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PUERTO RICO NS
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SUMMARY REPORT OF ENVIRONMENTAL ACTIVITIES AT HOSPITAL SITE NAVAL ACTIVITY PUERTO RICO

11/1/1996

BLASLAND, BOUCK AND LEE, INC.

11/1/96 - 001659

REPORT

Summary of Environmental Activities at the Hospital Site

U.S. Naval Facilities
Ceiba, Puerto Rico

November 1996

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

TECHNICAL REPORT

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Section 1

1. Introduction

Diesel fuel and water accompanied by strong petroleum odors was found seeping through the basement floor of the Hospital following storm events in November of 1994 and August of 1995.

In response to a request from Atlantic Division, Naval Facilities Engineering Command, Blasland, Bouck & Lee visited the hospital site at Roosevelt Roads during the week of October 2, 1995. Meetings were held with hospital maintenance and health and safety staff, Commanders of the Hospital, the Naval Station, and the Assistant Resident Engineer in Charge of Construction (ROICC).

Overfill of two fuel tanks used for hospital generators, (located approximately 15' south of the basement wall approximately 10 feet below land surface) was the suspected source of petroleum (see attached, Figure 1). Excess rainwater percolating into the ground during the storm events in November of 1994 and August of 1995 is believed to have forced both water and fuel into the basement floor, through a weak or cracked joint.

Although the hospital site generally rests on relatively impermeable, native clays and dense volcanic rock, the basement and fuel tank areas were excavated prior to construction and backfilled with earthen material, which was more permeable than the native sediments. This area of high permeability served as the path of least resistance for rainwater during heavy storms. The apparently cracked or leaking floor-wall joint in the basement of the Hospital was determined to be the conduit for incoming rainwater and fuel.

In February 1995, the Navy retained Blasland, Bouck & Lee, Inc. (BBL) to conduct a site characterization at the Naval Hospital on the U.S. Naval Station - Roosevelt Roads (NAVSTA Roosevelt Roads), near the town of Ceiba on the eastern end of Puerto Rico. In October of 1996, BBL provided oversight for remedial activities associated with two 6,000 gallon petroleum tanks. This report provides background information and summarizes environmental activities conducted at the hospital site.

Section 2

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2. Background

2.1 Site Description

The hospital is located on a hilltop, at an elevation of approximately 110 feet above mean sea level (MSL), overlooking Ensenada Honda to the southwest. The topography around the hospital slopes downward in all directions.

2.2 Site Geology

The geology of the Roosevelt Roads Naval Station consists of sequences of intrusive and extrusive volcanics and volcaniclastic rocks of lower Cretaceous age, and intrusive bodies ranging in age from Cretaceous to Eocene (M'Gonigle 1979). Quaternary surficial deposits, alluvium, and fanglomerate cover much of the low-land area, and soil or saprolite, or both, have formed on most of the upland areas. Much of the Roosevelt Roads study area is underlain by the Daguoa formation, except in the southwestern-most area of the base, where a quartz diorite/granodiorite stock is present. The Daguoa formation is characterized by interbedded volcanic breccia, lava, subordinate volcanic sandstone, and crystal tuff. The granodiorite stock varies in composition, from medium- to fine-grained unfoliated rock to quartz diorite to granodiorite. The largest hills and ridges on the naval base are composed of the Daguoa Formation and the granodiorite stock, with the highest elevations approaching 250 feet above MSL. The hills are flanked by Quaternary and Holocene fanglomerate and swamp deposits. The broad low-lying areas of the Naval Station surrounding the airfield and south of the hospital are composed of Quaternary alluvium, slopewash, and fanglomerate deposits.

Correlation of various lithotypes, observed in the field, to those documented in Puerto Rican geologic literature by M'Gonigle (1979) and others suggests that subsurface samples collected from land surface to a depth of approximately 37 feet below land surface (bls) are characterized by saprolite, slopewash, and fanglomerate deposits underlain by a dense volcanic rock formation. Within the study area, the surficial deposits are predominantly clays containing varying amounts of sand and silt. The colors of the clays are primarily brown, olive brown, yellow brown, and grayish brown, as determined by color matching in the field with the Munsell soil color system. The wide variance in clay color is attributed to the varying extent of oxidation of the iron minerals contained in the sediments, which were derived from weathered volcanic rock. The lithologic change between the surficial clays and the dense volcanic rock may suggest impedance to ground-water flow and, thus contaminant transport.

The hospital generally rests on relatively impermeable, native clays, slopewash, fanglomerate, and dense volcanic rock. However, the basement and UST areas were excavated prior to construction and backfilled with earthen material. The disturbed backfilled areas are more permeable than the native sediments. These backfilled areas often offer a path of least resistance for rainwater and fuel to travel.

2.3 Underground Storage Tanks

Two underground storage tanks (USTs), installed in 1966, were located on the south side of the hospital. The USTs were constructed of single-wall steel and contained JP-5 fuel used for the emergency generators and boilers at the hospital.

Petroleum contamination was detected during a routine annual tank and line tightness test performed in December 1994. Results of the tightness test indicated that one of the USTs was leaking. The UST was emptied and taken out of service. From November 1994, through September 1996, JP-5 fuel and water accompanied by strong petroleum odors was observed seeping through the basement floor of the hospital following storm/heavy rain events.

2.4 Environmental Assessment Activity

In February, 1995, the Navy retained BBL to conduct a site characterization (SC) at the hospital. The SC was conducted to evaluate the presence of petroleum hydrocarbons in the soil and ground water resulting from the USTs at the hospital.

2.4.1 Soil Assessment Results

A total of nine soil borings were advanced and soil samples were collected and tested for petroleum hydrocarbons in the vicinity of the UST area. Soil contamination was detected from 12 to 37 feet bls in only one soil boring (SB8) located between the south side of the hospital and the USTs (Figure 1). During the soil boring advancement a strong diesel odor was noticed at 12 feet bls and at 16 feet bls soils were saturated with fuel. A composite soil sample was obtained from soil boring SB8 (from 15 feet bls to 37 feet bls), and a hazardous waste characterization was performed. Analytical results for all hazardous waste constituents were below method detection limits. Total petroleum hydrocarbon (TPH), however, was detected at a concentration of 13,000 mg/Kg. The Puerto Rico Environmental Quality Board (PREQB) target level for TPH is 100 milligrams per kilogram (mg/Kg).

2.4.2 Groundwater Assessment Results

Because the depth to ground water was expected to be greater than 100 feet bls in the immediate vicinity of the hospital, PREQB allowed for the installation of three monitor wells downgradient of the hospital, at the base of the hill (where the watertable was reached at less than 10 feet bls). The purpose of the monitor wells was to assess potential ground-water contamination and/or migration.

Dissolved petroleum hydrocarbons were not detected in the groundwater samples obtained from the three monitoring wells at levels above the PREQB target levels of 5 micrograms per Liter (ug/L) for benzene, 50 ug/L for total BTEX (the sum of benzene, toluene, ethyl benzene, and xylenes), or 50 ug/L for Total Petroleum Hydrocarbons (TPH). Lead and Polynuclear Aromatic Hydrocarbons (PAHs) were not detected in any of the monitor wells above method detection limits. PREQB does not have target levels for lead or PAHs.

Based on these findings, the SC concluded that petroleum hydrocarbon contamination is present to depths of at least 37 bls along the southern side of the hospital, and that ground-water contamination, if present, is not migrating off-site.

Section 3

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3. Remedial Actions

3.1 Planning Activities

A site visit was made by naval personnel and contractors to discuss remedial measures. Excavation of contaminated soils, in conjunction with the UST removal, was selected at the method of soil remediation. In addition, a recommendation was made to use a waterproof sealant to fill the concrete pores and voids along the joint at the base of the basement wall. To prevent future infiltration of contaminated water into the basement. The excavation and sealing would be performed by a contractor with an existing base-wide UST removal contract with the ROICC. The ROICC requested that the A/E who did the original SC provide a licensed professional geologist or engineer to observe and photograph the excavation, perform field testing for volatile organics to determine whether the excavated soil is clean or must be hauled off as contaminated, and write a follow-up trip report.

3.2 Remedial Site Activities

The site activities documented in this trip report occurred from September 26, to October 4, 1996. BBL observed the excavation activities and performed the field testing of volatile organic vapors in the soils removed during the excavation. The excavation contractor was Reliable Mechanical of Louiseville, Kentucky (prime) and their subcontractors, Thickstun Brothers Equipment Company of Columbus, Ohio, and Oil Equipment Contractors of Ponce, Puerto Rico.

Site activities included the excavation and removal of two USTs, the excavation of contaminated soil and non-contaminated soil adjacent to the basement wall, the transportation of contaminated soil to an off-site disposal facility (BFI Industries landfill in Ponce, Puerto Rico), and the installation of a piping trench. The piping trench was installed along the bottom of the basement so that contaminated water, that might accumulate, could be extracted (by pumping during heavy rain events) before migrating beneath the building. A BBL professional geologist was on-site to observe and photograph the site activities and to identify/segregate contaminated from non-contaminated soil. The BBL representative was not on site during the installation of the piping trench or the transportation of the contaminated soil to the BFI Industries landfill. The facility ROICC directed all remedial activities.

Soil excavation was performed on the south side of the hospital basement wall, from land surface to the footing of the basement (Figure 2). The excavation was performed using a track hoe. During the soil excavation, soil samples were collected and analyzed with an Organic Vapor Analyzer (OVA) equipped with a photo-ionization detector (PID). Soil samples were collected in pint size ziplock bags and securely sealed. Once collected, each soil sample was analyzed within five minutes using the organic vapor analyzer (OVA). The following method was employed for OVA screening: (1) the pint size ziplock bag was half filled with soil and securely sealed; (2) the bag was placed in a cool area for five minutes to allow the headspace to equilibrate; and (3) the headspace was measured with an OVA.

When headspace readings in soil samples were less than 50 ppm, the soils were considered clean and set aside for backfill. Headspace readings above 50 ppm were determined to be contaminated, and the soil was prepared for off-site disposal at the BFI Industries landfill in Ponce, Puerto Rico. Contaminated soil was separated on the basis of OVA results, olfactory, and visual observations. The soils considered contaminated were stockpiled on plastic sheeting while awaiting transportation and disposal at the BFI landfill in Ponce, Puerto Rico. Approximately 500 cubic yards of contaminated soil was removed.

3.3 UST and Soil Extraction and Removal

Site activities documented in this report commenced on September 26, 1996. A portion of soil along the south side of the hospital was excavated to approximately 4 feet bls, exposing the tops of the USTs, fuel piping, and two concrete encased electrical conduits. The piping between the USTs and the basement wall was cut, removed, and capped near the entry point at the basement wall. According to the contractors on site, the soil excavated from this area (0 to 4 feet bls) was not contaminated.

The two 6,000-gallon, JP-5 USTs were excavated on September 26, 1996. The USTs were loaded onto a trailer and transported off-site for disposal. The USTs were in good condition with no visible pits, holes, or rust (Photographs 1 and 2). However, the area around the UST fill ports was stained and the soil extending from the fill ports toward the hospital and underneath the USTs was greenish/grey in color and had a strong petroleum odor. OVA screening of the soil confirmed that the soil was contaminated. In addition, the soil under the fuel piping entry points into the basement was also contaminated. All soil determined to be contaminated was loaded onto dump trucks, hauled to a holding area where it was stockpiled on plastic sheeting, and later transported to the BFI landfill in Ponce, Puerto Rico.

