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SITE CHARACTERIZATION
TOW WAY FUEL FACILITY

Roosevelt Roads Naval Station
Ceiba, Puerto Rico

Contract Number N62470-93-4021

FEBRUARY 1994

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

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TOW WAY FUEL FACILITY

U.S. NAVAL STATION
ROOSEVELT ROADS
CEIBA, PUERTO RICO

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Introduction

SECTION 1.0 - INTRODUCTION

Pursuant to Contract Number N62470-91-D-4021, Blasland, Bouck & Lee, Inc. (BB&L) was authorized by the U.S. Navy to conduct a site characterization (SC) at the Tow Way Fuel Facility, Roosevelt Roads U.S. Naval Station, Ceiba, Puerto Rico. This report presents the work completed and results of the site characterization field investigation and provides recommendations for a site remedial action plan.

1.1 Site Location

The Roosevelt Roads U.S. Naval Station (NAVSTA Roosevelt Roads) is located near the town of Ceiba on the eastern end of Puerto Rico. The approximate location of the base is 18° 15' 00" latitude and 65° 39' 30" longitude (Figure 1-1). The area of interest for this workplan is the fuel storage and distribution area, termed the Tow Way Fuel Facility (TWFF), located near the northeast corner of Ensenada Honda (Honda Bay) (Figure 1-2).

Ensenada Honda is a fueling port for the U.S. Navy Caribbean Fleet. Access to the Bay is restricted to U.S. Navy equipment and personnel. Therefore, no commercial or recreational activities (e.g., fishing) occur within or near the Bay.

1.2 Water Supply

Potable water in eastern Puerto Rico is primarily recovered from the nearby rain forest, El Yunque. El Yunque is located approximately 5 miles west of NAVSTA Roosevelt Roads. Based on conversations with U.S. Navy personnel, Puerto Rico Department of Natural Resources personnel, and water supply personnel in the town of Fajardo (Fajardo is located approximately 7 miles northwest of the naval base), the potable water supply for the Naval Base, the

town of Ceiba, (Figure 1-2) and Fajardo is from surface-water sources in El Yunque. The naval base has a gravity feed distribution system from the rain forest to the water treatment plant on the base.

Due to the availability of surface water in eastern Puerto Rico, ground water is not exploited as a source of potable water.

1.3 Site Background

The TWFF consists of nine underground storage tanks (USTs) containing diesel fuel and jet fuel (JP-5) (Figure 1-3). A previous site investigation (O'Brien & Gere, 1992), documented that spills and the disposal of fuels have occurred at the TWFF since 1957. The known fuel loss history is summarized below:

- 1957/1958 - Approximately 420,000 gallons of Bunker C fuel leaked from UST #82.
- 1960s/1970s/1980s - A cumulative volume of approximately 420,000 gallons of fuel leaked from USTs #56A and #56B during this time period.
- 1971/1972 - Approximately 3,900 to 7,500 cubic yards of Bunker C fuel-sludge was removed from USTs #83 and #1080 and was buried in pits excavated adjacent to the USTs.
- 1978 - Approximately 65,000 gallons of diesel fuel leaked from UST #1080.
- 1986 - Approximately 91,000 gallons of JP-5 leaked from UST #85. Approximately 32,000 gallons were recovered by various methods.

The USTs shown on Figure 1-3 are located in the Upper TWFF, which is on an area of higher elevation than the Lower TWFF. The Upper and Lower TWFFs are separated by Forestal Drive. Based on the TWFF topography and historic ground-water flow directions, fuel leaking from the USTs and associated piping flows to the southwest towards Ensenada Honda. However, the free-

product plume at the site does not extend to Ensenada Honda, it pools at the base of the hill that separates the Lower and Upper TWFFs (Figure 1-4).

1.4 Project Objectives

The main project objective was to completely define the extent of free-floating product, contaminated ground water, and soil contamination by installing additional soil borings and monitoring wells outside the approximated perimeter of the contaminated zone, and to collect information required to design a remediation system for the site. The SC field investigation consisted of installing seven soil borings, constructing eight monitoring wells, conducting field and laboratory analyses of soil and ground-water samples, conducting an aquifer performance test (APT), conducting slug tests, conducting four product bail down tests, and conducting a double-ring infiltrometer test. The site investigation was conducted using analytical screening techniques on soil and ground water prior to making decisions regarding placement of monitoring wells. Screening technologies included the use of a field chemist operating a gas chromatograph and a certified technician analyzing samples with immunoassay petroleum hydrocarbon test kits. This approach enabled the crew to define the extent of contamination in a single phase. The work completed and field procedures followed at the site are detailed in this report.

1.5 Previous Investigations

There have been three previous investigations in the TWFF. The first study, which was a ground-water and soil assessment of the TWFF, was completed in 1991 by O'Brien and Gere. The second study, completed in 1992 by Law Environmental, was a soil assessment around a leaking underground waste oil tank. The third investigation consisted of four soil borings installed in

conjunction with a Draft Corrective Action Plan (CAP) for the Tow Way Fuel Farm, submitted by Law Environmental in October 1993.

The O'Brien and Gere investigation consisted of installing ten soil borings and eighteen monitoring wells in the Upper and Lower TWFF to define the extent of ground-water contamination, free floating product, and soil contamination. In addition, slug tests were conducted on eleven monitoring wells to determine site hydraulic conductivity. The field investigation defined the extent of free floating product, but only partially defined the extent of ground-water and soil contamination. Results of the investigation were documented to the U.S. Navy in a report titled, "Underground Field Investigation, Tow Way Fuel Farm, U.S. Naval Station - Roosevelt Roads, Puerto Rico," in 1992.

The second investigation was a smaller scale soil assessment around a leaking 550 gallon underground waste oil tank. The tank, which had failed a tightness test, was located in the Lower TWFF, approximately 100 feet west of monitoring well UGW-18. Three soil borings were installed to 20 feet bls in the vicinity of the tank. Laboratory results indicated the Total Petroleum Hydrocarbon (TPH) concentrations in each soil boring was above the Puerto Rico Environmental Quality Boards (PREQB) contaminated soil standard of 100 milligrams per kilogram (mg/kg). The highest TPH concentration, 1,200 mg/kg, occurred in soil borings BO-02, see Figure 1-3 (due to the scale of Figure 1-3, soil boring BO-01 and BO-03 are not shown as they are in the immediate vicinity of boring BO-02). Results of the investigation were documented to the U.S. Navy in a report titled, "Preliminary Site Assessment Report, Underground Storage Tank Site No. 443 - U.S. Naval Station (Roosevelt Roads) Ceiba, Puerto Rico" in 1993.

The third investigation consisted of installing four soil borings (TWSB-1 through TWSB-4) to depths ranging from 8 to 19 feet (see Figure 1-3). The soil borings were installed in conjunction with the Draft CAP. Soil from only one of

the four borings, TWSB-1, exceeded the PREQB TPH standard for contaminated soil. The TPH concentrations in the three other soil borings ranged from 0 to 93 mg/kg.

Results of these three prior investigations were used in conjunction with the results of BB&L's site characterization to completely define the horizontal and vertical extent of ground-water and soil contamination.

Geology and Hydrogeology

SECTION 2.0 GEOLOGY AND HYDROGEOLOGY

2.1 Site Geology

The site geology description is based on previous site investigations (O'Brien & Gere, 1992, and Law Environmental, 1993) and the soil borings installed for this SC. The site surficial geology consists primarily of gravel fill material and fine sands and silts, overlying weathered, volcanic rock and unweathered volcanic rock. The surficial sediments are primarily reddish-brown or brown, very fine to fine grained, subrounded sands and silts. The weathered rock beneath the sands and silts is primarily red, brown, and white and is easily crumbled under hand pressure. The red and brown coloring of the weathered volcanic rock is due to iron oxidation. The unweathered volcanic rock beneath the weathered zone is a dark grey-green color, dense, and very hard. Based on macroscopic inspection of samples collected from the site, the rock is within the gabbro classification of volcanic rocks. A gabbro is identified by its high content of dark, mafic minerals, such as olivine, pyroxenes, amphiboles, and mica, and relative low content of siliceous material, such as quartz and feldspars. Gabbro also has relatively large crystals, which indicate the rock was formed deep below the surface of the earth. The rock was transferred from its point of origin to the surface through tectonic events.

The depth at which the unweathered, dense volcanic rock was encountered during soil borings and monitoring well installation varied irregularly across the site from 6 to 40 feet below land surface (bls). The irregular surface elevation of the rock may be related to its tectonic origin of emplacement. The base of the volcanic rock was not encountered in the soil borings or monitoring wells installed in the TWFF.

2.2 Site Hydrogeology

The site hydrogeology is controlled by elevation differences between the Upper and Lower TWFFs, which creates a southwestern ground-water gradient towards Ensenada Honda. Based on the most recent ground-water elevation survey conducted by BB&L on December 18, 1993 (Figure 2-1), the average site ground-water gradient is 0.012 feet/foot southwest.

During installation of soil borings and monitoring wells in the Upper and Lower TWFFs, the depth at which the ground-water table was first encountered was up to several feet lower than the measured static water level, which was measured after the water level was allowed to equilibrate in the soil boring. This discrepancy indicates that confined or partially confined ground-water conditions exist at the site due to volcanic rock, which may be acting as a confining unit. The dense nature of the volcanic rock and slow recharge rates observed in monitoring wells indicate that the permeability of the rock is very low, causing it to behave as a confining or semi-confining unit.

Field Investigation

SECTION 3.0 - FIELD INVESTIGATION

The SC field investigation work was conducted in two 2-week long mobilizations, from November 9 through November 18, 1993, and from December 6 through December 18, 1993. Two field mobilizations were required due to the difficulty encountered drilling through the dense, hard volcanic rock beneath the site. Since the volcanic rock was impenetrable utilizing the hollow-stem auger method, the drilling method was changed to straight-air drilling.

3.1 Drilling

3.1.1 Utility Location/Well Permits

Prior to initiating field work, the proposed soil boring and monitoring well locations were provided to Mr. Pedro Ruiz (NAVSTA Roosevelt Roads - Environmental Engineering Division/Public Works Department). Mr. Ruiz arranged a utility check in the proposed work areas prior to initiation of the SC field investigation. As a safety precaution, the first 4 feet of each soil boring and monitoring well were installed with a hand auger to avoid accidentally puncturing underground pipes/conduits.

Well construction permits were obtained from the Puerto Rico Department of Natural Resources, prior to initiating the field investigation of the TWFF.

3.1.2 Equipment Decontamination

Prior to beginning work and before installing each soil boring and monitoring well, the drilling rig and associated equipment were decontaminated by removing loose soil from the equipment, followed by steam cleaning. Potable water from a spigot in the fuels pump house and alconox (non-phosphate soap) were used for steam cleaning. The fuels pump house is located approximately 150 feet southeast of the decontamination area, which is located on the north side of Forestal Drive

in between existing monitoring wells GW-02 and GW-03 (see Figure 1-3). Prior to beginning field work, water from the pump house spigot was collected and laboratory analyzed by EPA Method 602; all the constituents tested for were below the method detection limit (bdl).

Equipment decontamination was conducted in an existing 30-ft x 30-ft concrete bermed area that was covered with plastic sheeting. Decontamination water contained in the decontamination area volatilized to the atmosphere before it could be pumped into 55-gallon drums for disposal.

During installation of each soil boring, the split-spoon sampling equipment was cleaned between each sampling interval by scrubbing the remaining soil off with a brush in soapy water and rinsing in fresh water. The split-spoon equipment was steam cleaned in the decontamination area after each borehole was installed.

3.1.3 Soil Boring Installation

The extent of soil contamination was partially delineated during two previous site investigations (O'Brien & Gere, 1992, and Law Environmental, 1993). BB&L installed seven additional soil borings (BBSB-1 through BBSB-7, see Figure 1-3) to delineate the outward boundary of soil contamination to complete the site assessment.

Soil borings were advanced to the water table using a stainless-steel, 2-foot long, split-spoon sampler, inside a hollow-stem auger. Standard Penetration Test procedures, in accordance with ASTM D-1586, were followed during collection of soil samples. Soil samples were collected continuously at 2-foot intervals to 30 feet bls or to the top of unweathered volcanic rock (whichever came first). Rock and soil types were described in accordance with the Unified Soil Classification System (USCS).

After unweathered volcanic rock was encountered, the drilling method was switched to straight-air. Lithologic samples were collected at 5-foot intervals from the air drilling discharge hose, to the bottom of the soil boring.

A portion of each split-spoon and air-drilling sample collected was placed in marked containers for future lithologic description. Soil boring lithologic logs are presented in Appendix A.

Soil boring cuttings suspected of being contaminated, based on field screening methods, were placed in labeled EPA-approved 55-gallon drums and stored on site. Cuttings from soil boring BBSB-4 were the only soils determined to be contaminated, based on field screening results, and were placed in drums and sealed. A composite soil sample was collected from the drums and laboratory analyzed for hazardous waste characteristics. The analytical results (see Appendix B) indicated the soil was below the method detection limit for all compounds tested except for hydrocarbons, in the form of jet fuel A, at 360 mg/kg. Based on these results, the soil was determined to be non-hazardous and was spread out at the surface in the immediate vicinity of BBSB-4.

3.1.3.1 Soil Field Screening and Sampling

Each soil sample collected from the soil borings was analyzed using an organic vapor analyzer (OVA), field gas chromatograph (GC), and immunoassay techniques, where appropriate. The following method was employed for OVA screening: 1) two pint-sized mason jars were filled half filled with soil from the same depth; 2) the jar tops were covered with tin foil and sealed; 3) the jars were placed in a cool area for five minutes to allow the headspace to equilibrate; and 4) the headspace was measured with an OVA. Two samples were collected from each interval to measure the headspace with and without a

charcoal filter; the filter allows differentiation between natural organic vapors (e.g., methane) and hydrocarbon vapors. The OVA results, summarized in Table 3-1, indicate that most of the soils tested had less than 5 parts per million (ppm) hydrocarbons or no hydrocarbons and that natural organic vapors are not prevalent at the site.

The following method (EPA Method 846/4030) was employed for immunoassay petroleum hydrocarbon screening: 1) standards for 10 and 100 mg/kg petroleum hydrocarbons were prepared; 2) the sample was weighted (10 grams of soil) and extracted; 3) the sample was filtered and diluted; 4) the sample was allowed to incubate for 10 minutes; 5) the coated antibody tube was vigorously washed; 6) substrates were added and allowed to sit for 2 1/2 minutes; and, 7) photometer color readings were recorded.

Modified EPA Method 602 was used to screen soils for benzene, ethylbenzene, toluene, and xylene in the field. EPA Method 418.1 was used to screen for TPH in field.

Based on the field screening results, selected soil samples were collected for laboratory confirmation analyses.

Samples collected for laboratory analysis were labeled, packed in ice, and shipped with appropriate chain-of-custody to Savannah Laboratories in Deerfield Beach, Florida, via Federal Express.

3.1.3.2 Ground-Water Field Screening

After each soil boring was completed to the water table, a ground-water sample was collected from the open borehole with a disposable bailer. The samples were analyzed for volatile organic aromatics (VOAs) (using modified EPA Method 602) and total petroleum hydrocarbons (TPH) (using modified EPA Method 418.1) using a field GC and TPH analyzer, respectively. Samples were tested within 24 hours of

collection to determine if the boreholes were outside the area of contaminated ground water. Borings installed outside the area of contaminated ground water were subsequently converted to a monitoring well. Ground-water contamination is defined by the PREQB as ground water that contains TPH above 50 milligrams per liter (mg/L), benzene above 5 micrograms per liter (ug/L), or total volatile organic compounds (VOCs) above 50 ug/L (PREQB, 1993).

3.1.4 Monitoring Well Construction

The extent of ground-water contamination was partially delineated during a previous site investigation (O'Brien & Gere, 1992). BB&L installed eight additional monitoring wells to delineate the outward boundary of ground-water contamination and complete the site assessment.

To define the horizontal extent of contamination, BB&L constructed six monitoring wells (UGW-19, UGW-20, UGW-21, UGW-23, UGW-24, and UGW-25) to the top of the water table (see Figure 1-3). To determine the vertical extent of contamination, a deep surface-cased well (UGW-26) was constructed to 46 feet bls (approximately 40 feet below the water table). A large, 6-inch diameter well, UGW-22, was installed in the center of the free-product plume near UGW-5 to accurately estimate the thickness of free-floating product on top of the water table. This well was also used to conduct an APT (see Section 3.2). A summary of the construction details for new and previously constructed monitoring wells in the TWFF is presented in Table 3-2.

Shallow monitoring wells constructed above the volcanic rock in the Lower TWFF were installed using the hollow-stem auger method, except for UGW-22 (APT and product test well), which was installed by straight-air. Due to the large borehole diameter (10 inches) required for a 6-inch well, BB&L decided to install the well using the straight-air method.

Monitoring wells installed into the volcanic rock in the Upper TWFF (UGW-23, UGW-24, and UGW-25) were advanced to the top of the rock using the hollow-stem auger method so that split-spoon samples could be collected. Upon encountering unweathered volcanic rock, hollow-stem auger drilling was suspended, and the boreholes were completed using the straight-air drilling method.

Seven of the eight monitoring wells installed for this SC (UGW-19 through UGW-25) were constructed to intercept the water-table. The top of the screened interval (ranging from 5 to 20 feet long) was placed several feet above the water table to ensure that the water table will remain below the top of the screen during yearly water-level fluctuations (maintaining the water table within the screen interval is necessary to accurately assess VOA ground-water contamination and free-floating product thickness).

Monitoring well UGW-26 was screened below the water table to 46 feet bls to measure the vertical extent of VOA contamination. The UGW-26 well casing and screen were installed inside an 8-inch diameter polyvinyl chloride (PVC) surface casing to isolate the deep screened interval from potential soil and ground-water contamination at and near the water table. The surface casing was inserted to 30 feet bls and grouted in place prior to installing UGW-26. Grout was allowed to set for 24 hours prior to drilling out the borehole.

Filter pack material consisting of 20/30 grade silica sand was poured in each borehole annulus to 2 feet above the top of the screen after the well casing and screen were emplaced in the borehole. During sand pack emplacement, the depth to sand was continuously monitored using a weighted tape measure to ensure sand bridging did not occur and to ensure the filter pack was placed at the proper interval. A 1- to 2-foot bentonite pellet seal was emplaced on top of the sand pack by the same

method. Water was poured on top of the bentonite to hydrate the pellets. The bentonite was allowed to hydrate before the well was completed by pouring cement grout to the surface.

The monitoring wells were completed using a triangular shaped concrete pad (measuring 3-ft x 3-ft x 3-ft x 0.5-ft deep), three 3-inch diameter steel protective posts in each corner of the pad, and a square steel protective casing over the well riser, which is also cemented into the surface pad. A monitoring well construction diagram and lithologic summary for each monitoring well constructed by BB&L is presented in Appendix C.

OVA, GC, and immunoassay screening of drill cuttings from wells UGW-19 and UGW-22 indicated VOC contamination. The cuttings were placed in 55-gallon drums until laboratory analyses were completed and the soil was determined to be non-hazardous (see Appendix B). The cuttings were then spread on the ground in the vicinity of the wells.

3.1.4.1 Well Development

Due to the variation in depth to water and recharge rates in the monitoring wells installed by BB&L, three techniques (pumping, hand bailing, and air development) were used to effectively develop the wells until they were free of silt and sand. Monitoring wells UGW-19 and UGW-20 were developed by pumping and surging with a centrifugal pump. Due to slow recharge rates, wells UGW-21 and UGW-23 were developed over several days by hand bailing with disposable and decontaminated teflon bailers, respectively. The remaining wells, UGW-22, UGW-24, UGW-25, and UGW-26, were developed by the reverse air method. This method consisted of lowering two pipes (one pipe inside the other) down to the base of the well. Using an oil-free air compressor, air was forced down the inner pipe creating a vacuum effect, which allowed water to rise to the surface without air blowing into

the formation. Water forced to the surface came through the annular space of the outer pipe. Well development dates, technique, and volume are summarized in Table 3-3.

Based on ground-water field screening results, development water from each monitoring well (except UGW-22, which contained free product) was determined to be clean and was purged onto the ground surrounding the well. Development water from UGW-22 was placed into 55-gallon drums and later removed from the site for proper disposal by a licensed hazardous waste disposal contractor.

3.1.5 Air Monitoring

During drilling activities, the breathing zone around the soil borings and monitoring wells was routinely monitored with an OVA. Results of the daily air monitoring are presented in Appendix D. The breathing zone levels exceeded the maximum levels allowed for level D work, above 10 ppm, while installing UGW-22. Personal protective equipment (PPE) was upgraded to level C for the remainder of the installation of UGW-22. The breathing zone concentrations did not exceed 10 ppm during installation of any other borehole.

3.2 Aquifer Performance Test (APT)

To determine hydrogeologic aquifer characteristics within the free-product plume for use in the Corrective Action Plan (CAP), an 8-hour constant rate APT was scheduled for the 6-inch diameter well located in the center of the free-product plume, UGW-22. Due to the low permeability of the surficial sediments, UGW-22 was pumped at a low flow rate of 0.5 gallons per minute (gpm). Despite the low flow rate, the well pumped dry within 50 minutes. Recovery data was collected for 24 hours after the well was pumped dry.

3.2.1 APT Setup

Prior to starting the APT, a pre-APT step test was attempted on UGW-22, but the well was pumped dry before an appropriate pump rate could be obtained. Due to the long recovery time of the well, a second step test was not attempted prior to the APT

The UGW-22 APT was performed by pumping UGW-22 with a 4-inch diameter submersible pump at a constant rate of 0.5 gpm. The discharge water was pumped through a totalizing flow meter and into a 55-gallon drum. The water was then pumped from the drum into an 8,000-gallon tanker truck. The discharge water was not pumped directly into the tanker truck to avoid backpressure, which would affect the constant flow rate. Water levels were measured in the pumping well and one observation well, UGW-5, with an IN-SITU Hermit 2000 data logger and associated pressure transducers (the pressure transducers measure water levels with an accuracy of 0.003 feet). UGW-5 is approximately 30 feet northeast of UGW-22 (see Figure 1-3). Water levels in a background well, UGW-13, which is approximately 200 feet southeast of UGW-22, were also monitored to determine the tidal effects on results of the APT. Based on the water-level fluctuations measured for 24 hours in UGW-13 (Appendix E), tidal influences have little effect on site ground-water elevations.

To ensure the accuracy of the pressure transducers, the transducers were calibrated as they were initially lowered into each well by raising the transducer by one foot and checking that a corresponding elevation difference was recorded by the data logger. Also, periodic measurements of water levels in the pumping and observation wells were collected during the APT with a hand-operated electronic interface probe.

Water and product generated during the APT were stored in the tanker truck and were properly disposed of by a licensed waste hauler according

to applicable regulations (transport manifests are provided in Appendix F). Prior to disposal, the water and product were laboratory analyzed by the waste hauler for hazardous waste characterization.

3.2.2 APT Results

Due to the lack of well capacity, the drawdown phase of the APT lasted only 50 minutes, withdrawing only 25 gallons from UGW-22 before purging dry. Due to the short pumping duration, water levels in UGW-22 did not stabilize, and water elevation changes in the observation well, UGW-5, did not occur. Since the APT drawdown data was inadequate, the recovery data from UGW-22 was used to determine the transmissivity of the surficial aquifer above the unweathered volcanic rock (storativity can not be calculated from pumping well data). A transmissivity of 0.14 feet squared per day (ft^2/day) was calculated using the Hantush-Jacob method. If a surficial aquifer thickness of 20 feet is assumed (20 feet is the height of the water table above volcanic rock in UGW-22), the transmissivity value corresponds to a hydraulic conductivity value of 7.0E-3 ft/day. This value is smaller than values calculated from slug tests (see Section 3.3), which could be due to well inefficiency at UGW-22 and because the drawdown did not stabilize in UGW-22 before recovery data was collected.

It should be noted that a flow rate of 0.5 gpm, with intermittent dry purging of potential recovery wells, would minimize the effective capture of impacted ground water. Results of the APT, including graphs and calculations, are presented in Appendix E.

3.3 Slug Tests

To verify the range of hydraulic conductivity across the Lower TWFF calculated by O'Brien & Gere (1992), slug tests were conducted four previously installed monitoring wells UGW-5, UGW-6, UGW-7, and UGW-18. Slug tests were

conducted by quickly removing a slug of water from the well using a centrifugal pump and measuring the recovery rate with a Hermit data logger and associated pressure transducer. The slug test results were plotted on semi-logarithmic graphs and analyzed using the Bouwer and Rice method (Bouwer and Rice, 1976). Raw data, graphs, and calculations are presented in Appendix G.

The hydraulic conductivities calculated from the slug tests ranged from 1.9E-2 ft/day to 1.0 ft/day, which is similar to values previously calculated by O'Brien & Gere, 1992 (1.73E-2 ft/day to 2.36 ft/day) (see Table 3-2).

3.4 Product Bail Down Tests

The thickness of free product in a monitoring well is typically not a true indicator of the actual product thickness in the aquifer. To more accurately define the free-product thickness in the ground at the TWFF, four product bail down tests were conducted as part of the SC in monitoring wells UGW-4, UGW-5, UGW-12, and UGW-17. The bail down test procedure used was based on the method recommended by Testa and Paczkowski, 1989.

Each test was conducted by bailing free-standing product from the well until less than a few inches remained in the well (due to movement of product into the wells, the product thickness could not be reduced below a few inches). A bottom weighted bailer, which only allowed fluid entry through the top, was used to recover product and minimize water recovery. After the product was removed, the recovery levels of both the water and product were measured continuously by hand with an electronic interface probe, which is accurate to 0.01 feet. Recovery data was collected until after an inflection point was reached. The inflection point is the point during recovery where the weight of overlying product causes depression of the water table. According to Testa and Paczkowski (1989), product thickness measured in a well at the inflection point represents the actual product thickness in the aquifer.

3.4.1 Product Bail Down Test Results

Results from three of the four tests conducted indicated a large difference between measured free-product thickness and the bail down test results. The measured free product in wells UGW-4, UGW-12, and UGW-17 prior to the bail down tests ranged from 5.81 to 14.83. Based on the bail down tests, the true product thickness in those wells does not exceed 0.8 feet. The fourth test was conducted on monitoring well UGW-5. UGW-5, which contained 10.38 feet of free product based on standard oil/water measurements, did not reach the inflection point after 10 hours of measurements. Ten hours into the test, the product thickness was 2.25 feet. Results from the tests are summarized in Table 3-4. Graphs of the test data are presented in Appendix H.

The results indicate that the free-product plume may contain less volume than previously thought. The large discrepancy between measured and actual product thickness is primarily due to the difference between true product thickness and the amount of product that flows into a monitoring well, but may also be due in part to improper well screen placement below the water table in several of the monitoring wells (UGW-1, UGW-3, UGW-4, UGW-6, UGW-7, UGW-8, UGW-9, UGW-10, UGW-11, UGW-12, UGW-13, and UGW-14).

Product removed from the monitoring wells during the product bail down tests was poured into a 5-gallon bucket and then transferred to 55-gallon drums. The drums were sealed, labeled, and stored on site until they were transported for proper disposal by a licensed waste hauler (see Section 3.2). The physical appearance of product removed from the wells tested varied from clear with a yellowish tint (in wells UGW-4 and UGW-17) to a dark amber color in UGW-5.

3.5 Product Recovery Rate Evaluation

On December 14, 1993, a peristaltic pump with teflon tube was used to test potential product removal rates from the 6-inch diameter monitoring well, UGW-22. The teflon line tubing was placed above the water/product interface to avoid pumping water. During the test, only product was removed from the well.

Prior to starting the test, the product thickness was measured with an electronic interface probe. The pump rate was gradually increased from 0.125 gpm to 0.36 gpm over 90 minutes, until the product layer was removed from the well. Flow rates were measured with a stop watch and graduated cylinder. During the 90 minute test, 19 gallons of product were removed from the well. Two days later, a similar test was conducted on UGW-22 to determine reproducability of the results. Approximately 20 gallons of product were removed from UGW-22 after pumping for 5 hours at a rate of .07 gpm. This would equate to 4 gallons/hour without pumping water.

Product removed during the tests was pumped directly into 55-gallon drums for subsequent disposal by a licensed waste hauler.

3.6 Double-Ring Infiltrometer Test

To determine permeability characteristics of the unsaturated sediments in the TWFF, a double-ring infiltrometer test was conducted in accordance with ASTM D 3385-88. The test results may be used in the CAP to design a recharge gallery for treated ground water, if necessary. The test location (Figure 3-1) was chosen to best approximate a possible location for a potential recharge gallery. Based on this criteria, the test was conducted upgradient of the center of the free-product plume at the base of the Upper TWFF.

The test was conducted by installing a 2-foot and a one-foot diameter steel cylinder into the ground. The one-foot diameter cylinder was placed in the center of the larger cylinder. The outer cylinder was installed to 4 inches bls,

1/2-inch deeper than the smaller cylinder, to prevent horizontal flow of water from the inner cylinder (since the water from the inner cylinder is forced to travel in a vertical direction, the measured infiltration rate of the inner cylinder is more accurate than the outer cylinder). Once installed, both cylinders were filled with 5 inches of water (the water was obtained from a spigot in the fuels pump house). The 5-inch head in the cylinders was maintained over the following 6.5 hours by pouring a measured amount of water into each cylinder at regular intervals. Water volumes were measured in a graduated cylinder. A tabulated record of the test is presented in Appendix I.

3.6.1 Double-Ring Infiltrometer Test Results

The results of the test are presented graphically in Appendix I. The results indicate that the infiltration rate decreased steadily during the first 100 minutes of the test and then started to level off. Based on extrapolation of the graphical results, the long-term infiltration rate in the area tested is approximately 2 to 2.5 inches per hour, or approximately 4 ft/day. This infiltration rate is extremely low and would prohibit the effective use of a recharge gallery.

3.7 Water/Product Elevation Measurements

The elevations of the 30 monitoring wells in the TWFF were surveyed by a licensed surveyor and referenced to the National Geodetic Vertical Datum. The survey results are presented in Table 3-5.

On December 18, 1993, the ground-water elevation and free-product elevation were measured to the top of well casing in the 30 TWFF monitoring wells. The fluid elevations were measured with an electronic interface probe, which is accurate to 0.01 feet. The fluid elevations and results of the monitoring well elevation survey were used to generate a ground-water table elevation map (see Figure 2-1) and a free-product plume map (see Figure 1-4).

To prevent cross-contamination of wells, the interface probe was decontaminated with a solvent rinse consisting of pesticide-grade isopropyl alcohol, followed by a distilled water rinse immediately after measuring fluid levels in each monitoring well.

3.8 Ground-Water Sampling

During the SC field investigation, ground water from the new monitoring wells, UGW-19 through UGW-26, were sampled for laboratory analyses for VOAs (EPA Method 602) and TPH (EPA Method 418.1). In addition, 10 previously constructed monitoring wells that did not contain free product were also sampled for analysis by EPA Methods 602 and 418.1. The 10 previously sampled wells were UGW-6 through UGW-11, UGW-15, UGW-16, UGW-18, and GW-02.

3.8.1 Ground-Water Sampling Procedures

Each new monitoring well was allowed to stabilize for at least 24 hours after installation prior to being sampled. To avoid cross-contamination between wells, disposable bailers were used to collect ground-water samples. Prior to sampling ground water from the new and previously constructed monitoring wells, depth to water was measured and each well was purged of at least three well volumes. The purge procedures included air development and/or hand bailing using a disposable bailer. During purging, multiple water-quality measurements of pH, temperature, and conductivity were collected in the field until reaching stabilization. Purge water-quality results are presented in Table 3-6 (complete well sampling logs are presented in Appendix J).

Ground-water samples were shipped in sealed coolers packed with ice via an overnight delivery service to Savannah Laboratories in Deerfield Beach, Florida.

3.8.2 Ground-Water Sampling QA/QC

To insure that contaminants were not introduced to the ground-water samples before or after sample collection, field blanks, equipment blanks, and trip blanks were collected. A summary of the laboratory analytical results is presented in Table 3-7.

Field blanks were collected on every date that two or more wells were sampled: November 11, 12, and 18 and December 11 and 17, 1993. The field blanks were analyzed for VOAs by EPA Method 602. Field blank samples were collected by filling the appropriate laboratory containers with deionized, organic free water in an area that ground-water samples were being collected on that date. No constituents were detected above the laboratory detection limits in any of the field blank samples.

Two equipment blanks were collected during the SC, one from a new disposable bailer and one from decontaminated hollow-stem augers used to install borings. The samples were collected by pouring deionized, organic-free water into and over the bailer and augers and collecting the runoff in the appropriate laboratory containers. No constituents were detected above the laboratory detection limits in either of the equipment blank samples.

One set of duplicate samples from monitoring well GW-02 was collected for analysis by EPA Method 602. To test the laboratory's precision, the origin of the duplicate sample was not known by the laboratory. The duplicate sample analysis (Table 3-7) was essentially identical, the total reported VOA concentrations for the two samples were 1,224.3 ug/L and 1,321.6 ug/L, less than 10 percent variation.

3.9 Ground-Water/Free-Product Sampling at APT Well UGW-22

During the UGW-22 APT, ground-water samples were collected for hazardous waste characterization and free-product samples were collected for potential remediation system characterization. Ground-water samples were collected from the discharge hose into the appropriate laboratory bottles, and free-product samples were collected through a peristaltic pump. The ground water was analyzed by EPA Methods 610 (polynuclear aromatic hydrocarbons), modified Method 8015 (hydrocarbons), eight RCRA metals, Method 415.1 (total organic carbon), Method 310.1 (alkalinity), Method 150.1 (pH), Method 314A (total hardness, as $CaCO_3$) and Method 375.4 (total sulfur). The free-floating product was analyzed by EPA Method 610, modified EPA Method 8015 and for viscosity. Due to the potentially high contaminant concentration in both the ground water and product, no other water samples were shipped with the UGW-22 sample containers to avoid cross-contamination.

Laboratory Analytical Results

SECTION 4.0 - LABORATORY ANALYTICAL RESULTS

4.1 Soil Analytical Results

A summary of field screening and laboratory soil analysis results is presented in Table 4-1 (laboratory results are presented at the end of Appendix B). A combination of soil TPH concentrations from previous reports (O'Brien & Gere, 1992, and Law Environmental, 1993) and this SC investigation were used to define the extent of site soil contamination (Figure 4-1); soil contamination is defined by the PREQB as soils containing TPH concentrations above 100 mg/kg.

The horizontal extent of soil contamination (see Figure 4-1) approximates the ground-water contamination plume (see Figure 1-4). Soil contamination extends in a northwest-southeast direction from monitoring well GW-02 to UGW-17 (approximately 500 feet) and in a north-south direction from UGW-9 to UST #83 (approximately 700 feet). The vertical extent of soil contamination is to the top of the water table (10 to 15 feet bls) in the Lower TWFF and to approximately 16 feet bls in the Upper TWFF, as determined from laboratory analyses and OVA field screening conducted by O'Brien & Gere (1992). The maximum TPH soil concentration measured in the TWFF is 22,850 mg/kg in soil boring B-3, located south of UST #83 (O'Brien & Gere, 1992).

The total area of soil contamination is approximately 130,000 ft^2 and, based on an approximate average soil contamination depth of 15 feet, the total volume of contaminated soil is 2 million ft^3.

4.2 Ground-Water Analytical Results

A combination of ground-water analytical results from previous reports (O'Brien & Gere, 1992, and Law Environmental, 1993) and results of this SC were used to define the extent of ground-water contamination. The ground-water

laboratory analytical results (Table 4-2) indicate only one of the 17 wells sampled by BB&L in 1993, GW-02, contained VOA concentrations above the PREQB designated levels for UST sites. GW-02 contained 1,100 ug/L of benzene and 1,224.3 ug/L of total VOAs, which exceed the PREQB levels of 5.0 ug/L and 50 ug/L, respectively. None of the wells sampled exceeded the PREQB TPH level of 50 mg/L. Based on the ground-water analytical results and free-product measurements, the extent of ground-water contamination and free-floating product is depicted on Figure 1-4. Laboratory analytical results are presented in Appendix B.

The sizes and shapes of the free-product and ground-water plumes are nearly identical (see Figure 1-4). The plumes are "L" shaped, with the plume axis oriented southwest-northeast and northwest-southeast parallel to Forestal Drive. Based on the interpolated/extrapolated plume dimensions, the approximate area covered by the free-product and ground-water plumes is 134,000 ft^2 and 155,000 ft^2, respectively.

The shape of the ground-water plume generally follows the location of fuel lines from the tank field in the Upper TWFF to the pump house in the Lower TWFF and then parallel to the fuel lines that run along the south side of Forestal Drive, east of the TWFF.

Monitoring wells could not be installed east of the Upper TWFF and north of Forestal Drive due to dense vegetation and a steep incline. Although there are no wells installed on the incline, it is unlikely that ground-water contamination extends uphill due to the strong ground-water gradient toward Ensenada Honda.

4.3 UGW-22 (APT Test Well) Ground-Water/Free-Product Analytical Results

Results of both the ground-water and free-product analyses from UGW-22 are summarized in Tables 4-3 and 4-4, respectively. Laboratory reports are presented in Appendix K. The results indicate that ground water in UGW-22 contains concentrations of naphthalenes (720 ug/L), jet air fuel (16,000 ug/L), gasoline (280 ug/L), barium (0.11 mg/L), and chromium (0.011 mg/L). The ground-water analytical results for iron, TDS, pH, and hardness indicate that ambient ground-water quality is adequate for a conventional treatment system and should not cause excessive fouling or blockage of equipment due to encrustation or precipitation. Toxicity Characteristic Leachate Potential (TCLP) tests were performed on product from monitoring wells UGW-5 and UGW-12 (located nearby UGW-22) by Terra-Vac and Analytical Technologies, Inc., in October 1993. The results indicate the product is not a characteristic hazardous waste (see Table 4-5).

The fuel fingerprint analyses (modified EPA Method 8015) show that the product contains naphthalene concentrations of 14,500 mg/kg, gasoline concentrations of 8,100 mg/kg, and jet air fuel concentrations of 890,000 mg/kg. The viscosity of the product measured 1.53 millimeters squared per second (mm^2/sec). This viscosity value indicates that product, once conveyed into a pump should move with relative ease.

Conclusions

5.0 CONCLUSIONS

5.1 Conclusions

Based on information obtained during this SC and previous site investigations (O'Brien & Gere, 1992, and Law Environmental, 1993), the following conclusions have been drawn:

1) The horizontal and vertical extent of the free-product and ground-water contamination plumes have been defined within the TWFF, except on the hill east of the Upper TWFF and north of Forestal Drive. The steep slopes of the Upper TWFF and the east hill, combined with dense vegetation, has precluded investigation drilling in that area. However, due to the large ground-water gradient from the hill toward Ensenada Honda, it is unlikely that contamination has migrated up the hill; monitoring wells along the north side of Forestal Drive and in the Upper TWFF adequately define the extent of ground-water contamination.
2) No additional site assessment is required prior to preparing a CAP.
3) The free-product plume covers an approximate area of 134,000 ft^2. The true thickness of the product ranges from a few inches in perimeter wells to less than 3 feet in the center of the plume.
4) The free-product plume consists primarily of jet fuel.
5) The free product does not appear to be a characteristic hazardous waste and should be eligible for disposal at a refinery or landfill that accepts petroleum products.
6) The ground-water contamination plume covers an approximate area of 155,000ft^2.

7) Soil contamination (TPH greater than 100 mg/kg) covers an approximate area of 130,000 ft^2. Based on an average thickness of 15 feet, the total volume of contaminated soil is 2 million ft^3.

8) Downgradient migration of soil and ground-water contamination does not appear to have occurred since the previous site characterization was conducted (O'Brien & Gere, 1992).

