# FOCUSED CORRECTIVE MEASURES STUDY WORK PLAN

CARIBE GENERAL ELECTRIC DISTRIBUTION TRANSFORMERS, INC
VIEQUES, PUERTO RICO

*Prepared for:*

General Electric Corporation
GE Corporate Environmental Programs
640 Freedom Business Center
King of Prussia, PA 19406

*For submittal to:*

United States Environmental Protection Agency
Caribbean Environmental Protection Division
City View Plaza, Suite 7000
#48 165 RD. KM 1.2
Guaynabo, PR 00968-8069

*Prepared by:*

Tetra Tech GEO, Inc.
21335 Signal Hill Plaza
Sterling, Virginia 20164

August 17, 2012

## TABLE OF CONTENTS

# LIST OF TABLES

**Page**

## LIST OF FIGURES

**Page**

# 1.0 INTRODUCTION

This workplan, prepared by Tetra Tech GEO, Inc. (GEO) for submittal to the United States Environmental Protection Agency, Caribbean Environmental Protection Division (EPA) on behalf of General Electric Caribe (GE Caribe), presents the scope of work for the Focused Corrective Measures Study (CMS) Workplan for the chlorinated volatile organic compounds (CVOCs) in groundwater at the GE Caribe Site (the Site) located at the intersection of Rd 200 and Rd 201 in town of Isabel Segunda, Vieques, Puerto Rico. This Focused CMS Work Plan amends the previous GE Caribe CMS Work Plan (GeoTrans 2008a) to address comments received from EPA in July 2012. The data summary tables and figures in the original work plan have not been updated. An update of these data will be incorporated into the CMS.

The purpose of the focused CMS is to identify and evaluate potential remedial technologies and alternatives for addressing CVOCs in groundwater. CVOCs in groundwater at the Site have been routinely monitored for over 20 years. Recent monitoring is at a semiannual frequency. The monitoring has shown: that the CVOCs are naturally degrading, that the plume does not extend beyond the property boundary, and that the plume footprint is not expanding.

EPA recently requested the installation and monitoring of a well at the western (sidegradient) portion of the Site, where the distance between wells that define the plume sidegradient extent is between approximately 250 and 300 feet. The well installation and monitoring will support evaluation of monitored natural attenuation as a corrective measure for this site. Therefore, this CMS work plan includes a plan for supplemental groundwater monitoring by: shallow monitoring well installation, sampling for CVOCs, and continuous water level monitoring in all Site wells over a one-year period.

## 1.1 DOCUMENT ORGANIZATION

This report addresses the elements of a CMS Work plan as described in the "RCRA Corrective Action Plan" (EPA, 1994). Section 1.0 contains discussions of the CMS purpose and site overview. Section 2.0 presents environmental conditions and RCRA closure activities performed at the GE Caribe site to date. Section 3.0 summarizes the plan for supplemental groundwater monitoring. Section 4.0 presents a general discussion of the approach to the Corrective Action Objectives (CAOs). Section 5.0 contains a discussion of the Corrective Measures Technologies and Alternatives. Section 6.0 discusses the technical components and criteria for the investigation and evaluation of potential corrective measures. Section 7.0 presents the proposed CMS report outline and schedule. Section 8.0 contains a list of reports referenced in this document.

## 1.2 FOCUSED CORRECTIVE MEASURES STUDY WORK PLAN OBJECTIVE

The objective of this work plan is to describe the overall approach to develop and complete a Focused CMS Report for the GE Caribe site. The purpose of the Focused CMS is to evaluate existing information about the nature and extent of environmental impacts, and determine suitable remedial alternatives for impacted media. GE has completed all closure activities for all hazardous waste management units at the site. The CMS will evaluate the potential need for additional activities to achieve the corrective action objectives (CAOs).

A detailed review of relevant site-specific information was performed while preparing this work plan. Data from numerous reports were utilized to identify and evaluate various remedial alternatives.

## 1.3 SITE BACKGROUND AND REGULATORY OVERVIEW

GE Vieques LLC is an approximately 4-acre facility involved in the manufacture of power fuses, auxiliary relays, and switch gear accessories. The Site is located near the north coast of Vieques at the intersection of Rd 200 and Rd 201 in the Barrio Martino section of the town of Isabel Segunda, as shown in Figure 1. A map of the property, including land survey, topography, monitor well locations, and soil boring locations is provided in Figure 2. No buildings were identified in a 1965 aerial photo. GE started manufacturing at the site in 1969. The property is owned by the Puerto Rico Industrial Development Corporation (PRIDCO) and leased by General Electric.

The constituents of concern in groundwater at the site are primarily trichloroethene (TCE) and its degradation products to a lesser degree, including 1,1-

dichloroethene (DCE), 1,1-dichloroethane (DCA), and cis-1,2-dichloroethene (cDCE). Vinyl chloride (VC) has also been detected sporadically in trace concentrations. Results from groundwater sampling from 1990 to present and a recent soil gas survey in 2007 indicate that a high concentration source area is not present at the site. Recent investigations have focused on characterizing the nature and extent of TCE and its degradation products in groundwater, examining concentration trends over time, and collecting natural attenuation data to evaluate the effectiveness of natural attenuation in reducing VOC concentrations.

In October 1980, the facility submitted a RCRA Part A Hazardous Waste permit application to EPA. The facility was subsequently given interim status approval as a TSD facility. All of the hazardous waste management units have been investigated, closure activities completed, and recommended to EPA for clean closure. In a letter dated March 21, 2005, EPA accepted the Closure Certification submitted by Caribe GE on March 4, 2005. The closure certification was provided for the following units:

- Inactive subsurface leach field system (leach field),
- Sediment tank (associated with the leach field),
- Septic tank system, and
- Bright dip area.

As noted by EPA in its letter of March 2005, "the Closure Certification was submitted in accordance with the amended Closure Plan which was approved on March 16, 1994; the approved Closure Report dated October 22, 2004; and in compliance with the requirements stipulated in 40CFR265.115 and 265(h)." GE has since the March 2005 Closure Certification approval, continued to perform groundwater monitoring focused on TCE in groundwater near monitoring well C-4.

# 2.0 ENVIRONMENTAL CONDITIONS

## 2.1 ENVIRONMENTAL SETTING

### 2.1.1 VIEQUES REGIONAL FEATURES

The island of Vieques covers an area of about 40 square miles and is approximately 18 miles long and 3 miles wide. It is located approximately 10 miles off the east coast of the main island of Puerto Rico. Vieques is dominated by a 250 to 500 foot high east-west trending ridge stretching the length of the island. Monte Pirata, at the west end of Isla de Vieques, is the highest point on the island with an elevation of 988 feet above mean sea level. With the exception of Monte Pirata, the topography is gentle, consisting of relatively broad valleys separated by rounded hills trending seaward from the central ridge.

The eastern half of Vieques was formerly used by the U.S. Marine Corps as a training facility and gunnery impact area. The western quarter of the island was also under military control. These areas are currently being closed to further military use. Historical non-military land use is concentrated in the central portions of Vieques.

### 2.1.2 SITE SURFACE FEATURES

As shown in Figure 2, the topography of most of the Site has been graded relatively flat with a 14-ft high shelf along the south side of the property, steeply sloping to an alley along the back of the main building. The majority of the area is occupied by the GE main plant building and paved parking lot. Two small auxiliary buildings are located on the steep slope at the south side of the alley. The ground surface around the main building slopes gently away from the perimeter walls in all directions. Stormwater runoff flows overland and through alley drainage to the north and east of the property.

### 2.1.3 SURROUNDING LAND USE

Property usage to the north (downgradient) is primarily residential with the exception of a commercial facility (Con-Agra) directly across Road 200 from the facility.

Properties to the east and west of the facility are also primarily residential. The property directly southwest of the facility is occupied by the Puerto Rico Electric Authority and is used for equipment and vehicle storage along with several trailers used for field offices. To the south (upgradient) several facilities are involved in the manufacturing of electronic components and have been evaluated as potential upgradient sources for TCE. These facilities include two electronics assemblage facilities and a printing operation approximately 300-400 feet to south of the GE Caribe site in two buildings located on PRIDCO property. Soil gas testing was conducted near these facilities and detected PCE and TCE (Canonie, 1994).

In 1995, a well survey found no domestic wells within a one-half mile radius north (downgradient) of the plant (Pedro Panzardi & Associates, 1995). In addition, a 1995 USGS water well survey report (Open-File report 95-368) found no used wells within a radius of at least one mile of the site. Public drinking water supplied to Vieques is piped from the Rio Blanco filtration plant located on the main island of Puerto Rico. A well field was operated on the south side of the island (in the Esperanza Valley alluvial deposits); however, operation of this well field ceased in 1978 due to saltwater intrusion. Groundwater on the island is no longer used for potable public water supply. There are no known shallow or deep bedrock wells in the vicinity of the Site.

### 2.1.4 CLIMATE

Vieques climate is tropical-marine with temperatures that average about 79 degrees Fahrenheit. Annually, the temperature ranges from an average of 76 degrees Fahrenheit in February to 82 degrees Fahrenheit in August. Vieques lies in the path of the easterly trade winds, which regulate the rainfall on the island. The average wind velocity is about 8 mph but can exceed 12 mph for as many as 30 days each year. The average amount of precipitation is about 45 inches a year. The western part of the island receives a higher amount of rainfall (about 50 inches a year) than the eastern section (about 25 inches a year), (NCDC, 1994). The rainy season is from August through November while the remainder of the year is drier. Tropical storms are common from June to November.

### 2.1.5 REGIONAL HYDROGEOLOGY

Vieques was formed from igneous and volcanic rock, mostly granodiorite, quartz diorite, and some lava which created the bedrock of the island. Igneous quartz-diorite and granodiorite underlie most of the western half of the island, including bedrock under the GE Caribe site. These plutonic rocks are part of the San Lorenzo-Humacao Batholith that also outcrops in southeastern Puerto Rico. Igneous and volcanic bedrock is exposed and weathered near the site on the central portion of the eastern half of the island. Over the millennia, this material has gathered in valleys by the ocean, forming alluvial deposits (sediment deposited by flowing water) where the valley meets the sea. The alluvial sedimentary deposits generally consist of a mixture of gravel, sand, silt, and clay. Other portions of Vieques have ancient marine deposits from a time when the island was submerged, revealing areas with some limestone, sandstone, siltstone, and other sedimentary rocks at the surface.

All the groundwater on Vieques is derived from rain that falls on the island. This water runs downhill as intermittent stream runoff or it seeps into the soil and underlying deposits. Water in pore space, cracks, and fractures in the weathered bedrock eventually flows to the ocean or into alluvial deposits.

There are two main types of potential water bearing zones on Vieques (Renken, 2002; ATSDR, 2001). The first type is within the upper portion of the bedrock and sedimentary rocks. The weathering, fracturing, and faulting of this rock has created pore space, joints, or fractures where water can seep underground. The flow of groundwater in these unnamed aquifer systems is controlled by the influence of gravity and flows in a downgradient direction through the pore space and along fracture or joint surfaces. Groundwater flow may be locally obstructed in areas where dense, nonporous rock or fault surfaces restrict flow.

The second type of water bearing zone is within the alluvial deposits where water seeps into the sand and gravel areas, filling up the pore space between these materials. These alluvial water bearing zones are found below the hills in the low flat valleys, predominantly along the north and south coasts. Water flow within these water bearing zones is also toward lower topographic areas and the Atlantic Ocean. The alluvial water bearing zones are generally self-contained with limited communication from one alluvial water bearing zone to another on the island.

### 2.1.6 FACILITY HYDROGEOLOGY

Ten on-site monitor well borings have been drilled/cored to approximately 110 ft bgs (approximately 104 ft of bedrock coring at well C-7) during three different remedial investigations at the GE Caribe site since 1990. Table 1 shows the boring depths and associated well construction data. The following hydrogeologic information was determined from these drilling programs, subsequent monitor well testing and sampling, and closure activities.

The GE-Vieques facility is underlain by late-Cretaceous/early-Tertiary granodiorite bedrock overlain by unconsolidated residual silty sand and gravels that are 0 ft to 28 feet thick. In the vicinity of the GE Caribe site, the unconsolidated overburden material is predominantly unsaturated, and consists of soil and saprolite. The soil is poorly sorted, very fine to medium grained sand with little silt and clay, highly organic, coarsening down to predominantly sandy gravel from weathered granodiorite bedrock grains. This gravel saprolite is highly decomposed bedrock that retains the structure of the parent bedrock while remaining in its original place. The soil horizon is thickest in the northeast portion of the site (Monitor Wells C-2 and C-3), the only site area where monitoring well groundwater levels have been historically noted at elevations within unconsolidated material, up to eight feet above the bedrock surface at Monitor Well C-3 measured during the December 6, 2006 quarterly sampling event. The soil horizon is thinnest along the southwest portions of the site (Monitor Well C-6) where bedrock outcrops are noted. A geologic cross section of the GE Caribe site is provided in Figure 3. A soil isopach map is provided in Figure 4.

Bedrock under the GE Caribe site is composed of fractured igneous granodiorite. Common vertical and horizontal fracture sets have been identified in rock cores. Bedrock coring and drilling notes indicate that the degree of fracturing decreases with depth and that the top and bottom elevation of the uppermost water bearing zone is variable. The first occurrence of a water bearing zone ranges from approximately 50 ft bgs near C-3 to 65 ft bgs at C-10. This uppermost water bearing zone extends to a depth of approximately 110 ft bgs at C-7 based on packer test data and to a depth of 80 ft bgs at C-10 based on observed water bearing zones in its screened interval. At C-10, no water bearing zones were encountered from a depth of 80 ft to 110 ft bgs as evidenced by the absence of groundwater inflow in this zone while the borehole was open.

Over the eight quarterly groundwater sampling events from February 2006 through December 2007, the highest elevation of groundwater was measured in December 2006 at the four wells in the SE corner of the site, approximately 55.5 ft MSL (approximately 25 to 40 ft bgs). Over this same time frame, the lowest elevation of groundwater was measured in March 2007 at well C-9, approximately 39.6 ft MSL (approximately 40.9 ft bgs). These elevations are significantly higher than the first occurrence of groundwater noted during drilling, indicating semi-confined upper aquifer conditions. There was no evidence of perched water in the drilling through unconsolidated sediments across the site. Based on the above and analyses of contaminant data, the uppermost aquifer is semi-confined and occurs within an interconnected zone of fractures located approximately 50 ft to 110 ft bgs in the granodiorite bedrock. Table 2 summarizes the results of site investigation aquifer testing (GeoTrans, Dec 23, 2005), which indicate that the hydraulic conductivity of the granodiorite is relatively low. The hydraulic conductivity was highest ($3.5 \times 10^{-5}$ cm/s) in the 90-110 ft bgs packer pumping test at C-7. A pumping and recovery test was performed in C-7 after the well was installed. The pumping test in this well indicated a lower value ($1.1 \times 10^{-6}$ cm/s), which suggests that fewer fractures were influenced during the shorter time period of this test. The remaining data are from slug tests, which indicate a geometric mean for hydraulic conductivity of $1.2 \times 10^{-6}$ cm/s based on data collected in the site monitoring wells.

Both aquifer pumping test data and rapid water level declines during well development indicate that the hydraulic conductivity of the granodiorite is low. Using estimated values of $1.1 \times 10^{-6}$cm/s (0.0031 ft/day based on pump test at C-7) to $1.0 \times 10^{-4}$ cm/s (0.28 ft/day, which is a factor of 3 higher than maximum observed value) for the horizontal hydraulic conductivity, a horizontal hydraulic gradient of 0.0094 ft/ft between C-4 and C-10, and an estimated effective porosity of 0.1 (de Marsily, 1986), the average linear groundwater velocity is estimated to range from 0.11 ft/yr to 9.6 ft/yr at the site.

These values indicate that groundwater moves relatively slowly, which is consistent with the limited observed plume migration distance at the site.

Water level elevations have been measured since 1992, including quarterly for two years (2006-2007), and are shown in conjunction with well construction details in Table 1. A typical potentiometric surface map of the water level data for December 19, 2007 is shown as Figure 5. The site data indicate that the uppermost aquifer is locally semi-confined. A comparison of horizontal (0.0208 ft/ft between C-4 and C-10) and vertically upward (0.0008 ft/ft between C-7 and C-4) hydraulic gradients on this date indicates that groundwater flow is primarily horizontal in the uppermost aquifer. The minor upward hydraulic gradient is consistent with the proximity of the Atlantic Ocean, which is a groundwater discharge zone. Note that an upward hydraulic gradient was observed between C-7 and C-4 in 7 of the 8 quarterly sampling events in 2006 and 2007, ranging from 0.03 to 0.18 ft. Based on previous reports submitted to EPA, historical water level data indicate that the water levels in the monitoring wells rise and fall in a pattern consistent with precipitation events. Given the low permeability of the granodiorite, lower precipitation rate in Vieques, and the high evapotranspiration rate, local rainfall may not reach the uppermost aquifer at the site, which is consistent with the absence of a water table at the site. Recharge likely occurs in upland areas located to the south where aquifer conditions are unconfined.

### 2.1.7 SURFACE WATER

The closest surface-water body to the Site is the Atlantic Ocean, approximately 2,500 ft north of the Site. There are no perennial streams on the island.

## 2.2 CONCEPTUAL FACILITY MODEL

Hydrogeology and groundwater flow conditions at the site have been repeatedly investigated over the past 18 years. The conceptual site model for the facility was originally presented in the combined report for the Fall 2005 Field Investigation and November 2005 Groundwater Sampling Event (GeoTrans, December 23, 2005). The site model presented in this report remains largely unchanged; however, additional quarterly groundwater sampling activities have been performed since this report was submitted to

EPA, allowing further refinement of the conceptual site model. This historical Site information provides the basis for the following technical understanding of groundwater flow and constituent transport at the site.

### 2.2.1 SOIL

Previous studies have addressed soils at the site and EPA approved clean closure for the remaining hazardous waste management units in March 2005. As a final screening measure for site soils, an extensive on-site soil gas study (GeoTrans 2007) determined that soil gas concentrations are below threshold levels typically indicative of the presence of free-phase or residual-phase products in soils. In this study, soil gas samples were collected at 32 locations throughout the southern, upgradient area of the facility, which is the location where the highest chlorinated solvent concentrations have been observed in samples from the groundwater monitoring wells (see Figure 2 and Table 3). In addition, localized surface and subsurface soil contamination was addressed during closure activity implementation. None of the groundwater concentrations are high enough to be consistent with the presence of free-phase or residual-phase products in Site soils, saprolite, or fractured bedrock.

### 2.2.2 GROUNDWATER

Groundwater at the site has been analyzed for various compounds, including volatile organics, metals, phenols, and a variety of indicator parameters (e.g., conductivity, pH, and dissolved oxygen). Both historical (1990 to 2006) and recent quarterly groundwater sampling data in 2006 and 2007 indicate that the contaminants of concern are primarily the chlorinated solvent TCE and, to a lesser degree, its biodegradation products (cis 1,2-DCE and 1,1-DCE). TCE in groundwater has been detected at the highest concentrations near the southern (upgradient) portion of the property, in water from well C-4. Available records do not indicate that TCE has been used at the facility and soil vapor testing (GeoTrans, 2007)) has detected TCE at the upgradient property; however, sampling of shallow groundwater at wells C-5 and C-6 has not identified elevated background concentrations of VOCs. 1,1,1-Trichloroethane

(TCA) has been used at the site and previously detected at low concentrations in samples from well C-4, but has generally not been detected in recent groundwater samples.

Summary results from the last eight quarterly groundwater sampling events are provided in Table 4 through Table 12. The highest observed VOC concentrations at the site have occurred in January 1998 in the vicinity of shallow monitor well C-4 where TCE was detected at a concentration 2,210 ug/L and 1,1-DCE was detected at 566 ug/L . In the more recent eight quarters of sampling data, the maximum observed TCE (440 ug/L) and 1,1-DCE (73ug/L) concentrations have been much lower and have occurred in the newly installed monitor well C-7. Recent sampling data show that concentrations are below MCLs in the downgradient monitor wells. Given the low permeability of the granodiorite, the migration rates of these compounds in groundwater is relatively low. Both the recent observed low concentrations in downgradient perimeter monitoring wells (C-1, C-2, C-3, C-9, and C-10) and the overall decreasing trend in concentrations over time indicate that the VOCs are naturally attenuating.

