

DATE: October 5, 2006

TO: Terrence Johnson, U.S. EPA/ERTC Work Assignment Manager

THROUGH: Parry Bhambra, REAC Operations Section Manager

FROM: Scott Grossman, REAC Task Leader

SUBJECT: SABANA ABAJO INDUSTRIAL PARK SITE: PHASE II - SOURCE LOCATION IDENTIFICATION, WORK ASSIGNMENT 0-111 - TRIP REPORT

BACKGROUND AND OBJECTIVES

The Sabana Abajo Industrial Park Site (Site) is located in Carolina, Puerto Rico. The Site is bounded to the north by Avenue Iturregui, to the west by a section of the Suarez Canal (a lined canal), to the south by York Property and to the east by Calle B (Figure 1). The Site is located in an Industrial Park that includes a number of active manufacturing, pharmaceutical, storage, other commercial facilities, and the two potentially responsible party (PRP) facilities owned by Biovail and Gillette respectively. The park is built on poorly sorted fill underlain by clayey and silty alluvium. Chlorinated hydrocarbon contamination of over 300,000 micrograms per liter ($\mu\text{g/L}$) in groundwater and over 400,000 micrograms per kilogram ($\mu\text{g/kg}$) in soil persist in the shallow subsurface on the Gillette facility within the industrial park.

Response Engineering and Analytical Contract (REAC) personnel provided technical assistance to the Environmental Protection Agency (EPA) Region II On Scene Coordinator (OSC) at the request of the EPA/Environmental Response Team (EPA/ERT) during the subsurface assessment to identify the source of the chlorinated solvent contamination. This trip report summarizes the second phase of work performed at the Site; the first phase was conducted in January 2005 as summarized below (Lockheed Martin 2005).

The first phase of this investigation was conducted between January 10 and 22, 2005 (Lockheed Martin, 2005). During the first phase of this project, ERT/REAC personnel installed and sampled 55 temporary monitor wells across the industrial park. In addition to the temporary monitor wells, ten permanent monitor wells previously installed on the Gillette Property were also sampled. The groundwater analytical data indicated a dissolved chlorinated hydrocarbon plume on the Gillette and Biovail properties with the center of the plume between the Gillette and Biovail buildings. Dissolved tetrachloroethene (PCE) and trichloroethene (TCE) concentrations ranged up to 67,000 $\mu\text{g/L}$ and 93,000 $\mu\text{g/L}$, respectively.

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In addition to TCE, other breakdown products of PCE (1,1 dichloroethene [1,1-DCE], cis 1,2 dichloroethene [cis 1,2-DCE], trans 1,2 dichloroethene [trans 1,2-DCE], and vinyl chloride [VC]) were also identified in the groundwater samples. Based on the distribution of the dissolved chlorinated plume, it was inferred that the source of the contamination was between the Biovail and the Gillette buildings, but more likely on the Biovail property.

The primary objective of this second phase of this project, conducted between April 3 to 11, 2006, was to further delineate the source of contamination. To achieve this objective, a focused soil sampling effort was conducted in the alley between the Gillette and the Biovail buildings. The secondary objective of this project was to install permanent monitor wells at the soil boring locations on the Biovail Property to form a network with existing wells on the Gillette Property. This would provide a comprehensive and repeatable method for sampling groundwater from these properties and an assessment of groundwater elevations.

OBSERVATIONS AND ACTIVITIES

Soil Borings and Sampling.

A local contractor, GeoEnviroTech, Inc., hired by Weston Solutions Removal Support Team (RST) used direct push methodology to continuously collect soil samples from eleven soil borings (MW-34 to MW-41 and SB-41 to SB-44) on the Biovail and Gillette properties (Figure 2). Eight of the soil borings were located on the Biovail Property and three on the Gillette Property. The soil samples were collected in acetate sleeves in five-foot increments down to a depth of 15-foot below ground surface (bgs). Not all locations could be sampled to the maximum depth of 15-foot, because of refusal. Each soil core was described and screened for total volatile organic compounds (VOCs) using a photo-ionization detector (PID). The soil descriptions and PID readings were recorded in field logbooks (Appendix A). Core sections with elevated PID readings were sampled, by transferring the appropriate section of soil boring to a labeled glass jar. Eighteen soil samples were collected from eight of the eleven soil boring locations. No samples were collected at the MW-34, MW-35 and MW-36 locations as there were no elevated PID readings at these locations.

All soil samples were collected in accordance with the ERT/REAC SOP #2012, *Soil Sampling*. All soil samples were maintained and shipped on wet ice at a temperature of approximately 4 degrees Celsius (°C) under chain of custody procedures specified in REAC SOP #4005, *Chain of Custody Procedures*. Matrix spike/matrix spike duplicate (MS/MSD) samples, trip blanks, and field blanks were collected and analyzed as specified in ERT SOP #2005, *Quality Assurance/Quality Control Samples*. Samples were analyzed for VOCs at the REAC Laboratory in Edison, New Jersey (NJ). All laboratory data were validated by the REAC data validation group and the final analytical results are contained in summary tables and in the Final Analytical Report (Appendix A). Split soil samples were provided to the respective PRP's contractor at their request.

Monitor Well Installation and Sampling.

Eight of the soil borings (MW-34 to MW-41) were converted to two-inch diameter monitor wells (Figure 2). All newly installed wells were constructed to a depth of 15 feet bgs with the bottom 10 feet of the well consisting of 10 slot PVC screen (Figure 3). Seven of the new monitor wells were installed on the

Biovail Property and one of the new monitor wells was installed on the Gillette property. After the wells were installed, an initial round of sampling and water table elevation measurements were completed.

After a minimum of 24 hours after installation, GeoEnviroTech, following their internal procedures developed all the newly installed monitor wells. After development, all wells were given a minimum of 24-hours to recover before they were purged and sampled by ERT/REAC personnel. All monitor wells were purged a minimum of three well volumes of water or until they were dry. Wells that were purged dry were given time to recover prior to sampling. All wells were sampled within 12 hours after purging, with most wells being sampled within less than one hour after purging. Sampling was performed using peristaltic pumps and dedicated Teflon[®] tubing. The pump flow rate was set as low as possible to avoid aeration of the sample. Samples were collected directly into labeled 40-milliliter (mL) glass volatile organic analysis (VOA) vials.

All groundwater sampling was conducted in accordance with REAC SOP #2007, *Groundwater Sampling*. All samples were maintained and shipped on wet ice at a temperature of approximately 4 ° C under chain of custody procedures specified in REAC SOP #4005, *Chain of Custody Procedures*. Trip blanks, field blanks and MS/MSD samples were collected and analyzed as specified in ERT SOP #2005, *Quality Assurance/Quality Control Samples*. Field logbook notes are contained in Appendix A. Groundwater samples were analyzed for VOCs at the REAC Laboratory in Edison, NJ. All laboratory data were validated by the REAC data validation group and the final analytical results are contained in summary tables and in the Final Analytical Report (Appendix A). Split soil samples were provided to the respective PRP's contractor at their request.

Monitor Well and Groundwater Elevation Survey.

All monitor wells (new and previously installed) were surveyed using a differential Global Positioning System (dGPS) and an automatic level. A Trimble PRO XRS dGPS was used to obtain the horizontal position for all soil boring and monitor well locations. Elevations from the top of casings (TOC) for all monitor wells and ground elevations were surveyed using a Topcon Automatic Level (Appendix A). Two points in the Suarez Canal, one located near the midpoint of the back of the Biovail property (Canal1) and one near the midpoint of the back of the property of Gillette (Canal2), were also surveyed and stream staff gages were installed at these locations. An arbitrary elevation of 100.98 feet was assigned to a benchmark (STA 5, Jorge Diaz & Assoc., Land Surveyors) on the Biovail property and all features were surveyed relative to this benchmark. Maximum loop misclosure for each survey was less than 0.01 foot.

