N00207.AR.003529
NAS JACKSONVILLE
5090.3a

ADDENDUM 1 TO CONTAMINATION ASSESSMENT REPORT FOR BUILDING 873 KEMEN TEST CELL NAS JACKSONVILLE FL

6/1/1993

U S ARMY CORPS OF ENGINEERS

ADDENDUM 1
TO
CONTAMINATION ASSESSMENT REPORT

JACKSONVILLE NAVAL AIR STATION
BUILDING 873 - KEMEN TEST CELL

JACKSONVILLE, FLORIDA

PREPARED FOR

UNITED STATES NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
SAVANNAH, GEORGIA

JUNE 1993

BACKGROUND

This addendum to the Contamination Assessment Report (CAR) for Building 873 (Kemen Test Cell) at Jacksonville Naval Air Station, Jacksonville, Florida is a result of a request from the Florida Department of Environmental Regulation (FDER) to perform supplemental assessment work at the site. A copy of the FDER request, and comments based on their review of the CAR can be found in attachment 6.

RESULTS OF SUPPLEMENTAL ASSESSMENT

The following findings of supplemental assessment at the site follow the numbered FDER comments shown in attachment 6.

1. The manway gaskets and fittings of the underground storage tank have been repaired.

2. Free product monitoring and recovery will be performed on monitoring wells at the site. The wells will be checked for free product using a properly decontaminated bailer. In the event free product is found, the wells will be bailed to remove the product and the product/contaminated ground water will be properly disposed of. Records will be kept of the free product monitoring and recovery which will document the dates, quantities and method of disposal. The wells will be monitored on a monthly basis.

3. An additional shallow monitoring well JAX-873-11, was installed at the site as shown on the Supplemental Executive Summary Map (attachment 1), to better define the horizontal and vertical extent of ground-water contamination.

4. After installation of supplemental monitoring well JAX-873-11, a complete round of sampling and analysis for EPA Methods 602 (including MTBE) and EPA 610 was performed. A summary of the results of these analyses is shown in table 3-A (attachment 2) and on the Supplemental Executive Summary Map.

New monitoring well JAX-873-11, which is located approximately 10 feet east of OVA headspace boring 873-8 and approximately 45 feet southeast (down-gradient) of the underground tank, was BDL for all parameters. The log for monitoring well JAX-873-11 is included in attachment 3.

5. Water level measurements were also made at the time of sampling of monitoring wells. These data are shown in table 1-A (attachment 4) and on figure 4-A (attachment 5). The maximum difference in head between

monitoring wells, for this latest round of readings, was 0.24 feet (or a gradient of .001). The general direction of shallow ground-water flow is to the east, towards the St. Johns River.

SUMMARY OF SUPPLEMENTAL ASSESSMENT

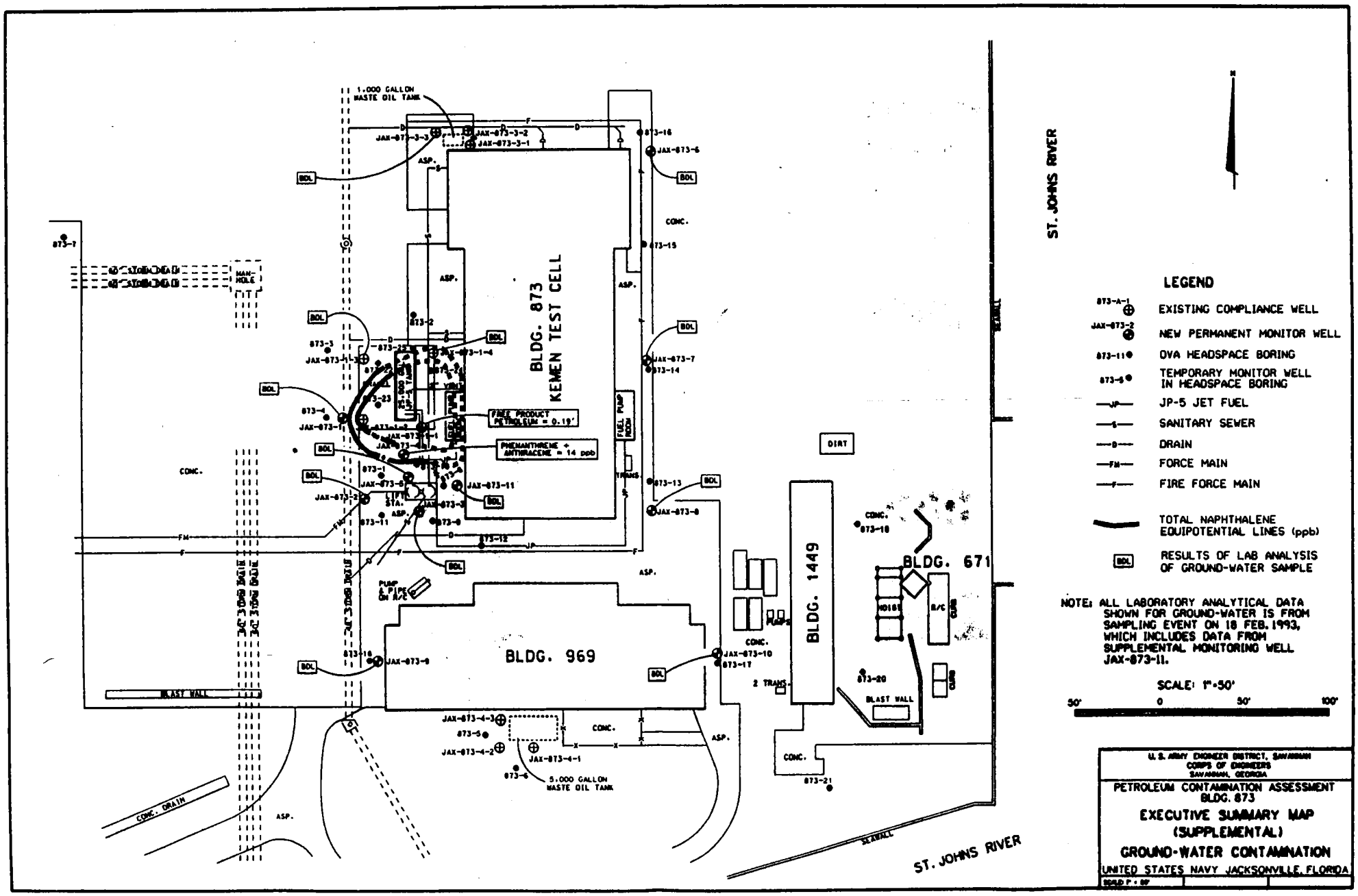
Supplemental sampling and analysis of monitoring wells at the site, including an additional new well, indicates that there has been very little change in the general configuration and extent of the ground-water contamination plume. New monitoring well JAX-873-11, which is immediately down-gradient of the source area, indicates the plume has not migrated significantly in the down-gradient direction since the previous round of sampling and analysis in January 1992.

LIST OF ATTACHMENTS

- ATTACHMENT 1 - SUPPLEMENTAL EXECUTIVE SUMMARY MAP
- ATTACHMENT 2 - TABLE 3-A, SUMMARY OF SUPPLEMENTAL GROUND-WATER ANALYTICAL RESULTS
- ATTACHMENT 3 - SUPPLEMENTAL MONITORING WELL LOG
- ATTACHMENT 4 - TABLE 1-A, SUPPLEMENTAL MONITORING WELL DATA
- ATTACHMENT 5 - FIGURE 4-A, SUPPLEMENTAL WATER TABLE CONTOURS
- ATTACHMENT 6 - FDER COMMENTS AND REQUEST FOR SUPPLEMENTAL ASSESSMENT
- ATTACHMENT 7 - SUPPLEMENTAL LABORATORY ANALYTICAL DATA

ATTACHMENT 1

SUPPLEMENTAL EXECUTIVE SUMMARY MAP


BLDG. 873
KEMEN TEST CELL
BLDG. 969
BLDG. 1449
BLDG. 671
ST. JOHNS RIVER
1,000 GALLON WASTE OIL TANK
5,000 GALLON WASTE OIL TANK
FREE PRODUCT PETROLEUM = 0.19'
PHENANTHRENE + ANTHRACENE = 14 ppb
LIFT STA.
FUEL PUMP ROOM
PUMP & PIPE ON R/C
BLAST WALL
CONC. DRAIN
MAN-HOLE
CONC.
ASP.
DIRT
SEAWALL
BDL
LEGEND
EXISTING COMPLIANCE WELL
NEW PERMANENT MONITOR WELL
OVA HEADSPACE BORING
TEMPORARY MONITOR WELL IN HEADSPACE BORING
JP-5 JET FUEL
SANITARY SEWER
DRAIN
FORCE MAIN
FIRE FORCE MAIN
TOTAL NAPHTHALENE EQUIPOTENTIAL LINES (ppb)
RESULTS OF LAB ANALYSIS OF GROUND-WATER SAMPLE
NOTE: ALL LABORATORY ANALYTICAL DATA SHOWN FOR GROUND-WATER IS FROM SAMPLING EVENT ON 18 FEB. 1993, WHICH INCLUDES DATA FROM SUPPLEMENTAL MONITORING WELL JAX-873-11.
SCALE: 1"=50'
50' 0 50' 100'
U.S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873
EXECUTIVE SUMMARY MAP
(SUPPLEMENTAL)
GROUND-WATER CONTAMINATION
UNITED STATES NAVY JACKSONVILLE, FLORIDA

ATTACHMENT 2

SUMMARY OF SUPPLEMENTAL GROUND-WATER ANALYTICAL RESULTS

TABLE 3-A (SUPPLEMENTAL)

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873 - KEMEN TEST CELL
JACKSONVILLE NAVAL AIR STATION
JACKSONVILLE, FLORIDA

18 FEBRUARY 1993

PARAMETER	MONITOR WELL NO. JAX-873-1 2-93	JAX-873-1 2-93 Duplicate	JAX-873-2 2-93	JAX-873-3 2-93	JAX-873-4 2-93	JAX-873-4 2-93 Duplicate	JAX-873-5 2-93	JAX-873-6 2-93	JAX-873-7 2-93	Regulatory Standard
Purgeable Aromatics (602/8020)										
Benzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Chlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,3-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,4-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Ethylbenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Toluene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Xylenes, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total VOA's, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Methyl-Tert-Butyl-Ether (MTBE), ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Polynuclear Aromatic Hydrocarbons (610/8100)										
Acenaphthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Acenaphthylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (a) pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (g,h,i) perylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (b,k) fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chrysene + Benzo (a) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Fluorene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Indeno (1,2,3-cd) pyrene+Dibenzo (a,h) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Naphthalene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Phenanthrene + Anthracene, ug/l	BDL	BDL	BDL	BDL	14	13	BDL	BDL	BDL	
Pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	

TABLE 3-A (SUPPLEMENTAL) CONTINUED

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873 - KEMEN TEST CELL
JACKSONVILLE NAVAL AIR STATION
JACKSONVILLE, FLORIDA

18 FEBRUARY 1993

PARAMETER	MONITOR WELL NO. JAX-873-8 2-93	JAX-873-9 2-93	JAX-873-10 2-93	JAX-873-11 2-93	JAX-873-1-3 2-93	JAX-873-1-4 2-93	JAX-873-3-3 2-93	Pre-Cleaned Equipment Blank 2-93	Field Cleaned Equipment Blank 2-93	Regulatory Standard
Purgeable Aromatics (602/8020)										
Benzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Chlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,3-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,4-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Ethylbenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Toluene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Xylenes, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Total VOA's, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Methyl-Tert-Butyl-Ether (MTBE), ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Polynuclear Aromatic Hydrocarbons (610/8100)										
Acenaphthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Acenaphthylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (a) pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (g,h,i) perylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Benzo (b,k) fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chrysene + Benzo (a) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Fluorene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Indeno (1,2,3-cd) pyrene+Dibenzo (a,h) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Naphthalene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Phenanthrene + Anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	

TABLE 3-A (SUPPLEMENTAL) CONTINUED

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873 - KEMEN TEST CELL
JACKSONVILLE NAVAL AIR STATION
JACKSONVILLE, FLORIDA

18 FEBRUARY 1993

MONITOR WELL NO.

PARAMETER	Trip Blank 2-93									Regulatory Standard
Purgeable Aromatics (602/8020)										
Benzene, ug/l	BDL									1
Chlorobenzene, ug/l	BDL									
1,2-Dichlorobenzene, ug/l	BDL									
1,3-Dichlorobenzene, ug/l	BDL									
1,4-Dichlorobenzene, ug/l	BDL									
Ethylbenzene, ug/l	BDL									
Toluene, ug/l	BDL									
Xylenes, ug/l	BDL									
Total VOA's, ug/l	BDL									50
Methyl-Tert-Butyl-Ether (MTBE), ug/l	BDL									50
Polynuclear Aromatic Hydrocarbons (610/8100)										
Acenaphthene, ug/l	NA									
Acenaphthylene, ug/l	NA									
Benzo (a) pyrene, ug/l	NA									
Benzo (g,h,i) perylene, ug/l	NA									
Benzo (b,k) fluoranthene, ug/l	NA									
Chrysene + Benzo (a) anthracene, ug/l	NA									
Fluoranthene, ug/l	NA									
Fluorene, ug/l	NA									
Indeno (1,2,3-cd) pyrene+Dibenzo (a,h) anthracene, ug/l	NA									
Naphthalene, ug/l	NA									
Phenanthrene + Anthracene, ug/l	NA									
Pyrene, ug/l	NA									

Notes: - BDL = Below Detection Limit
- Shaded values indicate values exceed regulatory limit.
- NA = Not Analyzed

ATTACHMENT 3

SUPPLEMENTAL MONITORING WELL LOG

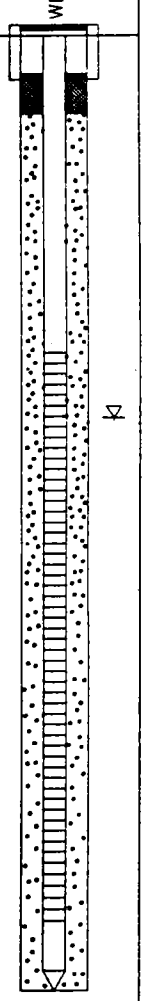
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
GROUNDWATER MONITORING WELL INSTALLATION REPORT

TITLE: Jacksonville Naval Air Station Bldg. 873		**LOG of WELL:** JAX-873-11	**BORING NO.**
CLIENT: SOUTHNAVFACENGCOM			**PROJECT NO:**
CONTRACTOR: USACE - Sav. District		**DATE STARTED:** 1 FEB. 93	**COMPLTD:** 1 FEB. 93
METHOD: 7¼" O.D. HSA	**CASE SIZE:** 2" PVC	**SCREEN INT.:** 5.0'-14.0'	**PROTECTION LEVEL:** D
TOC ELEV.: 8.77	**MONITOR INST.:** OVA	**TOT. DEPTH:** 15.0'	**DEPTH TO** ▽ 6.0'
LOGGED BY: G. ANDERSON	**WELL DEVELOPMENT DATE:** 3 FEB. 93		**SITE:** Bld. 873

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					0.0'-0.1' asphalt. 0.1'-0.5' crushed limestone.			
					(SM) Dark brown, fine grained, silty sand, slight fuel odor.		SM	
					Tan and gray			
					No fuel odor below 3.0'			
5								
					Gray and brown.			
10								
15								
20								

