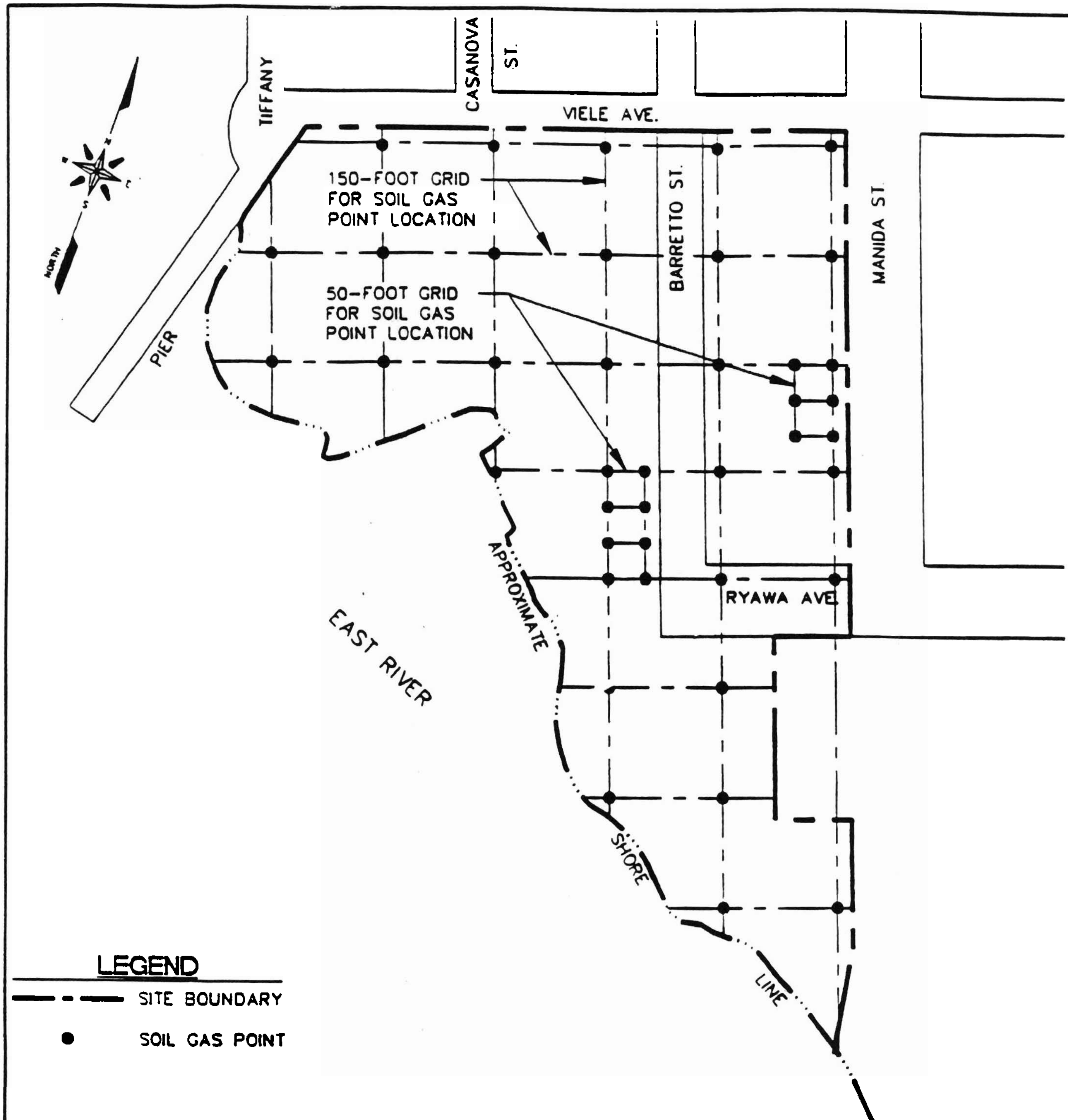
BARRETTO POINT SITE
BRONX, NEW YORK

GEOPHYSICAL SURVEY MAP

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

FIGURE 3

1616 BORDER DGC/09-08-99



REFERENCE: BARRETTO POINT
TAX PARCELS:
2777/ 100, 2777/105, 2777/600
2777/901, 2779/PART OF 1

SOURCE: TRC ENVIRONMENTAL CORPORATION, WORKPLAN, MAY 1998

DIR: 1616 FILE: BORDER DGC/09-08-99

BARRETTO POINT SITE
BRONX, NEW YORK

SOIL GAS SURVEY MAP

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

FIGURE 4

Photo 1

Northeastern portion of site looking south from Viele Avenue

Photo 2

Ponded water at intersection of Barretto Street and Ryawa Avenue

Dvirka
and
Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Photo 3

Squatter dwelling from Barretto Street looking west

Photo 4

Typical uneven terrain and debris in western portion of site

Dvirka and Bartilucci
CONSULTING ENGINEERS
A DIVISION OF WILLIAM F. COSULICH ASSOCIATES, P.C.

Photo 5

Area of apparently stressed vegetation in western portion of the site south of Viele Street

Photo 6

Area west of intersection of Barretto Street and Ryawa Avenue showing berm area and high vegetation. Note ponded water at intersection

Photo 7

Ponded water in southeastern portion of the site

Appendix B

APPENDIX B

REVISED COST LETTER

Dvirka
and
Bartilucci
CONSULTING ENGINEERS

330 Crossways Park Drive, Woodbury, New York, 11797-2015
516-364-9890 ▪ 718-460-3634 ▪ Fax: 516-364-9045
e-mail: db-eng@worldnet.att.net

November 10, 1999

Kay Zias
Director, Environmental Planning
New York City Economic
Development Corporation
110 William Street
New York, NY 10038

Re: Barretto Point Site Investigation/Remedial Alternatives Report
D&B No. 1616-01

Dear Ms. Zias:

Following up on recent discussions, our letter to you dated July 21, 1999, and our letter to Ms. Jacqueline Ritchie Tansey dated September 28, 1999, enclosed please find the revised cost spreadsheets for the referenced project (Attachment A). The spreadsheets have been revised to include the additional costs for line items not included in the request for proposal, additional work identified as part of the site reconnaissance survey, additional work identified for preparation of the SI Report and the increase in our costs and subcontractor costs which have come into effect since our proposal was submitted to EDC in July 1998.

A description of the revisions to each spreadsheet is presented below.

1. Table 1 – Total Cost Bid Schedule Summary: Revisions to this summary table are a result of changes to the supporting tables discussed below.

2. Table 1.1 – SI Labor Cost Estimate Summary and Table 2.1 – RAR Labor Cost Estimate Summary: The revisions to these tables reflect the increases in labor rates which have come into effect since our proposal was submitted to the EDC in July 1998, as previously discussed and presented in correspondence to you dated July 21, 1999. In addition, revisions to Table 1.1 are a result of the increased level of effort which is discussed in detail below with respect to Table 1.1A.

3. Table 1.1A – SI Labor Cost Estimate: The revisions to this table, by activity, are as follows:

- Activity 2.2 – Scheduling: As a result of protracted efforts to schedule the field program activities, eight (8) additional Level 3 hours have been added.

- Activity 2.3 – Procure Subcontractors: Additional effort was required under this task to obtain additional bids from land surveyors and soil gas survey subcontractors. Efforts to procure a lower cost land surveyor were completed in August 1998 and resulted in a decrease in cost of over $15,000 from our original proposal.

  As explained in our letter dated July 21, 1999, the soil gas survey subcontractor's (Vironex, Inc.) cost increased by $3,792 from their original July 1998 bid, and, as a result, NYSDEC required additional price quotations for this work. The procurement of a soil gas survey subcontractor is discussed further below with respect to Table 1.5.

  The total additional effort for this activity is four (4) Level 6 hours, eight (8) Level 4 hours and eight (8) Level 3 hours.

- Activity 4.1 – Reconnaissance Survey: As discussed in our letter to Ms. Jacqueline Ritchie Tansey dated September 28, 1999, additional effort was required to prepare the Site Reconnaissance Survey Report which was not part of our original scope of work, and additional effort was required to prepare an addendum to the work plan in response to comments from the NYSDEC on the site reconnaissance survey. The additional effort is four (4) Level 6 hours, four (4) Level 4 hours, eighteen (18) Level 3 hours, ten (10) Level 2 hours and six (6) "Other" hours.

- Activity 4.2 – Land Survey Oversight: The original RFP bid forms did not provide for surveying of the 2-inch river gauge required in the work plan. The effort for our oversight for this activity is four (4) Level 3 hours. In addition, sixteen (16) Level 3 hours have been added for overseeing the property boundary survey, discussed further below.

- Activity 6.1 – Surface Soil Sample Collection: As indicated in our September 28, 1999 letter, additional effort is required for the additional day of site clearing and collection of one additional surface soil sample and one surface water sample. The additional effort consists of Level 6 – 2 hours, Level 4 – 6 hours, Level 3 – 8 hours, Level 2 – 12 hours and 8 "Other" hours. This includes sample collection, data analysis, validation and reporting in addition to the one extra day of oversight for site clearing.

- Activity 7.1 – Soil Gas Survey–Field Sampling, and 7.2 – Data Review/Letter Report: The RFP bid forms did not account for the additional geoprobe work which is required to screen groundwater samples in addition to soil gas samples in accordance with the requirements of the work plan (see page 3-8). As a result, it is estimated that four (4) additional days will be required to complete the field program.

  In addition, as discussed, as a contingency, we have included the additional oversight labor of 51 hours (i.e., one hour per probe location) required for hand digging as needed for underground utility clearance. As a result, the total increase in effort for the soil gas survey field program and data review/letter report is as follows: Level 4 – 8 hours, Level 3 – 99 hours, Level 2 – 4 hours.

4. Table 1.2 – SI Other Direct Costs: The RFP bid form did not provide for the equipment needed for continuous groundwater and surface water elevation monitoring and slug testing. The costs for these items have been added to Table 1.2.

5. Table 1.3 – Land Surveyor Bid Schedule: The cost for surveying the 2-inch river gauge has been added to this table. Additionally, as indicated in our letter dated September 28, 1999, the cost for one additional day of site clearing has been added. Also, as discussed, the cost for having a licensed surveyor complete a property survey for the Barretto Point Site is included.

6. Table 1.4 – Geophysical Survey Bid Schedule: As indicated in our letter of July 21, 1999, the geophysical surveyor's costs increased by $190 since the proposal was submitted in July 1998. In addition, the cost for providing clearance for underground utilities around wells MW-2 and MW-4 and TP-5 has been added.

7. Table 1.5 – Soil Gas Survey Bid Schedule: As discussed above, this table has been revised to reflect the following:

   - A new subcontractor, Zebra Environmental Corp. has been selected (pending approval of NYCEDC and NYSDEC). In October 1999, new bids were obtained from four firms for the soil gas survey work. The results of the bids are shown in Attachment B, along with Vironex's costs, which were provided in our letter of July 21, 1999. Due to numerous exceptions by Vironex on subcontract provisions, Zebra is the lowest responsive bidder. Zebra's qualifications and a Vendex Affidavit of No Change form are being provided under separate cover.