Groundwater sampling shows the presence of TCE and its degradation products (cis 1,2-DCE and 1,1-DCE) in groundwater at levels above MCLs within the site. An examination of time series plots (Figures 6 through 10) shows that concentrations are decreasing, most likely because of natural attenuation mechanisms including biodegradation and hydrodynamic dispersion. The results of the groundwater sampling indicate elevated TCE concentrations are present in monitor wells C-4 and C-7. Recent data indicate the TCE groundwater concentrations in these wells were below 440 ug/L. This value is more than twenty five times below the 1% of TCE solubility rule of thumb that has been used as an indicator of DNAPL free phase presence. None of the groundwater concentrations are high enough to be consistent with the presence of free-phase or residual-phase products in Site soils, saprolite, or fractured bedrock.

The elevated concentrations of TCE at C-4 and C-7 may be caused by the slow diffusion of TCE from the lower permeability bedrock matrix into local fractures in this area. Although diffusion is a very slow process, the relatively low concentrations and decreasing concentration trends over time indicate only a limited amount of TCE in this area. A number of studies (EPA [2008], NGWA [2005], and others) have discussed the difficulty of remediating contaminants in bedrock. The CMS will examine potential remedial options for, and the technical feasibility of, addressing the elevated concentrations near C-4 and C-7.

### 2.2.3 FATE AND TRANSPORT

Groundwater flow is considered to be the primary transport mechanism for the aqueous-phase plume within the bedrock below the Site. The primary source for groundwater recharge at the site is precipitation, which likely occurs in the upland areas located south of the site. In agreement with regional flow information, groundwater flow at the site is primarily horizontal in a north-northwest direction toward the Atlantic Ocean, which is located approximately 2,500 feet north from the Site. Groundwater flow at the Site is relatively slow with an average linear velocity of approximately 10 ft/year (GeoTrans, 2006; 2007). This slow movement of groundwater is the likely explanation for the limited extent of dissolved TCE and its degradation products. As noted above, eight consecutive quarters of groundwater sampling data show that the observed concentration levels in the downgradient perimeter wells did not exceed MCLs.

### 2.2.4 POTENTIAL RECEPTORS AND RISK

Several years of groundwater monitoring indicate that VOCs in groundwater do not extend offsite. Therefore, GeoTrans performed a qualitative assessment of risk by evaluating the following exposure pathways for onsite personnel:

- Ingestion or inhalation of surface soils by onsite personnel
- Ingestion or dermal contact with groundwater by onsite personnel
- Inhalation of vapors by onsite personnel

The previous closure activities conducted by GE have addressed potential exposure and the associated risk from elevated contaminants in soil at the site. The pathway of direct exposure to surface soils (0 to 0.5 feet) via ingestion or inhalation is considered to be incomplete because elevated levels of VOCs have not been found in soils at the site.

With regard to groundwater, no risk is currently posed by site constituents. There are no groundwater supply wells located on site. In addition, as noted in Section 2.1, previous well surveys found no domestic wells within one-half mile of the site. Furthermore, all public drinking water for the island is piped from the Rio Blanco filtration plant located on the main island of Puerto Rico.

The contaminants of concern at the GE Caribe site are primarily TCE and its degradation products. Concentrations of TCE, 1,1-DCE, cis-1,2-DCE and vinyl chloride in shallow groundwater are above drinking water standards established under the Safe Drinking Water Act (SDWA). However, given that concentrations at the downgradient perimeter wells do not exceed MCLs, there is no current risk to off-site potential receptors. In addition, groundwater on the island is no longer used for potable public water supply as a result of saltwater intrusion and there are no known shallow or deep bedrock wells in the vicinity of the Site. If warranted, transport modeling may be performed to predict future trends for VOC concentrations in groundwater.

# 3.0 SUPPLEMENTAL GROUNDWATER MONITORING

The supplemental groundwater monitoring includes the following three work elements:

- Installation and periodic sampling of one bedrock monitoring well west of the main building;
- Installation of transducers and data loggers in all Site monitoring wells;
- Collection and evaluation of continuous ground water elevation data for at least one (1) year.

The objective of this supplemental monitoring is to further evaluate flow directions and the extent of CVOCs.

The work will supplement the ongoing groundwater sampling program which is conducted on a semi-annual frequency wherein all site monitoring wells are sampled and analyzed for CVOCs (as defined in USEPA SW-846, Method 8260).

Work procedures are described below based on assumed equipment and methods. Modifications to these procedures may be made to accommodate changes in equipment or conditions.

## 3.1 MONITOR WELL INSTALLATION PROGRAM

One (1) new bedrock monitor well (C-11) is planned to be installed along the western edge of the Plant building between monitor wells C-6 and C-9, as shown in Figure 12. Monitor Well C-11 will be installed using standard air rotary drilling techniques. The well will be completed with a 20-ft long well screen tentatively planned at the same elevation as Monitor Well C-9, 40 to 60 feet below ground surface (bgs). The final screened interval will be determined in the field with the 20-ft long well screen installed across the first water-bearing fracture below 40 ft bgs. Construction protocols for the new monitor well are described below.

**Drilling Specifications – Bedrock Well**

A schematic for a bedrock monitor well is presented in Figure 13. The construction protocols for the monitor well are as follows:

1. Bedrock monitor well construction will begin with the construction of a nominal 8-inch diameter open borehole two feet into competent bedrock (approximately 12 to 17 ft bgs) using air rotary methods, or ODEX drilling with casing advancement.
2. To prevent caving of overburden materials, a temporary, schedule 40, black steel 6-inch diameter steel casing will be driven from the ground surface into the drilled socket and seated in grout.
3. After an overnight grout-curing period, a nominal 6-inch diameter hole will be advanced by air rotary through the center of the 6-inch temporary casing, to a total depth of approximately 40 ft bgs.
4. DNAPL is unlikely to be encountered but if DNAPL is encountered at any point, additional drilling will not be attempted at that location. The well will be installed at the existing interval.
5. At 40 ft bgs, the geologist, in consultation with the driller, will estimate a baseline drilling water budget with return flow rates, if any water is used as a drilling fluid.
6. In the absence of DNAPL, air rotary drilling will continue to approximately 60 ft bgs, or 20 feet below the depth at which wet cuttings are first observed. If the baseline drilling water return rate has noticeably changed below 40 ft bgs, or water is observed to enter the borehole, or bedrock fractures can be inferred by the driller, the well will be installed to a total depth of 60 ft bgs. Alternatively, drilling will be continued in increments until one of the above conditions is observed or to a depth of 110 ft bgs.
7. The geologist shall locate the 20-ft well screen across the interval that has potential to provide the greatest yield, or absent indications of water yield, the lowest portion of the borehole. If water is not encountered, a new boring will be drilled within a 20 ft distance of this boring.
8. Twenty feet of 2-in diameter, flush threaded, schedule 40 PVC screen with end cap, along with a sufficient length of flush-threaded two-inch diameter, schedule 40 PVC riser pipe to provide a 2.5-ft stick-up, will then be placed into the borehole. Each section of casing and screen shall be National Sanitation Foundation (NSF) approved. Screen slot size shall be 0.01 inch.
9. A clean sand pack of No. 2 Morie (or equivalent) filter sand will be installed in the annular space around the screen via tremie tube and extended to a height of two feet above the screen. The depths of all backfill materials will be constantly monitored during the well installation process by means of a weighted stainless steel or fiberglass tape.
10. A two-foot seal of bentonite pellets will then be installed above the sand pack and allowed to hydrate for 1 hour with the remaining annulus grouted with a cement-bentonite mixture. The grout slurry will consist of ASTM Type I Portland cement, and potable city water. The cement will first be mixed into a

smooth slurry using 8.3 gallons of water for each 94-pound bag of cement; 5 pounds of powdered bentonite will be added to the cement mixture to minimize cement shrinkage during the curing process. The annular spacing outside of the riser will be filled from the bottom up via a tremie pipe. Casing centralizers will be installed on the outside of all casings to help minimize grout channeling and to help ensure a complete grout seal. The temporary 6-inch protective steel casing will be retracted incrementally during grouting to restrict any caving that could occur. The grout will be allowed to cure a minimum of 12 hours prior to additional work being performed inside of the casing.

11. Surface completion shall be provided by a 6” x 6” x 3’ long, square, galvanized steel protective casing (or equivalent) with flip top lid and locking tabs centered around the 2.5-ft PVC riser, with the top of PVC at the elevation of the protective casing hinge. The stickup will be spray painted safety yellow with the well ID stenciled in black paint. An approximately 3-foot by 3-foot by 6-inch thick concrete pad will be constructed around the stickup. The pad will be completed 3 inches above existing grade with the apron tapered 2 inches lower such that precipitation runoff will flow away from the well. Bollards may be located around the stickup for surface protection, if determined by the geologist to be needed. The protective casing lock will be keyed alike to the other Site wells.
12. After installation, the ground surface and the top of the inner casing will be surveyed to within 0.01-foot vertical accuracy. As-built well diagram will be constructed for each of the wells.
13. The wells will be developed the next day after installation to remove fine material from around the monitored interval of the well. Wells will be developed by bailing and surging, or by pumping, as determined by the field geologist. Well development shall consist of over-pumping of the well until the discharge water appears to be visibly clear. It is anticipated that a pumping rate of as much as 5 gpm may be achievable during well development. The purge water will be monitored for pH, temperature, specific-conductance, and turbidity. Wells will be developed up to a maximum of 2 hours or until the water quality field measurements become stable and the purge water is visibly free of sand and silt, as documented by the field geologist.
14. A monitoring well construction diagram will be completed for the well.

## 3.2 GEOLOGIC LOGGING

A field geologist will log representative drill cuttings using American Society for Testing and Materials (ASTM) standard procedures and techniques. The geologist will describe and record the color, moisture, sorting, grain size, and any other pertinent soil/rock characteristics observed. A photographic log of the cuttings obtained from representative samples of the borehole will be prepared and select formation reference samples will be retained in sample bags for archival purposes. Investigation derived waste (IDW), including soil core, will be contained for proper disposal, as detailed in Section 3.4.

## 3.3 DECONTAMINATION

The drill rig will be thoroughly steam cleaned at the staging area upon arrival at the project and prior to leaving the site. Steam-cleaning equipment must be capable of producing 1,500 psi at 220 degrees F. Plant water and electricity will be accessible at the decontamination site.

Drill rods, casing, bits, and the back-end of the drill rig will be steam cleaned at the decontamination area. All well pipes and screens to be used in monitor well construction will be new materials and should need no cleaning. Solids will be segregated from liquids, where practicable, and stored in 55-gal drums for subsequent characterization and disposal by the Site. A summary of the decontamination procedures for the drilling equipment is provided below.

Decontamination Procedure for Drilling Equipment.

| Items Covered | | |
|---|---|---|
| Drill Rigs | | Drill bits |
| Temporary well casing | | |
| Permanent well casing | | |
| Drill rods | | |
| Drill rod racks | | |
| Mud tub | | |
| **Decontamination Procedure** | | |
| 1. | Water wash equipment | |
| 2. | Wire brush equipment to remove visible soils and foreign material adhering to the equipment. | |
| 3. | Rinse equipment with clean, potable water. | |
| 4. | Steam clean equipment inside and out until clean. | |
| | | |
| | | |
| | | |
| Responsible Party: Drilling Subcontractor | | |

## 3.4 IDW

Collected drill cuttings and mud will be containerized in 55-gal drums. The bedrock boring will generate approximately 1,000 gallons of cuttings. The Contractor shall provide new drums with the means and methods to fill and stage the drums at a central site location.

Drilling water, development water, and sampling purge water will be discharged to the ground in order to remain on site. Other waste material generated from the subsurface investigation, such as gloves, Tyvek®, discarded tubing, etc. will be placed in heavy-duty trash bags for proper disposal by the site.

## 3.5 Continuous Water Level Monitoring

Currently, synoptic water level measurements are collected semi-annually at all monitor wells. More frequent hydraulic monitoring will be completed by installing pressure transducers and programmable data loggers in all monitor wells. Groundwater levels at the Site are known to fluctuate between approximately 39 to 56 feet MSL due to groundwater recharge. All ten of the existing wells and the proposed well in the groundwater monitoring network have been selected to provide continuous groundwater level data for a minimum of one year. These groundwater level data measurements will be used to generate well hydrographs and water level contour maps to try and better understand groundwater flow. Transducer data will be downloaded regularly throughout the year.

All work will be performed in accordance with the Quality Assurance Project Plan, and Site Specific Health and Safety Plan pending USEPA's approval of these documents.

## 3.6 Equipment Used and General Procedures

Commonly used equipment and supplies that can be used for continuous groundwater level monitoring include, but are not limited to, the following:

- Vented pressure transducer
- Datalogger
- Water level indicator
- Decontamination equipment
- Installation hardware and equipment
- Portable handheld data reader or laptop computer
- Communication data cables

The general procedures for pre-testing and post-testing activities are as follows:

- Decontaminate all downhole equipment (pressure transducers and water level monitoring devices) before and after use.

- Calibrate and test pressure transducers and data loggers before they are deployed in the field. Test the operational integrity and the configuration of the datalogger by running an inherent self-test program in the unit. Connect pressure transducers to the datalogger and check for operation by placing the pressure transducer below the water table at a known depth and taking a reading, moving the pressure transducer, and taking another reading.
- Synchronize all time-recording devices to the same clock before the test.
- Take manual water levels in all wells just before beginning of any data collection procedure.

## 3.7 INSTALLATION OF PRESSURE TRANSDUCERS

The procedure for installation of pressure transducers in monitoring wells is as follows:

- Measure the water level and depth to the bottom of the well relative to the top of the well casing using an electronic water level indicator before installation.
- Lower the vented pressure transducer gently down the well and install below the lowest anticipated change in water level, but not so low that the range of the transducer might be exceeded at the highest anticipated change in level.
- Do not install the pressure transducer to a depth less than 1 foot from the bottom of the well, to keep the transducer out of any fine sediment that may accumulate in the bottom of the well.
- Secure the pressure transducer in place by attaching it to the well casing or monument at the surface.
- Mark the cable at a convenient permanent witness point to facilitate evaluation of whether the cable may slip over time.
- Bundle any excess of cable connected to the pressure transducer at the surface and place it back into the well or coil and suspend from the well casing. A notch may be cut in the well cap to fit over the cable. Ensure not to completely seal the well to allow the water level in the well to fluctuate with pressure variances.

These procedures are based on assumed equipment and methods. Modifications to these procedures may be made to accommodate changes in equipment or conditions.

## 3.8 GROUNDWATER LEVEL DATA COLLECTION ACTIVITIES

The datalogger should be programmed according to the manufacturer's instructions for measurements every 30 minutes, or other interval as may be determined based on monitoring results. To prevent data loss because of equipment or battery failures, GEO shall periodically download partial data from the datalogger (for example, monthly or quarterly). In addition, GEO shall conduct periodic manual water level measurement throughout the continuous groundwater monitoring program to determine if there is measurement drift. GEO shall record the date and time that the manual reading was taken and the pressure head reading of the transducer. The pressure transducer, cables, and water level indicators shall be decontaminated according to the decontamination procedures in Section 3.3

All data collection events and continuous groundwater level monitoring activities shall be recorded in field log books or on field datasheets. The brand and model number, unique identification number, measurement location, date and time, installation methods, programming set-up, manual water level, and any additional information relevant to continuous water level monitoring activities shall be documented. All downloaded digital data shall be backed up and stored to a project server or file transfer protocol (FTP) site.

# 4.0 CORRECTIVE ACTION OBJECTIVES APPROACH

The purpose of this section is to define the corrective action objectives (CAOs) for the CMS at the GE Caribe facility. The purpose of the CMS is to identify and evaluate potential remedial alternatives to address any hazardous constituent releases that have occurred from the facility. As the primary drivers of the CMS, the CAOs are specified to ensure that human health and the environment are protected and that media cleanup objectives (defined below) are achieved. It should be noted that CAOs will consider current and reasonably foreseeable future site uses and will account for anticipated improvements to facility operations.

Given that groundwater is the primary transport pathway of concern, CAOs will only be developed for site groundwater. As summarized below, general site conditions or the results from previous investigations support the assertion that CAO development for other media is unnecessary.

**Surface Water.** Surface water CAOs are not needed since there is no perennial surface water feature on Vieques. Storm water runoff CAOs will not be developed since there are no impacted surface areas at the site that would cause storm water contamination.

**Surface and Subsurface Soil.** Surface and subsurface soil CAOs will not be developed because all site regulated units exhibiting elevated site constituent concentrations have been remediated. The clean closure of these units involved the excavation and removal of soils exhibiting elevated concentrations and subsequent backfilling with clean fill. Approval of the clean closure of these units was given in an March 4, 2005 letter from EPA.

**Soil Vapor.** Soil vapor has been examined in studies by Canonie (1994) and GeoTrans (2007). The Canonie (1994) study indicated zones of elevated counts of detected VOCs in an area located south of the main plant building. A more recent soil gas survey in March 2007 (GeoTrans, 2007) utilized the GeoProbe™ PRT system to more carefully examine current soil gas concentration levels in this area south of the main plant building. Figure 11 presents the results of this soil gas survey. The results of this study indicated that there are no unacceptable site risks from soil gas at the site. Based on the low concentrations observed in the more recent soil gas study in March 2007 (GeoTrans 2007), soil vapor CAOs will not be developed.

## 4.1 CORRECTIVE ACTION OBJECTIVES

Definition of the groundwater CAOs for the site requires specification of the cleanup level for each site groundwater constituent, the points of compliance where cleanup progress will be assessed, and the timeframe under which the cleanup will be performed. Each of these objectives are discussed below.

### 4.1.1 CLEANUP LEVEL OBJECTIVES

The constituents that will be addressed by the CMS are trichloroethene (TCE), 1,1-dichloroethene (DCE), 1,1-dichloroethane (DCA), cis-1,2-dichloroethene (cDCE), and vinyl chloride (VC). The default cleanup level objectives for constituents of concern (COCs) will be based on the U.S. EPA maximum contaminant levels (MCLs). For constituents without an MCL, the U.S. EPA Region III risk based concentration (RBC) will be used. The resulting cleanup levels are shown in the following table. Site-specific, risk-based cleanup goals may be developed during the CMS.

| Constituent | Cleanup Level (ug/L) | Source |
|---|---|---|
| Trichloroethene | 5 | MCL |
| 1,1-Dichloroethene | 7 | MCL |
| 1,1-Dichloroethane | 897 | RBC |
| cis-1,2-Dichloroethene | 7 | MCL |
| Vinyl Chloride | 2 | MCL |

### 4.1.2 POINT OF COMPLIANCE OBJECTIVE

The points of compliance for monitoring the attainment of cleanup level objectives will be the downgradient groundwater monitoring wells (C-9 and C-10). These wells will be used to verify that there is no unacceptable off-site migration of the COCs at levels above MCLs. Concentrations will be monitored at an EPA-approved frequency. Monitoring will be discontinued only after approval to do so is received from the EPA. In addition, GE may, with agency concurrence, reduce the number of compliance monitoring points based on fate and transport analyses or other evaluations conducted for the CMS.

### 4.1.3 CLEANUP TIMEFRAME

The timeframe for achievement of the cleanup level objectives will be estimated during the CMS and updated as necessary during remedy implementation.

# 5.0 CORRECTIVE MEASURES TECHNOLOGIES / ALTERNATIVES

Corrective measures technologies and alternatives for the CVOCs in groundwater at the GE Caribe site will be developed and presented in the Focused CMS report. The technologies considered will include, but not be limited to pump-and-treat, enhanced bioremediation, managed natural attenuation, and various combinations of these approaches. A complete list of relevant technologies will be developed and evaluated in the CMS report. The selected technologies will reflect site-specific knowledge, data, and analyses of groundwater conditions at the site.

# 6.0 EVALUATION APPROACH TO POTENTIAL CORRECTIVE MEASURES

The evaluation of the corrective measures technologies and alternatives will consider five technical components:

1) Protective of human health and the environment;
2) Attain media cleanup standards;
3) Control source releases;
4) Comply with applicable standards for waste management; and,
5) Other applicable factors.

Included under the fifth item in this list are current and future site operational issues, and community acceptance. A consideration in the evaluation of these components and the selection of the final corrective measures technologies is the current and reasonably foreseeable future uses anticipated for the GE Caribe site. The final corrective measures will be consistent with continued manufacturing operations at the GE Caribe manufacturing facility.

The criteria for the final selection of the groundwater remediation technology will include:

- Short- and long-term effectiveness;
- Reduction of toxicity, mobility, and/or volume;
- Implementability; and,
- Cost.