A groundwater interface probe was used to measure the depth to groundwater from the TOC in all new and existing monitor wells. Two sets of groundwater level measurements were collected, one on April 8, 2006 and a second set on April 11, 2006. The groundwater elevations collected on April 11, 2006 contained a complete set of data; however, two wells on the Gillette property were not accessible for the April 8, 2006 survey.

RESULTS AND DISCUSSION

Monitor Well and Groundwater Elevation Survey

Table 1 summarizes the results of the monitor well and groundwater elevation survey. Figure 4 shows groundwater elevation contours developed from the interpolated groundwater elevation data for April 11,

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2006 as given in Table 1. Groundwater appears to flow from the Biovail and Gillette properties in generally a westerly direction towards the Suarez Canal. Groundwater elevations on April 11, 2006 ranged from 97.8 feet on the eastern side of the site at MW-6 to 95.7 feet on the western side of the site at MW-21 near the Suarez Canal. Water levels in the canal were lower than the top of the water table indicating that groundwater is likely entering the canal from the site.

Soil Investigation

Table 2 summarizes the PID field screening and analytical results for the VOCs detected in the soil samples. The field screening PID data is contained in the field logbook notes (Appendix A) and the laboratory data is contained in the Final Analytical Report (Appendix B).

The primary compounds detected in the soil samples were PCE, TCE, cis 1,2-DCE and VC. The compound with the highest concentration was PCE (2,620,000 $\mu\text{g}/\text{kg}$) followed by cis 1,2-DCE (62,700 $\mu\text{g}/\text{kg}$) and TCE (31,100 $\mu\text{g}/\text{kg}$) and VC (6,960 $\mu\text{g}/\text{kg}$). Several other VOCs (acetone, 1,1-dichloroethene, methylene chloride and trans-1,2-dichloroethene) were detected in limited soil samples and at relatively low concentrations (219 $\mu\text{g}/\text{kg}$ or less).

Figure 5 plots the concentrations of total chlorinated compounds detected in soil samples. The highest soil concentration (2,700,00 $\mu\text{g}/\text{kg}$) for total chlorinated compounds was found on the Biovail property at MW-39 at a depth of 6.5 to 7.0 feet. The total chlorinated compounds in this sample consisted primarily of PCE (97.9%) with lesser concentrations of TCE (1.2%) and cis 1,2-DCE (0.9%). Total chlorinated compound concentrations in this sample was more than an order of magnitude higher than in any soil boring sample collected during this investigation. In fact, the three highest concentrations of chlorinated compounds in soil were found at MW-39.

On the Gillette property, the highest soil concentration of chlorinated compounds was found at MW-41 at a depth of 8.5 to 9.0 feet. This concentration is an order of magnitude lower than the highest concentration observed at MW-39, which is located on the Biovail property about 10 feet to the south of MW-41. Also, the highest concentration of chlorinated compounds at MW-41 is found at a greater depth than the highest concentration of chlorinated compounds at MW-39. This trend in concentration and depth indicate that the source area is near or upgradient of MW-39 on the Biovail property.

The total chlorinated hydrocarbon concentration in soil collected from MW-39 at the 15-foot depth was 260,000 $\mu\text{g}/\text{kg}$. Based on this, it appears that the contamination may also extend below the maximum depth sampled during this investigation.

The high concentrations of volatile organic compounds detected in the soil samples indicate that residual dense nonaqueous phase liquid (DNAPL) is likely present at the source in the shallow subsurface (less than 6.5 feet bgs). The sharp drop in soil concentrations of chlorinated compounds from the highs in soil borings proximal to MW-39 (i.e., soil borings MW-41, MW-42, MW-43 and MW-44) suggests a point source of limited area. Also, it appears that the source is limited to the area between north of the Biovail Building and south of the perimeter fence dividing the two properties; based on the relatively low concentrations of chlorinated compounds detected in samples collected at SB-44 (to the south) and MW-41, MW-42, and MW-43 (to the north). The extent of the source to the east and west, although slightly less defined, is constrained by the data from soil borings collected at MW-40 (to the east) and MW-38 (to the west).

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Groundwater Investigation

Table 3 summarizes the analytical results for the VOCs detected in the groundwater samples. All analytical methods and results are contained in the Final Analytical Report (Appendix B). As with the soil samples, the primary compounds detected in the groundwater were PCE, TCE, cis 1,2-DCE, and VC. The groundwater sample collected at MW-41 on the Gillette property had the highest concentration of dissolved total chlorinated hydrocarbons (470,000 µg/L) and also the highest concentrations of cis 1,2-DCE (323,000 µg/L) and TCE (42,900 µg/L). The groundwater sample with the highest PCE (88,900 µg/L) and VC (42,700 µg/L) concentrations was collected on the Gillette property at location MW-06. Other chlorinated compounds detected in the groundwater samples included 1,1, DCE, 1,1-dichloroethane (1,1-DCA), chlorobenzene, and 1,2-dichlorobenzene (1,2-DCB). These contaminants were only detected in three of the groundwater samples and were detected at relatively low concentrations (14 µg/kg or less).

As specified in the Final Analytical Report (Appendix B), PCE was detected in a trip blank collected on 8 April 2006 and in a method blank (041206-1) analyzed on 12 April 2006. Due to the PCE contamination in these blank samples, the results for samples 19450 through 19455 and 19664 were reported as non detect and the PCE reporting limits (RL) were raised for these samples. It should be therefore noted that PCE concentrations up to RL may exist at these locations, but were reported as non detect in the Final Analytical Report. Locations impacted by this included MW-2 (RL = 15,100 µg/L), MW-2 Dup (RL = 15,400 µg/L), and MW-17 (RL = 5,310 µg/L).

Figures 6 through 8 are color contour maps of dissolved total chlorinated compounds, PCE and TCE concentrations in groundwater. The maps were developed from the concentration data in Table 3 using Spatial Analyst module in ERSI® ArcMap™ Version 9.0. The concentration used for MW-39 is the arithmetic mean of the MW-39 sample and its duplicate.

In all three figures, the general shape and orientation of the contaminant plumes are similar. The contaminant plumes appear to be moving from the Biovail to the Gillette property with an elongate trend towards the Suarez Canal, likely caused due to the prevailing groundwater flow direction. The highest dissolved VOC concentrations are generally confined to an area between MW-17/MW-2 to the west and MW-40 to the east. All locations outside this area to the north, south and west had total chlorinated compound concentration at or below 130 µg/kg, PCE concentrations at or below 48 µg/kg and TCE concentrations at or below 19.6 µg/kg. The relatively low level of VOCs detected at sample locations between the plume and the Suarez Canal either indicate a very confined plume or possibly the wells were not deep enough to intercept the plume.

CONCLUSIONS AND RECOMMENDATIONS.

Based on the results of this investigation, it appears that primarily a PCE residual DNAPL source exists in the shallow subsurface on the Biovail Property near or upgradient of MW-39. A dissolved chlorinated hydrocarbon plume emanates from this source to the shallow groundwater. The dissolved plume has migrated onto the Gillette Property with a northwesterly orientation towards the Suarez Canal. The residual DNAPL, if not remediated, will continue to act as a source for dissolved chlorinated hydrocarbons in the groundwater for a very long time. The DNAPL source appears to be point source and does not appear to extend beneath the Biovail Building (based on results from SB-44).

