

**PHASE II REMEDIAL INVESTIGATION
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS
VOLUME III OF III**

April 1995

**Prepared for
Tutu Environmental Investigation Committee**

**Prepared by
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**SITE INSPECTION REPORT
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



**SITE INSPECTION REPORT
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**SITE INSPECTION REPORT
PHASE II REMEDIAL INVESTIGATION
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

1.0 INTRODUCTION

As specified in the Phase II Remedial Investigation (RI) for the Tutu Wells Site Work Plan (Geraghty & Miller, Inc. 1993), site inspections were conducted at eight facilities in Tutu, St. Thomas, U.S. Virgin Islands (USVI). The site inspections were carried out because results from previous investigations suggested that these sites might have been sources of the petroleum-related compounds and chlorinated volatile organic compounds (VOCs) detected in soil and groundwater in the Tutu Wells Site. The purpose of the site inspections was to gather information regarding the potential for each site as a likely source of contamination, and if so, whether additional field work was warranted to delineate the potential contaminant sources.

2.0 INVESTIGATED SITES

The site inspections included examination of the properties for such features as aboveground storage tanks (ASTs), underground storage tanks (USTs), manholes, vents, septic systems, dry wells, oil/water separators, drum storage areas, and oil pits/sumps. Any evidence of on-site waste disposal or releases, such as stained soils or stressed vegetation, were noted during the site inspections.

The following eight sites were inspected:

- Faith Christian Fellowship Church
- Virgin Islands Housing Authority (VIHA)
- Curriculum Center (Former LAGA Building)
- Tracy Dodd Property
- Antilles Auto Parts
- U.S. Virgin Islands (USVI) Department of Human Services



- Archie's Welding and Auto Body Repair
- Unknown Property

Formal site inspections were performed at the Faith Christian Fellowship Church, VIHA, Curriculum Center, and Tracy Dodd Property. At the four other properties, site inspections were not conducted because site access could not be obtained, or sufficient information was obtained while performing other RI activities at the property (such as groundwater sampling or water-level measurements during aquifer testing) to assess whether the sites are potential sources. The results of the investigations at each of these sites is described below. Site inspection forms are provided in Attachment A, and relevant correspondence is provided in Attachment B.

2.1 FAITH CHRISTIAN FELLOWSHIP CHURCH

The Faith Christian Fellowship Church is located about 500 feet north of the VIHA property and is not shown on any of the study area maps in the Phase II RI Work Plan (Geraghty & Miller 1993). Mr. Brian Turnbull, vice president of the church, and Ms. Essansonne, church administrator, were contacted on April 13, 1994 for information regarding the site.

The Faith Christian Fellowship Church purchased the property in 1992 from Storage Facilities, Inc. which was a subsidiary of Island Block Corporation. Mr. Turnbull indicated that the building was used for storage of materials by a hardware store owned by Island Block Corporation. According to Arthur D. Little, Inc. (ADL), Storage Facilities, Inc. purchased the building in 1988 from Ms. Sue Mortimer (Arthur D. Little, Inc. 1993). According to Mr. Turnbull, the West Indies Company originally owned the property and constructed the building to use as a staging ground for the construction of many of the houses in the Tutu area in mid-1970s. Mr. Turnbull did not know when the West Indies Company ceased their operations at the site.

In April 1994, approximately two-thirds of the building was used by the Faith Christian Fellowship Church for their meeting area, kitchen, and offices. The other part of the building (on the west side) is leased to D & C Marine, which is engaged in welding and fiberglass repair for boats, and to Better Roots and Fruits, a produce wholesaler.

There are no known USTs or septic tanks on the property. The sanitary sewer is connected to the public sewer system. An AST is located on a concrete pad at the southeast corner of the building. Piping from the roof drain is connected to this AST. According to Mr. Turnbull, this tank has always been used for storage of rain water collected on the roof of the building.

2.2 VIRGIN ISLANDS HOUSING AUTHORITY

The VIHA is located on Route 38 and is east of the Curriculum Center. A site inspection of the VIHA complex in Tutu was conducted by Geraghty & Miller personnel on March 18, 1994. Ralda Simmonds, legal counsel for the VIHA, was contacted to obtain access to the site. Ms. Simmonds provided information regarding past and present operations, and toured the property with the Geraghty & Miller site inspector.

The VIHA property includes a main building, service bay, drum storage shed, storage shed, waste oil storage area, and an unused water purification plant. The VIHA acquired the property from Joseph Sanson in 1978, and began using the upper two floors of the main building for offices in 1981. The VIHA maintenance department moved into the first floor of the building in 1982. Prior to purchase of the facility in 1978 by the VIHA, a car repair shop (Tropical Motors) operated at the site (Arthur D. Little, Inc. 1993). However, there is no further information available about when the shop was operating.

Potential sources inspected include a vehicle maintenance area, a former UST, and a waste oil drum storage area. Light maintenance of VIHA vehicles is conducted at the site. A service bay with a pit for accessing the underside of vehicles is located about 50 feet to the west



of the main VIHA building. At the time of the visit, the sump in the service bay contained water with a sheen of oil on top. Oil stains are common in the paved area between the service bay and a vehicle maintenance area located on the west side of the main building.

A UST is located on the property on the west side of the main building at the entrance to the vehicle maintenance area. The UST is reported to have been used by Tropical Motors. A sample of the contents was taken in 1987 (Geraghty & Miller, Inc. 1993). The contents were sampled and removed in 1989 by Safety Kleen when the UST was abandoned in place. A copy of the analysis of the contents by Safety Kleen is included with the Site Inspection Form in Attachment A. The tank contents were also sampled by Weston/Spill Prevention & Emergency Response (SPER) personnel in 1987. The contents were identified as waste oil (Geraghty & Miller, Inc. 1993). Based on the site information compiled, a soil-gas survey was recommended and performed a part of the Phase II RI. The results of the soil-gas survey showed no detectable VOCs in the soil gas in the vicinity of the UST (see Appendix B).

A concrete pad was constructed by the VIHA (date unknown) for storage of drums containing waste oil from the vehicle maintenance operations. The pad does not contain a cover nor any type of berm to contain spills. A drum storage shed is located on the northwest corner of the property and contains about 20 drums of unknown contents. There was no visual evidence of spills or leakage from the drums. ADL collected liquid samples from 11 drums in 1993 (Arthur D. Little, Inc. 1994). Chlorinated VOCs including tetrachloroethene (PCE), 1,1,1-trichloroethane (TCA), and 1,2-dichloroethene (1,2-DCE) were detected in four drum samples.

2.3 CURRICULUM CENTER (FORMER LAGA BUILDING)

The Curriculum Center (Former LAGA building) is located on the north side of Route 38, just west of VIHA. Geraghty & Miller conducted a site inspection of the Curriculum Center on March 11 and 18, 1994. Alda Donastorg, Maintenance Supervisor, was contacted by Geraghty & Miller personnel to obtain site access and to identify any individuals that could

provide information. Mr. Donastorg indicated that Mr. Lagos, a Curriculum Center employee, was the most knowledgeable individual about the history of operations at the facility. Mr. Lagos was unwilling to discuss the site because of restrictions by the Department of Justice on discussing the matter without prior permission. However, Mr. Lagos said that he knew very little about previous operations.

The Curriculum Center is owned by the USVI Department of Education and is used for offices, maintenance work areas, and storage of frozen food and other materials. The Department of Education has occupied the building since 1982. The Panex Company owned the facility from 1979 to 1982, but there is no available information about the nature of their operations. The building was originally constructed by the West Indies Company, Inc. in about 1970, for LAGA Industries, Ltd. (Arthur D. Little, Inc. 1993). LAGA Industries had a textile manufacturing operation in the building from 1971 to 1979. A dry cleaning facility in the northwest corner of the building was a part of the operation.

Potential source areas include a drum disposal area at the northwest corner of the building, a former discharge pipe suspected to be associated with dry cleaning operations, a sink that discharges water directly outside the building, and a reported former waste pit. Sampling activities carried out by ADL (1993; 1994) and Geraghty & Miller (1993) suggest that the north side of the Curriculum Center is an area of possible releases of VOCs to the environment. Soil samples taken from that area show elevated levels of PCE, TCE, and 1,2-DCE. A waste pit was reported to have been used by LAGA Industries for storage of fluids from the dry cleaning operation (Arthur D. Little, Inc. 1993). A portion of a 4-inch diameter steel pipe exits the west wall of the building and extends about 20 feet to the north where it has been welded shut. From the location of the pipe, it appears to have been associated with the process fluids from the dry cleaning operation. Another area of concern is along the north wall of the building, where a sink inside the building discharges outside directly to the ground. This sink is used by the Curriculum Center maintenance workers for cleaning materials in an area where paint and chemicals are stored and used. Based on the site inspection information, a soil gas survey was



recommended and implemented. The soil gas survey showed the presence of chlorinated VOCs in soil gas at several places north and west of the building (see Appendix B).

2.4 TRACY DODD PROPERTY

The Tracy Dodd property is located on an unnamed road approximately 200 feet northeast of a five-way intersection of Route 38, Route 382, and the unnamed road. Site inspections of the Tracy Dodd property were conducted on March 27 and April 13, 1994. Geraghty & Miller personnel met with Mr. Dodd on April 13 to discuss present and past uses and owners.

Mr. Dodd purchased the property in 1988 from a company (Top Banana) that operated a fruit wholesale company. The property had been vacant for several years prior to the sale. Mr. Dodd did not know any details about uses and ownership of the property prior to the occupancy by Top Banana, other than that the Winter family had owned the property in the 1960s and 1970s and had used the buildings for residences. Title records show that Branko Inc. owned the property briefly in 1978, and MBT Motors, Inc. owned the property from 1984 to 1986 (Arthur D. Little, Inc. 1993).

Mr. Dodd operated a used car lot at the site from approximately 1988 to 1993. There are currently four buildings and two trailers on the property. At present, all buildings are leased to various tenants. The house on the northeast side of the property is leased to HMS Pest Control Systems, which uses the house and surrounding grounds for office space and storage of chemicals for their domestic pest control business. The building on the northwest side of the property is occupied by Caribbean Sunset, Ltd., Country Radiator and Auto Glass, which is a car radiator repair shop. The building on the west side of the property is used as an equipment storage and vehicle maintenance area for a St. Thomas dive shop. On the south side of the property, Auto Kool, Inc. operates a car air conditioner repair shop. Two trailers are located on the western and central portions of the property; these were leased by Geraghty & Miller for office and storage space during the Phase II RI.



Mr. Dodd did not know of any problems with hazardous material at the site prior to his ownership. During visits to the property, he indicated that he never observed any problems with his tenants' handling or storage of chemicals or waste oils from their operations. During the site inspection conducted on March 27, 1994, 55-gallon drums were observed at the HMS Pest Control Systems property. One drum contained acetone; the contents of the others were unknown. Four apparently empty 55-gallon drums were also observed at the south-central portion of Auto Kool.

2.5 ANTILLES AUTO PARTS

Antilles Auto Parts is located on the east side of Route 382, approximately 150 feet north of the intersection with Route 38. A letter dated March 10, 1994 was provided by the property owners, Siegfried and Waltraud Torinus, that provided a history of the site since it was purchased in 1968 (Torinus 1994). This property was purchased from West Indies Enterprises, Inc., a land developer. In 1969, West Indies Enterprises constructed a building and a cistern. The Torinus letter indicated that no hazardous materials were stored on site during this time.

In February 1971, a portion of property including the building was leased to Fred Eglin and Seth Larrabee for use as an auto parts retail shop known as E. & L. Auto Parts. According to the Torinus letter, only auto accessories were sold; there was no repair work conducted (Torinus 1994).

In March 1978, a new tenant (Tutu Autos) took over the lease and sold auto parts, tires, and batteries. The front portion of the site was paved at this time. Around 1980, Tutu Auto began selling some British cars, which were shipped from Tortola, British Virgin Islands (BVI). According to the Torinus letter, there was reportedly no storage of oil or hazardous materials (Torinus 1994).

Tutu Autos was purchased in 1981 by Consolidated Parts/Prime Automotive Warehouse, Inc. The entire Torinus property was leased, and the back portion of the property was paved.



In addition to selling auto parts, repair work was conducted including brake, front-end, and muffler repair. The March 10 letter reported that there was some storage of waste oil drums (Torinus 1994).

In May 1988, Thomas Gassett took over the lease. Site activities included selling cars and spare parts, under the business name GS Industries, Inc. Mr. Gassett installed a 10,000-gallon aboveground waste oil UST (Arthur D. Little, Inc. 1993). The property was subleased to Antilles Automotive at an unknown time (between 1991 and 1993). Antilles currently performs automotive repair. According to the March 10, 1994 letter, the waste oil tank was emptied by Safety Kleen on February 9, 1994 (Torinus 1994). The site currently has several vehicle maintenance bays, one reported UST (Arthur D. Little, Inc. 1993), and the waste oil AST.

Site access agreements were required from three separate parties at Antilles Auto Parts. These included the owners (Siegfried and Waltraud Torinus), the lessee (Thomas Gassett), and the tenant (Brad Creeger of Antilles Auto Parts). The lessee resisted signing the site access agreement, and the USEPA intervened and required site access for the purpose of sampling the aboveground waste oil tank. Geraghty & Miller collected a sample from the waste oil tank on June 22, 1994. Analysis of this sample showed the presence of petroleum-related compounds, PCE, and TCA. Results are discussed in Section 5.1.4 of the RI Report.

Previous sampling was conducted in 1987 by Weston/SPER personnel (Weston/SPER 1988). Water samples were collected from a gutter and a storm drain. Soil and water samples were collected by Camp, Dresser & McKee (CDM) in 1988 and 1989 (Camp, Dresser & McKee Federal Programs Corporation 1989). In addition, a preliminary site assessment was performed in 1989 by NUS Corporation. This assessment indicated that there had been a surface release of waste oil which apparently flowed onto the adjacent Ramsay Motors property (NUS Corporation 1989). ADL conducted a site visit in October 1993 (Arthur D. Little, Inc. 1993) that confirmed the existing information.



2.6 USVI DEPARTMENT OF HUMAN SERVICES

Difficulty was encountered obtaining site access to the USVI Department of Human Services property at the time the inspections were being conducted. However, a questionnaire requesting site information was submitted to the Department on May 9, 1994 and the Department responded to the questionnaire on May 24, 1994. This form is provided in Attachment B.

The information provided indicates that the Department of Human Services purchased the property from Mr. Earle Ottley on November 29, 1989. The property is currently used by the Center for Independent Living, which provides a rehabilitation program for the handicapped, and a Senior Citizen center. Prior to purchase by the Department of Human Services, the property was occupied by Superior Printing and the Senior Citizen Center. This site was referred to by ADL as Classic Printers because they observed a sign on the side of the building (Arthur D. Little, Inc. 1993). The uses and ownership prior to Mr. Ottley are unknown.

Based on the responses provided by the Department of Human Services, there are currently no drums, other containers, or storage of hazardous materials. In addition, there have never been any underground or aboveground storage tanks at the site. The Department indicated that hazardous materials may have been used in previous operations conducted by the print shop.

There is a cistern and a septic tank on the property. The supply well (Ottley well) could not be located by Geraghty & Miller personnel during the comprehensive groundwater sampling event conducted during the Phase II RI in 1994. A standpipe exists along the south side of the access road near Route 38. This standpipe is believed to have been used to fill water trucks with groundwater pumped from the Ottley well. A site representative (name unknown) indicated that the pipe had not been used for approximately 20 years, and based on visual observation by Geraghty & Miller personnel, it appeared the pipe had not been used recently. It is suspected that the well may have been paved over during construction of the driveway.



2.7 ARCHIE'S WELDING AND AUTO BODY REPAIR

A formal site inspection was not performed at Archie's Welding Shop. However, Geraghty & Miller personnel made general observations while collecting water-level measurements from the onsite supply wells during the aquifer test of the Eglin wells. Archie's conducts welding, auto body repair, and painting of automobiles. In addition, some minor mechanical repairs are conducted, such as oil changes. Some concrete staining was observed, and scrap metal was observed throughout the property.

ADL personnel toured the facility in October 1993 and observed paints, primers, thinners, and one empty 30-gallon drum of engine degreaser (Arthur D. Little, Inc. 1993). The personnel noted that scrap metal, auto parts, and empty containers were littered throughout the yard. There was no information regarding the waste management systems, septic systems, or underground piping (Arthur D. Little, Inc. 1993).

2.8 UNKNOWN PROPERTY

An unknown property was observed approximately 300 feet to the east of Archie's Welding. Based on a review of a 1954 aerial photograph, this property was one of the few buildings in the Tutu area when most of the area was pasture land. Since there was no public water supply available in 1954, this property may have had a supply well. Review on a 1992 aerial photograph indicates the presence of light-colored circular objects, approximately 3 feet in diameter to the south of the building.

On inspection during the Phase I RI, it was determined that the property was a residence. Geraghty & Miller personnel interviewed the tenant, who indicated that there was no supply well onsite. No septic tank was observed. The property is owned by Drs. Gorrochategui and Vigoreaux, who reside elsewhere.



3.0 CONCLUSIONS

The conclusions regarding the eight properties are discussed below.

3.1 FAITH CHRISTIAN FELLOWSHIP CHURCH

Based on the present information, it does not appear that there are any potential sources at the church property. There are no known USTs or septic tanks, and the sanitary sewer is connected to the public sewer system. The AST reportedly is a water tank. Therefore, no additional work is required.

3.2 VIRGIN ISLANDS HOUSING AUTHORITY (VIHA)

Three potential source areas were identified at the VIHA including a former UST, a vehicle maintenance area, and waste oil storage drums. Although oil stained soils indicated the possibility that isolated small spills had occurred at the vehicle maintenance area, no impact to groundwater has been observed. In addition, no VOCs were detected in soil or soil-gas samples collected at the site. Therefore, the VIHA is not considered a potential source area and no additional work is required for delineation.

3.3 CURRICULUM CENTER (FORMER LAGA BUILDING)

Potential source areas were identified at the Curriculum Center, including the drum disposal area at the northwest corner of the building, a former discharge pipe and sink located on the north wall of the building, and the reported waste pit north of the building. The constituents of concern are dry cleaning chemicals, such as PCE, and PCE's breakdown (daughter) products, including TCE and DCE. At the northwest corner, there is no direct evidence of a release, and the presence of PCE and its daughter products in the groundwater can not be tied to this area because of other onsite sources. The former waste pit is likely a source of PCE, TCE, and DCE impact to groundwater based on reports by Arthur D. Little (1993) and



Geraghty & Miller (1993). Additional work may be warranted to delineate the extent of impacted soils in the vicinity of the waste pit and to identify maximum VOC concentrations in soil north of the Curriculum Center building.

3.4 TRACY DODD PROPERTY

The Tracy Dodd property has been dismissed as a potential source and no additional work is required.

3.5 ANTILLES AUTO PARTS

Based on the investigations and inspections conducted at Antilles Auto Parts, there are no potential sources of impact to groundwater. The waste oil sampling conducted during Phase II of the RI satisfied the data gap regarding waste oil content.

3.6 UNITED STATES VIRGIN ISLANDS DEPARTMENT OF HUMAN SERVICES

Based on information provided by the Department of Human Services, there does not appear to be a potential source of impact to groundwater. As such, no additional work is required.

3.7 ARCHIE'S WELDING AND AUTO BODY REPAIR

Although departures from good housekeeping practices were observed at Archie's, there is no specific information that suggests that this property is a source of impact to groundwater.

3.8 UNKNOWN PROPERTY

The unknown property was determined to be a residence and there are no potential sources. As such, additional investigation at this property is not required.



4.0 REFERENCES

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- NUS Corporation. 1989. Preliminary Assessment Report for Gassett Motors, St. Thomas, US Virgin Islands, TDD No. 02-8902-41, March 24, 1989.
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- Weston/SPER. 1988. Memorandum from Arnaldo Martinez, TAT II Project Manager and Douglas Henne, TAT Quality Control Officer, to Carlos O'Neill, USEPA Caribbean Field Office, January 27, 1988.

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ATTACHMENT A-1

**SITE INSPECTION FORMS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



SITE INSPECTION OF COMMERCIAL AND INDUSTRIAL PROPERTIES

AT TUTU WELLS SITE

NAME OF SITE: Faith Christian Fellowship Church

Date of Visit: April 13, 1994

A. Site History

- Names and titles of individuals contacted.

Mrs. Essansonne - Church Administrator

Brian Turnbull - Vice President of Church

- Previous occupants and dates of occupancy.

West Indies Co. - started in mid-1970s until ?

Hardware store - 1988 to 1992, owned by Island Block Corp.

- Past operations.

West Indies Co. used building and grounds as staging area for construction of homes in Tutu. The hardware store used the building for storing materials.

- Review listings in business manuals, telephone books, etc., where necessary.

NA

B. Current use of site

- Describe operations.

The eastern two-thirds of the building is used as the church meeting area and for offices. CFC Church leases west side of building to D+C Marine (welding and fiberglass operation) and to Better Roots and Fruits (produce wholesaler).

- Available documents and permits (maps, environmental permits, compliance documents, past environmental audits, material safety data sheets).

NA

- Relevant geological information.

Provided in Phase II RI report

- Soil type (field observations); paved areas, etc.

provided in phase II RI report

- Estimated depth to bedrock (outcrops onsite?, nearest outcrop).

2 to 5 ft estimated

- Depth to water table.

Unknown

C. Field Observation of Adjacent Land Use

The building is surrounded by residential properties.

D. PCBs

- Identify transformers and capacitors that may contain PCBs.

None seen during visit.

E. Above-ground tanks and plumbing:

- Identify past and present materials stored in the tanks.

An above ground tank is located along the south wall of the building at the southeast corner. According to Brian Turnbull the tank has always been used for water storage.

- Visually inspect for leaks.

NA

- Review leak-testing records.

NA

- Determine age, composition, etc. to estimate integrity.

The water tank is made of steel.

- Measure dimensions of tanks (length, width, height or length & diameter).

~ 8 ft diameter ~ 16 ft height

F. Underground storage tanks (USTs):

- Review available leak-testing records.

NA

- USTs (Size, use, age, composition).

Mr. Turnbull did not believe that any USTs were present at the site.

- Identify past and present materials stored in the tanks.

WATER only in AST, no USTs

G. Visual Inspections:

- Identify stains, discolored soils and distressed vegetation.

None

- Identify waste pits, landfills, lagoons or other impoundments.

None

- Identify hazardous waste treatment, storage, transfer or disposal facilities on site.

None

H. Water Supply and Disposal

- Identify all wells, septic tanks and similar underground structures on site.

None. Building is connected to the public
sanitary sewer.

- Determine sources of drinking and process water supplies.

Water used at the site is from rainwater that is stored in the tank at the southeast corner of the building.

- Closest known supply wells and distance.

VIHA wells are located about 300 feet south of the building.

I. Conclusions

- Areas of concern identified (possible sources).

None

- Contaminants suspected from sources.

None

- Potential for release.

Not likely

J. Recommendations

No additional investigation recommended.

SITE INSPECTION OF COMMERCIAL AND INDUSTRIAL PROPERTIESAT TUTU WELLS SITENAME OF SITE: VIHADate of Visit: March 18, 1994

A. Site History

- Names and titles of individuals contacted.

Ralda Simmonds - Legal Counsel

- Previous occupants and dates of occupancy.

Tropical Motors - dates unknownVIHA purchased property from Joseph Sanson in 1978

- Past operations.

Details about the Tropical Motors operations are unknown.VIHA used the facility as office space starting in 1981; maintenance department moved in in 1982

- Review listings in business manuals, telephone books, etc., where necessary.

MA

B. Current use of site

- Describe operations.

The top two floors of the building are used for office space. The maintenance department uses the ground floor and the area adjacent to the west side of the building. Light maintenance of VIHA vehicles is performed here. Waste oil is stored in drums on a pad on the north west side of the building. A storage shed on the far northwest side of the

Available documents and permits (maps, environmental permits, compliance documents, past environmental audits, material safety data sheets).

NAproperty contains drums of unknown contents.

- Relevant geological information.

See Phase II RI report

- Soil type (field observations); paved areas. etc.

See Phase II RI report

- Estimated depth to bedrock (outcrops onsite?, nearest outcrop).

Estimated 2 to 5 ft below grade

- Depth to water table.

Data provided for onsite Monitoring Wells MW-13/13D
in Phase II RI report.

C. Field Observation of Adjacent Land Use

Southwest - Curriculum Center; northwest - vacant area
with shrubs and tall grass; north - public housing;
south and southeast - school and residential area

D. PCBs

- Identify transformers and capacitors that may contain PCBs.

None were seen

E. Above-ground tanks and plumbing:

- Identify past and present materials stored in the tanks.

No tanks were seen

- Visually inspect for leaks.

NA

- Review leak-testing records.

NA

- Determine age, composition, etc. to estimate integrity.

NA

- Measure dimensions of tanks (length, width, height or length & diameter).

NA

F. Underground storage tanks (USTs):

- Review available leak-testing records.

NA

- USTs (Size, use, age, composition).

A UST of unknown size, age and composition is located beneath the extended roof on the west side of the building. A PVC cap is the only indication of the presence of the UST.

- Identify past and present materials stored in the tanks.

The UST was used to store waste oils from Tropical Motors. Safety-Kleen removed the contents in 1989. An analytical report is attached.

G. Visual Inspections:

- Identify stains, discolored soils and distressed vegetation.

The concrete in the vicinity of the vehicle maintenance area has oil stains.

- Identify waste pits, landfills, lagoons or other impoundments.

The sump in the outside vehicle maintenance bay contains oily water.

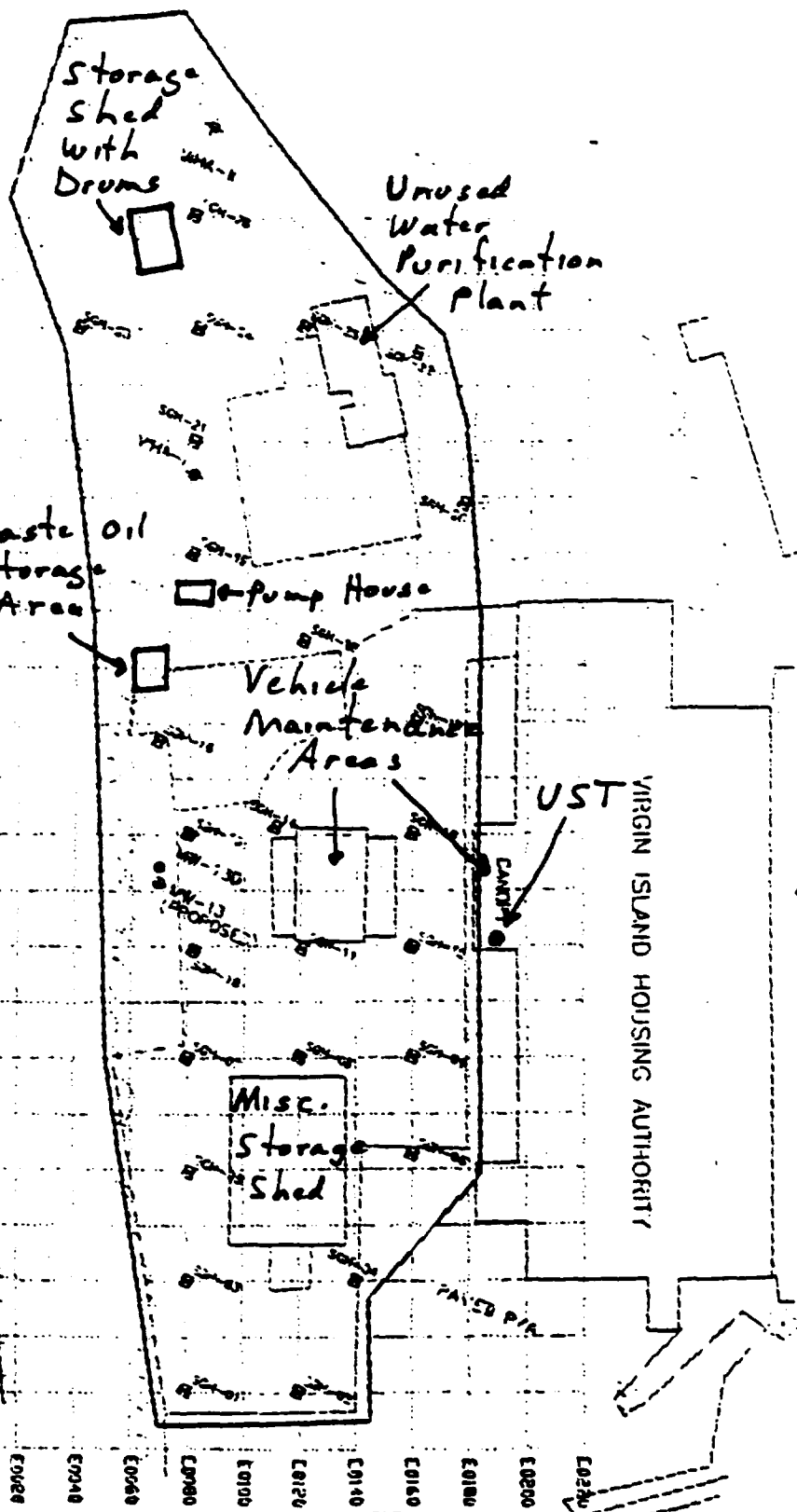
- Identify hazardous waste treatment, storage, transfer or disposal facilities on site.
Waste oil is stored in plastic drums on a concrete pad west of the building. Old drums of unknown contents are stored in a shed on the northwest side of the prop.

H. Water Supply and Disposal

- Identify all wells, septic tanks and similar underground structures on site.

Two water supply wells (V2HA-I and V2HA-II) are not presently in operation. The facility is connected to the public water supply and sanitary sewer.

520
 480
 440
 400
 360
 320
 280
 240
 200
 160
 120
 80
 40
 0



CURRICULUM CENTER
 (FORMER LAGS FACILITY)

PHASE 1 RELIEF
 VIRGIN ISLAND HOUSING AUTHORITY

☐ PC ☐ PR ☐ FUEL
☐ IC ☐ OC ☐ RECYCLE
☐ BRESLUBE ☐ TOLLING
☐ OC



SA USE ONLY

SK Control No: _____

Date Received: _____

OTHER _____

MATERIAL SURVEY

A. Company Name V.I. Housing Authority EPA ID No. (Federal) SAFETY-KLEEN County _____
Billing Address P.O. Box 7668 Charlotte Harbor Facility Address Anna's Retreat rd. 402
Street _____ Street _____
City ST. Thomas State USVI Zip 00801 City ST. Thomas State USVI Zip 00802
Nature of Business Citizen Service S.I.C. Number _____
State ID Numbers: Illinois ID _____ Missouri ID _____ State ID _____
Manifest Address: ☒ Billing Address ☐ Facility Address Manifest to: ☒ Safety-Kleen ☐ Other _____

B. Material Description Waste Oil
Process Description Motor Oil
Volume (gal.) _____ ☐ Wk ☐ Mth ☐ Qtr ☐ Yr ☐ Once
Volume on Hand (gal.) 800
Storage Capacity (gal.) _____ In ☒ Drums ☐ Bulk
Shipping Frequency _____ In ☐ Drums ☐ Bulk

C. Physical Description Color Brown
Layers ☐ One ☒ Two ☐ Three
Physical State ☒ Liquid ☐ Semisolid ☐ Solid
Liquid Viscosity ☐ Low ☒ Medium ☐ High

D. Material Composition (vol%)	Min	Max	Typical
Water			
Non-volatile Material			
Settled Solids			

E. Attach material safety data sheets for material components requiring employee communication under OSHA (Ref. 29 CFR 1910.1200).
Attach any current analysis of the material. ☐ MSDS attached ☐ Analysis attached ☒ No attachments

F. Check all of the following substances which may be in the material.

- ☐ DOT Corrosives, Poisons, Forbiddens, Radioactives, Explosives, or Gases.
- ☐ TSCA regulated materials (PCB, PBB, Chlorinated dibenzodioxins or furans).
- ☐ Materials used exclusively as pesticides, herbicides, insecticides, etc.
- ☐ OSHA carcinogens above exclusion levels (Ref. 29 CFR 1910.1001-).
- ☐ Toxic components with OSHA PEL or ACGIH TLV less than 2 ppm or 8 mg/m³.
- ☐ Toxic metals (Arsenic, Beryllium, Cadmium, Mercury, Selenium).
- ☐ Reactive components (Sulfides, Cyanides, Shock Sensitives, Pyrophorics, etc.).
- ☐ Water reactive components (Isocyanates, Acid Chlorides, Anhydrides, etc.).
- ☐ Biological hazards (Pathogenics, Infectious agents, Etiologic agents, etc.).
- ☐ None of the above ☐ Special Handling Required

Identify if present	Amount	Units

G. DOT Hazardous Material Description (Ref. 49 CFR 172.101)

Proper Shipping Name Waste Oil, N.O.S.

Hazard Class Combustible Liquid Number NA1270

☐ Not DOT Hazardous Material ☐ Need assistance to determine

H. EPA Hazardous Waste Description (Ref. 40 CFR 261)

Waste Number(s) ☐ D001 ☐ D002 ☐ F001 ☐ F002 ☐ F003

☐ F004 ☐ F005

Hazard Code(s) ☒ I ☐ T ☐ C ☐ R ☐ E ☐ H

☒ Not EPA Hazardous Waste ☐ Need assistance to determine

I. Safety-Kleen requires a sample and charges a fee for the qualification of all new material. Purchase Order No. N/A

Type of sample: ☐ grab ☒ tank ☐ composite of 2 #drums Sample taken by ☐ Customer ☒ Safety-Kleen Representative

J. To the best of my knowledge, this is an accurate material description and the sample submitted is representative of the material.

Name Fitzroy Bridges

Title Deputy Director of Plant, Maint. & E

Signature [Signature]

Date 11/16/99 Phone (809) 775 2741

Comments _____

Sales Representative Name Jeffrey Steyer

Representative # 4086 Branch # 625

MATERIAL ANALYSIS

COMPLETE: 12/15/89
CONTROL#: 0012347-1
SAMPLE#: 076465

ACCEPT

UELS
HOUSING AUTHORITY

ENVIRONMENTAL ANALYSIS

GENERAL ANALYSIS OF TOTAL SAMPLE

COLOR: BLACK
WATER CONTENT: 0.8 WT%
NON-VOLATILE RESIDUE: 95.1 WT%
FLAMMABILITY: FLASHED AT 200 F BY CLOSED-CUP
DM SCREEN: 5.8
DM: EXTRACT BY METER 5.8

FUEL EVALUATION OF TOTAL SAMPLE

HEAT CONTENT: 18230 BTU/LB
TOTAL HALOGENS: 0.1 WT%
CHLORINE CL: 0.1 WT%
FLUORINE F: 0.0 WT%
ASH UPON COMBUSTION: 3.8 WT%
BROMINE BR: 0.0 WT%
SULFUR S: 0.0 WT%
COMMENTS: GC SHOWS LOW BOILING POINT ALIPHATIC HYDROCARBONS

METALS CONTENT OF TOTAL SAMPLE (PPM): DIGEST BY: AA

CADMIUM (DO06) CD: < 0.1 CHROMIUM (DO07) CR: 0.7 IRON FE: 45
LEAD (DO08) PB: 2.8 ZINC ZN: 3.1

GENERAL COMPOSITION:

	SPECIFIC GRAVITY	VISCOSITY (CENTIPOISE)	GENERAL COMPOSITION BY: APPEARANCE (VOL%)	TOTAL (WT %)
AQUEOUS PHASE (FREE WATER)			0.0	0.0
ORGANIC PHASE (FEEDSTOCK)			100.0	100.0
BOTTOM SLUDGE (SEMISOLIDS)			0.0	0.0
BOTTOM SOLID (SETTLED SOLIDS)			0.0	0.0
TOTAL	0.880	135 CPS	100.0	100.0

SPECIFIC COMPOSITION OF TOTAL SAMPLE

	COMPOSITION OF: TOTAL SAMPLE (WT%)	TOTAL SAMPLE (WT%)
WATER CONTENT	0.8	0.8
NON-VOLATILE RESIDUE	95.1	95.1
VOLATILE ORGANICS BY DIFFERENCE	4.1	4.1
TOTAL	100.0	100.0

VOLATILE ORGANIC COMPOSITION OF TOTAL SAMPLE BY GAS CHROMATOGRAPHY

SAMPLE PREPARATION METHODS: NEAT
DETECTION METHODS: FID

COMPOUND NAME	CODE	CAS NUMBER	COMPOSITION OF: VOLATILE ORGANICS (AREA%)	VOLATILE ORGANICS (WT%)	TOTAL SAMPLE (WT%)
ALIPHATIC HYDROCARBONS (C3-C20)	ALIP	0-01-1	59.1	54.1	2.2
TOLUENE	TOL	108-88-3	19.8	22.4	0.9
XYLENES (ORTHO-, META-, AND PARA-)	XYLS	95-47-6	15.3	17.4	0.7
ACETONE	ACE	67-64-1	1.8	1.9	0.1
ETHYL ACETATE	ETAC	141-78-6	1.1	1.3	0.1
CYCLOHEXANE	CHEX	110-82-7	1.1	1.1	0.0
PROPYL ALCOHOL, ISO-	IPA	67-63-0	1.1	1.1	0.0
ETHYL ALCOHOL	ETOH	64-17-5	0.7	0.7	0.0
TOTAL			100.0	100.0	4.1

SUMMARY OF VOLATILE ORGANIC COMPOSITION BY COMPOUND CHEMICAL CLASS AREA:

ALCOHOLS	1.8	ALIPHATIC HYDROCARBONS	60.2
AROMATIC HYDROCARBONS	35.1	CHLORINATED SOLVENTS	0.0
ESTERS	1.1	ETHERS	0.0
GLYCOL ETHERS	0.0	INHIBITORS	0.0
KETONES	1.8	NITROGEN COMPOUNDS	0.0

LABORATORY REVIEW: A

LEVEL: SEG CODE: RELEASED: 12/06/89
LAB REVIEWERS: ME MP ANALYZED: 12/06/89

TRACKING INFORMATION:

DATE: 12/05/89 FACILITY: SK MANATI, PR
SURVEY RECEIVED:
SAMPLE RECEIVED:
RESAMPLE SHIPPED:
RESAMPLE RECEIVED:

- Determine sources of drinking and process water supplies.

All water comes from the public water supply.
the two wells on site were shut down in 1988.

- Closest known supply wells and distance.

Wells VIHA I+II are located on the property,
but are not currently being used.

I. Conclusions

- Areas of concern identified (possible sources).

Storage shed with drums of unknown contents
on northwest side of property.

- Contaminants suspected from sources.

None

- Potential for release.

Not likely

J. Recommendations

Sampling of soil and soil gas was performed
during Phase I RI - provided recommendations
in Phase II RI report



ACCEPT

FUELS

ENVIROSYSTEMS

CUSTOMER INFORMATION:

VI HOUSING AUTHORITY
PO BOX 7668
ST THOMAS

VI

ATTN: MR. BRIDGES

SALESPERSON: JEFFREY STEVENS TERRITORY: 0136 COUNTY
NATURE OF BUSINESS: CITIZEN SERVICE
FEDERAL EPA ID: SMALL GEN STATE EPA: ID:
MANIFEST ADDRESS IS MANIFEST TO SAFETY-KLEEN

MATERIAL: WASTE OIL	PROCESS: MOTOR OIL
VOLUME: 800 GALS PER YEAR	VOLUME ON HAND: 0
STORAGE CAPACITY: 0 IN DRUMS	SHIPPING FREQUENCY: YEARLY IN DRUMS
COLOR: BROWN	PHYSICAL STATE: LIQUID
LAYERS: TWO	VISCOSITY: MEDIUM
MATERIAL COMPOSITION(VOL%):	CODE MIN MAX TYPICAL
ALIPHATIC HYDROCARBONS (C5-C20)	ALIP 0.0
RESTRICTED SUBSTANCES: NONE	

P.O. NO:	SUBMITTER: 0136 JEFFREY STEVENS	DATE: 12/05/89
TYPE OF SAMPLE: TANK	NUMBER OF DRUMS SAMPLED: 2	TAKEN BY: SALESREP
CONTACT: MR BRIDGES	TITLE: DEPUTY DIRECTOR OF PLANT	PHONE: 809-854-1090
CORPORATE REVIEWS: DISPOSITION REVIEWER DATE	HANDLING CODES: 502/TSC	PRICING CODE:
TECHNICAL: ACCEPT EJE 12/14/89		
REGULATORY: ACCEPT JWH 12/14/89		
OPERATING: ACCEPT LWG 12/14/89		

APPROVED FACILITIES:
(650) SAFETY-KLEEN ENVIR
KMS1 HWY #2
MANATI PR 00701
FED EPA#: PRD090399718
STATE EPA#:
TELEPHONE: 809/854-1090
IL. AUTH#:

APPROVED 0001057 DRUM OR BULK
JT-EPA: RO WASTE COMBUSTIBLE LIQUID. N.O.S.
ISC. NA1993 (EPA 4005)

COMMENTS: OK FOR FUEL.

THIS SERVES AS NOTICE PER 40CFR264.12(B), THAT THE FACILITY(IES) NOTED ABOVE
HAS THE APPROPRIATE PERMITS AND IS WILLING TO RECEIVE THE MATERIAL DESCRIBED.

TUT 005 0806

SITE INSPECTION OF COMMERCIAL AND INDUSTRIAL PROPERTIES

AT TUTU WELLS SITE

NAME OF SITE: Curriculum Center

Date of Visit: March 11 and 18, 1994

A. Site History

- Names and titles of individuals contacted.

Alda Donastorg - Maintenance Supervisor

No one at the site knows much about the past operations, or they were unwilling to divulge any information.

- Previous occupants and dates of occupancy.

LAGA Industries, Ltd. 1971 - 1979; Panex Co. 1979 - 1981; USVI Dept. of Education 1982 to present.

- Past operations.

Textile manufacturing and dry cleaning, 1971 - 1979.

Operations by Panex are not known.

- Review listings in business manuals, telephone books, etc., where necessary.

NA

B. Current use of site

- Describe operations.

The Curriculum Center has offices for the V.I.

Department of Education, maintenance facilities (machine shop, carpentry, painting), and freezers for food storage for school cafeterias.

- Available documents and permits (maps, environmental permits, compliance documents, past environmental audits, material safety data sheets).

Arthur D. Little report - Ground Water Contamination

Occurrence and Sources in the Tutu Area, St.

Thomas, USVI, 1973.

- Relevant geological information.

Provided in Phase II RC report

- Soil type (field observations); paved areas, etc.

Provided in Phase II RI report

- Estimated depth to bedrock (outcrops onsite?, nearest outcrop).

2 to 5 ft.

- Depth to water table.

Monitoring Wells MW-1, MW-10, MW-14 (destroyed), and MW-16 - see table 4-5 of Phase II RI report

C. Field Observation of Adjacent Land Use

NE of site - V.I. Housing Authority; NW of site - Gomez School; S of site across Hwy. 38 - private school; W of site - Ramsey Motors and Antilles Auto Parts; SW of site - Tuto Texaco Service Station and Fire Department.

D. PCBs

- Identify transformers and capacitors that may contain PCBs.

None

E. Above-ground tanks and plumbing:

- Identify past and present materials stored in the tanks.

Deisel fuel tank for emergency generator is located at the NW corner of building.

- Visually inspect for leaks.

No leaks were seen.

- Review leak-testing records.

None available.

- Determine age, composition, etc. to estimate integrity.

Steel tank appears to be only several years
old, and in good condition.

- Measure dimensions of tanks (length, width, height or length & diameter).

~4 ft diameter, ~8 ft long

F. Underground storage tanks (USTs):

- Review available leak-testing records.

N/A

- USTs (Size, use, age, composition).

None

- 4
- Identify past and present materials stored in the tanks.

NA

G. Visual Inspections:

- Identify stains, discolored soils and distressed vegetation.

None were noticed.

- Identify waste pits, landfills, lagoons or other impoundments.

Waste pit is reported to have been present at north side of building during lagoon operations. No evidence of pit can presently be seen at the surface.

- Identify hazardous waste treatment, storage, transfer or disposal facilities on site.

Drums and pails of chemicals are stored at the site in what appears to be an uncontrolled manner. Drums contain some types of herbicide; pails contain a concrete sealer.

H. Water Supply and Disposal

- Identify all wells, septic tanks and similar underground structures on site.

Monitoring Wells only

- Determine sources of drinking and process water supplies.

NA

- Closest known supply wells and distance.

To the northeast, at VIHA.

I. Conclusions

- Areas of concern identified (possible sources).

North side of , near dry cleaning facilities.
Sink with discharge to the ground where paint and
other chemicals are used.

- Contaminants suspected from sources.

PCE and associated VOCs from dry cleaning operations.

- Potential for release.

No longer use dry cleaning facility

J. Recommendations

Work performed during Phase II RI and recommendations
are in the Phase II RI report

[illegible]

**CURRICULUM CENTER
(FORMER LAGA FACILITY)**

cleaning
sink with
discharge
to the
ground

4-inch
diameter
pipe

MAINE ISLAND HOUSING AUTHORITY

ROUTE 30

PAVED PIA

PAVED P/A

SITE INSPECTION OF COMMERCIAL AND INDUSTRIAL PROPERTIES

AT TUTU WELLS SITE

NAME OF SITE: Tracy Dodd's Property

Date of Visit: April 13, 1994

A. Site History

- Names and titles of individuals contacted.

Tracy Dodd - owner

- Previous occupants and dates of occupancy.

Winter family - 1960's and 1970's, residences

Tracy Dodd bought property in 1988 from previous owner who ran a produce wholesale operation called Top Banana. Property was vacant for several years before purchase. Overseas Steel Fabrication - offices and storage of metal and welding materials from about 1991 to 1993. Tracy Dodd operated a used car lot from about 1988 to 1993.

- Review listings in business manuals, telephone books, etc., where necessary.

B. Current use of site

- Describe operations.

HMS Pest Control Systems - office, storage for domestic pest control operation; Auto Kool - car air conditioning repair; storage of equipment for dive shop; Tracy's Radiators - car radiator repair.

- Available documents and permits (maps, environmental permits, compliance documents, past environmental audits, material safety data sheets).

MT

- Relevant geological information.

Provided in Phase II RI report

- Soil type (field observations); paved areas, etc.

Provided in Phase I RI report

- Estimated depth to bedrock (outcrops onsite?, nearest outcrop).

12-ft in well MW-20/20-1

- Depth to water table.

~25 ft in Monitoring well MW-20

C. Field Observation of Adjacent Land Use

West of site - Vitaleco building; north - Tillot's Art Gallery; east - residences; south - Dorothy's Bar and Restaurant

D. PCBs

- Identify transformers and capacitors that may contain PCBs.

None

E. Above-ground tanks and plumbing:

- Identify past and present materials stored in the tanks.

None

- Visually inspect for leaks.

NA

- Review leak-testing records.

NA

- Determine age, composition, etc. to estimate integrity.

NA

- Measure dimensions of tanks (length, width, height or length & diameter).

NA

F. Underground storage tanks (USTs):

- Review available leak-testing records.

NA

- USTs (Size, use, age, composition).

NA

- Identify past and present materials stored in the tanks.

NA

G. Visual Inspections:

- Identify stains, discolored soils and distressed vegetation.

Small stains near all buildings due to parking of vehicles and vehicle maintenance operations.

- Identify waste pits, landfills, lagoons or other impoundments.

None

- Identify hazardous waste treatment, storage, transfer or disposal facilities on site.

None, but drums were reported at the site in the Arthur D. Little report on ground water contamination.

H. Water Supply and Disposal

- Identify all wells, septic tanks and similar underground structures on site.

Water supply is from a cistern filled with rain water.

- Determine sources of drinking and process water supplies.

Cistern is reported to be located under the radiator shop.

- Closest known supply wells and distance.

Supply wells at Four Winds Plaza, 300 feet to the west

I. Conclusions

- Areas of concern identified (possible sources).

None

- Contaminants suspected from sources.

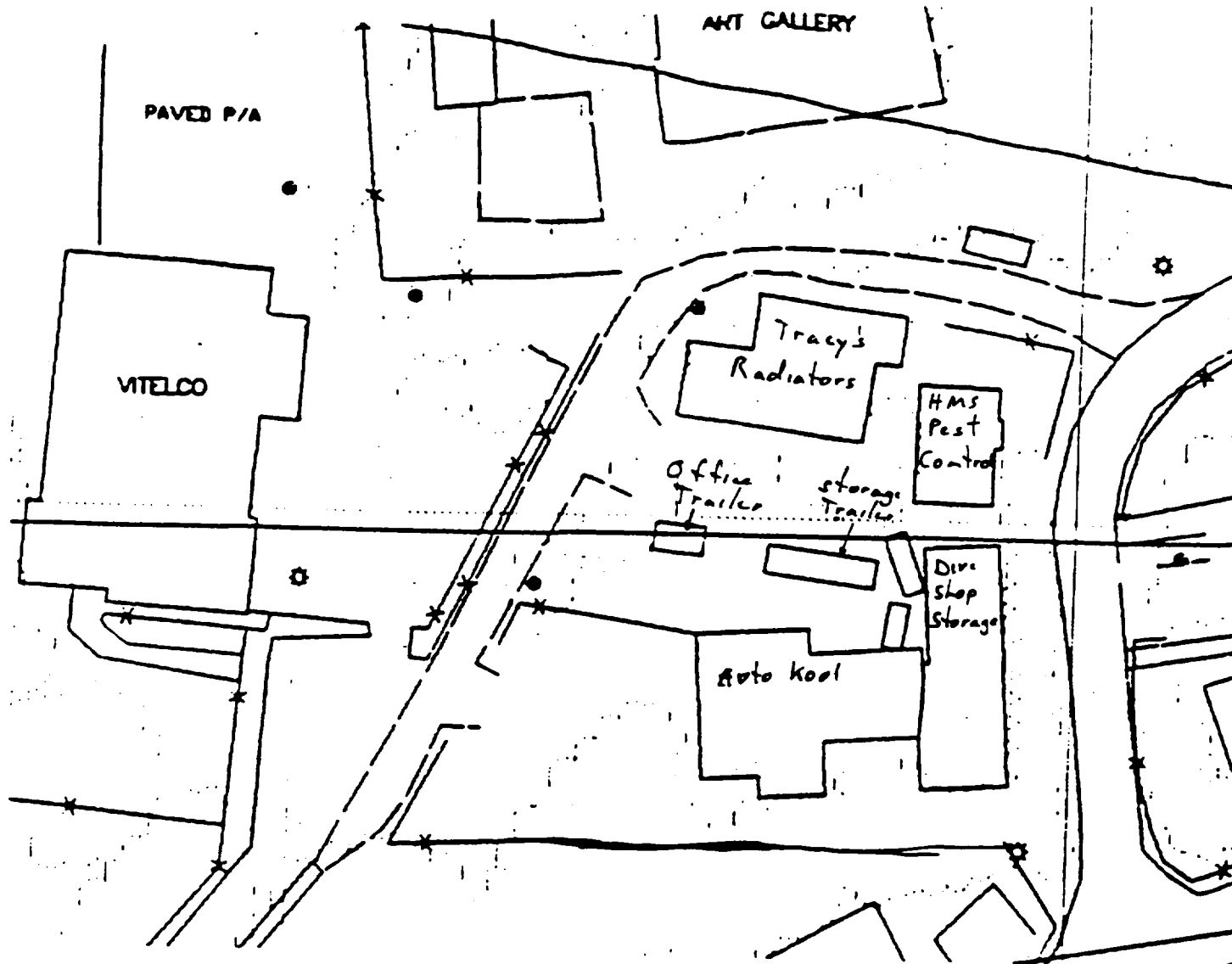
None

- Potential for release.

Not likely

J. Recommendations

No additional work



ATTACHMENT A-2

**SITE INSPECTION CORRESPONDENCE
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



T. DAHANY

March 10, 1994

Siegfried and Waltraud Torinus
presently: Holzhauser Str. 73
32760 Detmold / Germany
Phone and Fax - 49 - 5231 - 47393

GERAGHTY & MILLER, INC.
Environmental Services
201 West Passaic Street, 3rd Floor
Rochelle Park
New Jersey 07662

To: Mr. Thomas V. Dahany Senior Scientist / Project Manager

Re: Phase II Remedial Investigation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands
4.1.4. Antilles Auto Parts (Former Gassett Auto Parts and Former Consolidated Auto Parts)
HISTORY of Parcel 214 Estate Anna's Retreat

Dear Mr. Dahany:

To complete your report we are providing you with the history of our property at Anna's Retreat, Tutu, St. Thomas, U.S. Virgin Islands.

Enclosed you find the history of parcel 214 at Estate Anna's Retreat (2 pages) and 8 pages with pictures (1a, 1b, 2, 3a, 3b, 4, 5, 6) and one drawing (1 page).

Don't hesitate to call us if you need more information.

Please would you kindly confirm the receipt of our mail with enclosures.

Sincerely,

Siegfried and Waltraud Torinus

W. Torinus

cc. Attorney Aurelia Rashid, Esq. at BORNIN BORNIN HANDY & RASHID
8 Norre Gade P. O. Box 1500 St. Thomas, U.S. Virgin Islands
Tel. (809) - 774 - 1400 Fax (809) - 774 - 9607

TUT 005 0820

History of Parcel 214, Estate Anna's Retreat
Tutu, St. Thomas, U.S. Virgin Islands

Page 1

Documents:

Warranty Deed
Dec. 14, 1968

West Indies Enterprises, Inc. developed the Tutu area. Parcel 214 Anna's Retreat was purchased by Siegfried Torinus and Waltraud Torinus from West Indies Enterprises, Inc. in 1968. West Indies Enterprises, Inc. graded and leveled the ground.

Contract 10/20/69
(1a, 1b)

West Indies Enterprises, Inc. constructed the building: a steel building 24'X60' with 16' eave height, including cistern and slab; 2 end walls, office and parts area with siding. Galvanized steel panels.

On July 22, 1970 the place was bulldozed and thereafter the property was fenced and landscaped with Hibiscus hedge around the perimeter. Various Virgin Island trees as Yellow Cedar were planted.

There was no storage of any hazardous material.

Lease 2/26/71
(2)

In 1971 Fred Eglin and Seth Larrabee leased a portion (124.20'X91.38') of parcel 214 Anna's Retreat with the building. They first finished the interior of the building and then started a small autoparts retail shop: E. & L. AUTO PARTS.

The back portion of the parcel (40'X91.38') was left to the owner for future developement. It was landscaped. (1968 - 1981)

During the time of this lease there was no repair work done and no service. There was only the sale of auto parts, auto assessories and hardware and there was no contamination possible. The tenants kept the Hibiscus hedge along the fence and around the building well maintained.

Lease 3/30/78
(3a, 3b)

Keith Maddox and Ernie Sorrentino of Motorholdings, Ltd. Tortola, B.V.I. took over the lease from Fred Eglin and Seth Larrabee and operated the small auto parts business: TUTU AUTOS. A new lease was signed with them in 1978. The business was very small. Tutu Autos sold automotive parts, mostly for foreign cars (Bristish like M.G.), tires and batteries and later (about 1980) some British cars (as Landrovers) which they shipped over from Tortola.

In 1978 the front portion of the parcel was paved (by Meridian Engeneering). During the time of Tutu Autos the tenants took special care of the Hibiscus hedge along the fence and of the plants around the building. They kept the place clean. There was no storage of oil or any hazardous material and no pollution.

Lease 9/1/81
(4)

In 1981 Tutu Autos was purchased by CONSOLDATED PARTS / Prime Automotive Warehouse, Inc. with Doug Smith and Henry Owens and a new lease was signed. They leased the entire parcel (164.20'X91.38'). The back yard was paved and a shade erected.

The business was in the first place wholesale and retail of auto parts, and repair work was secondary. They did brake-, frontend-, and muffler-repair, but mainly they sold auto parts, batteries and tires. The used tires were brought to their branch "Tread-Nu Tire Recapping" at Sub-Base (Tel. 774-0700) for recapping.

The property was still landscaped. There were some drums for garbage and some for waste oil as anywhere else in car places on St. Thomas. At our visits we did not see any pollution.

TUT 005 0821

**Assignment and
Assumption to
Lease 5/2/88**

- (5) In May 1988 Thomas A. GASSETT took over the lease from Consolidated / Prime Automotive Warehouse, Inc. His mayor activities were selling cars and spare parts. His business was named GS Industries, Inc.
Gassettt installed a 5000 gallon above ground storage tank for waste oil. The Hibiscus was removed.
- (6) At the present time ANTILLES Automotive is operating at the site and it is visible that they keep the place in good shape.

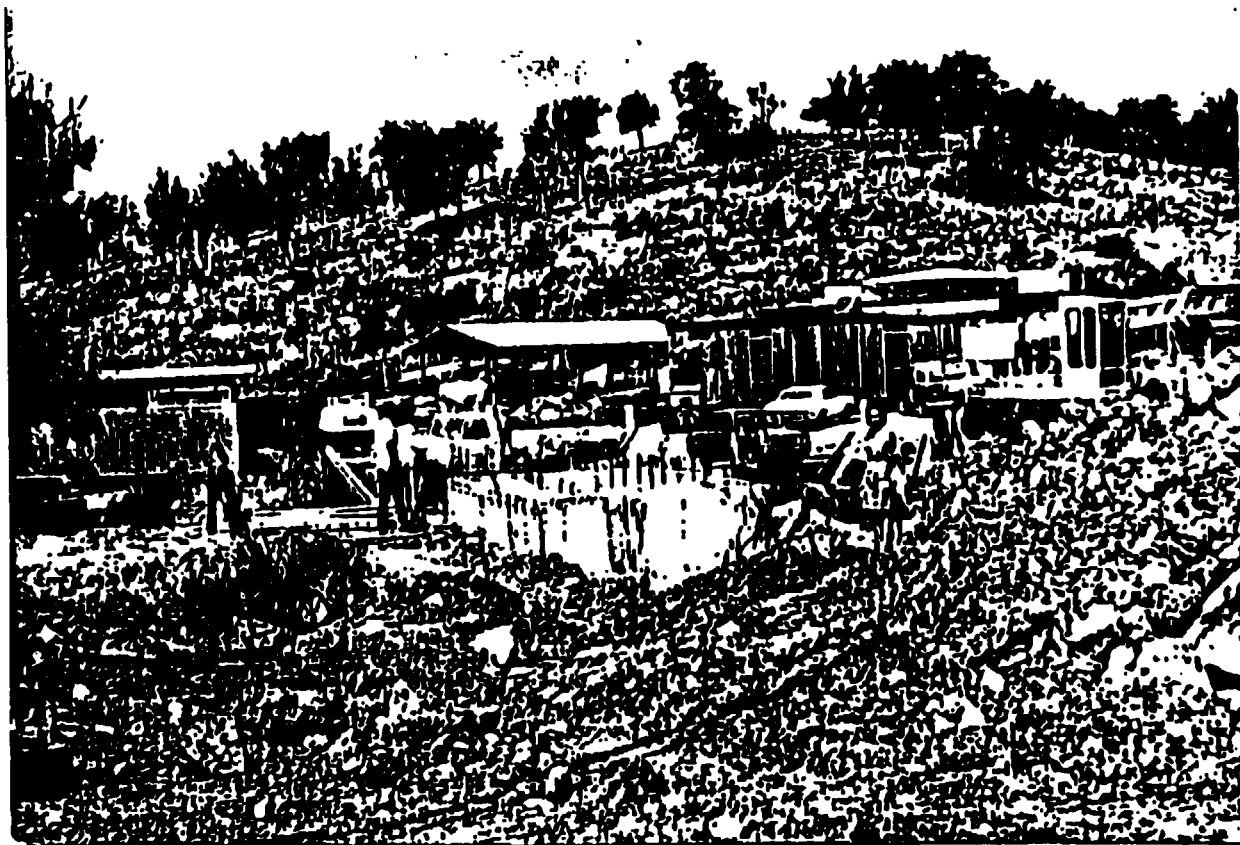
Since the owners of the property are off the Islands for some time of the year (retired and not in best health conditions) they hired an inspector to check the property on a monthly base and to write reports about the conditon of the facility. If necessary he is giving orders for cleanup or repairs to keep the environment clean. He informed us that the last pick-up of waste oil from the tank was done on February 9, 1994 by the Safety-Clean-Up Company.

The numbers in ()
refer to the enclosed
pages with pictures

March 10, 1994

Siegfried Torinus and Waltraud Torinus

Siegfried Torinus + Waltraud Torinus



at
ms, V.I.

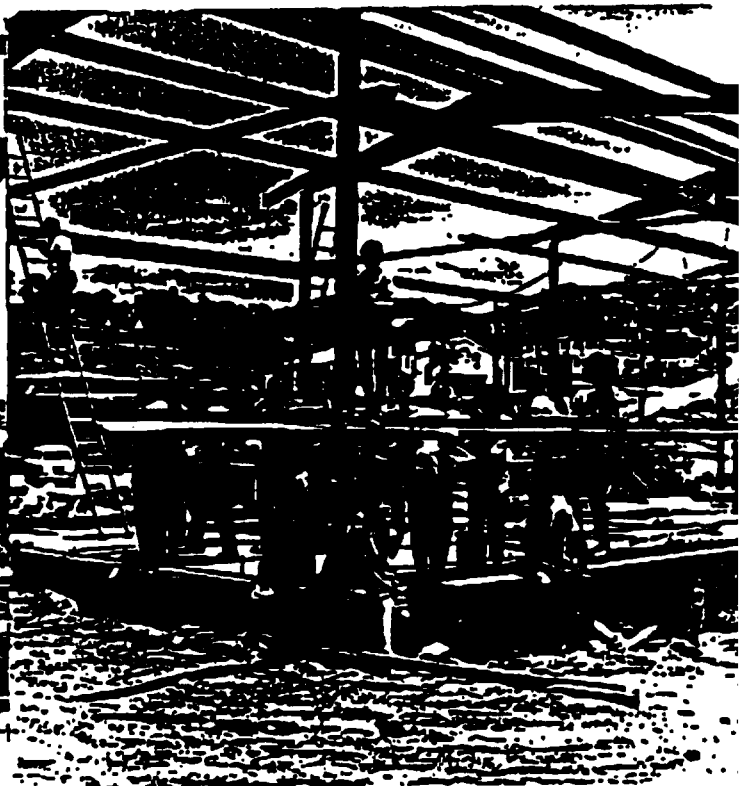
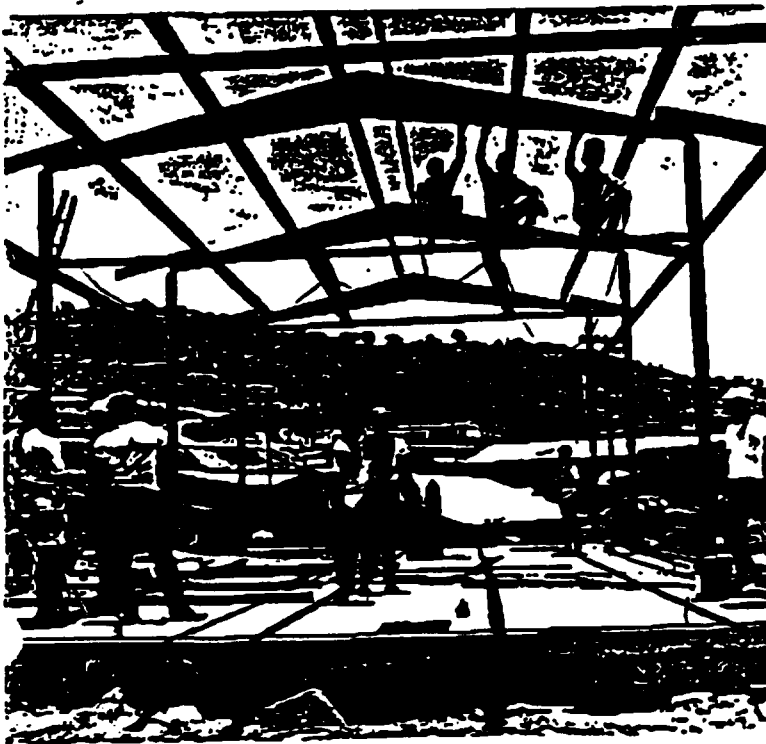


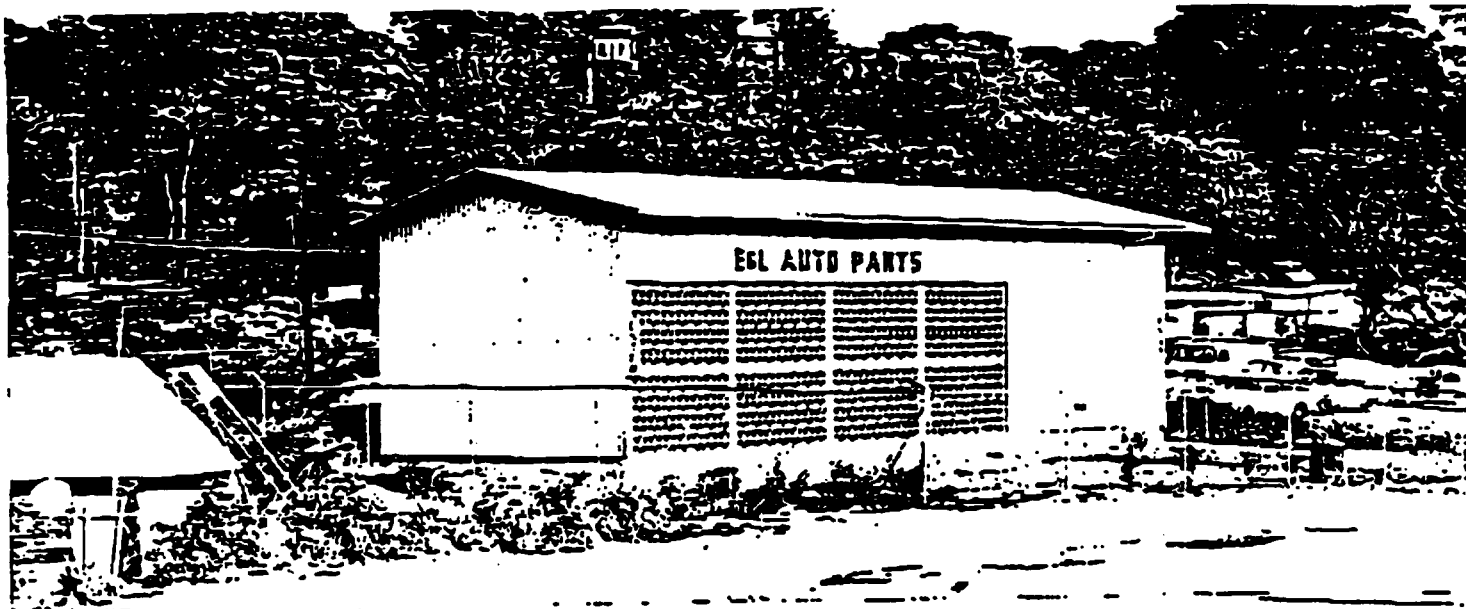
TUT 005 0824



Cistern >

Construction of building,
at parcel 214 Estate Anna's Retreat, Torto,
St. Thomas, Virgin Islands





2

214 Anna's Retreat
Tutu, St. Thomas,
U.S. Virgin Islands.

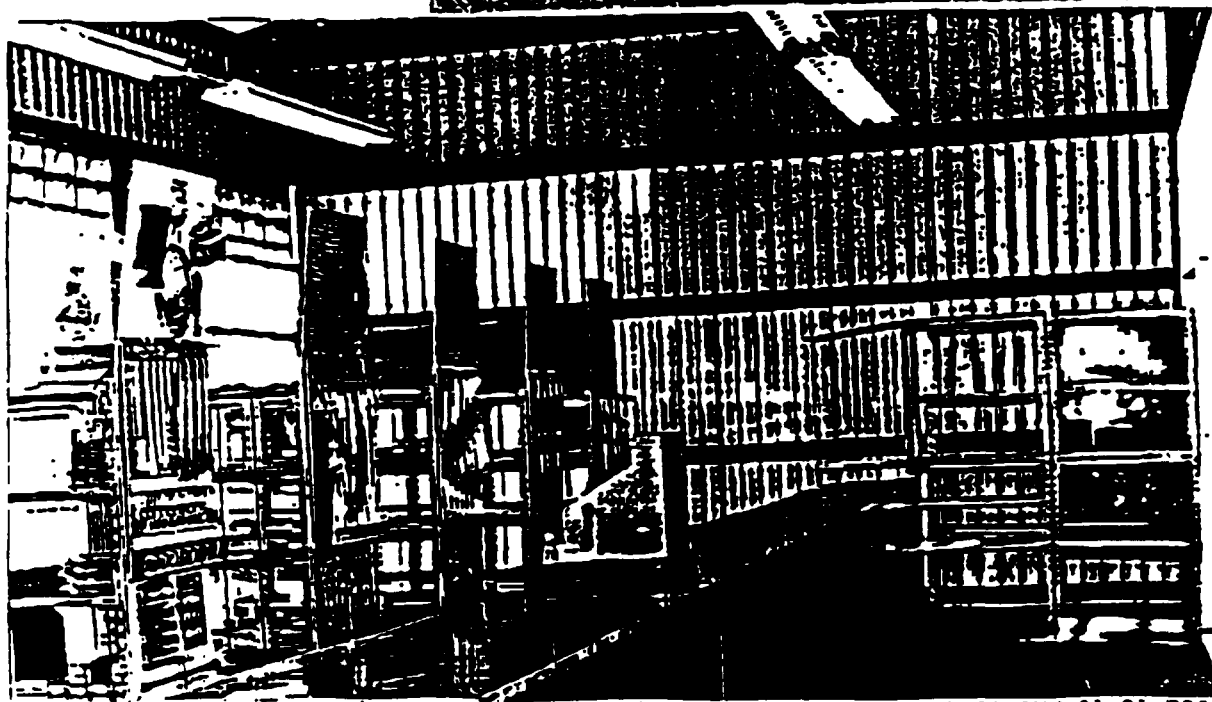
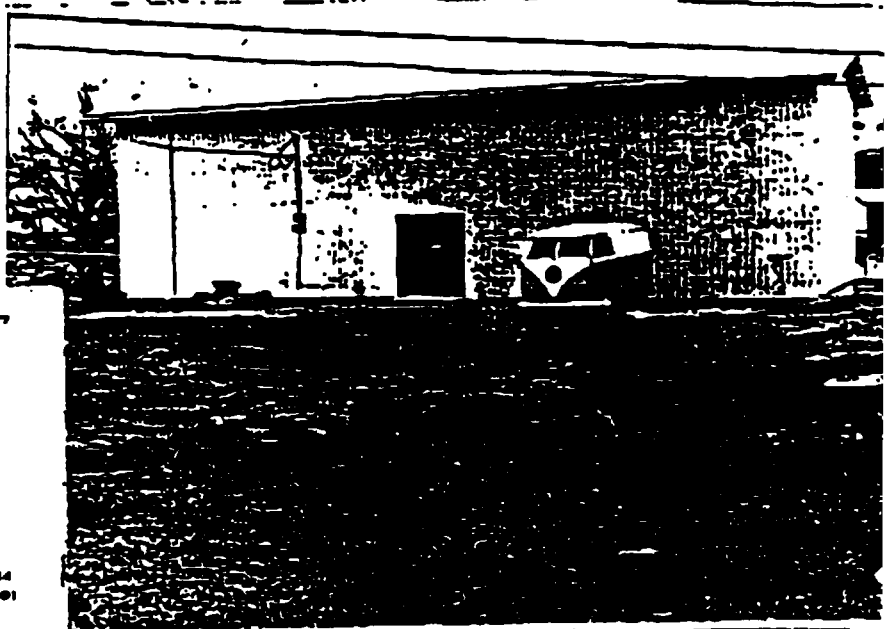
TEL: (800) 775-1003

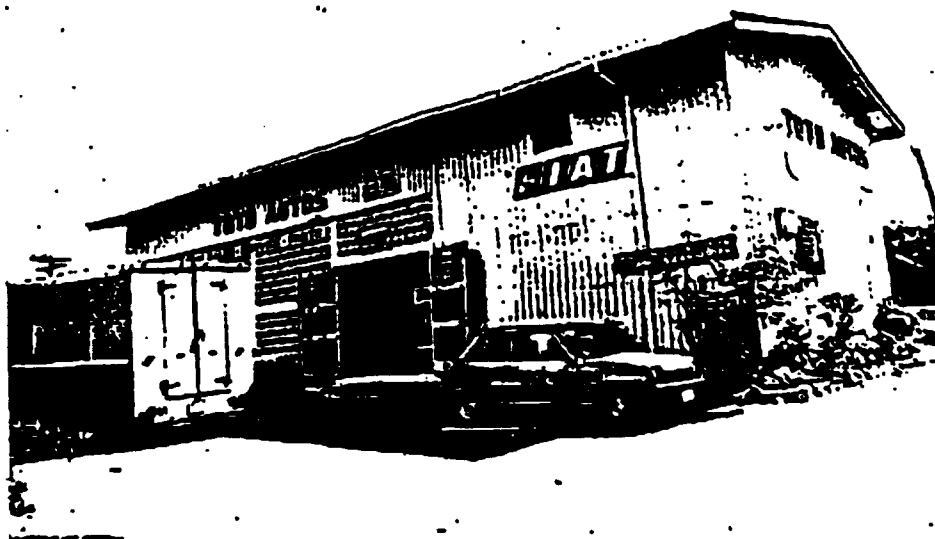
P. O. BOX 1477

E & L AUTO PARTS, INC.
SMALL AUTO PARTS AND ACCESSORIES

FRED EGLIN

ANNA'S RETREAT - ESTATE TUTU NO. 214
ST. THOMAS, U.S. VIRGIN ISLANDS 00001



$3a$ 

214 Anna's Retreat
Tutu. St. Thomas,

(36)

Tutu - Autos

Motor Holdings, Limited, Inc.

Mr. Keith J. Macdonald and Ernie Sorrentino, (Roosevelt Butler - manager)
Road Town, Tortola SWI - 425 13 - 7 Thelma Butler - secretary

Lease from April 1, 1977 - 31. March 1981



TUTU AUTOS INC.





CHAMPION
Spark Plugs



PENNZOIL
Additives & Cleaners



LUCAS



GIRLING
Genuine Service Parts



PIRELLI
Tires & Tubes



PRECISION AUTO PARTS
Clare More Building, Air Port Turn Off.

TEL. 775-1885 774-7305

Old Tutu, 214 Annes Retreat
St. Thomas, V.I.

Clare More Building, Air Port Turn Off,
St. Thomas, V.I.

SPECIAL ORDERS ACCEPTED!

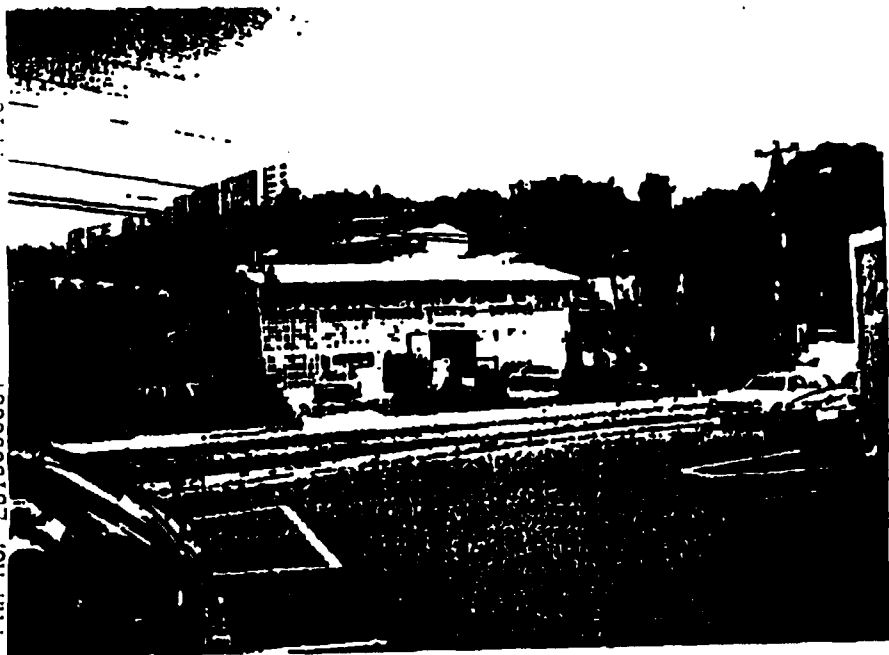
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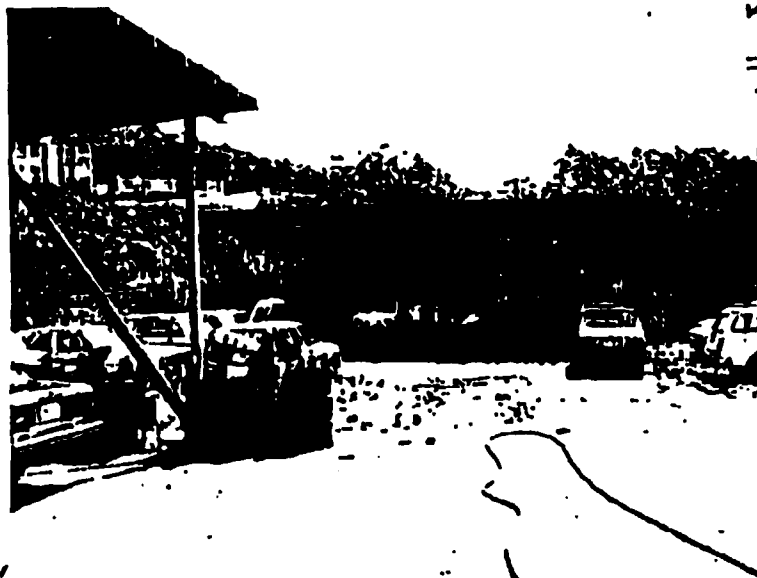
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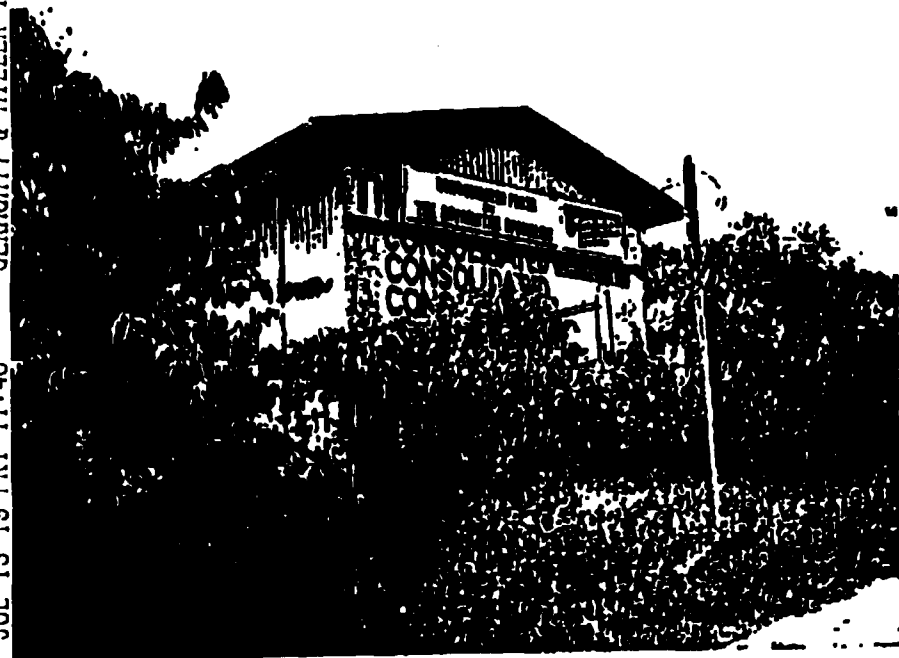
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4



217
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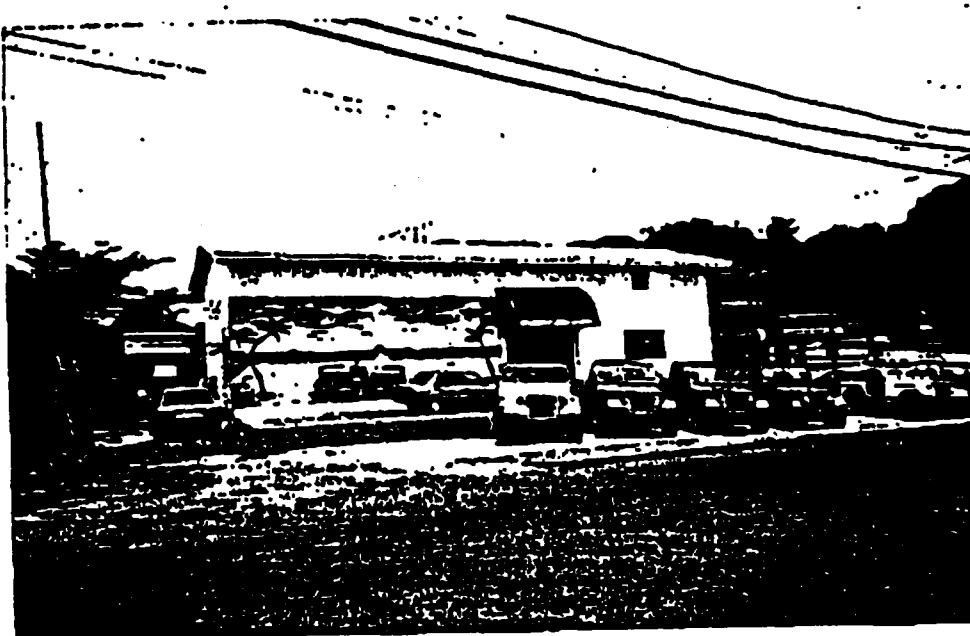
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214
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 Tutu, St. Thomas,
 U.S. Virgin Islands
 Aug. 1988



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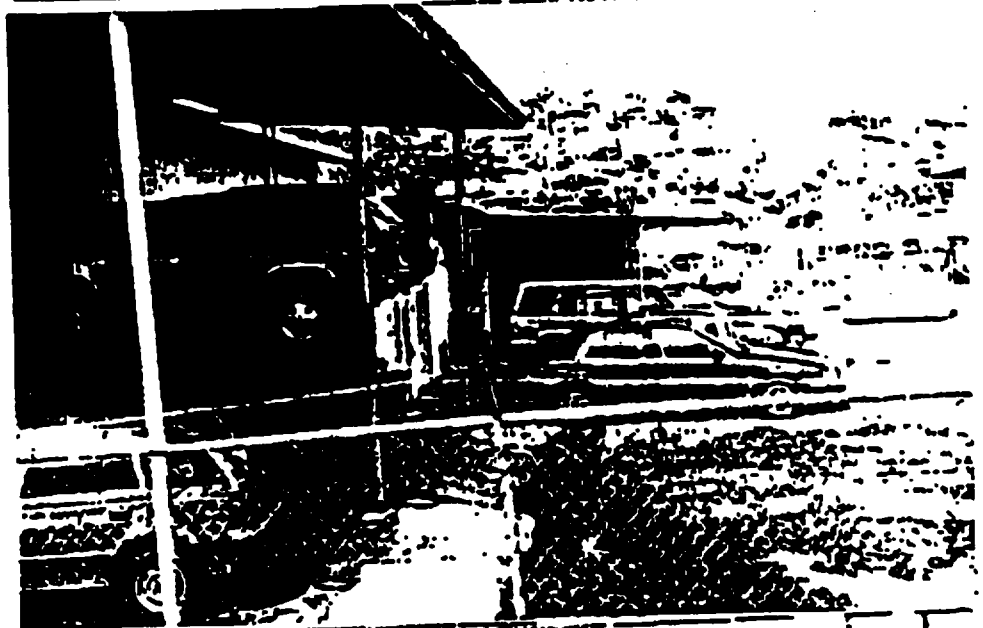
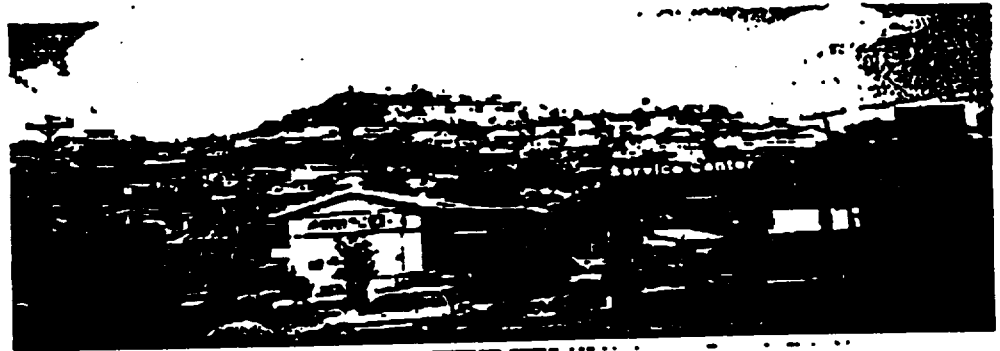


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214 Anna's Retreat
St. Thomas
U.S. Virgin Islands 00801

Gene A. LaPlace
Service Manager



1993



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HUMAN SERVICES
5- 8-84 112141PM

FAX NO. 18097743468

P.06
18 2/ 2
P03

Questions for Site Inspection at the Department of Human Services Facility, Tutu, St. Thomas

When was the property purchased by the Department of Human Services? November 29, 1989

From whom was the property purchased? Earle E. Outley; P.O. Box 7908;
St. Thomas, VI 00801

Is there any knowledge about owners prior to that owner? If so, who were they and what were the dates of occupancy? NO

What types of operations were conducted by the previous owner(s)? Center for Independent Living, a rehab program for handicapped; Superior Printing; Anna's Retreat Senior Center
Were any hazardous materials used or stored at the site by the previous owner(s)? unknown; possibly in print shop.

