

FOCUSED CORRECTIVE MEASURES STUDY WORK PLAN

CARIBE GENERAL ELECTRIC DISTRIBUTION TRANSFORMERS, INC
VIEQUES, PUERTO RICO

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1.0 INTRODUCTION

This document presents the Work plan for the Focused Corrective Measures Study (CMS) for the General Electric Caribe Site (GE Caribe) in Vieques, PR. This Focused CMS Work plan has been prepared to be consistent with EPA comments and subsequent conference calls in May 2008. The organization and objectives of this Work plan are discussed in detail below.

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 presents a general discussion of the approach to the Corrective Action Objectives (CAOs). Section 4.0 contains a discussion of the Corrective Measures Technologies and Alternatives. Section 5.0 discusses the technical components and criteria for the investigation and evaluation of potential corrective measures. Section 6.0 presents the proposed CMS report outline and schedule. Section 7.0 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 (CIS). 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 (down gradient) 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 lavas 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 crops out 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) over 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 (3.5×10^{-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 (1.1×10^{-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 1.2×10^{-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 1.1×10^{-6} cm/s (0.0031 ft/day based on pump test at C-7) to 1.0×10^{-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 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 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.

3.1 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.

3.1.1 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 (CIS), 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

3.1.2 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.

3.1.3 CLEANUP TIMEFRAME

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

4.0 CORRECTIVE MEASURES TECHNOLOGIES / ALTERNATIVES

Corrective measures technologies and alternatives for the VOCs 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.

5.0 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.

6.0 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.

7.0 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. Jean Robert-Jean 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. GeoTrans, Inc. (GeoTrans) is providing assistance to GE in the performance of this CMS. The GeoTrans project roles and associated personnel are discussed below.

Project Manager. Daniel Burnell is the CMS Project Manager. He will be responsible for the overall direction, coordination, budget, and technical consistency of project activities. Dr. Burnell holds advanced degrees in geophysics and possesses over 18 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. He is a registered geologist in Illinois, Kentucky, and Wisconsin.

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 18 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. Robert Fuhrer is a geologist with Alpha Engineering, Inc., a GeoTrans subcontracted environmental consulting firm located in San Juan, Puerto Rico. Mr. Fuhrer is a hydrogeologist with over 20 years of environmental experience. He has provided local support to GeoTrans on all previous investigations conducted at the GE Caribe site.

8.0 REFERENCES

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- 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, 2007.
- 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 Transformers, Inc., Vieques, Puerto Rico, February 1, 2008.
- Jean, J.R., USEPA, 2004. GE Vieques Monitoring Well Installation Work Plan, November 2, 2004.

TABLES

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		8.1×10^{-6}
C-2	Granodiorite	40 to 10		7.1×10^{-6}
C-3	Granodiorite	35.2 to 10.2		1.3×10^{-6}
C-4	Granodiorite	58.8 to 23.8		1.2×10^{-6}
C-5	Granodiorite	63.1 to 23.1		1.2×10^{-7}
C-6	Granodiorite	62.4 to 42.4		2.3×10^{-6}
C-7	Granodiorite	-12.9 to -32.9	1.1×10^{-6}	
C-7 (50-70' bgs)	Granodiorite	26.6 - 6.6		5.2×10^{-7}
C-7 (70-90' bgs)	Granodiorite	6.6 to -13.4		7.0×10^{-8}
C-7 (90-110' bgs)	Granodiorite	-13.4 to -33.4	1.5×10^{-5}	
C-8	Granodiorite	48.2 to 28.2		6.0×10^{-6}
C-9	Granodiorite	38.8 to 18.8		7.7×10^{-8}
C-10	Granodiorite	18.7 to -1.3		2.2×10^{-8}

bgs=below ground surface

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

²Bouwer, 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

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

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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
Microbial Analyses (cells/mL)										
Parameters	(Feb 2006 sampling event, only)									
DHC	NS	NS	4.88	3.66	3.76	2.82	2.99	3.68	2.5	3.14
DSM	NS	NS	0.00918	ND	0.0131	ND	2.54	0.0416	0.17	0.00316
DHB	NS	NS	4540	70.7	10.2	529	407	862	474	ND
EBAC	NS	NS	46500	38200	53800	7880	3050000	447000	792000	32900
MGN	NS	NS	9130	1820	62.1	786	971	3430	1080	2370
IRB/SRB	NS	NS	59.4	ND	ND	ND	56200	ND	15.7	0.0352
MOB	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.

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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 (°C)										
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	µg/L	EPA 8260	NA	ND	ND	ND	24	ND	25	16	3.8	ND	ND	18	ND	ND	ND	ND
1,1-Dichloroethene	µg/L	EPA 8260	7	ND	0.66	ND	11	ND	10	44	2.5	ND	0.28	59	ND	ND	ND	ND
Chloroform	µg/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	µg/L	EPA 8260	70	ND	0.59	ND	15	0.65	7.6	540	5	ND	0.43	550	ND	ND	ND	ND
Tetrachloroethene	µg/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	µg/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)	µg/L as Cl	USEPA-9020B	NA	13	28	7.4	94	32	68	390	46	16	610	460	2.2	14	NA	NA
Ethane	µg/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	µg/L	RSK-175	NA	ND	ND	ND	ND	ND	ND	20	ND	0.86	5.2	25	ND	ND	NA	NA
Methane	µg/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	µS/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	°C	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-7² 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 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	°C	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-4² 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	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	NA
Temperature	°C	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	NA
Turbidity	NTU	Horiba U22	NA	10	6.2	10	101	97	101	165	53.8	38.7	170	NA	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	NA
ORP	mV	Horiba U22	NA	92	93	129	-97	136	120	-340	79	115	-402	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-4² 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	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	NA
Temperature	°C	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	NA
Turbidity	NTU	Horiba U22	NA	11.5	20.6	20.2	112	119	123	228	158	35.2	300	NA	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	NA
ORP	mV	Horiba U22	NA	120	128	111	43	-4	108	-274	71	77	-399	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 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	°C	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-4² 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	ND	18	ND	20	12	7.1	ND	17	ND	ND	ND	ND
1,1-Dichloroethene	µg/L	EPA 8260	7	ND	0.83J	ND	9.6	ND	9.1	9.1	48	4.1	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	6.8	260	6	ND	0.79J	ND	ND	ND	ND
Tetrachloroethene	µg/L	EPA 8260	5	ND	ND	ND	0.93J	ND	1.7	1.7	0.74J	0.5J	ND	0.98J	ND	ND	ND	ND
Trichloroethene	µg/L	EPA 8260	5	0.39J	3.2	ND	64	ND	29	29	160	27	ND	62	ND	ND	ND	ND
Vinyl Chloride	µg/L	EPA 8260	2	ND	ND	ND	0.43J	ND	0.45J	0.45J	2.5	ND	0.17	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	96	490	170	62	240	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	ND	ND	ND	ND	NS	NS
Methane	µg/L	RSK-175	NA	1.4	0.18J	ND	ND	ND	8.4	1.3	8000	380	2.7	360	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	1.6	7.9	1.7	1.5	67.0	1.9	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	NS	32	NS	NS	NS	NS	NS	NS	NS
Calcium	mg/L	USEPA-6010B	NA	NS	NS	NS	55	NS	NS	NS	55	NS	NS	NS	NS	NS	NS	NS
Sodium	mg/L	USEPA-6010B	NA	NS	NS	NS	300	NS	NS	NS	480	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	°C	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

¹ Duplicate sample collected at concentration above laboratory detection limit² 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)	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	°C	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-4² 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	°C	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



TITLE:

SITE LOCATION MAP

LOCATION:

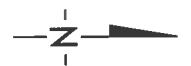
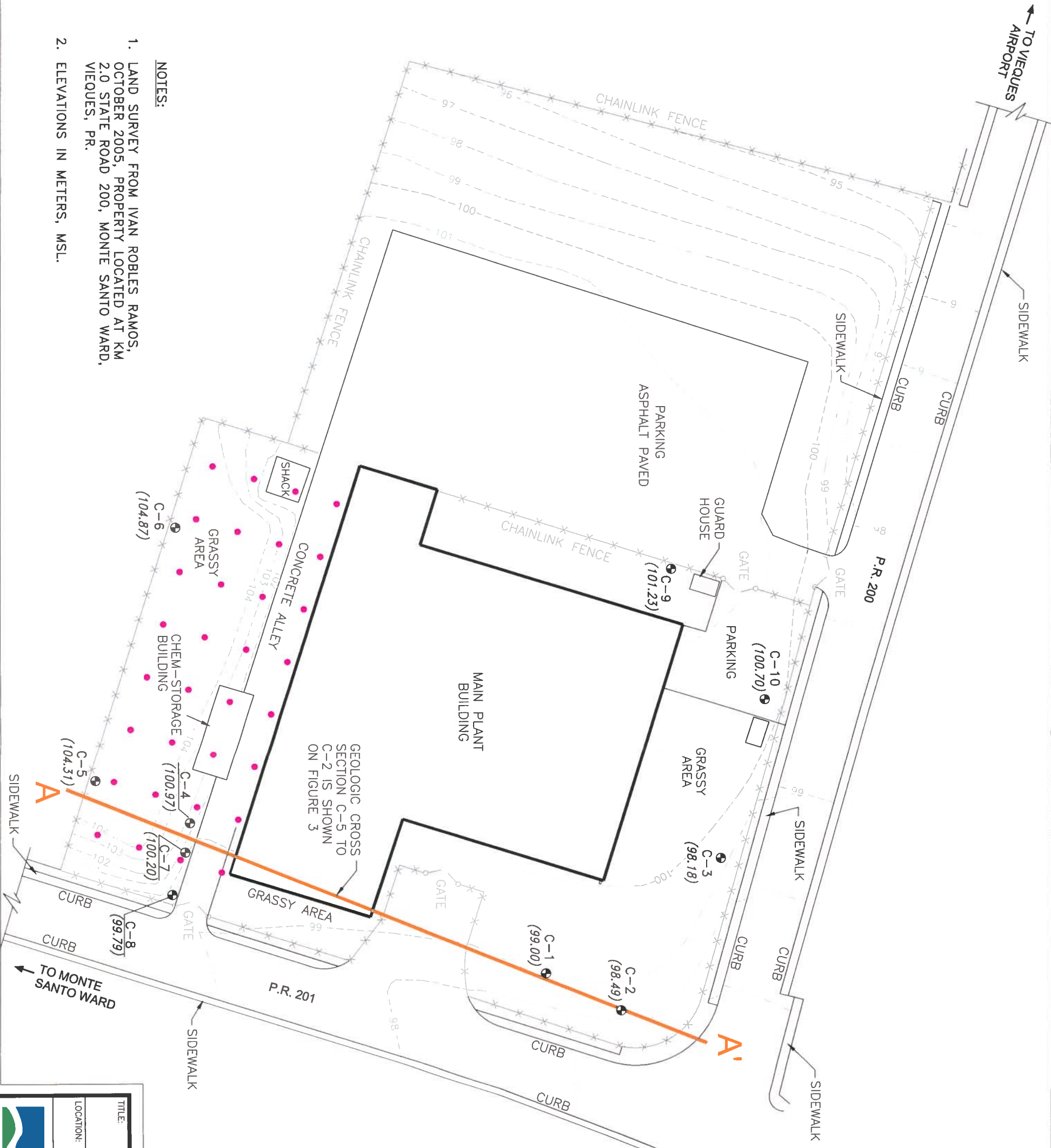
Caribe General Electric, Vieques, Puerto Rico