Additional monitor wells should be installed at a greater depth between the plume and the Suarez Canal to confirm that the contamination is confined to the areas shown on Figures 6 through 8 and the plume is not just passing below the 15-foot deep monitor wells (MW-21, MW-36, and MW-35) previously installed in this area. If contaminants are not detected in these additional wells, the source would then not extend much beyond the 15-foot depth (near or upgradient of MW-39), and groundwater can be excluded from remedial actions. Excavation would be then be an attractive remedy to address the VOC contamination on the Biovail and Gillette properties.

Additional monitoring of water levels and sampling of groundwater in the monitor well network is recommended to verify the results obtained during this mobilization and evaluate seasonal trends. Additionally, soil sampling in the vicinity of MW-39 is recommended to determine the horizontal and vertical extent of contamination. This could be done during the remedy phase or excavation with field screening techniques.

REFERENCE

Lockheed Martin REAC, 2005. Trip Report, Sabana Abajo Industrial Park PCE Site: Source Location Identification, Work Assignment 0-0111. Prepared for U.S. EPA/Environmental Response Team (U.S. EPA/ERT). Submitted by Lockheed Martin, Response Engineering and Analytical Contract (REAC). November 2005.

APPENDIX A
Field Log Book Notes
Sabana Abajo Industrial Park Site
Trip Report
October 2006

APPENDIX B
Final Analytical Report
Sabana Abajo Industrial Park Site
Trip Report
October 2006

Table 1
Automatic Level and GPS Survey Data
Sabana Abajo Site
Carolina, PR
September 2006

Location	Well Type	Property	Universal Transverse Mercator NAD 1983 Zone 20N (meters)		TOC Elevation (feet)	Ground Elevation (feet)	Total Depth April 2006 (feet)	Depth to Water* 8 April 2006 (feet)	Depth to Water* 11 April 2006 (feet)	Water Elevation 8 April 2006 (feet)	Water Elevation 11 April 2006 (feet)
			X	Y							
MW-02	Monitor Well	Gillette	184,050.0	2,039,381.9	101.20	101.25	14.78	5.24	5.36	95.96	95.84
MW-03	Monitor Well	Gillette	184,061.9	2,039,384.6	101.75	101.97	14.84	4.7	5.68	97.05	96.07
MW-05	Monitor Well	Gillette	184,086.0	2,039,389.7	102.16	102.23	14.62	5.84	5.61	96.32	96.55
MW-06	Monitor Well	Gillette	184,097.7	2,039,392.4	102.12	102.23	12.3	3.76	4.31	98.36	97.81
MW-16	Monitor Well	Gillette	184,094.0	2,039,404.0	102.38	102.52	12.88	NA	5.84	NA	96.54
MW-17	Monitor Well	Gillette	184,046.3	2,039,397.9	101.51	101.54	14.71	5.54	5.69	95.97	95.82
MW-21	Monitor Well	Gillette	184,034.7	2,039,402.3	100.84	100.96	11.89	3.83	5.15	97.01	95.69
MW-29	Monitor Well	Gillette	184,095.0	2,039,431.0	102.57	102.68	14.67	NA	5.33	NA	97.24
MW-30	Monitor Well	Gillette	184,028.3	2,039,420.6	100.33	100.53	10.83	4.1	4.4	96.23	95.93
MW-33	Monitor Well	Gillette	184,062.5	2,039,430.1	102.39	102.57	14.2	5.24	5.35	97.15	97.04
MW-34	Monitor Well	Biovail	184,074.1	2,039,346.9	100.74	100.95	14.82	4.21	4.32	96.53	96.42
MW-35	Monitor Well	Biovail	184,049.1	2,039,366.6	100.63	101.01	15.05	4.54	4.63	96.09	96.00
MW-36	Monitor Well	Biovail	184,042.0	2,039,373.3	100.51	100.74	15.08	4.57	4.67	95.94	95.84
MW-37	Monitor Well	Biovail	184,055.2	2,039,378.4	101.39	101.65	15.51	5.34	5.43	96.05	95.96
MW-38	Monitor Well	Biovail	184,078.5	2,039,385.9	102.05	102.36	15.18	5.74	5.83	96.31	96.22
MW-39	Monitor Well	Biovail	184,090.7	2,039,388.7	102.51	102.91	15.04	3.02	4.88	99.49	97.63
MW-40	Monitor Well	Biovail	184,106.8	2,039,391.7	103.30	103.73	14.88	7.66	6.11	95.64	97.19
MW-41	Monitor Well	Gillette	184,090.2	2,039,390.7	101.90	102.21	14.68	5.94	5.26	95.96	96.64
SB-42	Soil Boring	Gillette	184,087.7	2,039,393.4	-	-	-	-	-	-	-
SB-43	Soil Boring	Gillette	184,090.0	2,039,392.6	-	-	-	-	-	-	-
SB-44	Soil Boring	Biovail	184,088.9	2,039,386.0	-	-	-	-	-	-	-
Canal1	Water Level	Canal	-	-	-	95.38	-	-	-	95.38	-
Canal2	Water Level	Canal	-	-	-	95.34	-	-	-	95.34	-

TOC - Top of Casing

*Depth to Water = Depth to Water from Top of Casing

Table 2
 Summary of Volatile Organic Compounds in Soil Boring Samples
 Sabana Abajo Site
 Carolina, PR
 September 2006

(all laboratory concentrations in µg/kg)

Sample Location	Sample Number	Field Screening*	Total Chlorinated	Trichloroethene	Tetrachloroethene	cis-1,2-Dichloroethene	Vinyl Chloride
MW-37 13' to 13.5'	19426	7,000	2,900	748	1,580	388 J	ND
MW-38 4.5' to 5'	19428	3,200	720	ND	ND	ND	584
MW-38 7.5' to 8'	19429	21,700	35,000	6,950	18,000	9,820	ND
MW-38 9.5' to 10'	19430	29,000	9,400	2,790	1,500	5,080	ND
MW-38 13.5' to 14'	19431	5,900	22,000	6,290	5,610	9,660	319 J
MW-39 4.5' to 5'	19432	12,500	30,000	6,430	986	21,400	947
MW-39 6.5' to 7'	19433	120,000	2,700,000	31,100 J	2,620,000	24,100 J	ND
MW-39 9.5' to 10'	19434	120,000	600,000	ND	571,000	28,800 J	ND
MW-39 14.5'-15'	19435	47,000	260,000	6,250 J	185,000	62,700	6,960 J
MW-40 14.5'-15'	19438	500	870	97	422	125	166
MW-41 6.5' to 7'	19441	275,000	8,700	543 J	4,330	3,850	ND
MW-41 8.5' to 9'	19442	182,000	180,000	ND	175,000	ND	ND
MW-41 11.5' to 12'	19443	156,000	10,000	1,500	2,200	6,320	ND
MW-41 12.5' to 13'	19444	205,000	23,000	3,140	957	19,100	ND
MW-42 14.5' to 15'	19445	47,200	7,700	1,450	2,090	3,680	445
MW-43 9.5' to 10'	19446	37,100	400	43	26 J	222	113
MW-43 11.5' to 12'	19447	50,200	520	75	96	195	149
SB-44 11' to 12'	19461	2,400	3,000	445	1,100	637	761

ND - Not Detected at Concentration above the Reporting Limit

J - Estimated Value

*Field Screening concentration as determined by PID in parts per million (ppm)

Table 2 (Continued)
 Summary of Volatile Organic Compounds in Soil Boring Samples
 Sabana Abajo Site
 Carolina, PR
 September 2006

(all laboratory concentrations in µg/kg)