9) Based on the history of fuel spills in the TWFF and the current extent of contamination, contaminant migration off the TWFF is not occurring at an appreciable rate.

10) The ground-water and soil contamination in the TWFF should not present a threat to human health for the following reasons: contamination is not migrating at a noticeable rate; the source of potable water in this region is surface water collected in the rain forest 5 miles west of the site; and Ensenada Honda (which is downgradient of the TWFF) is a U.S. Navy fueling port that is not used for commercial or recreational activities.

11) As determined by slug tests, product bail down tests, infiltration tests, and the APT, free-product and ground-water contamination lies in very low permeability material. Recovery of ground water and/or discharge of treated ground water at the TWFF is not likely to be technically practical.

5.2 Recommendations

Based on the information contained in this SC, the following recommendations are presented:

1) Since the free-product and ground-water contamination plumes do not appear to be migrating from their current location, remediation efforts should concentrate on removing the free-product layer. As the free-

product layer dissipates under active remediation, the extent of ground-water contamination should also diminish.

2) Until a permanent remediation system is installed, current product remediation efforts using monitoring wells should continue at low flow rates. Low flow rates should be maintained to avoid large drawdowns, which will distribute product over a larger vertical thickness. Based on product removal rate tests performed on UGW-22, up to 20 gallons of product can be removed within 5 hours under slow flow rates (approximately 0.07 gpm) without pumping water. It is expected that the optimal pumping scheme would include 5 to 6 hours of pumping, followed 5 to 6 hours of no pumping. Free product can be removed from wells without pumping ground water by using a submersible product skimming pump, such as a 1.5 Ejector.

3) If recovery well(s) are chosen as the most effective remediation technology, it is recommended that the well(s) be installed in the Lower TWFF (in the vicinity of UGW-1, UGW-5, and UGW-12). Extreme depths to product in the Upper TWFF (due to elevation changes) would preclude this area for installation of recovery wells or a remedial system. In addition, the existing ground-water gradient in the Upper TWFF will cause contaminants to migrate into the Lower TWFF recovery wells, allowing for more effective capture by a pumping well (recovery wells located in areas of strong natural gradients are less efficient at capturing fluids from geologic material). A proposed vertical recovery well network is shown in Figure 5-1. The network consists of seven new 6-inch diameter recovery wells and monitoring well UGW-22, which will be converted to a recovery well. The proposed recovery well network forms a line parallel to Forestal Drive. This pattern is designed to efficiently capture the current free-product plume and also

act as a barrier between the source of contamination in the Upper TWFF and Ensenada Honda.

4) A ground-water monitoring plan should be implemented to help gauge the effectiveness of active remediation and guard against migration of ground-water contaminants toward Ensenada Honda. BB&L recommends that ground water from the following nine wells be sampled and laboratory analyzed for VOAs (EPA Method 602) and TPH (EPA Method 418.1) on a semi-annual basis (see Figure 5-1): UGW-7, UGW-9, UGW-10, UGW-15, UGW-16, UGW-19, UGW-23, UGW-24, and UGW-25.

References

REFERENCES

Freeze, R. Allen and John A. Cherry, "Groundwater," Prentice-Hall, Inc., 1979.

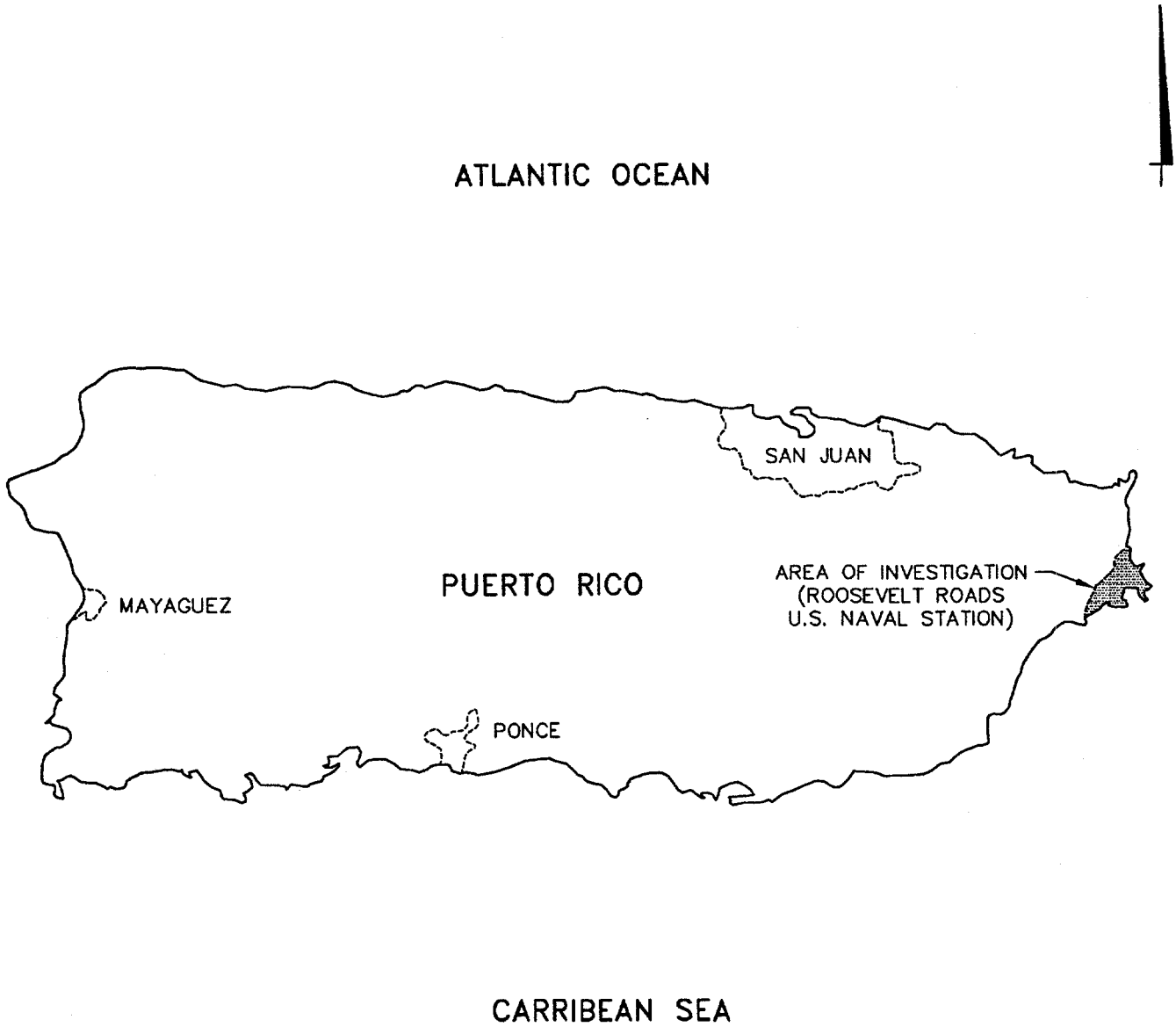
Law Environmental, "Draft Corrective Action Plan, Tow Way Fuel Farm, U.S. Naval Station - Roosevelt Roads, Ceiba, Puerto Rico," October 1993.

Law Environmental, "Preliminary Site Assessment Report: Underground Storage Tank Site No. 443 - U.S. Naval Station (Roosevelt Roads) Ceiba, Puerto Rico," April 1993.

Law Environmental, "Draft Corrective Action Plan, Tow Way Fuel Farm, U.S. Naval Station - Roosevelt Roads, Ceiba, Puerto Rico." October 1993.

O'Brien & Gere, "Final Report: Underground Fuel Investigation, Tow Way Fuel Farm - U.S. Naval Station, Roosevelt Roads, Puerto Rico," February 1992.

Testa, Stephen M. and Michael T. Paczkowski, "Volume Determination and Recoverability of Free Hydrocarbon," Ground-Water Monitoring Review, Winter 1989.



APPROXIMATE SCALE IN MILES:

15 0 15

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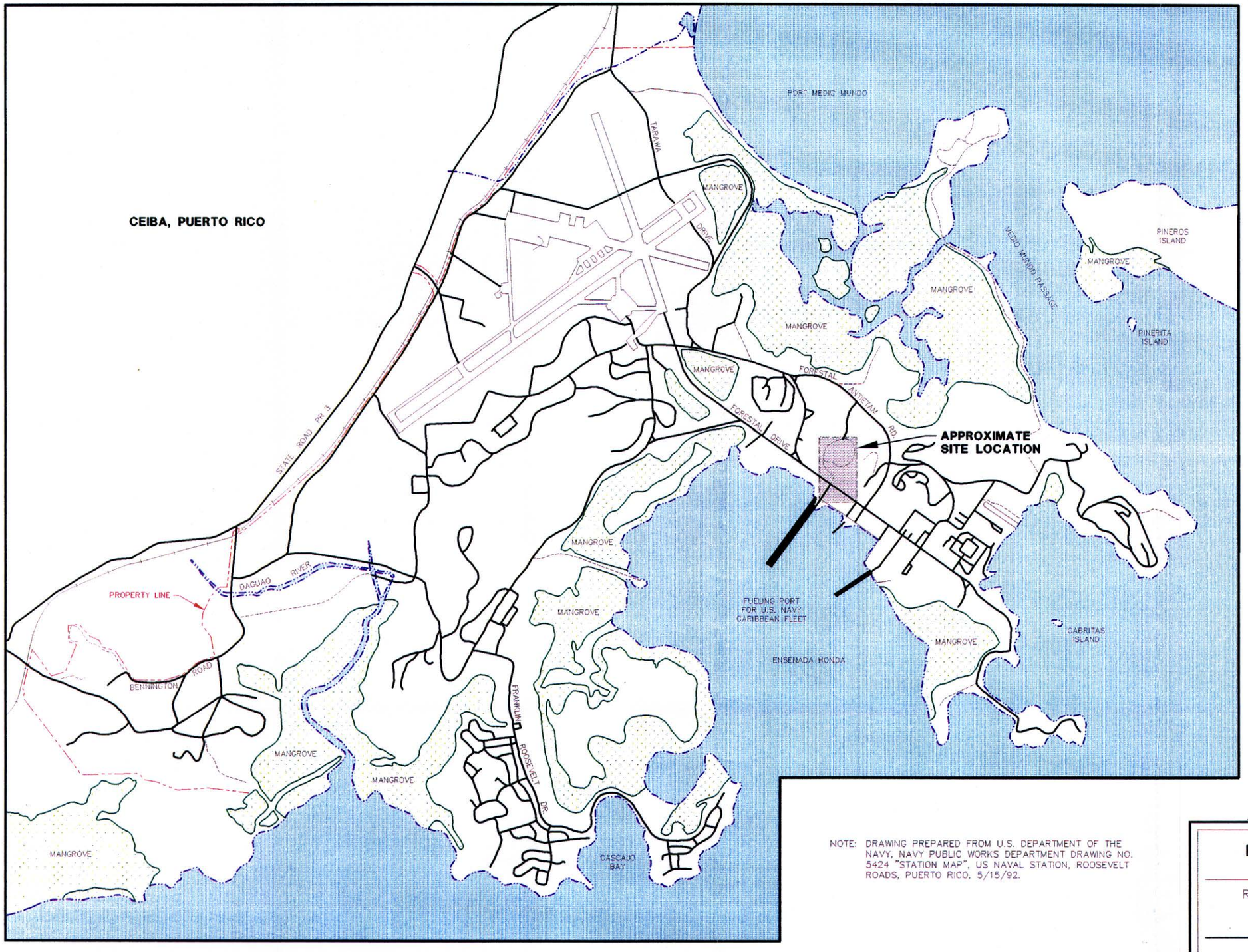
TOW WAY FUEL FARM
CEIBA, PUERTO RICO

SITE LOCATION MAP

FIGURE
1-1

1/31/94 SO-DMW
3990104R\39901SLM.DWG

CEIBA, PUERTO RICO



LEGEND

APPROXIMATE SCALE:
3000' 0 3000'

NOTE: DRAWING PREPARED FROM U.S. DEPARTMENT OF THE NAVY, NAVY PUBLIC WORKS DEPARTMENT DRAWING NO. 5424 "STATION MAP", US NAVAL STATION, ROOSEVELT ROADS, PUERTO RICO, 5/15/92.

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TOW WAY FUEL FACILITY
CEIBA, PUERTO RICO

SITE MAP

FIGURE **1-2**

1/31/94 60-DMW
3990104R\39901BM3.DWG

00759.TRIV

LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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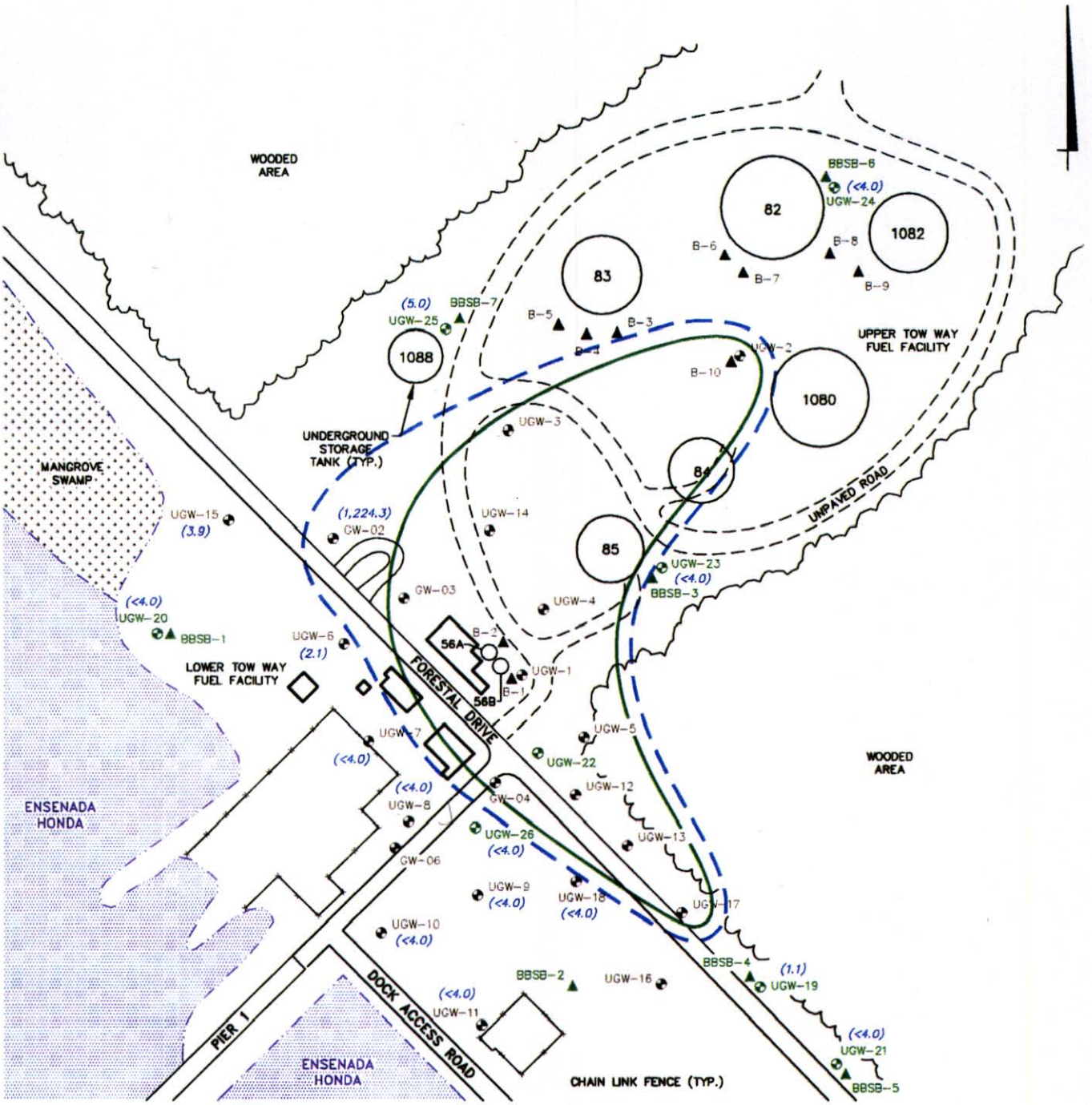
SOIL BORING AND MONITORING WELL LOCATION MAP

FIGURE **1-3**

SBMW
2/3/94 60-DMW
3990104R\39901BM1.DWG



LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)
- (2.1) TOTAL VOA CONCENTRATION IN GROUND-WATER (ug/L)
- EXTENT OF TOTAL VOA CONCENTRATIONS IN GROUND-WATER GREATER THAN 50 ug/L
- EXTENT OF FREE PRODUCT PLUME

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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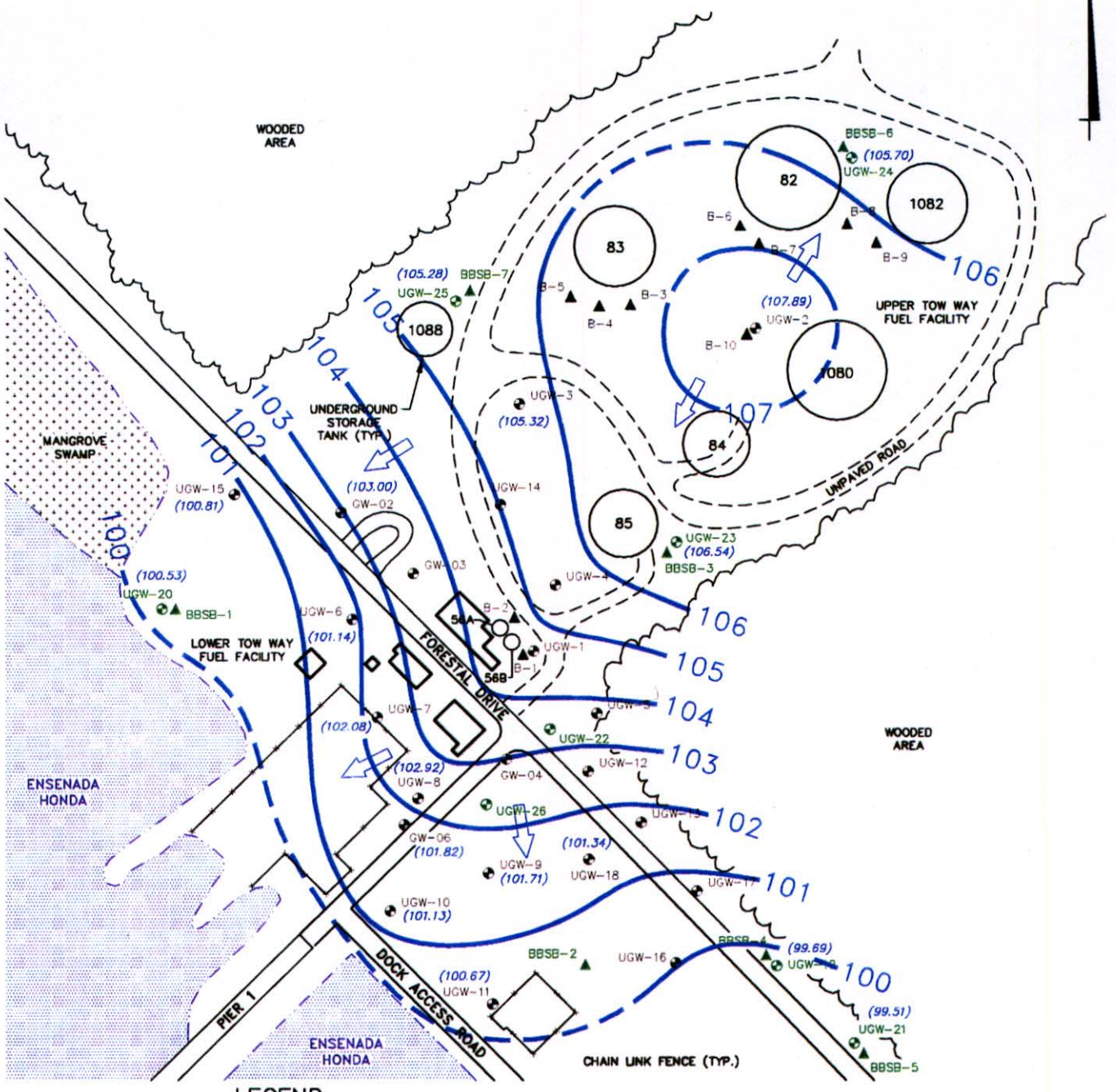
CEIBA, PUERTO RICO

FREE PRODUCT AND GROUND-WATER CONTAMINATION MAP (NOV-DEC, 1993)

FIGURE **1-4**

TV
2/3/94 60-DMW
3990104R\39901BM1.DWG



LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)
- (107.89) GROUND-WATER LEVEL ELEVATION IN FEET (NGVD + 100 FEET)
- 107 GROUND-WATER ELEVATION CONTOUR LINE IN FEET (NGVD + 100 FEET), DASHED WHERE INFERRED
- GROUND-WATER FLOW DIRECTION

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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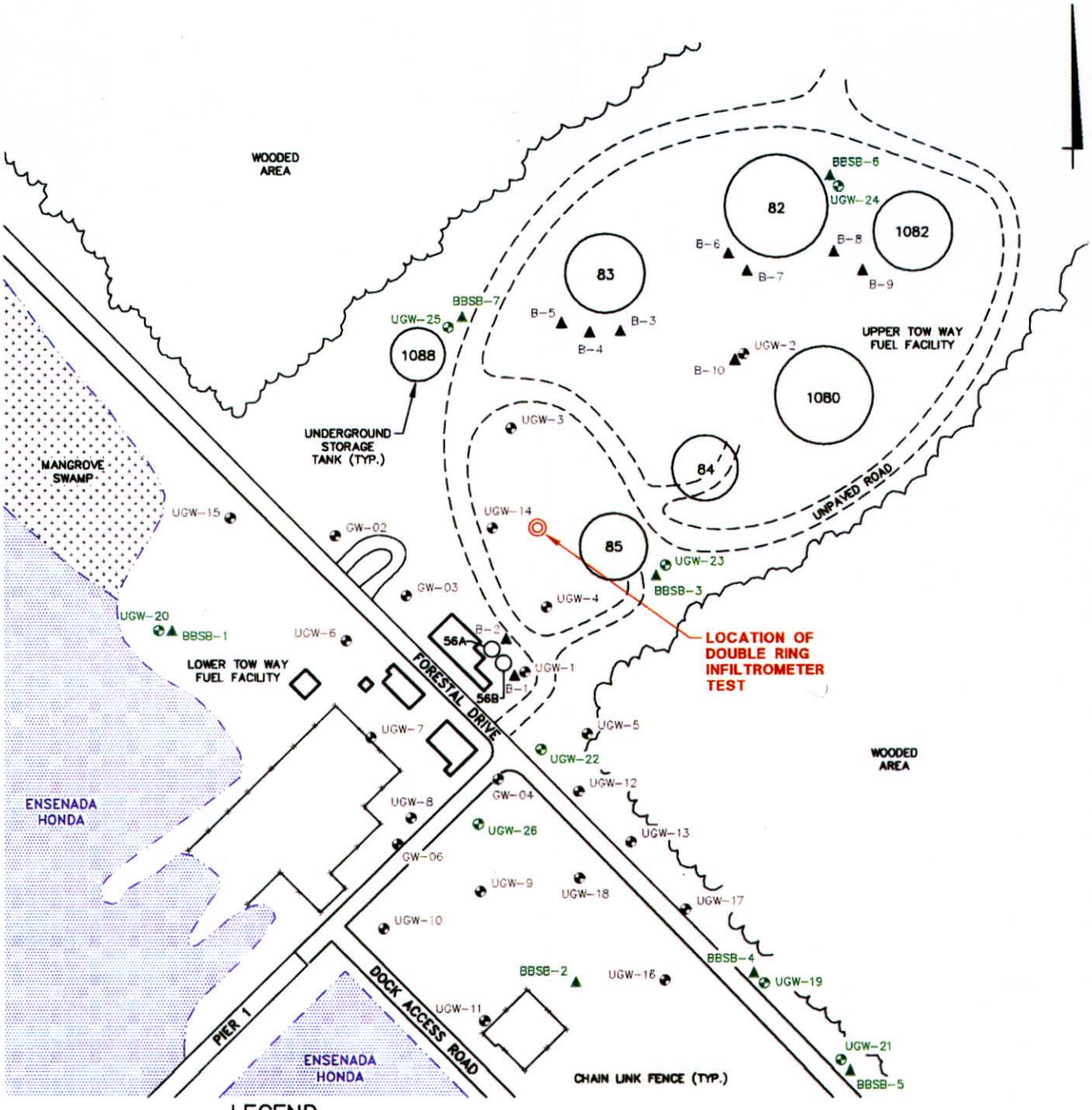
CEIBA, PUERTO RICO

GROUND-WATER ELEVATION CONTOUR MAP DECEMBER 18, 1993

FIGURE **2-1**

GW1
2/3/94 60-DMW
3990104R\39901BM1.DWG



LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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TOW WAY FUEL FACILITY
CEIBA, PUERTO RICO

LOCATION OF DOUBLE RING INFILTROMETER TEST

FIGURE **3-1**

DR
2/3/94 60-DMW
3990104R\39901BM1.DWG

LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)
- (167) TOTAL PETROLEUM HYDROCARBON CONCENTRATION IN SOIL (mg/Kg)
- EXTENT OF TOTAL PETROLEUM HYDROCARBON CONCENTRATION IN SOIL GREATER THAN 100 mg/Kg

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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CEIBA, PUERTO RICO

TOTAL PETROLEUM HYDROCARBONS IN SOIL (3/91, 11/92 AND 11 & 12/93)

FIGURE **4-1**

TPH
2/3/94 BO-DMW
3990104R\39901BM1.DWG

LEGEND

- MONITORING WELL
- SOIL BORING
- MONITORING WELL INSTALLED BY BB&L (1993)
- SOIL BORING INSTALLED BY BB&L (1993)
- EXISTING SIX-INCH DIAMETER MONITORING WELL
- PROPOSED RECOVERY WELL
- PROPOSED MONITORING PLAN WELL

APPROXIMATE SCALE:

150' 0 150'

NOTE: ALL LOCATIONS ARE APPROXIMATE.

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CEIBA, PUERTO RICO

PROPOSED MONITORING AND RECOVERY WELL LOCATIONS

FIGURE **5-1**

PR
2/3/94 60-DMW
3990104R\39901BM1.DWG

TABLE 3-1
OVA FIELD SCREENING RESULTS
NOVEMBER - DECEMBER 1993
ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Depth to Water (ft BLS)	Concentration Without Carbon Filter (ppm)	Concentration With Carbon Filter (ppm)	Total Hydrocarbon Concentration (ppm)
BBSB-1	0-2'	1	1	0
	2'-4'	0	0	0
	4'-6'	0	0	0
	6'-8'	0	0	0
BBSB-2	0-2'	2.1	1.3	0.8
	2'-4'	0.7	0.3	0.4
	4'-6'	0.1	0.1	0
	6'-8'	0.3	0.2	0.1
	8'-10'	0.1	0	0.1
	10'-12'	0.4	0.3	0.1
	12'-14'	0.1	0.1	0
	14'-16'	0	0	0
	16'-18'	0	0	0
	18'-20'	0	0	0
	20'-22'	0	0	0
BBSB-3	0-2'	1.3	1.3	0
	2'-4'	0	0	0
	4'-6'	0.8	0.7	0.1
	6'-8'	4	2	2
	8'-10'	1.6	1.6	0
	10'-12'	1.8	1.7	0.1
	12'-14'	2.3	2.2	0.1
	14'-16'	0.6	0.5	0.1
	16'-18'	0.3	0.2	0.1
	18'-20'	0.6	0.6	0
	25'-27'	0.7	0.7	0
	30'-32'	0.4	0.4	0
	35'-37'	0.2	0.2	0
	40'	0	0	0
	45'	0	0	0
	50'	0.1	0.1	0
	55'	0	0	0

TABLE 3-1 (cont'd)
OVA FIELD SCREENING RESULTS
NOVEMBER – DECEMBER 1993
ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Depth to Water (ft BLS)	Concentration Without Carbon Filter (ppm)	Concentration With Carbon Filter (ppm)	Total Hydrocarbon Concentration (ppm)
(continued) BBSB-3	60'	0	0	0
	65'	0	0	0
	70'	0	0	0
	75'	0	0	0
BBSB-4	0-2'	0	0	0
	2'-4'	0	0	0
	4'-6'	0	0	0
	6'-8'	0.3	0.3	0
	8'-10'	0.8	0.6	0.2
	10'-12'	No Split-Spoon Recovery		
BBSB-5	0-2'	5	2.5	2.5
	2'-4'	3.2	3.2	0
	4'-6'	0	0	0
	6'-8'	0.3	0.2	0.1
	8'-10'	0	0	0
	10'-12'	0	0	0
BBSB-6	0-2'	0	0	0
	2'-4'	0.2	0	0.2
	4'-6'	No Split-Spoon Recovery		
	6'-8'	0	0	0
	10'	0	0	0
	15'	0	0	0
	20'	0	0	0
	30'	0	0	0
	35'	0	0	0
	40'	0	0	0
	45'	0.4	0.2	0.2
	50'	0	0	0
	55'	0.6	0.4	0.2

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TABLE 3-1 (cont'd)
OVA FIELD SCREENING RESULTS
NOVEMBER - DECEMBER 1993
ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Depth to Water (ft BLS)	Concentration Without Carbon Filter (ppm)	Concentration With Carbon Filter (ppm)	Total Hydrocarbon Concentration (ppm)
(continued) BBSB-6	60'	0	0	0
	65'	0.1	0.1	0
	70'	0.1	0.1	0
	75'	0	0	0
BBSB-7	0-2'	0	0	0
	2'-4'	0.3	0.2	0.1
	4'-6'	0	0	0
	6'-8'	0	0	0
	8'-10'	0	0	0
	10'-12'	0	0	0
	12'-14'	0	0	0
	14'-16'	0	0	0
	25'	0	0	0
	30'	0	0	0
	35'	0	0	0
	40'	0	0	0
	45'	0	0	0
	50'	0	0	0
	55'	0	0	0
	60'	0	0	0
UGW-22	0-2'	0	0	0
	2'-4'	>1000	0	>1000
	4'-6'	No Sample Collected		
	6'-8'	>1000	0	>1000
	14'-16'	200	0	200
	20'-22'	40	20	20
UGW-26	0-2'	0.6	0.4	0.2
	2'-4'	0.9	0.8	0.1
	4'-6'	2	1.2	0.8
	6'-8'	2.3	1.6	0.7
	8'-10'	0.5	0.5	0

TABLE 3-1 (cont'd)
OVA FIELD SCREENING RESULTS
NOVEMBER – DECEMBER 1993
ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Depth to Water (ft BLS)	Concentration Without Carbon Filter (ppm)	Concentration With Carbon Filter (ppm)	Total Hydrocarbon Concentration (ppm)
UGW-26	10'-12'	0.9	0.9	0
	12'-14'	1.6	1.1	0.5
	14'-16'	No Sample Collected		
	16'-18'	0.2	0.2	0
	25'-27'	0	0	0

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BLS – Below Land Surface

TAB. 3-2
MONITORING WELL CONSTRUCTION SPECIFICATIONS
NOVEMBER – DECEMBER 1993

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Well Depth (ft. BLS)	Ground Elevation (ft NGVD + 100 ft)	Screened Interval Elevation (ft NGVD + 100 ft)	Hydraulic Conductivity (ft/day)	Ground – Water Elevation (ft NGVD + 100ft) 12/8/93
UGW–1	24.6	114.44	89.84–99.84	NA	NA[C]
UGW–2	58.4	160.03	101.63–110.63	1.73×10^{-2}	NA[C]
UGW–3	35.4	122.63	87.23–97.23	7.0×10^{-1}	105.32
UGW–4	35.3	118.60	83.33–93.33	NA	NA[C]
UGW–5	28.6	114.00	85.40–105.40	1.9×10^{-2}[A]	NA[C]
UGW–6	18.4	109.23	90.83–100.83	3.97×10^{-1} / 1.9×10^{-1}[A]	101.14
UGW–7	16.3	108.20	91.90–101.90	6.92×10^{-2} / 8.7×10^{-2}[A]	102.08
UGW–8	17.5	108.34	90.84–100.84	1.99×10^{-1}	102.92
UGW–9	19.9	109.45	89.55–99.55	9.50×10^{-2}	101.71
UGW–10	18.9	108.65	89.75–99.75	2.36	101.13
UGW–11	17.5	107.55	90.05–100.05	1.62	100.67
UGW–12	23.1	112.17	89.07–99.07	NA	NA[C]
UGW–13	25.9	111.44	85.54–95.54	NA	NA[C]
UGW–14	38.8	117.51	78.71–88.71	NA	NA[C]
UGW–15	17.9	110.41	92.51–102.51	NA[B]	100.81
UGW–16	20.4	111.83	91.43–101.43	1.99×10^{-1}	100.99
UGW–17	23.7	110.62	86.92–101.92	1.25	NA[C]
UGW–18	20.4	112.75	92.35–102.35	4.59×10^{-1} / 1.0[A]	101.34
UGW–19	18.5	110.55	92.05–102.05	NA	99.69
UGW–20	17.0	109.21	92.21–102.21	NA	100.53
UGW–21	12.5	110.75	98.25–103.25	NA	99.51
UGW–22	25.5	112.88	87.38–107.38	NA	NA[C]
UGW–23	66.0	165.91	99.91–114.91	NA	106.54
UGW–24	78.0	176.17	98.17–113.17	NA	105.70
UGW–25	54.0	151.31	97.31–112.31	NA	105.28
UGW–26	46.0	110.51	64.51–69.51	NA	102.70
GW–02	23.0	111.49	N/A	NA	103.00
GW–03	34.6	110.89	N/A	NA	NA[C]
GW–04	N/A	110.66	N/A	NA	NA[C]
GW–06	N/A	108.69	N/A	NA	101.82

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Notes:
[A] Hydraulic conductivity values calculated by BB&L. Other values taken from O'Brien & Gere results (1992).
[B] Water level too fast to measure by hand.
[C] Due to variation of free floating product physical characteristics, accurate corrected water elevations in wells with free product could not be calculated.
NP – No product in well
NA – Not Available

TABLE 3–3
MONITORING WELL DEVELOPMENT SUMMARY
NOVEMBER – DECEMBER 1993

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Development Method	Development Date(s)	Approximate Gallons Developed	Number of Well Volumes Developed
UGW–19	Hand Bail	11/17 – 11/18/93	3.5	2.9
UGW–20	Pumping	11/17/93	7	5.0
UGW–21	Hand Bail	12/14 – 12/17/93	1	5.0
UGW–22	Reverse Air	12/13/93	50	6.25
UGW–23	Hand Bail	12/15 – 12/17/93	14	3.1
UGW–24	Reverse Air	12/17/93	16	3.4
UGW–25	Reverse Air	12/17/93	30	5.9
UGW–26	Reverse Air	12/17/93	130	5.25

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TABLE 3–4
SUMMARY OF PRODUCT BAIL DOWN TESTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	Date	Gallons of Product Removed	Free Product Thickness Prior to Test (ft)	True Free Product Thickness (ft)[1]	Elapsed Time Required to Reach True Thickness (min)
UGW–4	11/10/93	7	14.83	0.21	7.5
UGW–12	11/10/93	6	10.78	0.79	1.9
UGW–17	11/10/93	2.5	5.81	0.26	1.5
UGW–5	11/13/93	5	10.38	2.25+[1]	---

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NOTES:
[1] Measured at the inflection point where product during recovery begins to depress the water table.
[2]Fluid levels were measured for 10 hours. Method inflection point was reached at some point after 10 hours.

TABLE 3-5
MONITORING WELL ELEVATIONS
DECEMBER 1993

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.	Well Casing	Protective Casing	Land Surface
GW-02	13.573	13.737	11.489
GW-03	13.178	13.272	10.889
GW-04	12.834	12.943	10.658
GW-06	10.700	10.821	8.692
UGW-1	16.337	16.390	14.439
UGW-2	61.931	62.000	60.028
UGW-3	24.763	24.894	22.633
UGW-4	20.211	20.399	18.603
UGW-5	16.073	16.175	14.004
UGW-6	11.237	11.325	9.227
UGW-7	9.809	9.857	8.204
UGW-8	10.034	10.103	8.337
UGW-9	9.221	9.450	9.450
UGW-10	10.500	10.537	8.645
UGW-11	9.454	9.576	7.553
UGW-12	13.967	14.020	12.166
UGW-13	13.342	13.424	11.438
UGW-14	19.225	19.317	17.512
UGW-15	12.328	12.412	10.414
UGW-16	13.630	13.682	11.829
UGW-17	12.279	12.379	10.620
UGW-18	14.282	14.378	12.747
UGW-19	12.267	12.272	10.553
UGW-20	11.918	11.978	9.206
UGW-21	13.279	13.142	10.746
UGW-22	15.181	15.734	12.877
UGW-23	69.202	68.132	65.905
UGW-24	78.937	77.540	76.174
UGW-25	53.916	53.076	51.305
UGW-26	14.506	13.014	10.514

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Note:

All wells referenced to National Geodetic Vertical Datum and surveyed by a professional surveyor.

TABLE 3-6
PURGE WATER QUALITY RESULTS
NOVEMBER 1993

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well	pH (Standard Units)	Temperature (°C)	Conductivity (umhos/cm)	Purge Method
UGW-6	6.63	31.6	>10,000	Hand Bail
UGW-7	6.99	28.5	5,461	Hand Bail
UGW-8	6.93	30.5	2,215	Hand Bail
UGW-9	7.07	31.9	1,313	Hand Bail
UGW-10	7.19	29.3	1,801	Hand Bail
UGW-11	7.33	29.3	1,880	Hand Bail
UGW-15	6.79	31.9	>10,000	Hand Bail
UGW-16	7.52	N/A	849	Hand Bail
UGW-18	7.37	30.4	1,413	Hand Bail
UGW-19	7.53	28.4	829	Hand Bail
UGW-20	6.40	31.0	>10,000	Hand Bail
UGW-21	7.51	29.5	815	Hand Bail
UGW-23	7.50	26.5	2,190	Hand Bail
UGW-24	8.29	26.4	6,850	Air Surge/Hand Bail
UGW-25	8.21	27.1	3,160	Air Surge/Hand Bail
UGW-26	7.53	30.8	4,780	Air Surge
GW-02	N/A	N/A	N/A	Hand Bail

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Notes:
N/A – Equipment malfunction. Data not available.

TABLE 3-7
SUMMARY OF GROUND WATER
QA/QC RESULTS[1]

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Sample ID	Date Collected	Benzene	Toluene	Ethyl Benzene	Xylenes	Total VOA	MTBE
Decon Water[2]	10/8/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Equipment Blank[3]	11/11/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Field Blank[4]	11/11/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Equipment Blank[5]	11/12/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Field Blank[4]	11/12/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Field Blank[4]	11/18/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Field Blank[4]	12/11/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
Field Blank[4]	12/17/93	<1.0	<1.0	<1.0	<1.0	<4.0	<10
GW-02	11/12/93	1,100	3.3	89	32	1224.3	<10
GW-02 (Duplicate)	11/12/93	1,200	4.6	89	28	1321.6	<10

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Notes:
[1] All concentrations in micrograms per liter (ug/L).
[2] Decon water sample collected from garden hose attached to spigot in the fuels pump house.
[3] Equipment blank collected from disposable bailer.
[4] Field blanks collected by pouring deionized water into laboratory vials in the area that monitoring well samples were being collected.
[5] Equipment blank collected by pouring deionized water over decontaminated augers and catching runoff in laboratory prepared vials.