Are there presently any drums or other containers of hazardous or unknown materials? If there are any hazardous materials stored at the site what are they and are they currently being used? NO

Are there now or were there ever any above ground or underground storage tanks at the site? If so, where are or were the tanks, what types of materials were stored in the tanks, and what are (was) the volumes or dimensions of the tanks? What is the present status of the tanks? NO

Is there a cistern for storing water on the property? YES

What is the building being used for at the present? Senior Citizens' Center; Center for Independent Living.

Is there a septic tank on the property? YES

Is there a water supply well on the property? If so, is it in use? Unknown; none currently in use.

The Outley Supply Well is located near the property (see attached map). Is this supply well located on Lot 173A? No conflict with Lot 175C.


Harry Hinkle
Deputy Commissioner, OPD
Dept. of Human Services

TUT 005 0832

APPENDIX B

**FIELD GAS-CHROMATOGRAPH ANALYTICAL REPORT
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



March 22, 1994

Caroline Kwan
U.S. Environmental Protection Agency
Region II
26 Federal Plaza, Room 737
New York, New York 10278

Re: Soil Gas Survey Report for the Curriculum Center and Virgin Islands Housing Authority,
Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Dear Ms. Kwan:

In accordance with the Phase II Remedial Investigation (RI) Work Plan, Tutu Wells Site, St. Thomas, U.S. Virgin Islands (Geraghty & Miller, Inc. 1993a), Geraghty & Miller, Inc., on behalf of the Tutu Environmental Investigation Committee (TEIC), conducted a soil gas survey at the Curriculum Center (former Laga Building) and the Virgin Island Housing Authority (VIHA) properties from February 28 through March 10, 1994. As stated in the work plan, the purpose of the soil gas survey was primarily to provide a screening tool to optimize the locations of proposed new monitoring wells, and to provide a preliminary indication of the potential contaminant source areas. The final location of two shallow new proposed Monitoring Wells, (MW-16 at the Curriculum Center and MW-13 at VIHA) are to be selected after analyzing the results of the soil gas survey. This letter report presents the methodology and results of the soil gas surveys.

TUT 005 0834

METHODOLOGY

A Photovac 10S50 portable gas chromatograph (GC) was used to analyze the vapor samples collected at the site. The Photovac 10S50 portable GC is equipped with a photoionization detector (PID) and a CPSil-5 capillary column. The oven temperature was set at 40° Celsius (C). Based on previous data collected at the site, the GC was calibrated with the following compounds: trans-1,2-dichloroethene (trans-1,2-DCE); cis-1,2-dichloroethene (cis-1,2-DCE); benzene; trichloroethene (TCE); toluene; tetrachloroethene (also known as perchloroethene and abbreviated as PCE); meta-xylene; and ortho-xylene. An unbiased 40-foot grid was laid out over the Curriculum Center property and the VIHA property. Some soil gas points were relocated if buildings or concrete pavement presented obstructions. Soil gas survey points were located at each node of the grid. In areas where greater resolution was needed to identify possible contaminant source areas, a 20-foot spacing was employed until the areas of concern were delineated. Soil gas survey sample points were numbered SGC-1 through SGC-46 at the Curriculum Center and SGH-1 through SGH-26 at VIHA, as shown on Figures 1 and 2, respectively.

Even though the column temperature is constant, due to the lack of a heated injection port, the temperature of the injection port and the lines leading to the column changes throughout the day, which changes the retention time of the compounds. Therefore, Geraghty & Miller relies on the chemist, rather than the GC, to identify all compounds. Also, due to software limitations, an internal calibration is based on only one injection. Geraghty & Miller's external calibration is derived from an average of 5 injections which is more accurate. The internal GC library was not used for these reasons; therefore, all peaks were identified by the GC as unknowns.

CALIBRATION

An air standard was prepared by withdrawing headspace gas from pure stocks of each selected compound using a gas-tight syringe and injection into a 1-liter Tedlar bag previously

filled with ultra zero air. The concentration of the compounds in the standard were 2 parts per million by volume (ppmv) of trans-1,2-DCE and cis-1,2-DCE and 5 ppmv for benzene, TCE, toluene, PCE, meta-xylene, and ortho-xylene. This standard was prepared daily. Each morning, the standard was injected into the GC five times. A response factor was calculated for each compound by dividing the standard concentration by the average peak area from the five injections. Detection limits were calculated daily based on instrument response.

QUALITY CONTROL

Standards were analyzed at a minimum of once every 4 hours and at the end of each day to check for retention time drift. Syringe blanks were analyzed after all standardizations, and equipment blanks were analyzed after running each sample that contained volatile organic compound (VOC) peaks with areas greater than 0.3 millivolt seconds (mv/s). The analysis of syringe blanks and equipment blanks prevents carryover of compounds from one run to the next run. Duplicate sample analyses were conducted every ten samples. Steel rods were rinsed with Micro liquid detergent and distilled water between soil gas points. After each soil gas point where VOCs were detected, probe blanks were analyzed. The probe tube was not reused unless the blank contained no peaks with areas greater than 0.3 mv/s.

SAMPLING PROCEDURE

A 1 1/2-inch diameter borehole was created in the soil with a slide hammer and solid rod assembly. The depths of the boreholes were approximately 1.5 to 3 feet below land surface. The solid rod was removed and a hollow 1/4-inch diameter stainless steel pipe was inserted with a 1/8-inch Teflon tube contained inside. The Teflon tubing extended above the hollow stainless steel tube; midway down the exposed Teflon tubing was a stainless steel tee through which syringe samples were collected. A nail inserted into the end of the Teflon tubing prevented clogging of the assembly as it was lowered into the borehole. The nail was then disengaged, and the top of the borehole was sealed around the stainless steel pipe with modeling clay. The clay used is reported to be non-toxic and safe for children. A sample of the clay was heated for

15 minutes in a VOC vial and the headspace analyzed; no VOCs were detected. The Teflon tubing was attached to a diaphragm pump and the borehole was evacuated.

A purging test was performed to determine the correct evacuation time. During the purging test, samples were collected from the stainless steel tee using a gas-tight syringe at 1-minute intervals for 5 minutes. No peaks appeared on the chromatogram of samples collected from Soil Gas Point SGC-1. The study done at Soil Gas Point SGC-3 indicated that all five samples collected during the study had approximately the same concentrations. Therefore, a purging time of 2 minutes was used for all further sampling. The technique used to collect soil gas samples is consistent with that described by Dr. Thomas Spittler, USEPA Region I Lab Director, in his course on soil gas sampling and analysis. The purging time study is designed to indicate at what purging time the area surrounding the probe has its maximum concentration of total VOCs. If the hole was overpumped, the study would show a decreasing concentration of VOCs over time. This recommended purging time study and has proven to be practical and useful at many sites.

RESULTS AND INTERPRETATION

The soil gas survey results are presented in this section.

CURRICULUM CENTER

The soil gas sample results for the Curriculum Center are provided in Table 1. Chromatograms for the analyses are included in Appendix A; soil gas sample locations are shown on Figure 1. Soil descriptions for the Curriculum Center from Geraghty & Miller soil boring and monitoring well logs indicated the presence of silty clay (saprolite) varying in thickness from 1.8 feet (at Monitoring Well MW-1) to 10.3 feet (at Soil Boring B-1). Fill placement in the northwest corner of the property has created the thickest soil cover (near Soil Boring B-1). All other boring logs, for locations north and west of the Curriculum Center,

indicate soil thicknesses equal to or less than 3.7 feet. The soil horizon lies directly over bedrock

PCE was detected at 32 locations, at concentrations ranging from 0.06 ppmv (Soil Gas Point SGC-13) to 140 ppmv (Soil Gas Point SGC-43). TCE was detected at eleven locations, at concentrations ranging from 0.03 ppmv (Soil Gas Point SGC-30) to 30 ppmv (Soil Gas Point SGC-43). Cis-1,2-DCE was detected at eight locations, at concentrations ranging from 0.1 ppmv (Soil Gas Point SGC-3) to 5 ppmv (Soil Gas Point SGC-29). Trans-1,2-DCE was detected at six locations at concentrations ranging from 0.04 ppmv (Soil Gas Points SGC-24 and SGC-35) to 0.4 ppmv (SGC-43).

Toluene was detected at only one location (Soil Gas Point SGC-37), at a concentration of 0.02 ppmv. Benzene, meta-xylene and ortho-xylene were not detected at any soil sampling locations.

The highest concentrations of chlorinated VOCs in soil gas were detected north of the Curriculum Center Building, centered around Soil Gas Point SGC-43 (estimated concentration of approximately 174 ppmv). An area approximately 150 feet long (in an east-west direction) and 90 feet wide (north-south) showed total chlorinated VOCs greater than 1 ppmv (see Figure 1).

Two other areas of elevated concentrations of chlorinated VOCs (above 1 ppmv total chlorinated VOCs) were identified at the Curriculum Center. One area is centered at Soil-Gas Point SGC-14 (estimated concentration of 30.1 ppmv). The other area, centered at Soil-Gas Point SGC-04, showed concentrations between 1.0 and 5.0 ppmv. An isolated concentration of 3 ppmv total VOCs was detected at Soil-Gas Survey Point SGC-25.

VIRGIN ISLANDS HOUSING AUTHORITY

The soil gas survey results for the VIHA property are provided in Table 2. Chromatograms for the analyses are included in Appendix A. Soil gas sample locations are shown on Figure 2. Twenty-six soil gas locations were sampled. VOCs were not detected in any of the soil gas samples collected at the Virgin Islands Housing Authority. According to Ms. Ralda Simmonds, Esq. (VIHA Attorney), an underground storage tank (UST) is located at the southwest corner of the canopy along the west side of the VIHA maintenance building (see Figure 2).

RECOMMENDATIONS

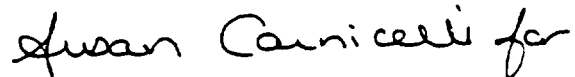
- Based on the results of the soil gas survey conducted at the Curriculum Center, Geraghty & Miller recommends that proposed shallow Monitoring Well MW-16 be installed at the location of Soil Gas Point SGC-29 (grid coordinates N0340, E0260). The highest concentrations of chlorinated compounds (estimated value of 174.04 ppmv) were detected 30 feet Northeast (upgradient) of this location. The soil sample from this boring with the highest photoionization detector (PID) reading should be collected and analyzed for the Target Compound List (TCL) VOCs. An underground water supply line is located near this location. If this water line interferes with the proposed location for Monitoring Well MW-16, the well will be located downgradient (i.e., southwest), as close as possible to the proposed location.
- Since no VOCs were detected in soil gas samples collected at VIHA, proposed shallow Monitoring Well MW-13 should be located within 10 feet of the existing deep Monitoring Well MW-13D; this will form a well pair to provide comparison of shallow and deep groundwater elevations and groundwater quality.

In Geraghty & Miller's Phase II RI proposed Work Plan, the proposed monitoring well at the Curriculum Center was called MW-13 and the monitoring well at VIHA was called MW-16. These designations have been reversed to be consistent with existing deep Monitoring Well MW-13D at VIHA.

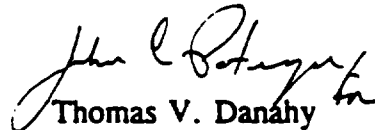
Geraghty & Miller, on behalf of the TEIC, would like to request that the USEPA respond promptly to the proposed locations for Monitoring Wells MW-13 and MW-16, so the drilling program can be scheduled accordingly.

Sincerely,

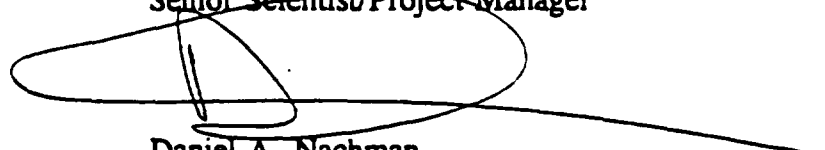
GERAGHTY & MILLER, INC.



John Burke
Project Scientist/GC Operator



Thomas V. Danahy
Senior Scientist/Project Manager



Daniel A. Nachman
Vice President/Project Officer

c: Ana Gloria Ramos - TEIC
Paul Ryan - Texaco
Michael Law, Esq. - Dept. of Justice
Ralda Simmonds, Esq. - VIHA
PRP Technical Committee Members

Table 1. Results of Portable GC Analyses of Soil Gas Samples Collected on February 28, 1994 through March 10, 1994 at the Curriculum Center, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Soil Gas Point	Date Sampled	trans-1,2-DCE (ppmv)	cis-1,2-DCE (ppmv)	Benzene (ppmv)	TCE (ppmv)	Toluene (ppmv)	PCE (ppmv)	m-Xylene (ppmv)	o-Xylene (ppmv)	Number of Unknown Compounds
SOC-1	2/28/94	<0.05	0.07	<0.1	<0.08	<0.1	<0.06	<0.2	<0.2	0
SOC-2	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	<0.06	<0.2	<0.2	2
SOC-3	3/1/94	0.1	0.1	<0.1	0.3	<0.1	0.4	<0.2	<0.2	1
SOC-4	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	5	<0.2	<0.2	0
SOC-5	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	2	<0.2	<0.2	0
SOC-6	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	<0.06	<0.2	<0.2	0
SOC-7	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	0.7	<0.2	<0.2	0
SOC-8	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.3	<0.1	<0.1	0
SOC-9	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.1	1	<0.2	<0.2	0
SOC-10	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	3	<0.1	<0.1	0
SOC-11	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.2	<0.1	<0.1	0
SOC-12	3/1/94	<0.05	<0.07	<0.1	<0.08	<0.06	<0.04	<0.1	<0.1	0
SOC-13	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.06	<0.1	<0.1	0
SOC-14	3/4/94	<0.02	<0.02	<0.08	0.1	<0.06	30.1	<0.1	<0.1	0
SOC-15	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	<0.04	<0.1	<0.1	0
SOC-16	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	<0.04	<0.1	<0.1	0
SOC-17	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.09	<0.1	<0.1	0
SOC-18	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.07	<0.1	<0.1	0
SOC-19	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.4	<0.1	<0.1	0
SOC-20	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.3	<0.1	<0.1	0
SOC-21	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	0.2	<0.1	<0.1	0
SOC-22	3/4/94	<0.02	<0.02	<0.08	0.05	<0.06	0.4	<0.1	<0.1	0
SOC-23	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	<0.04	<0.1	<0.1	0
SOC-24	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	<0.04	<0.1	<0.1	0
SOC-25	3/4/94	<0.02	<0.02	<0.08	<0.05	<0.06	3	<0.1	<0.1	0
SOC-26	3/7/94	<0.02	<0.08	<0.04	<0.02	<0.06	<0.03	<0.1	<0.1	0
SOC-27	3/7/94	<0.02	<0.08	<0.04	<0.02	<0.06	1	<0.1	<0.1	0
SOC-28	3/7/94	<0.02	0.2	<0.04	0.2	<0.06	2	<0.1	<0.1	0
SOC-29	3/7/94	0.04	5	<0.04	2	<0.06	7	<0.1	<0.1	0
SOC-30	3/7/94	<0.02	<0.08	<0.04	0.03	<0.06	0.3	<0.1	<0.1	0
SOC-31	3/7/94	<0.02	<0.08	<0.04	<0.02	<0.06	<0.03	<0.1	<0.1	0
SOC-32	No Sample -	Location inaccessible; overgrown vegetation.								
SOC-33	3/7/94	<0.02	<0.08	<0.04	<0.02	<0.06	<0.03	<0.1	<0.1	1
SOC-34	3/7/94	<0.02	<0.08	<0.04	<0.02	<0.06	0.1	<0.1	<0.1	0
SOC-35	3/7/94	0.04	0.4	<0.04	4	<0.06	30.1	<0.1	<0.1	0
SOC-36	3/7/94	<0.02	0.2	<0.04	0.6	<0.06	4	<0.1	<0.1	0
SOC-37	3/7/94	<0.02	<0.08	<0.04	<0.02	0.02	0.1	<0.1	<0.1	0

See page 2 for footnotes.

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Table 1. Results of Portable GC Analyses of Soil Gas Samples Collected on February 28, 1994 through March 10, 1994 at the Curriculum Center, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

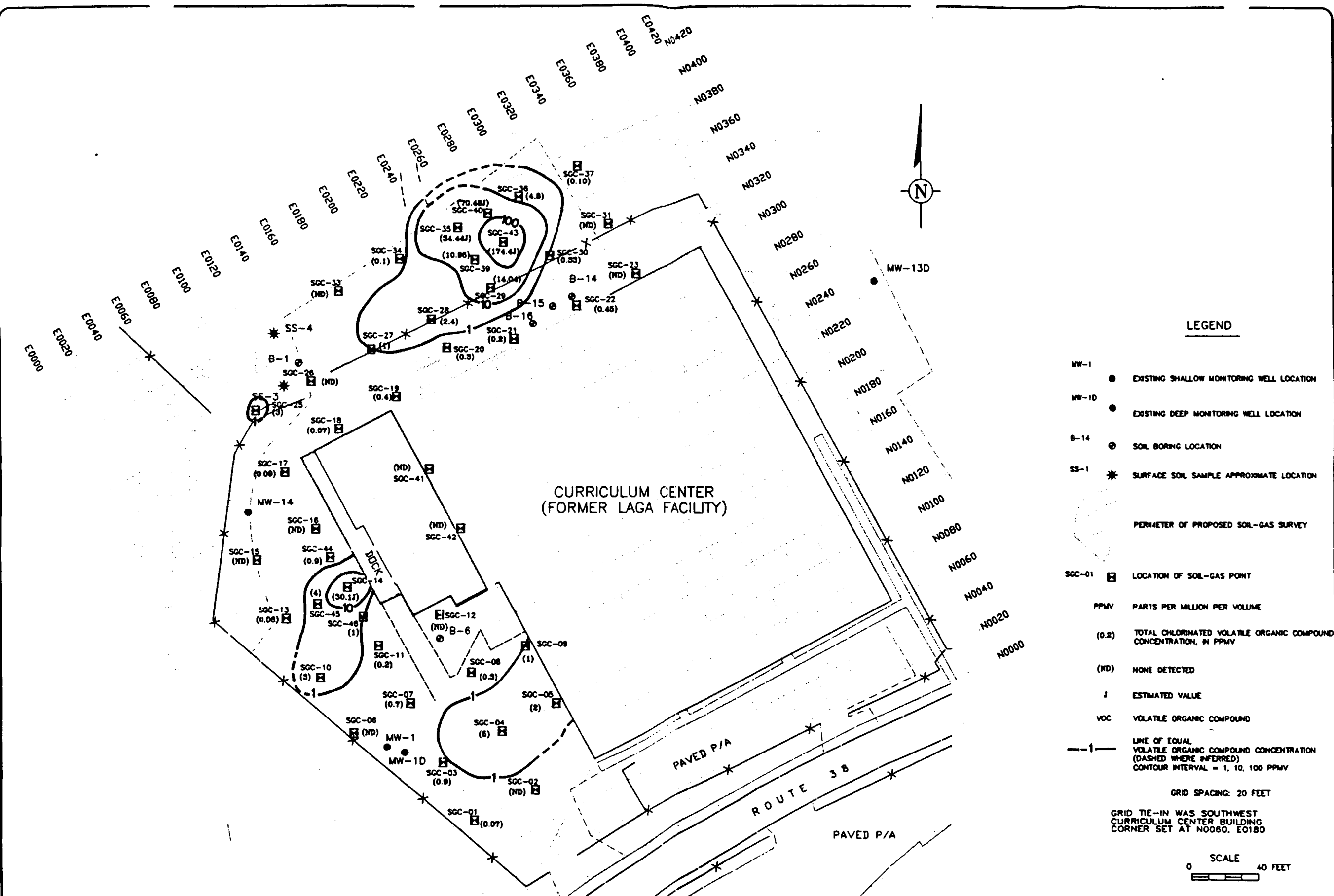
Soil Gas Point	Date Sampled	trans-1,2-DCE (ppmv)	cis-1,2-DCE (ppmv)	Benzene (ppmv)	TCE (ppmv)	Toluene (ppmv)	PCE (ppmv)	m-Xylene (ppmv)	o-Xylene (ppmv)	Number of Unknown Compounds
SQC-38	No Sample	Location inaccessible; overgrown vegetation.								
SQC-39	3/8/94	0.05	0.9	<0.04	3	<0.01	7	<0.1	<0.1	0
SQC-40	3/8/94	0.08	0.4	<0.04	10 J	<0.01	60 J	<0.1	<0.1	0
SQC-41	3/8/94	<0.02	<0.05	<0.04	<0.05	<0.01	0.2	<0.1	<0.1	0
SQC-42	3/8/94	<0.02	<0.05	<0.04	<0.05	<0.01	<0.05	<0.1	<0.1	0
SQC-43	3/10/94	0.4	4	<0.1	30 J	<0.07	140 J	<0.2	<0.2	1
SQC-44	3/10/94	<0.03	<0.03	<0.1	<0.06	<0.07	0.9	<0.2	<0.2	0
SQC-45	3/10/94	<0.03	<0.03	<0.1	<0.06	<0.07	4	<0.2	<0.2	0
SQC-46	3/10/94	<0.03	<0.03	<0.1	<0.06	<0.07	1	<0.2	<0.2	0

ppmv Parts per million by volume.
TCE Trichloroethene.
DCE Dichloroethene.
PCE Tetrachloroethene.
J Estimated value.

Table 2. Results of Portable GC Analyses of Soil Gas Samples Collected on March 8 through 10, 1994 at the Virgin Islands Housing Authority, Tutu Walls Site, St. Thomas, U.S. Virgin Islands..

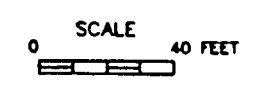
Soil Gas Point	Date Sampled	trans-1,2-DCE (ppmv)	cis-1,2-DCE (ppmv)	Benzene (ppmv)	TCE (ppmv)	Toluene (ppmv)	PCE (ppmv)	m-Xylene (ppmv)	o-Xylene (ppmv)	Unknown Number of Compounds
SGH-1	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-2	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-3	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-4	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-5	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-6	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-7	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-8	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-9	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-10	3/10/94	<0.03	<0.03	<0.1	<0.8	<0.07	<0.05	<0.2	<0.2	0
SGH-11	3/8/94	<0.02	<0.05	<0.09	<0.05	<0.01	<0.05	<0.2	<0.2	0
SGH-12	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-13	3/10/94	<0.03	<0.03	<0.1	<0.08	<0.07	<0.05	<0.2	<0.2	0
SGH-14	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-15	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-16	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-17	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-18	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-19	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-20	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-21	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-22	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-23	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-24	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-25	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0
SGH-26	3/9/94	<0.02	<0.05	<0.09	<0.04	<0.01	<0.05	<0.2	<0.2	0

ppmv Parts per million by volume.
TCE Trichloroethene.
DCE Dichloroethene.
PCE Tetrachloroethene.



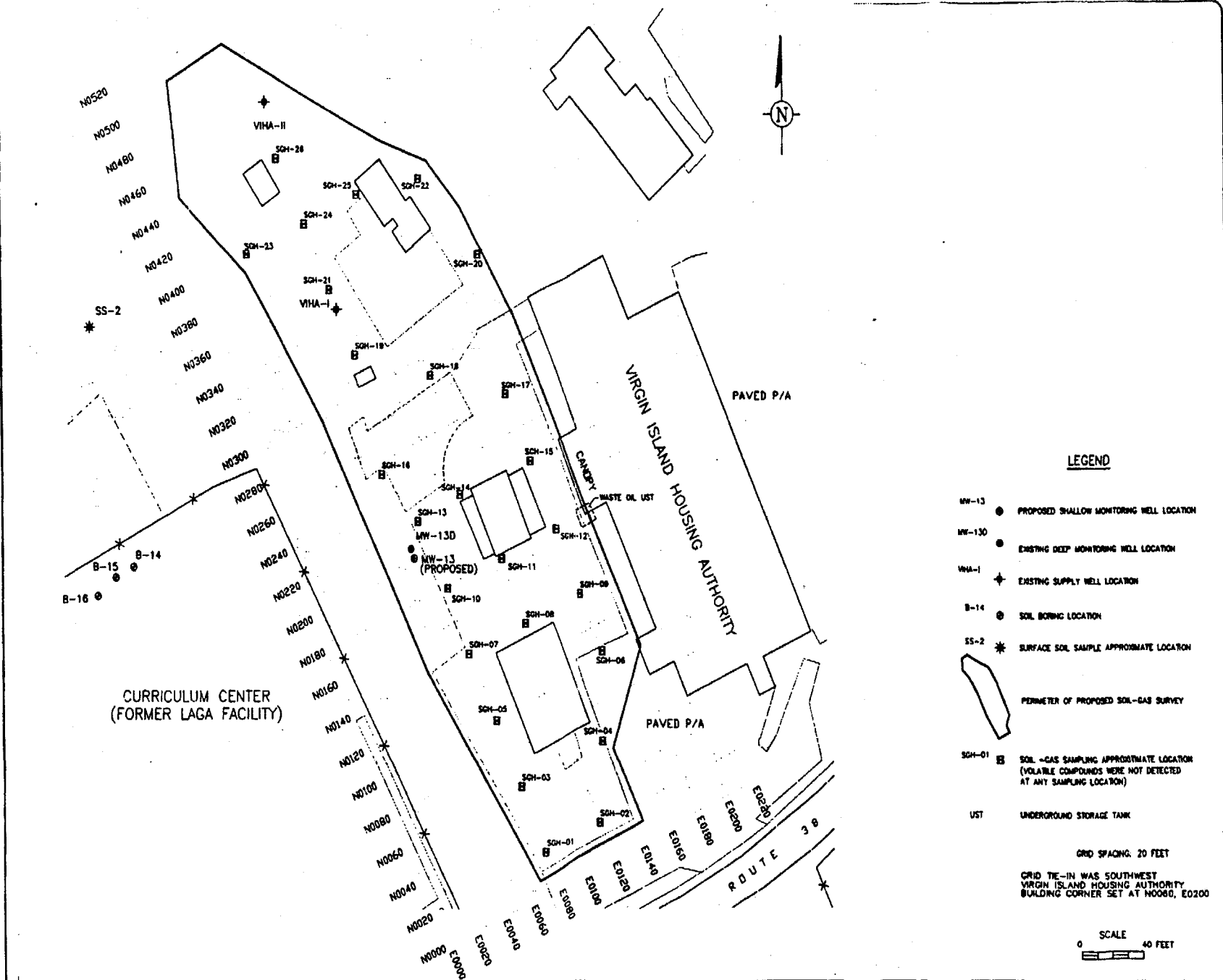
LEGEND

- MW-1 ● EXISTING SHALLOW MONITORING WELL LOCATION
- MW-1D ● EXISTING DEEP MONITORING WELL LOCATION
- B-14 ● SOIL BORING LOCATION
- SS-1 * SURFACE SOIL SAMPLE APPROXIMATE LOCATION
- PERIMETER OF PROPOSED SOIL-GAS SURVEY
- SGC-01 □ LOCATION OF SOIL-GAS POINT
- PPMV PARTS PER MILLION PER VOLUME
- (0.2) TOTAL CHLORINATED VOLATILE ORGANIC COMPOUND CONCENTRATION, IN PPMV
- (ND) NONE DETECTED
- J ESTIMATED VALUE
- VOC VOLATILE ORGANIC COMPOUND
- LINE OF EQUAL VOLATILE ORGANIC COMPOUND CONCENTRATION (DASHED WHERE INFERRED) CONTOUR INTERVAL = 1, 10, 100 PPMV
- GRID SPACING: 20 FEET
- GRID TIE-IN WAS SOUTHWEST CURRICULUM CENTER BUILDING CORNER SET AT N0060, E0180



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	PROJECT NO.: PROJ3.018	FILE NO.:													
DRAWING: TU-307	PLOT SIZE: 11x40														
DRAFTED BY: R. PADUA	DATE: 21MAR94														
CHECKED BY: J. POTENZA	DATE: 21MAR94														
APPROVED BY: T. DANAHY	DATE: 21MAR94														

TUT 005 0844



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SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.
USE TO VERIFY FIELD REPRODUCTION SCALE

PROJECT NO.: PROJ-0018	FILE NO.:
DRAWING: TU-308	PLOT SIZE: 11x17
DRAWN BY: R. PASLA	DATE: 2/28/94
CHECKED BY: J. JACKSON	DATE: 2/28/94
APPROVED BY: T. DAVITT	DATE: 2/28/94

PHASE II REMEDIAL INVESTIGATION
VIRGIN ISLAND HOUSING AUTHORITY
SOIL-GAS SURVEY GRID
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
2

APPENDIX C

**PREVIOUS INVESTIGATIONS SAMPLING RESULTS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



Table C-1. Concentrations of Volatile Organic Compounds in an Oil Sample Collected on August 17, 1987 at the VIHA Building, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID:	3239B-21
	Sample Location:	Waste Oil UST
Benzene		97
Toluene		98
Ethylbenzene		500
Xylene (total)		2,900

Analyte concentrations in milligrams per kilogram (mg/kg).

Samples collected by Region II Technical Assistance Team (TAT), Weston/SPER Division, New Jersey, and U.S. Virgin Islands Department of Planning and Natural Resources (DPNR) personnel.

Samples received at S-Cubed Laboratories of San Diego, California on September 15, 1987; holding times were exceeded.

VIHA Virgin Islands Housing Authority.

UST Underground storage tank.

Source: Weston/SPER Division Region II TAT (1988b).

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Table C-2. Summary of Preliminary Assessment Report for Curriculum Center (former LAGA Building), Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	LAGA Building.
Report:	Preliminary Assessment Report, LAGA Building/Virgin Islands Department of Education, St. Thomas, U.S. Virgin Islands, NUS Corporation, March 24, 1989.
Site Reconnaissance Date:	February 15, 1989
Site Information:	No RCRA permit. Active status. Dates of operation unknown. Owner: Virgin Islands Department of Education.
UST Location Record of Tank Leaks:	No UST at this location.
Disposal Procedures:	No indication in this report.
Areas of Concern:	Drums behind LAGA Building: * Drums were located less than 100 feet northwest of the corner of the Laga Building. * NUS Corporation observed 22 55-gallon drums over a grassy area: 21 steel drums and one plastic drum. Some during were corroded, some were perforated, some were empty; only one was found full. * No containment in this waste unit. Drums were found dispersed and on their sides over the ground surface. * No stains observed at the drums area.
Potential Sources to Soil and/or Groundwater Identified:	Potential of release to soil, surface water, and groundwater: * Drums laying on their sides, no labels, corroded, deposited over the ground. * No containment structures. * No records or information on drum contents. * DPNR indicates that the LAGA Building was a former textile processing facility that used solvents in its processes.
Sampling of Areas of Concern:	No readings above background were detected on the OVA or the PID during the NUS Corporation site reconnaissance. There is no reference of sampling activity conducted at this site in this report. No stains on the ground were observed during site reconnaissance by NUS Corporation.
Sample Results:	None.

RCRA Resource Conservation and Recovery Act.
UST Underground storage tank.
DPNR Department of Planning and Natural Resources.
OVA Organic vapor analyzer.
PID Photoionization detector.
Source: NUS Corporation, Region II FIT (1989a).



Table C-3. Summary of Analytical Results for Samples Collected from June 5 to 10, 1989 at the Curriculum Center (Former LAGA Facility), Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Location: Curriculum Center (former LAGA Building).

Sample Type: Four soil samples and one water sample were collected from an area behind the LAGA building according to Graber letter to C. Kwan of the USEPA dated April 27, 1990. Field notes from CDM dated June 6, 1989 described two soil samples, eL-02-01s and eL-02-02s, and one aqueous sample, eL-02-04L. Soil samples were collected from the ground surface area of dumped drums. The aqueous sample was collected from an open drum found during the sampling activity. Two field blanks, eL-02-FB1 and eL-02-FB2, were collected during this sampling event at LAGA (CDM 1989a).

Samplers: Camp, Dresser & McKee Federal Programs Corporation personnel.

Analytical

Results:

**(CDM letter dated
April 27, 1990)**

Toluene, ethylbenzene, and xylenes were detected in sample eL-02-01s.

Xylene was detected in sample eL-02-02s.

Phenol, methylphenols, naphthalene, methylnaphthalenes, and other hydrocarbons were detected in sample eL-02-01s.

Endosulfan I was detected in sample eL-02-01s.

Concentrations of total petroleum hydrocarbons (TPH) ranged between 544 to 3,470 micrograms per gram (ug/g).

Cadmium and lead were detected in all samples.

Heptanes were tentatively identified in water sample eL-02-04L.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989a).

Table C-4. Concentrations of Volatile Organic Compounds in an Oil Sample Collected on August 17, 1987 at Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample: 3239-20 Waste Oil Storage Tank
Acetone	ND
2-Butanone	15,000
Benzene	210,000
Toluene	1,400,000
Ethylbenzene	290,000
Total Xylenes	1,700,000

Analyte concentrations in micrograms per kilogram (ug/kg).

ND Not detected.

Source: Weston/Spill Prevention Emergency Response Division Region II, Technical Assistance Team (1988b).



Table C-5. Concentrations of Volatile Organic Compounds for Soil and Water Samples Collected on September 8, 1988 at Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample: e-02 Ramsay Motors Groundwater	eR-07s Ramsay Motors Soil	eR-08s Ramsay Motors Soil
Benzene	ND	ND	6
Ethylbenzene	ND	ND	18
2-Hexanone	ND	55	ND
4-Methyl-2-pentanone	ND	8	ND
Tetrachloroethane	11	ND	ND
Toluene	ND	2	ND
Xylene	ND	1	7

Analyte concentrations for groundwater in micrograms per liter (ug/L) and for soil in micrograms per kilograms (ug/kg).

ND Not detected.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989a).



Table C-6. Summary of Preliminary Assessment Report of Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	Ramsay Motors.
Report:	Preliminary Assessment Report, Ramsay Motors, St. Thomas, U.S. Virgin Islands, NUS Corporation, March 24, 1989.
Site Reconnaissance Date:	February 15, 1989.
Site Information:	No Resource Conservation and Recovery Act (RCRA) permit. Active status. Operation: unknown to present. Owner: Rita Ramsay.
UST Location	Waste oil UST located underground below the workshop area.
Record of Tank Leaks:	No record or indication of tank leakage.
Disposal Procedures:	Waste oil stored on-site. Report indicates no other disposal procedures.
Areas of Concern:	Waste oil drums: * Unknown age. * Drums located inside an overhanging garage in the northeast corner of Ramsay Motors property. * Twenty-five 55-gallon drums of waste oil observed during NUS Corporation site reconnaissance. * Drums contain automotive waste oil. Substances such as gasoline, kerosene, and degreasing solvents may also be present in the drums. * Drums located over a concrete floor. No berms or curbs observed during NUS Corporation site reconnaissance. * Many drums were open during site reconnaissance. Waste oil UST: * No RCRA permit. * Unknown age. * Unknown volume. * No evidence of tank leaking. * UST contains waste oil from automotive repair and servicing activities.

See Page 2 for footnotes.

TUT 005 0852



Table C-6. Summary of Preliminary Assessment Report of Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Potential Sources to Soil and/or groundwater Identified:	Drainage ditch at Gassett property line: * Waste oil discharging onto Ramsay Motors property from Gassett Motors.
	Waste oil drums: * Potential of release to groundwater. Some minor oil spills observed on the concrete floor of the garage area and at the drum storage area during site reconnaissance.
	Waste oil UST: * There is no indication of tank leakage.
	Waste oil was observed discharging from an oil pool at Gassett property into a drainage ditch on Ramsay property. This ditch discharges into the storm sewer.
Sampling of Areas of Concern:	PID and OVA readings of open drums ranged between 10 to 90 ppm (PID) and 60 to 300 ppm (OVA). Soil and groundwater samples were collected, but NUS did not report when this sampling occurred. Soil samples were analyzed by Cenref Labs of Brighton, Colorado. No laboratory information for groundwater sample analysis was provided by NUS.
Sample Results:	Detected in soil: toluene, ethylbenzene, xylene, and 2-hexane. Detected in groundwater: tetrachloroethane, ethylbenzene, and xylene.

RCRA	Resource Conservation and Recovery Act.
UST	Underground storage tank.
OVA	Organic vapor analyzer.
PID	Photoionization detector.
ppm	Parts per million.
Source:	NUS Corporation (1989b).



Table C-7. Concentrations of Volatile Organic Compounds in an Oil Sample Collected June 8, 1989, at Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample: eR-02-01a Ramsay Motors Oil
Benzene	64,000 J
Ethylbenzene	130,000 J
2-Hexanone	180,000 J
Total Xylene	1,200,000 J
Toluene	450,000 J

Analyte concentrations in micrograms per kilograms (ug/kg).
Four tentatively identified compounds reported.

J Estimated value.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990a).



Table C-8. Summary of Analytical Results for a Soil Sample Collected June 5 to 10, 1989 at Ramsay Motors, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Location: Ramsay Motors.

Sample Type: One soil sample (eR-02-02s) collected from 2 to 12 inches below ground surface in an area adjacent to Gassett fence on Ramsay property.

Samplers: Camp, Dresser & McKee Federal Programs personnel.

Analytical Results: Methylene chloride and xylenes were detected in sample eR-02-02s.

Tentatively identified benzenes were also detected in sample eR-02-02s.

Naphthalene, methylnaphthalene, fluorene, fluoranthene, pyrene, and benzofluoranthene were detected in sample eR-02-02s.

No pesticides or polychlorinated biphenyls (PCBs) were detected.

Concentration of total petroleum hydrocarbons (TPH) was 23,400 micrograms per gram (ug/g).

Cadmium was detected at a concentration of 6.1 micrograms per liter (ug/kg).

Lead was detected at a concentration of 15 ug/kg.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990a).

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Table C-9. Concentrations of Volatile Organic Compounds in Water Samples Collected on August 17, 1987 at Gasset (Former Consolidated Auto Parts), Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample:	3239B-18	3239B-19
	Sample Location: Sample Type:	Gutter Water	Storm Drain Water
Acetone		2.1	ND
2-Butanone		4.2	2.6
Ethylbenzene		0.39	ND
Toluene		0.78	0.10 J
Total Xylenes		2.6	ND

Analyte concentrations in milligrams per liter (mg/L).

J Estimated value.
ND Not detected.

Samples collected by Region II Technical Assistance Team (TAT), Weston/SPER Division, New Jersey, and St. Thomas Department of Planning and Natural Resources (DPNR) personnel of St. Thomas, U.S. Virgin Islands. Samples collected on August 17, 1987 and received in S-Cubed Laboratories of San Diego, California on September 15, 1987.

Holding time for volatile organic compounds were exceeded.

Source: Weston/SPER Division Region II, TAT (1988b).



Table C-10. Concentrations of Volatile Organic Compounds in Soil and Surface-Water Samples Collected on September 12, 1988 at Gassett (Former Consolidated Auto Parts), Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Type:	eC-09Js Garage Border Soil	eC-10Js Open Bay Garage Soil	eC-11a Standing Water Water
Benzene		ND	0.004 J	ND
Ethylbenzene		1.3	2.1	0.003
4-Methyl-2-pentanone		ND	0.033 J	ND
Styrene		ND	0.006	ND
Toluene		0.56 J	1.3	0.010
Xylene		2.5	5.6	0.013

Analyte concentrations in milligrams per kilogram (mg/kg) for soil samples and in milligrams per liter (mg/L) for water sample.

ND Not detected.
J Estimated value.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

eC-09s Collected behind open four bay garage in back of facility. Grab sample from entire rear border of garage.
eC-10s Collected on upgradient gable-End of open bay garage adjacent to drum storage area.
eC-11a Collected from standing water in an area adjacent to drum storage area.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989a).



Table C-11. Summary of Preliminary Assessment Reports for Gassett, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	Gassett.
Report:	Preliminary Assessment Report for Gassett Motors, St. Thomas, U.S. Virgin Islands, NUS Corporation, March 24, 1989.
Site Reconnaissance Date:	February 15, 1989.
Site Information:	No RCRA permit. Active status. Dates of operation unknown to present. Owner unknown. Former Consolidated Auto Parts. Site is bordered by Ramsay Motors on the northeast and Texaco on the southeast.
UST Location Record of Tank Leaks:	No UST reported at this site.
Disposal Procedures:	Waste oil stored on-site. No indication of other disposal procedure in the report.
Areas of Concern:	Waste oil drums: * Waste oil drums were at the facility when Mr. Gassett leased the property in May 1988. * Waste unit is located behind the main building adjacent to a garage overhang. Drums stored above ground surface. * Drum quantity: four 55-gallon drums and three 20-gallon drums. * Drums contain waste oil from automotive repair and servicing activities. Drums may also contain small quantities of gasoline, kerosene, and/or degreasing solvents. Waste oil from drainage ditch on Gassett property discharges into Ramsay Motors property.
Potential Sources to Soil and/or Groundwater Identified:	Potential of soil and groundwater contamination: * Waste was not properly contained. Drums stored over ground surface. Numerous spills and a large pool of oil in the northwest corner of the property (drum area) were observed during site reconnaissance by NUS Corporation. * Oil-stained area was observed during site reconnaissance on the Ramsay Motors property where drainage ditch left the Gassett property. The drainage ditch discharges into a storm sewer.
Sampling of Areas of Concern:	OVA and PID readings below background at the area of concern during site reconnaissance. No reference of samples collected at this site in this report.
Sample Results:	No sample results in this report.

RCRA Resource Conservation and Recovery Act.
PID Photoionization detector.
UST Underground storage tank.
OVA Organic vapor analyzer.
Source: NUS Corporation, Region II FIT (1989c) (1989d).



Table C-12. Concentrations of Volatile Organic Compounds in Oil Samples Collected on June 8, 1989 at Gassett (Former Consolidated Auto Parts), Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	eC-02-01a*
	Sample Location:	Drain
	Sample Type:	Oil
Acetone		0.013 J

Analyte concentration in milligrams per kilogram (mg/kg)

J Estimated value.

* Sample mistakenly analyzed as water. All other values were rejected (R).

eC-02-01a Sample of oily water collected from drain leading to Ramsay property.

Sample collected by Camp, Dresser & McKee (CDM) personnel.

Sample analyzed by Versar, Inc.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990a).



Table C-13. Concentrations of Volatile Organic Compounds in Oil and Water Samples Collected on August 17, 1987 at the Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	3239B-12	3239B-13	3239B-14	3239B-15	3239B-16	3239B-17
Sample Location:	Bay #1 Sump	Bay #2 Sump	Bay #3 Sump	Oil/Water Separator	Waste Oil Tank	Storm Drain
Sample Type:	Water/Oil	Water	Water	Oil	Oil	Water
Analyte						
Acetone	1.4	1.5	2.2	ND	1.9	2.2
2-Butanone	3	3.1	4.1	5.3	6.3	4.0
Benzene	ND	0.27	ND	2.8	ND	ND
Toluene	ND	2.3	0.9	43.0	ND	1.1
Ethylbenzene	ND	1.3	1.0	14.0	1.0	0.66
Xylene (total)	ND	9.1	7.0	110.0	9.3	4.4
Chloroform	ND	ND	0.26	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	2.4	ND	ND
Tetrachloroethene	ND	ND	ND	ND	ND	ND

Analyte concentrations in milligrams per liter (mg/L) for water and water/oil samples, and in milligrams per kilogram (mg/kg) for oil samples.

ND Not detected.

No field or trip blanks collected.

Samples collected by Region II Technical Assistance Team (TAT), Weston/SPER Division, New Jersey and St. Thomas Department of Planning and Natural Resources personnel.

Samples received at S-Cubed Laboratories, of San Diego, California on September 15, 1987. Samples analyzed using U.S. Environmental Protection Agency-Contract Laboratory Program (USEPA CLP) Methodology. Holding time was exceeded.

Source: Weston/Spill Prevention Emergency Response Division Region II, Technical Assistance Team (1988b).

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Table C-14. Concentrations of Volatile Organic Compounds in Soil, Oil, and Water Samples Collected from September 12 to 15, 1988 at the Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Type:	eT-01W Cistern Water	eT-02s * Soil	eT-02sd Duplicate of eT-02s Soil	eT-62 Oil/Water Separator Oil mg/kg
Carbon disulfide		2 J	ND	ND	ND
Toluene		ND	ND	ND	140
Ethylbenzene		ND	ND	ND	400
Xylene (total)		ND	ND	ND	160

Analyte concentrations for water in micrograms per liter (ug/L) and for soil and oil in micrograms per kilogram (ug/Kg).

J Estimated value.

ND Not detected.

* Sample collected north of the first open bay with lift, between concrete pad and fence.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

Sample eT-62 analyzed by Cenref Laboratories of Brighton, Colorado.

No results available for eT-23s and eT-23sd.

Samples analyzed using U.S. Environmental Protection Agency-Contract Laboratory Programs (USEPA CLP) methodology.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989a).

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Table C-15. Summary of Preliminary Assessment Report for Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	Texaco Service Station.
Report:	Preliminary Assessment Report for Tutu, Texaco, St. Thomas, U.S. Virgin Islands, NUS Corporation, March 31, 1989.
Site Reconnaissance Date:	February 15, 1989.
Site Information:	No RCRA permit. Active status. Operation unknown to present.
UST Location Record of Tank Leaks:	Waste oil UST of unknown age. Unknown location. A previous investigation by DPNR on August 5, 1987, indicated two USTs: one with a concrete top and a concrete partition, and the other covered with a square steel plate. No reports of leaks or spills.
Disposal Procedures:	
Areas of Concern:	Waste oil drums: No RCRA permits. Unknown age. Drums located in the northern corner of the Tutu Texaco property. Twenty-seven 55-gallon drums in the waste unit. Twenty-five drums contain waste oil from automotive repair and servicing operations. Two drums contain dirt. Three 20-gallon drums with waste oil. Few 5-gallon pails with waste oil. Drums stored over a concrete surface. No berms or curbs observed in this area. Evidence of oil spill in storage area. One drum was found open during site reconnaissance. Waste oil may contain small quantities of gasoline, kerosene, or degreasing solvents.

See Page 2 for footnotes.

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Table C-15. Summary of Preliminary Assessment Report for Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
	Waste oil USTs: Construction and integrity is unknown. USTs contain waste oil from automotive servicing. USTs operated in violation of USVI laws. Waste oil may contain small quantities of gasoline, kerosene, or degreasing solvents.
Potential Sources to Soil and/or Groundwater Identified:	Waste oil drums: Potential of release to surface water, soil, and groundwater. No containment structure in storage area. Spilled oil and soil staining observed during site reconnaissance.
Sampling of Areas of Concern:	OVA readings of 20 ppm from the open drum. No readings above background in the ambient air in the storage area. Waste oil sample collected.
Sample Results:	1,1,1-Trichloroethane was detected in waste oil sample. Sample results invalidated because the sample holding time was exceeded.

RCRA	Resource Conservation and Recovery Act.
DPNR	Department of Planning and Natural Resources.
UST	Underground storage tank.
USVI	U.S. Virgin Islands.
OVA	Organic vapor analyzer.
ppm	Parts per million.

Source: NUS Corporation, Regional FIT (1989a).

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Table C-16. Summary of Tank Excavation Procedures, September 7 to September 16, 1988 at Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site:	Texaco Service Station.
Field Activities Date:	September 7 to September 16, 1988.
Excavation and Installation of Underground Storage Tanks (USTs):	Local contractor.
Field Activities Oversight:	Camp, Dresser & McKee (CDM) Federal Programs Corporation. U.S. Virgin Islands Department of Planning and Natural Resources. (removal and transportation activities).
Sampling Activities:	Lebrón Associates, Inc.
Soil Venting System:	Groundwater Technology, Inc.
USTs Removed:	Three 4,000-gallon steel USTs, one containing motor fuels were removed from the south end of the Texaco Service Station.
USTs Installed:	Three doubled-walled steel tanks (two 10,000-gallon and one 6,000-gallon capacity tanks) with leak detection systems were installed at the west end of the Texaco service station.
Removal Operation:	USTs were excavated and removed from September 7 to September 9, 1988. USTs were degassed with carbon dioxide prior to removal. Large holes were noted in one of the USTs during an initial investigation. No holes were observed in the other two USTs. During UST removal excavated soils were placed over polyethylene sheeting at the eastern boundary of the site. Excavation depth was approximately 6.5 feet. USTs were transported to the Texaco terminal outside of Charlotte Amalie, St. Thomas.
Sampling of Excavation Pit:	An attempt to collect soil samples from the excavation was made after removal of the USTs. Soil sampling procedure was delayed due to a tropical storm event on September 8 and 9, 1988. Excavation pit was filled with the runoff produced by heavy rain. The soil piles were covered with plastic sheeting. CDM requested that Texaco analyze the water accumulated in the excavation pit and pump out the water prior to infiltration through the excavation walls.

See page 3 for footnotes.



Table C-16. Summary of Tank Excavation Procedures, September 7 to September 16, 1988 at Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

**Sampling of Excavation Pit
(continued):**

A tanker truck was not available until September 10, 1988. By this date the water inside the pit had dropped approximately 3 feet. Two 55-gallon drums provided by Texaco were filled with water from the excavation pit for later sampling. A 4,000-gallon tanker truck from the Texaco terminal arrived on September 10, 1988 to remove the water from the excavation pit.

Another hurricane advisory was in effect by the evening of September 10, 1988. Operations were shut down and the excavation pit was protected and bermed to keep surface runoff from going inside the excavation. A third 55-gallon drum was filled with the water that had accumulated in the excavation pit. Two tanker trucks were filled to empty the excavation pit.

CDM requested soil samples from at least 10 feet downgradient of the excavation area due to flooding of the excavation pit. Three holes were drilled in the concrete pad at the south-southwest portion of the excavation. Borehole depth was not indicated in the letter.

Soil samples from the excavation pit were collected on September 13 and 14, 1988: four soil samples were collected from the corners of the excavation pit floor and four soil samples were collected from the center of each wall. Three soil samples were collected in the vicinity of the excavation pit.

Water Sampling:

Three water samples were collected from the 55-gallon drums that were used to store water removed from the excavation pit. One sample per drum was collected.

Soil Pile Sampling:

Two soil piles were sampled on September 15, 1988. Three composite samples were collected from the first soil pile. Two composite samples were collected from the second pile. A third pile was generated during excavation for the new tanks installed at the west end of the Texaco service station on September 15, 1988. This soil pile was sampled the following week. One sample was collected from this soil pile.

See page 3 for footnotes.



Table C-16. Summary of Tank Excavation Procedures, September 7 to September 16, 1988 at Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Installation of New USTs:	Three new double-walled steel tanks and leak detection systems were installed at the west end of the Texaco service station on September 15, 1988. Excavation procedures began on September 14, 1988. The first 4-feet of soil removed during the excavation was used as backfill for the old tank excavation pit. Remaining soil was piled at the eastern and northern boundaries of the service station. Due to HNU readings obtained from soil samples during field activities of 10 to 15 parts per million (ppm) of total volatile organics, the soil could not be used as landfill. Fill material was utilized to backfill the excavations. The source of this fill material was not indicated in the letter.
Soil Venting System:	Soil removed from both excavations was placed over a slotted polyvinyl chloride (PVC) pipe for venting. Air was removed from the pipe with a high vacuum pump system. This system was monitored weekly with an HNU photoionization detector at selected points. Soil samples were scheduled to be collected after completion of the soil venting procedure for final disposition of the soils.
Air Monitoring:	An HNU photoionization detector and Draeger tube during field activities. HNU readings during tank excavation ranged between 20-30 ppm with peaks of 80 ppm of total VOCs during soil removal activity. HNU background readings ranged from 0.2 to 1.0 ppm total VOCs. HNU readings above the soil pile surface ranged between 80 to 150 ppm. Breathing zone readings ranged from 5 to 10 ppm. Draeger tubes for benzene levels during UST removal ranged from 1 to 2 ppm during peak activity. HNU readings at the new tanks excavation soil pile were from: 10 to 15 ppm.

USTs Underground storage tanks.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989b).

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Table C-17. Concentrations of Volatile Organic Compounds in Split Soil Samples Collected from September 12 to 15, 1988 during Texaco Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample: Location:	TP-01 Test Hole	TP-02 Test Hole	TP-03 Test Hole	EX-01 Excavtion Pit	EX-02 Excavation Pit	EX-03 Excavation Pit	EX-03d Excavation Pit	EX-04 Excavation Pit
Acetone		ND	18BJ	ND	ND	ND	ND	ND	ND
Chloroform		ND	ND	0.013J	ND	ND	ND	ND	ND
1,2-Dichloroethane		ND	ND	ND	ND	ND	0.01	ND	ND
4-Methyl-2-pentanone		ND	2.7	ND	6.2J	49J	ND	30J	ND
2-Hexanone		ND	14J	ND	ND	ND	24J	ND	ND
Toluene		ND	4.8	0.013J	14J	6.9	3.6	11	0.28J
Xylene		43	22	ND	31J	58	8.1	25	2B
Benzene		ND	1.4	0.087J	1.2J	4.6	0.28J	11	ND
Ethylbenzene		5	13	0.17J	16J	59	4	ND	1.4
2-Butanone		ND	2.3J	0.006J	ND	ND	ND	2.6J	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

- J Estimated value.
 B No explanation in reported results.
 ND Not detected.
 * Sample may be a duplicate or matrix spike.

Split samples were collected by Camp, Dresser & McKee (CDM) personnel during Texaco tank excavation soil sampling activities.

Source: Camp Dresser & McKee (CDM 1989b)

TUT 005 0867



Table C-17. Concentrations of Volatile Organic Compounds in Split Soil Samples Collected from September 12 to 15, 1988 during Texaco Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample: Location:	SP-1T Soil Pile	SP-2T Soil Pile	SP-3T Soil Pile	SP-3DT Duplicate of SP-3T	SP-2M	SP-3DM Duplicate of SP-2M*	SP-4T Soil Pile Trip Blank
Acetone		ND	ND	ND	ND	4.5J	ND	ND
Chloroform		ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane		ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone		ND	ND	ND	ND	ND	ND	ND
2-Hexanone		ND	ND	17J	7.8	7.9J	12J	ND
Toluene		ND	ND	0.67J	ND	0.52J	0.28J	0.24J
Xylene		0.72J	0.72J	5.6	1.9	1.7	1.3	1.9
Benzene		ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		0.99	0.92	3.2	1.4	1.4	1.7	1.3
2-Butanone		ND	ND	ND	ND	ND	ND	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

- J Estimated value.
 B No explanation in reported results.
 ND Not detected.
 * Sample may be a duplicate or matrix spike.

Split samples were collected by Camp, Dresser & McKee (CDM) personnel during Texaco tank excavation soil sampling activities.

Source: Camp Dresser & McKee (CDM 1989b)

TUT 005 0868 8980



Table C-18. Concentrations of Volatile Organic Compounds in Water Samples Collected by Camp, Dresser & McKee Corporation from September 12 to 15, 1988 During Texaco Service Station Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	PW-02
	Location:	Excavation Pit Pumped Water
Xylene		0.002J

Analyte concentrations in milligrams per liter (mg/L).

No tentatively identified compounds (TICs) reported in Sample PW-02.

Sample analyzed using U.S. Environmental Protection Agency-Contract Laboratory Program (USEPA CLP) methodology.

J Estimated value.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989b).



Table C-19. Concentrations of Volatile Organic Compounds in QA/QC Samples Collected from September 12 to 15, 1988 During the Texaco Service Station Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	TFB-01	TFB-02	TFB-03	SP-FB-59	SP-T-60	SP-T-61	648-WB
		Field Blank	Field Blank	Field Blank	Field Blank	Trip Blank	Trip Blank	Water Blank
Methylene chloride		ND	ND	0.004J	ND	ND	ND	ND
Acetone		0.005J	0.005J	0.013	0.012	0.01	0.026J	0.005J
Chloroform		ND	ND	ND	ND	ND	ND	0.008
1,2-Dichloroethane		0.006	ND	ND	0.002J	0.002J	ND	ND
Bromodichloromethane		ND	ND	ND	ND	ND	ND	0.006
Dibromochloromethane		ND	ND	ND	ND	ND	ND	0.008
Bromoform		ND	ND	ND	ND	ND	ND	0.01
Xylene		ND	0.01	ND	ND	ND	ND	ND
Benzene		ND	0.024J	ND	ND	ND	ND	ND
Ethylbenzene		ND	0.034B	ND	ND	ND	ND	ND

Analyte concentrations in milligrams per liter (mg/L).

Water blank concentration in milligrams per liter (mg/L).

No tentatively identified compounds (TICs) reported in the blank samples.

J Estimated value.

B No explanation in reported results.

ND Not detected.

QA/QC Quality assurance/quality control.

Source: Camp Dresser & McKee (CDM 1989b).

TUT 005 0870



Table C-20. Concentrations of Volatile Organic Compounds in Oil Samples Collected on June 8, 1989 at the Texaco Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Type:	eT-02-01a Oil/Water Separator Oil	eT-02-02a Middle Bay Collection Pit Oil	eT-02-03a* Waste Oil Drum Oil	eT-02-04a Waste Oil Drum Oil	eT-02-05a Waste Oil Drum Oil	eT-02-06a Waste Oil Drum Oil	eT-02-07a Waste Oil Drum Oil
Methylene chloride		ND	ND	R	ND	ND	ND	3.8 J
Acetone		ND	ND	2.4 JR	ND	ND	ND	ND
2-Hexanone		ND	ND	R	59 J	ND	ND	ND
Benzene		ND	7 J	R	46 J	11 J	4 J	ND
Toluene		340 J	76 J	R	490 J	130 J	110 J	24 J
Ethylbenzene		190 J	35 J	R	140 J	49 J	61 J	13 J
Xylene		1600 J	190 J	R	900 J	330 J	88 J	120 J
1,1,1-Trichloroethane		ND	ND	R	ND	ND	3.9 J	ND
Tetrachloroethene		ND	ND	R	ND	ND	ND	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

Samples analyzed using U.S. Environmental Protection Agency-Contract Laboratory Program (USEPA-CLP) methodology.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

Samples analyzed by Versar, Inc.

J Estimated values.

* Sample mistakenly analyzed as water by the laboratory.

ND Not detected.

R Sample analysis rejected.

Holding times exceeded for all samples.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990a).

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Table C-21. Summary of Analytical Results for Split Soil Samples Collected from June 5 to 10, 1989 from Texaco Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Location: Texaco service station soil pile generated during tank excavation. Samples collected after on-site soil ventilation procedure.

Sample Type: Split soil samples from ventilated soils. Grab samples were collected from the top, middle, and bottom section of each sampling location for VOAs analysis. Composite samples for other analysis were prepared from the top, middle, and bottom section of the soil pile at each location.

Samplers: Camp, Dresser & McKee Federal Programs Corporation personnel. Other personnel involved were not mentioned.

**Analytical
Results:**

Methylene chloride was found in soil samples and in the laboratory blank. The letter does not specify which samples.

Sample SP2-022 from the middle section of location SP-3 contained chlorinated hydrocarbons and xylenes. Tentatively identified hydrocarbons were detected in semivolatile analyses at this location.

No pesticides or PCBs were found in these samples.

Total petroleum hydrocarbons (TPH) were detected in all split samples. TPH concentrations ranged from < 10 to 91 micrograms per gram (ug/g).

Metals detected by EP Toxicity were cadmium from 0.35 to 2.8 micrograms per liter ug/L, and lead from 1.8 to 31 ug/L.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990b).

VOAs Volatile organic analyte.
PCBs Polychlorinated biphenyls.
EP Extraction procedure.

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Table C-22. Concentrations of Volatile Organic Compounds and Tentatively Identified Compounds in Soil Samples Collected on September 13, 1988 at Tillett Gardens, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

	Sample ID:	eTT-14	eTT-15
	Sample Location:	Paint Cleaning	Paint Cleaning
		Drain	Drain
Analyte	Sample Type:	Soil	Soil
<u>VOCs</u>			
Xylene (total)		0.011 J	ND
<u>Tentatively Identified VOCs</u>			
2-Ethyl-1,3-dimethylbenzene		0.30 JN	2 JN
1-Ethyl-2,3-dimethylbenzene		1 JN	3 JN
Acetic acid (methylester)		ND	0.03 JN

Analyte concentrations in milligrams per kilogram (mg/kg).

J Estimated value.
N Presumptive evidence of the presence of the analyte.
ND Not detected.
VOCs Volatile organic compounds.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

eTT-14 surface sample collected at the foot of the concrete drainway at beginning of gravel pit.

eTT-15 drainline location inside fence line collected from the 2-foot drainpipe where it exits the building.

Samples were analyzed for VOCs by using the method specified in the Contract Laboratory Program (CLP) Statement of Work (SOW).

Source: Camp, Dresser and McKee, Federal Programs Corporations (1989a).

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Table C-23. Concentrations of Volatile Organic Compounds in Oil Samples Collected on August 17, 1987, at Esso Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location:	3239B-22 Oil/Water Separator
Benzene		59
Toluene		970
Ethylbenzene		200
Total Xylenes		1,200
1,1,1-Trichloroethane		58
Tetrachloroethene		110

Analyte concentrations for oil in milligrams per kilogram (mg/kg).

Only detected compounds are reported.

Samples collected by Weston/SPER Division Region II Technical Assistance Team (TAT) of New Jersey, and St. Thomas Department of Planning and Natural Resources (DPNR) personnel.

Samples collected on August 17, 1987 and received in S-Cubed Laboratories of San Diego, California on September 15, 1987.

Holding time for sample was exceeded.

Source: Weston/SPER Division Region II, TAT (1988b).

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Table C-24. Concentrations of Volatile Organic Compounds in Oil Samples Collected on September 12, 1988 at Esso Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Type:	eE-63 Holding Tank Oil	eE-64 Oil/Water Separator Oil
Methylene chloride		ND	57
2-Butanone		ND	62
Benzene		ND	29
Toluene		1,800	2,900 *
Ethylbenzene		230	4,500 *
Xylene (total)		1,600	1,900 *
1,1,1-Trichloroethane		ND	100
Tetrachloroethene		ND	65

Analyte concentrations in milligrams per kilogram (mg/kg).

* Value from analysis of a diluted aliquot of this sample.

ND Not detected.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

Samples analyzed by Cenref Laboratories in Brighton, Colorado.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1989a).

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Table C-25. Summary of Preliminary Assessment Report for Esso Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	Esso Service Station.
Report:	Preliminary Assessment Report for Tutu Esso, St. Thomas, U.S. Virgin Islands, NUS Corporation, March 24, 1989.
Site Reconnaissance Date:	No indication on the report.
Site Information:	No RCRA permit. Active status. Operation: 1969 to present.
UST Location Record of Tank Leaks:	Waste oil UST installed in 1969. This UST is located below a tire rack inside the maintenance garage. Volume of tank unknown. Waste oil UST contains waste oil generated from automotive repairs and servicing operations. Solvents and cleaners are not stored in the tanks according to information provided by an Esso manager during site reconnaissance. No records of incidental spills or dumping on-site. No indication of tank leaking.
Disposal Procedures:	Tanks are periodically emptied by Esso Corporation and the waste is shipped off St. Thomas for disposal, according to information provided by Esso station manager during site reconnaissance.
Areas of Concern:	Waste oil UST: * No RCRA permit. * Unknown volume. * Installed in 1969. * UST contains waste oil from automotive services. * No records of incidental spills or tank leakage. UST for gasoline suspected of leaking. Potential of groundwater contamination.
Potential Sources to Soil and/or Groundwater Identified:	* Waste oil is containerized in a UST. * No evidence of spills or releases to the environment were observed by NUS Corporation during site reconnaissance.
Sampling of Areas of Concern:	Waste oil samples from UST collected by Belgedere Associates, Inc. and analyzed by Cenref Laboratories, Brighton, Colorado, according to report.
Sample Results:	Toluene, ethylbenzene, and xylenes were detected in waste oil samples.

RCRA Resource Conservation and Recovery Act.
 UST Underground storage tank.
 Source: NUS Corporation, Region II FIT (1989f).



Table C-26. Concentrations of Volatile Organic Compounds and Tentatively Identified Compounds in Oil Samples Collected on June 8, 1989 at Esso Service Station, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Type:	eE-02-01a Holding Tank Oil	eE-02-02-a Oil/Water Separator Oil	eE-02-03a (eE-02-02a Duplicate) Oil
<u>Volatile Organic Compounds</u>				
Benzene		12 J	ND	ND
Toluene		91 J	57 J	92 J
Ethylbenzene		32 J	19 J	ND
Xylene (total)		28 J	150 J	230 J
1,1,1-Trichloroethane		25 J	42 J	ND
Tetrachloroethane		30 J	63 J	91 J
<u>Tentatively Identified Compounds</u>				
1,2,3-Trimethylbenzene		140 JN	ND	ND
1,2,4-Trimethylbenzene		16 JN	ND	ND
3-Methylpentane		7.9 JN	ND	ND
2-Methoxy-2-Methylpropane		25 JN	ND	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

J Estimated value.
N Presumptive evidence of the presence of the analyte.
ND Not detected.

Samples collected by Camp, Dresser & McKee (CDM) personnel.
Contract Laboratory Program (CLP) sample analysis by Versar, Inc.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990a).



Table C-27. Concentrations of Volatile Organic Compounds in Soil Samples Collected by Soil Tech in June 1989 from the Esso Tank Excavation Pit Area, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	TP-1	TP-2	TP-3	TP-4	TP-5	TP-5A	TP-6	TP-7	TP-8	TP-9	TP-10	TP-10A	TP-10RE Replicate	TP-11	TP-12	TP-13
Analyte																
Acetone	ND	ND	ND	0.014	ND	ND	ND	0.029	ND	0.005 J	ND	0.053	0.032	ND	ND	0.11
2-Butanone	ND	ND	0.4 BJ	ND	3.6 B	4.4 B	19 BJ	ND	ND	ND	0.005 J	0.004 J	ND	ND	ND	0.004 J
Benzene	ND	ND	0.23 J	0.002 J	1.1	0.87	23 J	ND	0.093	ND	0.003 J	0.013	0.009	ND	ND	ND
Toluene	ND	ND	5.2	ND	ND	ND	180	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	2.1	0.005 J	7	14	55	0.005 J	0.52	ND	0.009	0.016	0.014	ND	ND	ND
Xylene (total)	ND	1.6 E	31 E	ND	ND	ND	540	0.30 E	0.22	ND	ND	ND	ND	ND	ND	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

B Analyte found in the method blank. The reported results have been adjusted for the quantity found in the blank.
E The reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.
J Estimated concentration below the method detection limit.
ND Not detected.

Source: Soil Tech Corporation (1990a).



Table C-28. Concentrations of Base Neutral and Acid Extractable Organic Compounds in Soil Samples Collected by Soil Tech in June 1989 from the Esso Tank Excavation Pit Area, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID:	TP-1	TP-2	TP-3	TP-3DL	TP-4	TP-4DUP (Duplicate)	TP-5	TP-5A	TP-6
Naphthalene		ND	ND	3.2 J	49	ND	ND	9	7.9	45 E
2-Methylnaphthalene		0.11 J	0.68 J	45 E	45	ND	ND	9.6	11	47 E
Acenaphthene		ND	ND	0.4 J	ND	ND	ND	ND	ND	ND
Diethylphthalate		ND	ND	ND	ND	ND	ND	ND	0.13 J	ND
Fluorene		ND	0.18 J	1.4	1.6 J	ND	ND	ND	0.69 J	NA
Phenanthrene		ND	0.12 J	1.1	1.2 J	ND	ND	0.37 J	0.47 J	NA
Anthracene		ND	ND	0.13 J	ND	ND	ND	ND	ND	ND
Fluoranthene		ND	ND	0.12 J	ND	ND	ND	ND	ND	NA
Pyrene		ND	ND	0.21 J	ND	ND	ND	ND	0.09 J	NA
Di-n-butylphthalate		0.069 BJ	ND	ND	ND	ND	ND	ND	0.2 J	ND
Butylbenzylphthalate		ND	ND	ND	ND	ND	ND	ND	1	ND
bis(2-Ethylhexyl)phthalate		0.28 BJ	ND	0.4 BJ	ND	ND	ND	0.11 BJ	0.26 BJ	NA

Analyte concentrations in milligrams per kilogram (mg/kg).

E The reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.
 J Estimated concentration below the method detection limit.
 B Analyte found in method blank. The reported results have been adjusted for the quantity found in the blank.
 ND Not detected.
 DL Diluted.
 NA Not available.

Source: Soil Tech Corporation (1990a).

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Table C-28. Concentrations of Base Neutral and Acid Extractable Organic Compounds in Soil Samples Collected by Soil Tech in June 1989 from the Esso Tank Excavation Pit Area, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	TP-6DL	TP-7	TP-8	TP-9	TP-10	TP-10A	TP-11
Analyte							
Naphthalene	55	0.3 J	1.1	ND	0.19 J	ND	ND
2-Methylnaphthalene	47	1.1	2	0.14 J	0.18 J	ND	ND
Acenaphthene	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	ND	ND	ND	ND	ND	ND	ND
Fluorene	2 J	0.29 J	0.29 J	ND	ND	ND	ND
Phenanthrene	1.5 J	0.16 J	0.18 J	ND	ND	ND	ND
Anthracene	ND	ND	ND	ND	ND	ND	ND
Fluoranthene	ND	ND	ND	ND	ND	ND	ND
Pyrene	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	ND	ND	ND	0.063 BJ	0.094 BJ	ND	ND
Butylbenzylphthalate	ND	ND	ND	ND	0.31 J	ND	ND
bis(2-Ethylhexyl)phthalate	ND	ND	ND	ND	0.36 J	0.13 BJ	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

E The reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.
 J Estimated concentration below the method detection limit.
 B Analyte found in method blank. The reported results have been adjusted for the quantity found in the blank.
 ND Not detected.
 DL Diluted.
 NA Not available.

Source: Soil Tech Corporation (1990a).

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Table C-29. Concentrations of Total Petroleum Hydrocarbons in Soil Samples Collected in June 1989 from the Esso Tank Excavation Pit Area, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample I.D.	Petroleum Hydrocarbons
TP-1	ND
TP-2	15
TP-3	40
TP-4	ND
TP-5	10
TP-5A	11
TP-6	40
TP-7	6
TP-8	23
TP-9	7
TP-10	ND
TP-10A	ND
TP-11	ND
TP-12	9
TP-13	ND

Analyte concentrations in milligrams per kilogram (mg/kg).
Samples analyzed by Soil Tech Corporation.

ND Not detected.

Source: Soil Tech Corporation (1990a).

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Table C-30. Concentrations of Metals in Soil Samples Collected from June 5 to 10, 1989 from the Esso Tank Excavation Pit Area, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	TP-1	TP-2	TP-3	TP-4	TP-5	TP-5A	TP-6	TP-7	TP-8	TP-9	TP-10	TP-10A	TP-11	TP-12	TP-13
Analyte															
Lead	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ND	ND	0.0002	ND	ND	ND	0.0001	ND	ND	ND	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Analyte concentrations in milligrams per kilogram (mg/kg).

ND Not detected.

Source: Soil Tech Corporation (1990a).

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TUT 005 0882



Table C-31. Concentrations of Volatile Organic Compounds in Soil Samples Collected from June 5 to June 10, 1989 from the Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID:	SP-1-Top	SP-1-Mid	SP-1-Bot	SP-2-Top	SP-2-Mid	SP-2-Bot	SP-3-Top	SP-3-Mid	SP-3-Bot	SP-4-Top	SP-4-DU-T	SP-4-Mid
	Location:	Top of Soil Pile	Middle of Soil Pile	Bottom of Soil Pile	Top of Soil Pile	Middle of Soil Pile	Bottom of Soil Pile	Top of Soil Pile	Middle of Soil Pile	Bottom of Soil Pile	Top of Soil Pile	Top of Soil Pile (Duplicate)	Middle of Soil Pile
Methylene chloride		0.003 J	ND	ND	ND	ND	ND	ND	0.004 J	ND	ND	ND	ND
Acetone		0.006 J	ND	ND	ND	ND	ND	ND	0.007 J	ND	ND	ND	ND
2-Butanone		ND	ND	ND	ND	3.2 B	ND	3.8 B	ND	0.003 J	ND	ND	ND
Vinyl acetate		ND	ND	ND	ND	ND	ND	0.21 J	ND	ND	ND	ND	ND
Benzene		ND	ND	ND	ND	0.033 J	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	1.6	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	0.027	0.028	0.83	ND	1.4	ND	0.003 J	ND	ND	ND
Xylene (total)		0.046	ND	0.14	0.92 E	16	0.58	20	0.073	0.14	ND	ND	ND

Analyte concentrations in milligrams per kilograms (mg/kg).

ND Not detected.

J Estimated concentration below method detection limit.

B Analyte found in method blank. Reported results have been adjusted for the quantity found in the blank.

E The reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.

Source: Soil Tech Corporation (1990a).

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Table C-31. Concentrations of Volatile Organic Compounds in Soil Samples Collected from June 5 to June 10, 1989 from the Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Location:	SP-4-DU-M Middle of Soil Pile (Duplicate)	SP-4 Bottom of Soil Pile	SP-4-DU-B Bottom of Soil Pile (Duplicate)	SP-5-Top Top of Soil Pile	SP-5-Mid Middle of Soil Pile	SP-5-Bot Bottom of Soil Pile	SP-6-Top Top of Soil Pile	SP-6Mid Middle of Soil Pile	SP-6-Bot Bottom of Soil Pile	SP-7-Top Top of Soil Pile	SP-7-Mid Middle of Soil Pile	SP-7-Bot Bottom of Soil Pile
Methylene chloride		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003 J	0.001 J
Acetone		ND	0.005 J	ND	ND	ND	ND	ND	ND	ND	ND	0.056	0.009 J
2-Butanone		ND	ND	ND	ND	ND	ND	ND	ND	ND	2.9 B	0.006 J	ND
Vinyl acetate		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene (total)		ND	ND	ND	ND	0.046	ND	ND	ND	0.009	7	ND	0.072

Analyte concentrations in milligrams per kilograms (mg/kg).

ND Not detected.
J Estimated concentration below method detection limit.
B Analyte found in method blank. Reported results have been adjusted for the quantity found in the blank.
E The reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.

Source: Soil Tech Corporation (1990a).

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Table C-32. Concentrations of Base Neutral and Acid Extractable Compounds in Soil Samples Collected from June 5 to 10, 1989 from the Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.: Location:	SP-1 Soil Pile	SP-2 Soil Pile	SP-3 Soil Pile	SP-4 Soil Pile	SP-4 Dup	SP-5 Soil Pile	SP-6 Soil Pile
Naphthalene		ND	2.6	0.32J	ND	ND	0.16J	ND
2-Methylnaphthalene		0.18J	5.2	1.7	0.085J	0.082J	0.81	ND
Fluorene		0.16J	0.33J	0.26J	ND	ND	0.16J	ND
Phenanthrene		0.15J	0.23J	0.22J	ND	ND	0.12J	ND
Di-n-butylphthalate		0.048BJ	ND	ND	0.098BJ	0.1BJ	0.045BJ	ND
bis-(2-Ethylhexyl) phthalate		0.16BJ	0.13BJ	0.11BJ	0.13BJ	ND	ND	ND

Analyte concentration in milligrams per kilogram (mg/kg).

Analyses were performed by Datachem of Salt Lake City, Utah.

J Estimated concentration below the method detection limit.

B Analyte found in the method blank. Reported results have been adjusted for the quantity found in the blank.

Dup Duplicate.

ND Not detected.

Source: Soil Tech Corporation (1990a).

TUT 005 0885



Table C-33. Concentrations of Total Petroleum Hydrocarbons in Soil Samples Collected from June 5 to 10, 1989 from the Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	SP-1	SP-2	SP-3	SP-4	SP-4-Dup	SP-5	SP-6	SP-7
Total Petroleum Hydrocarbons		18	24	21	20	14	19	12	12

Analyte concentrations in milligrams per kilogram (mg/kg).

Analyses were performed by Datachem of Salt Lake City, Utah.

Dup Duplicate.

Source: Soil Tech Corporation (1990a).

TUT 005 0886



Table C-34. Concentrations of Metals in Soil Samples Collected from June 5 to 10, 1989 from the Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	SP-1	SP-2	SP-3	SP-4	SP-4-Dup	SP-5	SP-6	SP-7
Lead		ND	ND	ND	ND	ND	ND	ND	ND
Arsenic		ND	ND	ND	ND	ND	ND	ND	ND
Chromium		ND	ND	ND	ND	ND	ND	ND	ND
Selenium		ND	ND	ND	ND	ND	ND	ND	ND

Analyte concentrations in micrograms per kilogram (mg/kg).
Analyses were performed by Datachem of Salt Lake City, Utah.

ND Not detected.
Dup Duplicate.

Source: Soil Tech Corporation (1990a).

TUT 005 0887



Table C-35. Results of Ignitability Analysis of Soil Samples Collected from the June 5 to 10, 1989 from Esso Tank Excavation Soil Pile, Tutu Wells Site, St. Thomas U.S. Virgin Islands.

Analyte	Sample I.D.:	SP-1	SP-2	SP-3	SP-4	SP-4-Dup	SP-5	SP-6	SP-7
Ignitability (oC)		> 60	> 60	> 60	> 60	> 60	> 60	> 60	> 60
Ignitability (Torch)		N-I	N-I	N-I	N-I	N-I	N-I	N-I	N-I

Analyses were performed by Datachem of Salt Lake City, Utah.
Flashpoint >60 degrees Celsius (oC) defines sample as nonignitable.

N-I Nonignitable when tested with torch.
Dup Duplicate.

Source: Soil Tech Corporation (1990a).

TUT 005 0888



Table C-36. Concentrations of Volatile Organic Compounds in Water Samples Collected from June 5 to 10, 1989 During Esso Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	DW-1	FB-1	FB-2	FB-3	TB6-8-89	TB6-9-89	TB6-10-89	T-E-1	WB-1
Methylene chloride		ND	0.009J	ND	ND	ND	ND	ND	ND	ND
Acetone	190B		0.26E	0.015	ND	ND	0.017	ND	ND	ND
Carbon disulfide		ND	ND	0.018	ND	ND	ND	ND	ND	ND
2-Butanone		ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl acetate		ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene		3.5J	ND	ND	ND	ND	ND	ND	3.8	ND
Toluene		ND	ND	ND	ND	ND	ND	ND	3.5	ND
Ethylbenzene		ND	ND	ND	ND	ND	ND	ND	1.8	ND
Total Xylenes		ND	ND	ND	ND	ND	ND	ND	5.0	ND

Analyte concentrations in milligrams per liter (mg/L).

Analyses were performed by Datachem of Salt Lake City, Utah.

J Estimated concentration below the method detection limit.
 B Analyte found in the method blank. Reported results have been adjusted for the quantity found in the blank.
 E Reported concentration is an estimate only. The response factor was assumed to be 1.000 relative to an internal standard.
 DW Water sample from decontamination waters.
 FB Field blank.
 TB Trip blank.
 T-E-1 Sample collected from a 55-gallon drum that was used to store liquid residues pumped out from tanks at the site.
 WB Water blank from deionized water.
 ND Not detected.

Source: Soil Tech Corporation (1990a).

TUT 005 0889



Table C-37. Concentrations of Base Neutral and Acid Extractable Compounds in Water Samples Collected from June 5 to 10, 1989 During Esso Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	DW-1	FB-1	FB-2	FB-3	WB-1	WB-2	T-E-1	TE-1-DL
Phenol		0.02	ND	ND	ND	ND	ND	0.15	0.13
Benzyl alcohol		0.041	ND	ND	ND	ND	ND	ND	ND
2- Methylphenol		ND	ND	ND	ND	ND	ND	0.028	ND
4-Methylphenol		ND	ND	ND	ND	ND	ND	0.036	ND
Naphthalene		0.067	ND	ND	ND	ND	ND	0.67E	0.72
2-Methylnaphtalene		0.031	ND	ND	ND	ND	ND	0.44E	0.39
Fluorene		0.004J	ND	ND	ND	ND	ND	0.015	0.02J
Phenanthrene		0.005J	ND	ND	ND	ND	ND	0.009J	0.012J
Pyrene		ND	ND	ND	ND	ND	ND	ND	0.005J
bis-2-Ethylhexylphthalate		0.084	ND	ND	ND	ND	ND	0.046	0.049

Analyte concentrations in milligrams per liter (mg/L).

Analyses were performed by Datachem of Salt Lake City, Utah.

E Reported concentration is an estimate only. The reponse factor was assumed to be 1.000 relative to an internal standard.
J Estimated concentration below the method detection limit.
DW Water sample from decontamination waters.
FB Field blank.
WB Water blank from deionized water.
T-E-1 Sample collected from a 55-gallon drum that was used to store liquid residues pumped out from tanks at the site.
DL Diluted sample.
ND Not detected.

Source: Soil Tech Corporation (1990a).

TUT 005 0890



Table C-38. Concentrations of Total Petroleum Hydrocarbons in Water Samples Collected from June 5 to 10, 1989 During Esso Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.:	DW-1	FB-1	FB-2	FB-3	WB-1	WB-2	T-E-1
Total Petroleum Hydrocarbons		39	ND	ND	ND	ND	ND	7.5

Analyte concentrations in milligrams per liter (mg/L).

Analyses were performed by Datachem of Salt Lake City, Utah.

ND Not detected.

DW Water sample from decontamination waters.

FB Field blank.

WB Water blank from deionized water.

T-E-1 Sample collected from a 55-gallon drum that was used to store liquid residues pumped out from tanks at the site.

Source: Soil Tech Corporation (1990a).

TUT 005 0891



Table C-39. Results of Ignitability Analysis of Water Samples Collected from June 5 to 10, 1989 During Esso Tank Excavation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample I.D.	DW-1	FB-1	FB-2	FB-3	WB-1	WB-2	T-E-1
Ignitability c-Degree		> 60	> 60	> 60	> 60	> 60	> 60	> 60

Flashpoint > 60 degrees Celsius defines sample as nonignitable.
Analyses were performed by Datachem of Salt Lake City, Utah.

DW Water sample from decontamination waters.
 FB Field blank.
 WB Water blank from deionized water.
 T-E-1 Sample collected from a 55-gallon drum that was used to store liquid residues pumped out from tanks at the site.

Source: Soil Tech Corporation (1990a).

TUT 005 0892



Table C-40. Summary of Analytical Results for Split Soil Samples Collected from June 5 to 10, 1989 from Esso Tank Excavation Pit, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Location: Esso service station tank excavation pit.

Sample Type: Split samples from seven of the 13 sampling locations.

Samplers: Soil Tech Corporation and Camp, Dresser & McKee Federal Programs Corporation personnel.

Analytical Results: Xylene and ethylbenzene were detected in all samples except one.

Benzene was detected in four samples.

Toluene was detected in two samples.

The highest combined concentrations of benzene, toluene, ethylbenzene, and xylene were detected in sample TE-X-03 at 311 milligrams per kilogram (mg/kg).

Several tentatively identified benzenes were detected in various samples.

Chlorobenzene was detected in sample TE-X-05 at a concentration of 0.008 mg/kg.

Semivolatiles detected included naphthalene, methylnaphthalenes, fluorene, phenanthrene, bis-2-ethylhexylphthalate, and benzene isomers.

No pesticides or polychlorinated biphenyls (PCBs) were detected.

Total petroleum hydrocarbons (TPHs) were detected in all samples. The concentration of TPH in sample TE-X-03 was 2,550 micrograms per gram (ug/g). TPH concentrations in other samples ranged from < 10 to 69 ug/g.

Barium, cadmium, and lead were detected in most of the samples.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990b).

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Table C-41. Summary of Analytical Results for Split Soil Samples Collected from June 5 to 10, 1989 from Esso Soil Pile, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Location: Esso service station soil pile generated from tank excavation procedures. Samples collected prior to soil ventilation procedures.

Sample Type: Split samples from three of the seven sampling locations. Grab samples were collected from the top, middle, and bottom sections of the soil pile at each location for volatile organic analyses. Composite samples for other analyses were collected from the top, middle, and bottom sections of the soil pile at each location.

Samplers: Soil Tech Corporation and Camp, Dresser & McKee Federal Programs Corporation personnel.

Analytical Results: High concentrations of xylenes and ethylbenzene were detected in all samples except one.

Toluene was detected in two samples.

Tentatively identified compounds for hydrocarbons and benzenes were detected in all samples.

Semivolatile compounds detected in all samples were naphthalene, methylnaphthalene, fluorene, phenanthrene, bis(2-ethylhexyl)phthalate, and benzene isomers.

No pesticides or polychlorinated biphenyls (PCBs) were detected in the samples.

Total petroleum hydrocarbons (TPH) ranged from 48 to 139 micrograms per gram (ug/g).

Barium, cadmium, and lead were detected in all samples.

Arsenic was detected in one sample.

Source: Camp, Dresser & McKee (CDM) Federal Programs Corporation (1990b).

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Table C-42. Concentrations of Volatile Organic Compounds in Soil Samples Collected on September 8, 1988 and June 5, 1989 at O'Henri Cleaners, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID: Sample Location: Sample Depth (bls): Sample Date:	e-01 Area Near Fuel Tank NA 9-8-88	e02-01* Area Southeast of Fuel Tank 6-15 in. 6-5-89	e02-02 * Area Southeast of Fuel Tank 15-24 in. 6-5-89	e02-03 * Area Southeast of Fuel Tank NA 6-5-89
Tetrachloroethane		440	-	-	-
1,2-Dichloroethene		-	-	0.02	-
Trichloroethene		-	-	0.075	-
Tetrachloroethene		-	-	180.00	-

Analyte concentrations in milligrams per kilogram (mg/Kg).

bls Below land surface.
 - Not analyzed or not detected. No clear indication from available data.
 NA Not available.
 in Inches.
 * Base neutral and acid extractable compounds (BNAs), pesticides, polychlorinated biphenyls (PCBs), total petroleum hydrocarbons (TPHs), and metals were also sampled, but no results were available.