Sample Location	Sample Number	Acetone	1,1-Dichloroethene	Methylene Chloride	trans-1,2-Dichloroethene
MW-37 13' to 13.5'	19426	ND	ND	210 J	ND
MW-38 4.5' to 5'	19428	137 J	ND	ND	ND
MW-38 7.5' to 8'	19429	ND	ND	ND	ND
MW-38 9.5' to 10'	19430	ND	ND	ND	ND
MW-38 13.5' to 14'	19431	66 J	20 J	219 J	60 J
MW-39 4.5' to 5'	19432	ND	ND	195 J	ND
MW-39 6.5' to 7'	19433	ND	ND	ND	ND
MW-39 9.5' to 10'	19434	ND	ND	ND	ND
MW-39 14.5'-15'	19435	ND	ND	ND	ND
MW-40 14.5'-15'	19438	59 J	ND	ND	ND
MW-41 6.5' to 7'	19441	ND	ND	ND	ND
MW-41 8.5' to 9'	19442	ND	ND	ND	ND
MW-41 11.5' to 12'	19443	ND	ND	ND	ND
MW-41 12.5' to 13'	19444	ND	ND	ND	ND
MW-42 14.5' to 15'	19445	ND	ND	ND	ND
MW-43 9.5' to 10'	19446	ND	ND	ND	ND
MW-43 11.5' to 12'	19447	8.6 J	ND	ND	ND
SB-44 11' to 12'	19461	37 J	ND J	ND	ND

ND - Not Detected at Concentration above the Reporting Limit

J - Estimated Value

Table 3
 Summary of Volatile Organic Compounds in Groundwater Samples
 Sabana Abajo Site
 Carolina, PR
 September 2006

(all concentrations in µg/L)

Sample Location	Sample Number	Total Chlorinated	Trichloroethene	Tetrachloroethene	cis-1,2-Dichloroethene	Vinyl Chloride
MW-02	19454	4,700	3,480	ND	1,260 J	ND
MW-02 (Dup)	19455	4,500	3,350	ND	1,130 J	ND
MW-03	19456	3,100	1,110	764	1,090	169
MW-05	19457	43,000	1,570	6,950	30,200	3,780
MW-06	19460	220,000	8,130	88,900	82,500	42,700
MW-16	19475	17,000	3,280	8,410	3,560	1,790
MW-17	19453	26,000	5,950	ND	17,400	2,750
MW-21	19452	85	4.1 J	ND	79	2.6 J
MW-29	19474	ND	ND	ND	ND	ND
MW-30	19451	ND	ND	ND	ND	ND
MW-33	19450	4.2	4.21 J	ND	ND	ND
MW-34	19462	130	20	48	28	23
MW-35	19463	55	5.5	ND	10	7.9
MW-36	19464	8.8	ND	ND	2.0 J	2.2 J
MW-37	19465	20,000	4,000	14,400	1,530 J	ND
MW-38	19466	110,000	34,200	35,900	32,800	3,900 J
MW-39	19470	200,000	10,900	67,300	100,000	19,200
MW-39 (Dup)	19471	160,000	7,890 J	56,700	80,900	10,500
MW-40	19472	10,000	1,210	7,010	1,550	276 J
MW-41	19473	470,000	42,900	68,600	323,000	33,000

ND - Not Detected at Concentration above the Reporting Limit

J - Estimated Value

Table 3 (Continued)
 Summary of Volatile Organic Compounds in Groundwater Samples
 Sabana Abajo Site
 Carolina, PR
 September 2006

(all concentrations in µg/L)

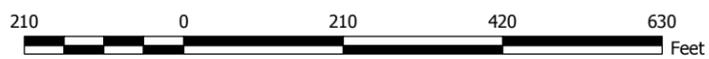
Sample Location	Sample Number	1,1-Dichloroethene	1,1-Dichloroethane	Chlorobenzene	1,2-Dichlorobenzene
MW-02	19454	ND	ND	ND	ND
MW-02 (Dup)	19455	ND	ND	ND	ND
MW-03	19456	ND	ND	ND	ND
MW-05	19457	ND	ND	ND	ND
MW-06	19460	ND	ND	ND	ND
MW-16	19475	ND	ND	ND	ND
MW-17	19453	ND	ND	ND	ND
MW-21	19452	ND	ND	ND	ND
MW-29	19474	ND	ND	ND	ND
MW-30	19451	ND	ND	ND	ND
MW-33	19450	ND	ND	ND	ND
MW-34	19462	ND	ND	10	4.6 J
MW-35	19463	12	14	3.4 J	1.3 J
MW-36	19464	2.7 J	2.0 J	ND	ND
MW-37	19465	ND	ND	ND	ND
MW-38	19466	ND	ND	ND	ND
MW-39	19470	ND	ND	ND	ND
MW-39 (Dup)	19471	ND	ND	ND	ND
MW-40	19472	ND	ND	ND	ND
MW-41	19473	ND	ND	ND	ND

ND - Not Detected at Concentration above the Reporting Limit

J - Estimated Value

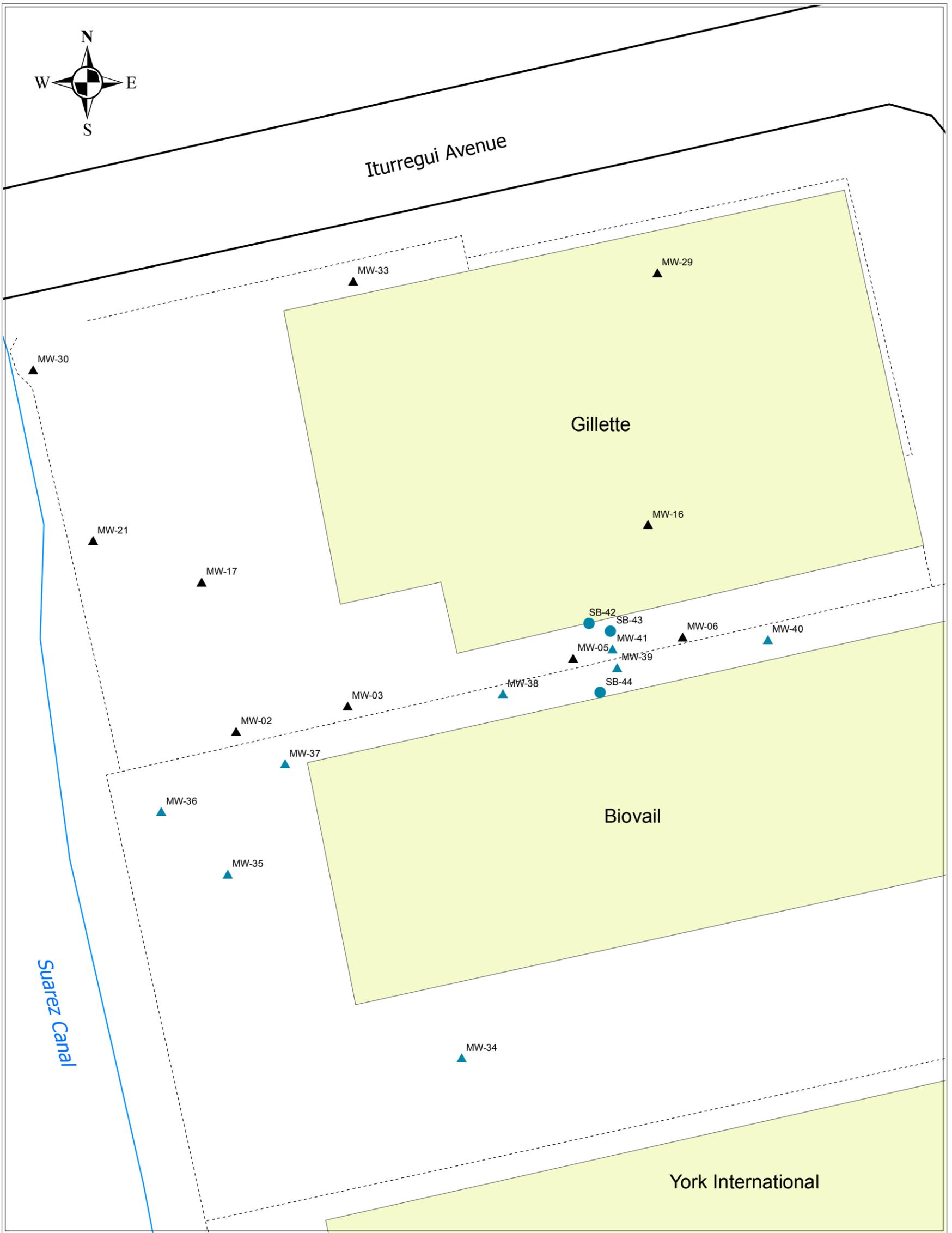


Map Creation Date: 7 March 2005
 Revised: 14 July 2005
 Coordinate metadata: Universal
 Transverse Mercator Zone 20N
 1983 North American Datum