TABLE 4-1
SUMMARY OF SOIL TOTAL PETROLEUM HYDROCARBONS ANALYSES

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Boring No./ Well ID	Date Sampled	Sample Depth (ft BLS)	EPA Method 418.1 Field TPH (mg/kg)	Modified EPA Method 602 on GC Field Total VOA (ug/kg)	EPA Method 418.1 Laboratory TPH (mg/kg)
BBSB-1/UGW-20	11/10/93	6-8	<10	BDL	NA
BBSB-1/UGW-20	11/10/93	10-12	<10	BDL	NA
BBSB-2/NA[2]	11/10/93	10-12	NA	NA	<5.0
BBSB-2/NA	11/10/93	20-22	<10	BDL	NA
BBSB-3/UGW-23	11/11/93	6-8	<10	BDL	<5.0
BBSB-4/UGW-19	11/12/93	8-10	51	BDL	NA
BBSB-5/UGW-21	11/16/93	10-12	64	BDL	<5.0
BBSB-6/UGW-24	12/12/93	65-70	NA	NA	<5.0
BBSB-7/UGW-25	11/16/93	10-14	<50	BDL	<5.0
UGW-26	12/15/93	4-8	NA	NA	<5.0

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Notes:
[1] Field analysis performed by modified 418.1 method.
[2]A monitoring well was not installed at the BBSB-2 soil boring.
Sampling depths reflect samples collected directly above the water table or intervals with positive OVA screening results.
BDL – Below detection limit.
TPH – Total petroleum hydrocarbons.
VOA – Volatile Organic Aromatics (Sum of benzene, toluene, ethylbenzene, and total xylene concentrations).
ug/kg – Micrograms per kilogram.
mg/kg – Milligrams per kilogram.
NA – Not analyzed.

TABLE 4-2
SUMMARY OF EPA METHOD 602 AND 418.1 GROUND-WATER ANALYTICAL RESULTS

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well ID	Date Sampled	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Total Xylenes[1] (ug/L)	MTBE (ug/L)	Total VOAs[2] (ug/L)	Total Petroleum Hydrocarbons (mg/L)
Puerto Rico EQB[3] Standards		5.0	NA	NA	NA	NA	50	50
UGW-6	11/12/93	<1.0	<1.0	2.1	<1.0	<10	2.1	<1.0
UGW-7	11/11/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-8	11/11/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-9	11/11/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-10	11/16/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-11	11/15/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-15	11/12/93	<1.0	<1.0	<1.0	3.9	<10	3.9	<1.0
UGW-16	11/12/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-18	11/12/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-19	11/18/93	<1.0	1.1	<1.0	<1.0	<10	1.1	<1.0
UGW-20	11/18/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-21	12/17/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-23	12/17/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-24	12/17/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
UGW-25	12/17/93	<1.0	<1.0	<1.0	5.0	<10	5.0	1.8
UGW-26	12/17/93	<1.0	<1.0	<1.0	<1.0	<10	<4.0	<1.0
GW-02	11/12/93	1,100	3.3	89	32	<10	1,224.3	<1.0

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Notes:
[1] Total Xylenes is sum of o, p, and m-xylenes.
[2] Total VOA is sum of benzene, toluene, ethylbenzene, and xylenes.
[3] EQB – Environmental Quality Board
NA – Not Applicable
ug/L – micrograms per liter
mg/L – milligrams per liter

TABLE 4-3
SUMMARY OF UGW-22 (6-INCH WELL)
GROUND-WATER LABORATORY ANALYSES

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Constituent	EPA Method	Units	Concentration/ Value
Naphthalene	610	ug/L	230
2-Methylnaphthalene	610	ug/L	270
1-Methylnaphthalene	610	ug/L	220
Hydrocarbons as gasoline	Modified 8015	ug/L	280
Barium	6010	mg/L	0.11
Iron	6010	mg/L	0.23
Chromium	6010	mg/L	0.011
Total Alkalinity	310.1	mg/L	520
Total Hardness	SM 314A	mg/L	310
pH	150.1	standard units	7.58
Total Dissolved Solids	160.1	mg/L	720
Total Organic Carbon	415.1	mg/L	28

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TABLE 4–4
SUMMARY OF UGW–22 (6–INCH WELL)
PRODUCT LABORATORY ANALYSES
BY EPA METHODS 610 AND MODIFIED 8015

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Constituent	EPA Method	Concentration/ Value (mg/Kg)
Naphthalene	610	2,200
2–Methylnaphthalene	610	8,000
1–Methylnaphthalene	610	4,300
Hydrocarbons as gasoline	Modified 8015	8,100

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TABLE 4–5
SUMMARY OF FREE PRODUCT
HAZARDOUS WASTE CHARACTERIZATION
LABORATORY RESULTS
OCTOBER 5, 1993

ROOSEVELT ROADS, U.S. NAVAL STATION
CEIBA, PUERTO RICO

Constituent	Unit	UGW–5	UGW–12
Arsenic	mg/L	3.709	3.084
Barium	mg/L	0.002	0.001
Cadmium	mg/L	0.019	0.015
Chromium	mg/L	<0.005	<0.005
Lead	mg/L	<0.025	<0.025
Mercury	mg/L	<0.0005	<0.0005
Selenium	mg/L	<0.010	<0.010
Silver	mg/L	0.008	0.007
Ignitability – Flash Point	°F	>140	130
Corrosivity – pIt	Standard Unit	5.63	4.3
Reactivity – Cyanide	mg/Kg	<0.05	<0.05
Reactivity – Sulfide	mg/Kg	9.0	<1.0

Source: Terra–Vac, Inc., San Juan, Puerto Rico, Analytical Technologies, Inc., 1993. 4694409A

Note:
Wells UGW–5 and UGW–12 are directly adjacent to APT test well UGW–22

Appendix A

APPENDIX A

SOIL BORING LITHOLOGIC LOGS

SOIL BORING LOG

Exploration for: Site Characterization	Location Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date: November 10, 1993	
Boring No.: BBSB–1	
Record By: E. Regensburger	Water Table
Drill Type: Hollow Stem Auger	~9' BLS
Weather: Sunny, 90°	

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	FILL; rock fragments.
2	SPT	2	4	NA	FILL; SAND and SILT; brown, gray and green; very fine to fine grained sand, some gray–green rock fragments, dry.
3	SPT	4	6	NA	FILL; SAND; brown and red–brown, very fine to fine grained, some gray–green rock fragments, dry.
4	SPT	6	8	NA	Same.
5	SPT	8	10	NA	No recovery.

*Remarks PH – Post Hole
SPT – Standard Penetration Test

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SOIL BORING LOG

Exploration for: Site Characterization	Location Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date: November 10, 1993	
Boring No.: BBSB–2	
Record By: E. Regensburger	Water Table
Drill Type: Hollow Stem Auger	~9' BLS
Weather: Sunny, 90°	

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	FILL; rock fragments.
2	SPT	2	4	NA	WEATHERED ROCK; red, white and gray, fine to medium grained sand, dry.
3	SPT	4	6	NA	WEATHERED ROCK; red/brown, fine to medium grained sand, dry.
4	SPT	6	8	NA	SAND; red–brown, fine to medium grained, dry.
5	SPT	8	10	NA	SAME with some gray/green rock fragments, moist at 10' BLS.
6	SPT	10	12	NA	SAND; red–brown, fine to medium grained, small gray–green rock fragments, dry. Bottom 1–inch of spoon was brown/black silty/clay.
7	SPT	12	14	NA	WEATHERED ROCK; light gray–brown, some brown/black soft material, similar to that encountered at 10' BLS.
8	SPT	14	16	NA	WEATHERED ROCK; red–brown, fine grained sand, dry.
9	SPT	16	18	NA	ROCk and WEATHERED ROCK; gray–green, dry.
10	SPT	18	20	NA	WEATHERED ROCK; light brown, fine sand, dry.
11	SPT	20	22	NA	Same.
12	SPT	25	27	NA	ROCK; gray–green with brown fine sand and silt.

*Remarks PH – Post Hole
SPT – Standard Penetration Test

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SOIL BORING LOG

Exploration for:	Site Characterization	Location	Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date:	November 11, 1993, December 8–9, 1993		
Boring No.:	BBSB–3		
Record By:	E. Regensburger	Water Table	~60' BLS
Drill Type:	Hollow Stem Auger/Air		
Weather:	Sunny, 90°		

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	TOPSOIL; brown, very fine grained sand and silt, some rock fragments.
2	SPT	2	4	NA	SAND; red–brown and light gray, very fine to fine grained from 2 to 3.5' BLS. SAND; red–brown, very fine to fine grained with gray–green rock fragments from 3.5 to 4 feet BLS.
3	SPT	4	6	NA	SAND; red–brown and light gray, very fine to fine grained, some silt, dry from 4 to 5.5' BLS. WEATHERED ROCK; gray brown, coarse grained, dry from 5.5 to 6' BLS.
4	SPT	6	8	NA	WEATHERED ROCK; gray with red–brown streaks, coarse grains, crumbly, dry.
5	SPT	8	10	NA	WEATHERED ROCK; red–brown, very fine to fine sand sized grains, dry.
6	SPT	10	12	NA	WEATHERED ROCK; red–brown and gray, medium sized sand grains, dry.
7	SPT	12	14	NA	Same.
8	SPT	14	16	NA	Same.
9	SPT	16	18	NA	Same.
10	SPT	18	20	NA	WEATHERED ROCK; red–brown and white, medium to coarse sized quartz grains, dry.
11	SPT	25	27	NA	WEATHERED ROCK; red–brown, medium to coarse sized quartz grains dry. Contains thin (1 mm) vein of dark brown clayey material.
12	SPT	30	32	NA	SAME.
13	SPT	35	37	NA	SAME.
14	CUT	40	42	NA	ROCK; gray–green, hard, dry.
15	CUT	45	47	NA	SAME.
16	CUT	50	52	NA	SAME.
17	CUT	55	57	NA	SAME.
18	CUT	60	62	NA	SAME.
19	CUT	65	67	NA	SAME.
20	CUT	70	72	NA	SAME.
21	CUT	75	77	NA	SAME.
22	CUT	80	82	NA	SAME.
23	CUT	85	87	NA	SAME. Completed boring at 87' BLS.

*Remarks
PH – Post Hole
SPT – Standard Penetration Test
CUT – Air Drill Cuttings.
NA – Not Applicable.

0393409T

SOIL BORING LOG

Exploration for:	Site Characterization	Location	Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date:	November 12, 1993		
Boring No.:	BBSB–4		
Record By:	E. Regensburger	Water Table	~10' BLS
Drill Type:	Hollow Stem Auger		
Weather:	Sunny, 90°		

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	TOPSOIL; brown, medium grained sand with gray–green rock fragments, dry.
2	SPT	2	4	NA	WEATHERED ROCK; light gray, gray and tan with some gray–green rock fragments, dry.
3	SPT	4	6	NA	SAME.
4	SPT	6	8	NA	WEATHERED ROCK; gray–brown, crumbly, dry.
5	SPT	8	10	NA	SAME; increasing brown color, dry.
6	SPT	10	12	NA	NO RECOVERY.
7	SPT	12	14	NA	ROCK; gray–green with some medium grained sand, wet.
8	SPT	14	16	NA	ROCK; gray–green, wet.
9	AG	16	18	NA	SAME.

*Remarks
PH – Post Hole
SPT – Standard Penetration Test
AG – Augers

0493409T

SOIL BORING LOG

Exploration for:	Site Characterization	Location	Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date:	November 15–16, 1993		
Boring No.:	BBSB–5		
Record By:	E. Regensburger	Water Table	~11' BLS
Drill Type:	Hollow Stem Auger		
Weather:	Sunny, 90°		

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	TOPSOIL; brown, medium grained sand.
2	SPT	2	4	NA	SILTY SAND; brown, very fine grained with gray–green rock fragments, dry.
3	SPT	4	6	NA	ROCK; dark gray with quartz minerals, dry.
4	SPT	6	8	NA	SAME.
5	SPT	8	10	NA	SAME.
6	SPT	10	12	NA	SAME; with dark slate type rock.
7	SPT	12	14	NA	NO RECOVERY – refusal.

*Remarks PH – Post Hole
SPT – Standard Penetration Test

0593409T

SOIL BORING LOG

Exploration for:	Site Characterization	Location	Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date:	November 11, 1993 December 11–12, 1993		
Boring No.:	BBSB–6		
Record By:	E. Regensburger	Water Table	
Drill Type:	Hollow Stem Auger/Air		~71' BLS
Weather:	Cloudy, 80°		

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	TOPSOIL; brown sand, silt and clay with roots, moist.
2	SPT	2	4	NA	WEATHERED ROCK; light gray with red–brown patches, very fine to fine grained sand, silty, dry.
3	SPT	4	6	NA	NO RECOVERY – Refusal.
4	SPT	6	8	NA	WEATHERED ROCK; light gray with red–brown patches, very fine to fine grained sand, silty, dry, underlain by dark gray rock.
5	CUT	15	17	NA	ROCK; gray–green, hard, dry.
6	CUT	20	22	NA	SAME.
7	CUT	25	27	NA	SAME.
8	CUT	30	32	NA	SAME.
9	CUT	35	37	NA	SAME.
10	CUT	40	42	NA	SAME.
11	CUT	45	47	NA	SAND and SILT; gray–brown, very fine to fine sub–rounded grains, dry.
12	CUT	50	52	NA	SAND and SILT; red–brown, very fine to fine sub–rounded grains, some gray–green rock.
13	CUT	55	57	NA	SAME.
14	CUT	60	62	NA	ROCK; gray with some red–brown sand (very fine to fine grains) and silt.
15	CUT	65	67	NA	SAND; buff, very fine to medium sub–rounded grains, some silt, dry.
16	CUT	70	72	NA	SAME.
17	CUT	75	77	NA	ROCK (gray–green) and SAND (buff); very fine to fine sub–rounded grains, moist.
18	CUT	80	82	NA	SAND, buff, fine to coarse, sub–rounded grains, little rock fragments, dry.
19	CUT	85	87	NA	SAME.
20	CUT	90	92	NA	ROCK (gray–green) and SAND (buff), fine grained, wet.

*Remarks
PH – Post Hole
SPT – Standard Penetration Test
CUT – Air Drill Cuttings.
NA – Not Applicable.

0692409T

SOIL BORING LOG

Exploration for:	Site Characterization	Location	Roosevelt Roads – U.S. Naval Station Ceiba, Puerto Rico
Date:	November 16, 1993 December 14, 1993		
Boring No.:	BBSB–7		
Record By:	E. Regensburger	Water Table	
Drill Type:	Hollow Stem Auger/Air		~46' BLS
Weather:	Cloudy, 80°		

Sample No.	Type	Depth From	Depth To	No. of Blows	Soil Description and Boring Log
1	PH	0	2	NA	SILT; red–brown, clayey with dark gray rock fragments, moist.
2	SPT	2	4	NA	WEATHERED ROCK; gray and red–brown, some silt and fine grained sand, dry.
3	SPT	4	6	NA	WEATHERED ROCK; gray and red–brown with white patches, crumbly, dry.
4	SPT	6	8	NA	SAME with dark gray rock fragments.
5	CUT	8	10	NA	WEATHERED ROCK; white and red–brown, crumbly, dry.
6	CUT	10	12	NA	SAME.
7	CUT	12	14	NA	SAME.
8	CUT	14	16	NA	NO RECOVERY – Refusal.
9	CUT	25	27	NA	ROCK; gray–green, hard, dry.
10	CUT	30	32	NA	SAME.
11	CUT	35	37	NA	ROCK (gray) and SAND (brown); fine to medium grained, dry.
12	CUT	40	42	NA	ROCK; gray–green, hard, dry.
13	CUT	45	47	NA	SAME.
14	CUT	50	52	NA	SAME.
15	CUT	55	57	NA	SAME.
16	CUT	60	62	NA	SAME.
17	CUT	65	67	NA	SAME.
18	CUT	69	70	NA	SAME.

*Remarks
PH – Post Hole
SPT – Standard Penetration Test
CUT – Air Drill Cuttings.
NA – Not Applicable.

07993409T

Appendix B

APPENDIX B

LABORATORY ANALYTICAL RESULTS

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23115

Received: 11 OCT 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01 (Roosevelt Roads)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23115-1	Decon Water	10-08-93

PARAMETER	23115-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	10.12.93
Method Number	EPA 602
Dilution factor	1

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23115

Received: 11 OCT 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01 (Roosevelt Roads)
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23115-2	Lab Blank
23115-3	Accuracy - % Recovery (Mean)
23115-4	Precision - Relative % Difference
23115-5	Detection Limit

PARAMETER	23115-2	23115-3	23115-4	23115-5
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	89 %	2.2 %	1.0
Chlorobenzene, ug/l	<1.0	97 %	6.2 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	96 %	---	1.0
Toluene, ug/l	<1.0	---	2.1 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	10.12.93	---	---	---
Method Number	EPA 602	---	---	---

Method Reference: EPA 40 CFR Part 136.

Paul Canevaro

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER: 399.01
PROJECT NAME: Roosevelt Roads
PAGE 1 OF 1

CLIENT NAME: BB+L
TELEPHONE/FAX NO.: 407-994-2711
CLIENT ADDRESS: 1730 NW 2nd Ave.
CITY, STATE, ZIP CODE: Boca Raton FL 33431
SAMPLER(S) NAME(S): E. Regansburger
CLIENT PROJECT MANAGER: E. Regensburger

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES: 602

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	NUMBER OF CONTAINERS SUBMITTED										
10/8/93	13:00	Decon Water	X				3										
—	—	Trip Blank	X				3										

Do not Analyze unless requested to do so.

EMPTY BOTTLES

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	10/7/93		[signature]	10/7/93	10:00	[signature]	10/11/93	13:40

RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	10/11/93	1340	☐ YES ☐ NO		D3-23115	

ORIGINAL

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23543

Received: 13 NOV 93

Ms. Kathy Luke
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES
23543-1	UGW-7
23543-2	UGW-8
23543-3	UGW-9
23543-4	BBSB-1

PARAMETER	23543-1	23543-2	23543-3	23543-4
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10
Date Analyzed	11.16.93	11.16.93	11.16.93	11.16.93
Method Number	EPA 602	EPA 602	EPA 602	EPA 602
Dilution factor, ug/l	1	1	1	1
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0	<1.0
Date Extracted	11.18.93	11.18.93	11.18.93	11.18.93
Date Analyzed	11.18.93	11.18.93	11.18.93	11.18.93
Method Number	EPA 418.1	EPA 418.1	EPA 418.1	EPA 418.1

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23543

Received: 13 NOV 93

Ms. Kathy Luke
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES
23543-5	Eq Blk
23543-6	Field Blk

PARAMETER	23543-5	23543-6
Purgeable Aromatics (602)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10
Date Analyzed	11.16.93	11.16.93
Method Number	EPA 602	EPA 602
Dilution factor, ug/l	1	1

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& ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23543

Received: 13 NOV 93

Ms. Kathy Luke
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23543-7	BBSB-2 (10-12)	11-10-93

PARAMETER	23543-7
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<5.0
Date Extracted	11.16.93
Date Analyzed	11.16.93
Method Number	EPA 9073
Percent Solids, %	77

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LOG NO: D3-23543

Received: 13 NOV 93

Ms. Kathy Luke
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23543-8	Lab Blank
23543-9	Accuracy - % Recovery (Mean)
23543-10	Precision - Relative % Difference
23543-11	Detection Limit

PARAMETER	23543-8	23543-9	23543-10	23543-11
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	98 %	8.2 %	1.0
Chlorobenzene, ug/l	<1.0	104 %	9.6 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	95 %	2.7 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	11.16.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	81 %	2.5 %	1.0
Date Extracted	11.18.93	---	---	---
Date Analyzed	11.18.93	---	---	---
Method Number	EPA 418.1	---	---	---

SL SAVANNAH LABORATORIES
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LOG NO: D3-23543

Received: 13 NOV 93

Ms. Kathy Luke
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23543-12	Lab Blank
23543-13	Accuracy - % Recovery (Mean)
23543-14	Precision - Relative % Difference
23543-15	Detection Limit

PARAMETER	23543-12	23543-13	23543-14	23543-15
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<5.0	90 %	6.7 %	5.0
Date Extracted	11.16.93	---	---	---
Date Analyzed	11.16.93	---	---	---
Method Number	EPA 9073	---	---	---

Method References: EPA 40 CFR Part 136,
EPA 600/4-79-020 and EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
QUIMICO LICENCIADO

Final Page Of Report

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☒ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

O NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	399.01.04	Roosevelt Roads	1	1

IENT NAME	TELEPHONE/FAX NO.
TBL	407-994-2711

IENT ADDRESS	CITY, STATE, ZIP CODE
4730 NW 2nd AVE	Boca Raton Fl 33431

AMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
Jim Twist / Eric Regensberger	KATHY LUKE

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES: 602, 418.1

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602	418.1									
/11	14:40	EQ BLK	X				3	1*									* Hold 418.1 on
/11	14:30	Field BLK	X				3	1*									Field + EQ BLK
/11	16:45	U6W-7	X				3	1									FOR P.M. APPROVAL
/11	15:15	U6W-8	X				3	1									
/11	14:10	U6W-9	X				3	1									
/11	16:00	BBSB-1	X				3	1									** NO TRIP BLANKS
/10	17:00	BBSB-2 (10'-12')		X				1									SHIPPED TO Project LOCATION **

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/11	20:30						
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RELINQUISHED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11/13/93	12:00	☐ YES ☐ NO		D3-23543	

ORIGINAL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23544

Received: 13 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23544-1	GW-02	11-12-93
23544-2	UGW-16	11-12-93
23544-3	UGW-18	11-12-93
23544-4	UGW-15	11-12-93
23544-5	UGW-6	11-12-93

PARAMETER	23544-1	23544-2	23544-3	23544-4	23544-5
Purgeable Aromatics (602)					
Benzene, ug/l	1100	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	89	<1.0	<1.0	<1.0	2.1
Toluene, ug/l	3.3	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	32	<1.0	<1.0	3.9	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10	<10	<10	<10
Date Analyzed	11.16.93	11.17.93	11.16.93	11.17.93	11.17.93
Method Number	EPA 602	EPA 602	EPA 602	EPA 602	EPA 602
Dilution factor	1	1	1	1	1
Petroleum Hydrocarbons					
Petroleum Hydrocarbons, mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
Date Extracted	11.17.93	11.17.93	11.17.93	11.17.93	11.17.93
Date Analyzed	11.17.93	11.17.93	11.17.93	11.17.93	11.17.93
Method Number	EPA 418.1	EPA 418.1	EPA 418.1	EPA 418.1	EPA 418.1

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LOG NO: D3-23544

Received: 13 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23544-6	DUP-1	11-12-93

PARAMETER	23544-6
Purgeable Aromatics (602)	
Benzene, ug/l	1200
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	89
Toluene, ug/l	4.6
Xylenes, ug/l	28
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	11.17.93
Method Number	EPA 602
Dilution factor	1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/l	<1.0
Date Extracted	11.17.93
Date Analyzed	11.17.93
Method Number	EPA 418.1

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Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23544-7	Equipment Blank	11-12-93
23544-8	Field Blank	11-12-93

PARAMETER	23544-7	23544-8
Purgeable Aromatics (602)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10
Date Analyzed	11.16.93	11.16.93
Method Number	EPA 602	EPA 602
Dilution factor	1	1

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Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23544-9	BBSB-3 (6-8)	11-11-93

PARAMETER	23544-9
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/kg dw	<5.0
Date Extracted	11.16.93
Date Analyzed	11.16.93
Method Number	EPA 9073
Percent Solids, %	85

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4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23544-10	Lab Blank
23544-11	Accuracy - % Recovery (Mean)
23544-12	Precision - Relative % Difference
23544-13	Detection Limit

PARAMETER	23544-10	23544-11	23544-12	23544-13
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	98 %	8.2 %	1.0
Chlorobenzene, ug/l	<1.0	104 %	9.6 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	95 %	27 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	11.16.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/l	<1.0	98 %	4.1 %	1.0
Date Extracted	11.17.93	---	---	---
Date Analyzed	11.17.93	---	---	---
Method Number	EPA 418.1	---	---	---

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LOG NO: D3-23544

Received: 13 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By:

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23544-14	Lab Blank
23544-15	Accuracy - % Recovery (Mean)
23544-16	Precision - Relative % Difference
23544-17	Detection Limit

PARAMETER	23544-14	23544-15	23544-16	23544-17
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/kg dw	<5.0	90 %	6.7 %	5.0
Date Extracted	11.16.93	---	---	---
Date Analyzed	11.16.93	---	---	---
Method Number	EPA 9073	---	---	---

Method References: EPA 40 CFR Part 136, EPA 600/4-79-020 and EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 8761
QUIMICO LICENCIADO

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	399.01.04	Roosevelt Roads	1	1

CLIENT NAME	TELEPHONE/FAX NO.
BB+L	407.944-2711

CLIENT ADDRESS	CITY, STATE, ZIP CODE
4730 NW 2nd Ave	Boca Raton, FL 33431

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
Tim Twist	Eric Regensburger

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602	418.1								
			NUMBER OF CONTAINERS SUBMITTED													
11/12/93	1730	GW-02	X				3	1								
11/12/93	1605	UGW-16	X				3	1								
11/12/93	1425	UGW-18	X				3	1								
11/12/93	1235	UGW-15	X				3	1								
11/12/93	1135	UGW-6	X				3	1								
11/12/93		Dup ~~[illegible]~~ -1	X				3	1								
11/12/93	1120	Equipment Blank	X				3									
11/12/93	1127	Field Blank	X				3									
~~11/23/93~~																
11/23/93	0900	BBJB-3 (6-8')		X				1								

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature] (BB+L)	11/12/93	1900						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11/15/93	1200	☐ YES ☐ NO		D3-23544	

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LOG NO: D3-23577

Received: 17 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23577-1	Trip Blank	11-16-93
23577-2	Equipment Blank	11-16-93
23577-3	Field Blank	

PARAMETER	23577-1	23577-2	23577-3
Purgeable Aromatics (602)			
Benzene, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	1.4	1.8
Xylenes, ug/l	<1.0	<1.0	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10	<10
Date Analyzed	11.17.93	11.22.93	11.18.93
Method Number	EPA 602	EPA 602	EPA 602
Dilution factor	1	1	1

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LOG NO: D3-23577

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Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23577-4	UGW-10	11-16-93

PARAMETER	23577-4
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	11.17.93
Method Number	EPA 602
Dilution factor	1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/l	<1.0
Date Extracted	11.18.93
Date Analyzed	11.18.93
Method Number	EPA 418.1

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LOG NO: D3-23577

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Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23577-5	Lab Blank
23577-6	Accuracy - % Recovery (Mean)
23577-7	Precision - Relative % Difference
23577-8	Detection Limit

PARAMETER	23577-5	23577-6	23577-7	23577-8
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	106 %	2.8 %	1.0
Chlorobenzene, ug/l	<1.0	104 %	4.8 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	104 %	2.9 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	11.17.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/l	<1.0	81 %	2.5 %	1.0
Date Extracted	11.18.93	---	---	---
Date Analyzed	11.18.93	---	---	---
Method Number	EPA 418.1	---	---	---

Method References: EPA 40 CFR Part 136 and EPA 600/4-79-020.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
QUIMICO LICENCIADO

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23577A

Received: 17 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23577A-1	UGW-11	11-15-93

PARAMETER	23577A-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	11.17.93
Method Number	EPA 602
Dilution factor	1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/l	<1.0
Date Extracted	11.17.93
Date Analyzed	11.17.93
Method Number	EPA 418.1

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LOG NO: D3-23577A

Received: 17 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23577A-2	Lab Blank
23577A-3	Accuracy - % Recovery (Mean)
23577A-4	Precision - Relative % Difference
23577A-5	Detection Limit

PARAMETER	23577A-2	23577A-3	23577A-4	23577A-5
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	106 %	2.8 %	1.0
Chlorobenzene, ug/l	<1.0	104 %	4.8 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	104 %	2.9 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	11.17.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/l	<1.0	98 %	4.1 %	1.0
Date Extracted	11.17.93	---	---	---
Date Analyzed	11.17.93	---	---	---
Method Number	EPA 418.1	---	---	---

Method References: EPA 40 CFR Part 136 and EPA 600/4-79-020.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
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LOG NO: D3-23577B

Received: 17 NOV 93

Mr. Eric Regensburger
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4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23577B-1	BBSB-5 (10-12')	11-16-93

PARAMETER	23577B-1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/kg dw	<5.0
Date Extracted	11.18.93
Date Analyzed	11.18.93
Method Number	EPA 9073
Percent Solids, %	94

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LOG NO: D3-23577B

Received: 17 NOV 93

Mr. Eric Regensburger
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4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23577B-2	Lab Blank
23577B-3	Accuracy - % Recovery (Mean)
23577B-4	Precision - Relative % Difference
23577B-5	Detection Limit

PARAMETER	23577B-2	23577B-3	23577B-4	23577B-5
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/kg dw	<5.0	97 %	0 %	5.0
Date Extracted	11.18.93	---	---	---
Date Analyzed	11.18.93	---	---	---
Method Number	EPA 9073	---	---	---

Method Reference: EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
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QUIMICO LIC.

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER: 399.01.04
PROJECT NAME: Roosevelt Roads
PAGE 1 OF 1

CLIENT NAME: BBL
TELEPHONE/FAX NO.: 407 994-2711
CLIENT ADDRESS: 4730 NW 2nd AVE
CITY, STATE, ZIP CODE: Boca Raton Fl
SAMPLER(S) NAME(S): Tim Twist / Eric Regens
CLIENT PROJECT MANAGER: Eric Regens

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES: 602 418.1

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	NUMBER OF CONTAINERS SUBMITTED										
		TRIP BLANK	X				3										
11/16	8:00	EQ. BLK	X				2										* Hold FOR
11/16	8:30	Field BLK	X				3										P.M. APPROVAL
11/15	10:00	U6W - 11	X				3	1									TO ANALYSIS
11/16	8:20	U6W - 10	X				3	1									
11/16	8:30	* BBSB-5 (10'-12') *		X				1									
11/15	16:00	* BBSB-5 (2'-4') *		X				1									
11/16	9:00	* BBSB-5 *	X				3	1									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/16	18:00						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[signature]								

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	11/17/93	1000	☐ YES ☐ NO		D3-23577	

ORIGINAL

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LOG NO: D3-23604

Received: 19 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23604-1	UGW-20	11-18-93
23604-2	UGW-19	11-18-93

PARAMETER	23604-1	23604-2
Purgeable Aromatics (602)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	1.1
Xylenes, ug/l	<1.0	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10
Date Analyzed	11.21.93	11.20.93
Method Number	EPA 602	EPA 602
Dilution factor	1	1
Petroleum Hydrocarbons		
Petroleum Hydrocarbons, mg/l	<1.0	<1.0
Date Extracted	11.23.93	11.23.93
Date Analyzed	11.23.93	11.23.93
Method Number	EPA 418.1	EPA 418.1

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23604

Received: 19 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23604-3	Field Blank	11-18-93

PARAMETER	23604-3
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	11.22.93
Method Number	EPA 602
Dilution factor	1

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Received: 19 NOV 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23604-4	Lab Blank
23604-5	Accuracy - % Recovery (Mean)
23604-6	Precision - Relative % Difference
23604-7	Detection Limit

PARAMETER	23604-4	23604-5	23604-6	23604-7
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	108 %	9.3 %	1.0
Chlorobenzene, ug/l	<1.0	101 %	2.9 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	103 %	2.9 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	11.20.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/l	<1.0	94 %	1.1 %	1.0
Date Extracted	11.23.93	---	---	---
Date Analyzed	11.23.93	---	---	---
Method Number	EPA 418.1	---	---	---

Method References: EPA 40 CFR Part 136 and EPA 600/4-79-020.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
QUIMICO LICENSADO

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23604A

Received: 19 NOV 93

Mr.Eric Regensbury
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23604A-1	BBSB-7 (10-14')	11-17-93

PARAMETER	23604A-1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/kg dw	<5.0
Date Extracted	11.29.93
Date Analyzed	11.29.93
Method Number	EPA 9073
Percent Solids, %	92

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LOG NO: D3-23604A

Received: 19 NOV 93

Mr.Eric Regensbury
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: TT/ER

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23604A-2	Lab Blank
23604A-3	Accuracy - % Recovery (Mean)
23604A-4	Precision - Relative % Difference
23604A-5	Detection Limit

PARAMETER	23604A-2	23604A-3	23604A-4	23604A-5
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/kg dw	<5.0	94 %	1.1 %	5.0
Date Extracted	11.29.93	---	---	---
Date Analyzed	11.29.93	---	---	---
Method Number	EPA 9073	---	---	---

Method Reference: EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
QUIMICO LICENCIADO

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☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
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☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER: 399.01.04
PROJECT NAME: Roosevelt Rowels
PAGE: OF

CLIENT NAME: BBL
TELEPHONE/FAX NO.: 407 736-6430
CLIENT ADDRESS: 4730 NW BOCA RATON BLVD.
CITY, STATE, ZIP CODE: 33431
SAMPLER(S) NAME(S): Tim Tust / ERIC REG.
CLIENT PROJECT MANAGER: ERIC REGENSBURGER

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES: 608 418.1

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	NUMBER OF CONTAINERS SUBMITTED										
11/18	12:00	Field Blk	X				~~3~~	1									✱ HOLD FOR
11/18	11:50	U6W-20	X				3	1									P.M. APPROVAL
11/18	12:40	U6W-19	X				3	1									FOR ANALYSIS ✱
11/17	10:00	✱ BB5B-7 (10'-14') ✱		X				X									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	11/18	16:20						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
[signature]	11/19/91		☐ YES ☐ NO		03 #23604

LABORATORY REMARKS:

ORIGINAL

SL SAVANNAH LABORATORIES
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414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23808-1	UGW-22 (10-12)	12-07-93

PARAMETER	23808-1
Carbon, Total Organic	
Carbon, Total Organic, mg/kg dw	4400
Date Analyzed	12.15.93
Method Number	*WB
Percent Solids, %	90

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
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4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23808-2	UGW-22 (Cuttings)	12-07-93

PARAMETER	23808-2
Volatiles in TCLP Extract (8240)	
Benzene (TCLP), mg/l	<0.020
Date Analyzed	12.14.93
Method Number	EPA 8240
Hydrocarbons (Modified 8100)	
Hydrocarbons as Kerosene, mg/kg dw	<10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10
Hydrocarbons as Heavy Oils, mg/kg dw	<10
Hydrocarbons as Mineral Spirits, mg/kg dw	<10
Hydrocarbons as Naphtha, mg/kg dw	<10
Hydrocarbons as Varsol, mg/kg dw	<10
Hydrocarbons as Fuel Oil, mg/kg dw	<10
Hydrocarbons as Jet Fuel A, mg/kg dw	360
Date Extracted	12.13.93
Date Analyzed	12.16.93
Method Number	MOD 8100
Dilution factor	1
Arsenic (TCLP)	
Arsenic (TCLP), mg/l	<0.20
Date Analyzed	12.15.93
Method Number	EPA 6010
Barium (TCLP)	
Barium (TCLP), mg/l	<1.0
Date Analyzed	12.15.93
Method Number	EPA 6010

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
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4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23808-2	UGW-22 (Cuttings)	12-07-93

PARAMETER	23808-2
Cadmium (TCLP)	
Cadmium (TCLP), mg/l	<0.010
Date Analyzed	12.15.93
Method Number	EPA 6010
Chromium (TCLP)	
Chromium (TCLP), mg/l	<0.050
Date Analyzed	12.15.93
Method Number	EPA 6010
Lead (TCLP)	
Lead (TCLP), mg/l	<0.20
Date Analyzed	12.15.93
Method Number	EPA 6010
Mercury (TCLP)	
Mercury (TCLP), mg/l	<0.020
Date Analyzed	12.15.93
Method Number	EPA 7470
Selenium (TCLP)	
Selenium (TCLP), mg/l	<0.50
Date Analyzed	12.15.93
Method Number	EPA 6010
Silver (TCLP)	
Silver (TCLP), mg/l	<0.010
Date Analyzed	12.15.93
Method Number	EPA 6010
Cyanide, Reactive	
Cyanide, Reactive, mg/kg dw	<1.0
Date Analyzed	12.14.93
Method Number	7.3.3.2

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23808-2	UGW-22 (Cuttings)	12-07-93

PARAMETER	23808-2
Ignitability (Flashpoint)	
Ignitability (Flashpoint)	*NF
Date Analyzed	12.15.93
Method Number	EPA 1010
pH	
Corrosivity-pH , units	8.11
Date Analyzed	12.14.93
Method Number	EPA 9045
Sulfide, Reactive	
Sulfide, Reactive, mg/kg dw	60
Date Analyzed	12.15.93
Method Number	7.3.4.2
Percent Solids, %	87

* The physical characteristics (hard, semisolid) of the sample prohibited continual stirring required by the Pensky Martens Method. Therefore, the sample was heated without continual stirring and a test flame applied to the sample surface. No apparent ignition of vapors over the sample was observed. NF = No Flash.

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23808-3	Lab Blank
23808-4	Accuracy - % Recovery (Mean)
23808-5	Precision - Relative % Difference
23808-6	Detection Limit

PARAMETER	23808-3	23808-4	23808-5	23808-6
Volatiles in TCLP Extract (8240)				
Benzene (TCLP), mg/l	<0.020	92 %	9.8 %	0.020
Date Analyzed	12.14.93	---	---	---
Method Number	EPA 8240	---	---	---
Hydrocarbons (Modified 8100)				
Hydrocarbons as Kerosene, mg/kg dw	<10	---	---	10
Hydrocarbons as Diesel Fuel, mg/kg dw	<10	60 %	3.3 %	10
Hydrocarbons as Heavy Oils, mg/kg dw	<150	---	---	150
Hydrocarbons as Mineral Spirits, mg/kg dw	<10	---	---	10
Hydrocarbons as Naphtha, mg/kg dw	<10	---	---	10
Hydrocarbons as Varsol, mg/kg dw	<10	---	---	10
Hydrocarbons as Fuel Oil, mg/kg dw	<10	---	---	10
Date Extracted	12.13.93	---	---	---
Date Analyzed	12.14.93	---	---	---
Method Number	MOD 8100	---	---	---
Arsenic (TCLP)				
Arsenic (TCLP), mg/l	<0.20	96 %	12 %	0.20
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---
Barium (TCLP)				
Barium (TCLP), mg/l	<1.0	86 %	10 %	1.0
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23808-3	Lab Blank
23808-4	Accuracy - % Recovery (Mean)
23808-5	Precision - Relative % Difference
23808-6	Detection Limit

PARAMETER	23808-3	23808-4	23808-5	23808-6
Cadmium (TCLP)				
Cadmium (TCLP), mg/l	<0.010	113 %	12 %	0.010
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---
Chromium (TCLP)				
Chromium (TCLP), mg/l	<0.050	84 %	15 %	0.050
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---
Lead (TCLP)				
Lead (TCLP), mg/l	<0.20	80 %	12 %	0.20
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---
Mercury (TCLP)				
Mercury (TCLP), mg/l	<0.020	98 %	1.0 %	0.020
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 7470	---	---	---
Selenium (TCLP)				
Selenium (TCLP), mg/l	<0.50	89 %	9.0 %	0.50
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---
Silver (TCLP)				
Silver (TCLP), mg/l	<0.010	140 %	28 %	0.010
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 6010	---	---	---

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23808

Received: 09 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Eric Regensburg

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23808-3	Lab Blank
23808-4	Accuracy - % Recovery (Mean)
23808-5	Precision - Relative % Difference
23808-6	Detection Limit

PARAMETER	23808-3	23808-4	23808-5	23808-6
Carbon, Total Organic				
Carbon, Total Organic, mg/kg dw	<50	137 %	3.7 %	50
Date Analyzed	12.15.93	---	---	---
Method Number	*WB	---	---	---
Cyanide, Reactive				
Cyanide, Reactive, mg/kg dw	<1.0	100 %	0 %	1.0
Date Analyzed	12.14.93	---	---	---
Method Number	7.3.3.2	---	---	---
Sulfide, Reactive				
Sulfide, Reactive, mg/kg dw	<10	104 %	4.8 %	10
Date Analyzed	12.15.93	---	---	---
Method Number	7.3.4.2	---	---	---

Method Reference: EPA SW-846.

