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CONTAMINATION ASSESSMENT REPORT BUILDING A317 PUBLIC WORKS  
DEPARTMENT MOTOR POOL NAS KEY WEST FL  
2/1/1992  
ABB ENVIRONMENTAL SERVICES INC

**CONTAMINATION ASSESSMENT REPORT**

**BUILDING A-317**

**PUBLIC WORKS DEPARTMENT MOTOR POOL**

**BOCA CHICA FIELD  
NAVAL AIR STATION  
KEY WEST, FLORIDA**

**UIC NO.: N00213**

**CONTRACT NO. 62467-89-D-0317**

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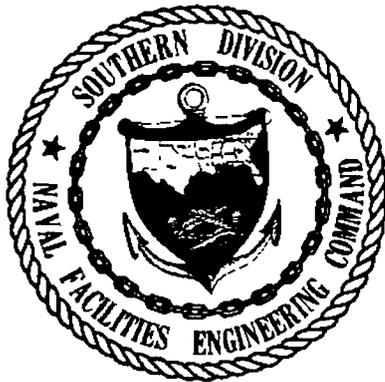
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**FEBRUARY 1992**

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## FOREWORD

Subtitle I of the Hazardous and Solid Waste Amendments (HSWA) of 1984 to the Solid Waste Disposal Act (SWDA) of 1965 established a national regulatory program for managing underground storage tanks (USTs) containing hazardous materials, primarily petroleum products. Prior to 1984, hazardous wastes stored in USTs were regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, an earlier amendment to SWDA. Subtitle I requires the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. Accordingly, programs were designed by the USEPA to be administered by individual states, allowing each state the alternative to develop more stringent, but not less stringent standards for the management and regulation of USTs than the Federal regulations provided in Subtitle I. Local governments were also permitted to establish regulatory standards that were more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (40 CFR 280), *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks* and 40 CFR 281, *Approval of State Underground Storage Tank Programs*. 40 CFR 280 was revised and published on September 23, 1988, and became effective December 22, 1988.

It is the policy of the Navy to comply with all Federal, State, and local regulations pertaining to USTs. This report was prepared to satisfy the requirements of the Florida Department of Environmental Regulation (FDER) Chapter 17-770, Florida Administrative Code (FAC), *State Underground Petroleum Environmental Response*, regarding regulations on petroleum contamination.

Questions regarding this report should be addressed to the Commanding Officer, Naval Air Station (NAS) Key West, Florida, or to Southern Division Naval Facilities Engineering Command (SOUTHNAVFAC), Code 18237, at 803-743-0528.

## EXECUTIVE SUMMARY

The Public Works Department Motor Pool is located at Boca Chica Field, Naval Air Station (NAS) Key West. The site includes three active, 6,000 underground storage tanks (USTs) that were installed in 1974 and contain diesel fuel and unleaded gasoline. During a precision tank testing in May 1989, shallow excavations were conducted at the active tank pad and free product was encountered. The tank testing results indicated that the tanks and associated piping were not leaking. In addition, six USTs abandoned in place are located immediately east of the active tanks. The abandoned USTs ranged in volume from 3,000 to 6,000 gallons and formerly contained gasoline and diesel fuel. The USTs were emptied, filled with an inert material, and abandoned in place.

A contamination assessment (CA) was performed by ABB Environmental Services, Inc. (ABB-ES) in July and August 1991. The objective of the CA was to identify petroleum contaminants at the site, to assess the degree and extent of petroleum contamination in soils and in the surficial aquifer, and to recommend a feasible course of action, if necessary, to attain compliance with State regulatory levels.

Seventeen soil borings and seven groundwater monitoring wells were installed at the site. Soil and groundwater samples were collected and analyzed for petroleum constituents of the gasoline and kerosene analytical groups. The findings, conclusions, and recommendations of the CA are summarized below.

### FINDINGS

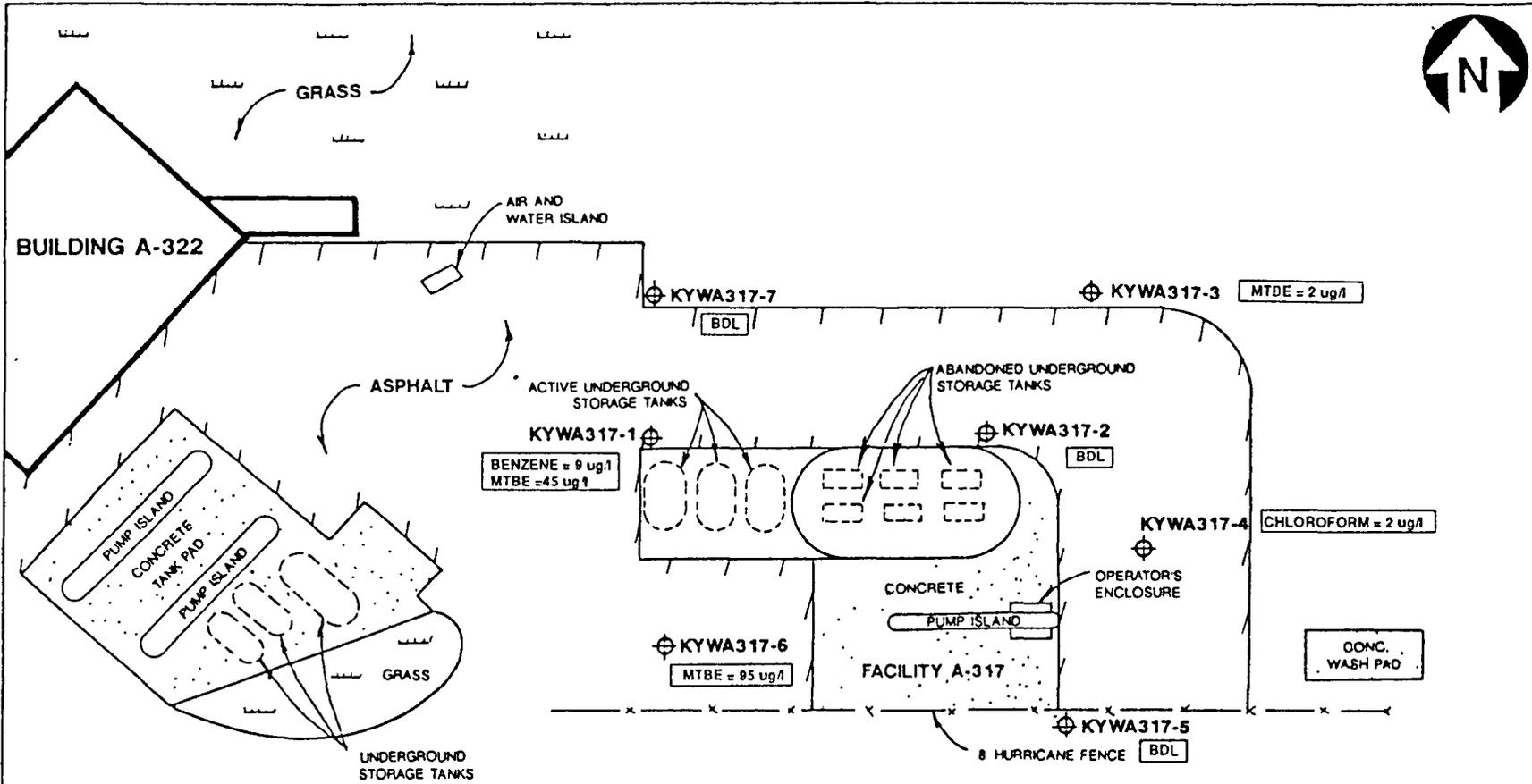
- Some excessively contaminated soils (i.e., >50 ppm) were identified by organic vapor analyzer (OVA) headspace analyses. The extent of excessively petroleum contaminated soils appears to be restricted to the vicinity of the abandoned tank pad.
- No free product was found at the site.
- No official potable wells are present in the Key West area.
- Three of the seven wells sampled showed no contamination from gasoline and diesel constituents. Contaminants identified in the other four wells include benzene at a concentration of 9  $\mu\text{g}/\text{l}$ , methyl tert-butyl ether (MTBE) at concentrations ranging from 2 to 95  $\mu\text{g}/\text{l}$ , and chloroform (a known laboratory contaminant) at a concentration of 2  $\mu\text{g}/\text{l}$  (see Executive Summary Figure).
- Precision tank testing, performed in May 1989, indicate the active USTs at the site are not leaking.

## CONCLUSIONS

- Laboratory analytical results indicate that the contamination appears to be confined to the tank pit area and is not migrating offsite.
- Groundwater from the surficial aquifer has been designated as an unlikely source of potable water (McKenzie, 1990), and is classified as a Class G-III non-potable source.
- Contaminant levels appear to be relatively low. No groundwater target levels exist for Class G-III groundwater.

## RECOMMENDATIONS

- Because the surficial aquifer is a Class G-III non-potable groundwater source and groundwater contamination levels are low, a *No Further Action Proposal (NOFAP)* is recommended for this site.



**LEGEND**

⊕ MONITORING WELL LOCATION

**SCALE**



**STATE REGULATORY STANDARDS**  
NO STANDARDS FOR CLASS  
G-III GROUNDWATER

**EXECUTIVE SUMMARY FIGURE**  
**GROUNDWATER CONTAMINATION**  
**DISTRIBUTION**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



**CONTAMINATION**  
**ASSESSMENT REPORT**  
**BOCA CHICA FIELD**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

## ACKNOWLEDGEMENTS

In preparing this report, the Underground Storage Tank Section of the Comprehensive Long-Term Environmental Action Navy (CLEAN) Group at ABB-ES commends the support, assistance, and cooperation provided by the personnel at NAS Key West, Florida, and Southern Division, Naval Facilities Engineering Command. In particular, ABB-ES acknowledges the effort, dedication, and professionalism provided by the following people during the investigation and preparation of this report.

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                  AUGUST 17, 1991 (8 HOUR PERIOD)

## ACRONYMS, INITIALISMS, AND ABBREVIATIONS

The following list contains many of the acronyms, initialisms, abbreviations, and units of measure that may be used in this report.

ABB-ES	ABB Environmental Services Inc.
BDL	below detection limits
BTEX	benzene, toluene, ethylbenzene, and xylenes
bls	below land surface
CA	Contamination Assessment
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CFR	Code of Federal Regulations
CompQAPP	Comprehensive Quality Assurance Program Plan
CNO	Chief of Naval Operations
CTO	Contract Task Order
EDB	ethylene dibromide
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulations
FID	flame ionization detector
ft/day	feet per day
ft <sup>2</sup> /day	feet squared per day
GC	gas chromatograph
gpd/ft	gallons per day per foot
HSWA	Hazardous and Solid Waste Amendments of 1984
msl	mean sea level
MOP	Monitoring Only Plan
MTBE	methyl-tert-butyl ether
NAS	Naval Air Station
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOFAP	No Further Action Plan
OVA	organic vapor analyzer
PAH	polynuclear aromatic hydrocarbons
POA	Plan of Action
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
SOUTHNAVFAC	Southern Division Naval Facilities Engineering Command
SPT	standard penetration test
SWDA	Solid Waste Disposal Act of 1965
TDS	total dissolved solids
TRPH	total recoverable petroleum hydrocarbons
µg/l	micrograms per liter
µmhos/cm	micromhos per centimeter
UIC	unit identification code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
VOA	volatile organic aromatics
1,2-DCA	1,2-dichloroethane

## 1.0 INTRODUCTION

ABB Environmental Services Inc. (ABB-ES) was contracted by the Naval Facilities Engineering Command, Southern Division (SOUTHNAVFAC) to perform a contamination assessment (CA) and submit a Contamination Assessment Report (CAR) for the Public Works Department Motor Pool, Building A-317, Boca Chica Field, Naval Air Station (NAS) Key West, Florida. The site consists of three active petroleum underground storage tanks (USTs) and six abandoned USTs. During a preliminary site investigation conducted in 1989, it was reported that shallow excavations made at the active UST area revealed the presence of free product. Additional site investigation was required to identify petroleum contaminants present at the site and to assess the extent of contamination resulting from leakage of the storage tanks.

The scope of services provided by ABB-ES to SOUTHNAVFAC during the CA were defined by and performed under Contract Task Order (CTO) No. 007, the Plan of Action (POA), and the Contamination Assessment Plan (CAP), and included the following:

- installing soil borings and monitoring wells,
- analyzing groundwater and soil samples to assess the horizontal and vertical extent of soil and groundwater petroleum contamination (no deep monitoring well was installed because of the low levels of contamination and the Class G-III groundwater),
- collecting water level data,
- conducting an inventory of potable wells within a 1/4-mile radius of the site,
- performing slug tests on select wells to estimate aquifer characteristics, and
- reducing and analyzing data gathered during the CA to complete this CAR.

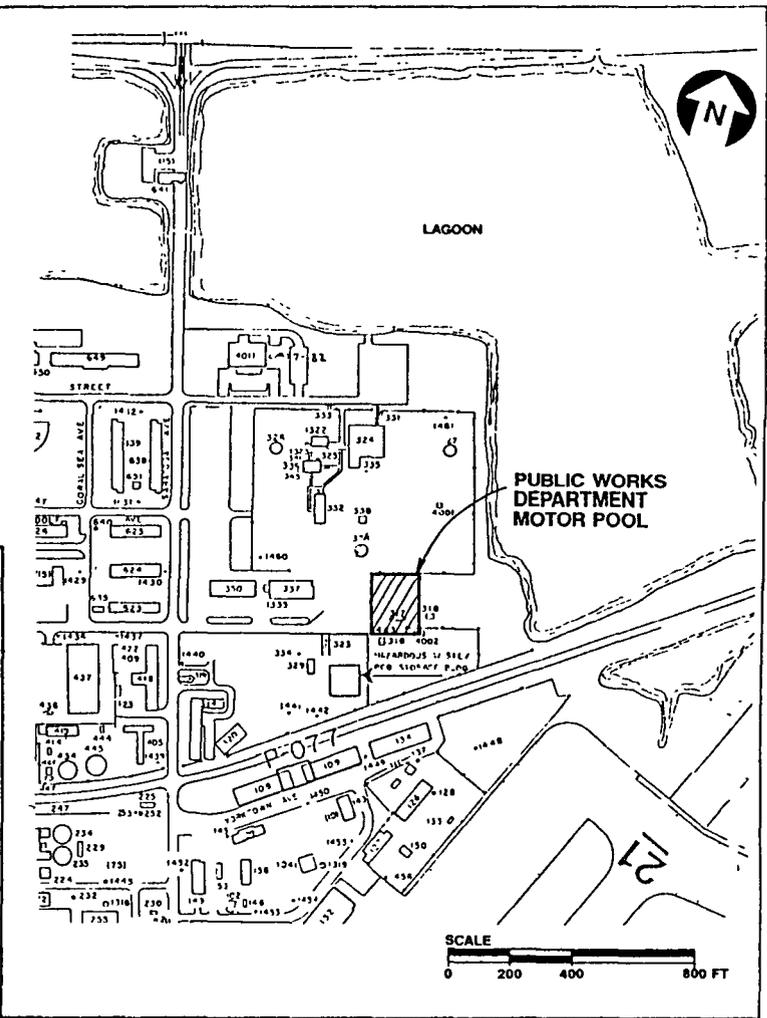
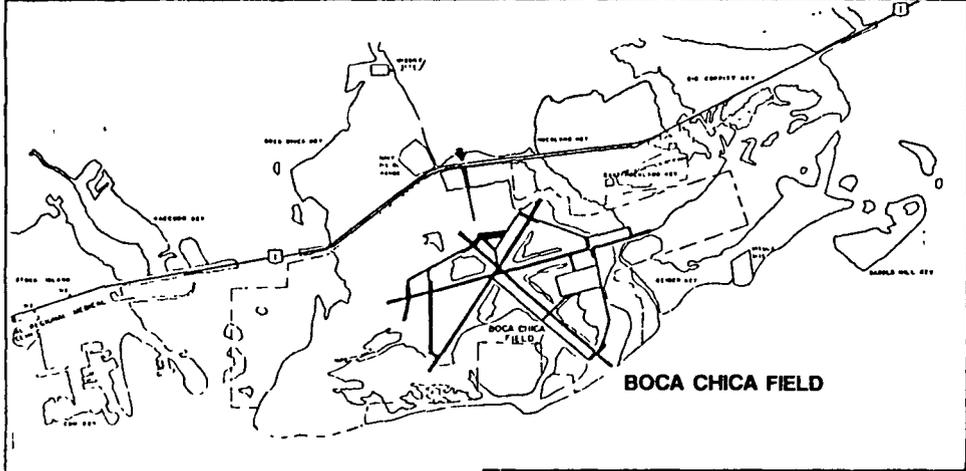
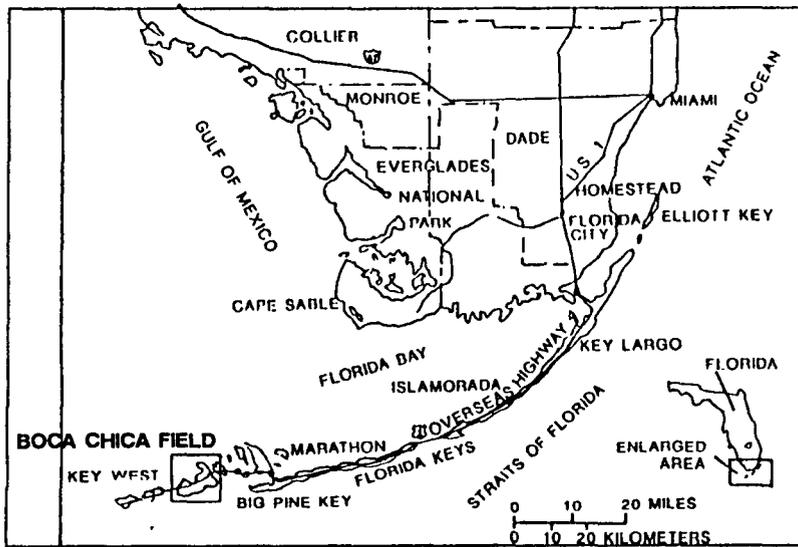
The assessment under this contract was conducted during August 1991. The following sections of the report present the background information, investigative methodologies, data compilation, results, conclusions, and recommendations of the CAR.