## 7.0 CMS REPORT OUTLINE AND SCHEDULE

The CMS report outline is provided in Attachment A to this work plan. The Schedule is provided in Attachment B. Dan Burnell will be the GeoTrans Project Manager responsible for coordination with GE and EPA and managing preparation of the focused CMS.

# 8.0 CMS PROJECT MANAGEMENT

This section provides a description of the overall project management structure that will be used for the GE Caribe CMS. GE is performing this investigation under the supervision of U.S. Environmental Protection Agency Region II. Mr. Jesse Avilés is the Region II project manager assigned to oversee the CMS. Mr. Ed Kolodziej is the GE project manager, and is responsible for communications with the agency and for general project oversight. GEO is providing assistance to GE in the performance of this CMS. The GEO project roles and associated personnel are discussed below.

**Project Manager.** Daniel Burnell, Ph.D., is the CMS Project Manager. He will be responsible for the overall direction, coordination, budget, and technical consistency of project activities. Dr. Burnell possesses over 20 years of experience with groundwater contamination issues, and has served as the project manager on all GE Caribe site characterization tasks conducted by GE since 2005.

**Project Engineer.** Mr. Peter Rich will provide environmental engineering oversight. He will be responsible for the appropriate specification and thorough evaluation of the selected remedial measures. Mr. Rich possesses over 20 years of experience in groundwater treatment system design and in the evaluation of groundwater remedial alternatives. He is a registered engineer in nine states including North Carolina, Virginia, Maryland, Pennsylvania, South Carolina, New York, Illinois, New Jersey, and Arizona.

**Local Subcontractor Support.** Mr. Fernando Pages, PE manages the Tetra Tech Caribe office in Puerto Rico. He has provided local support to Tetra Tech GEO on previous investigations conducted at the GE Caribe site. Mr. Pages is a registered professional engineer in Puerto Rico, and has over 20 years of professional experience specializing in project management and engineering analysis.

# 9.0 REFERENCES


ATSDR, 2001. Focused Public Health Assessment, Isla de Vieques Bombing Range, Vieques, PR.

Canonie Environmental Inc., 1994. Soil Gas Survey Report, Caribe General Electric Distribution Transformers, Inc., Vieques, PR.

EPA, 2008. http: //www.clu-in.org/fracrock.

GE-Vieques Facility, 2004. Request For Proposal, Focused Groundwater Investigation, GE-Vieques Facility, Puerto Rico, October 21, 2004.

GeoTrans, Inc. 2005. Results of Fall 2005 Field Investigation and November 2005 Groundwater Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, December 23, 2005.

GeoTrans, 2005. Response to November 2, 2004 EPA Comment Letter.

GeoTrans, Inc., 2006a. Results of First Quarter (Q1) 2006. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, March 23, 2006.

GeoTrans, Inc., 2006b. Results of Second Quarter (Q2) 2006. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, August 4, 2006.

GeoTrans, Inc., 2006c. Results of Third Quarter (Q3) 2006. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, November 2, 2006.

GeoTrans, Inc., 2006d. Results of Fourth Quarter (Q4) 2006. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, February 9, 2007.

GeoTrans, Inc., 2007a. Results of First Quarter (Q1) 2007. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, June 12, 200.

GeoTrans, Inc., 2007b. Results of Second Quarter (Q2) 2007. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, August 4, 2007.

GeoTrans, Inc., 2007c. Results of Third Quarter (Q3) 2007. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transformers, Inc., Vieques, Puerto Rico, October 31, 2007.

GeoTrans, Inc., 2007d. Results of Fourth Quarter (Q4) 2007. Groundwater and Natural Attenuation Parameter Sampling Event, Caribe General Electric Distribution Transforms, Inc., Vieques, Puerto Rico, February 1, 2008.

GeoTrans, Inc., 2008a. Focused Corrective Measures Study Workplan. Caribe General Electric Distribution Transforms, Inc., Vieques, Puerto Rico, July 14, 2008.

Jean, J.R., USEPA, 2004. GE Vieques Monitoring Well Installation Work Plan, November 2, 2004.

National Climatic Data Center, 1994. Annual Climatological Summary for Vieques Island, Puerto Rico: May 1985 through January 1994, and Torres-Gonzalez S., 1989. Reconnaissance of the ground-water resources of Vieques Island, Puerto Rico. U.S. Geological Survey, Report 86-4100. San Juan, P.R.: 1989. As published in the U.S. Department of Health Public Health Assessment for Isla de Vieques Bombing Range Feb 20, 2001).

National Ground Water Association, 2005. Fractured Rock: State of the Science and Measuring Success in Remediation.

N.A. Water Systems, 2004. GE-Vieques Monitoring Well Installation Work plan, August 21, 2004.

N.A. Water Systems, 2004. Caribe General Electric Products – Summary of site closure issues, Vieques, Puerto Rico, January 10, 2004.

N.A. Water Systems, 2004. June 2004 Semi-annual Groundwater Sampling Event Analytical Results, Caribe General Electric Distribution Transformers, Inc, Vieques, Puerto Rico, September 23, 2004.

N.A. Water Systems, 2005. December 2004 Semi-annual Groundwater Sampling Event Analytical Results, Caribe General Electric Distribution Transformers, Inc, Vieques, Puerto Rico, March 29, 2005.

Renken, A., Ward, W.C., Gill, I.P., Gómez-Gómez, F., Rodriguez-Martínez, J., and others, Geology and Hydrogeology of the Caribbean Islands Aquifer System of the Commonwealth of Puerto Rico and the U.S. Virgin Islands: U.S. Geological Survey Professional Paper 1419, 139 p., 5 pls.

U.S. EPA, May 1994, RCRA Corrective Action Plan, Directive Number 9902.3-2A. (de Marsily, 1986) (effective porosity book value)

Veve, T.D., and B.E. Taggart. Atlas of Ground-water Resources in Puerto Rico and the U.S. Virgin Islands. U.S. Geological Survey, Water-Resources Investigations Report 94-4198

Table 1. Well Construction Information and Quarterly Water Level Data, GE Caribe, Vieques, PR.

| Well ID | Date Installed | Ground Surface Elevation (ft MSL) | MP Elevation (ft MSL) | Top of Screen | | Bottom of Screen | | Screen Length (ft) | Depth to Bedrock (ft ) | Bedrock Elevation (ft MSL) | Water Level Elevation (ft MSL) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | (ft BGS) | (ft MSL) | (ft BGS) | (ft MSL) | | | | 2/07/06 | 6/21/06 | 9/12/06 | 12/06/06 | 3/06/07 | 6/27/07 | 9/19/07 | 12/19/07 |
| **C-1** | 10/30/90 | 73.14 | 73.34 | 22.8 | 50.3 | 57.8 | 15.3 | 35.0 | 14.5 | 58.6 | 51.20 | 49.39 | 52.30 | 54.15 | 48.19 | 50.41 | 51.94 | 52.65 |
| **C-2** | 10/31/90 | 71.47 | 71.67 | 31.5 | 40.0 | 61.5 | 10.0 | 30.0 | 23.8 | 47.7 | 46.65 | 44.29 | 48.46 | 49.74 | 43.37 | 46.46 | 46.88 | 48.50 |
| **C-3** | 10/25/90 | 70.45 | 73.96 | 35.3 | 35.2 | 60.3 | 10.2 | 25.0 | 28.3 | 42.2 | 46.98 | 44.61 | 48.97 | 50.29 | 43.58 | 47.05 | 47.42 | 49.30 |
| **C-4** | 11/1/90 | 73.04 | 79.77 | 14.2 | 58.8 | 49.2 | 23.8 | 35.0 | 8.0 | 65.0 | 52.46 | 50.79 | 53.32 | 55.38 | 50.69 | 51.70 | 52.09 | 53.33 |
| **C-5** | 3/12/03 | 90.56 | 92.89 | 27.5 | 63.1 | 67.5 | 23.1 | 40.0 | 9.5 | 81.1 | 52.72 | 50.97 | 53.52 | 55.60 | 50.93 | 51.89 | 52.23 | 53.51 |
| **C-6** | 3/12/03 | 92.40 | 94.60 | 30.0 | 62.4 | 50.0 | 42.4 | 20.0 | 0.5 | 91.9 | 52.39 | 50.88 | 53.04 | 54.60 | 50.80 | 51.32 | 51.76 | 53.17 |
| **C-7** | 10/18/05 | 77.08 | 79.21 | 90.0 | -12.9 | 110.0 | -32.9 | 20.0 | 6.3 | 70.8 | 52.54 | 50.62 | 53.45 | 55.56 | 50.73 | 51.76 | 52.22 | 53.36 |
| **C-8** | 9/30/05 | 75.73 | 77.87 | 27.5 | 48.2 | 47.5 | 28.2 | 20.0 | 8.6 | 67.1 | 52.50 | 50.82 | 53.28 | 55.54 | 50.77 | 51.81 | 52.16 | 53.39 |
| **C-9** | 10/6/05 | 80.46 | 82.69 | 41.7 | 38.8 | 61.7 | 18.8 | 20.0 | 19.0 | 71.0 | 43.73 | 43.14 | 44.38 | 45.95 | 39.55 | 42.04 | 42.84 | 45.15 |
| **C-10** | 10/13/05 | 78.72 | 81.11 | 60.0 | 18.7 | 80.0 | -1.3 | 20.0 | 8.5 | 70.2 | 48.36 | 43.91 | 46.93 | 48.94 | 43.29 | 44.39 | 44.44 | 46.29 |

Notes:

1. All well locations and elevations were resurveyed in November 2005.
2. MSL = Mean Sea Level
3. MP = Measuring Point (Top of Well Casing)
4. BGS = Below Ground Surface

Table 2. Summary of Hydraulic Conductivity Testing Results from Fall 2005 Field Investigation, GE Caribe, Vieques, PR.

| Well ID | Formation | Elevation of Screened interval (ft MSL) | Pump Test K Value (cm/sec) Using Moench w/Slab Block Method[1] | Slug Test K (cm/sec) Value Using Bouwer and Rice Method[2] |
|---|---|---|---|---|
| C-1 | Granodiorite | 50.3 to 15.3 | | $8.1 \times 10^{-6}$ |
| C-2 | Granodiorite | 40 to 10 | | $7.1 \times 10^{-6}$ |
| C-3 | Granodiorite | 35.2 to 10.2 | | $1.3 \times 10^{-6}$ |
| C-4 | Granodiorite | 58.8 to 23.8 | | $1.2 \times 10^{-6}$ |
| C-5 | Granodiorite | 63.1 to 23.1 | | $1.2 \times 10^{-7}$ |
| C-6 | Granodiorite | 62.4 to 42.4 | | $2.3 \times 10^{-6}$ |
| C-7 | Granodiorite | -12.9 to -32.9 | $1.1 \times 10^{-6}$ | |
| C-7 (50-70' bgs) | Granodiorite | 26.6 - 6.6 | | $5.2 \times 10^{-7}$ |
| C-7 (70-90' bgs) | Granodiorite | 6.6 to -13.4 | | $7.0 \times 10^{-8}$ |
| C-7 (90-110' bgs) | Granodiorite | -13.4 to -33.4 | $1.5 \times 10^{-5}$ | |
| C-8 | Granodiorite | 48.2 to 28.2 | | $6.0 \times 10^{-6}$ |
| C-9 | Granodiorite | 38.8 to 18.8 | | $7.7 \times 10^{-8}$ |
| C-10 | Granodiorite | 18.7 to -1.3 | | $2.2 \times 10^{-8}$ |

bgs=below ground surface

[1]Moench, A. F., 1984. Double-Porosity Models for a Fissured Groundwater Reservoir With Fracture Skin, Water Resources Research 20(7), pp. 831-846.

[2]Bouwer, H., and R. C. Rice, 1976. A slug test for determining hydraulic conducting of unconfined aquifers with completely or partially penetrating wells: Water Resources Research 12(3), pp. 423-428.

Table 3. Summary of March 2007 Soil Gas Survey Concentrations (ug/L), GE Caribe, Vieques, PR.

| Lab Sample Number | Sample ID | 1,1-DCA | 1,1-DCE | CIS | TCE | PCE |
|---|---|---|---|---|---|---|
| 0703103-02 | SG 1 (0-2) | ND | ND | **0.39** | **0.62** | **0.77** |
| 0703103-01 | SG 2 (0-1) | ND | ND | **0.36** | **0.42** | **2.04** |
| 0703103-03 | SG 3 (0-1) | ND | ND | ND | **0.80** | **0.39** |
| 0703103-04 | SG 4 (0-1) | ND | ND | ND | ND | **0.67** |
| 0703103-05 | SG 5 (0-1) | ND | ND | ND | ND | **0.50** |
| 0703103-06 | SG 6 (0-1.5) | **1.03** | **2.56** | ND | **1.62** | **1.07** |
| 0703103-07 | SG 7 (2-4) | ND | **0.22** | ND | **2.57** | ND |
| 0703103-08 | SG 8 (2-3.5) | **2.16** | **2.80** | **2.02** | **13.66** | **0.45** |
| 0703127-15 | SG 9 (0-2) | ND | ND | ND | **1.93** | **3.23** |
| 0703127-14 | SG 10 (0-1.5) | ND | ND | ND | **3.55** | **1.86** |
| 0703127-13 | SG 11 (0-1.5) | ND | ND | **0.23** | **0.81** | **2.15** |
| 0703127-12 | SG 12 (0-1) | ND | ND | **0.26** | **0.88** | **2.46** |
| 0703127-11 | SG 13 (0-0.75) | ND | ND | **0.43** | **1.62** | **4.67** |
| 0703127-16 | SG 14 (0-1.5) | **1.93** | **0.57** | **0.25** | **0.90** | **1.56** |
| 0703127-10 | SG 15 (0-2) | **0.34** | ND | **0.97** | **4.00** | **8.80** |
| 0703103-09 | SG 16 (0-2) | ND | ND | ND | ND | ND |
| 0703127-05 | SG 17 (0-2) | ND | ND | **0.74** | **1.70** | **3.78** |
| 0703127-06 | SG 18 (2-3.75) | ND | ND | **0.44** | **1.03** | **3.23** |
| 0703127-07 | SG 19 (0-1.8) | ND | ND | **0.23** | **0.85** | **1.78** |
| 0703103-16 | SG 20 (0-2) | ND | ND | ND | ND | ND |
| 0703103-15 | SG 21 (0-2) | ND | ND | **0.38** | **0.28** | ND |
| 0703103-14 | SG 22 (2-4) | ND | ND | ND | ND | ND |
| 0703127-08 | SG 23 (2-4) | ND | ND | ND | **0.77** | **1.40** |
| 0703127-09 | SG 24 (0-2) | ND | ND | **0.51** | **1.61** | **6.59** |
| 0703127-04 | SG 25 (0-2) | ND | ND | **0.78** | ND | **3.58** |
| 0703127-03 | SG 26 (0-1) | ND | ND | **1.88** | **3.47** | **11.03** |
| 0703127-02 | SG 27 (0-1) | ND | ND | **5.83** | **6.71** | **13.82** |
| 0703127-01 | SG 28 (0-2) | ND | **0.48** | **6.52** | **7.19** | **11.38** |
| 0703103-13 | SG 29 (0-2) | ND | ND | ND | ND | ND |
| 0703103-12 | SG 30 (0-2) | ND | ND | ND | **1.04** | **0.17** |
| 0703103-11 | SG 31 (0-2) | **0.12** | ND | **0.43** | **0.65** | **1.30** |
| 0703103-10 | SG 32 (0-2) | ND | ND | ND | ND | ND |

Note: This data was reprocessed using a calibration curve that forced the curve through the origin. All results are well below the method detection limits and must be considered estimated.

ND = Not Detected
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethene
CIS = cis-1,2-Dichloroethene
TCE = Trichloroethene
PCE = Tetrachloroethene

Table 4. Summary of Quarterly Groundwater Natural Attenuation Parameters and Microbial Data (2/06 through 12/07), GE Caribe, Vieques, PR.


| WELL ID | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **GROUNDWATER LABORATORY-ANALYZED PARAMATERS** | | | | | | | | | | |
| **Ethane (µg/L)** | | | | | | | | | | |
| Feb-06 | 0.56 | 0.55 | 0.62 | 0.55 | 0.54 | 0.54 | ND | 2.1 | 0.59 | 2.4 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS |
| Dec-06 | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS |
| Mar-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Jun-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Sep-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Dec-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| **Ethene (µg/L)** | | | | | | | | | | |
| Feb-06 | ND | ND | ND | ND | ND | ND | 20 | ND | 0.86 | 5.2 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS |
| Dec-06 | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS |
| Mar-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 9 |
| Jun-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12 |
| Sep-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 18J |
| Dec-07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 7.7J |
| **Methane (µg/L)** | | | | | | | | | | |
| Feb-06 | 1.8 | 1.3 | 0.97 | 0.59 | 0.89 | 1.2 | 1700 | 110 | 1 | 110 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | 14 | NS | NS | 3800 | NS | NS | NS |
| Dec-06 | NS | NS | NS | ND | NS | NS | 9000 | NS | NS | NS |
| Mar-07 | ND | ND | ND | ND | ND | 0.36J | 7000 | 500 | ND | 25 |
| Jun-07 | 1.4 | 0.18J | ND | ND | 8.4 | 1.3 | 8000 | 380 | 2.7 | 360 |
| Sep-07 | 1.4 | ND | ND | ND | 6.2 | 1.8 | 6600 | 190 | 1.6 | 860 |
| Dec-07 | 1.1 | 0.25J | ND | ND | 6.2 | ND | 2100 | 210 | ND | 270 |
| **Chloride (mg/L)** | | | | | | | | | | |
| Feb-06 | 9.9 | 14 | 20 | 190 | 220 | 100 | 480 | 190 | 44 | 180 |
| Jun-06 | 14 | 21 | 15 | 260 | 200 | 92 | 470 | 170 | 70 | 160 |
| Sep-06 | 9.7 | 13 | 23 | 150 | 160 | 75 | 500 | 140 | 63 | 290 |
| Dec-06 | 11 | 12 | 20 | 150 | 120 | 85 | 530 | 120 | 32 | 180 |
| Mar-07 | 18 | 21 | 33 | 160 | 180 | 110 | 500 | 150 | 75 | 180 |
| Jun-07 | 19 | 16 | 20 | 160 | 130 | 96 | 490 | 170 | 62 | 240 |
| Sep-07 | 15 | 15 | 20 | 130 | 150 | 70 | 490 | 160 | 59 | 230 |
| Dec-07 | 8.6 | 13 | 17 | 110 | 100 | 83 | 490 | 140 | 48 | 200 |
| **Nitrogen, Nitrate (mg/L)** | | | | | | | | | | |
| Feb-06 | 0.34 | 0.61 | 1.5 | 7.5 | 12 | 4.2 | 0.014 | 0.81 | 0.68 | 0.005 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | 0.96 | 0.69 | **50** | 9.6 | **11** | 3.4 | ND | 10 | 0.021J | 0.035J |
| Jun-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-07 | 0.22 | 1.2 | 4.1 | 7.1 | 8.1 | 5.5 | 0.049J | 9.1 | 1.8 | 0.0090J |
| Dec-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

| WELL ID | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Sulfate (mg/L)** | | | | | | | | | | |
| Feb-06 | 5.2 | 13 | 110 | 63 | 62 | 24 | ND | 56 | 20 | 590 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | 21 | 18 | 680 | 60 | 56 | 25 | 43 | 57 | 34 | 180 |
| Jun-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-07 | 12 | 13 | 160 | 56 | 54 | 37 | 60 | 60 | 27 | 380 |
| Dec-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Sulfide (mg/L)** | | | | | | | | | | |
| Feb-06 | ND | 0.027 | ND | ND | 0.014 | ND | 14 | ND | 0.14 | 41 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | ND | 0.47J | 0.13J | ND | 0.9 | 0.043J | 3.6 | ND | 0.025J | 12.0 |
| Jun-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-07 | 0.020J | 0.035J | 0.050J | 0.013J | 0.012J | 0.013J | 0.78 | 0.013J | 0.016J | 31.0 |
| Dec-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Carbon, Total Organic (mg/L)** | | | | | | | | | | |
| Feb-06 | 2.1 | 1.5 | 1.2 | 1.7 | 1.8 | 2.7 | 120 | 2 | 2.5 | 75 |
| Jun-06 | 2.1 | 2 | 1.3 | 1.7 | 1.7 | 1.7 | 11 | 1.6 | 2 | 38 |
| Sep-06 | 2.2 | 1.3 | 1.3 | 1.9 | 1.6 | 1.6 | 8.8 | 1.6 | 1.2 | 110 |
| Dec-06 | 2 | 1.4 | 1.2 | 2.1 | 2 | 1.6 | 8.8 | 1.7 | 1.2 | 43 |
| Mar-07 | 2.2 | 1.8 | 2.5 | 2.2 | 2.5 | 2.3 | 8.6 | 2.5 | 2.2 | 42.0 |
| Jun-07 | 1.8 | 1.3 | 1.3 | 1.8 | 1.9 | 1.6 | 7.9 | 1.7 | 1.5 | 67.0 |
| Sep-07 | 1.8 | 1.3 | 1.3 | 1.9 | 1.5 | 1.4 | 8.8 | 1.6 | 1.3 | 92.0 |
| Dec-07 | 2.4 | 1.3 | 1.5 | 2.2 | 2.7 | 1.9 | 8.7 | 1.8 | 1.8 | 59.0 |
| **Iron, Ferrous (mg/L)** | | | | | | | | | | |
| Feb-06 | 0.027 | 0.039 | ND | 0.027 | 0.085 | ND | 1.4 | 0.055 | 0.26 | 0.71 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | 0.022 | 0.11 | 0.23 | 0.067 | 0.088 | 0.095 | 0.74 | 0.044 | 0.18 | 0.32 |
| Jun-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-07 | 0.053 | 0.10 | 0.23 | 0.29 | 0.25 | 0.055 | 0.72 | 0.042 | 0.15 | 5.6 |
| Dec-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| **Dissolved $H_2$ (nM)** | | | | | | | | | | |
| Feb-06 | 1.5 | 1.5 | 2.6 | 110 | 31 | 2 | 2.7 | 84 | 160 | 170 |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Jun-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-07 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |