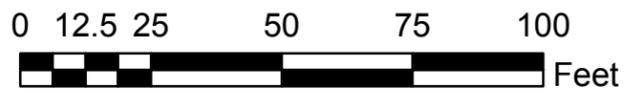
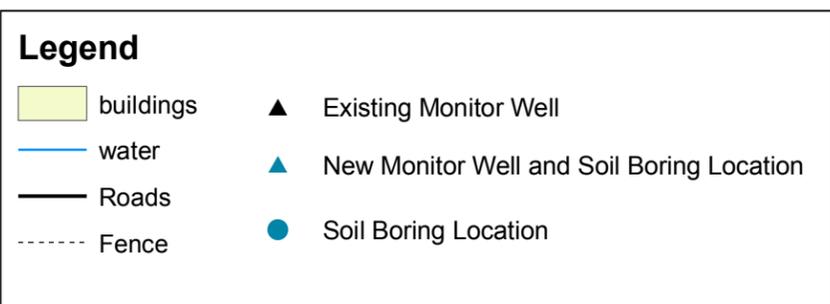


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 EP-C-04-032
 WO # EAC00111

Figure 1
 Site Location Map
 Sabana Abajo PCE Site
 Carolina, PR
 October 2006



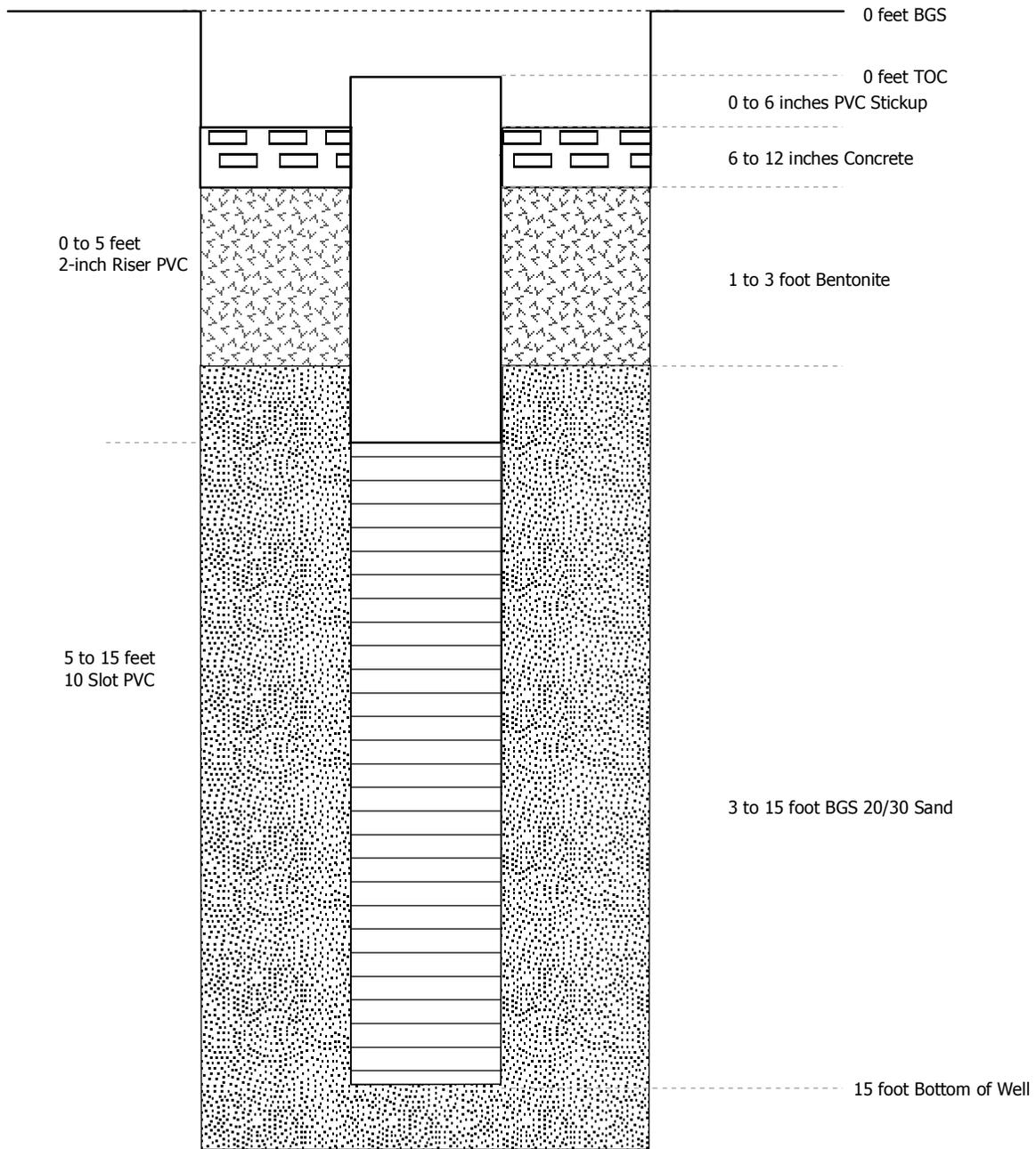
Map Creation Date: 12 May 2006
 Revised: 15 May 2006
 Coordinate metadata: Universal
 Transverse Mercator Zone 20N
 1983 North American Datum



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 WA # 0-111

Figure 2
 Sample Location Map
 Sabana Abajo Industrial Park
 Carolina, Puerto Rico
 October 2006