Paul Canevaro

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Mary E. Laboy
LIC. 3161
QUIMICO LICENCIADO

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ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PO. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	399.01.04	Roosevelt Roads	1	1

CLIENT NAME	TELEPHONE/FAX NO.
B B + L	407-994-2711

CLIENT ADDRESS	CITY, STATE, ZIP CODE
4730 NW 2nd Ave	Boca Raton 33431

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
E. Regensburger	E. Regensburger

MATRIX TYPE: AQUEOUS MATRIX / NONAQUEOUS MATRIX / OIL MATRIX / AIR MATRIX

REQUIRED ANALYSES: Haz Waste / TOC

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	Haz Waste	TOC								
			NUMBER OF CONTAINERS SUBMITTED													
12/7/93	14:00	UGW-22 (10'-12')		X				X(1)								
12/7/93	16:00	UGW-22 (cuttings)		X			X(2)									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	12/8/93	0700						

RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	12/9/93	10:30	☐ YES ☐ NO		D3-23808	

ORIGINAL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23924

Received: 14 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23924-1	BBSB-6 (65'-70')	12-11-93

PARAMETER	23924-1
Petroleum Hydrocarbons	
Petroleum Hydrocarbons, mg/kg dw	300
Date Extracted	12.16.93
Date Analyzed	12.17.93
Method Number	EPA 9073
Percent Solids, %	97

SL SAVANNAH LABORATORIES
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LOG NO: D3-23924

Received: 14 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23924-2	Field Blank	12-11-93

PARAMETER	23924-2
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Date Analyzed	12.16.93
Method Number	EPA 602
Dilution factor	1

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LOG NO: D3-23924

Received: 14 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23924-3	Lab Blank
23924-4	Accuracy - % Recovery (Mean)
23924-5	Precision - Relative % Difference
23924-6	Detection Limit

PARAMETER	23924-3	23924-4	23924-5	23924-6
Petroleum Hydrocarbons				
Petroleum Hydrocarbons, mg/kg dw	<5.0	108 %	2.8 %	5.0
Date Extracted	12.16.93	---	---	---
Date Analyzed	12.17.93	---	---	---
Method Number	EPA 9073	---	---	---

Method References: EPA SW-846 and EPA 600/4-79-020.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
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SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23924A

Received: 14 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23924A-1	BBSB-6	12-11-93

PARAMETER	23924A-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10
Date Analyzed	12.14.93
Method Number	EPA 602
Dilution factor, ug/l	1
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0
Date Extracted	12.14.93
Date Analyzed	12.15.93
Method Number	EPA 418.1

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LOG NO: D3-23924A

Received: 14 DEC 93

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Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23924A-2	Lab Blank
23924A-3	Accuracy - % Recovery (Mean)
23924A-4	Precision - Relative % Difference
23924A-5	Detection Limit

PARAMETER	23924A-2	23924A-3	23924A-4	23924A-5
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	93 %	2.2 %	1.0
Chlorobenzene, ug/l	<1.0	95 %	4.2 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	104 %	6.7 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	12.14.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	92 %	1.1 %	1.0
Date Extracted	12.14.93	---	---	---
Date Analyzed	12.15.93	---	---	---
Method Number	EPA 418.1	---	---	---

Method References: EPA 40 CFR Part 136 and
EPA 600/4-79-020.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
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☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER: 399.01.04
PROJECT NAME: Roosevelt Roads
PAGE 1 OF 1

CLIENT NAME: BB+L
TELEPHONE/FAX NO.: 407-994-2711
CLIENT ADDRESS: 1730 NW 2nd Ave.
CITY, STATE, ZIP CODE: Boca Raton 33431
SAMPLER(S) NAME(S): E. Regensburger
CLIENT PROJECT MANAGER: E. Regensburger

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES: 418.1, 602

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	418.1	602										
12/11/93	1000	BBSB-6 (65'-70')		X			1											
12/11	1600	BBSB-6	X				1	3										24 hr. turnaround time
12/11	1600	Field Blank	X					2										

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	12/13/93	1600						
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	12/14	1300	☐ YES ☐ NO		103-23924	

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LOG NO: D3-23948

Received: 16 DEC 93

Mr. E. Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #349.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23948-1	BBSB-7	12-15-93

PARAMETER	23948-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	5.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10
Date Analyzed	12.16.93
Method Number	EPA 602
Dilution factor, ug/l	1
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	1.7
Date Extracted	12.16.93
Date Analyzed	12.16.93
Method Number	EPA 418.1

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LOG NO: D3-23948

Received: 16 DEC 93

Mr. E. Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #349.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	DATE SAMPLED
23948-2	UGW-26 (4'-8')	12-15-93

PARAMETER	23948-2
Petroleum Hydrocarbons	
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<5.0
Date Extracted	12.17.93
Date Analyzed	12.20.93
Method Number	EPA 9073
Percent Solids, %	70

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LOG NO: D3-23948

Received: 16 DEC 93

Mr. E. Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #349.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23948-3	Lab Blank
23948-4	Accuracy - % Recovery (Mean)
23948-5	Precision - Relative % Difference
23948-6	Detection Limit

PARAMETER	23948-3	23948-4	23948-5	23948-6
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	90 %	4.4 %	1.0
Chlorobenzene, ug/l	<1.0	86 %	3.5 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	97 %	8.2 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	12.16.93	---	---	---
Method Number	EPA 602	---	---	---
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	81 %	2.5 %	1.0
Date Extracted	12.16.93	---	---	---
Date Analyzed	12.16.93	---	---	---
Method Number	EPA 418.1	---	---	---

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LOG NO: D3-23948

Received: 16 DEC 93

Mr. E. Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #349.01.04 (Roosevelt Roads)
Sampled By: E Regensburger

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR SOLID/SEMISOLID
23948-7	Lab Blank
23948-8	Accuracy - % Recovery (Mean)
23948-9	Precision - Relative % Difference
23948-10	Detection Limit

PARAMETER	23948-7	23948-8	23948-9	23948-10
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/kg dw	<5.0	119 %	1.7 %	5.0
Date Extracted	12.17.93	---	---	---
Date Analyzed	12.20.93	---	---	---
Method Number	EPA 9073	---	---	---

Method References: EPA 40 CFR Part 136,
EPA 600/4-79-020 and EPA SW-846.

Paul Canevaro

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☐ 900 Lakeside Drive, Mobile, AL 36693 Phone: (205) 666-6633 Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 Phone: (813) 885-7427 Fax (813) 885-7049

NALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

O. NUMBER	PROJECT NUMBER	PROJECT NAME
	399.01.04	Roosevelt Roads

LIENT NAME	TELEPHONE/FAX NO.
BB+L	407-994-2711

LIENT ADDRESS	CITY, STATE, ZIP CODE
4730 NW 2nd Ave	Boca Raton 33431

AMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
E. Regensburger	E. Regensburger

PAGE 1 OF 1

☒ STANDARD TAT
☒ EXPEDITED TAT *

REPORT DUE DATE _____

* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602	418.1									REMARKS
			NUMBER OF CONTAINERS SUBMITTED														
2/15/93	1630	BB SB-7	X				3	1									24 hr turnaround time
2/15/93	1000	UGW-26 (4'-8')		X				1									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	12/15/93	1800						

RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[signature]	12/16/93	1000	☐ YES ☐ NO		D3-23948	

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LOG NO: D3-24001

Received: 18 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
24001-1	Field Blank	12-17-93

PARAMETER	24001-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10
Date Analyzed	12.26.93
Method Number	EPA 602
Dilution factor, ug/l	1

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LOG NO: D3-24001

Received: 18 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
24001-2	UGW-21	12-17-93
24001-3	UGW-23	12-17-93

PARAMETER	24001-2	24001-3
Purgeable Aromatics (602)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10
Date Analyzed	12.26.93	12.26.93
Method Number	EPA 602	EPA 602
Dilution factor, ug/l	1	1
Petroleum Hydrocarbons		
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0
Date Extracted	12.27.93	12.27.93
Date Analyzed	12.28.93	12.28.93
Method Number	EPA 418.1	EPA 418.1

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LOG NO: D3-24001

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Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
24001-4	UGW-26	12-17-93
24001-5	UGW-24	12-17-93
24001-6	UGW-25	12-17-93

PARAMETER	24001-4	24001-5	24001-6
Purgeable Aromatics (602)			
Benzene, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	5.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10
Date Analyzed	12.26.93	12.26.93	12.27.93
Method Number	EPA 602	EPA 602	EPA 602
Dilution factor, ug/l	1	1	1

SL SAVANNAH LABORATORIES
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LOG NO: D3-24001

Received: 18 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
24001-4	UGW-26	12-17-93
24001-5	UGW-24	12-17-93
24001-6	UGW-25	12-17-93

PARAMETER	24001-4	24001-5	24001-6
Polynuclear Aromatic Hydrocarbons (610)			
Acenaphthene, ug/l	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10
Fluorene, ug/l	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10
Pyrene, ug/l	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	12
1-Methylnaphthalene, ug/l	<10	<10	30
Date Extracted	12.22.93	12.22.93	12.22.93
Date Analyzed	12.27.93	12.27.93	12.27.93
Method Number	EPA 610	EPA 610	EPA 610
Dilution factor, ug/l	1	1	1
Petroleum Hydrocarbons			
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	1.8
Date Extracted	12.27.93	12.27.93	12.27.93
Date Analyzed	12.28.93	12.28.93	12.28.93
Method Number	EPA 418.1	EPA 418.1	EPA 418.1

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LOG NO: D3-24001

Received: 18 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
24001-7	Lab Blank
24001-8	Accuracy - % Recovery (Mean)
24001-9	Precision - Relative % Difference
24001-10	Detection Limit

PARAMETER	24001-7	24001-8	24001-9	24001-10
Purgeable Aromatics (602)				
Benzene, ug/l	<1.0	98 %	9.2 %	1.0
Chlorobenzene, ug/l	<1.0	86 %	3.5 %	1.0
1,2-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,3-Dichlorobenzene, ug/l	<1.0	---	---	1.0
1,4-Dichlorobenzene, ug/l	<1.0	---	---	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	106 %	8.5 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	12.26.93	---	---	---
Method Number	EPA 602	---	---	---

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Project: #399.01.04 (Roosevelt Roads)
Sampled By: Tim Twist

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
24001-7	Lab Blank
24001-8	Accuracy - % Recovery (Mean)
24001-9	Precision - Relative % Difference
24001-10	Detection Limit

PARAMETER	24001-7	24001-8	24001-9	24001-10
Polynuclear Aromatic Hydrocarbons (610)				
Acenaphthene, ug/l	<10	---	---	10
Acenaphthylene, ug/l	<10	63 %	16 %	10
Benzo(a)pyrene, ug/l	<10	---	---	10
Benzo(g,h,i)perylene, ug/l	<10	---	---	10
Benzo(b,k)fluoranthene, ug/l	<10	---	---	10
Chrysene + Benzo(a)anthracene, ug/l	<10	---	---	10
Fluoranthene, ug/l	<10	92 %	5.4 %	10
Fluorene, ug/l	<10	69 %	8.6 %	10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	---	---	10
Naphthalene, ug/l	<10	62 %	11 %	10
Phenanthrene + Anthracene, ug/l	<10	---	---	10
Pyrene, ug/l	<10	92 %	5.4 %	10
2-Methylnaphthalene, ug/l	<10	---	---	10
1-Methylnaphthalene, ug/l	<10	---	---	10
Date Extracted	12.22.93	---	---	---
Date Analyzed	12.27.93	---	---	---
Method Number	EPA 610	---	---	---
Petroleum Hydrocarbons				
Total Recoverable Petroleum Hydrocarbons (418.1), mg/l	<1.0	75 %	2.7 %	1.0
Date Extracted	12.27.93	---	---	---
Date Analyzed	12.28.93	---	---	---
Method Number	EPA 418.1	---	---	---

Method References: EPA 40 CFR Part 136 and
EPA 600/4-79-020.

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
QUIMICO LICENCIADO

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	PAGE	OF
	399.01.04	Roosevelt Roads	1	1

CLIENT NAME	TELEPHONE/FAX NO.
BBL	407994-2711

CLIENT ADDRESS	CITY, STATE, ZIP CODE
11730 NW 2nd AVE	Boca Raton FL 33431

SAMPLER(S) NAME(S)	CLIENT PROJECT MANAGER
Jim Twist	Flip Regensburger

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602	418.1	610									
			NUMBER OF CONTAINERS SUBMITTED															
/17	9:30	Field Blank	X				3	1										
/17	8:20	UGW-21	X				3	1										
/17	9:20	UGW-23	X				3	1	1									
/17	1330	UGW-26	X				3	1	1									
/17	1520	UGW-24	X				3	1	1									
/17	1630	UGW-25	X				3	1	1									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Carolyn Henderson	12-7-93		[signature]	12/7/93	1100	[signature]	12/17/93	1500
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

RECEIVED

CLIENT'S FIELD COPY

ENVIRONMENTAL CONSULTING GROUP
Environmental, Health & Safety Specialists

November 23, 1993

Mr. Eric Regensburger
BB&L
4730 NW 2nd Ave.
Boca Raton, Florida 33431

Dear Mr. Regensburger:

Included you will find the preliminary report for the samples analyzed by our company and taken by your personnel from the Roosevelt Roads facilities in Ceiba, PR.

A final report including chain of custody and certification will be issued at the end of the project.

Results of Analysis

BB&L Sample ID	ECG Sample ID	BTEX Result in ppb (ug/l or ug/kg)	TPH Result in ppm (mg/l or mg/kg)
BBSB-1 (10-12')	045-01	<13.5, <25.5, <7.83, <27.9	<10
BBSB-2 (20-22')	045-02	<13.1, <24.4, <7.5, <27.0	<10
BBSB-3 (6-8')	045-03	<12.6, <23.4, <7.2, <25.9	<10
BBSB-1	045-04	<32.6, <60.6, <18.8, <67.0	12
BBSB-2	045-05	<32.6, <60.6, <18.8, <67.0	<10
BBSB-1 (6-8')	045-06	<13.0, <24.2, <7.5, <26.8	<10
BBSB-4 (8-10')	045-07	<8.1, <15.1, <4.7, <16.7	51

P.O. Box 190064, San Juan, P. R. 00919-0064 • Tels. (809) 384-1534 - 385-9521 • Fax (809) 764-8097

BBSB-4	045-08	<12.5, <23.3, <7.2, <25.7	10
BBSB-5 (2-4')	045-09	<7.5, <13.9, <4.3, <15.4	136
BBSB-5 (10-12')	045-10	<7.6, <14.2, <4.4, <15.8	64
BBSB-5	045-11	<8.1, <15.1, <4.7, <16.7	<50
BBSB-7 (10-14')	045-12	<7.2, <13.4, <4.2, <14.8	<50

* BTEX Results are given in the following order: Benzene, Toluene, Ethylbenzene, Xylenes.

If you have any other questions please feel free to contact me.

Cordially,

José Juan Orsini Hecht
Principal/Project Manager

Appendix C

APPENDIX C

MONITORING WELL CONSTRUCTION DIAGRAM/LITHOLOGIC LOGS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-19

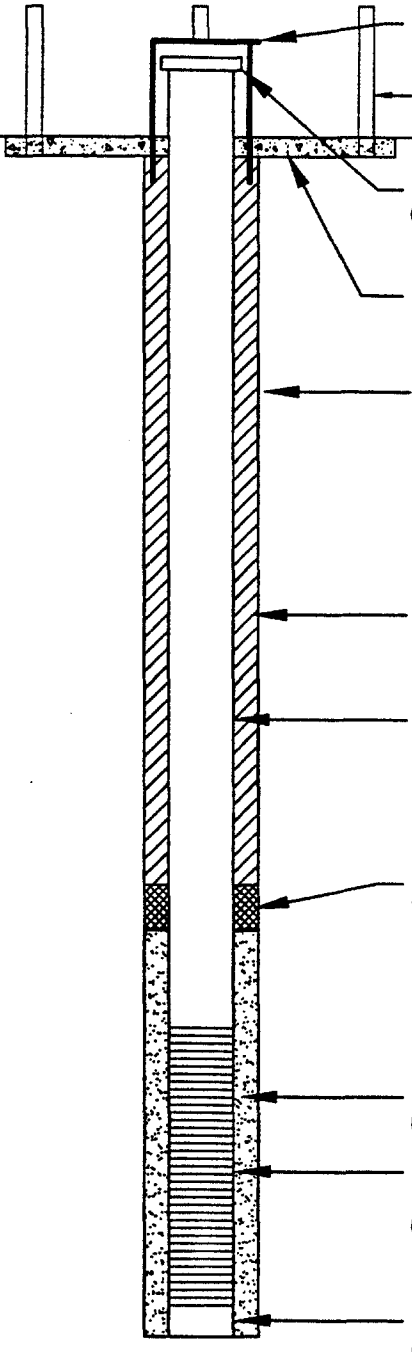
GENERAL LITHOLOGY

LAND SURFACE TO 2.0' BLS: SAND; brown, medium grained with grey-green rock fragments, dry.

2.0' TO 12.0' BLS: WEATHERED ROCK; grey-brown, some grey rock fragments, dry.

12.0' TO 14.0' BLS: ROCK; grey-green with some medium grained sand, wet.

14.0' TO 19.0' BLS: ROCK; grey-green, wet



PROTECTIVE STEEL LOCKING CASING WITH HINGE LID (2' STICKUP)

THREE 3" DIA. PROTECTIVE POSTS

WATER TIGHT LOCKING CAP (1.5' STICKUP)

TRIANGULAR CONCRETE PAD: (3' x 3' x 3' x 0.5')

8" DIA. BOREHOLE

CEMENT GROUT SEAL (FROM 0.5' TO 4' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL CASING (FROM 1.5' ALS TO 8.5' BLS)

BENTONITE SEAL (FROM 4' BLS TO 6' BLS)

20/30 SILICA SAND PACK (FROM 6' BLS TO 19' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL SCREEN, 0.010 IN. SLOT (FROM 8.5' BLS TO 18.5' BLS)

THREADED SCHEDULE 40 PVC SUMP (FROM 18.5' BLS TO 19' BLS)

PROJECT NO.: 399.01
WELL NO.: UGW-19
BY: EFR
DATE: 11/15/93
CASING ELEVATION: 12.27
DEPTH TO WATER UPON COMPLETION: 10 FT.
UNIT MONITORED: SURFICIAL

DRILLER: SOIL TECH, INC.
DRILLING METHOD: HOLLOW STEM AUGER
TOTAL DEPTH: 19 FEET
SAMPLE TYPE: SPLIT-SPOON
SAMPLE INTERVAL: CONTINUOUS

OGW19
1/29/94 60-DMW
3990104R\39901L01.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

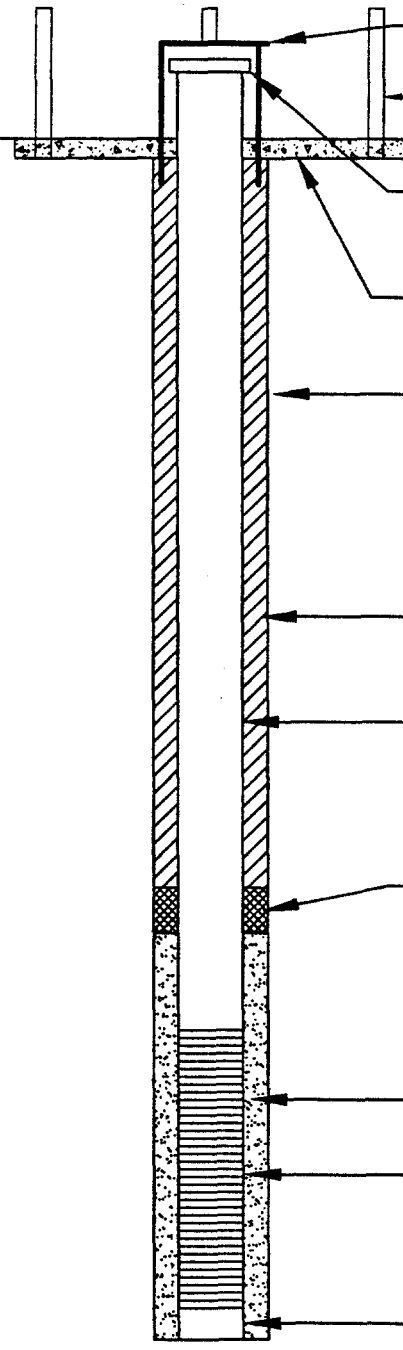
ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-20

GENERAL LITHOLOGY

LAND SURFACE TO 8.0' BLS: SAND and SILT; red/brown, very fine grained, some grey-green rock fragments, dry (FILL).

8.0' TO 19.0' BLS: WEATHERED ROCK; brown-red, moist.



PROTECTIVE STEEL LOCKING CASING WITH HINGE LID (3' STICKUP)

THREE 3" DIA. PROTECTIVE POSTS

WATER TIGHT LOCKING CAP (2.5' STICKUP)

TRIANGULAR CONCRETE PAD: (3' x 3' x 3' x 0.5')

8" DIA. BOREHOLE

CEMENT GROUT SEAL (FROM 0.5' TO 3' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL CASING (FROM 2.5' ALS TO 7' BLS)

BENTONITE SEAL (FROM 3' BLS TO 5' BLS)

20/30 SILICA SAND PACK (FROM 5' BLS TO 17.5' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL SCREEN, 0.010 IN. SLOT (FROM 7' BLS TO 17' BLS)

THREADED SCHEDULE 40 PVC SUMP (FROM 17' BLS TO 17.5' BLS)

PROJECT NO.: 399.01
WELL NO.: UGW-20
BY: EFR
DATE: 11/17/93
CASING ELEVATION: 11.92
DEPTH TO WATER UPON COMPLETION: 9 FT.
UNIT MONITORED: SURFICIAL

DRILLER: SOIL TECH, INC.
DRILLING METHOD: HOLLOW STEM AUGER
TOTAL DEPTH: 19 FEET
SAMPLE TYPE: SPLIT-SPOON
SAMPLE INTERVAL: CONTINUOUS

UGW20
1/29/94 60-DMW
3990104R\39901L01.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

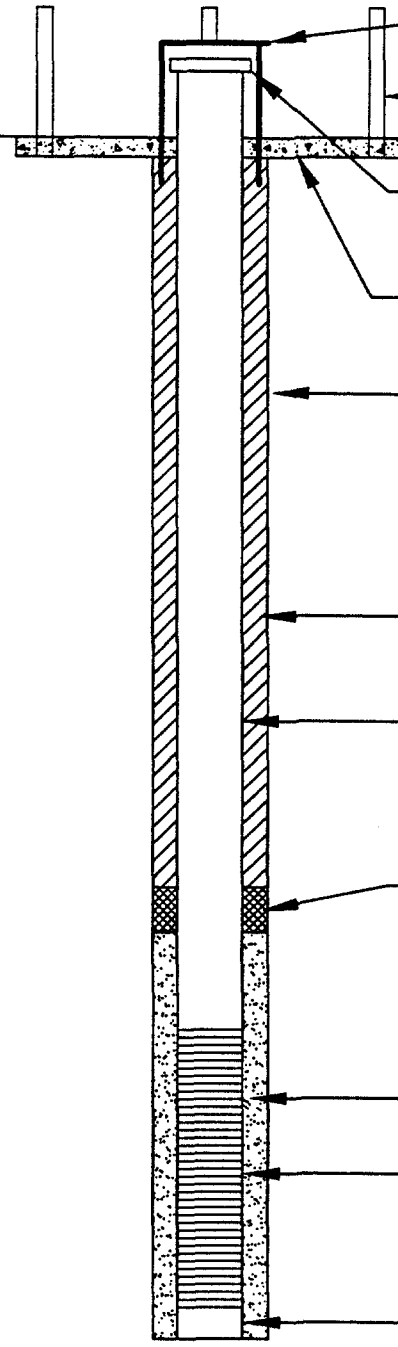
MONITORING WELL CONSTRUCTION DETAILS
UGW-21

GENERAL LITHOLOGY

LAND SURFACE TO 2.0' BLS: SAND; brown, medium grained, dry, (TOPSOIL).

2.0' TO 4.0' BLS: SAND; brown, very fine grained, some grey-green rock fragments, dry.

4.0' TO 13.0' BLS: ROCK; grey-green, dry.



PROTECTIVE STEEL LOCKING CASING WITH HINGE LID (3' STICKUP)

THREE 3" DIA. PROTECTIVE POSTS

WATER TIGHT LOCKING CAP (2.5' STICKUP)

TRIANGULAR CONCRETE PAD: (3' x 3' x 3' x 0.5')

8" DIA. BOREHOLE

CEMENT GROUT SEAL (FROM 0.5' TO 3' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL CASING (FROM 2.5' ALS TO 7.5' BLS)

BENTONITE SEAL (FROM 3' BLS TO 5' BLS)

20/30 SILICA SAND PACK (FROM 5' BLS TO 13' BLS)

2" DIA. SCHEDULE 40 PVC THREADED WELL SCREEN, 0.010 IN. SLOT (FROM 7.5' BLS TO 12.5' BLS)

THREADED SCHEDULE 40 PVC SUMP (FROM 12.5' BLS TO 13' BLS)

PROJECT NO.: 399.01
WELL NO.: UGW-21
BY: EFR
DATE: 11/18/93
CASING ELEVATION: 13.28
DEPTH TO WATER UPON COMPLETION: 10 FT.
UNIT MONITORED: SURFICIAL

DRILLER: SOIL TECH, INC.
DRILLING METHOD: HOLLOW STEM AUGER
TOTAL DEPTH: 13 FEET
SAMPLE TYPE: SPLIT-SPOON
SAMPLE INTERVAL: CONTINUOUS

UGW21
1/29/94 60-DMW
3990104R\39901L01.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-22

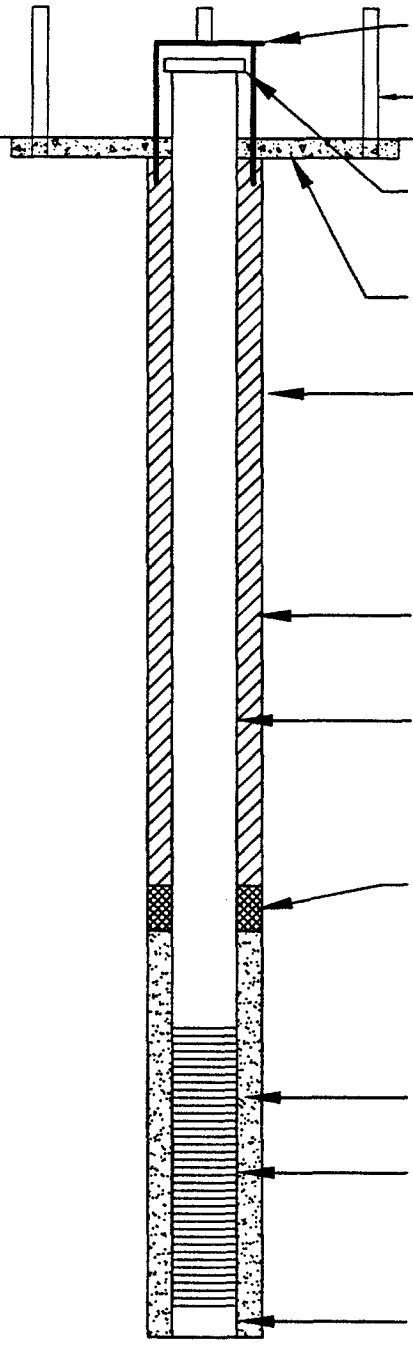
GENERAL LITHOLOGY

LAND SURFACE TO 4.0' BLS: SAND; dark brown, roots, dry, (TOPSOIL).

4.0' TO 20.0' BLS: WEATHERED ROCK; red-brown and grey.

20.0' TO 24.0' BLS: WEATHERED ROCK; red-brown and grey clay.

24.0' TO 25.5' BLS: ROCK; grey-green, hard.



PROJECT NO.: 399.01
WELL NO.: UGW-22
BY: EFR
DATE: 11/18/93
CASING ELEVATION: 15.18
DEPTH TO WATER UPON COMPLETION: 10 FT.
UNIT MONITORED: SURFICIAL

DRILLER: SOIL TECH, INC.
DRILLING METHOD: STRAIGHT AIR
TOTAL DEPTH: 25.5 FEET
SAMPLE TYPE: CUTTINGS
SAMPLE INTERVAL: 5 FT.

UGW22
1/29/94 60-DMW
3990104R\39901L02.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-23

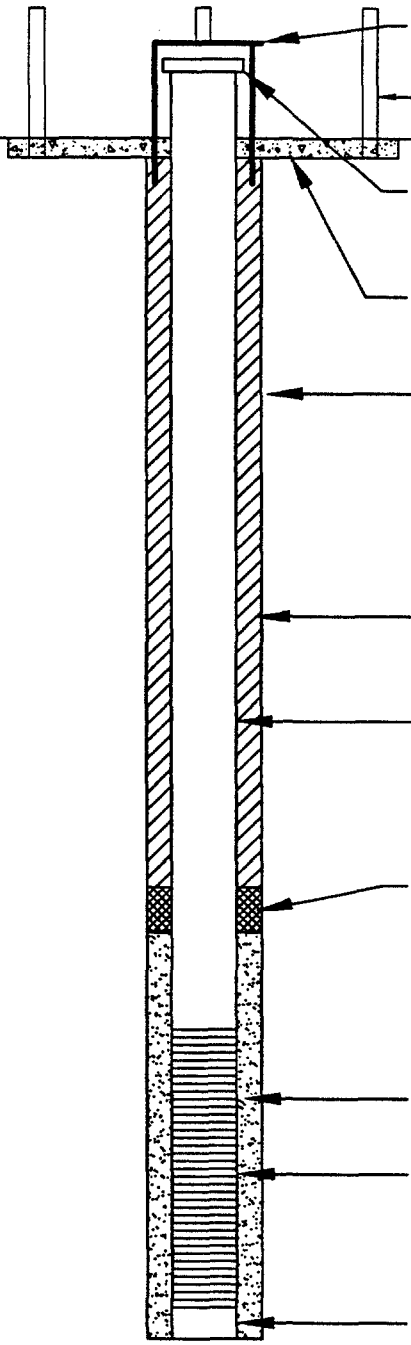
GENERAL LITHOLOGY

LAND SURFACE TO 2.0' BLS: SAND; brown, very fine grained, some silt, some rock fragments, dry.

2.0' TO 6.0' BLS: SAND; red-brown, very fine to fine grained, some silt, rock fragments, dry.

6.0' TO 37.0' BLS: WEATHERED ROCK; red-brown and white, some sand, dry.

37.0' TO 87.0' BLS: ROCK; grey-green, hard.



PROJECT NO.: 399.01
WELL NO.: UGW-23
BY: EFR
DATE: 12/11/93
CASING ELEVATION: 69.20
DEPTH TO WATER UPON COMPLETION: 60 FT.
UNIT MONITORED: BEDROCK

DRILLER: SOIL TECH, INC.
DRILLING METHOD: STRAIGHT AIR
TOTAL DEPTH: 87 FEET
SAMPLE TYPE: CUTTINGS
SAMPLE INTERVAL: 5 FT.

OGW23
1/29/94 60-DMW
3990104R\39901L02.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-24

GENERAL LITHOLOGY

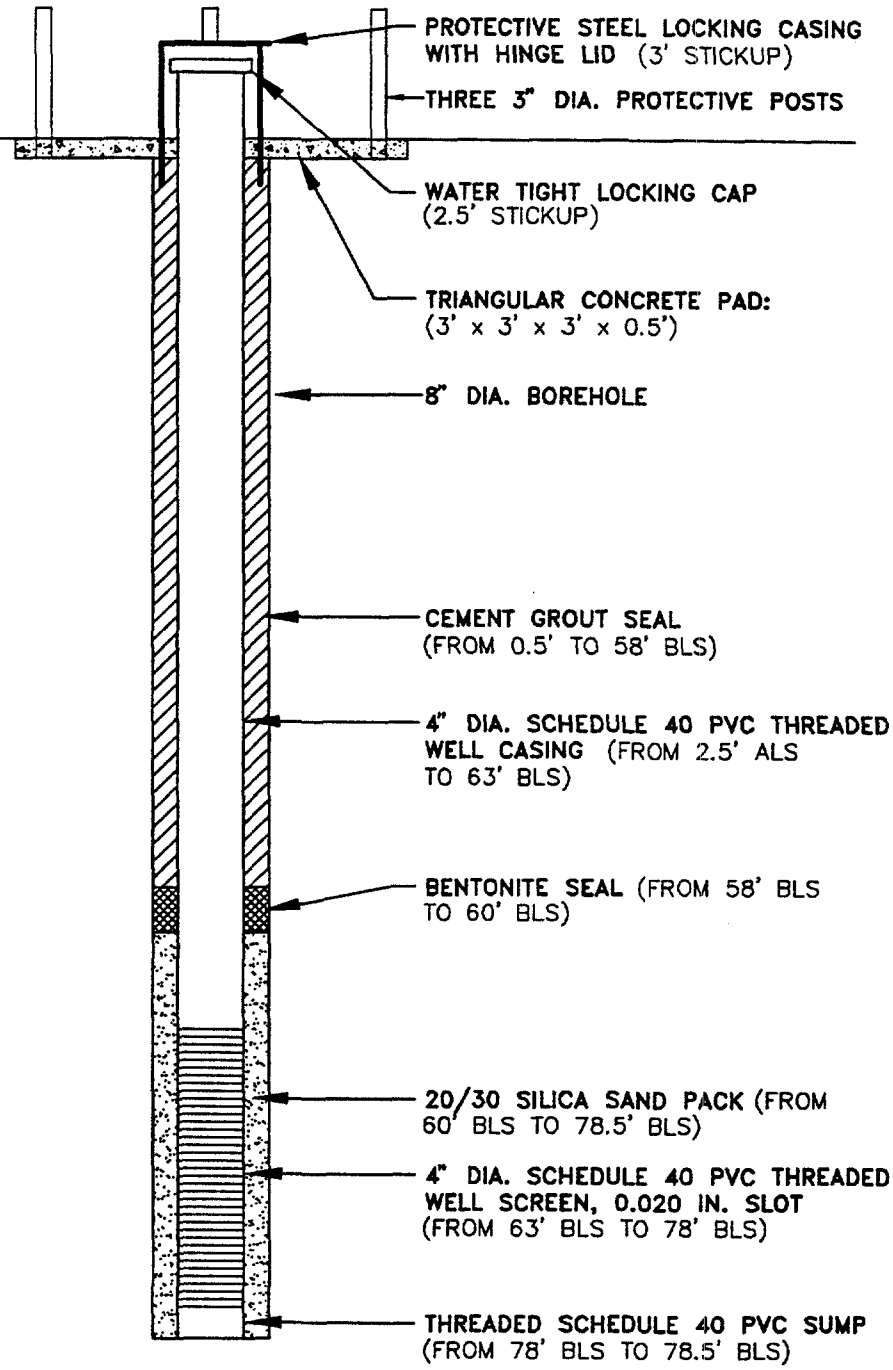
LAND SURFACE TO 2.0' BLS: SAND and SILT; brown, some clay, roots (TOPSOIL).

2.0' TO 15.0' BLS: WEATHERED ROCK; light grey with red-brown patches, some very fine to fine grained sand, silty, dry.

15.0' TO 45.0' BLS: ROCK; grey-green, hard, dry.

45.0' TO 60.0' BLS: SAND and SILT; grey-brown, very fine to fine grained, subrounded, dry.

60.0' TO 91.0' BLS: SAND/ SILT and ROCK, interbedded.



PROJECT NO.: 399.01
WELL NO.: UGW-24
BY: EFR
DATE: 12/16/93
CASING ELEVATION: 78.94
DEPTH TO WATER UPON COMPLETION: 71 FT.
UNIT MONITORED: BEDROCK

DRILLER: SOIL TECH, INC.
DRILLING METHOD: STRAIGHT AIR
TOTAL DEPTH: 91 FEET
SAMPLE TYPE: CUTTINGS
SAMPLE INTERVAL:

OGW24
1/29/94 60-DMW
3990104R\39901L02.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-25

GENERAL LITHOLOGY

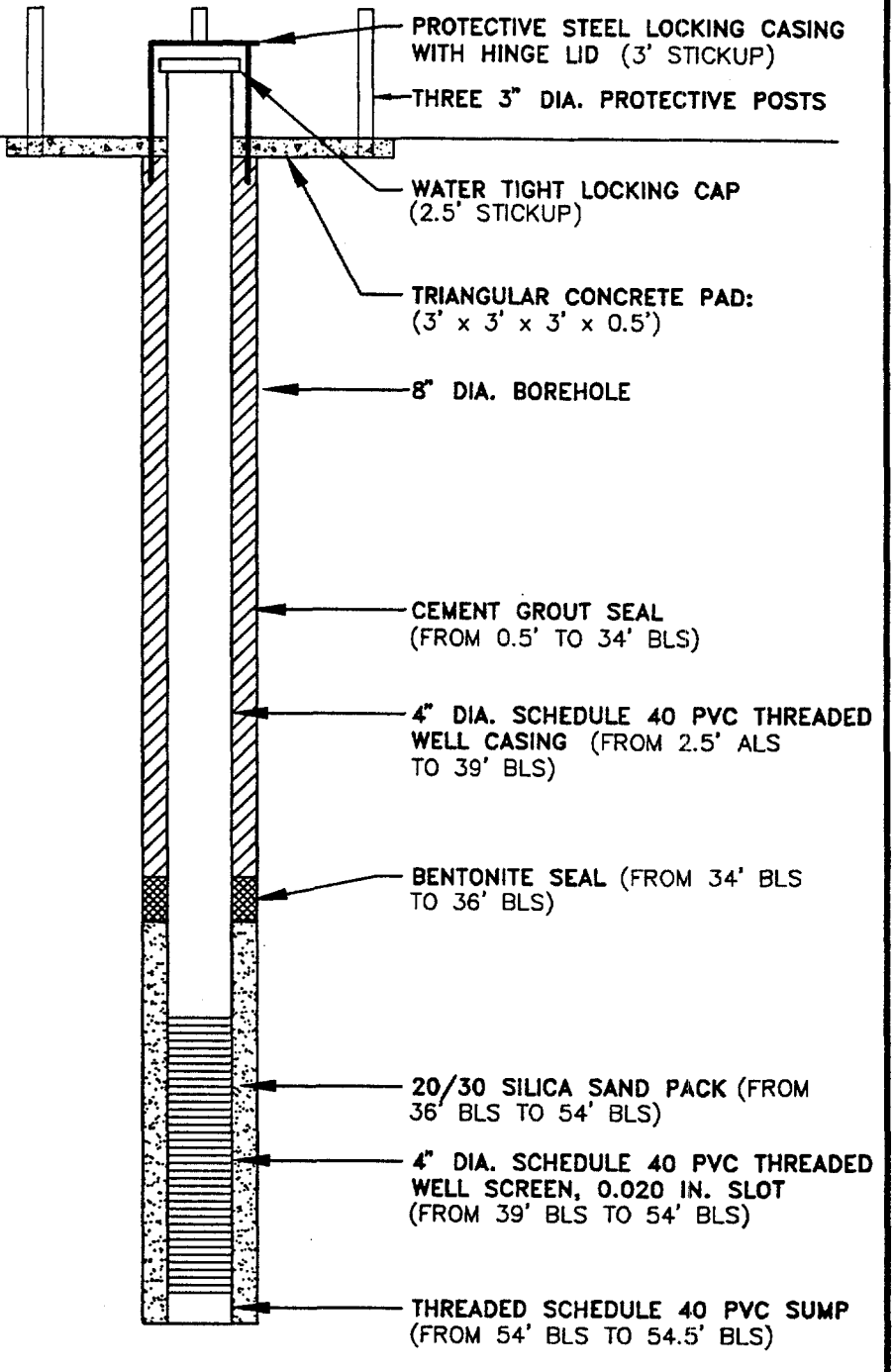
LAND SURFACE TO 2.0' BLS: SILT; brown, clayey with grey-green rock fragments, moist.