## 2.0 SITE BACKGROUND

2.1 SITE DESCRIPTION. NAS Key West is located approximately 150 miles southwest of Miami in Monroe County, Florida (Figure 2-1). NAS Key West, a complex of activities located in numerous areas of the Lower Florida Keys, encompasses approximately 5,000 acres. The majority of these activities are concentrated on Boca Chica Key and Key West. The mission of NAS Key West is to maintain and operate facilities and provide services and materials to support operations of aviation activities and units designated by the Chief of Naval Operations (CNO). The site is located on Boca Chica Key near Building A-317 at the Public Works Department Motor Pool (Figure 2-2). The CA for Building A-322, located immediately west of A-317, is being addressed under a separate investigation and report.

2.2 SITE HISTORY. The site consists of two UST areas: an older location that formerly contained six USTs, and a newer location containing three USTs. The older UST area consists of six steel USTs, four of which (A317-A, A317-B, A317-D, and A317-E) were installed in 1954 and two (A317-C and A317-F) in 1959. The USTs formerly contained gasoline and diesel. In 1974, inventory records revealed that the USTs may be leaking. The six tanks were filled with sand and abandoned in place. The tanks were replaced with three 6,000-gallon fiberglass tanks (A-317-G, A317-H, and A317-I) in 1974. Tank A317-G presently contains diesel fuel and tanks A317-H and A317-I contain unleaded gasoline.

Precision tank testing was performed on the three active USTs in May 1989 by AcuTest Corporation of Houston, Texas. The test results indicated that the three active tanks and their associated piping were not leaking. During tank testing, excavations were conducted to the top of the tanks to remove permanently installed drop tubes. Free product was observed at the top of the water table during the excavation process.

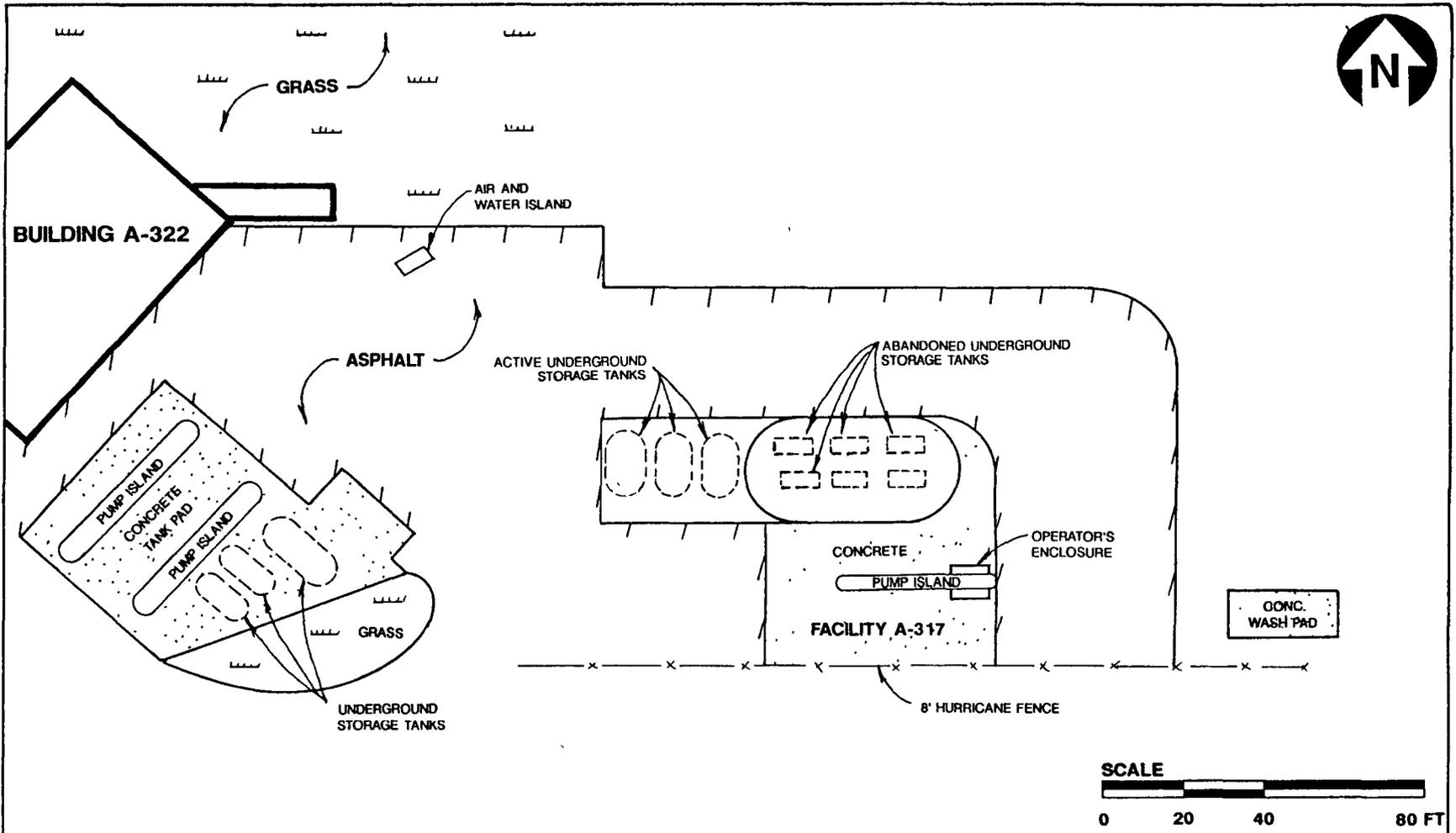


**FIGURE 2-1  
FACILITY LOCATION MAP  
BUILDING A-317  
PUBLIC WORKS DEPARTMENT  
MOTOR POOL**

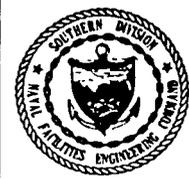


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**BOCA CHICA FIELD  
NAVAL AIR STATION  
KEY WEST, FLORIDA**



**FIGURE 2-2**  
**SITE LAYOUT**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



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**ASSESSMENT REPORT**  
**BOCA CHICA FIELD**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

### 3.0 SITE CONDITIONS

3.1 PHYSIOGRAPHY. Regional physiography is discussed in Appendix A. The site lies within the southern or distal geomorphic zone of Florida (White, 1970). Ground elevations at the Boca Chica site are approximately 5 feet above mean sea level.

#### 3.2 HYDROGEOLOGY.

3.2.1 Regional Regional hydrogeology is discussed in Appendix A.

3.2.2 Site Specific Site-specific hydrogeologic characteristics were based on information obtained during the soil boring and monitoring well installation program. Soil borings and monitoring well borings did not exceed 17 feet in depth due to the proximity of the water table to land surface. Lithology from the surface to 17 feet below land surface (bls) consists of white, moderately to heavily weathered, hard limestone with some sand and silt. A geologic description and complete lithologic logs for all site monitoring wells are presented in Appendix B.

The unconfined surficial aquifer is the only aquifer of concern in the site area. The water table is found at shallow depths at the site, occurring approximately 2 feet bls during this investigation. Groundwater flow direction in the surficial aquifer is predominantly to the southeast.

## 4.0 METHODOLOGIES AND EQUIPMENT

4.1 SOIL BORING PROGRAM. Seventeen soil borings (SB-1 through SB-17) were advanced into the water table to assess the degree and extent of soil contamination, to identify the type of subsurface material, and to aid in placement of subsequent groundwater monitoring wells. Soil boring locations are shown in Figure 4-1. Soil samples were collected from each borehole and analyzed using an organic vapor analyzer (OVA) for headspace analysis according to the method outlined in Florida Department of Environmental Regulation (FDER) Chapter 17-770, Florida Administrative Code (FAC). In addition, select samples were screened for benzene, toluene, ethylbenzene, and xylenes (BTEX) using a field gas chromatograph (GC). The results of the soil boring program are discussed in Section 5.2 of this report.

4.2 MONITORING WELL INSTALLATION PROGRAM. Seven 2-inch-diameter monitoring wells (KYWA317-1 through KYWA317-7) were installed using a hollow-stem auger drill rig. Monitoring wells were installed to an approximate depth of 12 feet bls. Monitoring well locations are shown in Figure 4-1. Monitoring well construction methodologies and materials are discussed in Appendix C.

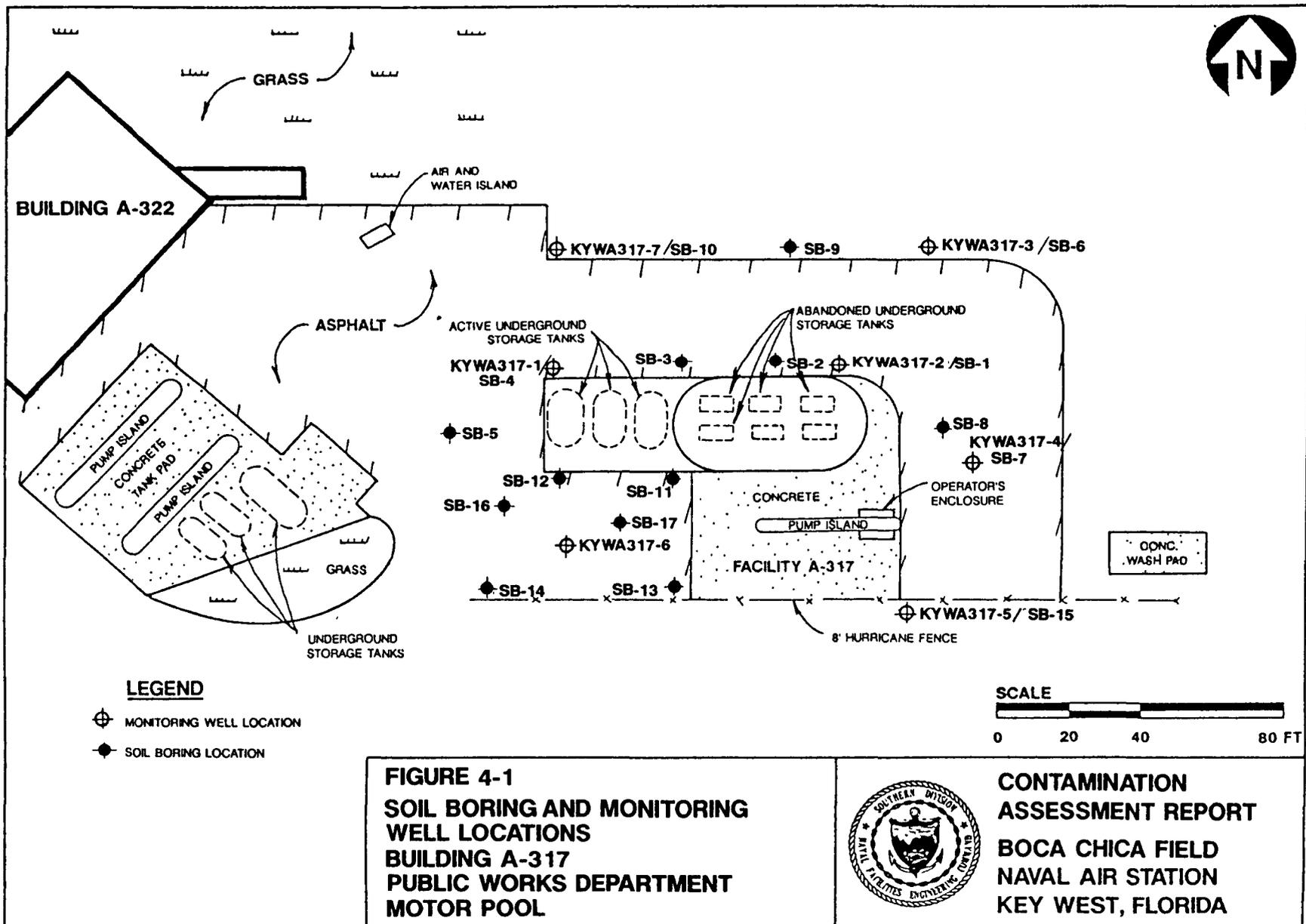
4.3 GROUNDWATER ELEVATION SURVEY. The elevation and slope of the water table were estimated by surveying the top of the well casing for each monitoring well to a common reference datum. No benchmark was located in the area; therefore, an arbitrary reference elevation of 5.00 feet was established at a benchmark onsite. To assess the effects of tidal fluctuations, groundwater levels were measured over an 8-hour period on August 17, 1991. Procedures for groundwater level measurements are contained in Appendix C.

4.4 GROUNDWATER SAMPLING PROGRAM. Groundwater samples were collected from site monitoring wells on August 21, 1991. Sampling procedures followed the guidelines set forth in ABB-ES' FDER approved Comprehensive Quality Assurance Program Plan (CompQAPP). The appropriate number of field blanks, equipment blanks, and duplicates were collected. Samples were sent under chain of custody to Wadsworth/Alert Laboratories in Tampa, Florida. Procedures for collection of groundwater samples are presented in Appendix C.