NOTE:
SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

WELL DATA



i:\eng\smith\jax873\wellog11.dgn

k:\jaxnas\jax873\wellog11.dgn Jun. 11, 1993 10:17:29

ATTACHMENT 4

SUPPLEMENTAL MONITORING WELL DATA

TABLE 1-A

MONITOR WELL
WATER LEVEL DATA

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

18 Feb. 1993

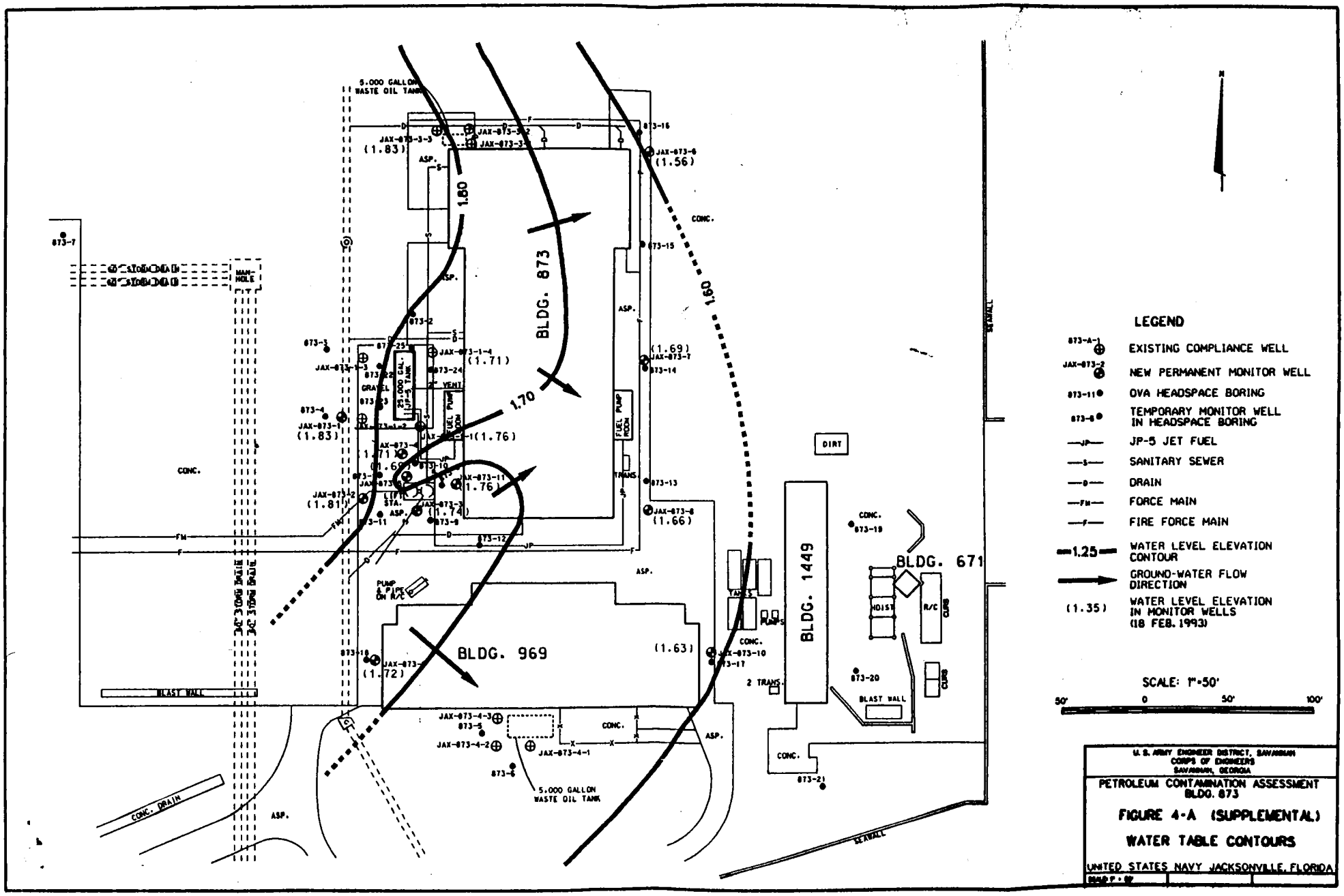
Well No.	Total Depth of Well BLS (ft.)	Top of Casing to Ground Surface (ft.)	Surveyed Top of Casing Elevation (msl)	Screened Interval Depth (ft.)	Depth to Water from Top of Casing (ft.)	Elevation of Water Table (msl)
JAX-873-1	12.84	Flush	7.33	3.5-12.5	5.50	1.83
JAX-873-2	12.92	"	7.47	3.4-12.4	5.66	1.81
JAX-873-3	12.95	"	8.05	4.0-13.0	6.31	1.74
JAX-873-4	13.12	"	7.93	4.0-13.0	6.22	1.71
JAX-873-5	25.08	"	8.04	20.0-24.0	6.35	1.69
JAX-873-6	12.65	"	7.18	3.5-12.5	5.62	1.56
JAX-873-7	12.11	"	7.39	3.5-12.5	5.70	1.69
JAX-873-8	11.47	"	7.29	2.9-11.9	5.63	1.66
JAX-873-9	13.46	"	8.48	4.0-13.0	6.76	1.72
JAX-873-10	12.50	"	6.61	4.0-13.0	4.98	1.63
JAX-873-11	13.76	"	8.77	5.0-14.0	7.01	1.76
JAX-873-1-1 *	NR	"	NR	2.5-12.5	6.63	--
JAX-873-1-3	14.29	"	NR	5.0-15.0	6.02	--
JAX-873-1-4	15.34	"	NR	5.0-15.0	7.26	--
JAX-873-3-3	15.21	"	NR	5.0-15.0	7.04	--

Notes:
- BLS = Below Land Suurface
- flush = Level with ground surface
- NR = Not Recorded
- * = JAX-873-1-1 indicated 1.92 tenths of free product.

6/11/93
pwlevsup.tbl

ATTACHMENT 5

SUPPLEMENTAL WATER TABLE CONTOURS


BLDG. 873
BLDG. 969
BLDG. 1449
BLDG. 671
1.80
1.70
1.60
(1.83)
(1.56)
(1.71)
(1.69)
(1.76)
(1.83)
(1.81)
(1.74)
(1.66)
(1.63)
(1.72)
5,000 GALLON WASTE OIL TANK
CONC.
ASP.
DIRT
BLAST WALL
SEAWALL
CONC. DRAIN
MAN-HOLE
GRAVEL
FUEL PUMP ROOM
TRANS.
LIFT STA.
PUMP & PIPE ON R/C
HOIST
R/C
CURB
LEGEND
EXISTING COMPLIANCE WELL
NEW PERMANENT MONITOR WELL
OVA HEADSPACE BORING
TEMPORARY MONITOR WELL IN HEADSPACE BORING
JP-5 JET FUEL
SANITARY SEWER
DRAIN
FORCE MAIN
FIRE FORCE MAIN
WATER LEVEL ELEVATION CONTOUR
GROUND-WATER FLOW DIRECTION
(1.35) WATER LEVEL ELEVATION IN MONITOR WELLS (18 FEB. 1993)
SCALE: 1"=50'
50' 0 50' 100'
U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873
FIGURE 4-A (SUPPLEMENTAL)
WATER TABLE CONTOURS
UNITED STATES NAVY JACKSONVILLE, FLORIDA

ATTACHMENT 6

FDER COMMENTS AND REQUEST FOR SUPPLEMENTAL ASSESSMENT

Florida Department of Environmental Regulation
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400
Lawton Chiles, Governor
Carol M. Browner, Secretary

September 15, 1992

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Carl Loop
Code 18237
Department of the Navy
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
P.O. Box 10068
Charleston, South Carolina 26411-0068

Dear Mr. Loop:

Department personnel have completed the technical review of the Draft Contamination Assessment Report for Building 873-Kemen Test Cell, NAS Jacksonville. I have enclosed a memorandum addressed to me from Mr. Jorge Caspary. It documents our comments on the referenced report.

If I can be of any further assistance with this matter, please contact me at 904/488-0190.

Sincerely,

Eric S. Nuzie

Eric S. Nuzie
Federal Facilities Coordinator

ESN/bb.

cc: Jorge Caspary
Brian Cheary
Lynn Griffin
John Mitchell
Jerry Young
James Hudson
Kevin Gartland

Recycled Paper

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

Interoffice Memorandum

TO: Eric S. Nuzie, Federal Facilities Coordinator
Bureau of Waste Cleanup

THROUGH: Dr. James J. Crane, PGIII/Administrator
Technical Review Section JJC

FROM: Jorge R. Caspary, P.G; Base Coordinator
Technical Review Section JRC

DATE: September 1, 1992

SUBJECT: Review of Draft Contamination Assessment Report Building 873-Kemen Test Cell. Naval Air Station Jacksonville.

The Bureau of Waste Cleanup has reviewed the Contamination Assessment Report (CAR) dated April 1992 (received July 27, 1992), submitted for this site. In order to meet the requirements of Chapter 17-770, Florida Administrative Code (F.A.C.), the following comments need to be addressed:

1).- Please indicate what efforts have been accomplished to date in repairing the defective manway gaskets and fittings of Tank 1 - Series # 873. Failure to repair leaks as required by Chapter 17-761, F.A.C., shall be construed to be gross negligence in the maintenance of a petroleum storage system.

2).- Free product recovery should be implemented in accordance with Rule 17-770.300(1), F.A.C., if measurable amounts are detected at any monitoring well.

3).- An additional, permanent monitoring well should be installed as follows to define the horizontal and vertical extent of the groundwater contamination in the downgradient direction:

a) One water table well located approximately ten (10) feet east of soil boring 873-8.

4).- Following installation of the supplemental monitoring well, a complete round of sampling and analysis for EPA Methods 602 (including MTBE) and 610 should be performed, so that this review can be completed and a Remedial Action Plan (RAP) can be prepared based on current data. Note, additional monitoring wells should be installed if significant contaminant concentrations are detected at perimeter monitoring wells of any affected stratum or at the vertical extent well.

5).- Following installation of the supplemental monitoring well, and concurrent with the sampling event, a complete set of water level measurements must be obtained in order to verify the direction of groundwater flow and to estimate fluctuations in the water table. These data must be provided in tabular form (including top of casing elevations, depths to water, and corresponding water level elevations) and in graphic form showing the consultant's interpretation of the groundwater flow direction.

Please provide the results of the supplemental assessment to the Technical Review Section within sixty (60) days of receipt of this request. If additional time is needed, a time extension request should be submitted, in accordance with Rule 17-770.800(6), F.A.C. If there are any questions concerning this review, please contact Jorge R. Caspary at (904) 488-0190.

Please note, all supplemental contamination assessment related documents should be signed and sealed by a registered professional in accordance with Rule 17-770.500, F.A.C. The certification should be made by a registered professional who is able to demonstrate competence in the subject area(s) addressed within the sealed document.

ATTACHMENT 7

SUPPLEMENTAL LABORATORY ANALYTICAL DATA

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S3-41009

Received: 22 FEB 93

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA2191A0009

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-1	TRIP BLANK	02-18-93

PARAMETER	41009-1
Purgeable Aromatics (602)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10
Surrogate - Trifluoro - toluene % Rec, %	98

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S3-41009

Received: 22 FEB 93

Contract: DACA2191A0009

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-2	PRECLEAN EQP BLK-873-2-93	02-18-93
41009-3	JAX-873-3-3-2-93	02-18-93
41009-4	JAX-873-6-2-93	02-18-93
41009-5	JAX-873-7-2-93	02-18-93
41009-6	JAX-873-8-2-93	02-18-93

PARAMETER	41009-2	41009-3	41009-4	41009-5	41009-6
Purgeable Aromatics (602)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10	<10
Surrogate - Trifluoro - toluene % Rec, %	97	100	97	98	98

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S3-41009

Received: 22 FEB 93

Contract: DACA2191A0009

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-2	PRECLEAN EQP BLK-873-2-93	02-18-93
41009-3	JAX-873-3-3-2-93	02-18-93
41009-4	JAX-873-6-2-93	02-18-93
41009-5	JAX-873-7-2-93	02-18-93
41009-6	JAX-873-8-2-93	02-18-93

PARAMETER	41009-2	41009-3	41009-4	41009-5	41009-6
Polynuclear Aromatics (610)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
Surrogate-2FBP	73 %	72 %	58 %	71 %	57 %

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Savannah, Georgia 31402-0889

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-7	JAX-873-10-2-93	02-18-93
41009-8	JAX-873-9-2-93	02-18-93
41009-9	JAX-873-3-2-93	02-18-93
41009-10	JAX-873-2-2-93	02-18-93
41009-11	FLD CLN EQP VLK-873-2-93	02-18-93

PARAMETER	41009-7	41009-8	41009-9	41009-10	41009-11
Purgeable Aromatics (602)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10	<10
Surrogate - Trifluoro - toluene % Rec, %	99	102	99	101	99

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Received: 22 FEB 93

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA2191A0009

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-7	JAX-873-10-2-93	02-18-93
41009-8	JAX-873-9-2-93	02-18-93
41009-9	JAX-873-3-2-93	02-18-93
41009-10	JAX-873-2-2-93	02-18-93
41009-11	FLD CLN EQP VLK-873-2-93	02-18-93

PARAMETER	41009-7	41009-8	41009-9	41009-10	41009-11
Polynuclear Aromatics (610)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
Surrogate-2FBP	70 %	73 %	75 %	60 %	73 %

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Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-12	JAX-873-1-2-93	02-18-93
41009-13	JAX-873-1-DUP-2-93	02-18-93
41009-14	JAX-873-1-3-2-93	02-18-93
41009-15	JAX-873-1-4-2-93	02-19-93
41009-16	JAX-873-11-2-93	02-19-93

PARAMETER	41009-12	41009-13	41009-14	41009-15	41009-16
Purgeable Aromatics (602)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10	<10
Surrogate - Trifluoro - toluene % Rec, %	98	93	91	89	90

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LOG NO: S3-41009

Received: 22 FEB 93

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA2191A0009

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-12	JAX-873-1-2-93	02-18-93
41009-13	JAX-873-1-DUP-2-93	02-18-93
41009-14	JAX-873-1-3-2-93	02-18-93
41009-15	JAX-873-1-4-2-93	02-19-93
41009-16	JAX-873-11-2-93	02-19-93

PARAMETER	41009-12	41009-13	41009-14	41009-15	41009-16
Polynuclear Aromatics (610)					
Acenaphthene, ug/l	<10	<10	<10	<10	<20*
Acenaphthylene, ug/l	<10	<10	<10	<10	<20*
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<20*
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<20*
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<20*
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<20*
Fluoranthene, ug/l	<10	<10	<10	<10	<20*
Fluorene, ug/l	<10	<10	<10	<10	<20*
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<20*
Naphthalene, ug/l	<10	<10	<10	<10	<20*
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<20*
Pyrene, ug/l	<10	<10	<10	<10	<20*
Surrogate-2FBP	61 %	62 %	67 %	63 %	80 %

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Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-17	JAX-873-5-2-93	02-19-93
41009-18	JAX-873-4-2-93	02-19-93
41009-19	JAX-873-4-DUP-2-93	02-19-93

PARAMETER	41009-17	41009-18	41009-19
Purgeable Aromatics (602)			
Benzene, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10
Surrogate - Trifluoro - toluene % Rec, %	91	93	91
Polynuclear Aromatics (610)			
Acenaphthene, ug/l	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10
Fluorene, ug/l	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	14	13
Pyrene, ug/l	<10	<10	<10

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Received: 22 FEB 93

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Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41009-17	JAX-873-5-2-93	02-19-93
41009-18	JAX-873-4-2-93	02-19-93
41009-19	JAX-873-4-DUP-2-93	02-19-93

PARAMETER	41009-17	41009-18	41009-19
Surrogate-2FBP	66 %	50 %	60 %

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Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41009-20	Detection Limits-Water
41009-21	Method Blank Results-Water
41009-22	Lab Control Standard Result/Dup
41009-23	LCS Expected Value
41009-24	LCS % Recovery/Duplicate

PARAMETER	41009-20	41009-21	41009-22	41009-23	41009-24
Purgeable Aromatics (602)					
Benzene, ug/l	1.0	<1.0	8.6/9.3	10	86/93 %
Chlorobenzene, ug/l	1.0	<1.0	7.6/8.1	10	76/81 %
1,2-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
1,3-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
1,4-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
Ethylbenzene, ug/l	1.0	<1.0	---	---	---
Toluene, ug/l	1.0	<1.0	7.7/8.2	10	77/82 %
Xylenes, ug/l	1.0	<1.0	---	---	---
Methyl-Tert-Butyl-Ether (MTBE), ug/l	10	<10	---	---	---

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Project: NAS BLD 873
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41009-20	Detection Limits-Water
41009-21	Method Blank Results-Water
41009-22	Lab Control Standard Result/Dup
41009-23	LCS Expected Value
41009-24	LCS % Recovery/Duplicate

PARAMETER	41009-20	41009-21	41009-22	41009-23	41009-24
Polynuclear Aromatics (610)					
Acenaphthene, ug/l	10	<10	31.9/32.6	50	64/65 %
Acenaphthylene, ug/l	10	<10	---	---	---
Benzo(a)pyrene, ug/l	10	<10	38.0/40.1	50	76/80 %
Benzo(g,h,i)perylene, ug/l	10	<10	---	---	---
Benzo(b,k)fluoranthene, ug/l	10	<10	---	---	---
Chrysene + Benzo(a)anthracene, ug/l	10	<10	---	---	---
Fluoranthene, ug/l	10	<10	---	---	---
Fluorene, ug/l	10	<10	35.4/35.3	50	71/71 %
Indeno(1,2,3-cd)pyrene+Dibe nzo(a,h)anthracene, ug/l	10	<10	---	---	---
Naphthalene, ug/l	10	<10	30.6/31.5	50	61/63 %
Phenanthrene + Anthracene, ug/l	10	<10	---	---	---
Pyrene, ug/l	10	<10	40.2/39.5	50	80/79 %

Methods: EPA 40 CFR Part 136
Savannah Environmental Laboratory HRS Cert. #87052
Savannah Drinking Water HRS Cert. #87279
* Elevated detection limits were reported due to matrix interference which required sample dilution.