CHECKED	NB
DRAFTED	CP
FILE	2204180001A.DWG
DATE	5-19-08

FIGURE:

1



- LEGEND**
- C-10 (100.97) GROUNDWATER MONITORING WELL
 - (100.97) GROUND SURFACE ELEVATION M, MSL
 - SOIL GAS COLLECTION POINT (SEE FIGURE 4 FOR DETAILS)
 - GROUND SURFACE CONTOUR CONTOUR INTERVAL = 1M
 - A—A' GEOLOGIC CROSS SECTION (SEE FIGURE 3)



NOTES:

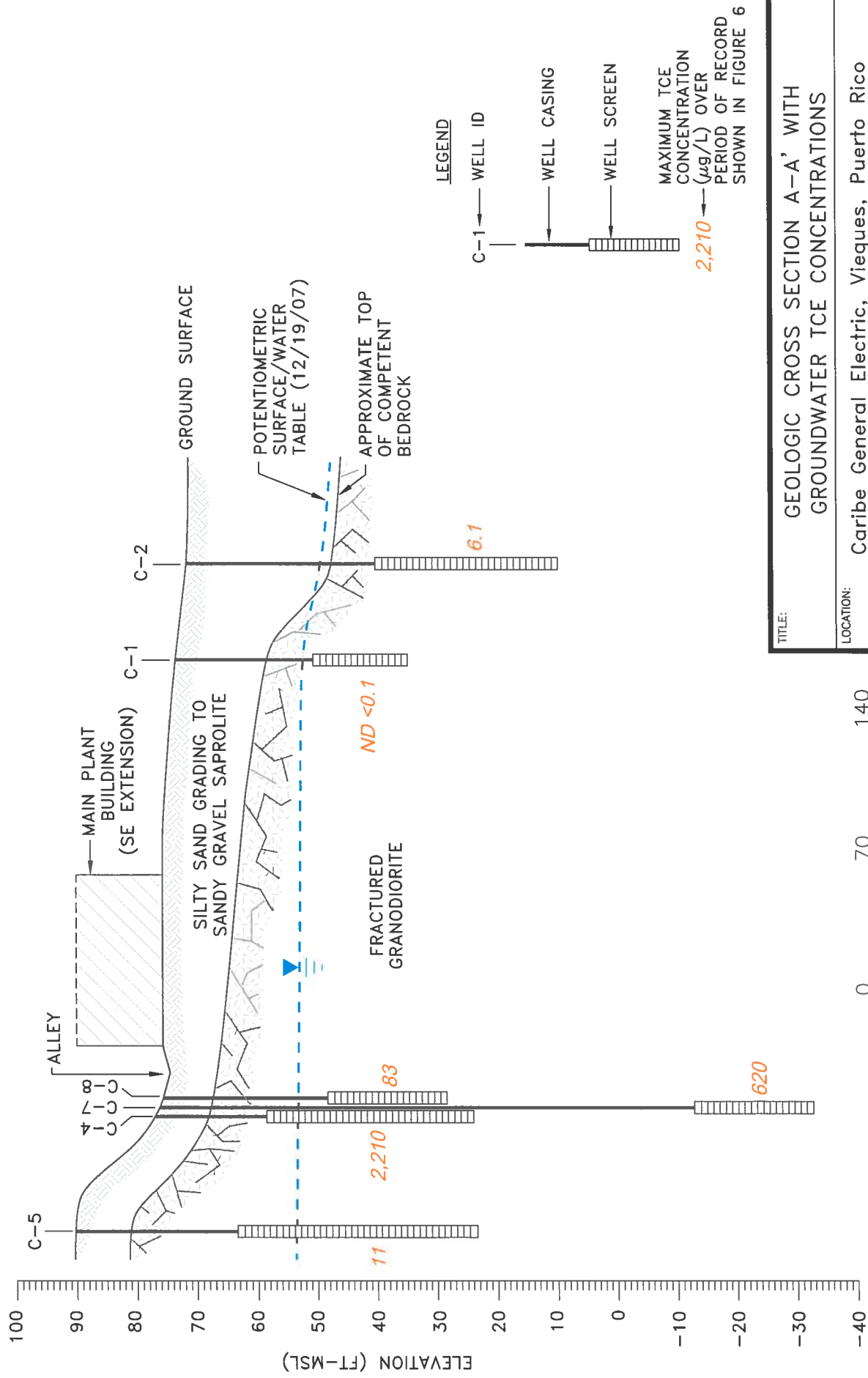
1. LAND SURVEY FROM IVAN ROBLES RAMOS, OCTOBER 2005, PROPERTY LOCATED AT KM 2.0 STATE ROAD 200, MONTE SANTO WARD, VIEQUES, PR.
2. ELEVATIONS IN METERS, MSL.

TITLE:		SITE PLAN WITH MONITOR WELL AND SOIL GAS SOIL BORING LOCATIONS	
LOCATION:		Caribe General Electric, Vieques, Puerto Rico	
CHECKED	JT	FIGURE:	2
DRAFTED	CP		
FILE	2204180002A.DWG		
DATE	5-15-08		

GeoTrans, Inc.
A TRIMA TECH COMPANY

A'

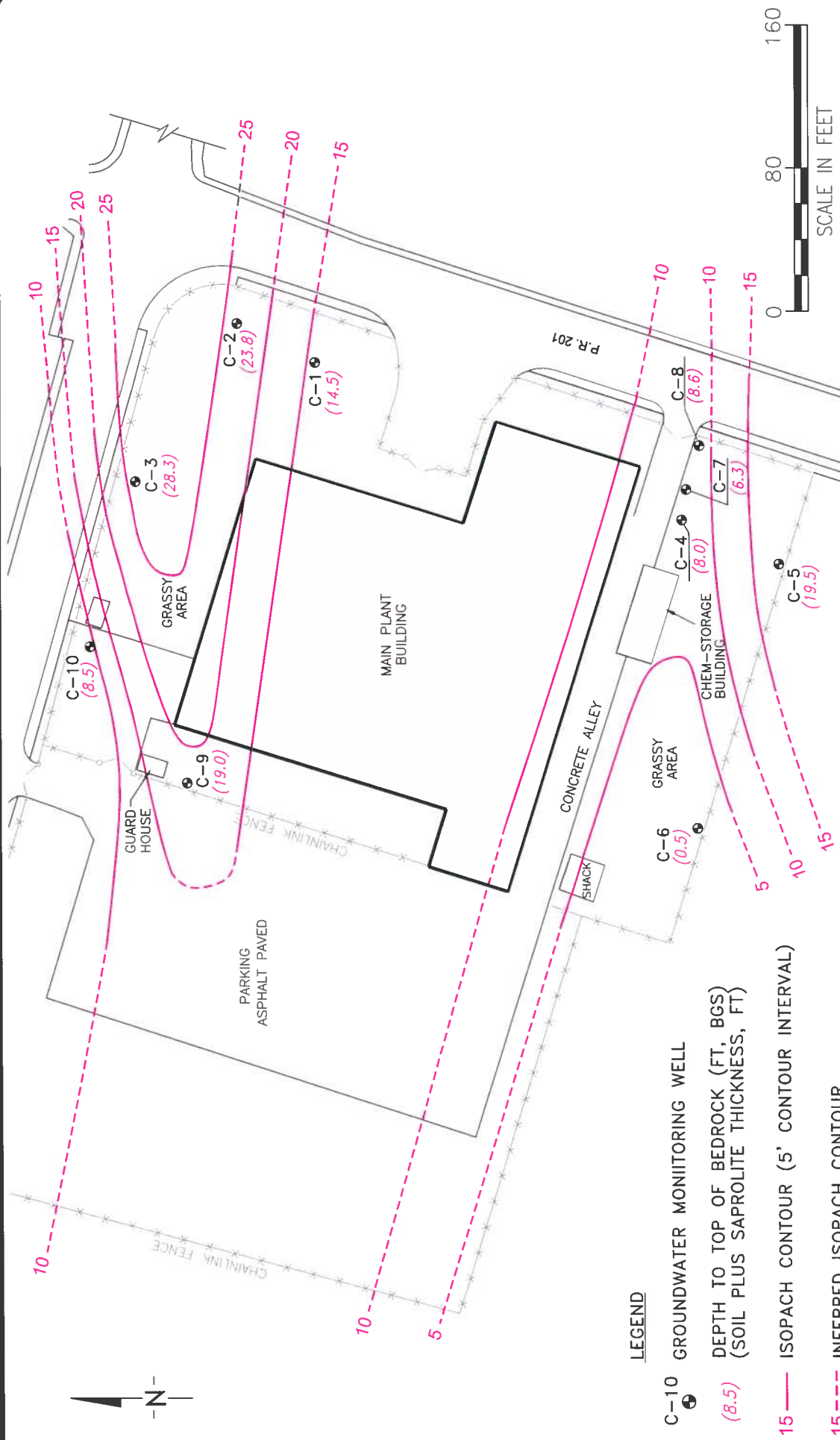
A



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	



TITLE:

SOIL ISOPACH MAP

LOCATION:

Caribe General Electric, Vieques, Puerto Rico

NOTES:

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



CHECKED	JT
DRAFTED	CP
FILE	2204180010A.DWG
DATE	5-19-08

FIGURE: 4

**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



FIGURE:

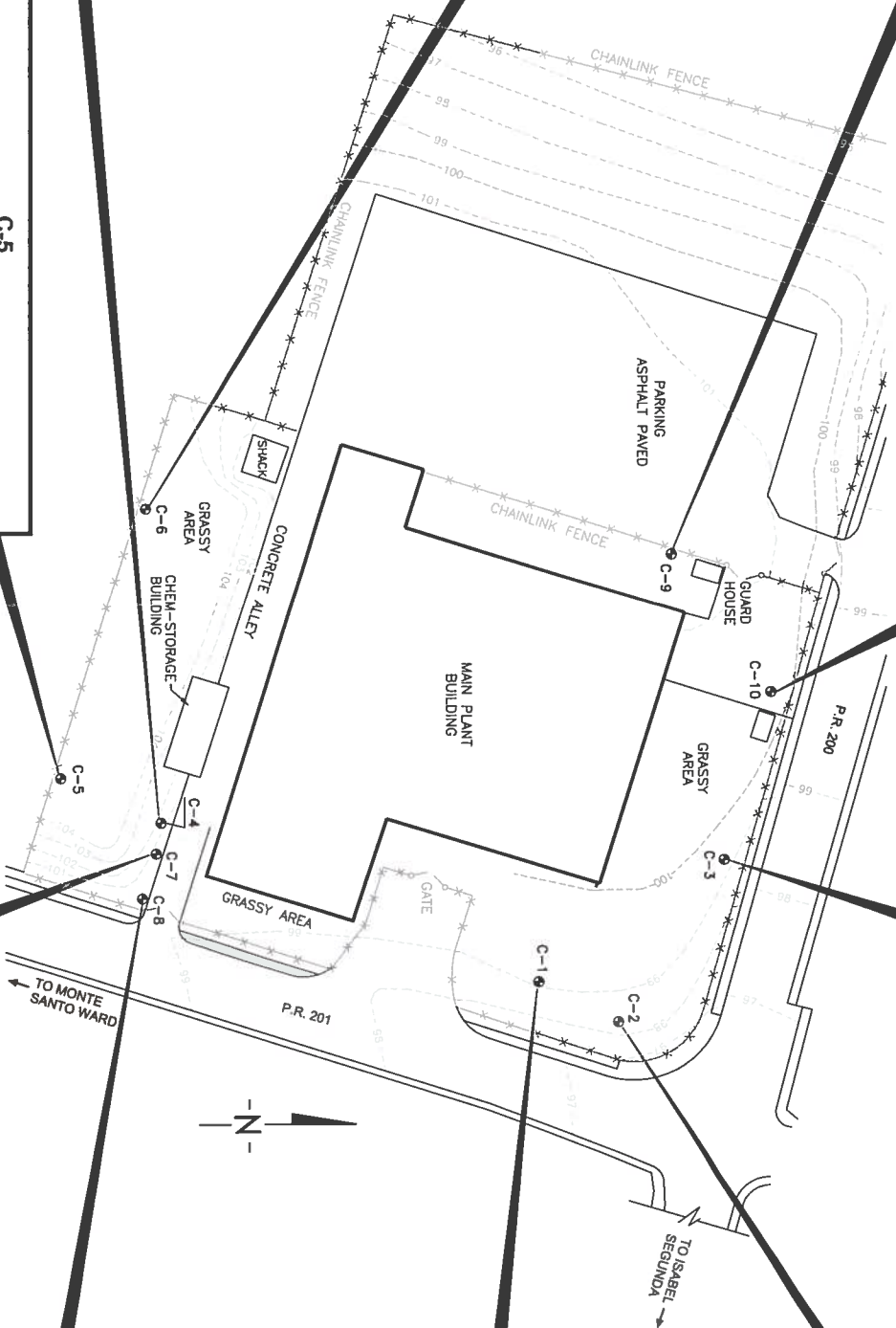
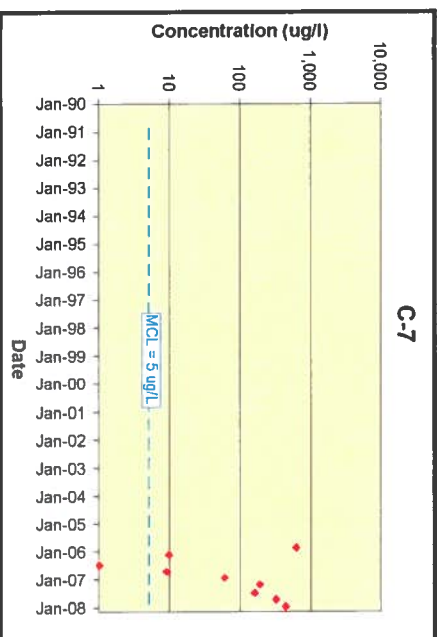
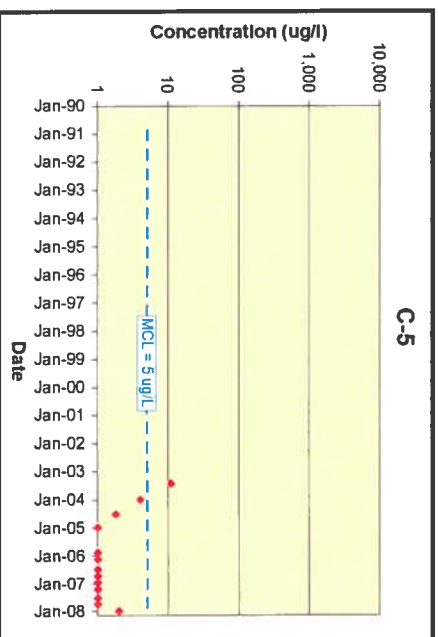
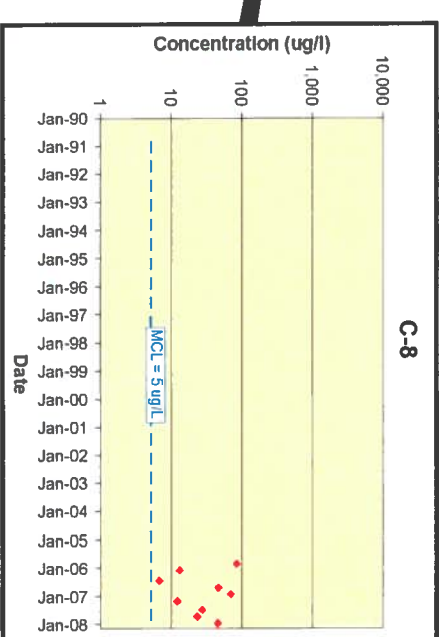
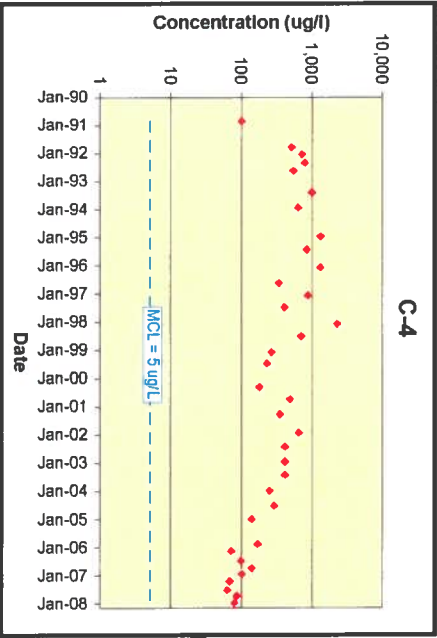
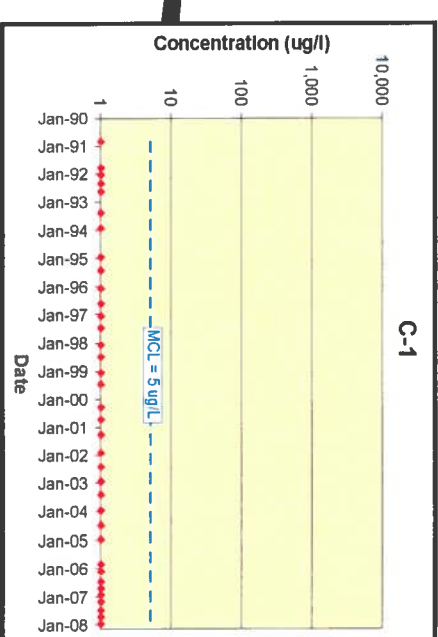
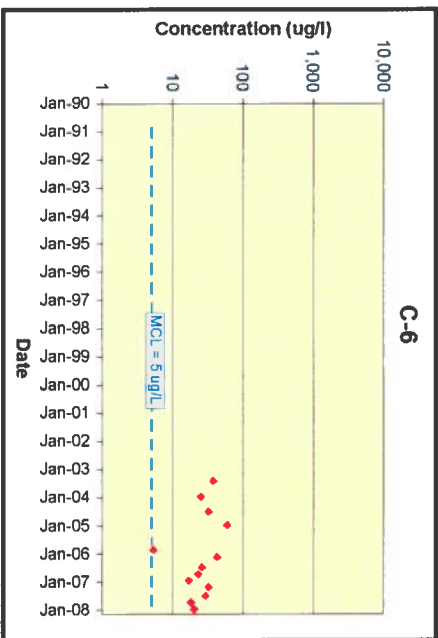
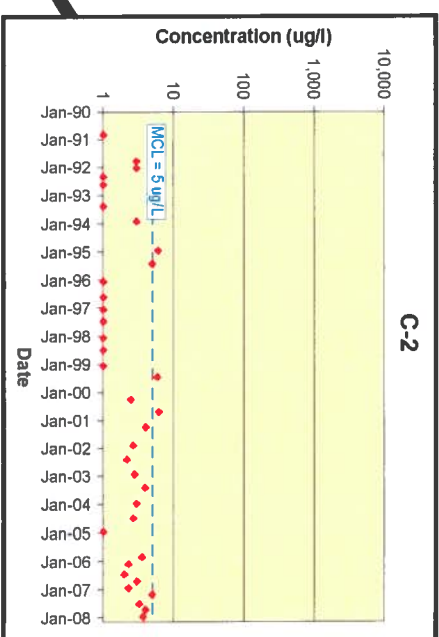
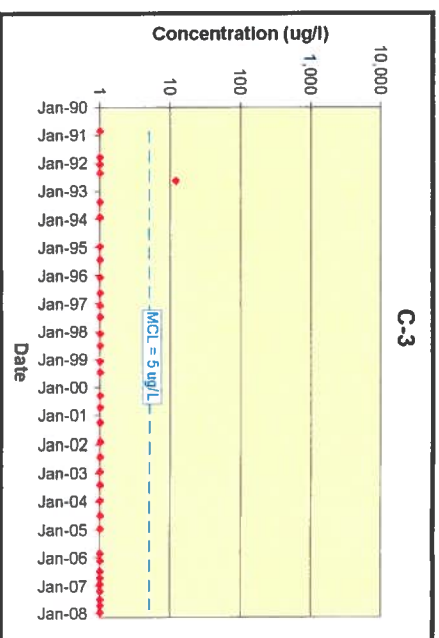
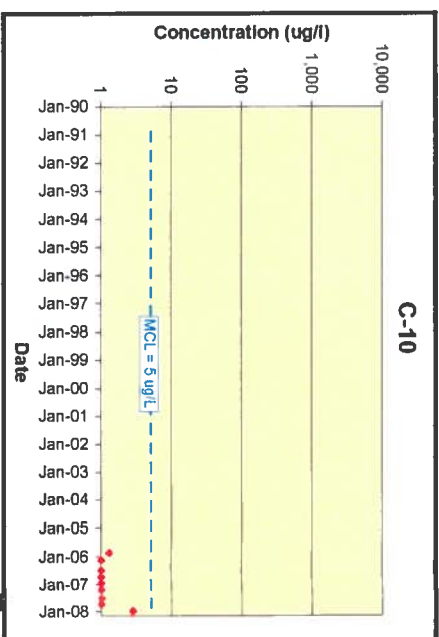
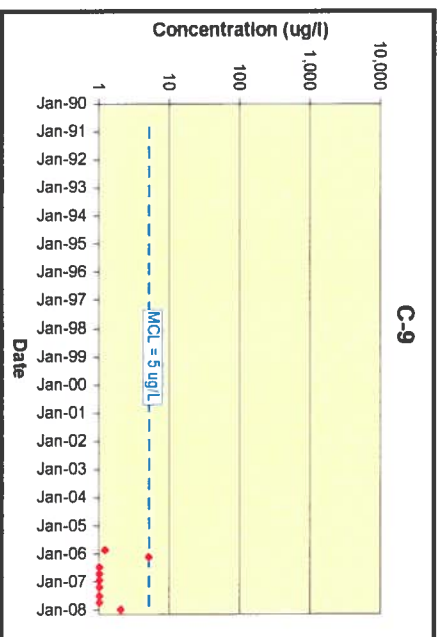
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CHECKED JT

DRAFTED CP

FILE 2204180012A.DWG

DATE 5-20-08



LEGEND

● MONITOR WELL LOCATION

◆ GRAPHED HISTORICAL TCE CONCENTRATION VALUE (ug/L)