   - As discussed above, the RFP bid forms did not account for the geoprobe work which is required to screen groundwater samples in accordance with the requirements of the work plan. Therefore, the cost of this work is included in the price quotes in Attachment B and on Table 1.5.

The cost for hand digging for underground utility clearance has also been added to Table 1.5. As discussed, every effort will be made to minimize the hand digging to the extent possible based on information on utilities which is made available to Zebra Environmental by the City. It should be noted, however, that even with this added cost, Zebra is still the lowest responsive bidder.

8. Table 1.7 – Drilling and Well Installation Bid Schedule: The cost of installation of the 2-inch river gauge has been added. Two (2) additional days subsistence and per diem have been added for site clearing, and due to the rugged terrain of portions of the site revealed during clearing, the drilling costs have been revised to reflect the use of an ATV drill rig.

9. Table 1.8 – Laboratory Analysis Bid Schedule: The cost for analysis of an additional surface soil sample and a surface water sample have been added.

If you have any questions or require additional information, please do not hesitate to contact Dave Glass or me at (516) 364-9890.

Very truly yours,

Thomas F. Maher, P.E.
Vice President

Acceptance by the New York City Economic Development Corporation of the additional costs outlined above is indicated by the signature below:

Signature: ________________________________
Kay Zias, Director, Environmental Planning

Date: ____________________

TFM/DSG/cmc
Enclosures
cc: Jacqueline Ritchie Tansey (NYCDEP)
D. Glass (D&B)
K. Wenz (D&B)
♦1616\DSG11059.KZ.DOC(R03)

ATTACHMENT A
REVISED COST SPREADSHEETS

TABLE 1
TOTAL COST BID SCHEDULE SUMMARY

Site: Barretto Point
Site Investigation
Bronx, New York

ITEM	TOTAL COST	REFERENCE
SITE INVESTIGATION		
DIRECT LABOR	$108,328.12	Table 1.1
OTHER DIRECT COSTS	$7,262.00	Table 1.2
SUBCONTRACTORS COSTS		
Land Surveyor	$37,100.00	Table 1.3
Geophysical Contractor	$6,450.00	Table 1.4
Soil Gas Contractor	$31,870.00	Table 1.5
Test Pit Contractor	$3,125.00	Table 1.6
Drilling Contractor	$14,975.00	Table 1.7
Laboratory Contractor	$35,580.00	Table 1.8
Health and Safety Contractor	$2,630.00	
Subtotal Subcontractor Costs	$131,730.00	Table 1.9
SUBTOTAL SI	$247,320.12	
REMEDIAL ALTERNATIVES REPORT		
DIRECT LABOR	$27,792.52	Table 2.1
OTHER DIRECT COSTS	$580.00	Table 2.2
SUBTOTAL RAR	$28,372.52	
TOTAL SI/RAR	$275,692.64	

TABLE 1.1
SI LABOR COST ESTIMATE SUMMARY

Site: Barretto Point

Site Investigation
Bronx, New York

JOB LEVELS(*)	LABOR RATE		HOURS	EXTENDED COST
6	$ 53	/HR	42	$2,226.00
5	$ 48	/HR	3	$144.00
4	$ 41	/HR	168	$6,888.00
3	$ 30	/HR	523	$15,690.00
2	$ 23	/HR	428	$9,844.00
1	$ 18	/HR	89	$1,602.00
OTHER	$ 15	/HR	153	$2,295.00
	TOTALS		1406	$38,689.00
INDIRECT COST AT	158.3%			$61,244.69
FEE @ 8.4%				$8,394.43
TOTAL SI DIRECT LABOR				$108,328.12

NOTES:
(*) Defined per NYSDEC Attatchment A - Direct Labor Guidelines.

TABLE 1.1A
SI LABOR COST ESTIMATE

Site: Barretto Point
Site Investigation
Bronx, New York

ACTIVITY		JOB LEVEL / LABOR HOURS 6	5	4	3	2	1	OTHER	TOTAL
I. MANAGEMENT									
1.1 PROJECT MANAGEMENT		8		24				24	56
1.2 MEETING (1) AT SITE		4		4		4			12
1.3 MEETING (1) AT EDC'S OFFICE		8		8					16
	TOTAL-1	20	0	36	0	4	0	24	84
II. OFFICE MOB./PREPARATION									
2.1 PREPARE HEALTH & SAFETY PLAN*				2					2
2.2 SCHEDULING				8	12				20
2.3 PROCURE SUBCONTRACTORS		4		10	8	8		8	38
	TOTAL-II	4	0	20	20	8	0	8	60
III. FIELD PREP./MOBILIZATION									
3.1 COORDINATE/OVERSEE FIELD SETUP				8	4	16			28
3.2 SETUP SURFACE WATER STATION						10			10
	TOTAL-III	0	0	8	4	26	0	0	38
IV. GENERAL SURVEYS									
4.1 RECONNAISSANCE SURVEY		4		8	18	14		6	50
4.2 LAND SURVEY OVERSIGHT/LOCATION STAKING					20	30			50
	TOTAL-IV	4	0	8	38	44	0	6	100

* Note that the Health and Safety Plan (HASP) will be prepared by one of our subcontractors (Field Safety Corporation) . The cost for preparation of the HASP is shown on Table 1.

TABLE 1.1A
SI LABOR COST ESTIMATE

Site: Barretto Point
Site Investigation
Bronx, New York

ACTIVITY	JOB LEVEL / LABOR HOURS 6	5	4	3	2	1	OTHER	TOTAL
V. GEOPHYSICAL SURVEYS								
5.1 FIELD SURVEY					20			20
5.2 DATA REVIEW			4					4
5.3 MEETING (ONE AT SITE)			8					8
TOTAL-V	0	0	12	0	20	0	0	32
VI. SURFACE SOIL SAMPLING								
6.1 SAMPLE COLLECTION	2		6	10	22		8	48
TOTAL-VI	2	0	6	10	22	0	8	48
VII. SOIL GAS SURVEYS								
7.1 FIELD SAMPLING				95	40			135
7.2 DATA REVIEW/LETTER REPORT			16	8	20			44
7.3 MEETING (ONE AT SITE)			8					8
TOTAL-VII	0	0	24	103	60	0	0	187
VIII. TEST PIT SAMPLING								
8.1 SAMPLE COLLECTION				2	20			22
TOTAL-VIII	0	0	0	2	20	0	0	22

TABLE 1.1A
SI LABOR COST ESTIMATE

Site: Barretto Point
Site Investigation
Bronx, New York

ACTIVITY		JOB LEVEL / LABOR HOURS 6	5	4	3	2	1	OTHER	TOTAL
IX. MONITORING WELL INSTALLATION									
9.1 SOIL SAMPLING/INSTALL WELLS (4 WELLS)					2	30			32
9.2 SAMPLING/INSTALL WELLS (3 WELLS)						20			20
	TOTAL-IX	0	0	0	2	50	0	0	52
X. WELL DEVELOPMENT									
10.1 WELL DEVELOPMENT (4 WELLS)						6			6
10.2 WELL DEVELOPMENT (3 WELLS)						4			4
	TOTAL-X	0	0	0	0	10	0	0	10
XI. WATER LEVEL MEASUREMENTS									
11.1 FIRST ROUND WATER LEVEL MSMTS.						5	5		10
11.2 CONTINUOUS WATER LEVEL MSMTS.						10	10		20
11.3 SECOND ROUND WATER LEVEL MSMTS.						5	5		10
	TOTAL-XI	0	0	0	0	20	20	0	40
XII. WATER PERMEABILITY TESTS									
12.1 SLUG TESTS (3 WELLS)						10	10		20
	TOTAL-XII	0	0	0	0	10	10	0	20

TABLE 1.1A
SI LABOR COST ESTIMATE

Site: Barretto Point
Site Investigation
Bronx, New York

ACTIVITY	JOB LEVEL / LABOR HOURS 6	5	4	3	2	1	OTHER	TOTAL
XIII. GROUND WATER SAMPLING								
13.1 WELL PURGING (4 WELLS)					3	3		6
13.2 WELL PURGING (3 WELLS)					3	3		6
13.3 SAMPLING COLLECTION (4 WELLS)					2	2		4
13.4 SAMPLE COLLECTION (3 WELLS)					2	2		4
TOTAL-XIII	0	0	0	0	10	10	0	20
XIV. SI REPORT								
14.1 SECTIONS 1.0 - 5.0, 7.0, & ATTACHMENTS	8		40	160	80	40	80	408
14.2 BASELINE RISK ASSESSMENT	4		8	120	20		16	168
14.3 DRAFT REPORT COMMENT RESPONSES		1	2	24	8	1	3	39
14.4 DRAFT REPORT REVISION; FINAL REPORT		2	4	40	16	8	8	78
TOTAL-XIV	12	3	54	344	124	49	107	693
TOTAL SI DIRECT LABOR	42	3	168	523	428	89	153	1406

TABLE 1.2
SI OTHER DIRECT COSTS

Site: Barretto Point
Site Investigation
Bronx, New York

	DESCRIPTION		QUANTITY/ DURATION	UNIT PRICE	EXTENDED COST
I.	MOBILIZATION/DEMOBILIZATION				
	(includes all expendables, equipment, travel, per diem, and subsistence necessary to complete work specified in the work plan)		Lump Sum	Lump Sum	$ 2,500 00
		Subtotal			$ 2,500 00
II.	PERSONAL HEALTH & SAFETY EQUIPMENT				
	Level C Personal Protection [optional]		6 man days	$ 12 /man day	$ 72
		Subtotal			$ 72
III.	MONITORING EQUIPMENT				
	OVA 108 (FID)		3 weeks	$ 100 /week	$ 300
	OVA Calibration Kit (methane and zero air calibration gases)		3 weeks	$ N/C /week	$ N/C
	HNu PI 101 (PID)		3 weeks	$ 25 /week	$ 75
	HNu Calibration Kit (isobutylene and zero air calibration gases)		3 weeks	$ N/C /week	$ N/C
	Organic Vapor Monitor (TVA 1000 with FID and PID) [optional]		3 weeks	$ N/C /week*	$ N/C
	TVA Calibration Kit (isobutylene, methane, zero air) [optional]		3 weeks	$ N/C /week*	$ N/C
	LEL/Oxygen Meter		2 weeks	$ 80 /week	$ 160
	LEL Calibration Kit (pentane/air mixture calibration gas)		2 weeks	$ N/C /week	$ N/C
	Dust Monitor (DataRAM) [optional]		1 week	$ 50 /week	$ 50
		Subtotal			$ 585
IV.	FIELD INVESTIGATION EQUIPMENT				
	Turbidity Meter		2 days	$ N/C /day	$ N/C
	pH and Temperature Meter		2 days	$ 40 /day	$ 80
	Salinity, Conductivity and Temperature Meter		2 days	$ N/C /day	$ N/C
	Water Level Indicator		3 days	$ 20 /day	$ 60
	Oil/Water Interface Probe		3 days	$ 20 /day	$ 60