Samples collected by Camp, Dresser & McKee (CDM) personnel.

A total of three soil samples was collected from an area of discarded filters from the dry cleaning process on June 5, 1989. Samples were identified as e02-01, e02-02, and e02-03 according to CDM personnel field notes. Samples were analyzed for volatile organic compounds (VOCs), BNAs, pesticides, PCBs, and metals (Camp, Dresser & McKee 1990b).

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TUT 005 0895



Table C-43. Summary of Preliminary Assessment Report for O'Henri Cleaners, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Site Data	
Site:	O'Henry Dry Cleaners.
Report:	Preliminary Site Assessment Report, O'Henry, Inc., St. Thomas, U.S. Virgin Islands, Pedro Panzardi & Associates, October 1989.
Site Reconnaissance Date:	Not available.
Site Information:	Dry cleaning operation: * One dry cleaning unit. * One industrial size washing machine and dryer. Operation started January 2, 1982. Historical purchases of PCE: 17 to 20 drums per year (1.5 to 1.75 gallons per month).
UST Location Record of Tank Leaks:	No UST at this site.
Disposal Procedures:	Dry cleaning unit filters, PCE sludge and lint have been disposed at a local dumping site. Total amount of PCE disposed does not exceed 22 gallons per year. At the time of the site reconnaissance and sampling activity, arrangements were made for disposal of PCE at a Safety Kleen facility in Puerto Rico.
Areas of Concern:	Reported disposition of PCE residue on-site by an operator. Approximately 36 ft u2 area with a lot of lint residues. In June 1989, soil samples were collected from this area by an inspector. After the inspection, O'Henri removed topsoil and stored it in two containers. No indication of inspector name, sample location, analysis, or laboratory in the report. Pedro Panzardi personnel collected two composite samples on August 23, 1989 (one from each container).
Potential Sources to Soil and/or Groundwater Identified:	Potential of soil and groundwater contamination. Pedro Panzardi proposed soil borings at different locations on the O'Henry to property to collect soil samples for PCE analysis.
Sampling of Areas of Concern:	Composite samples were collected from two containers that were filled with excavated topsoil. Sampling date: August 23, 1989. Sample ID: Station #1 and Station #2. Samples analyzed for PCE by EQ Lab of Puerto Rico.
Sample Results:	Station #1: PCE <0.03 ppm. Station #2: PCE <0.03 ppm.

PCE	Tetrachloroethene.
UST	Underground storage tank.
ppm	Parts per million.
ft u2	Square feet.

Source: Pedro Panzardi & Associates, Inc. (1989).



Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	B-1	B-1	B-1	B-2	B-2	B-2	B-2	B-2	B-2
Depth:	(0-2)	(2-4)	(4-6)	(0-2)	(2-4)	(4-6)	(6-8)	(8-10)	(10-12)
(ft bls)									
Sample Location:	22-May-90	22-May-90	22-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90
Analyte									
Benzene	ND	ND	ND	ND	ND	ND	1.78	ND	0.26
Toluene	ND	ND	ND	ND	ND	ND	0.37	0.29	56.71
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	5.95
Xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	34.81

See footnotes on last page.

TUT 005 0897



Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	B-2	B-2	B-2	B-2	B-2	B-3	B-3	B-3	B-3
Depth:	(12-14)	(14-16)	(16-18)	(18-20)	(25-27)	(0-2)	(2-4)	(4-6)	(6-8)
(ft bls)									
Sample Location:	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90
Analyte									
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	4.2	8.8	0.18	ND	ND	ND	ND	ND	ND
Ethylbenzene	0.80	1.27	ND	ND	ND	ND	ND	ND	ND
Xylenes (total)	5.48	7.74	ND	ND	ND	ND	ND	ND	ND

See footnotes on last page.

TUT 005 0890



Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

	Sample ID: Depth: (ft bls)	B-3 (8-10)	B-3 (10-12)	B-3 (12-14)	B-3 (14-16)	B-3 (16-18)	B-3 (18-20)	B-3 (20-22)	B-3 (22-24)	B-4 (0-2)
	Sample Location:	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90
Analyte										
Benzene		NR	ND	ND	ND	ND	ND*	ND*	NR	ND
Toluene		NR	ND	ND	ND	ND	ND*	ND*	NR	ND
Ethylbenzene		NR	ND	ND	ND	ND	ND*	ND*	NR	ND
Xylenes (total)		NR	ND	ND	ND	ND	ND*	ND*	NR	ND

See footnotes on last page.

TUT 005 0899 6680 500 INT



Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	B-4	B-4	B-4	B-4	B-4	B-4	B-4	B-4	B-4
Depth:	(2-4)	(4-6)	(6-8)	(8-10)	(10-12)	(12-14)	(14-16)	(16-18)	(20-22)
(ft bls)									
Sample Location:	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90	24-May-90
Analyte									
Benzene	ND	ND	0.23	ND	2.13	ND	ND	ND*	ND*
Toluene	ND	ND	1.42	0.94	44.75	0.71	ND	ND*	ND*
Ethylbenzene	ND	ND	ND	ND	7.15	ND	ND	ND*	ND*
Xylenes (total)	ND	ND	0.81	0.76	40.71	1.33	ND	ND*	ND*

See footnotes on last page.

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Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	B-4	B-5	B-5	B-5	B-5	B-5	B-5	B-5	B-5
Depth:	(25-26.5)	(0-2)	(2-4)	(4-6)	(6-8)	(8-10)	(10-12)	(12-14)	(14-16)
(ft bls)									
Sample Location:	24-May-90	23-May-90	23-May-90	23-May-90	23-May-90	23-May-90	23-May-90	23-May-90	23-May-90
Analyte									
Benzene	ND*	ND	ND	ND	ND	ND	ND	ND*	ND*
Toluene	ND*	ND	ND	ND	ND	ND	ND	ND*	ND*
Ethylbenzene	ND*	ND	ND	0.23	0.29	ND	ND	ND*	ND*
Xylenes (total)	ND*	ND	1.0	ND	ND	ND	ND	ND*	0.23*

See footnotes on last page.

TUT 005 0901



Table C-44. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station from May 22 to 24, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample ID:	B-5	B-5	B-6	B-6	B-6	B-6	B-6	B-6	B-6
Depth:	(20-22)	(22-27)	(0-2)	(2-4)	(4-6)	(6-8)	(10-12)	(15-17)	(20-25)
(ft bls)									
Sample Location:	23-May-90	23-May-90	22-May-90	22-May-90	22-May-90	22-May-90	22-May-90	22-May-90	22-May-90
Analyte									
Benzene	ND*	ND*	ND	ND	ND	ND	ND	ND*	ND*
Toluene	ND*	ND*	ND	ND	ND	ND	ND	ND*	ND*
Ethylbenzene	ND*	ND*	ND	ND	ND	ND	ND	ND*	ND*
Xylenes (total)	0.29*	0.24*	ND	ND	ND	ND	ND	ND*	ND*

Analyte concentrations in milligrams per kilogram (mg/kg).

ft bls Feet below land surface.

ND Not detected. Below lower limit of detection.

NR No recovery.

* Sample collected below water table and results are a combination of soil and groundwater concentrations.

Lower limit of detection is 0.010 mg/kg.

Source: Soil Tech. Corp. 1990a.

TUT 005 0902



Table C-45. Concentrations of Benzene, Toluene, Ethylbenzene, and Xylenes in Soil Samples Collected from the Rodriguez Esso Service Station on July 9, 1990, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Analyte	Sample ID:	MW-2	MW-3	Mw-4	MW-5	MW-6
	Date:	9-Jul-90	9-Jul-90	9-Jul-90	9-Jul-90	9-Jul-90
Benzene		8.66	ND	9.23	ND	ND
Toluene		5.60	ND	36.51	ND	ND
Ethylbenzene		1.65	ND	1.30	ND	ND
Xylenes (total)		8.83	ND	8.57	ND	ND

Analyte concentrations in milligrams per liter (mg/L).

ND Not detected, below lower limit of detection.

Source: Soil Tech. Corp. 1990a.

APPENDIX D

**SAMPLE/CORING LOGS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

SAMPLE/CORE LOG

Boring/Well B-1 Project/No. TUTU SITE/PR013.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 7/30/92 Drilling Completed 7/30/92

Total Depth Drilled 10.3 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 201 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blow per 6 inches	Sample/Core Description
From	To			
0.0	2.0	1.1	4-3- 4-4	SILTY CLAY; little Rock fragments, small to medium; trace Sand, fine to coarse; trace Gravel, fine; soft, brown to light brown, reddish brown, dry. HNU = 52 ppm. GC sample: 0-2'.
2.0	4.0	1.3	4-3- 4-5	Same as above. GC sample: 2-4'. HNU = 32 ppm.
4.0	6.0	1.5	6-11- 9-6	Same as above. HNU = 392 ppm. GC sample: 4-6'.
6.0	8.0	1.5	6-5- 6-5	Same as above. GC sample: 6-8'. Soil sample collected for BNA, metals, and TPH analysis. HNU = 62 ppm.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well B-4 Project/No. TUTU SITE/PRO13.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 6/9/92 Drilling Completed 6/9/92

Total Depth Drilled 188.0 feet Hole Diameter 6 inches Type of Sample/
Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 167.61 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller O. GARCIA Helper M. MORALES

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	0.5	0		FILL.
0.5	2	0.3	23-31-32	Spoon was redriven.
				CLAY; some Silt; trace Sand, medium; trace Rock
				fragments, fine to medium; very hard, brown, dry.
				GC sample: 0.5-2.0'.
				HNu = 0 ppm. CGI = 0% LEL.
2	3.5	1.3	7-15-17	Clay; some Silt; trace Sand, medium to coarse; trace
				Rock fragments; brown to reddish brown, dry to moist,
				hard.
				HNu = 0.1-0.4 ppm.
				GC sample: 2-4'.
4	4	0.9	4-21- 21-17	Same as above, but little Sand, medium to coarse and
				moist.
				GC sample: 4-6'.
				HNu = 0.1 ppm. CGI = 0% LEL.

SAMPLE/CORE LOG (Cont'd)

Page 2 of 2

Boring/Well B-4

Prepared By R. PONCIANO

Sample/Core Depth (feet below sand surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Flow per 6 Inches	
From	To			
6	8	1.4	32-50- 34-40	CLAY; some Silt; trace Sand, medium to fine; trace rock fragments, fine to large, brown to gray, moist, hard.
				GC sample: 6-8'.
				HNu = 0.1 - 0.3 ppm. CGI = 0% LEL.
8	10	1.5	12-23- 29-21	CLAY; little Silt; trace Sand; fine to medium; light brown to greenish gray, moist, hard; trace gravel, fine.
				Top of bedrock is approximately at 8.3' bls.
				HNu = 0.1 ppm.
				Soil samples collected for VOC, BNA, metals and TPH analysis.
10	10.8	0.8	34-50/ 0.25'	ROCK; fragments, small to large; little Sand, fine to medium, little Silt; trace Clay; trace Sand, coarse; light gray, saturated, very hard. Top of weathered bedrock inferred at 10.8' bls.
				GC sample: 10-12'
				HNu = 0.1 ppm.
				No water in borehole. It was raining before sample 10-12' was examined.
				Total depth = 10.8 ft bls.

SAMPLE/CORE LOG

Boring/Well B-5 Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 8/13/92 Drilling Completed 8/13/92

Total Depth Drilled 2.8 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2'3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 181.0 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	0.4			ASPHALT.
0.4	2.4	1.6	5-8- 12-14	CLAY; little Silt; little Sand, fine to medium; trace Gravel, fine; trace Sand, coarse, gray to reddish brown, stiff, dry.
				Soil samples collected for VOC, BNA, metals and TPH analysis.
				HNu = 5.0 ppm.
				GC sample: 2.0'.
2.4	2.80	0.4	50/0.4'	CLAY; little Silt; little Sand, fine to medium; trace organic material, wood; gray, very hard, dry.
				HNu = 1.0 ppm.
				GC sample: 2-4'
				Split-spoon was refused at 2.8 ft bls.
				Top of bedrock inferred at 2.8 ft bls.
				Total depth = 2.8 ft bls.

SAMPLE/CORE LOG

Boring/Well B-7 Project/No. TUTU SITE/PR013.01 Page 1 of 1

Site Location ST.THOMAS Drilling Started 7/31/92 Drilling Completed 7/31/92

Total Depth Drilled 4.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 184 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2.0	1.5	3-24- 48-78	FILL: SILT; little Rock fragments, small; trace Clay; trace Sand, medium to fine; trace Sand, coarse; trace roots; stiff, light-brown, dry.
				GC sample: 0-2'.
				HNu = 0 ppm.
2.0	4.0	1.4	23-45- 17-25	FILL: SILT; little Rock fragments, small; trace Clay; trace Sand, medium to fine; trace Sand, coarse; trace roots; stiff, light-brown, dry.
				GC sample: 2-4'.
				HNu = 0 ppm.
				Soil samples collected for VOC, BNA, metals and TPH analysis.
				Auger refusal at 3.0 ft bls.
				Total depth = 4.0 ft bls.

SAMPLE/CORE LOG

Boring/Well B-8 Project/No. TUTU SITE/PR013.01 Page 1 of 1
Site Location ST. THOMAS Drilling Started 8/12/92 Drilling Completed 8/12/92
Total Depth Drilled 3.6 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON
Length and Diameter of Coring Device 2'3" Sampling Interval CONTINUOUS feet
Land-Surface Elev. 191 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL
Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER
Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth
(feet below land surface)
From To
Core Recovery
(feet)
Time/Hydraulic
Pressure or
Blows per 6
inches

Sample/Core Description

0	0.8			CONCRETE.
0.8	2.8	1.3	5-10- 16-16	FILL: SILTY CLAY; trace Sand, medium to coarse; trace Gravel, fine; trace organic material, roots; trace Rock fragments, small; brown to reddish brown, hard, dry.
				Soil samples collected for VOC, BNA, metals and TPH analysis.
				Soil sample collected for matrix spike and matrix spike duplicate.
2.8	3.6	0.8	50-50/ 0.3'	SILTY CLAY; trace Sand, medium to coarse; trace Gravel, fine; trace Rock fragments, small; very hard, reddish brown, dry.
				HNu = 0.1 ppm.
				GC sample 2-4'.
				Split spoon and augers were refused at approx. 3.6 ft below land surface.
				Total depth = 3.6 ft bls.

SAMPLE/CORE LOG

Boring/Well B-9 Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 7/29/92 Drilling Completed 7/29/92

Total Depth Drilled 5.1 feet Hole Diameter 6 inches Type of Sample/
Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' 3' Sampling Interval CONTINUOUS feet

Land-Surface Elev. 165 feet Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below and surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 5 inches	Sample/Core Description
From	To			
0	0.2			ASPHALT.
0.2	2	1.4	10-15- 9-10	FILL: CLAY; some Silt; little Rock fragments, small to medium; trace Sand, fine to medium; trace Sand, coarse; trace Gravel, fine, dark gray to reddish brown, stiff, dry. HNU = 0 ppm. GC sample: 0-2'.
2	4	0.5	19-12- 8-9	Same as above. GC sample: 2-4'. HNU = 0 ppm. Soil sample collected for VOC analysis.
4	5.1	1.2	5-8- 50/0.1'	Same as above. HNU = 0 ppm. Soil samples collected for BNA, metals and TPH analysis. GC sample: 4-5.1 Top of bedrock inferred at 5.1 ft bls. Total depth = 5.1 ft bls.

SAMPLE/CORE LOG

Boring/Well B-10 Project/No. TUTU SITE/PR013.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 8/10/92 Drilling Completed 8/10/92

Total Depth Drilled 7.9 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 141.8 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2	1.3	17-16- 10-8	FILL: SILTY CLAY; little Rock fragments, small medium; little Sand, fine to medium; trace Sand, coarse to very coarse; trace Gravel, fine; soft, brown, dry. GC Sample: 0-2'. HNU = 0.1 ppm.
2	4	1.2	7-16- 20-16	FILL: CLAY; little Rock fragments, small to medium; trace Sand, coarse; trace Gravel, fine; brown to dark brown, hard, dry. GC Sample: 2-4'. HNU = 0.1 ppm.
4	6	1.3	8-12- 12-12	Same as above. HNU = 0.1 ppm. GC Sample: 4-6'.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well B-12 Project/No. TUTU SITE/PR013.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 8/11/92 Drilling Completed 8/11/92

Total Depth Drilled 8.4 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2'3" Sampling Interval CONTINUOUS feet
MEAN SEA LEVEL

Land-Surface Elev. 140.5 feet ☐ Surveyed ☒ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			

0	0.5	0		CONCRETE.
0.5	2	1.3	2-4-3-3	SILTY CLAY; little Gravel, fine to medium; trace Sand, fine to medium; trace organic materials, roots; brown, soft, moist. HNU = 1.0 ppm. GC Sample: 0-2'.
2	4	1.4	5-7-4-6	CLAY; little Silt, little Sand, fine to medium; trace Peat; trace Rock fragments; gray, soft, moist. HNU = 1.4 ppm. GC Sample: 2-4'.
4	6	1.6	3-13- 36-31	CLAY; little Silt; little Sand; fine to medium; trace of Rock fragments; gray, hard, moist. HNU = 0.1 ppm. GC Sample: 4-6'.

SAMPLE/CORE LOG

Boring/Well B-13 Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 8/10/92 Drilling Completed 8/10/92

Total Depth Drilled 6.4 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 139.8 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2.0	1.1	10-12- 21-14	Fill: CLAYEY SILT; little Gravel, fine to medium; little Sand, fine to medium; trace Rock fragments, small to medium; trace organic materials, roots; medium stiff, brown, dry. GC sample: 0-2'. HNu = 0.2 ppm.
2.0	4.0	1.3	10-25- 17-12	First 0.55' is same as above, the rest is highly altered bedrock; gray; very weak. HNu = 0.2 ppm. GC sample: 2-4'.
4.0	6.0	1.4	9-11- 11-19	SILTY CLAY; little Sand, medium to coarse; brown, stiff, dry. HNu = 0.3 ppm. Soil samples collected for VOC, BNA, metals and TPH analysis.
6.0	6.4	0.2	50/0.4'	Same as above. GC sample: 6-8'. HNu = 0.1 ppm. Top of bedrock inferred at 6.4 ft bls. Total depth = 6.4 ft bls.

SAMPLE/CORE LOG

Boring/Well B-15 Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 8/14/92 Drilling Completed 8/14/92

Total Depth Drilled 2.2 feet Hole Diameter 3 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 205.0 feet ☐ Surveyed ☒ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HOLLOW STEM AUGER

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2	1.3	6-4-4-5	CLAYEY SILT; some Sand, fine to medium; trace Rock fragments, small; trace organic materials, roots; soft, reddish brown, moist.
				Soil sample collected for VOC, BNA, metals and TPH analysis.
				HNu = 0.2 ppm.
				GC sample: 0-2'.
2	2.2	0.2	50/0.17'	Same as above. Trace weathered (highly) bedrock.
				Split-spoon sample refused at approximately 2.2' bls.
				Top of bedrock inferred at 2.2' bls.
				Total depth = 2.2 ft bls.
				HNu = 0.2 ppm.
				GC sample: 2-4'.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well MW-1 Project/No. TUTU SITE / PR013.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 6/30/92 Drilling Completed 6/30/92

Total Depth Drilled 46.0 feet Hole Diameter 8 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2 1/3" Sampling Interval 0-2.0 feet

Land-Surface Elev. 195.05 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used AIR / WATER (SMALL AMOUNT OF WATER TO MINIMIZE DUST) Drilling Method DOWN HOLE HAMMER

Drilling Contractor SOIL TECH Driller O. GARCIA Helper M. MORALES J. NIEVES

Prepared By W.I. MORALES Hammer Weight 140 LBS. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	1.8	1.4	47-70 75-50/0.3'	ASPHALT (0-0.1 ft.)
				SILTY CLAY, hard, brown; little Sand,
				intermixed w/weathered Rock Fragments,
				angular, greenish gray, fragments degraded
				into a fine to coarse Sand; dry.
				HNu = 0 ppm.
				Soil samples collected for VOC, BNA, metals and
				TPH analysis.
				One split-spoon soil sample collected at
				MW-1. Continue drilling with downhole hammer
				to a depth of 46.0 ft. Monitoring
				well installed at 43.6 ft. Water level measured
				on 6/30/90 after completion: 29.9 ft.
				Approximately 30 gallons of water were used to minimize
				dust during downhole hammer process before
				encountering groundwater.

SAMPLE/CORE LOG

Boring/Well MW-2 Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 8/13/92 Drilling Completed 8/25/92

Total Depth Drilled 28.0 feet Hole Diameter 6 inches Type of Sample/
Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 178 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			

0	0.40			ASPHALT.
0.40	2.40	1.5	10-19- 28-15	CLAYEY SILT (.8'); little Rock
				fragments, small; trace Sand, fine to medium;
				trace roots; hard, brown to tan, dry.
				SILTY CLAY; (1.2') little Rock fragments, small;
				trace Sand, fine to medium; hard, gray, dry.
				HNu = 0.6 ppm.
				GC sample: 0-2'.
				Soil samples collected for VOC, BNA, metals and TPH
				analysis.
2.4	3.10	0.5	40-50/ 0.1'	SILTY CLAY; little Rock fragments, small;
				trace Gravel, fine to medium; trace Sand,
				fine to medium; gray, very hard, dry.
				GC sample: 2-4'.
				HNu = 0.4 ppm.
				Split-spoon and auger were refused approximately
				3.1' below top of pavement. Continued drilling with
				downhole hammer to 28.0 ft. Set well at 27.0 ft.

SAMPLE/CORE LOG

Boring/Well MW-1D Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 6/5/92 Drilling Completed 7/8/92

Total Depth Drilled 90.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 195.14 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller O. GARCIA Helper J. NIEVES
M. MORALES

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	0.3			ASPHALT.
0.3	1.0			FILL: Gravel, medium to fine; some Silty Clay; trace Sand, medium to coarse; brown, dry to moist.
				HNu = 0 ppm.
				CGI = 0% LEL.
1.0	2.5	1.5	44-26- 50/0.5'	CLAY; some Silt; little Sand, medium to coarse; little Rock fragments, medium to large, angular; little Gravel, fine to medium; trace pieces of wood; light brown to brown, very hard, dry.
				HNu = 0 ppm.
				CGI = 0 % LEL. GC Sample: 1-2.5'.
				Soil samples collected for VOC, metals, BNA, and TPH analysis.
2.5	2.8	0.2	50/0.2'	CLAY; some Silt; trace Sand, medium to coarse; trace Gravel, fine: brown, dry to moist.
				Bedrock encountered at 2.8' bls.
				HNu = 0 ppm.
				CGI = 0 % LEL. Continued drilling by diamond coring bit to 89.0 ft and downhole hammer to 90 ft bls.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well MW-4 Project/No. TUTU SITE/PRO13.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 6/16/92 Drilling Completed 6/17/92

Total Depth Drilled 28.0 feet Hole Diameter 6 inches Type of Sample/
Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2'3" Sampling Interval 2.0 feet

Land-Surface Elev. 175.69 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller O. GARCIA Helper J. NIEVES
M. MORALES

Prepared By W.I. MORALES Hammer Weight 140 LBS. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Strokes per 6 inches	Sample/Core Description
From	To			
0.0	0.7			CONCRETE
0.7	2.7	1.0	24-22- 22-14	SILTY CLAY; trace Sand; trace Gravel, fine to coarse; reddish brown to dark greenish gray, moist; hard. HNU = 0 ppm.
2.7	4.7	1.5	10-15 12-16	SILTY CLAY; trace Sand, fine to coarse; trace Gravel, subangular to rounded, 1-2 inch pieces; brown to dark brown and gray, moist; very stiff. HNU = 4 ppm.
				Soil samples collected for VOC, BNA, metals and TPH analysis.
4.7	6.7	1.2	15-19- 30-50	SILTY CLAY; trace Sand, fine to coarse; trace Gravel, subangular; some organic content; dark gray, moist; hard. HNU = 3 ppm.
6.7	7.1	0.7	50/0.4'	SILTY CLAY; trace Sand, fine to coarse; trace Gravel, angular to rounded; some organic content; reddish brown to dark gray; hard. HNU = 0 ppm.

SAMPLE/CORE LOG

Boring/Well MW-4D Project/No. TUTU SITE/PR013.01 Page 1 of 4
Site Location ST. THOMAS Drilling Started 6/4/92 Drilling Completed 6/17/92
Total Depth Drilled 71.0 feet Hole Diameter _____ inches Type of Sample/ Coring Device SPLIT-SPOON
Length and Diameter of Coring Device 2' / 3" CONTINUOUS Sampling Interval _____ feet
Land-Surface Elev. 175.99 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL
Drilling Fluid Used NONE Drilling Method HSA
Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
Prepared By W. MORALES Hammer Weight 140 LBS Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	0.7	-	-	CONCRETE.
0.7	2.7	1.3	9-12- 3-3	SILTY CLAY; little Sand, coarse to fine; little Gravel, reddish brown at the top to brown, blue-gray Gravel fragments; moist at the bottom; plastic; hard, H _{Nu} = 0 ppm.
2.7	4.7	1.5	3-4-4-4	SILTY CLAY; little Sand, coarse to fine; little Gravel, angular, weathered fragments, blue-gray; dark reddish brown, moist; very plastic, stiff. H _{Nu} = 0 ppm. CGI = 0 % LEL
4.7	6.7	0.9	1-2-2-5	(4.7-5.2') SILTY CLAY; little Sand, medium to fine; little Gravel; dark reddish brown. (5.2-5.6') As above but dark gray; plastic to medium stiff, moist. H _{Nu} = 0 ppm.

SAMPLE/CORE LOG (Cont'd)

Page 2 of 4

Boring/Well MW-4D

Prepared By W. MORALES

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Slows per 6 Inches	
From	To			
6.7	8.7	1.3	7-11-16 -16	SILTY CLAY; little Sand, medium to fine; little Gravel, angular, dark gray, reddish fragments 2 inch pieces; moist; brown and dark gray; plastic to hard. HNu = 0 ppm.
8.7	10.7	1.75	9-34-38 -36	SILTY CLAY; some Sand, coarse to fine; some Gravel, angular to semi-rounded, brown and dark gray; weathered Rock fragments at 9.5' bls, crystalline, gray in a sandy silty clay matrix; hard. HNu = 0 ppm. Soil samples collected for VOC, BNA, metals, and TPH analysis.
10.7	11.7	0.1	50-60	ROCK; weathered, angular 2-4 inch fragments, blue- green porphyritic Rock fragments, with white feldspars, dry; some Sandy Clay, brown, moist. HNu = 0 ppm. Top of bedrock inferred at 10.7 ft bls.
12.7	13.15	0.9	60/0.45'	Same as above; HNu = 0 ppm.

SAMPLE/CORE LOG (Cont'd)

Page 3 of 4

Boring/Well MW-4D

Prepared By W. MORALES

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	
From	To			
13.7	14	0.9'	50/0.3'	ROCK; weathered in a Clayey matrix; angular fragments, coarse to fine grains (like Sand and Gravel); dark gray; moist. HNu = 0 ppm.
14.7	14.9	0.2'	50/0.16'	ROCK fragments; weathered, gray to dark gray; range from silty to Gravel sized fragments; moist; slightly wet. HNu = 0 ppm.
15.7	16.1	0.4	50/0.4'	ROCK; weathered in a Silty Clay matrix; angular fragments (0.5-2.0"); gray, brown, white, red mottled; black stains; crumbled; moist in Silty areas between weathered fragments. HNu = 0 ppm.
16.7	16.86	0	50/0.16'	No recovery: Wet split spoon sample of retrieval. Working Zone: HNu = 0 ppm. CGI = 0 % LEL. Wet cuttings on augers, gray green, Silty Clay.

SAMPLE/CORE LOG

Boring/Well MW-5 Project/No. TUTU SITE/PR013.01 Page 1 of 1
 Site Location ST. THOMAS Drilling Started 8/11/92 Drilling Completed 8/25/92
 Total Depth Drilled 40.8 feet Hole Diameter 6 inches Type of Sample/
 Coring Device SPLIT-SPOON
 Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet
 Land-Surface Elev. 187.24 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL
 Drilling Fluid Used NONE Drilling Method HSA
 Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLETT
 Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2	1.1	13-19- 18-21	FILL: SILT; little Sand, Fine to medium; little Gravel, fine to medium; trace of Rock fragments, small; trace pieces of wood; trace Clay; brown medium stiff, dry. HNU = 0.1 ppm. GC sample: 0-2'. Soil samples collected for BNA, metals, and TPH analysis.
2	4	1.4	25-30- 24-39	Same as above HNU = 2.0 ppm. GC Sample: 2-4'. Soil sample collected for VOC analysis.
4	4.8	0.8	35-50/ 0.25'	ROCK; highly altered; grayish green, very weak. HNU = 0.1 ppm. GC Sample: 4-6'. Top of bedrock approximately at 4.8' bls. Continued drilling with downhole hammer to 40.8 ft. Well installed at 39.0 ft.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well MW-6D Project/No. TUTU SITE/PR013.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 8/6/92 Drilling Completed 8/10/92

Total Depth Drilled 65.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2'3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 171.26 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller O. GARCIA Helper M. MORALES
J. NIEVES

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth
(feet below land surface)
From To

Core
Recovery
(feet)

Time/Hydraulic
Pressure or
Blows per 6
inches

Sample/Core Description

0	0.35	1		ASPHALT
0.35	2.0	1.4	12-40-33-28	SILTY CLAY (0.6') little Rock fragments, small to medium; trace Sand, medium; trace Gravel, fine to medium; very hard, brown, dry. Remaining materials are Silt; little Sand, fine to medium; trace Clay; orange to tan, hard, dry.
				HNu = 0 ppm.
				GC sample: 0-2'. Soil samples collected for VOC, BNA, metals and TPH analysis.
2	4	1.0	10-9-12-15	Same as above, upper description.
				GC sample: 2-4'.
				HNu = 0 ppm.
4	4.9	0.3	13-50, / 0.42'	ROCK; fragments, medium to large; some Silt; little Sand, fine to medium; trace Clay; trace Sand, coarse to very coarse; brown, dry; hard.
				Continued drilling with downhole hammer to 65.0 ft.

SAMPLE/CORE LOG

Boring/Well MW-7 Project/No. TUTU SITE/PR013.01 Page 1 of 2

Site Location ST. THOMAS Drilling Started 7/16/92 Drilling Completed 7/29/92

Total Depth Drilled 39.6 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" (CONTINUOUS) Sampling Interval feet

Land-Surface Elev. 171.26 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By W. MORALES Hammer Weight 140 LBS Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per ft inches	Sample/Core Description
From	To			
0	2	1.3'	22-23- 38-37	FILL; SILTY CLAY; little Rock fragments, small to medium; trace Sand, medium; trace Sand, coarse to very coarse; trace Organic roots; hard, brown, dry. GC sample: 0-2'. HNU = 0 ppm.
2	4	1.1	21-24- 24-38	Same as above but without the rock fragments. GC sample: 2 - 4'. HNU = 0 ppm.
2	5.3	1.2	17-35- 50/0.29'	Rock, highly weathered; Sand, fine to medium; some Silt; trace Sand, coarse to very coarse; trace Gravel, fine trace Clay; hard, gray, dry. GC sample: 4 - 6'. HNU = 0 ppm.
6	6.4	0.4	50/0.38'	ROCK, highly altered; weak, grayish green. GC sample: 6 - 8'. HNU = 0 ppm. Top of weathered bedrock inferred at 6.0 ft bls.

SAMPLE/CORE LOG (Cont'd)

Page 2 of 2

Boring/Well MW-7

Prepared By R. PONCIANO

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	
From	To			
8	9.0	0.9	27-42/ 0.46'	Same as above.
				GC sample: 8-10'.
				HNu = 0 ppm.
10	10.2	0.1	50/0.13'	Same as above.
				GC sample: 10-12'.
				HNu = 0 ppm.
12	12.6	1.2	78-128/ 0.11'	Same as above.
				GC sample: 12-14'.
				HNu = 0 ppm.
14	15	1.9	42-154/ 0.5'	ROCK; highly weathered. Same as above.
				GC sample: 14-16'.
				Soil samples collected for VOC, BNA, metals and TPH
				analysis.
				HNu = 0 ppm.
				Competent bedrock approximately at 15 ft bls.
				Continued drilling with downhole hammer to 39.6 ft.
				Well installed at 35.4 ft.

SAMPLE/CORE LOG

Boring/Well MW-8 Project/No. TUTU SITE/PRO13.01 Page 1 of 2
 Site Location ST. THOMAS Drilling Started 7/20/92 Drilling Completed 7/23/92
 Total Depth Drilled 26.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON
 Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet
 Land-Surface Elev. 167.61 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL
 Drilling Fluid Used NONE Drilling Method HSA
 Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET
 Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blow per 6 inches	Sample/Core Description
From	To			
0	0.35			ASPHALT.
0.35	2	1.4	12-10- 12-16	FILL: SILTY CLAY; trace Sand, very fine to fine; trace Rock fragments, small to medium; trace Sand, coarse to very coarse; stiff, brown, dry.
				GC sample: 0-2'.
				HNu = 0 ppm.
2	4	1.8	10-8- 11-10	Same as above (the first 1.3'); the rest is Silt; little Clay; trace Sand, very fine; little Rock fragments; stiff, brown to reddish brown, dry.
				GC sample: 2-4'.
				Soil samples collected for VOC, BNA, metals, and TPH analysis.
4	5.9	1.1	27-50/ 0.42'	ROCK; weathered; Silt; little Clay; trace Sand, very fine to fine; trace Rock fragments, very hard, brown, dry.
				GC sample: 4-6'.
				HNu = 0 ppm.

SAMPLE/CORE LOG

Boring/Well MW-9 Project/No. TUTU SITE/PRO13.01 Page 1 of 1
 Site Location ST. THOMAS Drilling Started 7/24/92 Drilling Completed 7/30/92
 Total Depth Drilled 35.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON
 Length and Diameter of Coring Device 2'3" Sampling Interval CONTINUOUS feet
 Land-Surface Elev. 162.32 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL
 Drilling Fluid Used NONE Drilling Method HSA
 Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
 Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	0.35			ASPHALT.
0.35	2	1.8	16-22- 27-26	FILL: SILTY CLAY; little Rock fragments, small to large; trace Sand, fine to very coarse; brown to reddish brown, stiff, dry. GC sample: 0-2'. HNU = 17 ppm at approx. 1.4' bls.
2	4	1.1	9-23- 31-15	Same as above. HNU = 25 ppm. Soil samples collected for VOC, metals, BNA and TPH analysis.
4	5.5	0	24-50/ 0.5'	No recovery. Top of bedrock approximately at 5.0' bls. Continued drilling by diamond coring from 5.5 to 35.0 ft. and downhole hammer from 3.7 to 34.3 ft.

SAMPLE/CORE LOG

SAMPLE/CORE LOG

Boring/Well MW-11D Project/No. TUTU SITE/PRO13.01 Page 1 of 2
Site Location ST. THOMAS Drilling Started 6/26/92 Drilling Completed 7/20/92
Total Depth Drilled 74.3 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON
Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet
Land-Surface Elev. 153.11 feet ☒ Surveyed ☐ Estimated Datum 153.22 FT ABOVE MSL
Drilling Fluid Used NONE Drilling Method HSA
Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET
Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blow per 6 inches	Sample/Core Description
From	To			
0	2	0.7	11-14- 9-11	FILL: CLAY; some Silt; trace Sand, fine to medium; trace Sand, coarse; trace organic materials, roots; light brown, dry, stiff. HNU = 0 ppm. GC sample: 0-2'.
2	4	1.1	14-4- 14-13	CLAY; little Silt; trace Sand, fine; trace organic materials; brown to reddish brown, moist, stiff. HNU = 0 ppm. GC sample: 2-4'.
4	5.88	1.4	21-29-31 50/0.38'	SILT; little Sand, fine; trace Clay; trace Sand, coarse to very coarse; brown, dry, hard. GC sample: 4-6'.

SAMPLE/CORE LOG

Boring/Well MW-12D Project/No. TUTU SITE/PRO13.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 7/6/92 Drilling Completed 7/23/92

Total Depth Drilled 75.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 161.58 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. DIAZ
J. MILLET

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	2		19-15- 35-25	FILL: SILT; some Clay; trace Sand, very fine to very coarse; trace roots; trace Gravel, medium; trace Rock fragments; hard; brown, dry. HNu = 0 ppm. GC Sample: 0-2'.
2	4	0.7	17-7- 13-21	CLAY; some Silt; trace Sand, very fine to very coarse; trace roots; trace Rock fragments, medium to large; very stiff. GC sample: 2-4'. HNu = 0 ppm.
4	5.9	1.4	18-27-44- 50/0.38'	SILT; some Clay; trace Sand, very fine to coarse; trace rock fragments, medium; brown to yellowish, stiff. GC sample: 4 - 6' Soil samples collected for VOC, BNA, metals and TPH analysis. Top of bedrock at 5.9 ft bls. Continued drilling by diamond coring from 5.9 to 75.0 ft and downhole hammer from 3.9 to 88.0 ft. HNu = 0 ppm.

SAMPLE/CORE LOG

Boring/Well MW-13D Project/No. TUTU SITE/PR013.01 Page 1 of 1

Site Location ST. THOMAS Drilling Started 6/19/92 Drilling Completed 7/15/92

Total Depth Drilled 120.3 feet Hole Diameter 6 inches Type of Sample/ Coring Device SPLIT-SPOON

Length and Diameter of Coring Device 2' / 3" Sampling Interval CONTINUOUS feet

Land-Surface Elev. 236.67 feet ☒ Surveyed ☐ Estimated Datum MEAN SEA LEVEL

Drilling Fluid Used NONE Drilling Method HSA

Drilling Contractor SOIL TECH Driller J. RIVERA Helper J. MILLET
J. DIAZ

Prepared By R. PONCIANO Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blow per 6 inches	Sample/Core Description
From	To			
0	0.83	0.7	14-50/ 0.25'	CLAY; some Silt; little Sand, very fine; trace Gravel, small to medium; trace organic materials (roots); very hard, light brown, dry. H _{Nu} = 1-3 ppm. CGI = 0% LEL. GC sample: 0-2'
2	4	0.6	23-31- 26-40	CLAY; some Silt; little Sand, very fine to medium; little Gravel, fine; trace Sand, very coarse to coarse; trace Rock fragments, large to medium; light-brown, hard, dry. H _{Nu} = 0 ppm. GC Sample: 2-4'
4	5.0	0.7	25-50/ 0.46'	Same as above. H _{Nu} = 0 ppm. Soil samples collected for VOC, BNA, metals and TPH analysis. GC sample: 4-5'. Continued drilling by diamond coring 4.6 to 120 ft and using a downhole hammer from land surface to 120.3 ft.





Prepared By Wanda I. Mondak Hammer Weight 25 Hammer Drop 25 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
5	60	N/A	46.9 min 200 psi	No cuttings recovered during drilling. Borehole drilled with a 5.5 inch hammer bit and then reamed with a 10-inch trimmer bit due to caving problems.



BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Down-the-hole hammer 5.5 inch

Boring/Well: MW-13

Date of Coring: April 20, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg / Richard Berg

	Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1215 (Start)	1	5-6	1	1	1			
1224	2	6-7	1	3	0.33			
clean up at 11 feet	3	7-8	1	1	1			
No cuttings	4	8-9	1	1	1			
1225	5	9-10	1	1	1			
leave drilling	6	10-11	1	1	1			
1227	7	11-12	1	0.5	2			
clean up	8	12-13	1	0.5	2			
No cuttings	9	13-14	1	0.5	2			
1228	10	14-15	1	0.5	2			
clean up	11	15-16	1	0.5	2			
No cuttings	12	16-17	1	0.5	2			
1229	13	17-18	1	0.5	2			
clean up at 20 ft	14	18-19	1	0.7	1.43			
	15	19-20	1	0.7	1.43			
	16	20-21	1	1	1			
	17	21-22	1	1	1			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

Hydraulic pressure 200psi

water flow rate 1 gallon per minute

PR01301.XLS/Bedrock

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Down-the-hole hammer 5.5 inch

Boring/Well: MW-13

Date of Coring: April 20, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
18	22-23	1	0.5	2			
19	23-24	1	0.5	2			
20	24-25	1	0.5	2			
21	25-26	1	0.9	1.11			
22	26-27	1	1.5	0.67			
23	27-28	1	1.2	0.83			
24	28-29	1	1	1			
25	29-30	1	1	1			
26	30-31	1	1.5	2			
27	31-32	1	0.6	1.67			
28	32-33	1	1.1	0.91			
29	33-34	1	1.3	0.77			
30	34-35	1	0.8	1.25			
31	35-36	1	0.6	1.67			
32	36-37	1	0.5	2			
33	37-38	1	0.7	1.43			
34	38-39	1	0.8	1.25			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PRO1301

Site: Tutu Wells Site Location: St. Thomas, U.S. Virgin Islands

Down-the-hole hammer 5.5 inch

Boring/Well: MW-13

Date of Coring: April 20, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg/Richard Berg

1253
Cleanup
at 43ft
(Add rod)

1258
Positive
drilling

1302
Cleanup
Hing

1313
Stop
won
4/20/94

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQC
35	39-40	1	0.8				
36	40-41	1	0.6				
37	41-42	1	0.6				
38	43-43	1	0.9				
39	43-44	1	0.6				
40	44-45	1	0.7				
41	45-46	1	0.6				
42	46-47	1	0.7				
43	47-48	1	1.1				
44	48-49	1	0.9				
45	49-50	1	0.8				
46	50-51	1	0.9				
47	51-52	1	1.2				
48	52-53	1	0.8				
49	53-54	1	0.8				
50	54-55	1	0.8				
51	55-56	1	0.9				

Percent Recovery = Run Penetration $\div$ Recovery

RQC = Rock Quality Designation

RQC = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PRO1301.XLS/Bedrock

Driller: Robert Berg Richard Berg

[illegible]

PR01301.XLS/Bedrock



SAMPLE/CORE LOG

Boring/Well MW-13 Project/No. Tuba BII PR0013.028 Page 1 of 1

Site Location St. Thomas Drilling Started 4/25/94 Drilling Completed 4/26/94

Total Depth Drilled 60 feet Hole Diameter 10 inches Type of Sample/
Coring Device Grison b.t

Length and Diameter
of Coring Device 19.0 feet / 10 inches Sampling Interval N/A feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method Air Rotary

Drilling Contractor Tuelos Inc. Driller R. Berg Helper R. Berg

Prepared By M. C. C. Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches
From	To		

Sample Core Description

53	60	N/A	6min	No cuttings recovered during drilling.
				Complete reaming with 10 inch tri-con bit from 53 to 60 feet.
				Set 6 inch casing at 60.3 feet.



Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site :

Location: St. Thomas, U.S. Virgin Islands

Boring/Wells

14-13

Date of Goring:

Amphibian Tricarb 10 inches

4/26/94

Logged by: M. Ceballos

Driller: B. Ben (B. Ben)[illegible]
$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

RQD = Rock Quality Designation

RQC = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PRO1301.XLS/Bedrock



MW-13

Grout calculation for 6 inch stainless
steel casing installation 4/26/94:

Borehole diameter: 10 inches

Borehole depth: 60.3 feet (724 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 (724) \\ &= 56834 / 1728 \\ &= 32.89 (7.48) \\ &= 246 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 60.3 feet (724 in)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{3.14(6)^2}{4} \\ &= 28.26 (724) \\ &= 20460 / 1728 \\ &= 11.84 (7.48) \\ &= 89 \text{ gal}\end{aligned}$$

Borehole - Casing = 157 gal

Estimated amount of grout: 157 gal

Actual amount poured during installation: 250 gal
(there was a cavity between 7-8 feet).

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: 1801001

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-13

Air Rotary / 5.5 inch trepan bit
Date of casting: April 28, 1999

Logged by: Daniel I. Morales

Driller: Robert Berg / Richard Berg

[illegible]
$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

Tricon bit 5.5 inch

RQD = Rock Quality Designation

Hydraulic pressure 400 psi

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

No water add during drilling.

PR01301.XLS/Bedrock

SAMPLE/CORE LOG

Boring/Well MA-15 Project/No. Tutu RI / PR001302 Page 1 of 1

Site Location St. Thomas "Ramsay" Drilling Started 3/23/94 Drilling Completed 3/28/94

Total Depth Drilled _____ feet Hole Diameter 6 1/4" inches Type of Sample/ Coring Device Split spoon

Length and Diameter of Coring Device 2' x 3" in. Sampling Interval continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method Helium straw auger

Drilling Contractor Suclos inc Driller Alfredo Andino Helper Mario Andino

Prepared By M. Cordero Hammer Weight 140 Hammer Drop 30" inches

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Flow per 6 inches

(HNGL reading background = 0.2 ppm)

Sample/Core Description

17:46	0	2.0'	1.0'	8-15 10-12	CLAY and Silt; some rock fragments, fine to very coarse, brown, yellowish brown mottled, dry "frit material". HNGL reading = 0.2 ppm
17:58	2.0	4.0'	0	11-12 12-11	No recovery
18:07	4.0'	6.0'	1.0	8-12 14-54/4	0.3 CLAY some Silt; little rock fragments fine to coarse dark brown, dry. 0.5 CLAY some Silt; trace rock fragments fine, trace black manganese joints, yellowish brown, plastic. 0.2 Rock fragments fine to very coarse, angular to sub-angular, dry, grayish. HNGL reading = 0.2 ppm * Collected soil samples for VOC, BNA's, metals, +PH & Cyanide.
18:20	7.5'				Met auger refusal at 7.5 ft.
18:30					Pulled out auger flight for borehole.

SAMPLE/CORE LOG

Boring/Well MW-15 Project/No. P10013.028 Page 1 of 2

Site Location ST. THOMAS "RAMSAY MOSES" Drilling Started 3/30/94 Drilling Completed 3/31/94

Total Depth Drilled 35 feet Hole Diameter 10 7/8" inches Type of Sample/ Coring Device DTH

Length and Diameter of Coring Device 10' x 6' Sampling Interval 5 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NA Drilling Method Art Rotary

Drilling Contractor SUELOS, INC. Driller Peter Berg Helper Richard Berg

Prepared By D. STERN Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From To Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

H-Nu leading background 4 ppm
CGI 08 LEL; 20.57% O2

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5	NA	135	Clay + silt; some rock fragments large to small, yellow-brown, dry. H-Nu < 1 ppm.
5	10	NA	1447	Clay; some rock fragments; coarse dark gray; dry. Rock fragments; coarse gray and black, some yellow and brown angular to sub-angular. H-Nu < 1 ppm
10	15	NA	1570	WEATHERED ROCK FRAGMENTS; COARSE GRAY + BLACK SOME YELLOW; SMALL TO LARGE; ANGULAR TO SUBANGULAR; MOIST HNU < 1 ppm
15	25	NA	1750	WEATHERED ROCK FRAGMENTS; COARSE; BLACK TRACE YELLOW WHITE, SMALL; WET; H-Nu 4 ppm.

MW-15

Grout calculation for 6 inch stainless steel casing installation on 3/30/94: _____

Borehole diameter: 10 inches

Borehole depth: 15 feet (180 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 (180) \\ &= 14130 / 1728 \\ &= 8.2 (7.48) \\ &= 61.16 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 15 feet (180 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.3 (180) \\ &= 5086.8 / 1728 \\ &= 2.94 (7.48) \\ &= 22 \text{ gal}\end{aligned}$$

Borehole - Casing = 39 gal

Estimated amount of grout: 39 gal

SAMPLE/CORE LOG

Boring/Well MW-16 Project/No. Tutu RI / PR0013028 Page 1 of 1

Site Location St. Thomas (Curriculum C.) Drilling Started 4/4/94 Drilling Completed 4/4/94

Total Depth Drilled 3 feet Hole Diameter 6 1/4" inches Type of Sample/ Coring Device Split spoon

Length and Diameter of Coring Device 2' x 3" in. Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method Hollow Stem Auger

Drilling Contractor Suclos inc. Driller Alfredo Andino Helper W. Andino

Prepared By M. Cedeño Hammer Weight 140 Hammer Drop 30" inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
14'24	0	2.0'	1.4	17-25 30-40
				0.6 CLAY and Silt; some rock fragments, sub-angular, fine to very coarse, dry, brown. 0.8 CLAY and Silt; trace rock fragments, fine angular, dry, yellowish brown, reddish brown mottled. HNU reading = .3 ppm
14:	2.0'	3.0'	.9	28-50/4"
				Rock fragments; fine to very coarse, angular, grayish, Some Silty clay, trace sand, coarse, dry, brown. HNU reading = .2 ppm
14:53	3.0'			
				Net auger refusal at 3.0-ft.
				* Soil samples were collected from both split spoon (0-3'), VOC, BNA, Metals, Cyanide and TPH.
				* field duplicate from the same interval MW-135.



Prepared By W. Morales Hammer Weight 21A Hammer Drop 21A inches

[illegible]

MW-16

Grout calculation for 10 inch steel casing installation on 4/27/94:
Borehole: 12 inches Depth: 5.0 ft (60 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(12)^2}{4} \\ &= 113 (60) \\ &= \frac{6782.4}{1728} \\ &= 3.93 (7.48) \\ &= 29.4 \text{ gal}\end{aligned}$$

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 (60) \\ &= \frac{4710}{1728} \\ &= 2.73 (7.48) \\ &= 20.38 \text{ gal}\end{aligned}$$

Estimated
9 gallons grout
• approximately

Actual amount during
installation: 15 gallons

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: ... St. Thomas, U.S. Virgin Islands

Boring/Well: MW 16

Date of ^{Air Rotary} Coring: 4/28/94

Logged by: W. Morales

Driller: Robert Berg / Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	5-10	5	4	1.25			
2	10-15	5	6	0.83			
3	15-20	7	10	0.70			
Sample collected.							

$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

RQC = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

Hydraulic Pressure: 200 psi
Water added during drilling:
penetration. 1 gallon per minute.

PRO1301.XLS/Bedrock

GERAGHTY & MILLER, INC.

TUT 005 0971

MW-16

Grout calculation for installation of 6 inch stainless steel casing on 4/29/94

Borehole: 24.6 feet $\Rightarrow$ 295 inches

Borehole Diameter 10 inches

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 \text{ in}^2 (295 \text{ in}) \\ &= \frac{23157.5 \text{ in}^3}{1728} \\ &= 13.4 \text{ ft}^3 (7.48) \\ &= 100.2 \text{ gallons}\end{aligned}$$

Casing Diameter 6 inches

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.3 \text{ in}^2 (295 \text{ in}) \\ &= \frac{8336.7 \text{ in}^3}{1728} \\ &= 4.8 \text{ ft}^3 (7.48) \\ &= 36.1 \text{ gallons}\end{aligned}$$

Estimate amount of grout: 64 gallons

Actual amount poured between borehole
and 6 inch casing: 125 gallons



BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well

MW-26

Date of Booking:

5/2/94

Logged by: W. Morales

Driller: Robert Bern Richard Bern

[illegible]
$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

RQD = Rock Quality Designation

RQC = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

SAMPLE/CORE LOG

Boring/Well MW-17 Project/No. Yuba RI / PA0013.028 Page 1 of 2

Site Location St. Thomas Drilling Started 3/28/99 Drilling Completed 3/28/99

Total Depth Drilled 9.5 feet Hole Diameter 7 inches Type of Sample/
Coring Device Split spoon

Length and Diameter of Coring Device 2 feet 13 inches Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Judoz, Inc. Driller Pablo Andino Helper Gilberto Baez

Prepared By Wanda I. Morales Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

1458 H2O Background Reading: 0.1 ppm
CEI: 0.70 LEL, 20.8 % Oxygen

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2.0	1.5'	13-24-15	CLAY and Silt, some Rock fragments angular, gray, reddish, small to large; brown; dry H2O reading: 0 ppm (Pieces of soda can)
2	4	0.4	13-33-35	CLAY and Silt, some Rock fragments, small to large, subangular, gray; brown dry Fill material H2O: 0 ppm Augers grinding between 2 to 4 feet. No grinding between 3.5 to 4.0 feet.
4	6	1.6	30-11	Same as above: 0.2 feet with some plastic trash, then 0.3 feet of rock fragments, gray, large; 1.0 feet of CLAY and Silt; some Gravel; small; greenish brown; dry H2O reading: 0 ppm
6	8	1.3	6-17	CLAY and Silt and Rock fragments, angular, small to large, gray, dk. gray; grayish



SAMPLE/CORE LOG

Boring/Well MW-18 Project/No. Tucke RI/PR0013.028 Page 1 of 2

Site Location J.F. Thomas Drilling Started 3/26/94 Drilling Completed 3/26/94

Total Depth Drilled 14.5 feet Hole Diameter 6 inches Type of Sample/ 5' in 1/2" Steel
Coring Device Split Spoon

Length and Diameter of Coring Device 2 feet / 3 inches Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Weldon Van Arner

Drilling Contractor Suelos, Inc. Driller Pablo Andre Helper Gilberto Bion

Prepared By Ward I. Morales / Miguel Cedeno Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From To Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

0102 H₂O Background Concentration: 0.4 ppm
CGI 0.6 LEL 20.8% Oxygen

Sample/Core Description

	0	0.4			ASPHALT
0115	0.4	1.9	0.8	7-27-24	Split spoon but during sample collection; have split spoon only 1.5 feet). CLAY and Silt; some Gravel, and rock fragments to large, sub angular, brown and yellowish brown; dry H ₂ O reading: 0.4 ppm
0122	2	4	1.5	11-17-94	CLAY and Silt; some Gravel, and Rock fragments to large, sub angular; brown; moist 0 to 0.3 feet, dry 0.3 to 1.5 feet of sample brown H ₂ O reading: 0.3 ppm
0128	4	6	1.1	5-28-97	CLAY, some Silt; some Gravel, small to large; little Rock fragments, gray, sub angular, large; brown; slightly moist H ₂ O reading: 0.2 ppm



SAMPLE/CORE LOG (Cont.d)

Boring/Well MU-1A

Page 2 of 2

Prepared By W. Morales / M. Cedeño

	Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
	From	To			
0145	6	6.8	0.6	20/50/6.3	Same as above. HNU reading: 0 ppm
0152	8	10	0.7	4-12-14-23	CLAY, some Silt, trace of Gravel, small to medium; little Sand, fine to medium; brown and gray; moist HNU reading: 0 ppm
0208	10	12	1	38-6-7	CLAY; trace of Silt; trace of Gravel small; little Sand, fine; greenish gray; moist HNU reading: 0 ppm
0217	12	14	1.2	2-6 24-27	CLAY, little Silt; trace of Sand, fine to medium; little Rock fragments; sub angular, gray; gray; moist HNU reading: 0 ppm Collect soil sample for laboratory analysis: roc, BNA, metals and Geotech, and TPH.
0228	14	15.2	0.5	5-32 50/0.2	Same as above: wet HNU reading: 0 ppm Augers grinding at 14.2 feet. Complete drilling at 14.5 feet after auger and split spoon refusal.

SAMPLE/CORE LOG

Boring/Well MW-19 Project/No. Tuta RI/PR003.028 Page 1 of 2

Site Location St. Thomas 'God of holiness ch.' Drilling Started 4/6/94 Drilling Completed 4/6/94

Total Depth Drilled 11.5' feet Hole Diameter 6 1/4" inches Type of Sample/ Coring Device Split spoon

Length and Diameter of Coring Device 2' x 3" in. Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method Hollow stem auger

Drilling Contractor Suclos inc. Driller Pablo Helper Wifredo

Prepared By Miguel A. Cedeño Hammer Weight 140 Hammer Drop 36" inches

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

HNH back-ground reading 0 ppm

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	2.0'	1.6	8-26 20-25	0.8 Silt and Sand; little rock fragments, fine, dry, light brown (top soil)
				0.8 CLAY and Silt; some rock fragments fine, dry, sub-angular, dark brown (fill)
				HNH reading = 0 ppm
2.0'	4.0'	1.4	14-21 21-18	0.5 Same as above (upper 0.8) / 0.9 CLAY some Silt; trace coarse sand, trace black manganese nodules, dry, brown, grayish brown and stiff.
				HNH reading = 0 ppm
4.0'	6.0'	1.8	10-7 9-17	0.4 Same as above (0.9 bottom spoon) / 1.4 CLAY some Silt; little sand, fine to coarse, dry, slightly yellowish brown, reddish brown mottled, contains oxidation iron pockets.
				HNH reading = 0 ppm
				* Collected soil samples for VOC's MSD
				MSD Composite 5'-8' ft. TPH, BVA, Metals & Cyanide 1/86

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-19

Page 2 of 2

Prepared By M. Cedeña / S. Caracelli

	Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
	From	To			
14:17	6.0'	8.0'	2.0	11-11 17-17	Same as above (bottom span) HNU reading = 0ppm
14:30	8.0'	10.0'	1.4	15-30 50/5"	CLAY and Rock, fragments fine to very coarse, sub-angular, dry, brown HNU reading = 0ppm
14:49	10.0'	11.5'	0.5'	50/6"	0.2 CLAY & Rock; fragments are fine, sub-angular, dry, brown. 0.3 Rock fragments; fine to very coarse, angular, dry and gray. HNU reading = 0ppm
15:12		11.5'			Met. auger refusal at 11.5' ft.
15:13					Drillers are pulling out auger flights from bore hole.





Prepared By Wanda I. Morales Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
11.5	12	N/A	—	CLAY and Silt, some Rock fragments, very fine grained, gray, subangular, small to medium size; brown; dry
12	16	N/A	—	Rock fragments, fine grained, gray, angular, friable, small; some Silt, brown, dry
				Stop drilling at 17.0 feet. Proceed with monitoring well installation.

SAMPLE/CORE LOG

Boring/Well MW-20D Project/No. Tutu RI/PR0013-028 Page 1 of 1

Site Location St. Thomas Drilling Started 5/6/94 Drilling Completed 5/6/94

Total Depth Drilled 48 feet Hole Diameter 10 inches Type of Sample/
Coring Device Tricon Bit

Length and Diameter of Coring Device 19 feet / 9.5 inches Sampling Interval 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method Air Rotary

Drilling Contractor Suecos Inc. Driller R. Berg Helper R. Berg

Prepared By W. Morales Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	10	N/A	6 min	CLAY, some silt, little Rock fragments, subangular, brown
10	20	N/A	8 min	ROCK FRAGMENTS, small to large, brown, light gray, dark gray, with iron oxidation, friable; trace of clay, white
20	30	N/A	9 min	Same as above: large fragments
30	40	N/A	14 min	Same as above
40	48	N/A	23 min	ROCK FRAGMENTS, small (sand size fine to coarse) to large, light gray, white, angular, friable, var fine grained
				Open borehole with 8 inch hammer bit and reamed with 9.5 inch tricon bit.

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PRQ1301Site: Tutu Wells Site Location: St. Thomas, U.S. Virgin IslandsBoring (Well): MW-200Date of Boring: 5/6/94Logged by: D. MoralesDriller: Robert Berg / Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	0-5	5	3				
2	5-6	1	3.7062				
3	6-7	1	0.75		Cleanup		
4	7-8	1	0.48				
5	8-9	1	0.58		Cleanup		
6	9-10	1	0.75				
7	10-11	1	0.50		Cleanup		
8	11-12	1	0.67				
9	12-13	1	0.62		Cleanup	Water found	
10	13-14	1	0.50				
11	14-15	1	0.60				
12	15-16	1	0.67		Cleanup		
13	16-17	1	1.77		Cleanup		
14	17-18	1	0.80				
15	18-19	1	1		cleanup		
16	19-20	1	0.67				
17	20-21	1	0.67				

Percent Recovery = $\text{Run Penetration} \div \text{Recovery}$

RQD = Rock Quality Designation

RQD = $\text{Sum of Core Pieces} > 4 \text{ inches in length} \div \text{penetration}$

PRQ1301.XLS/Bedrock

GERAGHTY & MILLER, INC.

Drill with PTMS 900 and
 1/2" compressor.
 Water added during drilling:
 1 gallon per minute

Open borehole with 8 inch hammer.
 Reamed with 4.5 inch tri-con bit.

TUT 005 0985

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Wells

MW-200

Date of Coring:

Air Rotary

5/6/94

Logged by: W. Morales

Driller: Robert Berg / Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
18	21-22	1	0.67				
19	22-23	1	0.67				
20	23-24	1	0.67				
21	24-25	1	0.47				
22	25-26	1	1				
23	26-27	1	1.37				
24	27-28	1	1.27				
25	28-29	1	0.83				
26	29-30	1	0.92				
27	30-31	1	0.80				
28	31-32	1	0.83				
29	32-33	1	0.53				
30	33-34	1	1				
31	34-35	1	2.33				
32	35-36	1	1.70				
33	36-37	1	1				
34	37-38	1	1				

Brown cuttings

Clean up

Clean up

Clean up

Clean up

Clean up

Clean up

Clean up

Clean up

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

MW-201

Grout calculation for 6 inch stainless steel casing installation on 516194:

Borehole diameter: 10 inches

Borehole depth: 48 feet (576 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 (576) \\ &= 45216 / 1728 \\ &= 26.17 (7.48) \\ &= 195.7 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 48 feet (576 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.26 (576) \\ &= 16277.76 / 1728 \\ &= 9.42 (7.48) \\ &= 70.4 \text{ gal}\end{aligned}$$

Borehole - Casing $\Rightarrow$ 125.3 gal

Estimate amount of grout: 125 gal

Actual amount during installation: 135 gal



Prepared By W. Morales Hammer Weight N/A Hammer Drop N/A inches

[illegible]

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-20b

Date of coring: Air Rotary: 5/9/94

Logged by: M. Celestino

Driller: Robert Berg Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	48-49	1	2	0.50			
2	49-50	1	3	0.33			
3	50-51	1	2	0.50			
4	51-52	1	2	0.50			
5	52-53	1	2	0.50			
6	53-54	1	2	0.50			
7	54-55	1	2	0.50			
8	55-56	1	2	0.50			
9	56-57	1	2	0.50			
10	57-58	1	2	0.50			
11	58-59	1	2	0.50			
12	59-60	1	1	1			
13	60-61	1	2	0.50			
14	61-62	1	2	0.50			
15	62-63	1	1	1			
16	63-68	5	7	0.71			
17							

Clean up
borehole

Clean up

High amount of water
from borehole

Percent Recovery = Run Penetration ÷ Recovery Drilling with 900 PTMS compressor.

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length ÷ penetration.

PR01301.XLS/Bedrock



SAMPLE/CORE LOG

Boring/Well MW -21D Project/No TUTU SITE / PR0013.028 Page 1 of 2

Site Location BENJAMIN OLIVER SCHOOL ST. THOMAS Drilling Started 3/25/94 Drilling Completed 3/27/94

Total Depth Drilled 77.5 feet Hole Diameter 10 inches Type of Samples Tricon bit & down the hole
Length and Diameter of Coring Device DHM - 88" OD, 5' length TRICONE - 10" OD, 19" length; Coring Device hammer
Sampling Interval 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used WATER Drilling Method Down the hole hammer

Drilling Contractor SUELOS, INC. Driller R. BERG Helper R. F. BERG

Prepared By DAVID E. STERN Hammer Weight N/A Hammer Drop N/A inches

Samples collected from air rotary drilling cuttings

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
0	10	N/A	1137	Silty Clay; trace gravel; brown; gray H-Nu = < 1 ppm
10	20	N/A	1216	Silty Clay; trace Fine gravel; brown to slight gray black H-Nu < 1 ppm.
20	30	N/A	1224	Silty Clay; trace Fine gravel; brown and gray black H-Nu < 1 ppm.
30	42	N/A	1334	Weathered Rock Fragments; black and gray; some blue; hard chunks approx 1/2 inch diameter H-Nu < 1 ppm
42	52	N/A	1540	Weathered Rock Fragments, black and blue some green, hard & very fractured zone H-Nu < 1 ppm



SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-21D

Page 2 of 2

Prepared By D. STEW

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per ft inches	Sample/Core Description
From	To			
52	58		1755	Washed Rock Fragments; mottled Black and gray some green; Hard and small $\sim 1/4"$ diameter H-Nu < 1 ppm
58	69		1210	Rock Fragments; mostly black some green and brown, trace white. Hard $\sim 1/4"$ diameter H-Nu < 1 ppm
69	77.5		1340	Rock Fragments; mostly black, some brown and green; Hard $\sim 1/8"$ diameter H-Nu < 1 ppm
				Depth to water 35.32 feet



MW-210

Grout calculation for 6 inch stainless steel casing installation on 4/8/94:

Borehole diameter: 10 inches

Borehole depth: 76 feet (912 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{3.14(10)^2}{4} \\ &= 78.5(912) \\ &= 71592/1728 \\ &= 41.43(7.48) \\ &= 310 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 76 feet (912 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.26(912) \\ &= 25773/1728 \\ &= 15(7.48) \\ &= 112 \text{ gal}\end{aligned}$$

Borehole - Casing = 198 gal

Estimated amount of grout: 198 gal

Actual amount: 105 gal on 4/8/94

? on 4/9/94 (not recorded)

SAMPLE/CORE LOG

Boring/Well M221b Project/No. Tuba R21 PA0013.029 Page 1 of 1
Site Benjamin Oliver School Drilling Started 4/11/94 Drilling Completed 4/11/94
Location St. Thomas

Total Depth Drilled 96.0 feet Hole Diameter 6 inches Type of Sample/ Coring Device Down-the-hole Hammer

Length and Diameter of Coring Device 5.0 feet / 5.5 inches Sampling Interval 5.0 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used _____ Drilling Method Air Rotary

Drilling Contractor Tucker, Inc. Driller Robert Berg Helper Richard Berg

Prepared By Wanda I. Morales Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
77	80		<u>7 min</u> <u>500 psi</u>	<u>Rock Fragments, very fine, crystalline, sand size (fine to coarse) to small; angular, light gray, white, green, brown minerals</u>
80	85		<u>13 min</u> <u>500 psi</u>	<u>Same as above</u>
85	90		<u>19 min</u> <u>1000 psi</u>	<u>Same as above: very fine ^{grained} sediment cuttings, some small frag rock fragments</u>
90	96		<u>25 min</u> <u>1000 psi</u>	<u>Same as above: finer ^{grained} sediment cuttings, light gray</u>
<u>Complete borehole at 96.0 feet</u>				



BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-21D

Air Rotary/Down the hole hammer 5.5 inch
Date of Coring: April 11, 1994

Logged by: Wanda I. Mordeir

Driller: Robert Berg Richard Berg

TIME

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	77-80	3	7	0.43	Sample collected (80ft)		
2	80-81	1	6	0.17			
3	81-82	1	3	0.33			
4	82-83	1	2	0.50			
5	83-84	1	2	0.50			
6	84-85	1	2	0.50	Sample collected (85ft)		
7	85-86	1	2	0.50			
8	86-87	1	2	0.50			
9	87-88	1	2	0.50			
10	88-89	1	6	0.14			
11	89-90	1	6	0.17	Sample collected (90ft)		
12	90-91	1	5	0.20			
13	91-92	1	3	0.33			
14	92-93	1	4	0.25			
15	93-94	1	4	0.25			
16	94-95	1	2	0.50			
17	95-96	1	3	0.33	Sample collected (96ft)		

Percent Recovery = Run Penetration ÷ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length ÷ penetration.

PR01301.XLS/Bedrock

GERAGHTY & MILLER, INC.

Notes:
• Hydraulic pressure (77-85ft)
500psi; (85-96ft)
1000psi
• Samples collected for visual observation.

TUT 005 0995

SAMPLE/CORE LOG

Boring/Well MW-226 Project/No. 7-Sub-B3 (PR0013.028) Page 1 of 3

Site Location St. Thomas, USVI Drilling Started 4/13/94 Drilling Completed 4/13/94

Total Depth Drilled 108 feet Hole Diameter 10 inches Type of Sample/
Coring Device Down-the-hole hammer

Length and Diameter of Coring Device 6 feet / 10 inches Sampling Interval 5 feet
(check drilling cuttings) Datum

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated

Drilling Fluid Used Water Added during drilling @ rate 0.5 gpm Drilling Method Air Rotary

Drilling Contractor Juelog, Inc. Driller Robert Berg Helper Richard Berg

Prepared By Wanda I. Morales Hammer Weight N/A Hammer Drop N/A inches

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

Initial Background Concentration: 0 ppm
CGI background: Oxygen 20% ; 0% LEL

From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	0.3	N/A		TOP SOIL: CLAY and Silt, trace of Rock fragments, small, subangular, trace of organics, dark brown
0.3	6	N/A	3min / 6psi	CLAY and Silt; some Rock fragments, small to large, subangular, light gray, brown
6	11	N/A	8min / 6psi	WEATHERED ROCK FRAGMENTS, and Clay, some Silt, brown; small to medium, subangular, iron oxidation stains, light gray (top of bedrock)
11	16	N/A	3min / 6psi	Same as above
16	23	N/A	3min / 6psi	ROCK FRAGMENTS, angular, sand size (fine to coarse) to small fragments, white, light gray, iron stained
Stop drilling to set 10 inch steel casing (4 feet long) for cuttings removal. Casing down to 3.3 feet				

SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-226

Page 2 of 3

Prepared By Wanda I. Morales

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
From	To			
23	28	N/A	3min/6psi	ROCK FRAGMENTS, angular, white, light gray, sand size (fine to coarse) for small size fragments, iron stained
28	33	N/A	3min/6psi	Same as above
33	38	N/A	3min/6psi	Same as above
38	43	N/A	2min/6psi	ROCK FRAGMENTS, very fine crystalline rock fragments, small to large size, angular, (quartz) gray, white, light gray, green minerals, (epidote) iron stained
43	48	N/A	3min/6psi	Same as above: Sand size (medium to coarse) to large size fragments
48	53	N/A	2min/6psi	ROCK FRAGMENTS, very fine crystalline rock, Sand size (medium to coarse) to large size, angular, light gray, green light brown fragments, green minerals (epidote), iron stained
53	58	N/A	9min/6psi	Same as above



SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-22D

Page 3 of 3

Prepared By Wanda I. Morales

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
58	63	N/A	7min/0psi	Same as above
63	68	N/A	4min/0psi	Same as above
68	73	N/A	8min/0psi	ROCK FRAGMENTS, very fine crystalline rock, small to large, angular, light gray, green and white minerals (epidote and quartz)
73	78	N/A	7min/0psi	Same as above
78	83	N/A	5min/0psi	Same as above: some light brown minerals
83	88	N/A	44min/10psi	Same as above: Sand size (medium to coarse) to small size fragments; increase in light brown minerals content
88	93	N/A	57min/10psi	Same as above
93	98	N/A	67min/0psi	Same as above
98	103	N/A	73min/0psi	Same as above
103	108	N/A	57min/0psi	Same as above

BEDROCK CORING NOTES

TUT 005 0999

Client: Tutu Environmental Investigation Committee Project Number: PR01301.008

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-22B

Air-Rotary / Down-the-hole hammer 10 inch

Date of Coring: April 19, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg / Richard Berg

Time	Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
0740	1	0-6	6	5	1.2 WIM 0.8 d/hy			
Weathered Rock (clean up)	2	6-11	5	8	0.6	SAMPLE COLLECTED (6-11.0 feet)		
(clean up)	3	11-16	5	5	1			
(clean up)	4	16-23	7	3	2.3			
(clean up)	5	23-28	5	3	2.3	SAMPLE COLLECTED (23-28 feet)		
p)	6	28-33	5	3	2.3			
	7	33-38	5	3	2.3	SAMPLE COLLECTED (33-38 feet)		
0926 Bedrock (more consistent)	8	38-39	1	0.5	2			
	9	39-40	1	0.5	2			
	10	40-41	1	0.5	2			
	11	41-42	1	0.25	4			
(clean up)	12	42-43	1	0.25	4	SAMPLE COLLECTED (43 feet)		
	13	43-44	1	0.5	2			
	14	44-45	1	0.5	2			
	15	45-46	1	0.70.5	2			
	16	46-47	1	0.50.7	1.4 WIM 0.7 d/hy			
(clean up)	17	47-48	1	0.5	2			

$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

• Samples collected from drill cuttings for visual observation description.

GERAGHTY & MILLER, INC.

Notes:

• Hydraulic Pressure: 0 psi
Hammer weight only.

• Water used during drilling to cool off hammer bit:
2.5 gpm approximately
Air Pressure 150 psi

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring(Well): MW-22b

Air Rotary / Down-the-hole hammer 10 inch

Date of coring: April 13, 1994

Logged by: Wanda T. Morales

Driller: Robert Berg / Richard Berg

Time

0946

0948
(clean up)
2

0950
clean up
work
1003

1011
(clean up)
1024

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
18	48-49	1	0.23	4.3			
19	49-50	1	0.45	2.2			
20	50-51	1	0.68	1.5			
21	51-52	1	0.77	1.3			
22	52-53	1	0.87	1.2	SAMPLE COLLECTED (53 feet)		
23	53-54	1	0.77	1.3			
24	54-55	1	1.72	0.6			
25	55-56	1	1.68	0.6			
26	56-57	1	2	0.5			
27	57-58	1	2.5	0.4			
28	58-59	1	1.8	0.5			
29	59-60	1	0.97	1			
30	60-61	1	1.2	0.8			
31	61-62	1	1.7	0.6			
32	62-63	1	1.5	0.7 ^{with} 0.6 ⁴⁶⁴⁴⁴	SAMPLE COLLECTED (63 feet)		
33	63-64	1	0.8	1.3			
34	64-65	1	0.8	1.3			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock



BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-22B

Air Rotary Down-the-hole hammer 10 inch

Date of Coring: April 13, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg Richard Berg

Time

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
35	65-66	1	0.8	1.3			
36	66-67	1	0.7	1.4			
37	67-68	1	0.8	1.3			
38	68-69	1	0.7	1.4			
39	69-70	1	1.2	0.8			
40	70-71	1	2.5	0.4			
41	71-72	1	2	0.5	SAMPLE COLLECTED (72 feet)		
42	72-73	1	1.8	0.6			
43	73-74	1	1.5	0.7			
44	74-75	1	2.5	0.4			
45	75-76	1	1.2	0.8			
46	76-77	1	1.3	0.8			
47	77-78	1	0.7	1.4			
48	78-79	1	0.5	2			
49	79-80	1	0.8	1.3			
50	80-81	1	0.8	1.3			
51	81-82	1	2	0.5			

1020
cleanup
1027

1037
cleanup
High yield
of water
at 73 ft
1044
Continue
drilling at
73 ft

1052
cleanup

Percent Recovery = $\frac{\text{Run Penetration}}{\text{Recovery}}$

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well

MW-22B

Air Rotary / Down-the-hole hammer / Wind

Date of Coring: April 13, 1994

Logged by: Wanda I. MoralesDriller: Robert Barcl Richard Berg

Time

	Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1101 clean up	52	82-83	1	1.5	0.7	SAMPLE COLLECTED (83 feet)		
1103	53	83-84	1	0.7	1.4			
clean up	54	84-85	1	5	0.2			
	55	85-86	1	13	0.08			
	56	86-87	1	12	0.08			
1202 p	57	87-88	1	13	0.08	SAMPLE COLLECTED (88 feet)		
	58	88-89	1	8	0.13			
	59	89-90	1	9	0.11			
clean up	60	90-91	1	18	0.06			
	61	91-92	1	7	0.14			
1312 clean up	62	92-93	1	15	0.07	SAMPLE COLLECTED (93 feet)		
	63	93-94	1	11	0.09			
clean up	64	94-95	1	17	0.06			
	65	95-96	1	10	0.10			
	66	96-97	1	16	0.06			
1425 clean up	67	97-98	1	13	0.08			
1428	68	98-99	1	17	0.06			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring (Well):

MW-221

Air Rotary / Down-the-hole hammer 10 inch

Date of boring: April 13, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg / Richard Berg

Time

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
69	99-100	1	7	0.14	SAMPLE COLLECTED		(100 feet)
70	100-101	1	17	0.06	Z		
71	101-102	1	13	0.08			
72	102-103	1	19	0.05			
73	103-104	1	17	0.06			
74	104-105	1	13	0.08	Z		
75	105-106	1	11	0.09			
76	106-107	1	10	0.10			
77	107-108	1	8	0.13	SAMPLE COLLECTED		(108 feet)

cleanup
1456
1500 clean
up. / stop
drilling at
refueling
compressor
1525
1540
cleanup

at 104 ft
1627
Continue
at 105 ft

1657
Cleanup
1718
Cleanup
at 108 ft

1721
Stop
drilling
at 108 ft

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

3 - 7 min / section

PR01301.XLS/Bedrock

MW-228

Ground Calculation for 6 inch stainless
steel casing installation on 7/14/94

Borehole Depth: 108 feet (1296 inches)

① Casing: 6 inches

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.26 \text{ in}^2 (1296 \text{ in}) \\ &= \frac{36624.96 \text{ in}^3}{1728} \\ &= 21.2 \text{ ft}^3 (7.48) \\ &= 158.54 \text{ gal}\end{aligned}$$

② Borehole: 10 inches

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5 \text{ in}^2 (1296) \\ &= \frac{101736 \text{ in}^3}{1728} \\ &= 58.87 \text{ ft}^3 (7.48) \\ &= 440 \text{ gal}\end{aligned}$$

440 (Borehole)

- 158 (Casing)

282 gal approximately

Powered 440 gal.
during installation.

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring (Well): MW-22A

Down-the-hole hammer 55 inches
Date of Coring: April 18, 1994

Logged by: Wanda T. Morales

Driller: Robert Berg, Richard Berg

1134 Start
108 feet

1154 Clean up

1156

1201

1211

1222

1246

1246

1249

Stop at
113 feetStart
113 feet

1204 Clean up

1310

1316

1331

1349

1356

1410

1414

1418

1439

1447
Stop at 121
feet to
add rod1500 Remove
cuttings1516 Clean
up1624 Clean
up

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	108-109	1	16	0.06			
2	109-110	1	6	0.17			
3	110-111	1	11	0.09			
4	111-112	1	28	0.04			
5	112-113	1	14	0.07	Sample at 113 feet		
6	113-114	1	10	0.10			
7	114-115	1	12	0.08			
8	115-116	1	20	0.05			
9	116-117	1	18	0.06			
10	117-118	1	24	0.04	Sample at 118 feet		
11	118-119	1	10	0.10			
12	119-120	1	7	0.14			
13	120-121	1	12	0.08			
14	121-122	1	5	0.20			
15	122-123	1	13	0.08	Sample at 123 feet		
16	123-124	1	16	0.06			
17	124-125	1	49	0.02			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

Hydraulic Pressure: 300 ps
Water rate: 1 gallon per minute

Sample collected from drilling cuttings for visual observation and description.

▼ BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee **Project Number:** PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Wells

142221

~~Date of Coring:~~ April 18, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg/Richard Berg

$$\text{Percent Recovery} = \text{Run Penetration} \div \text{Recovery}$$

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock



SAMPLE/CORE LOG

Boring/Well AW-24A Project/No. TUT 005 1008 Page 1 of 2

Site Location St. Thomas "Western Auto" Drilling Started 3/29/94 Drilling Completed 3/31/94

Total Depth Drilled 11 feet Hole Diameter 2 1/2 inches Type of Sample/ Coring Device Split spoon

Length and Diameter of Coring Device 2' X 3" i.d. Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NINE Drilling Method Hand Stem auger

Drilling Contractor Sucles inc. Driller Arrojo Alfredo Helper Arrojo Mario

Prepared By M. Cedeno A. W. Morales Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From To Core Recovery (feet) Time/Hydraulic Pressure or Blows per 6 inches

2354 H₂O Emulsion concentration: 1.2 ppm
CEI: 0% LEL 21% Oxygen

Sample/Core Depth (feet below land surface)	From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	.5				Asphalt
0005	0.5	2.5	1.1	5-7 8-10	0.1 Asphalt fragments, CLAY some Silt, trace of Rock fragments, angular, brown, gray, small to large; brown, greenish gray, moist (ENSA collect VOCs) H ₂ O reading: 0 ppm
0016	2.5	4.5	0.7	10-50 1-3	CLAY and weathered Rock fragments; some small to large, subangular Silt; brown, green mottled; moist H ₂ O reading: 0 ppm
0027	4.5	6.5	0.3	50 1-3	Weathered Rock, brown, dk brown, and CLAY, some Silt, brown; dry H ₂ O reading: 2 ppm Collect VOCs. (ENSA collect VOCs)
0044	6.5	6.9	0.4	50 1-4	CLAY and weathered Rock fragments, small to large, subangular, gray; brown; dry H ₂ O reading: 0 ppm Collect soil sample for BVA, Metals, Cyanide and TPH.



SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-24A

Page 2 of 2

Prepared By M. Cedeño

	Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
	From	To			
0058	8.5	8.9	0.4	50/0.4	Same as above; dry H2O reading: Open
0106	10.5	10.7	0.2	50/0.1	Same as above H2O reading: Open
					Angers grinding at 11.0 feet.
11.5	11.0	11.1	0.1	50/0.1	Same as above Weathered rock fragments, green, black stained, oxidation; friable, crumbly, large, wet.
					Stop drilling at 11.0 feet after split pipe Bedrock at 11.0 feet. & and danger refu
					Borehole grouted after soil sampling MW-24A. Attempted monitoring well installation 1.5 north and 1.0 feet east of MW-24A at MW-25B. MW-25B was aborted due to 4-inch PVC pipe. PVC pipe was repaired. Finally, Monitoring Well MW-24 was installed 11.0 feet north and 4.0 feet west of boring MW-24A location. See log for MW-24.

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-24

Date of Coring: May 11, 1994

Logged by: Wanda I. Morales

Driller: Robert Berg / Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	0-1	1	1	1			
2	1-2	1	2	0.5	Add water (2 gpm)		
3	2-3	1	2	0.5			
4	3-4	1	2	0.5			
5	4-5	1	3	0.33			
6	5-6	1	5	0.2	Stop water.		
7	6-7	1	2	0.5	Add water.		
8	7-8	1	3	0.33			
9	8-9	1	5	0.2	Add water.		
10	9-10	1	6	0.2	Hard drilling Add water.		
11	10-11	1	6	0.2	Stop water		
12	11-12	1	12	0.08	Add water		

Percent Recovery = Run Penetration ÷ Recovery

Hydraulic Pressure: 400 psi

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length ÷ penetration.

PR01301.XLS/Bedrock

GERAGHTY & MILLER, INC.

TUT 005 1011

MW-24

Grout calculation for 10 inch steel casing
installation: on 5/11/94

Borehole diameter: 12 inches

Borehole depth: 12 feet (144 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(12)^2}{4} \\ &= 113.04(144) \\ &= 16277.76 / 1728 \\ &= 9.42 (7.48) \\ &= 70.46 \text{ gal}\end{aligned}$$

Casing diameter: 10 inches

Casing depth: 12 feet (144 in)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5(144) \\ &= 11304 / 1728 \\ &= 6.54 (7.48) \\ &= 48.93 \text{ gal}\end{aligned}$$

$$\text{Borehole} - \text{casing} = 21.53 \text{ gal}$$

Estimate amount of grout: 22 gal

Actual amount during installation: 30 gal

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site Location: St. Thomas, U.S. Virgin Islands

Boring Well MW-24 Date of Logging 5/12/74
Logged by: W. Morales Driller: Robert Berg / Richard Berg

Date of Posting: 5/12/94

Driller: Robert Berg / Richard Berg

[illegible]
$$\text{Percent Recovery} = \frac{\text{Run Penetration}}{\text{Recovery}}$$

RQD = Rock Quality Designation

RQC = Sum of Core Pieces > 4 inches in length $\div$ penetration.

Our pressure with PTMS 90C
and rig compressor

PRO1301.XLS/Bedrock

MW-24

Grout calculation for 6 inch stainless steel casing
installation on 5/12/94

Borehole diameter: 10 inches

Borehole depth: 18 feet (216 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10)^2}{4} \\ &= 78.5(216) \\ &= 16956 / 1728 \\ &= 9.81(7.48) \\ &= 73.4 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 18 feet (216 in)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6)^2}{4} \\ &= 28.26(216) \\ &= 6104.2 / 1728 \\ &= 3.53(7.48) \\ &= 26.42 \text{ gal}\end{aligned}$$

Borehole - Casing $\Rightarrow$ 47 gal

Estimate amount of grout: 47 gal

Actual amount during installation: 90 gal



SAMPLE/CORE LOG

Boring/Well MW-24 Project/No.

Tubercle II / PR0013.028

Page 1 of 1

Site Location St. Thomas

Drilling Started 5/13/94

Drilling Completed 5/13/94

Total Depth Drilled 38.5 feet Hole Diameter 6 inches

Type of Sample/
Coring Device Tricon bit

Length and Diameter
of Coring Device 1.5 feet / 5.5 inches

Sampling Interval 5 feet

Land-Surface Elev. _____ feet

☐ Surveyed☐ Estimated

Datum

Drilling Fluid Used

Drilling Method Mr. A. J. Taylor

Drilling Contractor Dudlog Inc.