4.5 AQUIFER SLUG TESTS. An aquifer slug test was performed on monitoring well KYWA317-5 to assess the hydraulic conductivity of the surficial aquifer. Slug test procedures are discussed in Appendix C.

4.6 TANK TESTING METHODOLOGIES. Precision tank testing was conducted by AcuTest Corporation of Houston, Texas, on May 8, 1989. The USTs were tested using the "leak computer" system by AcuTest Corporation. The tanks were first tested at a high level leak rate. This testing method measures product loss in the tank, vent pipe, and delivery line (full system) and will indicate if the system has a leak. The tanks were then tested at a low level leak rate where product loss was measured only in the tank. The results of these two tests indicate if the system has a leak and determine if the leak is occurring in the tank or the piping. If the tests indicated a leak was occurring in the system but not the tank itself, a delivery line test was performed. The delivery line test

consisted of isolating and pressurizing the line with nitrogen to 40 pounds per square inch (psi) and monitoring for a pressure drop for a 30-minute time period.



**FIGURE 4-1**  
**SOIL BORING AND MONITORING**  
**WELL LOCATIONS**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



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**KEY WEST, FLORIDA**

## 5.0 CONTAMINATION ASSESSMENT RESULTS

5.1 AQUIFER CHARACTERISTICS AND HYDROGEOLOGIC PARAMETERS. Hydraulic gradients were assessed for both low tide and high tide periods. The calculated hydraulic gradients vary from approximately  $2.5 \times 10^{-3}$  foot per foot (ft/ft) at low tide to  $3.9 \times 10^{-3}$  ft/ft at high tide. The average hydraulic gradient for the high and low tide measurements is  $3.2 \times 10^{-3}$  or approximately 17 feet per mile. The calculated hydraulic gradients are significantly higher than the hydraulic gradients reported by McKenzie (1990) for the Key West area, which ranged from 1 to 4 feet per mile.

The slug test analyses indicate an average horizontal hydraulic conductivity of 3.8 feet/day (ft/day). This value represents a hydraulic conductivity of silty sand to clean sand (Freeze and Cherry, 1979). Calculated average pore water velocity in the surficial aquifer is  $5.5 \times 10^{-2}$  ft/day. Transmissivity was estimated to be 36 feet squared per day (ft<sup>2</sup>/day).

Presented in Appendix D are the slug test results and aquifer calculations.

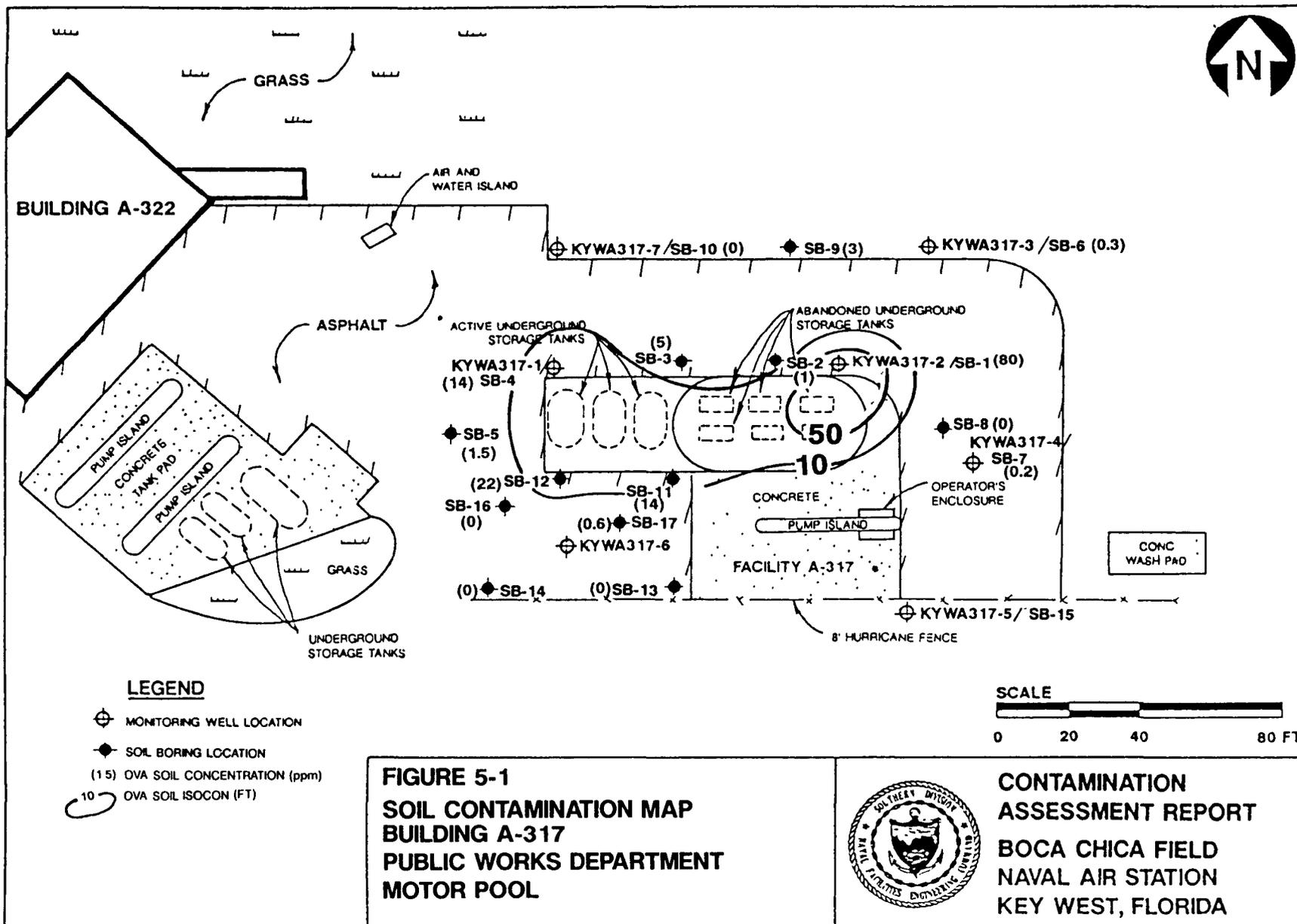
## 5.2 CONTAMINATION ASSESSMENT AND CHARACTERIZATION.

5.2.1 Soil Assessment Soil samples collected with a split-spoon sampler from soil borings and monitoring well borings were analyzed on an organic vapor analyzer (OVA) according to the headspace technique outlined in Chapter 17-770, FAC. For kerosene analytical group constituents, excessively contaminated soils are defined as those having OVA detected organic vapor concentrations in excess of 50 parts per million (ppm) and these soils must be remediated (FDER, 1991). For soils containing gasoline analytical group constituents, FDER (1991) defines excessively contaminated soils as soils having OVA detected organic vapor concentrations in excess of 500 ppm. Because both diesel and gasoline contamination may be present at the site, the 50 ppm OVA concentration was used to define excessive soil contamination. Table 5-1 summarizes results of the OVA headspace survey, and indicates maximum OVA concentrations detected in each soil sample.

Figure 5-1 is a soil contamination map showing OVA concentrations from samples obtained from soil borings and monitoring well borings at the site. The sample collected from boring KYWA317-1 (SB-1) had an OVA concentration of 80 ppm. No other samples exceeded OVA concentrations of 50 ppm. Soil contamination appears to be restricted to the vicinity of the former USTs.

5.2.2 Groundwater Assessment Water quality field parameters were measured for each monitoring well installed during the field investigation. In summary, the pH ranged from 7 to 8 standard units and the specific conductance ranged from 2,460 to >50,000 micromhos per centimeter ( $\mu\text{mhos/cm}$ ).

Pursuant to FDER Chapter 17-770, FAC, groundwater samples were analyzed for United States Environmental Protection Agency (USEPA) Methods 418.1, 601, 602, 610 (reported on laboratory sheets as Method 625), ethylene dibromide, and lead. Groundwater analytical results are attached in Appendix E.



**TABLE 5-1**  
**SUMMARY OF SOIL SAMPLE**  
**ORGANIC VAPOR ANALYZER (OVA) READINGS**  
**PUBLIC WORKS DEPARTMENT MOTOR POOL**  
**BUILDING A-317**  
**NAS KEY WEST, BOCA CHICA FIELD**

LOCATION	DEPTH (ft)	OVA READING (ppm)
SB-1/KYW-A317-2	3.5	80.0
SB-2	2.5	1.0
SB-3	3.0	5.0
SB-4/KYW-A317-1	2.5	14.0
SB-5	3.0	1.5
SB-6/KYW-A317-3	3.5	0.3
SB-7/KYW-A317-4	3.0	0.2
SB-8	3.0	0.0
SB-9	3.0	3.0
SB-10/KYW-A317-7	3.0	0.0
SB-11	2.5	14.0
SB-12	2.5	22.0
SB-13	2.5	0.0
SB-14	2.5	0.0
SB-15/KYW-A317-5	2.5	0.8
SB-16	2.5	0.0
SB-17	2.5	0.6

Notes: ft = feet.

ppm = parts per million.

Table 5-2 summarizes groundwater analytical results. Contaminants identified in monitoring well groundwater samples are benzene, methyl tert-butyl ether (MTBE), and chloroform. Benzene was detected at 9 parts per billion (ppb) in the sample collected from well KYW-A317-1. MTBE was detected in three groundwater samples collected from wells KYW-A317-1, KYW-A317-3, and KYW-A317-6 at concentrations of 45 ppb, 2 ppb, and 95 ppb, respectively. Chloroform was detected in both samples collected from well KYW-A317-4 at concentrations of 1 ppb and 2 ppb.

Methylene chloride and trichlorofluoromethane were detected in the trip blank and appear to be the result of laboratory contamination. Chloroform is also a common laboratory contaminant, and its presence in sample KYW-A317-4 may be the result of laboratory contamination. The source of toluene in the trip blank is presently unknown.

Figure 5-2 shows the distribution of groundwater contamination at the site. The highest groundwater contamination appears to be in the vicinity of wells KYW-A317-1 and KYW-A317-6. MTBE is the only contaminant present in more than one well. No MTBE regulatory standard has been established for Class G-III groundwater.

**5.2.3 Tidal Influence Study** On August 17, 1991, an 8-hour tidal influence study was conducted at the site. The purpose of the study was to observe water level fluctuations over a higher high water and lower low water tidal event and to determine the impact of the fluctuations on groundwater flow directions. Over the course of the study, water level measurements were obtained from each monitoring well. Table 5-3 summarizes groundwater elevation data collected from onsite monitoring wells during the study. In summary, water level elevations were shown to be affected by tidal fluctuations. However, the direction of groundwater flow was not significantly impacted by the tidal fluctuations. Figures 5-3 and 5-4 show the configuration of the surficial aquifer near the high and low tidal cycles.

Graphs of water level elevations versus time for each well monitored during the study are in Appendix F. The predicted high and low tides, based on information from tide table published by the U.S. Commerce National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (1990), are shown on each graph.

**5.3 POTABLE WELL SURVEY AND GROUNDWATER CLASSIFICATION.** There are no official potable wells in the Key West area. Potable water in the area is imported from mainland Florida through the Florida Keys Aqueduct. The volume of fresh groundwater in the Key West area is limited. Small lenses of fresh groundwater exist in the Key West area, but these lenses are subject to saltwater intrusion (Black, Crow, and Eidness, 1977).

**TABLE 5-2**  
**SUMMARY OF GROUNDWATER ANALYTICAL RESULTS, AUGUST 21, 1991, SAMPLING EVENT**

**PUBLIC WORKS DEPARTMENT MOTOR POOL**  
**BUILDING A-317**  
**NAS KEY WEST, BOCA CHICA FIELD**

COMPOUND	MONITORING WELL IDENTIFICATION								
	KYW-A317-1	KYW-A317-2	KYW-A317-3	KYW-A317-4/*	KYW-A317-5	KYW-A317-6	KYW-A317-7	TRIP BL	EQUIP. BL
Laboratory Designation:	BCPWMW-1	BCPWMW-2	BCPWMW-3	BCPWMW-4	BCPWMW-5	BCPWMW-6	BCPWMW-7		
<b>PURGABLE AROMATICS, ug/L</b>									
Methylene Chloride	BDL	BDL	BDL	BDL/BDL	BDL	BDL	BDL	9	BDL
Chloroform	BDL	BDL	BDL	1/2	BDL	BDL	BDL	BDL	BDL
Trichlorofluoromethane	BDL	BDL	BDL	BDL/BDL	BDL	BDL	BDL	33	BDL
Benzene	9	BDL	BDL	BDL/BDL	BDL	BDL	BDL	BDL	BDL
Toluene	BDL	BDL	BDL	BDL/BDL	BDL	BDL	BDL	1	BDL
Methyl tert-butyl ether (MTBE)	45	BDL	2	BDL/BDL	BDL	95	BDL	BDL	BDL

Notes.

\* Second value represents duplicate sample.

Laboratory Data Sheets are included in Appendix A.

Trip BL = Trip Blank.

Equip. BL = Equipment Blank

BDL = below detection limit

ug/L = micrograms per liter

State regulatory standards do not apply to Class G-III groundwater

**TABLE 5-3**  
**TOP OF CASING ELEVATIONS, DEPTH TO GROUNDWATER, AND GROUNDWATER ELEVATIONS**  
**FROM TIDAL INFLUENCE STUDY OF AUGUST 17, 1991 - 8-HOUR PERIOD**

**PUBLIC WORKS DEPARTMENT MOTOR POOL**  
**BUILDING A-317**  
**NAS KEY WEST, BOCA CHICA FIELD**

WELL I.D.	24-HOUR TIME:	0815		0922		1013		1115		1214	
	TOC ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.
KYW-A317-1	3.58	1.70	1.88	1.70	1.88	1.71	1.87	1.71	1.87	1.72	1.86
KYW-A317-2	3.61	1.79	1.82	1.81	1.80	1.80	1.81	1.83	1.78	1.84	1.77
KYW-A317-3	3.37	1.60	1.77	1.61	1.76	1.62	1.75	1.63	1.74	1.63	1.74
KYW-A317-4	3.75	1.95	1.80	1.95	1.80	1.95	1.80	1.97	1.78	1.96	1.79
KYW-A317-5 <sup>1</sup>	--	--	--	--	--	--	--	--	--	--	--
KYW-A317-6	3.54	1.63	1.91	1.65	1.89	1.65	1.89	1.70	1.84	1.70	1.84
KYW-A317-7	3.40	1.42	1.98	1.45	1.95	1.43	1.97	1.45	1.95	1.44	1.96