TABLE 1.2
SI OTHER DIRECT COSTS

Site: Barretto Point
Site Investigation
Bronx, New York

	DESCRIPTION	QUANTITY/ DURATION	UNIT PRICE	EXTENDED COST
V.	FIELD INVESTIGATION EQUIPMENT (continued)			
	Grundfos Redi-Flo2 2" Submersible Pump (low flow well purging)	2 days	$ 180 /week	$ 180
	Centrifugal Pump [optional]	2 days	$ N/C /day	$ N/C
	Peristaltic Pump (for sample filtering)	1 day	$ 25 /day	$ N/C
	Generator (for submersible pump)	2 days	$ 65 /week	$ 65
	Subtotal			$ 245
VI.	LARGE EQUIPMENT DECONTAMINATION PAD			
	Sump Pump and Hose	2 weeks	$120/week	$240.00
	Plastic Childrens Pool (for collection of decon water)	10ft. diameter	$20/unit	$20.00
	55-gallon DOT-Approved Plastic-Lined Steel Drums	10 drums	$40/drum	$400.00
	Subtotal			$660.00
VII.	SI REPORT PRODUCTION			
	Photocopying	2,500 sheets	N/C	N/C
	Binders (2-inch 3-hole binders)	20 binders	N/C	N/C
	Report Covers and Tabs (tables, figures, appendices)	20 sets	N/C	N/C
	Postage/Shipping (priority overnight)			$750.00 (1)
	Subtotal			$750.00
VIII.	CONTINOUS GROUNDWATER AND SURFACE WATER ELEVATION MONITORING EQUIPMENT			
	Four (4) Troll 4000 Intellegent Probes with 25' of Cable and 15 PSi Probes (including shipping)	1 week	$1,800/week	$1,800.00
IX.	SLUG TESTING EQUIPMENT			
	One (1) Troll 4000 Intellegent Probe with 25' of Cable and 15 PSI Probes (including shipping)	1 week	$450/week	$450.00
			TOTAL ODC's	$7,262.00

NOTES:
[optional] includes equipment which may or may not be required for this project
(1) Estimated shipping costs for draft and final report to EDC, NYC, DEP, DEC, and DOH. Actual costs will apply.
*: An OVA 128 and a Photovac 2020 will be used.

TABLE 1.3
LAND SURVEYOR BID SCHEDULE

Site: Barretto Point

Site Investigation
Bronx, New York

Approximate Quantity	Activity	Extended Total Cost
Lump Sum	Site Control	**$2,500**
Lump Sum	Grid and Traverse Clearing for Access for Surveys and Field Activities (1, 2)	**$2,450**
Lump Sum	Soil Gas Grids (50 and 150 - foot spaced)	$2,000
Lump Sum	Geophysical Survey Traverses (20 - foot spaced)	$3,600
Lump Sum	Topographic Survey: 1 - foot Contour Mapping	$2,800
Lump Sum	Samples Locations (12 Surface Soil, 7 Test Pit, 7 Boring Wells): New York State Grid Coordinates and Elevations (mean seal level to the nearest 0.01 foot)	$2,200
Lump Sum	Data Reduction and Site Topographic Map (1copy on mylar and an electronic copy in AutoCAD - computer diskette)	$1,500
Lump Sum	Survey of 2-inch River Gauge	$250
Lump Sum	Property Boundary Survey	$19,800
	TOTAL COST OF LAND SURVEYING	$37,100

TABLE 1.4
GEOPHYSICAL SURVEY BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

Approximate Quantity	Activity	Unit Cost	Extended Total Cost
	Electromagnetic Survey [EM-31]		
1 day	Subsistence for Two-Man Field Crew (includes lodging and meals)	$330/day	$330.00
1 day	Continuously along 20 - Foot Spaced Traverses	$1,250/day	$1,250.00
Lump Sum	Data Analysis and Report Preparation	Lump Sum	$1,100.00
	Subtotal for EM-31:		$2,680.00
	Ground Penetrating Radar Survey		
1 day	Subsistence for Two-Man Field Crew (includes lodging and meals)	$330/day	$330.00
1 day	Continuously along 20 - Foot Spaced Traverses	$1,500/day	$1,500.00
Lump Sum	Data Analysis and Report Preparation	Lump Sum	$1,340.00
	Subtotal for GPR:		$3,170.00
Lump Sum	Clearing for Underground Utilities Around Wells MW-2 and MW-4 and TP-5	Lump Sum	$600

TOTAL COST OF GEOPHYSICAL SURVEY ACTIVITIES $6,450.00

TABLE 1.5
SOIL GAS SURVEY BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

Approximate Quantity	Activity	Unit Price	Extended Total Cost
Lump Sum	Mobilization/Demobilization (Equipment and Personnel)	Lump Sum	$1,690.00
4 days	Subsistence for Soil Gas Field Crew (includes lodging and meals)	$150/day	$600.00
900 feet	Soil Gas Probe Advancement Footage - Total 51 Locations (#) (Assumed 15 locations at 10ft. each, 15 locations at 15ft. each, and 21 locations at 25ft. each)	$8.00	$7,200.00 (2)
51 samples (#)	Soil Gas Samples - Collection and Field GC Analysis for Total VOCs (per detector) by GC Equipped with PID and FID (includes QC samples)	$1,200/day	$4,800.00
51 samples (#)	Ground Water Samples - Collection and Field Analysis for Total VOCs (per detector) by GC Equipped with PID and FID (includes QC samples)	$1,200/day	$4,800.00
4 days	Additional Subsistence for Field Crew (meals and lodging included) (1)	$150/day	$600.00
900 feet	Groundwater Gas Probe Advancement Footage - Total 51 Locations (#) (Assumed 15 locations at 10ft. each, 15 locations at 15ft., and 21 locations at 25ft. each) (1)	$9.00/foot	$8,100.00 (2)
51 hours	Contingency for hand digging for underground utility clearence	$80/hour	$4,080.00
	TOTAL COST OF SOIL GAS ACTIVITIES		$31,870.00

Notes:
(#) Includes 10 contingency sample locations.
(1) Soil gas probe can not be further advanced for collection of groundwater gas sample. A second probe with the capablity to collect groundwater must be advanced.
(2) Zebra Environmental Corp. will invoice a minimum of 100 ft./day regardless of footage probed.

TABLE 1.6
TEST PIT BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

Approximate Quantity	Activity	Unit Price	Extended Total Cost
Lump Sum	Mobilization/Demobilization (Equipment and Personnel)	Lump Sum	$625.00
2 days	Track Excavator and Operator (Cat 235 or equivalent)	$1,150/day	$2,300.00
XXX	Level C Personnel Protection	$230/day	XXXXXXXXX
2 days	Steam Cleaner and Water Supply	$100/day	$200.00

TOTAL COST OF TEST PIT ACTIVITIES **$3,125**

TABLE 1.7
DRILLING AND WELL INSTALLATION BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

Approximate Quantity	Activity	Unit Price	Extended Amount
Lump Sum	Mobilization/Demobilization	Lump Sum	$975.00
7 days	Subsistence and Per Diem (2 man crew)	$180/day	$1,260.00
155 feet	Hollow-stem Auger Drilling and Split Spoon Sampling: Approximately 155 feet of 4.25 inch ID	$28/foot	$4,340.00
120 feet	2 - inch Schedule 40, PVC riser (includes installation, bentonite, grout, and concrete) (for 7 wells ranging in depth of 15 to 30ft.)	$12/foot	$1,440.00
70 feet	2 - inch Schedule 40, PVC screen (includes installation & sand pack) (10ft. screens for 7 ground water table wells)	$17/foot	$1,190.00
8 hours	Well Development (surge block at 7 wells)	$160/hour	$1,280.00
7 locations	Painted Protective Steel Casings (6 inch diameter) with Lock (keyed alike)	$300/each	$2,100.00
1 week	Steam Cleaner & Water Storage Tank	$ N/C /week	N/C
5 hours	Steam Cleaning	$ 160 /hour	$800.00
14 drums	55-Gallon Steel Drums (for cuttings, well water, and decon water)	$55/drum	$770.00
4 hours	Standby Time	$130/hour	$520.00
XXXX	Level C Personal Protection Surcharge (2-man crew)	$320/day	XXXXX
Lump Sum	Installation of 2" River Gauge	$300.00	$300.00

TOTAL COST OF DRILLING ACTIVITIES $14,975.00

TABLE 1.8
LABORATORY ANALYSIS BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

Sample Source	Parameter	Field Samples	Field Duplicates	Total Samples	Unit Cost	Extended Total Cost
Soil Gas	VOCs (NIOSH Method 1500)	5	1	6	$135.00	$810.00
	VOCs (NIOSH Method 1501)	5	1	6	$135.00	$810.00
			Subtotal Soil Gas Samples			**$1,620.00**
Surface Soil	TCL Volatiles (Method 8260)	16	1	17	$100.00	$1,700.00
	TCL Semivolatiles (Method 8270)	16	1	17	$200.00	$3,400.00
	TAL Metals (Methods 6010/7471)	16	1	17	$110.00	$1,870.00
	TCL PCBs (Method 8082)	3	1	4	$90.00	$360.00
			Subtotal Subsurface Soil Samples			**$7,330.00**
Test Pits (1)	TCL Volatiles (Method 8260)	14	1	15	$100.00	$1,500.00
	TCL Semivolatiles (Method 8270)	14	1	15	$200.00	$3,000.00
	TAL Metals (Methods 6010/7471)	14	1	15	$110.00	$1,650.00
	TCLP Metals	3	1	4	$125.00	$500.00
			Subtotal Test Pit Soil Samples			**$6,650.00**
Subsurface Soil Well Borings (2)	TCL Volatiles (Method 8260)	21	1	22	$100.00	$2,200.00
	TCL Semivolatiles (Method 8270)	21	1	22	$200.00	$4,400.00
	TAL Metals (Methods 6010/7471)	21	1	22	$110.00	$2,420.00
	Total Organic Carbon	7	0	7	$60.00	$420.00
	Cation Exchange Capacity	7	0	7	$75.00	$525.00
	Grain Size (Sieve only)	7	0	7	$75.00	$525.00
			Subtotal Well Boring Soil Samples			**$10,490.00**
Ground Water and Ponded Water	TCL Volatiles (Method 8260)	8	1	9	$100.00	$900.00
	TCL Semivolatiles (Method 8270)	8	1	9	$200.00	$1,800.00
	TAL Metals (Methods 6010/7471)	15	1	16	$110.00	$1,760.00
	Total Chloride	8	1	9	$20.00	$180.00
			Subtotal Ground Water Samples			**$4,640.00**
QA/QC Samples						
Trip Blanks (#)	TCL Volatiles (Method 8260)	16	0	16	N/C	$0.00
Aqueous Field Blanks (#)	TCL Volatiles (Method 8260)	7	0	7	$100.00	$700.00
	TCL Semivolatiles (Method 8270)	7	0	7	$200.00	$1,400.00
	TCL PCBs (Method 8082)	7	0	7	$90.00	$630.00
	TAL Metals (Methods 6010/7471)	8	0	8	$110.00	$880.00
	Total Chloride	8	0	8	$20.00	$160.00
Soil Gas Field Blanks	Volatiles (Soil Gas: Method 1500)	4	0	4	$135.00	$540.00
	Volatiles (Soil Gas: Method 1501)	4	0	4	$135.00	$540.00
			Subtotal QA/QC Samples			**$4,850.00**
	TOTAL COST OF LABORATORY ANALYSIS					$35,580.00

Notes:
ples will be collected from each of the seven test pits.
samples from three contigency boring locations.
ıter samples from three contingency monitoring wells.
ıles; samples to be collected at frequency specified in work plan.