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Contract: DACA2191A0009

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41009-25	LCS Control Limits
41009-26	LCS % RPD
41009-27	% RPD Control Limits
41009-28	Date Extracted-Water
41009-29	Date Analyzed-Water

PARAMETER	41009-25	41009-26	41009-27	41009-28	41009-29
Purgeable Aromatics (602)					
Benzene	61-131 %	7.8 %	<25 %	---	02.25.93
Chlorobenzene	25-144 %	6.3 %	<29 %	---	02.25.93
Toluene	64-144 %	6.3 %	<14 %	---	02.25.93
1,2-Dichlorobenzene	---	---	---	---	02.25.93
1,3-Dichlorobenzene	---	---	---	---	02.25.93
1,4-Dichlorobenzene	---	---	---	---	02.25.93
Ethylbenzene	---	---	---	---	02.25.93
Xylenes	---	---	---	---	02.25.93
Methyl-Tert-Butyl-Ether (MTBE)	---	---	---	---	02.25.93

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Contract: DACA2191A0009

Project: NAS BLD 873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41009-25	LCS Control Limits
41009-26	LCS % RPD
41009-27	% RPD Control Limits
41009-28	Date Extracted-Water
41009-29	Date Analyzed-Water

PARAMETER	41009-25	41009-26	41009-27	41009-28	41009-29
Polynuclear Aromatics (610)					
Acenaphthene	38-111 %	1.5 %	<21 %	02.24.93	03.09.93
Benzo(a)pyrene	24-132 %	5.1 %	<78 %	02.24.93	03.09.93
Fluorene	39-115 %	0 %	<23 %	02.24.93	03.09.93
Naphthalene	34-103 %	3.2 %	<25 %	02.24.93	03.09.93
Pyrene	36-124 %	1.3 %	<37 %	02.24.93	03.09.93
Acenaphthylene	---	---	---	02.24.93	03.09.93
Benzo(g,h,i)perylene	---	---	---	02.24.93	03.09.93
Benzo(b,k)fluoranthene	---	---	---	02.24.93	03.09.93
Chrysene + Benzo(a)anthracene	---	---	---	02.24.93	03.09.93
Fluoranthene	---	---	---	02.24.93	03.09.93
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene	---	---	---	02.24.93	03.09.93
Phenanthrene + Anthracene	---	---	---	02.24.93	03.09.93

Methods: EPA 40 CFR Part 136
Savannah Environmental Laboratory HRS Cert. #87052
Savannah Drinking Water HRS Cert. #87279
* Elevated detection limits were reported due to matrix interference which required sample dilution.

Steven J. White

Steven J. White

Final Page Of Report

SL SAVANNAH LABORATORIES ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 Phone: (912) 354-7858 Fax (912) 352-01
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 Phone: (904) 878-3994 Fax (904) 878-95
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 Phone: (305) 421-7400 Fax (305) 421-25
☐ 900 Lakeside Drive, Mobile, AL 36693 Phone: (205) 666-6633 Fax (205) 666-6
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 Phone: (813) 885-7427 Fax (813) 885-704

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER:
PROJECT NAME: JAX NAS Bld 873
CLIENT NAME: U S Army Corp of Eng
TELEPHONE/FAX NO.: (912)652-5311
CLIENT ADDRESS: PO Box 889
CITY, STATE, ZIP CODE: Savannah, Ga 31401
SAMPLER(S) NAME(S): J Smith, J Biddle
CLIENT PROJECT MANAGER: Cardwell Smith

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

REQUIRED ANALYSES: 602+MTBE, 610

LEVEL II REPORTING

PAGE 2 OF 2

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

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602+MTBE (NUMBER OF CONTAINERS SUBMITTED)	610 (NUMBER OF CONTAINERS SUBMITTED)
2/18/93	14:24	JAX-873-1-Dup-2-93	X				4	2
2/18/93	15:10	JAX-873-1-3-2-93	X				4	2
2/19/93	08:25	JAX-873-1-4-2-93	X				4	2
2/19/93	09:15	JAX-873-11-2-93	X				4	2
2/19/93	10:20	JAX-873-5-2-93	X				4	2
2/19/93	10:55	JAX-873-4-2-93	X				4	2
2/19/93	10:55	JAX-873-4-Dup-2-93	X				4	2

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
S Sanquel	2/16/93	1:00	Lydia Miller					
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[illegible]	2/16/93	1:35	[illegible]	2.22.93	1920			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
[illegible]	2/22/93	1:20	☑ YES ☐ NO		41009

LABORATORY REMARKS:

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-785 — Fax (912) 352-
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER:
PROJECT NAME: JAX NAS Bld 873
CLIENT NAME: US Army Corp of Eng
TELEPHONE/FAX NO.: (912) 652-5311
CLIENT ADDRESS: P.O. Box 889
CITY, STATE, ZIP CODE: Savannah, Ga 31401
SAMPLER(S) NAME(S): J Smith, J Biddle
CLIENT PROJECT MANAGER: Cardwell Smith

PAGE 1 OF 2

REQUIRED ANALYSES: LEVEL II REPORTING

☑ STANDARD TAT
☐ EXPEDITED TAT *

REPORT DUE DATE _____
* SUBJECT TO RUSH FEES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	602+ MTBE	GID
2/18/93		Trip Blank	X				4	
2/18/93	08:05	Preclean Eqp Blk-873-2-93	X				4	2
2/18/93	08:22	JAX-873-3-3-2-93	X				4	2
2/18/93	08:58	JAX-873-6-2-93	X				4	2
2/18/93	09:25	JAX-873-7-2-93	X				4	2
2/18/93	09:56	JAX-873-8-2-93	X				4	2
2/18/93	10:30	JAX-873-10-2-93	X				4	2
2/18/93	11:05	JAX-873-9-2-93	X				4	2
2/18/93	13:30	JAX-873-3-2-93	X				4	2
2/18/93	13:55	JAX-873-2-2-93	X				4	2
2/18/93	14:04	Fld Cln Eqp Blk-873-2-93	X				4	2
2/18/93	14:24	JAX-873-1-2-93	X				4	2

NUMBER OF CONTAINERS SUBMITTED

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
S Samuel	2/18/93	1:00	Lydia Miller					
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[illegible]	2/18/93	1:35	Jan a Biddle	2.22.93	1320			

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RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
L. Johnson	2/22/93	1:20	☑ YES ☐ NO		41009

LABORATORY REMARKS

DRAFT
CONTAMINATION ASSESSMENT REPORT

NAVAL AIR STATION JACKSONVILLE
BUILDING 873 - KEMEN TEST CELL

JACKSONVILLE, FLORIDA

PREPARED FOR

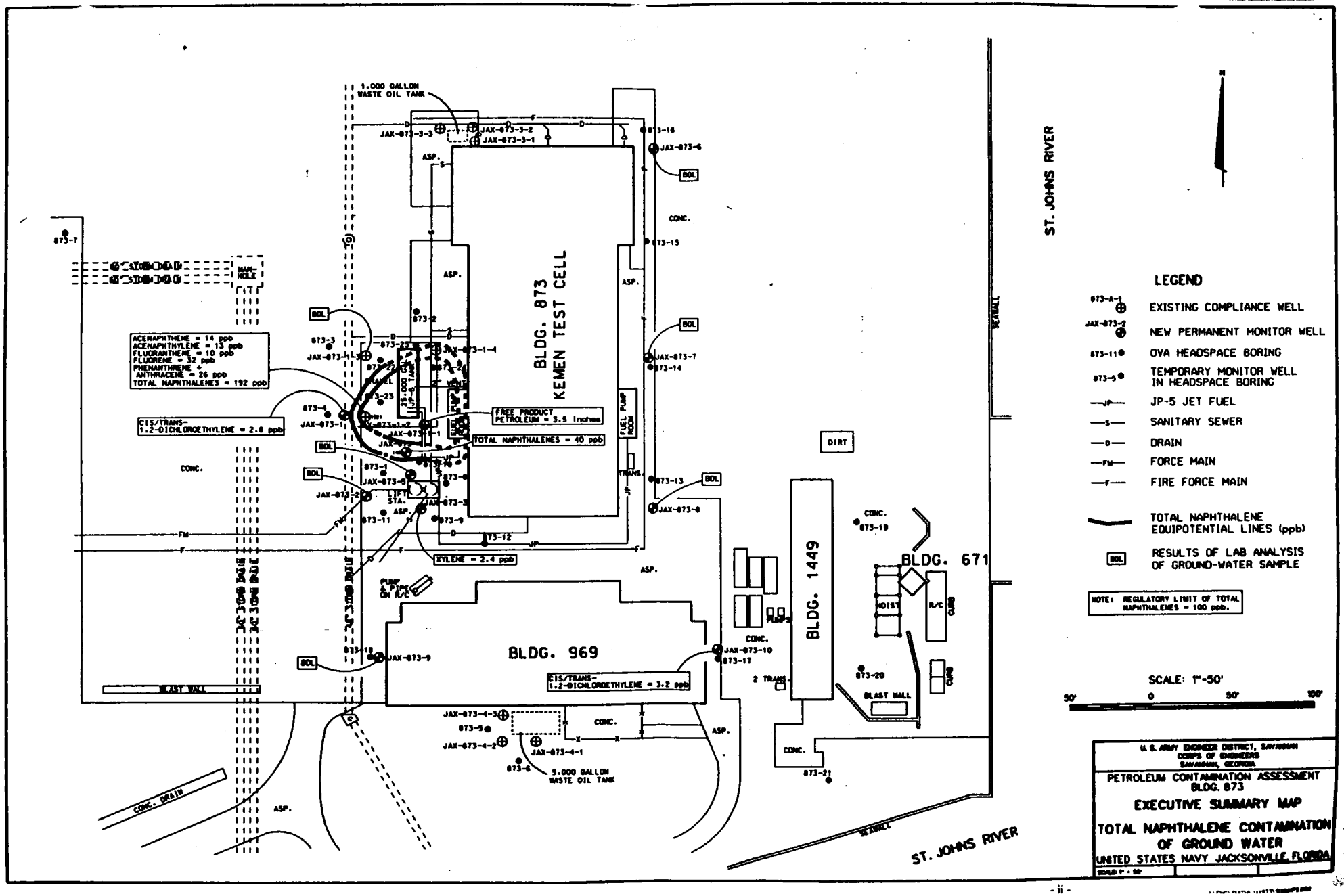
UNITED STATES NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

PREPARED BY

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
SAVANNAH, GEORGIA

~~APRIL~~ 1992
May

5/1/92
jax873.car


1,000 GALLON WASTE OIL TANK
JAX-873-3-3
JAX-873-3-2
JAX-873-3-1
873-16
JAX-873-6
BDL
CONC.
873-15
ASP.
BLDG. 873
KEMEN TEST CELL
873-7
MAN-HOLE
873-2
873-3
JAX-873-1-3
873-22
JAX-873-1-4
JAX-873-7
873-14
ACENAPHTHENE = 14 ppb
ACENAPHTHYLENE = 13 ppb
FLUORANTHENE = 10 ppb
FLUORENE = 32 ppb
PHENANTHRENE +
ANTHRACENE = 26 ppb
TOTAL NAPHTHALENES = 192 ppb
873-4
JAX-873-1
873-23
FREE PRODUCT PETROLEUM = 3.5 inches
TOTAL NAPHTHALENES = 40 ppb
CIS/TRANS-1,2-DICHLOROETHYLENE = 2.8 ppb
JAX-873-1-2
JAX-873-1-1
FUEL PUMP ROOM
TRANS.
JP
873-1
JAX-873-5
JAX-873-2
LIFT STA.
JAX-873-3
873-8
873-11
873-9
873-12
873-13
JAX-873-8
FM
XYLENE = 2.4 ppb
PUMP & PIPE ON R/C
873-18
JAX-873-9
BLAST WALL
BLDG. 969
CIS/TRANS-1,2-DICHLOROETHYLENE = 3.2 ppb
JAX-873-4-3
873-5
JAX-873-4-2
JAX-873-4-1
873-6
5,000 GALLON WASTE OIL TANK
CONC. DRAIN
DIRT
BLDG. 1449
BLDG. 671
873-19
HOIST
R/C
CURB
PUMP
JAX-873-10
873-17
2 TRANS.
873-20
873-21
SEAWALL
ST. JOHNS RIVER
LEGEND
873-A-1 EXISTING COMPLIANCE WELL
JAX-873-2 NEW PERMANENT MONITOR WELL
873-11 OVA HEADSPACE BORING
873-5 TEMPORARY MONITOR WELL IN HEADSPACE BORING
JP JP-5 JET FUEL
S SANITARY SEWER
D DRAIN
FM FORCE MAIN
F FIRE FORCE MAIN
TOTAL NAPHTHALENE EQUIPOTENTIAL LINES (ppb)
BDL RESULTS OF LAB ANALYSIS OF GROUND-WATER SAMPLE
NOTE: REGULATORY LIMIT OF TOTAL NAPHTHALENES = 100 ppb.
SCALE: 1"=50'
50' 0 50' 100'
U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873
EXECUTIVE SUMMARY MAP
TOTAL NAPHTHALENE CONTAMINATION OF GROUND WATER
UNITED STATES NAVY JACKSONVILLE, FLORIDA

EXECUTIVE SUMMARY

A contamination assessment has determined that ground-water and soil contamination around an underground petroleum storage tank at the Naval Air Station Jacksonville Kemen Test Cell (Building 873) is in violation of Florida Department of Environmental Regulation (FDER) Chapter 17-770, Florida Administrative Code (FAC), regulations for underground petroleum contamination.

Although four of five ground-water monitoring wells installed around a 25,000-gallon JP-5 jet fuel tank, as part of this contamination assessment, indicated petroleum contaminants such as xylene and naphthalenes at concentrations ranging from 2.4 to 35 parts per billion (ppb), none of these wells exceeded regulatory limits for petroleum contaminants. However, a previously installed compliance monitoring well, near the 25,000-gallon tank, did indicate total naphthalene contamination at a concentration of 192 ppb. The regulatory standard for total naphthalenes is 100 ppb. Also, during periodic water level readings taken during the investigation, another previously installed compliance monitoring well yielded varying amounts of free-product petroleum, ranging from approximately 1½ to 3½ inches.

Five additional monitoring wells installed around the perimeter of the Test Cell building (873) and its associated cooling tower (Building 969) did not indicate any petroleum contaminants above regulatory limits.

The contaminant plume around the 25,000-gallon fuel tank, based on laboratory analytical results for total naphthalenes, is shown on the executive summary map on the following page. The contamination at this site remains entirely on Navy property. The vertical extent of contamination does not appear to exceed 25 feet below land surface, based on the results of laboratory analyses of ground-water samples. The contaminant plume appears to be migrating down-gradient to the south-southeast from the source area.

The petroleum contamination at the site is believed to be due to cumulative effects of spills due to overtopping of the 25,000-gallon jet fuel tank and leaking pump seals in an adjacent fuel pump room attached to the Test Cell building (873).

Based on the findings of this contamination assessment, it is recommended that a Remedial Action Plan (RAP) be prepared to address the cleanup of the contamination.

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 (UST's) containing hazardous materials, especially petroleum products. Hazardous wastes stored in UST's were already regulated under the Resource Conservation and Recovery Act (RCRA) of 1976, which was also an amendment to SWDA. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The program was designed to be administered by the individual states, who were allowed to develop more stringent standards, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are 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 Title 40 CFR 281 (Approval of State Underground Storage Tank Programs). Title 40 CFR 280 was revised and published on 23 September 1988 and became effective 22 December 1988.

The Navy's UST Program policy is to comply with all Federal, State, and local regulations pertaining to UST's. 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) regulations on petroleum contamination in Florida's environment as resulting from spills or leaking tanks or piping.

Questions regarding this report should be addressed to the Commanding Officer, Naval Air Station Jacksonville, Jacksonville, Florida, or to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Code ~~1023~~ 1047, at AUTOVON 563-0528 or 803-743-0528.

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ACRONYMS AND ABBREVIATIONS

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

BDL	below detection limits
BETX	benzene, ethyl benzene, toluene, and xylenes
bls	below land surface
CA	Contamination Assessment
CAP	Contamination Assessment Plan
CAR	Contamination Assessment Report
CESAS	Corps of Engineers, South Atlantic Division, Savannah District
CFR	Code of Federal Regulations
CH	High plasticity clay (Unified Soil Classification System)
CL	Low plasticity clay (Unified Soil Classification System)
COE	Corps of Engineers
CompQAP	Comprehensive Quality Assurance Plan
°C	degrees Celsius
EDB	ethylene dibromide
FAC	Florida Administrative Code
FDER	Florida Department of Environmental Regulation
ft/day	feet per day
GC	gas chromatograph
gpd/ft	gallons per day per foot
GPM	gallons per minute
HSWA	Hazardous and Solid Waste Amendments of 1984
K	hydraulic conductivity
MH	High plasticity silt (Unified Soil Classification System)
ML	Low plasticity silt (Unified Soil Classification System)
msl	mean sea level
MGD	Million gallons per day
MTBE	methyl-tert-butyl-ether
OH	High plasticity organic clay (Unified Soil Classification System)
OL	Low plasticity organic silt or clayey silt (Unified Soil Classification System)
OVA	organic vapor analyzer
OVM	organic vapor monitor (see PID)
PAH	polynuclear aromatic hydrocarbons
PCA	Preliminary Contamination Assessment
PCAR	Preliminary Contamination Assessment Report
PID	Photo-ionization Detector
ppb	parts per billion
ppm	parts per million
PVC	polyvinyl chloride
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
SC	Clayey sand (Unified Soil Classification System)
SM	Silty sand (Unified Soil Classification System)
SP	Poorly graded sand (Unified Soil Classification System)
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
SPT	standard penetration test
SWDA	Solid Waste Disposal Act of 1965

ACRONYMS AND ABBREVIATIONS (cont'd)

T	transmissivity
TRPH	total recoverable petroleum hydrocarbons
µg/l	micrograms per liter
µmhos/cm	micromhos per centimeter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UST	underground storage tank
V	pore water velocity
VOA	volatile organic aromatic

1.0 INTRODUCTION

The U.S. Army Corps of Engineers, Savannah District was contracted by Southern Division, Naval Facilities Engineering Command, Charleston, South Carolina, to perform a contamination assessment at the Kemen Test Cell (Building 873), Naval Air Station Jacksonville, Jacksonville, Florida.