2.0' TO 25.0' BLS: WEATHERED ROCK; grey and red-brown with white patches, crumbly, dry.

25.0' TO 35.0' BLS: ROCK; grey-green, hard, dry.

35.0' TO 40.0' BLS: ROCK (grey-green) and SAND (brown), fine to medium grained, dry.

40.0' TO 70.0' BLS: ROCK; grey-green, hard.



PROJECT NO.: 399.01
WELL NO.: UGW-25
BY: EFR
DATE: 12/17/93
CASING ELEVATION: 53.92
DEPTH TO WATER UPON COMPLETION: 46 FT.
UNIT MONITORED: BEDROCK

DRILLER: SOIL TECH, INC.
DRILLING METHOD: STRAIGHT AIR
TOTAL DEPTH: 70 FEET
SAMPLE TYPE: CUTTINGS
SAMPLE INTERVAL: 5 FEET

OGW25
1/29/94 60-DMW
3990104R\39901L02.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

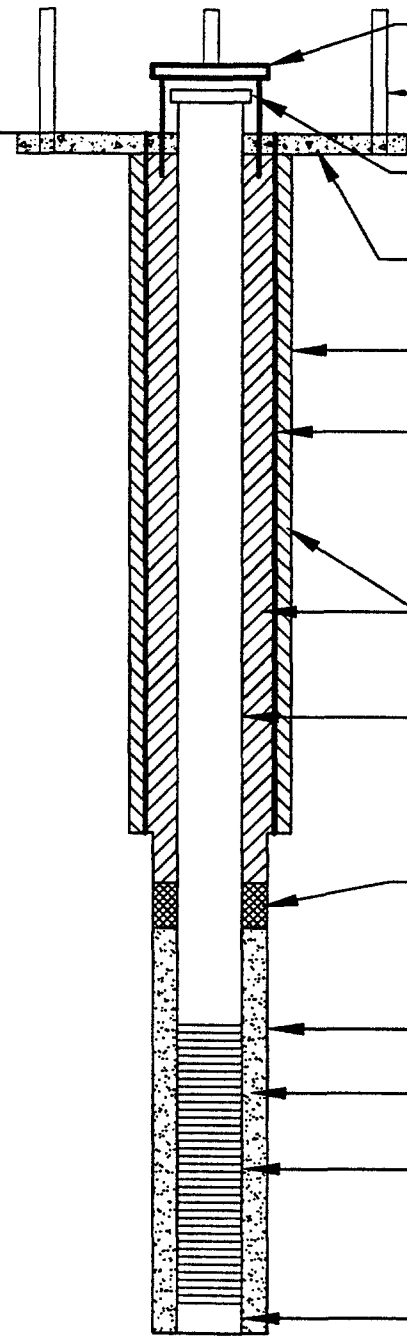
ROOSEVELT ROADS U.S. NAVAL STATION
TWO WAY FUEL FACILITY
CEIBA, PUERTO RICO

MONITORING WELL CONSTRUCTION DETAILS
UGW-26

GENERAL LITHOLOGY

LAND SURFACE TO 35.0' BLS: SAND and SILT; red-brown, very fine to fine subrounded grains, some clay and rock fragments, moist.

35.0' TO 50.0' BLS: ROCK; grey, hard.



PROTECTIVE OUTER WELL COVER WITH LID TOP (3' STICKUP)

THREE 3" DIA. PROTECTIVE POSTS

WATER TIGHT LOCKING CAP (2.5' STICKUP)

TRIANGULAR CONCRETE PAD: (3' x 3' x 3' x 0.5')

10" DIA. BOREHOLE

8" DIA. PVC SCHEDULE 40 SURFACE CASING (FROM SURFACE TO 30' BLS)

CEMENT GROUT SEAL (FROM 0.5' TO 35' BLS)

4" DIA. SCHEDULE 40 PVC THREADED WELL CASING (FROM 2.5' ALS TO 41' BLS)

BENTONITE SEAL (FROM 35' BLS TO 37' BLS)

8" DIA. BOREHOLE

20/30 SILICA SAND PACK (FROM 37' BLS TO 46.5' BLS)

4" DIA. SCHEDULE 40 PVC THREADED WELL SCREEN, 0.020 IN. SLOT (FROM 41' BLS TO 46' BLS)

THREADED SCHEDULE 40 PVC SUMP (FROM 46' BLS TO 46.5' BLS)

PROJECT NO.: 399.01
WELL NO.: UGW-26
BY: EFR
DATE: 12/16/93
CASING ELEVATION: 14.51
DEPTH TO WATER UPON COMPLETION: 10 FT.
UNIT MONITORED: DEEP SURFICIAL AQUIFER

DRILLER: SOIL TECH, INC.
DRILLING METHOD: STRAIGHT AIR
TOTAL DEPTH: 50 FEET
SAMPLE TYPE: CUTTINGS
SAMPLE INTERVAL: 5 FT

1/28/94 60-DMW
3990104R\39901L03.DWG

(DRAWING NOT TO SCALE)

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

Appendix D

APPENDIX D

DAILY AIR MONITORING LOGS

ASLAND & BOUCK ENGINEERS, .C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 11/10/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING
1325	BBSB-1 (14 ft BLS)	Ø (breathing zone behind rig)
1520	BBSB-2 (8 ft BLS)	Ø (" " " ")

ASLAND & BOUCK ENGINEERS .C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 11/11/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING
1120	BBSB-3 (15 ft BLS)	Ø (breathing zone behind rig)
1325	BBSB-3 (30 ft BLS)	Ø (" " " ")

ASLAND & BOUCK ENGINEERS, C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 11/12/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING
0755	BBSB-4 (2 ft BLS)	Ø (breathing zone behind rig)
0820	BBSB-4 (5 ft BLS)	Ø (" " " ")
0915	BBSB-4 (12 ft BLS)	0.3 (" " " ")

ASLAND & BOUCK ENGINEERS .C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 11/15/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING
1645	BBSB-5 (3 ft BLS)	Ø (breathing zone behind rig)

ASLAND & BOUCK ENGINEERS .C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 11/16/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING
0820	BBSB-5 (8 ft. BLS)	Ø (breathing zone behind rig)
1140	BBSB-6 (10 ft BLS)	Ø (" " " ")
1345	BBSB-7 (8 ft BLS)	Ø (" " " ")

BLASLAND & BOUCK ENGINEERS P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/7/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0955	UGW-22 (0' BLS)	2.0 (exhaust from rig)
1010	" (3' BLS)	15.0
1030	" (7' BLS)	50.0
1040	" (8' BLS)	90.0
1110	" (12' BLS)	40.0
1140	" (15' BLS)	20.0
1150	" (16' BLS)	10.0
1305	" (17 BLS)	<10
1315	" (22 BLS)	<10
1340	" (24 BLS)	5.0
1350	" (24.5 BLS)	10.0
140	" (25 BLS)	2.0

BLASLAND & BOUCK ENGINEERS P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/8/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
1500	B85B-3 (47' BLS)	Ø
1530	" (55' BLS)	Ø
1630	" (65' BLS)	Ø
1705	" (69' BLS)	Ø
1735	" (73' BLS)	Ø

BLASLAND & BOUCK ENGINEERS P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/9/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
1020	BBSB-3 (83' BLS)	Ø
1130	BBSB-3 (87' BLS)	Ø

BLASLAND & BOUCK ENGINEERING P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/10/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
1045	BBSB-6 (17' BLS)	Ø ppm
1145	BBSB-6 (32' BLS)	Ø ppm

BLASLAND & BOUCK ENGINEEI. , P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/11/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0740	BBSB-6 (50' BLS)	Ø ppm
0840	BBSB-6 (61' BLS)	Ø ppm
1105	BBSB-6 (90' BLS)	Ø ppm

BLASLAND & BOUCK ENGINEE. , P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/13/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0930	UGW-22 (pre-development)	5
0930	Background	9 (from fuel storage area)
1045	UGW-22 (during development)	10 ↔ 20
1045	Background	10 ↔ 15
1405	UGW-22 (during development)	<10
1405	Background	<10

BLASLAND & BOUCK ENGINEER . P.C.
BLASLAND, BOUCK & LEE
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/14/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0910	BBSB-7 (30 feet BLS)	Ø
1055	BBSB-7 (55 feet BLS)	Ø
1140	BBSB-7 (64 feet BLS)	Ø

BLASLAND & BOUCK ENGINEEF P.C.
BLASLAND, BOUCK & LEL
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/15/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0800	UGW-26 (5 feet BLS)	Ø
1100	UGW-26 (15 feet BLS)	Ø
1140	UGW-26 (28 feet BLS)	Ø

BLASLAND & BOUCK ENGINEEF P.C.
BLASLAND, BOUCK & LEL
DAILY AIR MONITORING LOG

PROJECT: Roosevelt Roads U.S. Naval Station DATE: 12/16/93

MONITORING INSTRUMENT: Foxboro Organic Vapor Analyzer

AIR MONITOR: Eric F. Regensburger ACTIVITY: Drilling

LEVEL OF PROTECTION: D

TIME	LOCATION	INSTRUMENT READING (ppm)
0900	OGW-26 (35 feet BLS)	Ø
1300	OGW-26 (45 feet BLS)	Ø

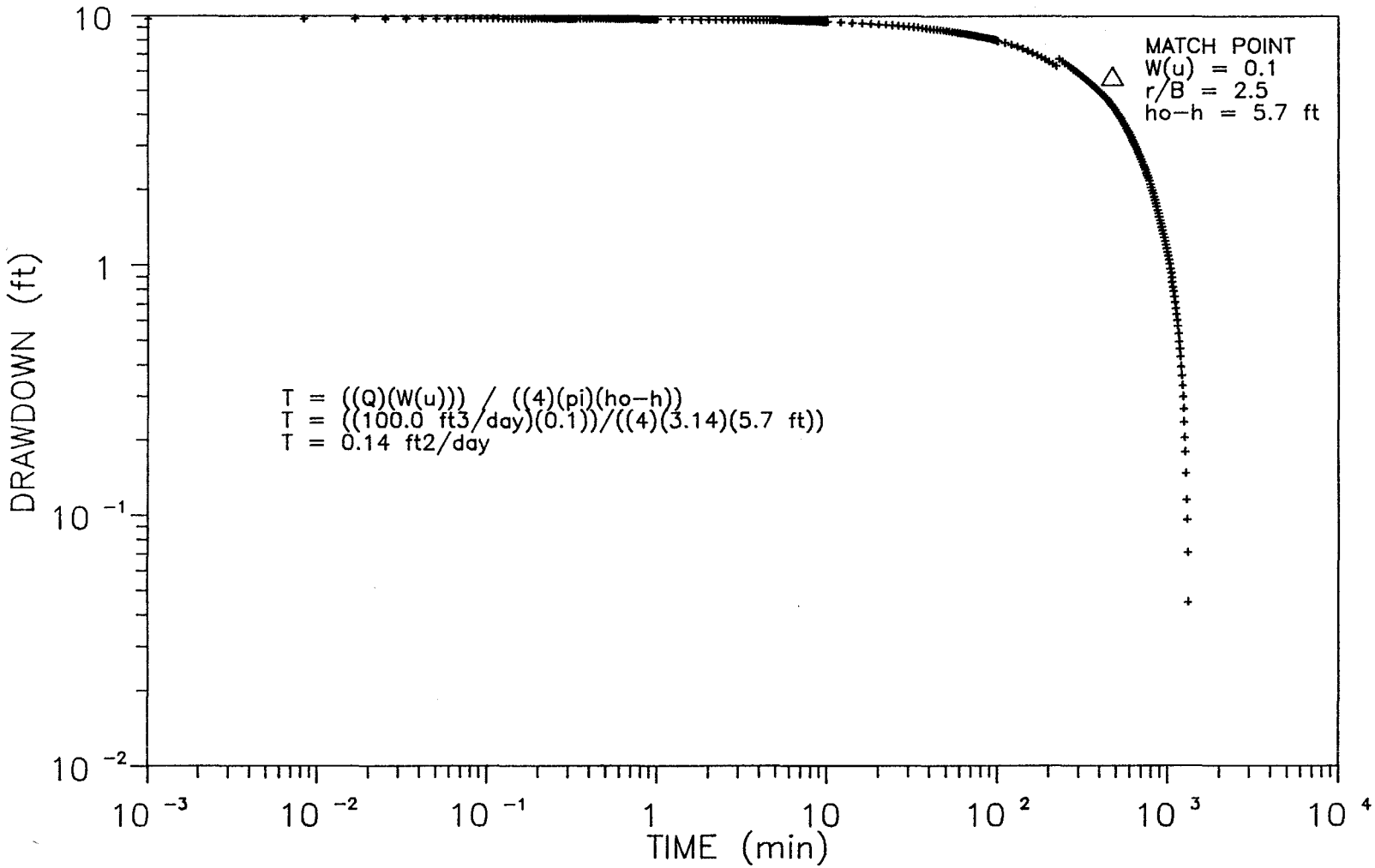
Appendix E

APPENDIX E

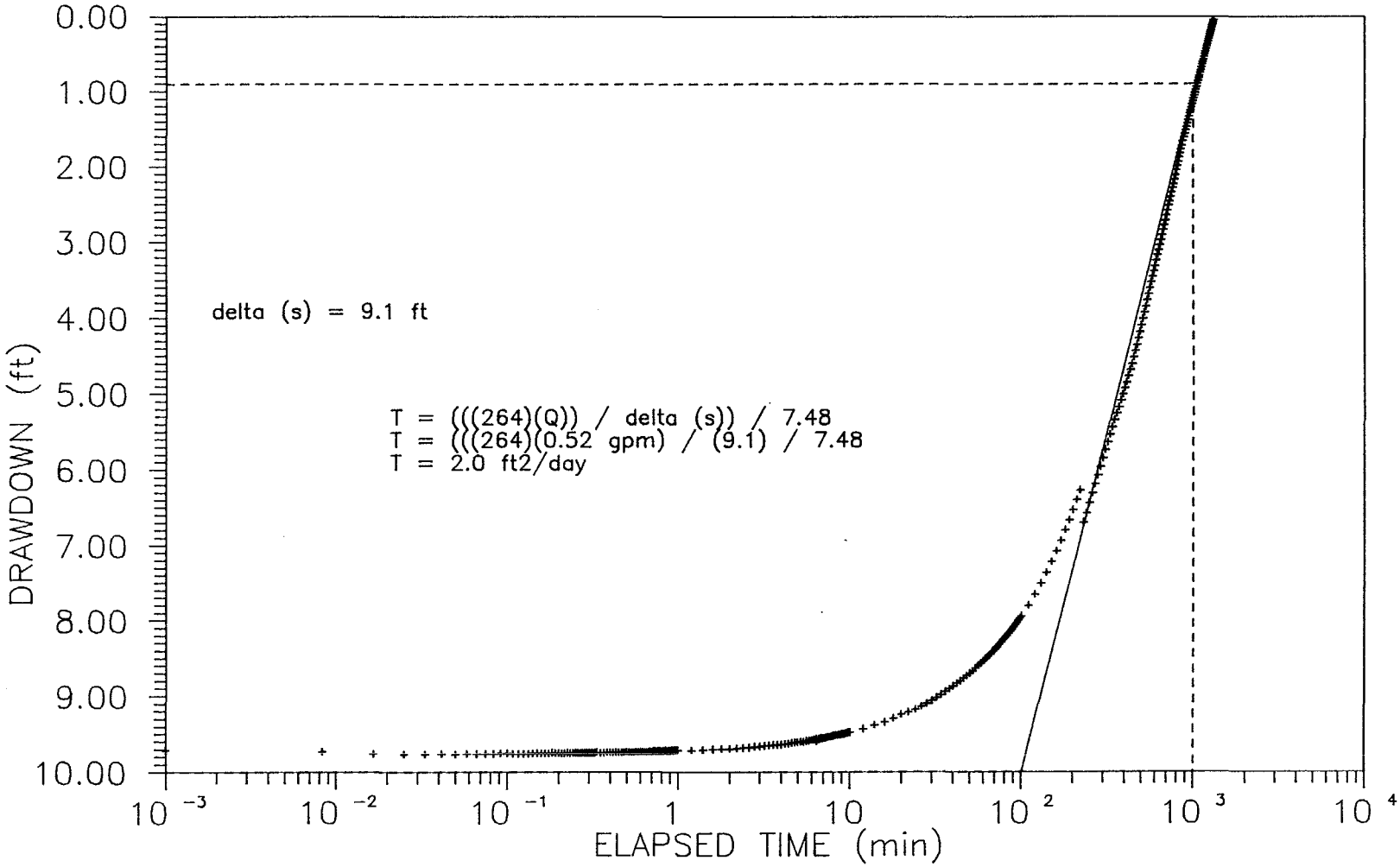
APT RESULTS AND CALCULATIONS

APT GRAPHS AND CALCULATIONS

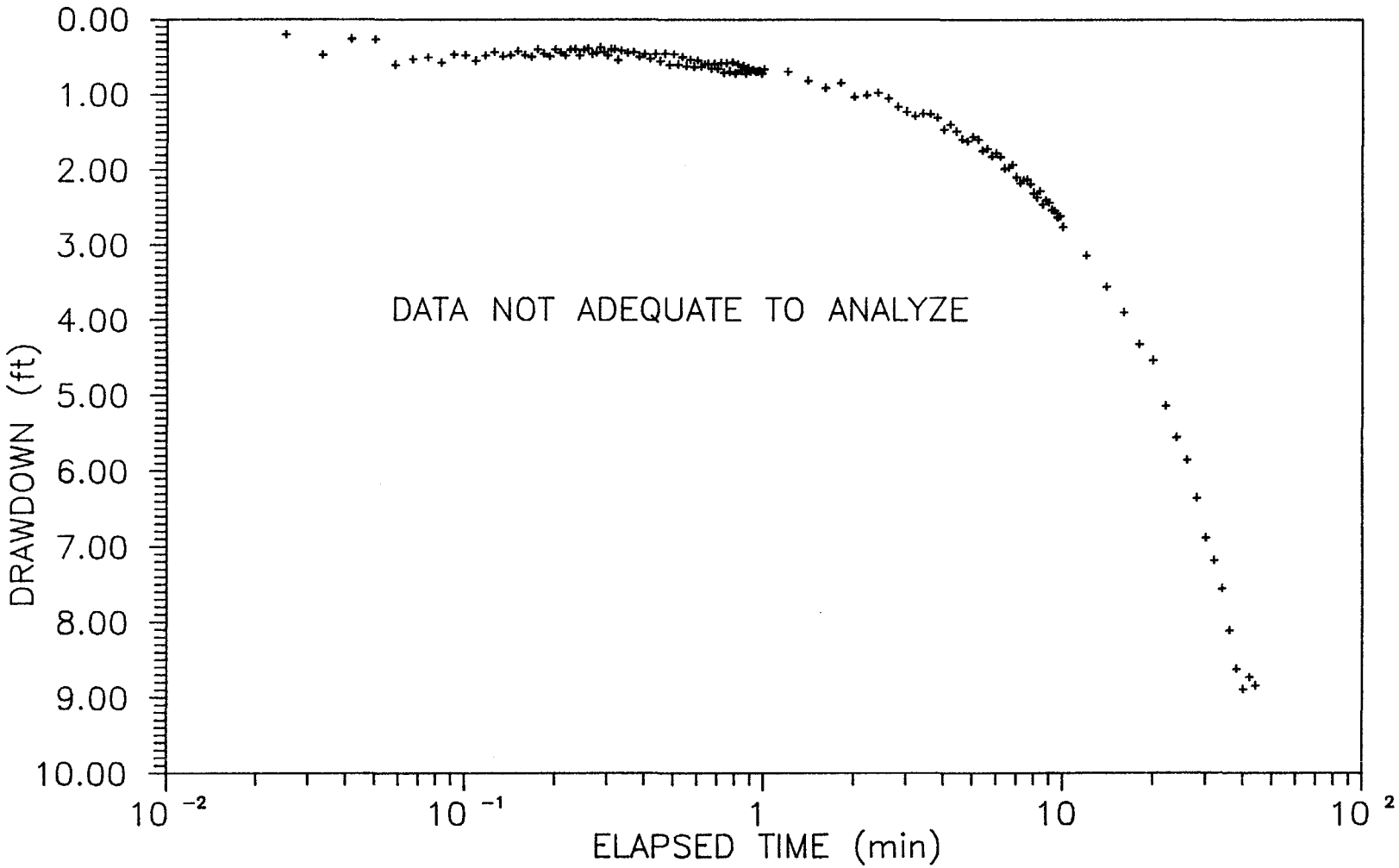
ROOSEVELT ROADS U.S. NAVAL STATION
AQUIFER PERFORMANCE TEST
UGW-22 (12/15/93)
RECOVERY



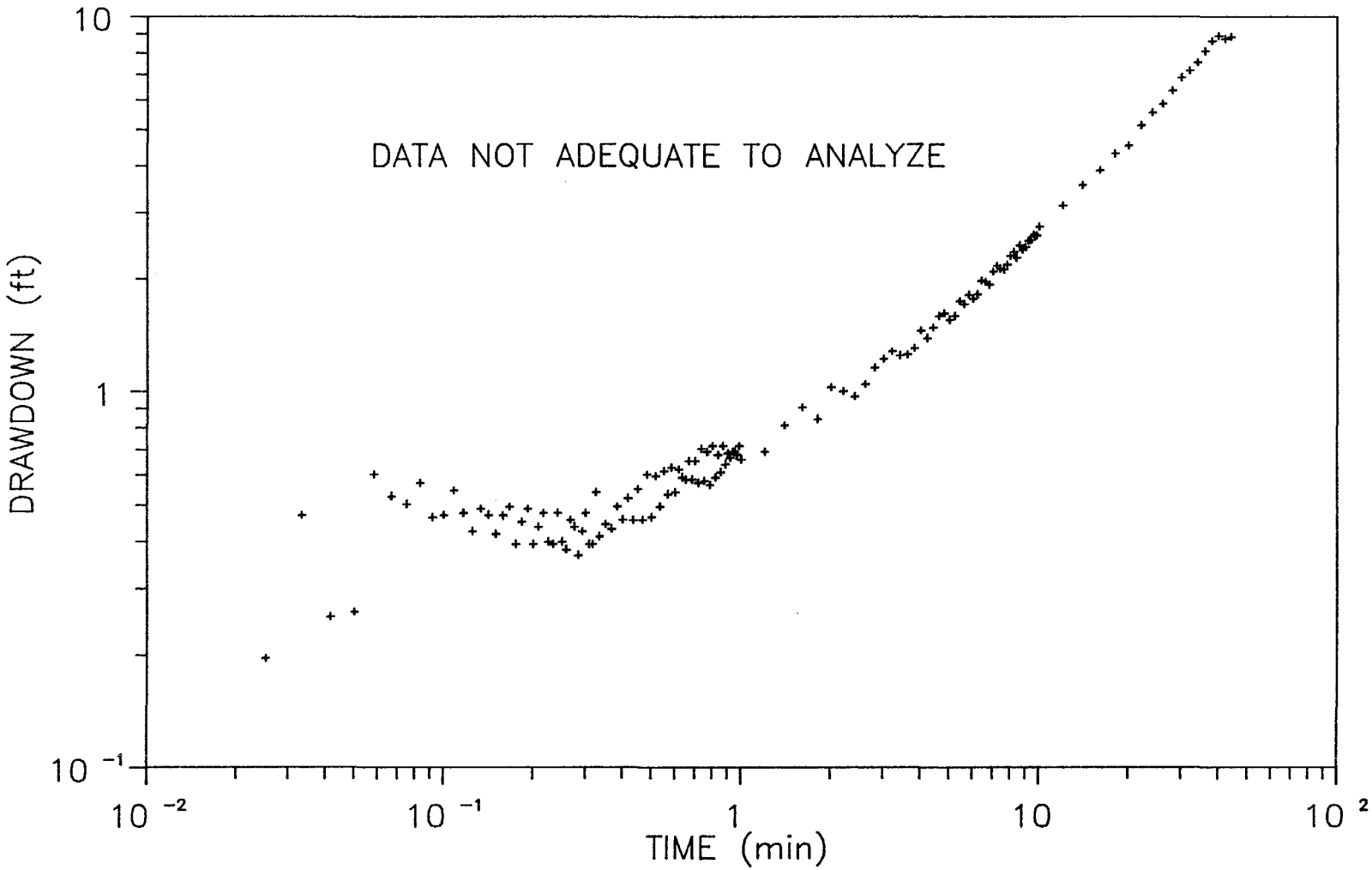
ROOSEVELT ROADS U.S. NAVAL STATION
AQUIFER PERFORMANCE TEST
UGW-22 (12/15/93)
RECOVERY



ROOSEVELT ROADS U.S. NAVAL STATION
AQUIFER PERFORMANCE TEST
UGW-22 (12/15/93)
DRAWDOWN



ROOSEVELT ROADS U.S. NAVAL STATION
AQUIFER PERFORMANCE TEST
UGW-22 (12/15/93)
DRAWDOWN



APT RAW DATA

AQUIFER PERFORMANCE TEST DATA – DRAWDOWN
ROOSEVELT ROADS U.S. NAVAL STATION

DATE: DECEMBER 1993

PUMPING WELL: UGW–22
DISCHARGE RATE: 0.52 gallons per minute

DATA RECORDED WITH IN–SITU HERMIT 2000 DATA LOGGER
REFERENCE POINT: STATIC WATER LEVEL

TIME (minutes)	DRAWDOWN (ft)		
	UGW–22	UGW–5	UGW–13
0.0000	0	–0.012	0.003
0.0083	0	–0.006	0.006
0.0166	–0.425	–0.006	0.003
0.0250	0.196	–0.006	0.003
0.0333	0.469	–0.006	0.006
0.0416	0.253	–0.006	0.006
0.0500	0.26	–0.006	0.006
0.0583	0.602	–0.006	0.006
0.0666	0.526	–0.006	0.006
0.0750	0.501	–0.006	0.006
0.0833	0.571	–0.006	0.006
0.0916	0.463	–0.006	0.006
0.1000	0.469	–0.006	0.006
0.1083	0.545	–0.006	0.006
0.1166	0.475	–0.006	0.009
0.1250	0.425	–0.006	0.006
0.1333	0.488	–0.006	0.009
0.1416	0.469	–0.006	0.009
0.1500	0.418	–0.006	0.009
0.1583	0.469	–0.006	0.006
0.1666	0.494	–0.006	0.009
0.1750	0.393	–0.006	0.006
0.1833	0.45	–0.006	0.009
0.1916	0.488	–0.006	0.006
0.2000	0.393	–0.006	0.009
0.2083	0.437	–0.006	0.009
0.2166	0.475	–0.006	0.009
0.2250	0.399	–0.006	0.009
0.2333	0.393	–0.006	0.009
0.2416	0.475	–0.006	0.009
0.2500	0.399	–0.006	0.009
0.2583	0.38	–0.006	0.009
0.2666	0.456	–0.006	0.009
0.2750	0.437	–0.006	0.009
0.2833	0.367	–0.006	0.009
0.2916	0.425	–0.006	0.009
0.3000	0.475	–0.006	0.009

TIME (minutes)	DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
0.3083	0.393	−0.006	0.012
0.3166	0.393	−0.006	0.009
0.3250	0.539	−0.006	0.009
0.3333	0.412	−0.006	0.009
0.3500	0.444	−0.006	0.009
0.3666	0.431	−0.006	0.009
0.3833	0.494	−0.006	0.009
0.4000	0.456	−0.006	0.009
0.4166	0.520	−0.006	0.009
0.4333	0.456	−0.006	0.009
0.4500	0.551	−0.006	0.012
0.4666	0.456	−0.006	0.012
0.4833	0.602	−0.006	0.009
0.5000	0.463	−0.006	0.009
0.5166	0.596	−0.006	0.009
0.5333	0.494	−0.006	0.012
0.5500	0.615	−0.006	0.012
0.5666	0.532	−0.006	0.012
0.5833	0.628	−0.012	0.012
0.6000	0.539	−0.006	0.012
0.6166	0.621	−0.006	0.012
0.6333	0.590	−0.006	0.012
0.6500	0.583	−0.006	0.012
0.6666	0.653	−0.006	0.012
0.6833	0.583	−0.012	0.012
0.7000	0.653	−0.006	0.012
0.7166	0.571	−0.006	0.012
0.7333	0.704	−0.006	0.012
0.7500	0.577	−0.012	0.012
0.7666	0.691	−0.012	0.009
0.7833	0.564	−0.006	0.012
0.8000	0.716	−0.006	0.009
0.8166	0.590	−0.006	0.012
0.8333	0.678	−0.012	0.009
0.8500	0.609	−0.006	0.009
0.8666	0.716	−0.006	0.009
0.8833	0.640	−0.012	0.009
0.9000	0.685	−0.006	0.009
0.9166	0.666	−0.006	0.009
0.9333	0.691	−0.012	0.009
0.9500	0.691	−0.006	0.009
0.9666	0.678	−0.006	0.009
0.9833	0.716	−0.006	0.009
1.0	0.659	−0.006	0.006
1.2	0.691	−0.012	0.003
1.4	0.812	−0.012	0.000

TIME (minutes)	DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
1.6	0.907	−0.006	−0.003
1.8	0.843	−0.012	−0.006
2.0	1.027	−0.012	−0.006
2.2	1.002	−0.012	−0.009
2.4	0.970	−0.012	−0.009
2.6	1.046	−0.012	−0.009
2.8	1.160	−0.012	−0.009
3.0	1.224	−0.012	−0.006
3.2	1.281	−0.012	−0.006
3.4	1.249	−0.012	−0.006
3.6	1.256	−0.012	−0.006
3.8	1.306	−0.012	−0.006
4.0	1.459	−0.012	−0.006
4.2	1.389	−0.012	−0.003
4.4	1.484	−0.012	−0.003
4.6	1.592	−0.012	−0.003
4.8	1.617	−0.012	0.000
5.0	1.554	−0.012	0.000
5.2	1.592	−0.012	0.000
5.4	1.744	−0.019	0.000
5.6	1.712	−0.019	0.000
5.8	1.814	−0.012	0.003
6.0	1.769	−0.019	0.000
6.2	1.820	−0.019	0.000
6.4	1.979	−0.012	0.000
6.6	1.966	−0.012	0.003
6.8	1.928	−0.012	0.003
7.0	2.093	−0.019	0.000
7.2	2.169	−0.019	0.000
7.4	2.131	−0.019	−0.003
7.6	2.118	−0.012	0.003
7.8	2.182	−0.019	0.003
8.0	2.302	−0.012	0.003
8.2	2.359	−0.012	0.006
8.4	2.277	−0.012	0.015
8.6	2.454	−0.019	0.019
8.8	2.391	−0.019	0.022
9.0	2.429	−0.019	0.022
9.2	2.524	−0.019	0.022
9.4	2.537	−0.019	0.022
9.6	2.625	−0.019	0.022
9.8	2.606	−0.019	0.019
10.0	2.752	−0.019	0.019
12.0	3.133	−0.012	0.012
14.0	3.551	−0.025	−0.006
16.0	3.893	−0.019	0.012

TIME (minutes)	DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
18.0	4.318	−0.019	0.006
20.0	4.533	−0.025	−0.003
22.0	5.135	−0.025	0.012
24.0	5.553	−0.025	0.000
26.0	5.851	−0.025	−0.006
28.0	6.352	−0.031	0.012
30.0	6.877	−0.031	0.003
32.0	7.175	−0.031	−0.006
34.0	7.549	−0.031	−0.003
36.0	8.099	−0.031	−0.006
38.0	8.612	−0.038	−0.009
40.0	8.884	−0.044	0.006
42.0	8.720	−0.044	0.000
44.0	8.834	−0.050	0.003

AQUIFER PERFORMANCE TEST DATA – RECOVERY
ROOSEVELT ROADS U.S. NAVAL STATION

DATE: DECEMBER 1993

PUMPING WELL: UGW–22
DISCHARGE RATE: 0.52 gallons per minute

DATA RECORDED WITH IN–SITU HERMIT 2000 DATA LOGGER
REFERENCE POINT: STATIC WATER LEVEL

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW–22	UGW–5	UGW–13
0.0000	8.903	–0.050	–0.012
0.0083	8.922	–0.050	–0.012
0.0166	8.954	–0.050	–0.015
0.0250	8.960	–0.050	–0.015
0.0333	8.960	–0.044	–0.012
0.0416	8.954	–0.050	–0.015
0.0500	8.960	–0.044	–0.012
0.0583	8.954	–0.050	–0.012
0.0666	8.954	–0.044	–0.015
0.0750	8.954	–0.050	–0.015
0.0833	8.954	–0.044	–0.015
0.0916	8.948	–0.044	–0.015
0.1000	8.948	–0.050	–0.015
0.1083	8.954	–0.044	–0.015
0.1166	8.954	–0.044	–0.015
0.1250	8.954	–0.044	–0.015
0.1333	8.954	–0.044	–0.015
0.1416	8.948	–0.044	–0.012
0.1500	8.948	–0.044	–0.015
0.1583	8.948	–0.044	–0.015
0.1666	8.948	–0.050	–0.015
0.1750	8.948	–0.050	–0.015
0.1833	8.941	–0.050	–0.015
0.1916	8.948	–0.050	–0.015
0.2000	8.948	–0.044	–0.015
0.2083	8.948	–0.050	–0.015
0.2166	8.948	–0.050	–0.015
0.2250	8.941	–0.050	–0.015
0.2333	8.948	–0.050	–0.015
0.2416	8.941	–0.050	–0.015
0.2500	8.941	–0.050	–0.015
0.2583	8.941	–0.050	–0.015
0.2666	8.941	–0.044	–0.015
0.2750	8.941	–0.044	–0.015
0.2833	8.941	–0.044	–0.015
0.2916	8.941	–0.044	–0.015
0.3000	8.941	–0.044	–0.015

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW-22	UGW-5	UGW-13
0.3083	8.941	-0.050	-0.019
0.3166	8.941	-0.044	-0.015
0.3250	8.941	-0.050	-0.015
0.3333	8.935	-0.044	-0.015
0.3500	8.941	-0.044	-0.019
0.3666	8.941	-0.044	-0.015
0.3833	8.935	-0.050	-0.019
0.4000	8.935	-0.044	-0.015
0.4166	8.935	-0.044	-0.015
0.4333	8.935	-0.050	-0.015
0.4500	8.935	-0.050	-0.015
0.4666	8.935	-0.044	-0.015
0.4833	8.935	-0.050	-0.019
0.5000	8.929	-0.050	-0.015
0.5166	8.935	-0.050	-0.015
0.5333	8.935	-0.050	-0.015
0.5500	8.935	-0.044	-0.015
0.5666	8.929	-0.050	-0.015
0.5833	8.929	-0.044	-0.015
0.6000	8.929	-0.044	-0.015
0.6166	8.929	-0.044	-0.015
0.6333	8.929	-0.050	-0.015
0.6500	8.929	-0.050	-0.015
0.6666	8.929	-0.044	-0.015
0.6833	8.922	-0.050	-0.015
0.7000	8.929	-0.050	-0.015
0.7166	8.922	-0.044	-0.015
0.7333	8.922	-0.050	-0.015
0.7500	8.922	-0.044	-0.015
0.7666	8.922	-0.044	-0.015
0.7833	8.922	-0.044	-0.015
0.8000	8.922	-0.044	-0.012
0.8166	8.922	-0.044	-0.015
0.8333	8.922	-0.044	-0.015
0.8500	8.916	-0.050	-0.015
0.8666	8.922	-0.044	-0.015
0.8833	8.922	-0.050	-0.015
0.9000	8.922	-0.050	-0.012
0.9166	8.916	-0.044	-0.012
0.9333	8.922	-0.050	-0.015
0.9500	8.916	-0.044	-0.015
0.9666	8.916	-0.050	-0.012
0.9833	8.916	-0.044	-0.012
1.0	8.916	-0.050	-0.012
1.2	8.910	-0.050	-0.012
1.4	8.903	-0.050	-0.012

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
1.6	8.897	−0.050	−0.012
1.8	8.891	−0.050	−0.012
2.0	8.891	−0.044	−0.009
2.2	8.884	−0.044	−0.009
2.4	8.878	−0.044	0.000
2.6	8.872	−0.044	0.000
2.8	8.865	−0.044	−0.003
3.0	8.859	−0.044	0.006
3.2	8.853	−0.044	0.006
3.4	8.846	−0.044	0.003
3.6	8.840	−0.044	0.006
3.8	8.840	−0.050	0.006
4.0	8.834	−0.044	0.012
4.2	8.827	−0.044	0.012
4.4	8.821	−0.044	0.015
4.6	8.815	−0.044	0.015
4.8	8.808	−0.044	0.015
5.0	8.802	−0.044	0.012
5.2	8.796	−0.044	0.012
5.4	8.796	−0.044	0.009
5.6	8.789	−0.044	0.006
5.8	8.783	−0.044	0.006
6.0	8.777	−0.044	0.006
6.2	8.770	−0.044	0.006
6.4	8.764	−0.050	0.006
6.6	8.758	−0.050	0.006
6.8	8.751	−0.050	0.006
7.0	8.751	−0.044	0.009
7.2	8.745	−0.044	0.006
7.4	8.739	−0.044	0.003
7.6	8.732	−0.044	0.003
7.8	8.726	−0.050	0.000
8.0	8.720	−0.044	−0.003
8.2	8.713	−0.050	0.000
8.4	8.713	−0.044	0.003
8.6	8.707	−0.050	0.000
8.8	8.707	−0.050	0.003
9.0	8.694	−0.044	0.000
9.2	8.694	−0.050	0.003
9.4	8.688	−0.044	0.006
9.6	8.682	−0.050	0.006
9.8	8.675	−0.044	0.003
10.0	8.675	−0.050	0.003
12.0	8.625	−0.050	0.003
14.0	8.574	−0.050	0.003
16.0	8.536	−0.050	0.003

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
18.0	8.486	−0.050	0.000
20.0	8.435	−0.057	0.003
22.0	8.403	−0.057	0.006
24.0	8.365	−0.050	−0.006
26.0	8.321	−0.057	−0.003
28.0	8.283	−0.057	−0.003
30.0	8.245	−0.057	0.003
32.0	8.207	−0.057	0.003
34.0	8.169	−0.057	0.000
36.0	8.131	−0.057	0.000
38.0	8.093	−0.057	−0.003
40.0	8.061	−0.057	−0.003
42.0	8.023	−0.057	0.000
44.0	7.992	−0.057	0.003
46.0	7.954	−0.057	0.000
48.0	7.922	−0.057	0.000
50.0	7.890	−0.057	0.000
52.0	7.859	−0.057	−0.012
54.0	7.821	−0.057	−0.003
56.0	7.789	−0.057	−0.003
58.0	7.757	−0.057	−0.003
60.0	7.726	−0.057	0.000
62.0	7.694	−0.057	0.000
64.0	7.663	−0.063	−0.003
66.0	7.637	−0.063	0.000
68.0	7.599	−0.063	0.003
70.0	7.574	−0.063	0.000
72.0	7.542	−0.063	−0.003
74.0	7.511	−0.063	−0.009
76.0	7.479	−0.069	−0.003
78.0	7.447	−0.069	−0.003
80.0	7.422	−0.069	−0.003
82.0	7.397	−0.069	−0.003
84.0	7.365	−0.069	−0.006
86.0	7.333	−0.069	−0.003
88.0	7.308	−0.069	−0.006
90.0	7.276	−0.076	−0.003
92.0	7.245	−0.076	−0.006
94.0	7.219	−0.076	−0.003
96.0	7.188	−0.076	−0.006
98.0	7.162	−0.076	−0.003
100.0	7.131	−0.076	−0.006
110.0	6.991	−0.082	−0.003
120.0	6.846	−0.082	−0.006
130.0	6.700	−0.095	−0.009
140.0	6.554	−0.088	−0.006