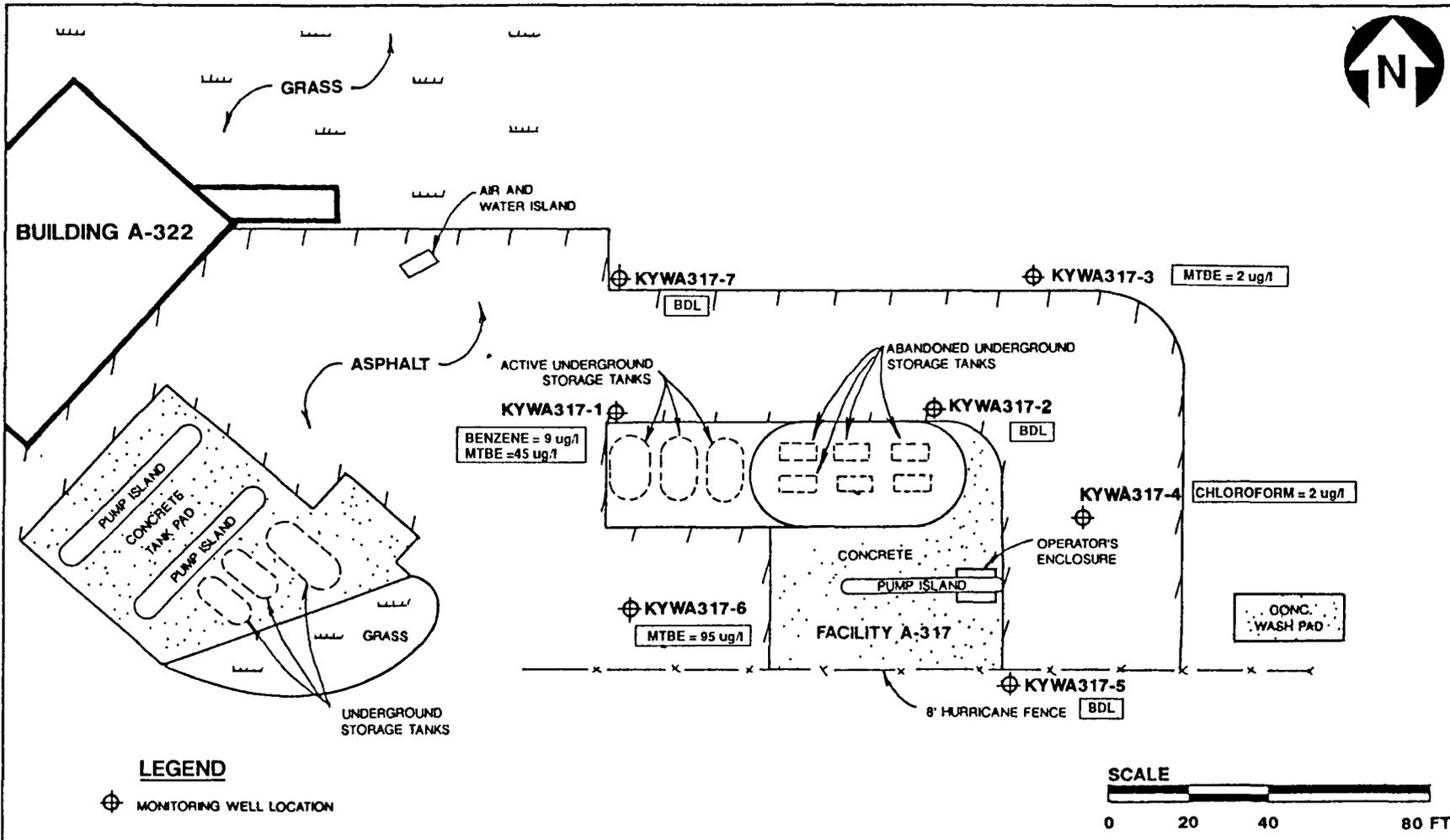
WELL I.D.	24-HOUR TIME:	1315		1415		1515		1610	
	TOC ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.	DEPTH TO WATER	WATER ELEV.
KYW-A317-1	3.58	1.72	1.86	1.73	1.85	1.74	1.84	1.74	1.84
KYW-A317-2	3.61	1.84	1.77	1.85	1.76	1.85	1.76	1.85	1.76
KYW-A317-3	3.37	1.63	1.74	1.64	1.73	1.65	1.72	1.65	1.72
KYW-A317-4	3.75	1.98	1.77	1.98	1.77	1.97	1.78	1.98	1.77
KYW-A317-5 <sup>1</sup>	--	--	--	--	--	--	--	--	--
KYW-A317-6	3.54	1.74	1.80	1.79	1.75	1.83	1.71	1.84	1.70
KYW-A317-7	3.40	1.45	1.95	1.46	1.94	1.46	1.94	1.46	1.94

<sup>1</sup> Monitoring well KWBC-A317-5 was locked inside fence and inaccessible on date of data collection.

**Notes:**

High Tides: 0420 and 1811 hours  
 Low Tides: 1149 and 2223 hours  
 TOC = Top of Casing

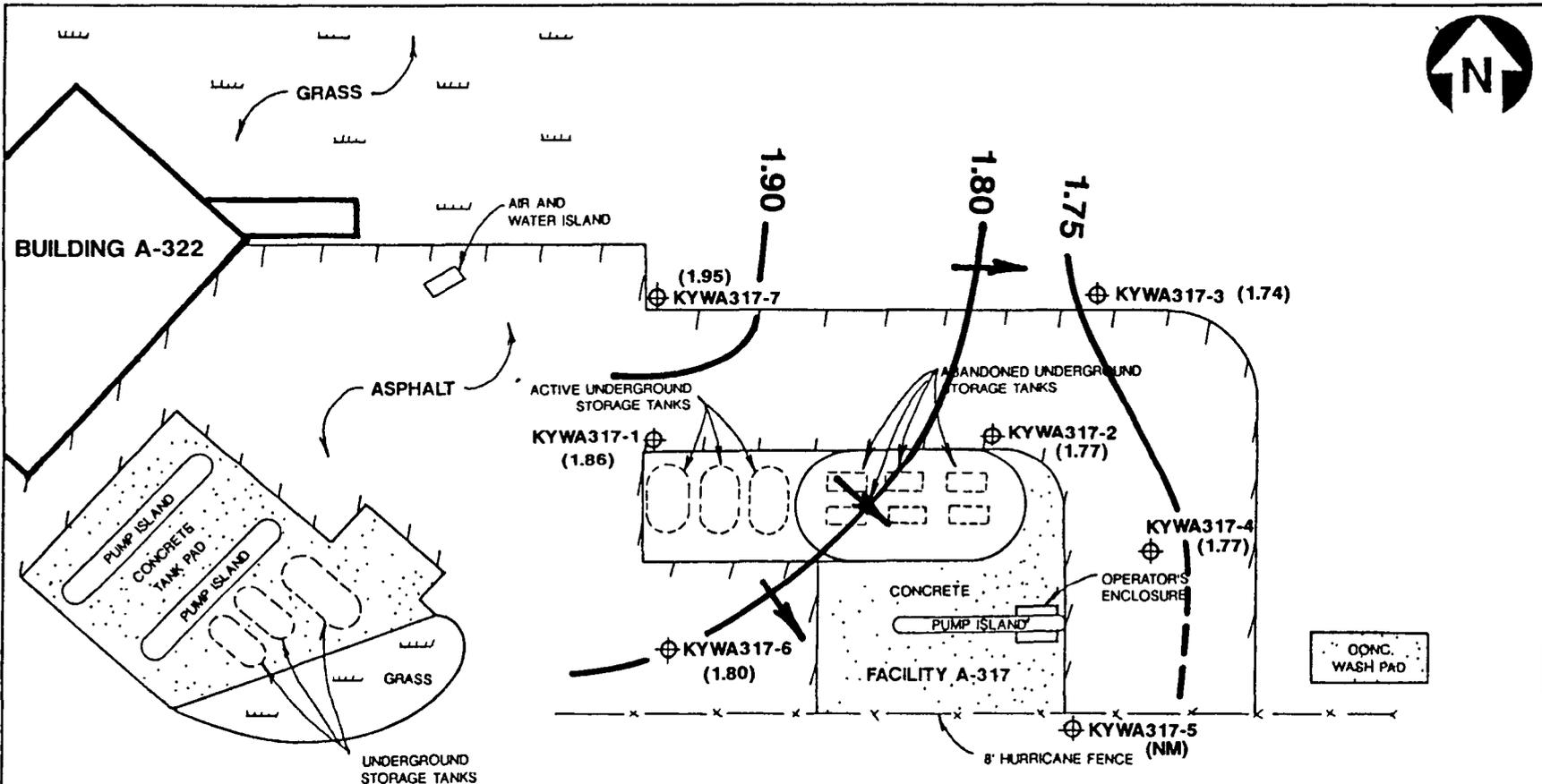
***All measurements in feet.***



**FIGURE 5-2**  
**GROUNDWATER CONTAMINATION**  
**DISTRIBUTION**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



**CONTAMINATION**  
**ASSESSMENT REPORT**  
**BOCA CHICA FIELD**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**



**LEGEND**

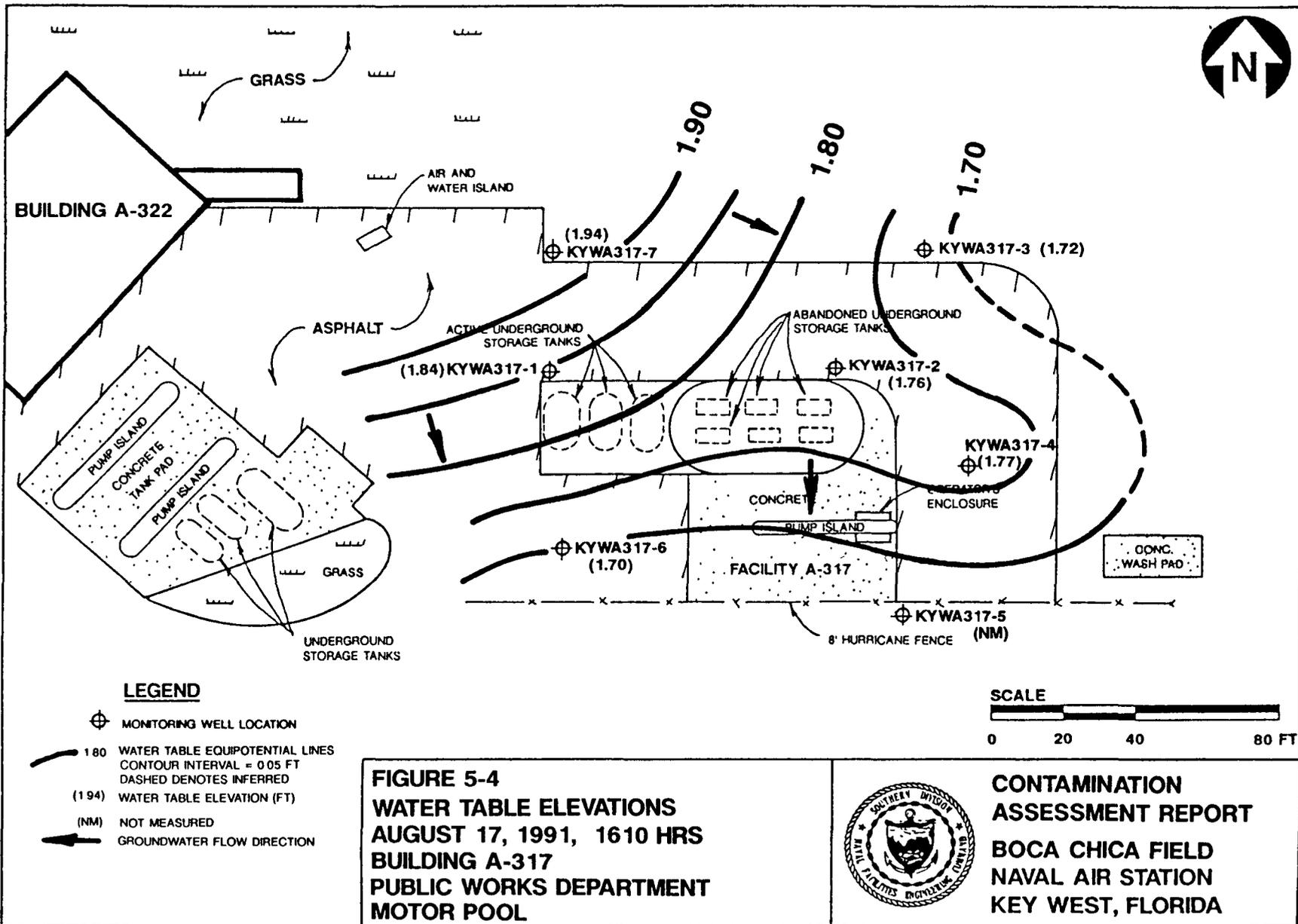
- ⊕ MONITORING WELL LOCATION
- 1.90 WATER TABLE EQUIPOTENTIAL LINES  
CONTOUR INTERVAL = 0.05 FT  
DASHED DENOTES INFERRED
- (1.77) WATER TABLE ELEVATION (FT)
- (NM) NOT MEASURED
- GROUNDWATER FLOW DIRECTION



**FIGURE 5-3**  
**WATER TABLE ELEVATIONS**  
**AUGUST 17, 1991, 1315 HRS**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



**CONTAMINATION**  
**ASSESSMENT REPORT**  
**BOCA CHICA FIELD**  
**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**



Groundwater in the Key West area is classified as G-III groundwater for the following reasons.

- There are no official potable wells in the Key West area.
- Water quality data indicate that the surficial aquifer is an unlikely potable water source (McKenzie, 1990).
- Total dissolved solid (TDS) concentrations in the water table aquifer are often in excess of 10,000 parts per million (ppm) (McKenzie, 1990).
- TDS concentration estimates from specific conductance measurement obtained during the field investigation indicate values in excess of 35,000 ppm.

5.4 TANK TESTING RESULTS. Three active USTs existing at the site, tanks A317-G, A317-H, and A317-I, were tightness tested on May 8, 1989. Tank A317-G contains diesel fuel; tanks A317-H and A317-I contain unleaded gasoline. Precision tank testing performed by Acutest of Houston, Texas in 1989 indicate that the storage tank systems (tank and associated piping) were not leaking. Precision tank testing results are shown in Table 5-4.

**TABLE 5-4  
PRECISION TANK TESTING RESULTS  
MAY 8, 1989**

**PUBLIC WORKS DEPARTMENT MOTOR POOL  
BUILDING A-317  
NAS KEY WEST, BOCA CHICA FIELD**

<b>TANK NUMBER</b>	<b>PRODUCT</b>	<b>TANK VOLUME (gallons)</b>	<b>HIGH LEVEL LEAK RATE (GPH)</b>	<b>LOW LEVEL LEAK RATE (GPH)</b>	<b>FULL SYSTEM</b>	<b>TANK ONLY</b>	<b>DISTRIBUTION PIPING ONLY</b>
A317-G	Diesel	5,766	0.04	0.00	Pass	Pass	--
A317-H	Unleaded	5,766	0.03	0.00	Pass	Pass	--
A317-I	Unleaded	5,766	<b>Manifolded Tanks</b>		Pass	Pass	--

Notes: GPH = gallons per hour.

-- = No testing was performed because full system passed testing.

## 6.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

6.1 SUMMARY. Based on the results of the field investigations and the laboratory analytical results collected during the CA, the following is a summary of conditions at the site.

- The surficial aquifer in the site area is classified as a Class G-III groundwater source. There are no official potable wells in the Key West area. Groundwater from the surficial aquifer has been designated as an unlikely source of potable water (McKenzie, 1990).
- Surficial and shallow subsurface materials are composed of a hard, weathered limestone.
- Groundwater was found at a depth of approximately 2 feet bls.
- The direction of groundwater flow in the surficial aquifer is predominantly to the southeast. Tidal fluctuations do not appear to significantly change the groundwater flow direction.
- The calculated hydraulic conductivity in the surficial aquifer is 3.8 ft/day.
- The average hydraulic gradient across the site is approximately  $3.2 \times 10^{-3}$  ft/ft.
- No free product was found during this investigation.
- Precision tank testing indicated that the active UST systems are not leaking.
- Soil contamination at the site was assessed to be low. The soil contamination is restricted to one boring near the abandoned tanks with an OVA reading of 80 ppm. No other samples exceeded OVA concentrations of 50 ppm.
- Three of the seven wells sampled showed no contamination from gasoline and diesel constituents. Contaminants identified in the other four wells include benzene at a concentration of 9  $\mu\text{g}/\text{l}$ , methyl tert-butyl ether (MTBE) at concentrations ranging from 2 to 95  $\mu\text{g}/\text{l}$ , and chloroform (a known laboratory contaminant) at a concentration of 2  $\mu\text{g}/\text{l}$ .