The purpose of the assessment was to determine the degree and extent of contamination to soil and ground water caused by petroleum product suspected of leaking from an underground storage tank at the site. The assessment of the site was conducted in several phases, from June 1991 to January 1992 and included:

- Performing headspace analysis of soils to determine the extent of soil contamination;
- The installation and sampling of monitoring wells to determine the vertical and horizontal extent of petroleum contamination of ground water;
- The collection of water level data to determine direction of ground-water flow;
- Performing recovery testing on selected monitoring wells to estimate aquifer characteristics; and
- Performing a survey of potable water wells in the vicinity of the site.

The work presented in this contamination assessment report (CAR) was performed in compliance with Chapter 17-770, Florida Administrative Code (FAC), State Underground Petroleum Environmental Response, and Florida Department of Environmental Regulation (FDER) "Guidelines for Assessment and Remediation of Petroleum Contaminated Soils."

2.0 BACKGROUND

2.1 Site Description

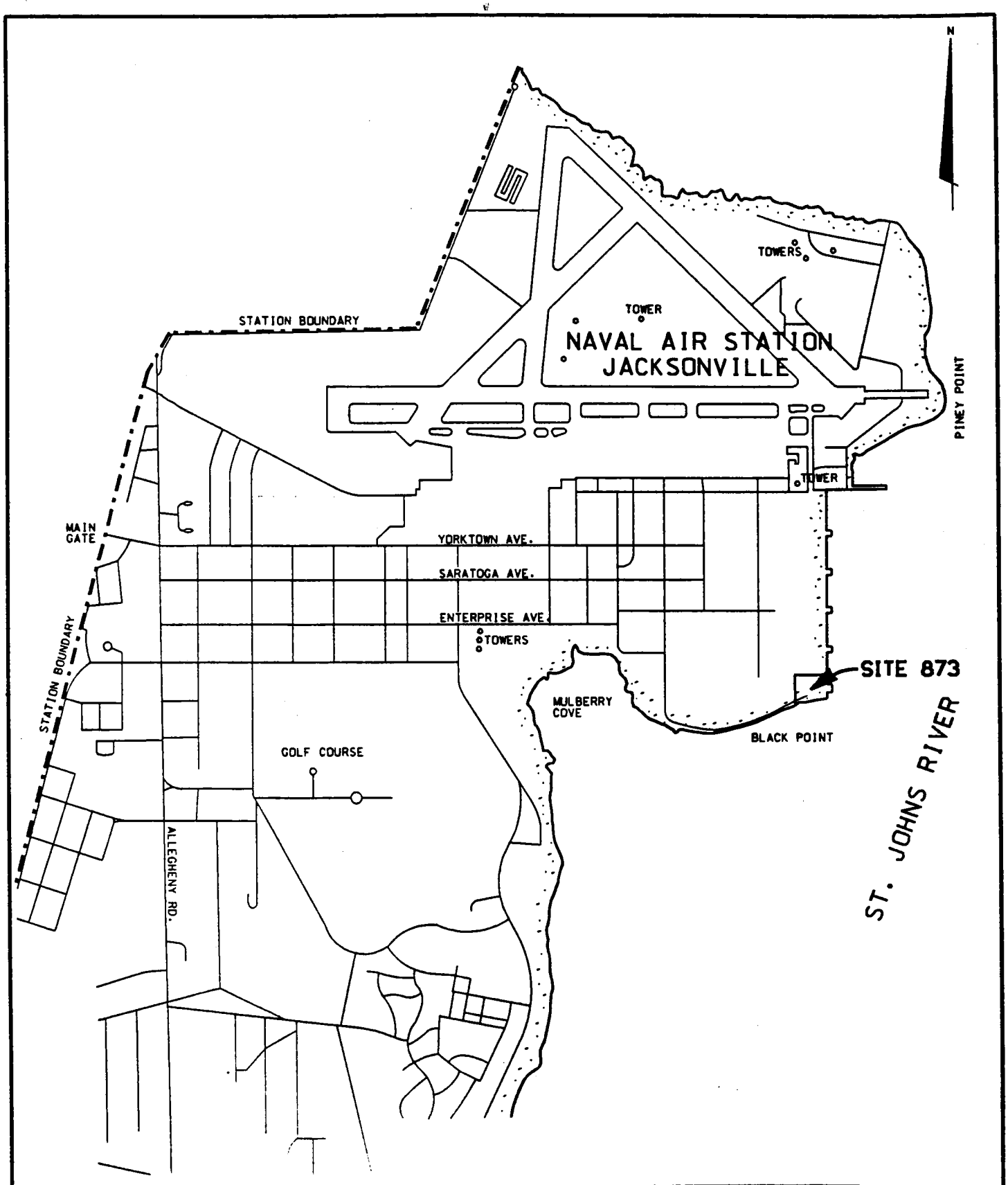
Naval Air Station Jacksonville is located approximately 8 miles south of Jacksonville, Florida, on the west bank of the St. Johns River. Figure 1 is a site location map of the air station facility. The Kemen Test Cell (Building 873) is located on Black Point approximately 200 feet from the seawall along the river (see figure 2). The Test Cell is a jet aircraft engine testing facility.

2.2 Site History

In 1974, an underground petroleum storage tank was installed on the west side of Building 873 as indicated on figure 2. The tank, designated 873-1, is constructed of steel and has a capacity of 25,000 gallons. The tank is used to store JP-5 jet fuel which is pumped into the test cell for use during jet engine testing.

In October of 1989, while performing field investigations for SOUTHNAVFACENGCOM's Release Detection Program For Underground Storage Tanks, E. C. Jordan Company installed compliance monitoring wells around underground storage tanks 873-1, 873-2 and 873-3 at Building 873. Four of these compliance wells, (labeled JAX-873-1-1 through JAX-873-1-4 on figure 2), were installed to monitor conditions at tank 873-1. During installation of the compliance wells at tank 873-1, petroleum odors were noted in the soil and ground water at the location of monitor well JAX-873-1-4. Subsequent research indicated that Test Cell personnel had noted problems several times in the past with leaking pump seals in the pumps used to move fuel from the storage tank to the Test Cell. These pumps are located approximately 25 feet to the east of tank 873-1, in a pump room attached to the side of the Test Cell building. The earliest known occurrence of the seal leaks was in June of 1982. In June of 1990, tank 873-1 passed a tightness test. A copy of the test results is included in appendix F.

A contamination assessment was begun at the site in June 1991 to determine the nature and extent of petroleum contamination as required by Chapter 17-770, FAC.



SCALE: 1"=2000'

2000' 0 2000' 4000'

U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

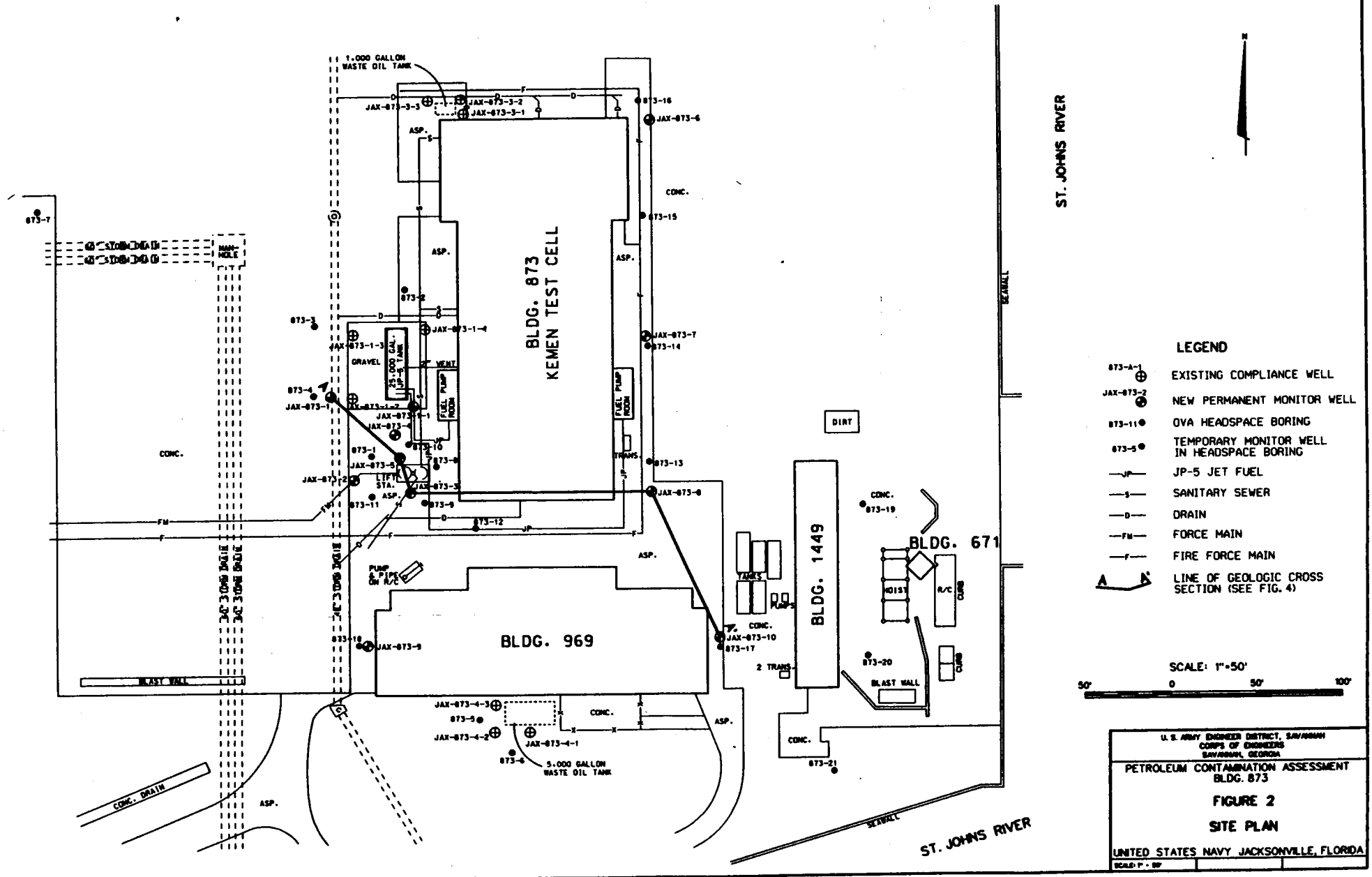
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873

FIGURE 1

SITE LOCATION MAP

UNITED STATES NAVY JACKSONVILLE, FLORIDA

SCALE: 1" = 20'


1,000 GALLON WASTE OIL TANK
JAX-873-3-3
JAX-873-3-2
JAX-873-3-1
873-16
JAX-873-6
ASP.
CONC.
873-15
BLDG. 873
KEMEN TEST CELL
873-7
MAN-HOLE
873-2
873-3
JAX-873-1-4
JAX-873-1-3
GRAVEL
25,000 GAL. JP-5 TANK
VENT
FUEL PUMP ROOM
JAX-873-7
873-14
873-4
JAX-873-1
JAX-873-1-2
JAX-873-1-1
JAX-873-4
873-10
873-1
JAX-873-5
873-8
JAX-873-2
LIFT STA.
JAX-873-3
873-11
873-9
873-12
TRANS.
873-13
JAX-873-8
FM
JP
PUMP & PIPE ON R/C
BLDG. 969
873-18
JAX-873-9
BLAST WALL
JAX-873-4-3
873-5
JAX-873-4-2
JAX-873-4-1
873-6
5,000 GALLON WASTE OIL TANK
CONC. DRAIN
DIRT
BLDG. 1449
TANKS
PUMPS
2 TRANS.
JAX-873-10
873-17
873-19
BLDG. 671
HOIST
R/C
CURB
873-20
873-21
SEAWALL
ST. JOHNS RIVER
N
LEGEND
873-A-1 EXISTING COMPLIANCE WELL
JAX-873-2 NEW PERMANENT MONITOR WELL
873-11 OVA HEADSPACE BORING
873-5 TEMPORARY MONITOR WELL IN HEADSPACE BORING
JP JP-5 JET FUEL
S SANITARY SEWER
D DRAIN
FM FORCE MAIN
F FIRE FORCE MAIN
A A' LINE OF GEOLOGIC CROSS SECTION (SEE FIG. 4)
SCALE: 1"=50'
50' 0 50' 100'
U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873
FIGURE 2
SITE PLAN
UNITED STATES NAVY JACKSONVILLE, FLORIDA

3.0 SITE CONDITIONS

3.1 Physiography

Regional physiography is discussed in appendix A. The site lies within the Coastal Lowland physiographic division of northeastern Florida, which runs roughly parallel to the coastline and extends from the Atlantic Ocean to just west of downtown Jacksonville. Site elevations range from approximately 6 to 9 feet above msl. Site surface drainage is controlled by the St. Johns River to the south and east.

3.2 Regional Hydrogeology

The southeast Georgia and northeast Florida area is underlain by two main aquifer systems: the Surficial aquifer system and the Floridan aquifer system. A third aquifer system, the Southeastern Coastal Plain aquifer system, underlies the Floridan aquifer system in southeast Georgia, portions of northeast Florida, and the Florida panhandle. These systems are further discussed in appendix A.

3.3 Site Hydrogeology

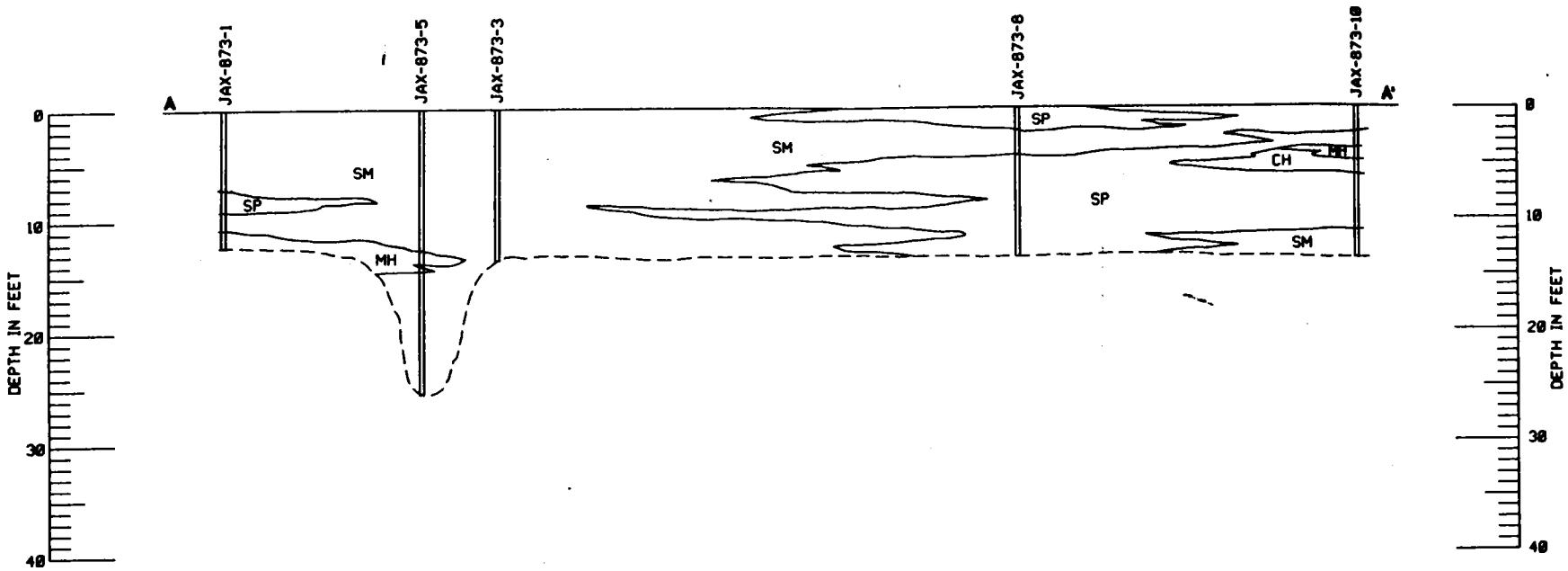
Naval Air Station Jacksonville is underlain by three water-bearing zones; the surficial aquifer, a shallow rock aquifer, and the Floridan aquifer system.

The surficial aquifer consists generally of unconsolidated sands with varying amounts of clay and silt to an approximate depth of 25 feet below land surface (bls). Figure 3 depicts the generalized geology encountered during drilling activities at the site (see appendix C for lithologic logs). Soil borings indicate the near-surface geology, to a depth of approximately 25 feet bls, consists of brown to gray, fine grained silty sand (SM) and brown, fine grained, poorly sorted sand (SP) with some clayey silt and gray high plasticity clay (MH and CH), and frequent shells and shell fragments. No confining units were encountered during drilling activities at the site.