General Well Construction



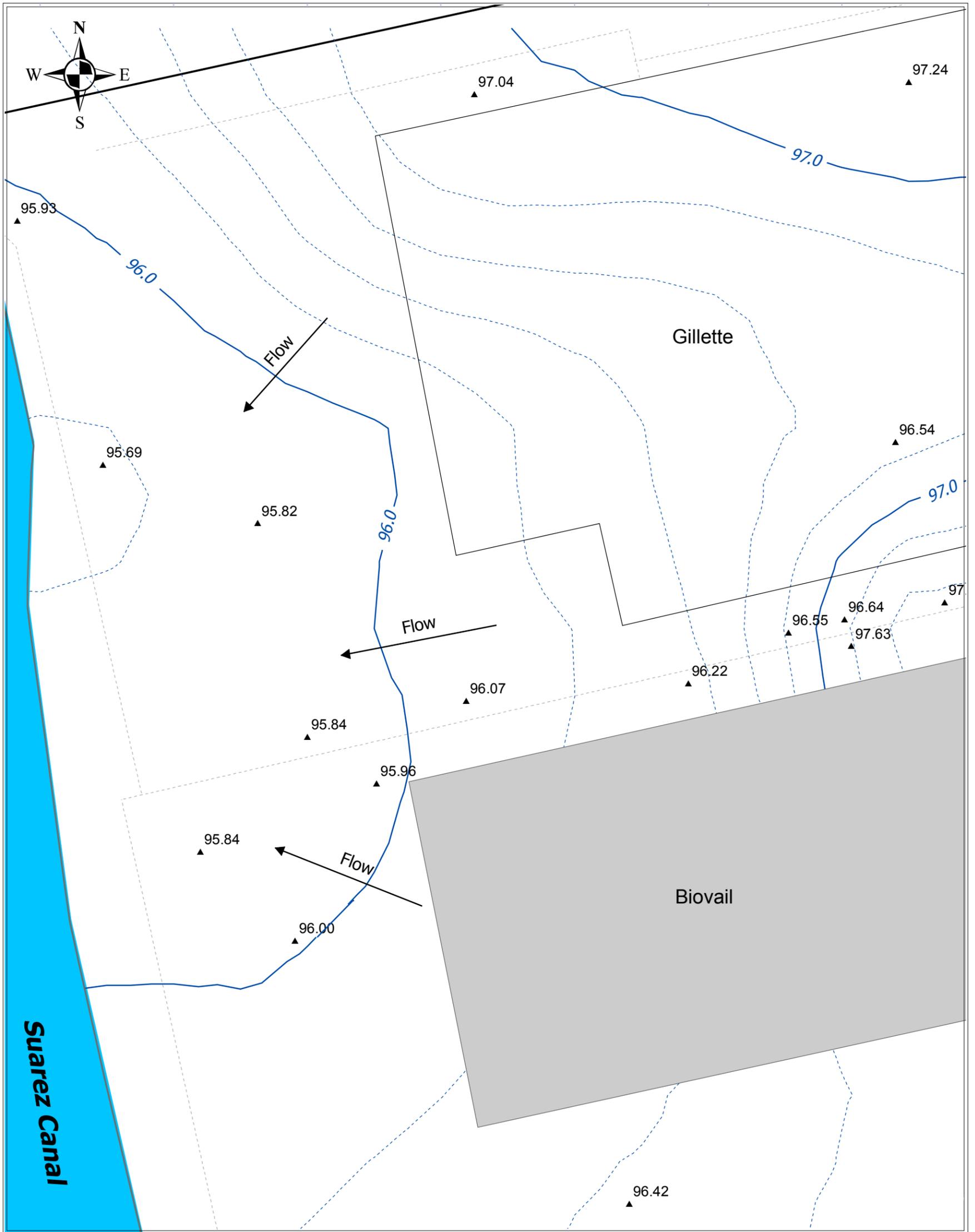
Legend

-  Concrete
-  Bentonite
-  20/30 Sand

Wells constructed by: GeoTech Environmental, April 2006
Flush Mount Wellhead Protector

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Figure 3
General Well Construction
Sabana Abajo Industrial Park
Carolina, Puerto Rico
October 2006



Map Creation Date: 12 May 2006
 Revised: 21 August 2006
 Coordinate metadata: Universal
 Transverse Mercator Zone 20N
 1983 North American Datum

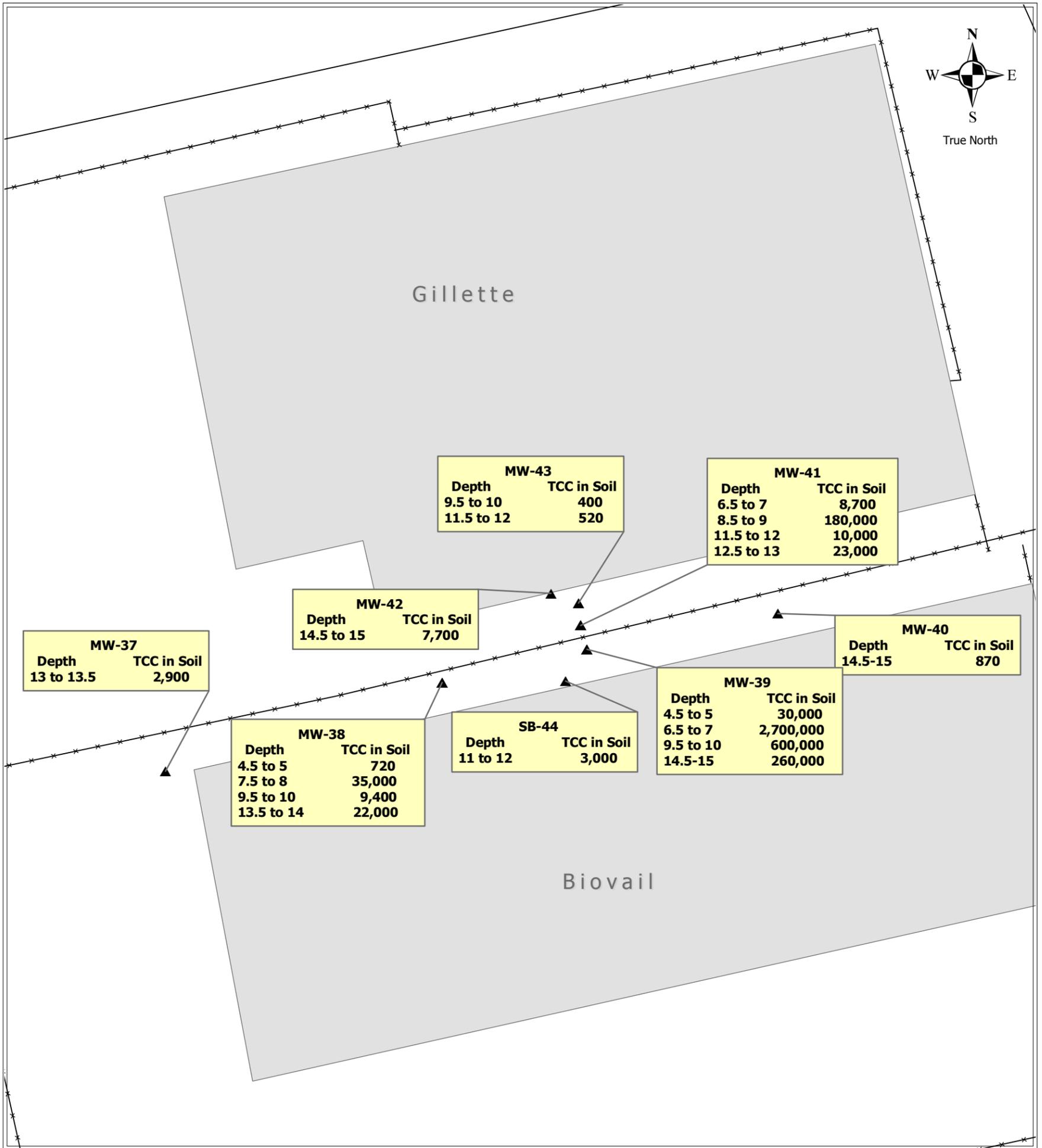
Legend

- 97.0 Groundwater Elevation, Major Contour (feet)
 - - - - - Groundwater Elevation, Minor Contour
 - Surface Water
 - ▲ 96.54 Monitor Well with Water Elevation (feet)
- Groundwater Elevations 4-11-2006
 Contour Interval 0.2 feet



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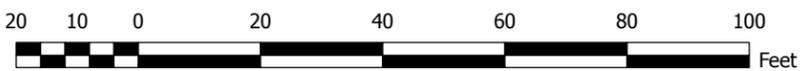
Figure 4
 Groundwater Elevation Map
 Sabana Abajo Industrial Park
 Carolina, Puerto Rico
 October 2006