Table 4. Summary of Quarterly Groundwater Natural Attenuation Parameters and Microbial Data (2/06 through 12/07), GE Caribe, Vieques, PR.


| WELL ID | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Magnesium (mg/L)** | | | | | | | | | | |
| Feb-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | NS | NS | NS | 37 | NS | NS | 32 | NS | NS | NS |
| Jun-07 | NS | NS | NS | 33 | NS | NS | 32 | NS | NS | NS |
| Sep-07 | NS | NS | NS | 34 | NS | NS | 31 | NS | NS | NS |
| Dec-07 | NS | NS | NS | 29 | NS | NS | 33 | NS | NS | NS |
| **Calcium (mg/L)** | | | | | | | | | | |
| Feb-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | NS | NS | NS | 63 | NS | NS | 57 | NS | NS | NS |
| Jun-07 | NS | NS | NS | 55 | NS | NS | 55 | NS | NS | NS |
| Sep-07 | NS | NS | NS | 57 | NS | NS | 52 | NS | NS | NS |
| Dec-07 | NS | NS | NS | 49 | NS | NS | 54 | NS | NS | NS |
| **Sodium (mg/L)** | | | | | | | | | | |
| Feb-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Jun-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sep-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Dec-06 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Mar-07 | NS | NS | NS | 280 | NS | NS | 460 | NS | NS | NS |
| Jun-07 | NS | NS | NS | 300 | NS | NS | 480 | NS | NS | NS |
| Sep-07 | NS | NS | NS | 280 | NS | NS | 460 | NS | NS | NS |
| Dec-07 | NS | NS | NS | 280 | NS | NS | 500 | NS | NS | NS |
| **Parameters** | **Microbial Analyses (cells/mL) (Feb 2006 sampling event, only)** | | | | | | | | | |
| DHC (Dehalococcoides spp.) | NS | NS | 4.88 | 3.66 | 3.76 | 2.82 | 2.99 | 3.68 | 2.5 | 3.14 |
| DSM (Desulfuromonas spp.) | NS | NS | 0.0092 | ND | 0.0131 | ND | 2.54 | 0.0416 | 0.17 | 0.0032 |
| DHB (Dehalobacter spp.) | NS | NS | 4540 | 70.7 | 10.2 | 529 | 407 | 862 | 474 | ND |
| EBAC (Total Eubacteria) | NS | NS | 46500 | 38200 | 53800 | 7880 | 3E+06 | 447000 | 792000 | 32900 |
| MGN (Methanogens) | NS | NS | 9130 | 1820 | 62.1 | 786 | 971 | 3430 | 1080 | 2370 |
| IRB/SRB (Sulfate and Iron Reducing Bacteria) | NS | NS | 59.4 | ND | ND | ND | 56200 | ND | 15.7 | 0.0352 |
| MOB (Methanotrophs) | NS | NS | 50.8 | 1390 | 10300 | 5400 | 354000 | 134000 | 243000 | 151 |

Table 4. Summary of Quarterly Groundwater Natural Attenuation Parameters and Microbial Data (2/06 through 12/07), GE Caribe, Vieques, PR.


| WELL ID | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 |
|---|---|---|---|---|---|---|---|---|---|---|
| **GROUNDWATER FIELD-ANALYZED PARAMETERS** | | | | | | | | | | |
| **pH** | | | | | | | | | | |
| Feb-06 | 6.87 | 6.95 | 6.84 | 7.35 | 6.63 | 6.67 | 6.55 | 7.36 | 8.28 | 10.24 |
| Jun-06 | 7.44 | 7.45 | 7.48 | 7.32 | 7.21 | 7.08 | 7.76 | 7.25 | 8.05 | 13.08 |
| Sep-06 | 7.14 | 7.14 | 6.95 | 6.96 | 6.94 | 6.85 | 6.85 | 7.04 | 7.79 | 7.58 |
| Dec-06 | 7.35 | 7.45 | 7.19 | 7.19 | 7.13 | 6.99 | 7.17 | 7.27 | 7.81 | 12.54 |
| Mar-07 | 6.85 | 7.15 | 6.79 | 6.8 | 6.75 | 6.61 | 6.79 | 6.81 | 7.55 | 11.39 |
| Jun-07 | 7.31 | 7.46 | 7.21 | 7.26 | 8.01 | 7.85 | 7.32 | 7.22 | 8.41 | 14 |
| Sep-07 | 7.58 | 8.08 | 7.82 | 7.75 | 8.35 | 7.82 | 10.54 | 8.77 | 7.99 | 14.38 |
| Dec-07 | 7.45 | 7.58 | 7.23 | 7.4 | 7.22 | 7.17 | 7.4 | 7.38 | 7.94 | 12.4 |
| **Specific Conductance (µS/cm)** | | | | | | | | | | |
| Feb-06 | 0.403 | 0.471 | 0.565 | 1.78 | 1.35 | 2.05 | 2.53 | 1.76 | 0.556 | 3.64 |
| Jun-06 | 0.684 | 0.66 | 0.603 | 1.99 | 1.74 | 1.07 | 2.47 | 1.61 | 0.899 | 5.45 |
| Sep-06 | 0.484 | 0.61 | 1.02 | 1.94 | 1.75 | 1.18 | 2.93 | 1.61 | 0.82 | 4.31 |
| Dec-06 | 0.459 | 0.519 | 0.901 | 1.51 | 1.47 | 1.2 | 2.69 | 1.63 | 0.593 | 5.67 |
| Mar-07 | 0.471 | 0.419 | 1.34 | 1.88 | 1.95 | 0.862 | 2.77 | 1.82 | 0.563 | 4.34 |
| Jun-07 | 0.651 | 0.493 | 0.751 | 1.9 | 1.65 | 1.32 | 2.91 | 1.84 | 0.758 | 3.77 |
| Sep-07 | 0.592 | 0.601 | 0.741 | 1.84 | 1.77 | 1.25 | 2.90 | 1.86 | 0.74 | 3.8 |
| Dec-07 | 0.523 | 0.605 | 1.17 | 1.72 | 1.42 | 1.2 | 2.79 | 1.73 | 0.829 | 4.09 |
| **Temperature (ºC)** | | | | | | | | | | |
| Feb-06 | 29.66 | 29.37 | 29.2 | 29.31 | 30.08 | 28.6 | 27.7 | 29.33 | 31.29 | 30.35 |
| Jun-06 | 32.47 | 30.48 | 30.79 | 31.29 | 31.5 | 31.02 | 28.51 | 30.51 | 32.61 | 28.8 |
| Sep-06 | 30.77 | 29.77 | 29.8 | 30.76 | 30.06 | 31.25 | 28.89 | 30.43 | 31.16 | 31.88 |
| Dec-06 | 31.3 | 29.7 | 30.8 | 31.27 | 30.3 | 31.1 | 31.2 | 30.7 | 30 | 29.7 |
| Mar-07 | 29.64 | 29.7 | 29.38 | 31.03 | 29.61 | 31.,2 | 29.24 | 31.08 | 31.35 | 29.7 |
| Jun-07 | 29.58 | 30.39 | 30.94 | 32.3 | 30.17 | 32.16 | 35.21 | 31.54 | 30.95 | 30.39 |
| Sep-07 | 29.62 | 29.28 | 29.95 | 30.68 | 29.76 | 33.7 | 31.26 | 30.58 | 30.5 | 30.95 |
| Dec-07 | 29.81 | 30 | 28.91 | 30.56 | 31.1 | 30.27 | 28.63 | 30.87 | 32.01 | 29.44 |
| **Dissolved Oxygen (mg/L)** | | | | | | | | | | |
| Feb-06 | 1.25 | 1.39 | 1.54 | 2.07 | 2.3 | 2.6 | 0.96 | 1.4 | 1.83 | 0.28 |
| Jun-06 | 0 | 0 | 0.1 | 2.37 | 0.31 | 1.31 | 0.08 | 0.36 | 3.64 | 1.1 |
| Sep-06 | 0.05 | 0 | 0 | 2.75 | 0.16 | 1.94 | 0 | 0.57 | 1.67 | 0 |
| Dec-06 | 0.74 | 0 | 0 | 6.08 | 0 | 3.4 | 0 | 0.31 | 4.09 | 0 |
| Mar-07 | 5.59 | 3.68 | 3.17 | 3.45 | 3.24 | 4.3 | 3.1 | 3.21 | 3.72 | 2.7 |
| Jun-07 | 0.32 | 0.2 | 3.14 | 0.91 | 0.67 | 2.11 | 0.23 | 0.38 | 5.37 | 0.16 |
| Sep-07 | 0.37 | 0.25 | 0.14 | 1.67 | 0.34 | 1.42 | 0.35 | 1.65 | 4.44 | 0 |
| Dec-07 | 0 | 0.33 | 0.82 | 1.64 | 1.41 | 2.62 | 1.27 | 1.26 | 1.94 | 0 |
| **ORP (mV)** | | | | | | | | | | |
| Feb-06 | 76 | 15 | 81 | 152 | 95 | 97 | -362 | 1 | -135 | -480 |
| Jun-06 | 82 | 94 | 86 | 43 | 121 | 104 | -332 | 65 | 74 | -293 |
| Sep-06 | 92 | 93 | 129 | -97 | 136 | 120 | -340 | 79 | 115 | -402 |
| Dec-06 | 120 | 128 | 111 | 43 | -4 | 108 | -274 | 71 | 77 | -399 |
| Mar-07 | 83 | 90 | 130 | 78 | 115 | 107 | -272 | 7 | 85 | -395 |
| Jun-07 | 124 | 112 | 131 | 78 | 56 | 77 | -172 | -18 | 66 | -398 |
| Sep-07 | 60 | 29 | 45 | 47 | -6 | 33 | -159 | -35 | 33 | -401 |
| Dec-07 | 69 | 66 | 96 | 75 | 32 | 84 | -194 | -34 | 48 | -433 |

Notes:

1. ND = Non Detect
2. NS = Not Sampled
3. J = Estimated concentration for a positively identified analyte
4. Duplicate samples not included. For duplicate QA/QC samples, see Tables 4 - 11

Table 5. February 2006 Summary of Detected Volatile Organic Compounds, Natural Attenuation Parameters and Microbial Data, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-7)[1] | Equipment Blank | Field Blank | Storage Blank | Trip Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in red if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | $\mu$g/L | EPA 8260 | NA | ND | ND | ND | 24 | ND | 25 | 16 | 3.8 | ND | ND | 18 | ND | ND | ND | ND |
| 1,1-Dichloroethene | $\mu$g/L | EPA 8260 | 7 | ND | 0.66 | ND | **11** | ND | **10** | **44** | 2.5 | ND | 0.28 | **59** | ND | ND | ND | ND |
| Chloroform | $\mu$g/L | EPA 8260 | 70[2] | ND | 0.25 | ND | 0.77 | ND | 0.29 | ND | 0.29 | 0.56 | ND | ND | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | $\mu$g/L | EPA 8260 | 70 | ND | 0.59 | ND | 15 | 0.65 | 7.6 | **540** | 5 | ND | 0.43 | **550** | ND | ND | ND | ND |
| Tetrachloroethene | $\mu$g/L | EPA 8260 | 5 | ND | 0.25 | ND | 1.6 | 0.3 | 3 | ND | 0.36 | 0.33 | 0.41 | 1.3 | ND | ND | ND | ND |
| Trichloroethene | $\mu$g/L | EPA 8260 | 5 | ND | 2.3 | 0.2 | **72** | ND | **42** | **9.8** | **13** | 0.64 | 0.67 | **69** | ND | ND | ND | ND |
| Total Organic Halides (TOX) | $\mu$g/L as Cl | USEPA-9020B | NA | 13 | 28 | 7.4 | 94 | 32 | 68 | 390 | 46 | 16 | 610 | 460 | 2.2 | 14 | NA | NA |
| Ethane | $\mu$g/L | RSK-175 | NA | 0.56 | 0.55 | 0.62 | 0.55 | 0.54 | 0.54 | ND | 2.1 | 0.59 | 2.4 | ND | 0.53 | 0.52 | NA | NA |
| Ethene | $\mu$g/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | 20 | ND | 0.86 | 5.2 | 25 | ND | ND | NA | NA |
| Methane | $\mu$g/L | RSK-175 | NA | 1.8 | 1.3 | 0.97 | 0.59 | 0.89 | 1.2 | 1700 | 110 | 1 | 110 | 1800 | 0.36 | 0.29 | NA | NA |
| Chloride | mg/L | USEPA-325.2 | NA | 9.9 | 14 | 20 | 190 | 220 | 100 | 480 | 190 | 44 | 180 | 490 | 1.6 | 2.3 | NA | NA |
| Nitrogen, Nitrate | mg/L | USEPA-353.2 | NA | 0.34 | 0.61 | 1.5 | 7.5 | 12 | 4.2 | 0.014 | 0.81 | 0.68 | 0.005 | ND | 0.018 | 0.042 | NA | NA |
| Sulfate | mg/L | USEPA-375.4 | NA | 5.2 | 13 | 110 | 63 | 62 | 24 | ND | 56 | 20 | 590 | 7.7 | ND | ND | NA | NA |
| Sulfide | mg/L | USEPA-376.2 | NA | ND | 0.027 | ND | ND | 0.014 | ND | 14 | ND | 0.14 | 41 | 13 | ND | ND | NA | NA |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2.1 | 1.5 | 1.2 | 1.7 | 1.8 | 2.7 | 120 | 2 | 2.5 | 75 | 110 | 0.4 | 0.23 | NA | NA |
| Iron, Ferrous | mg/L | APHA 3500-Fe B | NA | 0.027 | 0.039 | ND | 0.027 | 0.085 | ND | 1.4 | 0.055 | 0.26 | 0.71 | 1.4 | ND | ND | NA | NA |
| **Hydrogen Analyses** | | | | | | | | | | | | | | | | | | |
| Dissolved $H_2$ | nM | AM20GAX | NA | 1.5 | 1.5 | 2.6 | 110 | 31 | 2 | 2.7 | 84 | 160 | 170 | NA | NA | NA | NA | NA |
| **Microbial Analyses** | | | | | | | | | | | | | | | | | | |
| DHC | cells/mL | CENSUS | NA | NS | NS | 4.88 | 3.66 | 3.76 | 2.82 | 2.99 | 3.68 | 2.5 | 3.14 | NS | NS | NS | NA | NA |
| DSM | cells/mL | CENSUS | NA | NS | NS | 0.00918 | ND | 0.0131 | ND | 2.54 | 0.0416 | 0.17 | 0.00316 | NS | NS | NS | NA | NA |
| DHB | cells/mL | CENSUS | NA | NS | NS | 4540 | 70.7 | 10.2 | 529 | 407 | 862 | 474 | ND | NS | NS | NS | NA | NA |
| EBAC | cells/mL | CENSUS | NA | NS | NS | 46500 | 38200 | 53800 | 7880 | 3050000 | 447000 | 792000 | 32900 | NS | NS | NS | NA | NA |
| MGN | cells/mL | CENSUS | NA | NS | NS | 9130 | 1820 | 62.1 | 786 | 971 | 3430 | 1080 | 2370 | NS | NS | NS | NA | NA |
| IRB/SRB | cells/mL | CENSUS | NA | NS | NS | 59.4 | ND | ND | ND | 56200 | ND | 15.7 | 0.0352 | NS | NS | NS | NA | NA |
| MOB | cells/mL | CENSUS | NA | NS | NS | 50.8 | 1390 | 10300 | 5400 | 354000 | 134000 | 243000 | 151 | NS | NS | NS | NA | NA |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 6.87 | 6.95 | 6.84 | 7.35 | 6.63 | 6.67 | 6.55 | 7.36 | 8.28 | 10.24 | NA | NA | NA | NA | NA |
| Specific Conductance | $\mu$S/cm | Horiba U22 | NA | 0.403 | 0.471 | 0.565 | 1.78 | 1.35 | 2.05 | 2.53 | 1.76 | 0.556 | 3.64 | NA | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 29.66 | 29.37 | 29.2 | 29.31 | 30.08 | 28.6 | 27.7 | 29.33 | 31.29 | 30.35 | NA | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 1.25 | 1.39 | 1.54 | 2.07 | 2.3 | 2.6 | 0.96 | 1.4 | 1.83 | 0.28 | NA | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 76 | 15 | 81 | 152 | 95 | 97 | -362 | 1 | -135 | -480 | NA | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NS = Not Sampled

NA = Not applicable

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-7

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

DHC = Dehalococcoides spp.

DSM = Desulfuromonas spp.

DHB = Dehalobacter spp.