TABLE 2.1
RAR LABOR COST ESTIMATE SUMMARY

Site: Barretto Point

Site Investigation

Bronx, New York

JOB LEVELS(*)	LABOR RATE	HOURS	EXTENDED COST
6	$ 53 /HR	28	$1,484.00
5	$ 48 /HR	1	$48.00
4	$ 41 /HR	18	$738.00
3	$ 30 /HR	176	$5,280.00
2	$ 23 /HR	60	$1,380.00
1	$ 18 /HR	2	$36.00
OTHER	$ 15 /HR	64	$960.00
	TOTALS	349	$9,926.00
INDIRECT COST AT	158.3%		$15,712.86
FEE @ 8.4%			$2,153.66
TOTAL RAR DIRECT LABOR			$27,792.52

NOTES:

(*) Defined per NYSDEC Attatchment A - Direct Labor Guidelines.

TABLE 2.1A
REMEDIAL ALTERNATIVES REPORT LABOR BID SCHEDULE

Site: Barretto Point
Site Investigation
Bronx, New York

ACTIVITY	JOB LEVEL / LABOR HOURS 6	5	4	3	2	1	OTHER	TOTAL
I. MANAGEMENT & MEETINGS								
1.1 TASK MANAGEMENT	8		8				16	32
1.2 MEETING (1) AT EDC OFFICE	8			8				16
1.3 PUBLIC HEARING (ATTENDANCE/PREPARATION)	4			16			16	36
TOTAL-I	20	0	8	24	0	0	32	84
II. DRAFT RA REPORT								
2.1 INTRODUCTION				8			2	10
2.2 IDENTIFICATION/DEVELOPMENT OF ALTERNATIVES	4		4	40	16		8	72
2.3 DETAILED ANALYSIS OF ALTERNATIVES	2		2	40	16		8	68
2.4 COMPARATIVE ANALYSIS OF ALTERNATIVES	2		2	40	16		8	68
TOTAL-II	8	0	8	128	48	0	26	218
III. FINAL RA REPORT								
3.1 COMMENT RESPONSES	0	0	1	8	4	0	2	15
3.2 DRAFT REPORT REVISION; FINAL REPORT	0	1	1	16	8	2	4	32
TOTAL-III	0	1	2	24	12	2	6	47
TOTAL RAR DIRECT LABOR	28	1	18	176	60	2	64	349

TABLE 2.2
RAR OTHER DIRECT COSTS

Site: Barretto Point
Site Investigation
Bronx, New York

	DESCRIPTION	QUANTITY/ DURATION	UNIT PRICE	EXTENDED COST
I.	**MEETING TRAVEL**			
	Vehicle (includes gasoline)	2 days	$40/day	$80.00
II.	**RAR REPORT PRODUCTION**			
	Photocopying	1,000 sheets	N/C	N/C
	Binders (1-inch 3-hole binders)	20 binders	N/C	N/C
	Report Covers and Tabs (tables, figures, appendices)	20 sets	N/C	N/C
	Postage/Shipping (priority overnight)			$500.00 (1)
			TOTAL ODC's	$580.00

NOTES:
(1) Estimated shipping costs for draft and final report to EDC, NYC, DEP, DEC, and DOH.

ATTACHMENT B
SOIL GAS SURVEY PRICE QUOATATIONS

SOIL GAS SURVEY PRICE QUOTATIONS

Site: Barretto Point
Site Investigation
Bronx, New York

Company		Vironex, Inc. (1)		Zebra Environmental Corp.		Onsite Environmental Laboratories, Inc.		TerraProbe, Inc. (1)	
Approximate Quantity	Activity	Unit Price	Extended Total Cost	Unit Price	Extended Total Cost	Unit Price	Extended Total Cost	Unit Price	Extended Total Cost
Lump Sum	Mobilization/Demobilization (Equipment and Personnel)	Lump Sum	$200.00	Lump Sum	$1,690.00	Lump Sum	$1,000.00	Lump Sum	$3,000.00
4 days	Subsistence for Soil Gas Field Crew (includes lodging and meals)	$250/day	$1,000.00	$150/day	$600.00	$200/day	$800.00	$2,600/day	$10,400.00
900 feet	Soil Gas Probe Advancement Footage - Total 51 Locations (#) (Assumed 15 locations at 10ft. each, 15 locations at 15ft. each, and 21 locations at 25ft. each)	$6.08/foot	$5,472.00	$8.00/foot	$7,200.00 (4)	$11.50/foot	$10,350.00	$4.00/foot	$3,600.00
51 samples (#)	Soil Gas Samples - Collection and Field GC Analysis for Total VOCs (per detector) by GC Equipped with PID and FID (includes QC samples)	$96/each	$4,896.00	$1,200/day	$4,800.00	$125/each	$6,375.00	$25/each	$1,275.00
51 samples (#)	Ground Water Samples - Collection and Field Analysis for Total VOCs (per detector) by GC Equipped with PID and FID (includes QC samples)	$96/each	$4,896.00	$1,200/day	$4,800.00	$125/each	$6,375.00	$30/each	$1,530.00
4 days	Additional Subsistence for Field Crew (meals and lodging included) (2)	$250/day	$1,000.00	$150/day	$600.00	$200/day	$800.00		not provided
900 feet	Groundwater Gas Probe Advancement Footage - Total 51 Locations (#) (Assumed 15 locations at 10ft. each, 15 locations at 15ft., and 21 locations at 25ft. each) (2)	$5.33/foot	$4,797.00	$9.00/foot	$8,100.00 (4)	$11.50/foot	$10,350.00		not provided
	TOTAL COST OF SOIL GAS ACTIVITIES		$22,261.00 (3)		$27,790.00		$36,050.00		not applicable

Notes:
(#) Includes 10 contingency sample locations

(1) Vironex, Inc. and Terra Probe, Inc. had exceptions to certain provisions of the subcontractor agreement and as a result are considered non-responsive. Bids were solicited from a fifth firm, S2C2, which did not provide a completed bid form

(2) Soil gas probe can not be further advanced for collection of groundwater gas sample. A second probe with the capability to collect groundwater must be advanced

(3) Vironex, Inc. has indicated that an additional payment of $5,000 is required to clear underground utilities prior to probing

(4) Zebra Environmental Corp. will invoice a minimum of 100 ft./day regardless of footage probed

Appendix C

APPENDIX C

GEOPHYSICAL SURVEY REPORT

HAGER-RICHTER
GEOSCIENCE, INC.

RECONNAISSANCE
GEOPHYSICAL SURVEY
BARRETTO POINT SITE
BRONX, NEW YORK

D&B Project No. 1616-01

Prepared for:

Dvirka & Bartilucci Consulting Engineers
330 Crossways Park Drive
Woodbury, New York 11797-2015

Prepared by:

Hager-Richter Geoscience, Inc.
8 Industrial Way - D10
Salem, New Hampshire 03079

File 98D77
December, 1999

0. EXECUTIVE SUMMARY

Hager-Richter Geoscience, Inc. conducted a reconnaissance geophysical survey at the Barretto Point Site in the Borough of Bronx, New York for Dvirka & Bartilucci Consulting Engineers (D&B). The reconnaissance geophysical survey is part of an environmental investigation of the Barretto Point Site by D&B for the New York City Economic Development Corporation.

The Barretto Point Site is located on the north bank of the East River in the Hunts Point section of the Bronx. The Site is currently vacant land. According to information provided by D&B, former uses of the Site included a sand and gravel operation, an asphalt plant, and a paint and varnish manufacturing plant. Four areas of interest for the reconnaissance geophysical survey were specified by D&B. One of the areas of interest is approximately 2.8 acres in size and the remaining three areas of interest are each approximately ¼ acre in size.

D&B specified that the reconnaissance geophysical survey be conducted using electromagnetic induction terrain conductivity (commonly called EM) and ground penetrating radar (GPR) and that the data be collected along survey lines spaced 20 feet apart. The objectives of the reconnaissance geophysical survey were to aid in locating subsurface utilities and other buried materials of potential environmental concern such as drums and tanks.

The results of the reconnaissance geophysical survey at the Barretto Point Site in Bronx, New York are as follows:

- Eleven areas of possible buried metal were detected within the geophysical survey area.
- One area of possible conductive fill was detected within the geophysical survey area.
- No utilities were identified within the geophysical survey area.

Reconnaissance Geophysical Survey
Barretto Point Site
Bronx, New York
File 98D77 December, 1999

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FIGURES

PLATES

APPENDICES

Reconnaissance Geophysical Survey
Barretto Point Site
Bronx, New York
File 98D77 December, 1999

1. INTRODUCTION

Hager-Richter Geoscience, Inc. conducted a reconnaissance geophysical survey at the Barretto Point Site, in the Bronx, New York for Dvirka & Bartilucci Consulting Engineers (D&B) of Woodbury, New York in November, 1999. The reconnaissance geophysical survey is part of an environmental investigation of the Barretto Point Site by D&B for the New York City Economic Development Corporation (NYCEDC).

The Barretto Point Site is bounded on the north by Viele Avenue, on the east by Manida Street, on the south by Ryawa Avenue, and on the west by the East River. The general location of the Site is shown in Figure 1. D&B specified four areas of interest for the reconnaissance geophysical survey, designated as Areas 1-4 and shown on Plate 1. Area 1 is approximately 2.8 acres in size and is located between Barretto Street and Manida Street south of Viele Avenue. Areas 2-4 are each approximately ¼ acre in size and are located between Barretto Street and the East River. Area 2 is at the former location of a sand and gravel operation; Area 3 is at the former location of a former asphalt plant; and Area 4 is at the location of former coal storage structures. The objectives of the reconnaissance geophysical survey were to aid in locating subsurface utilities and other buried materials of potential environmental concern such as drums and tanks.

D&B specified that the geophysical survey be conducted using electromagnetic induction terrain conductivity (commonly called EM) and ground penetrating radar (GPR) along lines spaced 20 feet apart in the four areas of interest. The design of the survey leaves unexplored a strip at least 6 to 8 feet wide between each pair of adjacent lines, and therefore, the survey should be considered reconnaissance in nature. Data for the EM survey were recorded in the vertical and horizontal dipole modes for both the quadrature phase component (apparent conductivity) and in-phase component.