TCE TRICHLOROETHENE

0 100 200

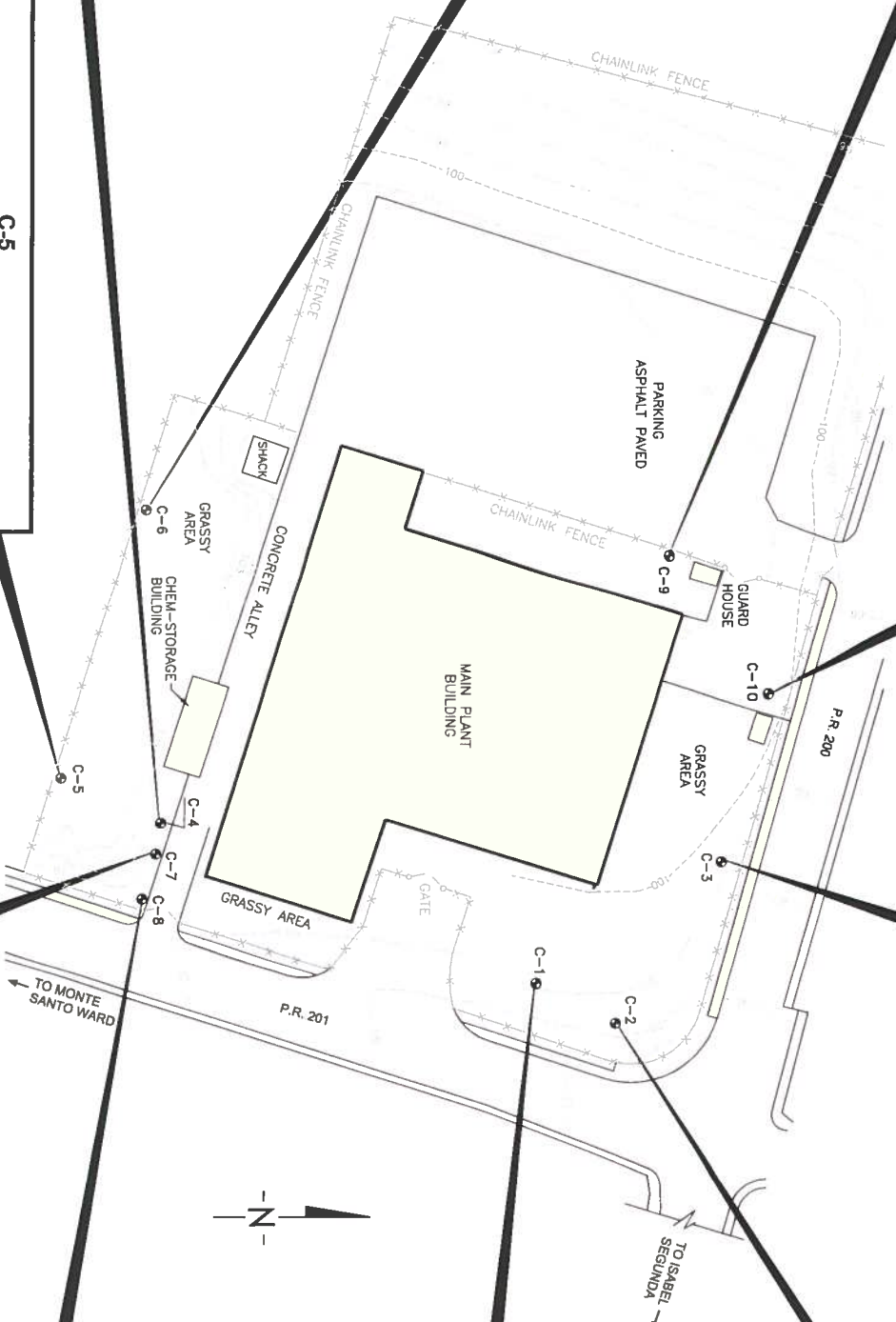
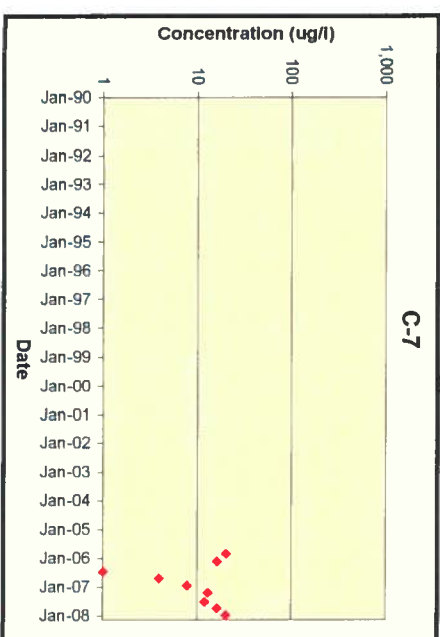
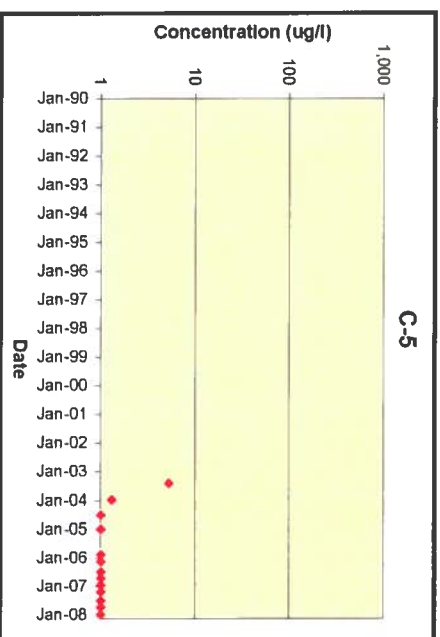
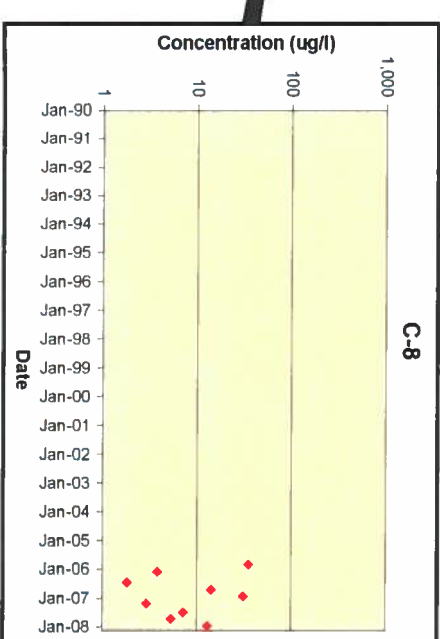
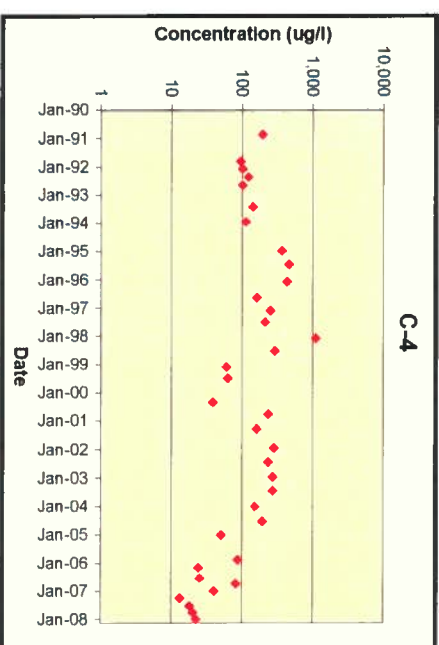
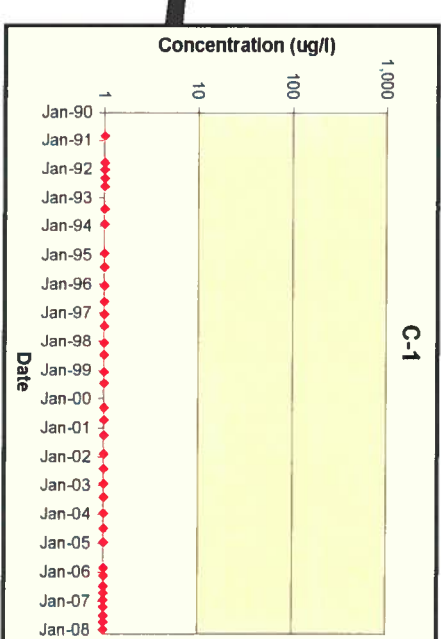
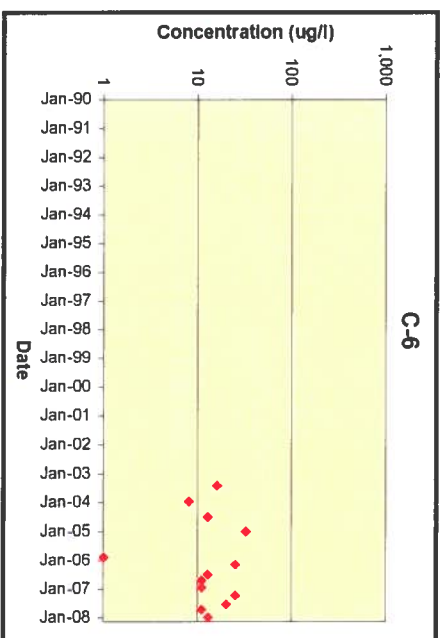
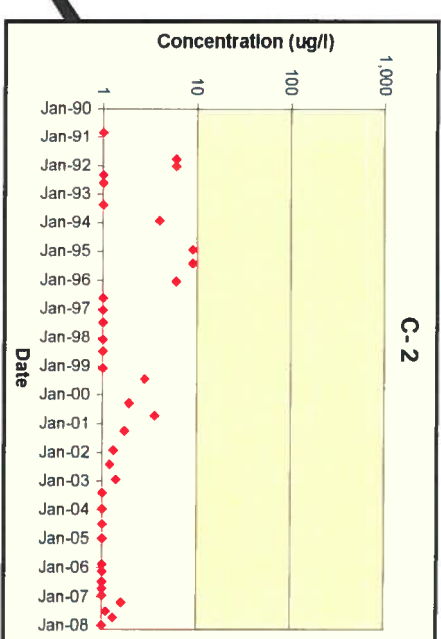
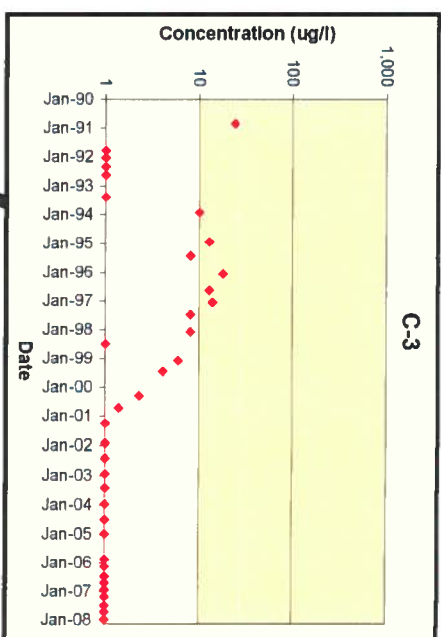
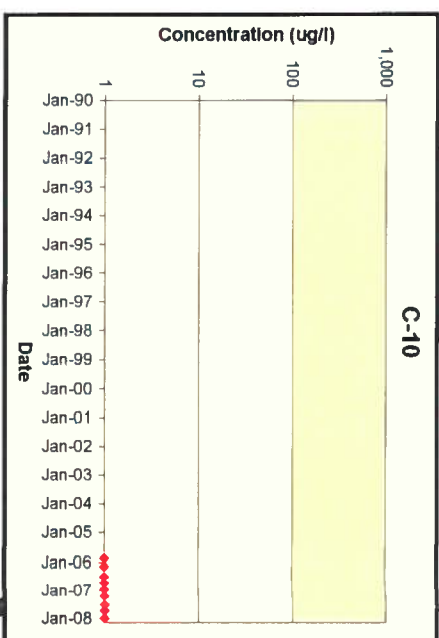
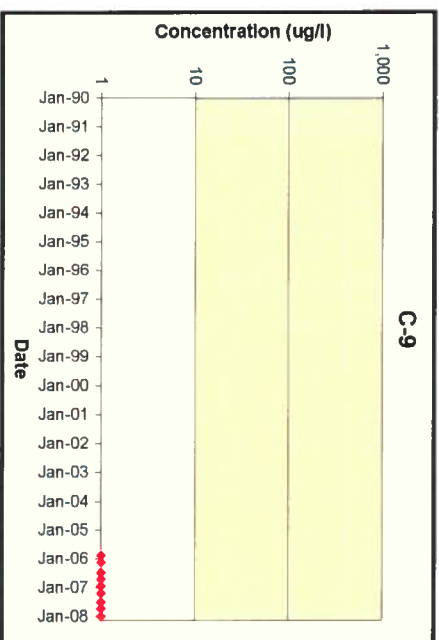
SCALE IN FEET