Recharge to the surficial aquifer is by way of infiltrating rainwater. The depth to the water table at the site varied from approximately 5.5 feet to 6.5 below land surface (bls). The general direction of ground-water flow at the site, as determined from water level measurements obtained from monitor wells during the investigation, appears to be towards the St Johns River to the south and east.

Although the shallow rock aquifer was not encountered during drilling at the site, it is described as consisting of permeable deposits of sand, shell, and limestone within and below the Hawthorn Formation (Fairchild, 1972). The general direction of ground-water flow in the shallow rock aquifer is believed to be to the east (Fairchild, 1972).

The Floridan aquifer system is the principal source of fresh water in northeast Florida. It is confined from above by clay units within the Hawthorn Formation. Ground-water flow in the Floridan is thought to be generally toward areas of heavy pumping in Jacksonville. However, a severe depression in the potentiometric surface due to pumping makes it difficult to predict the direction of local flow in the aquifer (Geraghty & Miller, 1985). Very little recharge to the Floridan occurs in the Duval County area. Recharge to the aquifer is from up-dip areas to the west where units of the aquifer are nearer to the surface. The potentiometric surface of the upper Floridan in the vicinity of the facility is approximately 30 feet above mean sea level (Geraghty & Miller, 1985), indicating an upward gradient from the Floridan to the overlying shallower aquifers.



SCALE: 1"=10' VERT.
1"=30' HORIZ.

LEGEND

MH	CLAYEY SILT
CH	FAT CLAY
SM	SILTY SAND
SP	POORLY GRADED SAND

U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

PETROLEUM CONTAMINATION ASSESSMENT
BUILDING 873 - KEMEN TEST CELL

FIGURE 3

GEOLOGIC CROSS SECTION

UNITED STATES NAVY JACKSONVILLE, FLORIDA

SCALE AS SHOWN

4.0 SITE ASSESSMENT METHODS

4.1 Soil Sampling

A series of 21 shallow soil borings (873-1 through 873-21), ranging from approximately 11 feet to 15 feet deep, were drilled at the site (see figure 2) to determine the horizontal and vertical extent of petroleum contamination in the soil. Appendix B contains additional information on soil boring methods.

4.2 Monitoring Well Installation

Four temporary monitoring wells were installed in soil borings 873-7, 873-13, 873-16, and 873-17, during soil contamination assessment. These wells were set to an approximate depth of 15 feet and were used to determine ground-water gradient and flow direction during site investigations and to help guide the location and depth of permanent wells installed later.

Based on the findings of soil borings and headspace analyses, five permanent monitoring wells (JAX-873-1 through JAX-873-5) were installed within and around an area of elevated OVA readings near the 25,000-gallon JP-5 fuel tank to detect and characterize ground-water contamination at the site.

Five permanent monitoring wells (JAX-873-6 through JAX-873-10) were also installed around the perimeter of the Test Cell (Building 873) and its associated cooling tower (Building 969) to determine if any other areas around the Test Cell were contributing to petroleum contamination at the site. Monitor well installation procedures are discussed in appendix B. Monitor well installation reports are contained in appendix C. Pertinent data on these permanent monitor wells can also be found in table 1.

4.3 Ground-water Elevation Survey

The elevation and gradient of the water table was determined by referencing the top of the temporary monitor well casings to a temporary bench mark (TBM) established inside the bay door to Building 873. This TBM was referenced to the finished floor elevation (10.00) indicated on as-built drawings of the Test Cell..

A water table contour map based on ground-water elevation measurements from the monitoring wells, taken on 21 August 1991, is depicted in figure 4. Procedures for ground-water level measurements are contained in appendix B.

TABLE 1

MONITOR WELL
WATER LEVEL DATA

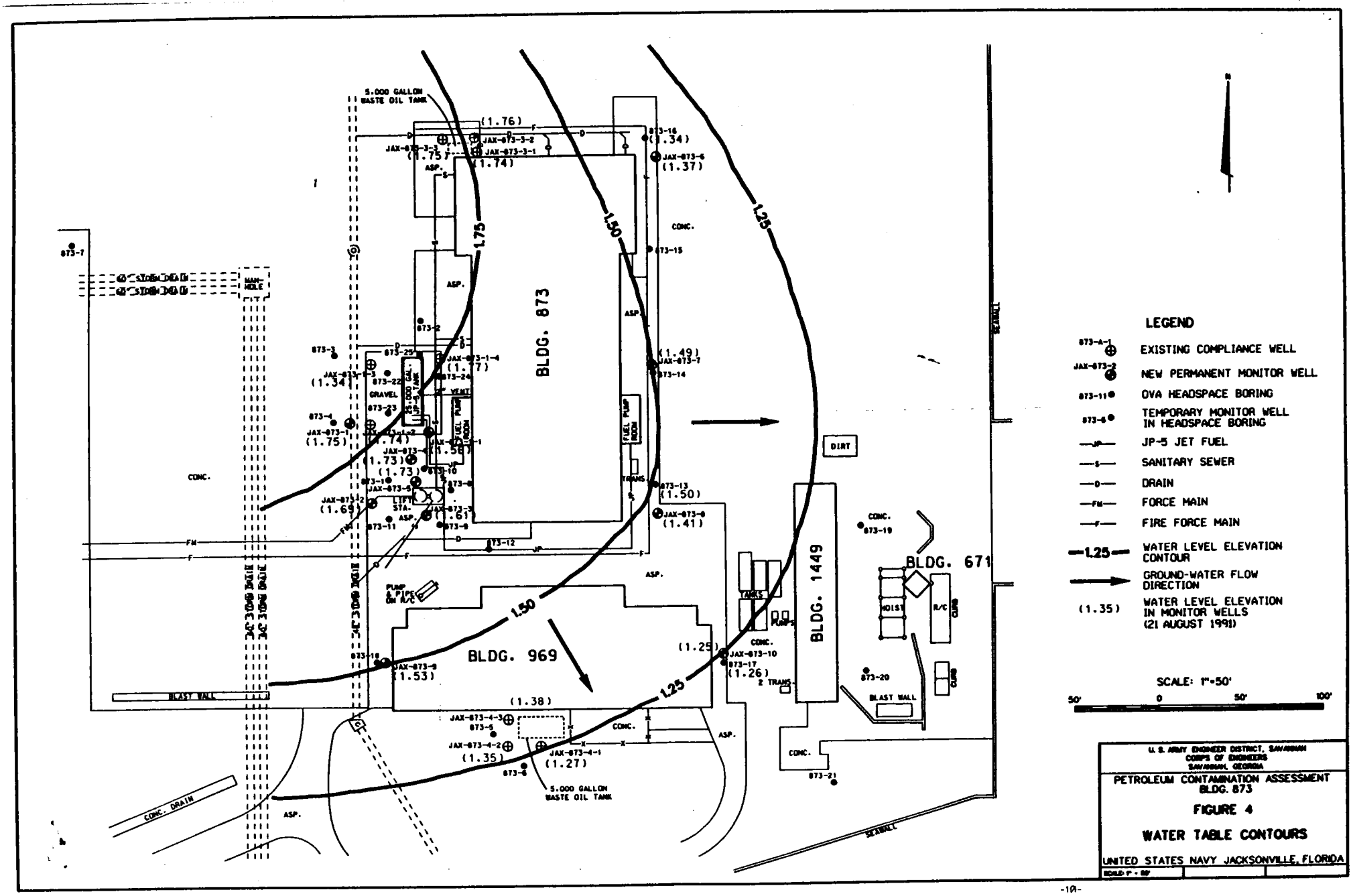
BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

21 AUGUST 1991

Well No.	Total Depth of Well BLS (ft.)	Top of Casing to Ground Surface (ft.)	Surveyed Top of Casing Elevation (msl)	Depth to Water from Top of Casing (ft.)	Elevation of Water Table (msl)
JAX-873-1	12.90	Flush	7.33	5.58	1.75
JAX-873-2	12.94	"	7.47	5.78	1.69
JAX-873-3	12.96	"	8.05	6.44	1.61
JAX-873-4	13.23	"	7.93	6.20	1.73
JAX-873-5	25.10	"	8.04	6.31	1.73
JAX-873-6	12.68	"	7.18	5.81	1.37
JAX-873-7	12.33	"	7.39	5.90	1.49
JAX-873-8	11.53	"	7.29	5.88	1.41
JAX-873-9	13.81	"	8.48	6.95	1.53
JAX-873-10	12.69	"	6.61	5.36	1.25

Notes: - BLS = Below Land Suurface
- flush = Level with ground surface

4/30/92
pwlevdat.tbl


BLDG. 873
BLDG. 969
BLDG. 1449
BLDG. 671
5,000 GALLON WASTE OIL TANK
1.75
1.50
1.25
(1.76)
(1.75)
(1.74)
(1.34)
(1.37)
(1.49)
(1.77)
(1.34)
(1.75)
(1.74)
(1.58)
(1.73)
(1.73)
(1.69)
(1.61)
(1.50)
(1.41)
(1.53)
(1.25)
(1.26)
(1.38)
(1.35)
(1.27)
CONC.
ASP.
GRAVEL
VENT
FUEL PUMP ROOM
TRANS.
LIFT STA.
PUMP & PIPE ON A/C
MAN-HOLE
BLAST WALL
CONC. DRAIN
SEAWALL
DIRT
TANKS
PUMPS
HOIST
R/C
CURB
FM
F
JP
D
S
LEGEND
EXISTING COMPLIANCE WELL
NEW PERMANENT MONITOR WELL
OVA HEADSPACE BORING
TEMPORARY MONITOR WELL IN HEADSPACE BORING
JP-5 JET FUEL
SANITARY SEWER
DRAIN
FORCE MAIN
FIRE FORCE MAIN
WATER LEVEL ELEVATION CONTOUR
GROUND-WATER FLOW DIRECTION
(1.35) WATER LEVEL ELEVATION IN MONITOR WELLS (21 AUGUST 1991)
SCALE: 1"=50'
50' 0 50' 100'
U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873
FIGURE 4
WATER TABLE CONTOURS
UNITED STATES NAVY JACKSONVILLE, FLORIDA

4.4 Ground-water Sampling

Ground-water samples were collected on 7 - 8 January 1992 from all ten of the permanent monitor wells installed during this contamination assessment, plus one existing well. The samples were properly preserved, stored on ice, and delivered to Savannah Laboratories and Environmental Services, Inc., Savannah, Georgia, for analysis.

All monitor well samples were analyzed for the Florida Kerosene Group (FDER 17-770). Chain of custody was maintained on the samples throughout the sampling period. Procedures for monitor well sampling are contained in appendix B.

4.5 Ground-water Hydraulic Conductivity Testing

Slug tests were conducted on monitoring wells JAX-873-4 and JAX-873-5 to allow estimation of the hydraulic conductivity of the surficial aquifer surrounding the wells. Procedures for conducting slug tests are further discussed in appendix B.

4.6 Tidal Influence Monitoring

One of the ground-water monitoring wells at the site was monitored over a 49-hour period (14 - 16 October 1991) to determine the influence on the surficial aquifer at the site from tidal changes in the St. Johns River, which is approximately 200 feet to the south and east. One Hermit data logger transducer was placed in monitor well JAX-873-10 and another transducer was suspended in the river to measure water level changes during four complete tide cycles. The data logger was set to log data at 15-minute intervals. The response of the water level in the well and the river, plotted against time, is shown in figure 7.

5.0 RESULTS OF CONTAMINATION ASSESSMENT

5.1 Contaminant Plume Delineation and Characterization

Approximately 3.5 inches of free product petroleum was found in existing compliance well number JAX-873-1-1 on several occasions during the course of field investigations; however, since no other wells indicated free product or a petroleum sheen, the area of free product or residual petroleum is believed to be limited.

The results of the Organic Vapor Analyzer (OVA) analyses of soil samples taken during contamination assessment are shown in table 2. These analyses indicated an area of soil contamination with elevated OVA readings, as shown on figure 5. This area, approximately 50 by 70 feet, includes the immediate area of the south end of the underground storage tank and the fuel pump room. The area of soil contamination appears to be centered around the south end of the tank. Headspace borings 873-8, 873-10, 873-23 and 873-24 exhibited moderate to very strong fuel odors. Soil samples obtained from headspace borings 873-23 and 873-24 exceeded the criterion for "excessively contaminated soil" (OVA results > 50 ppm for kerosene group contaminants) as defined in Chapter 17-770.200(2).

The OVA analyses, as depicted on figure 5, indicate that soil contamination greater than 50 ppm is located predominantly within the area of the tank and the pump room, and trends down gradient to the south-southeast. This contamination is believed to be due to a cumulative effect of past pump seal leaks and spills due to overtopping of the underground storage tanks. Asphalt and concrete paving surrounding most of the site has probably been an influencing factor in the migration of contaminants from the source area. The surface area above the tank is covered only with a layer of gravel over the soil and, because of the surface grade, a significant amount of runoff collects there. This local ground-water recharge area may have contributed to the migration of the contaminants in the soil and the groundwater.

A summary of laboratory analytical results for ground-water samples is presented in table 3. A complete copy of laboratory analytical results and chain-of-custody documentation is contained in appendix E. These analyses indicated all wells to be below detection limits (BDL) for volatile organic halocarbons (VOH's), except JAX-873-1 and JAX-873-10, which had detectable amounts of cis/trans-1,2-dichloroethylene of 2.8 and 3.2 ppb, respectively. The analyses for volatile organic aromatics (VOA's) indicated a concentration of xylene in JAX -873-3 at 2.4 ppb.

Analyses for polynuclear aromatic hydrocarbons (PAH's) indicated phenanthrene + anthracene was present in compliance well number JAX-873-1-2 at 26 ppb. In compliance well 873-1-2, 14 ppb of acenaphthene, 13 ppb of

acenaphthylene, 10 ppb of fluoranthene, and 32 ppb of fluorene were detected. Naphthalenes were found to be the most prevalent parameter detected in the wells sampled. Naphthalene was found in JAX-873-4 at 11 ppb. 2-methylnaphthalene and 1-methylnaphthalene were found in JAX-873-4 and compliance well JAX-873-1-2 at 11 ppb and 18 ppb for JAX-873-4 and 96 ppb and 70 ppb for JAX-873-1-2. 2-methylnaphthalene was also detected in JAX-873-9 at 12 ppb. All other PAH's analyzed for, were BDL in all wells.

Total lead was found above detection limits in all the wells sampled; however, none of the wells exceeded the regulatory standard of 0.05 ppm.

The approximate horizontal extent of ground-water contamination, based on laboratory analyses of monitor well samples, is indicated on figure 6. The approximate vertical extent of contamination, as defined by deep well JAX-873-5, appears to be no deeper than 25.0 feet bls.

The configuration of Naphthalene contamination of ground water depicted in figure 6 suggests, as did the soil headspace analyses, that the source of the contamination was in the area of the underground tank and the adjacent fuel pump room.

Specific conductance measured in the field, as well as laboratory analysis of total dissolved solids, confirms that ground water from the shallow surficial aquifer beneath the site is Class G-II as defined by Chapter 17-3.403, FAC.

Laboratory analytical results indicate that existing compliance monitoring well JAX-873-1-2 is in violation of FDER Chapter 17-770 standards for Class G-II ground water. Field observations of free product petroleum indicate existing compliance well JAX-873-1-1 is also in violation of Chapter 17-770.