Driller R. Bero

Helper R. B. Brown

Prepared By Wanda I. Morales

Hammer Weight 250

~~Hammer~~
Drop ~~N/A~~ inches

Sample/Core Depth
(feet below land surface)

**Core
Recovery
(feet)**

**Time/Hydraulic
Pressure or
Blows per 6
inches**

Sample Case Description

18	23.5	N/A	4 min	Silt, fine clay, trace Rock Fragments, angular brown, gray
23.5	28.5	N/A	8 min	ROCK FRAGMENTS, sand size medium to coarse, angular, fine grained, brown, light gray, with iron oxidation; in a Silt, trace clay, grayish brown matrix
28.5	33.5	N/A	7 min	Same as above; increase content of Rock fragments
33.5	38.5	N/A	6 min	Same as above

BEDROCK CORING NOTES

Client: Tutu Environmental Investigation Committee Project Number: PR01301

Site: Tutu Wells Site

Location: St. Thomas, U.S. Virgin Islands

Boring/Well: MW-24

Date of Coring: Airphoto May 13, 1994

Logged by: J. Padilla

Driller: Robert Berg / Richard Berg

Run Number	Depth of Run (feet)	Penetration (feet)	Run Duration (min)	Penetration Rate (feet/min)	Recovery (feet)	Percent Recovery	RQD
1	23.5-23.5	5	4	1.25			
2	23.5-24.5	4	2	0.50			
3	24.5-25.5	1	1.5	0.67			
4	25.5-26.5	1	1	1			
5	26.5-27.5	1	1	1			
6	27.5-28.5	1	2.5	0.40			
7	28.5-29.5	1	2	0.50			
8	29.5-30.5	1	2	0.50			
9	30.5-31.5	1	1	1			
10	31.5-32.5	1		1			
11	32.5-33.5	1	1	1			
12	33.5-34.5	1	1.5	0.67			
13	34.5-35.5	1	1.5	0.67			
14	35.5-36.5	1	1	1			
15	36.5-37.5	2	1	1			
16	37.5-38.5	1	1	1			

Percent Recovery = Run Penetration $\div$ Recovery

RQD = Rock Quality Designation

RQD = Sum of Core Pieces > 4 inches in length $\div$ penetration.

PR01301.XLS/Bedrock

SAMPLE/CORE LOG

Boring/Well MA-25 Project/No. T-12 PR0013028 Page 1 of 2

Site Location St. Thomas "Western Auto" Drilling Started 3/31/94 Drilling Completed 4/7/94

Total Depth Drilled 17.5 feet Hole Diameter 6 1/4" inches Type of Sample/ Coring Device Split Spoon

Length and Diameter of Coring Device 2' x 3" in. Sampling Interval Continuous feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used None Drilling Method Walter steam auger

Drilling Contractor Suclos inc Driller Mario Helper Alfredo

Prepared By M. Cedeno & N. Morales Hammer Weight 140 Hammer Drop 30" inches

Sample/Core Depth (feet below land surface) Core Recovery (feet) Time/Hydraulic Pressure or Blow per 6 inches

0351 HNU Background Reading: Oppm
CGI: 940 to 42; Oxygen 21 to

From	To	Core Recovery	Time/Hydraulic Pressure or Blow per 6 inches	Sample/Core Description
0	0.3			Concrete Slab.
0312	0.3	2.0	1.3 4-9 7"	CLAY and Silt, some Gravel, small to large, sub rounded, gray; brown and gray; dry HNU reading: Oppm ENSR personnel collect soil sample for VOC and BNA's.
0322	2.0	4.0	1.6 8-10 13-14	CLAY and Silt, some Rock fragments, small to large, brown, green, weathered; brown; dry HNU reading: Oppm Augers grinding at 3.0 feet
0335	4.0	6.0	2 7-12 15-20	CLAY, some Silt, trace of Rock fragments, gray, brown, small to medium; greenish gray, dry HNU reading: Oppm



SAMPLE/CORE LOG (Cont.d)

Boring/Well MW-25

Page 2 of 2

Prepared By M. Cedeño/W. Morales

	Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
	From	To			
0350	6.0	8.0	2	12-15 15-14	Same as above; moist HNU reading: 0 ppm
0400	8.0	10.0	2 1.7	9-31 10-8	Same as above: 1.1 CLAY some Silt, trace of weathered rock fragments; brown; d HNU reading: 0 ppm
0417	10.0	12.0	1.1	4-8 7-10	CLAY, some Silt, trace of Weathered Rock fragments; brown; brown and dark gray; p dry HNU: 0 ppm
0438	12.0	14.0	2.0	3-8 9-12	CLAY, some Silt, trace Rock Fragments; brown, dk gray; dry very plastic HNU reading: 0.6 ppm
0452	14.0	16.0	2.0	12-14 28-40	Collect soil sample for VOC, BPA, PAH, metals and Silt soil sample with ENR personnel for VOC again. Weather 0-0.3 ft CLAY, some Silt gray; 0.3-20 ft Weathered Rock brownish green; friable; moist HNU reading: 0 ppm
0519	16.0	17.5 18.0	1.6	41-41 50/5"	Weathered Rock, greenish gray friable arenaceous; moist; trace clay, green HNU reading: 0 ppm ENR personnel collect soil sample for VOC and BPA. 17.5 Stop drilling at 18 ft after split spoon refusal.



SAMPLE/CORE LOG

Boring/Well MW 25 Project/No. PR0013.02B Page 1 of 1
Site Location St. Thomas "Western Auto" Drilling Started 3/31/94 Drilling Completed 4/7/94

Total Depth Drilled 45 feet Hole Diameter 10 inches Type of Sample/Coning Device DTH
Length and Diameter of Coning Device _____ Sampling Interval 10 feet

Land-Surface Elev. _____ feet ☐ Surveyed ☐ Estimated Datum _____

Drilling Fluid Used NONE Drilling Method AIR-ROTARY

Drilling Contractor SUELOS, INC Driller R. BERG Helper B. BERG

Prepared By W. MORALES Hammer Weight 140 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface)		Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
From	To			
18	25	N/A	-	ROCK FRAGMENTS: light gray, fine grained, brown, small to large
				Switch to 5.5-inch diameter hammer bit (air rotary) for open hole completion. Samples collected from drilling cuttings. (4/6/94).
25	30	N/A	-	FRABLE Rock, grayish, green, trace of clay
30	38	N/A	-	SILT, brownish gray, EUSR personnel inspect samples
38	40	N/A	-	SILT, brownish gray - dark gray
40	45	N/A	-	FRABLE rock, gray
				Stop drilling at 45 ft bls.



MW-25

Grout calculation for 6 inch stainless steel casing installation

Borehole diameter: 10 inches

Borehole depth: 25 feet (300 inches)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(10^2)}{4} \\ &= 78.50(300) \\ &= 23550 / 1728 \\ &= 13.63(7.48) \\ &= 102 \text{ gal}\end{aligned}$$

Casing diameter: 6 inches

Casing depth: 25 ft (300 in)

$$\begin{aligned}\frac{\pi d^2}{4} &= \frac{(3.14)(6^2)}{4} \\ &= 28.26(300) \\ &= 8478 / 1728 \\ &= 4.9(7.48) \\ &= 37 \text{ gal}\end{aligned}$$

Borehole - casing = 65 gal

Estimate amount of grout: 65 gal

Actual amount of grout during installation: 100 gal

SUBJECT: PENETRATION RATE, MW-25

PROJECT: TUTU WELLS SITE

CLIENT/PROJECT NO: P20013.02B

BY: SC DATE: 4/6/94

CHKD: DATE:

REV: DATE:

PAGE

SHEET

/

DEPTH (FT b/s)	Time	REMARKS
26	0 - 1 min, 30 sec.	-
27	1 min, 30 sec.	-
28	1 min, 45 sec.	-
29	1 min., 30 sec.	-
30	1 min, 50 sec.	SAMPLE COLLECTED
31	1 min, 48 sec.	-
32	1 min, 39 sec.	-
33	1 min, 45 sec.	-
34	1 min, 50 sec.	-
35	1 min, 45 sec.	-
36	1 min, 55 sec.	-
37	1 min, 43 sec.	-
38	1 min, 40 sec.	SAMPLE COLLECTED.
39	1 min., 35 sec.	-
40	1 min., 45 sec.	SAMPLE COLLECTED.
41	1 min., 48 sec.	-
42	1 min., 50 sec.	-
43	3 min., 10 sec.	-
44	3 min, 15 sec.	-
45	3 min. 10 sec.	SAMPLE COLLECTED.

SUBJECT: MONITORING WELL DEVELOPMENT
PROJECT: MW-13, TUTU WELLS SITE
CLIENT/PROJECT NO: PR0013.028

BY: BA DATE: _____
CHKD: _____ DATE: _____
REV: _____ DATE: _____

PAGE

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1 / 1

WELL ID	QUANTITY REMOVED (GAL)	DRAWDOWN (Ft./min.)	RECOVERY (Ft./min.)	PUMPING RATE (gal/min)	REMARKS
MW-13	110	N/A	N/A	2	WATER LEVEL STABILIZED AT A PUMPING RATE OF 2 GALLONS PER MINUTE.
MW-15	165	L1	N/A	~8	FAST RECOVERY
MW-16	100	L1	N/A	6	NONE
-17	11	N/A	N/A	N/A	USED BAKER TO DEVELOP MW-17.
MW-19	20	N/A	~0.1	N/A	USED BAKER TO DEVELOP MW-19. WELL RUNS DRY QUICKLY.
MW-21D	205	N/A	~0.1	8	NONE
	265*	N/A	~1/5-6	8	WELL RUNS DRY QUICKLY, SLOW RECHARGE. NEED TO PURGE WITH VARIABLE SPEED PUMP OR BAKER. WATER IS CLEAR * 150 gallons 4/25/94. 115 gallons 4/26/94.

APPENDIX E

**PETROGRAPHIC STUDY
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**





CORE LABORATORIES

October 7, 1992

Mr. Michael D. Reive
Geraghty and Miller, Inc.
201 West Passaic Street, 3rd Floor
Rochelle Park, NJ 07662

Subject: Petrographic Study (detailed thin section petrography analyses)
Wells: MW-4D, MW-6D, MW-11D, MW-13D
Location: St. Thomas, U.S. Virgin Islands
File: 192187

Dear Mr. Reive:

This report presents the final results of a Petrographic Study performed on four rotary drilled bedrock samples. The sample remnants will be sent to you via regular mail.

It has been a pleasure performing this study for Geraghty and Miller, Inc. Should you have any questions about these analyses, or if we can be of further assistance, please do not hesitate to contact us.

Sincerely,

CORE LABORATORIES
Reservoir Geology Group

Debra J. Malek
Senior Geologist

TUT 005 1025

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DISCUSSION

ANALYTICAL PROCEDURES

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PLATE 1 - MW-4D Well Sample Depth: 59.0-60.0 feet

PLATE 2 - MW-6D Well Sample Depth: 51.2-51.6 feet

PLATE 3 - MW-11D Well Sample Depth: 73.5-74.0 feet

PLATE 4 - MW-13D Well Sample Depth: 65.0-70.0 feet

INTRODUCTION

Four bedrock samples were received on September 9, 1992 by the Reservoir Geology Group of Core Laboratories, in Carrollton, Texas. The samples were obtained from the MW-4D, MW-6D, MW-11D, and MW-13D Wells, located in St. Thomas, U.S. Virgin Islands. The samples were analyzed by detailed thin section petrography. The objective of this study was to characterize the texture and mineralogy of the samples. The sample depths for the respective wells are as follows:

<u>Well</u>	<u>Depth (feet)</u>
MW-4D	59.6-60.0
MW-6D	51.2-51.6
MW-11D	73.5-74.0
MW-13D	65.0-70.0

DISCUSSION

The four analyzed bedrock samples are gabbro (well MW-4D), porphyritic basalt (well MW-6D), diorite (well MW-11D), and reworked andesite (well MW-13D). The gabbro and diorite exhibit slightly inequigranular textures with interlocking crystals which average medium grained (1 to 5 millimeters) and fine grained (0.1 to 1 millimeter) sizes, respectively. The inequigranular basalt has a bimodal distribution of the crystal sizes, as does the reworked andesite. The samples appear to be holocrystalline (devoid of glass); however, extensive alteration of the epiclastic andesite from well MW-13D makes the assessment difficult for this sample.

Plagioclase is observed to be the predominant primary mineral. Other primary minerals observed in various samples as phenocrysts include pyroxene, magnetite, quartz, hornblende, and apatite. The primary mineralogical composition of samples from the wells of MW-4D, MW-6D, and MW-13D are similar, whereas the sample from MW-11D contains primary quartz, abundant hornblende (both primary and secondary), and primary apatite. Pyroxene is most abundant in the gabbro from MW-4D. Hornblende occurs as both a phenocryst of primary origin and also as a secondary replacement of pyroxene in the samples. Sample MW-13D may also contain rock fragments, although alteration makes this assessment difficult.

Alteration in the four samples is variable. The gabbro and diorite from wells MW-4D and MW-11D are significantly less altered than the porphyritic basalt. Nearly all of the minerals observed in the reworked andesite from MW-13D are secondary replacement minerals. Cement-filled fractures are observed in all four of the samples. Cement-filled and open fractures are particularly abundant in the sample from MW-13D.

ANALYTICAL PROCEDURES

A Petrographic Study allows for characterization of reservoir rock texture, mineralogy, and porosity. Information about the relationships among rock textures, allochemical/detrital grains, cement and matrix composition, and porosity characteristics are determined from thin section analyses.

The sample fraction is prepared for thin section analysis by first impregnating the sample with epoxy to augment sample cohesion and to prevent loss of material during grinding. A blue dye is added to the epoxy to highlight the pore spaces. Each sample is mounted on a frosted glass slide and then cut and ground in water to an approximate thickness of 30 microns. Samples containing known water-soluble phases are prepared using odorless kerosene. Prepared thin sections are subsequently stained for calcite (Alizarin Red-S stain), iron-bearing carbonates (potassium ferricyanide stain), and potassium feldspar (sodium cobaltinitrate stain) as necessary. The thin sections are analyzed using standard petrographic techniques. The terminology in this report is that of Streckeisen (1978).

REFERENCES CITED

Streckeisen, A.L., 1978, To each plutonic rock its proper name: Earth Sci. Rev., Vol. 12, p. 1-34.



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TABLE 1
THIN SECTION ANALYSES : COMPOSITION

File No.: 192187

Well:	MW-4D	MW-6D	MW-11D	MW-13D
Sample Depth (feet):	59.6-60	51.2-51.6	73.5-74.0	65.0-70.0
Plagioclase	50.8	33.6	36.4	tr
Quartz	0.0	0.8	4.8	0.0
Chert	0.0	tr	0.0	4.0
Epidote	0.8	5.6	2.8	4.4
Calcite	tr	22.0	9.2	23.6
Dolomite	0.0	0.4	0.0	0.0
Magnetite	2.4	0.0	2.4	0.0
Titanium-oxide	0.0	0.0	0.4	2.8
Pyroxene	25.6	13.2	0.4	0.0
Hornblende	4.4	6.0	19.6	0.0
Pennine	8.0	0.4	7.6	0.0
Chlorite	1.2	1.6	11.2	30.4
Sericite	2.4	1.2	2.8	7.6
Undifferentiated clay	4.4	12.0	2.4	21.6
Kaolinite	0.0	0.0	0.0	4.8
Zeolite	0.0	2.4	0.0	0.0
Apatite	0.0	0.0	tr	0.0
Aphanocrystalline matrix	0.0	0.8	0.0	0.0
Fracture porosity	0.0	0.0	0.0	1.6
Total	100.0	100.0	100.0	100.0

TUT 005 1029



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TABLE 2
THIN SECTION ANALYSES: GENERAL DESCRIPTION

FILE: 192187

Well:	MW-40	MW-60	MW-110
Sample Depth:	59.0-60.0 feet	51.2-51.6 feet	73.5-74.0 feet
Rock Type:	Igneous	Igneous	Igneous
Rock Name: (Streckeisen, 1978)	Gabbro	Amygdaloidal porphyritic basalt	Diorite
Primary Constituents:	Abundant plagioclase and pyroxene; lesser magnetite, hornblende	Plagioclase, augite, hornblende, aphanocrystalline matrix	Plagioclase, hornblende, magnetite, quartz, pyroxene, apatite
Secondary Constituents:	Minor to trace amounts of pennine (type of chlorite), undifferentiated clay, sericite, hornblende, chlorite, epidote, calcite	Calcite, undifferentiated clay, hornblende (alteration of pyroxene), epidote, zeolite, chlorite, sericite, pennine, dolomite, quartz	Chlorite, some of the hornblende, pennine, sericite, calcite, undifferentiated clay, epidote, titanium-oxides
Grain Size Estimate			
Minimum:	0.9mm (fine grained)	<0.01mm (microlitic/aphanocrystalline)	0.05mm (very fine grained)
Maximum:	5.8mm (coarse grained)	3.3mm (medium grained)	2.0mm (medium grained)
Average:	1.9mm (medium grained)	Phenocrysts average is 0.8mm (fine grained)	0.8mm (fine grained)
Orientation:	Random	Random	Random
Texture/Fabric:	Holocrystalline; phaneritic; inequigranular; intergrown subhedral plagioclase and anhedral to subhedral pyroxene; clay and carbonate-filled fractures	Holocrystalline (no glass observed); inequigranular porphyritic; monomineralic clusters of plagioclase and pyroxene form glomerocrysts; rock alteration/weathering has produced calcite, clay, and zeolite-filled amydules; calcite-filled fractures	Holocrystalline; fairly equigranular; interlocking phenocrysts; calcite- and clay-filled interconnected fractures
Other:	Alteration is not extensive; pennine and most of the hornblende are present as alteration products	Alteration is extensive	Common alteration, especially of mafic minerals; chlorite and pennine are common to abundant



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International

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TABLE 2

FILE: 192187

THIN SECTION ANALYSES: GENERAL DESCRIPTION

Well:	MW-130
Sample Depth:	65.0-70.0 feet

Rock Type:	Epiclastic
Rock Name: (Streckelsen, 1978)	Reworked andesite(?)
Primary Constituents:	Plagioclase (alteration of primary minerals is nearly complete)
Secondary Constituents:	Chlorite, undifferentiated clay, calcite, sericite, kaolinite, chert, epidote, titanium-oxide
Grain Size Estimate	
Minimum:	<0.01mm (microlitic/aphanocrystalline)
Maximum:	3.4mm (medium grained)
Average:	0.7mm (fine grained)
Orientation:	Random
Texture/Fabric:	Hypocrystalline(?); alteration makes identification of possible glassy constituents indeterminate; inequigranular porphyritic; highly fractured, with cement- filled and open fractures; fractures are filled by calcite and chert
Other:	Extremely altered; appears to be epiclastic in origin

THIN SECTION PHOTOMICROGRAPHS

The scale of the thin section photomicrographs in each plate is a function of the magnification:

15X: Horizontal width of the photomicrograph (127mm) represents
8.467mm.

31X: Horizontal width of the photomicrograph (127mm) represents
4.097mm.

**Geraghty and Miller, Inc.
Bedrock Samples
St. Thomas, U.S. Virgin Islands**

File: 192187

WELL: MW-4D

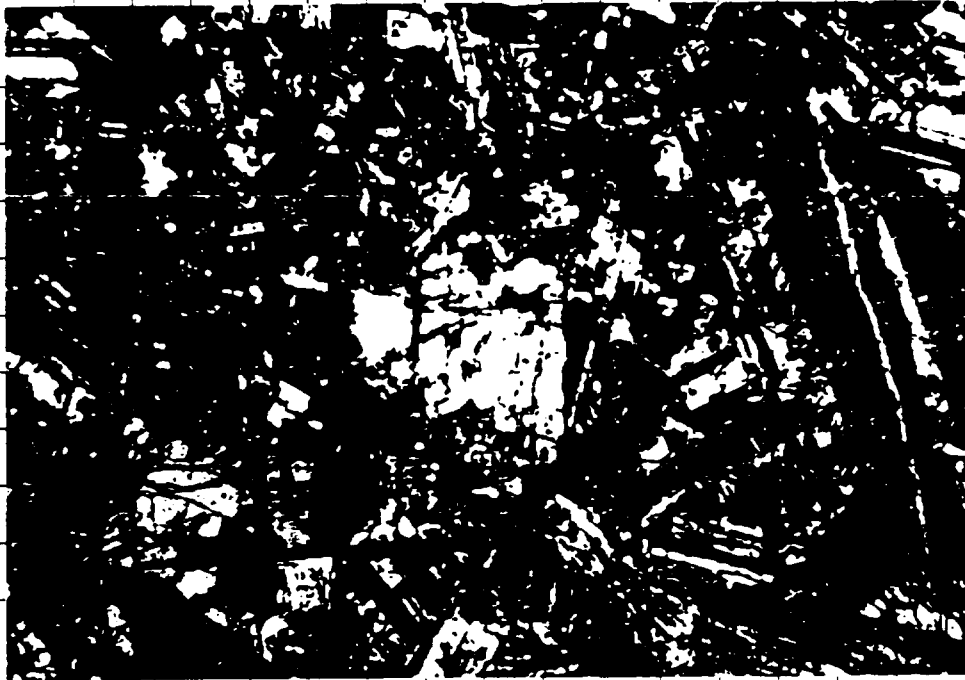
SAMPLE DEPTH (feet): 59.0-60.0

PLATE 1A

This sample is a medium grained igneous rock. Using Streckeisen's 1979 classification scheme, it is considered to be a gabbro. The predominant constituents are interlocking subhedral plagioclase (seen with abundant polysynthetic twinning; B15.5, J12, F8) and anhedral to subhedral pyroxene (minerals with high birefringence in view; H3, C5). (15X magnification, crossed polarizers)

PLATE 1B

This photomicrograph, taken at a higher magnification (31X), shows a localized area of finer grained crystals. Magnetite (opaque crystals at H6, G-H9, E10) is observed in this view, along with plagioclase (J2, A14.5) and pyroxene (C9). A cement-filled fracture extended diagonally across the view at C1 to J15. It is filled with pennine, which is a variety of chlorite, and other undifferentiated clay, possibly smectitic or illitic (H13 to K16). Several intersecting fractures are observed in the thin section. (31X magnification, crossed polarizers)



A



B

**Geraghty and Miller, Inc.
Bedrock Samples
St. Thomas, U.S. Virgin Islands**

File: 192187

WELL: MW-6D

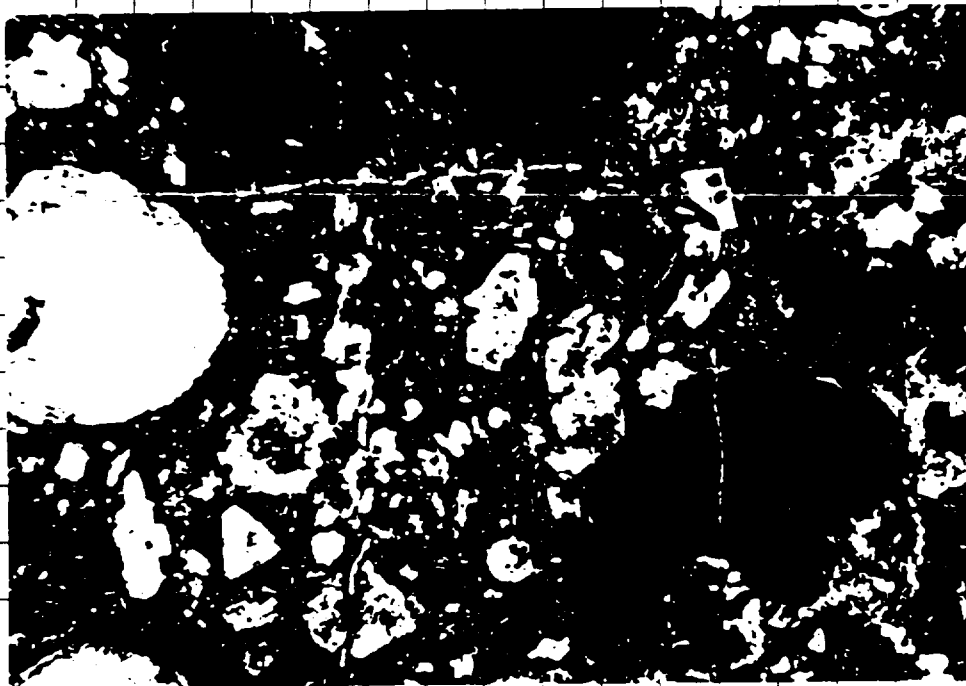
SAMPLE DEPTH (feet): 51.2-51.6

PLATE 2A

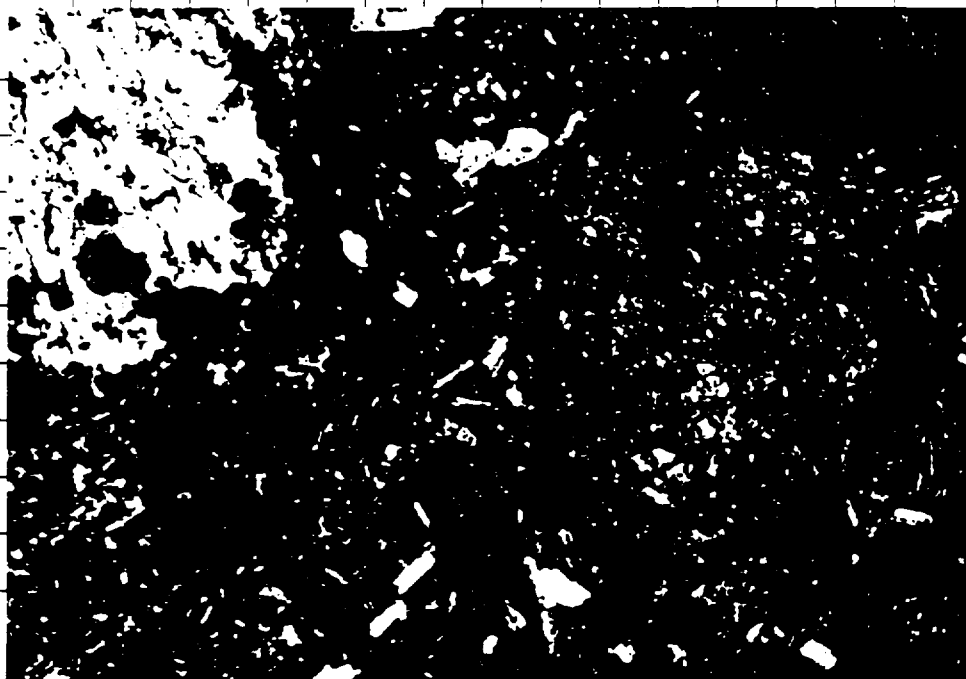
An amygdaloidal porphyritic basalt is shown in this view. Plagioclase phenocrysts (E8.5, G4.5, J2, K6) float in a very finely crystalline groundmass of tiny plagioclase, altered pyroxene, and undifferentiated microlites and clay. Large amygdules are filled by calcite (E1; stained pink), undifferentiated clay (A9, B14-16), chlorite and possibly actinolite (poorly visible here), zeolites (not in view) and chert (K14.5). Small calcite- and clay-filled fractures are observed (C1 to C16, K12-E12, E12 to D16). (15X magnification, plane-polarized light)

PLATE 2B

This photomicrograph shows a partially altered pyroxene phenocryst. Much of the pyroxene in the porphyritic basalt has been altered to secondary minerals. Even at higher magnification, minerals in the groundmass still appear very small. A calcite-filled amygdale is in the upper left of the view. (31X magnification, crossed polarizers)



A



B

**Geraghty and Miller, Inc.
Bedrock Samples
St. Thomas, U.S. Virgin Islands**

File: 192187

WELL: MW-11D

SAMPLE DEPTH (feet): 73.5-74.0

PLATE 3A

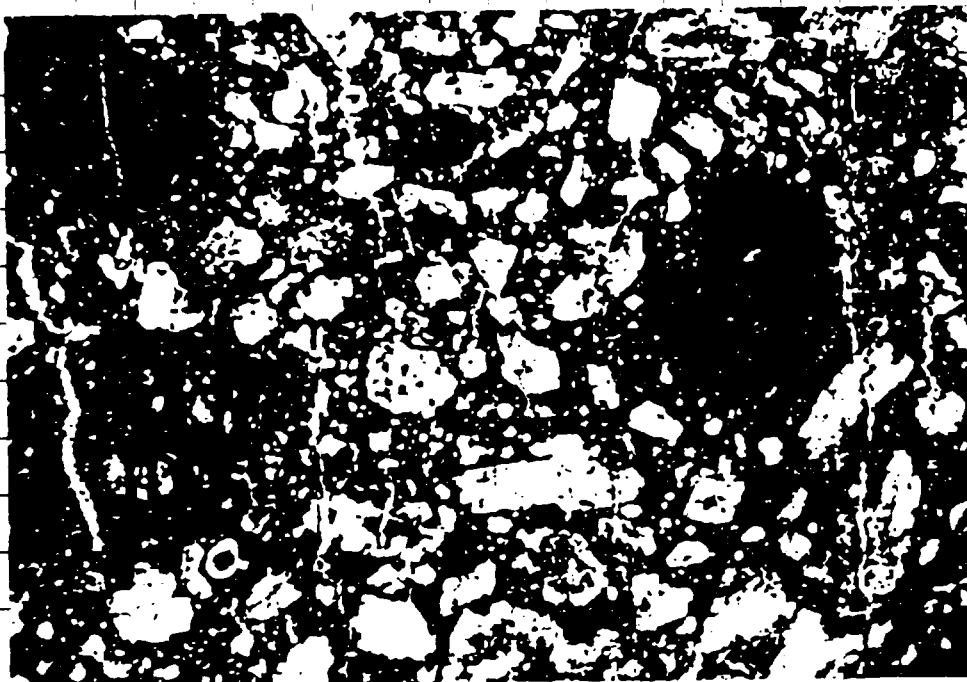
This diorite igneous rock contains interlocking, fine-grained crystals of plagioclase, hornblende, and lesser magnetite, quartz, and pyroxene. Minerals in this view include plagioclase (E11, F5), magnetite (G8, K7), and quartz (B3). Hornblende at D-E4 appears dark at this magnification, but is actually green. Much of the hornblende, along with chlorite and pennine, appears to be an alteration product. The green minerals in this view are chlorite and pennine (E7). Calcite fractures intersect at H10. (15X magnification, plane-polarized light)

PLATE 3B

Another view of the sample shows interlocking crystals similar to those in Plate 3A. The texture of this sample is homogeneous. Several phenocrysts in this view, however, are altered to yellowish clay, possibly sericite and/or smectite (C5.5, J9, D13.5). (15X magnification, plane-polarized light)



A



B

**Geraghty and Miller, Inc.
Bedrock Samples
St. Thomas, U.S. Virgin Islands**

File: 192187

WELL: MW-13D

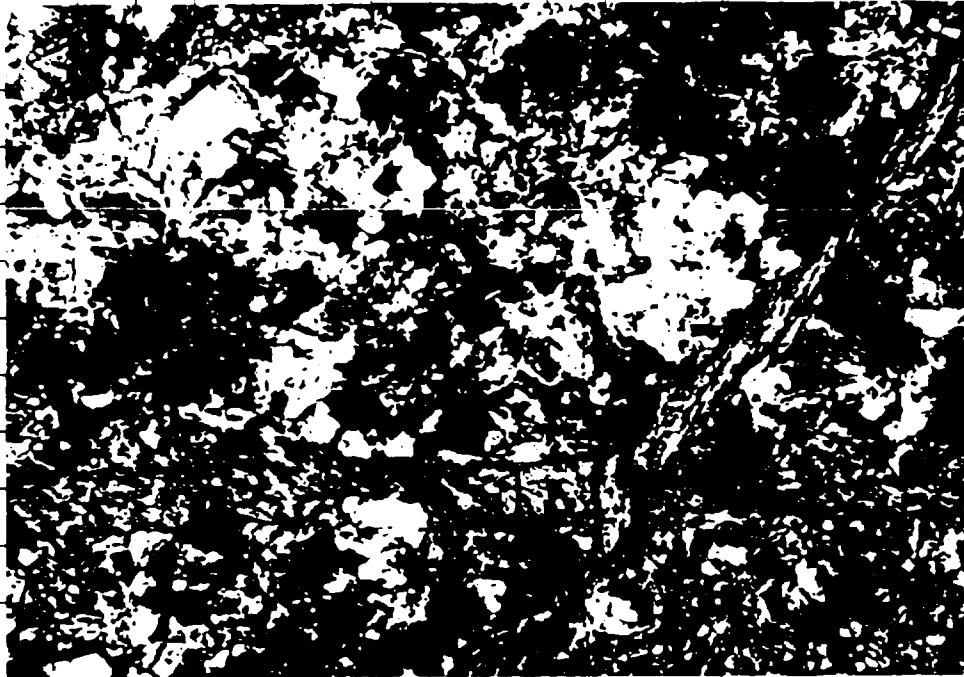
SAMPLE DEPTH (feet): 65.0-70.0

PLATE 4A

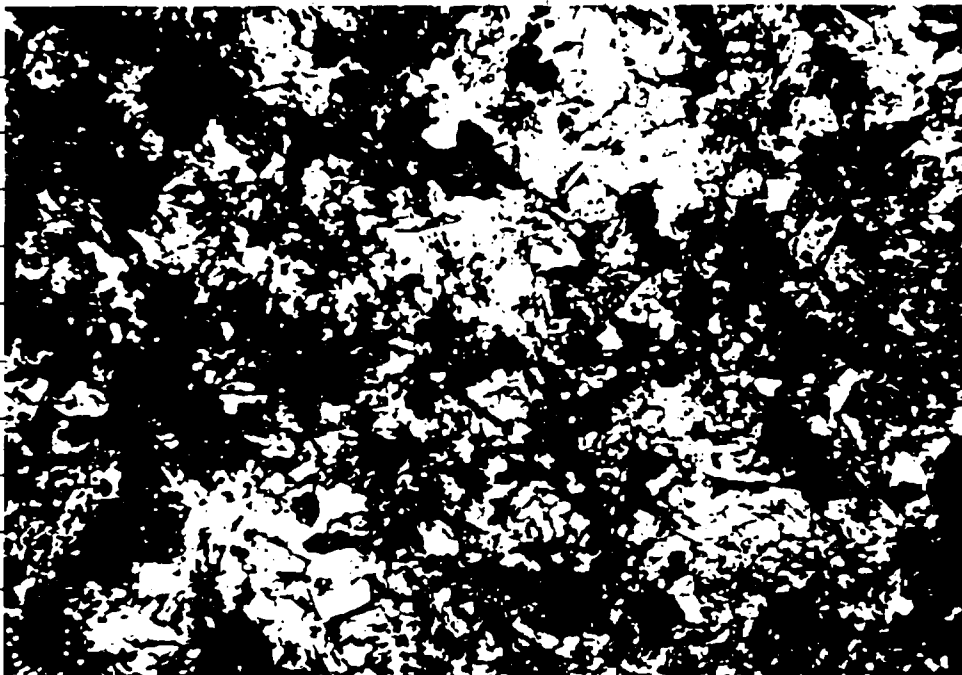
This extensively altered rock appears to be a reworked andesite. Large calcite-filled fractures and smaller-aperture open fractures are abundant. As illustrated in this view, much of the original mineralogy and texture is obscured by secondary alteration. Intercrystalline clay is abundant. Only trace amounts of the primary minerals, such as plagioclase, remain in this rock. For example, the plagioclase(?) phenocryst at C-F6 is completely altered to secondary minerals, mostly clay. (15X magnification, plane-polarized light)

PLATE 4B

Areas of the sample that are located farthest away from the large calcite-filled fractures appear to be slightly less altered. This view shows altered plagioclase phenocrysts (white crystals) set in a clay matrix. The large dark areas (E13, G2, B2) are probably altered mafic phenocrysts. Based on the texture and plagioclase-rich composition, this sample appears to be an epiclastic rock derived from an andesite. (15X magnification, plane-polarized light)



A



B

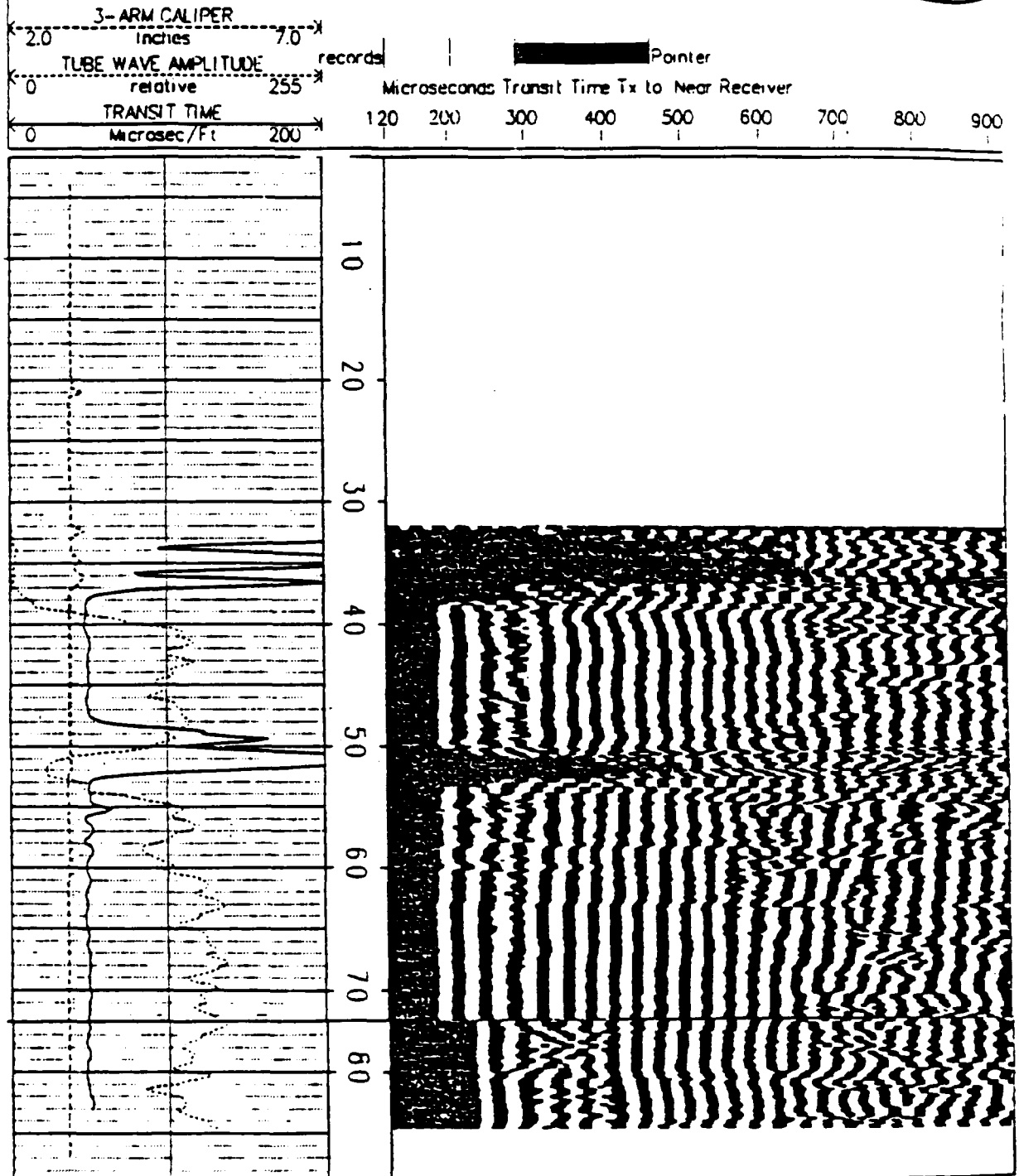
APPENDIX F

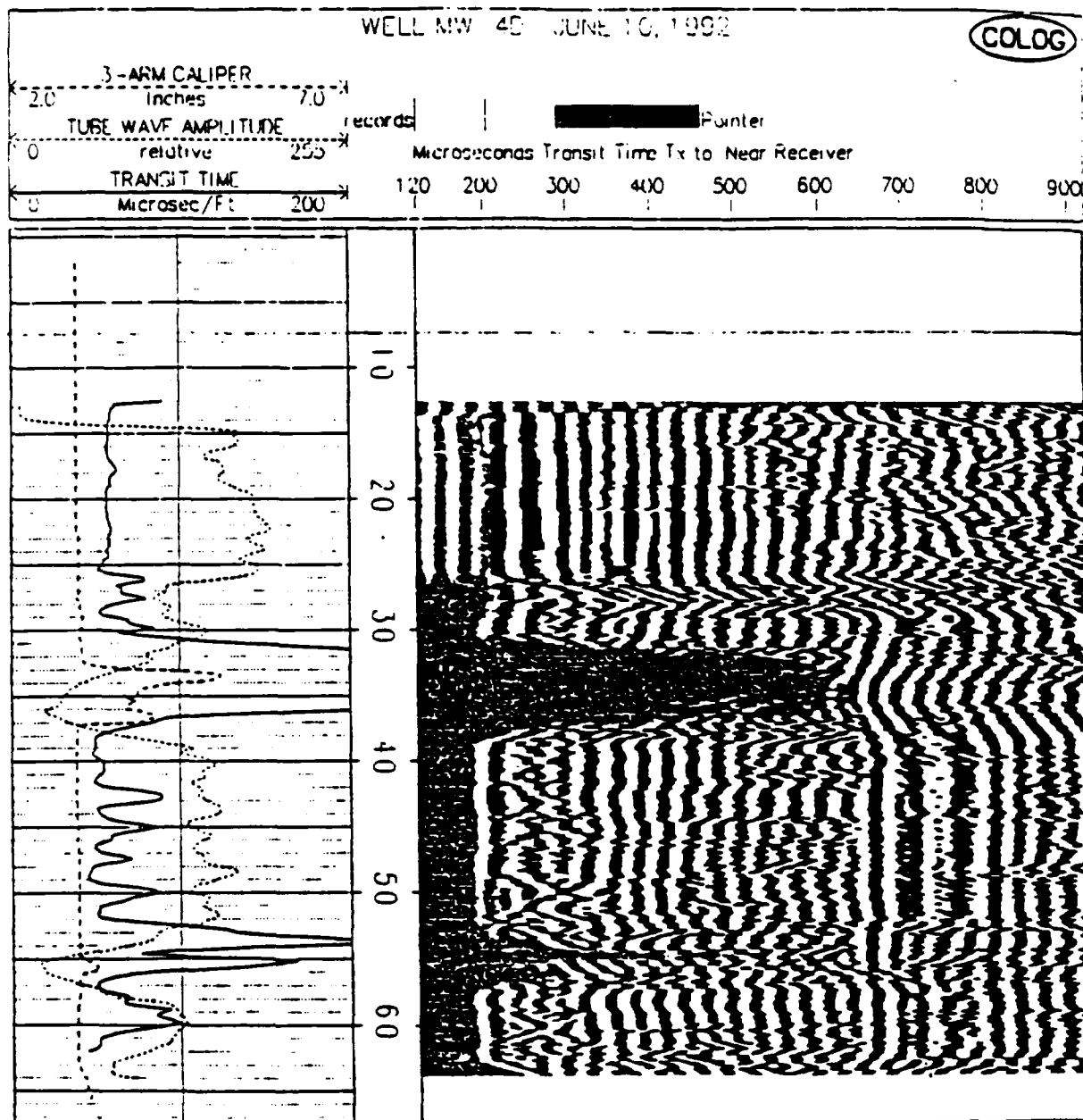
**BOREHOLE GEOPHYSICAL LOGS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



WELL MW-10 JUNE 12, 1992

COLOG



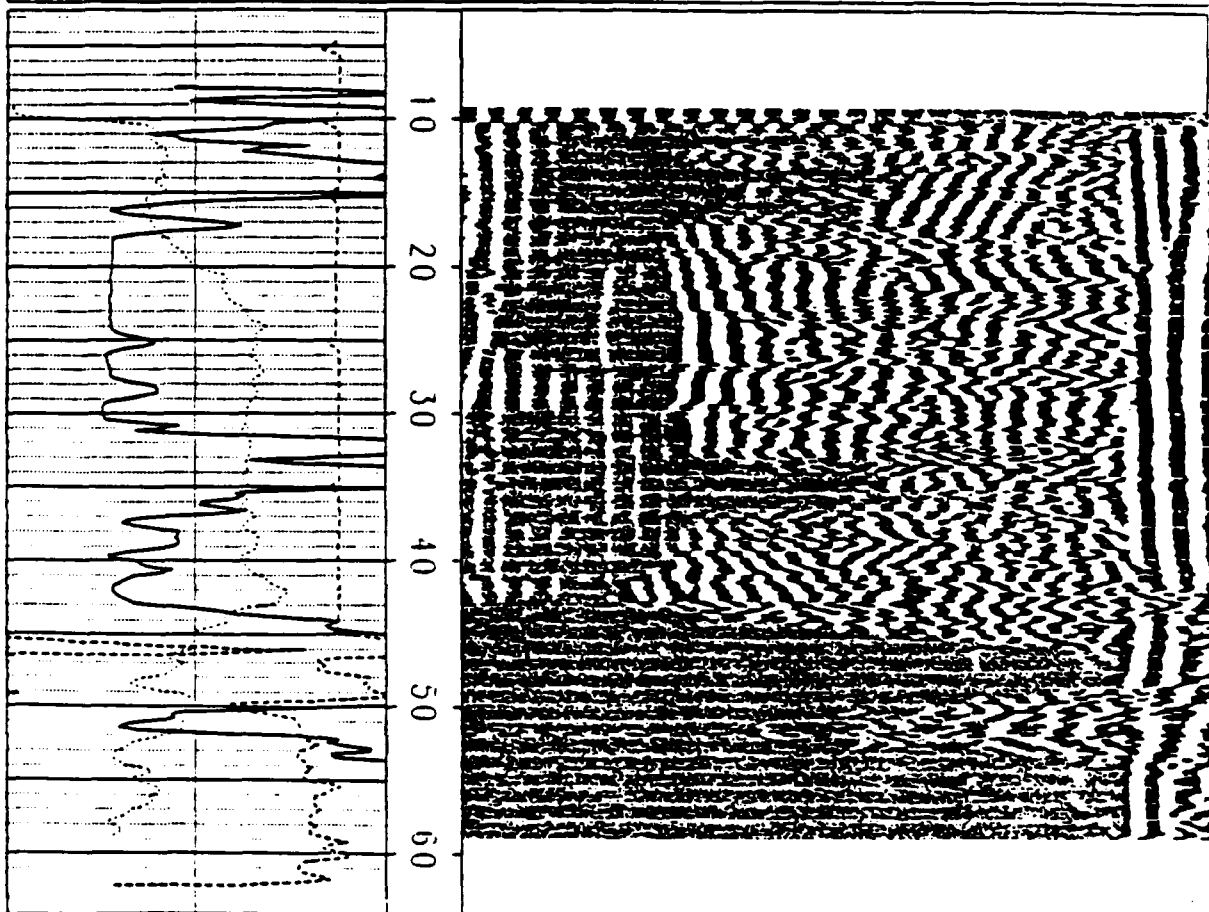


WELL MW-6D (RUN 2) AUGUST 10, 1992

COLOG

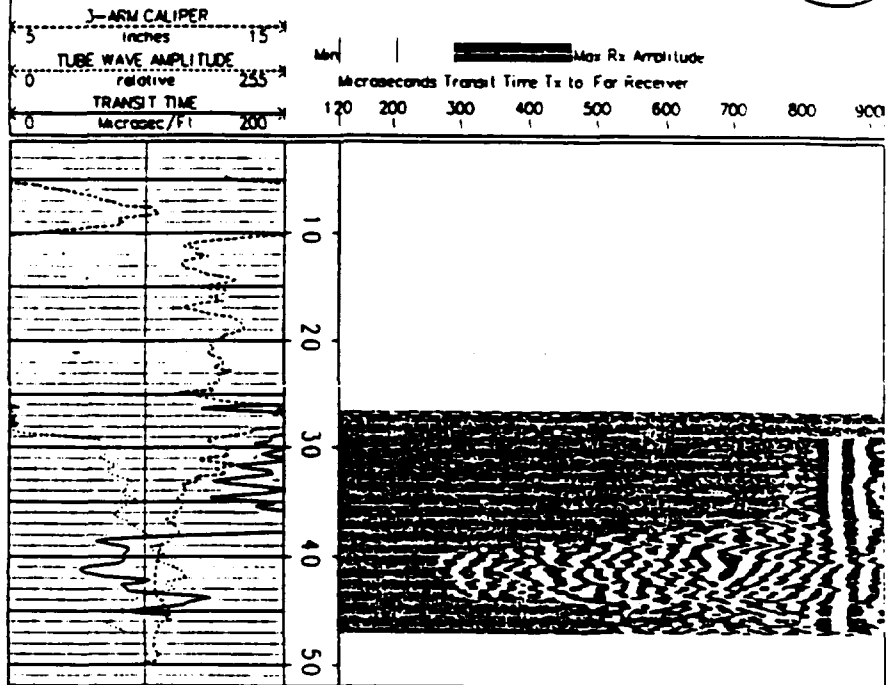
3-ARM CALIPER
2.0 Inches 7.0
TUBE WAVE AMPLITUDE
0 relative 255
TRANSIT TIME
0 Microsec/Ft 200

Min | Max Rx Amplitude
Microseconds Transit Time Tx to Far Receiver
120 200 300 400 500 600 700 800 900



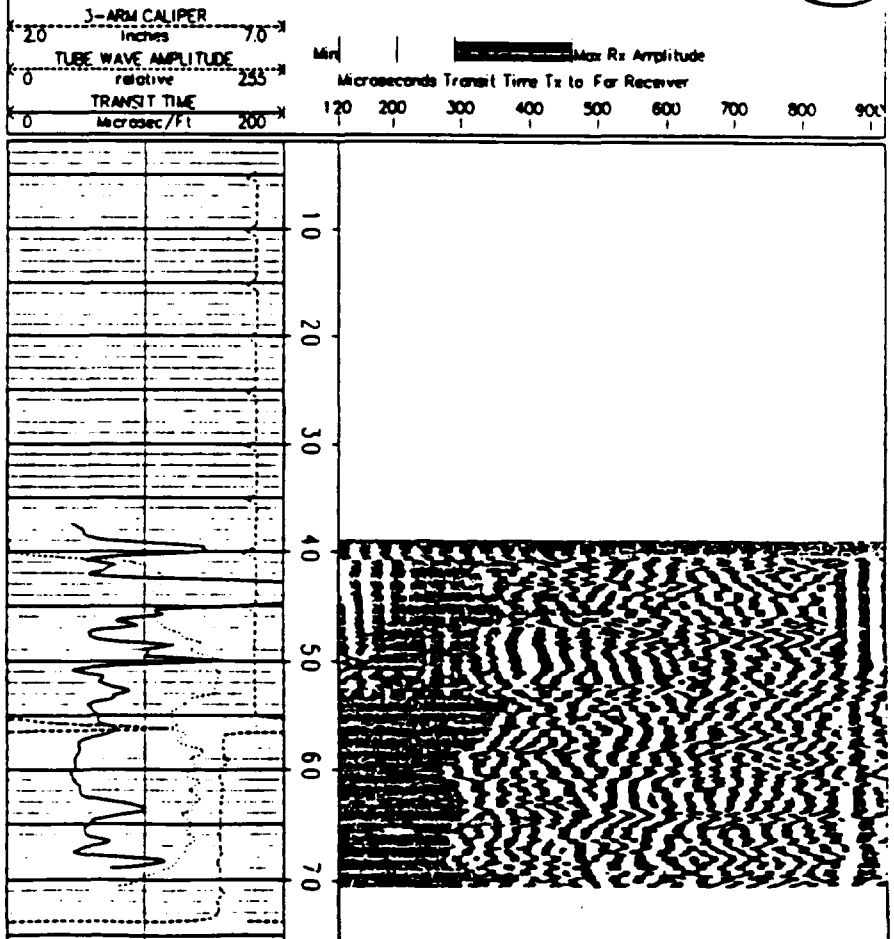
WELL MW-100 (RUN 1) AUGUST 18, 1992

CGLOG



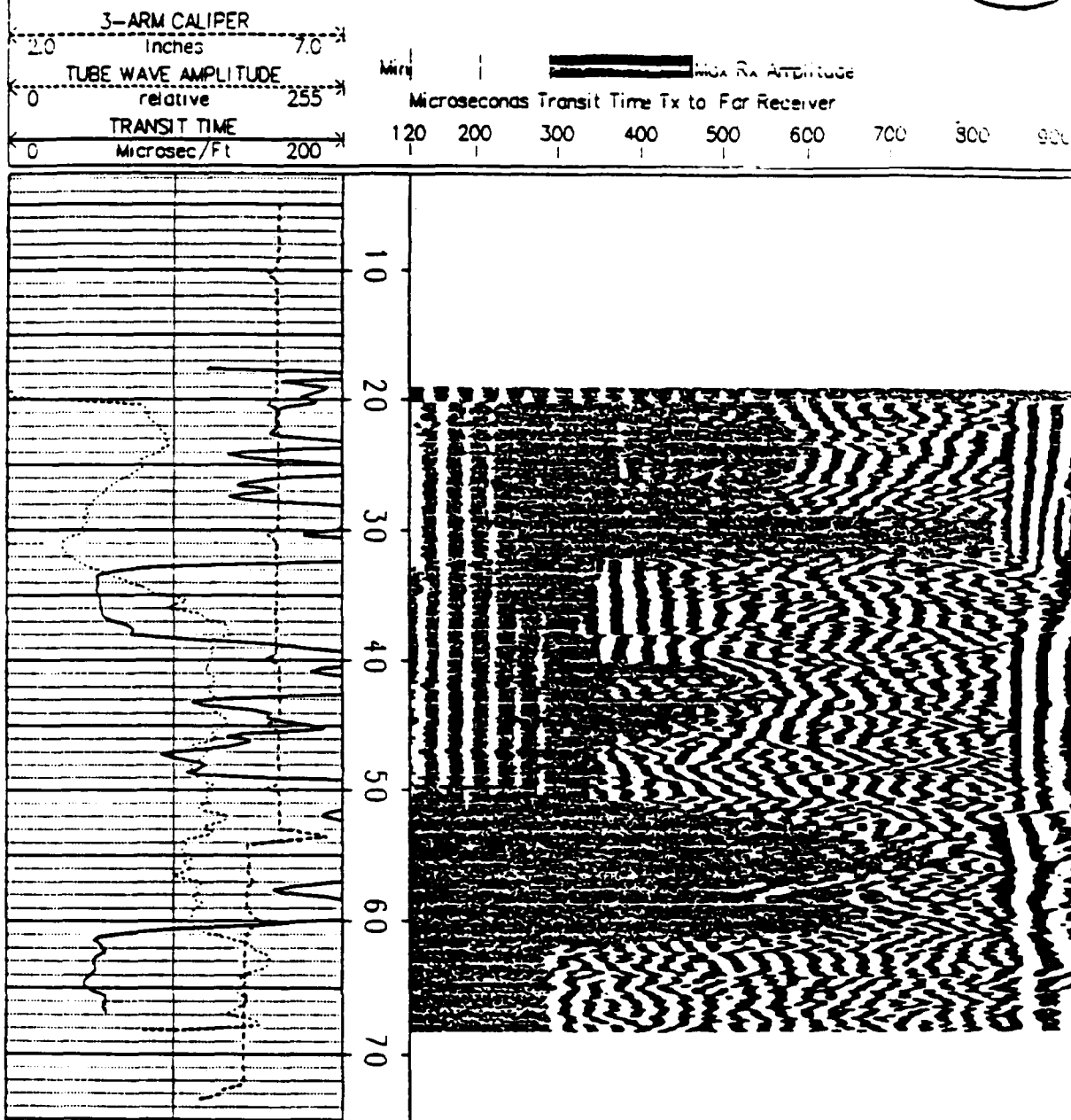
WELL MW-100 (RUN 2) AUGUST 19, 1992

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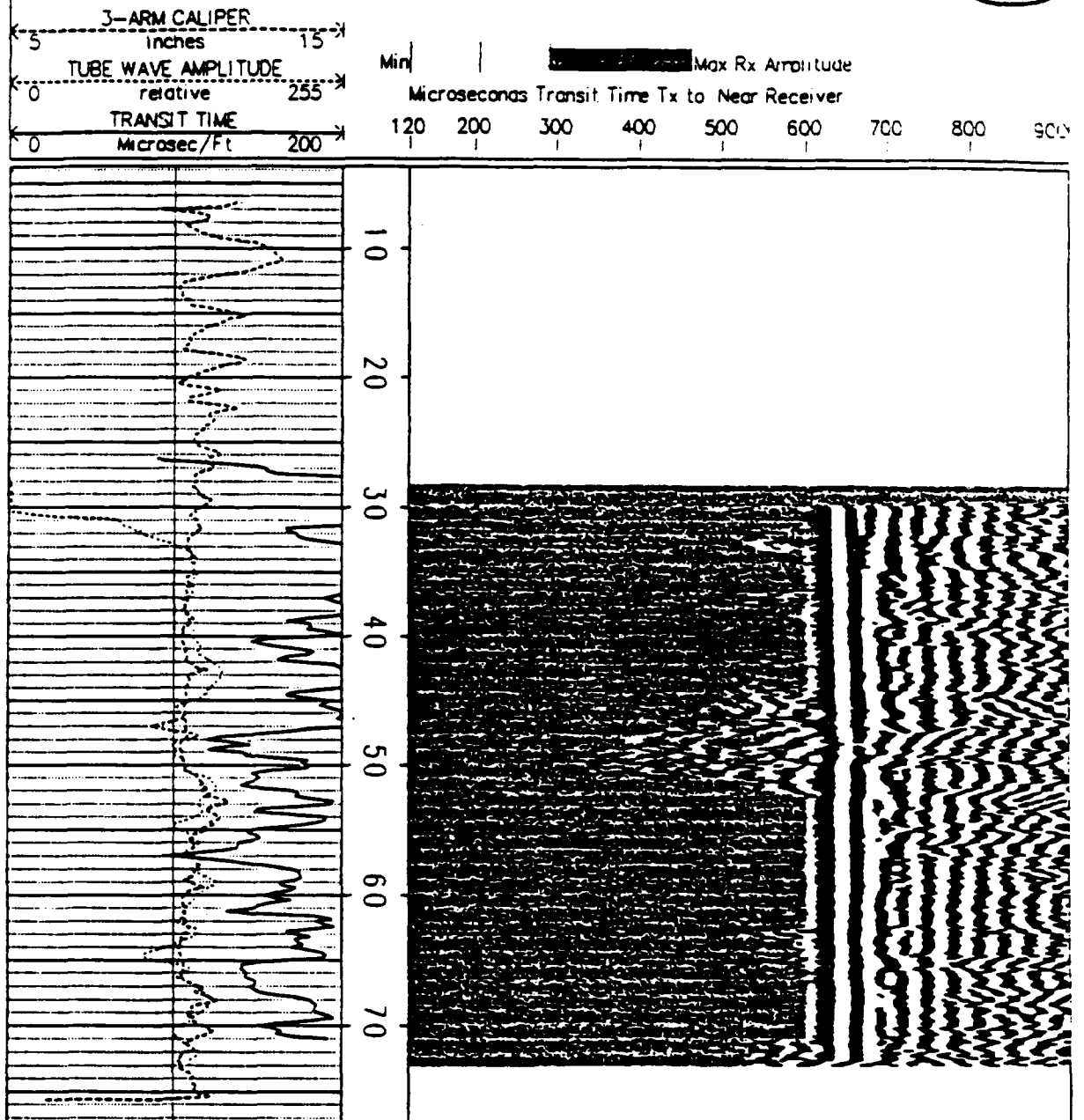
WELL MW-11D (RUN 2) JULY 20, 1992

COLOG



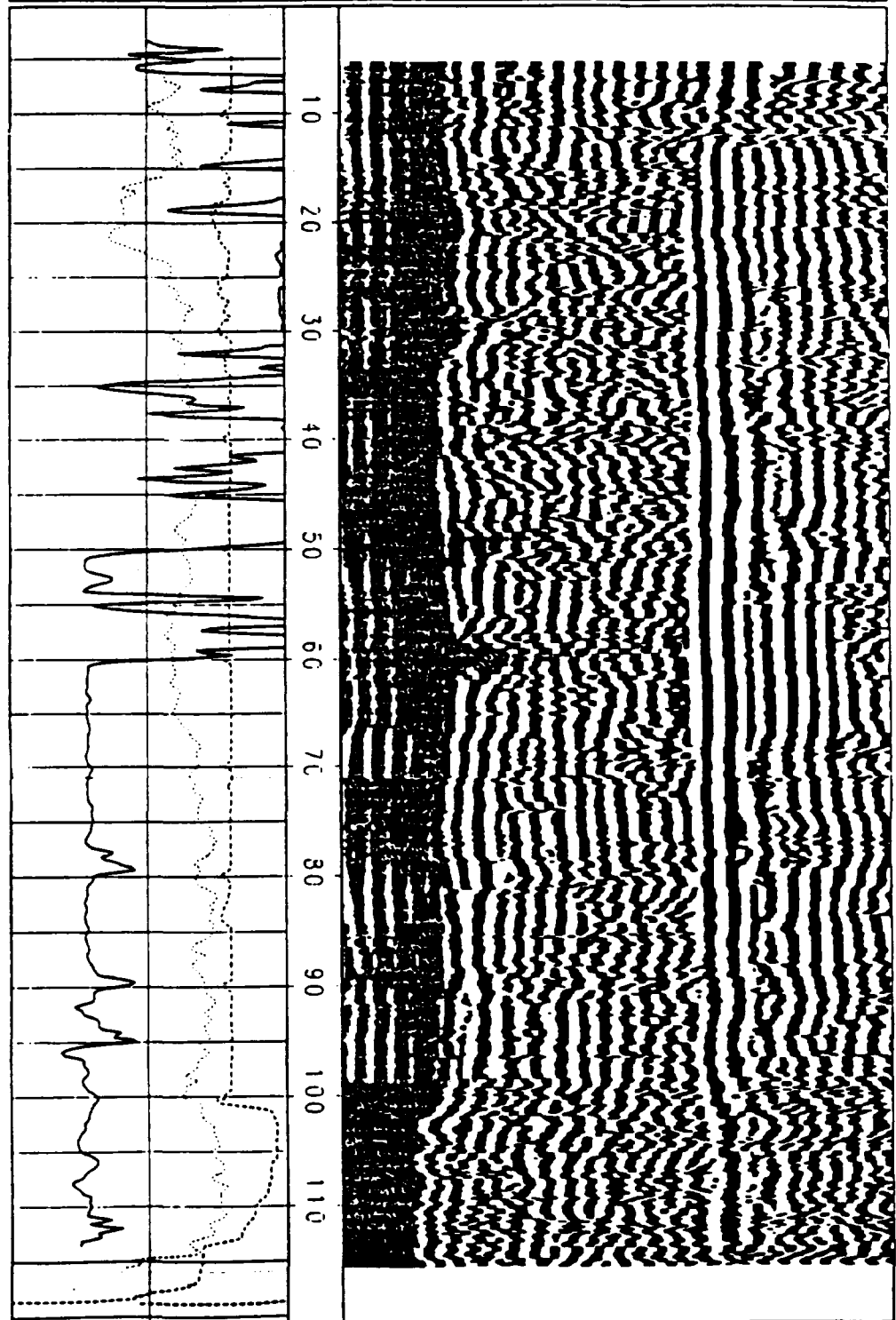
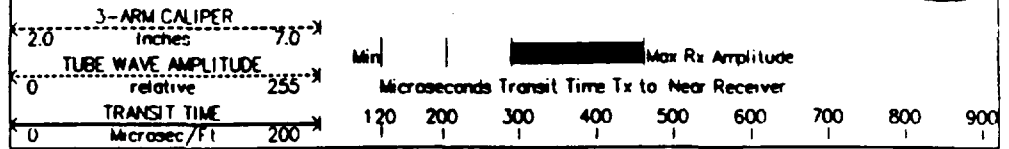
WELL MW-12D JULY 22, 1992

COLOG



WELL MW-13D JULY 15, 1992

COLOG



APPENDIX G
GEOLOGIC LOGS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS



**Geologic Log of MW-1
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.1
CLAY; some Silt; little Sand, fine to coarse, trace weathered rock fragments; angular, hard, dry, brown, greenish-gray.	0.1 - 1.8
Top of bedrock inferred at 1.8 feet below land surface.	

(See also Geologic Log of MW-1D)

**Geologic Log of MW-1D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.3
Fill consisting of GRAVEL medium to fine; some Clay; trace silt; trace Sand, medium to coarse; dry to moist; brown.	0.3 - 2.5
CLAY; some SILT; little to trace Sand, medium to coarse; little rock fragments, medium to large, angular; little to trace gravel, fine to medium; trace pieces of wood; very hard, dry to moist, light brown to brown.	2.5 - 2.8
VOLCANIC BRECCIA (coarse grained); greenish-gray; strong to moderately strong; fine, medium, large grained, rectangular and irregular shape, moderately sorted; plagioclase feldspar, pyroxenes, and chlorite minerals, dull to vitreous; calcite veins, iron stains; fresh to slightly altered.	2.8 - 15.0
VOLCANIC BRECCIA (finer grained); mottled gray and white; some pebble sized, angular clasts; contact metamorphism; plagioclase feldspar, hornblende, pyroxene, magnetite.	15.0 - 21.2
VOLCANIC BRECCIA - Debris Flow; dark, grayish-green; competent, jointed interval; porphyritic, fine to coarse; large (8 cm) slump clasts; large plagioclase and pyroxene crystals.	21.2-89.0
Fracture zones observed from 2.34 to 15.09 feet bls, 19.34 to 21.2 feet bls, 34.5 to 35.5 feet bls, and 54.0 to 55.0 feet bls.	

bls below land surface

**Geologic Log of MW-2
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.4
SILT; some Clay, little rock fragments, small; trace Sand, fine to medium; trace roots; hard, dry; brown to tan	0.4 - 1.2
CLAY; some Silt; little rock fragments, small; trace Gravel, fine to medium; hard to very hard; dry, gray.	1.2 - 3.1
Top of bedrock inferred at 3.4 feet below land surface.	

**Geologic Log of MW-3
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
CONCRETE	0 - 0.4
Fill, CLAY; some Silt; trace Sand, fine to medium; trace rock fragments, small to medium; hard, dry; brown, reddish brown.	0.4 - 2.0
No recovery.	2.0 - 2.4
Top of bedrock inferred at 2.4 feet below land surface.	

**Geologic Log of MW-4
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
CONCRETE	0 - 0.7
CLAY; some Silt; some organic content (4.7 - 6.7 feet); trace Sand, fine to coarse; trace Gravel; subangular, very stiff to hard; reddish brown, dark greenish-gary, brown, dark brown, gray, and dark gray.	0.7 - 7.1
No recovery.	8.7 - 9.8
Top of bedrock inferred at 8.7 feet below land surface.	

(See also Geologic Log for MW-4D)

**Geologic Log of MW-4D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
CONCRETE PAVEMENT	0 - 0.7
CLAY; some Silt, little Sand, fine to coarse; little Gravel; stiff to hard; moist; reddish brown to brown, bluish-gray, dark gray; medium plasticity.	0.7 - 9.5
Weathered rock fragments and CLAY; some Silt; some to little Sand.	9.5 - 10.7
Top of weathered bedrock inferred at 10.7 feet.	
Weathered rock fragments and CLAY - some Silt; angular, small to large; hard; moist to wet at 14.7 and 18.7 feet, gray, blue, green, brown, white, red, black stains; crumbled.	10.7 - 22.8
Top of competent bedrock inferred at 22.8 feet below land surface.	
VOLCANIC ANDESITE TUFF; dark green; highly fractured to 26.5 feet bls; gray; moderately strong to strong; very fine grained; pyroxene, plagioclase feldspars, some quartz, chlorite, and orthoclase minerals; calcite veins; iron stains; contact metamorphism and hydrothermal alteration 26.5 to 28.2 feet bls.	22.8 - 28.2
VOLCANIC BRECCIA; gray; fine to medium grained; plagioclase, pyroxene, magnetite; pyroxene crystals (2 cm); fining upward sequences.	28.2 - 33.0
Weathered VOLCANIC BRECCIA; SILT and CLAY; light brown, very fine grained to pebble sized fragments; semi-angular.	33.0 - 35.0
No recovery	35.0 - 37.1

**Geologic Log of MW-4D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
VOLCANIC ANDESITE TUFF; dark green, gray; strong; aphanitic, very fine grained; pyroxene, plagioclase feldspars, epidote, some quartz, magnetite, chlorite, and orthoclase minerals; calcite veins; black minerals 60% rock matrix; white plagioclase amygdules 35% of rock matrix, slightly altered.	37.1 - 58.3
DIORITE; dark gray; very dense; strong; very fine to coarse grained; pyroxene, plagioclase feldspar, quartz, chlorite, and orthoclase minerals; pyroxene minerals ranged from 35 to 60% of rock matrix; plagioclase minerals ranged from 35 to 40% of rock matrix, slightly altered.	58.3 - 64.0
Weathered VOLCANIC ANDESITE TUFF; altered to SILT and CLAY; very fine to medium grained; friable, vertical foliations; calcite, kaolinite, chlorite; white-rust color.	64.0 - 66.5
VOLCANIC ANDESITE TUFF; dark green; fine grained; aphanitic; pyroxene, plagioclase, epidote; calcite filled vertical fractures.	66.5 - 68.0
Fracture zones observed from 9.0 to 25.5 feet bls, 30.0 to 38.2 feet bls, and 65.0 to 66.5 feet bls.	
Highly weathered fracture plane at 40.9, 55.0, and 64.0 feet bls.	

bls below land surface

PR01301/052193.log/lcb

**Geologic Log of MW-5
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill, SILT; little Sand, fine to medium; little Gravel, fine to medium; trace rock fragments, small; trace clay; trace pieces of wood; hard; dry; brown.	0 - 4.0
Highly weathered bedrock; very weak; grayish-green.	4.0 - 4.8
Top of bedrock inferred at 4.8 feet below land surface.	

**Geologic Log of MW-6D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.3
CLAY; some SILT; trace Sand, fine to very coarse; little rock fragments, small to medium; hard; dry; brown to gray.	0.3 - 2.0
No recovery.	2.0 - 4.0
VOLCANIC BRECCIA; grayish-green to dark green; moderately strong; porphyritic, medium to coarse grained; rectangular to massive phenocrysts (2 mm to 6 cm), moderately sorted; plagioclase feldspar, pyroxene minerals, dull, glassy, vitreous; white minerals ranged from 10 - 15% of rock matrix; slightly to highly altered and stained; Clay - little Silt; trace Sand, fine to coarse; light gray; soft; wet; magnesium and iron oxide.	4.0 - 32.0
VOLCANIC ANDESITE TUFF; grayish-green; moderately strong to weak; fine to medium grained, rectangular and irregular shape, moderately sorted; plagioclase feldspar, pyroxenes, epidote and chlorite minerals; dull, glassy; calcite veins; iron staining; moderately to highly altered.	32.0 - 45.0
VOLCANIC BRECCIA - Debris Flow, with slump casts; competent, jointed interval; medium to coarse grained, plagioclase, epidote, chlorite, pyroxene; rounded slump blocks (6 cm) of dark gray, coarse grained Tuff in a mottled dark gray-green matrix.	45.0 - 53.0
VOLCANIC BRECCIA; grayish-green; competent, jointed interval; strong to moderately strong; coarse grained, rectangular, cubic and irregular shape; plagioclase, chlorite, and epidote minerals, dull, glassy; calcite veins; fresh to slightly altered.	53.0 - 60.0

**Geologic Log of MW-6D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
VOLCANIC BRECCIA - Debris Flow, with slump casts; greenish-gray; moderately strong; fine grained, rectangular to irregular shaped slump casts (8 cm), dark gray, pyroxene rich, coarse Tuff; matrix is fine grained; well sorted; plagioclase, dull, glassy, slightly altered.	60.0 - 65.0
Fracture zones observed from 9.6 to 32.0 feet bls, 35.0 to 35.5 feet bls, 37.0 to 40.0 feet bls, and 43 to 60 feet bls.	

Note: This log is a combination of the geology observed at MW-6 (abandoned) and MW-6D.

bls below land surface

PR01301/052193.log/leeb

**Geologic Log of MW-7
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill, CLAY; some Silt; little rock fragments, small to medium; trace Sand, medium to very coarse; trace roots; hard; dry; brown.	0 - 4.0
Highly weathered Rock; SAND, fine to medium; some Silt; trace Sand, coarse to very coarse; trace Gravel, fine; trace Clay; hard, dry, gray.	4.0 - 6.0
Highly weathered bedrock; weak, grayish-green.	6.0 - 15.0

**Geologic Log of MW-8
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill, CLAY; some Silt; trace Sand, very fine to very coarse; trace rock fragments, small to medium; very stiff; dry; brown.	0 - 0.35
Moderately weathered rock; SILT; little to trace Sand, very fine to fine; little trace rock fragments; very stiff to hard; dry; brown to reddish-brown.	3.3 - 8.3
Top of bedrock inferred at 8.3 feet below land surface.	

**Geologic Log of MW-9
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill, consisting of CLAY; some Silt; little rock fragments, small to large; trace Sand, fine to very coarse; hard; dry; brown to reddish-brown.	0 - 5.0
Top of bedrock inferred at 5.0 feet below land surface.	
VOLCANIC BRECCIA; light greenish-gray; moderately strong; porphyritic, fine to large grained, rectangular to irregular shape, moderately sorted; plagioclase, epidote, and chlorite minerals, some chert; dull, vitreous; calcite veins; plagioclase minerals range from 10 to 25% of rock matrix; slightly altered; Clay; observed at 10 feet, little Silt, trace Sand, medium to coarse.	5.0 - 15.0
VOLCANIC ANDESITE TUFF, and Silt and Clay; homogenous, aphanitic, very fine grained; plagioclase, pyroxene, chlorite, some quartz; calcite veins; slightly to highly altered; bluish-green to grayish-green.	15.0 - 28.0
VOLCANIC BRECCIA; grayish-green; moderately strong; porphyritic, fine to coarse grained; moderately to poorly sorted; plagioclase, calcite, hornblende, magnetite, chlorite, and pyroxene minerals; calcite veins; slightly altered.	28.0 - 35.0

**Geologic Log of MW-10
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill, CLAY; some Silt; little Sand; medium, little rock fragments, small to medium; trace Gravel, fine to medium; hard; dry; gray to brown.	0 - 2.9
Top of bedrock inferred at 2.9 feet.	
See also Geologic Log of MW-10D.	

**Geologic Log of MW-10D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.5
CLAY; some Silt; trace Sand, fine; trace Gravel, fine to medium; little rock fragments, small to medium; hard; dry; gray to brown.	0.5 - 1.7
VOLCANIC BRECCIA, greenish-gray; moderately strong; medium to large grained, rectangular to irregular shape, moderately sorted; plagioclase minerals, dull; manganese oxidation, iron stains; calcite stains; moderately to slightly altered.	2.3 - 5.0
VOLCANIC ANDESITE TUFF; greenish-gray; moderately strong, fine grained, plagioclase, hornblende, less pyroxene.	5.0 - 6.0
VOLCANIC BRECCIA; greenish-gray, moderately strong, medium to coarse grained, plagioclase, pyroxene, heterogeneous, zoned rectangular clasts, alteration to iron oxides.	6.0 - 8.2
VOLCANIC ANDESITE TUFF; grayish-blue, moderately strong and competent, fine grained, plagioclase, pyroxene, calcite.	8.2 - 12.0
VOLCANIC ANDESITE TUFF; grayish-blue, highly fractured and crushed, fine grained, pyroxene, plagioclase, calcite.	12.0 - 19.0
VOLCANIC BRECCIA; mottled olive-green, moderately strong and competent, fine grained; plagioclase, calcite, pyroxene, epidote, hornblende, alteration to magnesium and iron oxides.	19.0 - 21.0
VOLCANIC ANDESITE TUFF; light gray, highly fractured and crushed; very fine grained, homogeneous, plagioclase, calcite, pyroxene, epidote, hornblende.	21.0 - 22.0

**Geologic Log of MW-10D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
VOLCANIC BRECCIA; greenish-gray; weak, highly fractured to crushed at 22.0 to 27.5; medium to coarse grained, rectangular to irregular shape, moderately sorted; plagioclase, pyroxenes, and some quartz minerals, dull, glassy; manganese oxidation, iron stains, calcite veins; moderately to slightly altered.	22.0 - 32.0
VOLCANIC BRECCIA - Debris Flow; mottled greenish-gray; strong, moderate jointing; medium to large grained; rectangular, irregular shape, large clasts; poorly sorted; plagioclase, quartz, pyroxenes, epidote and chlorite minerals; calcite veins; fresh to slightly altered	32.0 - 75.0
Fracture zone observed from 6.0 to 8.2 feet bls, 12.0 to 19.0 feet bls, 21.0 to 27.5 feet bls, and 53.4 to 55.0 feet bls.	

bls below land surface

**Geologic Log of MW-11D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill consisting of CLAY; some to little Silt, trace Sand, fine to coarse; trace Organic material; very stiff; dry to moist; light brown, brown to reddish-brown.	0 - 4.0
SILT; little SAND, fine; trace clay; trace Sand, coarse to very coarse; hard; dry; brown.	4.0 - 10.2
VOLCANIC ANDESITE TUFF; bluish-green; strong to moderately strong; fine grained, rectangular, cubic and irregular shape, well sorted; plagioclase feldspar, epidote, quartz, and pyroxene minerals, dull, glassy, bright to silky; calcite veins, iron stains; white minerals ranged from 10 to 25% of rock matrix; fresh, slightly to highly altered.	10.2 - 52.0
VOLCANIC ANDESITE TUFF; contact metamorphism, zoned (heated) clasts (1 cm); bluish-green, strong to moderately strong; fine grained; well sorted; plagioclase feldspar, epidote, quartz, and pyroxene minerals, glassy, silky dull; calcite veins, iron stains; fresh to slightly altered; white minerals ranged from 10 to 25% of rock matrix (plagioclase content increases with depth).	52.0 - 75.0
Fracture zone observed from 12.0 to 25.0 feet bls, 30.0 to 32.0 feet bls, 36.0 to 37.0 feet bls, at 38.0 feet bls, 42.0 to 45.0 feet bls, and 50 to 52.0 feet bls.	

bls below land surface

**Geologic Log of MW-12D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
Fill consisting of SILT; some Clay; trace Sand, very fine to very coarse; trace Gravel, medium, trace rock fragments; trace Organic material; hard; dry; brown.	0 - 2.0
CLAY, some SILT; trace Sand, very fine to very coarse; trace rock fragments, medium to large, trace organics; very stiff.	2.0 - 4.0
No recovery.	5.9 - 10.0
Highly weathered and altered VOLCANIC BRECCIA, SILT and CLAY; crushed; little to trace rock fragments, small to medium; trace Sand, very fine to coarse (5 cm clasts); stiff to very stiff; dry; brown to yellow, light brown.	10.0 - 15.0
Top of weathered bedrock inferred at 15.0 feet below land surface.	
VOLCANIC BRECCIA; orange to light brown, light gray to reddish-gray; coarse grained, competent; pyroxene and plagioclase phenocrysts, calcite veins, iron stains; moderately to highly altered.	15.0 - 29.0
VOLCANIC BRECCIA - Debris Flow; dark greenish-black; coarse grained matrix with fine grained angular slump clasts, plagioclase, pyroxene, epidote.	29.0 - 31.0
VOLCANIC ANDESITE TUFF; bluish-green and gray; strong to weak to moderately strong; fine to very fine grained, aphanitic, angular fragments; plagioclase feldspar, pyroxenes, quartz and pyrite minerals, dull, vitreous, metallic; calcite veins, iron stains; plagioclase minerals range from 5 to 10% of rock matrix; slightly to moderately altered.	31.0 - 50.2

**Geologic Log of MW-12D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
VOLCANIC BRECCIA - Debris Flow; dark grayish-black, moderately fractured, coarse grained matrix and clasts, pyroxene and hornblende clasts and plagioclase, pyroxene, and hornblende matrix.	50.2 - 65.0
No recovery.	65.0 - 75.0
Fracture zones observed from 10.0 to 15.0 feet bls, 18.5 to 19.0 feet bls, 20.0 to 21.0 feet bls, 37.0 to 40.0 feet bls, 45.0 to 46.0 feet bls, 48.5 to 49.5 feet bls, 51.0 to 53.0 feet bls, and 59.7 to 63.0 feet bls.	

bls below land surface

PR01301/052193.log/lcb

**Geologic Log of MW-13D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
CLAY; some Silt; little Sand, very fine; trace Gravel, small to medium; trace Organic material; very hard; dry; light brown.	0 - 2.0
CLAY, some Silt; little Sand, very fine to medium; little Gravel, fine; trace Sand, very coarse to coarse; trace rock fragments, large to medium; hard; dry; light brown.	2.0 - 5.0
VOLCANIC ANDESITE TUFF; dark green with white mottling in some areas; moderately strong to very weak at 20.0 feet bls; highly fractured and crushed, fine, medium grained, irregular shape, moderately sorted; plagioclase feldspar, quartz and epidote minerals, dull; calcite veins; slightly to moderately altered at 5.3 feet bls, highly altered with iron stains at 20.0 feet bls; plagioclase minerals range from 10 to 35% of rock matrix.	5.0 - 20.0
VOLCANIC BRECCIA; fine to coarse grained, highly altered and fractured (20.0 to 30 feet bls), vertical foliations, friable, alteration to Clay minerals (calcite, chlorite, kaolinite), mottled grayish-green.	20.0 - 45.0
VOLCANIC BRECCIA - Debris Flow; coarse grained with 6 cm slump clasts, clasts are very fine grained Tuff, epidote, chlorite, pyroxene, plagioclase, and calcite, FeO ₂ staining, dark green and mottled.	45.0 - 55.0
VOLCANIC BRECCIA; dusky yellow green to grayish-green; moderately strong to weak; epiclastic, fine, medium, large grained, occasional clast of 1 to 3 cm (40 to 55 feet bls), rectangular, cubic, and irregular shape, moderately to well sorted; plagioclase feldspar, epidote, chlorite, and pyroxene minerals, glassy, dull; calcite veins, iron stains; slightly to highly altered (55 to 85 feet bls); plagioclase minerals range from 10 to 35% of rock matrix (40 to 55 feet bls).	55.0 - 88.0

**Geologic Log of MW-13D
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
VOLCANIC BRECCIA; finer grained, competent, primary minerals are pyroxene and hornblende, secondary minerals are epidote, plagioclase, and chlorite, vertical foliations, grayish-blue green.	88.0 - 92.0
VOLCANIC BRECCIA - DEBRIS FLOW; fine and coarse grained slump blocks (7 to 15 cm), rounded, plagioclase, pyroxene, some pyrite, calcite veins oriented 45°, grayish-green to blue green.	92.0 - 110.0
VOLCANIC ANDESITE TUFF; fine to very fine grained; competent and relatively unweathered, plagioclase, epidote, and pyroxene, calcite inclusions, dark greenish-blue.	110.0 - 120.0
Fracture zones observed from 5.0 to 36.0 feet bls, 56.0 to 60.0 feet bls, 63.0 to 65.0 feet bls, and 70.0 to 75.0 feet bls.	

bls below land surface

PR01301/052193.log/lcb

**Geologic Log of MW-14
Tutu Service Station Investigation
St. Thomas, U.S. Virgin Islands**

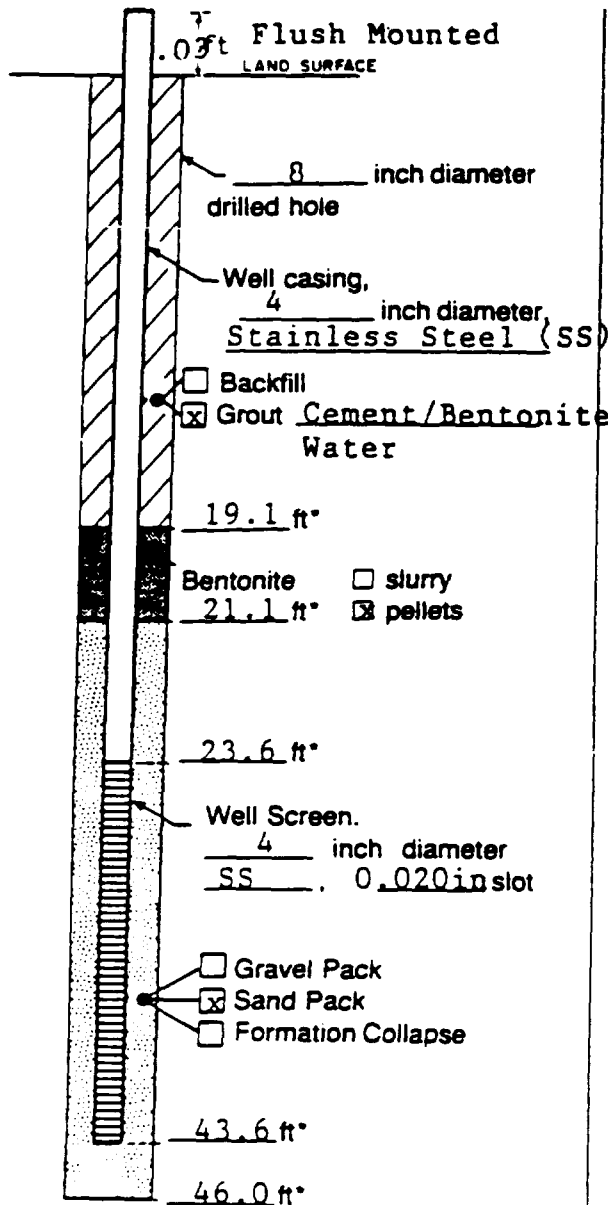
<u>Description</u>	<u>Sampled Interval (feet below land surface)</u>
ASPHALT	0 - 0.1
CLAY; some Silt; some Sand; trace Gravel to some weathered rock fragments, angular; very hard; greenish-gray, brown gray.	0.1 - 3.0
Top of bedrock inferred at 3.0 feet below land surface.	