After the USTs were removed, the area between the former UST location and the basement was excavated. The soil excavated to approximately 5 feet bls was brown to tan in color, contained no odor, and had OVA headspace readings of less than 50 ppm. The soil was considered clean, set aside, and later used as backfill. The soil, between the USTs and the hospital, excavated below 5 feet was greenish/grey in color (Photographs 3 through 5) and had a strong petroleum odor. OVA screening of the soil confirmed that it was contaminated, requiring disposal.

As the excavation started on the western end and moved eastward along the hospital wall, the depth of soil contamination encountered increased from west to east. Contaminated soil was encountered at approximately 4 feet bls on the west end of the hospital basement wall under the fuel pipes (Figure 3 and Photographs 4 and 5), and at approximately 13 feet bls on the east end of the basement wall (Figure 4). Excavation along the east end of the basement wall was complicated by the pretense of two concrete encased electrical conduits. The conduits had to be supported to prevent collapse and a potentially hazardous situation. It was determined by the ROICC that the conduits could be supported from above using a heavy gauge steel pipe and support straps (Photograph 6 through 9).

Once the engineering controls were in place to support the electrical conduits, the excavation continued to base of the foundation (16 feet bls). Small pockets or pools of water and fuel (sheen) were observed at the base of the excavation (Photograph 9). The entire basement wall was exposed to the foundation (Photographs 10 through 12). The foundation is 18 inches thick and extends out approximately 6 inches from the basement wall joint. It is through this joint that water and fuel are assumed to enter the basement.

3.4 Sandblasting and Sealing of the Basement Wall

Subsequent to the soil excavation and prior to backfilling, the basement wall was sandblasted (Photographs 13 through 17) and sealed (Photographs 18 through 20). The bottom 8 feet of the basement wall was sandblasted using a black silica sand. The sandblasting was preformed by Caribe Hidroblasting Environmental Division (CHED). The wall was sandblasted to remove all loose dirt, grit, and oil contaminates, to prepare the surface for sealing. Sandblasting ensured that the surface would be clean allowing a better bonding of the sealants to the concrete wall. The sealing process consisted of applying four different coating materials (see Attachment A) to the wall. The four different sealing materials were applied and allowed to dry before backfilling.

3.5 Installation of the Trench and Risers

Following sandblasting and sealing of the bottom 8 feet of the basement wall, a field decision was made by BBL and the facility ROICC to install a piping trench at the base of the building (see Figure 2) to allow extraction of rainwater and fuel during future rain events. The trench consisted of approximately 75 feet of 4 inch diameter horizontal slotted piping placed at the bottom of the excavation (16 feet bls), next to the footing, with three risers (12" diameter), one at each end and one in the middle, extending from the horizontal pipes to land surface.

After installation of the piping trench, and placement of 1 foot pea gravel, the first lift was backfilled with clean silty soil and compacted. The sandblasting and sealing of the wall was conducted in two 8-foot phases or lifts. After each lift, the section was backfilled with clean fill and compacted. The top layer of soil was graded with a slope away from the hospital building. The sandblasting, sealing, installation of the trench, backfill, and compaction activities were conducted under the supervision and direction of the facility ROICC.

Section 4

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4. Summary and Recommendations

4.1 Summary

As confirmed by the OVA, all contaminated soil encountered during the excavation was stained and had a greenish/grey color, as compared to the clean soil which was brown to tan in color. The source of the contamination appears to have been from overfill of the USTs and from one or two fuel pipes leading from the USTs to the basement boilers which were found to be leaking near the point where the pipes enter the basement. Contaminated soil was found extending both horizontally and vertically from these two locations. Two USTs located on the south side of the hospital were removed, loaded on a trailer, and hauled off site on September 26, 1996. The USTs were in generally good condition with no visible pits, holes, or rust. Contaminated soil and staining of the USTs were encountered on the north side of the USTs near the fill ports.

Approximately 500 cubic yards of contaminated soil from the south side of the hospital basement were removed between September 24, and October 4, 1996. The soils adjacent to the basement wall were excavated to 16 feet bls (the depth of the basement floor and the maximum depth allowed by the Atlantic Division [LANTDIV] Design Branch) exposing the basement footing along the entire wall. The depth where the contaminated soils were encountered varied from approximately 3 feet bls on the west end of the basement wall, near the leaking fuel pipes, to 13 feet bls on the east end of the wall. Contaminated soil was encountered at the maximum allowable depth of the excavation and appears to extend below the excavation floor (unknown depth) and under the basement.

The basement wall was exposed, sandblasted, and sealed to prevent the penetration of water or fuel from entering the basement through cracks or joints. A slotted horizontal pipe with three risers was installed at the base of the building so that contaminated water could be extracted during future rain events before it enters the basement.

4.2 Recommendations

Although the USTs and a significant amount of contaminated soil was removed from the area to the greatest extent possible and the basement wall was sealed, contaminated soil remains below and along the sides of the basement. Future rain events may continue to cause water and fuel to enter the basement. Since soil contamination is present, it is possible that contaminated water may migrate toward and/or beneath the basement. The navy should continue with plans to pump water out of the horizontal trench using a vac truck, during heavy rain events, to minimize complications from seepage of water into the basement.

Figures

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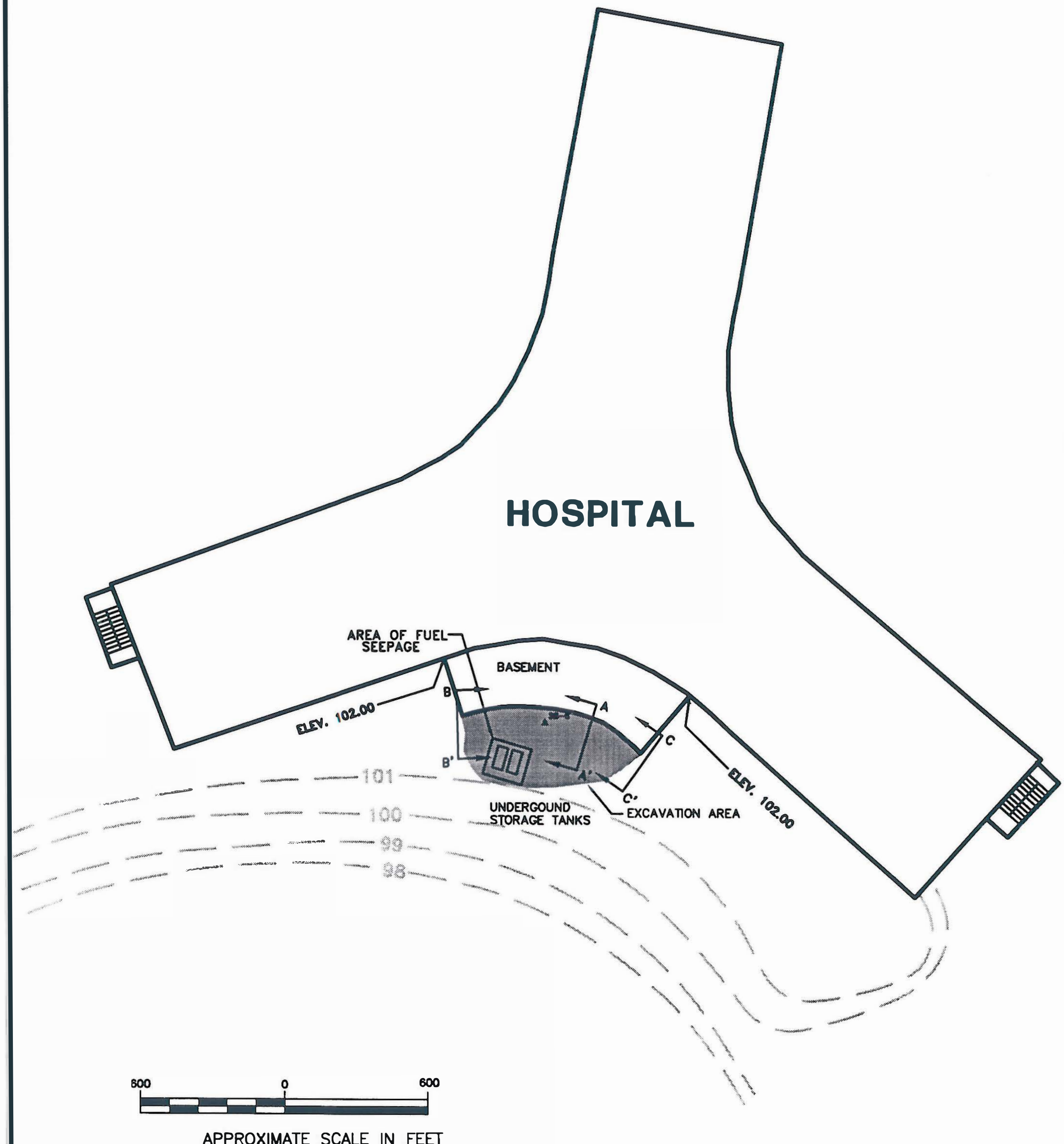

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ROOSEVELT ROADS NAVAL STATION
CEIBA, PUERTO RICO

AREA OF EXCAVATION

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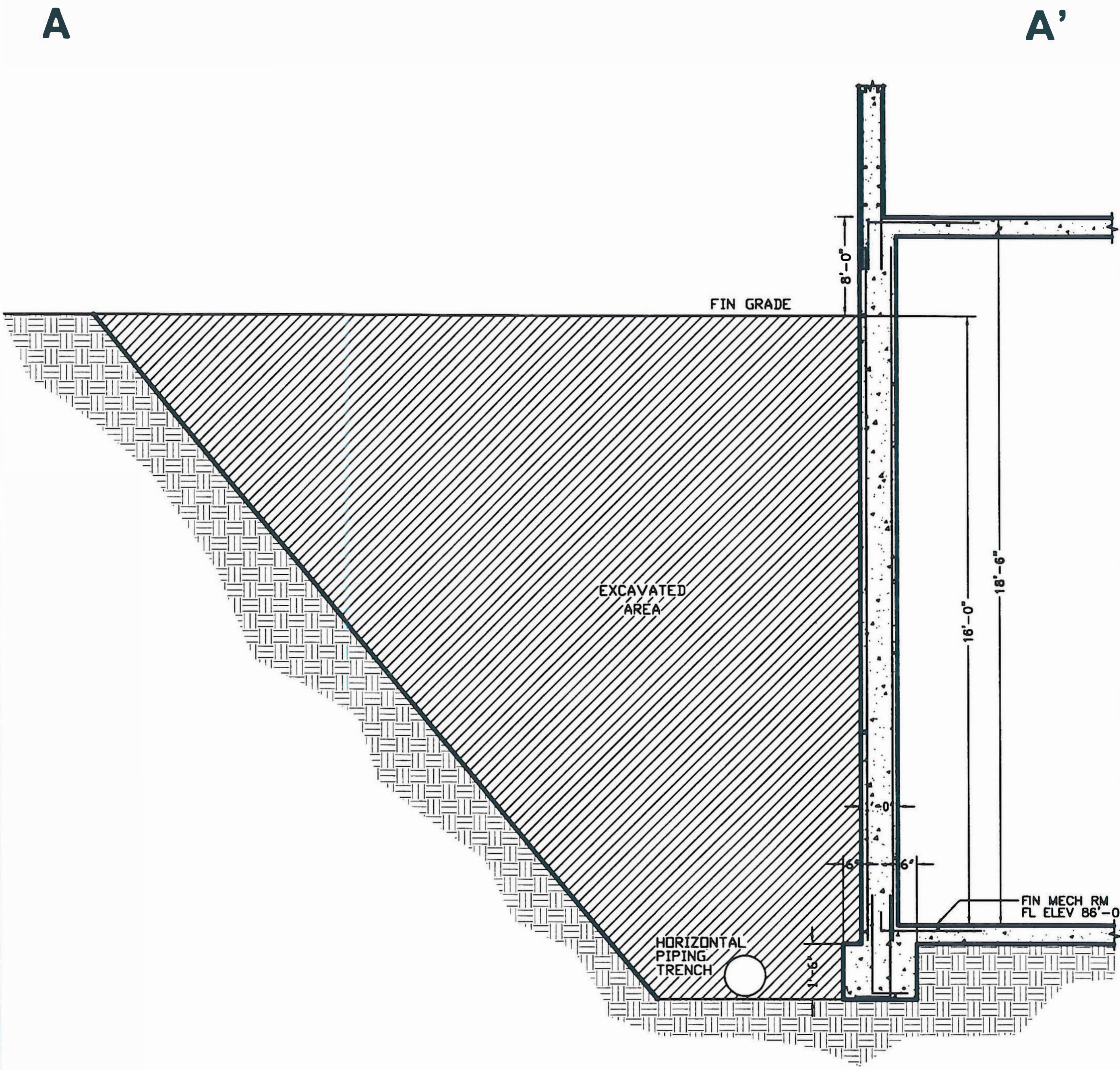
FIGURE 1