TABLE 2

SUMMARY OF SOIL HEADSPACE ANALYSES

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample No.	Depth (feet)	OVA Headspace Reading	OVA Headspace Reading With Carbon Filter	Corrected OVA Headspace Reading (*)	PID Reading
873-1	1.0-1.5	3.5	NR	--	10.6
873-2	1.0-1.5	1.0	NR	--	0
873-3	1.0-1.5	1.2	NR	--	0
873-4	1.0-1.5	0.6	NR	--	0
873-5	1.0-1.5	1.4	NR	--	0
873-6	1.0-1.5	0.7	NR	--	0
873-7	1.0-1.5	0.9	NR	--	0
873-8	1.0-1.5	50.0**	NR	--	53.1
873-9	1.0-1.5	6.6	NR	--	4.7
873-10	1.0-1.5	31.0**	NR	--	18.9
873-11	1.0-1.5	3.9	NR	--	0.3
873-12	1.0-1.5	1.4	NR	--	0
873-13	1.0-1.5	0.4	NR	--	0
873-14	1.0-1.5	1.7	NR	--	0
873-15	1.5-2.0	0.9	NR	--	0
873-16	1.5-2.0	1.0	NR	--	0
873-17	1.0-1.5	0.6	NR	--	0
873-18	1.0-1.5	12	NR	--	0
873-19	1.0-1.5	0.1	NR	--	0
873-20	1.0-1.5	0	NR	--	0
873-21	1.0-1.5	0	NR	--	0
873-22	1.5-2.0	0.5	NR	--	NR
873-23	1.5-2.0	1000+ **	NR	--	NR
873-24	1.5-2.0	760 **	NR	--	NR
873-25	1.5-2.0	0	NR	--	NR
JAX-873-1	1.0-1.5	0.8	NR	--	0
JAX-873-2	1.0-1.5	2.0	NR	--	2.3
JAX-873-3	1.0-1.5	2.8	NR	--	0
JAX-873-4	1.0-1.5	4.4	NR	--	7.9
JAX-873-5	NR	NR	NR	--	NR

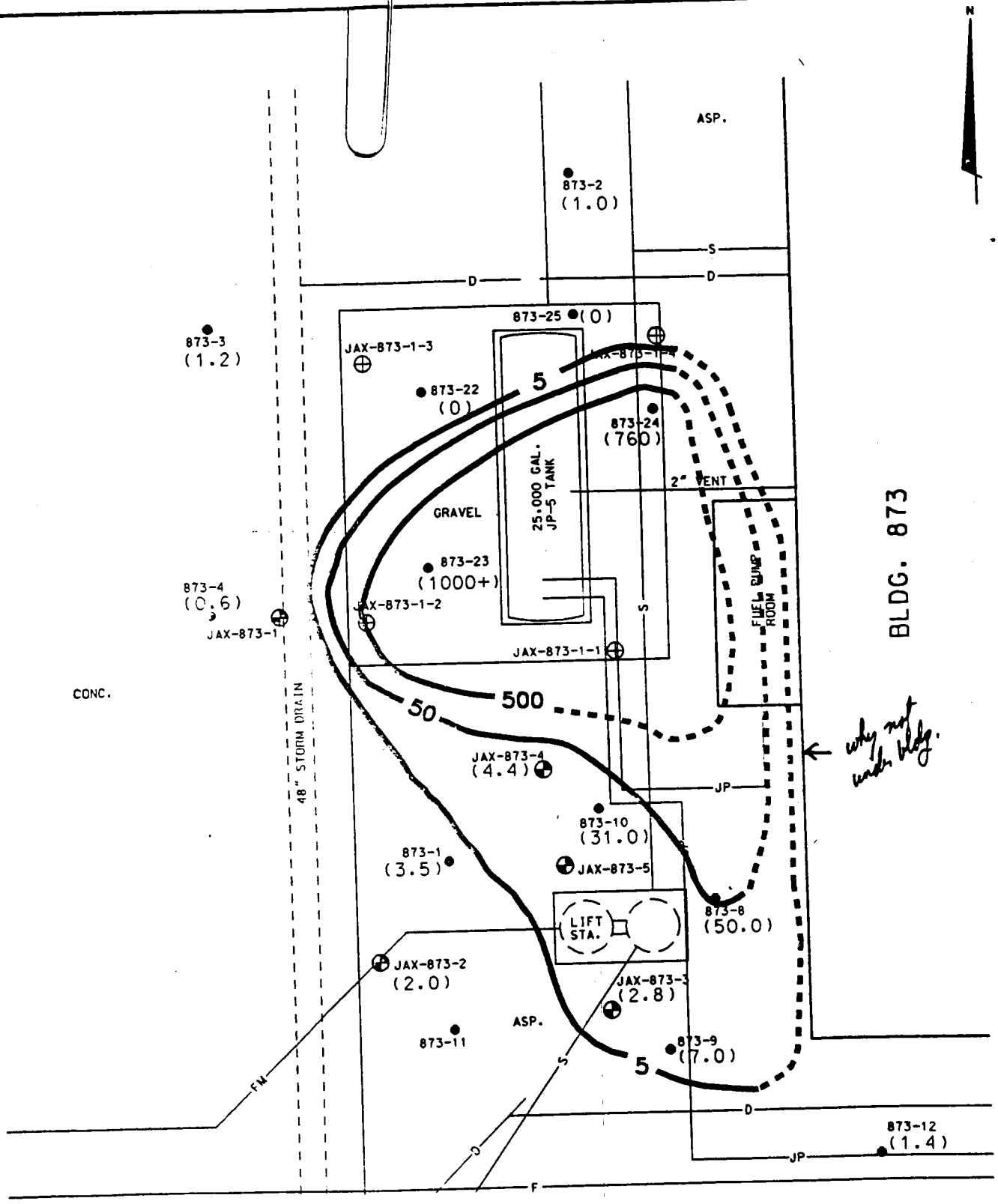
TABLE 2 CONTINUED

SUMMARY OF SOIL HEADSPACE ANALYSIS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Sample No.	Depth (feet)	OVA Headspace Reading	OVA Headspace Reading With Carbon Filter	Corrected OVA Headspace Reading (*)	PID Reading
JAX-873-6	1.0-1.5	0.5	NR	--	0
JAX-873-7	1.0-1.5	0	NR	--	0
JAX-873-8	1.0-1.5	0	NR	--	0
JAX-873-9	1.0-1.5	0.4	NR	--	1.1
JAX-873-10	1.5-2.0	0	NR	--	0

Notes:
- All units in parts per million (ppm)
- NR = Not Recorded
- OVA = Organic Vapor Analyzer (Century OVA-128)
- (*) = Difference between OVA reading without carbon filter and OVA reading with carbon filter
- PID = Photoionizing Device (Thermo-Ennvironmental OVM or Photo-vac Micro-tip)
- (**)= petroleum odor



SCALE: 1"=20'

20' 20' 40'

NOTE:
FOR ADDITIONAL [illegible] SEE [illegible]

Mike Parker

LEGEND

— 0 — [illegible] PLUME CONTOURS (ppm)

[illegible] HEADSPACE READING (ppm)

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SAVANNAH, GEORGIA

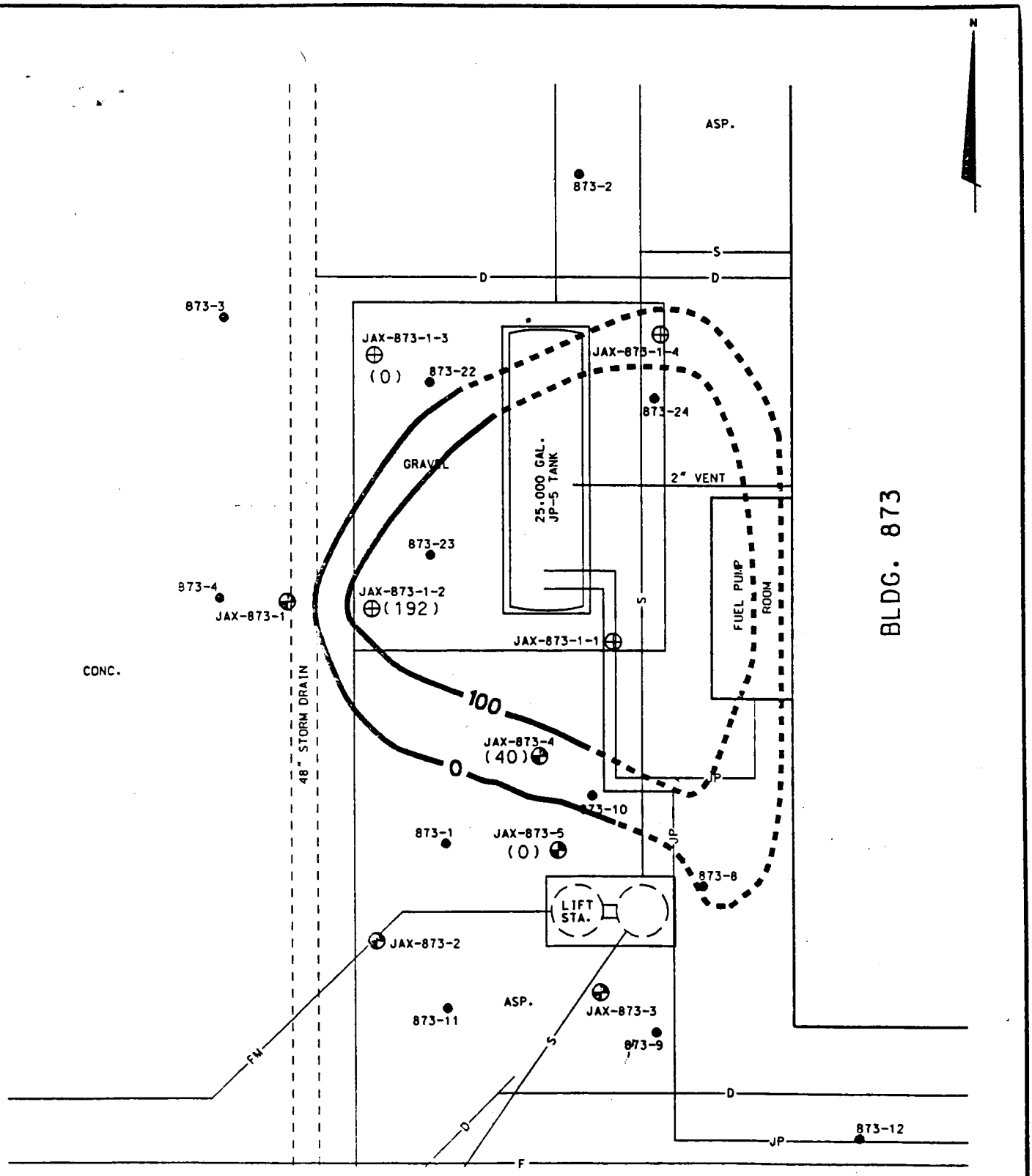
PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873

FIGURE 5

SOIL CONTAMINATION

UNITED STATES NAVY JACKSONVILLE, FLORIDA

SCALE: 1" = 20'



SCALE: 1"=20'

20' 0 20' 40'

NOTE:
FOR ADDITIONAL DETAIL SEE FIGURE 1.

LEGEND

100 — TOTAL NAPHTHALENE
ISO-CONTAMINATION LINES (ppb)
NAPHTHALENE VALUE (ppb)

U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873

FIGURE 6
TOTAL NAPHTHALENE
CONTAMINATION OF GROUND WATER

UNITED STATES NAVY JACKSONVILLE, FLORIDA

SCALE: 1" = 20'

TABLE 3

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

MONITOR WELL NUMBER

PARAMETER	JAX-873-1	JAX-873-2	JAX-873-3	JAX-873-4	JAX-873-5	JAX-873-6	JAX-873-7	JAX-873-8	JAX-873-9	Regulatory Standard
Purgeable Halocarbons (601/8010)										
Bromodichloromethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Bromoform, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Bromomethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Carbon Tetrachloride, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
2-Chloroethylvinyl Ether, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chloroform, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Chloromethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Dibromochloromethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,3-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,4-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Dichlorodifluoromethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,1-Dichloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-Dichloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	3
1,1-Dichloroethene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
cis/trans-1,2-Dichloroethylene, ug/l	2.8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,2-Dichloropropane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Cis-1,3-Dichloropropene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Trans-1,3-Dichloropropene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Methyline Chloride, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,1,2,2-Tetrachloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Tetrachloroethene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,1,1-Trichloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
1,1,2-Trichloroethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Trichloroethene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	

4/30/92 - CHEM1.XLS

TABLE 3

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

PARAMETER	MONITOR WELL NUMBER									
	JAX-873-1	JAX-873-2	JAX-873-3	JAX-873-4	JAX-873-5	JAX-873-6	JAX-873-7	JAX-873-8	JAX-873-9	Regulatory Standard
Trichlorofluoromethane, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Vinyl Chloride, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Purgeable Aromatics (602/8020)										
Benzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	1
Ethylbenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Toluene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	
Xylenes, ug/l	BDL	BDL	2.4	BDL	BDL	BDL	BDL	BDL	BDL	
Methyl-Tert-Butyl-Ether (MTBE), ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	50
Total Volatile Organic Aromatics, ug/l	BDL	BDL	2.4	BDL	BDL	BDL	BDL	BDL	BDL	50
1,2-Dibromoethane (EDB), ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.02
Total Lead, mg/l	0.016	0.037	0.024	0.009	0.006	0.034	0.036	0.05	0.024	0.05
Polynuclear Aromatic Hydrocarbons (8100)										
Acenaphthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Acenaphthylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Benzo (a) pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Benzo (g,h,i) perylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Benzo (b,k) fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Chrysene + Benzo (a) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Fluorene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Indeno (1,2,3-cd) pyrene+Dibenzo (a,h) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Naphthalene, ug/l	BDL	BDL	BDL	11	BDL	BDL	BDL	BDL	BDL	
Phenanthrene + Anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
Pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	DL (10)
2-Methylnaphthalene, ug/l	BDL	BDL	BDL	11	BDL	BDL	BDL	BDL	BDL	

4/30/92 - CHEM1.XLS

TABLE 3

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

PARAMETER	MONITOR WELL NUMBER									
	JAX-873-1	JAX-873-2	JAX-873-3	JAX-873-4	JAX-873-5	JAX-873-6	JAX-873-7	JAX-873-8	JAX-873-9	Regulatory Standard
1-Methylnaphthalene, ug/l	BDL	BDL	BDL	18	BDL	BDL	BDL	BDL	BDL	
Total Naphthalenes, ug/l	BDL	BDL	BDL	40	BDL	BDL	BDL	BDL	BDL	100
Petroleum Hydrocarbons (418.1), mg/l	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	5
Total Dissolved Solids, mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Chloride (325.2), mg/l	NA	NA	NA	NA	NA	NA	NA	NA	NA	

Notes: - BDL = Below Detection Limit
- NA = Not Analyzed
- Shaded values indicate value exceeds regulatory standard
- DL (10) = Detection Limit (in this case 10 ppb)

TABLE 3 (CONTINUED)

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873

NAVAL AIR STATION JACKSONVILLE

JACKSONVILLE, FLORIDA

9 JANUARY 1992

MONITOR WELL NUMBER

PARAMETER	JAX-873-9 DUPLICATE	JAX-873-10	JAX-873-1-2 (873 MW-2)	JAX-873-1-3 (873 MW-3) *	RINSATE BLANK	TRIP BLANK				Regulatory Standard
Purgeable Halocarbons (601/8010)										
Bromodichloromethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Bromoform, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Bromoethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Carbon Tetrachloride, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Chlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Chloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
2-Chloroethylvinyl Ether, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Chloroform, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Chloromethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Dibromochloromethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,2-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
1,3-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
1,4-Dichlorobenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Dichlorodifluoromethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,1-Dichloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,2-Dichloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				3
1,1-Dichloroethene, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
cis/trans-1,2-Dichloroethylene, ug/l	BDL	3.2	BDL	NA	BDL	BDL				
1,2-Dichloropropane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Cis-1,3-Dichloropropene, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Trans-1,3-Dichloropropene, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Methyline Chloride, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,1,2,2-Tetrachloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Tetrachloroethene, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,1,1-Trichloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
1,1,2-Trichloroethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Trichloroethene, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Trichlorofluoromethane, ug/l	BDL	BDL	BDL	NA	BDL	BDL				

4/30/92 - CHEM2.XLS

TABLE 3 (CONTINUED)

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

MONITOR WELL NUMBER

PARAMETER	JAX-873-9 DUPLICATE	JAX-873-10	JAX-873-1-2 (873 MW-2)	JAX-873-1-3 (873 MW-3) *	RINSATE BLANK	TRIP BLANK				Regulatory Standard
Vinyl Chloride, ug/l	BDL	BDL	BDL	NA	BDL	BDL				
Purgeable Aromatics (602/8020)										
Benzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				1
Ethylbenzene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Toluene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Xylenes, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Methyl-Tert-Butyl-Ether (MTBE), ug/l	BDL	BDL	BDL	NA	BDL	BDL				50
Total Volatile Organic Aromatics, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				50
1,2-Dibromoethane (EDB), ug/l	BDL	BDL	BDL	NA	BDL	BDL				0.02
Total Lead, mg/l	0.025	0.02	0.029	NA	BDL	BDL				0.05
Polynuclear Aromatic Hydrocarbons (610/8100)										
Acenaphthene, ug/l	BDL	BDL	14	BDL	BDL	BDL				DL (10)
Acenaphthylene, ug/l	BDL	BDL	13	BDL	BDL	BDL				DL (10)
Benzo (a) pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
Benzo (g,h,i) perylene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
Benzo (b,k) fluoranthene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
Chrysene + Benzo (a) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
Fluoranthene, ug/l	BDL	BDL	10	BDL	BDL	BDL				DL (10)
Fluorene, ug/l	BDL	BDL	32	BDL	BDL	BDL				DL (10)
Indeno (1,2,3-cd) pyrene+Dibenzo (a,h) anthracene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
Naphthalene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				
Phenanthrene + Anthracene, ug/l	BDL	BDL	26	BDL	BDL	BDL				DL (10)
Pyrene, ug/l	BDL	BDL	BDL	BDL	BDL	BDL				DL (10)
2-Methylnaphthalene, ug/l	BDL	BDL	96	NA	BDL	BDL				
1-Methylnaphthalene, ug/l	BDL	BDL	70	NA	BDL	BDL				
Total Naphthalenes, ug/l	BDL	BDL	192	NA	BDL	BDL				100

4/30/92 - CHEM2.XLS

TABLE 3 (CONTINUED)

SUMMARY OF GROUND-WATER ANALYTICAL RESULTS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

MONITOR WELL NUMBER

PARAMETER	JAX-873-9 DUPLICATE	JAX-873-10	JAX-873-1-2 (873 MW-2)	JAX-873-1-3 (873 MW-3) *	RINSATE BLANK	TRIP BLANK				Regulatory Standard
Petroleum Hydrocarbons (418.1), mg/l	BDL	BDL	BDL	NA	BDL	BDL				5
Total Dissolved Solids, mg/l	NA	NA	NA	NA	NA	NA				
Chloride (325.2), mg/l	NA	NA	NA	NA	NA	NA				

Notes: - BDL = Below Detection Limit
- NA = Not Analyzed
- Shaded values indicate value exceeds regulatory standard
- DL (10) = Detection Limit (in this case 10 ppb)
- * Sample collected 10 April 1992

5.2 Field Ground-water Quality Parameters

Water quality parameters measured in the field at the time of monitor well sampling indicate that pH ranged from 6.22 to 6.82, specific conductance ranged from 210 to 1015 umhos/cm, and temperature ranged from 20.6 to 21.9 degrees Celsius. A summary of field water quality parameters for the eight wells sampled is presented in table 4.