TITLE: TCE 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	6
FILE	2204180005A.DWG	
DATE	5-5-08	



LEGEND

● MONITOR WELL LOCATION

◆ GRAPHED HISTORICAL 1,1-DCA CONCENTRATION VALUE (ug/L)

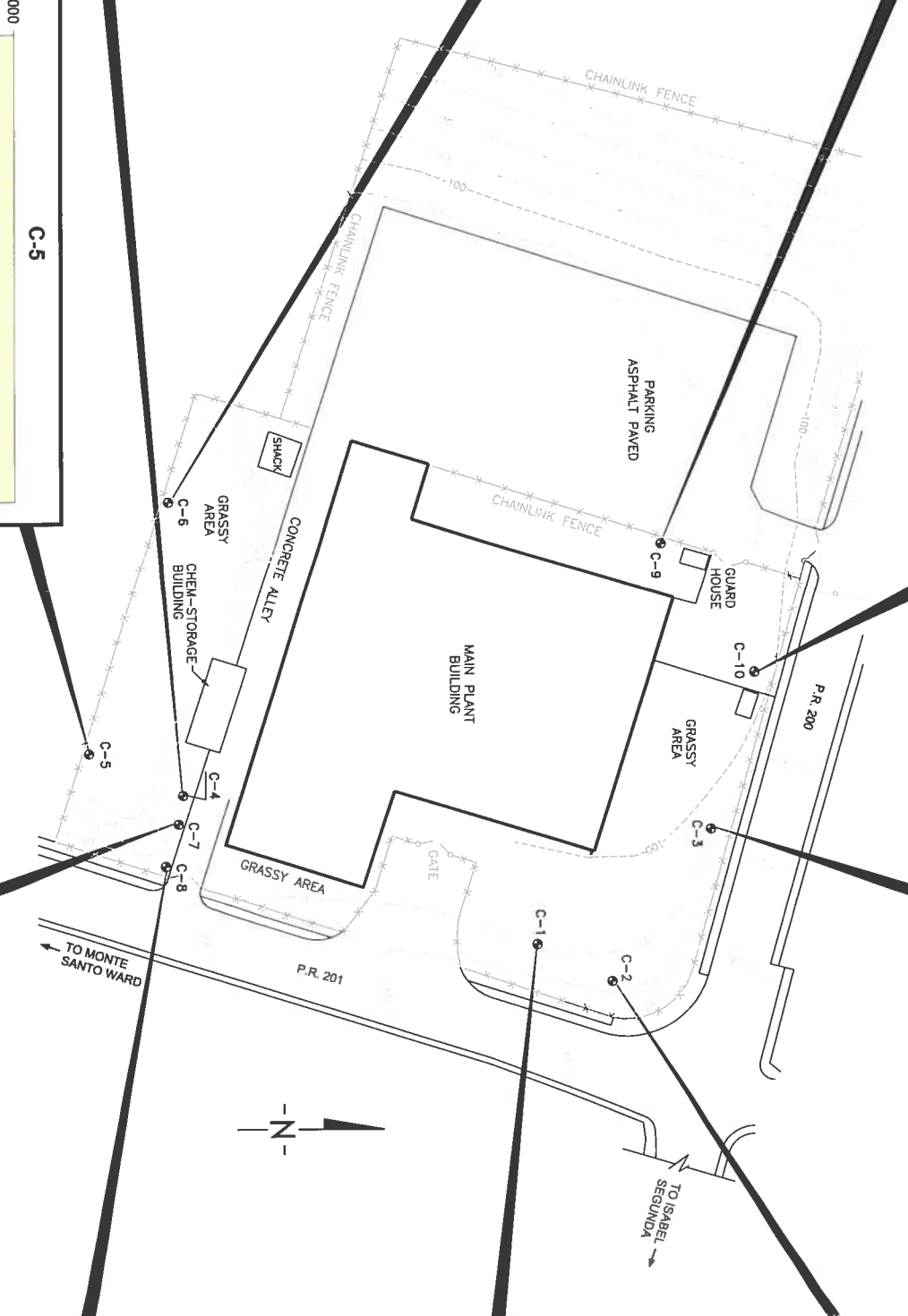
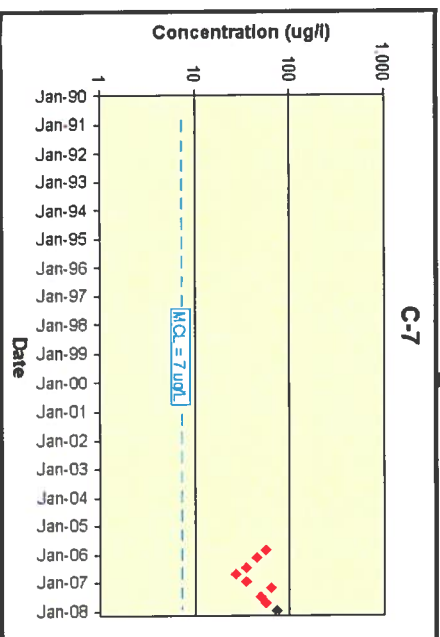
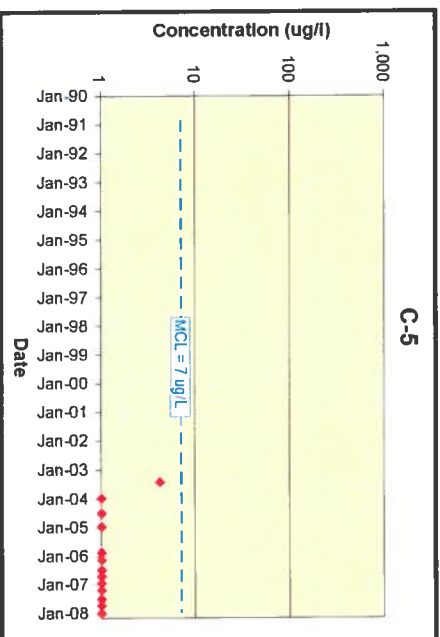
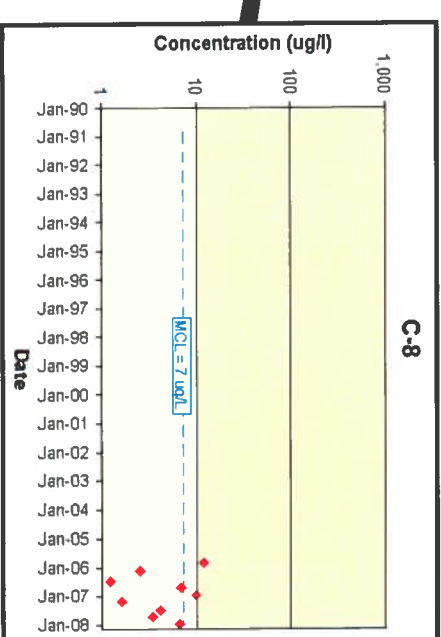
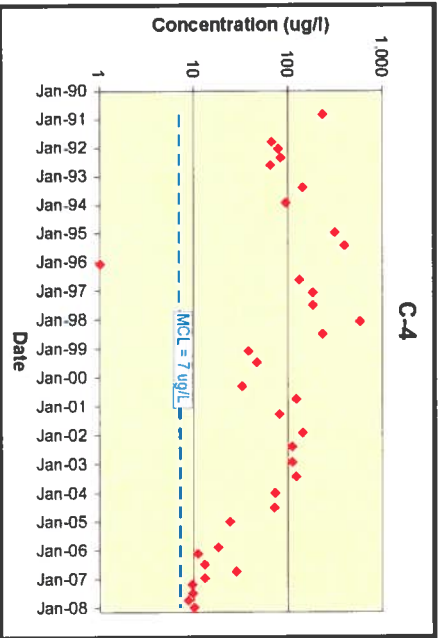
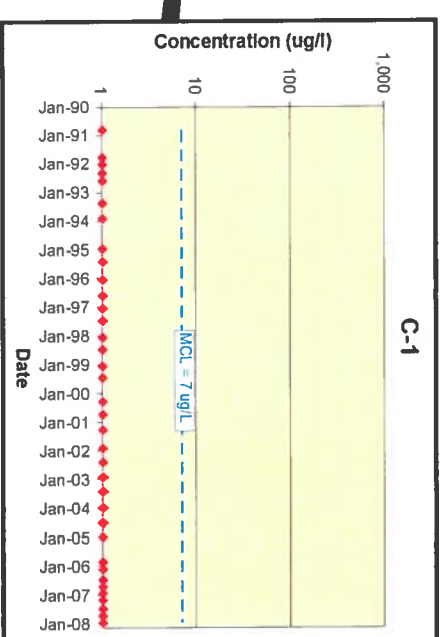
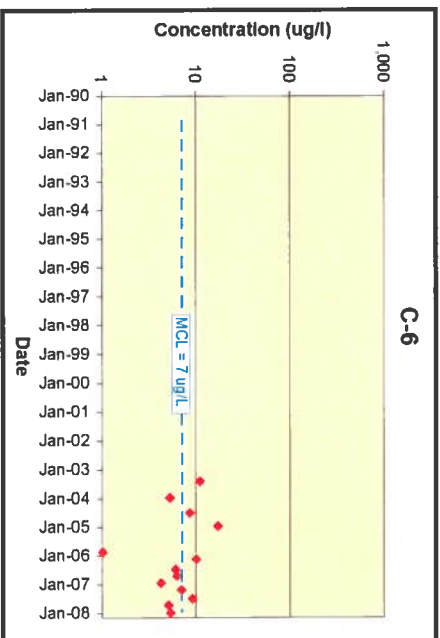
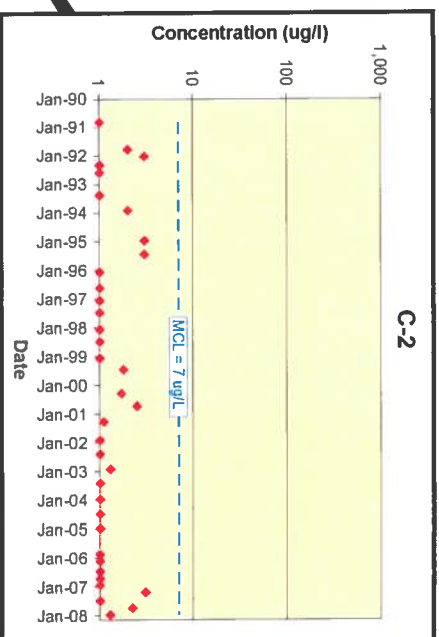
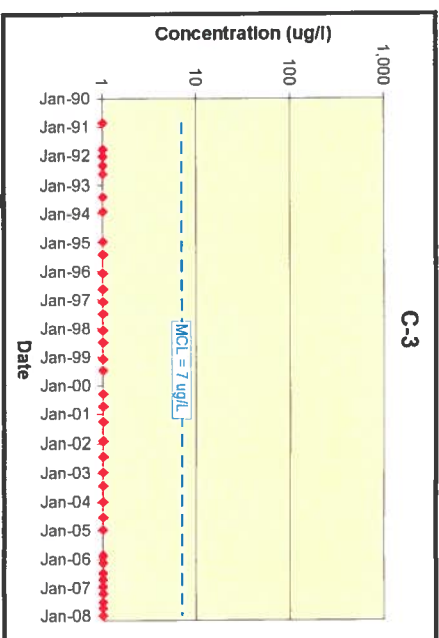
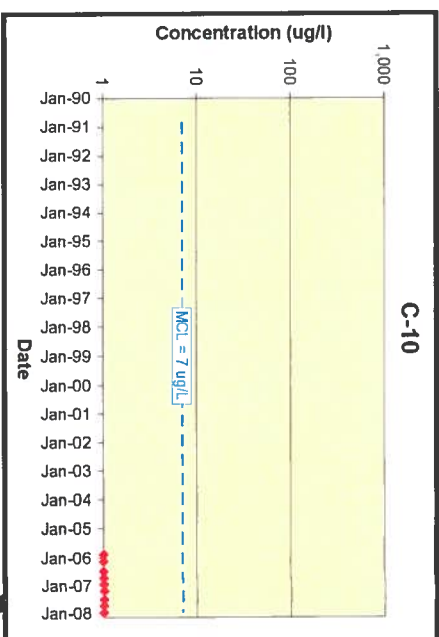
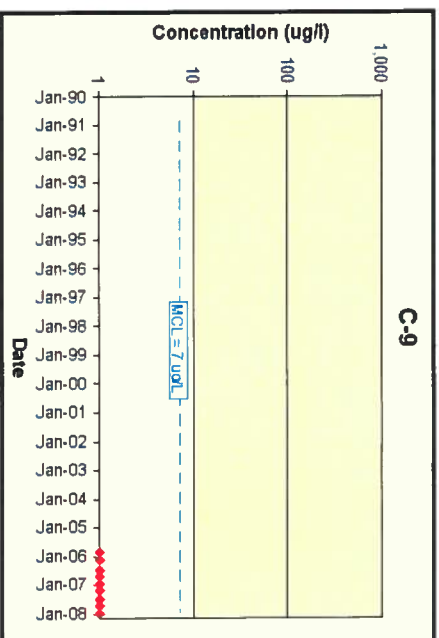
1,1-DCA 1,1-DICHLOROETHANE