6.2 CONCLUSIONS. The extent of petroleum contaminated soils appears to be restricted to the vicinity of the abandoned USTs. Groundwater contamination levels are slightly above detection limits.

6.3 RECOMMENDATIONS. Based on the findings and interpretations of the CAR, a *No Further Action Proposal (NOFAP)* is recommended.

7.0 PROFESSIONAL REVIEW CERTIFICATION

The CA contained in this report was prepared using sound hydrogeologic principles and judgment. This assessment is based on the geologic investigation and associated information detailed in the text and appended to this report. If conditions are revealed that differ from those described, the undersigned geologist should be notified to evaluate the effects of any additional information on the assessment described in this report. This CAR was developed for the NAS, Key West site near Building A317 at the Public Works Department Motor Pool, Boca Chica Field, and should not be construed to apply to any other site.

  
\_\_\_\_\_  
Kenneth L. Busen  
Professional Geologist  
P.G. No. 0000191  
  
\_\_\_\_\_  
Date 2/25/92



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## APPENDIX A

### SITE CONDITIONS

#### Physiography

The State of Florida is divided into three geomorphic zones: the northern or proximal zone, the central or mid-peninsular zone, and the southern or distal zone (White, 1970). The Key West area is part of the Lower Keys and is located entirely within the southern or distal zone. This area is characterized by a sparse veneer of residual soil and surface vegetation overlying eroded limestone. The topography of the Lower Keys is generally smooth and flat in the center of the key and slopes gently downward toward the shoreline (White, 1970). Ground elevations at the site are approximately 5 feet above mean sea level.

#### Regional Hydrogeology

The Lower Keys are overlain by an oolitic member of the Pleistocene Miami Limestone. The Key Largo coral reef limestone underlies the Miami Limestone. Hoffmeister (1974) reported that the Miami Limestone is 27 feet thick and the Key Largo Limestone is greater than 270 feet thick in the western part of Key West. The Key Largo Limestone is generally more porous than the Miami Limestone. Surficial and shallow subsurface features in the area have often been altered by imported fill material.

The surficial aquifer in the Key West area is unconfined. The water table is found at shallow depths in the area, generally occurring from less than 1 foot to 10 feet below land surface. Water table elevations can be influenced by local rainfall and tidal fluctuations (McKenzie, 1990). The surficial aquifer is contained within the Miami Limestone, the underlying Key Largo Limestone, and surficial fill materials. The limestones generally contain brackish or saline water. Recharge to the aquifer is directly from precipitation, and infiltration rates are rapid. Groundwater flow discharge is to surrounding surface waters.

The surficial aquifer contains a small freshwater lens that floats on the saline groundwater. The lens, which is very thin (from less than 1 foot near the edge to an average of 5 feet near the center), is located below the center of the western half (Old Town) of the island. The lens contains about 20 million gallons of freshwater during the dry season and about 30 million gallons during the wet season.

The water table fluctuates and the configuration of the lens constantly changes, largely as a result of tidal actions. On the average the lens is approximately 8,000 feet in length by 4,000 feet in width. Water quality data indicate that the lens is an unlikely source of potable water (McKenzie, 1990).

APPENDIX B  
LITHOLOGIC LOGS

TITLE: NAS Key West, Boca Chica Field		LOG of WELL: KYW-A317-1	BORING NO.
CLIENT: SOUTHWAYFACENGCOM			PROJECT NO: 7518-30
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/12/91	COMPLTD: 7/12/91
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT.: 13' to 11.3'	PROTECTION LEVEL: D
TOC ELEV.: 3.56 FT.	MONITOR INST.: OVA	TOT DPTH: 13FT.	DPTH TO $\nabla$ 1.72 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/15/91		SITE: Public Works Motor Pool

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5		1.5/2	G.C.	[Brick pattern symbol]	1	9, 11, 13, 8	[Well diagram]	
10		1.8/2	G.C.					Limestone: White, hard, highly weathered. Strong organic (septic tank) odor.
15		1.2/2	G.C.					Split spoon sample taken to assess the extent of downward contamination.
20								

TITLE: NAS Key West, Boca Chica Field		LOG of WELL: KYW A317-2	BORING NO.
CLIENT: SOUTHNAVFACENGC.COM		PROJECT NO: 7519-30	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/12/81	COMPLTD: 7/12/81
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT.: 1.3' to 11.3'	PROTECTION LEVEL: D
TOC ELEV.: 3.81 FT.	MONITOR INST.: OVA	TOT DPTH: 13FT.	DPTH TO $\nabla$ 164 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/15/81		SITE: Public Works Motor Pool

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA	
5		0.6/2	G.C.	[Brick pattern symbol]	1	11,7,E,9	[Well diagram]	
10		12/2	G.C.					7,16,15,13
15		1.8/2	G.C.					13,10,8,15
			Limestone: White mostly weathered, with some to many hard limestone fragments.					
			Split spoon sample taken to assess the extent of downward contamination.					
20								

TITLE: NAS Key West, Boca Chico Field		LOG of WELL: KYW A317-3	BORING NO.
CLIENT: SOUTHFLORIDACOM		PROJECT NO: 7519-30	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/15/91	COMPLTD: 7/15/91
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT: 1.3' to 11.3'	PROTECTION LEVEL: D
TOC ELEV.: 3.41 FT.	MONITOR INST: OVA	TOT DPTH: 12FT.	DPTH TO $\nabla$ 163 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/16/91		SITE: Public Works Motor Pool

DEPTH F.T.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		12/2	G.C.	Limestone: White, hard, moderately to highly weathered. Some gray sandy silt (possibly fill).			6,13,50/3"	
10		1/2	G.C.	Limestone: White to very light gray, hard, slightly to moderately weathered.			11,10,8,15	
15								

TITLE: NAS Key West, Boca Chica Field		LOG of WELL: KYW A317-4	BORING NO.
CLIENT: SOUTHNAVFACENSGCOM		PROJECT NO: 7519-30	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/15/91	COMPLTD: 7/15/91
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT: 13' to 11.3'	PROTECTION LEVEL: D
TOC ELEV.: 3.75 FT.	MONITOR INST: OVA	TOT DPTH: 12FT.	DPTH TO $\nabla$ 1.98 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/16/91		SITE: Public Works Motor Pool

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5		14/2	G.C.	Limestone: White, hard, moderately to highly weathered.	[Brick pattern symbol]	-	18,22,25,25	[Well diagram]
10		2/2	G.C.				11,13,11,23	
15								

TITLE: NAS Key West, Boca Chica Field		LOG of WELL: KYW A317-5	BORING NO.
CLIENT: SOUTHNAVFACENCOM		PROJECT NO: 7519-30	
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/15/91	COMPLTD: 7/15/91
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT.: 1.3' to 11.3'	PROTECTION LEVEL: D
TOC ELEV.: 3.64 FT.	MONITOR INST.: OVA	TOT DPTH: 12FT.	DPTH TO $\nabla$ : 17.8 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/16/91		SITE: Public Works Motor Pool

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY SAMPLE	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5			1.5/2	G.C.	[Hatched Pattern]	-	10, 9, 8, 11	[Well Diagram]
10			0.6/2	G.C.				
15								

TITLE: NAS Key West, Eoca Chica Field		LOG of WELL: KYW 4317-B	BORING NO.
CLIENT: SOUTHNAVFACENGC0M			PROJECT NO: 7519-30
CONTRACTOR: Groundwater Protection Inc.		DATE STARTED: 7/15/91	COMPLTD: 7/15/91
METHOD: HSA	CASE SIZE: 2 inch	SCREEN INT.: 1.3' to 11.3'	PROTECTION LEVEL: D
TOT ELEV.: 3.75 FT.	MONITOR INST.: OVA	TOT DPTH: 12FT.	DPTH TO $\nabla$ 1.98 FT.
LOGGED BY: A. DeSandro	WELL DEVELOPMENT DATE: 7/17/91		SITE: Public Works Motor Pool

DEPTH FT.	LABORATORY SAMPLE ID.	RECOVERY SAMPLE	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION AND COMMENTS	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN	WELL DATA
5				Limestone: White, hard, moderately to highly weathered.	[Brick pattern symbol]	1	13,36,35,38	[Well diagram]
		1.6/2	G.C.					
10							30,36,28,50	
		1.5/2	G.C.					
15								

## APPENDIX C

### INVESTIGATIVE METHODOLOGIES AND PROCEDURES

#### Soil borings

Soil borings were used to assess the degree of soil contamination at the site and to aid in the placement of subsequent monitoring wells. Soil borings were advanced into the water table using rotary drilling and hollow-stem augers. For each boring, a soil sample was collected immediately above the soil-groundwater interface. Samples were collected with a standard penetration test (SPT) split-spoon sampler. Samples were placed in 16-ounce glass jars, and headspace analysis was performed with an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID).

#### Monitoring well construction

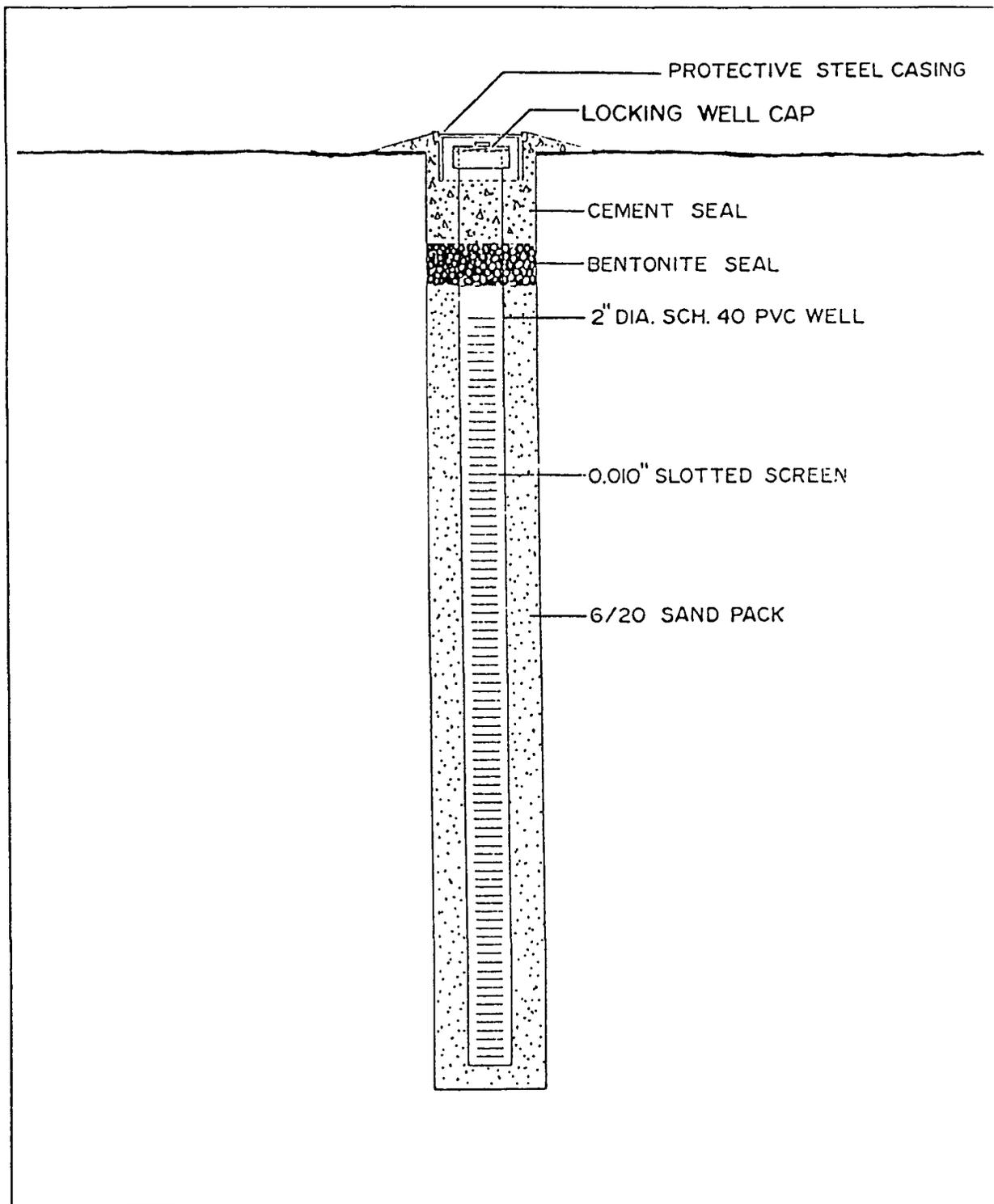
All monitoring wells were constructed of 2-inch diameter, flush-threaded, schedule 40, polyvinyl chloride (PVC) casing. The bottom 10 feet of each well was screened with 2-inch diameter, 0.010-inch slotted, PVC well screen. The proximity of the shallow water table to land surface necessitated limiting the thickness of the sand filter pack, bentonite seal, and grout above the screened interval. A 6/20 grade silica sand filter pack was placed in the annular space around each well to approximately 7 inches above the top of the screen. A 4-inch thick bentonite seal was then placed on top of the filter pack. The remaining annular space was grouted to the surface with neat cement. A protective traffic-bearing vault was installed to complete each well. Each monitoring well was equipped with a locking well cap. Typical monitoring well construction details are presented in Figure C-1.

#### Groundwater elevation measurements and tidal influence study

The elevation of the water table was estimated by surveying the top of the well casing of each monitoring well to a common reference datum. No benchmark was located in the area; therefore, an arbitrary reference elevation of 10.00 feet was established onsite. Groundwater levels were measured using an electronic water level indicator. Water level elevations were calculated by subtracting the measured depth to groundwater from the elevation at the top of the well casing. To assess the effect of tidal fluctuations on water level elevations, water elevations were measured over an 8-hour period.

#### Groundwater sampling

Groundwater samples were collected from site monitoring wells on August 14, 1991. The groundwater samples were collected in accordance with ABB-ES' FDER-approved CompQAPP. Before sampling, monitoring wells were properly developed and purged with Teflon™ bailers. Purging continued until a minimum of five well volumes had been removed. Groundwater samples were then collected, and the samples were placed into appropriate containers. The containers were labeled, placed on ice, and shipped under chain of custody to Wadsworth/Alert Laboratories in Tampa,



**FIGURE C-1**  
**TYPICAL MONITORING WELL**  
**CONSTRUCTION DIAGRAM**  
**BUILDING A-317**  
**PUBLIC WORKS DEPARTMENT**  
**MOTOR POOL**



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**NAVAL AIR STATION**  
**KEY WEST, FLORIDA**

Florida, for analyses. Pursuant to FDER Chapter 17-770, FAC, groundwater samples collected from monitoring wells underwent analyses for USEPA Methods 418.1, 601, 602, 610, ethylene dibromide (EDB), and lead. Field blanks, trip blanks, and equipment blanks were also analyzed.

### Slug Tests

An aquifer slug test was performed on monitoring well KYW-A317-5 to assess the hydraulic conductivity of the surficial aquifer. The slug was constructed of 1-inch outside diameter PVC pipe, 5 feet in length. The slug was filled with sand and capped watertight at both ends. Water level changes in the monitoring wells were recorded with a data logger and pressure transducer.

The pressure transducer was suspended less than 6 inches above the bottom of the well and the initial water level was recorded prior to beginning the test. The slug was then lowered into the well until it was totally submerged beneath the water table. Following recovery, the slug was quickly removed, and water level measurements were recorded until the water level recovered. Slug test results are attached in Appendix G.