11/7/96 BOC-54 APD
39924\001\39924003.DWG



NOT TO SCALE

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CROSS SECTION A-A'

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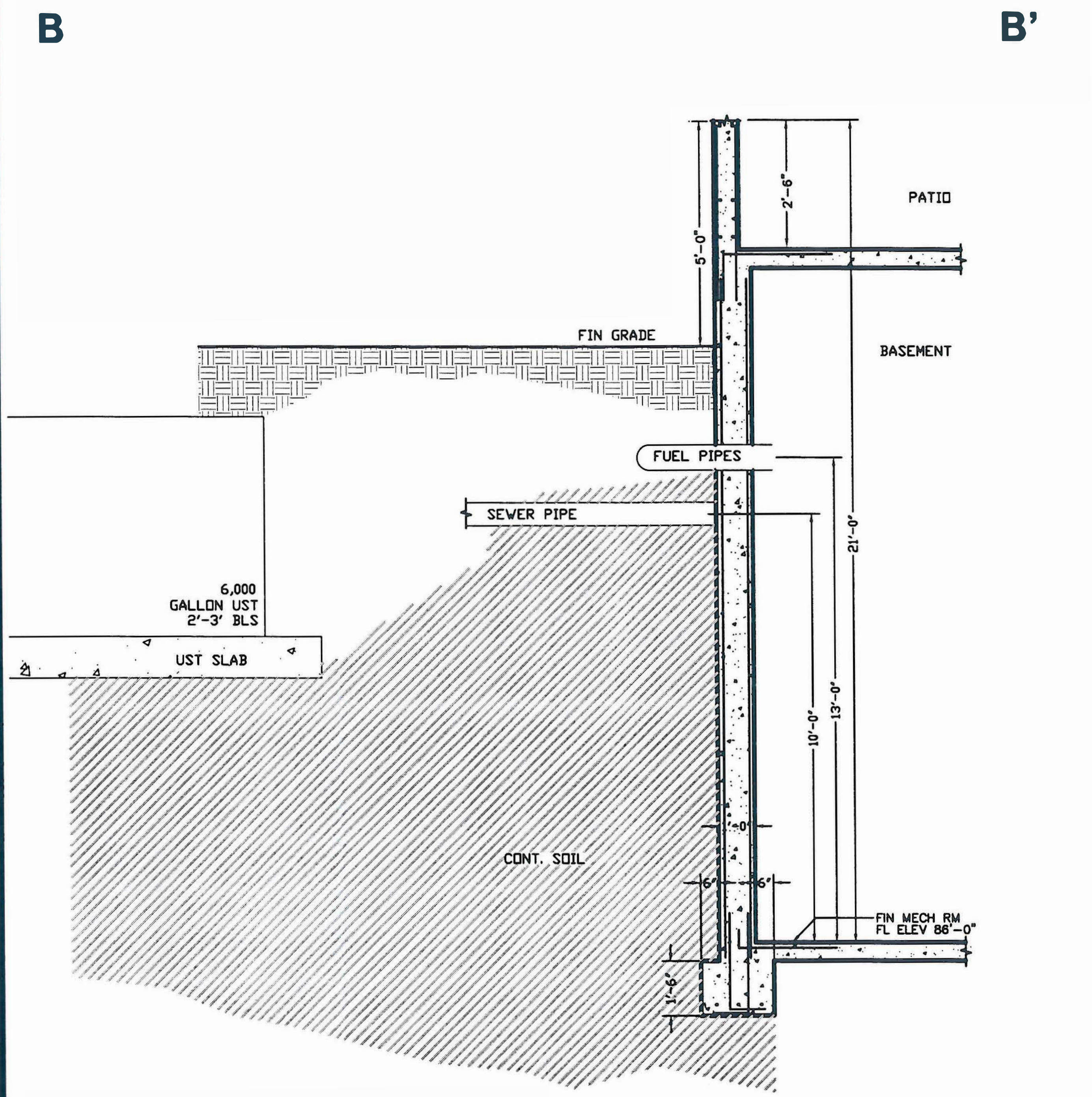
FIGURE
2

11/7/96 BOC-54 APD
39924\001\39924004.DWG



NOT TO SCALE

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CEIBA, PUERTO RICO

CROSS SECTION B-B'
WEST END OF EXCAVATION

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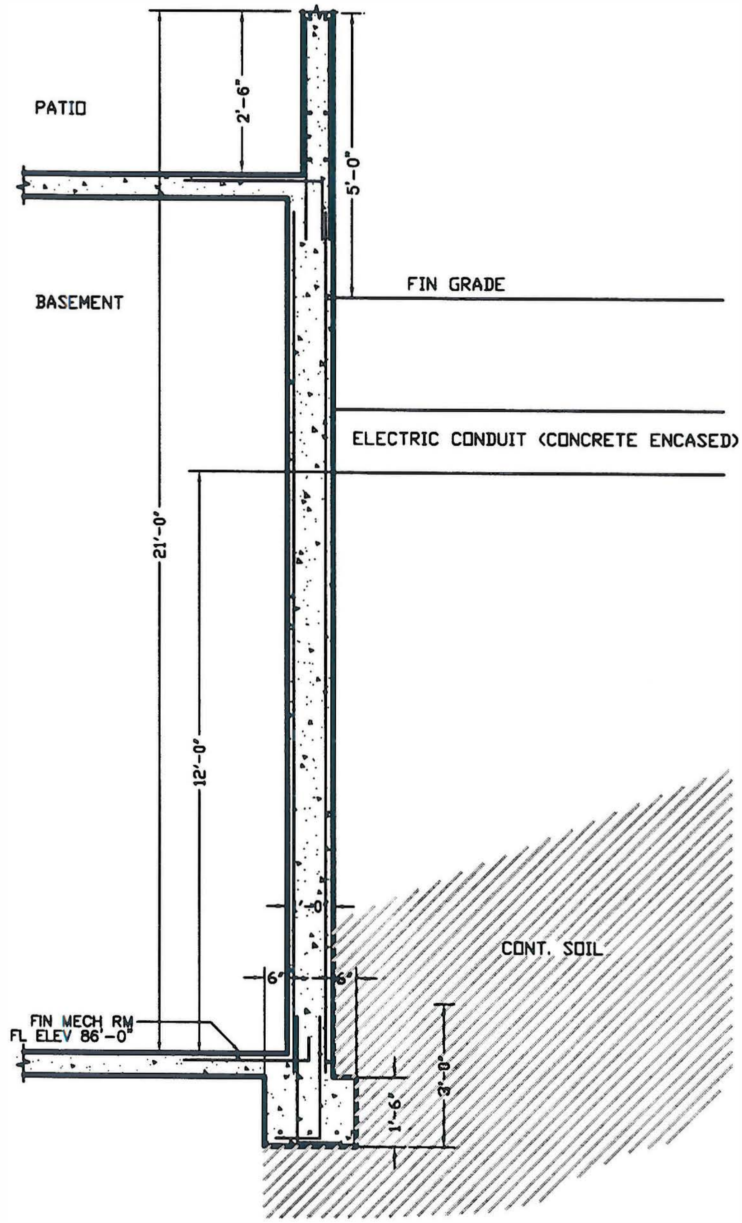
FIGURE
3

11/7/96 BOC-54 APD
39924\001\39924006.DWG

C C'



NOT TO SCALE

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CROSS SECTION C-C'
EAST END OF EXCAVATION

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FIGURE 4

11/7/96 BOC-54 APD
39924\001\39924005.DWG

Photographs

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Soil Excavation Photographs

Excavation and removal of UST's.

View of UST after removal (note no pits holes or rust.)

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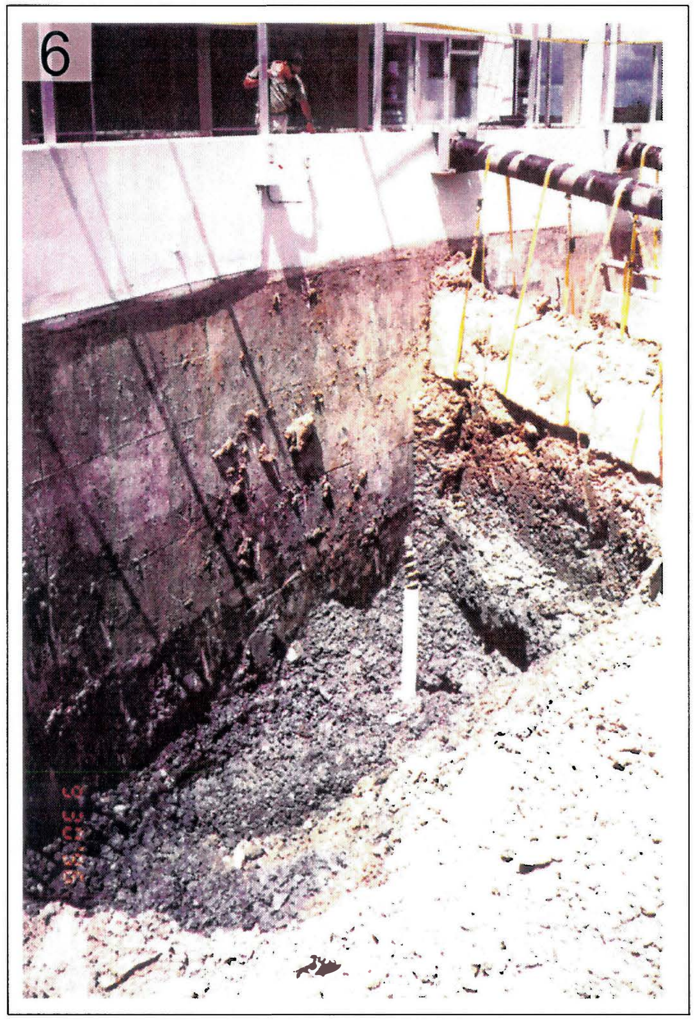
Soil Excavation Photographs

Excavation between UST's and basement wall. Note: Clean brown to tan colored soil on top and contaminated greenish/gray colored soils below.

Western end of basement wall. Note: contaminated soils belo fuel pipes.

Soil Excavation Photographs

Excavation near the western end at Basement wall.
Note: fuel pipes on left side.



Excavation on western end and the support structure used for the electrical conduits. Note: auger and casing in middle of photograph is the location of soil boring SB-8.