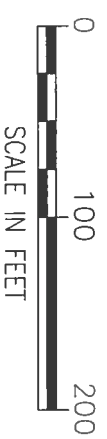
NOTE: THERE IS NO USEPA DRINKING WATER MCL FOR 1,1-DCA.

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

LOCATION: Caribe General Electric, Vieques, Puerto Rico

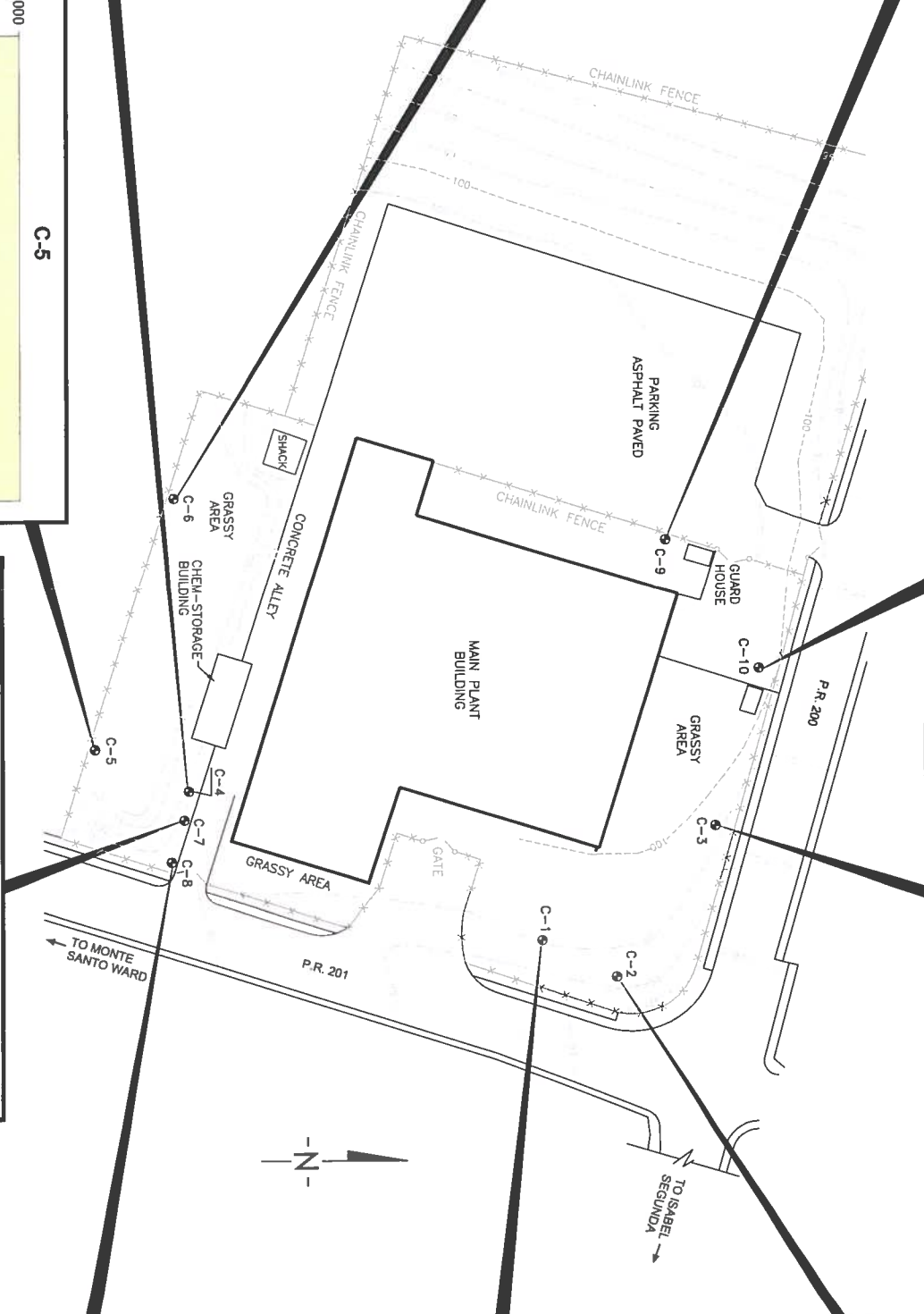
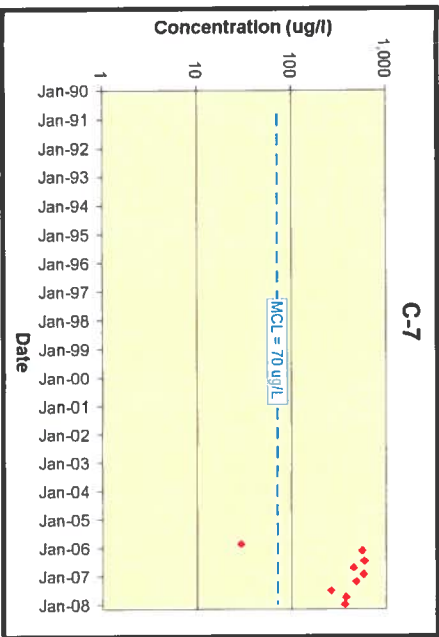
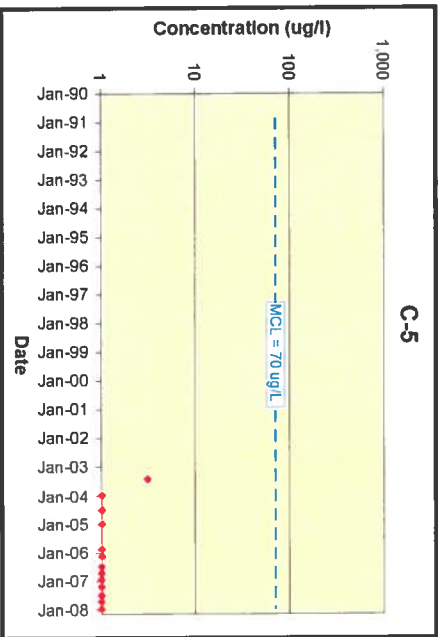
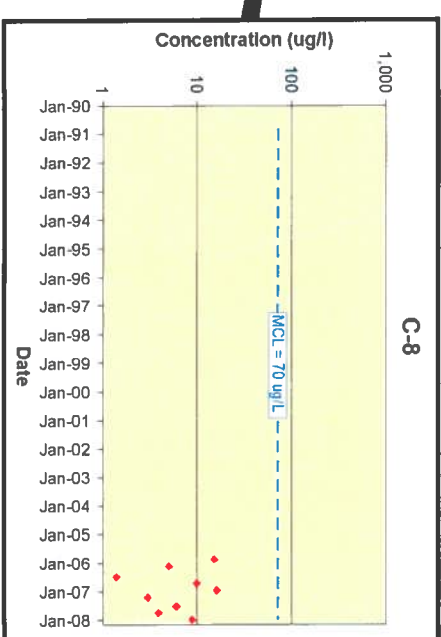
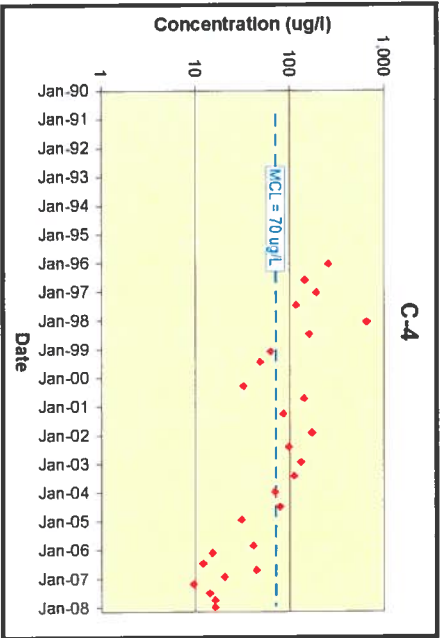
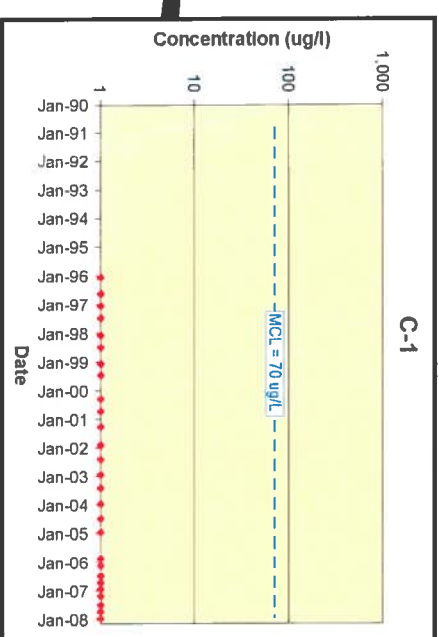
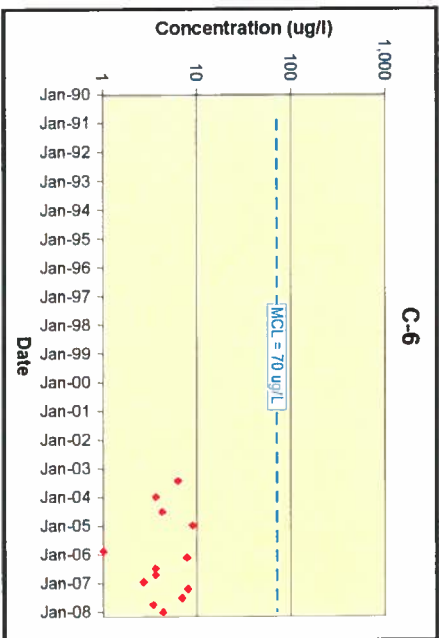
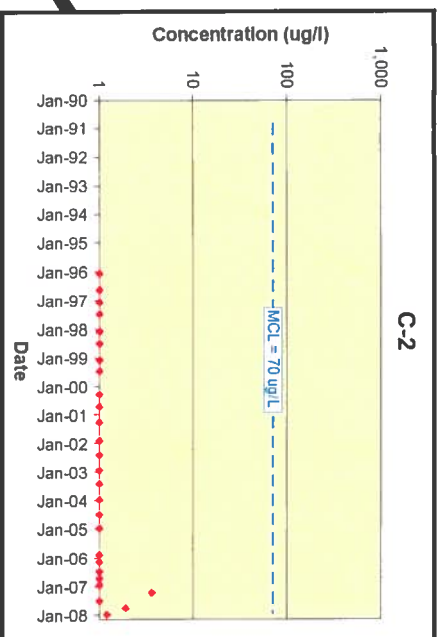
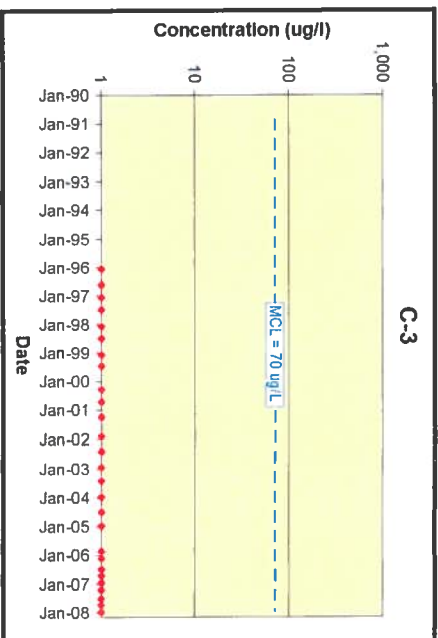
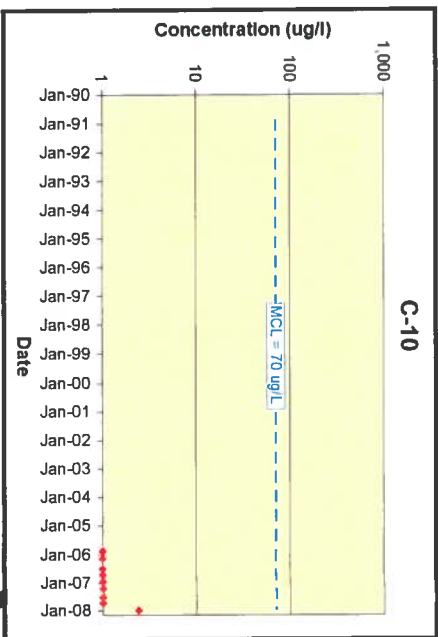
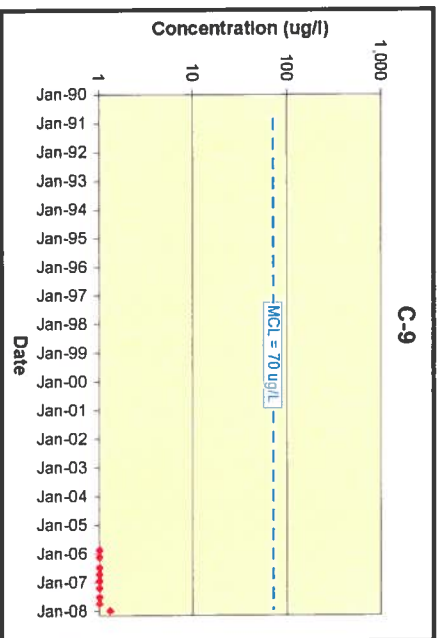