APPENDIX H

**MONITORING WELL CONSTRUCTION DETAILS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

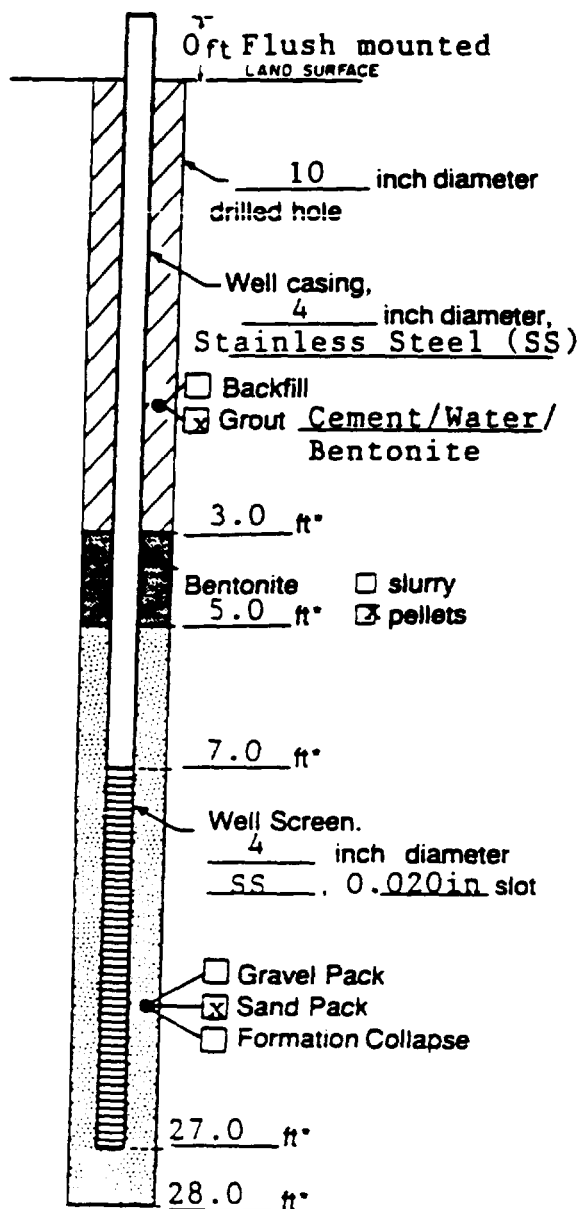
*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-1
Town/City Anna's Retreat/Tutu
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation 195.05 feet msl
and Datum 195.08 feet ☒ Surveyed
☐ Estimated
Installation Date(s) June 30, 1992
Drilling Method Hollow Stem Auger & Air Hammer
Drilling Contractor Soil Tech
Drilling Fluid Water
Development Technique(s) and Date(s)
Submersible pump; 8/29/92
Fluid Loss During Drilling NA gallons
Water Removed During Development 60 (approximately) gallons
Static Depth to Water 29.5 before develop. feet below M.P.
Pumping Depth to Water 40.0 feet below M.P.
Pumping Duration 0.42 hours
Yield NA gpm Date 8/29/92
Specific Capacity NA gpm/ft
Well Purpose Monitoring

Remarks 6-inch hollow stem auger from land
surface to 1.7 feet.
7.5-inch air hammer from land surface to
46.0 feet.
Borehole cave in up to 43.6 feet.
Top of bedrock at 1.8 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PR01301 Well MW-2

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 178.31 feet msl

and Datum 178.15 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) August 25, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water
to facilitate development: 9/2/92

Fluid Loss During Drilling NA gallons

Water Removed During Development 72 (approximately) gallons

Static Depth to Water 13.6 before develop. feet below M.P

Pumping Depth to Water 26.0 feet below M.P

Pumping Duration 0.41 hours

Yield NA gpm

Date 9/2/92

Specific Capacity NA gpm/ft

Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land
surface to 2.0 feet.

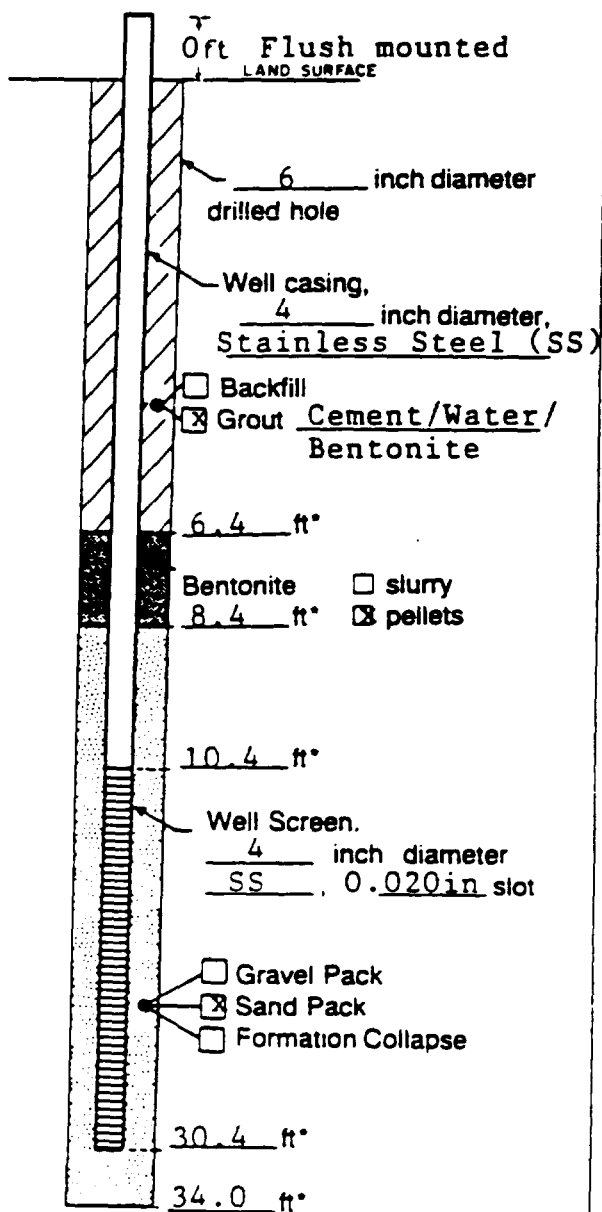
10-inch air hammer from land surface to
29.0 feet.

Borehole cave in up to 28.0 feet.

Top of bedrock at 3.1 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-3

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 181.85 feet msl

and Datum 181.84 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) June 9 & 11, 1992

Drilling Method Hollow Stem Auger/Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Submersible pump, August 25, 1992

Fluid Loss During Drilling NA gallons

Water Removed During Development 130 gallons

Static Depth to Water 17.35ft before develop feet below M.P.

Pumping Depth to Water 28.40 feet below M.P.

Pumping Duration 0.5 hours

Yield 4.3 gpm

Date 8/25/92

Specific Capacity 0.4 gpm/ft

Well Purpose Monitoring Well

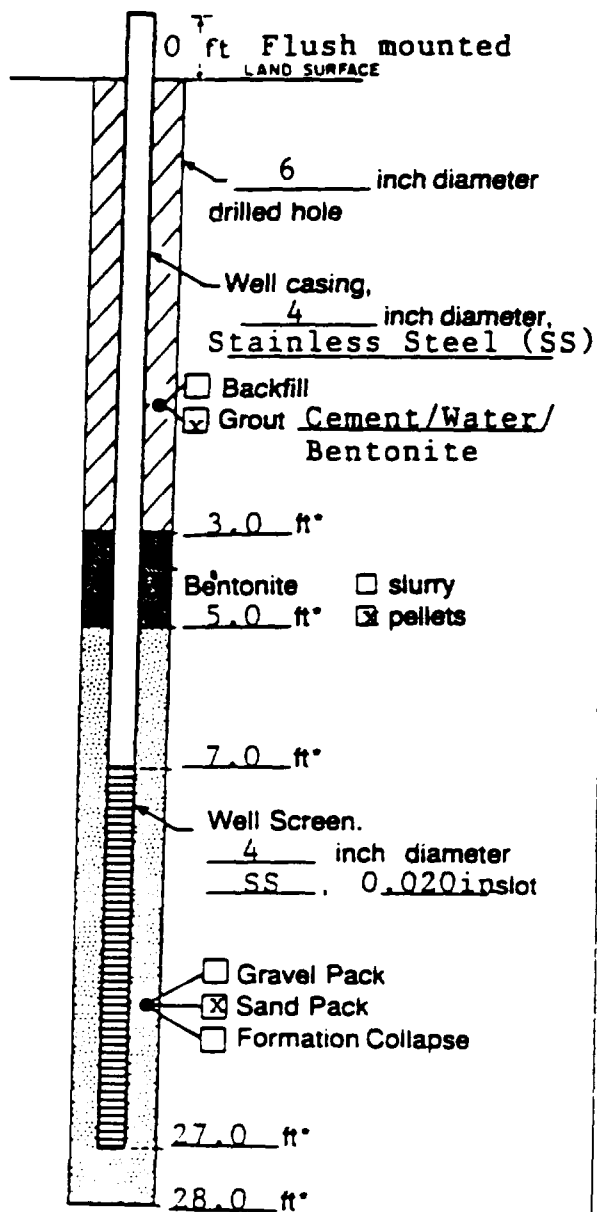
Remarks 6-inch hollow stem auger from land surface to 2.4 feet (Bedrock).

5.5-inch air hammer from 2.4 to 34.0 feet.

Borehole cave in up to 33.3 feet.

Prepared by Rubén Ponciano

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-4

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 175.69 feet msl

and Datum 175.66 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) June 17, 1992

Drilling Method Hollow Stem Auger/Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Submersible pump: 8/24/92

Fluid Loss During Drilling NA gallons

Water Removed During Development 73 gallons

Static Depth to Water 11.54 ft before development feet below M.P

Pumping Depth to Water 25.0 feet below M.P

Pumping Duration 0.5 hours

Yield 2.4 gpm

Date 8/24/92

Specific Capacity 0.2 gpm/ft

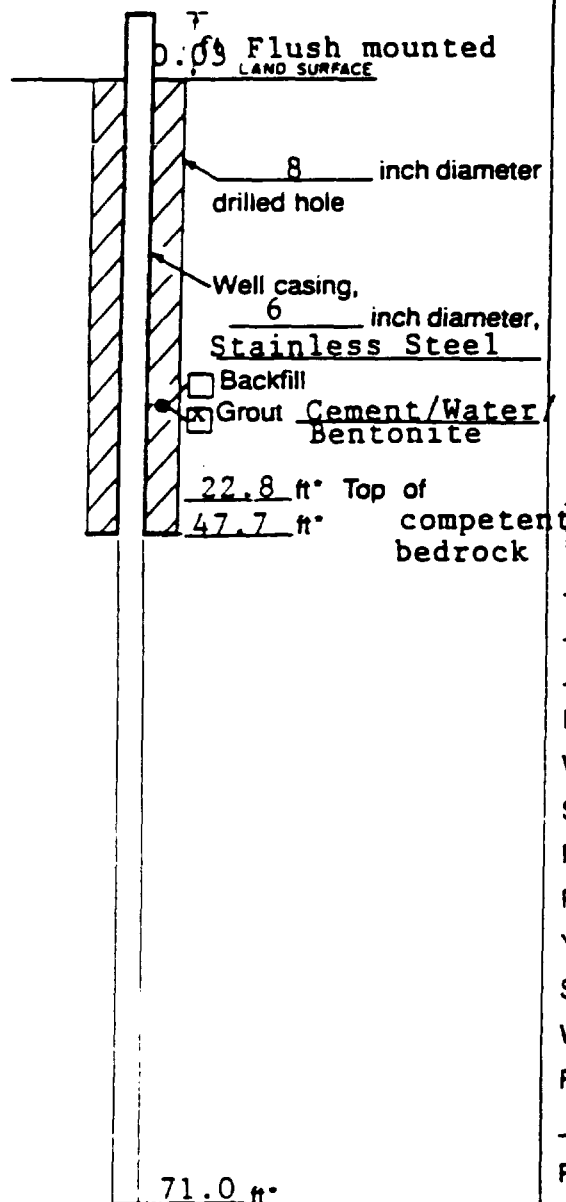
Well Purpose Monitoring Well

Remarks 6-inch hollow stem auger from land surface to 9.8 feet.

7.5-inch air hammer from 9.8 to 28.0 feet. Top of bedrock at 8.7 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



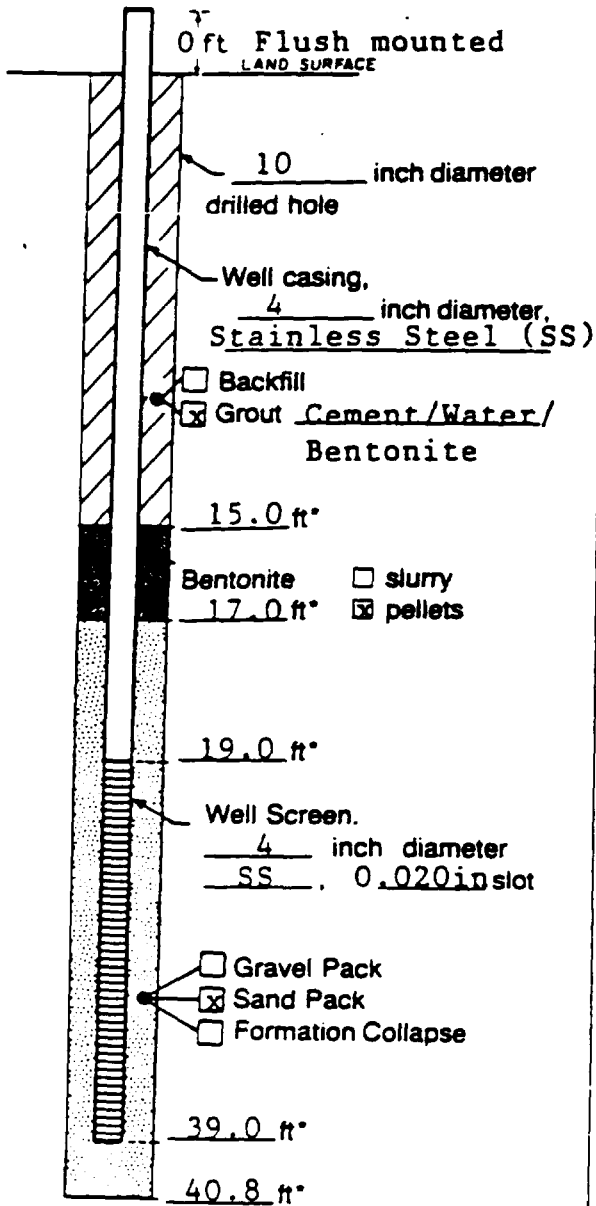
Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-4D
Town/City Anna's Retreat/Tutu
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation 175.99 feet msl
and Datum 176.02 feet msl ☒ Surveyed
☐ Estimated
Installation Date(s) June 17, 1992
Drilling Method Hollow Stem Auger & Air Hammer
Drilling Contractor Soil Tech
Drilling Fluid Water when diamond coring was performed
Development Technique(s) and Date(s)
Submersible pump; 8/24/92.
Fluid Loss During Drilling NA gallons
Water Removed During Development 360 gallons
Static Depth to Water 12.20ft before develop feet below M.P.
Pumping Depth to Water 68.0 feet below M.P.
Pumping Duration 0.8 hours
Yield 7.2 gpm Date 8/24/92
Specific Capacity 0.13 gpm/ft
Well Purpose Monitoring well
Fracture Zones _____

Remarks 6-inch hollow stem auger from land surface to 24.7 feet.
3-inch diamond coring from 24.0 to 67.25 feet.
7.5-inch air hammer from land surface to 48.0 feet.
Top of weathered bedrock at 10.7 feet.
6-inch casing installed at 47.7 feet.
5.5-inch air hammer from 47.7 to 71.0 feet.
Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-5

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 187.24 feet msl

and Datum 187.09 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) August 25, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water
to facilitate development: 9/2/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 66 gallons

Static Depth to Water 22.8 ft before develop feet below M.P.

Pumping Depth to Water 37.5 feet below M.P.

Pumping Duration 0.43 hours

Yield NA gpm Date 9/2/92

Specific Capacity NA gpm/ft

Well Purpose Monitoring well

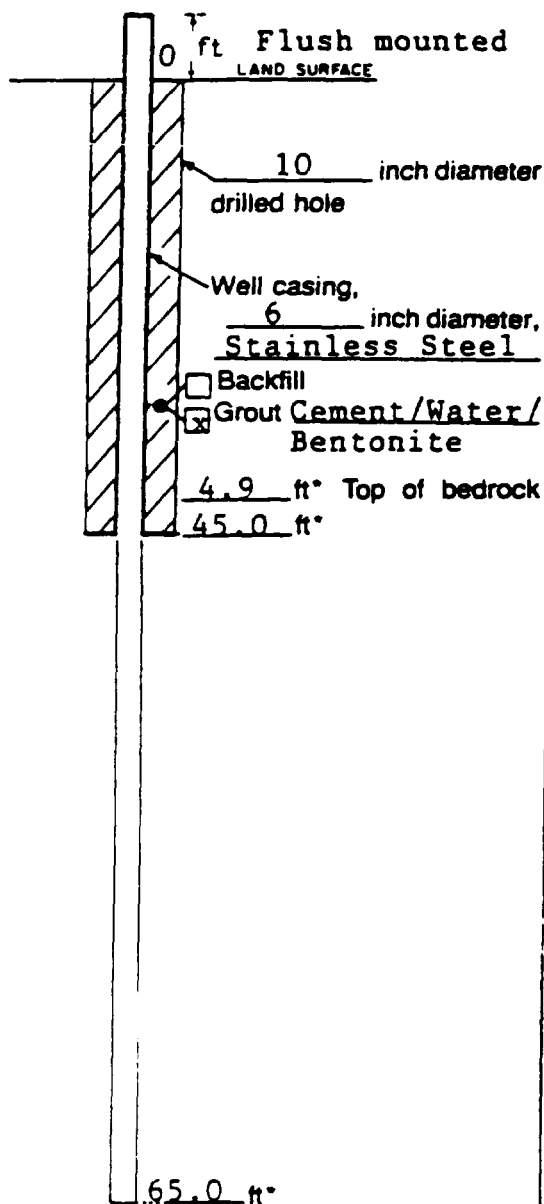
Remarks 6-inch hollow stem auger from land
surface to 4.0 feet.

10-inch air hammer from land surface to
45.0 feet. Top of bedrock at 4.8 feet.

Grout seal from 44.8 up to 40.8 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

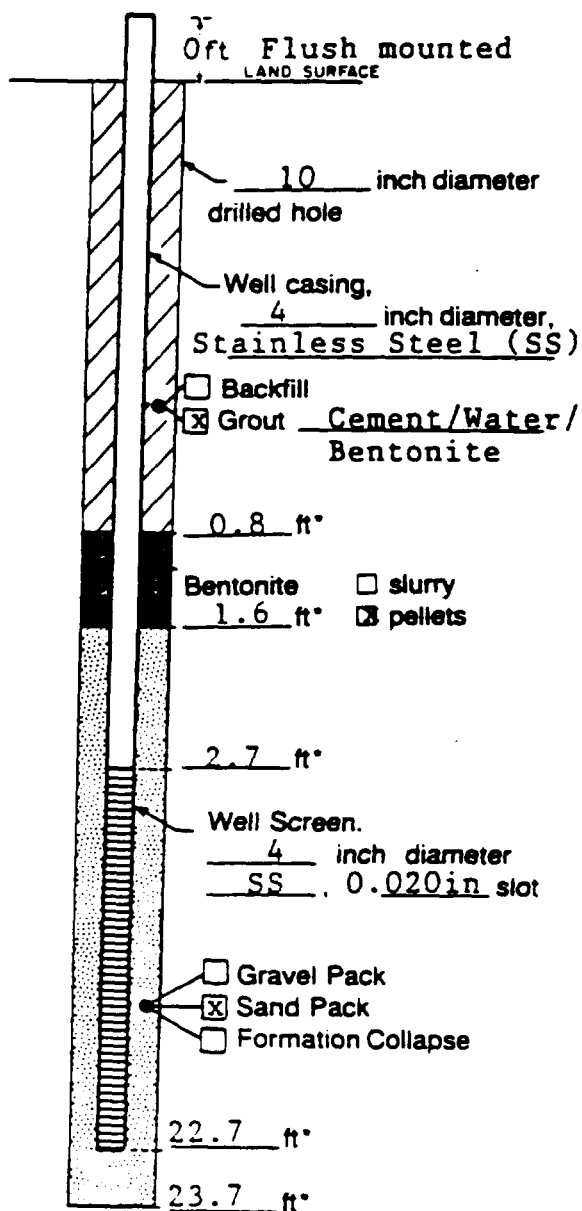
Project TEIC/PR01301 Well MW-6D
Town/City Anna's Retreat/Tutu
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation 171.26 feet msl
and Datum 171.01 feet msl ☒ Surveyed
☐ Estimated
Installation Date(s) August 6 & 10, 1992
Drilling Method Hollow Stem Auger & Air Hammer
Drilling Contractor Soil Tech
Drilling Fluid Water when diamond coring was
performed.
Development Technique(s) and Date(s)
Centrifugal pump; September 2, 1992

Fluid Loss During Drilling NA gallons
Water Removed During Development 240 gallons
Static Depth to Water 20.2ft before develop feet below M.P.
Pumping Depth to Water 74.0 feet below M.P.
Pumping Duration 0.33 hours
Yield 12 gpm Date 9/2/92
Specific Capacity 0.22 gpm/ft
Well Purpose Monitoring well
Fracture Zones _____

Remarks 6-inch hollow stem auger from land
surface to 4.9 feet. Depth to bedrock 4.9 feet
10-inch air hammer from land surface to
45.0 feet.
5.5-inch air hammer from 45.0 to 65.0 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-6R

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 171.44 feet msl

and Datum 171.17 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) September 2, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Submersible pump: 9/9/92

Fluid Loss During Drilling NA gallons

Water Removed During Development 486 gallons

Static Depth to Water 8.2ft before develop feet below M.P.

Pumping Depth to Water 20.6 feet below M.P.

Pumping Duration 0.9 hours

Yield 9 gpm

Date 9/9/92

Specific Capacity 0.72 gpm/ft

Well Purpose Monitoring Well

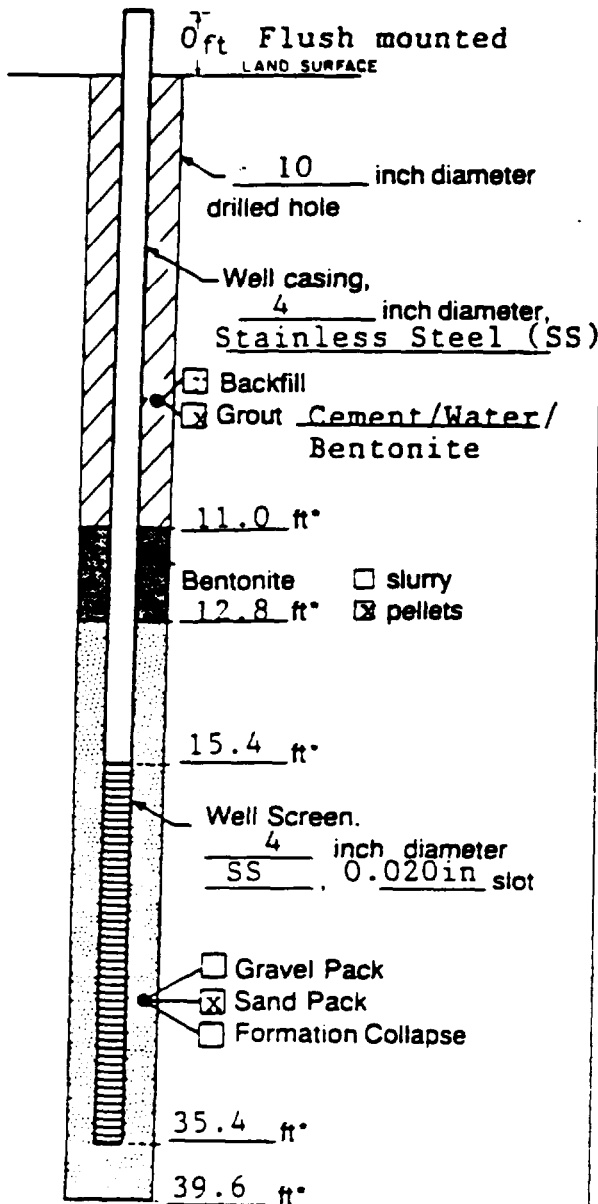
Remarks 10-inch air hammer from land surface
to 26.0 feet.

Borehole cave in up to 23.7 feet.

Bedrock at approximately 4.92 feet bls
(see MW-6D).

Prepared by Derrick Stepanof/Rubén Ponciano

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-7
Town/City Anna's Retreat/Tutu
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation 180.3 feet msl
and Datum 180.13 feet msl ☒ Surveyed
☐ Estimated
Installation Date(s) July 29, 1992
Drilling Method Hollow Stem Auger & Air Hammer
Drilling Contractor Soil Tech
Drilling Fluid _____

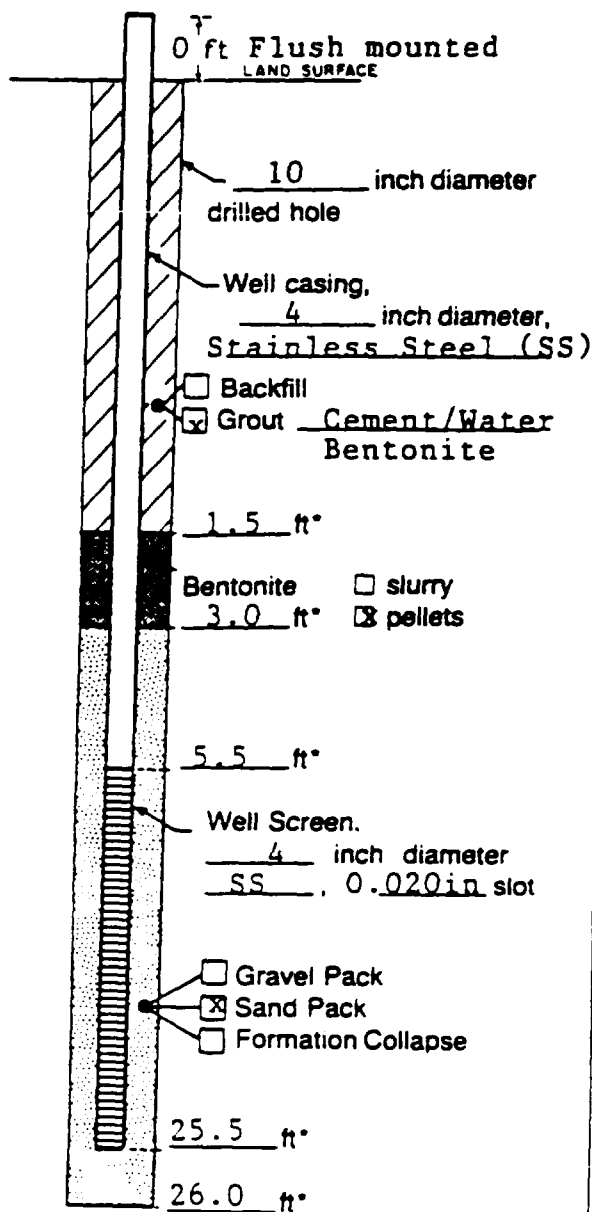
Development Technique(s) and Date(s)
Centrifugal pump. Flushed well with water
to facilitate development; 9/2/92.

Fluid Loss During Drilling NA gallons
Water Removed During Development 84 gallons
Static Depth to Water 17.14 ft before develop feet below M.P.
Pumping Depth to Water 34.0 feet below M.P.
Pumping Duration _____ hours
Yield NA gpm Date 9/2/92
Specific Capacity NA gpm/ft
Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land
surface to 15.0 feet.
10-inch air hammer from land surface to
40.0 feet.
Borehole cave in up to 39.6 feet.
Competent bedrock approximately at 15.0 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-8

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 167.61 feet msl

and Datum 167.54 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) July 23, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water
to facilitate development: 8/31/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 110 gallons

Static Depth to Water 17.70ft before develop feet below M.P.

Pumping Depth to Water 25.0 feet below M.P.

Pumping Duration 0.76 hours

Yield NA gpm

Date 8/31/92

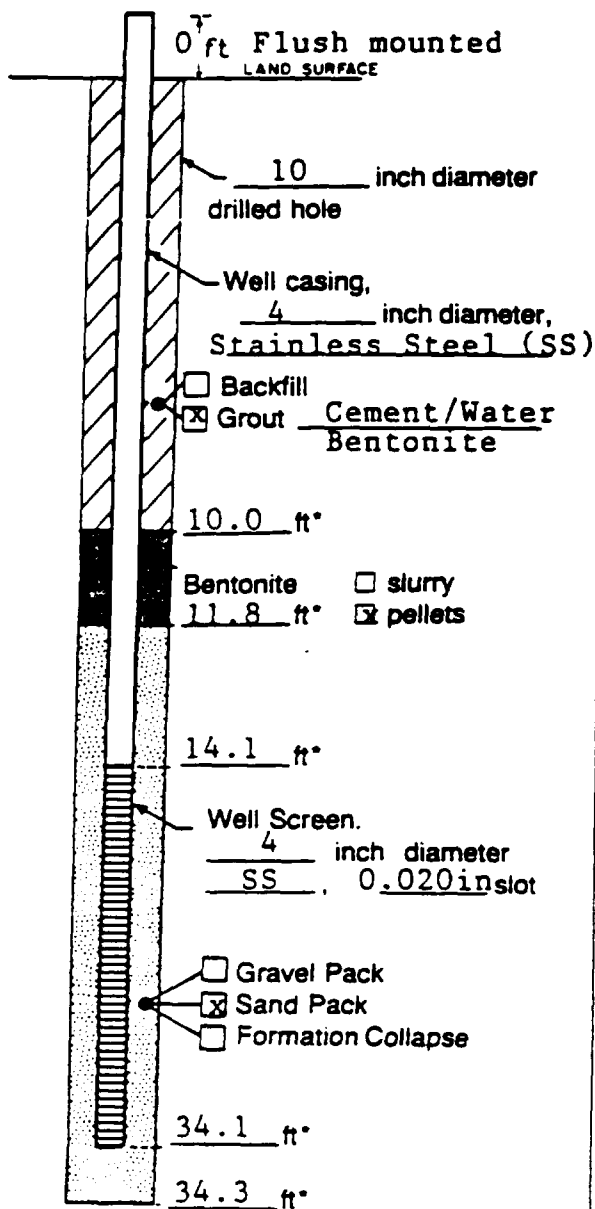
Specific Capacity NA gpm/ft

Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land
surface to 8.3 feet (bedrock).
10-inch air hammer from land surface to
27.0 feet.
Borehole cave in up to 26.0 feet.

Prepared by Wanda L. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-9

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 162.32 feet msl

and Datum 162.26 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) July 30, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid Water when diamond coring was performed.

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water to facilitate development; 9/2/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 70 gallons

Static Depth to Water 13.14 ft before development feet below M.P.

Pumping Depth to Water 33.0 feet below M.P.

Pumping Duration 0.33 hours

Yield NA gpm Date 9/2/92

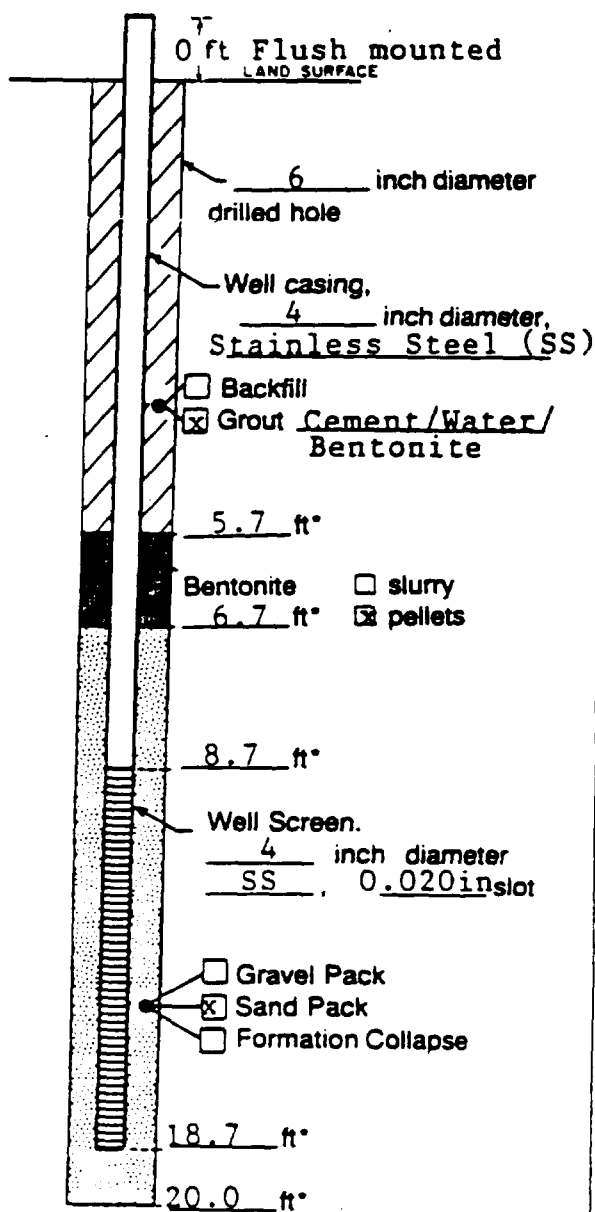
Specific Capacity NA gpm/ft

Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land surface to 5.5 feet. Bedrock at 5.0 feet.
3-inch diamond coring from 5.5 to 35.0 feet.
10-inch air hammer from 3.7 to 37.0 feet.
Borehole cave in up to 34.3 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-9S

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 162.47 feet msl
and Datum 162.37 feet msl ☒ Surveyed
☐ Estimated

Installation Date(s) September 14, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)
Centrifugal pump. Flushed well with water
to facilitate development; 9/15/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 20 gallons

Static Depth to Water 13.34 ft before develop feet below M.P

Pumping Depth to Water 18.0 feet below M.P

Pumping Duration 0.20 hours

Yield NA gpm Date 9/15/92

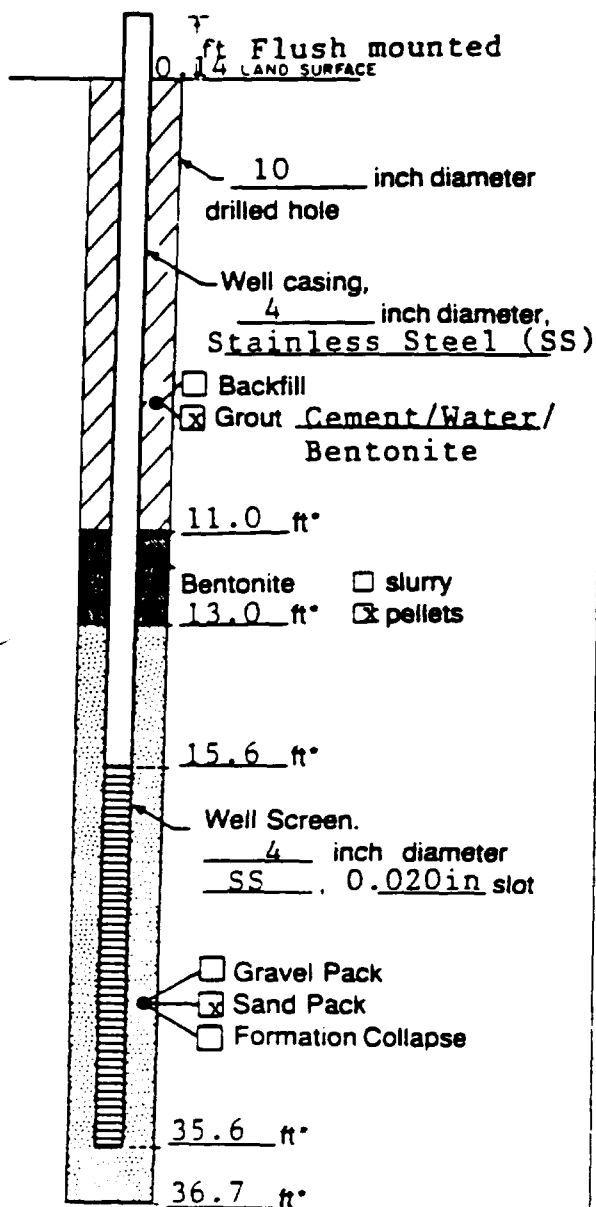
Specific Capacity NA gpm/ft

Well Purpose Monitoring well

Remarks 10-inch air hammer from land surface
to 20.0 feet.
Borehole cave in from 20.0 up to
18.7 feet. Bedrock located approximate
at 5.0 feet.

Prepared by Rubén Ponciano

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-10

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 161.36 feet msl

and Datum 161.50 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) August 20, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water
to facilitate development; 9/2/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 40.0 gallons

Static Depth to Water 20.80ft before develop feet below M.P.

Pumping Depth to Water 34.0 feet below M.P.

Pumping Duration 0.3 hours

Yield NA gpm Date 9/2/92

Specific Capacity NA gpm/ft

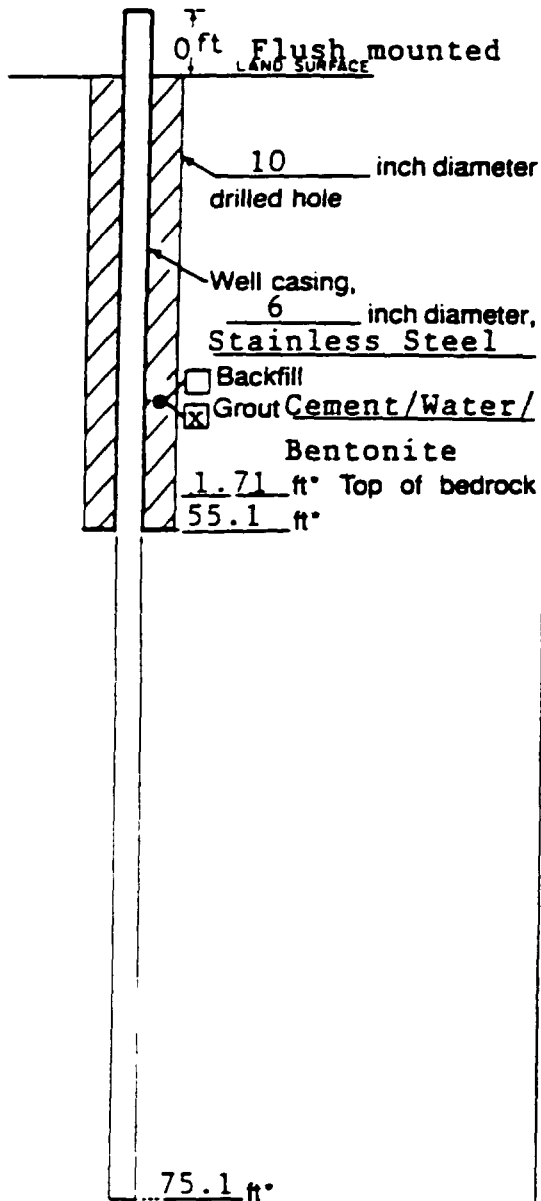
Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land
surface to 3.0 feet. (Bedrock at 2.9 feet).
10-inch air hammer from land surface to
36.7 feet.

Prepared by Wanda I. Morales



WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-10D
 Town/City Anna's Retreat/Tutu
 County St. Thomas State USVI
 Permit No. _____
 Land-Surface Elevation 161.52 feet msl
 and Datum 161.38 feet msl ☒ Surveyed
☐ Estimated
 Installation Date(s) August 17, 18 & 19, 1992
 Drilling Method Hollow Stem Auger & Air Hammer
 Drilling Contractor Soil Tech
 Drilling Fluid Water when diamond coring was performed.

Development Technique(s) and Date(s)
Centrifugal pump. Flushed well with water to facilitate development; 9/2/92.

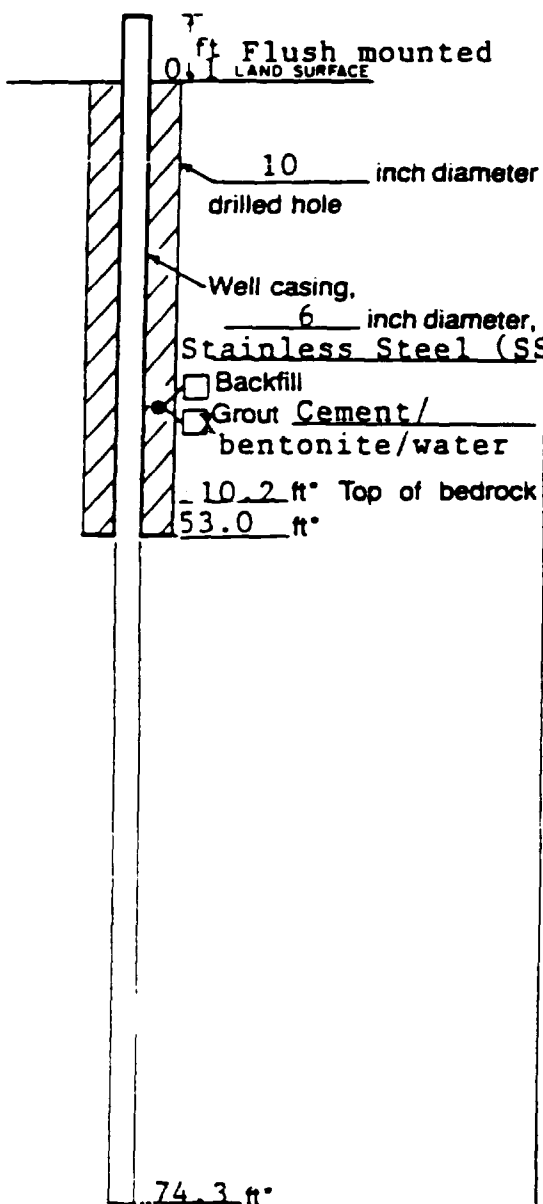
Fluid Loss During Drilling NA gallons
 Water Removed During Development 240 gallons
 Static Depth to Water 20.20ft before develop feet below M.P.
 Pumping Depth to Water 74.0 feet below M.P.
 Pumping Duration 0.33 hours
 Yield NA gpm Date 9/2/92
 Specific Capacity NA gpm/ft
 Well Purpose Monitoring well
 Fracture Zones _____

Remarks 6-inch hollow stem auger from land surface to 1.71 feet (Top of bedrock).
3-inch diamond coring from 1.71 to 75.0 feet.
10-inch air hammer from 2.0 to 56.0 feet.
6-inch casing installed at 55.1 feet.
5.5-inch air hammer from 55.1 to 75.1 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG

(BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

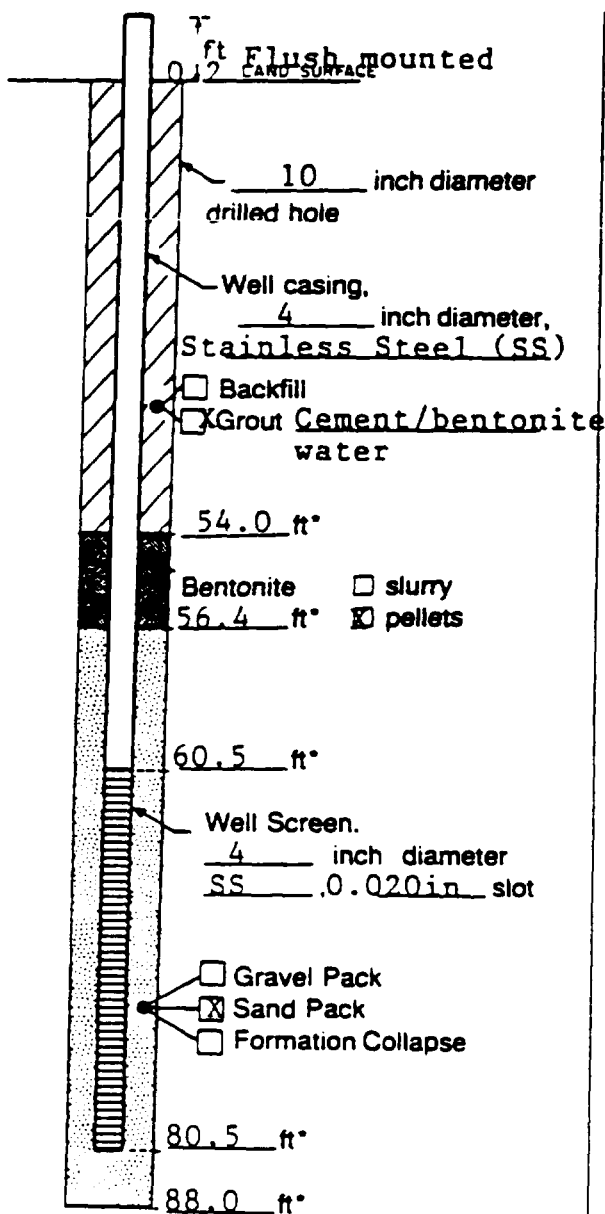
*Depth Below Land Surface

Project TEIC/Tutu PRO1301 Well MW-11D
 Town/City Anna's Retreat /Tutu
 County St. Thomas State USVI
 Permit No. _____
 Land-Surface Elevation 153.11 feet msl
 and Datum 153.22 feet msl ☒ Surveyed
☐ Estimated
 Installation Date(s) July 16, 17, 20, 1992
 Drilling Method Hollow Stem Auger & Air Hammer
 Drilling Contractor Soil Tech
 Drilling Fluid Water when diamond coring was performed
 Development Technique(s) and Date(s)
Centrifugal pump. Flushed well with water to facilitate development; 9/2/92.
 Fluid Loss During Drilling NA gallons
 Water Removed During Development 84 gallons
 Static Depth to Water 17.20 before develop feet below M.P.
 Pumping Depth to Water 73.0 feet below M.P.
 Pumping Duration 0.43 hours
 Yield NA gpm Date 9/2/92
 Specific Capacity NA gpm/ft
 Well Purpose Monitoring
 Fracture Zones _____

Remarks 6-inch hollow stem auger from land surface to 11.0 feet. (Top of bedrock approx. 10.2 feet)
3-inch diamond coring from 10.2 to 75.0 feet.
10-inch air hammer from 5.0 to 53.5 feet.
6-inch casing installed at 53.0 feet.
5.5-inch air hammer from 53.0 to 74.3 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/Tutu PR01301 Well MW-12D

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 161.58 feet msl

and Datum 161.81 feet msl

☒ Surveyed

☐ Estimated

Installation Date(s) July 23, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid Water when diamond coring was performed

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water to facilitate development; 9/1/92.

Fluid Loss During Drilling NA gallon

Water Removed During Development 76 gallon

Static Depth to Water 26.0 before develop. feet below M.F

Pumping Depth to Water 79.0 feet below M.F

Pumping Duration 1.1 hours

Yield NA gpm

Date 9/1/92

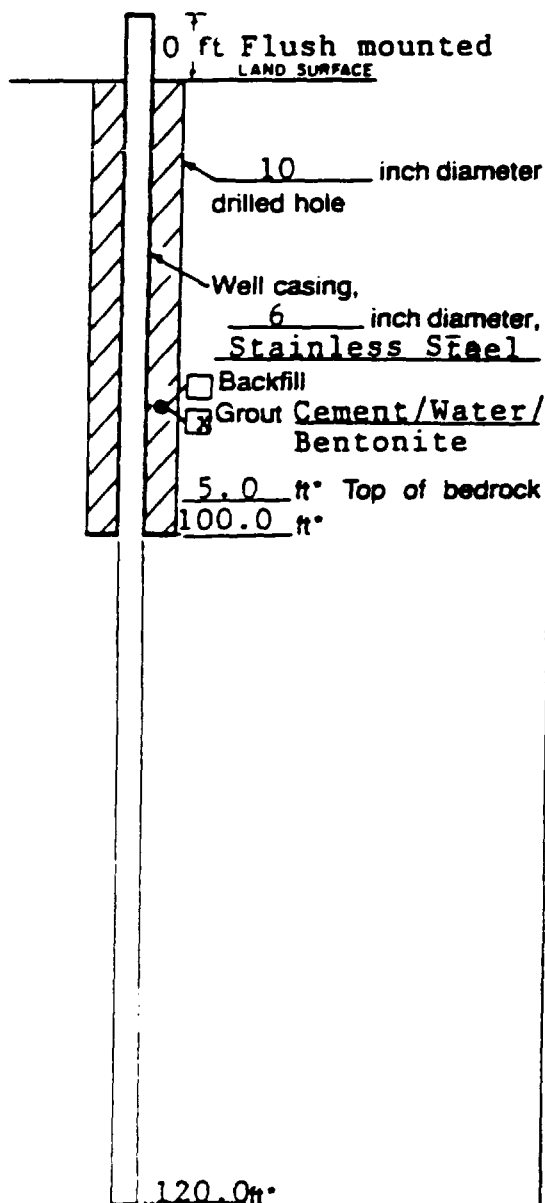
Specific Capacity NA gpm/ft

Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land surface to 5.9 feet (top of bedrock).
3-inch diamond coring from 5.9 to 75.0 feet.
10-inch air hammer from 3.9 to 88.0 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-13D
Town/City Anna's Retreat/Tutu
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation 236.67 feet msl
and Datum 236.60 feet msl ☒ Surveyed
☐ Estimated
Installation Date(s) July 9, 13, & 15, 1992
Drilling Method Hollow Stem Auger & Air Hammer
Drilling Contractor Soil Tech
Drilling Fluid Water when diamond coring was performed

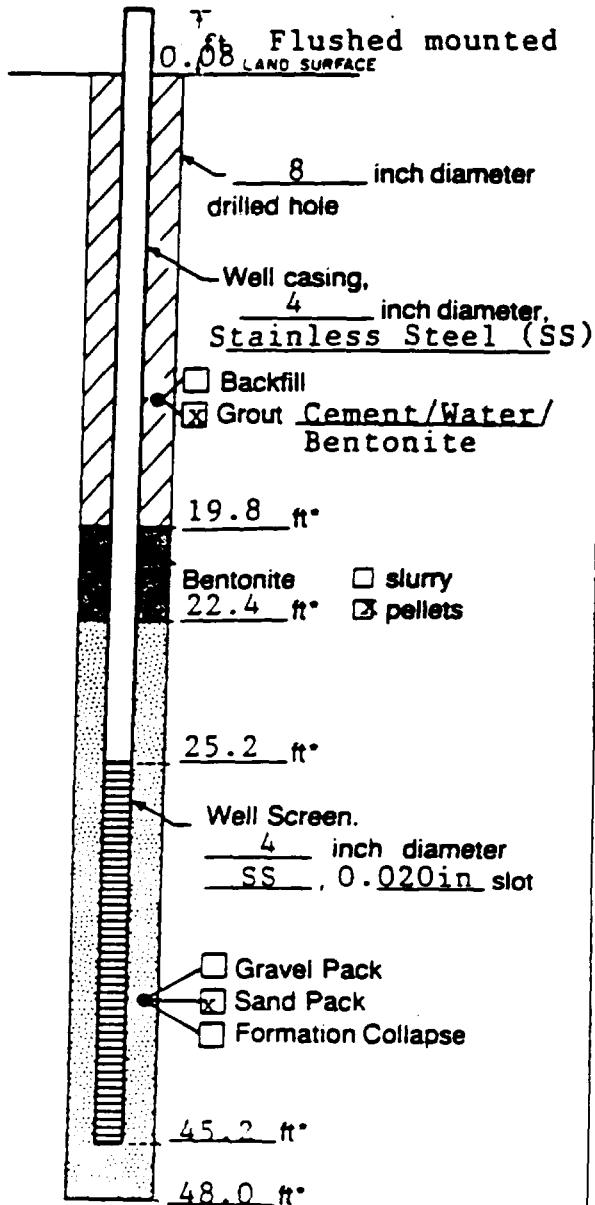
Development Technique(s) and Date(s)
Submersible pump. Flushed well with water
to facilitate development; 9/3/92.

Fluid Loss During Drilling NA gallons
Water Removed During Development 150 gallons
Static Depth to Water 57.60ft before develop feet below M.P.
Pumping Depth to Water 106 feet below M.P.
Pumping Duration 0.42 hours
Yield NA gpm Date 9/3/92
Specific Capacity NA gpm/ft
Well Purpose Monitoring well
Fracture Zones _____

Remarks 6-inch hollow stem auger from land
surface to 5.3 feet. (Bedrock at 5.0 feet).
3-inch diamond coring from 4.6 to 120 feet.
10-inch air hammer from land surface to
100.5 feet.
5 5-inch air hammer from 100 to 120.3 feet.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project TEIC/PRO1301 Well MW-14

Town/City Anna's Retreat/Tutu

County St. Thomas State USVI

Permit No. _____

Land-Surface Elevation 196.04 feet msl

and Datum 196.12 feet msl ☒ Surveyed

☐ Estimated

Installation Date(s) July 2, 1992

Drilling Method Hollow Stem Auger & Air Hammer

Drilling Contractor Soil Tech

Drilling Fluid _____

Development Technique(s) and Date(s)

Centrifugal pump. Flushed well with water
to facilitate development; 8/31/92.

Fluid Loss During Drilling NA gallons

Water Removed During Development 108 gallons

Static Depth to Water 28.40ft before develop feet below M.P.

Pumping Depth to Water 43.0 feet below M.P.

Pumping Duration 0.55 hours

Yield NA gpm

Date 8/31/92

Specific Capacity NA gpm/ft

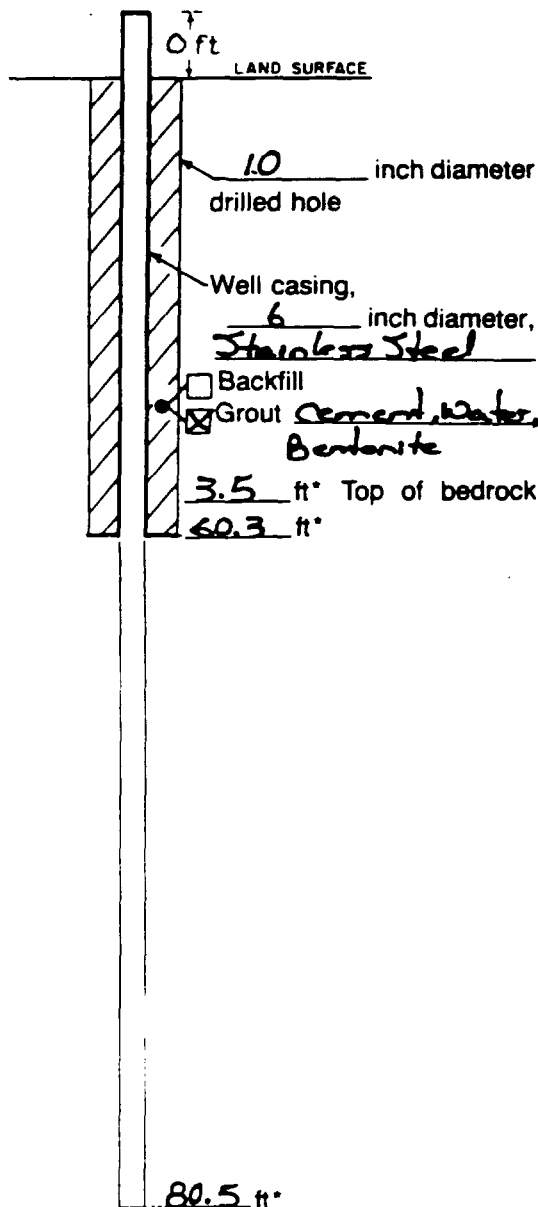
Well Purpose Monitoring well

Remarks 6-inch hollow stem auger from land
surface to 3.0 feet. (top of bedrock).
7.5-inch air hammer from land surface to
48.0 feet.

Prepared by Wanda I. Morales



WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Juola RI/PA0013.028 Well MW-13
 Town/City Anna's Retreat
 County St. Thomas State USVI
 Permit No. _____
 Land-Surface Elevation _____
 and Datum _____ feet ☐ Surveyed
☐ Estimated
 Installation Date(s) April 26, 1994 / April 28, 1994
 Drilling Method Narrow Stem Auger / Air Rotary
 Drilling Contractor Juolas, Inc.
 Drilling Fluid _____

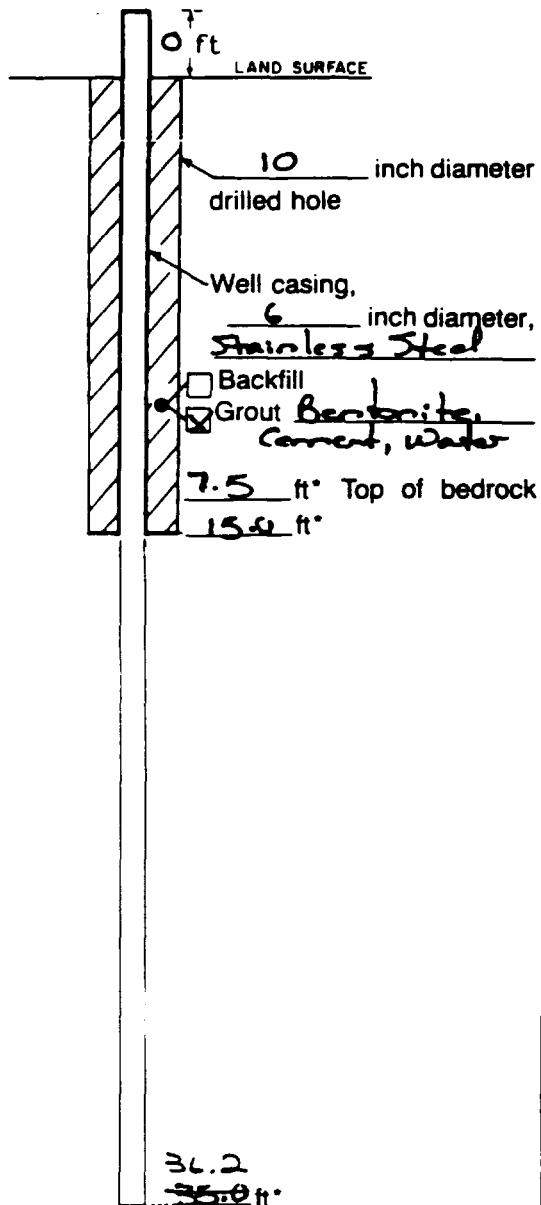
Development Technique(s) and Date(s)
Submersible pump 5/9/94 (5/2/94 - 5/3/94)

Fluid Loss During Drilling NA gallons
 Water Removed During Development 110 gallons
 Static Depth to Water 68.00 feet below M.P.
 Pumping Depth to Water 75.00 feet below M.P.
 Pumping Duration ~ 2 hours
 Yield 2 gpm Date 5/9/94
 Specific Capacity NA gpm/ft
 Well Purpose Monitoring
 Fracture Zones _____

Remarks water level stabilizes at a pumping rate of 2 gal. per minute. On 5/2/94 and 5/3/94 80 gallons and 8 gallons were removed respectively.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

* Depth Below Land Surface

Project Indus RE / PR0013.028 Well MW-15
Town/City Annas Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
☐ Estimated
Installation Date(s) March 30, 1994 / March 31, 1994
Drilling Method Air Rotary
Drilling Contractor Indus Inc.
Drilling Fluid _____

Development Technique(s) and Date(s)
Submersible pump 5/4/94

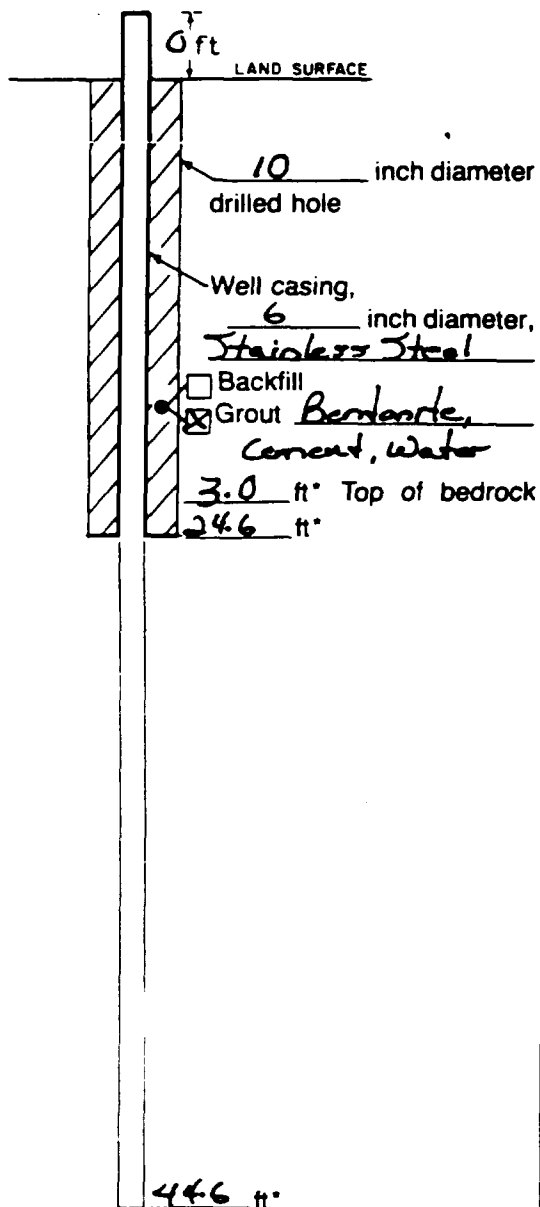
Fluid Loss During Drilling NA gallons
Water Removed During Development 165 gallons
Static Depth to Water 10.76' feet below M.P.
Pumping Depth to Water 33 feet below M.P.
Pumping Duration 10 min hours
Yield ~ 8 gpm Date 5/4/94
Specific Capacity NA gpm/ft
Well Purpose Monitoring
Fracture Zones _____

Remarks Total Depth of Well 36.12 feet on 5/4/94. Water is clear

Prepared by Wanda I. Morales



WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Yute RI/PR0013-028 Well MW-16
 Town/City Anna's Retreat
 County St. Thomas State USVI
 Permit No. _____
 Land-Surface Elevation _____ feet
 and Datum _____ ☐ Surveyed
 _____ ☐ Estimated
 Installation Date(s) April 27, 1994 / April 29, 1994 / May 2, 1994
 Drilling Method Hollow Stem Auger / Air Rotary
 Drilling Contractor Sueker, Inc.
 Drilling Fluid _____

Development Technique(s) and Date(s)
Submersible Pump / 5/4/94

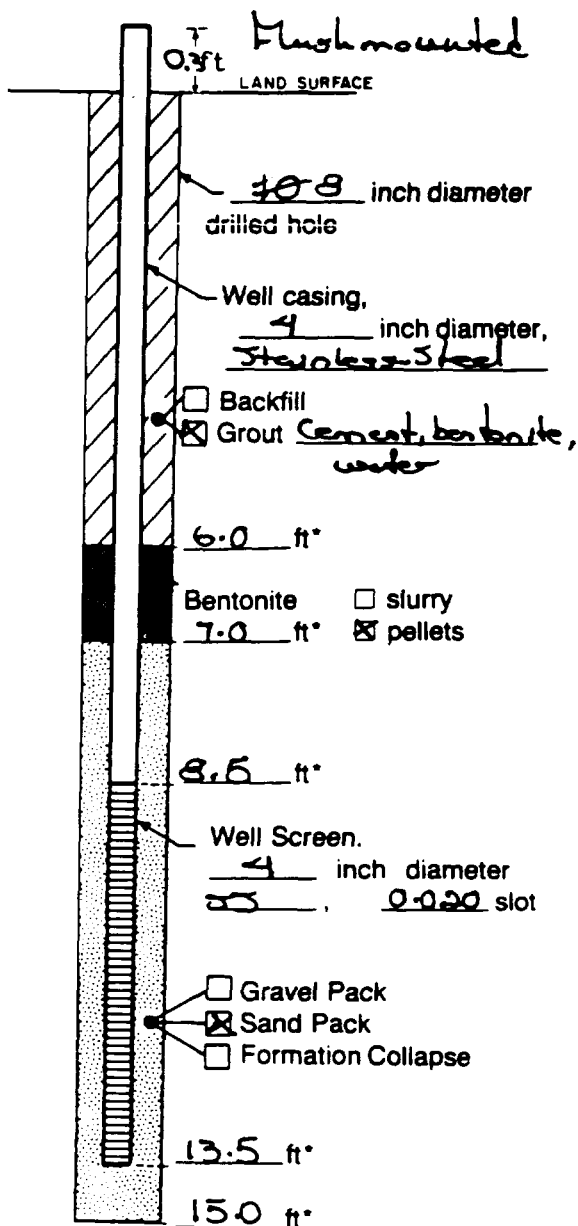
Fluid Loss During Drilling NA gallons
 Water Removed During Development 100 gallons
 Static Depth to Water 31.18 feet below M.P.
 Pumping Depth to Water 31.30 feet below M.P.
 Pumping Duration 0.5 hours
 Yield 6 gpm Date 5/4/94
 Specific Capacity NA gpm/ft
 Well Purpose Monitoring
 Fracture Zones _____

Remarks 10 inch steel casing installed at 5.0 feet

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Tutu AI Well MW-17

Town/City Anne's Retreat

County St Thomas State USVI

Permit No. _____

Land-Surface Elevation _____ feet ☐ Surveyed ☐ Estimated

Installation Date(s) March 30, 1994

Drilling Method Hollow Stem Auger / Air rotary

Drilling Contractor Suelos Inc.

Drilling Fluid None

Development Technique(s) and Date(s)
Bottom fill Teflon Bailor (5/4/94)

Fluid Loss During Drilling NA gallons

Water Removed During Development 11 gallons

Static Depth to Water 9.42 feet below M.P.

Pumping Depth to Water N/A feet below M.P.

Pumping Duration N/A hours

Yield N/A gpm Date 5/4/94

Specific Capacity NA gpm/ft

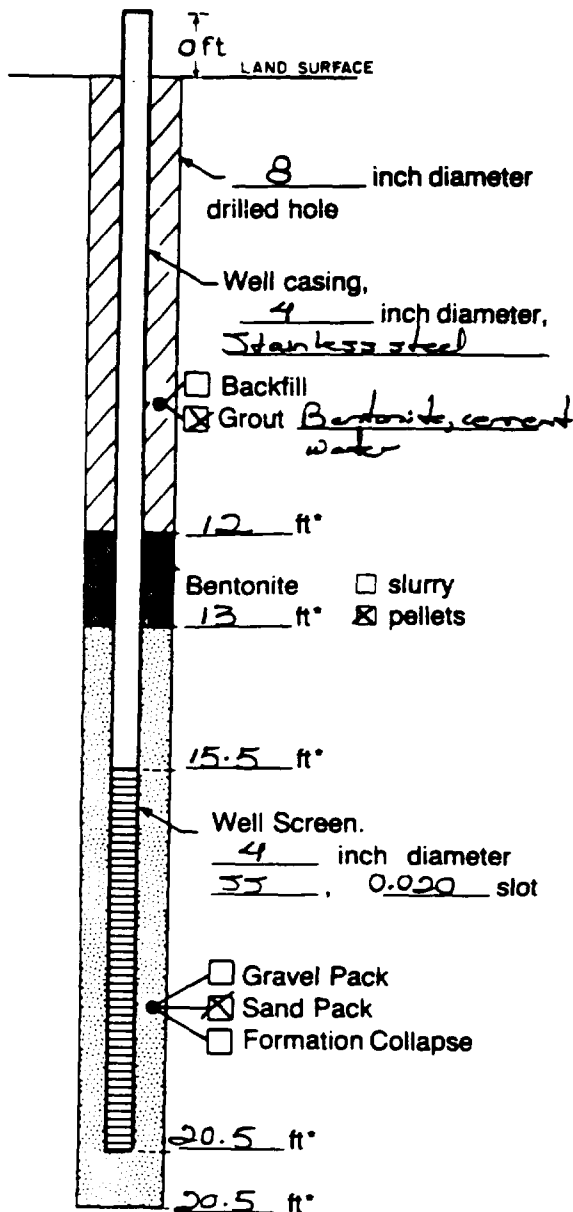
Well Purpose Monitoring

Remarks Well does not recover quickly.

Prepared by Wanda J. Morales

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Tutu R.I / PR0013-028 Well MW-18

Town/City Anna's Retreat

County J. Thomas State USVI

Permit No. _____

Land-Surface Elevation

and Datum _____ feet

☐ Surveyed

☐ Estimated

Installation Date(s) April 7, 1994

Drilling Method Bottom Stem Auger / Air Rotary

Drilling Contractor Tuelor, Inc.

Drilling Fluid None

Development Technique(s) and Date(s)

Centrifugal Pump / 6-8-94

Fluid Loss During Drilling NA gallons

Water Removed During Development 6 gallons

Static Depth to Water 15.24' feet below M.P

Pumping Depth to Water 19.0' feet below M.P

Pumping Duration 8 min. hours

Yield NA gpm

Date 6-8-94

Specific Capacity NA gpm/ft

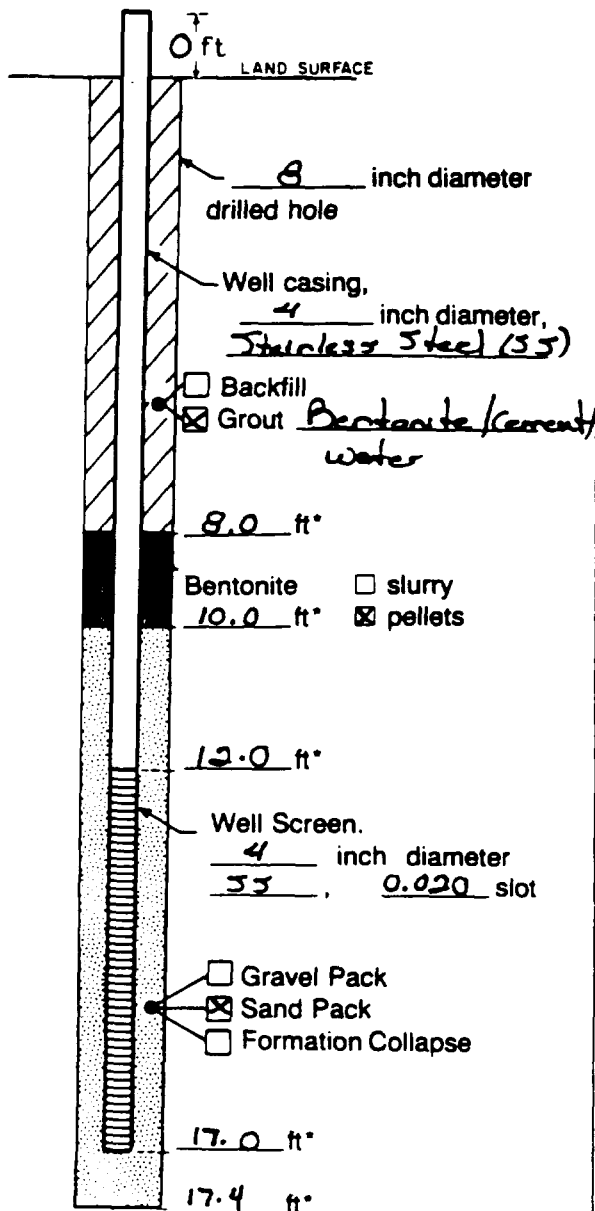
Well Purpose Monitoring

Remarks _____

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG

(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Tutor R.I. / PR0013.028 Well MW-19
Town/City Anna's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed ☐ Estimated
Installation Date(s) April 7, 1994
Drilling Method Hollow Stem Auger / Air Rotary
Drilling Contractor Juelor, Inc.
Drilling Fluid None

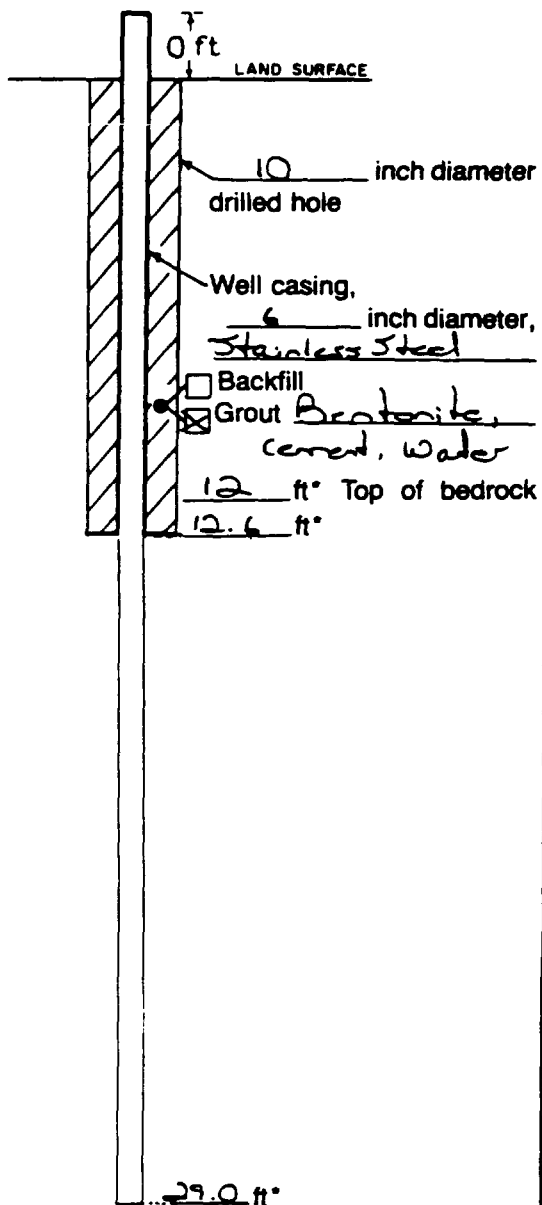
Development Technique(s) and Date(s)
April 27, 1994 / Bailer

Fluid Loss During Drilling NA gallons
Water Removed During Development 20 gallons
Static Depth to Water 11.80 feet below M.P.
Pumping Depth to Water N/A feet below M.P.
Pumping Duration N/A hours
Yield N/A gpm Date 4/27/94
Specific Capacity _____ gpm/ft
Well Purpose Monitoring

Remarks Well does not recover quickly

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



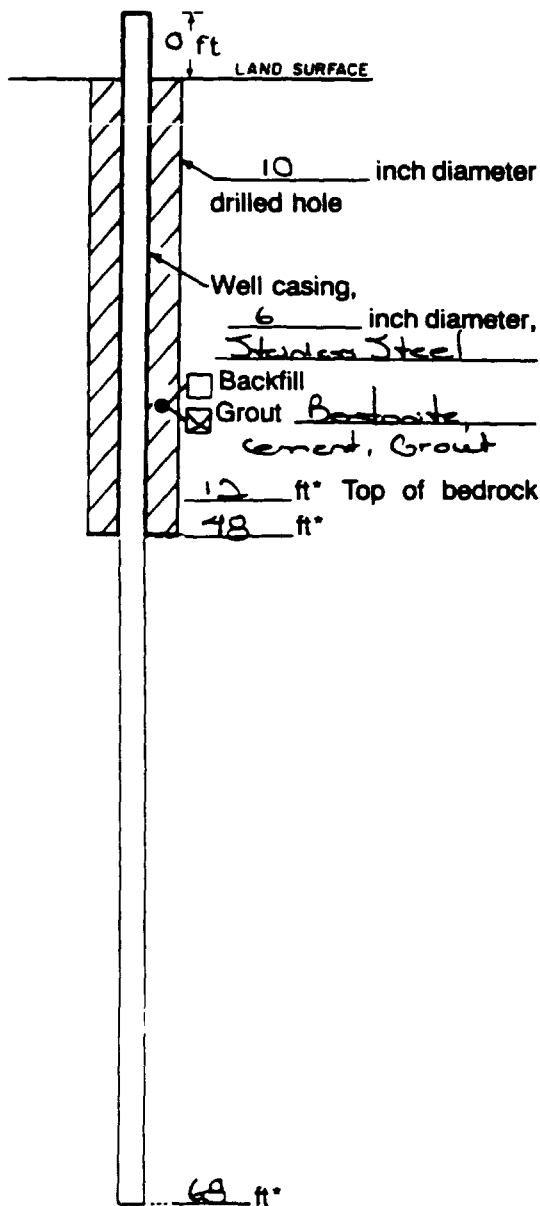
Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

Project T. LUKI/PA0013.028 Well MW-20
Town/City Anna's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
and Datum _____ ☐ Estimated
Installation Date(s) May 9, 1994 / May 11, 1994
Drilling Method Air Rotary
Drilling Contractor Juslos Inc.
Drilling Fluid _____
Development Technique(s) and Date(s)
Submersible Pump / May 16, 1994
Bailer / May 17, 1994
Fluid Loss During Drilling N/A gallons
Water Removed During Development 13 (5/14/94); 6 (5/17/94) gallons
Static Depth to Water 23.90 feet below M.P.
Pumping Depth to Water 27.84 feet below M.P.
Pumping Duration 0.6 hours
Yield N/A gpm Date 5/16/94
Specific Capacity N/A gpm/ft 5/17/94
Well Purpose Monitoring
Fracture Zones _____
Remarks _____

Prepared by Wanda J. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

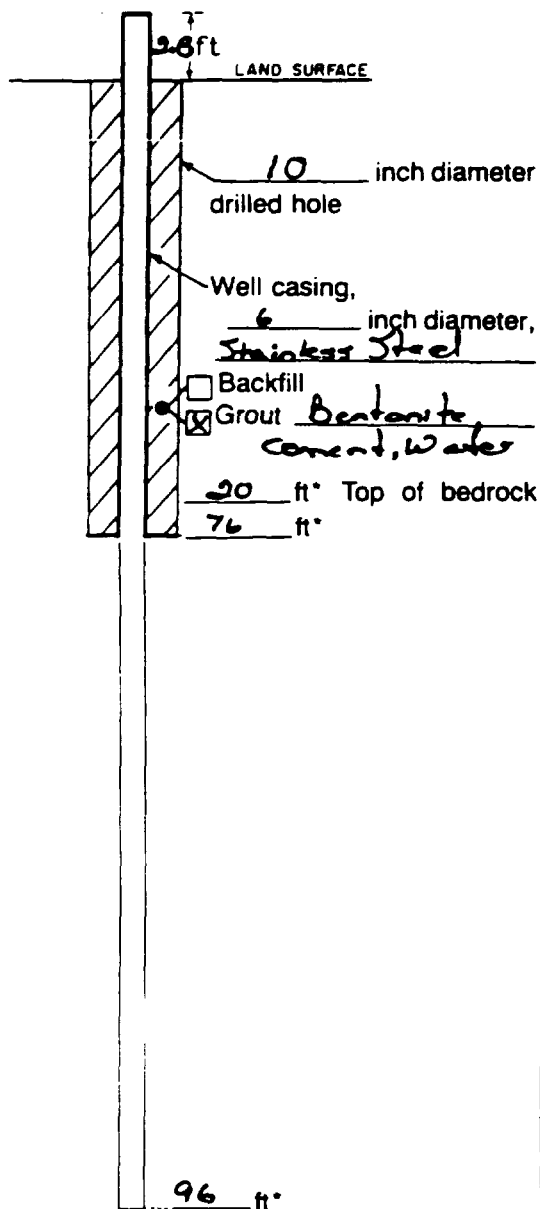
Project Tutu RZ/PR0013.028 Well MW-20D
Town/City Anna's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
and Datum _____ ☐ Estimated
Installation Date(s) May 6, 1994 / May 9, 1994
Drilling Method Air Rotary
Drilling Contractor Jules Inc.
Drilling Fluid _____
Development Technique(s) and Date(s)
Bailer / May 16, 1994
Submersible Pump / May 17, 1994
Fluid Loss During Drilling N/A gallons
Water Removed During Development 23 (5/16/94); 3 (5/17/94) gallons
Static Depth to Water 62.39 feet below M.P.
Pumping Depth to Water 66.80 feet below M.P.
Pumping Duration 1 hours
Yield N/A gpm Date 5/16/94
Specific Capacity N/A gpm/ft 5/17/94
Well Purpose Monitoring
Fracture Zones _____

Remarks Add 20 gallons of water during
development on 5/16/94.

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG

(BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

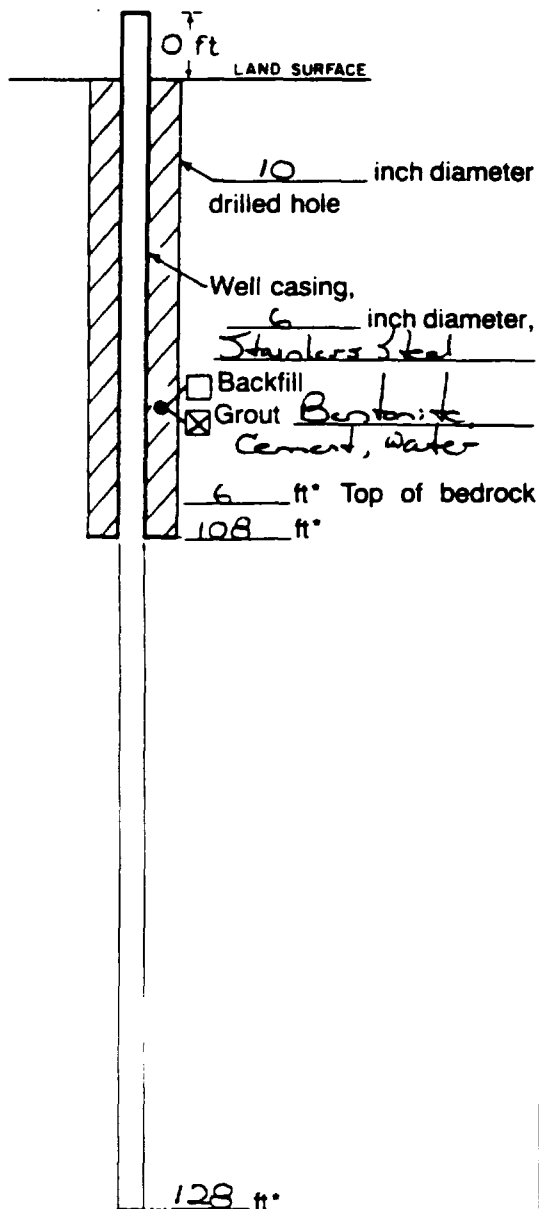
*Depth Below Land Surface

Project Tutu HI PR0013.028 Well MW-21D
Town/City Anna's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
and Datum _____ feet ☐ Estimated
Installation Date(s) April 9, 1994 / April 11, 1994
Drilling Method Air Rotary
Drilling Contractor Judex, Inc.
Drilling Fluid _____
Development Technique(s) and Date(s)
Submersible pump 4/25/94 and 4/26/94
Fluid Loss During Drilling NA gallons
Water Removed During Development 150 (4/25/94) + 115 (4/26/94) gallons
Static Depth to Water 38.90 feet below M.P.
Pumping Depth to Water 93' feet below M.P.
Pumping Duration NA hours
Yield NA gpm Date 4/25/94 4/26/94
Specific Capacity _____ gpm/ft
Well Purpose Monitoring
Fracture Zones _____

Remarks _____

Prepared by Wade I. Pordes

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Tutu RI/PR0013.028 Well MW-22A
Town/City Anna's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
and Datum _____ feet ☐ Estimated
Installation Date(s) April 14, 1994 / April 18, 1994
Drilling Method Air Rotary
Drilling Contractor Jucos Inc.
Drilling Fluid _____

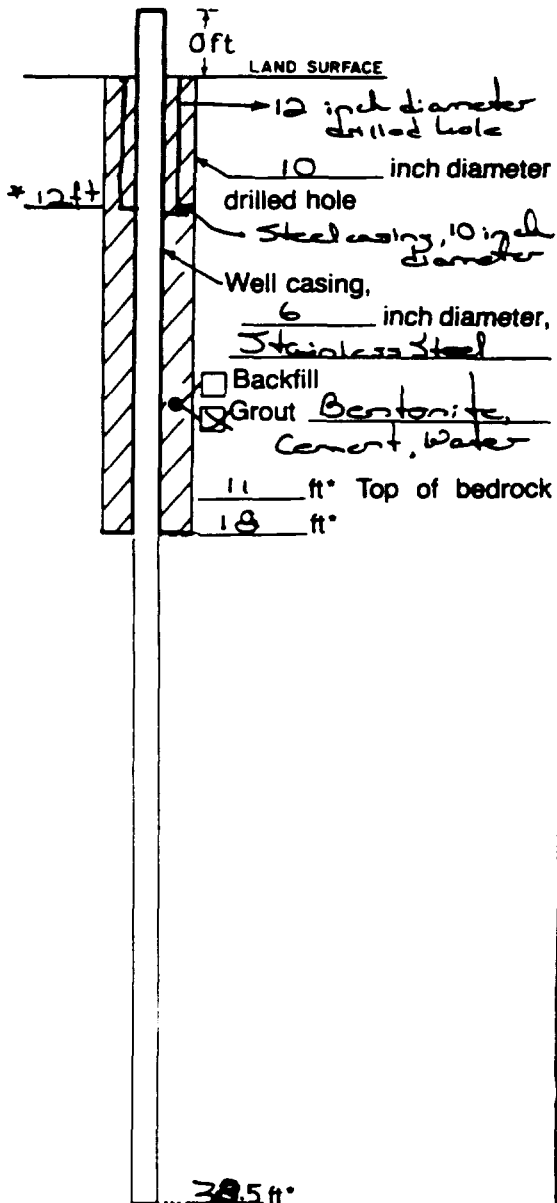
Development Technique(s) and Date(s)
Submersible pump 5/2/94

Fluid Loss During Drilling NA gallons
Water Removed During Development 65 gallons
Static Depth to Water 88.30 feet below M.P.
Pumping Depth to Water 128 feet below M.P.
Pumping Duration 1/2 min total hours
Yield NA gpm Date 5/2/94
Specific Capacity NA gpm/ft
Well Purpose Monitoring
Fracture Zones _____

Remarks Water is clear

Prepared by Wanda I. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Tuba RI/PA0013.028 Well MW-24
Town/City Annapolis
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed ☐ Estimated
Installation Date(s) May 11, 1994; May 12, 1994;
Drilling Method Air Rotary
Drilling Contractor Jacob Inc.
Drilling Fluid _____

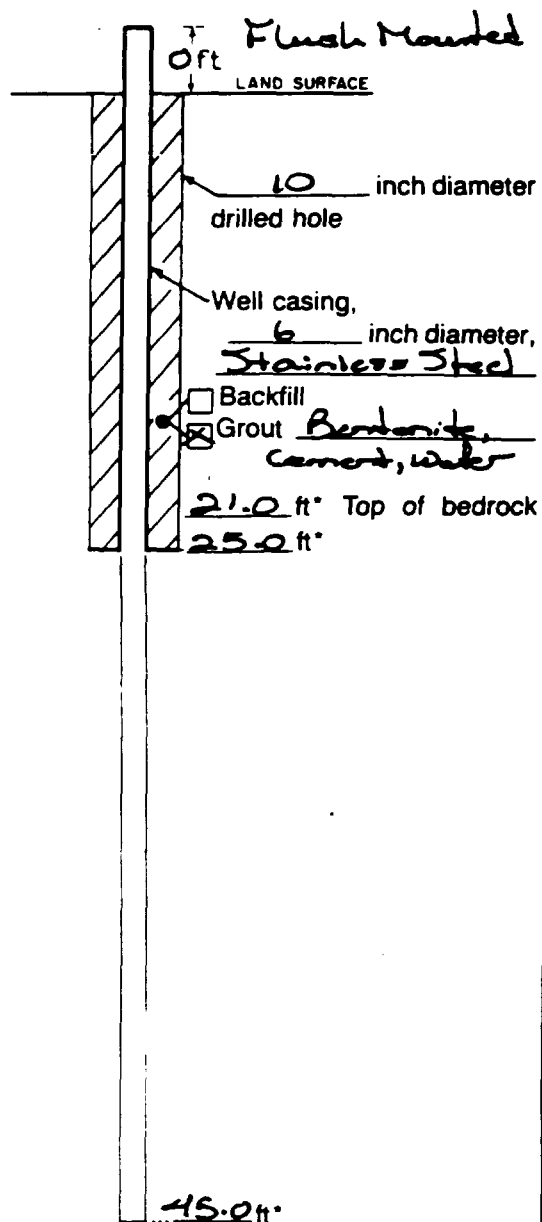
Development Technique(s) and Date(s)
Submersible pump / May 23, 1994

Fluid Loss During Drilling N/A gallons
Water Removed During Development 80 gallons
Static Depth to Water 7.70 feet below M.P.
Pumping Depth to Water 33.09 feet below M.P.
Pumping Duration 1 hours
Yield N/A gpm Date 5/23/94
Specific Capacity N/A gpm/ft
Well Purpose Monitoring
Fracture Zones _____

Remarks _____

Prepared by Wanda T. Morales

WELL CONSTRUCTION LOG (BEDROCK)



Measuring Point is Top of
Well Casing Unless Otherwise
Noted.