Map created using site survey GPS and USGS DOQQ. GPS collected in Lat., Lon., Decimal Degrees, WGS84

Map Creation Date: 18August2006

Coordinate system: UTM
 Zone: 20N
 Units: Meters
 Datum: NAD83



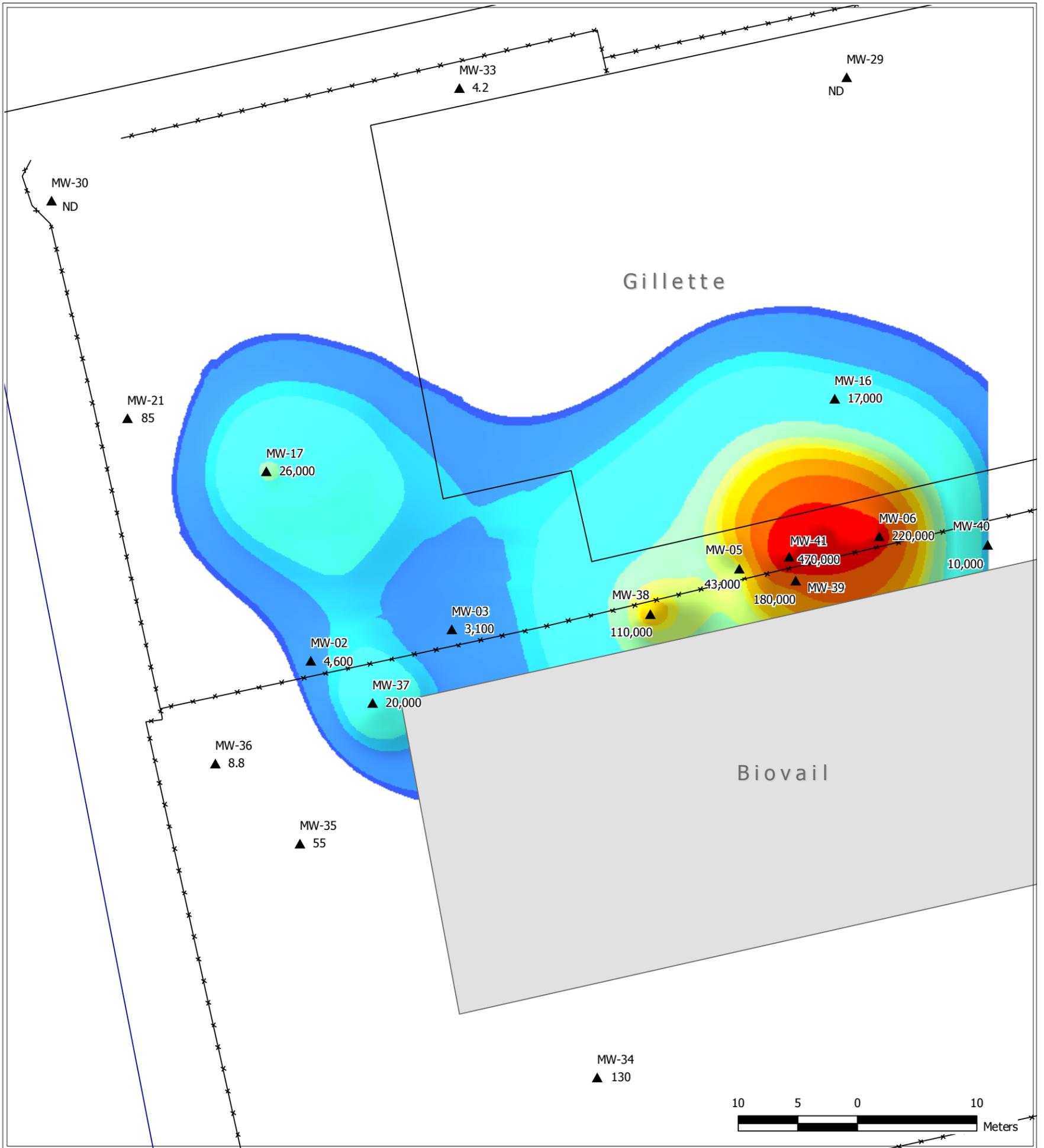
Legend:

- ▲ Sample Location
- ⋈ Fenceline

Notes:

TCC - Total Chlorinated Compounds
 Depth in Feet Below Ground Surface (BGS)
 Concentrations in micrograms per kilogram (µg/kg)

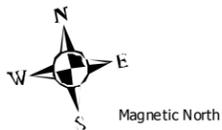




Map created using site survey GPS and USGS DOQQ. GPS collected in Lat., Lon., Decimal Degrees, WGS84

Map Creation Date: 18August2006

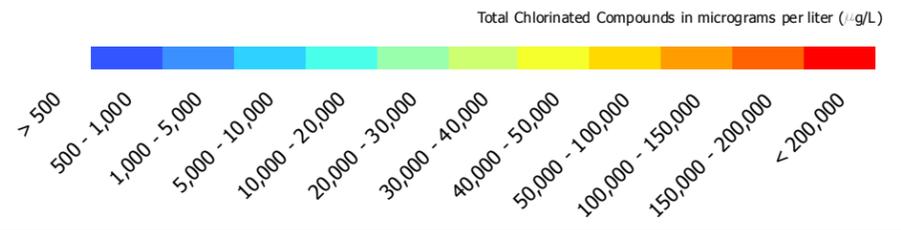
Coordinate system: UTM
 Zone: 20N
 Units: Meters
 Datum: NAD83



Legend

- ▲ Sample Location
- Fenceline

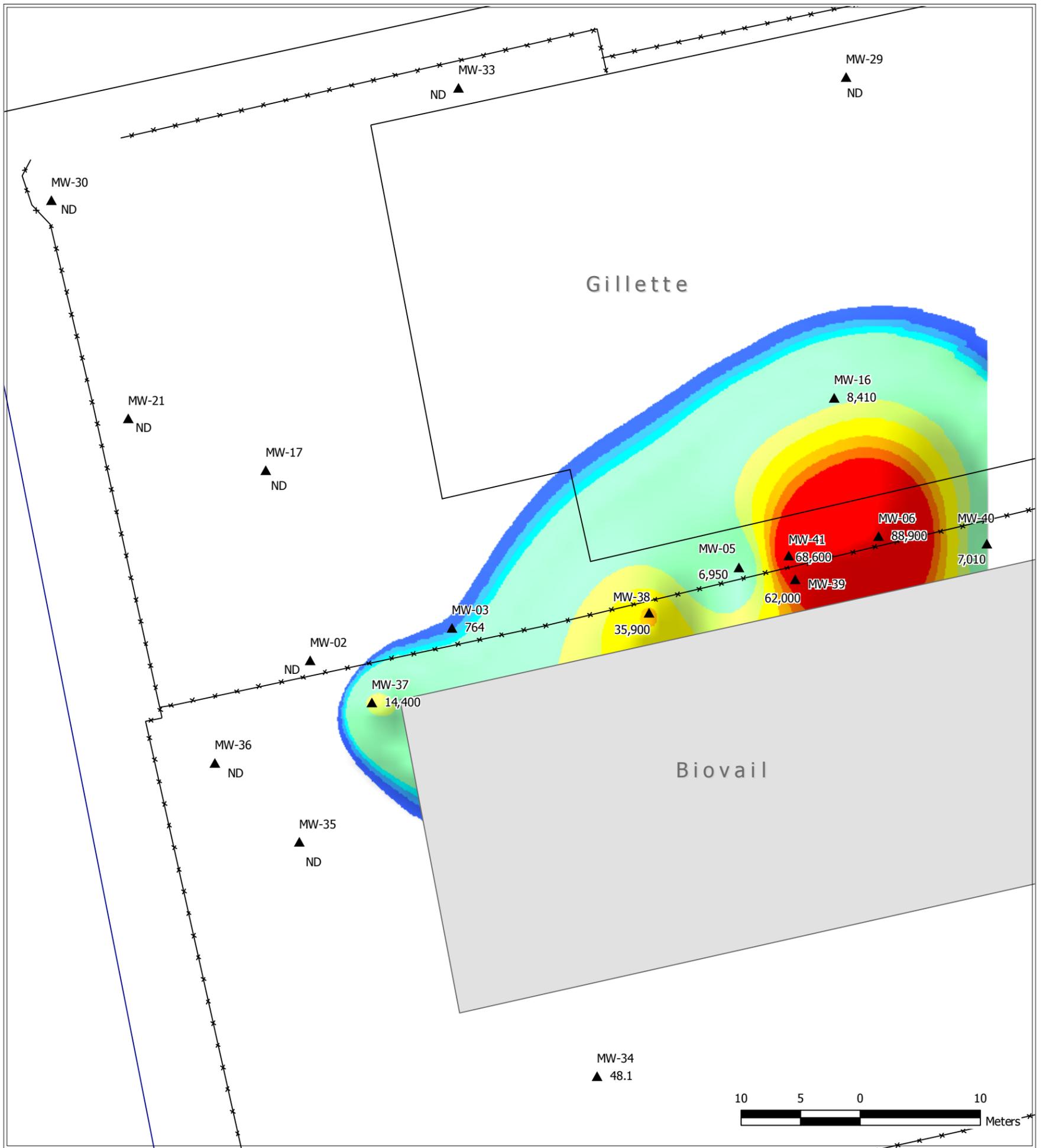
Total Chlorinated Compounds in Groundwater