Soil Excavation Photographs

Support structures used for the electrical conduits

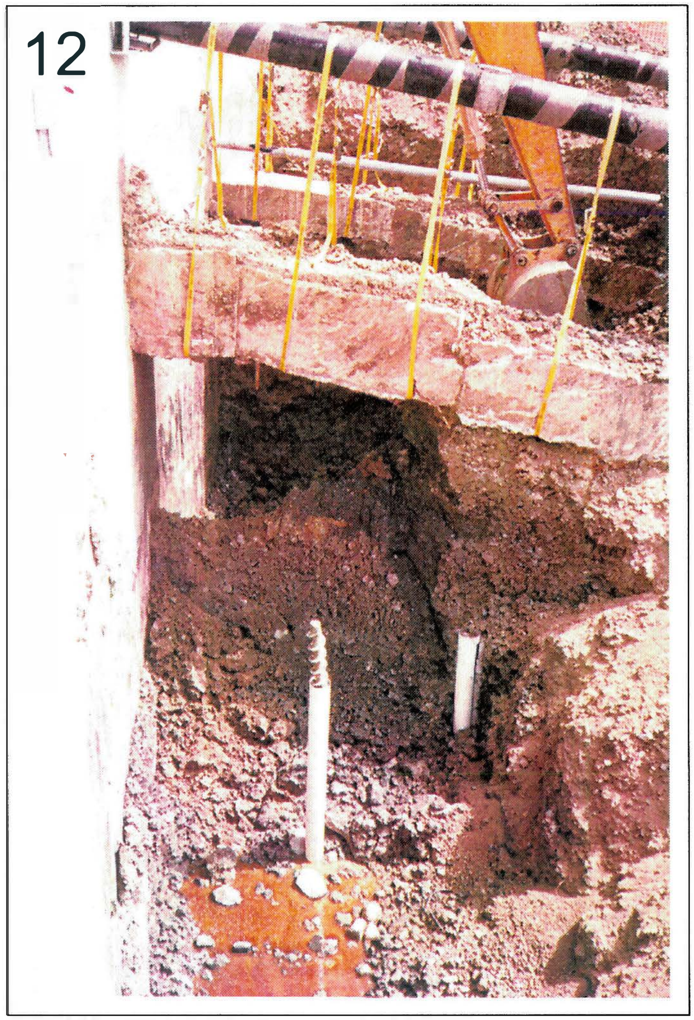
Support structures used for the electrical conduits

Soil Excavation Photographs

Support structures used for the electrical conduits. Note location of SB-8 (white PVC casing) and pools of water and fuel (sheen).

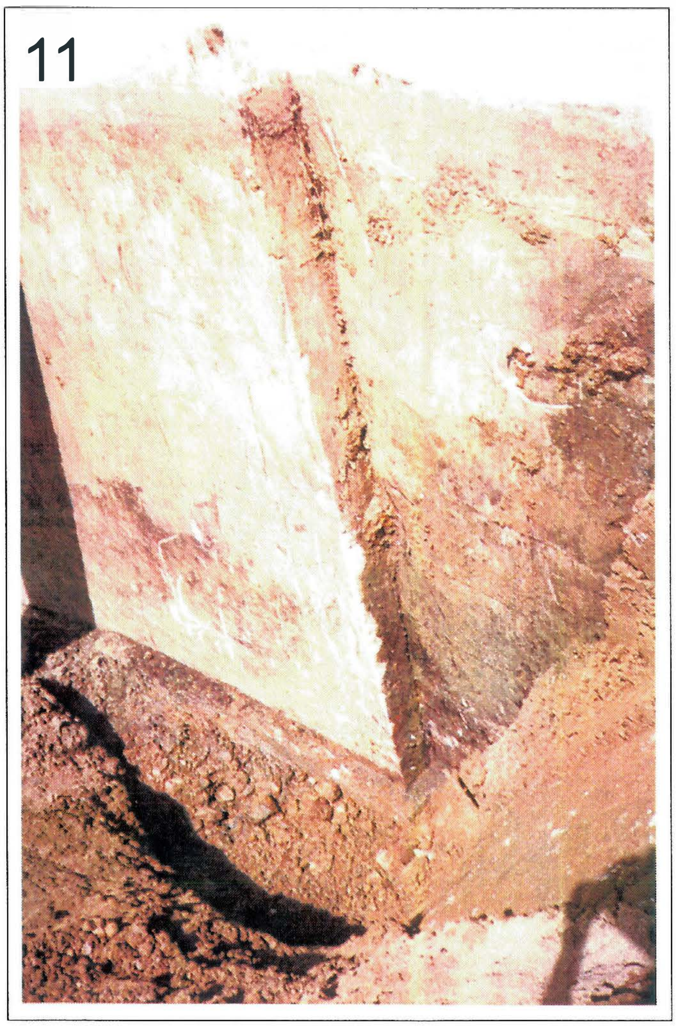
Western end of basement wall exposed to the foundation.

Soil Excavation Photographs



Evcavation below the electrical conduits.

Eastern end (corner) of basement wall exposed to the foundation.

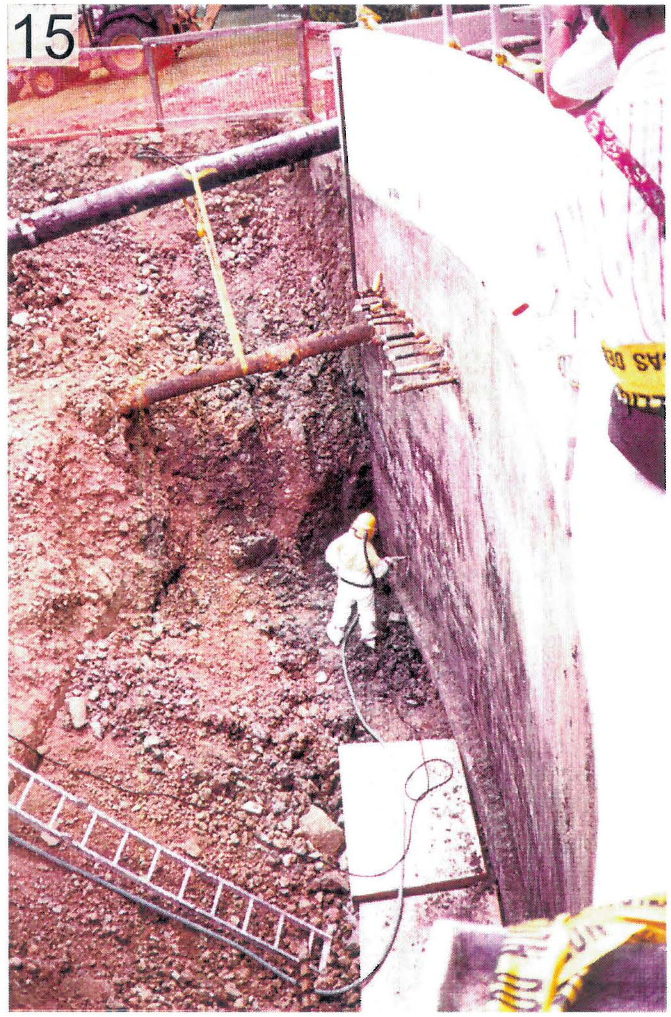


Soil Excavation Photographs

Sandblasting at bottom 8 feet of basement wall.

Sandblasting at bottom 8 feet of basement wall.

Soil Excavation Photographs



Sandblasting at bottom 8 feet of basement wall.

Wall after sandblasting.

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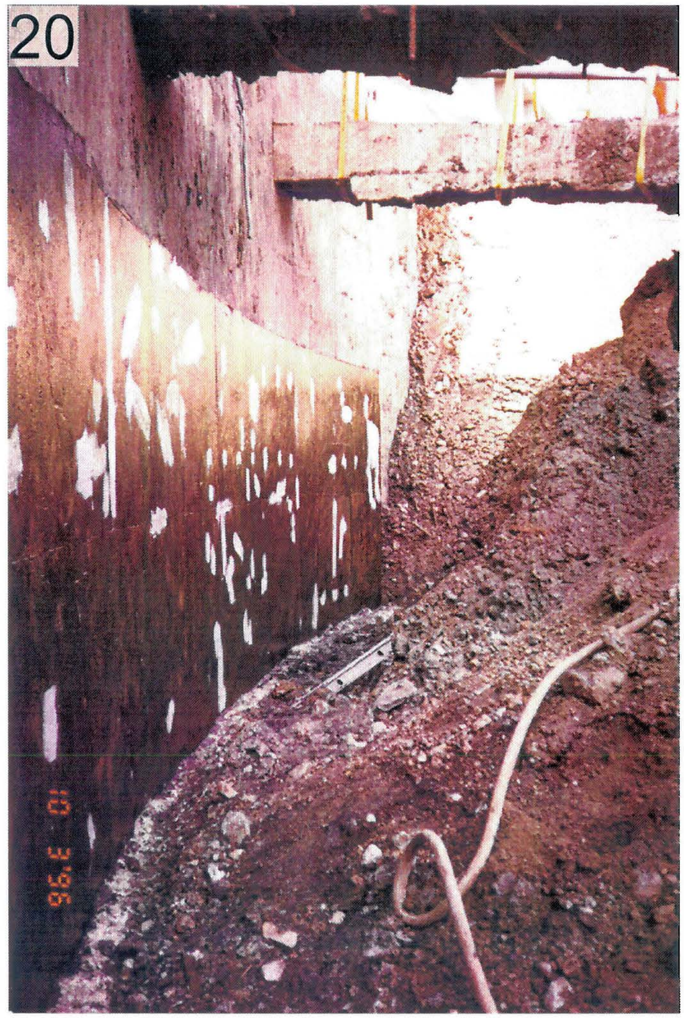
Soil Excavation Photographs

Wall after sandblasting.

Sealing of basement wall.

Soil Excavation Photographs



Sealing of basement wall.

Sealing of basement wall.

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Attachment A

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ATTACHMENT A
JOINT SEALING AGENTS

Since 1754

DEVOE COATINGS

Marine·Industrial·Offshore

Devran® 244HS

Epoxy Tank Lining

Catalog Number 244-K-XXXX

FEATURES

High Volume Solids

- Economical fuel and ballast tank lining
- Minimum volatile solvents

Two Coat System

- The Devran 244HS Tank Lining System consists of two coats at 4 mils (100 microns per coat).
- High visibility colors

Approvals

- Approved under MIL-P-23236B Type 1 and IV coating for steel fuel and salt water ballast tanks.
- Approved by the U.S.Military Sealift Command
- Meets MIL-C-4556D requirements
- Approved by Lloyd's Register of Shipping as a corrosion control coating in association with reduced scantlings for tanks carrying refined or crude oil/ballast
- Meets air quality regulations

Special Order

RECOMMENDED USES

Devran 244 HS Tank Lining Systems are recommended for:

- Fuel Tanks
- Cargo Tanks
- Cargo Ballast Tanks
- Fish and Shell Fish Holds
- Landside Storage Tanks

Devran 244HS Tank Lining is recommended as a lining in cargo or cargo/ballast tanks where the cargoes are:

- Aviation, motor and home fuels
- Lube and motor oils
- Hydraulic fluids
- Crude oil (sweet or sour)
- Grain
- and other selected cargoes - See Devoe Tank Lining Chemical Resistance Table

SPECIFICATION DATA

Coating Type	Two-component epoxy
Colors	**Catalog Number**
White	244-K-3200
Pale Blue	244-K-4129
Packaging	5 Gallon two-component kits
Component Ratio	4 to 1 by volume
Gloss	Semi-gloss
Flash Point	100° F (38°C) Setaflash
Thinner	Devoe T-4 Thinner
Use Devoe T-10 Thinner for clean-up	
Pot Life	4 hours at 77°F (25°C)
Shelf Life	More than 2 years
Density	12.4 Lbs/Gal (1.49 kg/l)
VOC EPA 24	0.4 Lbs/Gal(50.8 Grams/liter)
Induction time	1 hour at 77°F(25°C)

Temp. Resistance	250°F (121°C) dry
Volume Solids	93%

Recommended Film Thickness

4.5 mils wet to obtain 4.0 mils dry

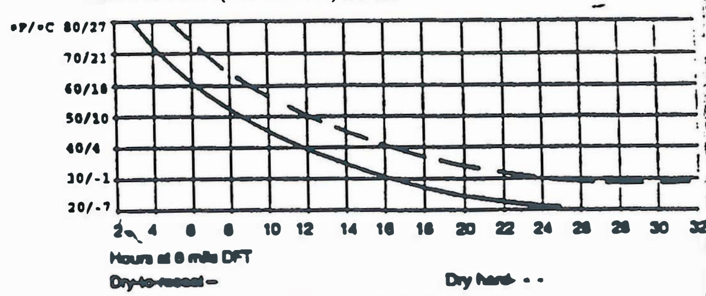
Theoretical Spreading Rate

1492 Sq.Ft/Gal at 1 mil (36.7 Sq.m/l at 25 microns)

Application Air or airless spray

Time — Temperature Drying Curve

Hours at 4 mils (100 microns) D.F.T.