*Depth Below Land Surface

Project Futu RI / PRO013.028 Well MW-25
Town/City Anne's Retreat
County St. Thomas State USVI
Permit No. _____
Land-Surface Elevation _____ feet ☐ Surveyed
and Datum _____ feet ☐ Estimated
Installation Date(s) April 5, 1994 ; April 7, 1994
Drilling Method Hollow Stem Auger / Air Rotary
Drilling Contractor Suelos, Inc.
Drilling Fluid Pore
Development Technique(s) and Date(s)
Submersible Pump / 4/27/94
Fluid Loss During Drilling NA gallons
Water Removed During Development 80 gallons
Static Depth to Water 11.98 feet below M.P.
Pumping Depth to Water 22.35 feet below M.P.
Pumping Duration 0.32 hours
Yield NA gpm Date 4/27/94
Specific Capacity NA gpm/ft
Well Purpose Monitoring
Fracture Zones _____

Remarks _____

Prepared by Wanda I. Morales

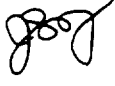
APPENDIX I

**SURVEYOR'S DATA
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



MEMORANDUM

TO: Tutu Wells Site Project File (PR0013.000) and Tom Danahy

FROM: Joanna Jasiorkowski 

DATE: August 26, 1994

RE: Surveying at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Several surveying tasks have been performed at the Tutu Wells Site. The main contractor was R. LOPEZ DE AZUA & ASSOC. (RLDA) of Puerto Rico.

In 1992, RLDA surveyed the measuring point elevations (ie. top of inner casings), top of outer casings, and ground-surface elevations of the Tutu Phase I Remedial Investigation (RI) monitoring wells installed by Geraghty & Miller, Inc. In September 1993, RLDA was asked to extend the topographic control on the base map to the northeast and the southwest to increase the size of the base map for the Phase II RI Work Plan proposed in December 1993. In February and March of 1994, RLDA surveyed the monitoring wells installed by Blasland, Bouck & Lee, Inc. (designated "DW-" and "SW-") and the monitoring wells installed by GCL (designated "TT-"). In May 1994, RLDA surveyed the Phase II RI monitoring wells installed by Geraghty & Miller, Inc.; the monitoring wells installed by Caribbean Hydro-Tech, Inc. (designated "CHT-"); the monitoring wells installed by Terra Vac, Inc. (designated "KFC-"); the monitoring wells installed by Geo Caribe, Inc. (designated "OHMW-"); and the VIHA-I, VIHA-II, LaPLACE, HARTHMAN WILFRED, EGLIN-I, EGLIN-II, and EGLIN-III supply wells.

In July 1994, discrepancies were noticed in the elevations reported at the Monitoring Wells OHMW-1, OHMW-2, OHMW-3, and OHMW-4, and Control Monument 202 at the intersection of Route 38 and Highway 382 with respect to the topographic map. Due to delays associated with the response of RLDA, Brian Moseley and Associates of St. Thomas were contracted to resurvey the monitoring wells designated "OHMW-", and Control Monument 202; and survey the tops of casing at the Church, Steele, and Harvey supply wells. The measuring point elevations at Monitoring Wells OHMW-2 and OHMW-4 changed less than two tenths of a foot, the measuring point elevation at Monitoring Well OHMW- 3 increased by approximately 2.6 feet, and the measuring point at Monitoring Well OHMW- 1 increased by approximately 2.5 feet.



October 12, 1993

Ana Gloria Ramos, P.E.
Designated Coordinator
Tutu Environmental Investigation Committee
P.O. Box 364269
San Juan, Puerto Rico 00936-4269

Re: Confirmation of Authorization for Base Map Revisions, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands.

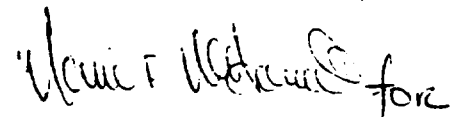
Dear Ana Gloria:

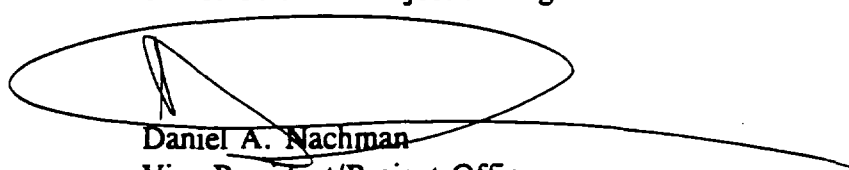
As requested in your telephone conversation with Thomas Danahy on October 8, 1993, Geraghty & Miller, Inc. has prepared this letter confirming your authorization, on behalf of the Tutu Environmental Investigation Committee (TEIC), of \$11,038 for Geraghty & Miller to implement the base map revisions as discussed in our September 8, 1993 letter proposal. We will be contacting the surveyor today to schedule the work.

If you have any questions or require further information regarding this confirmation of authorization, please contact us immediately.

Sincerely,

GERAGHTY & MILLER, INC.


Thomas V. Danahy
Senior Scientist/Project Manager


Daniel A. Nachman
Vice President/Project Officer

c: Paul Ryan - Texaco

TVD:ar
PR0013.***/PR0013.001/101293.ltr

TUT 005 1106

September 23, 1993

Alberto Colberg
Geraghty & Miller, Inc.
809 Fernandez Juncos
Santurce, Puerto Rico 00907

Re: Lopez De Azua & Associates, Inc., Extension of Base Map for Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Dear Alberto:

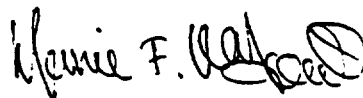
We have enclosed two figures illustrating the approximate boundaries of the areas to be extended on the current site base map for the Tutu Wells Site. These figures are provided for your use in procuring a cost estimate from Lopez De Azua & Associates, Inc. The base map should be extended by Lopez De Azua & Associates to the south, southeast and northwest as indicated, and should include cultural features (i.e., buildings, roads and portion of Turpentine Run).

Upon completion of the extended draft base map on or before October 15, 1993, we will review and locate monitoring wells, supply wells and designation on the map for incorporation by our drafting department. It is assumed that base map extension can be made without further aerial or ground work. If sufficient ground control is not available and further aerial or field work will be required, please let us know.

We look forward to receiving your response regarding the surveyor's scope of work and cost estimate to complete the work.

Sincerely,

GERAGHTY & MILLER, INC.



Marie F. McDonnell
Project Scientist

RLDA

Attn. Alberto Colberg

Extension of Base Map
Tutu Wells Site
St. Thomas, U.S.V.I

Topographic Control
added to Southeast
and Northwest

- Additional Topo.
for Phase II
Work Plan (Dec. 93)

After reviewing the specifications and the information issued for performing survey services for the Extension of Base Map for Tutu Wells Site, St. Thomas, U.S.V.I, we propose to accomplish these services as specified on your R.F.P. dated September 23, 1993, after notice to proceed is issued and for a lump sum price of Seven Thousand, Two Hundred Dollars (\$ 7,200.00). Invoicing will be done upon completion of the project and will be payable upon presentation.

If you have any further questions or information, please do not hesitate to contact me at our San Juan, Puerto Rico office, (809) 268-6049 or (809) 268-6049, our FAX number is (809) 726-6536.

R. LOPEZ DE AZUA & ASSOCIATES

R. LOPEZ DE AZUA & ASSOC.

TUT 005 1108

IMPROVING COMMUNITY ENGAGEMENT

104 NYE0111 C6-63-20
07/28/93 15:53 0000 7268536

R. LOPEZ DE AZUA

0001

J-92-1240

July 28, 1993

RLDA

SOIL TECH
P.O. Box 191704
Hato Rey Station

Attn. Mr. José M. Cardona
Project Manager

Post-It™ brand fax transmittal number 7671		Page 1 of 1	
Wanda Morales		Jose Cardona	
Gen. M. Miller		Phone 1	
Fax 725-2344		Fax 2	

Re:

Horizontal and Vertical of Controls
For Monitoring and Production Wells and
Topographic Survey of
Tutu Site, St Thomas, USVI

Dear Mr. Cardona:

As per your request for information regarding the Horizontal and Vertical of Controls For Monitoring and Production Wells for the survey performed at the Tutu Site, St Thomas, USVI, we provide you the following information:

Departure Controls utilized are Control Point 774 NGS and Control Point Deck which are in Lambert Grid Coordinate for Puerto Rico & the Virgin Islands, North American Datum 1927, located at the Southern end of the Island. The Vertical Control utilized was U.S.G.S. B.M. 2118 1954 with its elevation referred to Mean Sea Level.

If you have any further questions or information, please do not hesitate to contact me at our San Juan, Puerto Rico Office, (809) 268-6049 or (809) 268-6049, our FAX number is (809) 726-6536.

Cordially yours,

R. LOPEZ DE AZUA & ASSOCIATES

for: Renán Lopez de Azua, BAS, MBA
Senior Partner

RLA/bs

R. LOPEZ DE AZUA & ASSOC.

SPECIALTY CONTRACTORS & CONSULTANTS

TUT 005 1109

Monitoring Well Elevations Data, Tuna Wells Site, St. Thomas,
U.S. Virgin Islands - March 24, 1994.

Elevations (feet amsl)		
Monitoring Well Number	Ground Surface (Well Cover)	Measuring Point (Top of Casing)
TT-1	179.34	179.03
TT-1D	179.65	179.45
TT-2	179.91	179.69
TT-3D	182.04	181.75
TT-4	180.71	180.51
TT-5	182.58	182.34
TT-6	169.46	169.18
MW-8	167.70	167.48 167.54
DW-1 (near MW-8)	167.50	167.16
DW-2 (near SW-6)	148.19	147.73
SW-1	166.76	166.36
SW-2	166.80	166.52
SW-3	167.08	166.68
SW-4	153.14	152.96
SW-5	142.56	142.21
SW-6	148.06	147.60
SW-7	167.38	167.02

DRAFT



**TUTU, ST. THOMAS
GERAGHTY & MILLER, INC.
809 FERNANDEZ JUNCOS AVENUE
SANTURCE, PUERTO RICO**

**MW 22-D
TOP OF PIPE 167.572 FT.
TOP OF CASING 167.742
GROUND 167.604**

DRAFT

**CHT 6-D
TOP OF PIPE 174.202
TOP OF CASING 174.444
GROUND 174.352**

**CHT -4
TOP OF PIPE 166.953
TOP OF CASING 167.196
GROUND 167.026**

**CHT -1
TOP OF PIPE 167.696
TOP OF CASING 167.98
GROUND 167.802**

**CHT -7D
TOP OF PIPE 158.293
TOP OF CASING 158.479
ASPHALT 158.482**

**CHT -3
TOP OF PIPE 161.859
TOP OF CASING 162.252
TOP OF CONCRETE 162.259**

**CHT -2
TOP OF PIPE 161.856
TOP OF CASING 162.180
GROUND 162.051**

**MW -24
TOP OF PIPE 167.754
TOP OF CASING 168.017
TOP OF CONCRETE 167.868**

DRAFT

**VIHA -1
TOP OF PIPE 234.164
TOP OF RIM 236.236**

PAGE 2

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VIHA -1
GROUND 232.867

VIHA -2
TOP OF PIPE 235.986
TOP OF RIM 237.304
GROUND 234.304

MW -13
TOP OF PIPE 236.310
TOP OF RIM 236.752
GROUND 236.675

MW -25
TOP OF PIPE 166.341
TOP OF CASING 166.573
TOP OF SIDEWALK 166.447

MW -18
TOP OF PIPE 159.261
TOP OF CASING 159.495
ASPHALT 159.404

MW -19
TOP OF PIPE 148.784
TOP OF CASING 148.963
GROUND 148.759

MW -20D
TOP OF PIPE 174.705
TOP OF CASING 174.933
GROUND 174.68

MW -20
TOP OF PIPE 174.915
TOP OF CASING 175.139
GROUND 174.779

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PAGE 3

EGLIN I
TOP OF CONCRETE 146.648

DRAFT

EGLIN II
TOP OF PVC PIPE 151.981
GROUND 150.484

EGLIN III
TOP OF PIPE 155.174
TOP OF GROUND 153.248

HARTMAN WILFRED
TOP OF PVC PIPE 142.16
TOP OF CORRUGATED PIPE 144.136

KFC -1
TOP OF PIPE 121.809
TOP OF CASING 122.217

KFC -2
TOP OF PIPE 122.023

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PAGE 4

MW -8

TOP OF PIPE ~~167.509~~ *USE 167.54*
GROUND 167.739

DRAFT

MW -17

TOP OF PIPE 177.18
GROUND 177.42

MW -15

TOP OF PIPE 178.947
TOP OF CASING 179.421

MW -16

TOP OF PIPE 202.331
TOP OF CASING 202.801

LA PLACE

TOP OF PIPE 114.229
GROUND 112.901

NW -21D

TOP OF PIPE 123.475
TOP OF CASING 123.765
GROUND 120.70

DRAFT

BRIAN MOSELEY AND ASSOCIATES
P.O. Box 1710
St. Thomas, V.I. 00803
Phone: 774-5310

DRAFT

12 ±

	ELEV.	DESC.
101	175.89	BM 101
202	160.86 (200.31)	BM 202
24	140.13	NL/WSH
28	135.78 137.84	OHMW-1 WELL #1 WELL #1
		GRND ELEV. CASING
26	138.82	OHMW-2 WELL #2
27	139.05	" "
		CASING MH. RIM
25	145.95 141.90	OHMW-3 WELL #3 " "
		CASING GROUND
	148.64 146.09	OHMW-4 WELL #4 " "
29		CASING GROUND
30	142.80	DRAFT HARVEY WELL CASING
32	179.33 177.03	STEELE "
		CASING GROUND
33	182.14	CHURCH
34	182.70	"
		CASING GROUND

200.31 elevation
by RLDA
is wrong/compare
to topo.

PROPERTY • TITLE • TOPOGRAPHIC • SUBDIVISIONS • LAND CONSULTANTS

Brian Moseley and Associates**FOUR WINDS PLAZA
STORM SEWER SURVEY**#2990
8/17/94**A) Distances between storm sewer grates (BB&L DESIGN) NEW REFERENCE**

FSS00 - FSS01	30.9'	CB-10 → CB-9
FSS01 - FSS02	37.4'	CB-9 → CB-8
FSS02 - FSS03	54.5'	CB-8 → CB-7
FSS03 - FSS04	108.1'	CB-7 → CB-6
FSS04 - FSS05	140.2'	CB-6 → CB-5
FSS05 - FSS06	98.3'	CB-5 → CB-4
FSS06 - FSS07	138.4'	CB-4 → CB-3
FSS07 - FSS08	144.2'	CB-3 → CB-2
FSS08 - FSS09	139.4'	CB-2 → CB-1
FSS09 - FSS10	58.4'	CB-1 → CB-00

B) Storm Sewer Grate Elevations		CATCH BASIN (BB&L DESIGNATION)
FSS00	175.9'	CB-10
FSS01	175.3'	CB-9
FSS02	175.4'	CB-8
FSS03	175.4'	CB-7
FSS04	172.2'	CB-6
FSS05	169.4'	CB-5
FSS06	166.6'	CB-4
FSS07	164.8'	CB-3
FSS08	161.5'	CB-2
FSS09	157.9'	CB-1
FSS10	152.4'	CB-00

P.O. BOX 1710, ST. THOMAS, U.S. VIRGIN ISLANDS 00803
(809) 774-5310

06-23-94 11:54 AM P.O.

TUT 005 1116

PROPERTY • TITLE • TOPOGRAPHIC • ENGINEERING • LAND CONSULTANTS

Brian Moseley and Associates**FOUR WINDS PLAZA
STORM SEWER SURVEY**#2990
8/17/94**C) Required Offset Distances**

PSS03 - North curb	36.3'
PSS03 - South curb	0.0'
PSS04 - Manhole	19.3'
PSS07 - Corner pavement	38.6'
- Corner wall	38.6'
PSS08 - Corner wall	47.1'
- Perpendicular to wall	36.9'
- Perpendicular to curb	30.1'
PSS09 - MW 18	41.8'
PSS09 - Sanitary MH	59.3'
PSS10 - Curb	14.0'

P.O. BOX 1710, ST. THOMAS, U.S. VIRGIN ISLANDS 00803
(809) 774-5310

PROPERTY • TITLE • TOPOGRAPHIC • SUBDIVISIONS • LAND CONSULTANTS

Brian Moseley and Associates

Pt. #	NORTHING.. NORTH	EASTING	ELEV.	DESCRIP.
1	360.6354	488.1592	176.1000	NL/W
2	423.6262	634.8094	175.9800	BLDG
3	633.6669	655.5796	176.0900	BLDG
4	869.7255	638.7252	166.7300	NL/W
5	228.9899	485.9388	175.8900	FSS00 CB-10
6	259.5957	490.1853	175.2500	FSS01 CB-9
7	294.2200	504.2627	175.4400	FSS02 CB-8
8	348.5326	508.5305	175.4000	FSS03 CB-7
9	312.3249	506.5324	176.5500	CURB
10	457.2573	495.2993	174.8200	MH
11	456.4090	514.6056	172.1500	FSS04 CB-6
12	588.7489	560.9974	169.4200	FSS05 CB-5
13	678.9195	600.0306	156.6000	FSS06 CB-4
14	796.3023	673.2612	164.8400	FSS07 CB-3
15	796.0703	634.6102	166.5800	WALL
16	716.4040	683.8002	166.6700	BLDG
17	940.1399	683.6778	161.5000	FSS08 CB-2
18	930.0043	710.7270	163.3900	CURB
19	1078.9035	697.4689	157.9400	FSS09 CB-1
20	1038.4274	687.1706	159.4100	WELL
21	1019.9110	703.7803	180.7000	MH
22	1127.3047	716.4480	159.2800	WALL
23	1127.0722	730.4959	152.4400	FSS10 CB-00
101	379.0844	491.8266	175.8900	LOPEZ TARGET
202	1114.5394	491.8266	160.8600	LOPEZ TARGET

P.O. BOX 1710, ST. THOMAS, U.S. VIRGIN ISLANDS 00803
(808) 774-8310

APPENDIX J

**WATER SAMPLING LOGS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



TUTU WATER WELL SAMPLING

Project/No. Tutu RI / PR0013.030

Page 1 of 1

Site Location Tilledt

Date June 22, 1994

Well I.D. MW-5

Sampling Personnel: W. Morales

Replicate I.D. PHA

M. Cedeño

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel Casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

38.87 feet / Water level: 24.04 feet

Water Column in Well

14.83

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

9.64

Gallons Pumped Prior to Sampling

30

Pump Setting (feet below land surface)

37 feet

Purging Method

Submersible Pump (Fiberglass)

HNU background: Oppm

Sampling Data

(1 gallon) (15 gal) Time (30 gal)

Field Parameters	1134	1136	1138	1150
pH	7.7	7.7	7.8	7.7
T (celcius)	30	30	30	29
Specific Conductivity μS	1.3	1.4	1.4	1.4
PID (ppm)	0	0.2	1	0.1
	0.1 9.2	0.1 9.1	0.1 9.0	0.1 10.1

1134 Start purging.
1138 Water level: 29.30 feet
1140 Stop purging. Purged volume: 30 gallons.

Color Clear
Odor Strong produced
Appearance Clear

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1150
BNA TCL	1 - liter	None	1150
TAL 500 ml	1 - liter	HNO3	1150
Cyanide	500 ml	NAOH	1150

Sulfide 500ml NAOH + Zinc Acetate 1150
Sulfate 500ml NONE 1150
9. Phos + CAD 500ml #2504 1150

Hardness 1-liter HNO3 1150
O-load 1-liter HNO3 1150
NO3, PO4, TDS, TSS / Alkal Chlor 1-liter None 1150

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030

Page 1 of 1

Site Location Four Winds

Date 6/29/94

Well I.D. MW-18

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

Purging Data

Description of Measuring Point (MP)

Top of Casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

20.36 feet / Water level: 15.28 feet

Water Column in Well

5.08 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

3.30

Gallons Pumped Prior to Sampling

6 gallons

Pump Setting (feet below land surface)

Bottom

Purging Method

Centrifugal Pump

Sampling Data

Field Parameters	1 gal	3 gal	Time	6 gal
	0711	0712	0715	0735
pH	7.2	7.3	7.3	7.4
T (celcius)	28	28	28	28
Specific Conductivity (mS/cm)	1.2	1.2	1.3	1.3
PID (ppm)	—	—	—	—
Salinity (‰)	0	0.1	0.1	0.1
DO (mg/L)	6.6	6.8	7.2	7.2
Color	<u>Gray</u>			
Odor	<u>None</u>			
Appearance	<u>Silly</u>			

0710 Start purging.
0715 Well went dry.
0730 Water level: 19.10 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0735
BNA	1 - liter	None	
TAL	1 - liter	HNO3	
Cyanide	1 - liter	NAOH	

* Well re-sampled for VOCs only.

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013.030
 Site Location Four Winds
 Well I.D. MW-18
 Replicate I.D. N/A

Page 1 of 1
 Date June 23, 1994
 Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel Casing
 Height of (MP) Above/Below Land Surface 1 Flush mounted
 Total Sounded Depth of Well Below MP 20.36 feet / water level: 15.42 feet
 Water Column in Well 4.94
 Diameter of Casing 4 inches
 Gallons Per Foot 0.65
 Gallons in Well 3.21
 Gallons Pumped Prior to Sampling 6
 Pump Setting (feet below land surface) Bottom
 Purging Method Centrifugal Pump

How background: Oppm

Field Parameters	Sampling Data			
	(4gal)	(4gal)	Time (6gal)	6/24/94
pH	0704	0706	0708	0740
T (celcius)	7.1	7.2	7.2	7.0
Specific Conductivity (mS/cm)	32	30	30	29
PID (ppm)	0.60	1.3	1.3	1.3
SALINITY (%)	0	0	0	0
DO (mg/L)	0	0.1	0.1	0.1
Color	6.5	7.2	7.2	7.5
Odor	light grey			
Appearance	like sports water			
	Very silty			

0703 Start purging
 0707 well went dry. Purged
 volume: 6 gallons
 water level: 19.98 feet
 0723 water level: 19.0 feet
 6/24/94
 0728 water level: 15.32 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0740
BNA TCL	1 - liter	None	0740
TAL Non	1 - liter	HNO3	0740
Cyanide	500 ml	NAOH	0740

Sulfide 500ml NAOH + Zinc Acetate 0740
 Sulfate 500ml None 0740
 9. Phos + COB 500ml H2SO4 0740

Hardness 1-liter HPO3 0740
 2-lead 1-liter HPO3 0740
 NO2/NO3/TDS
 TSS/Alkalor 1-liter None 0740

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI / PR00.3.030
 Site Location God of Holiness Church
 Well I.D. 170-19
 Replicate I.D. N/A

Page 1 of 1
 Date June 20, 1994
 Sampling Personnel: W. Morales

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of Stainless Steel Casing
Flush mounted
16.90 feet / Water level: 12.40 feet
4.5 feet
4 inches
0.65
2.92
12
Bottom
Centrifugal Pump

Have background: Oppm

Field Parameters	Sampling Data						
	(2gal)	(6gal)	Time (9gal)	(10gal)	(11gal)	(12gal)	
pH	1028	1030	1054	1101	1105	1109	1115
T (celcius)	7.5	7.7	7.7	7.3	7.3	7.4	7.4
Specific Conductivity (mS/cm)	29	30	33	30	29	29	29
PID (ppm)	1.7	1.8	1.5	1.6	1.6	1.7	1.7
SALINITY (‰)	0	0	0	0	0	0	0
DO (mg/L)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Color	7.7	7.4	69	8.7	8.8	8.7	9.5
Odor	<u>Light brown</u>						
Appearance	<u>None</u>						
	<u>Slightly silty</u>						

Redox meter readings are fluctuating.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1115
BNA TCL	1 - liter	None	1115
TAL ^{Total}	1 - liter	HNO3	1115
Cyanide	500 ml	NaOH	1115

Sulfide 500 ml NaOH + Zinc Acetate 1115
 Sulfate 500 ml None 1115
 Arsenic + COD 500 ml As2O4 1115

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Leadness ± 14 HNO3 1115
 Lead ± 14 HNO3 1115

As/Hg/1/DB/1/SS/1A/Kal/dor ± 14 None 1115

PR0001A (form)

1026 Start purging.
 1032 well went dry. Purged volume: 8 gallons
 1049 water level: 14.22 feet
 1052 continue purging.
 1056 stop purging. Purged volume: 12 gallons

TUTU WATER WELL SAMPLING

Project/No. Tutu AI/PR0013.030
 Site Location Pearlita Harper Residence
 Well I.D. MW-221
 Replicate I.D. N/A

Page 1 of 1
 Date June 21, 1994
 Sampling Personnel: W. Morales
S. Padilla

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method
 HNU background: Oppm

Top of Stainless Steel Casing
Flush mounted
127.5 feet / Water level: 79.06 feet
48.44 feet
6 inches
1.47
71.21
40 gallons
100 feet / 127 feet / 127.5 feet
Submersible Pump

Field Parameters	Sampling Data				
	(5gal)	(25gal)	Time (28gal)	(38gal)	(45gal)
pH	0927	0937	1023	1104	1108
T (celcius)	12.3	12.6	9.4	10.2	12.0
Specific Conductivity (ms/cm)	28	28	30	29	29
PID (ppm)	53	6.0	3.4	3.2	3.7
JA-INTV (60)	0	0	0	0	0
DO (mg/L)	0.3	0.3	0.2	0.2	0.2
Color	7.8	8.1	10.4	9.6	9.3
Odor	Clear				
Appearance	None				
	Clear				

Temp 29°C
 Sal 0.2%
 pH 10.5
 Cond 3.2 (ms/cm)
 DO 9.2 (mg/L)
 HNU 0 ppm

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1410
BNA TCL	1 - liter	None	1410
TAL Total	1 - liter	HNO3	1410
Cyanide	500 ml	NaOH	1410

Sulfide 500ml NaOH + Zinc Acetate
 Sulfate 500ml None
 P. Phos + WD 500ml H2SO4

Barium 1 lt HNO3 1410
 Lead 1 lt HNO3 1410
 U2NO3TDS 1551 Alkal Chlor 1 lt None 1410

PR0001 & ut form

Well Casing Volumes (GAL/FT)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

0924 Start purging.
 0930 Water level: 86 feet
 0938 Water drop to 100 feet
 0945 Continue purging. Set pump at 127 feet
 Pump does not work. Rerun from well.
 0958 Water level: 92.88 feet
 1020 Continue purging. Set pump at 100 feet. Lowered slowly to 120 feet.
 1024 Water drop. Problems with submersible pump.
 1103 Continue purging with other submersible pump.
 1111 Water drop. Purged volume: 50 gal well water.
 1130 Measure water level: deeper than 100 feet
 1410 Water level: approx. 115 feet

TUTU WATER WELL SAMPLING

Project/No. Tutu RI / P 0003.030

Page 1 of 1

Site Location E 500 Station

Date June 21, 1994

Well I.D. 50-2

Sampling Personnel: W. Morales

Replicate I.D. N/A

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of PVC casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

34.9 feet / Water level: 18.93 feet

Water Column in Well

15.97 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

10.38

Gallons Pumped Prior to Sampling

23 gallons

Pump Setting (feet below land surface)

30 feet

Purging Method

Centrifugal Pump / Teflon Bailer

Well background: 0 ppm

Sampling Data

Field Parameters	(2 gal)	(4 gal)	(8 gal)	(16 gal)
pH	13.18	13.23	15.13	07.18
T (celcius)	8.0	7.9	7.8	8.0
Specific Conductivity (uS/cm)	34	33	31	30
PID (ppm)	2.9	3.2	2.5	2.0
Salinity (‰)	0.2	0.3	0.1	0
DO (mg/L)	0.8	0.2	0.1	0.1
Color	7.9	8.3	8.3	6.4
Odor	Light gray			
Appearance	None			
	Silly			

Constituents	Container	Preservative	Sample Collected
VOCs TCH	40 ml	None	1500 (6/21/94)
BNA TCH	1 - liter	None	0718 (6/22/94)
TAL TCH	1 - liter	HNO3	0718 (6/22/94)
Cyanide	500 ml	NaOH	0718 (6/22/94)

Sulf. de	500ml	NaOH + Zinc Acetate	0718 (6/22/94)
Sulfate	500ml	None	0718 (6/22/94)
9. Phos + Cd	300ml	H2SO4	0718 (6/22/94)

Well Casing Volumes (GAL/Ft)

hardness 1H H2O3	0718 (6/22/94)	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
7-lead 1H H2O3	0718 (6/22/94)	1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

2203/TDS/TSS/Alkal/Chlor 1H None 0718 (6/22/94)

PR00801A ut form

1316 Start purging

1319 Water level: 24 feet

1322 Water level: 27 feet

1324 Stop purging. Centrifugal pump does not work at this depth. Proceed with teflon bailer to complete purging

1422 Well went dry. Purged volume: 22 gallons

1440 No water in well.

1509 Water level: 33.25 feet

1650 Water level: 32.25 feet

6/22/94

0706 Water level: 26.16 feet

TUTU WATER WELL SAMPLING

Project/No. Tutu AI / PR0013.030

Page 1 of 1

Site Location E-30 Station

Date June 23, 1994

Well I.D. 5W-3

Sampling Personnel: W. Morales

Replicate I.D. DIA

M. Cedeño

Purging Data

Description of Measuring Point (MP)

Top of PVC pipe

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

39.30 feet / Water level: 18.18 feet

Water Column in Well

21.12 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

13.73

Gallons Pumped Prior to Sampling

22

Pump Setting (feet below land surface)

Bottom / Bottom

Purging Method

Centrifugal Pump / Submersible Pump

Has background: Oppm

Sampling Data

Field Parameters	(2 gallons)	(2 gallons)	(2 gallons)	(2 gallons)
	0804	0825	0826	1145
pH	7.0	7.1	7.0	7.0
T (celcius)	32	30	30	30
Specific Conductivity (mS/cm)	2.4	2.4	2.4	2.4
PID (ppm)	1	3	8	9
SALINITY (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	6.6	7.4	7.4	7.9
Color	<u>Grayish green</u>			
Odor	<u>Strong gasoline odor</u>			
Appearance	<u>Very silty / Green</u>			

0802 Start purging.
 0807 Stop purging.
 water drop and centrifugal pump could not lift.
 0823 Continue purging with submersible pump.
 0826 Stop purging. Well went dry. Purged volume: 22 gal
 0827 Water level: 36 ft
 0843 Water level: 35.60 ft

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1145
BNA TCL	1 - liter	None	1145
TAL TCL	1 - liter	HNO3	1145
Cyanide	500 ml	NaOH	1145

Sulfide 500 ml NaOH + Zinc Acetate 1145
 Sulfate 500 ml None 1145
 Arsenic + Cd 500 ml H2SO4 1145

Well Casing Volumes (GAL/ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

sediment 1 lt HNO3 1145
 - lead 1 lt HNO3 1145

1/2 NO3 / TOB / TSS / Alkal / Chlor 1 lt None 1145

PR000114141

TUT 005 1126

TUTU WATER WELL SAMPLING

Project/No. Future RIIPRO013.030

Page 1 of 1

Site Location E 550 Station

Date June 23, 1994

Well I.D. 5W-7

Sampling Personnel: W. Morales

Replicate I.D. M5/M5B/5W-6 (Duplicate)

M. Cedeño / S. Padilla

Purging Data

Description of Measuring Point (MP)

Top of PVC casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

19.91 feet / Water level: 10.00 (approx)

Water Column in Well

9.91 Waste oil in well; could not measure thickness with test bailer.

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

6.44

Gallons Pumped Prior to Sampling

11

Pump Setting (feet below land surface)

Bottom

Purging Method

Centrifugal Pump

HNu background: 0.1 ppm

Sampling Data

Field Parameters	2 gal (0909)	(11 gal) Time (0912)	0945	
pH	7.0	7.0	7.1	
T (celcius)	29	30	28	
Specific Conductivity (mS/cm)	1.8	1.8	1.8	
PID (ppm)	1	1	0.2	
SALINITY (‰)	0.1	0.1	0.1	
DO (mg/L)	7.4	7.4	8.0	
Color	Light brown			
Odor	Slightly product odor			
Appearance	Very viscous product			

0908 Start purging of well
0912 Well went dry
0928 Water level: 15 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0945
BNA TCL	1 - liter	None	0945
TAL Total Dissolved	1 - liter	HNO3	0945
Cyanide	500 ml	NAOH	0945

Sulfide 500ml
Sulfate 500ml
Pb, Cu, Co 500ml

PAOW + Zinc Acetate 0945
None 0945
H2SO4 0945

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness 1-liter HNO3 0945
O-lead 1-liter HNO3 0945
Pb, Cu, Co 1-liter HNO3 0945
TSS / Alkalinity 1-liter NONE 0945

TUTU WATER WELL SAMPLING

Project/No. TutuRI/PR0013.30

Page 1 of 1

Site Location Kentucky Fried Chicken / Fort Myler

Date June 22, 1994

Well I.D. KFC

Sampling Personnel: W. Morales

Replicate I.D. N/A

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of PVC pipe

Height of (MP) Above/Below Land Surface

1.35 feet

Total Sounded Depth of Well Below MP

19.00 feet / Water level: 9.45 feet

Water Column in Well

9.55 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

6.21

Gallons Pumped Prior to Sampling

10

Pump Setting (feet below land surface)

Bottom

Purging Method

Centrifugal Pump

How background: 0 ppm

Sampling Data

Field Parameters	(2 gal)	(8 gal)	Time (10 gal)	
pH	8.0	7.8	7.9	7.9
T (celcius)	28	29	29	29
Specific Conductivity	1.3	1.3	1.7	1.7
PID (ppm)	0	0	0	0
SALINITY (%)	0.1	0.1	0.1	0.1
DO (mg/L)	7.8	7.6	9.8	9.8
Color	Light greenish brown			
Odor	None			
Appearance	Very silty			

0842 Start purging.

0846 Well went dry.

Purged volume: 10 gal

0902 Water level: 15.60 feet

Constituents	Container	Preservative	Sample Collected
VOCs 529.2	40 ml	None	0927
BNA 1	1 - liter	None	0927
TAL TOTAL dissolved	1 - liter	HNO3	0927
Cyanide	500 ml	NaOH	0927

Sulfide 500 ml NaOH + Zinc Acetate

Sulfate 500 ml NONE

4-phospho 500 ml H2SO4

Well Casing Volumes (GAL/Ft)

Hardness 1 H HPO3 0927	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
0-bad 1 H HPO3 0927	1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

221N03/TDS/MS/Alkalinity 1 H None 0927

PR0001A form

TUT 005 1128

TUTU WATER WELL SAMPLING

Project/No. Yucha RI / PR0013030

Page 1 of 1

Site Location Gassett Property

Date 5/17/94

Well I.D. Gassett (new)

Sampling Personnel: Wanda I. Morales

Replicate I.D. N/A

Miguel Cedeño

Purging Data

Description of Measuring Point (MP)

Top of Pre casing

Height of (MP) Above/Below Land Surface

1.75 feet

Total Sounded Depth of Well Below MP

203 feet / Water level: 23.85 feet

Water Column in Well

179.15 feet

Diameter of Casing

6 inches

Gallons Per Foot

263

Gallons in Well

790

Gallons Pumped Prior to Sampling

825

Pump Setting (feet below land surface)

40

Purging Method

Submersible Pump with Polyethylene Tubing

Sampling Data

Field Parameters	Time	1050	1205	1256	1312
pH		7.3	7.4	7.4	7.4
T (celcius)		27	27	28	28
Specific Conductivity (µS/cm)		1.9	2	2	1.2
PID (ppm)		—	—	—	—
Salinity (‰)		0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)		8.1	8.3	8.4	8.5
Color		Clear			
Odor		None			
Appearance		Clear			

Water levels during purging:

1113 29.04 feet
1210 29.20 feet
1259 29.02 feet

Water level after completion of Sampling:

1344 23.92 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1312
BNA TCL	1 - liter	None	1312
TAL TOTAL Residue	1 - liter	HNO3	1312
Cyanide	600 ml	NAOH	1312
Sulfide	500 ml	NaOH + Zinc Acetate	1312
T-phos + COB	500 ml	H2SO4	1312
TPH	1-liter	None	1312

Iron 23 1-liter HNO3 1312
O-Leads 1-liter HNO3 1312
Alkal Chlor Sulfate 1-liter None 1312
NO2/NO3/TDS/TSS 1-liter None 1312
Hardness 1-liter None 1312

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu I/PR0013.030
 Site Location Tutu Park Mall
 Well I.D. Hartman Race Track
 Replicate I.D. N/A

Page 1 of 1
 Date May 17, 1994
 Sampling Personnel: W. Morales
M. Cedeno

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Measuring Port at Top of Casing
N/A
Not measured. Water level 22.72 feet
N/A
6 inches
N/A
N/A
N/A
Existing Submersible Pump
Existing Submersible Pump but
it run for 15 minutes prior to
sampling.

Sampling Data

Field Parameters	1500	1511	1516	
pH	7.3	7.3	7.3	
T (celcius)	30	29	28	
Specific Conductivity (mS/cm)	1.8	1.9	1.9	
PID (ppm)	—	—	—	
Salinity (‰)	0.1	0.1	0.1	
DO (mg/L)	8.7	8.7	8.7	
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Clear</u>			

Constituents	Container	Preservative	Sample Collected
VOCS <u>500 ml</u>	40 ml	<u>None</u>	<u>1524</u>
BNA <u>TCH</u>	1 - liter	<u>None</u>	<u>1524</u>
TAL <u>Total</u>	1 - liter	<u>HNO3</u>	<u>1524</u>
Cyanide <u>500 ml</u>	1-liter	<u>NAOH</u>	<u>1524</u>
Sulfide	500 ml	<u>NaOH + Zinc Acetate</u>	<u>1524</u>
Ar. Phos + COB	500 ml	<u>W 504</u>	<u>1524</u>
O-Lead <u>500 ml</u>	1-liter	<u>HNO3</u>	<u>1524</u>

Iron 2-3 1-liter HNO3 1524
Alkal/Clor/Sulfate 1-liter None 1524
NO3, NO2, ITAS, ITTS 1-liter None 1524
Hardness TPH 1-liter None 1524

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu AI/PR0013.030

Page 1 of 1

Site Location Steele Residence

Date 5/18/94

Well I.D. STEEL

Sampling Personnel: M. Cedeño

Replicate I.D. N/A

W. Morales

Purging Data

Description of Measuring Point (MP) N/A

Height of (MP) Above/Below Land Surface N/A

Total Sounded Depth of Well Below MP N/A

Water Column in Well N/A

Diameter of Casing 6 inches

Gallons Per Foot N/A

Gallons in Well N/A

Gallons Pumped Prior to Sampling Pump was running.

Pump Setting (feet below land surface) N/A

Purging Method Existing Submersible Pump

Sampling Data

Field Parameters	1020	1025	1030	1035
pH	6.9	7.0	7.0	7.0
T (celcius)	27	28	28	28
Specific Conductivity (µm/cm)	2.5	2.4	2.4	2.4
PID (ppm)	—	—	—	—
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	8.1	8.2	8.3	8.6
Color	Clear			
Odor	None			
Appearance	Clear			

Constituents	Container	Preservative	Sample Collected	
VOCs TCL	40 ml	None	1035	Iron 2-3 1-liter HNO ₃ 1035
BNA TCL	1 - liter	None	1035	0-Lead 1035 1-liter HNO ₃ 1035
TAL TOTAL	1 - liter	HNO ₃	1035	Alkal Chlor/Sulfate 1-liter None 1035
Cyanide	500 ml	NaOH	1035	NO ₂ /PO ₄ /TDS/TSS 1-liter None 1035
Sulfide	500 ml	NaOH + Zinc Acetate	1035	Hardness 1-liter None 1035
T. Phos + COD	500 ml	H ₂ SO ₄	1035	

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. TURBRI/PR0013030
 Site Location Archives Welling Area
 Well I.D. EGLIN III
 Replicate I.D. N/A

Page 1 of 1
 Date 5/18/94
 Sampling Personnel: M. Cedeño
W. Morales

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches, steel
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling Pump was running prior to purging at
38 gallons per minute
 Pump Setting (feet below land surface) N/A
 Purging Method Existing Submersible Pump

Sampling Data

Field Parameters	1410	1415	1420	1425
pH	7.3	7.3	7.3	7.3
T (celcius)	30	30	30	30
Specific Conductivity (µmS/cm)	2.3	2.4	2.4	2.4
PID (ppm)	—	—	—	—
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	9.4	9.1	9.1	8.7
Color	Clear			
Odor	None			
Appearance	Clear			

Constituents	Container	Preservative	Sample Collected
VOCs (TCL)	40 ml	None	1425
BNA (TCL)	1 - liter	None	1425
TAL ^{TOTAL} Dissolved	1 - liter	HNO3	1425
Cyanide	500 ml	NAOH	1425
Sulfide	500 ml	NaOH + Zinc Acetate	1425
T. Phos + COB	500 ml	N ₂ SO ₄	1425

Iron 2-3 1-liter H₂O₂ 1425
 O-Lead ~~1-liter~~ 1-liter H₂O₂ 1425
 Nickel/Chlor/Sulfate 1-liter None 1425
 NO₂/NO₃/TDS/TSS 1-liter None 1425
 Hardness 1-liter None 1425

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu AI/PR0013.030

Page 1 of 1

Site Location _____

Date 5/19/94

Well I.D. EGWIN I

Sampling Personnel: M. Cedeno

Replicate I.D. N/A

W. Morales

J. Padilla

Purging Data

Description of Measuring Point (MP) N/A

Height of (MP) Above/Below Land Surface N/A

Total Sounded Depth of Well Below MP N/A

Water Column in Well N/A

Diameter of Casing 6 inch steel

Gallons Per Foot N/A

Gallons in Well N/A

Gallons Pumped Prior to Sampling N/A

Pump Setting (feet below land surface) N/A

Purging Method Existing Submersible Pump. Pump was running prior to sampling.

Sampling Data

Field Parameters	0905	0910	0915	0919
pH	7.2	7.5	7.5	7.5
Temperature	27	27	28	29
Specific Conductivity (mS/cm)	2.1	2.1	2.1	2.1
TID (ppm)	—	—	—	—
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/l)	7.4	7.5	7.6	7.3
Color	Clear			
Turbidity	None			
Appearance	Clear			

Constituents	Container	Preservative	Sample Collected	
VOCs TCL	40 ml	None	0919	Alkalinity/Sulfate 1-liter None 0919
BNA TCL	1-liter	None	0919	NO ₂ /NO ₃ /NH ₄ /TSS 1-liter None 0919
TA/TOTAL	1-liter	HNO ₃	0919	Iron 2-3 1-liter HNO ₃ 0919
Cyanide	500ml	NaOH	0919	O-lead 1-liter HNO ₃ 0919
Sulfide	500ml	NaOH + Zinc Acetate	0919	Hardness 1-liter None 0919
Ar. Phos + Cob	500ml	H ₂ SO ₄	0919	

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013.030

Page 1 of 1

Site Location _____

Date May 19, 1994

Well I.D. La Place

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

J. Padilla

Purging Data

Description of Measuring Point (MP) N/A

Height of (MP) Above/Below Land Surface N/A

Total Sounded Depth of Well Below MP N/A

Water Column in Well N/A

Diameter of Casing 6 inches

Gallons Per Foot N/A

Gallons in Well N/A

Gallons Pumped Prior to Sampling N/A

Pump Setting (feet below land surface) Existing submersible pump.

Purging Method Existing submersible pump.

Let it run for 15 minutes prior to sampling.

Sampling Data

Field Parameters	1405	1410	1415	1418
pH	7.3	7.3	7.3	7.3
Temperature	29	29	27	28
Specific Conductivity (mS/cm)	1.4	1.5	1.5	1.5
PID (ppm)	—	—	—	—
Salinity (%)	0.1	0.1	0.1	0.1
DO (mg/L)	10.2	9.7	9.1	8.6
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Clear</u>			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	<u>None</u>	1418
BNA TCL	1 - liter	<u>None</u>	1418
TAL Total Alkalinity	1 - liter	<u>HNO3</u>	1418
Cyanide	<u>500 ml</u>	<u>NaOH</u>	1418
Sulfide	500 ml	<u>NaOH + Zinc Acetate</u>	1418
Ar. Phos + COB	500 ml	<u>H2SO4</u>	1418

Alkal (Clor/Sulf) 1-liter None 0919

NO₃(NO₂) TDS/TSS 1-liter None 0919

Iron 2-3 1-liter HNO₃ 0919

O-lead 1-liter HNO₃ 0919

Hardness 1-liter None 0919

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030Page 1 of 1Site Location Smith ResidenceDate 5/20/94Well I.D. SmithSampling Personnel: M. CedeñoReplicate I.D. N/AS. PadillaW. MoralesPurging Data

Description of Measuring Point (MP)

N/A

Height of (MP) Above/Below Land Surface

N/A

Total Sounded Depth of Well Below MP

N/A

Water Column in Well

N/A

Diameter of Casing

6 inch

Gallons Per Foot

N/A

Gallons in Well

N/A

Gallons Pumped Prior to Sampling

N/A

Pump Setting (feet below land surface)

N/A

Purging Method

Existing submersible pump. Let it run for 15 minutes prior to samplingSampling Data
Time

Field Parameters	0757	0802	0807	0812
pH	7.3	7.5	7.5	7.4
T (celcius)	27	27	27	28
Specific Conductivity (mS/cm)	2.5	2.5	2.5	2.5
PID (ppm)	—	—	—	—
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	7.9	7.9	8.6	8.7
Color	Clear			
Odor	None			
Appearance	clear			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0812
BNA TCL	1 - liter	None	0812
TAL Total Lead	1 - liter	HNO ₃	0812
Cyanide	500ml	NaOH	0812
Sulfide	500ml	NaOH + Zinc Acetate	0812
T. Phos + CO ₂	500ml	H ₂ SO ₄	0812

Iron 2-3 1-liter HNO₃ 0812
 O-lead 1-liter HNO₃ 0812
 Na₂CO₃/TDS/TSS 1-liter None 0812
 Alkal/Chlor/Sulfate 1-liter None 0812
 Hardness 1-liter None 0812

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. 9th RI/PR0013.030
 Site Location Assembly of God Church
 Well I.D. MW-12D
 Replicate I.D. N/A

Page 1 of 1
 Date 5/20/94
 Sampling Personnel: M. Cedeño
S. Padilla
W. Morales

Purging Data

Description of Measuring Point (MP) Top of stainless steel casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 80.62 / water level 24.18 ft
 Water Column in Well 56.44
 Diameter of Casing 4 inch
 Gallons Per Foot 0.65
 Gallons in Well 36.68
 Gallons Pumped Prior to Sampling 110
 Pump Setting (feet below land surface) 30 feet
 Purging Method Submersible Pump with Polyethylene Tubing

Sampling Data

Field Parameters	1012	1017	1023	1040
pH	7.3	7.2	7.3	7.4
T (celcius)	30	30	30	30
Specific Conductivity (mS/cm)	1.4	1.4	1.4	1.2
PID (ppm)	—	—	—	—
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	8.5	8.7	8.7	8.5
Color	Clear			
Odor	None			
Appearance	Clear			

1002 Start purging.
 1007 water level: 25.74 feet
 1012 water level: 25.83 feet
 1019 water level: 25.88 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1040
BNA TCL	1 - liter	None	1040
TAL TOTAL	1 - liter	HNO3	1040
Cyanide	500ml	NaOH	1040
Sulfide	500ml	NaOH + Zinc Acetate	1040
T. Phos + COB	500ml	H2SO4	1040

Iron 2-3 1-liter HNO3 1040
 Lead 1-liter HNO3 1040
 Ni/Pb/Mn/PP3 1-liter None 1040
 Al/K/Cr/Sulfate 1-liter None 1040
 Hardness 1-liter None 1040

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Yubut I/PR0013.030

Page 1 of 1

Site Location O'Henry Cleaners

Date May 24, 1994

Well I.D. OH MW-3

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of stainless steel casing

Height of (MP) Above/Below Land Surface

3.8 feet

Total Sounded Depth of Well Below MP

33.8 feet / Water level: 9.65 feet

Water Column in Well

24.15 feet (Measured on 5/23/94)

Diameter of Casing

2 inch

Gallons Per Foot

0.16

Gallons in Well

4

Gallons Pumped Prior to Sampling

15

Pump Setting (feet below land surface)

21.20 feet

Purging Method

Pump intake -
(1/2 inch ID Polyethylene
tubing)

Centrifugal Pump

Sampling Data

Field Parameters	(1 gallon)	(6 gal)	Time (15 gal)	
pH	0919	0922	0928	0955
T (celcius)	7.5	7.6	7.6	7.7
Specific Conductivity (mS/cm)	2.2	2.3	2.3	2.2
PHD (ppm) Dissolved O ₂ (mg/L)	7.1	7.2	6.9	7.1
Salinity (‰)	0.1	0.1	0.1	0.1
Redox (mv)	184	119.6	93.7	99.7
Color	<u>Brown</u>			
Odor	<u>None</u>			
Appearance	<u>Very silty</u>			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0955
BNA TCL	1 - liter	None	0955
TAL Total Alkalinity	1 - liter	HNO ₃	0955
Cyanide	500 ml	NaOH	0955

Sulfide 500 ml NaOH + Zinc Acetate 0955
NO₂/NO₃/TSS/TDS 1 liter None 0955
Alkalinity / Sulfate 1 liter None 0955

Iron 2-3 1-liter HNO₃ 0955
O-Lead 1-liter HNO₃ 0955
Mercury 1-liter None 0955
T. Phos + Cob 500 ml H₂SO₄ 0955

Well Casing Volumes (GAL/Ft)

1 - 1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1 - 1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013-030

Page 1 of 1

Site Location O'Herry Cleaners

Date 5/24/94

Well I.D. 04 MW2

Sampling Personnel: M. Cedeño

Replicate I.D. N/A

W. Morales

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of 24 inch steel casing
Flush mounted

Height of (MP) Above/Below Land Surface

Total Sounded Depth of Well Below MP

29.9 feet / Water level 17.39 feet (Measured on 5/23/94)

Water Column in Well

12.51 feet

Diameter of Casing

2 inch

Gallons Per Foot

0.16

Gallons in Well

2

Gallons Pumped Prior to Sampling

8

Pump Setting (feet below land surface)

22 feet (1/2 inch ID Polyethylene tubing)

Purging Method

Centrifugal Pump

Sampling Data

Field Parameters	(6 gal)	(6 gal)	Time (8 gal)	
pH	11.02	11.06	11.08	11.15
T (celsius)	7.3	7.3	7.3	7.3
Specific Conductivity (mS/cm)	28	28	28	30
Specific Conductivity (mS/cm)	2.1	2.2	2.2	2.2
PID (ppm) Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	6.6	6.8	6.8	7.4
Redox (mv)	137.2	98	96	107.5
Color	Clear			
Odor	NONE			
Appearance	Clear			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1115
BNP TOL	1 - liter	None	1115
AL Total	1 - liter	HNO3	1115
Cyanide	500 ml	NaOH	1115

Sulfide 500 ml
P. Phosphate 500 ml

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Alkalinity 1-liter None 1115
NO3/NO2/RS/RS 1-liter None 1115
Iron 2-3 1-liter WPO3 1115
O-lead 1-liter WPO3 1115
Hardness 1-liter None 1115

TUTU WATER WELL SAMPLING

Project/No. 9-10-RI/PR0013-030
 Site Location Oil Henry Cleaners
 Well I.D. OH MW-1
 Replicate I.D. N/A

Page 1 of 1
 Date May 24, 1994
 Sampling Personnel: W. Morales
M. Cebalero

Purging Data

Description of Measuring Point (MP)

Height of (MP) Above/Below Land Surface

Total Sounded Depth of Well Below MP

Water Column in Well

Diameter of Casing

Gallons Per Foot

Gallons in Well

Gallons Pumped Prior to Sampling

Pump Setting (feet below land surface)

Purging Method

Top of stainless steel casing
2.07 feet
39.2 feet / Water level: 21.65 feet (measured on 5/23/94)
17.55 feet
2 inches
0.16
2.8
8.5
N/A
Yellow Bailer

Sampling Data

(2.5 gallons) (4.5 gal) Time (8.5 gal)

Field Parameters	1303	1304	1318	1325
pH	7.2	7.1	7.1	7.2
T (celcius)	28	28	28	28
Specific Conductivity (mS/cm)	2.3	2.3	2.3	2.3
PID (ppm) DO (mg/L)	8.6	8.5	8.4	8.5
Salinity (‰)	0.1	0.1	0.1	0.1
Redox (mV)	132	113	167.4	139.3
Color	Brown			
Odor	None			
Appearance	Very Silty			

Consutients	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1325
BNA TCL	1 - liter	None	1325
TAL Total Alkalinity	1 - liter	HNO3	1325
Cyanide	500 ml	NaOH	1325

Sulfide 500ml
 4. Phos + CuD 500ml
 NaOH + Zinc Acetate
 H2SO4

0 lead 1-liter HNO3 1325
 Iron 2-3 1-liter HNO3 1325
 Hardness 1-liter None 1325
 Alkal (br/sulfate) 1-liter None 1325
 NO3/PO3/TDS/TS 1-liter None 1325

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PRO013.030
 Site Location O'Herry Cleaners
 Well I.D. OHMW-4
 Replicate I.D. N/A

Page 1 of 1
 Date 5/24/94
 Sampling Personnel: M. Cedeño
W. Morales

Purging Data

Description of Measuring Point (MP) Top of casing (stainless steel)
 Height of (MP) Above/Below Land Surface 2.5 feet
 Total Sounded Depth of Well Below MP 49.10 feet / Water level 32.42 feet
 Water Column in Well 16.68 (Measured Slightly)
 Diameter of Casing 2 inches
 Gallons Per Foot 0.16
 Gallons in Well 2.7
 Gallons Pumped Prior to Sampling 8 gallons
 Pump Setting (feet below land surface) N/A
 Purging Method Teflon Bailer

Sampling Data

Field Parameters	(4gal)	(6gal)	Time (gal)	6gal	8gal	
pH	1430	1432	1435	1455	1500	1505
T (celcius)	7.3	7.3	7.3	7.3	7.4	7.2
Specific Conductivity	28	28	27	29	28	28
PHD (ppm) Salinity (‰)	0.1	0.1	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	8.1	8.2	8.2	8.9	9.1	10.1
Color	186	127.8	127	134.3	140.4	156.6
Odor	Grayish brown					
Appearance	NOAE					
	Very silty					

Constituents	Container	Preservative	Sample Collected			
VOCs TCL	40 ml	None	1505	Alkal/Chlor/Sulfate	1-liter None	1505
BNA TCL	1 - liter	None	1505	NO ₂ /NO ₃ /TDS/TSS	1-liter None	1505
TAL Total Alkalinity	1 - liter	HNO ₃	1505	Iron 2-3	1-liter NPO ₃	1505
Cyanide	500ml	NaOH	1505	0-lead	1-liter H ₂ O ₂	1505
Sulfide	500ml	NaOH + Zinc Acetate	1505	Hardness	1-liter None	1505
4-Phos + LOD	500ml	H ₂ SO ₄	1505			

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI-PA0013.030
 Site Location Matias Residence
 Well I.D. Delgado Matias
 Replicate I.D. N/A

Page 1 of 1
 Date 5/25/94
 Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling N/A
 Pump Setting (feet below land surface) Existing submersible pump.
 Purging Method Pump was running. Open faucet for 15 minutes prior to sampling.

Sampling Data

Field Parameters	0835	0840	0845	0850
pH	7.2	7.5	7.4	7.6
T (celcius)	24	25	25	27
Specific Conductivity (mS/cm)	2.3	2.3	2.3	2.3
Hardness (ppm) Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	7.3	7.5	7.8	8.2
Resor (mV)	197.7	194.2	209.8	180.9
Color	Clear			
Odor	None			
Appearance	Clear			

Constituents	Container	Preservative	Sample Collected
TA - TCL	40 ml	None	0850
BNA - TCL	1 - liter	None	0850
TAL Total Dissolved	1 - liter	HNO3	0850
Cyanide	500 ml	NaOH	0850
Sulfide	500 ml	NaOH + Zn Acetate	0850
P. Phos + WOB	500 ml	H3PO4	0850

Alkal/clor/Sulf 1-liter None 0850
 NO₂/NO₃/NH₄ 1-liter None 0850
 Iron 2-3 1-liter HNO₃ 0850
 A lead 1-liter HNO₃ 0850
 Hardness 1-liter None 0850

Well Casing Volumes (GAL/Ft)

1 - 1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1 - 1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Quila RI/PRO013.030

Page 1 of 1

Site Location Tillet Area

Date May 25, 1994

Well I.D. Tillet

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

J. Padilla

Purging Data

Description of Measuring Point (MP)

N/A

Height of (MP) Above/Below Land Surface

N/A

Total Sounded Depth of Well Below MP

N/A

Water Column in Well

N/A

Diameter of Casing

6 inches

Gallons Per Foot

N/A

Gallons in Well

N/A

Gallons Pumped Prior to Sampling

305

Pump Setting (feet below land surface)

Existing Submersible Pump

Purging Method

Let pump run for 15 minutes prior to sampling.

H₂O background: 0.2 ppm

Sampling Data

Field Parameters	Time	1117	1132	1145	1146
pH		7.3	7.4	7.3	7.3
T (celcius)		30	29	30	30
Specific Conductivity (mS/cm)		1.3	1.3	1.3	1.3
PID (ppm)		0.2	0.2	0.2	0.2
Salinity (‰)		0.1	0.1	0.1	0.1
DO (mg/L)		9.2	9.9	10.5	10.3
Color		<u>Clear</u>			
Odor		<u>None</u>			
Appearance		<u>Clear</u>			

Redox (mv) 20 -25.5 -22.1 -28.5

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1146
BNA TCL	1 - liter	None	1146
TAL Total Dissolved	1 - liter	HNO3	1146
Cyanide	500 ml	NAOH	1146

Sulfide 500 ml NaOH + Zinc Acetate 1146
 Cr. Phos + COD 500 ml H₂SO₄ 1146

Iron 2-3 1-liter H₂O₂ 1146
 O-Lead 1-liter H₂O₂ 1146
 Mg/Na₂SO₄/H₂SO₄ 1-liter None 1146
 Alkal/Clor/Sulfate 1-liter None 1146
 Hardness 1-liter None 1146

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu AI/PR0013.030

Page 1 of 1

Site Location Lutheran Church

Date May 25, 1994

Well I.D. 3W-5

Sampling Personnel: W. Morales

Replicate I.D. N/A

S. Padilla

M. Cedeño

Purging Data

Description of Measuring Point (MP)

Top of PVC casing

Height of (MP) Above/Below Land Surface

N/A

Total Sounded Depth of Well Below MP

29.83 feet / Water level: 20.62 feet

Water Column in Well

9.21 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

6

Gallons Pumped Prior to Sampling

20

Pump Setting (feet below land surface)

25

Purging Method

Centrifugal Pump with 1/2 inch ID
Polyethylene Tubing

How background: 0.1 ppm

Sampling Data

Field Parameters	1323	1326	1331	1335
pH	7.2	7.2	7.2	7.2
T (celcius)	32	31	31	31
Specific Conductivity (mS/cm)	2.3	2.3	2.3	2.3
PID (ppm)	0.1	0.1	0.1	0.1

Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	8.7	8.8	8.8	9.1

Color Clear

Odor None

Appearance Slightly silty

Redox (mV) 141.5 152.7 163.2 159

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1335
BNA TCL	1 - liter	None	1335
TAL dissolved	1 - liter	HNO3	1335
Cyanide	500 ml	NaOH	1335

Sulfide 500ml NaOH + Zinc Acetate 1335

g. Phos + COD 500ml H2SO4 1335

Iron 2-3 1-liter HNO3 1335
O-lead 1-liter HNO3 1335
NO3/NO2/NO3/HS 1-liter None 1335
Alkal (6-1) Sulfate 1-liter None 1335
Hardness 1-liter None 1335

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.050

Page 1 of 1

Site Location _____

Date 5/26/14

Well I.D. Delegarde

Sampling Personnel: W. Morales

Replicate I.D. M3/M3D for VOC analysis (EPA Method 524.2 modified) only

M. Cedeño

Purging Data

Description of Measuring Point (MP) _____

NA

Height of (MP) Above/Below Land Surface _____

NA

Total Sounded Depth of Well Below MP _____

NA

Water Column in Well _____

NA

Diameter of Casing _____

6 inches / 5 feet

Gallons Per Foot _____

NA

Gallons in Well _____

NA

Gallons Pumped Prior to Sampling _____

NA

Pump Setting (feet below land surface) _____

NA (Existing Pump)

Purging Method _____

Pump run for 15 minutes.
Collect sample at water faucet

Sampling Data

Field Parameters	0810	0815	0820	0830
pH	7.3	7.5	7.6	7.4
T (celcius)	26	27	26	27
Specific Conductivity mS/cm	2.5	2.5	2.5	2.5
PHD ppm: Salinity ‰	0.1	0.1	0.1	0.1
Dissolved Oxygen mg/L	7.7	7.7	7.7	8.2
Redox mv	225.4	225.6	221	209.1
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Clear</u>			

Conservation	Container	Preservative	Sample Collected
VOCs 524.2	40 ml	None	0830
BNA TCL	1 - liter	None	0830
TAL Dissolved	1 - liter	HNO3	0830
Cyanide	500ml	NaOH	0830
Sulfide	500ml	NaOH + Zinc Acetate	0830
P. Plus + COB	500ml	H2SO4	0830

Iron 2-3	1-liter	HNO3	0830
O-lead	1-liter	HNO3	0830
NO3/NO2/TS/SS	1-liter	None	0830
Alkal/Chlor/Sulfate	1-liter	None	0830
Hardness	1-liter	None	0830

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. TutuRI PR0013.030
 Site Location Ramsay Motors
 Well I.D. Ramsay
 Replicate I.D. N/A

Page 1 of 1
 Date May 26, 1994
 Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling N/A
 Pump Setting (feet below land surface) Existing Submersible Pump
 Purging Method Jet purging for 15 minutes prior to sampling

W. background: 0.3 ppm

Sampling Data

Field Parameters	1050	1055	1100	1102
pH	7.3	7.3	7.3	7.3
T (celcius)	29	28	28	29
Specific Conductivity (mS/cm)	1.4	1.4	1.4	1.4
PID (ppm)	0.3	0.3	0.3	0.3

Salinity (%) 0.1 0.1 0.1 0.1
 DO (mg/L) 8.2 8.3 8.4 9.1
 Redox (mV) 190.8 187.1 196.0 199.8

Color Clear
 Odor None
 Appearance Clear

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1102
BNA TCL	1 - liter	None	1102
TAL ^{Probed} Probed	1 - liter	HNO3	1102
Cyanide	500 ml	NAOH	1102

Sulfide 500 ml H2O4 + Zinc Acetate 1102
 G. Phos + COD 500 ml H2SO4 1102

Iron 2-3 1-liter HNO3 1102
 O-Lead 1-liter HNO3 1102
 Hardness 1-liter None 1102
 NO3/NO2/TDS/TSS 1-liter None 1102
 Alkal Chlor/Sulf 1-liter None 1102

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project No. Tutu RTI PR0013.030
 Site Location Tanacet Landmark
 Well I.D. SW-6
 Replicate I.D. N/A

Page 1 of 1
 Date May 26, 1994
 Sampling Personnel: M. Cedeño
W. Morales

Purging Data

Description of Measuring Point (MP) Top of PVC casing
 Height of (MP) Above/Below Land Surface 4 inch mounted
 Total Sounded Depth of Well Below MP 34.2 feet / Water level 11.08 feet
 Water Column in Well 23.12 feet
 Diameter of Casing 4 inches
 Gallons Per Foot 0.65
 Gallons in Well 15.03
 Gallons Pumped Prior to Sampling 45
 Pump Setting (feet below land surface) 27
 Purging Method Centrifugal Pump with 1/2 inch ID polyethylene tubing.

Sampling Data

	(40 gallons)	(60 gal)	Time (40 gal/min)	
Field Parameters	1246	1253	1300	1310
pH	7.2	7.1	7.1	7.1
T (celcius)	29	31	31	30
Specific Conductivity (mS/cm)	1.9	1.9	1.9	1.9
DO (ppm) Background: 0.2	0.2	0.3	0.4	0.3
Salinity (‰)	0.1	0.1	0.1	0.1
Dissolved Oxygen (mg/L)	8.8	8.6	8.6	8.6
Color	<u>Slightly white</u>			
Odor	<u>At a distance</u>			
Appearance	<u>Slightly silty</u>			

Redox (mV) 114.6 95.3 131 110.5

Constituents	Container	Preservative	Sample Collected
DOCs TCL	40 ml	None	1310
BNA TCL	1 - liter	None	1310
TAL (total)	1 - liter	HNO3	1310
Cyanide	<u>500ml</u>	NaOH	1310
Sulfide	500ml	NaOH + Zinc Acetate	1310
T. Phos + CO2	500ml	H2SO4	1310

Hardness 1-liter None 1310
 Alkalinity 1-liter None 1310
 PO4/PO3/TDS/TSS 1-liter None 1310
 U-Lead 1-liter HPO3 1310
 Iron 2-3 1-liter H2O2 1310

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RTI PROJ 13.030
 Site Location Forest Landmark
 Well I.D. 8 DW-2
 Replicate I.D. N/A

Page 1 of 1

Date May 27, 1994

Sampling Personnel: M. Cedeño
S. Padilla
W. Morales

Purging Data

Description of Measuring Point (MP) Top of PVC casing
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP 79.2 feet / Water level: 11.60 feet
 Water Column in Well 67.60 feet
 Diameter of Casing 6 inches
 Gallons Per Foot 1.47
 Gallons in Well 99.4
 Gallons Pumped Prior to Sampling 330
 Pump Setting (feet below land surface) 40 feet / 23 feet after 10 minutes of purging
 Purging Method Submersible Pump with 2 inch ID Polyethylene tubing

Sampling Data

Field Parameters	(10 gal)	(165 gal)	Time (330 gal)	
	0810	0837	0918	0920
pH	7.2	7.2	7.3	7.3
T (celcius)	30	30	30	30
Specific Conductivity (mS/cm)	1.6	1.6	1.6	1.6
PID (ppm) Salinity (‰)	0.1	0.1	0.1	0.1

DO (mg/L) 7.4 8.6 8.7 8.9
 Redox (mV) 233.3 174.6 180.4 189.3

Color Clear
 Odor None
 Appearance Clear

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0920
BNA TCL	1 - liter	None	0920
TAL ^{Total} _{Dissolved}	1 - liter	HNO3	0920
Cyanide	500 ml	NAOH	0920

Sulfide 500ml NaOH + Zn Acetate 0920
 Phos + ~~COB~~ 125ml H2SO4 0920
 COB 125ml H2SO4 0920

Iron 2-3 1-liter HNO3 0920
 P-lead 1-liter HNO3 0920
 Hardness 1-liter HNO3 0920
 TDS/TSS/NO3/NO2 1-liter None 0920
 Alkalinity 1-liter None 0920

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. RII PR0013.030
 Site Location Lutheran Church
 Well I.D. MW-11B
 Replicate I.D. BW-4

Page 1 of 1
 Date May 27, 1994
 Sampling Personnel: W. Morales
S. Padilla

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of Stainless Steel Casing
N/A
74.20 feet / Water level: 16.20 feet
58 feet
6 inches
1.47
85.26
240
35 feet / 30 feet
Centrifugal Pump / Submersible Pump
 (Change to submersible pump to minimize purging time)

Field Parameters	Sampling Data			
	(21 gallons)	(110 gal)	Time (109 gal)	
pH	7.7	7.3	7.4	7.9
T (celcius)	30	29	30	30
Specific Conductivity (ms/cm)	0.9	1.6	1.6	0.38
PTD (ppm) Salinity (%)	0	0.1	0.1	0

Color Clear
 Odor None
 Appearance Clear

Consutients	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1203
BNA TCL	1 - liter	None	1203
TAL Total Dissolved	1 - liter	HNO ₃	1203
Cyanide	500 ml	NaOH	1203

Sulfide 500 ml
 Ar. Phos 125 ml
 COD 125 ml
 NaOH + Zn Acetate
 H₂SO₄
 H₂SO₄

Well Casing Volumes (GAL/FT)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

DO (mg/L) 8.6 9.8 10.5 10.1
 Redox (mV) 258.4 314.1 299.5 302.1

1043 Start purging.
 1120 Purged volume: 110 gallons
 Water level: 19.30 feet

1126 Change to submersible pump.
 1128 continue purging.
 1138 Water level: 20 feet
 1154 Water level: 20.54 feet
 1230 Water level: 16.60 feet

Iron 2-3 1-liter HNO₃ 1203
 O-lead 1-liter HNO₃ 1203
 Hardness 1-liter HNO₃ 1203
 NO₂/NO₃/Total N 1-liter None 1203
 Alkalinity/Sulf 1-liter None 1203

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013.030

Page 1 of 1

Site Location Four Winds Plaza

Date 5/31/94

Well I.D. MW-93

Sampling Personnel: W. Morales

Replicate I.D. N/A

S. Padilla

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel Casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

18.3 feet / Water level: 11.63 feet

Water Column in Well

6.7 feet

Diameter of Casing

4 inch

Gallons Per Foot

0.65

Gallons in Well

4.3

Gallons Pumped Prior to Sampling

16

Pump Setting (feet below land surface)

18 feet

Purging Method

Centrifugal Pump with Polyethylene Tubing

Sampling Data

Field Parameters	Time	1117	1120	1137
pH		6.9	7.2	7.2
Temperature		30	30	30
Specific Conductivity $\mu S/cm$		1.4	1.4	1.4
PID (ppm) Background: 4.8 ppm		0.3	0.2	0.1
Salinity %		0.1	0.1	0.1
DO mg/L		7.6	7.6	8.6
Color				
Odor				
Appearance				

1117 1120 1137
Redox -79mV -89.4 -50.9
Start purging at 1114
Well went dry at 1119.

Constituents	Container	Preservative	Sample Collected
VOCs	40 ml	None	1137
BNA	1-liter	None	1137
TAL ^{Total} Dissolved	1-liter	HNO3	1137
Cyanide	500ml	NAOH	1137
Sulfide	500ml	NaOH + Zinc Acetate	1137
COD	500ml	H2SO4	1137
Phosphorus	125	H2SO4	1137

Alkal (60l) 1-liter None 1137
Sulfate 500ml None 1137
Hardness 1-liter HNO3 1137
Iron 2-3 1-liter HNO3 1137
O-lead 1-liter HNO3 1137
NO2/NO3/TB/TSS 1-liter None 1137

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. 4. RI/PR0013.030
 Site Location Four Winds / car Wash
 Well I.D. MW-10
 Replicate I.D. 21A

Page 1 of 1
 Date 5/31/94
 Sampling Personnel: W. Morales
J. Padilla
D. McGregor

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel Casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 35.15 feet / Water level: 17.86 feet
 Water Column in Well 17.29 feet
 Diameter of Casing 4 inches
 Gallons Per Foot 0.65
 Gallons in Well 11.24
 Gallons Pumped Prior to Sampling 30 gallons
 Pump Setting (feet below land surface) 34 feet
 Purging Method Centrifugal Pump Action Bailer
(15 gallons) (15 gallons)

Field Parameters	Sampling Data			
	(15gal)	(20gal)	Time (30gal)	
pH	7.3	7.3	7.4	7.5
T (celcius)	32	31	32	31
Specific Conductivity	1.5	1.5	1.4	1.4
PID (ppm)	0	0.5	0.5	0
Salinity %	0.1	0.1	0.1	0.1

Color Clear
 Odor None
 Appearance Clear

1333 water level: 29.72 feet
 DO (mg/L) 8.9 8.9 9.4 8.2
 Redox (mv) 35 52 67 180

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1345
BNA TCL	1 - liter	None	1345
TAL Total dissolved	1 - liter	HNO3	1345
Cyanide	500 ml	NAOH	1345
Sulf. de	500 ml	NaOH + Zinc Acetate	1345
Ar. Phos	125 ml	H2SO4	1345
COD	125 ml	H2SO4	1345

Hardness 1-liter H2O3 1345
 O-lead 1-liter H2O3 1345
 Iron 2-3 1-liter H2O3 1345
 Alkalinity 1-liter None 1345
 NO3/PO4/Pb/SS/TSS 1-liter None 1345

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI PR0013.030
 Site Location Four Winds Car Wash
 Well I.D. MW-10D
 Replicate I.D. N/A

Page 1 of 1

Date May 31, 1994

Sampling Personnel: W. Morales

S. McGeehan
S. Pabilla

Purging Data

Description of Measuring Point (MP)

Top of 3" Tankers Steel Casing
Flush mounted

Height of (MP) Above/Below Land Surface

Total Sounded Depth of Well Below MP

74.46 feet / Water level: 18.28 feet

Water Column in Well

56.18 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

82.58

Gallons Pumped Prior to Sampling

240

Pump Setting (feet below land surface)

74 feet

Purging Method

Submersible Pump

Field Parameters	Sampling Data				
	(5gal)	(100gal)	Time (165gal)	(240gal)	
pH	1340	1410	1425	1455	1515
T (celcius)	7.3	7.3	7.7	7.5	7.5
Specific Conductivity (mS/cm)	31	32	31	31	32
PID (ppm)	1.3	1.3	1.3	1.3	1.3
DO (mg/L)	0	0	0	0	0
Color (PCU)	8.1	8.1	8.1	8.1	8.1
Odor	8.8	9.6	7.9	7.9	9.2
Appearance	180	170	206	210	228
	Clear				
	None				
	Clear				

1425 Well went dry.
 1445 Continue purging.
 1455 Stop purging. Purged volume: 240 gallons

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1515
BNA TCL	1 - liter	None	1515
TAL Total Dissolved	1 - liter	HNO3	1515
Cyanide	500 ml	NaOH	1515
Sulfide	500 ml	NaOH + Zinc Acetate	1515
Silica	125 ml	H2SO4	1515
COD	125 ml	H2SO4	1515

Hardness 1-liter H2O3 1345
 O-lead 1-liter H2O3 1345
 Iron 2-3 1-liter HNO3 1345
 Alkalinity 1-liter H2O3 1345
 POC/NO3/TDS/TS 1-liter HNO3 1345

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. 9. J. RI/PR003.030

Page 1 of 1

Site Location Four Winds Plaza

Date 6/1/94

Well I.D. CHT-6D

Sampling Personnel: W. Morales

Replicate I.D. CHT-6DMS / CHT-6DMSD

M. Cedeño

S. Padilla

Purging Data

Description of Measuring Point (MP)

Top of PVC casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

107.5 feet / Water level: 10.63 feet

Water Column in Well

96.87 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

142

Gallons Pumped Prior to Sampling

440

Pump Setting (feet below land surface)

20 feet

Purging Method

Submersible pump with polyethylene tubing

HNO background: oppm

Sampling Data

Field Parameters	0930	1000	1059	1110
pH	7.3	7.3	7.3	7.6
T (celsius)	31	29	31	31
Specific Conductivity (mS/cm)	1.5	1.5	1.4	1.4
PID (ppm)	0	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	9.2	10.2	10.8	9.4
Color	Clear			
Odor	NOAE			
Appearance	Clear			

Redox meter not working.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1110
BNA TCL	1 - liter	None	1110
TAL Total	1 - liter	HNO3	1110
Cyanide	500 ml	NaOH	1110
Sulfide	500 ml	NaOH + Zinc Acetate	1110
Sulfate	500 ml	None	1110
COD	500 ml	H2SO4	1110

P. Phosphorus 125 500ml H2SO4 1110
Iron 2-3 1 lt HNO3 1110
O-Lead 1 lt HNO3 1110
Hardness 1 lt HNO3 1110
NO3/NO2/TDS/TSS/Alkal/Clor 1 lt None 1110

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013030
 Site Location Four Winds Place/Car Wash
 Well I.D. CHT-3
 Replicate I.D. N/A

Page 1 of 1
 Date 6/1/94
 Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP) Top of PVC casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 29.5 feet / Water level: 17.30 feet
 Water Column in Well 12.20 feet
 Diameter of Casing 2 inches
 Gallons Per Foot 0.16
 Gallons in Well 2
 Gallons Pumped Prior to Sampling 6
 Pump Setting (feet below land surface) N/A
 Purging Method Teflon Bailor

H2O background: 0.1 ppm

Sampling Data

Field Parameters	1355	1402	1414	1420
pH	7.2	7.1	7.3	7.1
T (celcius)	31	30	30	31
Specific Conductivity (mS/cm)	1.7	1.6	1.6	1.6
PID ppm	2	5	5	1
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	8.1	8.9	9.6	8.9
Color	<u>Greenish gray</u>			
Odor	<u>Strong product</u>			
Appearance	<u>Very silty / Slightly green</u>			

Redox meter does not work.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1420
BNA TCL	1 - liter	None	1420
TAL ^{Total} Residual	1 - liter	HNO3	1420
Cyanide	<u>500ml</u>	NAOH	1420
Sulfide	500ml	NaOH + Zinc Acetate	1420
Sulfate	500ml	None	1420
COD	500ml	H2SO4	1420
	125		

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

P. Phosphorus 125 500ml H2SO4 1420
Hardness 1 liter HNO3 1420
Iron 2-3 1 liter HNO3 1420
O-Lead 1 liter HNO3 1420
NO3/PO3/TDS/TSS/Alkal/lor 1 liter None 1420

TUTU WATER WELL SAMPLING

Project/No. Tutu RI1 P00013.030

Page 1 of 1

Site Location Four Winds Plaza

Date June 2, 1994

Well I.D. MW-25

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of stainless steel casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

43.0 feet / Water level 12.34 feet

Water Column in Well

30.66 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

45

Gallons Pumped Prior to Sampling

65

Pump Setting (feet below land surface)

42 feet

Purging Method

Submersible Pump with

H₂O background: 0 ppm

Polyethylene Tubing (1/2 inch ID)

Sampling Data

Field Parameters	0751	0826	0830	0900
pH	6.9	7.4	7.3	7.4
Total Chlorine	26	28	28	28
Specific Conductivity (mc/cm)	1.6	1.5	1.5	1.5
PID (ppm)	0.1	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	8.0	9.2	9.2	9.8
Color	<u>Light gray</u>			
Odor	<u>NONE</u>			
Appearance	<u>Slightly silty</u>			

0750 Start purging.
0806 Well went dry. Purged volume 50 gallons.
0825 Continue purging. Water level: 36.80 feet
0831 Well went dry. Purged volume: 15 gallons.
0851 Water level: 36.0 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0900
BNA TCL	1 - liter	None	0900
TAL (Total Dissolved)	1 - liter	HNO ₃	0900
Chloride	500ml	NaOH	0900
Sulfide	500ml	NaOH + Zinc Acetate	0900
Sulfate	500ml	None	0900
CO ₂	500ml	H ₂ SO ₄	0900

P. Phosphorus 125 500ml H₂SO₄ 0900
NO₂/NO₃/Alkal/Cl/Br/DS/TSS 1 liter None 0900
Hardness 114 HNO₃ 0900
O-Level 114 HNO₃ 0900

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013.030
 Site Location Car Wash / Four Winds Plaza
 Well I.D. CWT-7D
 Replicate I.D. PIA

Page 1 of 1Date 6/2/94Sampling Personnel: W. MoralesM. CedeñoS. PadillaPurging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of PVC casing
Flush mounted
143.3 feet water level: 16.30 feet
127
6 inches
1.47
187
560
26.0
Submersible Pump with
Polyethylene tubing (1/2 inch ID)

H₂O Background: 0 ppmSampling Data
Time

Field Parameters	1100	1156	1307	1320
pH	7.3	7.5	7.4	7.2
T (celcius)	30	30	31	30
Specific Conductivity (mS/cm)	1.4	1.4	1.4	1.4
PID (ppm)	0	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	8.3	9.4	9.6	10

Odor Clear
 Appearance None
Clear

1057 Start purging.
 1112 water level: 17.44 feet
 1131 water level: 17.32 feet
 1230 water level: 17.50 feet

Constituents	Container	Preservative	Sample Collected
VOC TCL	40 ml	None	1320
BNA TCL	1 - liter	None	1320
TAL Total	1 - liter	HNO ₃	1320
Cyanide	500ml	NaOH	1320
Sulfide	500ml	NaOH + Am Acetate	1320
COD	500ml	H ₂ SO ₄	1320
P. Phosphorus	500ml	H ₂ SO ₄	1320

Hardness 1 liter HNO₃ 1320
 O-Lead 1 liter HNO₃ 1320
 NO₂/NO₃ (TDS) 1 liter None 1320
 Sulfate 500ml None 1320

Well Casing Volumes (GAL/ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tut-RIL PR0013.030
 Site Location Western Auto
 Well I.D. MW-24
 Replicate I.D. N/A

Page 1 of 1
 Date June 3, 1994
 Sampling Personnel: M. Cedeño
S. Padilla
W. Morales

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of tankers
N/A (Flush mounted)
36.3 feet / Water level: 7.86
29.44 feet
6 inches
1.47
42
48
35
Submersible Pump with 1/2 inch ID
Polyethylene tubing
NAW background: 0ppm

Sampling Data

Field Parameters	0657	0706	0714	0835
pH	7.9	7.6	8.9	7.7
T (celcius)	25	27	27	29
Specific Conductivity (mS/cm)	1.6	1.6	1.5	1.5
PID (ppm)	0	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	7.3	7.3	7.6	4.2
Color	<u>Clear</u>			
Odor	<u>NOAE</u>			
Appearance	<u>Clear Slightly turbid silty</u>			

0655 Start purging.
 0720 Well went dry.
 0735 Water level: 30.62 feet
 0816 Water level: 22.81 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0835
BNA TCL	1 - liter	None	0835
TAL TCL	1 - liter	HNO3	0835
Cyanide	500ml	NAOH	0835

Sulfide 500ml
 Ar. Phos 125ml
 200ml + 20ml Acetate
 H2SO4

COD 125ml H2SO4 0835
 Hardness 4-liter HNO3 0835
 0-lead 2-liter HNO3 0835
 NO3/NO2/HS/TS/Alkal/lor 1-liter None 0835
 Sulfate 500ml None 0835

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI PR0013.030

Page 1 of 1

Site Location E330 Station

Date June 3, 1994

Well I.D. MW-B

Sampling Personnel: M. Cedeño

Replicate I.D. N/A

J. Padilla

W. Morales

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel casing

Height of (MP) Above/Below Land Surface

N/A (Flush mount)

Total Sounded Depth of Well Below MP

25.5 feet / Water level 13.84 feet

Water Column in Well

11.66 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

7.6

Gallons Pumped Prior to Sampling

30

Pump Setting (feet below land surface)

25

Purging Method

Centrifugal Pump with 1/2 inch ID polyethylene tubing

Sampling Data

Field Parameters	0757	0800	0803	0840
pH	7.4	7.3	7.3	7.3
T (celcius)	26	26	27	32
Specific Conductivity (mS/cm)	1.5	1.4	1.4	1.4
PID (ppm)	0	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	0.1	0.0	0.0	0.0
Color (mg/L)	light brown			
Odor	NONE			
Appearance	Very Silty			

u background: 0 ppm

0755 start purging.