James Coffman and Garrick Marcoux of Hager-Richter conducted the survey November 4-5, 1999. The project was coordinated with Mr. Kenneth Wenz of D&B. Mr. Wenz specified the areas of interest and observed portions of the field operations. Preliminary plots of the geophysical data and interpretation were transmitted to D&B on November 10, 1999 and December 1, 1999. Final data analysis and interpretation were completed at the Hager-Richter offices. Original data and field notes reside in the Hager-Richter files and will be retained for at least three years.

2. EQUIPMENT AND PROCEDURES

2.1 GENERAL

As specified by D&B, two complementary techniques were used at the Barretto Point Site: EM and GPR. Both the design of the survey and the locations and sizes of the survey areas were specified by D&B. The survey grids and naming conventions for the reconnaissance geophysical survey were staked and established by D&B prior to the field work.

2.2 ELECTROMAGNETIC INDUCTION TERRAIN CONDUCTIVITY

2.2.1 General. The EM survey was conducted using a Geonics EM31 terrain conductivity meter. A general description of the equipment, procedures, and limitations for the EM survey, as conducted by Hager-Richter, is contained in the Appendix.

2.2.2 Site Specific. Data for the terrain conductivity survey were recorded at approximately 2½-foot intervals along lines spaced 20 feet apart as specified by D&B. The EM31 has transmitter and receiver coils mounted with a fixed separation of 12 feet in a rigid boom. For this survey, the data were collected in both vertical or horizontal dipole modes—that is, with the plane of the coils oriented either horizontally or vertically, respectively. The horizontal dipole mode is more sensitive to shallow materials than the vertical dipole mode. The nominal depth of exploration for the EM31 is generally estimated as about 9 feet for the horizontal dipole mode, and 18 feet for the vertical dipole mode.

Two components of the induced magnetic field were measured: (1) the quadrature-phase component; and (2) the in-phase component. The quadrature-phase component is a measure of the *average* terrain conductivity of the subsurface materials located between the receiver and transmitter of the EM31. The in-phase component is a sensitive indicator of the presence of conductive metal objects; however, the exact identification of the object cannot be determined from the terrain conductivity data alone.

Data were re-measured along a baseline at the beginning and end of the field day to check for instrument drift. No significant instrument drift was detected. The EM data were processed in the field using a notebook computer to obtain preliminary contour plots.

2.3 GROUND PENETRATING RADAR

2.3.1 General. The ground penetrating radar (GPR) survey was conducted using a Geophysical Survey Systems SIR-2 digital GPR system. A general description of the equipment, procedures, and limitations for the GPR survey, as conducted by Hager-Richter, is contained in the Appendix.

2.3.2 Site Specific. As specified by D&B, GPR data were acquired along the same lines as the EM data. The GPR antenna was pulled by hand for all traverses. GPR data were acquired with a 300 MHz antenna and a 60 nsec time window. GPR signal penetration varied at the Site. Based on handbook values of time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have varied from approximately less than 2 feet to about 5 feet.

3. RESULTS AND DISCUSSION

3.1 General

The reconnaissance geophysical survey was conducted using two complementary techniques: electromagnetic induction terrain conductivity (EM) and GPR. The geophysical methods, the spacing between the survey lines, and the areas of interest for the survey were specified by D&B. The EM survey was conducted along lines spaced 20 feet apart across the accessible portions of the specified areas of interest. The GPR survey was conducted along the same survey lines as the EM survey in Areas 2-4. GPR signal penetration in Area 1 was limited to less than 2 feet, and the survey for this area was discontinued with the concurrence of the D&B Site representative.

The EM data for the four survey areas are presented in color contour form in Figures 2-6. The results of the GPR survey and the integrated interpretation of the geophysical data are given in Plate 2.

Terrain conductivity data are useful for detecting the presence of anomalously conductive ground, which might be caused by the presence of objects with properties unlike those of the natural materials on site, such as utilities or buried metal. The in-phase component data, on the other hand, are *only* used to interpret the presence of metal objects.

3.2 Terrain Conductivity Survey

3.2.1 Area 1. Area 1 is located between Barretto Avenue and Manida Avenue, south of Viele Street at the location of a former paint and varnish manufacturing facility. The EM data for the reconnaissance geophysical survey conducted in Area 1 of the Barretto Point Site are presented as color contour plots of the apparent conductivity and the in-phase component in Figures 2 and 3, respectively. Data for both the horizontal and vertical dipoles for each component are shown.

Background apparent conductivity values and in-phase values range from 20 to 40 mmho/m and -14 to -10 ppt, respectively. The values of apparent conductivity generally increase from south to north. As can be seen on Figures 2 and 3, a few large areas exhibit apparent conductivity and in-phase component values that well above the background range. Note the apparent conductivity-horizontal dipole anomaly located near 120W,500S. The anomaly is more significant in the horizontal dipole mode rather than the vertical dipole mode, indicating that the object(s) causing the anomaly is(are) shallow.

3.2.2 Area 2. Area 2 is located southwest of the intersection of Barretto Avenue and Viele Street, at the location of a former sand and gravel operation. The EM data for the reconnaissance geophysical survey conducted in Area 1 of the Barretto Point Site are presented as color contour plots of the apparent conductivity and the in-phase component in Figure 4. The data for both the horizontal and vertical dipoles for each component are shown.

Background apparent conductivity values and in-phase values range from 20 to 40 mmho/m and -12 to -16 ppt, respectively. The values of apparent conductivity generally increase from northeast to southwest. As can be seen on Figure 4, two areas exhibit apparent conductivity and in-phase component values that well above the background range. Note the apparent conductivity-vertical dipole anomaly located near 50W,82S. The anomaly is more significant in the vertical dipole mode rather than the horizontal dipole mode, indicating that the object(s) causing the anomaly is(are) more deeply buried.

3.2.3 Area 3. Area 3 is located northeast of the intersection of Barretto Avenue Ryawa Avenue at the location of a former asphalt plant. The EM data for the reconnaissance geophysical survey conducted in Area 3 of the Barretto Point Site are presented as color contour plots of the apparent conductivity and the in-phase component in Figure 5. Data for both the horizontal and vertical dipoles for each component are shown.

Background apparent conductivity values and in-phase values range from 20 to 40 mmho/m and -16 to -12 ppt, respectively. The values of apparent conductivity vary only slightly across the area. As can be seen on Figure 5, a few small in-phase component anomalies are present along the edges of the area and near 60W,80S.

3.2.4 Area 4. Area 4 is located west Barretto Avenue, along the East River at the location of a former coal storage facility. The EM data for the reconnaissance geophysical survey conducted in Area 1 of the Barretto Point Site are presented as color contour plots of the apparent conductivity and the in-phase component in Figure 6. Data for both the horizontal and vertical dipoles for each component are shown.

Background apparent conductivity values and in-phase values range from 40 to 60 mmho/m and -14 to -8 ppt, respectively. The values of apparent conductivity generally increase from east to west. As can be seen on Figure 4, one area on the western edge exhibits apparent conductivity and in-phase component values that well above the background range.

3.3 GPR Survey

3.3.1 Area 1. Apparent GPR signal penetration in Area 1 was limited to less than 20 nsec. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been less than 2 feet. Because of the limited signal penetrations, the GPR survey in Area 1 was discontinued with the concurrence of the D&B site representative. The cause for the limited GPR signal penetration cannot be determined from the GPR data alone. In most cases, the conductivity of the subsurface controls the GPR signal penetration. However, the apparent conductivity of the subsurface for Area 1 is not significantly different from that of Areas 2-4 where GPR signal penetration was somewhat better.

3.3.2 Area 2. GPR data were collected along the same lines as the EM data for Area 2. The locations of the traverses and the interpretation of the data are shown on Plate 2. Apparent GPR signal penetration in Area 2 varied from 30 to 40 nsec. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been about 4 to 5 feet. GPR signatures typical of small unidentified buried objects were detected along the traverses, and their locations are shown on Plate 2.

3.3.3 Area 3. GPR data were collected along the same lines as the EM data for Area 3. The locations of the traverses and the interpretation of the data are shown on Plate 2. Apparent GPR signal penetration in Area 3 varied from 30 to 40 nsec. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been about 4 to 5 feet. GPR signatures typical of small unidentified buried objects were detected along the traverses, and their locations are shown on Plate 2.

3.3.4 Area 4. GPR data were collected along the same lines as the EM data for Area 4. The locations of the traverses and the interpretation of the data are shown on Plate 2. Apparent GPR signal penetration in Area 4 varied from 30 to 40 nsec. Based on handbook time-to-depth conversions for the GPR signal in average soils, the GPR signal penetration is estimated to have been about 4 to 5 feet. GPR signatures typical of small unidentified buried objects were detected along the traverses, and their locations are shown on Plate 2.

3.4 Integrated Interpretation

The integrated interpretation of the geophysical data for the Site is given in Plate 2. Eleven general areas exhibiting elevated in-phase component values not associated with surface metal are shown as crosshatched areas on Plate 2 and are interpreted as areas of possible buried metal. Three of the areas in Area 1 are large in size. No linear EM or GPR anomalies indicative of utilities were detected by the reconnaissance geophysical survey.

Based on the similarity of the color contour plots for the horizontal and vertical components for each of the areas, we infer that in most cases, there is little significant variation in fill materials with depth, except for the two locations specifically noted above.

The anomalies located along the east and west boundaries of Area 1 are likely caused by metal fencing at these locations. Such areas are shown as stippled areas on Plate 2. The presence or absence of buried metal at these locations cannot be determined on the basis of the EM data alone.

One area exhibiting slightly anomalous apparent conductivity values not associated with surface objects is located in Area 3. This area, shown as a crosshatched area on Plate 2. The lack of a significant anomaly in the in-phase component for this area, indicates that the anomalous values of apparent conductivity is not due to the presence of metal, and, therefore is due to the presence of slightly conductive soils.