LEGEND
 C-7 ● MONITOR WELL LOCATION
 ● GRAPHED HISTORICAL 1,1-DCE CONCENTRATION VALUE (ug/L)
 1,1-DCE 1,1-DICHLOROETHENE



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

LOCATION: Caribe General Electric, Vieques, Puerto Rico

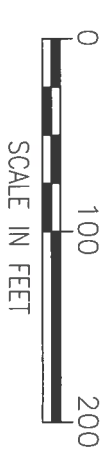


LEGEND

● **C-7**
MONITOR WELL LOCATION

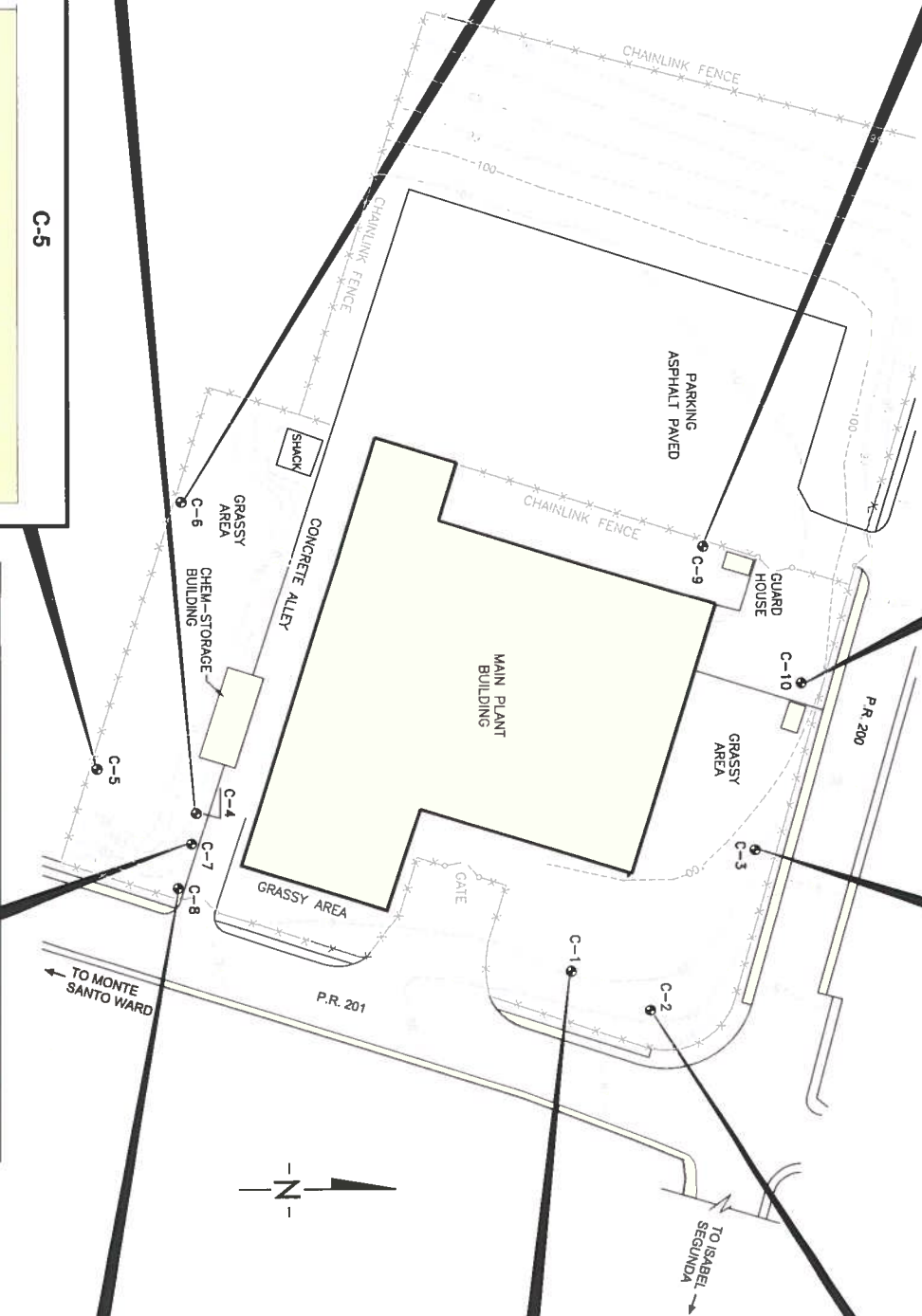
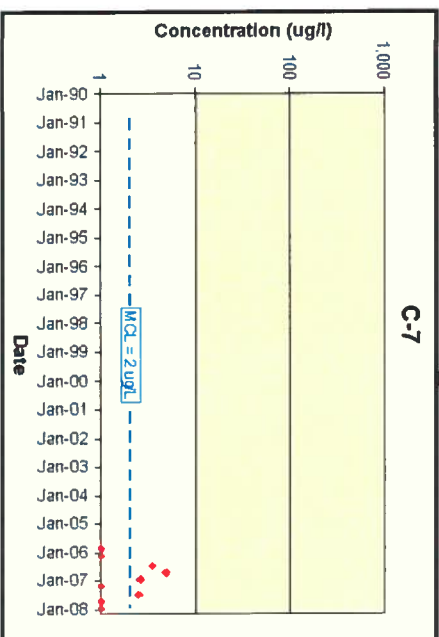
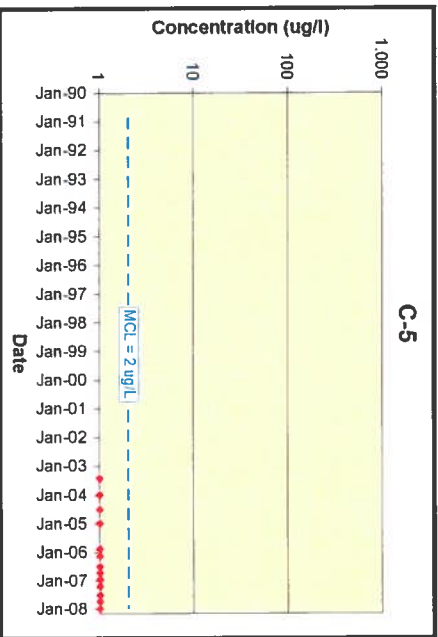
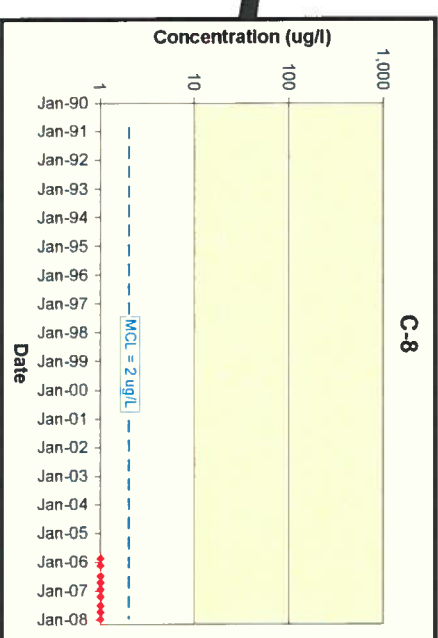
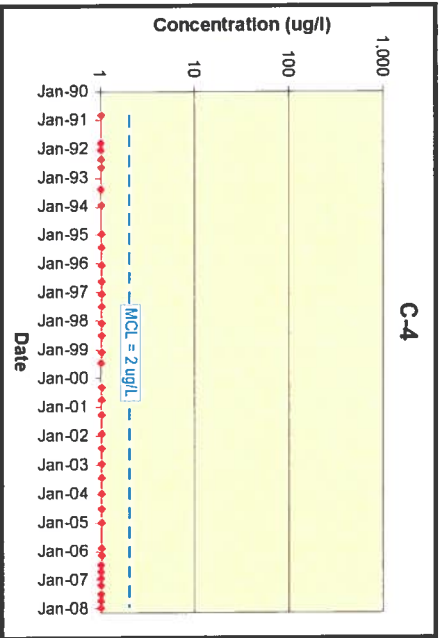
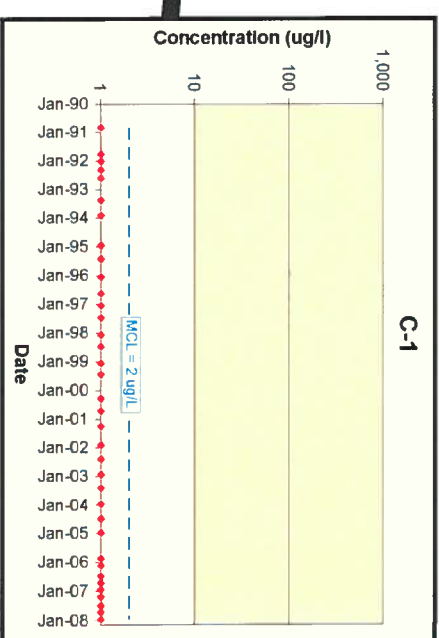
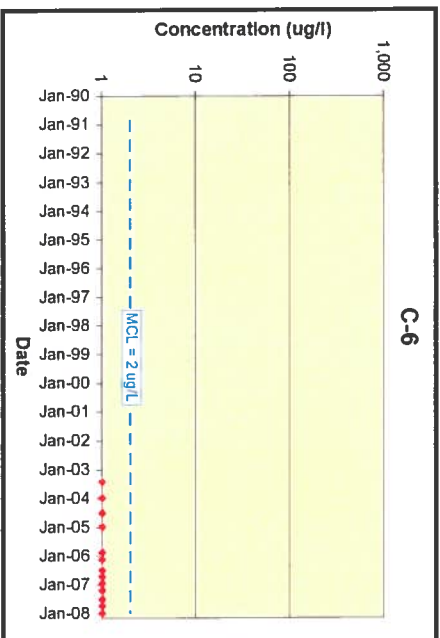
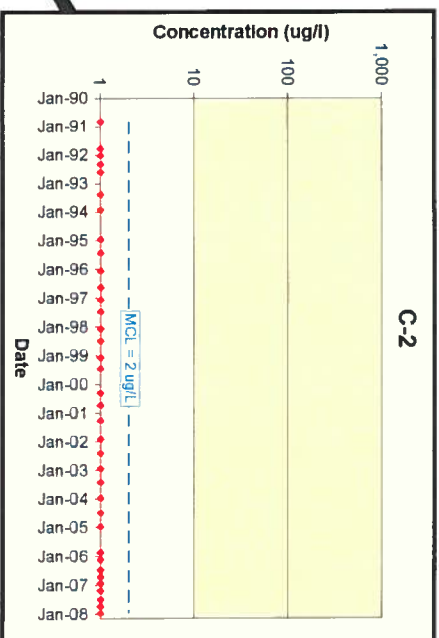
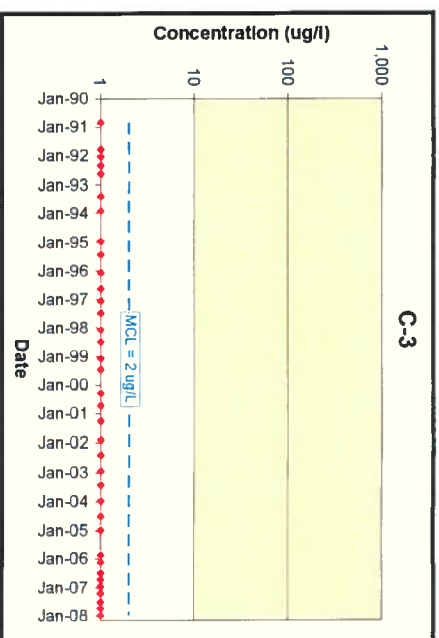
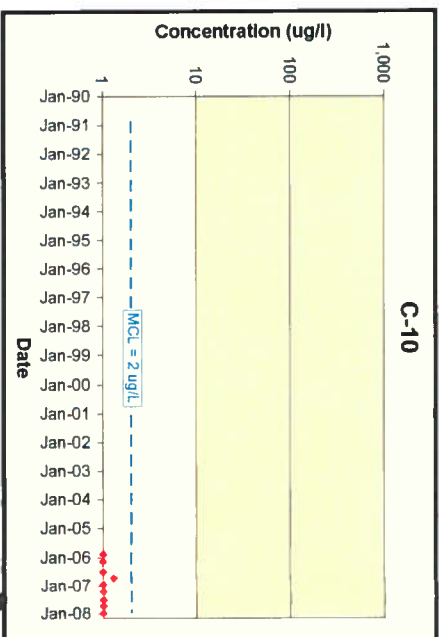