EBAC = Eubacteria

MGN = Methanogens

IRB/SRB = Sulfate and Iron Reducing Bacteria

MOB = Methanotrophs

Table 6. June 2006 Summary of Detected Volatile Organic Compounds, Natural Attenuation Parameters and Microbial Data, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4)[1] | Equipment Blank | Field Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | 0.31J | 0.70J | ND | 25 | ND | 13 | ND | 1.8 | ND | ND | 26 | ND | ND | ND |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | 0.61J | ND | **13** | ND | 6 | **34** | 1.2 | ND | ND | **13** | ND | ND | ND |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | ND | ND | 0.46J | ND | 0.24J | ND | 0.20J | 0.24J | ND | 0.51J | 1.7 | 2 | ND |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | 0.31J | 0.79J | ND | 12 | ND | 3.6 | **570** | 1.4 | 0.57J | 0.50J | 13 | ND | ND | ND |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | ND | ND | ND | 1.7 | ND | 1.8 | ND | 0.33J | 0.58J | 0.52J | 1.8 | ND | ND | ND |
| Trichloroethene | μg/L | EPA 8260 | 5 | 0.93J | 2 | 0.27J | **97** | 0.58J | **26** | ND | **6.7** | 0.40J | 0.36J | **100** | ND | ND | ND |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | **3.5J** | ND | ND | 0.35J | ND | ND | ND | ND |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | 22 | 23 | 9.1J | 77 | 35 | 46 | 480 | 22 | 43 | 110 | NA | ND | ND | NA |
| Chloride | mg/L | USEPA-325.2 | NA | 14 | 21 | 15 | 260 | 200 | 92 | 470 | 170 | 70 | 160 | 260 | ND | ND | NA |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2.1 | 2 | 1.3 | 1.7 | 1.7 | 1.7 | 11 | 1.6 | 2 | 38 | 1.6 | ND | ND | NA |
| **Field Parameters** | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.44 | 7.45 | 7.48 | 7.32 | 7.21 | 7.08 | 7.76 | 7.25 | 8.05 | 13.08 | NA | NA | NA | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.684 | 0.66 | 0.603 | 1.99 | 1.74 | 1.07 | 2.47 | 1.61 | 0.899 | 5.45 | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 32.47 | 30.48 | 30.79 | 31.29 | 31.5 | 31.02 | 28.51 | 30.51 | 32.61 | 28.8 | NA | NA | NA | NA |
| Turbidity | NTU | Horiba U22 | NA | 32.8 | 14.1 | 6.1 | 14.8 | 89.1 | 32.1 | 121 | 50.1 | 105 | 53.9 | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0 | 0 | 0.1 | 2.37 | 0.31 | 1.31 | 0.08 | 0.36 | 3.64 | 1.1 | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 82 | 94 | 86 | 43 | 121 | 104 | -332 | 65 | 74 | -293 | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 7. September 2006 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4)[1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | ND | 0.97J | 0.3J | 81 | ND | 11 | 4J | 14 | ND | 0.49J | 83 | ND | ND | ND | ND |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | 0.87J | ND | **28** | ND | 6.2 | **27** | 6.7 | ND | 0.45J | **29** | ND | ND | ND | ND |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | 0.25J | ND | 1 | ND | 0.26J | ND | 0.39J | ND | ND | 1 | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | 0.24J | 0.7J | ND | 43 | ND | 3.6 | **440** | 9.8 | ND | 1 | 44 | ND | ND | ND | ND |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | ND | ND | ND | 4.4 | ND | 1.3 | ND | 0.97J | ND | ND | 4.5 | ND | ND | ND | ND |
| Trichloroethene | μg/L | EPA 8260 | 5 | ND | 3 | 0.23J | **140** | ND | **23** | **9** | **45** | ND | 0.88J | **150** | ND | ND | ND | ND |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | **4.9J** | ND | ND | 1.3J | ND | ND | ND | ND | ND |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | NS | NS | NS | 180 | 17 | 36 | 320 | 46 | 29 | 1000 | 200 | ND | ND | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 9.7 | 13 | 23 | 150 | 160 | 75 | 500 | 140 | 63 | 290 | 150 | 0.59J | 0.42J | NS | NS |
| Ethane | μg/L | RSK-175 | NA | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS | ND | NS | NS | NS | NS |
| Ethene | μg/L | RSK-175 | NA | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS | ND | NS | NS | NS | NS |
| Methane | μg/L | RSK-175 | NA | NS | NS | NS | 14 | NS | NS | 3800 | NS | NS | NS | 11 | NS | NS | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2.2 | 1.3 | 1.3 | 1.9 | 1.6 | 1.6 | 8.8 | 1.6 | 1.2 | 110 | 1.9 | 0.25J | ND | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.14 | 7.14 | 6.95 | 6.96 | 6.94 | 6.85 | 6.85 | 7.04 | 7.79 | 7.58 | NA | NA | NA | | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.484 | 0.61 | 1.02 | 1.94 | 1.75 | 1.18 | 2.93 | 1.61 | 0.82 | 4.31 | NA | NA | NA | | NA |
| Temperature | ºC | Horiba U22 | NA | 30.77 | 29.77 | 29.8 | 30.76 | 30.06 | 31.25 | 28.89 | 30.43 | 31.16 | 31.88 | NA | NA | NA | | NA |
| Turbidity | NTU | Horiba U22 | NA | 10 | 6.2 | 10 | 101 | 97 | 101 | 165 | 53.8 | 38.7 | 170 | NA | NA | NA | | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0.05 | 0 | 0 | 2.75 | 0.16 | 1.94 | 0 | 0.57 | 1.67 | 0 | NA | NA | NA | | NA |
| ORP | mV | Horiba U22 | NA | 92 | 93 | 129 | -97 | 136 | 120 | -340 | 79 | 115 | -402 | NA | NA | NA | | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 8. December 2006 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4)[1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | ND | .83J | .44J | 40 | ND | 11 | 7.8 | 30 | ND | ND | 40 | ND | ND | ND | ND |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | .63J | ND | **13** | ND | 4.2 | **34** | **9.9** | ND | ND | **13** | ND | ND | ND | ND |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | ND | ND | 0.70J | ND | ND | 5 | 120 | ND | ND | 0.69J | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | ND | .66J | ND | 20 | .38J | 2.7 | **560** | 16 | ND | ND | 20 | ND | ND | ND | ND |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | ND | ND | ND | 4.4 | ND | .88J | ND | 1.1 | ND | ND | 1.5 | ND | ND | ND | ND |
| Trichloroethene | μg/L | EPA 8260 | 5 | ND | 2.3 | .43J | **100** | ND | **17** | **60** | **68** | 0.48J | 0.57J | **100** | ND | ND | ND | ND |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | **2.6** | ND | ND | 0.72J | ND | ND | ND | ND | ND |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | NS | NS | NS | 110 | 38 | 32 | 470 | 70 | 13 | 250 | 85 | 2.6J | 2.5J | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 11 | 12 | 20 | 150 | 120 | 85 | 530 | 120 | 32 | 180 | 140 | 0.45J | 1 | NS | NS |
| Ethane | μg/L | RSK-175 | NA | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS | ND | NS | NS | NS | NS |
| Ethene | μg/L | RSK-175 | NA | NS | NS | NS | ND | NS | NS | ND | NS | NS | NS | ND | NS | NS | NS | NS |
| Methane | μg/L | RSK-175 | NA | NS | NS | NS | ND | NS | NS | 9000 | NS | NS | NS | ND | NS | NS | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2 | 1.4 | 1.2 | 2.1 | 2 | 1.6 | 8.8 | 1.7 | 1.2 | 43 | 2.2 | ND | ND | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.35 | 7.45 | 7.19 | 7.19 | 7.13 | 6.99 | 7.17 | 7.27 | 7.81 | 12.54 | NA | NA | NA | | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.459 | 0.519 | 0.901 | 1.51 | 1.47 | 1.2 | 2.69 | 1.63 | 0.593 | 5.67 | NA | NA | NA | | NA |
| Temperature | ºC | Horiba U22 | NA | 31.3 | 29.7 | 30.8 | 31.27 | 30.3 | 31.1 | 31.2 | 30.7 | 30 | 29.7 | NA | NA | NA | | NA |
| Turbidity | NTU | Horiba U22 | NA | 11.5 | 20.6 | 20.2 | 112 | 119 | 123 | 228 | 158 | 35.2 | 300 | NA | NA | NA | | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0.74 | 0 | 0 | 6.08 | 0 | 3.4 | 0 | 0.31 | 4.09 | 0 | NA | NA | NA | | NA |
| ORP | mV | Horiba U22 | NA | 120 | 128 | 111 | 43 | -4 | 108 | -274 | 71 | 77 | -399 | NA | NA | NA | | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 9. March 2007 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4) [1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | µg/L | EPA 8260 | NA | ND | 1.6 | ND | 13 | ND | 25 | 13 | 2.9 | ND | ND | 11 | ND | ND | ND | ND |
| 1,1-Dichloroethene | µg/L | EPA 8260 | 7 | ND | 3 | ND | **9.4** | ND | 6.9 | **62** | 1.6 | ND | ND | **8** | ND | ND | ND | ND |
| Chloroform | µg/L | EPA 8260 | 70[2] | ND | 0.48J | ND | 0.39J | ND | ND | ND | ND | ND | ND | ND | 2.2 | 3 | ND | ND |
| cis-1,2-Dichloroethene | µg/L | EPA 8260 | 70 | ND | 3.6 | ND | 9.4 | ND | 7.8 | **470** | 3 | ND | ND | 7.9 | ND | ND | ND | ND |
| Tetrachloroethene | µg/L | EPA 8260 | 5 | ND | ND | ND | 1.1 | ND | 1.9 | ND | 1.1 | ND | ND | 0.93J | ND | ND | ND | ND |
| Trichloroethene | µg/L | EPA 8260 | 5 | ND | 5 | ND | **69** | ND | **32** | **190** | **12** | 0.48J | ND | **61** | ND | ND | ND | ND |
| Vinyl Chloride | µg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| Total Organic Halides (TOX) | µg/L as Cl | USEPA-9020B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 18 | 21 | 33 | 160 | 180 | 110 | 500 | 150 | 75 | 180 | 160 | 0.94J | ND | NS | NS |
| Ethane | µg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | NS | NS |
| Ethene | µg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | 9 | ND | ND | ND | NS | NS |
| Methane | µg/L | RSK-175 | NA | ND | ND | ND | ND | ND | 0.36J | 7000 | 500 | ND | 25 | ND | ND | ND | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2.2 | 1.8 | 2.5 | 2.2 | 2.5 | 2.3 | 8.6 | 2.5 | 2.2 | 42.0 | 2.2 | 0.42J | 0.48J | NS | NS |
| Nitrate | mg/L | USEPA-353.2 | 10 | 0.96 | 0.69 | **50** | 9.6 | **11** | 3.4 | ND | 10 | 0.021J | 0.035J | 10 | 0.021 | 0.029 | NS | NS |
| Sulphate | mg/L | USEPA-375.4 | NA | 21 | 18 | 680 | 60 | 56 | 25 | 43 | 57 | 34 | 180 | 61 | ND | ND | NS | NS |
| Sulphide | mg/L | USEPA-376.2 | NA | ND | 0.47J | 0.13J | ND | 0.9 | 0.043J | 3.6 | ND | 0.025J | 12.0 | 0.031J | ND | ND | NS | NS |
| Ferrous Iron | mg/L | APHA 3500-Fe B | NA | 0.022 | 0.11 | 0.23 | 0.067 | 0.088 | 0.095 | 0.74 | 0.044 | 0.18 | 0.32 | 0.037 | ND | ND | NS | NS |
| Magnesium | mg/L | USEPA-6010B | NA | NS | NS | NS | 37 | NS | NS | 32 | NS | NS | NS | NS | NS | NS | NS | NS |
| Calcium | mg/L | USEPA-6010B | NA | NS | NS | NS | 63 | NS | NS | 57 | NS | NS | NS | NS | NS | NS | NS | NS |
| Sodium | mg/L | USEPA-6010B | NA | NS | NS | NS | 280 | NS | NS | 460 | NS | NS | NS | NS | NS | NS | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 6.85 | 7.15 | 6.79 | 6.8 | 6.75 | 6.61 | 6.79 | 6.81 | 7.55 | 11.39 | NA | NA | NA | NA | NA |
| Specific Conductance | µS/cm | Horiba U22 | NA | 0.471 | 0.419 | 1.34 | 1.88 | 1.95 | 0.862 | 2.77 | 1.82 | 0.563 | 4.34 | NA | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 29.64 | 29.7 | 29.38 | 31.03 | 29.61 | 31.,2 | 29.24 | 31.08 | 31.35 | 29.7 | NA | NA | NA | NA | NA |
| Turbidity | NTU | Horiba U22 | NA | 42.7 | 84 | 123 | 113 | 327 | 10.5 | 474 | 70.8 | 110 | 240 | NA | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 5.59 | 3.68 | 3.17 | 3.45 | 3.24 | 4.3 | 3.1 | 3.21 | 3.72 | 2.7 | NA | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 83 | 90 | 130 | 78 | 115 | 107 | -272 | 7 | 85 | -395 | NA | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 10. June 2007 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4)[1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | ND | 1.1 | ND | 18 | ND | 20 | 12 | 7.1 | ND | ND | 17 | ND | ND | ND | ND |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | 0.83J | ND | **9.6** | ND | **9.1** | **48** | 4.1 | ND | ND | **9** | ND | ND | ND | ND |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | 0.43J | ND | 0.48J | ND | ND | ND | ND | ND | ND | 0.46J | ND | ND | ND | ND |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | ND | 0.83J | ND | 14 | ND | 6.8 | **260** | 6 | ND | 0.79J | 14 | ND | ND | ND | ND |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | ND | ND | ND | 0.93J | ND | 1.7 | 0.74J | 0.5J | ND | ND | 0.98J | ND | ND | ND | ND |
| Trichloroethene | μg/L | EPA 8260 | 5 | 0.39J | 3.2 | ND | **64** | ND | **29** | **160** | **27** | ND | 0.43J | **62** | ND | ND | ND | ND |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | 0.43J | ND | 0.45J | 2.5 | ND | 0.17 | ND | 0.5J | ND | ND | ND | ND |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 19 | 16 | 20 | 160 | 130 | 96 | 490 | 170 | 62 | 240 | 160 | ND | ND | NS | NS |
| Ethane | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | NS | NS |
| Ethene | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12 | ND | ND | ND | NS | NS |
| Methane | μg/L | RSK-175 | NA | 1.4 | 0.18J | ND | ND | 8.4 | 1.3 | 8000 | 380 | 2.7 | 360 | ND | ND | ND | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 1.8 | 1.3 | 1.3 | 1.8 | 1.9 | 1.6 | 7.9 | 1.7 | 1.5 | 67.0 | 1.9 | ND | ND | NS | NS |
| Nitrate | mg/L | USEPA-353.2 | 10 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sulphate | mg/L | USEPA-375.4 | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sulphide | mg/L | USEPA-376.2 | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Ferrous Iron | mg/L | APHA 3500-Fe B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Magnesium | mg/L | USEPA-6010B | NA | NS | NS | NS | 33 | NS | NS | 32 | NS | NS | NS | NS | NS | NS | NS | NS |
| Calcium | mg/L | USEPA-6010B | NA | NS | NS | NS | 55 | NS | NS | 55 | NS | NS | NS | NS | NS | NS | NS | NS |
| Sodium | mg/L | USEPA-6010B | NA | NS | NS | NS | 300 | NS | NS | 480 | NS | NS | NS | NS | NS | NS | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.31 | 7.46 | 7.21 | 7.26 | 8.01 | 7.85 | 7.32 | 7.22 | 8.41 | 14 | NA | NA | NA | NA | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.651 | 0.493 | 0.751 | 1.9 | 1.65 | 1.32 | 2.91 | 1.84 | 0.758 | 3.77 | NA | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 29.58 | 30.39 | 30.94 | 32.3 | 30.17 | 32.16 | 35.21 | 31.54 | 30.95 | 30.39 | NA | NA | NA | NA | NA |
| Turbidity | NTU | Horiba U22 | NA | 32.6 | 96.2 | 86.6 | 86.2 | 180 | 59.4 | 444 | 146 | 33.1 | 646 | NA | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0.32 | 0.2 | 3.14 | 0.91 | 0.67 | 2.11 | 0.23 | 0.38 | 5.37 | 0.16 | NA | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 124 | 112 | 131 | 78 | 56 | 77 | -172 | -18 | 66 | -398 | NA | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 11. September 2007 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4) [1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | ND | 1.3 | ND | 20 | ND | 11 | 16 | 5.3 | ND | 0.38J | 21 | ND | ND | ND | ND |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | 2.2 | ND | **8.6** | ND | 5.1 | **54** | 3.4 | ND | ND | **9.5** | ND | ND | ND | ND |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | 0.50J | ND | 0.49J | ND | ND | ND | ND | ND | ND | 0.50J | ND | 1.5 | ND | ND |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | ND | 1.9 | ND | 16 | ND | 3.4 | **370** | 3.9 | ND | 0.77J | 16 | ND | ND | ND | ND |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | ND | ND | ND | 1 | ND | 0.67J | 1 | 0.45J | ND | ND | 1.2 | ND | ND | ND | ND |
| Trichloroethene | μg/L | EPA 8260 | 5 | ND | 4 | ND | **85** | ND | **18** | **320** | **23** | ND | 0.78J | **94** | ND | ND | ND | ND |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | 2.0J | ND | ND | 1.2J | ND | ND | ND | ND | ND |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 15 | 15 | 20 | 130 | 150 | 70 | 490 | 160 | 59 | 230 | 130 | ND | ND | NS | NS |
| Ethane | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | NS | NS |
| Ethene | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | 18J | ND | ND | ND | NS | NS |
| Methane | μg/L | RSK-175 | NA | 1.4 | ND | ND | ND | 6.2 | 1.8 | 6600 | 190 | 1.6 | 860 | ND | ND | ND | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 1.8 | 1.3 | 1.3 | 1.9 | 1.5 | 1.4 | 8.8 | 1.6 | 1.3 | 92.0 | 1.7 | ND | ND | NS | NS |
| Nitrate | mg/L | USEPA-353.2 | 10 | 0.22 | 1.2 | 4.1 | 7.1 | 8.1 | 5.5 | 0.049J | 9.1 | 1.8 | 0.0090J | 7.4 | 0.0070J | 0.0051J | NS | NS |
| Sulfate | mg/L | USEPA-375.4 | NA | 12 | 13 | 160 | 56 | 54 | 37 | 60 | 60 | 27 | 380 | 55 | ND | ND | NS | NS |
| Sulfide | mg/L | USEPA-376.2 | NA | 0.020J | 0.035J | 0.050J | 0.013J | 0.012J | 0.013J | 0.78 | 0.013J | 0.016J | 31.0 | ND | ND | ND | NS | NS |
| Ferrous Iron | mg/L | APHA 3500-Fe B | NA | 0.053 | 0.10 | 0.23 | 0.29 | 0.25 | 0.055 | 0.72 | 0.042 | 0.15 | 5.6 | 0.22 | ND | ND | NS | NS |
| Magnesium | mg/L | USEPA-6010B | NA | NS | NS | NS | 34 | NS | NS | 31 | NS | NS | NS | NS | NS | NS | NS | NS |
| Calcium | mg/L | USEPA-6010B | NA | NS | NS | NS | 57 | NS | NS | 52 | NS | NS | NS | NS | NS | NS | NS | NS |
| Sodium | mg/L | USEPA-6010B | NA | NS | NS | NS | 280 | NS | NS | 460 | NS | NS | NS | NS | NS | NS | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.58 | 8.08 | 7.82 | 7.75 | 8.35 | 7.82 | 10.54 | 8.77 | 7.99 | 14.38 | NA | NA | NA | NA | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.592 | 0.601 | 0.741 | 1.84 | 1.77 | 1.25 | 2.90 | 1.86 | 0.74 | 3.8 | NA | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 29.62 | 29.28 | 29.95 | 30.68 | 29.76 | 33.7 | 31.26 | 30.58 | 30.5 | 30.95 | NA | NA | NA | NA | NA |
| Turbidity | NTU | Horiba U22 | NA | 152 | 313 | 650 | 421 | 649 | 228 | 312 | 243 | 190 | 664 | NA | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0.37 | 0.25 | 0.14 | 1.67 | 0.34 | 1.42 | 0.35 | 1.65 | 4.44 | 0 | NA | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 60 | 29 | 45 | 47 | -6 | 33 | -159 | -35 | 33 | -401 | NA | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

Table 12. December 2007 Summary of Detected Volatile Organic Compounds and Natural Attenuation Parameters, GE Caribe, Vieques, PR.