0800 Water level: 22 feet

0802 Water level: 23 feet

0803 Water level: 24 feet

0805 Well went dry.

0816 water level: 22.81 feet

0930 water level: 15.49 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0840
BNA TCL	1 - liter	None	0840
TAL (total dissolved)	1 - liter	HNO3	0840
Cyanide	500 ml	NaOH	0940

Sulfide 500ml NaOH + Zinc Acetate

Sulfate 500ml

0940

0940

T. Phosphorus 125ml H2SO4 0940

COD 125ml H2SO4 0940

Hardness 1-liter HNO3 0940

Lead 1-liter HNO3 0940

NO3/NO2/HS/SS/Alkal/Clor 1-liter None 0940

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030Page 1 of 1Site Location Esso StationDate June 3, 1994Well I.D. DW-1Sampling Personnel: M. CedeñoReplicate I.D. N/AJ. PadillaPurging Data

Description of Measuring Point (MP)

Top of Stainless Steel Casing

Height of (MP) Above/Below Land Surface

N/A (Flush mounted)

Total Sounded Depth of Well Below MP

78.3 feet / Water level: 13.88 feet

Water Column in Well

64.42

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

94.7

Gallons Pumped Prior to Sampling

140

Pump Setting (feet below land surface)

25 feet / 64 feet / 74 feet

Purging Method

Submersible pump with 1/2 inch IDSampling Data
Time

Field Parameters	1046	1055	1104	1200
pH	7.3	7.4	7.3	7.4
T (celcius)	31	31	31	31
Specific Conductivity (mS/cm)	1.4	1.4	1.4	1.4
PID (ppm)	0	0	—	0
Salinity (‰)	0.1	0.1	0.1	0.1
Color (mg/l)	10	9.7	9.3	10.6
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Slightly silty</u>			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1200
BNA TCL	1 - liter	None	1200
TAL total	1 - liter	HNO3	1200
Cyanide	500 ml	NAOH	1200

Sulfide 500 ml N₂O₄ 2. Acetate 1200
 COD 125 ml H₂SO₄ 1200
 T. Phos 125 ml H₂SO₄ 1200

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

0956 Start purging.

1001 Stop purging. Water drop below 25.0 feet.

1018 Water level: 24.70 feet

1040 Lower pump to 64 feet approximately.

1042 Continue purging.

1105 Stop pumping. Water drop.

1106 Water level: 61.60 feet

1110 Lowered pump to 74 feet

1113 Continue purging

1125 Stop pumping. Water drop.

1127 Water level: 69.42 feet

1142 Water level: 62.00 feet

Purged volume: 140 gallons

Hardness 1-liter H₂O₂ 1200O-Lead 1-liter H₂O₂ 1200

Sulfate 500 ml None 1200

NO₃/NO₂/NH₄ 1-liter H₂O₂ 1200

TUTU WATER WELL SAMPLING

Project No. PR0013030
 Site Location Laurel Vitelco
 Well I.D. AW-7
 Replicate I.D. N/A

Page 1 of 1

Date 6/6/94

Sampling Personnel: MC D.M. & S.P.

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of pipe "casing"
4 1/4" Flush mounted
17.78' / T.O. 35.1' ft.
17.32 feet
4" 5.5
0.65
11.25
35 gal.
30' ft.
Centrifugal pump

Field Parameters	Sampling Data			
	(5 gl.)	(17.9 gl.)	Time (33 gl.)	bailer
10:25	10:35	10:44	11:05	
pH	7.1	7.3	7.3	7.4
T (celsius)	29°C	29°C	29°C	29°C
Specific Conductivity (mS/cm)	1.3	1.3	1.3	1.3
0 ppm	0	0	0	0
Sal. → (‰)	0.1	0.1	0.1	0.1
0.0 → (mg/L)	8.5	8.4	9.2	9.8
Color	Slightly dusty			
Odor	Slight hydrocarbon			
Appearance	dusty			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	Pure	1105
BNA TCL	1 - liter	None	1105
TAL Total base	1 - liter	HNO3	1105
Cyanide	500 ml	NaOH	1105
Sulfide	500 ml	NaOH + Zinc Acetate	1105
Sulfate	500 ml	None	1105
Ar. Phos + CO3	500 ml	H2SO4	1105

Hardness 1 liter H2O3 1105
 O-lead 1 liter H2O3 1105
 NO3/NO2/HS/TS/ 1 liter Pure 1105
 Alkal Chlor

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project No. PR0013030
 Site Location Low Woods Plaza
 Well I.D. MM-6A
 Replicate I.D. N/A

Page 1 of 1
 Date 6/6/94
 Sampling Personnel: MC, D.M. & S.P.
(G & M)

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of casing
N/A
- 8.43' / 21.11' ft. (21.9 ft)
13.47 feet
4" 5.5.
0.65
8.24
25 gal.
15' ft.
Centrifugal pump with 1/2 inch
ID polyethylene tubing

Field Parameters	Sampling Data			
	(2 gl.)	(15 gl.)	Time (24 gl.)	'bailer'
pH	12:23	12:27	12:28	12:35
	7.3	7.3	7.3	7.3
Temp (celcius)	32°C	31°C	30°C	29°C
Specific Conductivity (µS/cm)	1.5	1.5	1.4	1.5
PID (ppm)	0	0	0	0
Sal. → (‰)	0.1	0.1	0.1	0.1
D.O. → (mg/L)	8.9	9.0	9.4	9.7
Color	Clear			
Odor	NONE			
Appearance	Clear			

Substrates	Container	Preservative	Sample Collected
VOC: TCL	4 ml	None	1235
BNA: TCL	1-liter	None	1235
TAL: Total Dissolved	1-liter	HNO3	1235
Cyanide	500ml	NaOH	1235
Sulfide	500ml	NaOH + Zinc Acetate	1235
Sulfate	500ml	None	1235
4-Phos + COD	500ml	H2SO4	1235

Hardness 1-liter H2O3 1235
 O-lead 1-liter H2O3 1235
 H2O2/H2O3/TDS/TSS/Alkal (for 1-liter None 1235)

Well Casing Volumes (GAL/FT)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. PR0013030
 Site Location Four Winds Plaza
 Well I.D. MW-CO
 Replicate I.D. N/A

Page 1 of 1
 Date 6/7/94
 Sampling Personnel: MC & SP
(G & M)

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of pipe casing
N/A
8.30' / TD 22.3' FY
54
6" S.S.
1.47
79.38
238 gal.
15 ft.
Successful pump

Sampling Data

Field Parameters	(5 gal.)	(120 gal.)	Time (235 gal.)	'bailer'
pH	08:17	08:41	09:12	09:20
	7.2	7.3	7.3	7.7
T (celcius)	27°C	29°C	29°C	30°C
Specific Conductivity (mS/cm)	1.4	1.4	1.5	1.4
PID (ppm)	0.6 ppm	0.2 ppm	0.2 ppm	0
ml → (%)	0.1	0.1	0.1	0.1
0.0 → (mg/L)	7.4	8.1	8.5	8.7
Color	clear			
Odor	none			
Appearance	clear			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0920
BNATCL	1-liter	None	0920
TAH dissolved	1-liter	HNO3	0920
Cyanide	500 ml	NaOH	0920

Sulfide 500 ml
 Sulfate 500 ml
 & Phos + COD 500 ml
 NaOH + Zinc Acetate
 None
 Hg 304

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness 1-liter H2O3 0920
 O-lead 1-liter H2O3 0920
 PO4/NO3/TS/1755/Alkal/Clor 1-liter None 0920

TUTU WATER WELL SAMPLING

Project/No. PR 0013030
 Site Location Ramsay Motors
 Well I.D. MW-15
 Replicate I.D. N/A

Page 1 of 1
 Date 6/7/94
 Sampling Personnel: MC, SP & WM
(GPM)

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of pipe casing
N/A
11.80 ft. / T.O. 35.8" ft. (35.7)
23.9 feet
6" 5.5
1.47
35.28
110 + 106 gal.
20' ft.
Summersville pump with 2" in ID polyethylene tubing

* HNU background (0 ppm)

Field Parameters	Sampling Data			
	(5 gal.)	(55 gal.)	(110 gal.)	6 min
Time	11:49	12:06	12:17	12:25
Temp (°C)	7.3	7.3	7.3	7.4
Specific Conductivity (µS/cm)	29°C	30°C	30	29°C
Specific Conductivity (µS/cm)	1.5	1.5	1.5	1.5
PID (ppm)	.1 PPM	0	0	0
Salinity (‰)	0.1	0.1	0.1	0.1
pH (→/ms/L)	8.4	9.0	9.9	10.2
Color	clear			
Odor	NONE			
Appearance	clear slightly oily			

1148 Start purging.
 1151 water level: 13.42 feet
 1153 water level: 13.48
 1201 water level: 13.26
 1208 water level: 14.74
 (Increase pumping rate)
 1217 Stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1225
BNA TCL	1 - liter	None	1225
TAL TCL	1 - liter	HNO3	1225
Cyanide	500 ml	NAOH	1225

Sulfide 500ml NaOH + Zn Acetate 1225
 4. Phos + Cob 500ml H2SO4 1225

Hardness 1-liter H2O2 1225
 Sulfate 500ml None 1225
 Pgm, TDS, TSS, Alkal, 1-liter None 1225

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. PA0013030
 Site Location Ramsay Motors
 Well I.D. MW-17
 Replicate I.D. N/A

Page 1 of 1
 Date 6/7/94
 Sampling Personnel: MC, S.P. & W.M.
GPM

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Cations in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of casing
N/A
10.30' / T.D. 13.0'
2.7 feet
4" S.S.
0.65
1.75
3 gl.
at bottom
Centering a 1" pump with 1/2 inch
ID polyethylene tubing

* HNU background (0.1 ppm)

Field Parameters	Sampling Data		
	(1 gl.)	(2.5 gl.)	Time
pH	11:03	11:04	1315
Temperature	7.7	7.8	7.6
Specific Conductivity (mS/cm)	30°C	30°C	29
PID (ppm)	1.4	1.2	1.4
Sal. → (%)	0	0	0
D.O. → (mg/L)	0.1	0.1	0.1
Color	7.4	8.2	8.5
Odor	<u>Light Brownish</u>		
Appearance	<u>None</u>		
	<u>clear slightly rilly</u>		

1102 Start purging.
 1106 Stop purging. Well vent dry.
 1107 water level: 13.0 feet
 1122 water level: 12.40 feet
 1306 water level: 10.34 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	4 - ml	None	1315
BNA TCL	1 - liter	None	1315
TAI Total Alkalinity	1 - liter	HNO3	1315
Cyanide	500ml	NaOH	1315
Sulfide	500ml	NaOH + Zinc Acetate	1315

9. Phos + COD 500ml H₂SO₄ 1315
 Hardness 1-liter H₂O₃ 1315
 0-Lead 1-liter H₂O₃ 1315
 Sulfate 500ml None 1315
 *PO₂/PO₃ TDS TSS Alkalinity 1-liter None 1315

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu FT/PA0013.030
 Site Location Curriculum Center
 Well I.D. MW-1
 Replicate I.D. N/A

Page 1 of 1
 Date June 8, 1994
 Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel Casing
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP 43.0 feet / Water level: 31.0 feet
 Water Column in Well 12.0 feet
 Diameter of Casing 4 inches
 Gallons Per Foot 0.65
 Gallons in Well 7.8
 Gallons Pumped Prior to Sampling 23
 Pump Setting (feet below land surface) N/A
 Purging Method Teflon Bailor

WPU background: 0.3 ppm

Field Parameters	Sampling Data			
	(2 gal)	(10 gal)	Time (3 gal)	
pH	0820	0843	0911	0915
T (celcius)	7.3	7.3	7.4	7.4
Specific Conductivity	28	28	28	28
PID (ppm)	1.5	1.5	1.5	1.5
Salinity (‰)	0.3	0.2	0.2	0.2
DO (mg/L)	8.0	8.7	9.2	10.0
Color	Light Brown			
Odor	None			
Appearance	Turbid / Slightly Silty			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0915
BNA TCL	1 - liter	None	0915
TAL Total	1 - liter	HNO3	0915
Cyanide	500ml	NaOH	0915

Sulfide 500ml NaOH + Zinc Acetate 0915
 Sulfate 500ml None 0915
 & Phosphate 500ml 12504 0915

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness 1-liter HPO3 0915
 A lead 1-liter HPO3 0915
 NO2/NO3/TDS/TSS/Alkalinity 1H None 0915

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA0013.030

Page 1 of 1

Site Location Curriculum Center

Date June 8, 1994

Well I.D. MW-1B

Sampling Personnel: M. Cedeño

Replicate I.D. N/A

W. Morales

Purging Data

Description of Measuring Point (MP)

Top of stainless steel casing

Height of (MP) Above/Below Land Surface

N/A

Total Sounded Depth of Well Below MP

88.60 feet / Water level: 29.64 feet

Water Column in Well

58.96 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

86.67

Gallons Pumped Prior to Sampling

110

Pump Setting (feet below land surface)

40 / 88

Purging Method

Submersible Pump

H₂O background: 0.3 ppm

Sampling Data

Time bailed

Field Parameters	0753	0806	0745
pH	7.5	7.5	7.6
T (celcius)	27	27	27.2
Specific Conductivity (mS/cm)	1.2	1.4	1.4
PID (ppm)	0.3	0.3	0
Salinity (‰)	0.1	0.1	0.1
DO (mg/L)	6.6	7.4	8.4

Color White

Odor None

Appearance Slightly silty

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	<u>None</u>	<u>1130 (6/8/94)</u>
BNA TCL	1 - liter	<u>None</u>	<u>0745 (6/9/94)</u>
TAL ^{total} dissolved	1 - liter	<u>HNO₃</u>	<u>0745 (6/9/94)</u>
Cyanide	<u>500 ml</u>	<u>NaOH</u>	<u>0745 (6/9/94)</u>

Sulfide 500ml NaOH + Zinc Acetate 0745 (6/9/94)

Sulfate 500ml None 0745 (6/9/94)

9. Phos + COD 300ml H₂SO₄ 0745 (6/9/94)

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

0750 Start purging.

0756 Water drop.

0802 Continue purging after sed pump at 88 feet

0813 Water level: 73.60 feet

0817 Water drop. water level: 87 ft

(well dry).

0830 Stop purging.

0833 Water level: 87 feet

0932 Water level: 87 feet

1110 Water level: 86.86 feet

Hardness 1-liter H₂O₂ 0745

Lead 1-liter H₂O₂ 0745

NO₂/NO₃/NH₄/H₂S/Alkalinity 1-liter None 0745

6/9/94

07:35 depth to water 85.26

TUTU WATER WELL SAMPLING

Project/No. Tutu RI / PR0013.030

Page 1 of 1

Site Location Texaco Station

Date 5/9/94

Well I.D. 2 1/2"

Sampling Personnel: MC & S.P. Wn

Replicate I.D. 2/A

Purging Data

Description of Measuring Point (MP) top of prepiped casing

Height of (MP) Above/Below Land Surface N/A

Total Sounded Depth of Well Below MP 15.80' ft / T.D. = 30.7' ft

Water Column in Well 14.9

Diameter of Casing 4" PVC

Gallons Per Foot .65

Gallons in Well 9.68

Gallons Pumped Prior to Sampling 30 gal.

Pump Setting (feet below land surface) 21'

Purging Method centrifugal pump

HNU Background →

Sampling Data

Field Parameters	5g/l	15g/l	Time	30g/l
pH	9:27	9:31	9:36	10:10
T (celcius)	7.1	7.0	7.1	7.2
Specific Conductivity (mS/cm)	31°	30°	30°	27
PID (ppm)	1.7	1.8	1.9	1.9
Sal → (%)	4.0	3.0	6.0	10
Oil → (mg/L)	0.1	0.1	0.1	0.1
Color	7.8	7.9	8.0	7.9
Odor	<u>Clear / 15 sec observed</u>			
Appearance	<u>Residual Gasoline</u>			
	<u>Clear</u>			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	<u>None</u>	<u>10:10</u>
BNA TCL	1 - liter	<u>None</u>	<u>10:10</u>
TAL <u>total</u>	1 - liter	<u>HNO3</u>	<u>10:10</u>
Cyanide	<u>500ml</u>	<u>NAOH</u>	<u>10:10</u>

Sulfide 500ml
Sulfate 500ml
V. Phos + LOD 500ml

NaOH + Zinc Acetate 10:10
None 10:10
H2SO4 10:10

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness, 1-liter HNO3 10:10
O-Lead 1-liter HNO3 10:10
NO3, NO2, NH4, H2S, Alkalinity 1-liter None 10:10

TUTU WATER WELL SAMPLING

Project/No. PR0017030
 Site Location Texaco
 Well I.D. 44-1d
 Replicate I.D. PM

Page 1 of 1

Date 6/9/94

* Sampling Personnel: MC & S. P. W.

Purging Data

Description of Measuring Point (MP) Top of PVC casing
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP Water level 16.20 ft. / 50.1" ft.
 Water Column in Well 33.8 feet
 Diameter of Casing 2"
 Gallons Per Foot 5.408 .16
 Gallons in Well 5.408
 Gallons Pumped Prior to Sampling 17 (3 well volumes)
 Pump Setting (feet below land surface) 25'
 Purging Method centrifugal pump

How background: 0 ppm
(5 gal)

Sampling Data

Field Parameters	0950	951	954	1035
pH	7.2	7.2	7.2	7.4
T (celcius)	30°	30°	29	29
Specific Conductivity (mS/cm)	1.4	1.5	1.5	1.4
PID (ppm)	4	5	8.0	0.3
SO ₄ → (ppm)	0.1	0.1	0.1	0.1
DO → (mg/L)	8.1	8.3	8.7	7.9
Color	<u>Clear</u>			
Odor	<u>Petroleum Gasoline</u>			
Appearance	<u>Clear</u>			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	<u>None</u>	1035
BNA TCL	1 - liter	<u>None</u>	1035
TAL <u>Test</u>	1 - liter	<u>HNO₃</u>	1035
Cyanide	<u>500ml</u>	<u>NaOH</u>	1035

Sulfide 500ml NaOH + Zinc acetate 1035
 Sulfate 500ml None 1035
 γ-Phenyl 500ml H₂SO₄ 1035
 Hardness 1-liter H₂O₃ 1035
 2 lead 1-liter H₂O₃ 1035
 NO₂, NO₃, TDS, H₂S, Alkalinity 1 liter None 1035

* Strong odors coming out of well when it was opened, possibly hydrocarbon on surface water.

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013-030

Page 1 of 1

Site Location Texas

Date June 9, 1994

Well I.D. TT-5

Sampling Personnel: M. Cedeño

Replicate I.D. N/A

J. Padilla

W. Morales

Purging Data

Description of Measuring Point (MP)

Top of PVC casing

Height of (MP) Above/Below Land Surface

N/A

Total Screened Depth of Well Below MP

± 30.0 feet / Water level: 19.0

Water Column in Well

11.0 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

7.15

Gallons Pumped Prior to Sampling

22

Pump Setting (feet below land surface)

22

Purging Method

Centrifugal Pump

Non background: Open

Sampling Data

Field Parameters	(2 gal)	(11 gal)	Time (22 gal)	
	1110	1113	1115	1120
T (celcius)	7.3	7.3	7.3	7.4
Specific Conductivity (mS/cm)	30	30	30	30
PID (ppm)	2.2	2.0	1.7	1.7
Salinity (‰)	0.1	0	0.5	0
DO (mg/L)	0.1	0.1	0.1	0.1
Color	7.2	7.7	7.7	8.4
Odor	Clear			
Appearance	Slightly			
	Clear			

Constituents	Container	Preservative	Sample Collected
VO's	40 ml	None	1120
BNA	1 - liter	None	1120
TAL	1 - liter	HNO3	1120
Cyanide	500 ml	NaOH	1120

Sulfide 500ml
Sulfate 500ml
Pb, Zn, Cd 500ml

Well Casing Volumes (GAL/FT)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness 1-liter H2O3 1120
O-load 1-liter H2O3 1120
NO2/NO3/NO3- 1120
Alkal Chlor 1-liter None 1120

TUTU WATER WELL SAMPLING

Project No. PR0012030
 Site Location Texaco
 Well I.D. 4-2
 Replicate I.D. DW5

Page 1 of 1
 Date 5/9/94
 Sampling Personnel: MC/SP/W.M.

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of pipe casing
N/A
15.72 ft / 29.3 ft
13.58'
4" PVC
65
8.98
27.0 gal.
25.0
Centrifugal pump

* HNU background ϕ ppm

Field Parameters	Sampling Data			
	(4 gal.)	(12 gal.)	Time (26 gal.)	
pH	11.54	11.55	12.00	12.08
T (celcius)	7.2	7.3	7.2	7.2
Specific Conductivity (ms/cm)	28°C	30°C	29°C	30°C
PID (ppm)	1.5	1.5	1.5	1.4
Sal. $\rightarrow$ (%)	0	0	0	0
Chlor. $\rightarrow$ (mg/L)	0.1	0.1	0.1	0.1
Odor	1.4	1.4	1.4	9.5
Appearance	Clear	Clear	Clear	Clear

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1208
BNA TCL	1 - liter	None	1208
TAL Distilled	1 - liter	HNO3	1208
Cyanide	500 ml	NaOH	1208

Sulfide 500ml
 Sulfate 500ml
 P. Phos + Cob 500ml

NaOH + zinc Acetate 1208
 None 1208
 H2SO4 1208

Hardness 1-liter H2O3 1208
 O-Lead 1-liter H2O3 1208
 NO3/Mg/PO4
 TSS/Alkalinity 1-liter H2O3 1208
 None

Well Casing Volumes (GAL/FT)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030
 Site Location Texaso Station
 Well I.D. TT-4
 Replicate I.D. N/A

Page 1 of 1
 Date June 10, 1994
 Sampling Personnel: W. Morales
M. Cedeño
J. Padilla

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of PVC casing
N/A
28.80 feet / water level: 17.21 feet
11.59 feet
4 inches
0.65
7.53
23
28 feet
Centrifugal Pump After Bailer

H₂O background: 0 ppm

Sampling Data

Field Parameters	(2 gal)	(15 gal)	Time (23 gal)	
pH	0655	0659	0725	0730
T (celcius)	8.3	8.2	8.1	8.2
Specific Conductivity (mS/cm)	31	30	30	29
PID (ppm)	1.8	1.7	2.0	1.7
Salinity (‰)	26	100	10	10
SO ₄ (mg/L)	0.1	0.1	0.1	0.1
Color	6.6	6.5	8.6	9.1
Odor	Grayish brown			
Appearance	Strong gasoline odor			
	Silty			

0650 Start purging.
 0703 Stop purging with centrifugal pump.
 Water level: 24.88 feet
 Purged volume: 15 gallons
 0709 continue purging with after bailer.
 0725 Complete purging

Constituents	Container	Preservative	Sample Collected
VOCs YCL	40 ml	None	0730
BNA YCL	1 - liter	None	0730
TAL ^{total} _{analyzed}	1 - liter	HNO ₃	0730
Cyanide	500 ml	NaOH	0730
Sulfide	500 ml	NaOH + Zinc Acetate	0730
Sulfate	500 ml	None	0730
Phos + COD	500 ml	H ₂ SO ₄	0730

Hardness 1-liter H₂O₃ 0730
 O-Lead 1-liter H₂O₃ 0730
 NO₂/NO₃/NH₄/TSS/Alkalinity 1-liter None 0730

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. PA0013030
 Site Location Curriculum Center
 Well I.D. MW-1C
 Replicate I.D. N/A

Page 1 of 1
 Date 5/10/94
 Sampling Personnel: MC, WAM, SP

Purging Data

Description of Measuring Point (MP) top of casing (stainless steel)
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP 32.64 ft / T.D. 43.8" A. (43.74)
 Water Column in Well 11.06
 Diameter of Casing 6" S.S.
 Gallons Per Foot 1.47
 Gallons in Well 16.26 gal.
 Gallons Pumped Prior to Sampling 50 gal.
 Pump Setting (feet below land surface) bottom
 Purging Method sump 11.3/c pump

HNA background: 0ppm
 (2 gal.) (22 gal.)
 (22 gal.) (22 gal.)

Field Parameters	08:05	08:12	08:19	08:35
pH	8.3	8.2	8.2	8.2
T (celcius)	28°C	28°C	28	28
Specific Conductivity (mS/cm)	1.6	1.6	1.5	1.6
PID (ppm)	0	0	0	0
Sal. (‰)	0.1	0.1	0.1	0.1
D.O. (mg/L)	3.5	3.6	3.6	3.4
Color	Light brown			
Odor	Slightly			
Appearance	Slightly silty			

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0835
BNA TCL	1 - liter	None	0835
TAL Total Dissolved	1 - liter	HNO3	0835
Cyanide	500ml	NaOH	0835

Sulfide 500ml NaOH + Zinc Acetate 0835
 Sulfate 500ml None 0835
 4. Phos + COD 500ml H2SO4 0835

Hardness 1-liter HNO3 0835
 O-Lead 1-liter HNO3 0835
 NO3/NO2/ITDS/
 TSS/Alkalor 1-liter None 0835

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu AI/PR 013.030
 Site Location Texaco Station
 Well I.D. MW-4
 Replicate I.D. N/A

Page 1 of 1

Date 6/13/94

Sampling Personnel: W. Morales
S. Padilla
M. Cedeño

Purging Data

Description of Measuring Point (MP)

Height of (MP) Above/Below Land Surface

Total Sounded Depth of Well Below MP

Water Column in Well

Diameter of Casing

Gallons Per Foot

Gallons in Well

Gallons Pumped Prior to Sampling

Pump Setting (feet below land surface)

Purging Method

HNU background: 0ppm

Top of Stainless Steel Casing
PIA (Flush mounted)
26.8 feet / Water level: 12.05 feet
14.75
4 inches
0.65
9.58
30
20 feet / 26 feet
Centrifugal Pump

Sampling Data

Field Parameters	(2gal)	(15gal)	Time (30gal)	
pH	1155	1200	1209	1236
T (celcius)	7.3	7.2	7.2	7.3
Specific Conductivity (mS/cm)	29	29	29	29
PID (ppm)	1.3	1.4	1.4	1.4
Salinity (‰)	0	0	0	0
DO (mg/L)	0.1	0.1	0.1	0.1
Color	8.1	8.6	8.2	8.0
Odor	light brown			
Appearance	None			
	Slightly silty			

1156 Start purging.
 1158 Water drop. Set tubing at 26 feet
 1206 Water level: 20.12 feet
 1209 Stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1236
BNA TCL	1 - liter	None	1236
TAL Total	1 - liter	HNO3	1236
Cyanide	500ml	NaOH	1236
Sulfide	500ml	NaOH + Zinc Acetate	1236
Sulfate	500ml	None	1236
T.D. H ₂ S + COD	500ml	#2504	1236

Hardness 1-liter HNO3 1236
 O-lead 1-liter HNO3 1236
 NO₂/PO₄/H₂S/
 TSS/Al/Ka/Clor 1-liter None 1236

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.4"

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PH0013.030

Page 1 of 1

Site Location Pexaco Station

Date 6/13/94

Well I.D. MW-4B

Sampling Personnel: M. Cedeño

Replicate I.D. 21A

V. Morales

S. Padilla

Purging Data

Description of Measuring Point (MP)

Top of stainless steel casing

Height of (MP) Above/Below Land Surface

2 ft (Flush mounted)

Total Sounded Depth of Well Below MP

70.9 feet / Water level: 12.67 feet

Water Column in Well

58.23 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

85.59

Gallons Pumped Prior to Sampling

260 gallons

Pump Setting (feet below land surface)

20 feet

Purging Method

Submersible Pump

HW background: 0 ppm

Sampling Data

Field Parameters	(5 gal) (130 gal)	Time (260 gal)	
pH	1039	1106	1138
T (celcius)	7.5	7.3	7.2
Specific Conductivity (ms/cm)	30	29	29
PID (ppm)	1.3	1.4	1.4
	1.3	1.4	1.3
	0	0	0
	0	0	0

1037 Start purging:
1105 water level: 16.60 feet
1136 water level: 16.64 feet
1138 stop purging.
Water level: 12.86 feet

Salinity (‰)	0.1	0.1	0.1	0.1
DO (mg/L)	7.7	8.9	8.8	8.8
Color	Clear			
Odor	None			
Appearance	Clear			

Consituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1215
BNA TCL	1 - liter	None	1215
TAL Total	1 - liter	HNO3	1215
Cyanide	500 ml	NaOH	1215

Sulfide 500ml
Sulfate 500ml
r. Phos + cob 500ml

NaOH + Zinc Acetate	1215
None	1215
H2SO4	1215

Hardness 1-liter HNO3 1215
Lead 1-liter HNO3 1215
NO3, HNO3, HCl
V. HNO3 1-liter None 1215

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030

Page 1 of 1

Site Location Texaco Station

Date June 14, 1994

Well I.D. MW-3

Sampling Personnel: M. Cedeño

Replicate I.D. M5/M5D

W. Morales

J. Padilla

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel casing

Height of (MP) Above/Below Land Surface

N/A (Flush mounted)

Total Sounded Depth of Well Below MP

30.3 feet / Water level: 17.95 feet

Water Column in Well

12.35 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

8

Gallons Pumped Prior to Sampling

25

Pump Setting (feet below land surface)

20

Purging Method

Centrifugal Pump

H₂O background: 0 ppm

Sampling Data

Field Parameters	(2 gal)	(2 gal)	Time (25 gal)	(25 gal)
pH	0751	0754	0758	0835
T (celcius)	7.0	7.2	7.3	7.4
Specific Conductivity (mS/cm)	28	27	28	28
PID (ppm)	1.4	1.4	1.4	1.4
Salinity (‰)	0	0	0	0.3
DO (mg/L)	0.1	0.1	0.1	0.1
Color	7.4	7.6	7.8	8.3
Odor	<u>Clear</u>			
Appearance	<u>None</u>			
	<u>Slightly silty</u>			

0750 start purging.
0758 stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0835
BNA TCL	1 - liter	None	0835
TAH Total	1 - liter	HNO ₃	0835
Cyanide	500 ml	NAOH	0835
Sulfide	500 ml	NaOH + Zinc Acetate	0835
Sulfate	500 ml	None	0835

A. Phosphorus 125 ml H₂SO₄ 0835
CO₂ 125 ml H₂SO₄ 0835
Hardness 1-liter HNO₃ 0835
O-lead 1-liter HNO₃ 0835
NO₂/NO₃/NH₄ 1-liter None 0835
TSS/Alkalinity

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030
 Site Location Texaco Station
 Well I.D. TT-3D
 Replicate I.D. N/A

Page 1 of 1
 Date June 14, 1994
 Sampling Personnel: M. Cedeño
W. Morales
S. Padilla

Purging Data

Description of Measuring Point (MP) Top of PVC casing
 Height of (MP) Above/Below Land Surface N/A (Flush mounted)
 Total Sounded Depth of Well Below MP 52.8 feet / Water level: 17.66 feet
 Water Column in Well 35.14
 Diameter of Casing 2 inches
 Gallons Per Foot 0.16
 Gallons in Well 5.62
 Gallons Pumped Prior to Sampling 20
 Pump Setting (feet below land surface) 22 / 32
 Purging Method Centrifugal Pump
 H₂O background: Oppm

Sampling Data

Field Parameters	(2 gal)	(8 gal)	Time (0 gal)	(0 gal)
pH	0807	0811	0820	0923
T (celcius)	8.0	7.3	7.4	7.5
Specific Conductivity (mS/cm)	27	29	29	28
PID (ppm)	1.3	1.5	1.5	1.4
Salinity (‰)	2	0	0	1
DO (mg/L)	0.1	0.1	0.1	0.1
Color	6.9	7.1	7.2	8.2
Odor	Clear			
Appearance	None			
	Clear			

0802 Start purging.
 0803 Water drop. Test polyethylene tubing at 32 feet.
 0806 Continue purging.
 0820 Stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0923
BNA TCL	1 - liter	None	0923
TAL Total dissolved	1 - liter	HNO ₃	0923
Cyanide	500 ml	NaOH	0923
Sulfide	500 ml	NaOH + Zinc Acetate	0923
Sulfate	500 ml	None	0923

T. Phosphorus/COD 500 ml H₂SO₄ 0923
 COD 100 ml H₂SO₄ 0923
 Hardness 1-liter HNO₃ 0923
 A lead 1-liter H₂O₂ 0923
 NO₂/NO₃/TDSS
 TSS/Alkalinity 1-liter None 0923

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu B I / PR0013.030

Page 1 of 1

Site Location Benjamin Oliver School

Date June 14, 1994

Well I.D. MW-21D

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cederio

S. Padilla

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel Casing

Height of (MP) (Above) Below Land Surface

2.78 feet

Total Sounded Depth of Well Below MP

97.30 feet / water level: 35.28 feet

Water Column in Well

62.02 feet

Diameter of Casing

6 inches

Gallons Per Foot

1.47

Gallons in Well

91.17

Gallons Pumped Prior to Sampling

275 96

Pump Setting (feet below ~~land surface~~ measuring point)

40 feet / 50 feet / 70 feet / 96 feet

Purging Method

Submersible Pump

HNU background: 0 ppm

Sampling Data

Field Parameters	(29 gal) (12 gal)	(68 gal) (12 gal)	(1235)	(1620)
pH	7.4	7.3	7.6	7.2
T (celcius)	29	30	29	27
Specific Conductivity (mS/cm)	3.4	3.8	3.7	3.8
PID (ppm)	0	0	0	0
SALINITY (‰)	0.2	0.2	0.2	0.2
DO (mg/L)	8.3	10.6	10.9	7.7
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Slightly silty</u>			

1129 Start purging.

1131 Stop purging. Water drop. Set pump at 50 feet.

1134 Continue purging.

1139 Water drop. Set pump at 70 feet.

1143 Continue purging

1153 Water drop. Purged volume: 58 gallons.

1200 Continue purging after set pump at 96 feet.

1235 well went dry. Purged volume: 96 gallons.

1252 water level: well is dry.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1620
BNA TCL	1 - liter	None	1620
TAL TOTAL	1 - liter	HNO3	1620
Cyanide	500ml	NaOH	1620

Sulfide	500ml	NaOH + Zinc Acetate	1620
Sulfate	500ml	None	1620
Hardness	1-liter	HNO3	1620

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

COB 125ml H2SO4 1620

9. Phos 125ml H2SO4 1620

Q-lead 1-liter HNO3 1620

NO3/NO2/1
TDS/TSS/
Alkalinity 1-liter None 1620

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PA00.3.030
 Site Location Auto-Kool-Inc.
 Well I.D. MW-20b
 Replicate I.D. N/A

Page 1 of 1

Date June 15, 1994

Sampling Personnel: W. Morales

S. Padilla

N. Cedeño

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel Casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 67.83 feet / Water level: 43.35 feet
 Water Column in Well 24.48 feet
 Diameter of Casing 6 inches
 Gallons Per Foot 1.47
 Gallons in Well 35.98
 Gallons Pumped Prior to Sampling 33 40
 Pump Setting (feet below land surface) 66 feet
 Purging Method Submersible Pump

Purging Method
 H₂O background: 0 ppm

Sampling Data

Field Parameters	(2 gal)	(2 gal)	(2 gal)	(2 gal)
pH	0804	0813	0818	1115
T (celcius)	7.5	7.7	7.8	7.4
Specific Conductivity (mS/cm)	27	27	28	29
PID (ppm)	1.3	1.2	1.2	1.2
	0	0	0	0

Salinity (‰) 0.1
 DO (mg/L) 6.9
 Color light gray
 Odor None
 Appearance Very Silty

Redox (mv) 30.2 24.4 23.8 117.4

0803 Start purging.
 0809 Water level: 47.0 feet
 0812 Water level: 55 feet
 0814 Water level: 60 feet
 0818 Well went dry.
 0835 Water level: 68.90 feet

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1115
BNA TCL	1 - liter	None	1115
TAL <u>Disolved</u>	1 - liter	HNO ₃	1115
Cyanide	<u>500 ml</u>	NaOH	1115

Sulfide 500ml NaOH + Zinc Acetate 1115
 Sulfate 500ml None 1115
 P. Phosph + COD 500ml H₂SO₄ 1115

Hardness 1-liter HNO₃ 1115
 O-lead 1-liter HNO₃ 1115
 NO₃/NO₂/NH₄
 TSS/Alkalinity 1-liter None 1115

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. 9.4. RI/PR0013.030

Page 1 of 1

Site Location VIN A

Date June 15, 1994

Well I.D. MW-13D

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

3. Padilla

Purging Data

Description of Measuring Point (MP)

Top of Shank to Steel Casting

Height of (MP) Above/Below Land Surface

Fresh mounted

Total Sounded Depth of Well Below MP

116.33 feet / Water level: 63.14 feet

Water Column in Well

53.19 feet

Diameter of Casing

6 inches

Gallons Per Foot

147

Gallons in Well

78.2

Gallons Pumped Prior to Sampling

110

Pump Setting (feet below land surface)

89 feet / 115 feet

Purging Method

Submersible Pump

How background: 0.4 ppm

Sampling Data

Field Parameters	(2 gal)	(5 gal)	(10 gal)	(15 gal)	(20 gal)
pH	12.4	12.0	12.2	12.1	12.0
T (celcius)	28	28	28	29	27
Specific Conductivity (mS/cm)	3.5	3.4	3.6	3.7	3.5
PID (ppm)	0.4	0.4	0.4	0.4	0.4
SALINITY (‰)	0.2	0.2	0.2	0.2	0.2
DO (mg/L)	8.6	9.0	9.8	8.5	8.9
ORP (mV)	43.9	36.6	38.4	37.0	37.6
Color	Light gray				
Odor	None				
Appearance	Very silty				

116.04	1005	Start purging.
08.5	1009	Water level: 72 feet
122	1014	Water drop. Purged volume: 55 gallons.
27		Water level: 89 feet
3.5		
0.1	1023	Continue purging. Pump set at 115 feet.
22		
99		
6	1035	Well went dry.
	1050	Water level deep than 100 feet.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1340 (6/15/99)
BNA TCL	1 - liter	None	0815 (6/16/99)
TAL ^{Total} _{Dissolved}	1 - liter	HNO3	0815 (6/16/99)
Cyanide	500 ml 1 - liter	NaOH	0815 (6/16/99)

6/16/94 Water level approximately
115 feet.

Sulfide	500ml	NaOH + Zinc Acetate	0815	(6116194)
Sulfate	500ml	None	0815	(6116194)
Other (N)	500ml	H ₂ SO ₄	0815	(6116194)
Well Casing Volumes (GAL/FT)				

Hardness	1-liter	HNO ₃	0815 (6/16/94)
O-lead	1-liter	HNO ₃	0815 (6/16/94)
NO ₂ /NO ₃			
TDS TSS			
Alkalinity	1-liter	None	0815 (6/16/94)

$1 - 1/4" = 0.06$	$2" = 0.16$	$3" = 0.37$	$4" = 0.65$
$1 - 1/2" = 0.09$	$2 1/2" = 0.26$	$3 1/2" = 0.26$	$6" = 1.47$

TUTU WATER WELL SAMPLING

Project/No. Future RI PR0013030
 Site Location VINA
 Well I.D. MW-13
 Replicate I.D. PIA

Page 1 of 1

Date June 15, 1994

Sampling Personnel: M. Cedeño
W. Morales
J. Padilla

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel Casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 66.46 feet water level / 79.58 feet
 Water Column in Well 13.12 feet
 Diameter of Casing 6 inches
 Gallons Per Foot 1.47
 Gallons in Well 19.3
 Gallons Pumped Prior to Sampling 60
 Pump Setting (feet below land surface) 78
 Purging Method Submersible Pump
 How background: 0 ppm

Field Parameters	Sampling Data			
	(5gal)	(20gal)	Time (60gal)	
pH	1138	1146	1207	1415
T (celcius)	6.8	7.1	6.9	6.8
Specific Conductivity (mS/cm)	28	28	29	28
PID (ppm)	1.2	1.3	1.3	1.3
	—	—	—	0

SALINITY (‰) 0.1 0.1 0.1 0.1
 DO (mg/L) 8.8 8.9 9.3 9.0 Redox (mV) 96.4 74.1 108.9 115
 Color Clear
 Odor None
 Appearance Slightly silty

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1415
BNA TCL	1 - liter	None	1415
TAL Total	1 - liter	HNO3	1415
Cyanide	500 ml	NaOH	1415

Sulfide 500ml NaOH + Zinc Acetate 1415
 Sulfate 500ml None 1415
 4. Phos + CO₂ 500ml H₂SO₄ 1415

Hardness 1-liter H₂O₂ 1415
 O-lead 1-liter H₂O₂ 1415
 NO₂/NO₃/TDS 1-liter None 1415
 TSS/Alkalinity 1-liter None 1415

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013030
 Site Location God of Holiness Church
 Well I.D. SW-4
 Replicate I.D. N/A

Page 1 of 1

Date June 16, 1994

Sampling Personnel: W. Morales
M. Cedeño

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

Top of PVC casing
Flush mounted
34.92 feet / Water level: 11.32 feet
23.60 feet
4 inches
0.65
15.34
50
20 feet / 26 feet
Centrifugal Pump

HNO background: 0.3 ppm

Sampling Data

Field Parameters	2gal	25gal	Time (50gal)	
pH	1103	1109	1114	1135
T (celcius)	7.1	7.2	7.2	7.1
Specific Conductivity (mS/cm)	29	29	29	29
PID (ppm)	1.5	1.5	1.5	1.5
SALINITY (‰)	0.3	0.3	0.3	
DO (mg/L)	0.1	0.1	0.1	0.1
Color (APHA)	7.8	7.7	7.7	8.4
Odor	Clear	75.9	80.6	110
Appearance	None		79.6	
	<u>Slightly silty</u>			

1100 Start purging
 1106 Water level: 17.90 feet
 1110 Water level: 15.78 feet
 Set tubing intake at
 26 feet
 1119 Water level: 20.5 feet
 1115 Stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1135
BNA TCL	1-liter	None	1135
TAL Total	1-liter	HNO3	1135
Cyanide	500 ml	NaOH	1135
Sulfide	500 ml	NaOH + zinc Acetate	1135
Sulfate	500 ml	None	1135
T. Phos + Cad	500 ml	H2SO4	1135

Hardness 1-liter HNO3 1135
 O-lead 1-liter HNO3 1135
 NO3/PO3/TB1
 TSS/Alkal/Clor 1-liter None 1135

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR 0013.030
 Site Location Auto-Kool Inc.
 Well I.D. MW-20
 Replicate I.D. PIA

Page 1 of 1
 Date June 15, 1994
 Sampling Personnel: W. Morales
J. Padilla
M. Cedeño

Purging Data

Description of Measuring Point (MP) Top of Stainless Steel casing
 Height of (MP) Above/Below Land Surface Flush mounted
 Total Sounded Depth of Well Below MP 28.83 feet / Water level: 24.78 feet
 Water Column in Well 4.05 feet
 Diameter of Casing 6 inches
 Gallons Per Foot 1.47
 Gallons in Well 5.95
 Gallons Pumped Prior to Sampling 5
 Pump Setting (feet below land surface) PIA
 Purging Method Section Bailer

Initial background: 0ppm

Field Parameters	Sampling Data			
	(1 gal)	(3 gal)	Time (5 gal)	(6/16/94)
	0831	0844	0901	1257
pH	7.5	7.6	7.9	7.4
T (celcius)	27	28	27	28
Specific Conductivity	0.7	0.7	0.7	0.7
PID (ppm)	0	0	0	0

0831 Start purging.
 0901 Well went dry after 5 gallons removed.
 0933 Water level: 27.08 feet
 Salinity (‰) 0 0 0 0
 DO (mg/L) 7.3 7.7 8.0 9.1
 Redox (mv) 25.2 25.0 22.1 23.5

Color Clear
 Odor None
 Appearance Clear

Consutents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1257 (6/16/94)
BNA TCL	1-liter	None	1257 (6/16/94)
TAL ^{total} dissolved	1-liter	HNO3	1257 (6/16/94)
Cyanide	500 ml	NaOH	1257 (6/16/94)

Sulfide 500ml NaOH + Zinc Acetate 1257 (6/16/94)
 Sulfate 500ml None 1257 (6/16/94)
 A. Plus + COB 500ml H2SO4 1257 (6/16/94)

Hardness 1-liter HNO3 1257 (6/16/94)
 O-lead 1-liter HNO3 1257 (6/16/94)
 NO3/PO3/TDS 1-liter None 1257 (6/16/94)
 TSS/Alkalinity

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030

Page 1 of 1

Site Location Four Winds Plaza

Date June 17, 1994

Well I.D. MW-2

Sampling Personnel: W. Morales

Replicate I.D. N/A

M. Cedeño

Purging Data

Description of Measuring Point (MP)

Top of Stainless Steel Casing

Height of (MP) Above/Below Land Surface

Flush mounted

Total Sounded Depth of Well Below MP

26.75 feet / Water level: 14.06 feet

Water Column in Well

12.69 feet

Diameter of Casing

4 inches

Gallons Per Foot

0.65

Gallons in Well

8.25

Gallons Pumped Prior to Sampling

25

Pump Setting (feet below land surface)

20 feet

Purging Method

Centrifugal Pump

How background: 0 ppm

Sampling Data

Field Parameters	(5gal)	(15gal)	Time (25gal)	
pH	0735	0738	0741	0750
T (celcius)	7.0	7.2	7.3	7.3
Specific Conductivity mS/cm	28	28	28	28
PID (ppm)	1.5	1.4	1.4	1.4
	0	0	0	0

SALINITY (%) 0.1 0.1 0.1 0.1

DO (mg/L) 7.6 7.7 7.8 8.4

Color light brown

Odor None

Appearance Slightly silty

Redox (mv) 122/120/116/110

0734 Start purging.

0737 water level: 15.32 feet

0740 water level: 15.42 feet

0742 Stop purging.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0750
BNA TCL	1 - liter	None	0750
TAL TCL	1 - liter	HNO3	0750
Cyanide	500 ml	NAOH	0750

Sulfide 500ml NaOH + Zinc Acetate 0750

Sulfate 500ml NONE 0750

C.P.H.S./WB 500ml H₂SO₄ 0750

Hardness 1-liter H₂O₂ 0750

U-lead 1-liter H₂O₂ 0750

NH₃/NH₃MBDs)

TSS/Alkal/Clor 1-liter None 0750

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RTI PR0013030
 Site Location Four Winds Plaza
 Well I.D. Four Winds I
 Replicate I.D. M5, MSD

Page 1 of 1

Date July 22, 1994

Sampling Personnel: W. Morales

B. Anderson

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling 150 (approximately)
 Pump Setting (feet below land surface) N/A
 Purging Method Existing Submersible Pump

Run for 30 min prior to sampling.
0910 Start pump.
1010 Stop pump

Field Parameters	Sampling Data Time			
	0916	0930	0940	0947
pH	7.47	7.45	7.44	7.61
T (celcius)	28.3	28.6	29.0	29.6
Specific Conductivity (mS/cm)	1.47	1.45	1.46	1.46
PID (ppm) Salinity %	0.06	0.06	0.06	0.06
DO (mg/L)	4.08	3.71	3.75	3.99
Color	<u>Clear</u>			
Odor	<u>None</u>			
Appearance	<u>Clear</u>			

Pump flow rate at the
 outfall (water hose) into
 WTS holding tank: 5 gpm

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	0947
BNA TCL	1 - liter	None	0947
TAL	1 - liter	HNO3	0947
Cyanide	100 ml	NAOH	0947

Sulfide 500 ml NaOH + Zinc Acetate 0947
 Sulfate 500 ml None 0947
 Arsenic 500 ml H2SO4 0947

Hardness 1 liter HNO3 0947
 0-lead 1 liter HNO3 0947
 Alkalinity 1 liter None 0947
 PO4/NO3/NO2 1 liter None 0947

Well Casing Volumes (GAL/Ft)			
1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PROJ. 030
 Site Location St. Thomas
 Well I.D. VINA I
 Replicate I.D. N/A

Page 1 of 1
 Date July 19, 1994
 Sampling Personnel: W. Morales
B. Anderson

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches steel
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling 450 (Run for 15 minutes prior to sampling)
 Pump Setting (feet below land surface) existing Pump
 Purging Method Submersible Pump
flow rate 30 gpm approximately

Sampling Data

Field Parameters	1002	1005	1010	1015	1017
pH	7.0	7.32	7.33	7.15	7.24
T (celcius) (°C)	27.6	28.2	28.3	28.7	28.9
Specific Conductivity (mS/cm)	1.68	1.61	1.26	1.19	1.28
PID (ppm)	—	—	—	—	—
Salinity (‰)	0.07	0.07	0.05	0.05	0.05
DO (mg/L)	3.90	3.51	3.43	2.46	3.16
Color	Clear				
Odor	None				
Appearance	Clear				

Constituents	Container	Preservative	Sample Collected
VOCs 524.2	40 ml	None	1017
BNA TCL	1 - liter	None	1017
TAL TAL	1 - liter	HNO3	1017
Cyanide	500 ml	NAOH	1017

Sulfide 500ml
 Sulfate 500ml
 & Phos + Cob 500ml

NaOH + Zinc Acetate 1017
 None 1017
 H2SO4 1017

Hardness 1 liter HNO3 1017
 O-lad 1 liter HNO3 1017
 Alkal (br/5ulf) 1017
 NO2/NO3/TDS/TSS 1 liter None 1017

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. Tutu RI/PR0013.030

Page 1 of 1

Site Location St. Thomas

Date July 21, 1994

Well I.D. Four Winds II

Sampling Personnel: W. Mordas

Replicate I.D. DW-7

B. Anderson

Purging Data

Description of Measuring Point (MP) N/A
 Height of (MP) Above/Below Land Surface N/A
 Total Sounded Depth of Well Below MP N/A
 Water Column in Well N/A
 Diameter of Casing 6 inches steel / PVC stick up
 Gallons Per Foot N/A
 Gallons in Well N/A
 Gallons Pumped Prior to Sampling 525 (estimated)
 Pump Setting (feet below land surface) N/A
 Purging Method Existing submersible pump

Sampling Data

Field Parameters	0857	0947	1047	1147
pH	7.88	7.96	7.98	7.71
T (celcius)	28.4	29.5	30	30.3
Specific Conductivity (mS/cm)	1.47	1.47	1.47	1.52
Chloride (ppm)	0.06	0.06	0.06	0.07

DO (mg/L) 5.70 5.65 5.37 —
 Color Clear
 Odor None
 Appearance Clear

0847 Start pumping.
 Pump flow rate at the
 outfall (water hose) into
 WTS holding tank:
 3 gallons per minute
 1218 Pump off.

Constituents	Container	Preservative	Sample Collected
VOCs TCL	40 ml	None	1147
BNA TCL	1 - liter	None	1147
TAL	1 - liter	HNO3	1147
Cyanide	500 ml	NaOH	1147

Sulfide 500 ml
 Sulfate 500 ml
 T.P.H.S + CO₂ 500 ml

NaOH + Zinc Acetate
 none
 H₂SO₄

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

Hardness 1 liter HNO₃
 O-Lead 1 liter HNO₃
 Alkalinity 1 liter HNO₃
 NO₂/NO₃/NH₄ 1 liter HNO₃

TUTU WATER WELL SAMPLING

Project No. PH0013030
 Site Location St. Thomas, ASVT
 Well I.D. Harvey well
 Replicate I.D. NONE

Page 1 of 1
 Date 7/27/94
 Sampling Personnel: M. Cedeno S. Padilla
(G & M)

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

top of pipe, steel BHK casing
2.5' ft. stick up
27.20' ft / 155.75' ft TD
128.55
5"
1.02
131.12 X 3 = (393.36 gal.)
400 gal.
60' ft.
Submersible pump ^ Poly comb.

Field Parameters	Sampling Data				
	(22 gal.)	(200 gal.)	Time (400 gal)	14:50	
	11:30	12:02	12:37	13:02	
	6.96	7.24	7.30	7.14	7.14
T (celsius)	30.1	29.5	29.5	29.0	29.5
Specific Conductivity	2.2	2.16	2.15	2.06	2.12
PID (ppm)	N/A	N/A	N/A	N/A	N/A
pH	8.49	8.34	8.40	8.44	8.40
Color	clear				
Odor	none				
Appearance	clear				

(minus 2.5' ft)
 24.70' V
 out stick up 153.25' TD
 (128.55')

Constituents	Container	Preservative	Sample Collected
VOCs TOL	40 ml	NONE	3/1450
BNA TOL	1 - liter	None	2/1450
PAH Metals	1 - liter	HNO3	1450
Amide	500 ml	NAOH	1450
Sulfide	500 ml	NaOH + Zinc Acetate	1450
Sulf. Phos + Pb	500 ml	H2SO4	1450

Hardness 1 liter H2O2 1450
 O-lead 1 liter H2O2 1450
 Alkalinity 1 liter None 1450
 NO3/PO3/HS/H2S 1 liter None 1450

Well Casing Volumes (GAL/FT)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

TUTU WATER WELL SAMPLING

Project/No. PR0013030
 Site Location St Thomas, USVI
 Well I.D. Delegarde
 Replicate I.D. NONE

Page 1 of 1
 Date 7/27/94
 Sampling Personnel: M. Cedeño

Purging Data

Description of Measuring Point (MP)
 Height of (MP) Above/Below Land Surface
 Total Sounded Depth of Well Below MP
 Water Column in Well
 Diameter of Casing
 Gallons Per Foot
 Gallons in Well
 Gallons Pumped Prior to Sampling
 Pump Setting (feet below land surface)
 Purging Method

N/A

Sampling Data

Field Parameters	15:17	15:22	15:28	15:30
pH	7.28	7.24	7.24	7.24
T (celcius)	28.9	28.3	28.2	28.1
Specific Conductivity	2.34	2.36	2.36	2.36
PID (ppm)	N/A	N/A	N/A	N/A
Sal.	11	11	11	11
D.O.	9.10	8.78	8.57	8.50
Color	clear			
Odor	NONE			
Appearance	clear			

* Faucet was open at:
 (15:16)

* Faucet closed
 (15:45)

Comments:

* Lots of bubbles in vials while samples were being collected.

Well re-sampled for VOCs only.

Constituents	Container	Preservative	Sample Collected
VOCs 521.2	40 ml	NONE	31530
BNA	1 - liter	None	
TAL	1 - liter	HNO3	
Cyanide	1 - liter	NAOH	

Well Casing Volumes (GAL/Ft)

1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-1/2" = 0.09	2 1/2" = 0.26	3 1/2" = 0.26	6" = 1.47

APPENDIX K

**DATA VALIDATION SUMMARY REPORT
PHASE II SOIL SAMPLING
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



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TABLE

- K-1. Summary of Sample Delivery Groups, Sample Identifications, Collection Dates, and Parameters for Soils and Blanks, Phase II Remedial Investigation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

ATTACHMENTS (submitted separately)

- K1. Organic Data Review for Sample Delivery Group 33590.
- K2. Inorganic Data Review for Sample Delivery Group 33590.
- K3. Organic Data Review for Sample Delivery Group 33735.
- K4. Inorganic Data Review for Sample Delivery Group 33735.
- K5. Organic Data Review for Sample Delivery Group 33745.
- K6. Inorganic Data Review for Sample Delivery Group 33745.
- K7. Organic Data Review for Sample Delivery Group 33835.
- K8. Inorganic Data Review for Sample Delivery Group 33835.
- K9. Organic Data Review for Sample Delivery Group 33878.
- K10. Inorganic Data Review for Sample Delivery Group 33878.

APPENDIX K
**DATA VALIDATION SUMMARY
OF THE PHASE II
REMEDIAL INVESTIGATION
SOIL RESULTS
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**

OVERVIEW

This report presents the data validation summary for soil samples collected in March and April 1994 for the Phase II Remedial Investigation at the Tutu Wells Site, St. Thomas, U.S. Virgin Islands conducted by Geraghty & Miller, Inc.

SAMPLING

The samples were collected on 6 days during the period of March 26, 1994 through April 6, 1994. They were delivered to the laboratory using chain-of-custody (COC) procedures in five sample delivery groups (SDGs). Each SDG was assigned a unique laboratory project number. An SDG and sample identification (ID) summary is provided in Table 1.

Eight soil samples, one field replicate, one field blank, and four trip blank samples were collected during the sampling period.

The field blank sample, identified as FB032694, was collected on the first day of sampling. This field blank is associated with every soil sample collected during the sampling period and was used in the validation of all field samples.

Four trip blanks were prepared and shipped with the field samples. The trip blank collected on March 26, 1994 is associated with both SDG 33590 and SDG 33735. SDG 33590 was held for shipment with SDG 33735. This trip blank, identified as TB032694, is associated with the soil samples in the first two SDGs and was used in the validation of MW-18 (12-14'), MW-17 (6-8'), and MW-15.

A field replicate sample was collected on April 4, 1994 for MW-16 (0-3') and provided to the laboratory with a blind field identification. The field replicate sample was identified as sample MW-135 (0-3') and is in SDG 33835.

Matrix spike (MS) and matrix spike duplicate (MSD) samples were collected for MW-19 (4-6' and 4-8') and analyzed in SDG 33878.

For three of the soil samples, the field replicate, the MS, and the MSD samples collected during the sampling period, samples from different borehole depths were provided for the volatile organic compound (VOC) analyses than those provided for all other parameters. The following table summarizes the depths and sample IDs that pertain to the analytical parameters:

<u>Soil Boring</u>	<u>VOC Analysis</u>	<u>Non-VOC Parameters</u>
MW-24	MW-24 (4.5-6.5')	MW-24 (6.5-8.5')
MW-16	MW-16 (0-2')	MW-16 (0-3')
MW-135	MW-135 (0-2')	MW-135 (0-3')
MW-19	MW-19 (4-6')	MW-19 (4-8')
MW-19 MS	MW-19 (4-6') MS	MW-19 (4-8') MS
MW-19 MSD	MW-19 (4-6') MSD	MW-19 (4-8') MSD

ANALYSIS

The samples were sent to Enseco-East in Somerset, New Jersey for analysis of the target compound list (TCL) VOCs, TCL semivolatile organic compounds (SVOCs), target analyte list (TAL) inorganics, total petroleum hydrocarbons (TPHs), and three site-specific VOCs. The site-specific VOCs included the following compounds: methyl-tertiary butyl ether (MTBE); 1,2-dibromoethane (EDB); and n-propylbenzene.

The TCL VOCs and TCL SVOCs were analyzed in accordance with the U.S. Environmental Protection Agency (USEPA) Contract Laboratory Program (CLP) methodologies contained in the March 1990 Statement of Work (SOW) for Organics Analysis (USEPA 1990a). The TAL metals and cyanide were analyzed in accordance with the USEPA CLP methodologies contained in the March 1990 SOW for Inorganics Analysis (USEPA 1990b). Analyses for TPHs and site-specific VOCs were conducted in accordance with the methods and requirements of the quality assurance project plan (QAPP) prepared for the remedial investigation at the Tutu Wells Site (Geraghty & Miller, Inc. 1992).

VALIDATION

All TCL VOCs, TCL SVOCs, TAL metals, and cyanide were validated in accordance with the USEPA Region II data validation guidelines for organic and inorganic analyses performed in accordance with CLP methods for routine analytical services. The guidelines for organics and inorganics are provided in the regional Standard Operating Procedure (SOP) Number HW-6, Revision 8 and in regional SOP Number HW-2, Revision 11, respectively (USEPA 1992a; 1992b).

MTBE, EDB, and n-propylbenzene results and quality control criteria were reviewed and validated using the USEPA Region II guidelines for TCL VOCs (USEPA 1992a).

Data validation of TPH data was performed according to criteria specified in USEPA Method 418.1 (USEPA 1983) and in accordance with the following guidelines:

- Method and/or reagent blanks - Reported concentration should be less than the quantitation limit. Blanks, including field blanks, associated with field samples were reviewed for contamination. Sample results were evaluated using a five times multiplier of the highest concentration in the associated TPH blank.

- Precision of duplicates - Acceptable precision was demonstrated by calculation of relative percent difference (RPD) with a limit of 20 percent. For calculated RPD between 20 and 40 percent, all associated sample data for the analytical batch were estimated and qualified with a "J" flag.
- Accuracy of matrix spikes - Acceptable accuracy was demonstrated by percent recovery (%R) of MS and MSD in the acceptance window range of 80 to 120 percent. For %R values outside of the 80 to 120 window, but within 50 to 150 %R, associated sample data were qualified as estimated and flagged with a "J."
- Accuracy of laboratory control spikes - Acceptable %R of blank spikes was within the window of 80 to 120 percent. For %R values outside of the 80 to 120 window, but within 50 to 150 %R, associated sample data in the SDG were qualified as estimated and flagged with a "J."

Individual organic and inorganic data review checklists and data assessment narratives were completed for each SDG. This information and any required tables pertaining to the data assessments may be found in Attachments K1 through K10 by SDG number. The information about the data review of MTBE, EDB, n-propylbenzene, and TPH are located in the organic data assessment narratives for each SDG.

OVERALL ASSESSMENT

Overall, the majority of the data submitted by Enseco-East for analysis are of good quality and demonstrate acceptable precision, accuracy, and completeness. The problems found with the data are discussed below.

In the analyses for TPHs, the laboratory failed to report estimated concentrations detected in the method blanks, field blanks, and several field samples. The laboratory was required to report estimated analyte concentrations as specified in the site QAPP (Geraghty & Miller, Inc.

1992). This information would allow the data reviewer to evaluate potential sample and blank contamination originating in the field and during analysis. It would also identify target analytes present in concentrations below the CLP contract required quantitation limits and laboratory reporting limits. The TPH data were corrected during the data review in order to evaluate potential sample contamination.

In the analyses for the three site-specific VOCs, the laboratory calibrated instruments and quantitated sample concentrations for MTBE only. The laboratory failed to calibrate the instruments for EDB, or n-propylbenzene. In addition, due to an error in the COC record and the project specifications at the laboratory, the laboratory thought that the samples were to be analyzed for dibromomethane instead of EDB. The laboratory narratives for several SDGs did not address the compound discrepancy between EDB and dibromomethane, but noted the lack of calibration for EDB and n-propylbenzene. The laboratory narratives indicated that although calibrations were not performed, the laboratory analysts had reviewed the sample spectra for the presence of EDB and n-propylbenzene and determined that both were not present in any of the samples. In actuality, the laboratory review was for dibromomethane and n-propylbenzene. Since the laboratory review was based on standard reference spectra not associated with the analyses of the samples, the results for dibromomethane and n-propylbenzene are qualitative only and should not be considered quantitative. On this basis, the data for dibromomethane and n-propylbenzene were rejected in the quantitative VOC analyses for all of the field samples and associated blanks.

Other data qualifications pertaining to the organic parameters are as follows:

- Some data generated for the VOC, SVOC, and TPH analyses have been negated due to blank contamination and estimated due to calibration outliers.
- All of the VOC data for SDG 33590 were estimated due to sample condition upon receipt at the laboratory.

- The 2,4-dinitrophenol result for MW-15 and the associated SVOC method blank were rejected due to a poor response factor in the calibration analysis.
- The results for tetrachloroethene and TPH were estimated in samples MW-16 and MW-135 because of poor field precision.

In the data review of TAL inorganics, the following analytes were qualified because of quality control outliers:

- Antimony results were estimated in all field samples and blanks due to calibration deficiencies.
- Antimony and chromium results were estimated in all field samples due to MS recoveries.
- Cobalt results were estimated in samples MW-19 (4-8'), MW-16 (0-3'), and MW-135 (0-3') due to outliers in the inductively coupled plasma (ICP) serial dilution analysis.
- Chromium was estimated in sample MW-13 (2-3.5') due to an outlier in the ICP serial dilution analysis.
- Selenium was estimated in sample MW-13 (2-3.5') due to graphite furnace atomic absorption analytical spike recovery.

As stated above, with the exceptions noted, the data was found to be acceptable and usable and meet the data quality objectives for the Phase II Remedial Investigation. The qualifications given to the results discussed above are based on the USEPA data validation guidelines and, given the relatively small number of samples qualified, especially for the compounds discussed, are well within the normal range for a validated data set of this size.

REFERENCES

- Geraghty & Miller, Inc. 1992. Quality Assurance Project Plan, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands, March 1992.
- U.S. Environmental Protection Agency (USEPA). 1983. Methods of Chemical Analysis of Water and Wastes, EPA-600/4-7-90-020, United States Environmental Protection Agency, Cincinnati, Ohio, March 1983.
- U.S. Environmental Protection Agency (USEPA). 1990a. USEPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, SOW No. 3/90 including Rev. 12/90 and 2/91, United States Environmental Protection Agency, March 1990.
- U.S. Environmental Protection Agency (USEPA). 1990b. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, SOW No. 3/90, United States Environmental Protection Agency, March 1990.
- U.S. Environmental Protection Agency (USEPA). 1992a. Evaluation of Organic Data for the Contract Laboratory Program (CLP), Region II Standard Operating Procedure No. HW-6, Revision No. 8, United States Environmental Protection Agency, January 1992.
- U.S. Environmental Protection Agency (USEPA). 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP), Region II Standard Operating Procedure No. HW-2, Revision No. 11, United States Environmental Protection Agency, January 1992.

c:\wpwin\docs\tutu\IP2SOILDV.DOC
June 23, 1994

Table K-1. Summary of Sample Delivery Groups, Sample Identifications, Collection Dates, and Parameters for Soils and Blanks, Phase II Remedial Investigation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

SDG	Field ID	Laboratory ID	Matrix	Collection Date	Parameters
33590	MW-18 (12-14')	33590-01-SA	Soil	March 26, 1994	VOCs, SVOCs, TPHs, metals, cyanide
	FB032694	33590-02-FB	Aqueous	March 26, 1994	VOCs, SVOCs, TPHs, metals
	TB032694	33590-03-TB	Aqueous	March 26, 1994	VOC
33735	MW-17 (6-8')	33735-01-SA	Soil	March 28, 1994	VOCs, SVOCs, TPHs, metals, cyanide
	MW-15	33735-02-SA	Soil	March 28, 1994	VOCs, SVOCs, TPHs, metals, cyanide
33745	MW-13 (2-3.5')	33745-01-SA	Soil	March 29, 1994	VOCs, SVOCs, TPHs, metals, cyanide
	MW-24 (4.5-6.5')	33745-02-SA	Soil	March 31, 1994	VOC
	MW-24 (6.5-8.5')	33745-03-SA	Soil	March 31, 1994	SVOCs, TPHs, metals, cyanide
	MW-25 (12-14')	33745-04-SA	Soil	March 31, 1994	VOCs, SVOCs, TPHs, metals, cyanide
	TB033194	33745-05-TB	Aqueous	March 31, 1994	VOC
33835	MW-16 (0-2')	33835-01-SA	Soil	April 4, 1994	VOC
	MW-16 (0-3')	33835-03-SA	Soil	April 4, 1994	SVOCs, TPHs, metals, cyanide
	MW-135 (0-2') (a)	33835-02-SA	Soil	April 4, 1994	VOC
	MW-135 (0-3') (b)	33835-04-SA	Soil	April 4, 1994	SVOCs, TPHs, metals, cyanide
	Trip Blank	33835-05-TB	Aqueous	April 4, 1994	VOC
33878	MW-19 (4-6')	33878-01-SA	Soil	April 6, 1994	VOC
	MW-19 (4-6')	MS33878-01-MS	Soil	April 6, 1994	VOC
	MW-19 (4-6') MSD	33878-01-SD	Soil	April 6, 1994	VOC
	MW-19 (4-8')	33878-02-SA	Soil	April 6, 1994	SVOCs, TPHs, metals, cyanide
	MW-19 (4-8') MS	33878-02-MS	Soil	April 6, 1994	SVOCs, TPHs, metals, cyanide
	MW-19 (4-8') MSD	33878-02-SD	Soil	April 6, 1994	SVOCs, TPHs, metals, cyanide
	Trip Blank	33878-03-TB	Aqueous	April 6, 1994	VOC

- (a) Field replicate of sample MW-16 (0-2').
(b) Field replicate of sample MW-16 (0-3').

SDG Sample delivery group.
ID Identification.
VOCs Volatile organic compounds.
MS Matrix spike.
SVOCs Semivolatile organic compounds.
TPHs Total petroleum hydrocarbons.
MSD Matrix spike duplicate.

g:\chemical\data-rat\stth\1994\oil\VP28OIL71.tbl

APPENDIX L

**DATA VALIDATION SUMMARY REPORT
PHASE II GROUNDWATER SAMPLING
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



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TABLE

- L-1. Summary of Sample Delivery Groups, Sample Identifications, Collection Dates, and Laboratory Receipt Dates for the Water Samples Collected as Part of the Phase II Remedial Investigation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

ATTACHMENTS (submitted separately)

- L-1. Organic Data Review for Sample Delivery Group 34399.
- L-2. Inorganic Data Review for Sample Delivery Group 34399.
- L-3. Organic Data Review for Sample Delivery Group 34496.
- L-4. Organic Data Review for Sample Delivery Group 34545.
- L-5. Inorganic Data Review for Sample Delivery Group 34545.
- L-6. Organic Data Review for Sample Delivery Group 34647.
- L-7. Inorganic Data Review for Sample Delivery Group 34647.
- L-8. Organic Data Review for Sample Delivery Group 34584.
- L-9. Inorganic Data Review for Sample Delivery Group 34584.
- L-10. Organic Data Review for Sample Delivery Group 34656.
- L-11. Inorganic Data Review for Sample Delivery Group 34656.



ATTACHMENTS (continued)

- L-12. Organic Data Review for Sample Delivery Group 34666.
- L-13. Inorganic Data Review for Sample Delivery Group 34666.
- L-14. Organic Data Review for Sample Delivery Group 34706.
- L-15. Inorganic Data Review for Sample Delivery Group 34706.
- L-16. Organic Data Review for Sample Delivery Group 34731.
- L-17. Inorganic Data Review for Sample Delivery Group 34731.
- L-18. Organic Data Review for Sample Delivery Group 34732.
- L-19. Inorganic Data Review for Sample Delivery Group 34732.
- L-20. Organic Data Review for Sample Delivery Group 34769.
- L-21. Inorganic Data Review for Sample Delivery Group 34769.
- L-22. Organic Data Review for Sample Delivery Group 34776.
- L-23. Inorganic Data Review for Sample Delivery Group 34776.
- L-24. Organic Data Review for Sample Delivery Group 34812.
- L-25. Inorganic Data Review for Sample Delivery Group 34812.
- L-26. Organic Data Review for Sample Delivery Group 34905.
- L-27. Inorganic Data Review for Sample Delivery Group 34905.
- L-28. Organic Data Review for Sample Delivery Group 34960.
- L-29. Inorganic Data Review for Sample Delivery Group 34960.
- L-30. Organic Data Review for Sample Delivery Group 34952.
- L-31. Inorganic Data Review for Sample Delivery Group 34952.
- L-32. Organic Data Review for Sample Delivery Group 34982.
- L-33. Inorganic Data Review for Sample Delivery Group 34982.



ATTACHMENTS (continued)

- L-34. Organic Data Review for Sample Delivery Group 35014.
- L-35. Inorganic Data Review for Sample Delivery Group 35014.
- L-36. Organic Data Review for Sample Delivery Group 35016.
- L-37. Inorganic Data Review for Sample Delivery Group 35016.
- L-38. Organic Data Review for Sample Delivery Group 35029.
- L-39. Inorganic Data Review for Sample Delivery Group 35029.
- L-40. Organic Data Review for Sample Delivery Group 35033.
- L-41. Organic Data Review for Sample Delivery Group 35035.
- L-42. Inorganic Data Review for Sample Delivery Group 35035.
- L-43. Organic Data Review for Sample Delivery Group 35037.
- L-44. Inorganic Data Review for Sample Delivery Group 35037.
- L-45. Inorganic Data Review for Sample Delivery Group 35144.



APPENDIX L

DATA VALIDATION SUMMARY OF THE PHASE II REMEDIAL INVESTIGATION WATER RESULTS TUTU WELLS SITE ST. THOMAS, U.S. VIRGIN ISLANDS

OVERVIEW

As part of the Phase II Remedial Investigation at the Tutu Wells Site, located in St. Thomas, U.S. Virgin Islands, Geraghty & Miller, Inc. collected water samples from May through July 1994. A majority of the May through June 1994 data were validated; the validation results are discussed in this Appendix. Several of the water-supply well samples collected in May and June 1994 and all of the samples collected in July 1994 did not have to be validated.

SAMPLING

Groundwater wells and water-supply wells were sampled from May through July, 1994. The samples were delivered to the laboratory using chain-of-custody (COC) procedures, and the laboratory provided the analytical data results in 28 sample delivery groups (SDGs). Each SDG was assigned a unique laboratory project number. An SDG and sample identification (ID) summary is provided in Table L-1. Sixty-seven water samples, four field replicates, four field blanks, and 28 trip blank samples were collected during the sampling period. Samples Four Winds I, CHT-6D, MW-7, MW-3, and SW-7 were also analyzed as matrix spike/matrix spike duplicate (MS/MSD) samples.

Several of the water-supply well samples collected in May and June 1994 and of all the samples collected in July 1994 did not have to be validated and are not discussed in this report. The data from water-supply wells Gassett, Steele, Eglin I, Eglin III, La Place, WTS-2 (Port 3), and Mathias, which were sampled in May and June 1994, were not validated.



ANALYSIS

The samples were sent to Enseco-East in Somerset, New Jersey for analysis of the target compound list (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), target analyte list (TAL) dissolved metals, TAL total metals, cyanide, and three site-specific VOCs. The site-specific VOCs included the following compounds: methyl tertiary-butyl ether (MTBE); 1,2-dibromoethane (EDB); and n-propylbenzene. In addition, a majority of the samples collected were analyzed for total dissolved solids, total suspended solids, alkalinity, hardness, ferrous iron, chloride, nitrite, nitrate, phosphorous, sulfate, sulfide, chemical oxygen demand, and organic lead. Two samples collected on June 29, 1994, DS-1 and DS-2, were only analyzed for the Toxicity Characteristic Leaching Procedure (TCLP) parameters, ignitability, corrosivity, and reactivity.

Samples collected from the Gassett, Harthman Race Track, Delegarde, VIHA I, WTS-1 (Port 3), and WTS-2 (Port 3) supply wells were analyzed for TCL VOCs according to U.S. Environmental Protection Agency (USEPA) Method 524.2 Revision 3.0 (USEPA 1989) with USEPA Region II modifications. Geraghty & Miller requested that these supply well samples be analyzed for the three site-specific VOCs. However, none of the samples analyzed according to Method 524.2 was analyzed for these additional compounds. All the other VOC samples and all the SVOC samples were analyzed in accordance with USEPA Contract Laboratory Program (CLP) methodologies contained in the March 1990 Statement of Work (SOW) for Organics Analysis (USEPA 1990a). The metals and cyanide were analyzed in accordance with the USEPA CLP methodologies contained in the March 1990 SOW for Inorganics Analysis (USEPA 1990b). Analyses for the other parameters were conducted in accordance with the methods and requirements of the quality assurance project plan (QAPP) prepared for the remedial investigation at the Tutu Wells Site (Geraghty & Miller, Inc. 1992).



VALIDATION

All VOCs, SVOCs, metals, and cyanide were validated in accordance with the USEPA Region II data validation guidelines for organic and inorganic analyses performed in accordance with CLP methods for routine analytical services. The guidelines for validating organic and inorganic data are provided in the USEPA Region II Standard Operating Procedures (SOPs) numbered HW-6, Revision 8 and HW-2, Revision 11, respectively (USEPA 1992a; 1992b).

MTBE, EDB, n-propylbenzene, and Method 524.2 results were reviewed and validated using the USEPA Region II guidelines for TCL VOCs (USEPA 1992a).

Individual organic and inorganic data review checklists and data assessment narratives were completed for each SDG. This information and any required tables pertaining to the data assessments may be found under their SDG number in Attachments L-1 through L-47. The information about the data review of MTBE, EDB, n-propylbenzene, and Method 524.2 VOCs is located in the organic data assessment narratives for each SDG.

OVERALL ASSESSMENT

Overall, the majority of the data submitted by Enseco-East for analysis are of good quality and demonstrate acceptable precision, accuracy, and completeness. Some of the reasons for data qualification are discussed below. Detailed discussions regarding the validation of the data and the qualifiers added to the results are found in Attachments L-1 through L-47.

When analyzing VOC samples following Method 524.2, the laboratory failed to calibrate the instruments for MTBE, EDB, or n-propylbenzene. However, if these compounds were present in the samples, they would have been detected as tentatively identified compounds (TICs). When analyzing VOC samples following the CLP method, the laboratory failed to perform five-point initial calibrations for MTBE, EDB, or n-propylbenzene. Only single-point calibrations were routinely performed for these site-specific compounds. Therefore, all the MTBE, EDB, and n-



propylbenzene sample results were estimated because of calibration deficiencies. Some data generated for the TCL VOC and TCL SVOC analyses were rejected because of low response factors reported in the calibration analyses.

Several coolers containing samples being shipped from the site to the laboratory were delayed in customs. As a result, cooler temperatures were above 7 degrees Celsius when the coolers were received at the laboratory. Therefore, the VOC and SVOC results for the samples contained in these coolers were estimated.

For several trip blanks and one field blank, the volatile organic analysis (VOA) vials containing these blanks contained air bubbles. The non-detect results for these blanks were rejected, and the positive results were estimated.

Several aluminum sample results were rejected because of high MS recoveries. A few thallium sample results were rejected because of a low MS recoveries. Several metal results for sample CHT-3 were rejected because the concentrations of the dissolved metals exceeded the concentrations of the total metals by more than 50%.

As stated above, with the exceptions noted in the attachments, the data were found to be acceptable and usable, and the data meet the data quality objectives for the Phase II Remedial Investigation. The qualifications of the results discussed in this Appendix are based on the USEPA data validation guidelines and, given the relatively small number of samples qualified (especially for the parameters discussed), are well within the normal range for a validated data set of this size.



REFERENCES

- Geraghty & Miller, Inc. 1992. Quality Assurance Project Plan, Tutu Service Station Investigation, St. Thomas, U.S. Virgin Islands, March 1992.
- U.S. Environmental Protection Agency (USEPA). 1989. Method 524.2, Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry, Revision 3.0, Environmental Monitoring Systems Laboratory (EMSL), Office of Research and Development, United States Environmental Protection Agency, Cincinnati, Ohio, 1989.
- U.S. Environmental Protection Agency (USEPA). 1990a. USEPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, SOW No. 3/90 including Rev. 12/90 and 2/91, United States Environmental Protection Agency, March 1990.
- U.S. Environmental Protection Agency (USEPA). 1990b. USEPA Contract Laboratory Program, Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, SOW No. 3/90, United States Environmental Protection Agency, March 1990.
- U.S. Environmental Protection Agency (USEPA). 1992a. Evaluation of Organic Data for the Contract Laboratory Program (CLP), Region II Standard Operating Procedure No. HW-6, Revision No. 8, United States Environmental Protection Agency, January 1992.
- U.S. Environmental Protection Agency (USEPA). 1992b. Evaluation of Metals Data for the Contract Laboratory Program (CLP), Region II Standard Operating Procedure No. HW-2, Revision No. 11, United States Environmental Protection Agency, January 1992.

g:\chemical\data-val\tutu\1994\water\p2wstdv.rep
October 4, 1994



Table L-1. Summary of Sample Delivery Groups, Sample Identifications, Collection Dates, and Laboratory Receipt Dates for the Water Samples Collected as part of the Phase II Remedial Investigation, Tutu Wells Site, St. Thomas, U.S. Virgin Islands.