Data: g:\arcviewprojects\reac4\00-111
 MXD file: g:\arcinfo\projects\reac4\EAC00111_SabanaAbajo\111_tcingroundwater_f6rev002
 Revision Number: 002

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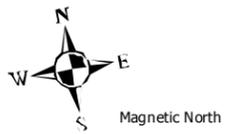
Figure 6
 Total Chlorinated Compounds
 in Groundwater
 Sabana Abajo
 Industrial Park
 Carolina Co., PR
 April 2006



Map created using site survey GPS and USGS DOQQ. GPS collected in Lat., Lon., Decimal Degrees, WGS84

Map Creation Date: 18August2006

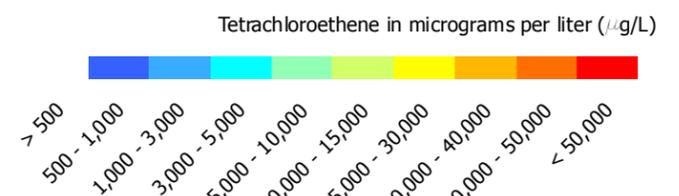
Coordinate system: UTM
 Zone: 20N
 Units: Meters
 Datum: NAD83



Legend

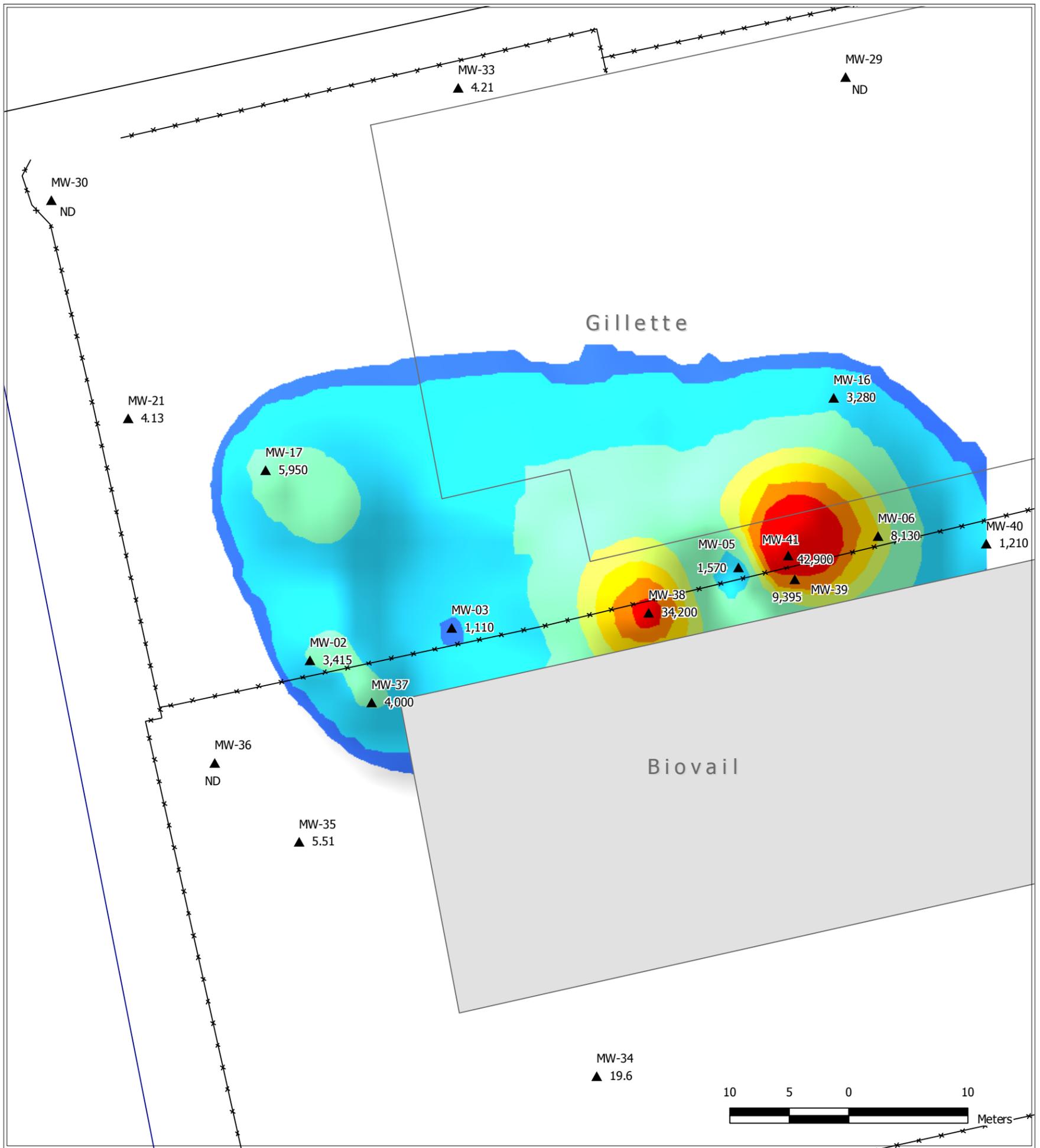
- ▲ Sample Location
- x-x- Fenceline

Tetrachloroethene in Groundwater



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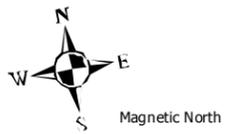
Figure 7
 Tetrachloroethene in Groundwater
 Sabana Abajo
 Industrial Park
 Carolina Co., PR
 April 2006



Map created using site survey GPS and USGS DOQQ. GPS collected in Lat., Lon., Decimal Degrees, WGS84

Map Creation Date: 18August2006

Coordinate system: UTM
 Zone: 20N
 Units: Meters
 Datum: NAD83



Legend

- ▲ Sample Location
- x-x- Fenceline

Trichloroethene in Groundwater