| PARAMETER | Units | Method | MCL | C-1 | C-2 | C-3 | C-4 | C-5 | C-6 | C-7 | C-8 | C-9 | C-10 | C-11 (dup of C-4)[1] | Equipment Blank | Field Blank | Trip Blank | Storage Blank |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Parameters showing levels above laboratory detection limits (in bold if above MCL).** | | | | | | | | | | | | | | | | | | |
| 1,1-Dichloroethane | μg/L | EPA 8260 | NA | ND | 0.74J | 0.27J | 22 | ND | 13 | 20 | 13 | ND | 0.18J | 22 | ND | ND | NS | NS |
| 1,1-Dichloroethene | μg/L | EPA 8260 | 7 | ND | 1.3 | ND | **10** | ND | 5.3 | **73** | 6.6 | ND | 0.83J | **10** | ND | ND | NS | NS |
| Chloroform | μg/L | EPA 8260 | 70[2] | ND | 0.93J | ND | 0.78J | ND | 0.52J | ND | 0.56J | 0.52J | ND | 0.82J | ND | ND | NS | NS |
| cis-1,2-Dichloroethene | μg/L | EPA 8260 | 70 | ND | 1.5 | ND | 16 | ND | 4.3 | **360** | 8.8 | 1.3 | 2.4 | 17 | ND | ND | NS | NS |
| Tetrachloroethene | μg/L | EPA 8260 | 5 | 0.31J | 0.77J | 0.43J | 1.2 | 0.26J | 1.4 | 1.7 | 0.92J | 0.69J | 1.1 | 1.2 | ND | ND | NS | NS |
| Trichloroethene | μg/L | EPA 8260 | 5 | ND | 3.7 | ND | **79** | 2 | **20** | **440** | **45** | 2 | 2.8 | **81** | ND | ND | NS | NS |
| Vinyl Chloride | μg/L | EPA 8260 | 2 | ND | ND | ND | ND | ND | ND | 1.8J | ND | ND | 0.78J | ND | ND | ND | NS | NS |
| Total Organic Halides (TOX) | μg/L as Cl | USEPA-9020B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Chloride | mg/L | USEPA-325.2 | NA | 8.6 | 13 | 17 | 110 | 100 | 83 | 490 | 140 | 48 | 200 | 110 | ND | ND | NS | NS |
| Ethane | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND | NS | NS |
| Ethene | μg/L | RSK-175 | NA | ND | ND | ND | ND | ND | ND | ND | ND | ND | 7.7J | ND | ND | ND | NS | NS |
| Methane | μg/L | RSK-175 | NA | 1.1 | 0.25J | ND | ND | 6.2 | ND | 2100 | 210 | ND | 270 | ND | ND | ND | NS | NS |
| Carbon, Total Organic | mg/L | USEPA-415.1 | NA | 2.4 | 1.3 | 1.5 | 2.2 | 2.7 | 1.9 | 8.7 | 1.8 | 1.8 | 59.0 | 2.3 | 0.32J | 0.29J | NS | NS |
| Nitrate | mg/L | USEPA-353.2 | 10 | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sulphate | mg/L | USEPA-375.4 | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Sulphide | mg/L | USEPA-376.2 | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Ferrous Iron | mg/L | APHA 3500-Fe B | NA | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Magnesium | mg/L | USEPA-6010B | NA | NS | NS | NS | 29 | NS | NS | 33 | NS | NS | NS | NS | NS | NS | NS | NS |
| Calcium | mg/L | USEPA-6010B | NA | NS | NS | NS | 49 | NS | NS | 54 | NS | NS | NS | NS | NS | NS | NS | NS |
| Sodium | mg/L | USEPA-6010B | NA | NS | NS | NS | 280 | NS | NS | 500 | NS | NS | NS | NS | NS | NS | NS | NS |
| **Field Parameters** | | | | | | | | | | | | | | | | | | |
| pH | --- | Horiba U22 | NA | 7.45 | 7.58 | 7.23 | 7.4 | 7.22 | 7.17 | 7.4 | 7.38 | 7.94 | 12.4 | NA | NA | NA | NA | NA |
| Specific Conductance | μS/cm | Horiba U22 | NA | 0.523 | 0.605 | 1.17 | 1.72 | 1.42 | 1.2 | 2.79 | 1.73 | 0.829 | 4.09 | NA | NA | NA | NA | NA |
| Temperature | ºC | Horiba U22 | NA | 29.81 | 30 | 28.91 | 30.56 | 31.1 | 30.27 | 28.63 | 30.87 | 32.01 | 29.44 | NA | NA | NA | NA | NA |
| Turbidity | NTU | Horiba U22 | NA | 32.6 | 47.5 | 321 | 30.5 | 109 | 61.1 | 273 | 96.8 | 156 | 854 | NA | NA | NA | NA | NA |
| Dissolved Oxygen | mg/L | Horiba U22 | NA | 0 | 0.33 | 0.82 | 1.64 | 1.41 | 2.62 | 1.27 | 1.26 | 1.94 | 0 | NA | NA | NA | NA | NA |
| ORP | mV | Horiba U22 | NA | 69 | 66 | 96 | 75 | 32 | 84 | -194 | -34 | 48 | -433 | NA | NA | NA | NA | NA |

Note: The drinking water criteria are presented based on USEPA standards, however, the aquifer is not used for potable water supply

NA = Not applicable

NS = Not sampled

ND = Not detected at concentration above laboratory detection limit

[1] Duplicate sample collected at location C-4

[2] MCL for total trihalomethanes is listed since no MCL is available for chloroform

Field parameters recorded in this table are values immediately prior to sampling

ORP = oxidation reduction potential

FIGURES


0 800 1600

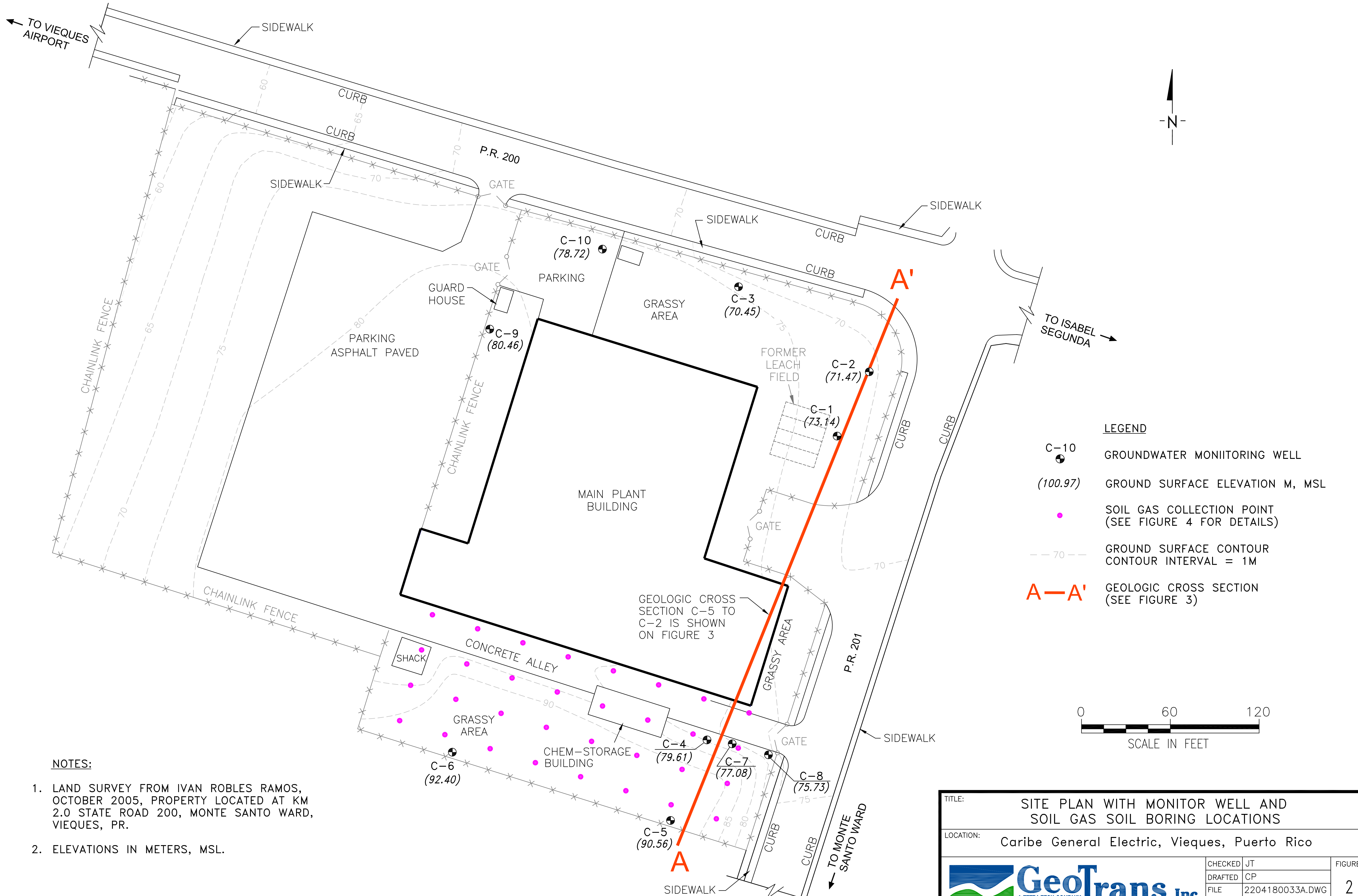
SCALE IN FEET

N


| | |
|---|---|
| TITLE: | SITE LOCATION MAP |
| LOCATION: | Caribe General Electric, Vieques, Puerto Rico |

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | NB | FIGURE: |
| DRAFTED | CP | 1 |
| FILE | 2204180001A.DWG | |
| DATE | 5–19–08 | |



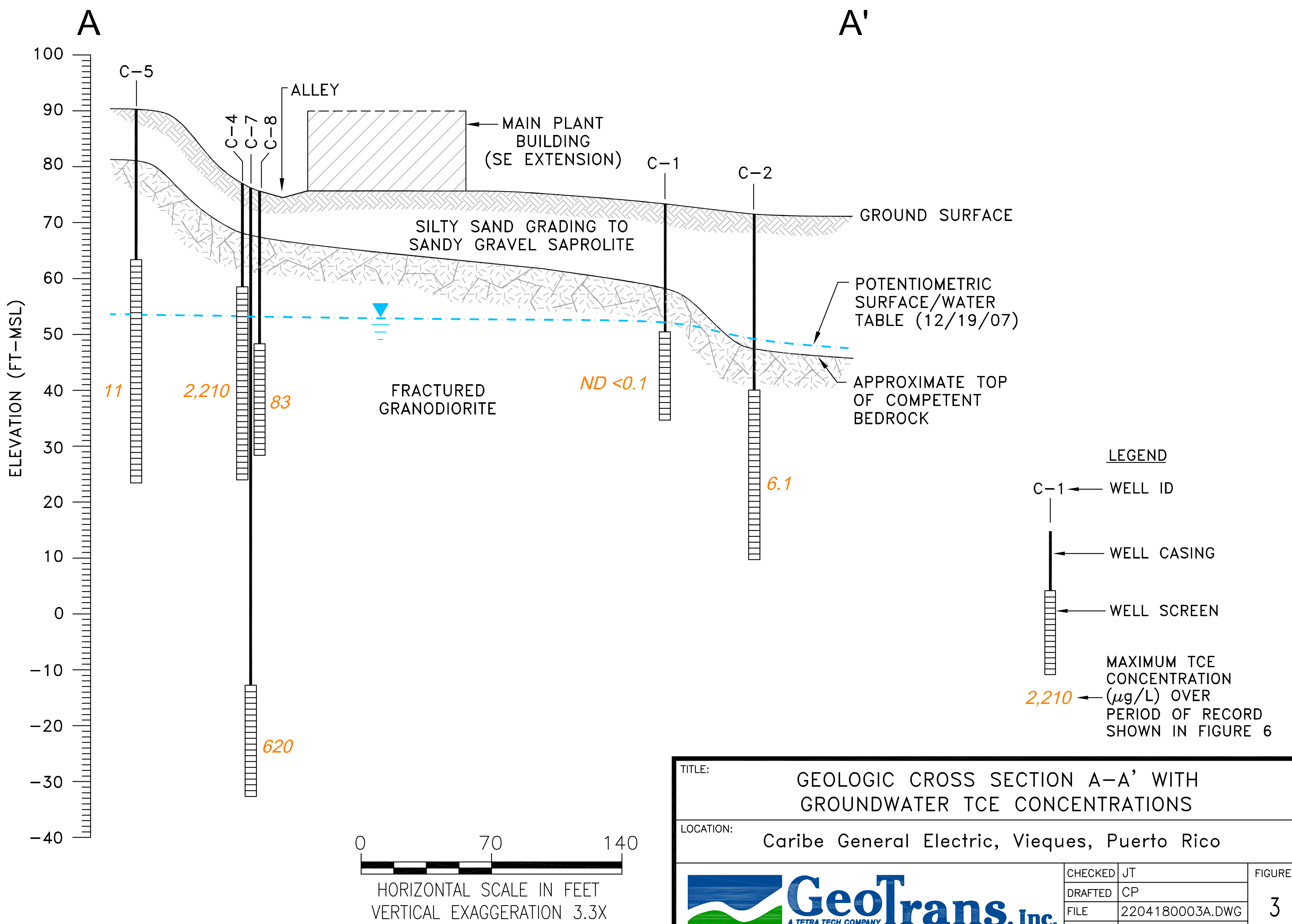

NOTES:

1. LAND SURVEY FROM IVAN ROBLES RAMOS, OCTOBER 2005, PROPERTY LOCATED AT KM 2.0 STATE ROAD 200, MONTE SANTO WARD, VIEQUES, PR.
2. ELEVATIONS IN METERS, MSL.

| | |
|---|---|
| TITLE: | SITE PLAN WITH MONITOR WELL AND SOIL GAS SOIL BORING LOCATIONS |
| LOCATION: | Caribe General Electric, Vieques, Puerto Rico |

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | JT | FIGURE: |
| DRAFTED | CP | 2 |
| FILE | 2204180033A.DWG | |
| DATE | 10-22-09 | |



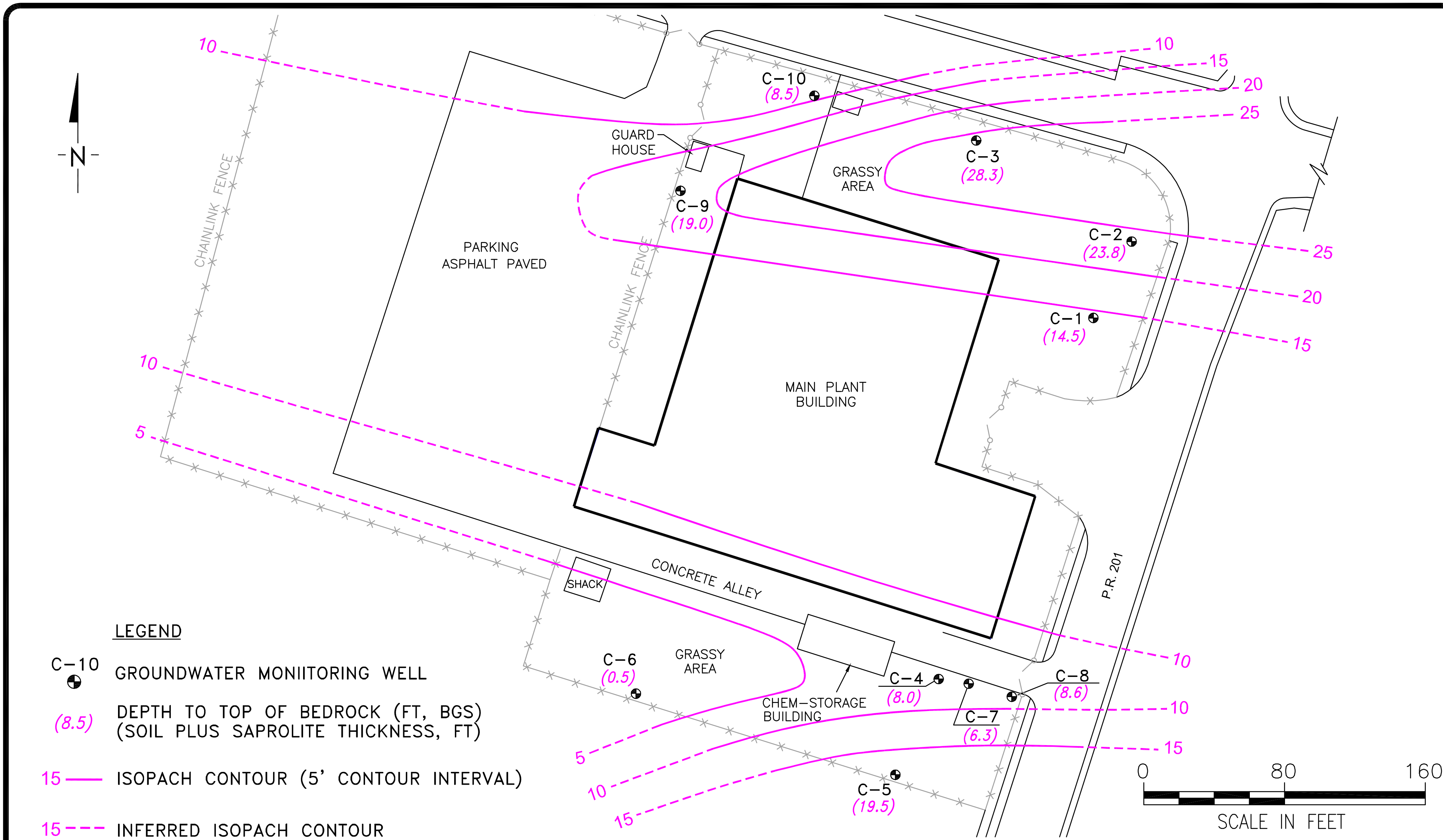

TITLE: GEOLOGIC CROSS SECTION A-A' WITH GROUNDWATER TCE CONCENTRATIONS

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | JT | FIGURE: |
| DRAFTED | CP | 3 |
| FILE | 2204180003A.DWG | |
| DATE | 5-19-08 | |

2204180010A.DWG




LEGEND

C–10 GROUNDWATER MONIITORING WELL

(8.5) DEPTH TO TOP OF BEDROCK (FT, BGS)
(SOIL PLUS SAPROLITE THICKNESS, FT)

15 —— ISOPACH CONTOUR (5' CONTOUR INTERVAL)

15 – – – INFERRED ISOPACH CONTOUR

NOTES:

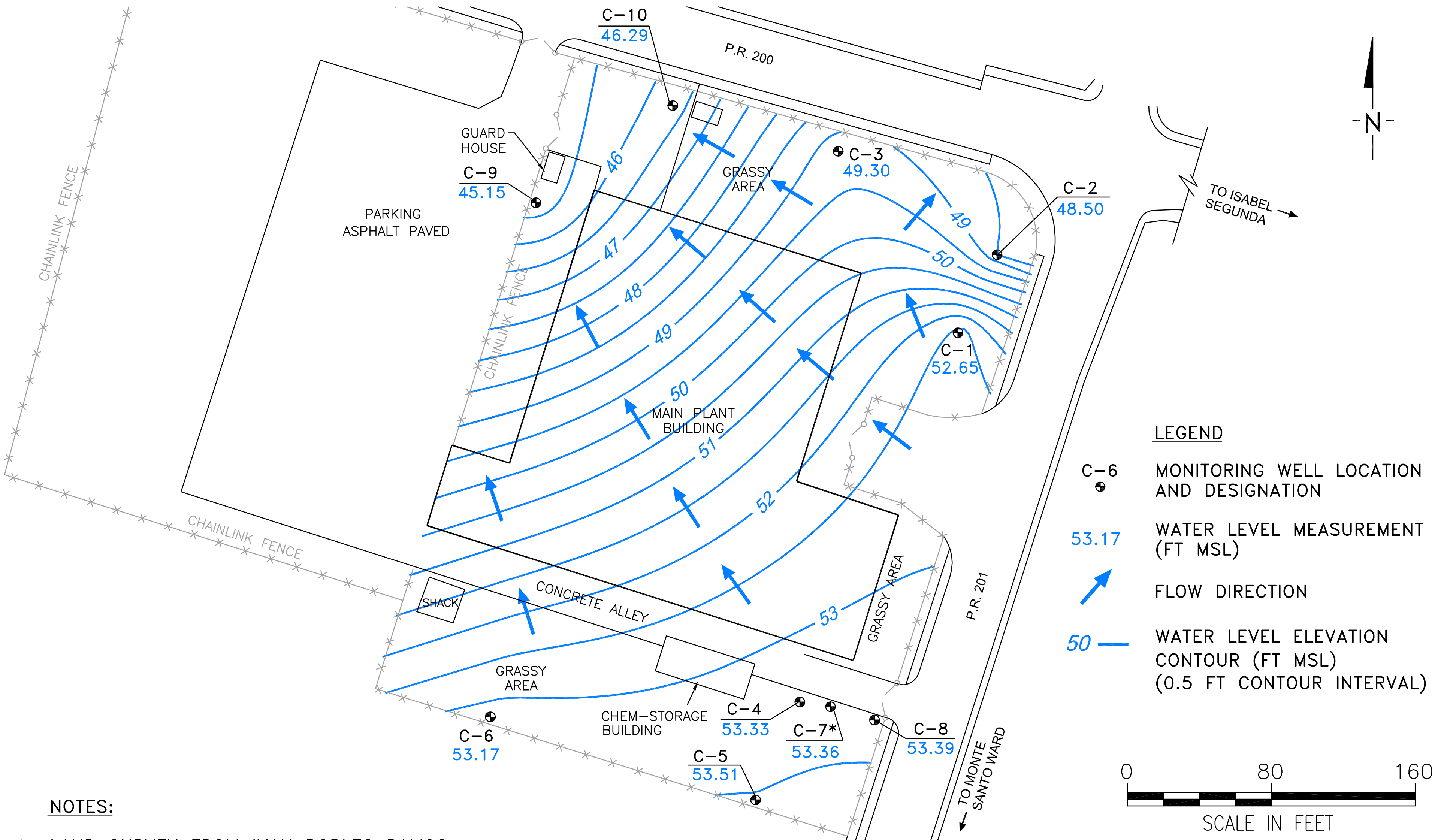
1. LAND SURVEY FROM IVAN ROBLES RAMOS, OCTOBER 2005, PROPERTY LOCATED AT KM 2.0 STATE ROAD 200, MONTE SANTO WARD, VIEQUES, PR.

| | |
|---|---|
| TITLE: | SOIL ISOPACH MAP |
| LOCATION: | Caribe General Electric, Vieques, Puerto Rico |

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | JT | FIGURE: |
| DRAFTED | CP | 4 |
| FILE | 2204180010A.DWG | |
| DATE | 5–19–08 | |

2204180011A.DWG




NOTES:

1. LAND SURVEY FROM IVAN ROBLES RAMOS, OCTOBER 2005, PROPERTY LOCATED AT KM 2.0 STATE ROAD 200, MONTE SANTO WARD, VIEQUES, PR.