Hydraulic conductivity was calculated from slug test data based on the analytical method of Bouwer and Rice (1976) for partially penetrating wells screened in an unconfined aquifer. The computer program AQTESOLV™ (Geraghty and Miller, 1989) was used to calculate a hydraulic conductivity (K) value based on linear regression of the data gathered during the slug test.

APPENDIX D

AQUIFER SLUG TEST RESULTS AND CALCULATIONS

BCA317DF CAR  
01.92 (CLEAN 01)

## AQUIFER SLUG TEST CALCULATIONS

### Average Pore Water Velocity Calculations

Estimates of average pore water velocity were obtained using the following formula:

$$v = (KI_{av})/n$$

where

v = average pore water velocity (ft/day),  
K = hydraulic conductivity (ft/day),  
 $I_{av}$  = average hydraulic gradient across site =  $8.5 \times 10^{-3}$  ft/ft, and  
n = estimated porosity.

Using an estimated porosity of 22 percent (Davis and DeWiest, 1966), the average hydraulic gradient across the site ( $I_{av}$ ) and the hydraulic conductivity from well KYWA317-5 ( $K = 3.8$  ft/day), the calculated average pore water velocity is:

$$v = (3.8 \text{ ft/day})(3.2 \times 10^{-3})/0.22$$

$$v = 5.5 \times 10^{-2} \text{ ft/day.}$$

### Transmissivity

Transmissivity, T, for the surficial aquifer, was estimated by using the following formula:

$$T = K*b$$

where

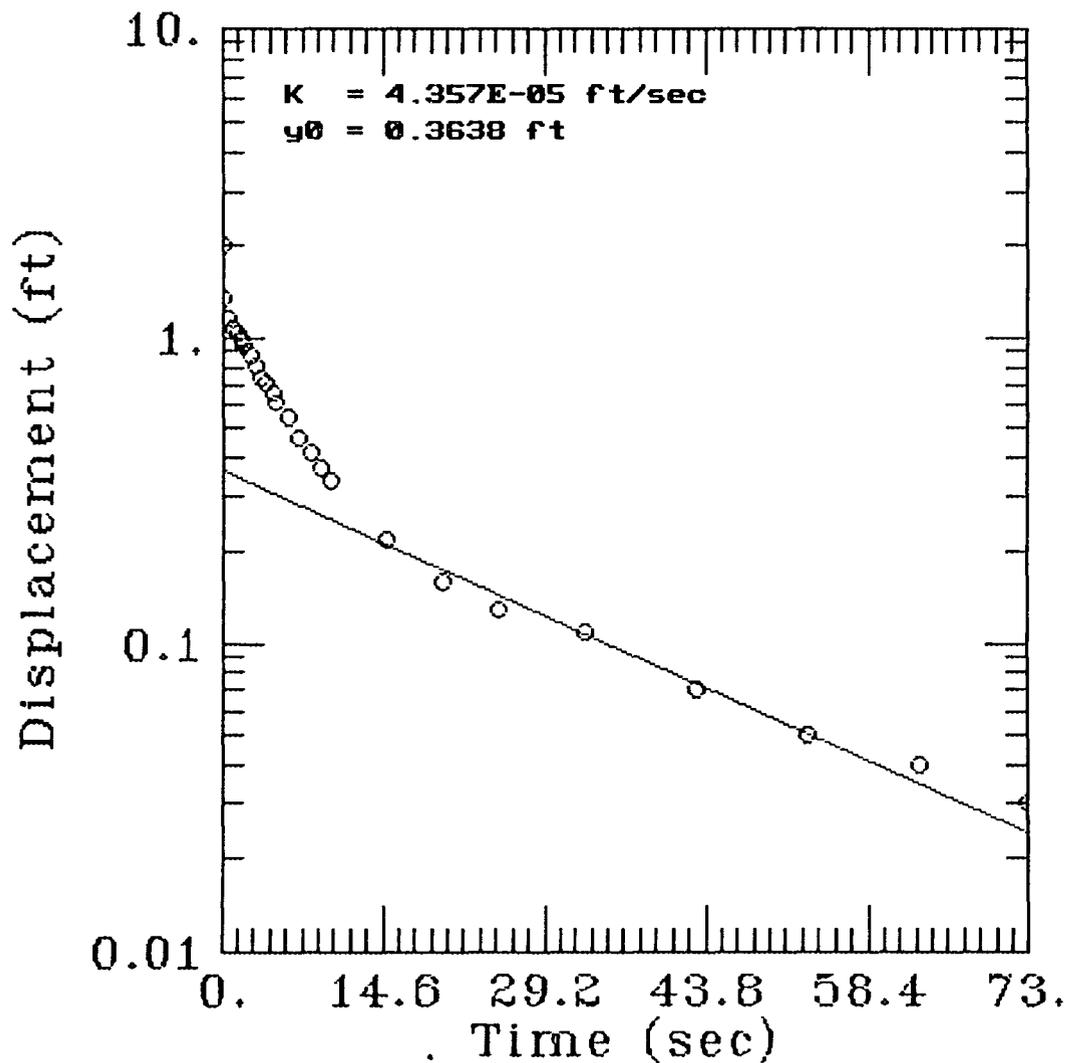
T = transmissivity ( $\text{ft}^2/\text{day}$ ),  
K = hydraulic conductivity (ft/day), and  
b = aquifer test interval or thickness (ft).

For monitoring well KYWA317-5, using a K value of 3.8 ft/day and a b value of 9.52 ft, the calculated transmissivity is as follows:

$$T = 3.8 \text{ ft/day} \times 9.52 \text{ ft}$$

$$T = 36 \text{ ft}^2/\text{day.}$$

# NAS KEY WEST KYW-A317-5



AQTESOLV

 GERAGHTY  
& MILLER, INC.

 Modeling Group

APPENDIX E  
GROUNDWATER ANALYTICAL RESULTS

Laboratory Analytical Data  
Conversion Table

<u>Monitoring Well Designation</u>	<u>Laboratory Sample Designation</u>
KYWA317-1	BCPWMW-1
KYWA317-2	BCPWMW-2
KYWA317-3	BCPWMW-3
KYWA317-4	BCPWMW-4
KYWA317-4 Duplicate	BCDUPE3
KYWA317-5	BCPWMW-5
KYWA317-6	BCPWMW-6
KYWA317-7	BCPWMW-7



WADSWORTH/ALERT  
LABORATORIES, INC.

### INVOLVEMENT

This report summarizes the analytical results of the NAS Key West - Truman Annex site submitted by ABB Environmental Services, Inc. to Wadsworth/ALERT Laboratories, Inc. who provided independent, analytical services for this project under the direction of Ken Busen. The samples were accepted into Wadsworth's Florida facility on 15, 17, 22 & 23 August 1991, in accordance with documented sample acceptance procedures. The associated analytical methods and sample results are outlined sequentially in this report.

Analytical results included in this report have been reviewed for compliance with the Laboratory QA/QC Plan as summarized in the Quality Control Section at the rear of the report. Sample custody documentation describing the number of samples and sample matrices is also included. Any qualifications and/or non-compliant items have been noted below.

Laboratory ID #

Narrative

1H1906-1

The surrogate compound recoveries for the polynuclear aromatic hydrocarbon analysis of this sample were outside of established laboratory control limits. A second extraction and analysis performed outside of the EPA recommended holding time demonstrated acceptable recoveries. Both sets of data are reported and may be interpreted accordingly.

1H2205-9,10,11

The acid extractable spiking compound recoveries in the laboratory control sample associated with these samples were outside of established laboratory control limits. Sample nine also demonstrated low acid surrogate recoveries. This batch is being re-extracted and re-analyzed outside of the EPA recommended holding time. These results will be forthcoming and may be interpreted accordingly at that time.



WADSWORTH/ALERT  
LABORATORIES, INC.

### ANALYTICAL METHODS

Wadsworth/ALERT Laboratories utilizes only USEPA approved analytical methods and instrumentation. The analytical methods utilized for the analysis of these samples are listed below.

PARAMETER	METHOD
ORGANICS	
Volatile Organics	** EPA Method 601/2
Volatile Organics	** EPA Method 624
Ethylene Dibromide	** EPA Method 601 Mod.
Base/Neutral Acid Extractables	** EPA Method 625
Polynuclear Aromatic Hydrocarbons	** EPA Method 625
METALS	
Arsenic	** EPA Method 206.2
Cadmium	** EPA Method 200.7
Chromium	** EPA Method 200.7
Lead	** EPA Method 239.2
MISCELLANEOUS	
Tot. Rec. Petroleum Hydrocarbons	** EPA Method 418.1

NOTE: \*\* Indicates usage of this method to obtain results for this report.

- EPA Methods -Methods for Chemical Analysis of Water and Wastes, USEPA, 600/4-79-020, March, 1983. July, 1982  
Drinking Waters USEPA, 600/4-88/039, December, 1988.
- Std. Methods -Standard Methods for the Examination of Water and Wastewater, APHA, 16th edition, 1985.
- USEPA Methods -From 40CFR Part 136, published in Federal Register on October 26, 1984.
- SW846 Methods -Test Methods for Evaluating Solid Waste Physical/Chemical (SW846) Methods, 3rd Edition, USEPA, 1986.
- ASTM Methods -American Society for Testing and Materials.
- NIOSH Method -NIOSH Manual of Analytical Methods, National Institute for Occupational Safety and Health, 2nd Edition, April 1977.



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-1  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPMMW-1 NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

VOLATILE ORGANICS  
METHOD 601/602 - GC

HRS84297

Benzene	9	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	45

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	111	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-1  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 3/91

SAMPLE ID: BCPWMW-1      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-1  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-1      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

---

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	44	(22-135)	(10-155)
Fluorobiphenyl	48	(34-140)	(12-153)
Terphenyl-d14	112	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-1  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPMMW-1

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT

HRS84297

SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-1  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPMMW-1      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-2  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPWMW-2      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
VOLATILE ORGANICS      HRS84297  
METHOD 601/602 - GC

---

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	95	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-2  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 3/91

SAMPLE ID: BCPHMW-2      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-2  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-2      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	47	(22-135)	(10-155)
Fluorobiphenyl	48	(34-140)	(12-153)
Terphenyl-d14	91	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB # : 1H2305-2  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-2

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT

HRS84297

SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	8/29/91	ND	5	ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-2  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPMMW-2      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-3  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPWMW-3      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
VOLATILE ORGANICS      HRS84297  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	2

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	105	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-3  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPMMW-3      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-3  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 4/91

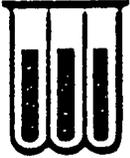
SAMPLE ID: BCPHMW-3      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

---

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	52	(22-135)	(10-155)
Fluorobiphenyl	48	(34-140)	(12-153)
Terphenyl-d14	91	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-3  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-3

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT

HRS84297

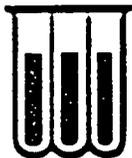
SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-3  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-3 NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-4  
MATRIX: WATER

DATE RECEIVED: 2/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 3/30/91

SAMPLE ID: BCPWMW-4      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
VOLATILE ORGANICS      HRS84297  
METHOD 601/602 - GC

---

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	1	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	106	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-4  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-4      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-4  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 5/91

SAMPLE ID: BCPWMW-4      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	42	(22-135)	(10-155)
Fluorobiphenyl	56	(34-140)	(12-153)
Terphenyl-d14	86	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-4  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-4

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT  
SELECTED LIST

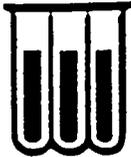
HRS84297

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Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	8/29/91	ND	5	ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-4  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-4      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-5  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPWMW-5 NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

VOLATILE ORGANICS  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	118	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-5  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPMW-5      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-5  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 5/91

SAMPLE ID: BCPMMW-5      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

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Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	40	(22-135)	(10-155)
Fluorobiphenyl	56	(34-140)	(12-153)
Terphenyl-d14	99	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-5  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-5

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT  
SELECTED LIST

HRS84297

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-5  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-5      NAS KEY WEST/BOCA CHICA FIELD      PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-6  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPMW-6      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
VOLATILE ORGANICS      HRS84297  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	95

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	X	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	110	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-6  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-6      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

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PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, .INC.  
LAB #: 1H2305-6  
MATRIX: WATER

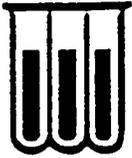
DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 6/91

SAMPLE ID: BCPWMW-6      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	38	(22-135)	(10-155)
Fluorobiphenyl	47	(34-140)	(12-153)
Terphenyl-d14	75	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-6  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-6

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT  
SELECTED LIST

HRS84297

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Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-6  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPMMW-6      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-7  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BCPWMW-7 NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

VOLATILE ORGANICS  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	Z	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	112	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-7  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

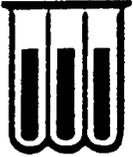
SAMPLE ID: BCPWMW-7      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-7  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 5/91

SAMPLE ID: BCPWMW-7

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

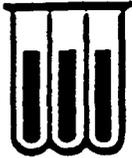
POLYNUCLEAR AROMATIC HYDROCARBONS  
METHOD 625 HSL/TCL LIST - GC/MS

HRS84297

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	38	(22-135)	(10-155)
Fluorobiphenyl	46	(34-140)	(12-153)
Terphenyl-d14	78	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-7  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCPWMW-7      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
METALS ANALYTICAL REPORT      HRS84297  
SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-7  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCPWMW-7      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-10  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/31/91

SAMPLE ID: BCDUPE3

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

VOLATILE ORGANICS  
METHOD 601/602 - GC

HRS84297

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	2	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	113	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2905-10  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/4/91

SAMPLE ID: BCDUPE3      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS24297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

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PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-10  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 5/91

SAMPLE ID: BCDUPE3      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
POLYNUCLEAR AROMATIC HYDROCARBONS      HRS84297  
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	23	(22-135)	(10-155)
Fluorobiphenyl	32	(34-140)	(12-153)
Terphenyl-d14	75	(10-132)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-10  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCDUPE3

NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

METALS ANALYTICAL REPORT

HRS84297

SELECTED LIST

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Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-10  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCDUPE3 NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

---

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2205-14  
MATRIX: WATER

DATE RECEIVED: 8/22/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BC FIELD BLANK

NAS KEY WEST (BOCA CHICA FIELD)

CERTIFICATION #: E24059

VOLATILE ORGANICS  
METHOD 601/602 - GC

HRS84297

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	100	(78-122)
Trifluorotoluene (PID)	99	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2205-14  
MATRIX: WATER

DATE RECEIVED: 3/22/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 3/ 3/91

SAMPLE ID: BC FIELD BLANK      NAS KEY WEST (BOCA CHICA FIELD)  
CERTIFICATION #: ES4059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2205-14  
MATRIX : WATER

DATE RECEIVED: 3/22/91

SAMPLE ID : BC FIELD BLANK      NAS KEY WEST (BOCA CHICA FIELD)  
CERTIFICATION #: E84059  
METALS ANALYTICAL REPORT      HRS84297  
SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/30/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2205-15  
MATRIX: WATER

DATE RECEIVED: 8/22/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: TRIP BLANK

NAS KEY WEST (BOCA CHICA FIELD)

CERTIFICATION #: E84059

VOLATILE ORGANICS  
METHOD 601/602 - GC

HRS84297

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	9
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	i
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	34
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	110	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-12  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/31/91

SAMPLE ID: TRIP BLANK      NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
VOLATILE ORGANICS      HRS84297  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	10
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	1
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	37
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	115	(78-122)
Trifluorotoluene (PID)	99	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: AEB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-13  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/31/91

SAMPLE ID: TRIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E34059  
VOLATILE ORGANICS HRS84297  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	9
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	1
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	33
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	111	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALEFT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H1509-8  
MATRIX: WATER