The above curve is intended only as a general guideline. Ventilation, film thickness, humidity, thinning and other factors can influence the rate of dry (ASTM D1640)

Division of Grow Group, Inc

Application Guide

Surface Preparation

All surfaces must be free of oil, grease and moisture before blasting to near white metal equivalent to Steel Structures Painting Council SP10 or Swedish Standard Sa 2½. The steel profile after blasting should be 1½ to 2½ mils in depth and be of a jagged nature as opposed to a peen pattern. Surfaces must be free of grit dust. Primer or first coat should be applied to cleaned surfaces as soon as possible to prevent rerusting or contamination.

Mixing and Thinning

Devran 244HS is a two component product supplied in 5 gallon or 1 gallon kits which contain the proper ratio of ingredients. The entire contents of each container must be mixed together. Power mix the base portion first to obtain a smooth, homogeneous condition. After mixing the base portion slowly for several minutes, add the convertor slowly with continued agitation. After the convertor add is complete, continue to mix slowly for 15 minutes. Allow an additional 45 minutes induction time before application.

Thinning is not normally required or desired; however, at extreme environmental conditions, **small** amounts (5% or less) of the solvent on the reverse page can be added depending on local VOC and air quality regulations. Any solvent addition should be made after the two components are thoroughly mixed.

The pot life of the mixed material is 4 hours at 77°F (25°C). Higher temperatures will reduce working life of the coating; lower temperatures will increase it.

Application

Devran 244HS Tank Lining can be applied by both conventional air spray and airless spray equipment; however, airless spray is recommended.

For air spray application, a fluid tip of .070" to .086" (DeVilbiss E and D tips) and an air cap with good break-up such as DeVilbiss 704 or 765 will give good results. The fluid pressure should be kept low, about 15 PSI, with just enough air pressure to get good break-up of the coating. Excessive air pressure can cause overspray problems.

Where airless equipment is used, a 30 to 1 pump or larger and .019" to .023" tip size will provide a good spray pattern. Ideally, fluid hoses should not be less than 3/8" ID and not longer than 50 feet to obtain optimum results.

For touch-up work, Devran 244HS Tank Lining can be applied by brush or roller, Care should be taken that proper and uniform film thicknesses are obtained. A minimum of four days curing with good ventilation at temperatures above 60°F(15.6°C) should be allowed before the tanks are put into service. Longer curing time with good ventilation are required if temperatures are lower than 60°F or if the tank will carry strong cargoes.

VENTILATION: It is very important for the safety of the applicator and the proper performance of the Devran 244HS Tank Lining that good ventilation be provided to all portions of the enclosed area. It is equally important to bring into the enclosed area, fresh air to remove all solvent vapors. Since all solvent vapors are heavier than air, ventilation ducts should reach to the lowest portions of the enclosed areas as well as into any structural pockets. Ventilation should be provided throughout the cure period to insure all the solvents are removed from the coating.

RECOMMENDED SYSTEMS: 2 Coats Devran 244HS Tank Lining in contrasting colors at 4 mils (100 microns) per coat, plus two stripe coats in contrasting colors over sharp edges, cutouts and welds.

Note: Because Devran 244HS Tank Lining has minimal shrinkage, film thickness in excess of 4 mils can be applied without adverse performance effects.

Precautions

See the material safety data sheet and product label for complete safety and precaution requirements.

• 244/May/93

DEVOE COATINGS COMPANY
Division of GROW GROUP, INC.

REGIONAL HEADQUARTERS

KENTUCKY
P.O. Box 7600
Louisville 40257-0600
(502) 897-9861

TEXAS
4555 Homestead Road
Suite 606
Houston 77028
(713) 675-5115

NEW JERSEY
800 Ferndale Pl.
Rahway 07065
(908) 388-5100

CALIFORNIA
2625 Durahart St.
Riverside 92507
(909) 686-6930

CANADA
Devoe Coatings Canada
Div. of Grow Group Canada, Ltd.
55 MacDonald Ave.
Dartmouth, Nova Scotia
Canada B3B 1T9
(902) 468-9888

THE NETHERLANDS
Devoe Coatings B.V.
Rotterdamseweg 144A
2628 AP DELFT-Holland
(15) 569212

SINGAPORE
No. 1 Wan Shih Road
Jurong Town
Singapore 2262
(65) 2641772

CONSULT YOUR DEVOE CATALOG FOR COMPLETE LIST OF OFFICES

Since 1754

DEVOE COATINGS

Marine·Industrial·Offshore

Pre-Prime 167

Rust Penetrating Sealer

Catalog Number 167-K-XXXX

FEATURES

Reinforces Rusty Steel Substrates

Penetrates Through Rusty Surfaces

Cures to a Tough, Water Resistant Coating

100% Volume Solids

- Very low viscosity
- Low film thickness required
- No shrinkage

RECOMMENDED USES

The extraordinary penetrating properties of Pre-Prime 167 Sealer provide a means of reinforcing rusty steel substrates-this in turn insures the adhesion of subsequent coatings.

- Recommended in areas where, due to restrictions or economics, blasting or thorough hand cleaning is not feasible.
- Very effective sealer and/or reinforcement for concrete, masonry or wood surfaces.
- Excellent sealer for aged "white rusted" zinc surfaces.

SPECIFICATION DATA

Coating Type	100% Solids epoxy
Colors	Catalog Number
Clear	167-K-0000
Packaging	4 Gallon and 1 Gallon two-component kits
Component Ratio	3 to 1 by volume
Gloss	Medium sheen
Flash Point	135°F (43°C) Setaflash
Thinner	Do not thin
Pot Life	4 hours at 77°F (25°C)
Shelf Life	More than 1 year

Density	8.5 Lbs/Gal (1.02 kg/l)
VOC	Theoretical - 0
EPA 24 - 1.7 lbs/gal.(204 Grams per liter)	
Temp. Resistance	250°F (121°C) dry
Volume Solids	100%
Theoretical Spreading Rate	1604 Sq. Ft/Gal at 1 mil 39.3 Sq. m/l at 25 microns
Recommended Film Thickness	1.5 wet mils to obtain 1.5 dry mils
Application	Air spray, brush or roller
Dry Time	**At 77°F (25°C), 50% RH**
To recoat	Overnight

Application Guide

Surface Preparation

Pre-Prime 167 Sealer is designed for less than ideal surface preparation. However, performance will be improved as surface preparation improves. All oil/grease contaminants, loose rust, loose scale and unsecured old paint must be removed.

Best performance will be obtained by treating all surfaces with Devprep® 88 Cleaner, followed by a high pressure water wash before applying Pre-Prime 167 Sealer.

Mixing and Thinning

Pre-Prime 167 Sealer is a two component product supplied in 4 Gallon and 1 Gallon kits which contain the proper ratio of ingredients. The entire contents of each container must be mixed together.

Add the convertor portion to the base portion slowly with continued agitation. After the convertor add is complete, continue to mix slowly until homogeneous. **Do not thin this material.**

The pot life of the mixed material is 4 hours at 77°F (25°C). Higher temperatures will reduce working life of the coating; lower temperatures will increase it.

Application

Provide good, thorough ventilation. Enclosed areas require complete air turnover.

Apply Pre-Prime 167 Sealer by conventional air spray, brush or roller. A Graco #700 or #800 air spray gun with suitable needle/nozzle and air cap combinations will work best. To minimize overspray, use low air pressure and pot pressure, 5 to 10 PSI (0.3 to 0.7 bars). Airless application is not recommended.

Pre-Prime 167 Sealer is low in viscosity. It should be applied in one thin, wet coat sufficient to completely cover and penetrate to the steel surface. Do not apply heavy coats. Clean up application equipment with Devoe T-10 Thinner.

Apply one coat of Pre-Prime 167 Sealer at 1½ mils - allow overnight cure. An additional coat of Pre-Prime 167 Sealer may be required for very porous surfaces. After overnight cure, Pre-Prime 167 Sealer may be overcoated if still tacky.

Pre-Prime 167 Sealer is normally topcoated with Bar-Rust™ 235 or Bar-Rust 236 Coating. Consult your Devoe Coatings Representative for alternatives.

Precautions

See the material safety data sheet and product label for complete safety and precaution requirements.

167/May/93

DEVOE COATINGS COMPANY
Division of GROW GROUP, INC.

REGIONAL HEADQUARTERS

KENTUCKY
P.O. Box 7600
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(15) 569212

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No. 1 Wan Shih Road
Jurong Town
Singapore 2262
(65) 2641772

CONSULT YOUR DEVOE CATALOG FOR COMPLETE LIST OF OFFICES

CONCRESIVE® STANDARD LIQUID

High Early Strength Bonding Adhesive

DESCRIPTION:

CONCRESIVE Standard Liquid is two-component, liquid epoxy bonding agent designed for areas where high early strength is required.

RECOMMENDED FOR:

- Bonding fresh concrete to existing concrete.
- Grouting bolts, dowels and rebars into concrete, stone and masonry.
- Filling joints and voids in masonry.
- Bonding concrete to dissimilar materials such as steel, wood and plastics.

FEATURES:

- High early strength.
- May be used on damp or dry surface.

TYPICAL TECHNICAL[1] DATA:

Tensile Strength: 5,000 psi (345 MPa)
Elongation at Break: 1% minimum (ASTM D 638)
Compressive Yield Strength: 10,000 psi (69 MPa)
Compressive Modulus: 1.25 x 10^6 psi (ASTM D 695)
Heat Deflection Temperature: 122°F (51°C) (ASTM D 648)
Slant Shear Strength: 5,500 psi (37.9 MPa)
Damp-to-Damp Concrete: 100% concrete failure (AASHTO T-237)
Flexural Bond Strength: 575 psi (3.9 MPa) (ASTM C 293)

Properties listed are typical and descriptive of the product and may be used as a guide for determining suitability for particular applications.

[1]Test specimens cured 7 days @ 77°F (25°C) and tested at same temperature.

GENERAL INFORMATION:

	Components	
	Part A (Resin)	Part B (Hardener)
Color	Off White	Amber
Mixing Ratio		
(by volume)	2	1
(by weight)	100	45
Mixed Color	Amber	

	60°F (16°C)	77°F (25°C)	105°F (41°C)
Viscosity — poise			
Resin - Part A	2.5	1.6	0.3
Hardener - Part B	224	100	28
Mixed	100	32	17.6
Open Time (Thin Film)	4 hrs.	3 hrs.	1 hr.
Initial Cure (AASHTO T-237)	36 hrs.	24 hrs.	12 hrs.
Full Cure (ASTM D 695)	10 days	7 days	3 days
Pot Life			
1 quart (0.946 liters)	50 mins.	35 mins.	15 mins.
1 gallon (3.8 liters)	45 mins.	30 mins.	10 mins.