2. *C-7 IS SCREENED AT A LOWER INTERVAL THAN THE OTHER MONITORING WELLS, AND THEREFORE WAS NOT USED IN CONTOURING.

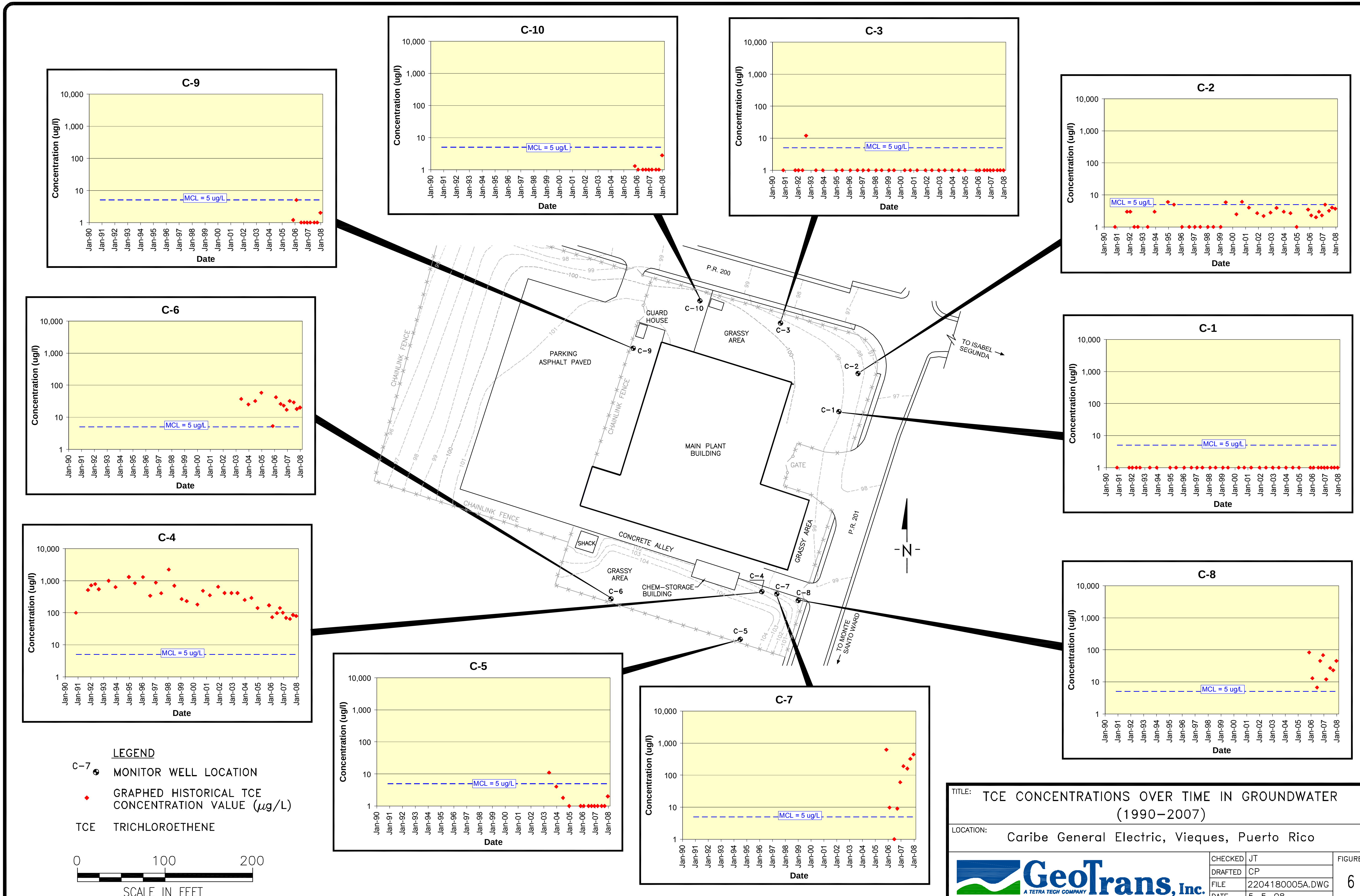
TITLE: POTENTIOMETRIC SURFACE MAP, DECEMBER 19, 2007

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | |
|---|---|
| CHECKED | JT |
| DRAFTED | CP |
| FILE | 2204180012A.DWG |
| DATE | 5-20-08 |

FIGURE: 5



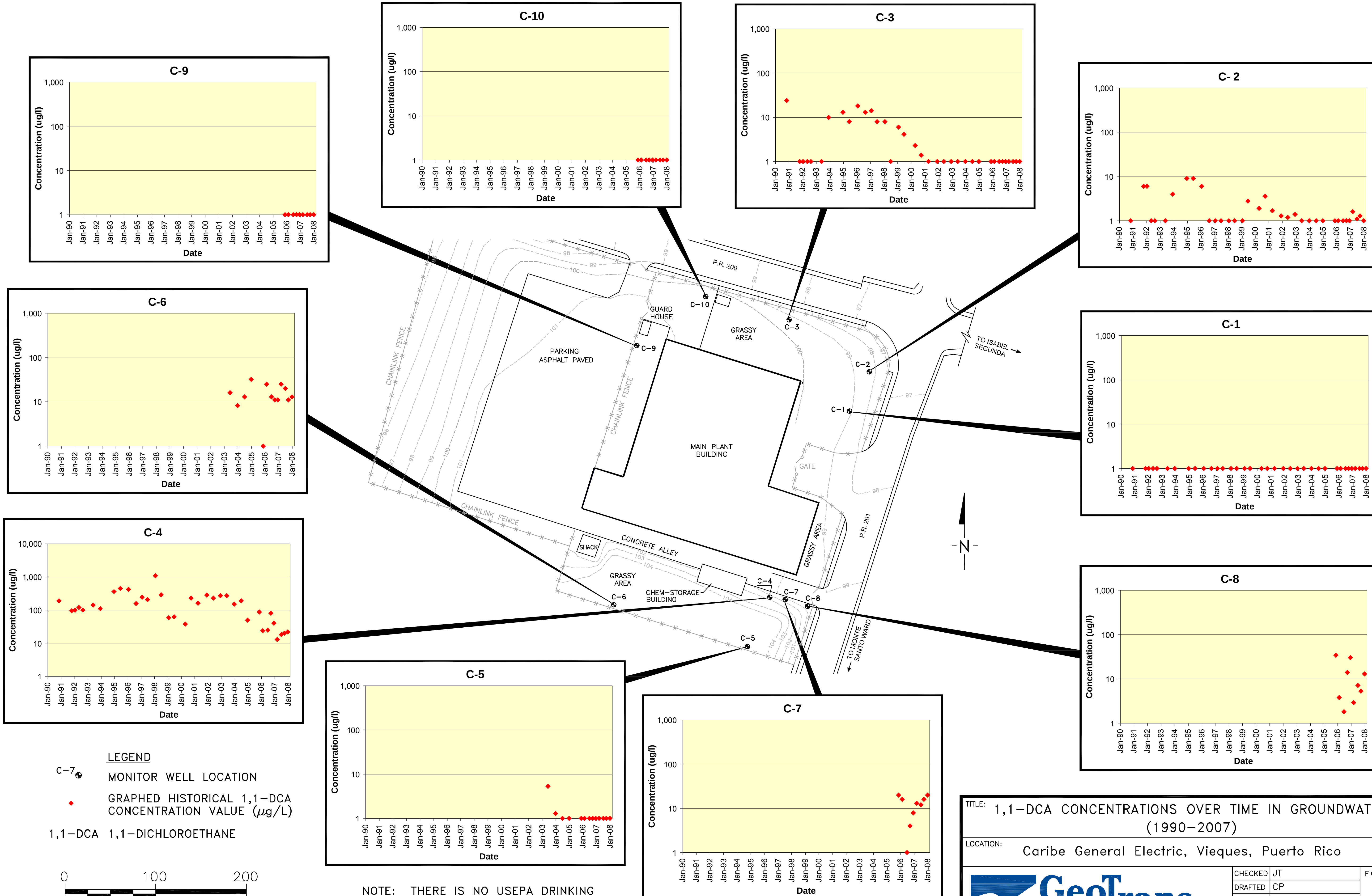

TITLE: TCE CONCENTRATIONS OVER TIME IN GROUNDWATER (1990–2007)

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | |
|---|---|
| CHECKED | JT |
| DRAFTED | CP |
| FILE | 2204180005A.DWG |
| DATE | 5-5-08 |

FIGURE: 6




LEGEND

C-7 MONITOR WELL LOCATION

GRAPHED HISTORICAL 1,1-DCA CONCENTRATION VALUE ($\mu$g/L)

1,1-DCA 1,1-DICHLOROETHANE

0 100 200

SCALE IN FEET

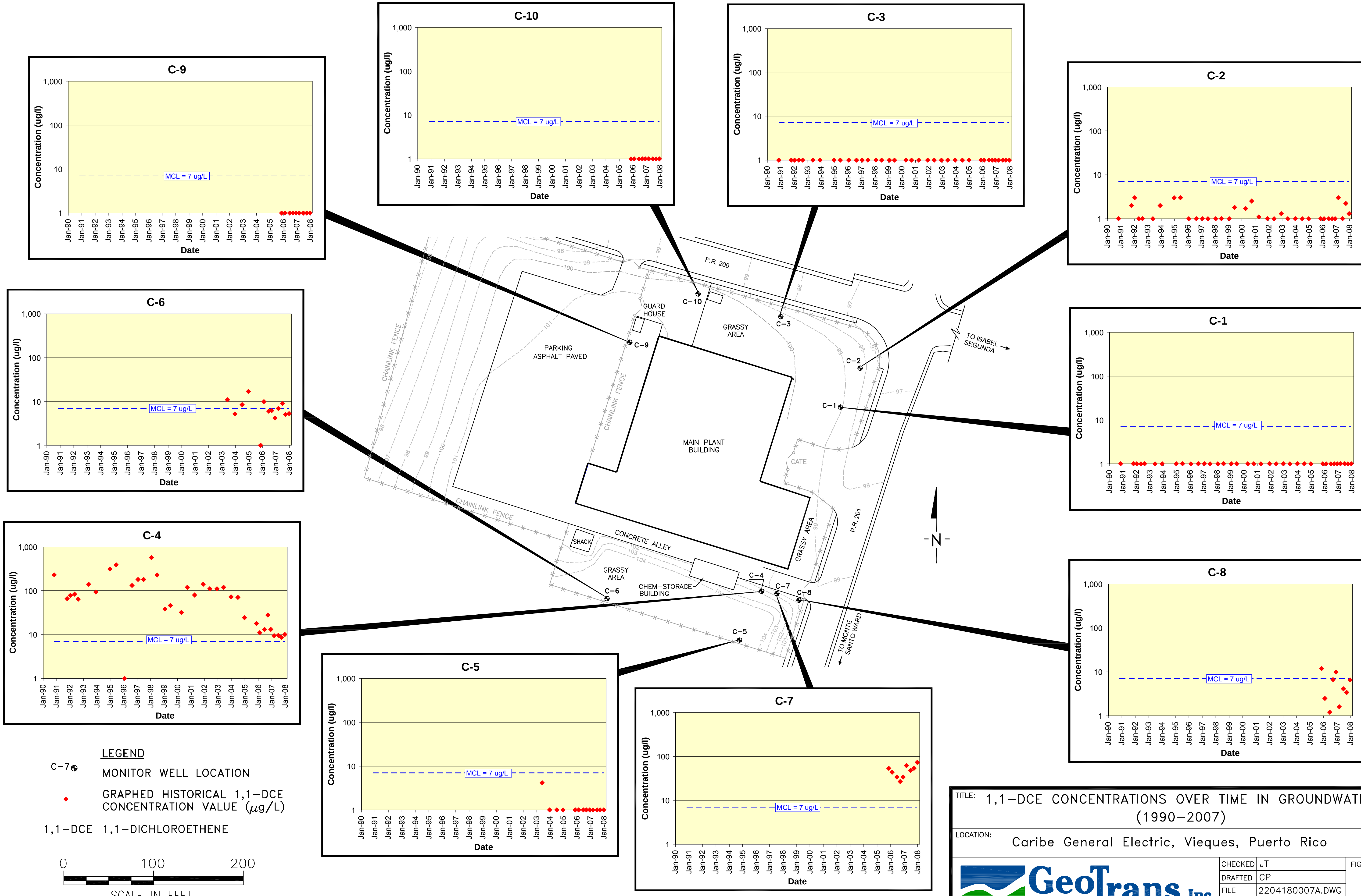
NOTE: THERE IS NO USEPA DRINKING WATER MCL FOR 1,1-DCA.

TITLE: 1,1-DCA CONCENTRATIONS OVER TIME IN GROUNDWATER (1990-2007)

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | JT | FIGURE: |
| DRAFTED | CP | 7 |
| FILE | 2204180006A.DWG | |
| DATE | 5-5-08 | |



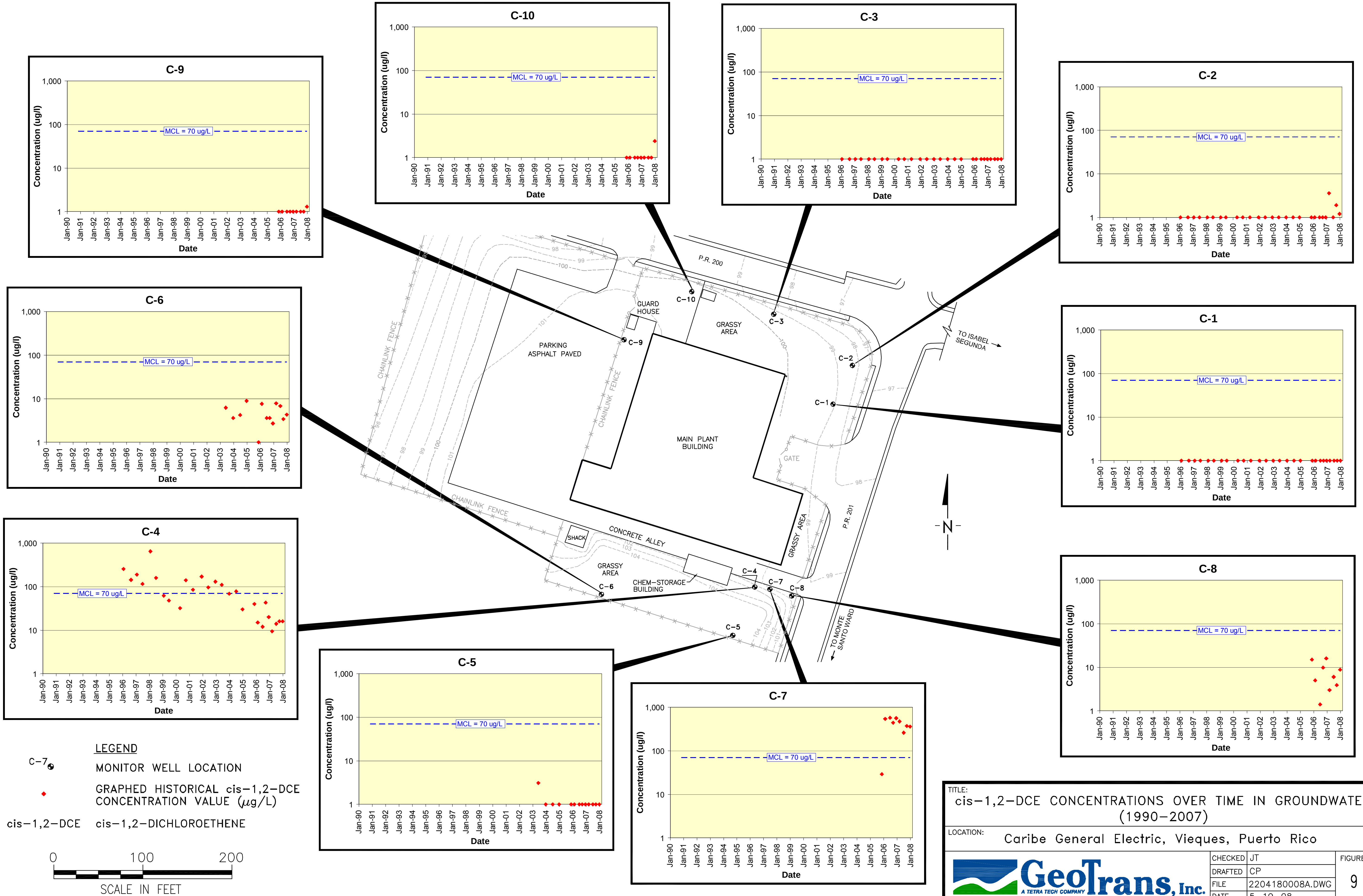

TITLE: 1,1-DCE CONCENTRATIONS OVER TIME IN GROUNDWATER (1990-2007)

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | |
|---|---|
| CHECKED | JT |
| DRAFTED | CP |
| FILE | 2204180007A.DWG |
| DATE | 5-5-08 |

FIGURE: 8

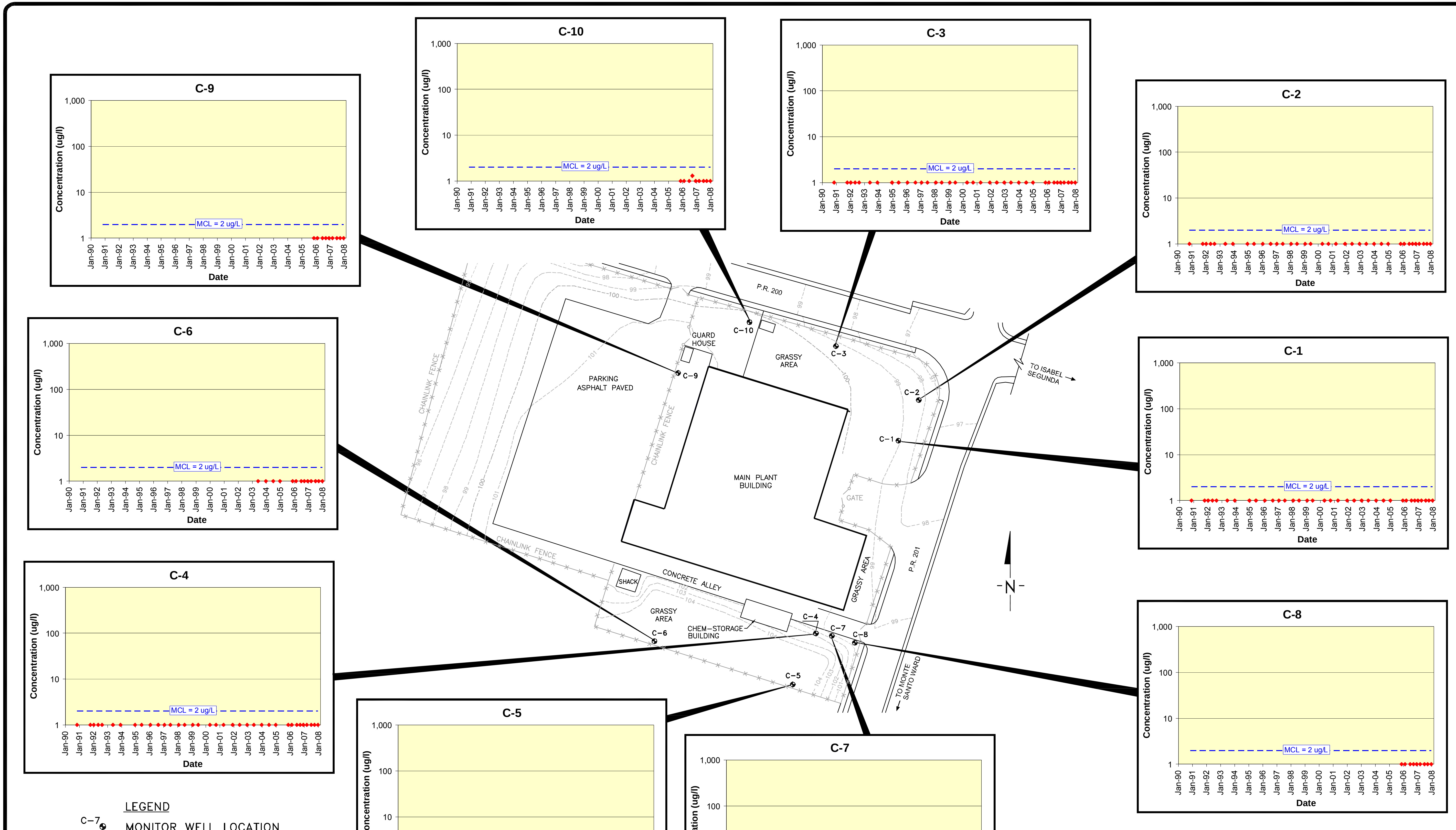



TITLE: cis-1,2-DCE CONCENTRATIONS OVER TIME IN GROUNDWATER (1990-2007)