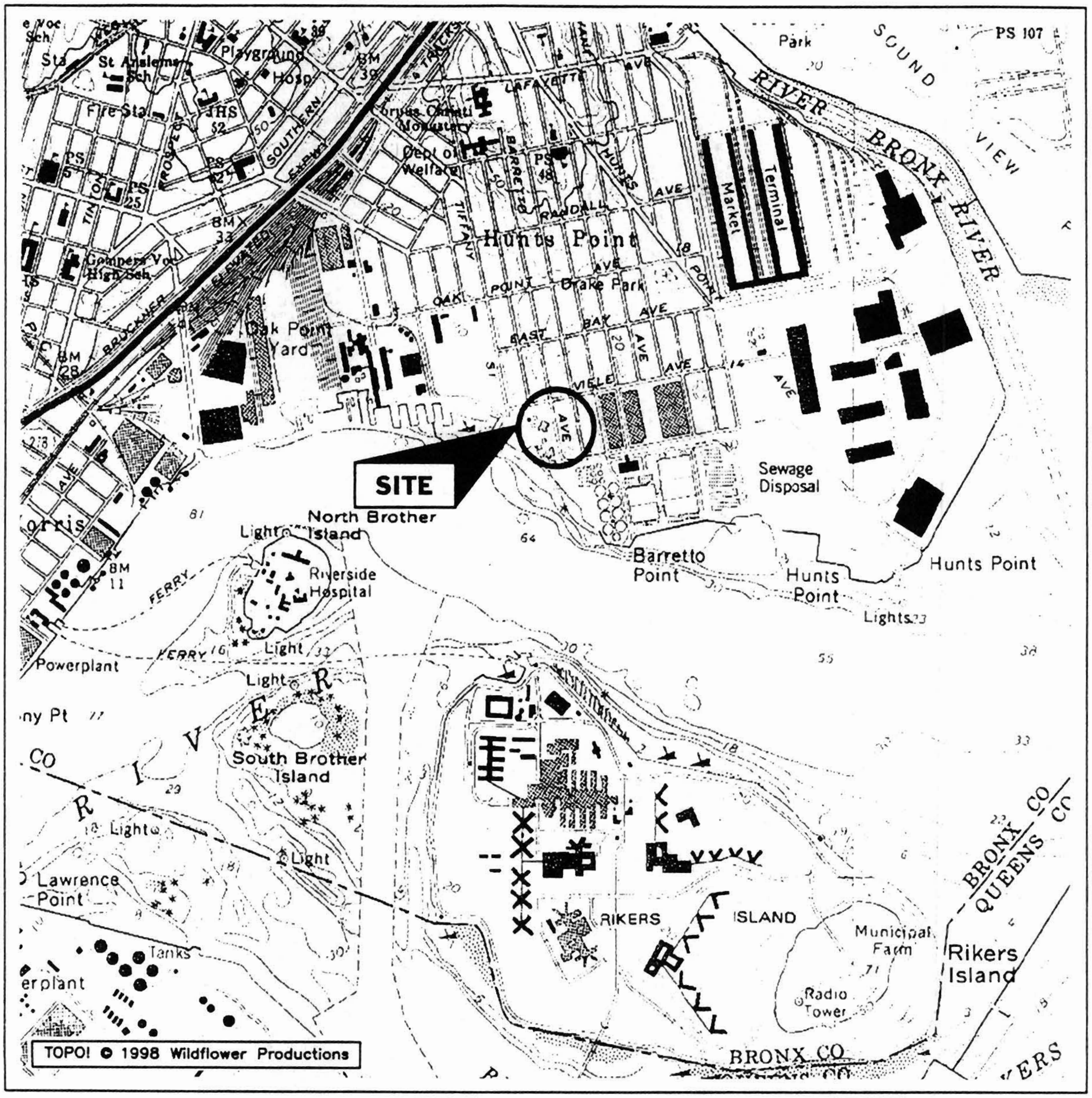
Based on the GPR data collected in Areas 2-4, we infer that the shallow subsurface contains many small objects such as construction debris. Because many of these objects are located in areas with no significant EM anomalies, we conclude that many objects do not contain metal.

4. LIMITATIONS

This report was prepared for the exclusive use of Dvirka & Bartilucci Consulting Engineers(Client) and the NYCEDC. No other party shall be entitled to rely on this Report or any information, documents, records, data, interpretations, advice or opinions given to Client by Hager-Richter Geoscience, Inc. (H-R) in the performance of its work. The Report relates solely to the specific project for which H-R has been retained and shall not be used or relied upon by Client or any third party for any variation or extension of this project, any other project or any other purpose without the express written permission of H-R. Any unpermitted use by Client or any third party shall be at Client's or such third party's own risk and without any liability to H-R.

H-R has used reasonable care, skill, competence and judgment in the performance of its services for this project consistent with professional standards for those providing similar services at the same time, in the same locale, and under like circumstances. Unless otherwise stated, the work performed by H-R should be understood to be exploratory and interpretational in character and any results, findings or recommendations contained in this Report or resulting from the work proposed may include decisions which are judgmental in nature and not necessarily based solely on pure science or engineering. It should be noted that our conclusions might be modified if subsurface conditions were better delineated with additional subsurface exploration including, but not limited to, test pits, soil borings with collection of soil and water samples, and laboratory testing.

Except as expressly provided in this limitations section, H-R makes no other representation or warranty of any kind whatsoever, oral or written, expressed or implied; and all implied warranties of merchantability and fitness for a particular purpose, are hereby disclaimed.



LOCATION

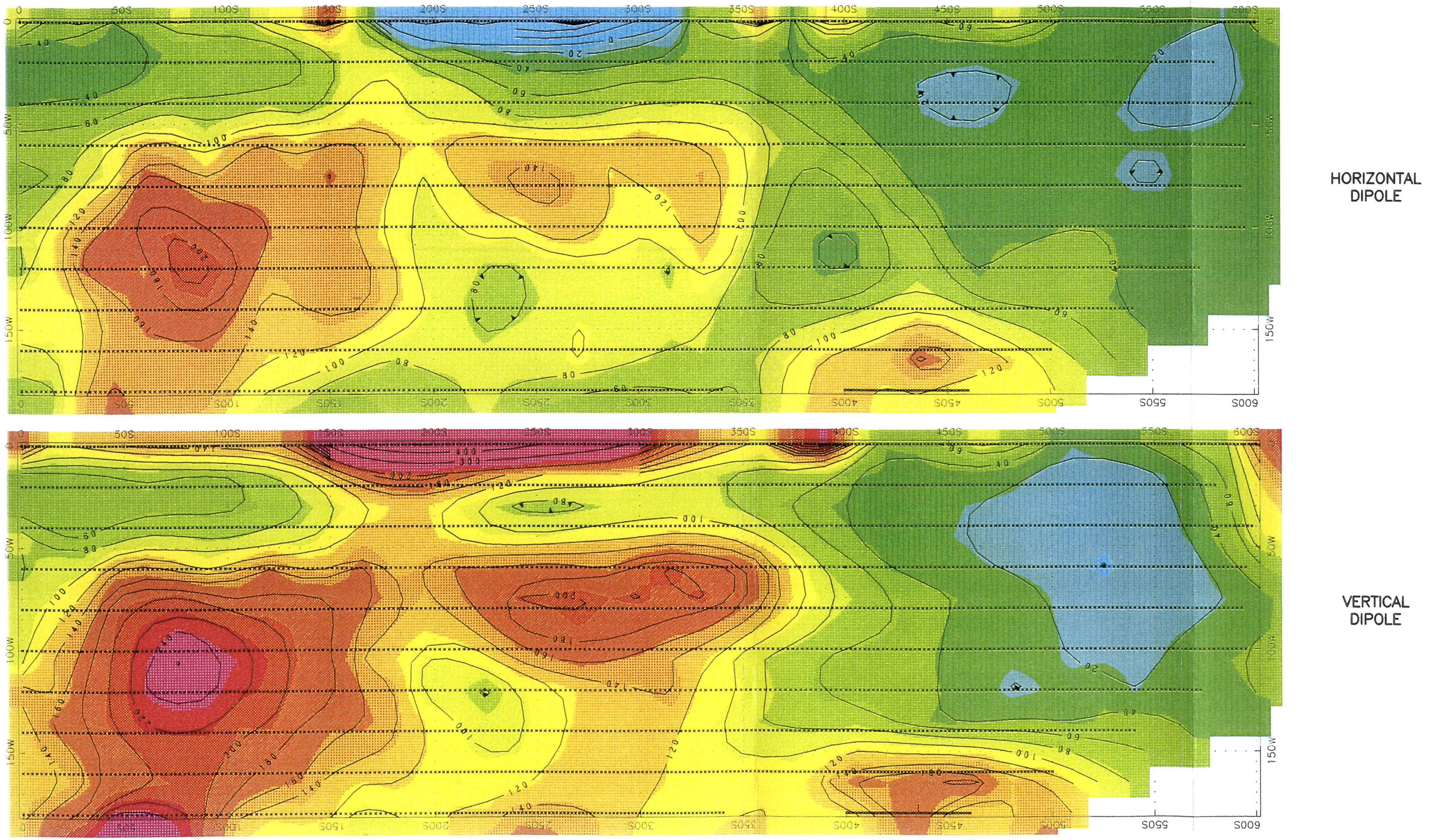
SCALE (feet)

0 2000 4000

Figure 1
General Site Location
Barretto Point Site
Bronx, New York

File 98D77	December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



NOTES:

1. Data collected with EM-31.
2. Contour Interval = 20 mmho/m.

LEGEND

× DATA STATION

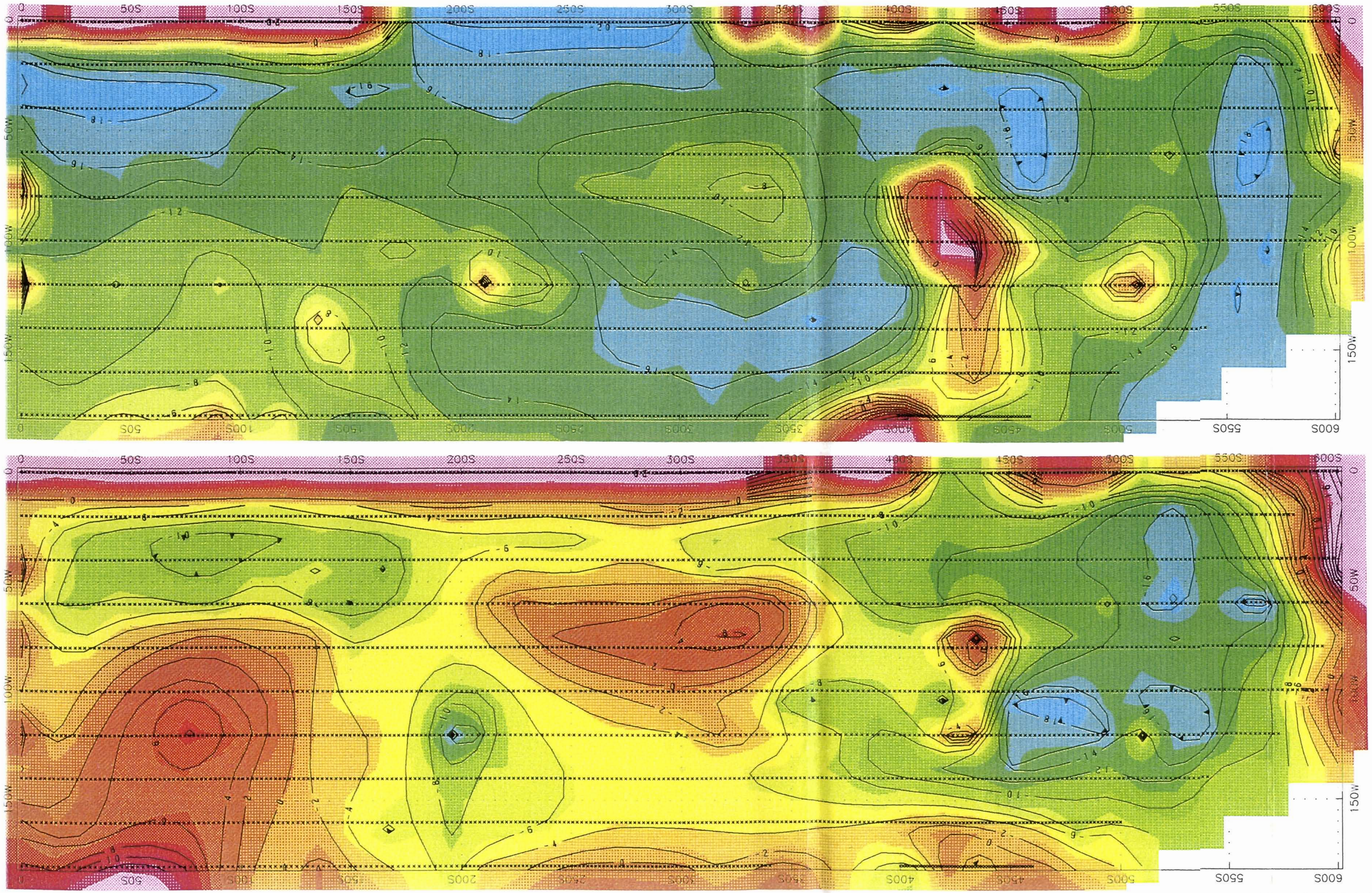
SCALE (feet)