5.3 Ground-water Hydraulic Conductivity Testing Results

The results of slug test analyses indicate an average shallow subsurface horizontal hydraulic conductivity of 8.6 ft/day. The hydraulic gradient at the site was determined to be 0.002. The average pore water velocity (V) was calculated to be 0.057 ft/day. Transmissivity (T) was calculated to be 57.5 ft^2/day. Slug test data, as well as equations and calculations used to determine these values, are contained in appendix D.

5.4 Tidal Influence Monitoring

The effect of tidal fluctuation in the nearby St. Johns River on the water level in monitor well JAX-873-10 was measured over a 49-hour period. The maximum change in water level was less than 0.5 feet (see figure 7). It should be noted that since monitoring well JAX-873-10 is the closest site monitoring well to the St Johns River (approximately 120 feet), the recorded response probably represents an upper limit of tidal influence in the study area.

5.5 Potable Water Well Survey

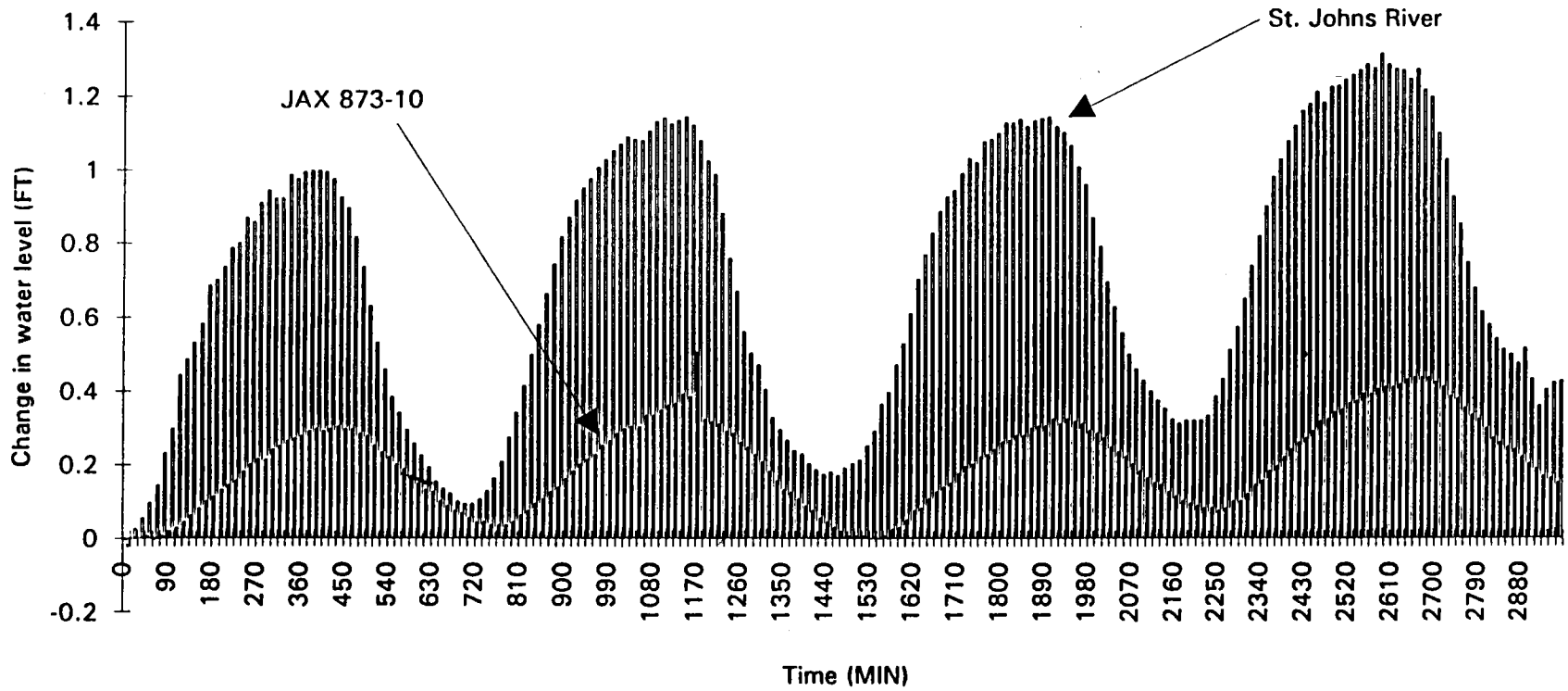
Naval Air Station Jacksonville presently provides all of its own potable water. Raw water supply is obtained from three 12-inch, one 10-inch and one 8-inch diameter well located on the station which draw water from the Floridan aquifer at depths from approximately 300 to 1,200 feet. Individual well capacities range between 150 and 3800 GPM.

Since all of the area within a ½-mile radius of Building 873 is within the Naval Air Station boundary, a potable water well survey of the area was conducted using data supplied by the Naval Air Station Jacksonville Public Works Department, as well as data supplied by the City of Jacksonville Department of Health, Welfare, and Bio-Environmental Services. All known potable wells on the Naval Air Station were researched for applicable information and included in table 5. The locations of these wells are shown on figure 8. All of the Naval Station water supply wells are ½-mile or more from Bldg. 873, except well numbers 2 and 3, which are slightly less than

½ mile. These wells are completed in the Floridan aquifer and have minimum casing depths of 300+ feet. The fact that these wells are cased to these depths, are some distance away, and none are down-gradient from the site, should preclude any effects from the shallow contaminants at the Kemem Test Cell.

FIGURE 7

TIDAL INFLUENCE
BUILDING 873 - KEMEN TEST CELL



JAX873T.XLC

TABLE 4

FIELD WATER QUALITY PARAMETERS

BUILDING 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

9 JANUARY 1992

Well No.	pH	Specific Conductance (umhos/cm)	Temperature (Degrees Celsius)
JAX-873-1	6.49	210	21.6
JAX-873-2	6.27	280	21.5
JAX-873-3	6.42	276	21.8
JAX-873-4	6.22	382	21.9
JAX-873-5	6.40	212	21.9
JAX-873-6	6.82	581	21.7
JAX-873-7	6.77	1015	21.2
JAX-873-8	6.73	935	20.6
JAX-873-9	6.61	379	20.7
JAX-873-10	6.58	580	21.8

TABLE 5

POTABLE WATER WELL SURVEY

BLDG. 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well No.	Usage	Total Depth (feet)	Casing Depth (feet)	Notes
1	Potable	708	463	Main water supply well - NIU
2	Potable	1005	380	Main water supply well
3	Potable	1210	410	Main water supply well
4	Potable	1015	312	Main water supply well
5	Potable	988	400	Main water supply well
6	Potable	646	271	Hospital Water Plant
7	Utility	1096	316	Fire protection only
8	irrigation	500	?	Golf course irrigation
9	irrigation	498	?	Supply Hospital sprinklers
10	utility	120	120	Wastewater treatment plant
11	utility	400	288	Salvage yard
12	utility	407	251	Radio tower area
13	utility	144	95	cooling water
14	?	400	?	Capped - NIU
15	?	400	?	Capped - NIU
16	?	400	?	Capped - NIU
17	?	400	?	Capped - NIU
18	?	400	?	Capped - NIU
19	?	101	?	Bldg. 201
20	?	?	?	Salvage yard
21	?	160	115	Bldg. 104
22	?	?	?	Crash Station
23	?	522	297	Inductance Pier - NIU

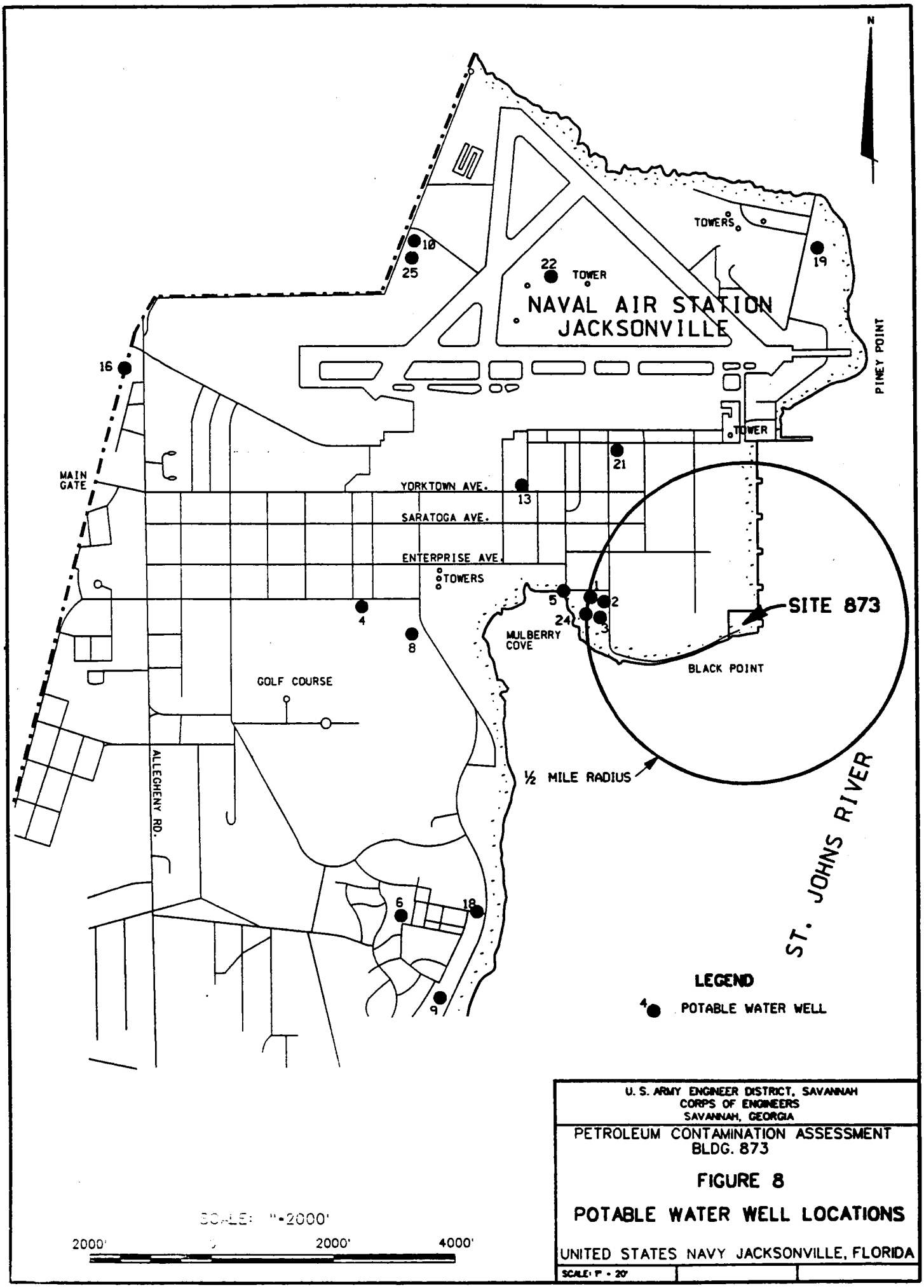
TABLE 5 (CONTINUED)

POTABLE WATER WELL SURVEY

BLDG. 873
NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA

Well No.	Usage	Total Depth (feet)	Casing Depth (feet)	Notes
24	?	1200	350	Water Plant #1
25	?	650	120	Sewage Plant
26	?	?	?	Black Point Test Cell

Notes: NIU = Not in use



U. S. ARMY ENGINEER DISTRICT, SAVANNAH
CORPS OF ENGINEERS
SAVANNAH, GEORGIA

PETROLEUM CONTAMINATION ASSESSMENT
BLDG. 873

FIGURE 8

POTABLE WATER WELL LOCATIONS

UNITED STATES NAVY JACKSONVILLE, FLORIDA

SCALE: 1" = 20'

6.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

6.1 Summary

The following is a summary of site conditions based on the results of field and laboratory investigations made during contamination assessment:

1. Three water bearing zones apparently exist beneath the site. These consist of a surficial aquifer, a shallow rock aquifer, and the deeper Floridan aquifer.

2. Soil borings indicate the sediments beneath the site consist generally of unconsolidated, brown, fine grained sands and silty sands, with some clay and silt seams, to an approximate depth of 30 feet below land surface (bls). No confining units were encountered during drilling activities at the site.

3. Ground water at the site was encountered at a depth of approximately 5.5 to 7.0 feet bls. The direction of flow in the surficial aquifer appears to be generally to the south -southeast.

4. Free product petroleum was found in one previously installed compliance well during contamination assessment at the site. The maximum thickness of product measured in the well was approximately 3.5 inches.

5. Contaminants identified at the site during contamination assessment included naphthalenes, xylenes, cis/trans-1,2-Dichlorethylene, Acenaphthene, Acenaphthylene, Fluoranthene, and Fluorene.

6. The vertical extent of contamination, as defined by the deep well, does not exceed 25 feet bls.

7. Of five potable water supply wells located on the Naval Air Station, two are slightly less than ½ mile from the site. All of these wells are cased to a depth of 300+ feet or more, where they draw from the Floridan aquifer, and none of the wells is down-gradient from the site.

8. The results of tank testing conducted in June of 1990 indicate that the 25,000-gallon JP-5 tank and associated piping are tight.

9. Laboratory analyses of ground-water samples from five monitoring wells placed around the down-gradient perimeter of the Test Cell buildings detected only low level occurrences of several petroleum contaminants, none of which were above regulated limits.

6.2 Conclusions

1. OVA headspace analyses, as well as free product petroleum observed in one of the existing compliance monitoring wells, indicate that soil contamination is located predominantly in the immediate area of the south end of the underground storage tank and the fuel pump room. Soil contamination appears to decrease significantly in all directions a short distance away from this area.

2. The immediate tank area is covered by a layer of gravel while the surrounding area is either concrete or asphalt. As a result of rain and storm-water runoff entering the gravel area, a localized zone of increased surface water infiltration probably exists, through at least a portion of the zone of free product, which contributes to the migration of the contaminant plume. Ground-water contaminant concentration contours suggest that the contaminant plume is moving generally down-gradient to the south-southeast, away from the source area.

3. Information obtained from the Naval Air Station Public Works Department, and NADEP personnel, as well as field observations during contamination assessment, indicate the petroleum contamination at the site is probably due to a cumulative effect of past pump seal leaks from fuel pumps located in the pump room adjacent to the tank area, and spills due to overtopping of the underground jet fuel storage tank.

6.3 Recommendations

Because soil at the site has been determined to be "excessively contaminated" for kerosene group contaminants, and ground water beneath the site exceeds Chapter 17-770, FAC, levels for Class G-II ground water, it is recommended that a Remedial Action Plan (RAP) be prepared to address the contamination.

7.0 PROFESSIONAL REVIEW

The contamination assessment contained in this report was prepared by an employee of the U.S. Army Corps of Engineers, Savannah District, who is a registered Professional Geologist in the state of Florida. Current Corps of Engineers policy does not support the signing and sealing of documents for work performed on projects for the Federal Government by its ~~registered~~ professional employees. This Contamination Assessment Report was prepared for the Naval Facilities Engineering Command , Building 1330 site at Mayport Naval Station, Mayport, Florida.

no

H. Cardwell Smith
Professional Geologist
P.G. No. 748

REFERENCES

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APPENDIX A

SITE CONDITIONS

Physiography

The topography of northeast Florida is controlled by a series of ancient marine terraces, generally indicated by low seaward sloping scarps trending more or less parallel to the present shoreline (Cooke, 1945). Seven of these terraces are recognized in northeast Florida; in descending order they are the Coharie, Sunderland, Wicomico, Penholoway, Talbot, Pamlico, and Silver Bluff terraces. The terraces have been modified by stream erosion to the point that only remnants of the original terraces remain. The areal distribution of the terraces has generally been determined by their elevation above mean sea level (Leve, 1966). The Naval Air Station Jacksonville lies within the Pamlico terrace (10-25 feet above msl).

Surface drainage of the eastern area of Duval County is primarily by numerous small brackish-water streams which empty either into the Intracoastal Waterway or directly into the ocean.

Naval Air Station Jacksonville lies on the west bank of the St. Johns River. The site lies within the Coastal Lowland physiographic division of northeastern Florida, which runs roughly parallel to the coastline and extends from the Atlantic Ocean to just west of downtown Jacksonville. Site elevations range from approximately 8 to 12 feet above msl. Site surface drainage is controlled by the St. Johns River to the east and south.