Shelf Life 18 months minimum when stored at temperatures between 40°F and 90°F (4°C and 32°C).

ESTIMATING:

Packaging
1,3 and 15 U.S. gallon (3.8, 11.4 and 56.8 liter) units.

Coverage Rates

Smooth surfaces -	100 ft^2/gallon (2.4 m^2/liter)
Rough surfaces-	50 to 75 ft^2/gallon (1.2 to 1.8 m^2/liter)

Master Tech

SURFACE PREPARATION PROCEDURES:

Concrete Surfaces

1. Substrate may be dry or damp, although optimum results are obtained on a dry surface.
2. New concrete must be fully cured (28-day minimum).
3. Remove grease, wax, oil contaminants and curing compounds by scrubbing with an industrial grade detergent or a degreasing compound, then follow with mechanical cleaning.
4. Remove weak, contaminated or deteriorated concrete by shotblasting, bushhammering, gritblasting, scarifying or other suitable mechanical means. Follow mechanical cleaning with vacuum cleaning.
5. Acid-etching with 15% hydrochloric acid should only be used if there is no practical alternative. It must be followed by pressure washing, scrubbing and flushing with copious amounts of clean water. Check for removal of acid with moist pH paper. Reading must be greater than 10.
6. The prepared surface must be clean, free of dust and textured to provide mechanical bond. Remove the surface skin of all finished or formed concrete.

Steel Surfaces

1. Remove dirt, grease and oil with a suitable, industrial grade, cleaning and degreasing compound.
2. Remove rust and mill scale by gritblasting. Blast steel to white metal. Follow gritblasting with vacuuming or oil-free, dry-air blast.

PRODUCT USAGE INSTRUCTIONS:

General Bonding

Although this product will adhere to a damp surface, the best and most consistent results are obtained when bonded to a dry surface. When the surface is wet, remove free water by oil-free air blast or squeegee. Apply the bonding agent with a brush, paint roller, squeegee, conventional spray or airless spray. The minimum bondline thickness is 15 ml.

Bonding Fresh Concrete to Existing Concrete

The new concrete to be bonded should be a relatively dry mix with a maximum slump of 3" (75 mm). When bonding concrete containing polymer admixtures, check compatibility by either installing a test patch and performing a pull-off test or by a laboratory slant shear test (AASHTO T-237).

Lightweight concrete may require a second coat if the first coat penetrates. Place fresh concrete within the "open time" or while the bonding agent is still tacky.

Bolt and Rebar Grouting

Drilling: Holes may be cut by either rotary-percussion drilling followed by air blow-out with oil-free compressed air or by diamond core boring followed by water flush. The hole must be free of water before grouting. Where holes are precast into the concrete, cast them undersize, then drill to fit.

Hole sizing: The diameter of the hole is 1/4" (6 mm) larger than that of the bar; larger annular spaces are less desirable.

Application: Pour a measured amount of bonding agent into the hole. Insert the bar, displacing the bonding agent, then secure the bar in the center of the hole. Remove excess bonding agent from around the hole before it hardens. For grouting deep holes, pressure grouting may be required.

CLEAN UP:

Mixed epoxy is much easier to clean up before it hardens. Commercial epoxy/paint stripper solvents are recommended for hardened epoxy. Consult solvent manufacturer's usage recommendations.

LIMITATIONS:

Application Temperature Range

40°F to 105°F (4°C to 41°C)
Do not add solvents or water to epoxy components.

SAFETY PRECAUTIONS:

CONCRESIVE Standard Liquid is an early cure, high-strength epoxy system which is formulated for industrial and professional use only and must be kept out of the reach of children. These products contain chemicals which may be COMBUSTIBLE and potentially HARMFUL to your health if not stored and used properly. Hazards can be significantly reduced by observing all precautions found on Material Safety Data Sheets (MSDS), product labels and technical literature. Please read this literature carefully before using product.

WARRANTY:

Master Builders stands behind its products when used by competent persons in accordance with current, published recommendations, but cannot be held responsible for difficulty caused by other materials or conditions or by inferior workmanship. Master Builders reserves the right to have the true cause of any difficulty determined by accepted test methods.

CONCRESIVE® STANDARD PASTE

General purpose, paste bonding adhesive

DESCRIPTION:

CONCRESIVE Standard Paste is a two-component, non-sag adhesive used for vertical and overhead applications and for horizontal anchoring.

RECOMMENDED FOR:

- Pinning loose or broken masonry.
- Bonding concrete and other rigid materials.
- Anchoring dowels and rebars
- Fairing uneven surfaces, filling gaps and joints.
- Bonding fresh concrete to existing hardened concrete.

FEATURES:

- Excellent for overhead applications.
- Non-sag paste.
- Bonds to damp or dry surfaces.
- May be extended with properly graded sands.
- Contrasting Part A and B colors provide visual mixing indicators.

TYPICAL TECHNICAL[1] DATA:

Tensile Strength: 3,500 psi (24.1 MPa)
Elongation at Break: 1% (ASTM D 638)
Compressive Yield Strength: 11,900 psi (82.1 MPa)
Compressive Modulus: 4.34×10^5 psi (ASTM D 695) (3.0×10^3 MPa)
Heat Deflection Temperature: 125°F (52°C) (ASTM D 648)
Slant Shear Strength: 6,000 psi (41.4 MPa)
Damp-to-Damp Concrete: 100% concrete failure (AASHTO T-237)
Flexural Bond Strength: 580 psi (4.0 MPa) (ASTM C 293)

Properties listed are typical and descriptive of the product and may be used as a guide for determining suitability for particular applications.

[1]Test specimens cured 7 days @ 77°F (25°C) and tested at same temperature.

GENERAL INFORMATION:

	Components	
	Part A (Resin)	Part B (Hardener)
Form	Paste	Paste
Mixing Color	White	Black
Ratio (by volume)	1	1
(by weight)	100	128

	60°F (16°C)	77°F (25°C)	105°F (41°C)
Non-Sag Thickness (ASTM D 2730)	3/4" (18 mm)	3/4" (18 mm)	1/2" (13 mm) minimum
Open Time (Thin Film)	4 hrs.	3 hrs.	1 hr.
Initial Cure (AASHTO T-237)	36 hrs.	24 hrs.	12 hrs.
Full Cure (ASTM D 695)	10 days	7 days	3 days
Pot Life 1 quart (3.8 liter)	50 mins.	40 mins.	15 mins.

Shelf Life 18 months minimum when stored at temperatures between 40°F and 90°F (4°C and 32°C).

ESTIMATING:

Packaging
2 and 10 U.S. gallon (7.6 and 38 liter) units.

Coverage Rates
[1/8" (3 mm) thick]
Smooth surfaces - 12 ft^2/gallon (0.29 m^2/liter)
Rough surfaces - 6 ft^2/gallon (0.15 m^2/liter)

SURFACE PREPARATION PROCEDURES:

Concrete Surfaces

1. Substrate may be dry or damp, although optimum results are obtained on a dry surface.
2. New concrete must be fully cured (28-day minimum).

Master Builders Technologies

3. Remove grease, wax, oil contaminants and curing compounds by scrubbing with an industrial grade detergent or a degreasing compound or a solvent strong enough for complete removal, then follow with mechanical cleaning.
4. Remove weak, contaminated or deteriorated concrete by shotblasting, bushhammering, gritblasting, scarifying or other suitable mechanical means. Follow mechanical cleaning with vacuum cleaning.
5. Acid-etching with 15% hydrochloric acid should only be used if there is no practical alternative. It must be followed by pressure washing, scrubbing and flushing with abundant amounts of clean water. Check for removal of acid with moist pH paper. Reading must be greater than 10.
6. The prepared surface must be clean, free of dust and textured to provide mechanical bond. Remove the surface skin of all finished or formed concrete.

Steel Surfaces

1. Remove dirt, grease and oil with a suitable, industrial grade, cleaning and degreasing compound.
2. Remove rust and mill scale by gritblasting. Blast steel to white metal. Follow gritblasting with vacuuming or oil-free, dry-air blast.

PRODUCT USAGE INSTRUCTIONS:

General Bonding

Deep surface irregularities can be faired with a 1 to 1 sand: CONCRESIVE Standard Paste mix. Allow this fairing material to set. Within 24 hours, apply neat CONCRESIVE Standard Paste bonding agent with a trowel in sufficient quantities to fill all gaps between the mated surfaces. The bondline thickness should be between 1/32" and 1/8" (1-1/2 mm and 3 mm). Ideally, a small amount of bonding agent should be extruded from the joint when the surfaces are mated and pressure is applied. Surfaces must be mated while the paste is still tacky (within the open time).

Sand Selection

Use graded silica sand; washed, kiln-dried and bagged. A carefully selected blend of sand with a low void content will require less epoxy for a given volume of mortar compared to ungraded sands. A good "gap" grading for low void content is a blend by weight of two parts #12 or #16 mesh to one part #80 or #100 mesh. When graded sands are not available, a good general purpose sand is #30 mesh.

Moisture

Bonding to a clean damp surface is possible but less desirable than to a dry surface. When applying this product to a damp surface, remove free water by oil-free, air blast.

Bolt and Rebar Grouting

Drilling: Holes may be cut by either rotary-percussion drilling followed by air blow-out with oil-free compressed air or by diamond core boring followed by water flush. The hole must be free of water before grouting. Where holes are precast into the concrete, cast them undersize, then drill to fit.

Hole sizing: The recommended diameter of the hole is 1/4" (6 mm) larger than that of the bar; larger or smaller annular spaces are less desirable.

Application: Install a measured amount of bonding adhesive into the bottom of the hole with a caulking gun equipped with an extension nozzle. Insert the bar, displacing the paste, then secure it in the center of the hole. Remove excess bonding agent from around the hole before it hardens. For grouting holes deeper than 2 ft. (0.6 m), pressure grouting is recommended.

CLEAN UP:

Mixed epoxy is much easier to clean up before it hardens. Commercial epoxy/paint stripper solvents are recommended for hardened epoxy. Consult solvent manufacturer's usage recommendations.

LIMITATIONS:

Application Temperature Range

40°F to 105°F (4°C to 41°C)
Do not add solvents or water to epoxy components.

Non-sag characteristics will diminish at the upper end of the application temperature range. For structural use above 105°F (41°C) service temperature, sustained load conditions must be evaluated before selection of CONCRESIVE Standard Paste.

SAFETY PRECAUTIONS:

CONCRESIVE Standard Paste is two-component, non-sag adhesive which is formulated for industrial and professional use only and must be kept out of the reach of children. These products contain chemicals which may be COMBUSTIBLE and potentially HARMFUL to your health if not stored and used properly. Hazards can be significantly reduced by observing all precautions found on Material Safety Data Sheets (MSDS), product labels and technical literature. Please read this literature carefully before using product.

APPENDIX D

D-1. Utility Location/Well Permit

The tentative locations of the soil borings and monitoring well locations were presented to Caleb Romero (Facilities Management and Utilities Division, Public Works Department) before the initiation of drilling activities. A utility check in the proposed area of investigation was conducted by Mr. Romero. To avoid damaging any potential underground structures, the first two feet of each soil boring and monitoring well were installed with a post hole digger. In addition, a hand auger was used to collect samples from two feet to four feet BLS.

An application requesting well construction permits was submitted to the Puerto Rico Department of Natural Resources on February 17, 1998.