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | |
|---|---|
| CHECKED | JT |
| DRAFTED | CP |
| FILE | 2204180008A.DWG |
| DATE | 5-19-08 |
| FIGURE: | 9 |



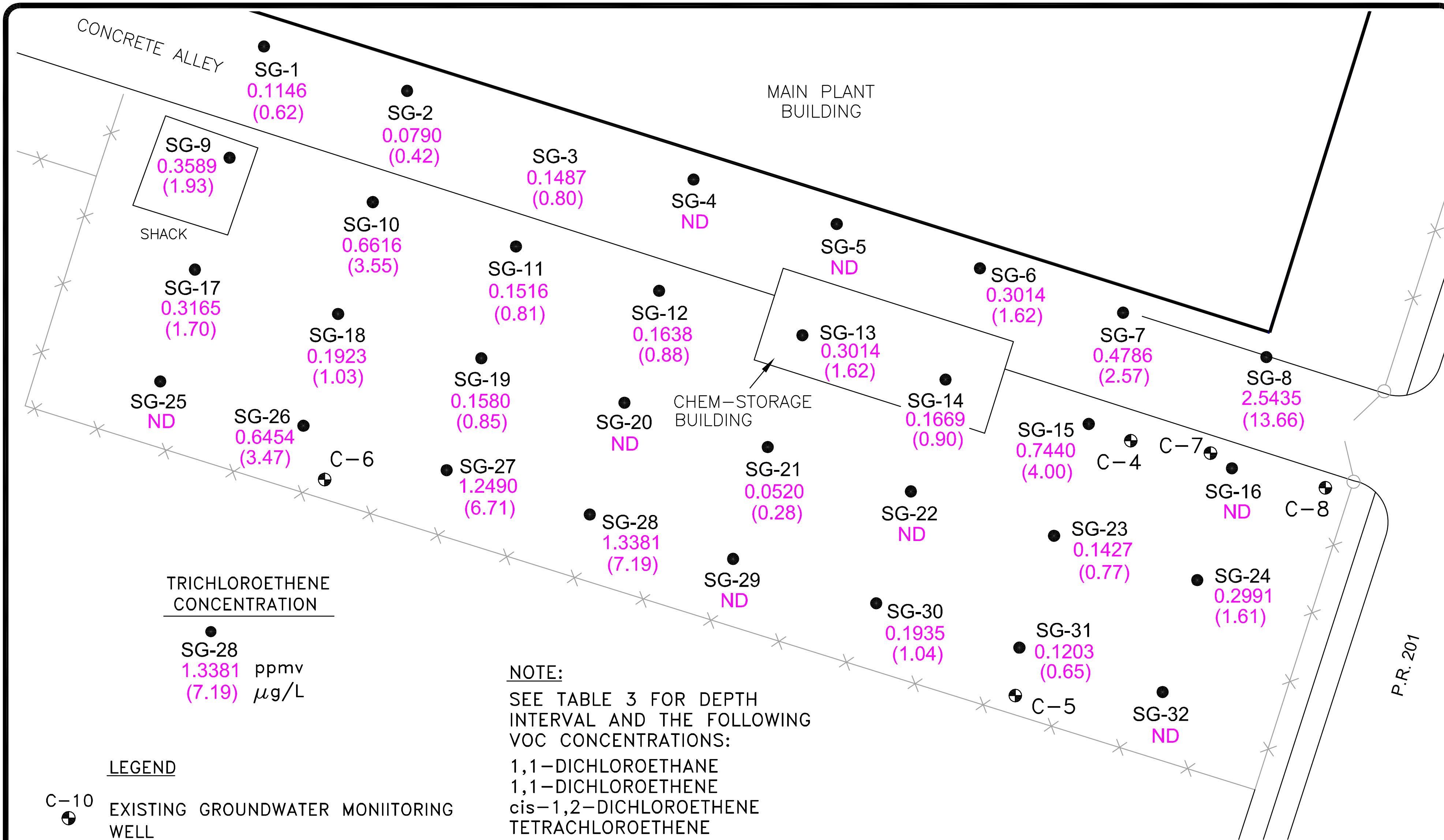

TITLE: VC CONCENTRATIONS OVER TIME IN GROUNDWATER (1990–2007)

LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | | |
|---|---|---|
| CHECKED | JT | FIGURE: |
| DRAFTED | CP | 10 |
| FILE | 2204180009A.DWG | |
| DATE | 5-5-08 | |

2204180013A.DWG




TRICHLOROETHENE CONCENTRATION

SG-28
1.3381 ppmv
(7.19) µg/L

NOTE:

SEE TABLE 3 FOR DEPTH INTERVAL AND THE FOLLOWING VOC CONCENTRATIONS:

1,1–DICHLOROETHANE
1,1–DICHLOROETHENE
cis–1,2–DICHLOROETHENE
TETRACHLOROETHENE

LEGEND

C–10 EXISTING GROUNDWATER MONIITORING WELL

SOIL GAS SAMPLE LOCATION

0 30 60
SCALE IN FEET

N

TITLE: SOIL GAS TRICHLOROETHENE CONCENTRATIONS MARCH 2007

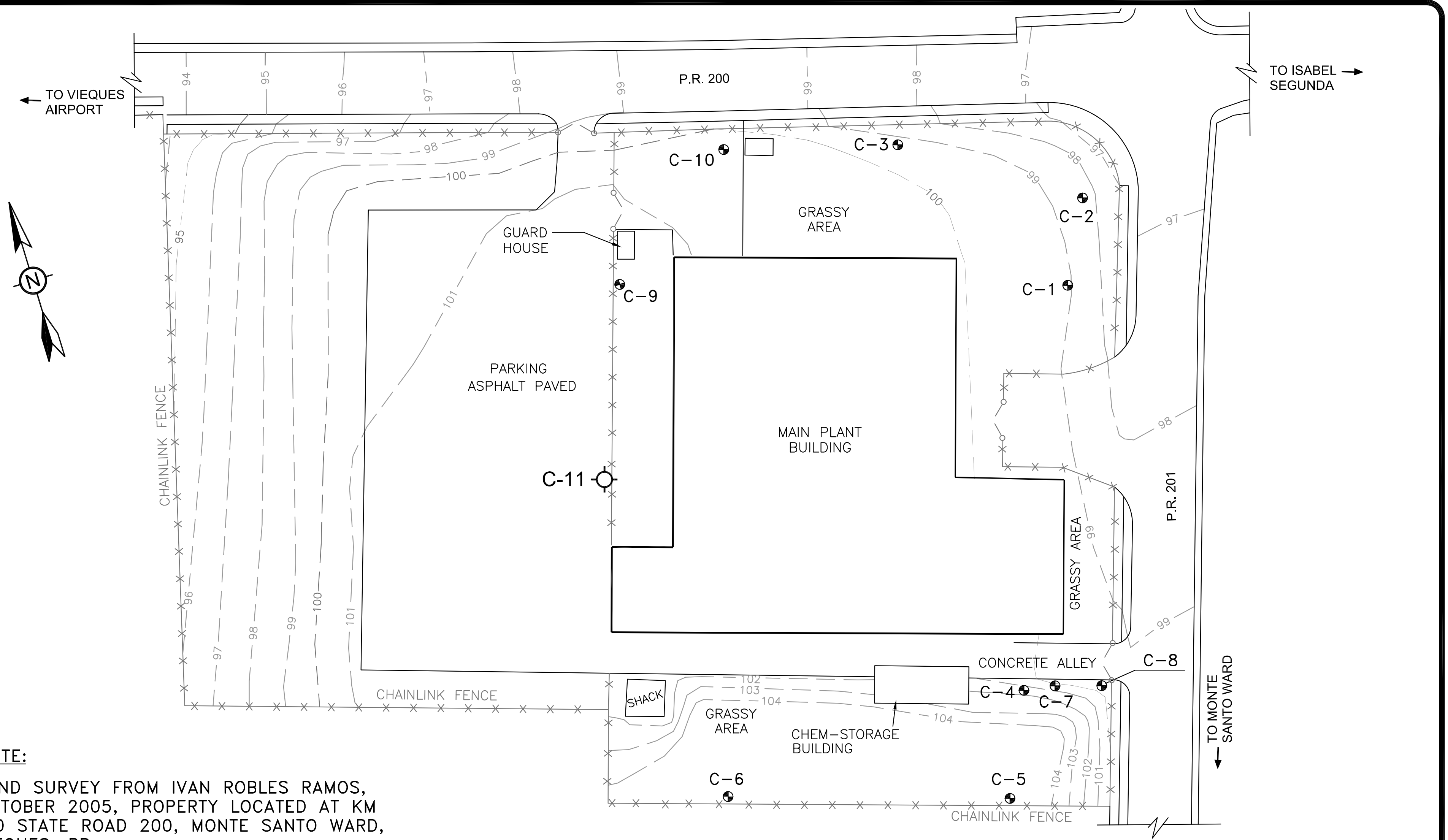
LOCATION: Caribe General Electric, Vieques, Puerto Rico

GeoTrans, Inc. A TETRA TECH COMPANY

| | |
|---|---|
| CHECKED | JT |
| DRAFTED | CP |
| FILE | 2204180013A.DWG |
| DATE | 5–22–08 |

FIGURE: 11

P:\ACAD\2204-221-VIEQ\2204221013A.DWG




NOTE:

LAND SURVEY FROM IVAN ROBLES RAMOS, OCTOBER 2005, PROPERTY LOCATED AT KM 2.0 STATE ROAD 200, MONTE SANTO WARD, VIEQUES, PR.

LEGEND

C-6 EXISTING GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION

C-11 PROPOSED MONITORING WELL

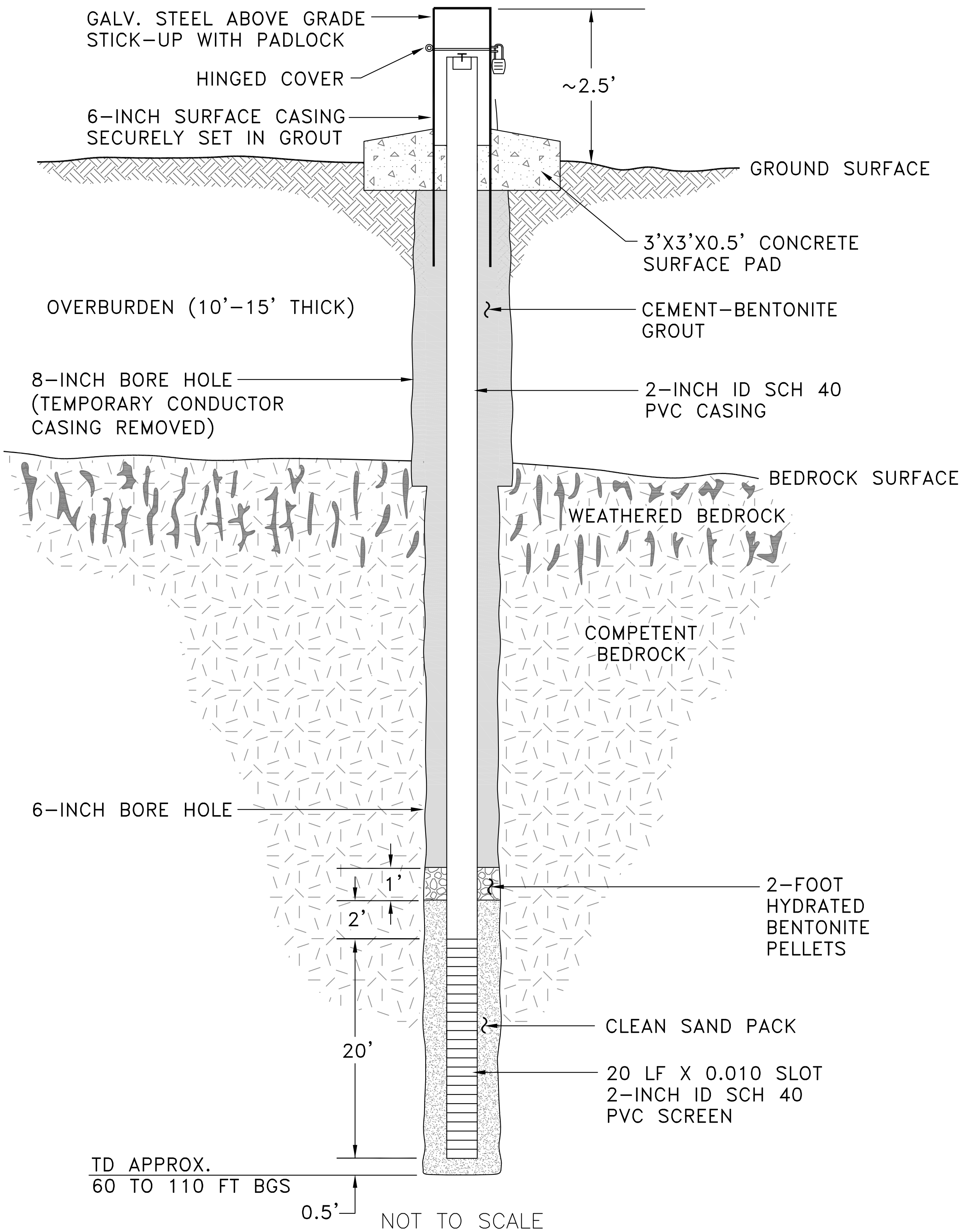
0 80 160
SCALE IN FEET

TITLE: **PROPOSED LOCATION OF CMS DATA GAP INVESTIGATION MONITOR WELL C-11**

LOCATION: **Caribe General Electric, Vieques, Puerto Rico**

TETRA TECH GEO

| | | |
|---|---|---|
| APPROVED | DB | FIGURE |
| DRAFTED | CP | 12 |
| PROJECT# | 117-2204221 | |
| DATE | 7-18-12 | |




NOT TO SCALE

| | | | |
|---|---|---|---|
| TITLE: **TYPICAL SCHEMATIC FOR BEDROCK MONITOR WELL C-11** | | | |
| LOCATION: **Caribe General Electric, Vieques, Puerto Rico** | | | |
| TETRA TECH GEO | APPROVED | DB | FIGURE |
| | DRAFTED | CP | **13** |
| | PROJECT# | 117-2204221 | |
| | DATE | 7-18-12 | |

P:\ACAD\2204-221-VIEQ\2204221012A.DWG

# APPENDIX A

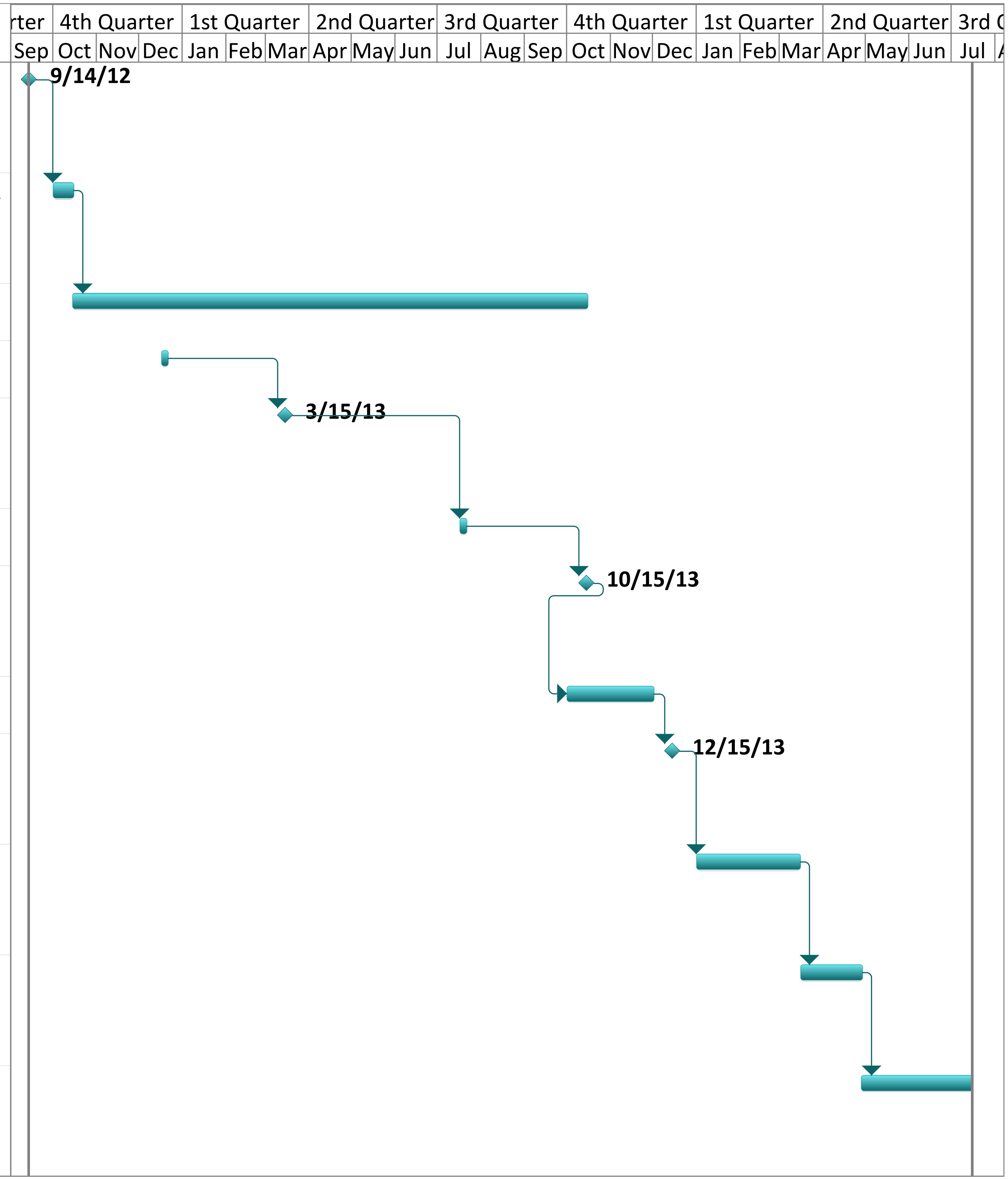
## FOCUSED CMS REPORT TABLE OF CONTENTS

## TABLE OF CONTENTS

## Appendix B

## Schedule

| ID | Task Name | Start | Finish |
|---|---|---|---|
| 1 | Assumed EPA Approval of CMS Workplan* | Fri 9/14/12 | Fri 9/14/12 |
| 2 | Monitor Well and Pressure Transducer Installation | Mon 10/1/12 | Mon 10/15/12 |
| 3 | Water Level Monitoring | Mon 10/15/12 | Tue 10/15/13 |
| 4 | Groundwater Sampling | Mon 12/17/12 | Fri 12/21/12 |
| 5 | GE Submits Groundwater Sampling Report | Fri 3/15/13 | Fri 3/15/13 |
| 6 | Groundwater Sampling | Wed 7/17/13 | Sun 7/21/13 |
| 7 | GE Submits Groundwater Sampling Report | Tue 10/15/13 | Tue 10/15/13 |
| 8 | CMS Preparation | Tue 10/1/13 | Sun 12/1/13 |
| 9 | GE Submits draft Focused CMS to EPA | Sun 12/15/13 | Sun 12/15/13 |
| 10 | EPA Reviews Draft Focused CMS* | Wed 1/1/14 | Sat 3/15/14 |
| 11 | GE Prepares and Submits Final Focused CMS to EPA | Sun 3/16/14 | Mon 4/28/14 |
| 12 | EPA Reviews Final Focused CMS* | Mon 4/28/14 | Tue 7/15/14 |




# GE Caribe Focused Corrective Measures Study, Vieques, PR

* Document approvals by EPA have been noted for scheduling purposes only. It is acknowledged that EPA is not bound by this schedule.