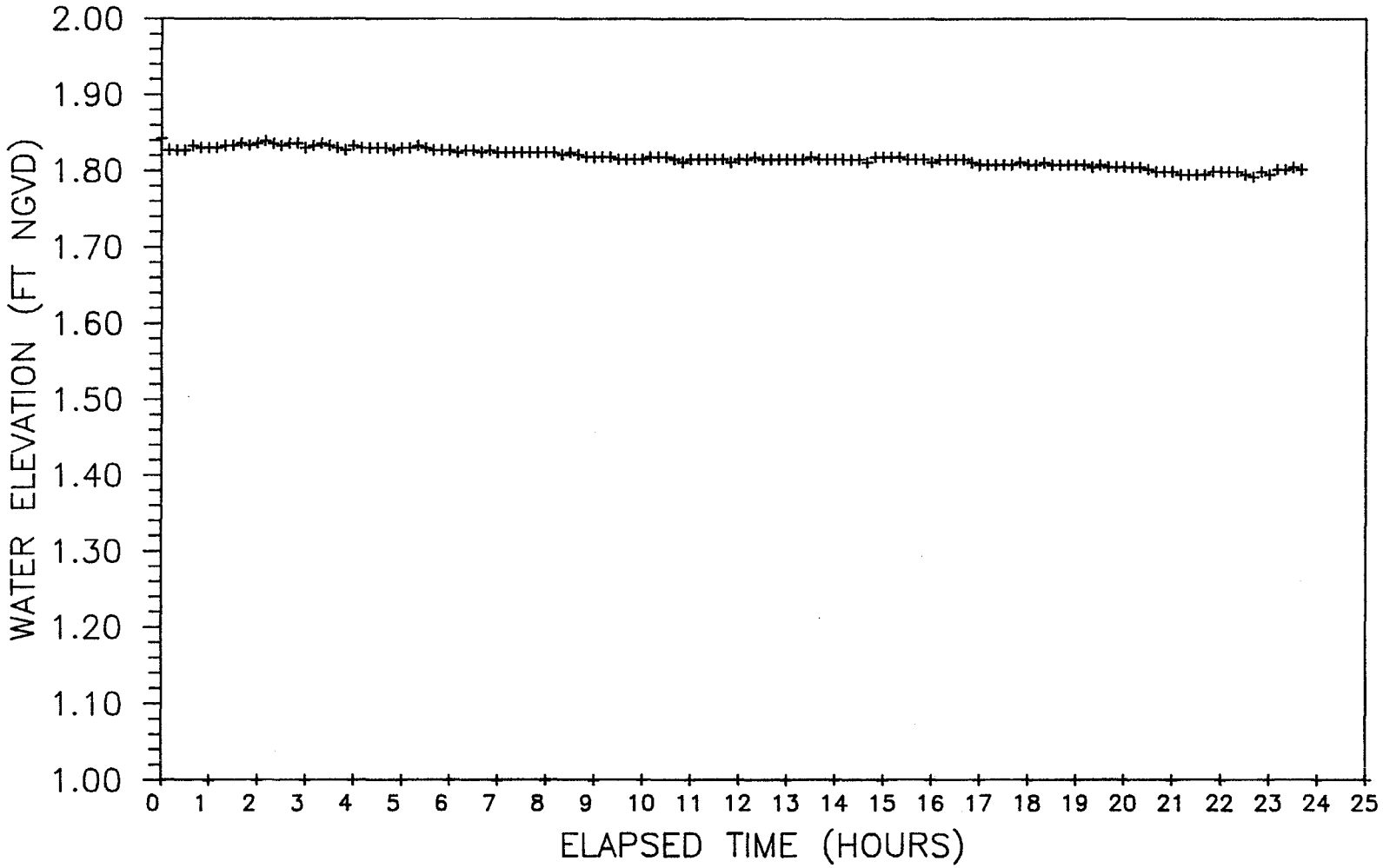
TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW-22	UGW-5	UGW-13
150.0	6.409	-0.095	-0.003
160.0	6.269	-0.101	-0.006
170.0	6.130	-0.107	-0.006
180.0	5.991	-0.107	0.000
190.0	5.858	-0.114	-0.003
200.0	5.725	-0.114	-0.006
210.0	5.592	-0.114	-0.003
220.0	5.465	-0.114	0.000
230.0	5.896	-0.114	0.003
240.0	5.763	-0.120	-0.003
250.0	5.630	-0.120	0.000
260.0	5.503	-0.120	0.000
270.0	5.382	-0.107	0.000
280.0	5.268	-0.107	0.000
290.0	5.154	-0.107	0.003
300.0	5.040	-0.114	0.000
310.0	4.933	-0.114	0.000
320.0	4.831	-0.114	-0.003
330.0	4.730	-0.114	0.000
340.0	4.635	-0.114	0.003
350.0	4.540	-0.114	0.003
360.0	4.451	-0.120	0.003
370.0	4.369	-0.126	0.006
380.0	4.280	-0.120	0.003
390.0	4.197	-0.126	0.003
400.0	4.115	-0.126	0.006
410.0	4.039	-0.126	0.003
420.0	3.957	-0.126	0.006
430.0	3.874	-0.133	0.006
440.0	3.798	-0.133	0.006
450.0	3.709	-0.133	0.006
460.0	3.621	-0.126	0.006
470.0	3.545	-0.133	0.006
480.0	3.456	-0.126	0.006
490.0	3.374	-0.126	0.006
500.0	3.285	-0.114	0.009
510.0	3.202	-0.107	0.006
520.0	3.120	-0.107	0.009
530.0	3.044	-0.107	0.012
540.0	2.955	-0.107	0.012
550.0	2.879	-0.114	0.012
560.0	2.797	-0.107	0.012
570.0	2.721	-0.107	0.015
580.0	2.644	-0.101	0.015
590.0	2.575	-0.107	0.015
600.0	2.505	-0.107	0.015

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW-22	UGW-5	UGW-13
610.0	2.429	-0.101	0.012
620.0	2.359	-0.095	0.012
630.0	2.296	-0.095	0.012
640.0	2.226	-0.088	0.015
650.0	2.163	-0.088	0.019
660.0	2.099	-0.082	0.015
670.0	2.029	-0.082	0.015
680.0	1.966	-0.082	0.015
690.0	1.903	-0.082	0.015
700.0	1.839	-0.088	0.015
710.0	1.776	-0.082	0.019
720.0	1.712	-0.088	0.015
730.0	1.655	-0.088	0.015
740.0	1.598	-0.095	0.012
750.0	1.535	-0.101	0.015
760.0	1.478	-0.095	0.015
770.0	1.427	-0.088	0.015
780.0	1.370	-0.088	0.015
790.0	1.306	-0.088	0.015
800.0	1.243	-0.082	0.015
810.0	1.186	-0.095	0.012
820.0	1.129	-0.088	0.015
830.0	1.072	-0.095	0.015
840.0	1.015	-0.095	0.015
850.0	0.964	-0.095	0.015
860.0	0.913	-0.095	0.015
870.0	0.856	-0.101	0.015
880.0	0.805	-0.101	0.019
890.0	0.761	-0.101	0.012
900.0	0.710	-0.107	0.012
910.0	0.666	-0.114	0.012
920.0	0.621	-0.120	0.012
930.0	0.577	-0.120	0.015
940.0	0.532	-0.120	0.015
950.0	0.488	-0.126	0.015
960.0	0.450	-0.133	0.019
970.0	0.406	-0.114	0.015
980.0	0.367	-0.107	0.015
990.0	0.329	-0.107	0.015
1000.0	0.291	-0.107	0.015
1010.0	0.253	-0.107	0.019
1020.0	0.215	-0.107	0.022
1030.0	0.171	-0.107	0.022
1040.0	0.133	-0.107	0.022
1050.0	0.095	-0.107	0.022
1060.0	0.057	-0.101	0.022

TIME (minutes)	RESIDUAL DRAWDOWN (ft)		
	UGW−22	UGW−5	UGW−13
1070.0	0.019	−0.114	0.019
1080.0	−0.012	−0.107	0.022
1090.0	−0.050	−0.107	0.022
1100.0	−0.088	−0.107	0.019
1110.0	−0.126	−0.107	0.022
1120.0	−0.164	−0.095	0.022
1130.0	−0.196	−0.095	0.022
1140.0	−0.228	−0.088	0.022
1150.0	−0.266	−0.095	0.022
1160.0	−0.304	−0.095	0.025
1170.0	−0.336	−0.095	0.022
1180.0	−0.368	−0.095	0.025
1190.0	−0.406	−0.095	0.025
1200.0	−0.437	−0.088	0.025
1210.0	−0.469	−0.088	0.025
1220.0	−0.501	−0.095	0.025
1230.0	−0.533	−0.095	0.028
1240.0	−0.564	−0.101	0.031
1250.0	−0.596	−0.095	0.031
1260.0	−0.621	−0.088	0.031
1270.0	−0.653	−0.069	0.035
1280.0	−0.685	−0.069	0.035
1290.0	−0.704	−0.069	0.035
1300.0	−0.729	−0.063	0.035
1310.0	−0.755	−0.063	0.031
1320.0		−0.063	0.031
1330.0		−0.069	0.031
1340.0		−0.069	0.031
1350.0		−0.069	0.035
1360.0		−0.069	0.038
1370.0		−0.069	0.031
1380.0		−0.063	0.035
1390.0		−0.057	0.028
1400.0		−0.069	0.028
1410.0		−0.069	0.025
1420.0		−0.095	0.028

APT BACKGROUND WATER LEVELS

ROOSEVELT ROADS U.S. NAVAL STATION
BACKGROUND WATER ELEVATIONS
UGW-13 (12/15 - 12/16/93)



Appendix F

APPENDIX F

CONTAMINATED WATER TRANSPORT MANIFESTS

CLEAR AMBIENT SERVICE CO.
LIQUID WASTE HANDLING
P O BOX 366408
SAN JUAN P R 00936-6408
TEL. (809) 788-1200

CONDUCE

CONTROL NUMBER
013389

SOLD TO
BBL010
B.B. & L.
4730 NW 2ND AVENUE
BOCA RATON, FL 33431

SERVICE ON
B.B. & L.
TANK PICK-UP WITH MATER
BE DISPOSED AT BFI, PONC

PREPARED BY

CUSTOMER P.O. NO.	TERMS	SERVICE DATE	PERSON WHO CALL	CONDUCE NO.
VERBAL ORDER	NET 30	12-17-93	SR. ERIC REIENSBURG	13389

CODE NUMBER	DESCRIPTION	QUANTITY
000000	REMOLCADOR TT-507	
100537	TANK TRUCK #107 SERVICE	
250365	PEDRO OQUENDO-H.L.R. (200062)	

LEFT C. AMBIENT	ARRIVE SITE	DEPT. SITE	ARRIVE C. AMBIENT
3:00	7:00	7:55	

CUSTOMER SIGNATURE

CLEAR AMBIENT SIGNATURE 12/17/93

CLEAR AMBIENT S[illegible]ICE CO.
LIQUID WASTE HA[illegible]NG
P O BOX 368408
SAN JUAN P R 00936-8408
TEL (809) 788-1200

CONDUCE

CONTROL NUMBER
013390

SOLD TO
[illegible]
B. B. [illegible]
4730 NW 2ND AVENUE
BOCA RATON FL 33431

SERVICE ON
B. B. [illegible]
PICK-UP OF THETH DRUMS
WITH CONTAMINATED PRODU[illegible]
BE DISPOSED AT BEI, PON[illegible]
PRIOR A[illegible]

CUSTOMER P.O. NO.	TERMS	SERVICE DATE	PERSON WHO CALL	CONDUCE
VERBAL ORDER	NET 30	12-17-93	MR. ERIC	013390

CODE NUMBER	DESCRIPTION	QUANTIT
100386	PICK-UP SERVICE	
250401	RAUL MORRS-W.R. (200001)	

LEFT C. AMBIENT	ARRIVE SITE	DEPT. SITE	ARRIVE C. AMBIENT
[illegible]	7.00	8:00 AM	

CUSTOMER SIGNATURE

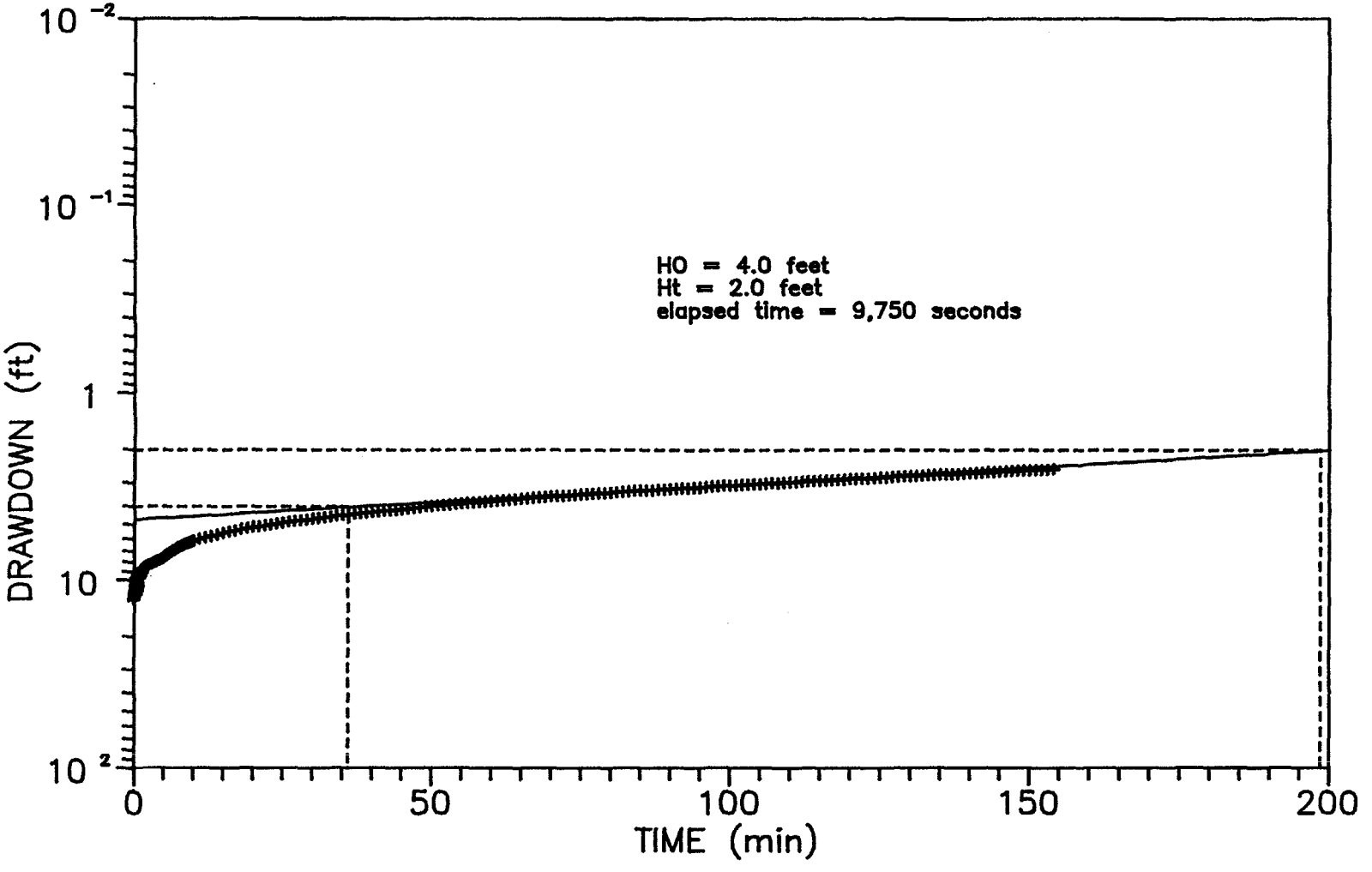
CLEAR AMBIENT SIGNATURE

Appendix G

APPENDIX G

SLUG TEST RESULTS AND CALCULATIONS

ROOSEVELT ROADS U.S. NAVAL STATION
SLUG TEST RECOVERY CURVE
UGW-5 (11/16/92)



SLUG TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-5
Test Date: 11/16/93

Formation Tested: Surficial
Rising Head Test

	English Units	Metric Units
Stickup	1.84 (ft)	56.08 (cm)
Static Water Level	10.87 (ft)	331.32 (cm)
Depth to Bottom of Screen (distance from ground level)	28.57 (ft)	870.81 (cm)
Boring Diameter	8.00 (in)	20.32 (cm)
Casing Diameter	2.00 (in)	5.08 (cm)
Screen Diameter	2.00 (in)	5.08 (cm)
Screen Length	20.00 (ft)	609.60 (cm)
Depth to Boundary (b)	30.00 (ft)	914.40 (cm)
Delta H at Time 0	4.00 (ft)	121.92 (cm)
Delta H at Time t	2.000 (ft)	60.96 (cm)
Time t	9750 (sec)	9750 (sec)
Ratio Kh/Kv	1	1
Porosity of Filter Pack	0.3	0.3

HYDRAULIC CONDUCTIVITY	cm/sec	ft/day	gpd/ft^2
Bouwer-Rice Method	6.7E-06	1.9E-02	1.0E-01
TRANSMISSIVITY	**cm^2/sec**	**ft^2/day**	**gpd/ft**
	6.1E-03	5.7E-01	3.0E+0

SLUG TEST WORKSHEET

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-5 ***Test Date: 11/16/93***

EQUATIONS USED

EQUATION 1: Bouwer-Rice Method

*K = (((Rc ^ 2)*ln(Re/Rw))/(2Le))*(1/T)*ln(H0/Ht)*

where:
K = Hydraulic conductivity
Rc = Casing radius
Re = Effective well radius over which the drawdown is dissipated (this value is calculated from predetermined curves)
Rw = Borehole radius
Le = Saturated screen length
H0 = Drawdown in well at time zero: time zero is specified on the slug test curve
Ht = Drawdown in well at time "t": time "t" is specified on the slug test curve
T = Elapsed time from time zero to time "t"

EQUATION 2: Transmissivity

*T = K*b*

where:
K = Hydraulic conductivity
b = Aquifer thickness

Note: All equations are valid for any consistent set of units

VARIABLES USED

Variables	***English Units***	***Metric Units***
Rc	1.00 (in)	2.54 (cm)
Rw	4.00 (in)	10.16 (cm)
Le	19.54 (ft)	595.58 (cm)
H0	4.00 (ft)	121.92 (cm)
Ht	2.000 (ft)	60.96 (cm)
T	9750 (sec)	9750 (sec)
b	30 (ft)	914.40 (cm)

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–5 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.0000	12.8300	0.2583	10.9670
0.0083	12.6780	0.2666	10.9100
0.0166	12.5640	0.2750	10.8620
0.0250	12.5730	0.2833	10.8240
0.0333	12.4690	0.2916	10.7770
0.0416	12.3930	0.3000	10.7290
0.0500	12.3170	0.3083	10.6820
0.0583	12.2500	0.3166	10.6340
0.0666	12.1930	0.3250	10.5870
0.0750	12.1270	0.3333	10.5390
0.0833	12.0600	0.3500	10.4530
0.0916	11.9840	0.3666	10.3680
0.1000	11.9270	0.3833	10.2820
0.1083	11.8700	0.4000	10.2060
0.1166	11.8220	0.4166	10.1300
0.1250	11.7560	0.4333	10.0730
0.1333	11.7180	0.4500	10.0160
0.1416	11.6510	0.4666	9.9590
0.1500	11.5940	0.4833	9.9020
0.1583	11.5470	0.5000	9.8540
0.1666	11.5090	0.5166	9.8070
0.1750	11.4610	0.5333	9.7690
0.1833	11.4040	0.5500	9.7310
0.1916	11.3470	0.5666	9.6930
0.2000	11.3000	0.5833	9.6550
0.2083	11.2620	0.6000	9.6260
0.2166	11.2050	0.6166	9.5980
0.2250	11.1570	0.6333	9.5790
0.2333	11.1190	0.6500	9.5500
0.2416	11.0620	0.6666	9.5310
0.2500	11.0140	0.6833	9.5030

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–5 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.7000	9.4740	3.6000	7.9520
0.7166	9.4450	3.8000	7.9040
0.7333	9.4070	4.0000	7.8570
0.7500	9.3790	4.2000	7.8000
0.7666	9.3410	4.4000	7.7520
0.7833	9.3120	4.6000	7.7050
0.8000	9.2840	4.8000	7.6480
0.8166	9.2550	5.0000	7.5240
0.8333	9.2270	5.2000	7.4190
0.8500	9.1980	5.4000	7.3240
0.8666	9.1790	5.6000	7.2380
0.8833	9.1600	5.8000	7.1720
0.9000	9.1320	6.0000	7.1050
0.9166	9.1130	6.2000	7.0480
0.9333	9.0940	6.4000	6.9810
0.9500	9.0840	6.6000	6.9150
0.9666	9.0650	6.8000	6.8480
0.9833	9.0460	7.0000	6.7910
1.0000	9.0270	7.2000	6.7240
1.2000	8.8180	7.4000	6.6580
1.4000	8.6560	7.6000	6.6100
1.6000	8.5510	7.8000	6.5530
1.8000	8.4750	8.0000	6.5060
2.0000	8.4180	8.2000	6.4670
2.2000	8.3610	8.4000	6.4200
2.4000	8.3040	8.6000	6.3720
2.6000	8.2470	8.8000	6.3340
2.8000	8.1900	9.0000	6.2960
3.0000	8.1330	9.2000	6.2490
3.2000	8.0660	9.4000	6.2200
3.4000	8.0090	9.6000	6.1820

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–5 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
9.8000	6.1530	40.0000	4.2970
10.0000	6.1250	41.0000	4.2680
11.0000	5.9920	42.0000	4.2300
12.0000	5.8770	43.0000	4.2020
13.0000	5.7730	44.0000	4.1730
14.0000	5.6680	45.0000	4.1440
15.0000	5.5440	46.0000	4.1060
16.0000	5.4580	47.0000	4.0780
17.0000	5.3920	48.0000	4.0490
18.0000	5.3160	49.0000	4.0210
19.0000	5.2490	50.0000	3.9920
20.0000	5.1820	51.0000	3.9630
21.0000	5.1250	52.0000	3.9440
22.0000	5.0680	53.0000	3.9160
23.0000	5.0110	54.0000	3.8870
24.0000	4.9540	55.0000	3.8680
25.0000	4.9060	56.0000	3.8400
26.0000	4.8490	57.0000	3.8110
27.0000	4.8020	58.0000	3.7920
28.0000	4.7540	59.0000	3.7730
29.0000	4.7160	60.0000	3.7440
30.0000	4.6680	61.0000	3.7250
31.0000	4.6210	62.0000	3.7060
32.0000	4.5820	63.0000	3.6870
33.0000	4.5440	64.0000	3.6590
34.0000	4.5060	65.0000	3.6400
35.0000	4.4680	66.0000	3.6210
36.0000	4.4300	67.0000	3.6020
37.0000	4.3920	68.0000	3.5830
38.0000	4.3630	69.0000	3.5630
39.0000	4.3250	70.0000	3.5440

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–5 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
71.0000	3.5350	102.0000	3.0680
72.0000	3.5160	103.0000	3.0590
73.0000	3.4970	104.0000	3.0490
74.0000	3.4780	105.0000	3.0400
75.0000	3.4590	106.0000	3.0300
76.0000	3.4400	107.0000	3.0110
77.0000	3.4300	108.0000	3.0010
78.0000	3.4110	109.0000	2.9820
79.0000	3.3920	110.0000	2.9730
80.0000	3.3730	111.0000	2.9630
81.0000	3.3540	112.0000	2.9540
82.0000	3.3440	113.0000	2.9440
83.0000	3.3350	114.0000	2.9250
84.0000	3.3060	115.0000	2.9160
85.0000	3.2970	116.0000	2.9060
86.0000	3.2780	117.0000	2.8970
87.0000	3.2780	118.0000	2.8870
88.0000	3.2590	119.0000	2.8780
89.0000	3.2490	120.0000	2.8590
90.0000	3.2300	121.0000	2.8590
91.0000	3.2210	122.0000	2.8390
92.0000	3.2010	123.0000	2.8300
93.0000	3.1920	124.0000	2.8200
94.0000	3.1730	125.0000	2.8010
95.0000	3.1630	126.0000	2.8010
96.0000	3.1540	127.0000	2.7820
97.0000	3.1350	128.0000	2.7820
98.0000	3.1250	129.0000	2.7540
99.0000	3.1060	130.0000	2.7540
100.0000	3.0970	131.0000	2.7540
101.0000	3.0870	132.0000	2.7350

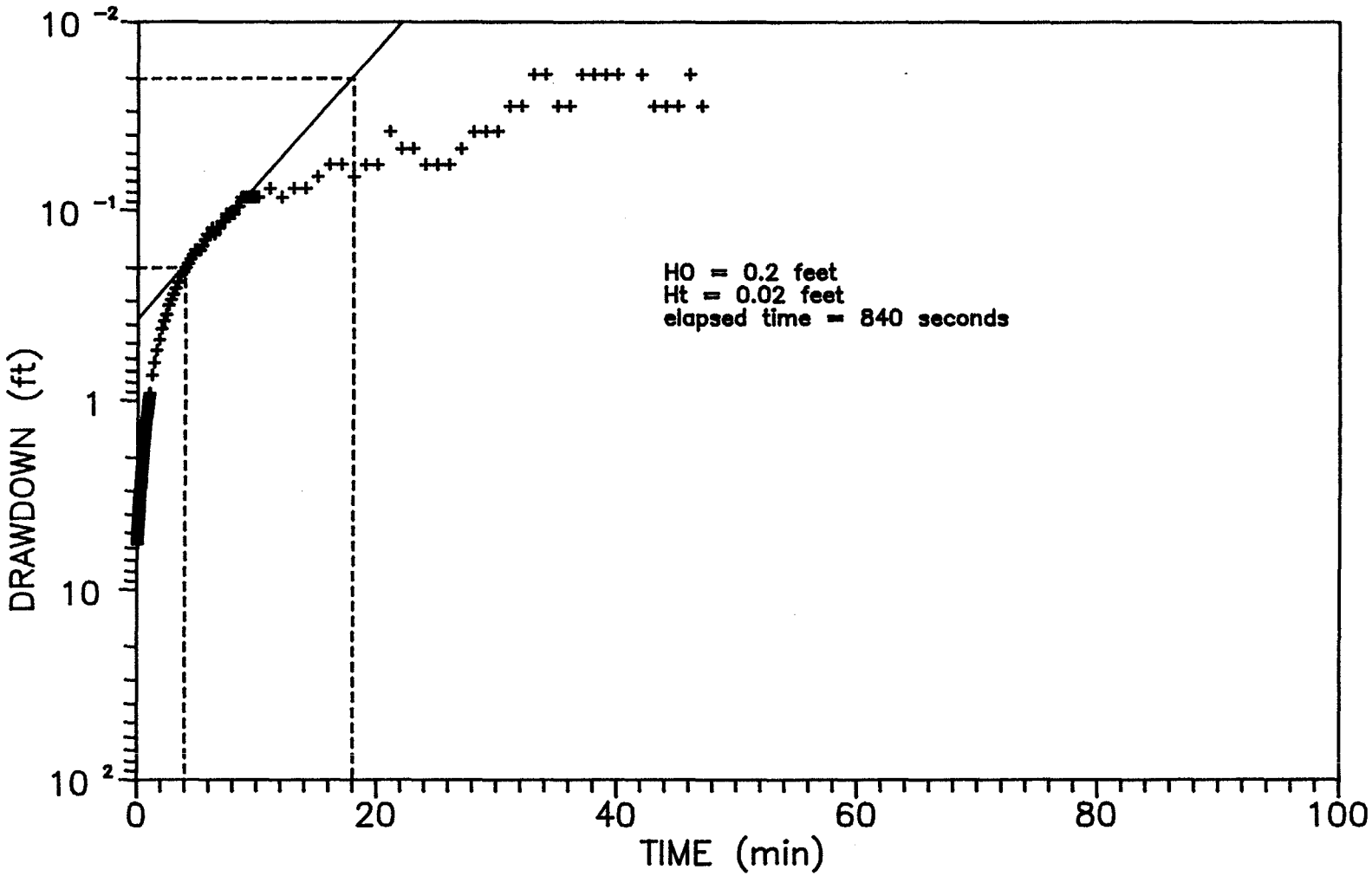
SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–5 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
133.0000	2.7250		
134.0000	2.7160		
135.0000	2.7060		
136.0000	2.6970		
137.0000	2.6870		
138.0000	2.6870		
139.0000	2.6680		
140.0000	2.6580		
141.0000	2.6490		
142.0000	2.6390		
143.0000	2.6300		
144.0000	2.6200		
145.0000	2.6110		
146.0000	2.6010		
147.0000	2.5920		
148.0000	2.5820		
149.0000	2.5730		
150.0000	2.5730		
151.0000	2.5540		
152.0000	2.5540		
153.0000	2.5440		
154.0000	2.5250		

ROOSEVELT ROADS U.S. NAVAL STATION
SLUG TEST RECOVERY CURVE
UGW-6 (11/16/92)



SLUG TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-6
Test Date: 11/16/93

Formation Tested: Surficial
Rising Head Test

	English Units	Metric Units
Stickup	1.74 (ft)	53.04 (cm)
Static Water Level	10.08 (ft)	307.24 (cm)
Depth to Bottom of Screen (distance from ground level)	18.37 (ft)	559.92 (cm)
Boring Diameter	8.00 (in)	20.32 (cm)
Casing Diameter	2.00 (in)	5.08 (cm)
Screen Diameter	2.00 (in)	5.08 (cm)
Screen Length	10.00 (ft)	304.80 (cm)
Depth to Boundary (b)	30.00 (ft)	914.40 (cm)
Delta H at Time 0	0.20 (ft)	6.10 (cm)
Delta H at Time t	0.020 (ft)	0.61 (cm)
Time t	840 (sec)	840 (sec)
Ratio Kh/Kv	1	1
Porosity of Filter Pack	0.3	0.3

HYDRAULIC CONDUCTIVITY	cm/sec	ft/day	gpd/ft^2
Bouwer-Rice Method	6.7E-05	1.9E-01	1.4E+0
TRANSMISSIVITY	**cm^2/sec**	**ft^2/day**	**gpd/ft**
	5.9E-02	5.7E+0	4.2E+01

SLUG TEST WORKSHEET

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-6 ***Test Date: 11/16/93***

EQUATIONS USED

EQUATION 1: Bouwer-Rice Method

*K = (((Rc ^ 2)*ln(Re/Rw))/(2Le))*(1/T)*ln(H0/Ht)*

where:
K = Hydraulic conductivity
Rc = Casing radius
Re = Effective well radius over which the drawdown is dissipated (this value is calculated from predetermined curves)
Rw = Borehole radius
Le = Saturated screen length
H0 = Drawdown in well at time zero: time zero is specified on the slug test curve
Ht = Drawdown in well at time "t": time "t" is specified on the slug test curve
T = Elapsed time from time zero to time "t"

EQUATION 2: Transmissivity

*T = K*b*

where:
K = Hydraulic conductivity
b = Aquifer thickness

Note: All equations are valid for any consistent set of units

VARIABLES USED

Variables	*English Units*	*Metric Units*
Rc	1.00 (in)	2.54 (cm)
Rw	4.00 (in)	10.16 (cm)
Le	10.00 (ft)	304.80 (cm)
H0	0.20 (ft)	6.10 (cm)
Ht	0.020 (ft)	0.61 (cm)
T	840 (sec)	840 (sec)
b	30 (ft)	914.40 (cm)

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–6 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.0000	5.8000	0.2666	2.9390
0.0083	5.6670	0.2750	2.8820
0.0166	5.5530	0.2833	2.8340
0.0250	5.3910	0.2916	2.7770
0.0333	5.2390	0.3000	2.7300
0.0416	5.0970	0.3083	2.6820
0.0500	4.9730	0.3166	2.6340
0.0583	4.8590	0.3250	2.5870
0.0666	4.7350	0.3333	2.5390
0.0750	4.6310	0.3500	2.4540
0.0833	4.5260	0.3666	2.3780
0.0916	4.4220	0.3833	2.2920
0.1000	4.3270	0.4000	2.2160
0.1083	4.2410	0.4166	2.1490
0.1166	4.1650	0.4333	2.0830
0.1250	4.0800	0.4500	2.0160
0.1333	3.9940	0.4666	1.9500
0.1416	3.9180	0.4833	1.8930
0.1500	3.8510	0.5000	1.8360
0.1583	3.7750	0.5166	1.7880
0.1666	3.6990	0.5333	1.7310
0.1750	3.6230	0.5500	1.6830
0.1833	3.5470	0.5666	1.6360
0.1916	3.4810	0.5833	1.5880
0.2000	3.4240	0.6000	1.5500
0.2083	3.3570	0.6166	1.5120
0.2166	3.2910	0.6333	1.4650
0.2250	3.2240	0.6500	1.4360
0.2333	3.1670	0.6666	1.3980
0.2416	3.1100	0.6833	1.3600
0.2500	3.0530	0.7000	1.3310
0.2583	2.9960	0.7166	1.2930

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–6 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)
0.7333	1.2650
0.7500	1.2360
0.7666	1.2080
0.7833	1.1790
0.8000	1.1600
0.8166	1.1320
0.8333	1.1030
0.8500	1.0840
0.8666	1.0650
0.8833	1.0460
0.9000	1.0180
0.9166	0.9990
0.9333	0.9790
0.9500	0.9600
0.9666	0.9410
0.9833	0.9320
1.0000	0.9130
1.2000	0.7320
1.4000	0.6270
1.6000	0.5420
1.8000	0.4750
2.0000	0.4180
2.2000	0.3800
2.4000	0.3520
2.6000	0.3140
2.8000	0.2940
3.0000	0.2750
3.2000	0.2560
3.4000	0.2370
3.6000	0.2180
3.8000	0.2090
4.0000	0.1990

TIME (min)	DEPTH (ft)
4.2000	0.1900
4.4000	0.1800
4.6000	0.1710
4.8000	0.1610
5.0000	0.1610
5.2000	0.1610
5.4000	0.1520
5.6000	0.1420
5.8000	0.1330
6.0000	0.1330
6.2000	0.1230
6.4000	0.1330
6.6000	0.1230
6.8000	0.1230
7.0000	0.1140
7.2000	0.1140
7.4000	0.1040
7.6000	0.1040
7.8000	0.1040
8.0000	0.1040
8.2000	0.0950
8.4000	0.0950
8.6000	0.0850
8.8000	0.0850
9.0000	0.0850
9.2000	0.0850
9.4000	0.0850
9.6000	0.0850
9.8000	0.0850
10.0000	0.0850
11.0000	0.0760
12.0000	0.0850

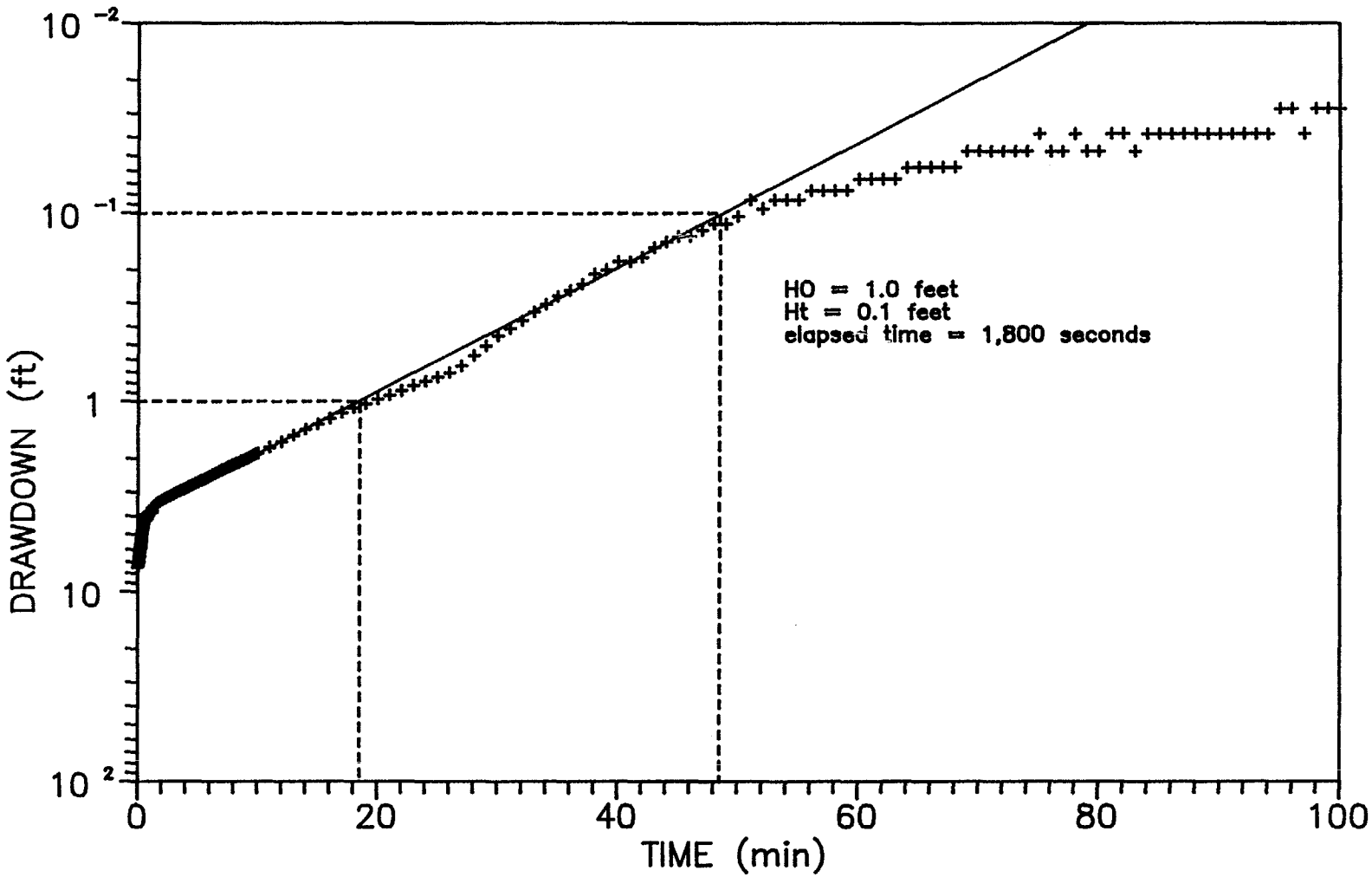
SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–6 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)
13.0000	0.0760
14.0000	0.0760
15.0000	0.0660
16.0000	0.0570
17.0000	0.0570
18.0000	0.0660
19.0000	0.0570
20.0000	0.0570
21.0000	0.0380
22.0000	0.0470
23.0000	0.0470
24.0000	0.0570
25.0000	0.0570
26.0000	0.0570
27.0000	0.0470
28.0000	0.0380
29.0000	0.0380
30.0000	0.0380
31.0000	0.0280
32.0000	0.0280
33.0000	0.0190
34.0000	0.0190
35.0000	0.0280
36.0000	0.0280
37.0000	0.0190
38.0000	0.0190
39.0000	0.0190
40.0000	0.0190
41.0000	0.0090
42.0000	0.0190
43.0000	0.0280
44.0000	0.0280
45.0000	0.0280
46.0000	0.0190
47.0000	0.0280