DATE RECEIVED: 8/15/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/21/91

SAMPLE ID: TRIP BLANK

NAS KEY WEST-TRUMAN ANNEX

CERTIFICATION #: E84059  
HRS84297

VOLATILE ORGANICS  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	106	(78-122)
Trifluorotoluene (PID)	98	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H1906-22  
MATRIX: WATER

DATE RECEIVED: 2/17/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 2/25/91

SAMPLE ID: TRIP BLANK TRUMAN ANNEX/NAS KEY WEST PROJ.#0715.30  
CERTIFICATION #: 224059  
HRS84297  
VOLATILE ORGANICS  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	Z	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	105	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2205-13  
MATRIX: WATER

DATE RECEIVED: 8/22/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 8/30/91

SAMPLE ID: BC EQUIPMENT BLANK NAS KEY WEST (BOCA CHICA FIELD)

CERTIFICATION #: E84059  
HRS84297

VOLATILE ORGANICS  
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	110	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2205-13  
MATRIX: WATER

DATE RECEIVED: 8/22/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 3/91

SAMPLE ID: BC EQUIPMENT BLANK NAS KEY WEST (BOCA CHICA FIELD)

CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

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PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2205-13  
MATRIX : WATER

DATE RECEIVED: 8/22/91

SAMPLE ID : BC EQUIPMENT BLANK NAS KEY WEST (BOCA CHICA FIELD)  
CERTIFICATION #: E84059  
METALS ANALYTICAL REPORT HRS84297  
SELECTED LIST

---

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/30- 9/ 3/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB # 1H2305-11  
MATRIX: WATER

DATE RECEIVED: 2/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 3/31/91

SAMPLE ID: BCEQUIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

VOLATILE ORGANICS  
METHOD 601/602 - GC

HRS84297

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd  
ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
-- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS
Bromochloromethane (HECD)	114	(78-122)
Trifluorotoluene (PID)	100	(73-131)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: 42B ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-11  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: NA  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCEQUIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059  
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

---

PARAMETER	RESULT (ug/L )	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd  
J (Detected, but below quantitation limit; estimated value)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: 4BB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-11  
MATRIX: WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 8/26/91  
DATE ANALYZED: 9/ 5/91

SAMPLE ID: BCEQUIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30

CERTIFICATION #: E84059

POLYNUCLEAR AROMATIC HYDROCARBONS,  
METHOD 625 HSL/TCL LIST - GC/MS

HRS84297

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd  
 ND\* (None Detected, lower detectable limit = ug/L) as rec'd  
 -- (Not Analyzed)

SURROGATE RECOVERY:	%	ACCEPTABLE LIMITS	
		WATER	SOLID
Nitrobenzene-d5	50	(22-135)	(10-155)
Fluorobiphenyl	55	(34-140)	(12-153)
Terphenyl-d14	90	(10-122)	(13-140)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY : ABB ENVIRONMENTAL SERVICES, INC.  
LAB #: 1H2305-11  
MATRIX : WATER

DATE RECEIVED: 8/23/91

SAMPLE ID : BCEQUIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: EB4059  
METALS ANALYTICAL REPORT HRS84297  
SELECTED LIST

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Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT
Lead	8/29/91	ND	5 ug/L

NOTE: ND (None Detected)



WADSWORTH/ALERT  
LABORATORIES, INC.

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.  
LAB ID: 1H2305-11  
MATRIX : WATER

DATE RECEIVED: 8/23/91  
DATE EXTRACTED: 9/ 4/91  
DATE ANALYZED: 9/ 4/91

SAMPLE ID: BCEQUIP BLANK NAS KEY WEST/BOCA CHICA FIELD PROJ.#7519-30  
CERTIFICATION #: E84059  
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

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	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

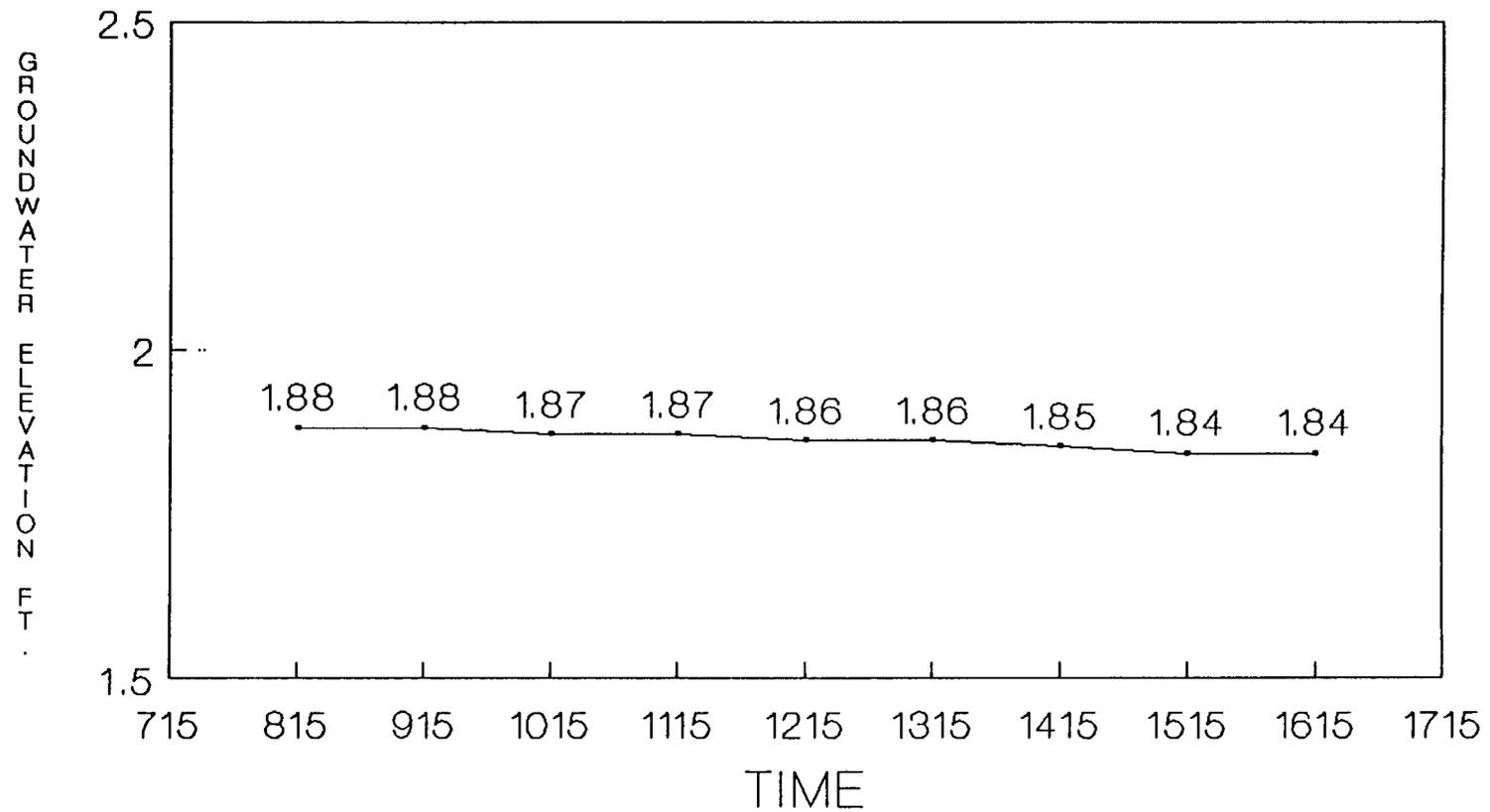
APPENDIX F

GROUNDWATER ELEVATION GRAPHS FROM TIDAL INFLUENCE STUDY

AUGUST 17, 1991 (8 HOUR PERIOD)

# TIDAL INFLUENCE STUDY, BUILDING A-317

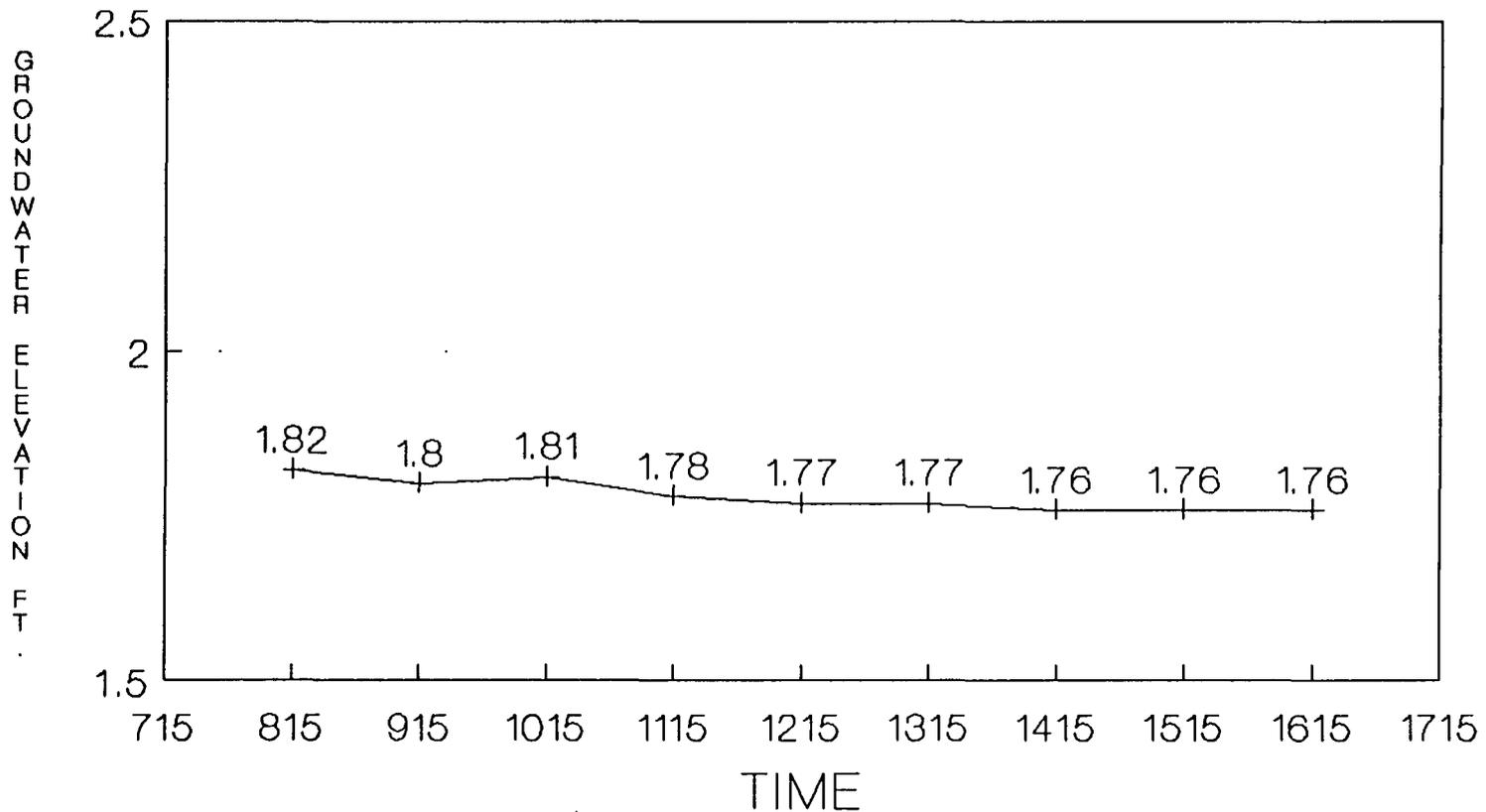
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-1



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

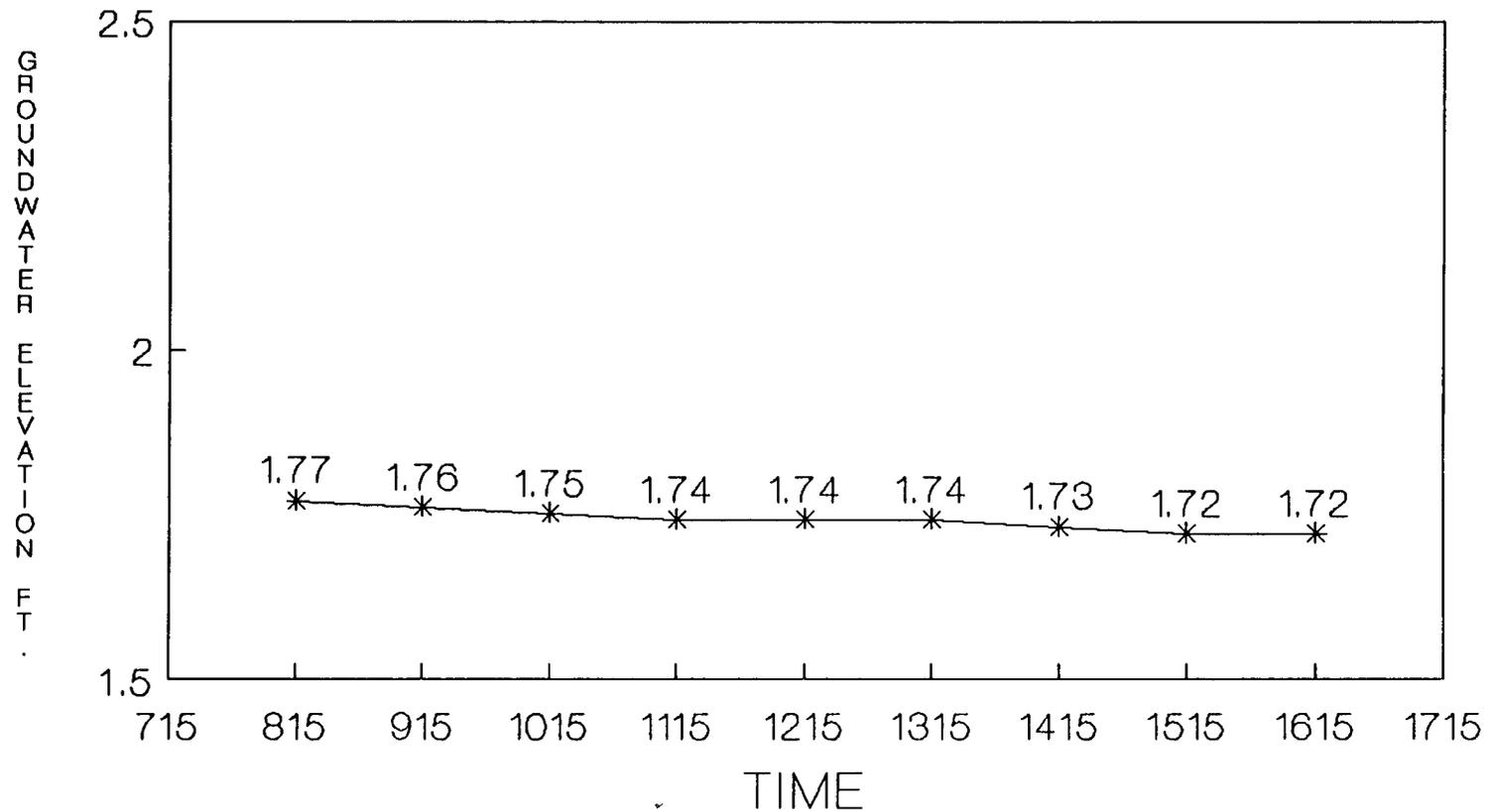
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-2