0 50 100

Figure 2
Apparent Conductivity – Area 1
Barretto Point Site
Bronx, New York

File 98D77	December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



NOTES:

1. Data collected with EM-31.
2. Contour Interval = 2 ppt.

N

H-R

LEGEND

× DATA STATION

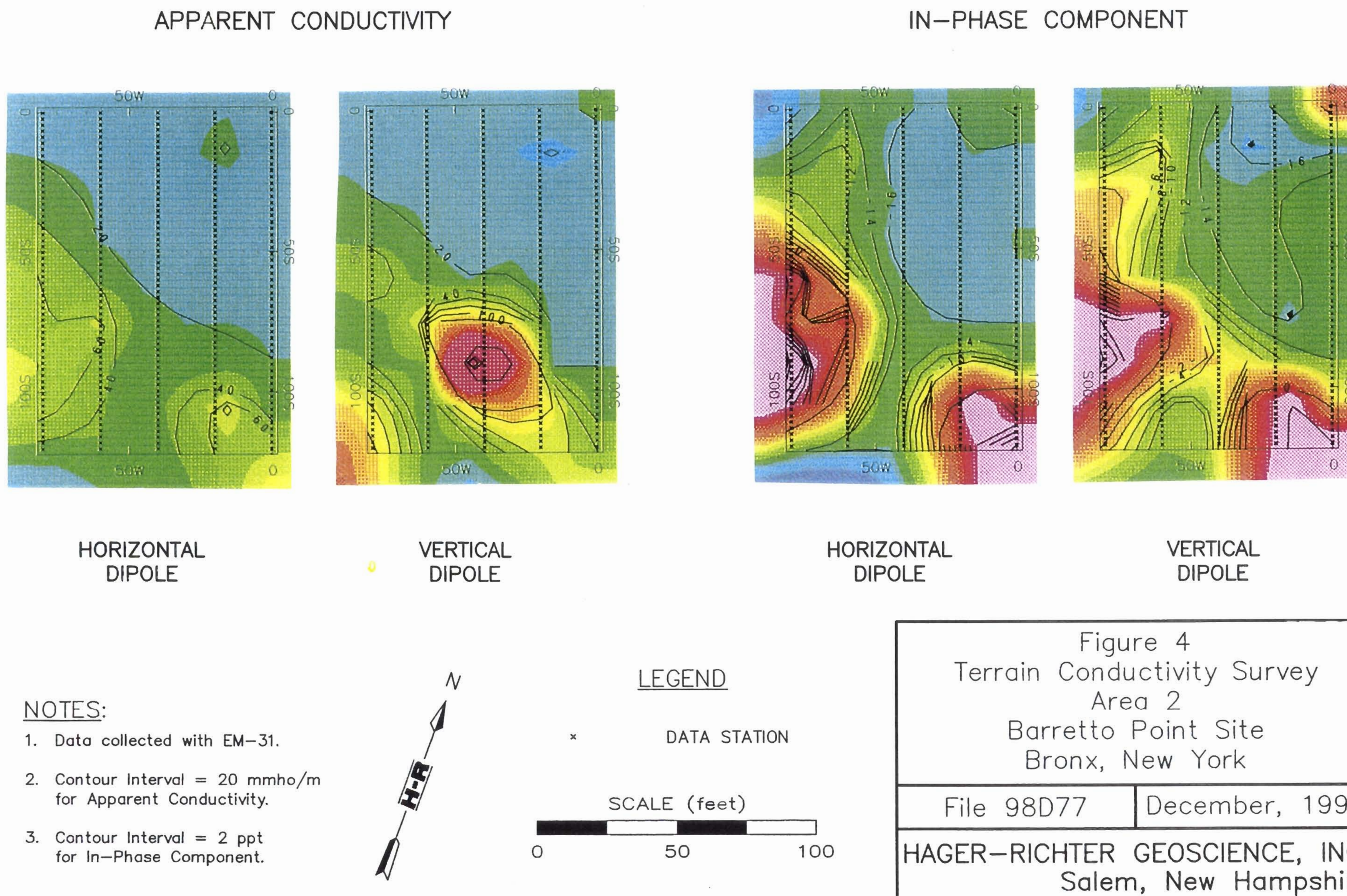
SCALE (feet)

0 50 100

Figure 3
In-Phase Component – Area 1
Barretto Point Site
Bronx, New York

File 98D77	December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



NOTES:

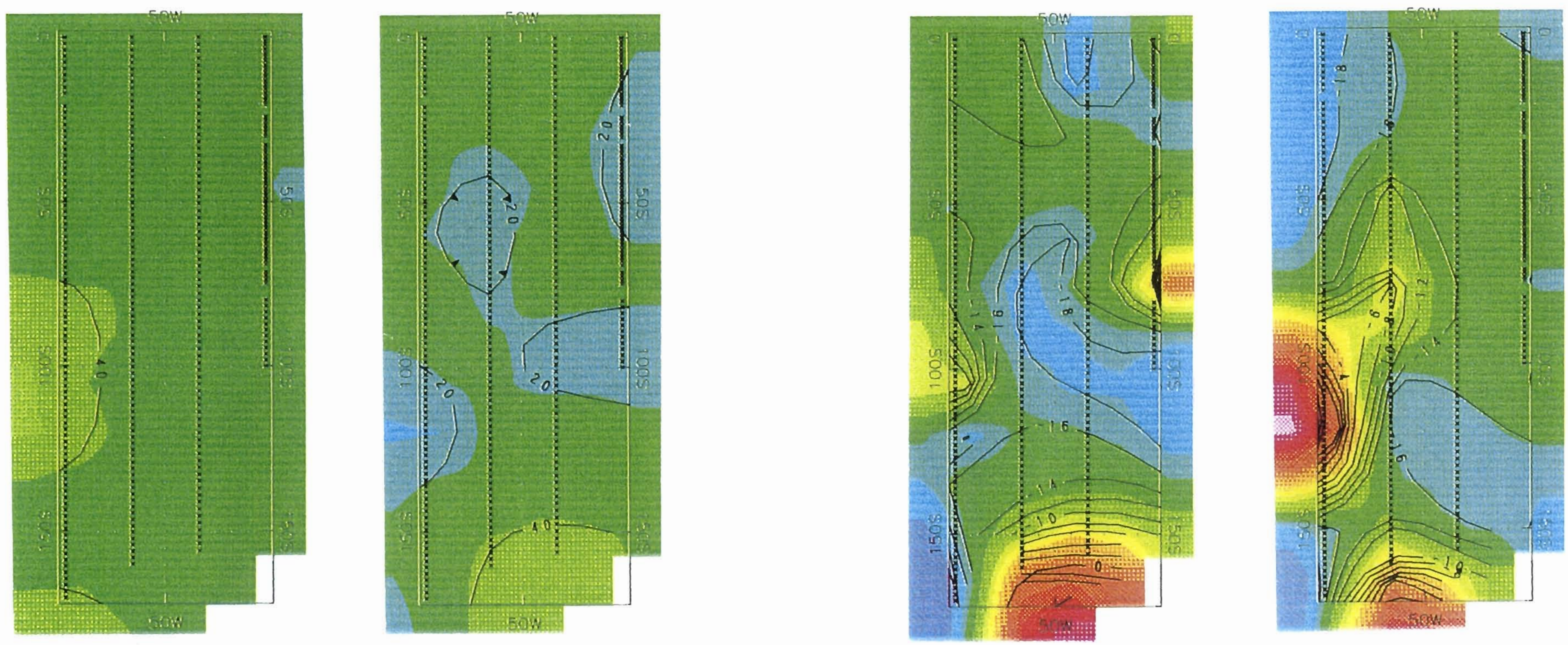
1. Data collected with EM-31.
2. Contour Interval = 20 mmho/m for Apparent Conductivity.
3. Contour Interval = 2 ppt for In-Phase Component.

Figure 4
Terrain Conductivity Survey
Area 2
Barretto Point Site
Bronx, New York

File 98D77 | December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

APPARENT CONDUCTIVITY — IN-PHASE COMPONENT



HORIZONTAL DIPOLE | VERTICAL DIPOLE | HORIZONTAL DIPOLE | VERTICAL DIPOLE

NOTES:

1. Data collected with EM-31.
2. Contour Interval = 20 mmho/m for Apparent Conductivity.
3. Contour Interval = 2 ppt for In-Phase Component.