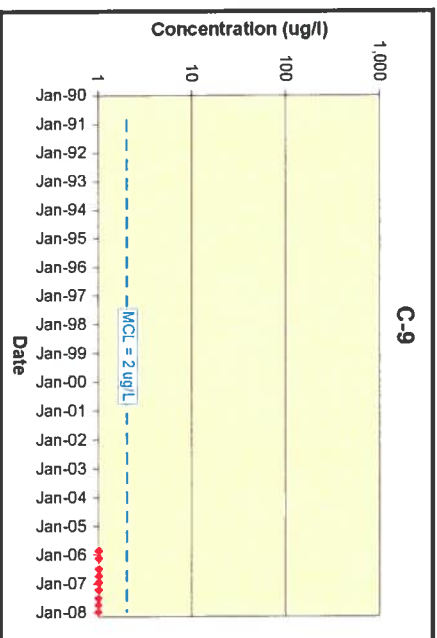
◆ **GRAPHED HISTORICAL cis-1,2-DCE CONCENTRATION VALUE (ug/l)**

cis-1,2-DCE cis-1,2-DICHLOROETHENE



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

LOCATION:
Caribe General Electric, Vieques, Puerto Rico



LEGEND

● MONITOR WELL LOCATION

● GRAPHED HISTORICAL VC CONCENTRATION VALUE ($\mu\text{g/L}$)

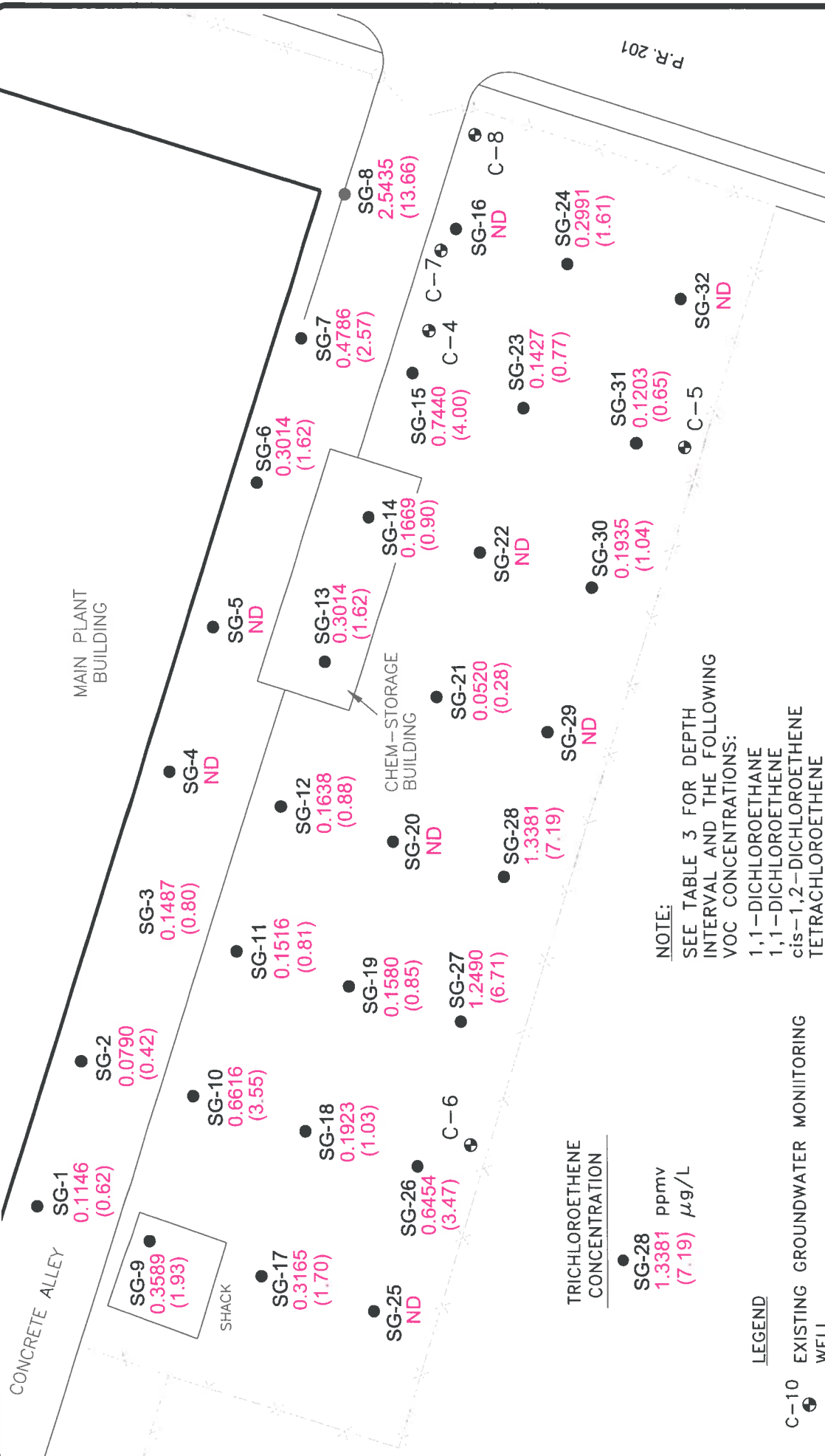
VC VINYL CHLORIDE

0 100 200

SCALE IN FEET

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

LOCATION: Caribe General Electric, Vieques, Puerto Rico



TITLE: SOIL GAS TRICHLOROETHENE CONCENTRATIONS
MARCH 2007

LOCATION: Caribe General Electric, Vieques, Puerto Rico

FIGURE:	CHECKED	JT	11
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