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

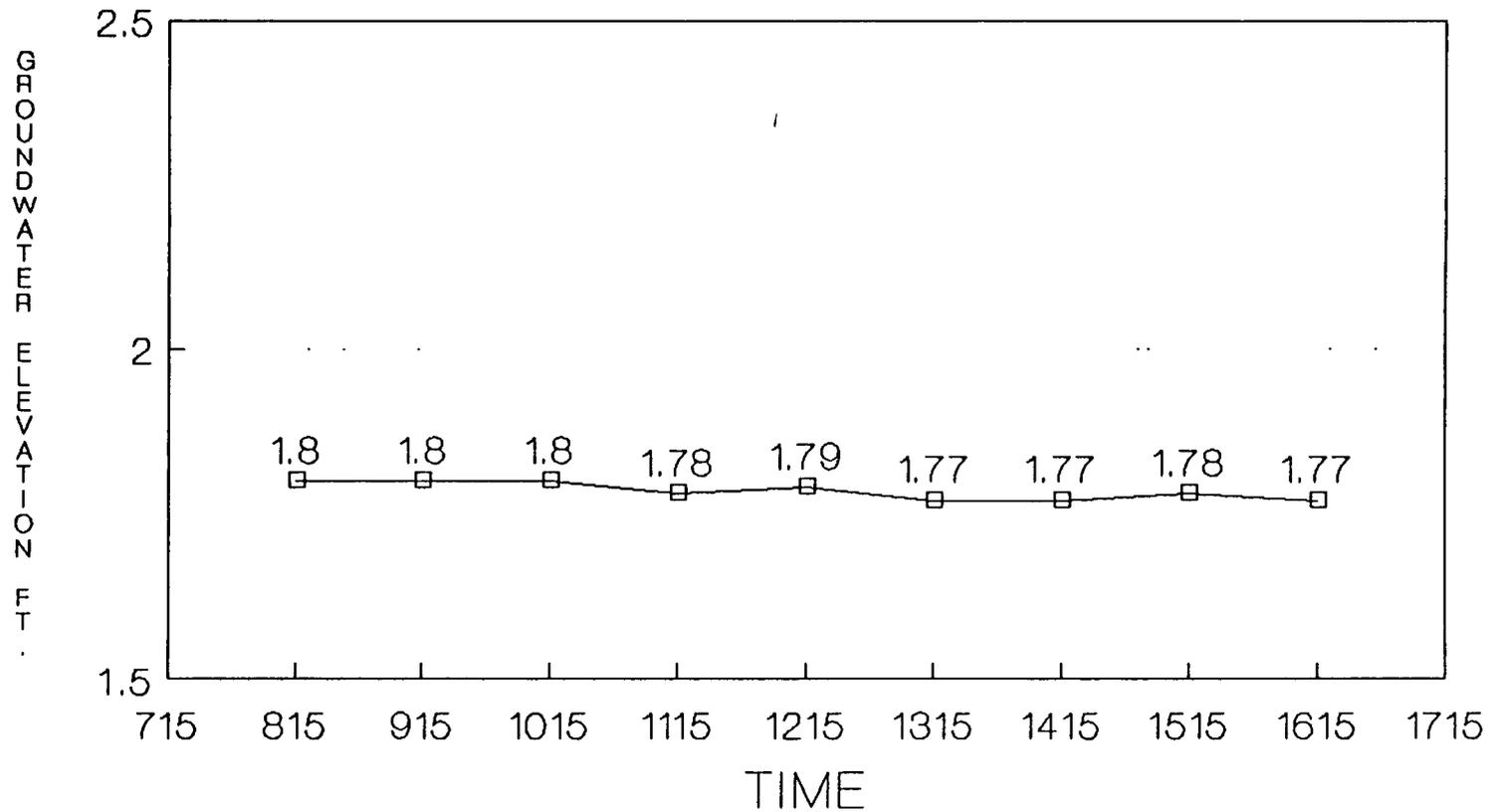
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-3



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

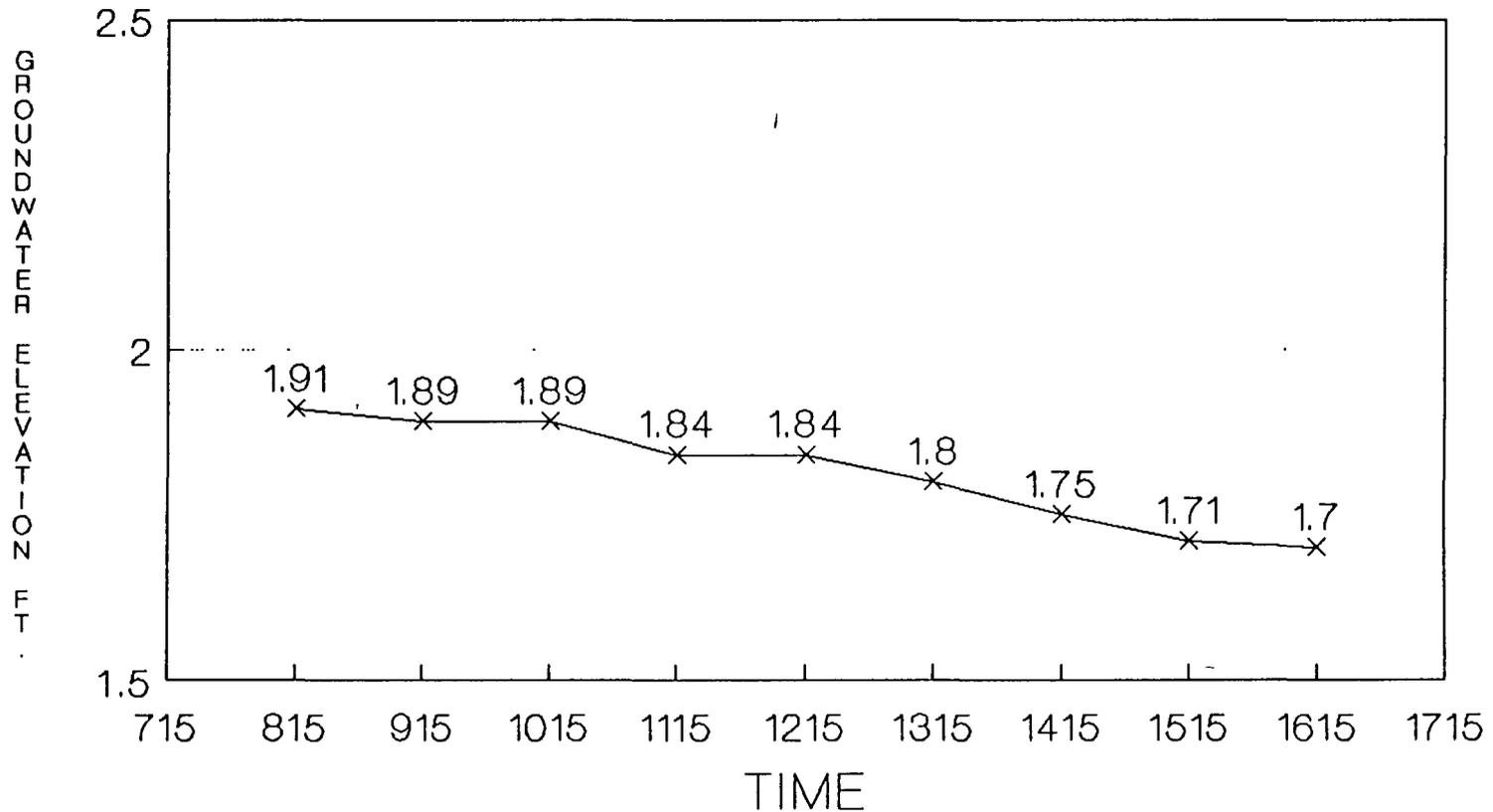
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-4



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

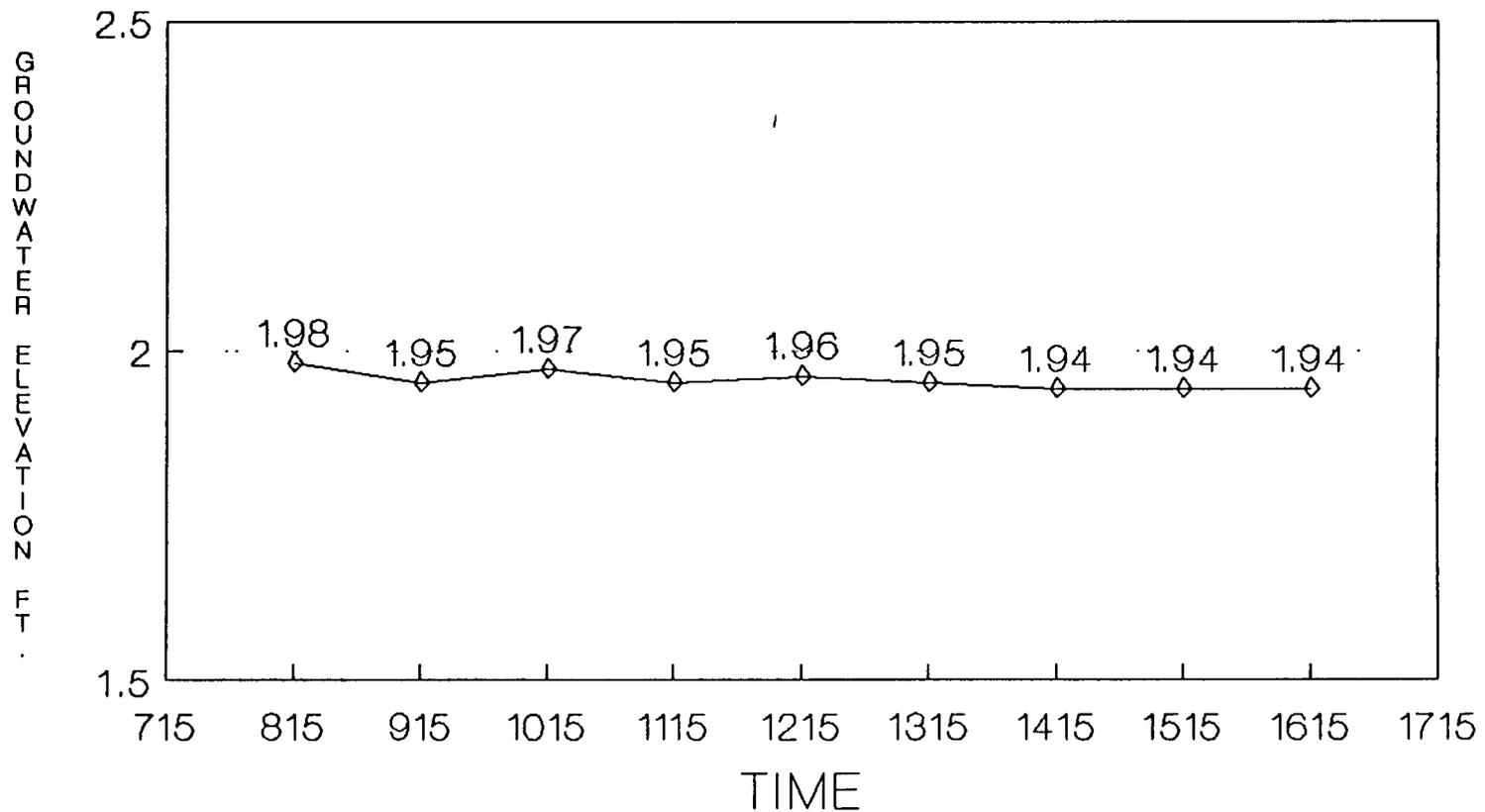
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-5



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

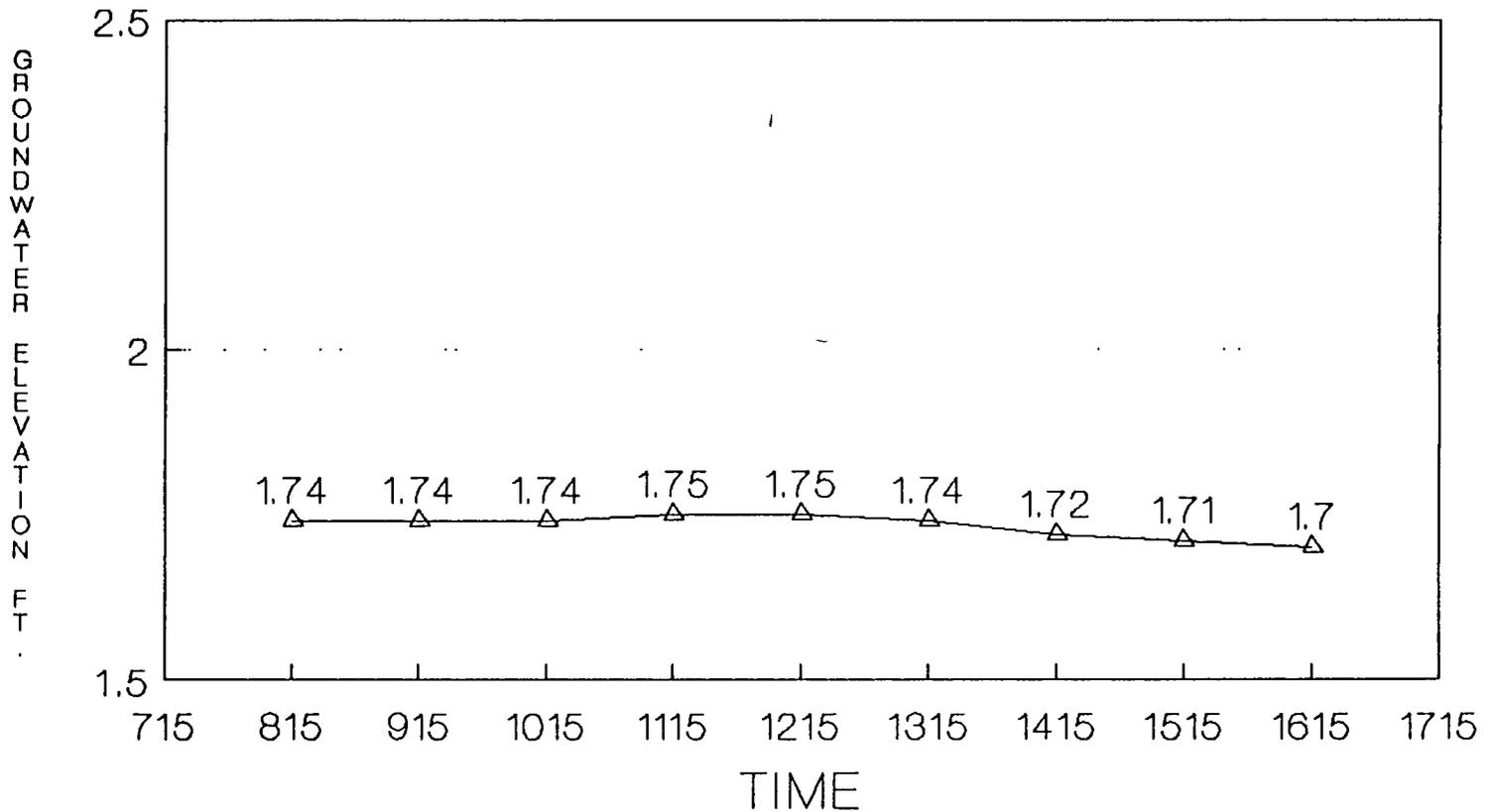
PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-6



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL

# TIDAL INFLUENCE STUDY, BUILDING A-317

PUBLIC WKS DEPT MTR POOL, AUG. 17, 1991  
KYW-A317-7



HIGH TIDES: 0420 & 1811 HOURS  
LOW TIDES: 1149 & 2223 HOURS  
PUBLIC WORKS DEPT MOTOR POOL