LEGEND

× DATA STATION

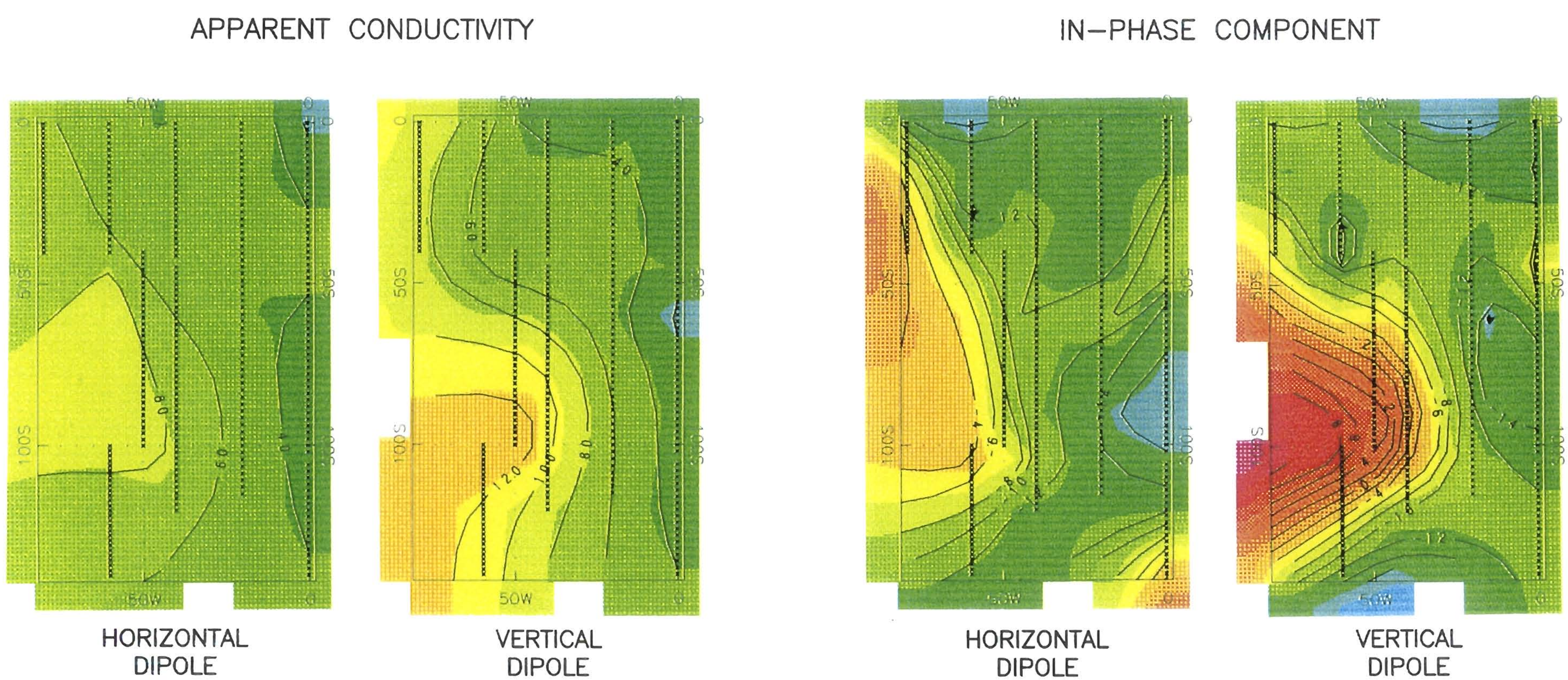
SCALE (feet)

0 50 100

Figure 5
Terrain Conductivity Survey
Area 3
Barretto Point Site
Bronx, New York

File 98D77 | December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire



NOTES:

1. Data collected with EM-31.
2. Contour Interval = 20 mmho/m for Apparent Conductivity.
3. Contour Interval = 2 ppt for In-Phase Component.

LEGEND

× DATA STATION

SCALE (feet)

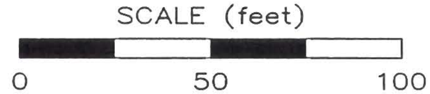


Figure 6
Terrain Conductivity Survey
Area 4
Barretto Point Site
Bronx, New York

File 98D77	December, 1999

HAGER-RICHTER GEOSCIENCE, INC.
Salem, New Hampshire

APPENDICES

APPENDIX
TERRAIN CONDUCTIVITY (EM) SURVEYS

Field Work. We used a Geonics EM31-DL Terrain Conductivity Meter for the survey. This unit is an induction type instrument and provides measurement of both the quadrature-phase and in-phase components of terrain conductivity without ground electrodes or contact. The data for both components are recorded on a digital data logger. The EM31-DL is calibrated to read ground conductivity directly in millimhos per meter with a resolution of 2% of full scale and an accuracy of 1 mmho/meter.

The EM31-DL has coils mounted with a fixed separation of 12 feet in a rigid boom. In normal operation, it is used with a vertical dipole, and the nominal depth of earth sampled by the EM31-DL is about 18 feet. In the horizontal dipole mode, the nominal depth of earth sampled by the EM31-DL is about 9 feet.

Two components of the induced magnetic field measured by the EM31-DL are recorded: (1) the quadrature-phase component and (2) the in-phase component. The quadrature-phase component is a measure of the average terrain conductivity of the subsurface materials located between the receiver and transmitter of the EM31-DL. The in-phase component is a sensitive indicator of the presence of conductive metal objects; however, the exact identification of the object cannot be determined from the terrain conductivity data alone.

Data Analysis and Interpretation. Terrain conductivity data are most commonly plotted in either profile format or as contour maps, depending on the density of the data. At sites free of metal objects and other cultural interference, the terrain conductivity measured at a particular location is controlled by the subsurface fluid. The instrument response is more affected by near-surface material than by deeper material, particularly horizontal dipole data. In cases where the terrain conductivity meter coil is directly over a buried metal target, the apparent conductivity reading may be a negative number.

Terrain conductivity surveys are commonly included in environmental investigations because they can be used to determine the lateral extent of disposal areas and/or landfills, to detect buried metal objects, and to detect the presence of conductive leachate plumes. Typically, terrain conductivity values measured in disposal areas are irregular and highly variable over short distances due to the heterogeneous materials in the subsurface. The edges of disposal areas can be determined, then, where there is a change to smoothly varying values of terrain conductivity. In areas of buried metal objects, terrain conductivity meters commonly yield apparently negative values. Leachate plumes are generally recognized on the basis of terrain conductivity data as relatively smoothly varying, but anomalously elevated, values compared to the background values for a given site.

Limitations of the Method. As with any of the electrical geophysical methods, terrain conductivity data are subject to interference from such cultural features as buildings, fencing, and underground and overhead power lines. Thus, for certain sensitive geologic applications, the use of the terrain conductivity method in urban settings might be inappropriate.

The usefulness of terrain conductivity soundings for delineating stratigraphic changes with depth is limited by the relatively small combination of coil separations and dipole orientations available with Geonics' equipment. The instruments were not designed for detailed vertical soundings but, according to the manufacturer's literature (Geonics Technical Note TN-8, rev. 1983), give the most accurate results where the earth can be approximated by a two-layer model. Models of the earth calculated from terrain conductivity data are non-unique; in most cases, multiple models can satisfy the observed data.

The terrain conductivity meter instrument response varies with the orientation of the dipoles. In the horizontal dipole mode (coils vertical and co-planar), the instrument is more sensitive to near-surface conductive layers than it is in the vertical dipole mode (coils horizontal and co-planar). In the horizontal dipole mode, the high sensitivity to near-surface conductivity might mask the effects of changes at depth.

APPENDIX
GROUND PENETRATING RADAR SURVEYS

Field Work. A Geophysical Survey Systems, Inc. Model SIR-2 ground penetrating radar system was used for this survey. The SIR-2 is a fully digital system and includes a color monitor, grey-scale thermal printer, and 10-Gbyte digital tape backup system. The transmit/receive antenna is housed in a box that is moved across the surface. The antenna transmits electromagnetic signals into the subsurface and then detects, amplifies, and displays reflections of the signals in real-time on the color monitor. The result is a radar record of the subsurface.

The maximum depth of penetration of the GPR signal and the resolution of the reflections are controlled in part by the frequency of the antenna used and in part by the electrical properties of the subsurface. Hager-Richter owns antennas with the following center frequencies: 120 MHz, 300 MHz, 500 MHz, and 1000 MHz. The total time during which radar signals are recorded can be varied from a few to 1,000 nanoseconds (nsec). However, there is a trade-off between total time, corresponding to depth range, and resolution. As the total time of recording is increased, the resolution of the GPR records decreases. For a given site, the total time window is set to detect features located somewhat below the maximum expected target depths.

Interpretation. The horizontal axis of a GPR record represents distance across the surface and the vertical axis represents round-trip travel time of the radar signal. The round-trip travel time can be converted to approximate depth by correlating with reflections from targets of known depth or by using handbook values of velocities for materials in the subsurface. For those sites where the subsurface is electrically heterogeneous, the travel times of the radar signal may be different in the various materials, and the vertical scale for the radar records is not necessarily uniform with depth.

The reflections in a GPR record are produced by spatial changes in the physical properties (e.g., type of material, subsurface fluids, porosity, etc.) and related changes in the electrical properties (dielectric constant) of the subsurface materials in the path of the signals. The greater the difference in electrical properties between two materials in the subsurface, the stronger the reflection observed in the GPR record.

The size, shape, and amplitude of the GPR reflections are the characteristics that are considered in the interpretation of the data from any site. Because the electrical properties of metal USTs, utilities, and conduits different significantly from those of the soils in which they are buried, such objects produce GPR reflections with high amplitude and distinctive shapes that permit identification with a high degree of reliability. Most other objects, although readily detectable, require "ground truth" for identification. Only excavations provide positive identification for most objects identified in GPR surveys.

For GPR profiles oriented perpendicular to the long axis of a tank, the signature is similar to a hyperbola, the shape of which is a function of the diameter and depth of burial of the tank. For GPR profiles oriented parallel to the long axis of a tank, the signature is a set of parallel, high amplitude reflections that terminate sharply at the ends of the tank. GPR, then, is useful for determining the exact location and dimensions of USTs.

Limitations of the Method. The maximum depth to which GPR signals can penetrate depends on the electrical properties of the subsurface materials. The higher the electrical conductivity of the subsurface materials, the lower the radar signal penetration. Clay minerals and/or brackish water in the subsurface, for example, attenuate the GPR signal, so reflections are not received from materials at greater depths.

There are limitations of the GPR technique as used to detect and/or locate particular targets: (1) surface conditions, (2) electrical conductivity of the ground, (3) contrast of the electrical conductivities of the targets and the ground, and (4) spacing between lines. Of these limitations, only the fourth, line spacing, is controlled by the operator.

The condition of the ground surface can affect the quality of the GPR data and the depth of penetration of the GPR signal. Sites covered with high grass, bushes, landscape structures, debris, obstacles, soil mounds, etc. limit the survey access and the coupling of the GPR antenna with the ground. In many cases, the GPR signal will not penetrate below concrete pavement, and a target may not be detectable.

The electrical conductivity of the ground determines the attenuation of the GPR signals, and thereby limits the maximum depth of exploration. The GPR signal does not penetrate clay-rich soils, and targets buried in clay can be missed.

A contrast in the electrical conductivities of the ground and the target is required to obtain a reflection of the GPR signal. If the contrast is too small, possibly due to extremely corroded conditions of a metal target, then the reflection may be too weak to recognize, and the target can be missed.

The spacing between lines is under control of the GPR operator, and the design of the survey is based on the dimensions of the smallest target of interest. Targets with dimensions smaller than the spacing between GPR survey lines can be missed.

Accurate determination of the depth to any interface requires calibration of the site specific GPR signal velocity. Where targets of a known depth are not available at a site, the time-to-depth conversion of the GPR signal can be estimated from handbook values, but such depth estimations might contain significant error.

Interpretation of GPR data is subjective. As noted above, "ground truth" through correlation with borings and excavations is required for positive identification of most objects detected on the basis of GPR data.