ROOSEVELT ROADS U.S. NAVAL STATION
SLUG TEST RECOVERY CURVE
UGW-7 (11/16/92)



SLUG TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-7
Test Date: 11/16/93

Formation Tested: Surficial
Rising Head Test

	English Units	Metric Units
Stickup	1.66 (ft)	50.60 (cm)
Static Water Level	7.58 (ft)	231.04 (cm)
Depth to Bottom of Screen (distance from ground level)	16.27 (ft)	495.91 (cm)
Boring Diameter	8.00 (in)	20.32 (cm)
Casing Diameter	2.00 (in)	5.08 (cm)
Screen Diameter	2.00 (in)	5.08 (cm)
Screen Length	10.00 (ft)	304.80 (cm)
Depth to Boundary (b)	30.00 (ft)	914.40 (cm)
Delta H at Time 0	1.00 (ft)	30.48 (cm)
Delta H at Time t	0.100 (ft)	3.05 (cm)
Time t	1800 (sec)	1800 (sec)
Ratio Kh/Kv	1	1
Porosity of Filter Pack	0.3	0.3

HYDRAULIC CONDUCTIVITY	cm/sec	ft/day	gpd/ft^2
Bouwer-Rice Method	3.1E-05	8.7E-02	6.0E-01
TRANSMISSIVITY	**cm^2/sec**	**ft^2/day**	**gpd/ft**
	2.8E-02	2.6E+0	1.8E+01

SLUG TEST WORKSHEET

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-7 ***Test Date: 11/16/93***

EQUATIONS USED

EQUATION 1: Bouwer-Rice Method

*K = (((Rc ^ 2)*ln(Re/Rw))/(2Le))*(1/T)*ln(H0/Ht)*

where:
K = Hydraulic conductivity
Rc = Casing radius
Re = Effective well radius over which the drawdown is dissipated (this value is calculated from predetermined curves)
Rw = Borehole radius
Le = Saturated screen length
H0 = Drawdown in well at time zero: time zero is specified on the slug test curve
Ht = Drawdown in well at time "t": time "t" is specified on the slug test curve
T = Elapsed time from time zero to time "t"

EQUATION 2: Transmissivity

*T = K*b*

where:
K = Hydraulic conductivity
b = Aquifer thickness

Note: All equations are valid for any consistent set of units

VARIABLES USED

Variables	***English Units***	***Metric Units***
Rc	1.00 (in)	2.54 (cm)
Rw	4.00 (in)	10.16 (cm)
Le	10.00 (ft)	304.80 (cm)
H0	1.00 (ft)	30.48 (cm)
Ht	0.100 (ft)	3.05 (cm)
T	1800 (sec)	1800 (sec)
b	30 (ft)	914.40 (cm)

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–7 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.0000	7.4820	0.2666	5.4390
0.0083	7.3970	0.2750	5.3820
0.0166	7.2830	0.2833	5.3350
0.0250	7.2450	0.2916	5.2870
0.0333	7.1500	0.3000	5.2300
0.0416	7.0930	0.3083	5.1830
0.0500	7.0170	0.3166	5.1350
0.0583	6.9310	0.3250	5.0880
0.0666	6.8650	0.3333	5.0400
0.0750	6.8080	0.3500	4.9550
0.0833	6.7320	0.3666	4.8690
0.0916	6.6650	0.3833	4.7840
0.1000	6.5990	0.4000	4.7170
0.1083	6.5420	0.4166	4.6410
0.1166	6.4750	0.4333	4.5840
0.1250	6.4090	0.4500	4.5170
0.1333	6.3420	0.4666	4.4700
0.1416	6.2760	0.4833	4.4220
0.1500	6.2190	0.5000	4.3750
0.1583	6.1620	0.5166	4.3370
0.1666	6.0950	0.5333	4.2890
0.1750	6.0380	0.5500	4.2610
0.1833	5.9810	0.5666	4.2320
0.1916	5.9240	0.5833	4.1940
0.2000	5.8670	0.6000	4.1660
0.2083	5.8100	0.6166	4.1470
0.2166	5.7530	0.6333	4.1180
0.2250	5.6960	0.6500	4.0990
0.2333	5.6390	0.6666	4.0800
0.2416	5.5910	0.6833	4.0610
0.2500	5.5440	0.7000	4.0420
0.2583	5.4870	0.7166	4.0230

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–7 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.7333	4.0040	4.2000	2.8150
0.7500	3.9850	4.4000	2.7770
0.7666	3.9760	4.6000	2.7390
0.7833	3.9570	4.8000	2.6920
0.8000	3.9470	5.0000	2.6630
0.8166	3.9280	5.2000	2.6160
0.8333	3.9180	5.4000	2.5780
0.8500	3.8990	5.6000	2.5400
0.8666	3.8900	5.8000	2.5020
0.8833	3.8800	6.0000	2.4640
0.9000	3.8710	6.2000	2.4260
0.9166	3.8520	6.4000	2.3880
0.9333	3.8420	6.6000	2.3590
0.9500	3.8330	6.8000	2.3210
0.9666	3.8230	7.0000	2.2920
0.9833	3.8040	7.2000	2.2640
1.0000	3.7950	7.4000	2.2260
1.2000	3.6330	7.6000	2.1970
1.4000	3.5290	7.8000	2.1690
1.6000	3.4340	8.0000	2.1400
1.8000	3.3670	8.2000	2.1120
2.0000	3.3000	8.4000	2.0930
2.2000	3.2530	8.6000	2.0550
2.4000	3.2050	8.8000	2.0360
2.6000	3.1580	9.0000	2.0070
2.8000	3.1100	9.2000	1.9790
3.0000	3.0720	9.4000	1.9500
3.2000	3.0250	9.6000	1.9210
3.4000	2.9770	9.8000	1.8930
3.6000	2.9390	10.0000	1.8740
3.8000	2.9010	11.0000	1.7410
4.0000	2.8630	12.0000	1.6270

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–7 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
13.0000	1.5030	45.0000	0.1330
14.0000	1.3980	46.0000	0.1330
15.0000	1.3130	47.0000	0.1230
16.0000	1.2270	48.0000	0.1140
17.0000	1.1410	49.0000	0.1140
18.0000	1.0750	50.0000	0.1040
19.0000	1.0270	51.0000	0.0850
20.0000	0.9700	52.0000	0.0950
21.0000	0.9230	53.0000	0.0850
22.0000	0.8750	54.0000	0.0850
23.0000	0.8180	55.0000	0.0850
24.0000	0.7800	56.0000	0.0760
25.0000	0.7420	57.0000	0.0760
26.0000	0.7040	58.0000	0.0760
27.0000	0.6470	59.0000	0.0760
28.0000	0.5700	60.0000	0.0660
29.0000	0.5040	61.0000	0.0660
30.0000	0.4470	62.0000	0.0660
31.0000	0.4090	63.0000	0.0660
32.0000	0.3710	64.0000	0.0570
33.0000	0.3330	65.0000	0.0570
34.0000	0.3040	66.0000	0.0570
35.0000	0.2750	67.0000	0.0570
36.0000	0.2560	68.0000	0.0570
37.0000	0.2370	69.0000	0.0470
38.0000	0.2090	70.0000	0.0470
39.0000	0.1990	71.0000	0.0470
40.0000	0.1800	72.0000	0.0470
41.0000	0.1800	73.0000	0.0470
42.0000	0.1710	74.0000	0.0470
43.0000	0.1520	75.0000	0.0380
44.0000	0.1420	76.0000	0.0470

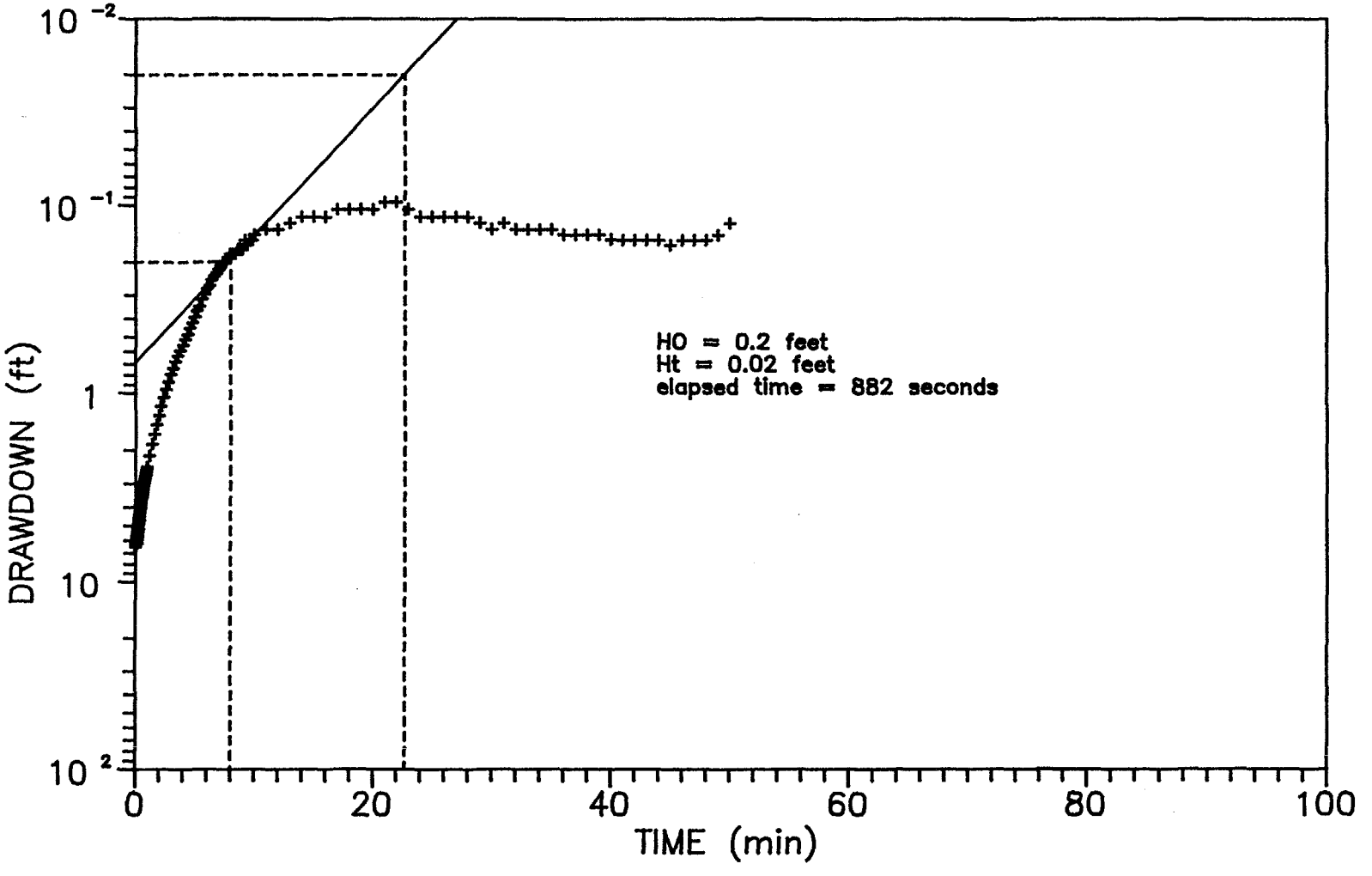
SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–7 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
77.0000	0.0470		
78.0000	0.0380		
79.0000	0.0470		
80.0000	0.0470		
81.0000	0.0380		
82.0000	0.0380		
83.0000	0.0470		
84.0000	0.0380		
85.0000	0.0380		
86.0000	0.0380		
87.0000	0.0380		
88.0000	0.0380		
89.0000	0.0380		
90.0000	0.0380		
91.0000	0.0380		
92.0000	0.0380		
93.0000	0.0380		
94.0000	0.0380		
95.0000	0.0280		
96.0000	0.0280		
97.0000	0.0380		
98.0000	0.0280		
99.0000	0.0280		
100.0000	0.0280		

ROOSEVELT ROADS U.S. NAVAL STATION
SLUG TEST RECOVERY CURVE
UGW-18 (11/16/92)



SLUG TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-18
Test Date: 11/16/93

Formation Tested: Surficial
Rising Head Test

	English Units	Metric Units
Stickup	1.53 (ft)	46.63 (cm)
Static Water Level	12.85 (ft)	391.67 (cm)
Depth to Bottom of Screen (distance from ground level)	20.38 (ft)	621.18 (cm)
Boring Diameter	8.00 (in)	20.32 (cm)
Casing Diameter	2.00 (in)	5.08 (cm)
Screen Diameter	2.00 (in)	5.08 (cm)
Screen Length	10.00 (ft)	304.80 (cm)
Depth to Boundary (b)	30.00 (ft)	914.40 (cm)
Delta H at Time 0	0.20 (ft)	6.10 (cm)
Delta H at Time t	0.020 (ft)	0.61 (cm)
Time t	882 (sec)	882 (sec)
Ratio Kh/Kv	1	1
Porosity of Filter Pack	0.3	0.3

HYDRAULIC CONDUCTIVITY	cm/sec	ft/day	gpd/ft^2
Bouwer-Rice Method	3.7E-04	1.0E+0	7.8E+0
TRANSMISSIVITY	**cm^2/sec**	**ft^2/day**	**gpd/ft**
	3.4E-01	3.0E+01	2.3E+02

SLUG TEST WORKSHEET

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW-18 ***Test Date: 11/16/93***

EQUATIONS USED

EQUATION 1: Bouwer-Rice Method

*K = (((Rc ^ 2)*ln(Re/Rw))/(2Le))*(1/T)*ln(H0/Ht)*

where:
K = Hydraulic conductivity
Rc = Casing radius
Re = Effective well radius over which the drawdown is dissipated (this value is calculated from predetermined curves)
Rw = Borehole radius
Le = Saturated screen length
H0 = Drawdown in well at time zero: time zero is specified on the slug test curve
Ht = Drawdown in well at time "t": time "t" is specified on the slug test curve
T = Elapsed time from time zero to time "t"

EQUATION 2: Transmissivity

*T = K*b*

where:
K = Hydraulic conductivity
b = Aquifer thickness

Note: All equations are valid for any consistent set of units

VARIABLES USED

Variables	***English Units***	***Metric Units***
Rc	1.00 (in)	2.54 (cm)
Rw	4.00 (in)	10.16 (cm)
Le	9.06 (ft)	276.15 (cm)
H0	0.20 (ft)	6.10 (cm)
Ht	0.020 (ft)	0.61 (cm)
T	882 (sec)	882 (sec)
b	30 (ft)	914.40 (cm)

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–18 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)	TIME (min)	DEPTH (ft)
0.0000	6.4830	0.2666	4.9150
0.0083	6.4260	0.2750	4.8680
0.0166	6.3980	0.2833	4.8200
0.0250	6.3410	0.2916	4.7730
0.0333	6.3120	0.3000	4.7350
0.0416	6.2650	0.3083	4.6870
0.0500	6.2170	0.3166	4.6400
0.0583	6.1790	0.3250	4.5920
0.0666	6.1410	0.3333	4.5540
0.0750	6.1030	0.3500	4.4690
0.0833	6.0750	0.3666	4.3830
0.0916	6.0180	0.3833	4.3070
0.1000	5.9700	0.4000	4.2310
0.1083	5.9230	0.4166	4.1550
0.1166	5.8660	0.4333	4.0790
0.1250	5.8090	0.4500	4.0030
0.1333	5.7520	0.4666	3.9270
0.1416	5.6950	0.4833	3.8510
0.1500	5.6380	0.5000	3.7750
0.1583	5.5900	0.5166	3.6990
0.1666	5.5240	0.5333	3.6320
0.1750	5.4760	0.5500	3.5660
0.1833	5.4290	0.5666	3.4990
0.1916	5.3720	0.5833	3.4230
0.2000	5.3240	0.6000	3.3660
0.2083	5.2670	0.6166	3.2900
0.2166	5.2200	0.6333	3.2330
0.2250	5.1720	0.6500	3.1760
0.2333	5.1150	0.6666	3.1190
0.2416	5.0670	0.6833	3.0710
0.2500	5.0200	0.7000	3.0330
0.2583	4.9720	0.7166	2.9950

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–18 ***Test Date: 11/16/93***

TIME (min)	DEPTH (ft)
0.7333	2.9570
0.7500	2.9190
0.7666	2.8810
0.7833	2.8430
0.8000	2.8050
0.8166	2.7770
0.8333	2.7390
0.8500	2.7100
0.8666	2.6820
0.8833	2.6440
0.9000	2.6150
0.9166	2.5870
0.9333	2.5580
0.9500	2.5300
0.9666	2.5010
0.9833	2.4730
1.0000	2.4440
1.2000	2.1300
1.4000	1.8450
1.6000	1.6360
1.8000	1.4550
2.0000	1.3030
2.2000	1.1600
2.4000	1.0460
2.6000	0.9510
2.8000	0.8650
3.0000	0.7890
3.2000	0.7320
3.4000	0.6750
3.6000	0.6270
3.8000	0.5890
4.0000	0.5510
4.2000	0.5130
4.4000	0.4850
4.6000	0.4470
4.8000	0.4180
5.0000	0.3900
5.2000	0.3610
5.4000	0.3420
5.6000	0.3130
5.8000	0.2940
6.0000	0.2750
6.2000	0.2660
6.4000	0.2470
6.6000	0.2370
6.8000	0.2280
7.0000	0.2180
7.2000	0.2090
7.4000	0.1990
7.6000	0.1990
7.8000	0.1900
8.0000	0.1800
8.2000	0.1800
8.4000	0.1800
8.6000	0.1710
8.8000	0.1710
9.0000	0.1710
9.2000	0.1520
9.4000	0.1610
9.6000	0.1520
9.8000	0.1520
10.0000	0.1420
11.0000	0.1330
12.0000	0.1330

SLUG TEST RESULTS – FIELD DATA

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Well No.: UGW–18 ***Test Date: 11/16/93***

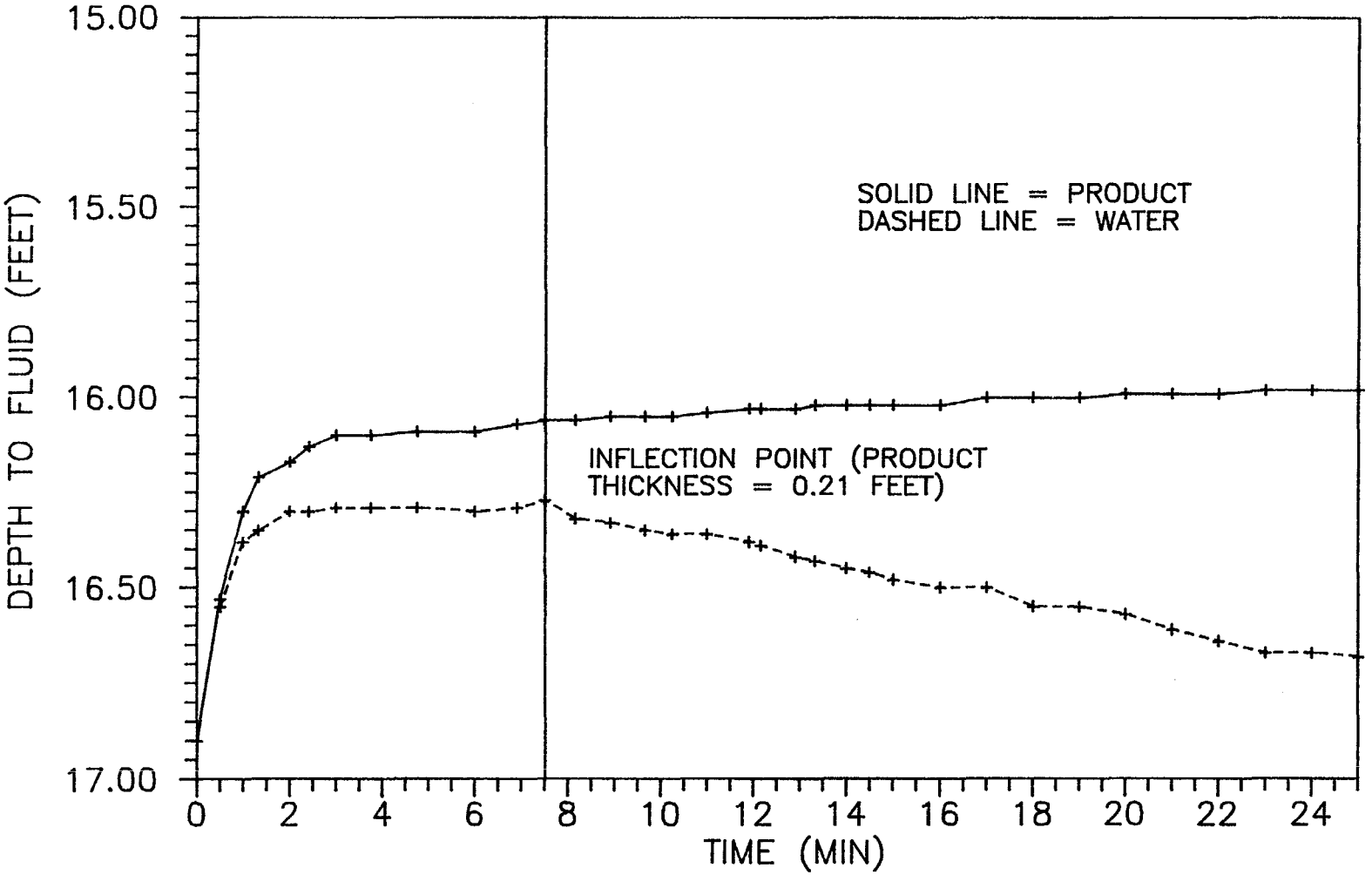
TIME (min)	DEPTH (ft)
13.0000	0.1230
14.0000	0.1140
15.0000	0.1140
16.0000	0.1140
17.0000	0.1040
18.0000	0.1040
19.0000	0.1040
20.0000	0.1040
21.0000	0.0950
22.0000	0.0950
23.0000	0.1040
24.0000	0.1140
25.0000	0.1140
26.0000	0.1140
27.0000	0.1140
28.0000	0.1140
29.0000	0.1230
30.0000	0.1330
31.0000	0.1230
32.0000	0.1330
33.0000	0.1330
34.0000	0.1330
35.0000	0.1330
36.0000	0.1420
37.0000	0.1420
38.0000	0.1420
39.0000	0.1420
40.0000	0.1520
41.0000	0.1520
42.0000	0.1520
43.0000	0.1520
44.0000	0.1520
45.0000	0.1610
46.0000	0.1520
47.0000	0.1520
48.0000	0.1520
49.0000	0.1420
50.0000	0.1230

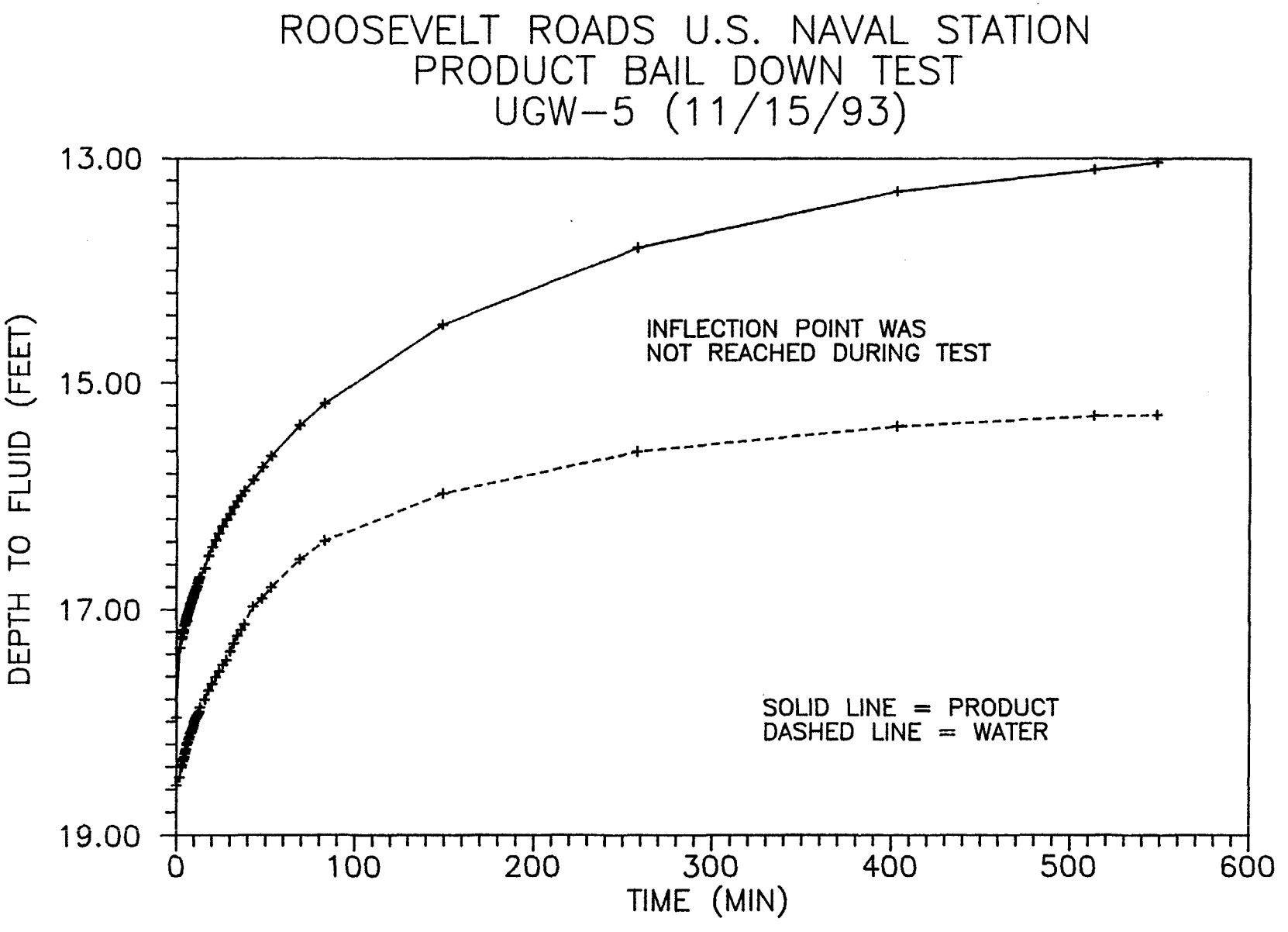
Appendix H

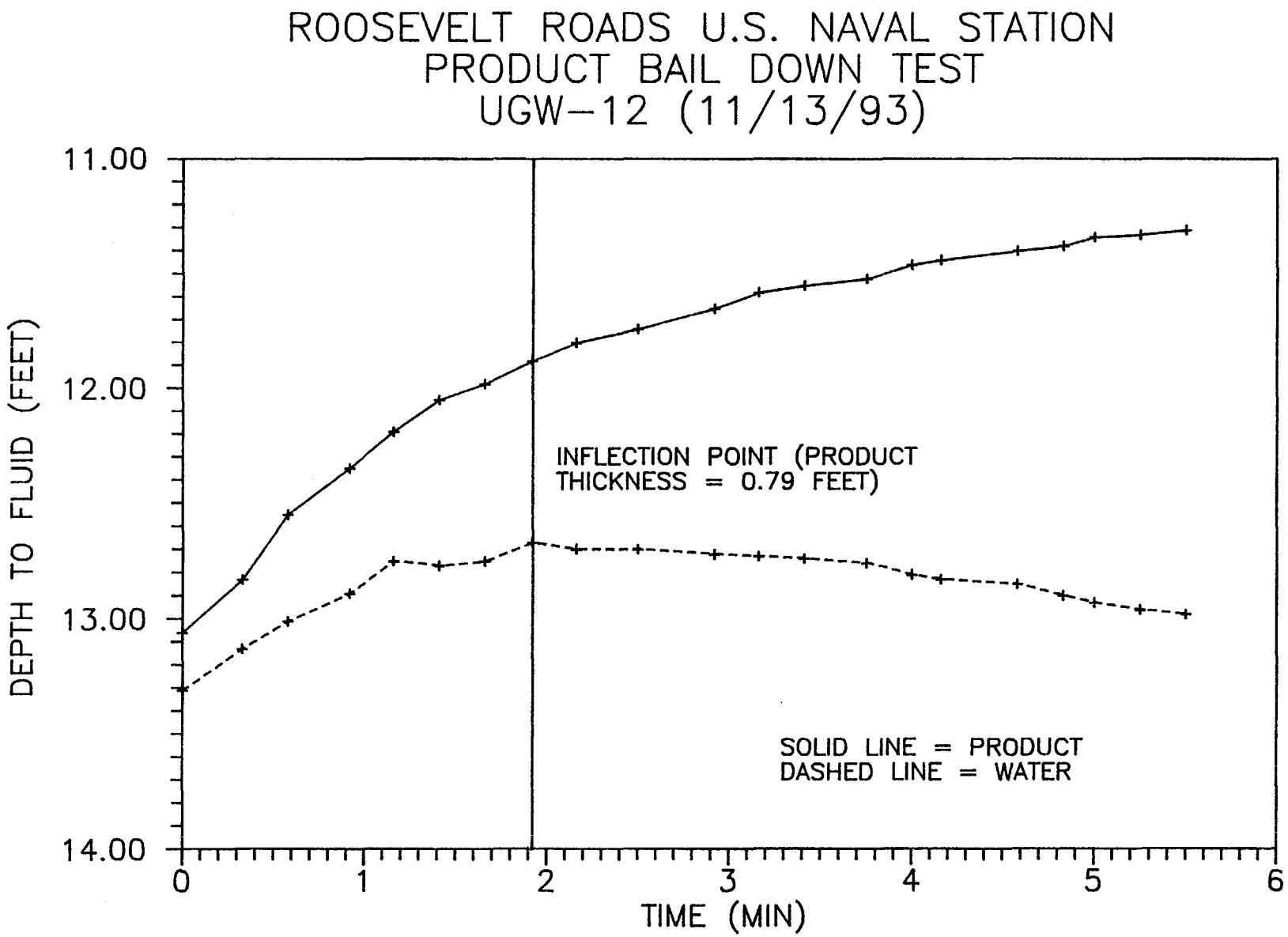
APPENDIX H

PRODUCT BAIL DOWN TEST RESULTS

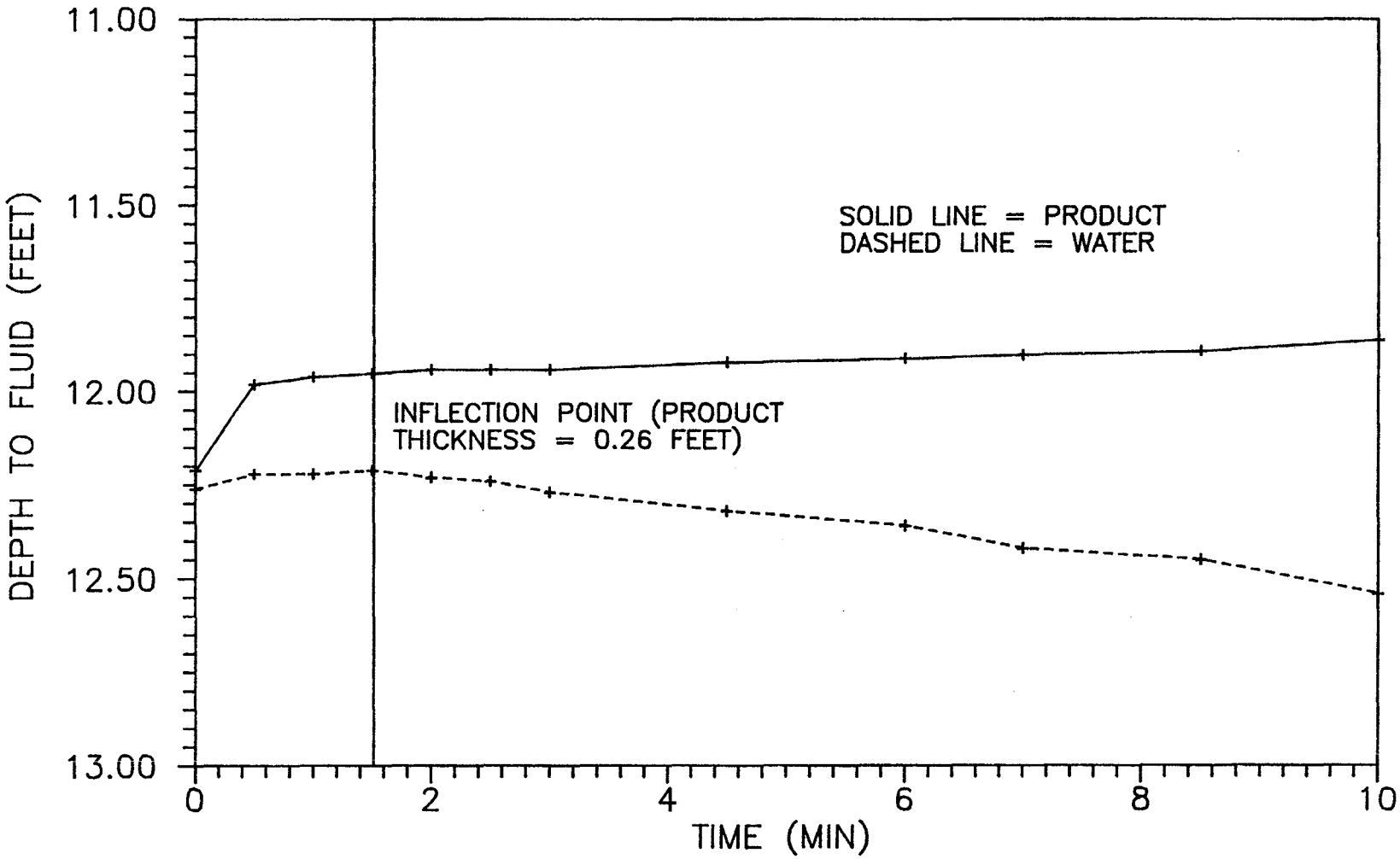
ROOSEVELT ROADS U.S. NAVAL STATION
PRODUCT BAIL DOWN TEST
UGW-4 (11/13/93)




ROOSEVELT ROADS U.S. NAVAL STATION
PRODUCT BAIL DOWN TEST
UGW-5 (11/15/93)
13.00
15.00
17.00
19.00
DEPTH TO FLUID (FEET)
0
100
200
300
400
500
600
TIME (MIN)
INFLECTION POINT WAS
NOT REACHED DURING TEST
SOLID LINE = PRODUCT
DASHED LINE = WATER


ROOSEVELT ROADS U.S. NAVAL STATION
PRODUCT BAIL DOWN TEST
UGW-12 (11/13/93)
11.00
12.00
13.00
14.00
DEPTH TO FLUID (FEET)
0
1
2
3
4
5
6
TIME (MIN)
INFLECTION POINT (PRODUCT THICKNESS = 0.79 FEET)
SOLID LINE = PRODUCT
DASHED LINE = WATER

ROOSEVELT ROADS U.S. NAVAL STATION
PRODUCT BAIL DOWN TEST
UGW-17 (11/13/93)

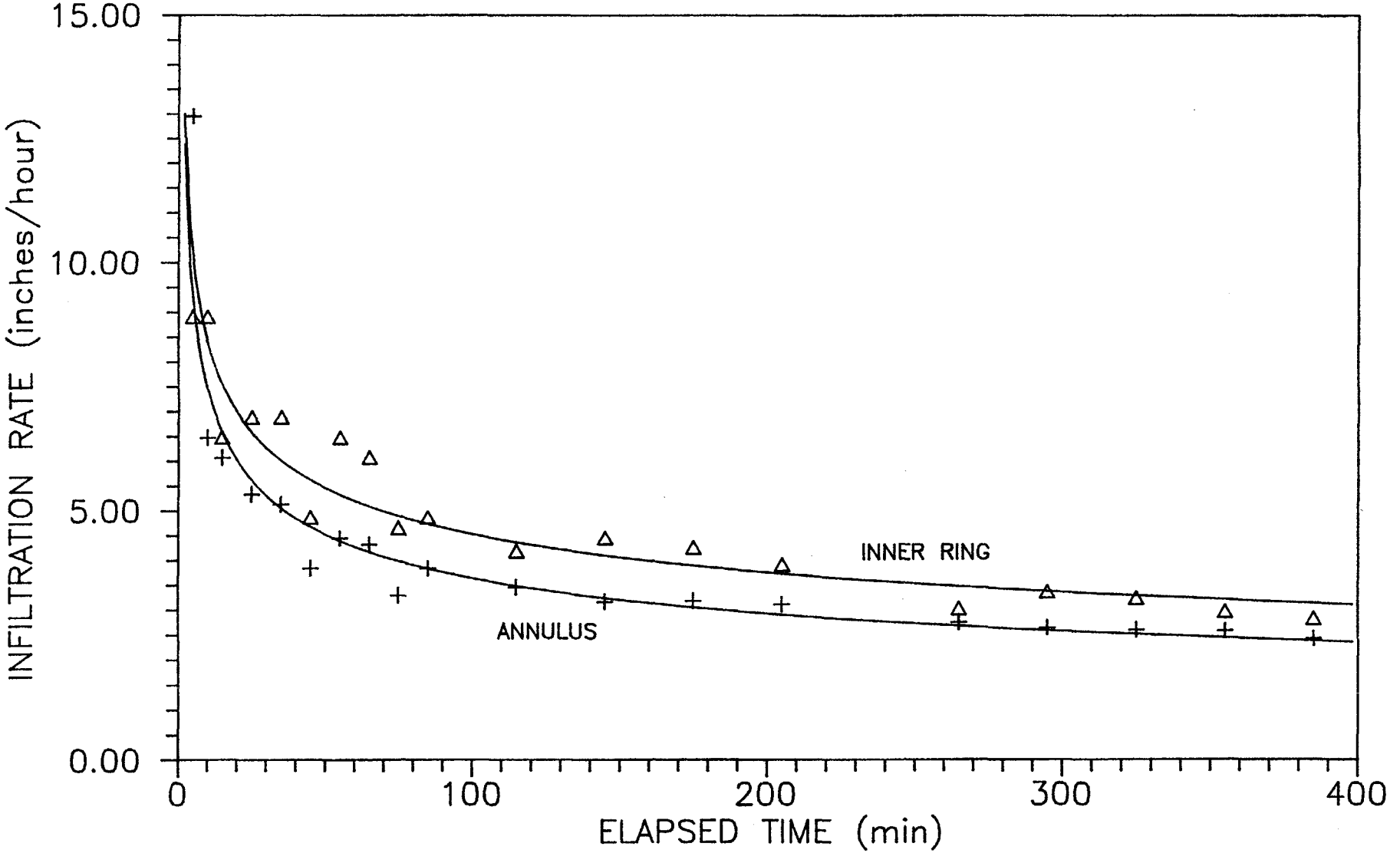


Appendix I

APPENDIX I

DOUBLE RING INFILTROMETER TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
DOUBLE RING INFILTROMETER TEST
(11/13/92)



DOUBLE RING INFILTROMETER TEST RESULTS

ROOSEVELT ROADS U.S. NAVAL STATION
CEIBA, PUERTO RICO

Elapsed Time	Water Volume Added To Inner Ring		Water Volume Added To Annular Space		Depth of Water Added To Rings (inches)		Infiltration Rate (inches/hour)	
	(liters)	(cubic inches)	(liters)	(cubic inches)	inner	annulus	inner	annulus
0								
5	1.125	83.90	6	366.09	0.74	1.08	8.90	12.95
10	1.375	83.90	3	183.05	0.74	0.54	8.90	6.47
15	1	61.02	2.813	171.64	0.54	0.51	6.47	6.07
25	2.125	129.66	4.938	301.30	1.15	0.89	6.88	5.33
35	2.125	129.66	4.75	289.82	1.15	0.85	6.88	5.13
45	1.5	91.52	3.563	217.40	0.81	0.64	4.86	3.84
55	2	122.03	4.125	251.69	1.08	0.74	6.47	4.45
65	1.875	114.40	4	244.06	1.01	0.72	6.07	4.32
75	1.438	87.74	3.063	186.89	0.78	0.55	4.65	3.30
85	1.5	91.52	3.563	217.40	0.81	0.64	4.86	3.84
115	3.875	236.44	9.625	587.28	2.09	1.73	4.18	3.46
145	4.125	251.69	8.813	537.73	2.23	1.58	4.45	3.17
175	3.938	240.28	8.875	541.51	2.12	1.60	4.25	3.19
205	3.625	221.18	8.688	530.10	1.96	1.56	3.91	3.12
265	5.625	343.21	15.375	938.12	3.03	2.76	3.03	2.76
295	3.125	190.67	7.375	449.99	1.69	1.33	3.37	2.65
325	3	183.05	7.25	442.36	1.62	1.30	3.24	2.61
355	2.75	167.79	7.188	438.58	1.48	1.29	2.97	2.59
385	2.625	160.17	6.75	411.86	1.42	1.21	2.83	2.43

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Appendix J

APPENDIX J

MONITORING WELL SAMPLING LOGS

BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-6 Coded/ Replicate No. _____ Date 11/12/93

Weather Sunny, 90° Time Sampling Began 10:45 Time Sampling Completed 11:35

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 3' MP Elevation 111.23

Total Sounded Depth (TD) of Well Below MP 18.37' Water-Level Elevation 101.15

Held _____ Depth to Water (DTW) Below MP 10.08' Diameter of Casing/ Construction Type 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 8.29' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 7 gals.