Sample Identification	Sample Date	Laboratory Receipt Date	Sample Delivery Group Number
MW-1	6/8/94	6/10/94	34776
MW-1D	6/8/94	6/10/94	34776
MW-2	6/17/94	6/20/94	34982
MW-3	6/14/94	6/16/94	34905
MW-4	6/13/94	6/20/94	35014
MW-4D	6/13/94	6/20/94	35014
MW-5	6/22/94	6/27/94	35029
MW-6R	6/6/94	6/7/94	34812
MW-6D	6/7/94	6/10/94	34776
MW-7	6/6/94	6/7/94	34812
MW-8	6/3/94	6/6/94	34769
MW-9S	5/31/94	6/2/94	34666
MW-10	5/31/94	6/2/94	34666
MW-10D	5/31/94	6/2/94	34666
MW-11D	5/27/94	5/28/94	34656
MW-12D	5/20/94	5/21/94	34545
MW-13	6/15/94	6/16/94	34952
MW-13D	6/15/94	6/16/94	34960
MW-15	6/7/94	6/10/94	34776
MW-16	6/10/94	6/11/94	34732/35144
MW-17	6/7/94	6/10/94	34776
MW-18	6/24/94 and 6/27/94	6/28/94 and 6/30/94	35033/35037
MW-19	6/20/94	6/21/94	35016
MW-20	6/15/94	6/16/94	34960
MW-20D	6/15/94	6/16/94	34952
MW-21D	6/14/94	6/16/94	34952
MW-22D	6/22/94	6/27/94	35029
MW-24	6/3/94	6/6/94	34769
MW-25	6/2/94	6/3/94	34731
CHT-3	6/1/94	6/2/94	34706
CHT-6D	6/1/94	6/2/94	34706
CHT-7D	6/2/94	6/3/94	34731
DW-1	6/3/94	6/6/94	34769
DW-2	5/27/94	5/28/94	34656
SW-2	6/22/94	6/27/94	35029
SW-3	6/23/94	6/24/94	35035
SW-4	6/16/94	6/17/94	34960
SW-5	5/25/94	5/27/94	34584
SW-6	5/26/94	5/27/94	34647
SW-7	6/23/94	6/24/94	35035
OHMW-1	5/24/94	5/27/94	34584
OHMW-2	5/24/94	5/27/94	34584
OHMW-3	5/24/94	5/27/94	34584
OHMW-4	5/24/94	5/27/94	34584
TT-1	6/9/94	6/10/94	34776
TT-1D	6/9/94	6/10/94	34776
TT-2	6/9/94	6/10/94	34776
TT-3D	6/14/94	6/15/94	34905
TT-4	6/10/94	6/11/94	34732
TT-5	6/9/94	6/10/94	34776
KFC-1 (KFMW-2)	6/22/94	6/27/94	35029
DW-6 (SW-7 FR)	6/23/93	6/24/94	35035
DW-4 (MW-11D FR)	5/27/94	5/28/94	34656
DW-5 (TT-2 FR)	6/9/94	6/10/94	34776
TT-1FR	6/9/94	6/10/94	34776
CHT-6D (FR)	6/1/94	6/2/94	34706
Four Winds II (FR)(dw-7)	7/21/94	7/25/94	35541

APPENDIX M

**EGLIN III SUPPLY WELL PUMPAGE
IMPACT TEST HYDROGRAPHS
MAY 1994
TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS**



DWG DATE: 7/21/94

PRJCT NO.: PR0013033

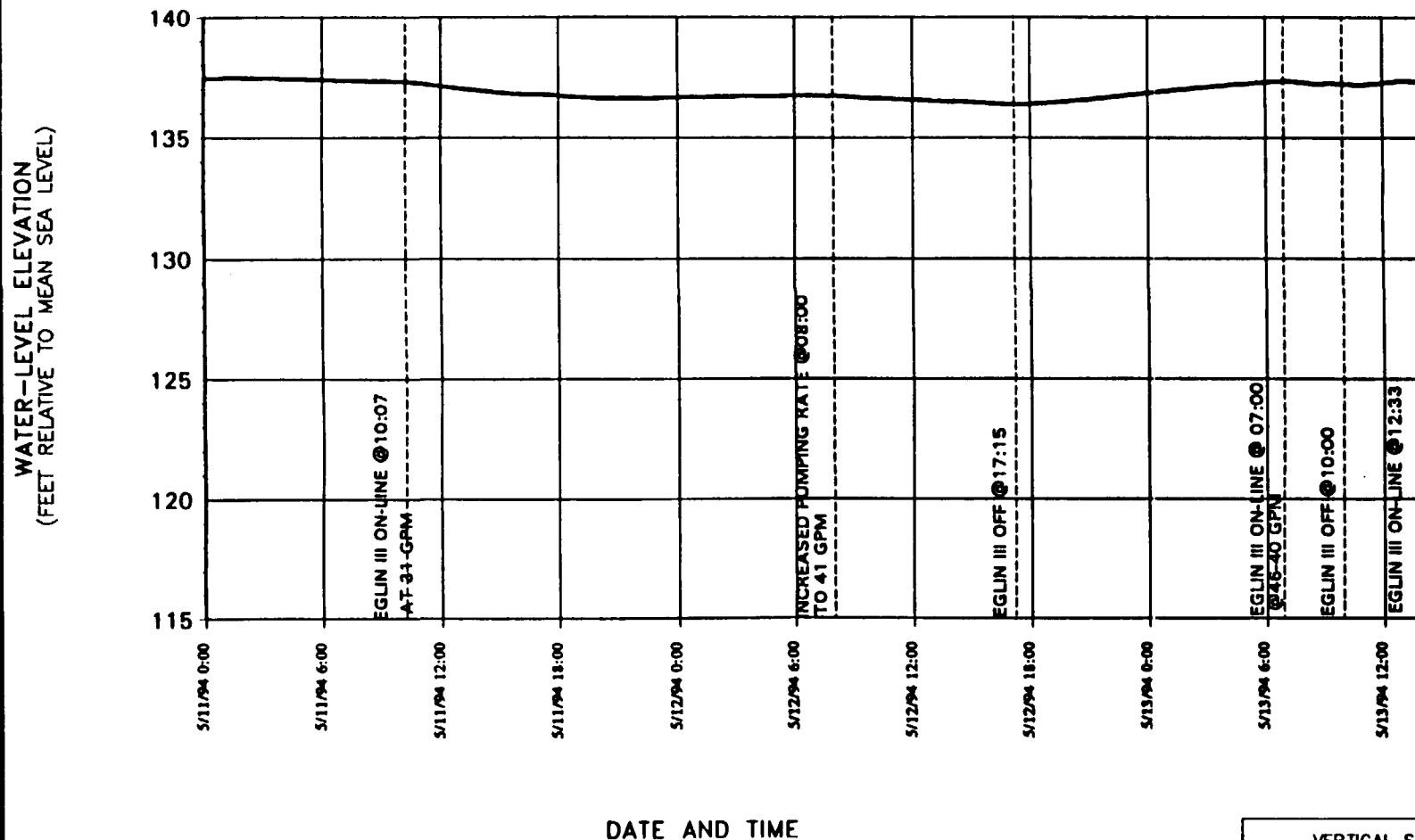
FILE:

DRAWING: SW-6

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 248 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



SHALLOW MONITORING WELL SW-6 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-1

TUT 005 1209

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

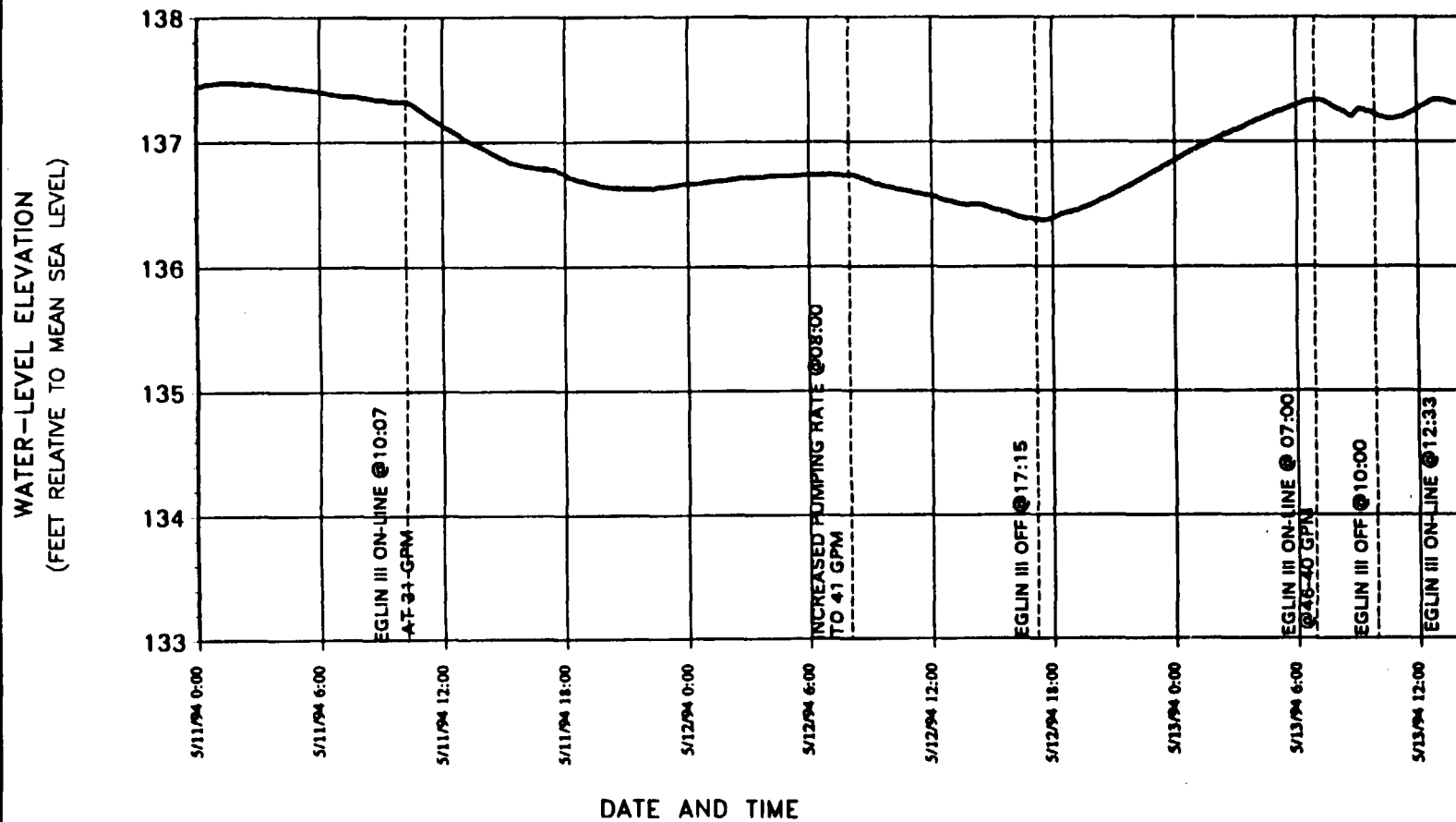
FILE:

DRAWING: SW-6A

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=1.7 FEET
 DISTANCE FROM EGLIN III = 248 FEET
 NOTE: VERTICAL DASHED LINES MARK THE
 TIMES THAT THE PUMPING RATE WAS
 CHANGED IN EGLIN III



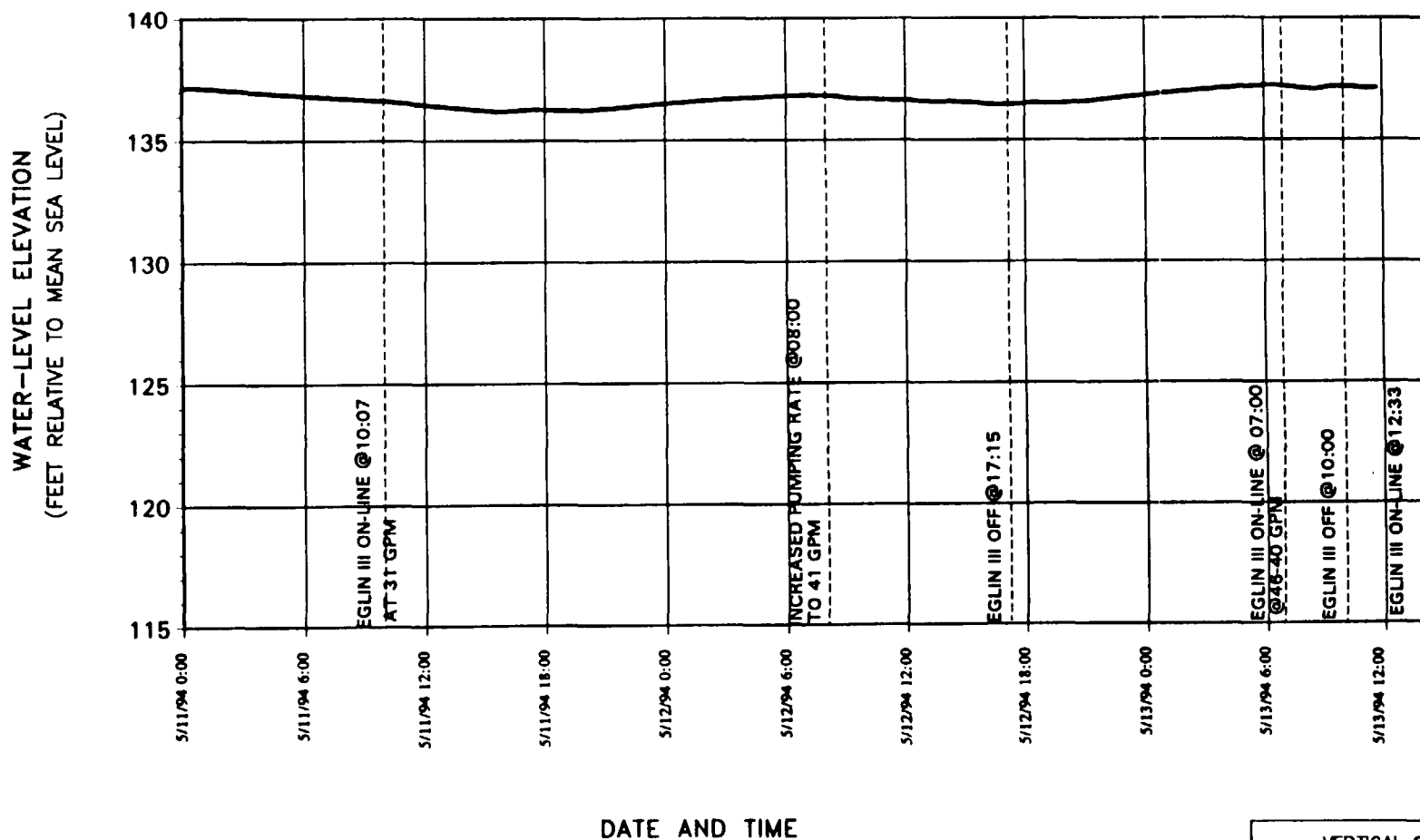
SHALLOW MONITORING WELL SW-6 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-2

TUT 005 1210



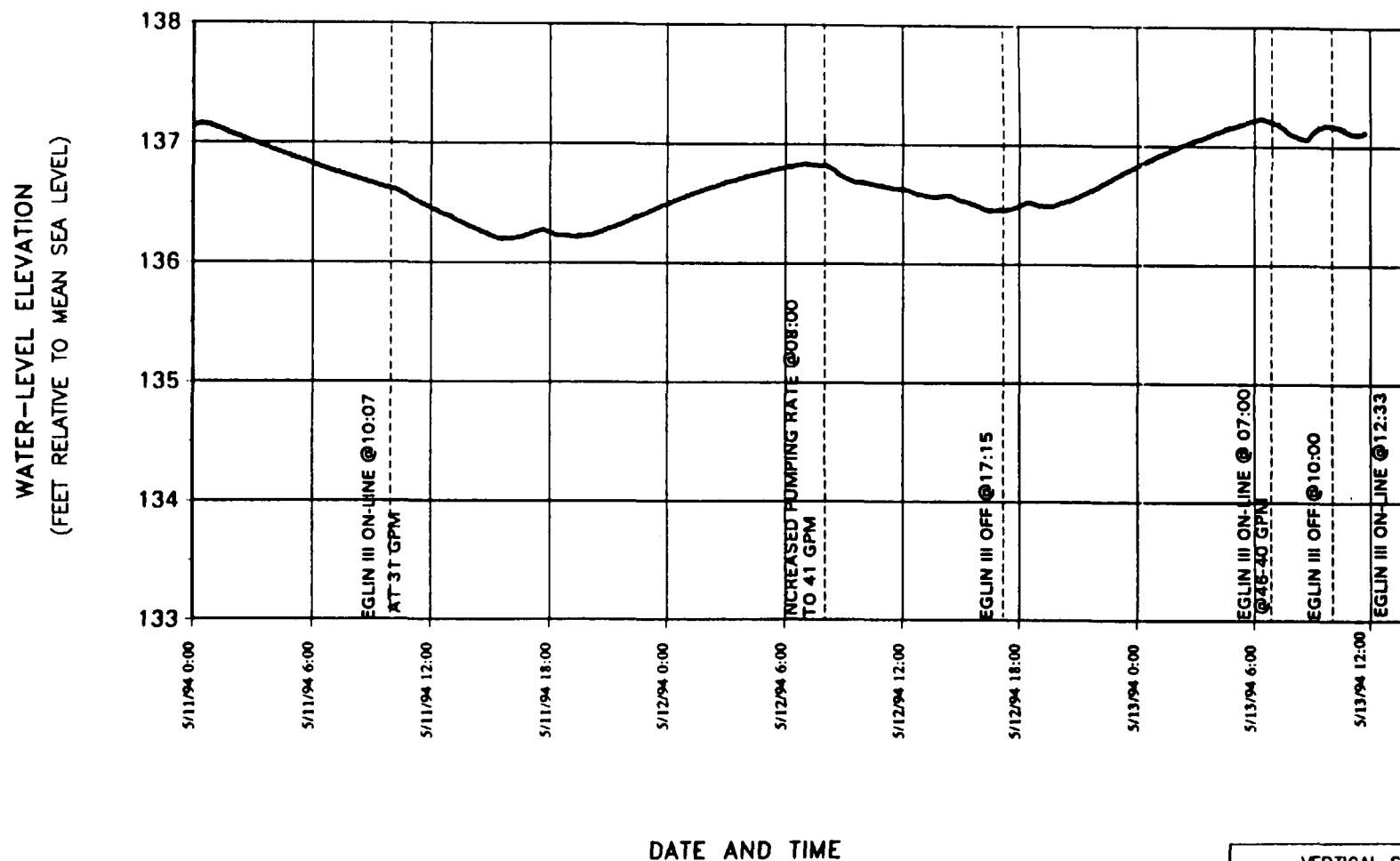
VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 198 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



SHALLOW MONITORING WELL OHMW-3 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-3



VERTICAL SCALE IS 1 INCH=1.7 FEET
 DISTANCE FROM EGLIN III = 198 FEET
 NOTE: VERTICAL DASHED LINES MARK THE
 TIMES THAT THE PUMPING RATE WAS
 CHANGED IN EGLIN III

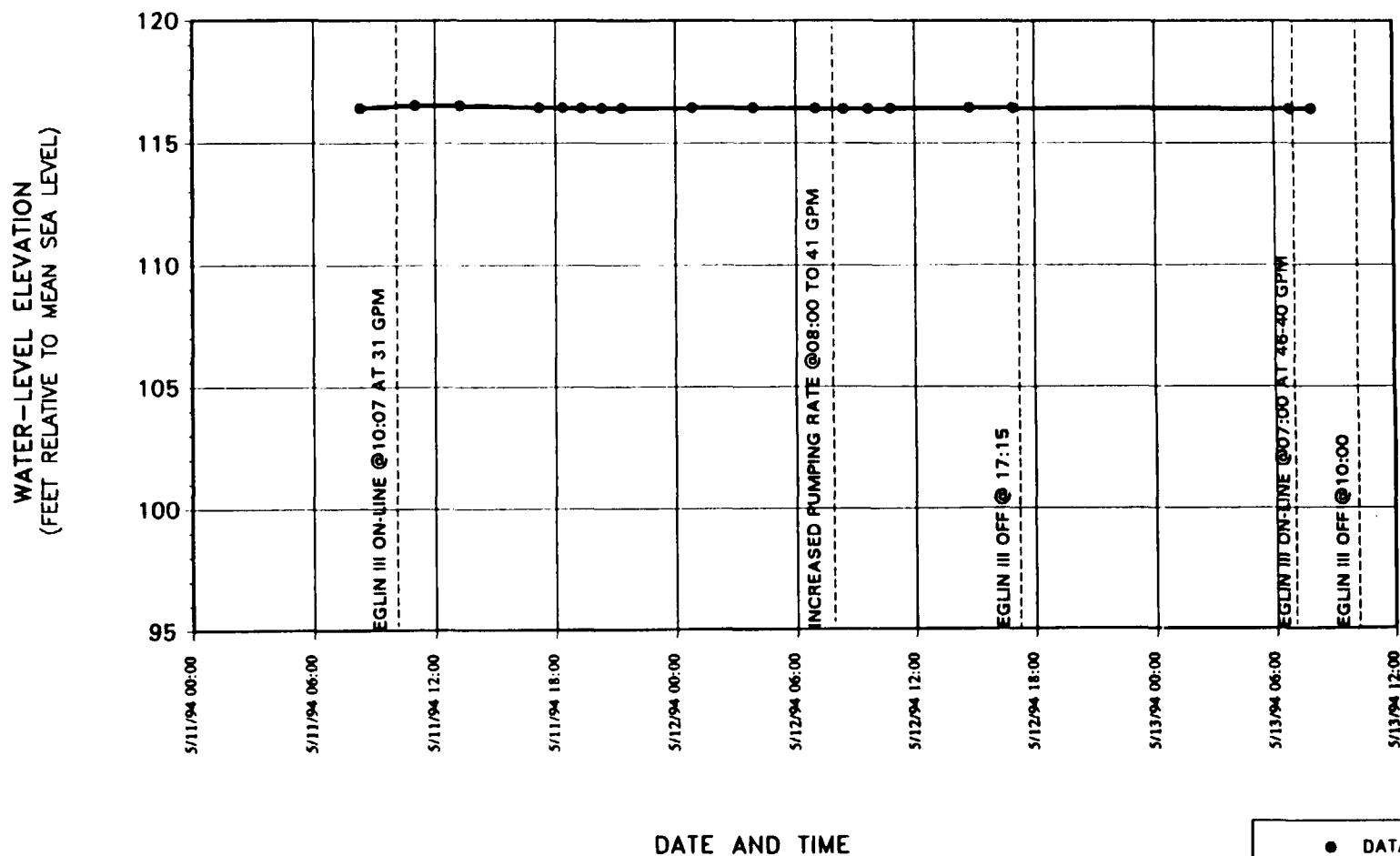


SHALLOW MONITORING WELL OHMW-3 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
 ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-4

TUT 005 1212



● DATA POINT

VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 374 FEET

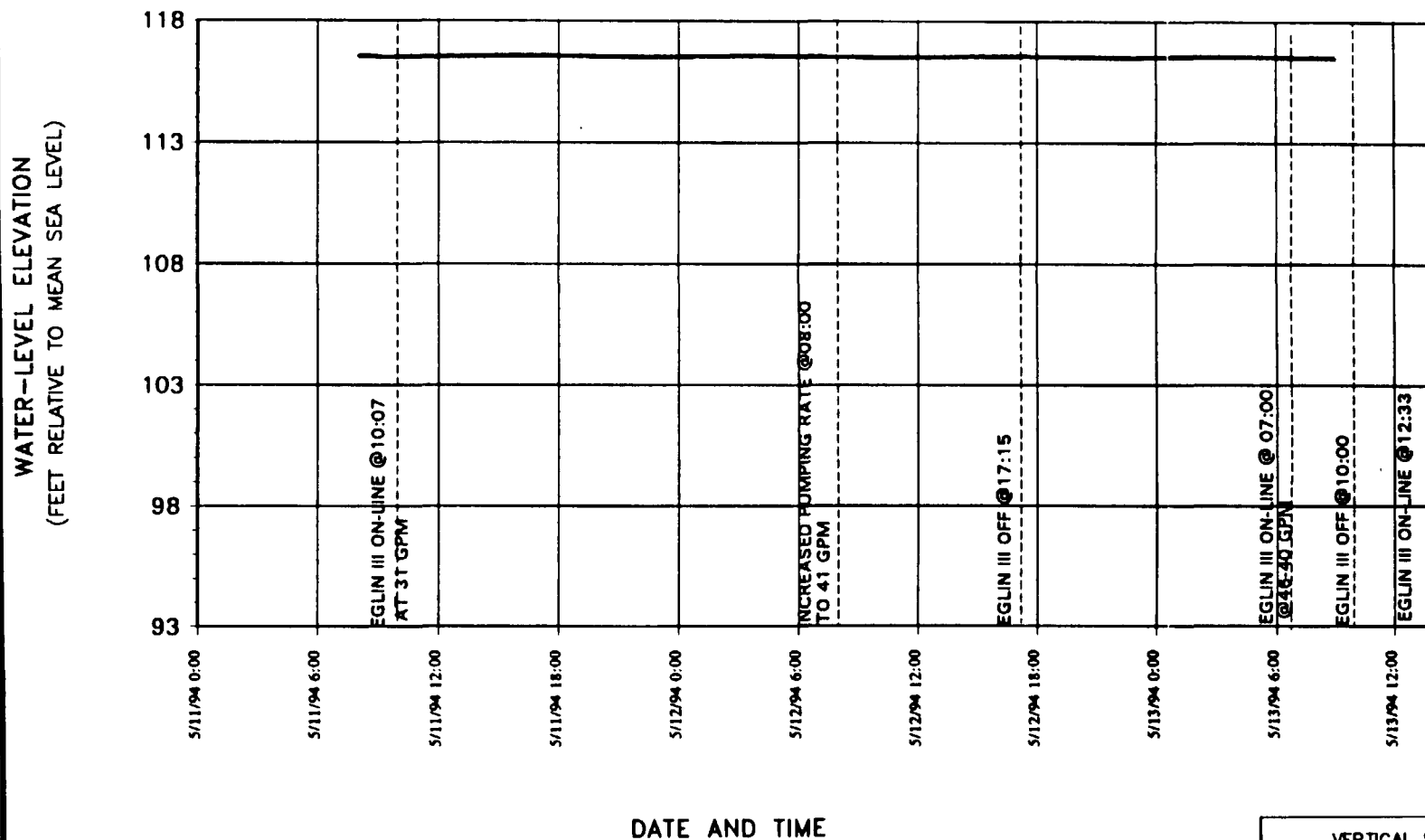
NOTE: VERTICAL DASHED LINES MARK THE TIMES THAT THE PUMPING RATE WAS CHANGED IN EGLIN III



SHALLOW MONITORING WELL OHMW-1 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-5



VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 259 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



SHALLOW MONITORING WELL OHMW-4 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-6

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

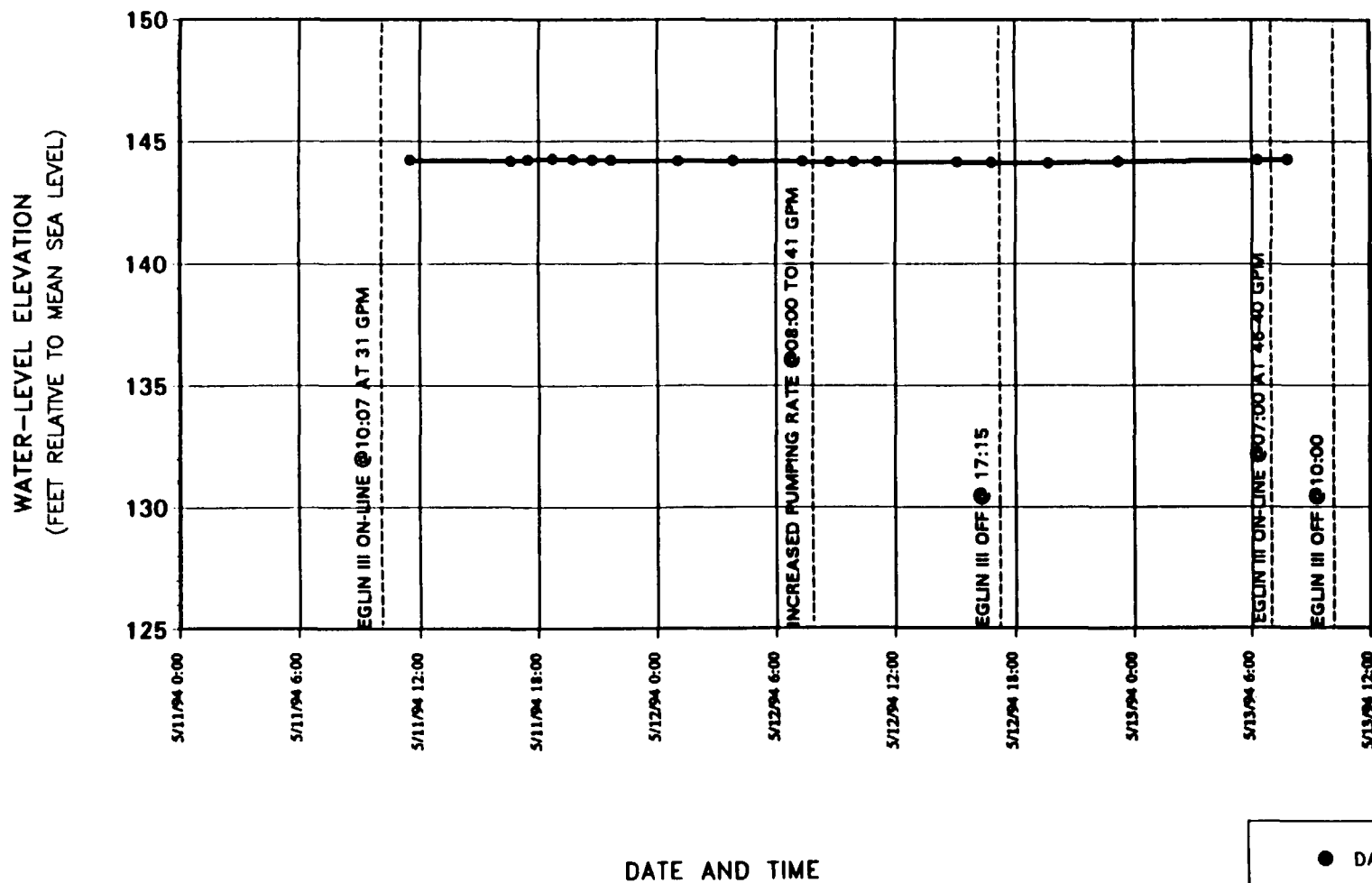
FILE:

DRAWING: MW-10

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



SHALLOW MONITORING WELL MW-10 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLAND'S

FIGURE

M-7

TUT 005 1215

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

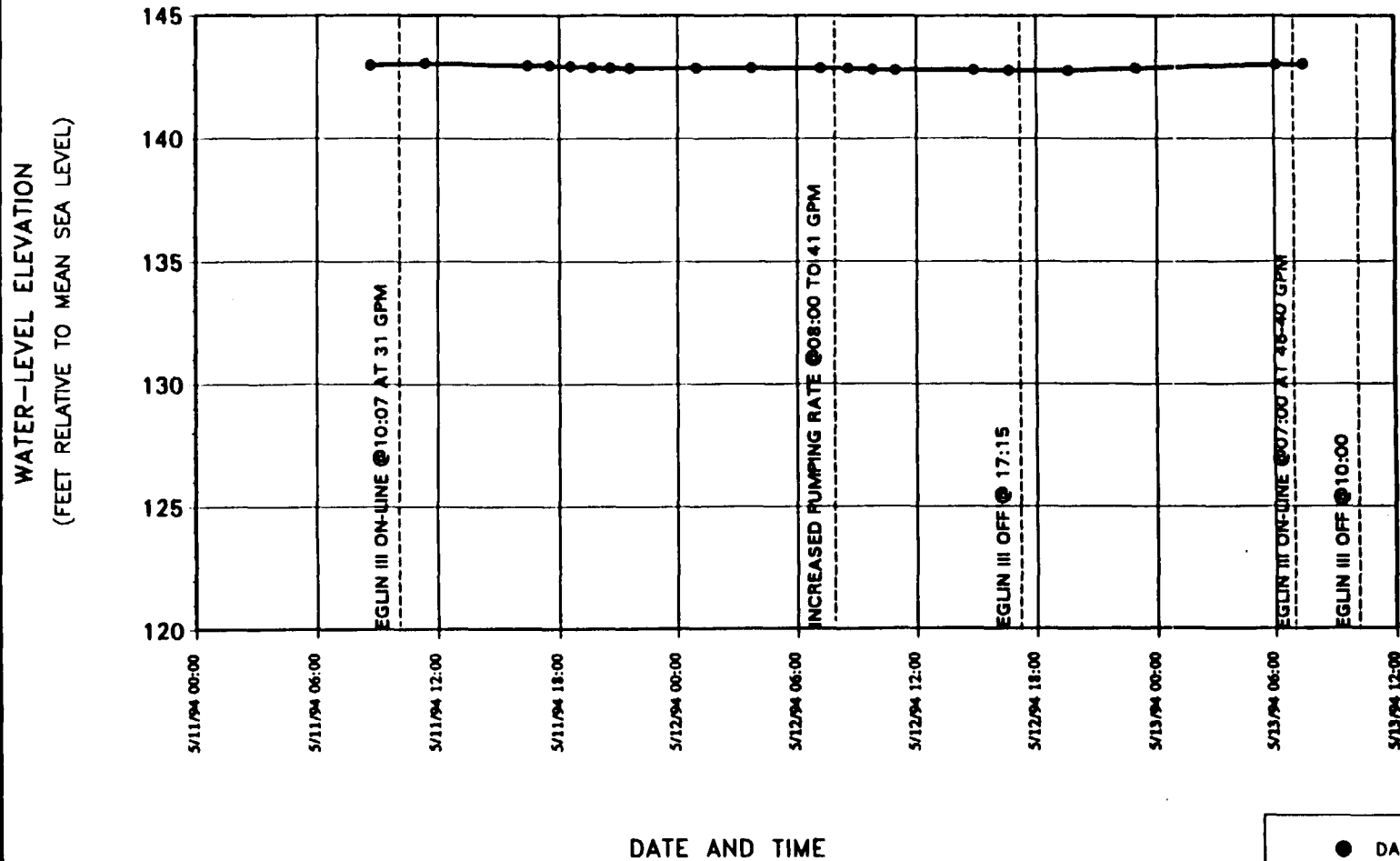
FILE:

DRAWING: SW4

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



● DATA POINT

VERTICAL SCALE IS 1 INCH=7 FEET

DISTANCE FROM EGLIN III = 462 FEET

NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



SHALLOW MONITORING WELL SW-4 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-8

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

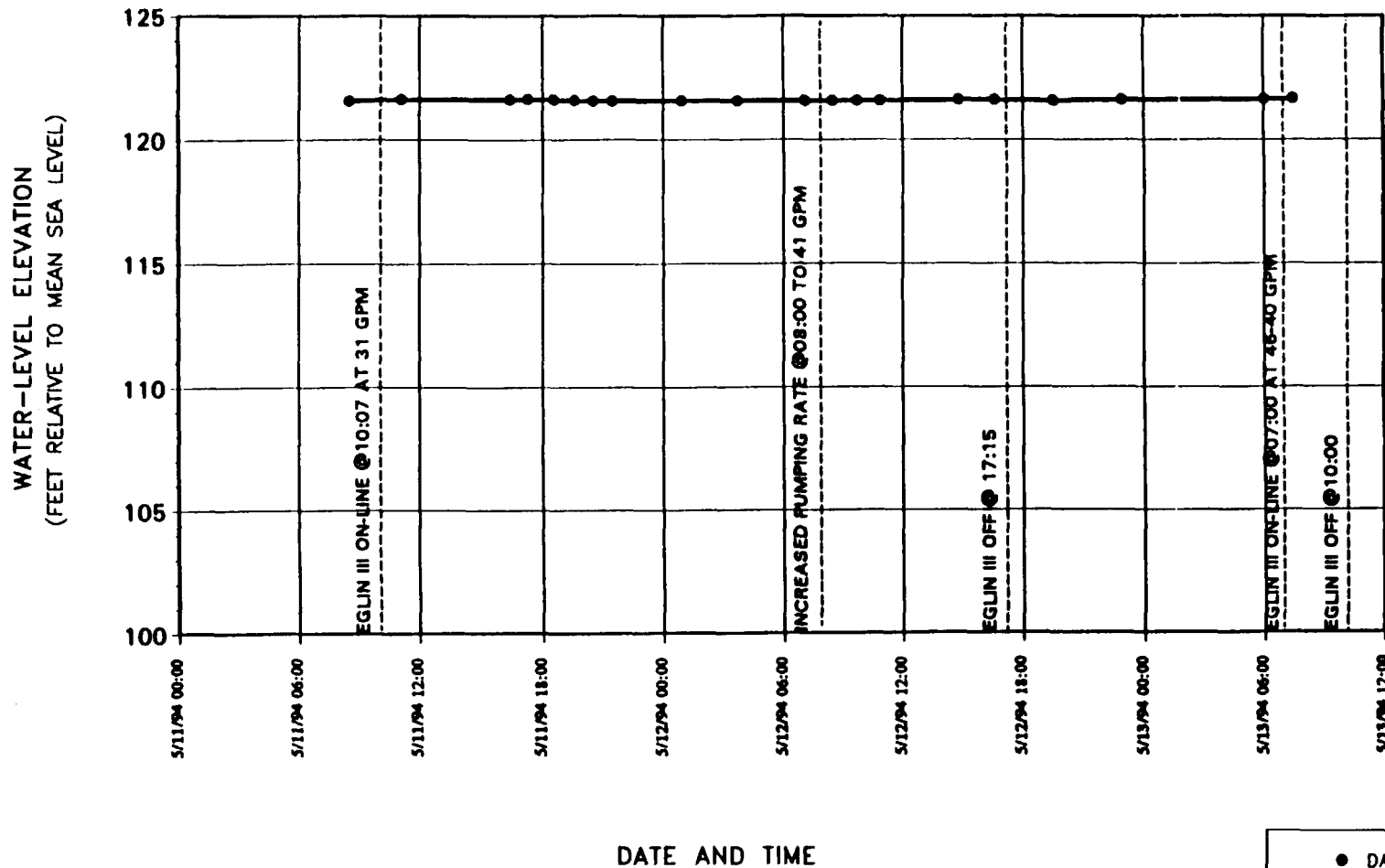
FILE:

DRAWING: SW-5

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



• DATA POINT

VERTICAL SCALE IS 1 INCH=7 FEET

DISTANCE FROM EGLIN III = 297 FEET

NOTE: VERTICAL DASHED LINES MARK THE TIMES THAT THE PUMPING RATE WAS CHANGED IN EGLIN III



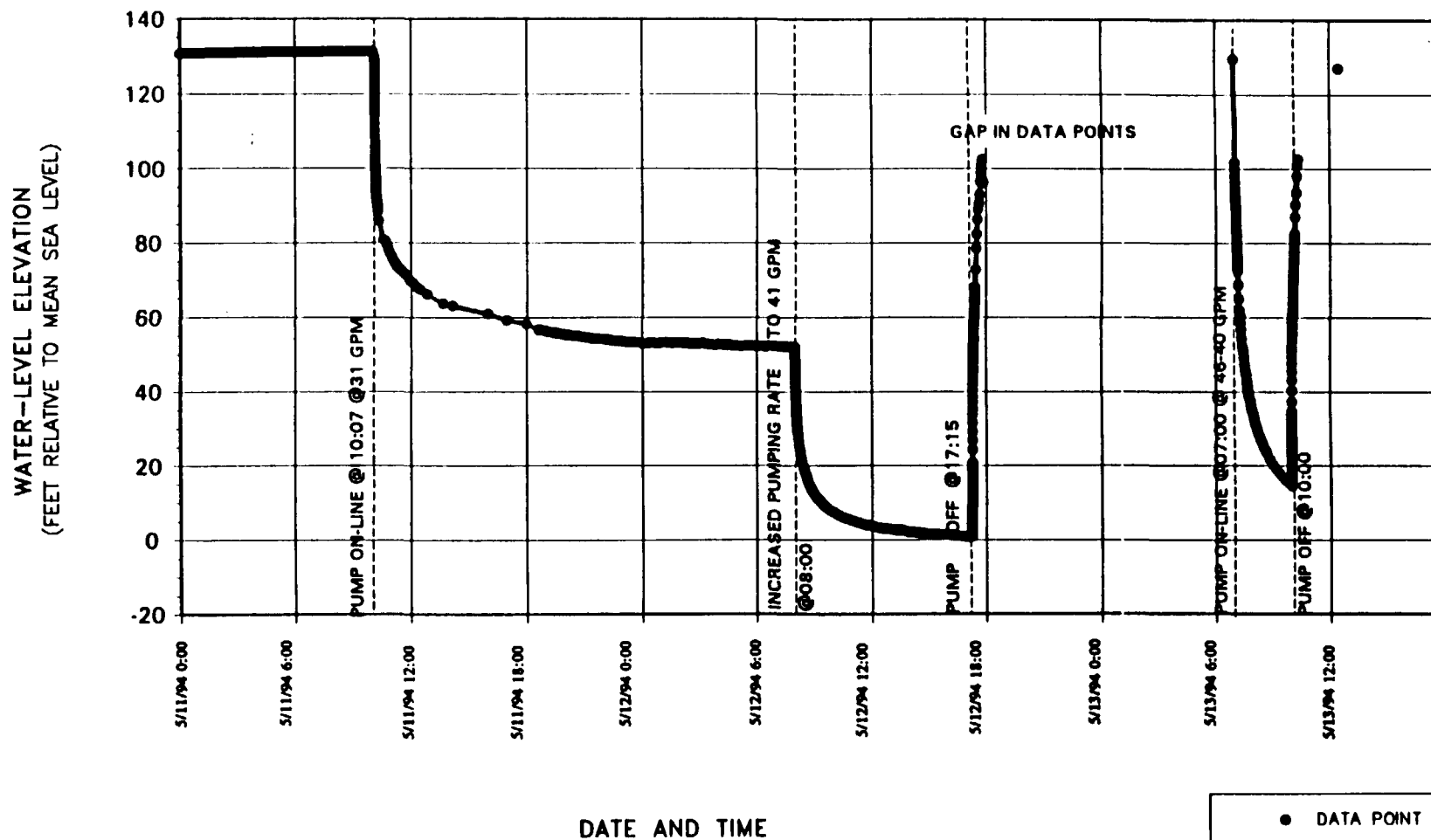
SHALLOW MONITORING WELL SW-5 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-9

TUT 005 1217



DWG DATE: 9/12/94

PRJCT NO.: PR0013033

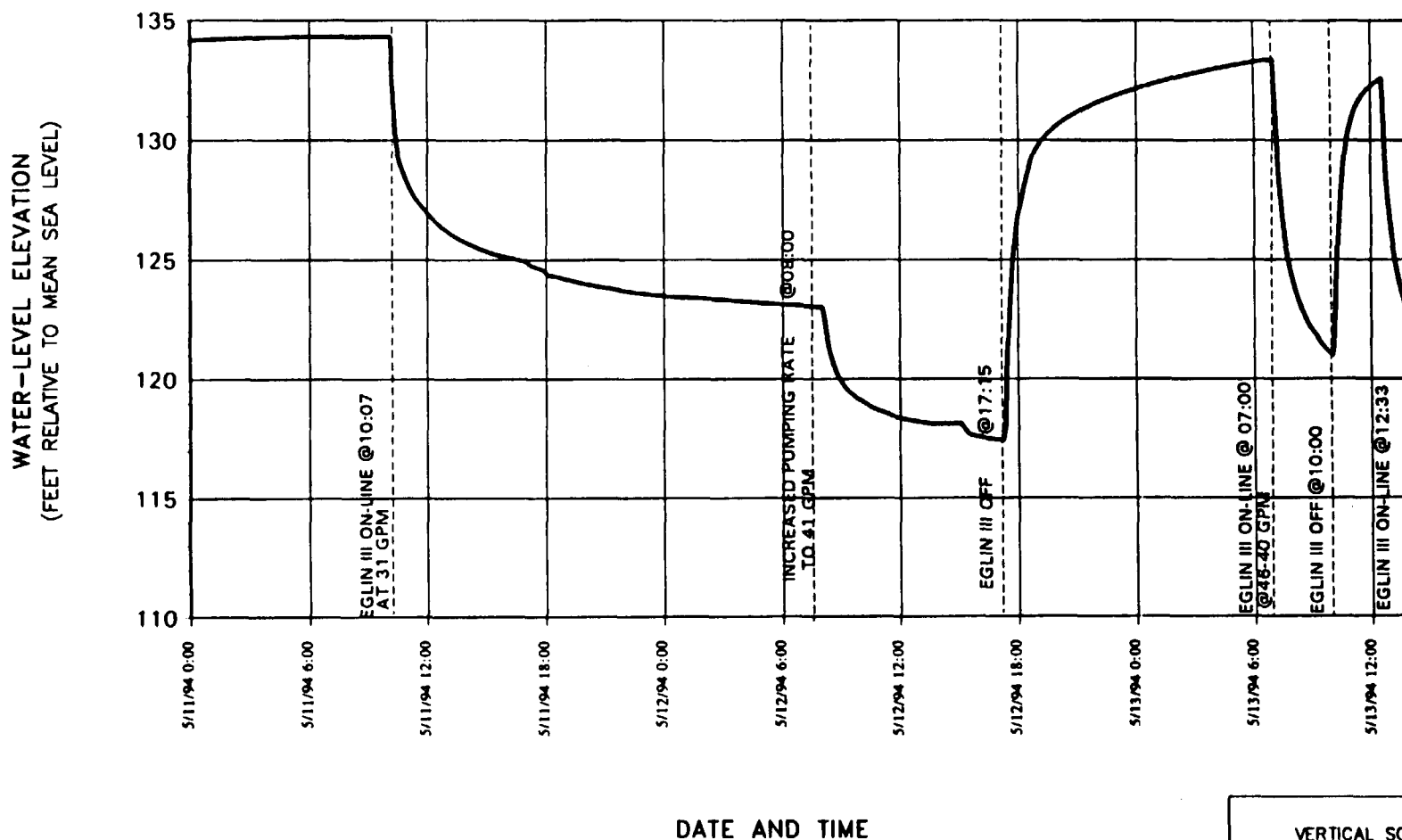
FILE:

DRAWING: EGLIN-2

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET

DISTANCE FROM EGLIN III = 88 FEET

NOTE: VERTICAL DASHED LINES MARK THE TIMES THAT THE PUMPING RATE WAS CHANGED IN EGLIN III



EGLIN II SUPPLY WELL HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-11

TUT 005 1219

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

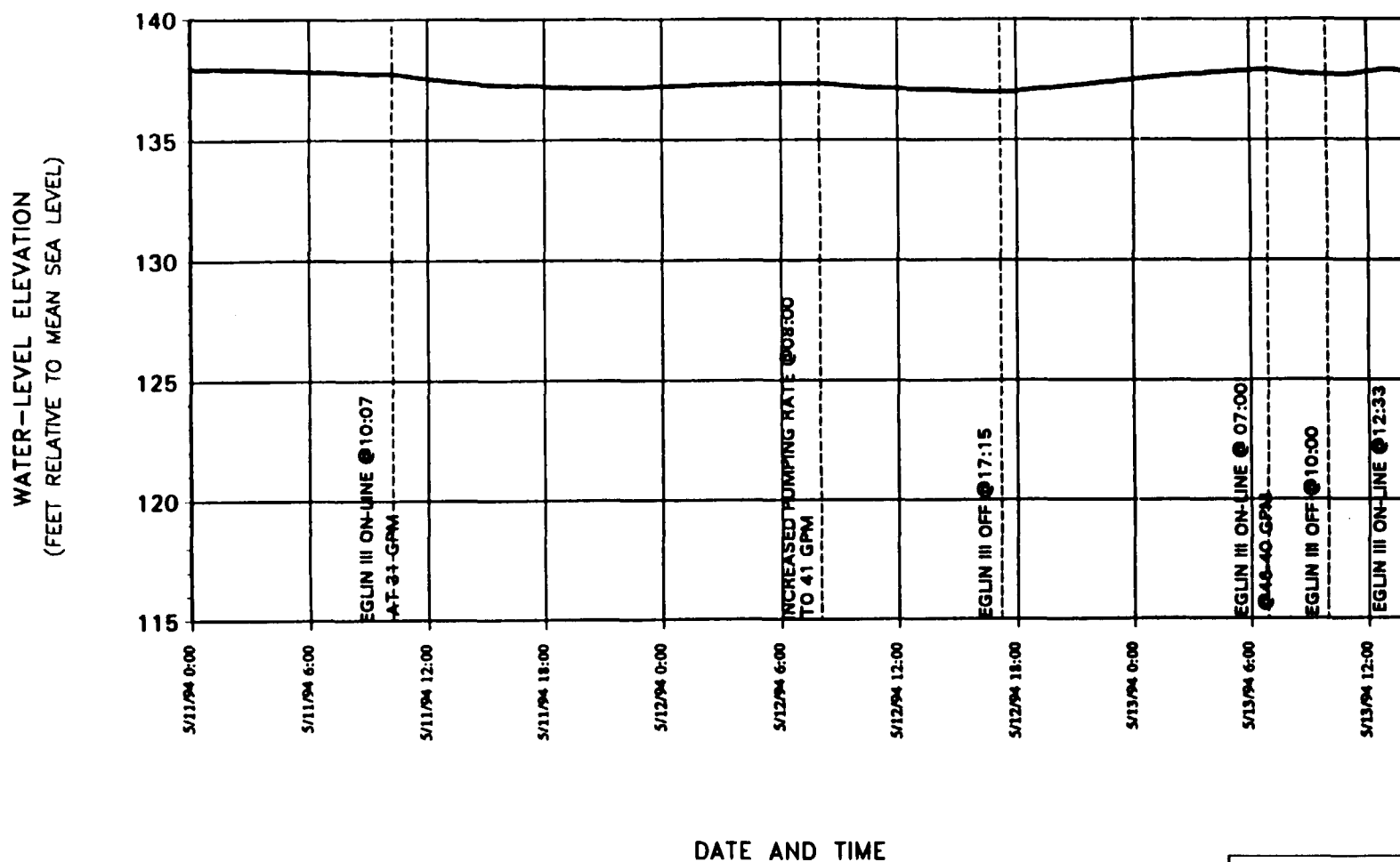
FILE:

DRAWING: MW-11D

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 363 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



DEEP MONITORING WELL MW-11D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-12

TUT 005 1220

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

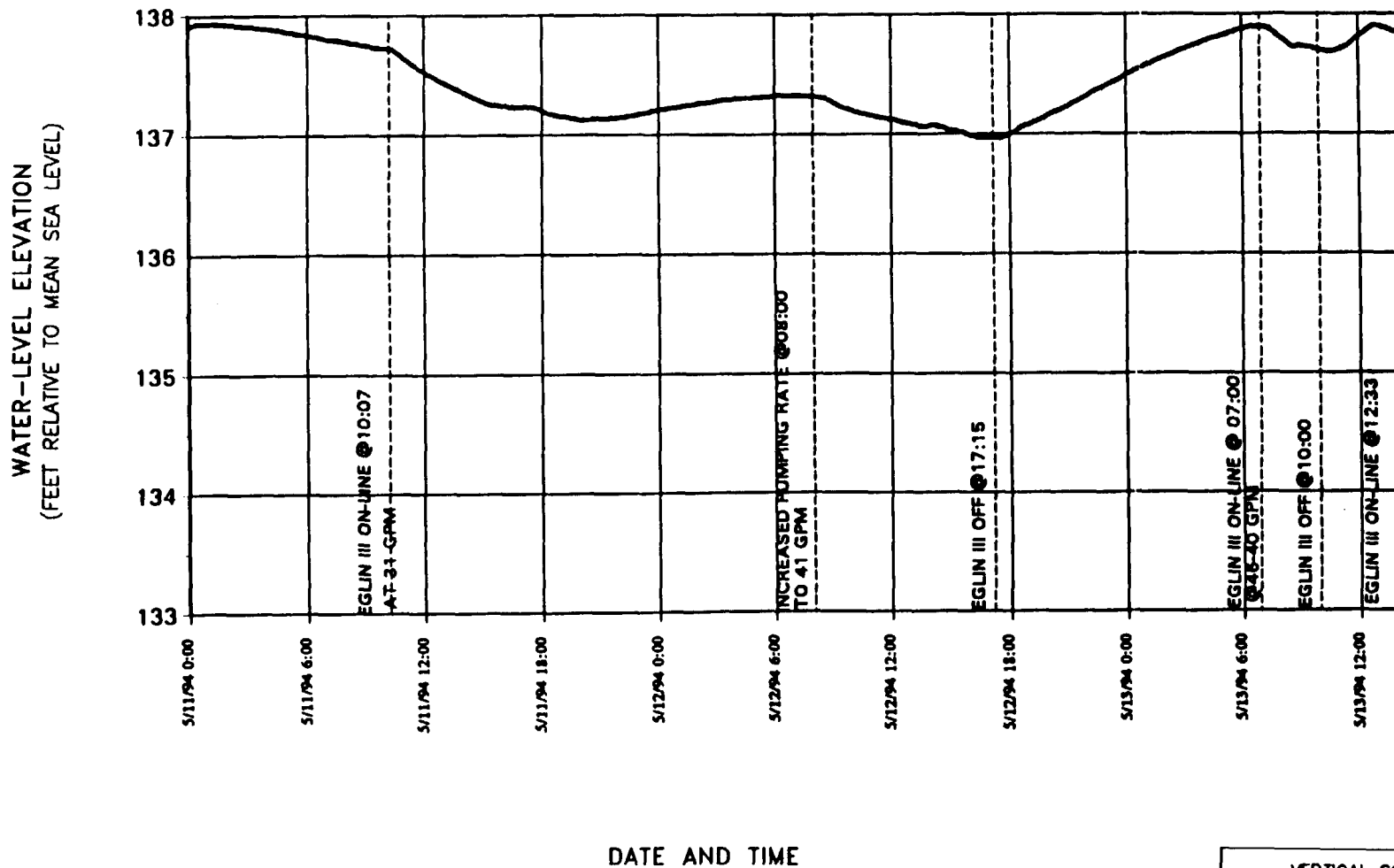
FILE:

DRAWING: MW-11DA

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=1.7 FEET
DISTANCE FROM EGLIN III = 363 FEET
NOTE: VERTICAL DASHED LINES MARK THE TIMES THAT THE PUMPING RATE WAS CHANGED IN EGLIN III



DEEP MONITORING WELL MW-11D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-13

TUT 005 1221

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

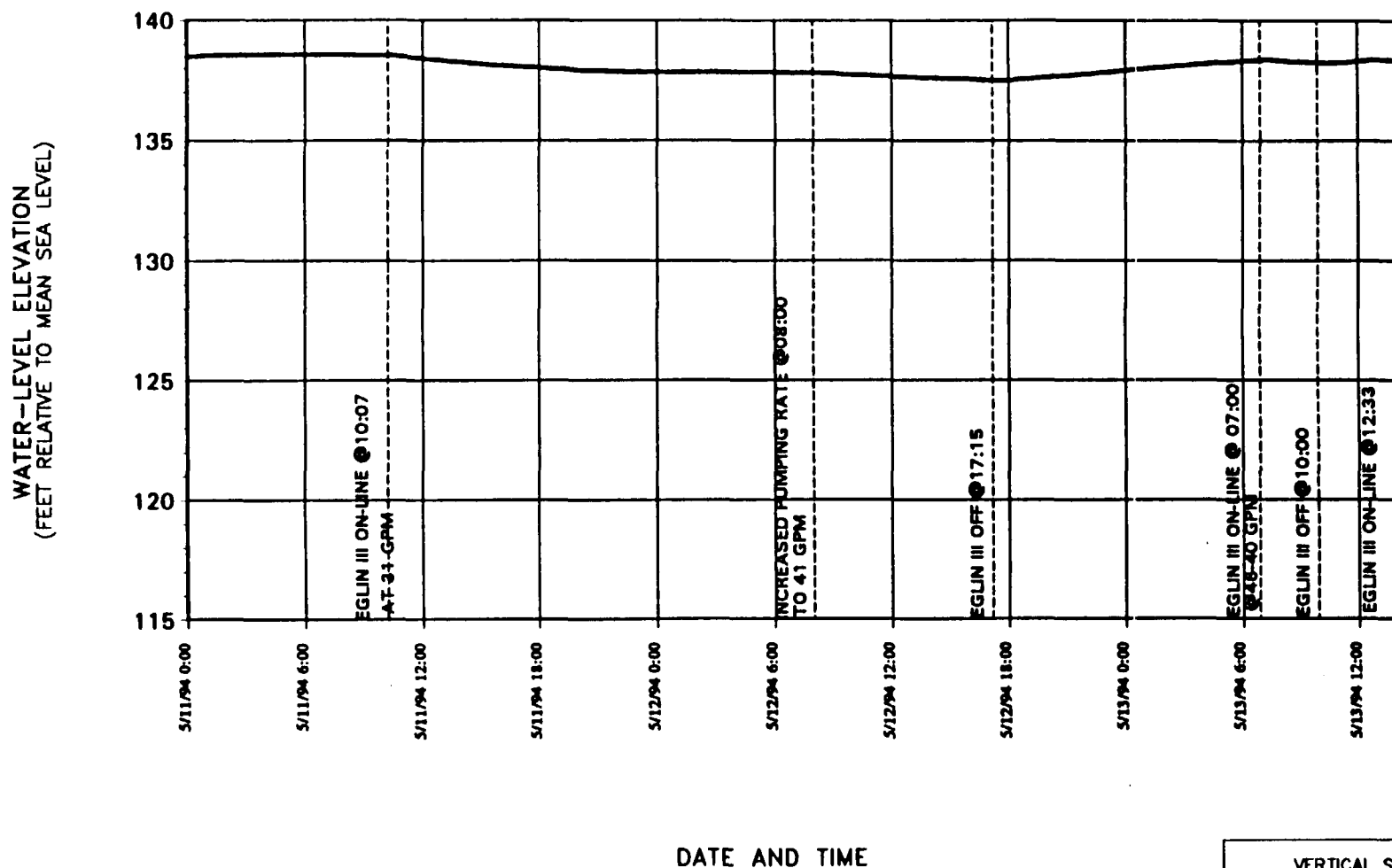
FILE:

DRAWING: MW-12D

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 390 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



DEEP MONITORING WELL MW-12D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-14

1222 005 JUT

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

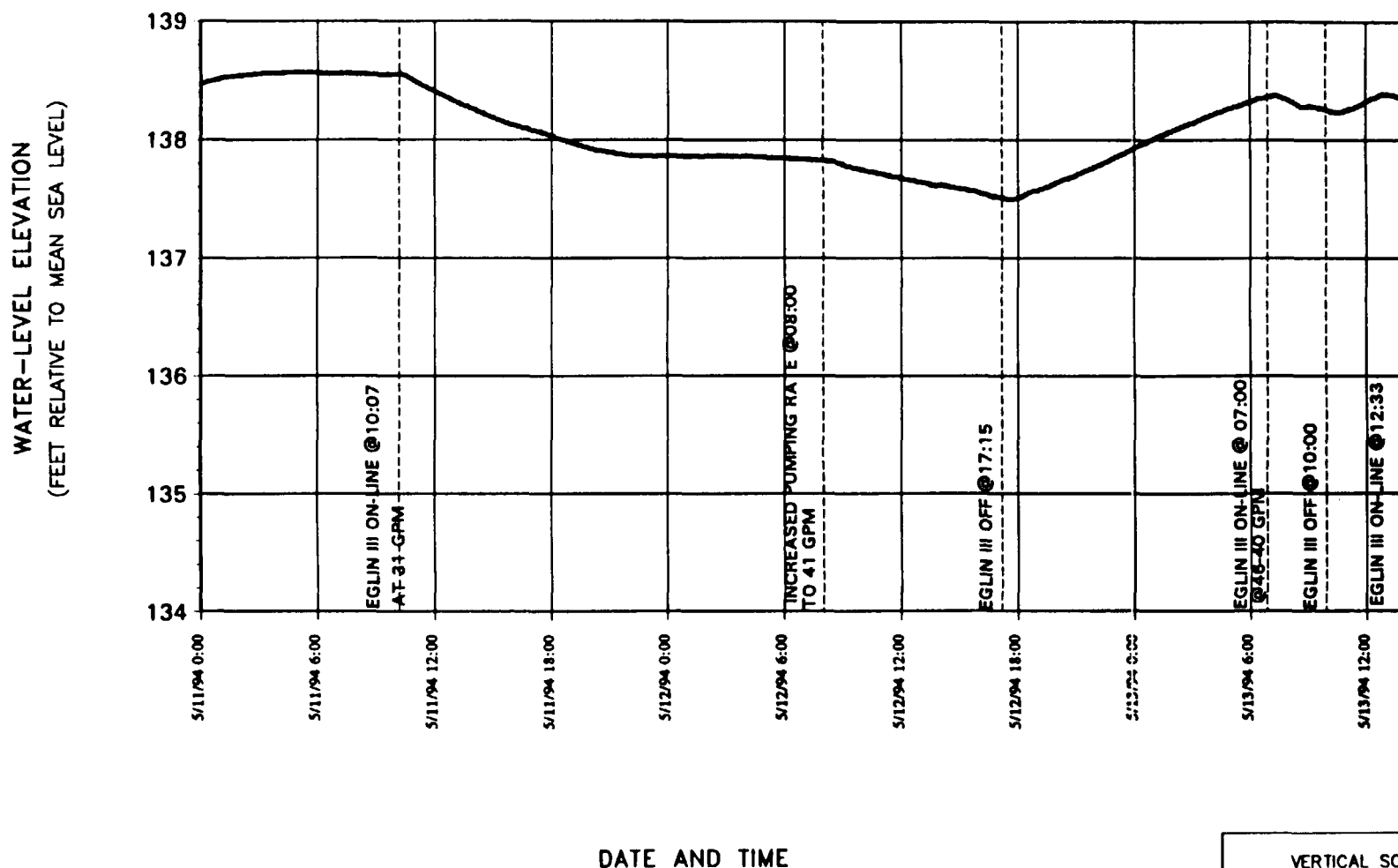
FILE:

DRAWING: MW-12DA

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=1.7 FEET
 DISTANCE FROM EGLIN III = 390 FEET
 NOTE: VERTICAL DASHED LINES MARK THE
 TIMES THAT THE PUMPING RATE WAS
 CHANGED IN EGLIN III



DEEP MONITORING WELL MW-12D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-15

TUT 005 1223

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

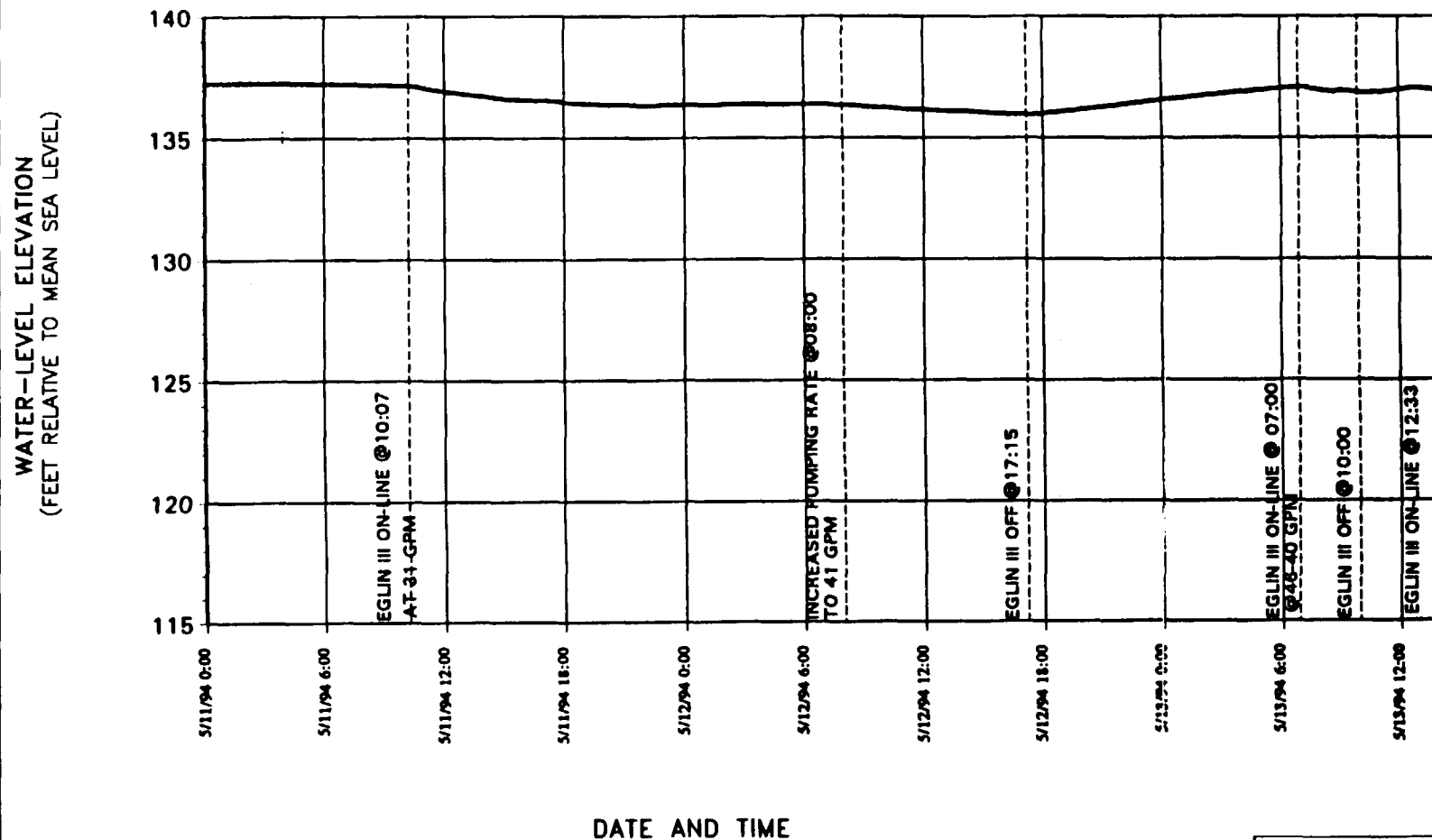
FILE:

DRAWING: DW-2

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=1.7 FEET
DISTANCE FROM EGLIN III = 248 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



DEEP MONITORING WELL DW-2 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-16

TUT 005 1224

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

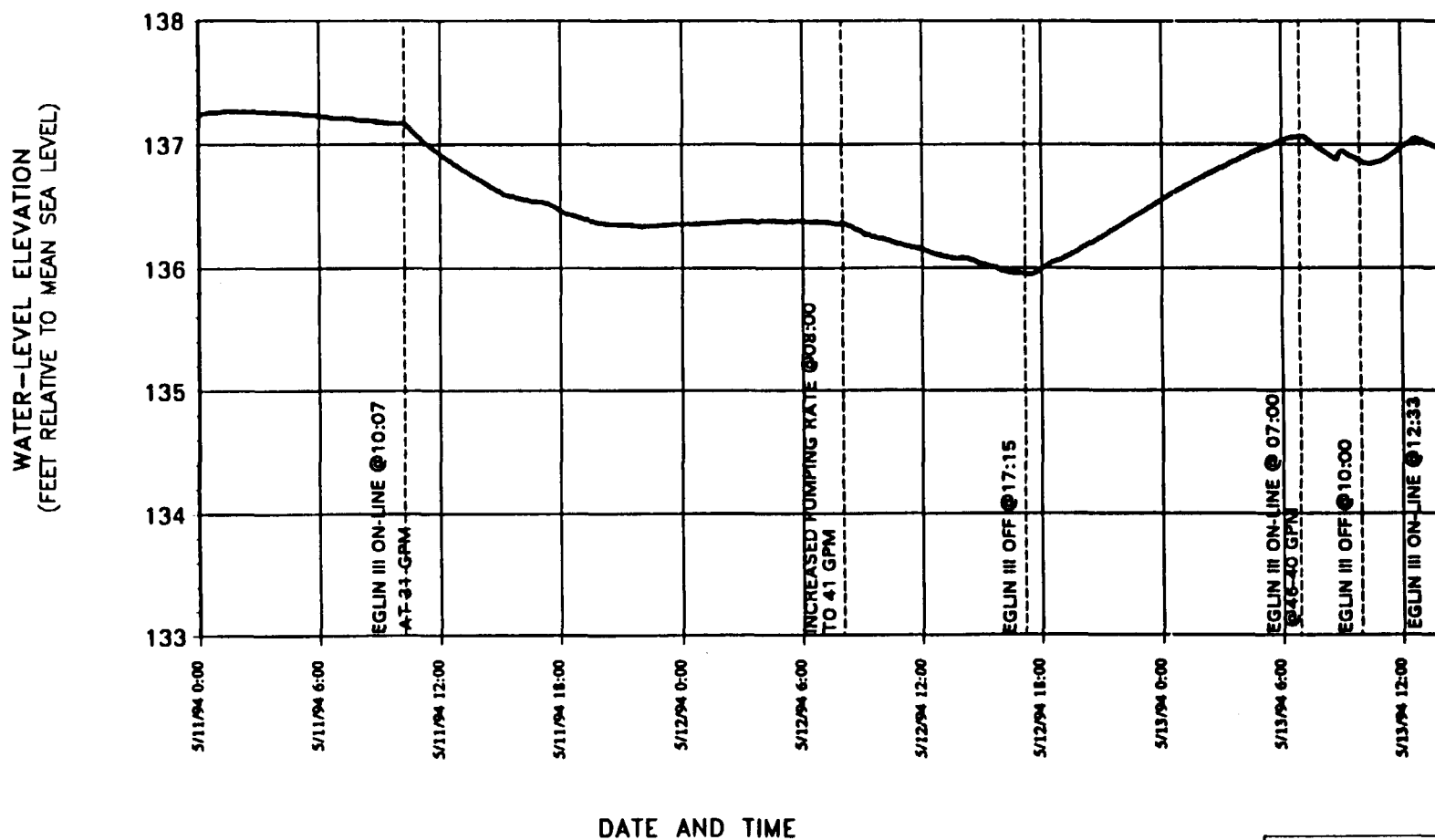
FILE:

DRAWING: DW-2

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=1.7 FEET
 DISTANCE FROM EGLIN III = 248 FEET
 NOTE: VERTICAL DASHED LINES MARK THE
 TIMES THAT THE PUMPING RATE WAS
 CHANGED IN EGLIN III



DEEP MONITORING WELL DW-2 HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-17

TUT 005 1225

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

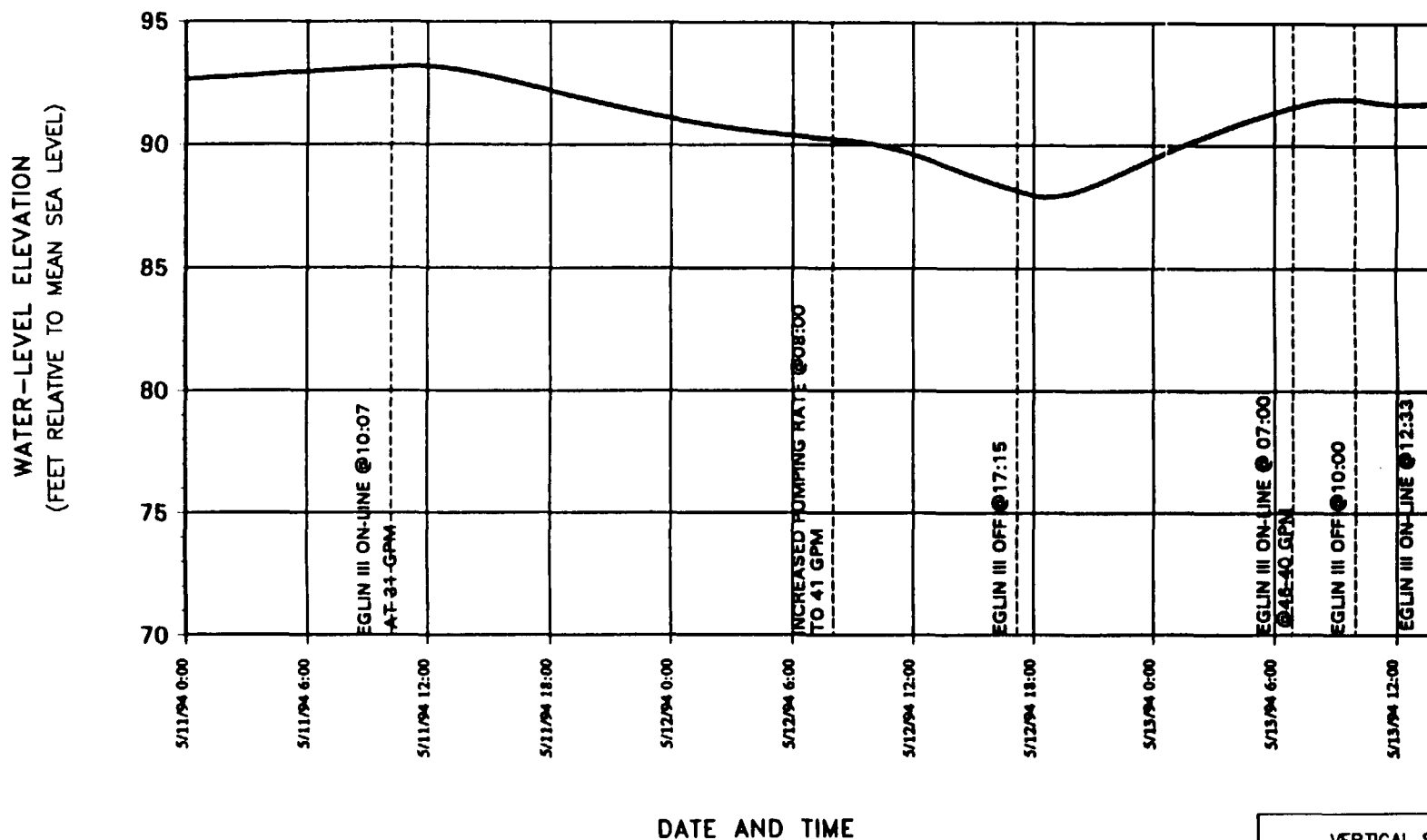
FILE:

DRAWING: MW-21D

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 446 FEET
NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



DEEP MONITORING WELL MW-21D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-18

TUT 005 1226

DWG DATE: 8/25/94

PRJCT NO.: PR0013033

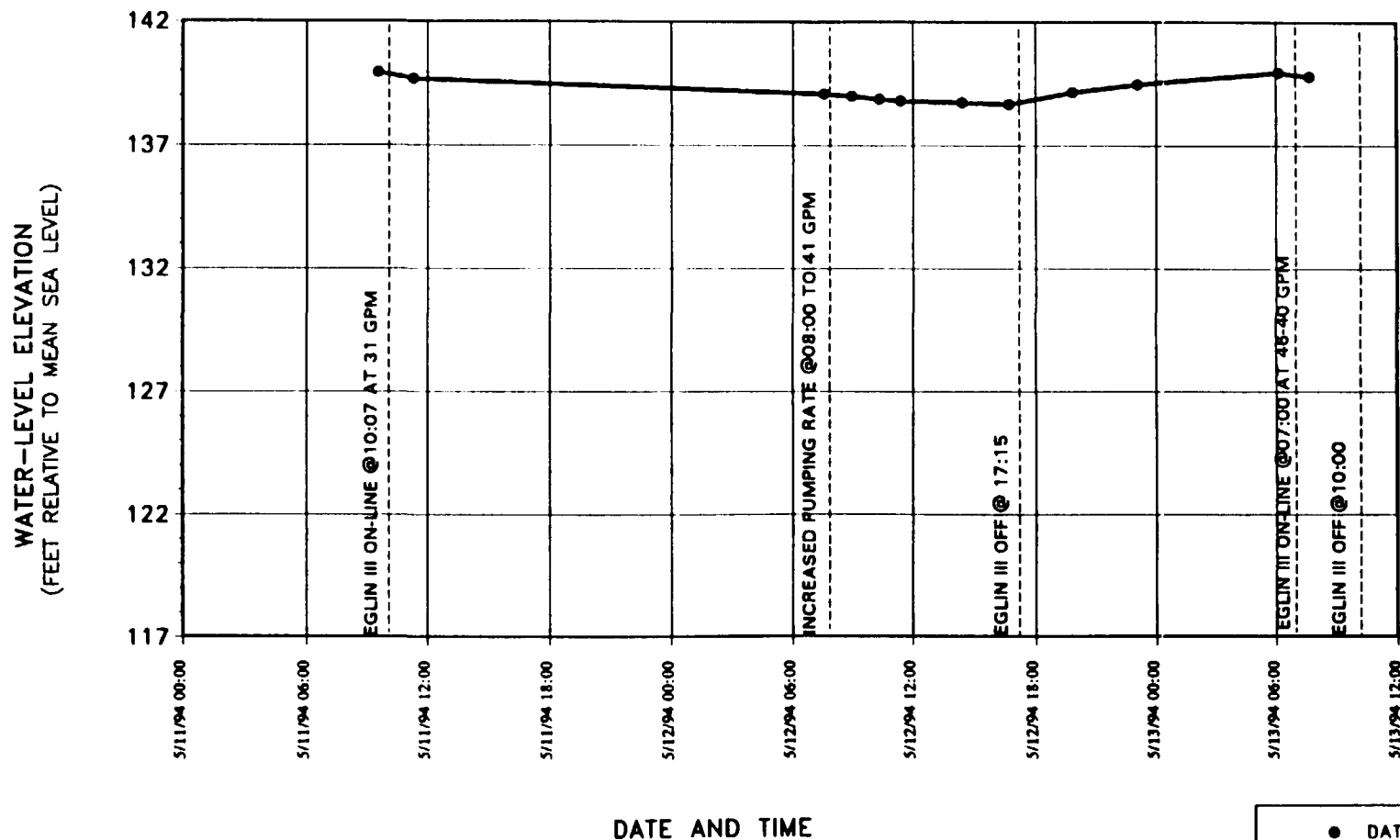
FILE:

DRAWING: CHURCH

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



● DATA POINT

VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 644 FEET

NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



CHURCH SUPPLY WELL HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE

M-19

TUT 005 1227

DWG DATE: 8/25/94

PRJCT NO.: PR0013033

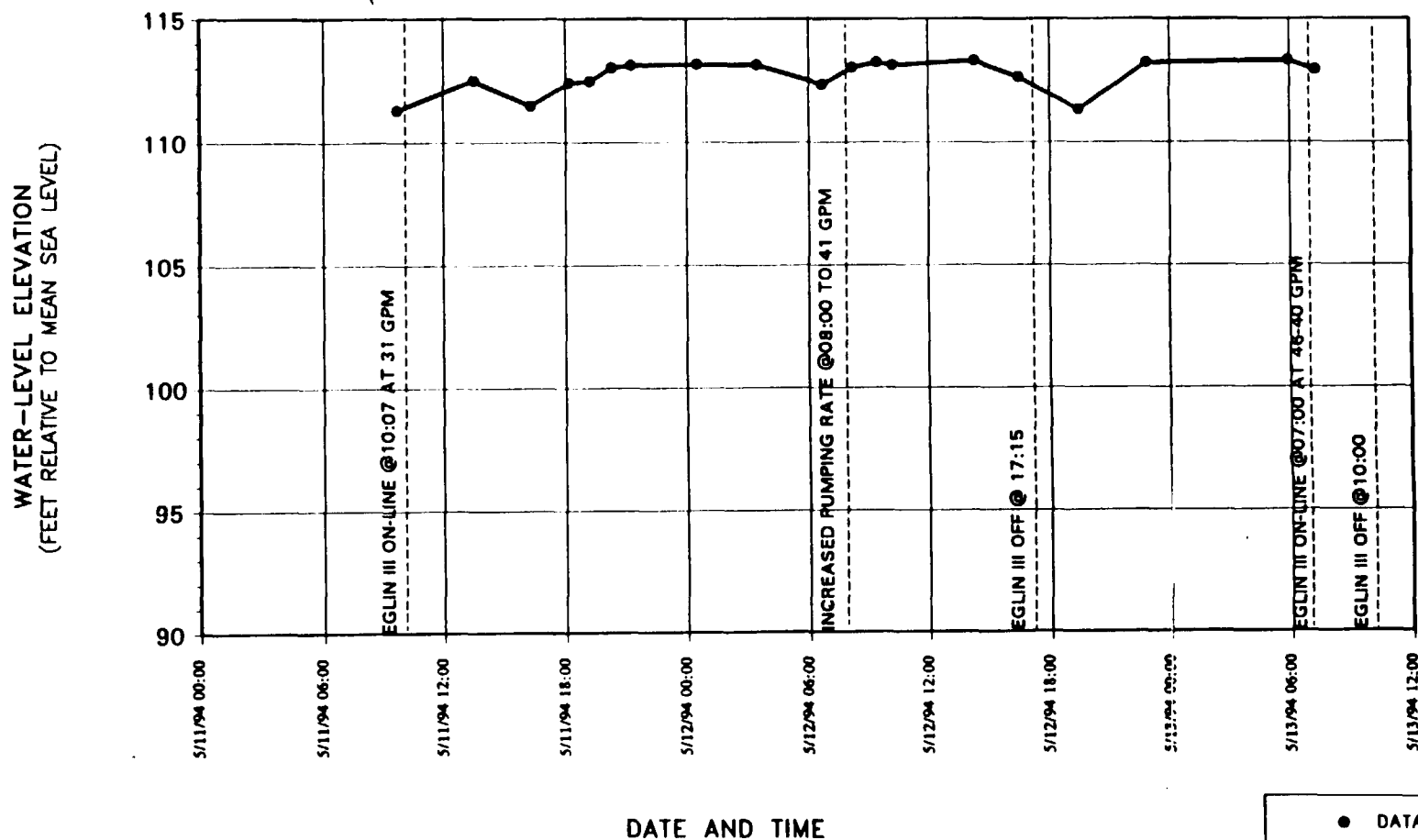
FILE:

DRAWING: STEELE

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



DWG DATE: 7/21/94

PRJCT NO.: PR0013033

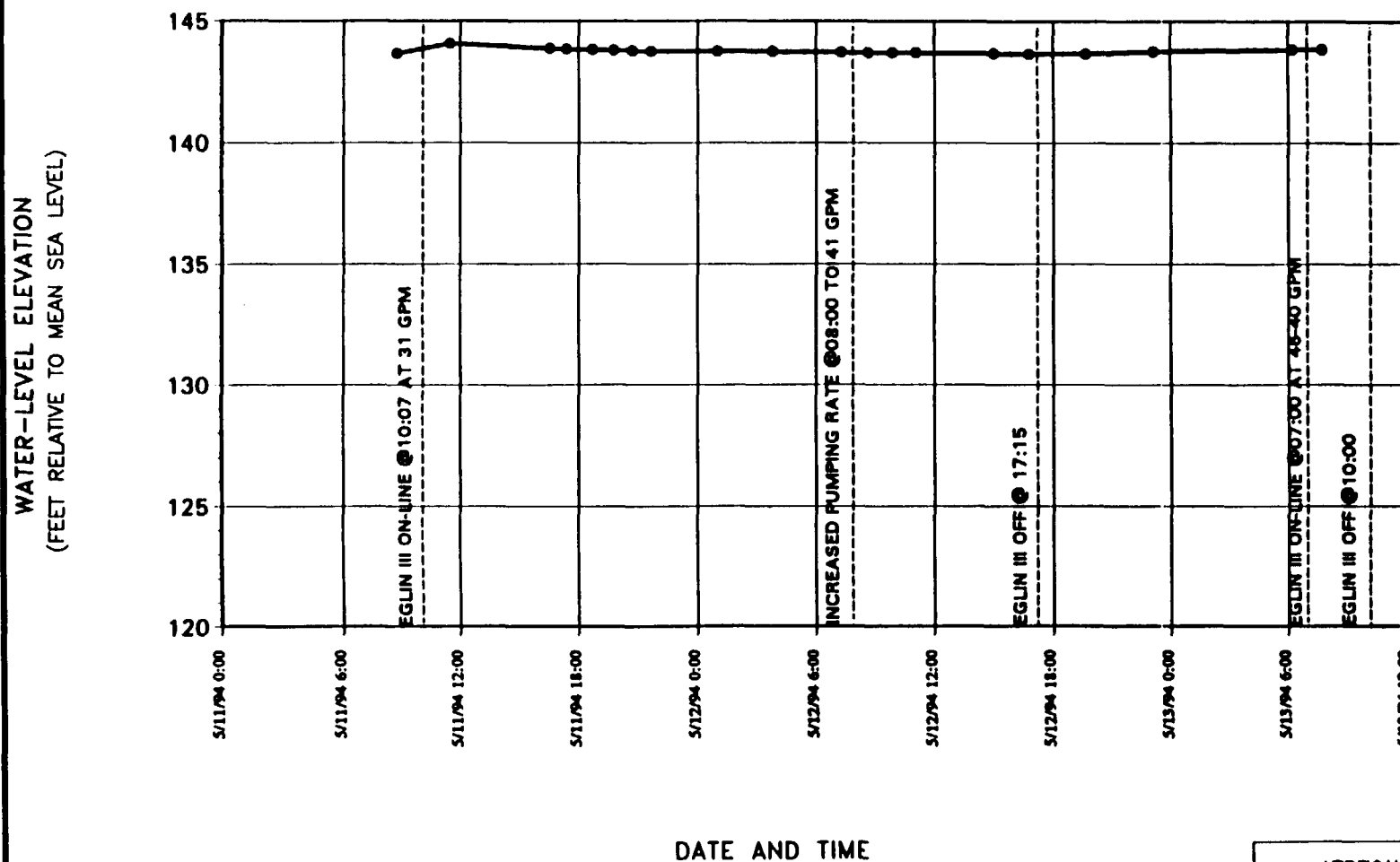
FILE:

DRAWING: MW-10D

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO



VERTICAL SCALE IS 1 INCH=7 FEET
 DISTANCE FROM EGLIN III = 600 FEET
 NOTE: VERTICAL DASHED LINES MARK THE
 TIMES THAT THE PUMPING RATE WAS
 CHANGED IN EGLIN III



DEEP MONITORING WELL MW-10D HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
 ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-21

6221 500 LUT 005 1229

DWG DATE: 7/21/94

PRJCT NO.: PR0013033

FILE:

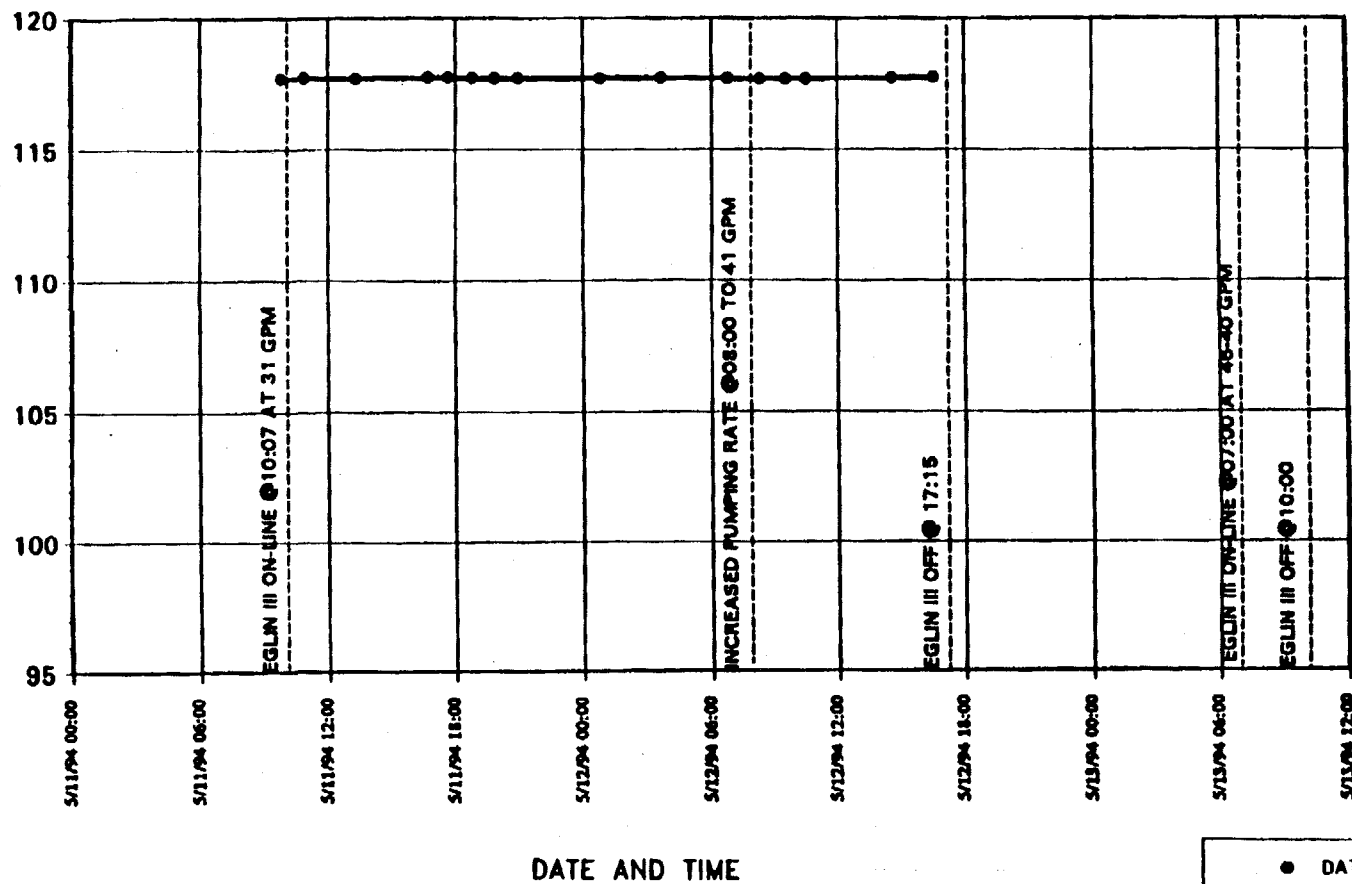
DRAWING: HARVEY

CHECKED: J. JASIORKOWSKI

APPROVED: T. DANAHY

DRAFTER: V. CARUNCHO

APPROXIMATE WATER-LEVEL ELEVATION
(FEET RELATIVE TO MEAN SEA LEVEL)



● DATA POINT

VERTICAL SCALE IS 1 INCH=7 FEET
DISTANCE FROM EGLIN III = 242 FEET

NOTE: VERTICAL DASHED LINES MARK THE
TIMES THAT THE PUMPING RATE WAS
CHANGED IN EGLIN III



HARVEY SUPPLY WELL HYDROGRAPH OF DATA COLLECTED DURING THE EGLIN III PUMPAGE IMPACT TEST

TUTU WELLS SITE
ST. THOMAS, U.S. VIRGIN ISLANDS

FIGURE
M-22

TUT 005 1230