4330
NO2C-A411
Jan 20,1998

MEMORANDUM

From: Facilities Management Division, PWD
To: Pitt T. Maner III, Blasland Bouck & Lee

Subj.: EXCAVATION PERMIT FOR N62470-93-D-4021, VARIOUS SITES CHARACTERIZATIONS

Ref. : (a) Personal request

1. The excavation permit is approved based on the existing utilities information contained on existing filed drawings and on contract drawings.

2. Care must be observed during the excavation process and excavation by hand shall be performed whenever utilities are present as shown in project drawings.

3. The contractor will do arrangements for repairs of any utilities damaged or disconnected shown on enclosure(1) after notification to PWD is done.

4. Facilities 1691, 429R and 729 will be scanned prior to excavation by PWD.

5. This permit shall be available at the work site at all times with the provided exhibits if any.

6. For any additional information or assistance to perform excavation, please contact Mr. Caleb Romero, Utilities Engineer, at telephone extensions 4068/4268.

Caleb Romero

Received by : ______________________

5090-14-13

DEPARTMENT OF THE NAVY
U.S. NAVAL STATION, ROOSEVELT ROADS
PSC 1008 BOX 3001
FPO AA 34051-0001

5090
Ser N02C-A64/ 0388
17 FEB 1998

Department of Natural Resources
Box 5887
Puerta de Tierra, PR 00906

Attention: Ms. Sara Cortez

SUBJECT: PERMIT APPLICATION AND FEE TO INSTALL 45 MONITORING WELLS AT THE U.S. NAVAL STATION, ROOSEVELT ROADS

Enclosed is a permit application and fee to install 45 monitoring wells at the US Naval Station, Roosevelt Roads. These wells will be used to collect water samples for laboratory analysis as required by the Environmental Quality Board regulation for Underground Storage Tanks (USTs). The wells will not be used for any type of groundwater production.

Should you have any questions, please contact Mr. Pedro Ruiz, Pollution Abatement Program Manager, Environmental Engineering Division, at 865-4429.

Sincerely,

D. L. DUREN
Lieutenant Commander, CEC, U.S. Navy
Assistant Public Works Department
By direction of the
Commanding Officer

Enclosure: (1)

Estado Libre Asociado de Puerto Rico
DEPARTAMENTO DE RECURSOS NATURALES
San Juan, Puerto Rico

Secretaría Auxiliar de Planificación de Recursos

SOLICITUD PARA PERMISO DE CONSTRUCCION DE POZO

PARA USO DEL DEPARTAMENTO
Número de Solicitud ________ Fecha de Recibo ________

Número de Franquicia ____ Número de Reclamo de Derecho Adquirido ____

1. Solicitante Seguro Social ________

Nombre US Naval Station Roosevelt Roads Teléfono (787)865-4429

Dirección Residencial Public Works Dpt Bldg. 31, NAVSTA Roos.Rds., Ceiba,PR
Calle Núm. Municipio Zona Postal

____
Urbanización o Barrio Núm. Carr. Km. Hm.

Dirección Postal Commanding Officer Attn. Public Works Officer, Code NO2C-A6
PSC 1008 Box 3021 FPO AA 34051-3021
Buzón Rural Núm. Apdo. Municipio Zona Postal

2. Propietario de los terrenos donde se construirá el pozo. De ser igual al solicitante, indique IGUAL.

Nombre SAME Teléfono ________

Dirección Residencial ________
Calle Núm. Municipio Zona Postal

____
Urbanización o Barrio Núm. Carr. Km. Hm.

Dirección Postal ________
Buzón Rural Núm. Apdo. Municipio Zona Postal

Relación del solicitante con el propietario (arrendatario, usufructuario, otro). ________

3. Pocero. De ser igual al solicitante, indique IGUAL.

Nombre GeoWorks Inc. Teléfono (787)261-0932

Dirección Residencial Pedro Arcillagos H-10 Septima Seccion , Levitown, Toa
Calle Núm. Municipio Zona Postal

Baja, 00950
Urbanización o Barrio Núm. Carr. Km. Hm.

Dirección Postal ________
Buzón Rural Núm. Apdo. Municipio Zona Postal

4. Localización del Pozo

Municipio Ceiba Barrio ________

Sector 18° 15' 00" Latitude
65° 39' 30" Longitude Finca US Navy Roosevelt Roads

Núm. Carr. ________ Km. ________ Hm. ________

5. Cantidad de Agua a Extraerse (en millones de galones al año (MGA))

(________) X (________) X (________) X (________) X (60/1,000,000) = ____ MGA
razón de extracción (gpm) horas/día días/semana semanas/año

6. Uso de Agua: ( ) Doméstico ( ) Comercial ( ) Agrícola ( ) Industrial

Describa brevemente la actividad en que se utilizará el agua.

_The wells will be installed for monitoring purposes only. No water will be collected from them.

7. Tipo de Pozo:

( )abasto (X)observación ( )reserva ( )barreno de prueba

8. Datos del Pozo:

Profundidad anticipada 25 pies Diámetro del barreno 8 pulg.

Diámetro de la camisilla 2 pulg. Tipo de rejilla 0.010

9. Método de Construcción:

( )a mano ( )percusión ( )rotario (X)OTRO Hollow Sten Auger (HSA)

AUTORIZACION

Autorizo al personal del Departamento de Recursos Naturales a entrar en los terrenos de mi propiedad o uso a inspeccionar el lugar donde se construirá el pozo aquí propuesto, así como cualquier otro lugar que pudiere afectarse con las obras en proyecto.

CERTIFICO: Que la información aquí expuesta es correcta, según mi mejor saber y entender.

28 Jan 98
FECHA

Firma del solicitante o su representante autorizado

Pedro J. Ruiz Lebron
Nombre del solicitante o su representante autorizado, en letra de molde

D-2. Equipment Decontamination

The drilling rig and associated equipment was decontaminated before installing each soil boring and monitoring well. Decontamination procedures included removing loose soils from tools and steam cleaning the equipment. Potable water, from an on-site source, and Alconox (non-phosphate soap) were used in addition to steam cleaning. An equipment decontamination pit was temporarily built with short wooden walls and covered with plastic sheeting. The decontamination area was located next to the former gas station at Site 520.

Equipment decontamination was conducted in a 20-foot by 20-foot pit that had wooden walls with a minimum height of 6-inches . The pit was covered with plastic sheeting to contain any fluids. Decontamination water contained in the pit evaporated before it could be pumped into 55-gallon drums for disposal.

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

D-3. Air Monitoring

During the installation of the soil borings, the breathing zone around the drilling rig was routinely monitored with a Foxboro Model 128 OVA. Results of the daily air monitoring are presented in the table below. The breathing levels never exceeded 0 ppm during the soil borings installations.

PROJECT: Roosevelt Roads U.S. Naval Station-Site 731

MONITORING INSTRUMENT: 128 Foxboro Organic Vapor Analyzer
AIR MONITOR: Albert Naya
LEVEL OF PROTECTION: Level D
ACTIVITY : Soil Boring Installation

Date	Time	Boring Location	Instrument Reading (ppm)
2/9/98	08:00	731-SB1 Breathing zone behind rig	0
2/9/98	10:00	731-SB1 Breathing zone behind rig	0
2/9/98	12:00	731-SB1 Breathing zone behind rig	0
2/9/98	14:00	731-SB1 Breathing zone behind rig	0
2/9/98	16:00	731-SB1 Breathing zone behind rig	0
2/10/98	08:00	731-SB2 Breathing zone behind rig	0
2/10/98	10:00	731-SB2 Breathing zone behind rig	0
2/10/98	12:00	731-SB2 Breathing zone behind rig	0
2/10/98	14:00	731-SB2 Breathing zone behind rig	0
2/10/98	16:00	731-SB3 Breathing zone behind rig	0
2/11/98	08:00	731-SB3 Breathing zone behind rig	0
2/11/98	10:00	731-SB3 Breathing zone behind rig	0
2/11/98	12:00	731-SB3 Breathing zone behind rig	0
2/11/98	14:00	731-SB3 Breathing zone behind rig	0
2/11/98	16:00	731-SB3 Breathing zone behind rig	0
2/12/98	08:00	731-SB4 Breathing zone behind rig	0
2/12/98	10:00	731-SB4 Breathing zone behind rig	0
2/12/98	12:00	731-SB4 Breathing zone behind rig	0
2/12/98	14:00	731-SB4 Breathing zone behind rig	0
2/12/98	16:00	731-SB4 Breathing zone behind rig	0

D-4. OVA Field Screening Methodology

Field screening of the soils with an OVA involved the following: (1) two pint-sized mason jars were half filled with soil obtained from the split-spoon sampler; (2) the jar tops were covered with aluminum foil and sealed; (3) the jars were placed in a cool area for five minutes to allow the head space to equilibrate; and (4) the headspace was measured with an OVA. Two samples were collected from each interval to measure the head space with and without a charcoal filter; the filter allows differentiation between natural organic vapors (e.g., methane and ethane) and hydrocarbons vapors. The difference between the two readings is the net hydrocarbon vapor content attributed to non-naturally occurring sources.

D-5. Monitoring Well Construction

The three monitoring wells (731-MW-1, 731-MW-2, and 731-MW-3) were installed using hollow stem augers. The filter pack material consisted of 20/30 grade silica sand. Following the well casing and screen emplacement, the sand material was poured into each borehole annulus to least two feet above the top of the screen interval. To confirm that the filter pack was placed at the proper interval, the depth to sand was continuously measured. A weighted tape measure was used to determine the depth to sand. A 2 to 3-foot bentonite pellet seal was emplaced above the sand pack. Water was added to the bentonite pellets which were allowed to hydrate overnight. The remaining annular space around the well was filled with neat cement to land surface. The monitoring wells were completed with a concrete pad (3-ft x 3-ft x 0.6-ft deep), flush-mounted, bolt down manholes, locking watertight caps, and keyed-alike padlocks. Appendix B contains the construction logs for each of the monitoring wells.

D-6. Monitoring Well Development

The monitoring well development was performed by with a hand bailer. To obtain a representative water sample, development continued until the purge water was free of silt and sand. Well development dates and volumes developed are summarized in Table 3-3.

The development water was containerized in 55-gallon drums. Based on laboratory analytical data, the development water was discharged onto the asphalt road surface adjacent to the site to evaporate.

APPENDIX E
TEG LABORATORY ANALYTICAL RESULTS

ɔrld Leader In On-Site Sampling and Analysis

February 12, 1998
TEG Project #98I0211BBL

Mr. Pitt Maner
BBL, Inc.
185 N.W. Spanish River Blvd., Suite 110
Boca Raton, FL 33431

SUBJECT: DATA REPORT - ROOSEVELT ROADS PROJECT NO. 39933

Dear Pitt,

Please find enclosed the data report for samples collected by BBL staff from the above referenced project site and delivered to TEG under the proper chain-of-custody protocol. TEG's Puerto Rico-certified chemist conducted the following analyses:

- 2 water samples analyzed for TRPH by modified EPA test method 418.1.
- 1 trip blank water sample analyzed for TRPH.
- Laboratory QA/QC analyses for TRPH.

The results of the analyses are summarized in the attached table. Applicable detection limits, QA/QC data and a chain-of-custody are also included as attachments.

TEG appreciates the opportunity to provide analytical services for this project. If you have any questions relating to the data or report, please do not hesitate to contact us.

Sincerely,
TEG

Kevin Shelburne
Principal

Attachments

rld Leader In On-Site Sampling and Analysis

BLASLAND, BOUCK & LEE, INC.
ROOSEVELT ROADS
CEIBA, P. R.