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 1.4 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor strong to none Appearance very silty

Temperature (°F/°C) 31.62°C Other sample water – strong reaction with HCL

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
>10,000	6.54	30.33	11:05	17
>10,000	6.61	30.73	11:08	21
>10,000	6.6	30.64	11:11	25
>10,000	6.63	31.62	11:15	28

Sampling Method and Material Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Equipment blank taken on disposable bailer (11:20)
Field blank taken at UGW-6 location

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-7 Coded/ Replicate No. _____ Date 11/11/93

Weather Sunny, 88° Time Sampling Began 16:00 Time Sampling Completed 16:45

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5' MP Elevation 109.81

Total Sounded Depth (TD) of Well Below MP 16.27' Water-Level Elevation 102.23

Held _____ Depth to Water (DTW) Below MP 7.58' Diameter of Casing/ Construction Type 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 8.69' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) Dry purge 6.0 gals total

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 1.4 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color Rust to brown to black to clear Odor sulfur Appearance very silty

Temperature (°F/°C) 28.48°C Other Purge H20 very silty, purge dry 17 bails - allow recharge for parameters - sample H20 clear/strong reaction with HCL

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
5,293	6.93	28.60	16:17	18
5,504	7.05	28.58	16:22	20
5,991	7.13	28.69	16:27	22
5,848	7.09	28.54	16:30	23
5,461	6.99	28.48	16:33	24

Sampling Method and Material Purge and bail - disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-8 Coded/ Replicate No. _____ Date 11/11/93

Weather Sunny, 85° Time Sampling Began 14:22 Time Sampling Completed 15:15

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5' MP Elevation 110.03

Total Sounded Depth (TD) of Well Below MP 17.53' Water-Level Elevation 102.69

Held _____ Depth to Water (DTW) Below MP 7.34' Diameter of Casing/ Construction Type 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 10.19' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 8.5 gals.

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 1.7 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color gray/green Odor sulfur Appearance very silty

Temperature (°F/°C) 30.51°C Other Black substance (thin sheets) floating in first 10 bails

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
2,159	6.86	30.80	14:56	20
2,195	6.95	30.16	15:00	26
2,192	6.94	30.32	15:04	30
2,215	6.93	30.51	15:09	34

Sampling Method and Material Purge and bail -- disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Equipment bkank taken on BB&L 3' bailer prior to purge
First field blank taken UGW-8 location, water used for blank is bottled water, purchased in Puerto Rico

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-9 Coded/ Replicate No. _____ Date 11/11/93

Weather: Sunny, 85° Time Sampling Began 13:35 Time Sampling Completed 14:10

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 6" MP Elevation: 109.22

Total Sounded Depth (TD) of Well Below MP: 19.93' Water-Level Elevation: 101.84

Held _____ Depth to Water (DTW) Below MP: 7.38' Diameter of Casing/ Construction Type: 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW): 12.55' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 10.25 gals.

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 2.04 Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: Rusty to brown Odor: unknown origin Appearance: silty

Temperature (°F/°C): 31.90°C Other: _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
1,319	7.12	30.89	13:45	24
1,316	7.10	30.80	13:44	30
1,312	7.04	31.07	13:52	36
1,313	7.07	31.90	13:56	40

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-10 Coded/ Replicate No. _____ Date 11/16/93

Weather: Partly cloudy 78° Time Sampling Began 7:20 Time Sampling Completed 8:20

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' MP Elevation: 110.50'

Total Sounded Depth (TD) of Well Below MP: 18.86' Water-Level Elevation: 101.21'

Held _____ Depth to Water (DTW) Below MP: 9.29' Diameter of Casing/ Construction Type: 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW): 9.57' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 7.75 gals

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 1.56 Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: grayish/green Odor: yes Appearance: very silty

Temperature (°F/°C): 29.32°C Other: _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
1,796	7.20	29.61	8:01	18
1,782	7.18	30.27	8:04	24
1,816	7.24	30.24	8:07	28
1,801	7.19	29.32	8:10	31

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Sheen on sample; Field blank taken at UGW-10 location

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-11 Coded/Replicate No. _____ Date: 11/15/93

Weather: Partly cloudy 85° Time Sampling Began: 10:15 Time Sampling Completed: 10:57

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' MP Elevation: 109.45'

Total Sounded Depth (TD) of Well Below MP: 17.45' Water-Level Elevation: 100.75'

Held _____ Depth to Water (DTW) Below MP: 8.70' Diameter of Casing/Construction Type: 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW): 8.75' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 7.25 gals

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 1.44 Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: brown/tan Odor: none Appearance: very silty

Temperature (°F/°C): 29.25°C Other: _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
2,576	7.22	28.58	10:40	18
2,061	7.23	28.59	10:43	22
1,936	7.27	28.70	10:46	26
1,880	7.33	29.25	10:49	29

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-15 Coded/ Replicate No. _____ Date: 11/16/93

Weather: Partly cloudy 85° Time Sampling Began: 11:58 Time Sampling Completed: 12:35

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' MP Elevation: 112.33'

Total Sounded Depth (TD) of Well Below MP: 17.92' Water-Level Elevation: 100.8'

Held _____ Depth to Water (DTW) Below MP: 11.53' Diameter of Casing/ Construction Type: 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW): 6.39' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 5.0 gals

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 1.06 Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: dark gray/greenish Odor: sulfur Appearance: very silty

Temperature (°F/°C): 31.88°C Other: _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
>10,000	6.78	31.39	12:18	13
>10,000	6.75	31.14	12:21	17
>10,000	6.82	31.25	12:23	18
>10,000	6.79	31.88	12:26	20

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-16 | Coded/Replicate No.: | Date: 11/16/93

Weather: Cloudy 80° | Time Sampling Began: 15:25 | Time Sampling Completed: 16:05

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' | MP Elevation: 113.63'

Total Sounded Depth (TD) of Well Below MP: 20.35' | Water-Level Elevation: 102.73'

Held _____ | Depth to Water (DTW) Below MP: 10.90' | Diameter of Casing/Construction Type: 2" / PVC

Wet _____ | Water Column (WC) in Well (TD-DTW): 9.45' | Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 8.0 gals

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 1.6 | Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: Rusty | Odor: None | Appearance: very little silt

Temperature (°F/°C): Not available | Other:

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
913	7.45	N/A	15:48	19
905	7.48	N/A	15:51	24
869	7.53	N/A	15:54	28
849	7.52	N/A	15:57	32

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

7093409R

BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: UGW-18 Coded/ Replicate No. _____ Date: 11/16/93

Weather: Partly cloudy 83° Time Sampling Began: 13:40 Time Sampling Completed: 14:25

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' MP Elevation: 114.28'

Total Sounded Depth (TD) of Well Below MP: 20.38' Water-Level Elevation: 101.43'

Held _____ Depth to Water (DTW) Below MP: 12.85' Diameter of Casing/ Construction Type: 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW): 7.53' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 6.25 gals

Gallons per Foot (GPF): .16

Gallons in Well (WC x GPF): 1.25 Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: Brown/tan Odor: None Appearance: very silty

Temperature (°F/°C): 30.44°C Other: _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
1,359	7.36	29.97	14:05	17
1,408	7.36	30.20	14:08	20
1,424	7.35	30.07	14:11	22
1,413	7.37	30.44	14:15	25

Sampling Method and Material: Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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BLASLAND, BOUCK & LEE
ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-19 Coded/ Replicate No. _____ Date 11/18/93

Weather Rainy, 75° Time Sampling Began 10:50 Time Sampling Completed 12:30

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5 MP Elevation 112.27'

Total Sounded Depth (TD) of Well Below MP 20' Water-Level Elevation 100.12'

Held _____ Depth to Water (DTW) Below MP 12.15 Diameter of Casing/ Construction Type 2"

Wet _____ Water Column (WC) in Well (TD-DTW) 7.85 Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 3.5 gals

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 1.2 Sampling Pump Intake Setting (feet below land surface) Bottom

Evacuation Method Hand bail/ (3') 1 1/2' bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown Odor No Appearance very silty/clear to very silty

Temperature (°F/°C) _____ Other 6 bails dry, 1 hr recharge, 6 bails dry Parameter collected/ 1/2 recharge sample

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
953	7.40	29.23	12:10	8
874	7.47	29.00	12:13	11
829	7.53	28.39	12:16	13

Sampling Method and Material Purge and bail - disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab ___ or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-20 Coded/ Replicate No. _____ Date 11/18/93

Weather Rainy, 75° Time Sampling Began 11:00 Time Sampling Completed 12:00

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5' MP Elevation 111.92'

Total Sounded Depth (TD) of Well Below MP 20' Water-Level Elevation 100.61'

Held _____ Depth to Water (DTW) Below MP 11.31' Diameter of Casing/ Construction Type 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 8.69' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 7 gals

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 1.4 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color Brown to clear Odor None Appearance very little silt

Temperature (°F/°C) 31.00°C Other _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
>10,000	6.42	30.43	11:30	17
>10,000	6.39	30.39	11:37	21
>10,000	6.39	31.08	11:40	25
>10,000	6.40	31.00	11:40	28

Sampling Method and Material Purge and bail – disposable bailer.

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Field blank taken at UGW-20 location

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-21 Coded/ Replicate No. _____ Date 12/17/93

Weather Sunny, 90° Time Sampling Began 7:50 Time Sampling Completed 8:30

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 3' MP Elevation 113.28'

Total Sounded Depth (TD) of Well Below MP 15.0' Water-Level Elevation 99.47'

Held _____ Depth to Water (DTW) Below MP 13.81' Diameter of Casing/ Construction Type 2"/PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 1.29' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 1.0 gals

Gallons per Foot (GPF) .16

Gallons in Well (WC x GPF) 0.2 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long disposable bailer

SAMPLING DATA/FIELD PARAMETERS

Color Tan, cloudy Odor No Appearance very little silt

Temperature (°F/°C) 85.1°F Other _____

Specific Conductance, umhos/cm	pH	Temp.	Time
1270	7.78	83.0	8:00
842	7.67	83.9	8:06
874	7.58	84.5	8:12
815	7.51	85.1	8:16

Sampling Method and Material Purge and bail - disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-23 Coded/ Replicate No. _____ Date 12/17/93

Weather Sunny, 90° Time Sampling Began 8:30 Time Sampling Completed 9:15

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 3' MP Elevation 169.20'

Total Sounded Depth (TD) of Well Below MP 70.0' Water-Level Elevation 106.69'

Held _____ Depth to Water (DTW) Below MP 62.51' Diameter of Casing/ Construction Type 4"/PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 7.5' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 14 gals

Gallons per Foot (GPF) .65

Gallons in Well (WC x GPF) 4.5 Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method Hand bail with 3' long disposable bailer

SAMPLING DATA/FIELD PARAMETERS

Color Tan, cloudy Odor No Appearance Some silt

Temperature (°F/°C) 79.7°F Other _____

Specific Conductance, umhos/cm	pH	Temp.	Time
2280	7.45	79.5	8:50
2220	7.55	79.5	8:56
2160	7.51	79.8	9:06
2190	7.50	79.7	9:14

Sampling Method and Material Purge and bail – disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Field blank taken at UGW-23 location

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-24 Coded/ Replicate No. _____ Date 12/17/93

Weather Sunny, 90° Time Sampling Began 15:30 Time Sampling Completed 15:40

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface Approx. 2.5' MP Elevation 178.94'

Total Sounded Depth (TD) of Well Below MP 80.5' Water-Level Elevation 105.7'

Held _____ Depth to Water (DTW) Below MP 73.24' Diameter of Casing/ Construction Type 4" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 7.26' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) Approx. 16 gal.

Gallons per Foot (GPF) 0.65'

Gallons in Well (WC x GPF) 4.72 Sampling Pump Intake Setting (feet below land surface) NA

Evacuation Method Air surge and bailer

SAMPLING DATA/FIELD PARAMETERS

Color brown Odor none Appearance cloudy

Temperature (°F/°) 79.6 (°F) Other _____

Specific Conductance, umhos/cm	pH	Temp (°F)	Time	Bail No.
6,970	8.32	81.3	15:30	4
6,900	8.28	80.2	15:35	7
6,850	8.29	79.6	15:40	10

Sampling Method and Material Disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml. vials	HCL
2. 418.1	(1) clear liter	HCL
3. 610	(1) clear liter	None
4.		
5.		

Remarks:
(Vistors, field decon, QC sample locations/time)

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

1493266M

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-25 Coded/ Replicate No. _____ Date 12/17/93

Weather Sunny, 90° Time Sampling Began 17:10 Time Sampling Completed 17:35

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface Approx. 2.5' MP Elevation 153.92'

Total Sounded Depth (TD) of Well Below MP 56.5' Water-Level Elevation 107.28'

Held _____ Depth to Water (DTW) Below MP 48.64' Diameter of Casing/ Construction Type 4" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 7.86' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 30 gal.

Gallons per Foot (GPF) 0.65'

Gallons in Well (WC x GPF) 5.11 Sampling Pump Intake Setting (feet below land surface) NA

Evacuation Method Air surge and bailer

SAMPLING DATA/FIELD PARAMETERS

Color yellow tint Odor slight Appearance slightly cloudy

Temperature (°F/°C) 80.7 (°F) Other _____

Specific Conductance, umhos/cm	pH	Temp (°F)	Time	Bail No.
3,200	8.53	81.0	17:10	6
3,140	8.27	80.5	17:15	10
3,160	8.21	80.7	17:20	13

Sampling Method and Material Purge and bail disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml. vials	HCL
2. 418.1	(1) clear liter	HCL
3. 610	(1) clear liter	None
4.		
5.		

Remarks:
(Vistors, field decon, QC sample locations/time)

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-26 Coded/ Replicate No. _____ Date 12/17/93

Weather Sunny, 90° Time Sampling Began 13:10 Time Sampling Completed 13:30

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface Approx. 2.5' MP Elevation 114.51'

Total Sounded Depth (TD) of Well Below MP 48.5' Water-Level Elevation 104.20'

Held _____ Depth to Water (DTW) Below MP 10.31 Diameter of Casing/ Construction Type 4" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 38.2' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 130 gal.

Gallons per Foot (GPF) 0.65'

Gallons in Well (WC x GPF) 24.8 Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method Air surge and bailer

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor none Appearance slightly cloudy

Temperature (°F/°) 87.5 (°F) Other _____

Specific Conductance, umhos/cm	pH	Temp (°F)	Time	Bail No.
5330	7.81	88.9	13:10	5
4,730	7.57	87.6	13:15	8
4,780	7.53	87.5	13:20	11

Sampling Method and Material Purge and bail disposable bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml. vials	HCL
2. 418.1	(1) clear liter	HCL
3. 610	(1) clear liter	None
4.		
5.		

Remarks:
(Vistors, field decon, QC sample locations/time)

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number: 399.01.04

Site Location: Roosevelt Roads, Puerto Rico

Site/Well No.: GW-02 | Coded/ Replicate No.: DUP -1 | Date: 11/16/93

Weather: Partly cloudy, 75° | Time Sampling Began: 17:10 | Time Sampling Completed: 18:00

EVACUATION DATA

Description of Measuring Point (MP): Top-of-casing (N)

Height of MP Above/Below Land Surface: 2.5' | MP Elevation: 113.57'

Total Sounded Depth (TD) of Well Below MP: 23.0' | Water-Level Elevation: 102.88'

Held _____ | Depth to Water (DTW) Below MP: 10.69' | Diameter of Casing/ Construction Type: 2" / PVC

Wet _____ | Water Column (WC) in Well (TD-DTW): 12.31' | Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE): 2.0 gals

Gallons per Foot (GPF): .16 | dry 8 bails

Gallons in Well (WC x GPF): 2.05 | Sampling Pump Intake Setting (feet below land surface): N/A

Evacuation Method: Hand bail with 3' long bailer

SAMPLING DATA/FIELD PARAMETERS

Color: Clear | Odor: None | Appearance: very little silt

Temperature (°F/°C): Not Available | Other: Dry purge, no parameters collected.

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.
Not Available				

Sampling Method and Material: Purge (dry) + bail - 3' bailer

Constituents Sampled (order of collection)	Container Description From Lab X or BB&L ___	Perservative/ pH Checked
1. 602	(3) 40 ml vials	HCL
2. 418.1	(1) clear liter	HCL
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Duplicate sample taken.

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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ENGINEERS & GEOSCIENTISTS

WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-2 Coded/ Replicate No. _____ Date 11/12/93

Weather Sunny, 90° Time Sampling Began 17:00 Time Sampling Completed 17:10

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5' MP Elevation 161.93'

Total Sounded Depth (TD) of Well Below MP 59.4' Water-Level Elevation 107.78'

Held _____ Depth to Water (DTW) Below MP 54.15' Diameter of Casing/ Construction Type 2" / PVC

Wet _____ Water Column (WC) in Well (TD-DTW) 5.25' Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) 2.64 gals

Gallons per Foot (GPF) 0.16

Gallons in Well (WC x GPF) .88 sheen in bailer Sampling Pump Intake Setting (feet below land surface) N/A

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____

Temperature (°F/°C) _____ Other _____

Specific Conductance, umhos/cm _____ pH _____

Sampling Method and Material _____

Constituents Sampled (order of collection)	Container Description From Lab ___ or BB&L ___	Perservative/ pH Checked
1.		
2.		
3.		
4.		
5.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Product in well – not sampled.
1/10"

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-3 Coded/ Replicate No. _____ Date 11/12/93

Weather Sunny, 90° Time Sampling Began 16:45 Time Sampling Completed 16:55

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 2.5' MP Elevation 124.76'

Total Sounded Depth (TD) of Well Below MP 35.44' Water-Level Elevation 104.76'

Held _____ Depth to Water (DTW) Below MP 20.00' Diameter of Casing/ Construction Type 2" / PVC

Depth to Product (DTP) 19.61'

Wet _____ Water Column (WC) in Well (TD-DTW) _____ Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) _____

Gallons per Foot (GPF) _____

Gallons in Well (WC x GPF) _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____

Temperature (°F/°C) _____ Other _____

Specific Conductance, umhos/cm _____ pH _____

Sampling Method and Material _____

Constituents Sampled (order of collection)	Container Description From Lab ___ or BB&L ___	Perservative/ pH Checked
1.		
2.		
3.		
4.		
5.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Product in well – not sampled.

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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WATER SAMPLING LOG

Project Number 399.01.04 Page 1 of 1

Site Location Roosevelt Roads, Puerto Rico

Site/Well No. UGW-14 Coded/ Replicate No. _____ Date 11/12/93

Weather Sunny 90° Time Sampling Began 16:30 Time Sampling Completed 16:38

EVACUATION DATA

Description of Measuring Point (MP) Top-of-casing (N)

Height of MP Above/Below Land Surface 3' MP Elevation 119.23'

Total Sounded Depth (TD) of Well Below MP 38.83' Water-Level Elevation 103.95'

Held _____ Depth to Water (DTW) Below MP 15.28' Diameter of Casing/ Construction Type 2" / PVC

Depth to Product (DTP) 15.21'

Wet _____ Water Column (WC) in Well (TD-DTW) _____ Gallons pumped/bailed Prior to sampling (GAL x 4 VOL x PUMP RATE) _____

Gallons per Foot (GPF) _____

Gallons in Well (WC x GPF) _____ Sampling Pump Intake Setting (feet below land surface) _____

Evacuation Method _____

SAMPLING DATA/FIELD PARAMETERS

Color _____ Odor _____ Appearance _____

Temperature (°F/°C) _____ Other _____

Specific Conductance, umhos/cm	pH	Temp.	Time	Bail No.

Sampling Method and Material _____

Constituents Sampled (order of collection)	Container Description From Lab ___ or BB&L ___	Perservative/ pH Checked
1.		
2.		
3.		

Remarks:
(Vistors, field decon, QC sample locations/time)
Product in well – not sampled.

Sampling Personnel: Tim Twist

WELL CASING VOLUMES

GAL/FT				
	1-1/4" = 0.077	2"=0.16	3"=0.37	4"=0.65
	1-1/2" = 0.10	2-1/2"=0.24	3-1/2"=0.50	6"=1.46"

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Appendix K

APPENDIX K

UGW-22 FLUIDS LABORATORY ANALYTICAL RESULTS

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

414 SW 12th Avenue • Deerfield Beach, Florida 33442 • (305) 421-7400 • Fax (305) 421-2584

LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , OIL SAMPLES	DATE SAMPLED
23961-1	UGW-22 (Product)	12-15-93

PARAMETER	23961-1
Polynuclear Aromatic Hydrocarbons (610)	
Acenaphthene, mg/kg	<100
Acenaphthylene, mg/kg	<100
Benzo(a)pyrene, mg/kg	<100
Benzo(g,h,i)perylene, mg/kg	<100
Benzo(b,k)fluoranthene, mg/kg	<100
Chrysene + Benzo(a)anthracene, mg/kg	<100
Fluoranthene, mg/kg	<100
Fluorene, mg/kg	<100
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, mg/kg	<100
Naphthalene, mg/kg	2200
Phenanthrene + Anthracene, mg/kg	<100
Pyrene, mg/kg	<100
2-Methylnaphthalene, mg/kg	8000
1-Methylnaphthalene, mg/kg	4300
Date Extracted	12.20.93
Date Analyzed	12.21.93
Method Number	EPA 8100
Dilution factor, mg/kg	1
Hydrocarbons (Mod 8015 - Purgeable)	
Hydrocarbons as Gasoline, mg/kg	*8100
Date Analyzed	12.28.93
Method Number	MOD 8015

*Hydrocarbon pattern is similar to that of the Gasoline standard as analyzed by Modified Method 8015.

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23961-2	UGW-22	12-15-93

PARAMETER	23961-2
Polynuclear Aromatic Hydrocarbons (610)	
Acenaphthene, ug/l	<10
Acenaphthylene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
Benzo(b,k)fluoranthene, ug/l	<10
Chrysene + Benzo(a)anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Fluorene, ug/l	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10
Naphthalene, ug/l	230
Phenanthrene + Anthracene, ug/l	<10
Pyrene, ug/l	<10
2-Methylnaphthalene, ug/l	270
1-Methylnaphthalene, ug/l	220
Date Extracted	12.20.93
Date Analyzed	12.28.93
Method Number	EPA 610
Dilution factor, ug/l	1
Hydrocarbons (Mod 8015 - Purgeable)	
Hydrocarbons as Gasoline, ug/l	*280
Date Analyzed	12.28.93
Method Number	MOD 8015
Arsenic	
Arsenic, mg/l	<0.010
Date Analyzed	12.21.93
Method Number	EPA 7060

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Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23961-2	UGW-22	12-15-93

PARAMETER	23961-2
Barium	
Barium, mg/l	0.11
Date Analyzed	12.30.93
Method Number	EPA 6010
Cadmium	
Cadmium, mg/l	<0.0050
Date Analyzed	12.30.93
Method Number	EPA 6010
Chromium	
Chromium, mg/l	0.011
Date Analyzed	12.30.93
Method Number	EPA 6010
Lead	
Lead, mg/l	<0.0050
Date Analyzed	12.21.93
Method Number	EPA 7421
Mercury	
Mercury, mg/l	<0.00020
Date Analyzed	12.21.93
Method Number	EPA 7470
Selenium	
Selenium, mg/l	<0.010
Date Analyzed	12.21.93
Method Number	EPA 7740
Silver	
Silver, mg/l	<0.010
Date Analyzed	12.30.93
Method Number	EPA 6010

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23961-2	UGW-22	12-15-93

PARAMETER	23961-2
Sulfur, Total	
Sulfur, Total, mg/l	<5.0
Date Analyzed	12.29.93
Method Number	EPA 375.4
Alkalinity, Total	
Alkalinity (to pH 4.5) as CaCO3, mg/l	520
Date Analyzed	12.28.93
Method Number	EPA 310.1
Hardness, Total by calculation	
Hardness as CaCO3, mg/l	310
Date Calculated	12.30.93
Method Number	SM 314A
pH	
pH , units	7.58
Date Analyzed	12.16.93
Method Number	EPA 150.1
Solids, Total Dissolved	
Solids, Total Dissolved, mg/l	720
Date Analyzed	12.18.93
Method Number	EPA 160.1
Total Organic Carbon	
Total Organic Carbon, mg/l	28
Date Analyzed	12.21.93
Method Number	EPA 415.1

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC-O SAMPLES
23961-3	Lab Blank
23961-4	Accuracy - % Recovery (Mean)
23961-5	Precision - Relative % Difference
23961-6	Detection Limit

PARAMETER	23961-3	23961-4	23961-5	23961-6
Polynuclear Aromatic Hydrocarbons (610)				
Acenaphthene, mg/kg	<100	---	---	100
Acenaphthylene, mg/kg	<100	84 %	4.8 %	100
Benzo(a)pyrene, mg/kg	<100	---	---	100
Benzo(g,h,i)perylene, mg/kg	<100	---	---	100
Benzo(b,k)fluoranthene, mg/kg	<100	---	---	100
Chrysene + Benzo(a)anthracene, mg/kg	<100	---	---	100
Fluoranthene, mg/kg	<100	88 %	5.7 %	100
Fluorene, mg/kg	<100	84 %	4.8 %	100
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, mg/kg	<100	---	---	100
Naphthalene, mg/kg	<100	86 %	4.6 %	100
Phenanthrene + Anthracene, mg/kg	<100	---	---	100
Pyrene, mg/kg	<100	88 %	6.8 %	100
2-Methylnaphthalene, mg/kg	<100	---	---	100
1-Methylnaphthalene, mg/kg	<100	---	---	100
Date Extracted	12.20.93	---	---	---
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 8100	---	---	---
Hydrocarbons (Mod 8015 - Purgeable)				
Hydrocarbons as Gasoline, ug/kg	<1.0	80 %	14 %	1.0
Date Analyzed	12.28.93	---	---	---
Method Number	MOD 8015	---	---	---

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23961-7	Lab Blank
23961-8	Accuracy - % Recovery (Mean)
23961-9	Precision - Relative % Difference
23961-10	Detection Limit

PARAMETER	23961-7	23961-8	23961-9	23961-10
Polynuclear Aromatic Hydrocarbons (610)				
Acenaphthene, ug/l	<10	---	---	10
Acenaphthylene, ug/l	<10	66 %	8.0 %	10
Benzo(a)pyrene, ug/l	<10	---	---	10
Benzo(g,h,i)perylene, ug/l	<10	---	---	10
Benzo(b,k)fluoranthene, ug/l	<10	---	---	10
Chrysene + Benzo(a)anthracene, ug/l	<10	---	---	10
Fluoranthene, ug/l	<10	84 %	0 %	10
Fluorene, ug/l	<10	72 %	7.0 %	10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	---	---	10
Naphthalene, ug/l	<10	60 %	22 %	10
Phenanthrene + Anthracene, ug/l	<10	---	---	10
Pyrene, ug/l	<10	85 %	2.4 %	10
2-Methylnaphthalene, ug/l	<10	---	---	10
1-Methylnaphthalene, ug/l	<10	---	---	10
Date Extracted	12.20.93	---	---	---
Date Analyzed	12.28.93	---	---	---
Method Number	EPA 610	---	---	---
Hydrocarbons (Mod 8015 - Purgeable)				
Hydrocarbons as Gasoline, ug/l	<1.0	139 %	3.6 %	1.0
Date Analyzed	12.28.93	---	---	---
Method Number	MOD 8015	---	---	---

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23961-7	Lab Blank
23961-8	Accuracy - % Recovery (Mean)
23961-9	Precision - Relative % Difference
23961-10	Detection Limit

PARAMETER	23961-7	23961-8	23961-9	23961-10
Arsenic				
Arsenic, mg/l	<0.010	96 %	4.2 %	0.010
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 7060	---	---	---
Barium				
Barium, mg/l	<0.010	104 %	2.9 %	0.010
Date Analyzed	12.30.93	---	---	---
Method Number	EPA 6010	---	---	---
Cadmium				
Cadmium, mg/l	<0.0050	100 %	8.0 %	0.0050
Date Analyzed	12.30.93	---	---	---
Method Number	EPA 6010	---	---	---
Chromium				
Chromium, mg/l	<0.010	98 %	7.1 %	0.010
Date Analyzed	12.30.93	---	---	---
Method Number	EPA 6010	---	---	---
Lead				
Lead, mg/l	<0.0050	103 %	1.9 %	0.0050
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 7421	---	---	---
Mercury				
Mercury, mg/l	<0.00020	95 %	0 %	0.00020
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 7470	---	---	---

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LOG NO: D3-23961

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23961-7	Lab Blank
23961-8	Accuracy - % Recovery (Mean)
23961-9	Precision - Relative % Difference
23961-10	Detection Limit

PARAMETER	23961-7	23961-8	23961-9	23961-10
Selenium				
Selenium, mg/l	<0.010	103 %	1.9 %	0.010
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 7740	---	---	---
Silver				
Silver, mg/l	<0.010	100 %	5.0 %	0.010
Date Analyzed	12.30.93	---	---	---
Method Number	EPA 6010	---	---	---
Sulfur, Total				
Sulfur, Total, mg/l	<5.0	116 %	0 %	5.0
Date Analyzed	12.29.93	---	---	---
Method Number	EPA 375.4	---	---	---
Total Organic Carbon				
Total Organic Carbon, mg/l	<1.0	90 %	1.1 %	1.0
Date Analyzed	12.21.93	---	---	---
Method Number	EPA 415.1	---	---	---

Method References: EPA 40 CFR Part 136, EPA 600/4-79-020, Standard Methods and EPA SW-846.

Paul Canevaro

Lic. Mary E. Laboy
Mary E. Laboy
LIC. 3161
ESTADO LIBRE ASOCIADO DE PUERTO RICO
QUIMICO LICENSIADO

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LOG NO: D3-23961A

Received: 20 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , OIL SAMPLES	DATE SAMPLED
23961A-1	UGW-22 (Product)	12-15-93

PARAMETER	23961A-1
Hydrocarbons (Mod 8015 - Extractable)	
Hydrocarbons as Kerosene, mg/kg	<3400
Hydrocarbons as Diesel Fuel, mg/kg	<3400
Hydrocarbons as Heavy Oils, mg/kg	<45000
Hydrocarbons as Mineral Spirits, mg/kg	<3400
Hydrocarbons as Naphtha, mg/kg	<3400
Hydrocarbons as Varsol, mg/kg	<3400
Hydrocarbons as Fuel Oil, mg/kg	<3400
Hydrocarbons as Jet Air Fuel, mg/kg	890000
Date Extracted	12.20.93
Date Analyzed	01.28.94
Method Number	MOD 8100
Dilution factor	1

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LOG NO: D3-23961A

Received: 20 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23961A-2	UGW-22	12-15-93

PARAMETER	23961A-2
Hydrocarbons (Mod 8015 - Extractable)	
Hydrocarbons as Kerosene, mg/l	<0.5
Hydrocarbons as Diesel Fuel, mg/l	<0.5
Hydrocarbons as Heavy Oils, mg/l	<5.0
Hydrocarbons as Mineral Spirits, mg/l	<0.5
Hydrocarbons as Naphtha, mg/l	<0.5
Hydrocarbons as Varsol, mg/l	<0.5
Hydrocarbons as Fuel Oil, mg/l	<0.5
Hydrocarbons as Jet Air Fuel, mg/l	16
Date Extracted	12.20.93
Date Analyzed	12.27.93
Method Number	MOD 8100
Dilution factor	1

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& ENVIRONMENTAL SERVICES, INC.

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LOG NO: D3-23961A

Received: 20 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC-O SAMPLES
23961A-3	Lab Blank
23961A-4	Accuracy - % Recovery (Mean)
23961A-5	Precision - Relative % Difference
23961A-6	Detection Limit

PARAMETER	23961A-3	23961A-4	23961A-5	23961A-6
Hydrocarbons (Mod 8015 - Extractable)				
Hydrocarbons as Kerosene, mg/kg	<3400	---	---	3400
Hydrocarbons as Diesel Fuel, mg/kg	<3400	75 %	8.0 %	3400
Hydrocarbons as Heavy Oils, mg/kg	<45000	---	---	45000
Hydrocarbons as Mineral Spirits, mg/kg	<3400	---	---	3400
Hydrocarbons as Naphtha, mg/kg	<3400	---	---	3400
Hydrocarbons as Varsol, mg/kg	<3400	---	---	3400
Hydrocarbons as Fuel Oil, mg/kg	<3400	---	---	3400
Hydrocarbons as Jet Air Fuel, mg/kg	<3400	---	---	3400
Date Extracted	12.20.93	---	---	---
Date Analyzed	12.27.93	---	---	---
Method Number	MOD 8100	---	---	---

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LOG NO: D3-23961A

Received: 20 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23961A-7	Lab Blank
23961A-8	Accuracy - % Recovery (Mean)
23961A-9	Precision - Relative % Difference
23961A-10	Detection Limit

PARAMETER	23961A-7	23961A-8	23961A-9	23961A-10
Hydrocarbons (Mod 8015 - Extractable)				
Hydrocarbons as Kerosene, mg/l	<0.5	---	---	0.5
Hydrocarbons as Diesel Fuel, mg/l	<0.5	64 %	6.3 %	0.5
Hydrocarbons as Heavy Oils, mg/l	<5.0	---	---	5.0
Hydrocarbons as Mineral Spirits, mg/l	<0.5	---	---	0.5
Hydrocarbons as Naphtha, mg/l	<0.5	---	---	0.5
Hydrocarbons as Varsol, mg/l	<0.5	---	---	0.5
Hydrocarbons as Fuel Oil, mg/l	<0.5	---	---	0.5
Hydrocarbons as Jet Air Fuel, mg/l	<0.50	---	---	0.50
Date Extracted	12.20.93	---	---	---
Date Analyzed	12.27.93	---	---	---
Method Number	MOD 8100	---	---	---

Method References: EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC. 8761
QUIMICO LICENCIADO

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LOG NO: D3-23961B

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
23961B-1	UGW-22	12-15-93

PARAMETER	23961B-1
Purgeable Aromatics (602/8020)	
Benzene, ug/l	13J
Ethylbenzene, ug/l	41
Toluene, ug/l	14J
Xylenes, ug/l	2.5J
Methyl-Tert-Butyl-Ether (MTBE), ug/l	80J
Date Analyzed	12.28.93
Method Number	EPA 8020
Dilution factor, ug/l	25
Iron	
Iron, mg/l	0.23
Date Analyzed	12.30.93
Method Number	EPA 6010

Due to sample dilution, results flagged with a "J" were below the sample PQL.

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LOG NO: D3-23961B

Received: 16 DEC 93

Mr. Eric Regensburger
Blasland, Bouck & Lee
4730 NW Boca Raton Boulevard
Boca Raton, FL 33431

Project: #399.01.04 (Roosevelt Roads)
Sampled By: ER/TT

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
23961B-2	Lab Blank
23961B-3	Accuracy - % Recovery (Mean)
23961B-4	Precision - Relative % Difference
23961B-5	Detection Limit

PARAMETER	23961B-2	23961B-3	23961B-4	23961B-5
Purgeable Aromatics (602/8020)				
Benzene, ug/l	<1.0	98 %	5.1 %	1.0
Ethylbenzene, ug/l	<1.0	---	---	1.0
Toluene, ug/l	<1.0	98 %	5.1 %	1.0
Xylenes, ug/l	<1.0	---	---	1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	10
Date Analyzed	12.28.93	---	---	---
Method Number	EPA 8020	---	---	---
Iron				
Iron, mg/l	<0.050	98 %	7.1 %	0.050
Date Analyzed	12.30.93	---	---	---
Method Number	EPA 6010	---	---	---

Method Reference: EPA SW-846.

Paul Canevaro

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Lic. Mary E. Laboy
Mary E. Laboy
LIC 3161
QUIMICO LICENCIADO

Final Page Of Report

LAW & COMPANY
Consulting and Analytical Chemists
1763 MONTREAL CIRCLE TUCKER, GA. 30084
404-934-8200 FAX: 404-270-1700

Chemical Report

12/21/93

Number: 802420-1 Received: 12/21/93

47250
Ms. Rhonda Moll
Savannah Labs
414 S.W. 12th Avenue
Deerfield Beach, FL 33442

Description: Project #D3-23961, 12/15, 9:30

Sample I.D	Laboratory I.D	Viscosity (kinematic) (cSt)
UGW-22 (product)	802420	1.53
UGW-22	802421	0.68

Analysis performed 12/21/93, 1100 hrs.

*****

Respectfully Submitted,
LAW & COMPANY

By:

5 5400eh

Samples are retained for a period of thirty to sixty days after completion of testing. After that time, samples are disposed of in an environmentally sound manner unless other arrangements are made by the client.

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER: 399.01.04
PROJECT NAME: Roosevelt Roads
PAGE 1 OF 1

CLIENT NAME: BB+L
TELEPHONE/FAX NO.: 407-994-2711
CLIENT ADDRESS: 4730 NW 2nd Ave
CITY, STATE, ZIP CODE: Boca Raton 33431
SAMPLER(S) NAME(S): E. Regensburger / Tim Twist
CLIENT PROJECT MANAGER: E. Regensburger

☒ STANDARD TAT
☐ EXPEDITED TAT *
REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

MATRIX TYPE: AQUEOUS MATRIX / NONAQUEOUS MATRIX / OIL MATRIX / AIR MATRIX

REQUIRED ANALYSES — NUMBER OF CONTAINERS SUBMITTED

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	GW Modified 8015	Viscosity	8 RCRA metals	TOC	Alk, pH, hardness, TDS, [redacted]	Total S				
12/15/93	0930	UGW-22 (product)		[redacted]	X		2	2	2							
12/15/93	0930	UGW-22	X				2	2	1	1	1	1	1			

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
EMPTY BOTTLES Carolyn Henderson	12-7-93		(BB+L)	12/9/93		(BB+L)	12/15/93	1800
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

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[signature]	12/16/93	1000	☐ YES ☐ NO		D3-23961	

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