TEG Project #98I0211BBL

TRPH (EPA Method 418.1) ANALYSES OF WATER

SAMPLE NUMBER	DATE ANALYZED	TRPH (mg/L)
METHOD BLANK	2/12/98	ND
731 SB-1 (auger)	2/12/98	ND
731 SB-2 (auger)	2/12/98	ND
731 SB-2 (auger) rep.	2/12/98	ND
Trip Blank	2/12/98	ND
DETECTION LIMIT (mg/L)		10

SAMPLING PERFORMED BY BBL PERSONNEL
"ND" INDICATES NOT DETECTED AT LISTED DETECTION LIMIT
mg/L = MILLIGRAMS PER LITER
ANALYSES PERFORMED BY: MARCO A. PEDRAZA
DATA REVIEWED BY: KEVIN SHELBURNE

Marco A. Pedraza
Laboratory Manager

Kevin Shelburne
Principal

Químico Licenciado
Estado Libre Asociado de Puerto Rico
LICENCIA NUM. 1193

TEG-PUERTO RICO • PMB 627, HC-01 Box 29030, Caguas, PR 00725 • Phone (787) 720-0329 • Fax (787) 789-3858 • Pager 759-1255 Unit 217-4053

teg

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD)

TEG Project #98I0211BBL
DAILY CALIBRATION DATE : 2/12/98

BLASLAND, BOUCK & LEE, INC. 39933
PROJECT NAME: ROOSEVELT ROADS

COMPOUND	SPK CONC (ppm)	MS CONC (ppm)	%REC MS	MSD CONC (ppm)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TRPH	250	216	87%	213	85%	2%	15%	80% - 120%

ppm = PARTS PER MILLION
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED BY: MARCO A. PEDRAZA
DATA REVIEWED BY: KEVIN SHELBURNE

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY
PMB 627, HC-01 BOX 29030, CAGUAS, P.R. 00725
TELEPHONE (787) 720-0329 FAX 789-3858

teg

QA/QC REPORT - CALIBRATION DATA

TEG Project #98I0211BBL
DAILY CALIBRATION DATE : 2/12/98

BLASLAND, BOUCK & LEE, INC. 39933
PROJECT NAME: ROOSEVELT ROADS

			INITIAL		OPENING			CLOSING		
COMPOUND	DETECTOR	CALIB RANGE	RF	%RSD	ABS	RF	%DIFF	ABS	RF	%DIFF
TRPH	IR	10 - 1,000	617.89	15.7%	0.371	673.9	9.1%	0.445	561.8	9.1%

CALIB RANGE - RANGE OF CALIBRATION CURVE IS IN ppm
INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF (+/- 15% ACCEPTABLE LIMITS)
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED BY: MARCO A. PEDRAZA
DATA REVIEWED BY: KEVIN SHELBURNE

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY
PMB 627, HC-01 BOX 29030, CAGUAS, P.R. 00725
TELEPHONE (787) 720-0329 FAX 789-3858

teg Transglobal Environmental Geochemistry

Chain of Custody Record

PO # ____

Client: BBL
Address: Boca Raton, FL
Phone: 561 750 3733 FAX: 737 800 4531
Client Project #: 39933 Project Manager: D. Moore

Date: 2/11/98 Page 1 of 1
TEG Project #: 98I0211 BBL Outside Lab.#:
Location: Roosevelt Roads
Collector: D. Press Date of Collection: See Note

Sample #	Depth	Time	Sample Type	Container Type	VOA 8010	VOA 8020 (BTEX)	VOA 8260	SEMI VOL 8270	TRPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (gas & diesel)	TPH 8015 (oil)	PNA 610/8100	TOTAL LEAD	pH	METALS	RCI	FIELD NOTES / PRESERVATION	Collection Date	Total # of Containers
731 SB-1 Agua	–	0740	Aq	3x40ml					X										Ice	2/10/98	3
731 SB-2 Agua	–	0730	Aq	3x40ml					X										Ice	2/10/98	3
Trip Blank	–	–	–	1x40ml					X												1

RELINQUISHED BY (signature)	Date/Time	RECEIVED BY (signature)	Date/Time
[signature]	2/11/98 @ 1625	[signature]	2/11/98 4:30
RELINQUISHED BY (signature)	Date/Time	RECEIVED BY (signature)	Date/Time

Total # of containers	7	TEMPERATURE
Chain of Custody seals Y / N / NA	N/A	
Seals intact? Y / N / NA	N/A	
Received good conditions / cold	yes	24 Hour

Sample disposal Instructions: ____TEG Disposal @ $2.00 each Return to client Pickup rld Leader In On-Site Sampling and Analysis

February 13, 1998
TEG Project #98I0212BBL

Mr. Pitt Maner
BBL, Inc.
185 N.W. Spanish River Blvd., Suite 110
Boca Raton, FL 33431

SUBJECT: DATA REPORT - ROOSEVELT ROADS PROJECT NO. 39933

Dear Pitt,

Please find enclosed the data report for samples collected by BBL staff from the above referenced project site and delivered to TEG under the proper chain-of-custody protocol. TEG's Puerto Rico-certified chemist conducted the following analyses:

- 2 water samples analyzed for TRPH by modified EPA test method 418.1.
- 1 trip blank water sample analyzed for TRPH.
- Laboratory QA/QC analyses for TRPH.

The results of the analyses are summarized in the attached table. Applicable detection limits, QA/QC data and a chain-of-custody are also included as attachments.

TEG appreciates the opportunity to provide analytical services for this project. If you have any questions relating to the data or report, please do not hesitate to contact us.

Sincerely,
TEG

Kevin Shelburne
Principal

Attachments

TEG-PUERTO RICO • PMB 627, HC-01 Box 29030, Caguas, PR 00725 • Phone (787) 720-0329 • Fax (787) 789-3858 • Pager 759-1255 Unit 217-4053

teg
rld Leader In On-Site Sampling and Analysis

BLASLAND, BOUCK & LEE, INC.
ROOSEVELT ROADS
CEIBA, P. R.

TEG Project #98I0212BBL

TRPH (EPA Method 418.1) ANALYSES OF WATER

SAMPLE NUMBER	DATE ANALYZED	TRPH (mg/L)
METHOD BLANK	2/13/98	ND
731 SB-3 (auger)	2/13/98	ND
731 SB-4 (auger)	2/13/98	ND
731 SB-4 (auger) rep.	2/13/98	ND
Trip Blank	2/13/98	ND
DETECTION LIMIT (mg/L)		10

SAMPLING PERFORMED BY BBL PERSONNEL
"ND" INDICATES NOT DETECTED AT LISTED DETECTION LIMIT
mg/L = MILLIGRAMS PER LITER
ANALYSES PERFORMED BY: RUTH DONES
DATA REVIEWED BY: KEVIN SHELBURNE

Ruth Dones
Quality Assurance/Control Manager

ESTADO LIBRE ASOCIADO DE PUERTO RICO
Ruth Dones Ramos
LIC. 3772
A 488329
QUIMICO LICENCIADO

Kevin Shelburne
Principal

TEG-PUERTO RICO • PMB 627, HC-01 Box 29030, Caguas, PR 00725 • Phone (787) 720-0329 • Fax (787) 789-3858 • Pager 759-1255 Unit 217-4053

QA/QC REPORT - CALIBRATION DATA

TEG Project #98I0212BBL
DAILY CALIBRATION DATE : 2/13/98

BLASLAND, BOUCK & LEE, INC. 39933
PROJECT NAME: ROOSEVELT ROADS

			INITIAL		OPENING			CLOSING		
COMPOUND	DETECTOR	CALIB RANGE	RF	%RSD	ABS	RF	%DIFF	ABS	RF	%DIFF
TRPH	IR	10 - 1,000	617.89	15.7%	0.419	596.7	3.4%	0.416	601.0	2.7%

CALIB RANGE - RANGE OF CALIBRATION CURVE IS IN ppm
INITIAL RF - AVERAGE RESPONSE FACTOR FROM MULTIPOINT CALIBRATION CURVE
% RSD - LINEARITY OF MULTIPOINT CALIBRATION CURVE (+/- 20% ACCEPTABLE LIMITS)
AREA - AREA COUNTS FROM DAILY CALIBRATION STANDARD
RF - DETECTOR RESPONSE FACTOR FROM MID-POINT CALIBRATION STANDARD
% DIFF - DIFFERENCE, IN PERCENT, BETWEEN THE AVERAGE RF AND THE OPENING OR CLOSING RF (+/- 15% ACCEPTABLE LIMITS)
OPENING - MID-POINT CALIBRATION STANDARD ANALYZED BEFORE SAMPLE ANALYSES BEGIN
CLOSING - MID-POINT CALIBRATION STANDARD ANALYZED AFTER SAMPLES ANALYSES ARE COMPLETE

ANALYSES PERFORMED BY: RUTH DONES
DATA REVIEWED BY: KEVIN SHELBURNE

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY
PMB 627, HC-01 BOX 29030, CAGUAS, P.R. 00725
TELEPHONE (787) 720-0329 FAX 789-3858

QA/QC REPORT - MS/MSD DATA

MATRIX SPIKE (MS)/MATRIX SPIKE DUPLICATE (MSD)

TEG Project #98I0212BBL
DAILY CALIBRATION DATE : 2/13/98

BLASLAND, BOUCK & LEE, INC. 39933
PROJECT NAME: ROOSEVELT ROADS

COMPOUND	SPK CONC (ppm)	MS CONC (ppm)	%REC MS	MSD CONC (ppm)	%REC MSD	RPD	ACCEPTABLE RPD	ACCEPTABLE RECOVERY
TRPH	250	236	94%	240	96%	2%	15%	80% - 120%

ppm = PARTS PER MILLION
MS CONC - ANALYZED CONCENTRATION OF SPIKED SAMPLE
% REC - PERCENT RECOVERY OF SPIKE FROM MATRIX
RPD - RELATIVE PERCENT DIFFERENCE BETWEEN MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RECOVERIES

ANALYSES PERFORMED BY: RUTH DONES
DATA REVIEWED BY: KEVIN SHELBURNE

TRANSGLOBAL ENVIRONMENTAL GEOCHEMISTRY
PMB 627, HC-01 BOX 29030, CAGUAS, P.R. 00725
TELEPHONE (787) 720-0329 FAX 789-3858

Transglobal Environmental Geochemistry

Chain of Custody Record

PO #

Client: BBL

Address: [illegible], FL

Phone: [illegible]

FAX: 787 860 4531

Client Project #: 39933

Project Manager: P. [illegible]

Date: 3/12/98

Page 1 of 1

TEG Project #: 98I0212BBL

Outside Lab. #:

Location: [illegible]

Collector: D. [illegible]

Date of Collection: 2/12/98

Sample #	Depth	Time	Sample Type	Container Type	VOA 8010	VOA 8020 (BTEX)	VOA 8260	SEMI VOL 8270	TRPH 418.1	TPH 8015 (gasoline)	TPH 8015 (diesel)	TPH 8015 (gas & diesel)	TPH 8015 (oil)	PNA 610/8100	TOTAL LEAD	pH	METALS	RCI							FIELD NOTES / PRESERVATION	Total # of Containers
731 SB-3 Auger	–	0730	GW	3x40ml					x																	3
731 SB-4 Auger	–	0710	GW	3x40ml					x																	3
Trip Blank	–	–	–	1x40ml					x																	1

RELINQUISHED BY (signature)	Date/Time	RECEIVED BY (signature)	Date/Time
[signature]	2/12/98 @ 1615	[signature]	2/12/98 16:17
RELINQUISHED BY (signature)	Date/Time	RECEIVED BY (signature)	Date/Time

		TEMPERATURE
Total # of containers	7	
Chain of Custody seals Y / N / NA	N/A	
Seals intact? Y / N / NA	N/A	
Received good conditions / cold	YES	24 hr. TAT

Sample disposal Instructions: ____TEG Disposal @ $2.00 each ____ Return to client ____Pickup