Regional Hydrogeology

The southeast Georgia and northeast Florida area is underlain by two main aquifer systems: the Surficial aquifer system and the Floridan aquifer system. A third aquifer system, the Southeastern Coastal Plain aquifer system, underlies the Floridan aquifer system in southeast Georgia, portions of northeast Florida, and the Florida panhandle (Miller, 1990).

The Surficial aquifer system is comprised of Holocene through Miocene deposits and contains water mostly under unconfined (water table) conditions. These deposits consist of a thin, widespread layer of unconsolidated sand beds that commonly contain a few beds of shell and limestone. This aquifer system generally yields small volumes of water, and primarily is used for domestic water supplies.

The Floridan aquifer system consists of a thick sequence of Tertiary carbonate rocks and is the most productive aquifer in the southeastern U.S. The Floridan supplied more than 3 billion gallons of water per day during 1985, primarily for municipal and agricultural purposes (Miller, 1990). The Floridan underlies the Surficial aquifer system and is separated from it by a clayey confining unit which is thick in some places and thin (or absent) in others. The formations that comprise the Floridan, from oldest to youngest, are the Oldsmar Limestone, the Lake

City Limestone, the Avon Park Limestone, the Ocala Limestone, and several thin discontinuous aquifers in the Hawthorne Formation which are hydraulically connected to the rest of the system (Leve, 1966).

The Floridan aquifer system can generally be divided into an Upper Floridan aquifer and a Lower Floridan aquifer, separated by a less permeable unit in most places and bounded above and below by confining units that are much less permeable. The Lower Floridan aquifer locally contains zones that are extremely permeable.

The Southeastern Coastal Plain aquifer system underlies the Floridan aquifer system in some places and grades laterally into the Floridan in other places. There is no confining unit separating the two aquifer systems, and the major difference between them is that the Floridan aquifer system tends to be more permeable.

Two of the above mentioned aquifer systems, the shallow Surficial aquifer and the Floridan aquifer, are known to underlie Duval County (Leve, 1966).

APPENDIX B

SITE ASSESSMENT METHODS

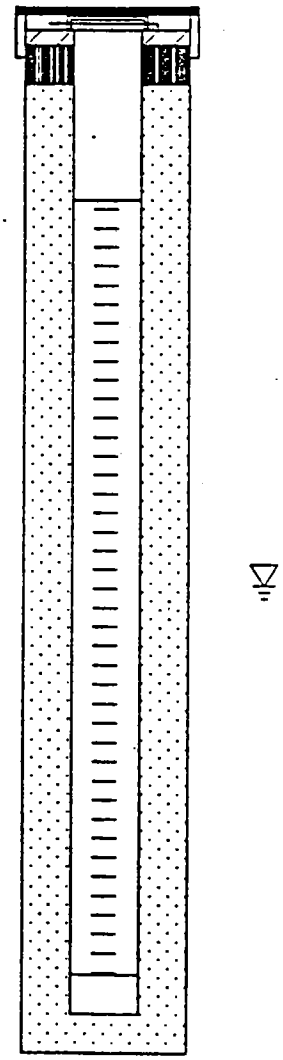
Southern Division Naval FAC. Eng. Com.

Monitoring Well Diagram

LOCATION NAS, Jacksonville

LOG OF BORING NO. JAX-873-1-1 LOG OF WELL NO. JAX-873-1-1

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
0			Dark brown topsoil	
			Dark brown fine sand, damp	
5			Medium brown fine sand, saturated	
10			Medium grey fine sand, saturated	
			TD = 13' BLS	
15				



Boring Completion Date: 10-24-89
Well Completion Date: 10-24-89
Well Development Date: 10-24-89
Drilling Method: HSA
Depth to Water: 7.5 FT.

Boring Diameter: 8 in
Ground Elevation:
Top of Casing Elevation:
Driller: NPTC

C-E ENVIRONMENTAL, INC.

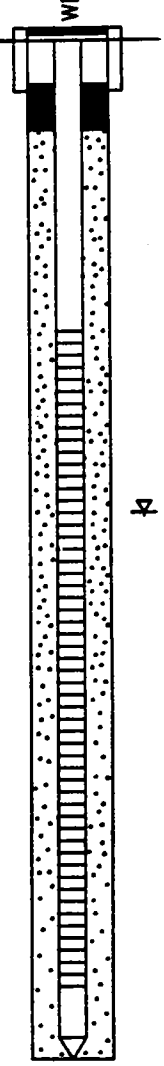
SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND
GROUNDWATER MONITORING WELL INSTALLATION REPORT

TITLE: Jacksonville Naval Air Station Bldg. 873		**LOG of WELL:** JAX-873-9	**BORING NO.**
CLIENT: SOUTHNAVFACENGCOM			**PROJECT NO:**
CONTRACTOR: USACE - Sav. District		**DATE STARTED:** 15 AUG 91	**COMPLTD:** 15 AUG 91
METHOD: 7¼" O.D. HSA	**CASE SIZE:** 2" PVC	**SCREEN INT.:** 4.0'-13.0'	**PROTECTION LEVEL:** D
TOC ELEV.: 8.48	**MONITOR INST.:** OVA	**TOT. DEPTH:** 14.0'	**DEPTH TO ∇** 6.5'
LOGGED BY: C. GRIFFIN	**WELL DEVELOPMENT DATE:** 17 AUG 91		**SITE:** Bld. 873

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					0.0'-0.1' asphalt, 0.1'-0.5' crushed limestone.			
					(SM) Tan and light brown, fine grained, silty sand, gray, slight organic odor with some loose rocks.		SM	
					Brown, no odor with clay seams.			
					(SC) Reddish orange, gray, very fine grained, clayey sand, no odor.		SC	
5					(SP) Light tan and white, fine grained, poorly graded sand, no odor.		SP	
					Light gray.			
10					(SM) Brown, fine grained, silty sand, organic odor.		SM	
15								
0								

NOTE:
SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

WELL DATA



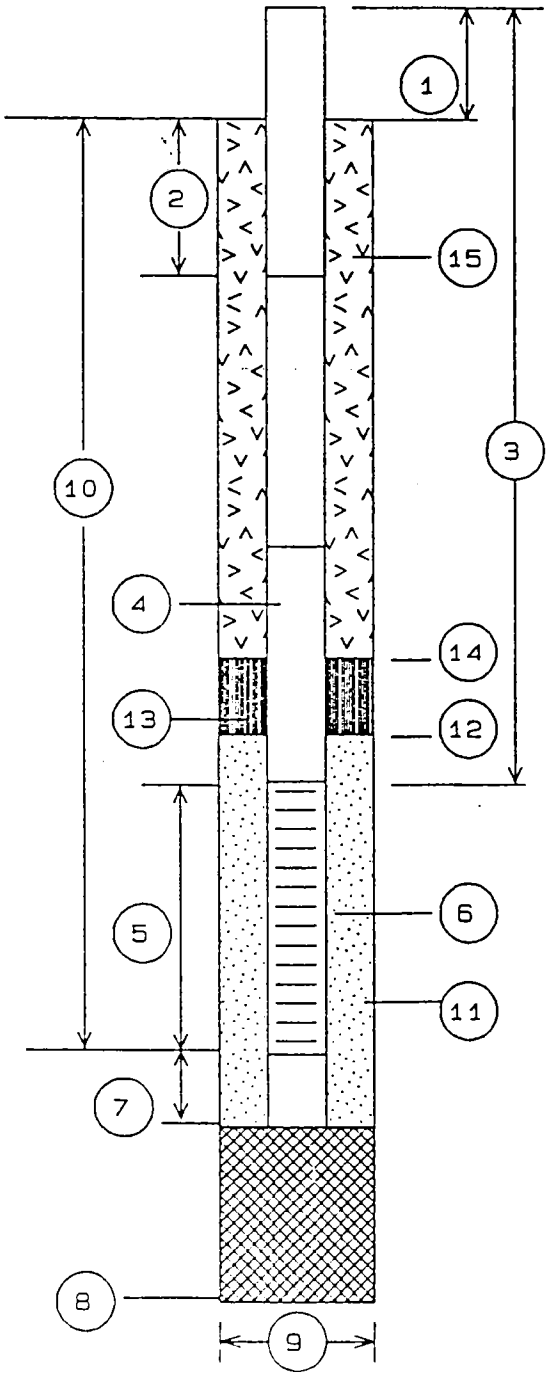
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

WELL CONSTRUCTION DETAIL

WELL NUMBER: JAX-873-1-1

DATE OF INSTALLATION: 10-24-89



1. Height of Casing above ground: 0
2. Depth to first Coupling: 2.5 feet
   Coupling Interval Depths: 10
3. Total Length of Riser Pipe: 2.5 feet
4. Type of Riser Pipe: 2 in. SCH 40 PVC
5. Length of Screen: 10 feet
6. Type of Screen: 2 in. dia. SCH 40 w/0.010 in. slots
7. Length of Sump: 6 in.
8. Total Depth of Boring: 13 feet
9. Diameter of Boring: 8 in.
10. Depth to Bottom of Screen: 12.5 feet
11. Type of Screen Filter: coarse sand
    Quantity Used: 300 lbs. Size: 20/30
12. Depth to Top of Filter: 1.5 feet
13. Type of Seal: Bentonite pellets
    Quantity Used: 1/2 bucket (5 gal.)
14. Depth to Top of Seal: 0.5 feet
15. Type of Grout: Cement
    Grout Mixture: .
    Method of Placement: .
16. Stabilizers: .

COMMENTS ON INSTALLATION

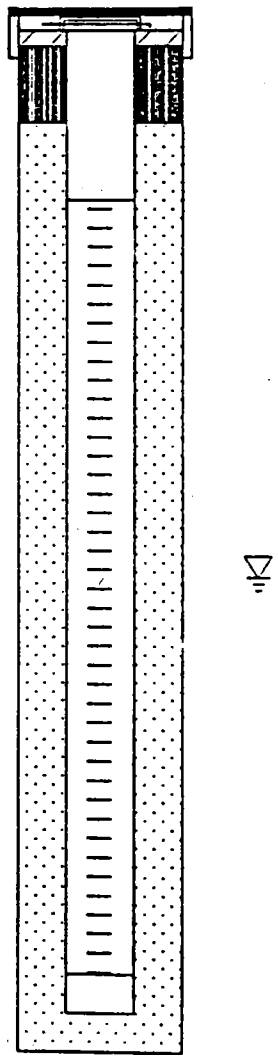
C-E ENVIRONMENTAL, INC.

Southern Division Naval FAC. Eng. Com.

Monitoring Well Diagram

LOCATION NAS, Jacksonville

LOG OF BORING NO. JAX-873-1-2 LOG OF WELL NO. JAX-873-1-2

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
0			Dark brown topsoil	
5			Orange-brown fine sand, damp	
10			Brown-orange fine sand with trace grey fines, saturated	
			Grey /dark brown fine sand, saturated	
15			TD = 14.5' BLS	

Boring Completion Date: 10-24-89
Well Completion Date: 10-24-89
Well Development Date: 10-24-89
Drilling Method: HSA
Depth to Water: 7.4 FT.

Boring Diameter: 8 in
Ground Elevation:
Top of Casing Elevation:
Driller: NPTC

C-E ENVIRONMENTAL, INC.

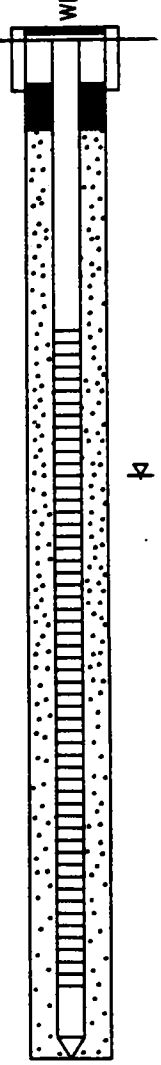
GROUNDWATER MONITORING WELL INSTALLATION REPORT

TITLE: Jacksonville Naval Air Station Bldg. 873		**LOG of WELL:** JAX-873-10	**BORING NO.**
CLIENT: SOUTHNAVFACENGCOM			**PROJECT NO:**
CONTRACTOR: USACE - Sav. District		**DATE STARTED:** 15 AUG 91	**COMPLTD:** 15 AUG 91
METHOD: 7¼" O.D. HSA	**CASE SIZE:** 2" PVC	**SCREEN INT.:** 4.0'-13.0'	**PROTECTION LEVEL:** D
TOC ELEV.: 6.61	**MONITOR INST.:** OVA	**TOT. DEPTH:** 14.0'	**DEPTH TO ∇** 6.0'
LOGGED BY: C. GRIFFIN	**WELL DEVELOPMENT DATE:** 17 AUG 91		**SITE:** Bld. 873

DEPTH FT.	LABORATORY SAMPLE ID.	SAMPLE	RECOVERY	HEADSPACE (ppm)	SOIL/ROCK DESCRIPTION	LITHOLOGIC SYMBOL	SOIL CLASS	BLOWS/6-IN
					0.0'-0.1' asphalt, 0.1'-0.6' crushed limestone.			
					(SM) Reddish brown, fine grained, silty sand, no odor.		SM	
					(SP) White and light tan, fine grained, poorly graded sand, no odor.		SP	
					(MH) Black and dark brown, fat clayey silt, organic odor.		MH	
5					(CH) Gray, fat clay, with sand lenses, no odor.		CH	
					(SP) Gray, fine grained, poorly graded sand, no odor. Slight organic odor.		SP	
10					No odor.			
					(SM) Brown, fine grained, silty sand, no odor.		SM	
15								
20								

NOTE:
SOILS VISUALLY FIELD CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.

WELL DATA



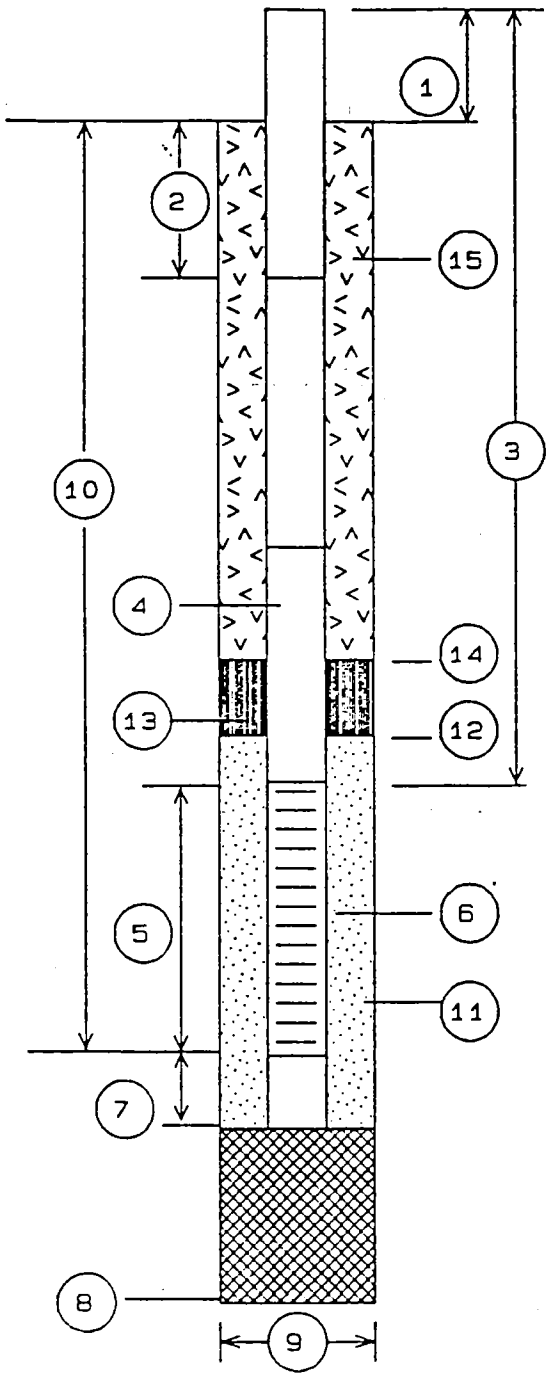
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

WELL CONSTRUCTION DETAIL

WELL NUMBER: JAX-873-1-2

DATE OF INSTALLATION: 10-24-89



1. Height of Casing above ground: 0
2. Depth to first Coupling: 4 feet
   Coupling Interval Depths: 10
3. Total Length of Riser Pipe: 4 feet
4. Type of Riser Pipe: 2 in. SCH 40 PVC
5. Length of Screen: 10 feet
6. Type of Screen: 2 in. dia. SCH 40w/0.010 in. slots
7. Length of Sump: 6 in.
8. Total Depth of Boring: 14.5 feet
9. Diameter of Boring: 8 in.
10. Depth to Bottom of Screen: 14 feet
11. Type of Screen Filter: coarse sand
    Quantity Used: 300 lbs. Size: 20/30
12. Depth to Top of Filter: 1.5 feet
13. Type of Seal: Bentonite pellets
    Quantity Used: 1/2 bucket (5 gal.)
14. Depth to Top of Seal: 0.5 feet
15. Type of Grout: Cement
    Grout Mixture: .
    Method of Placement: .
16. Stabilizers: .

COMMENTS ON INSTALLATION

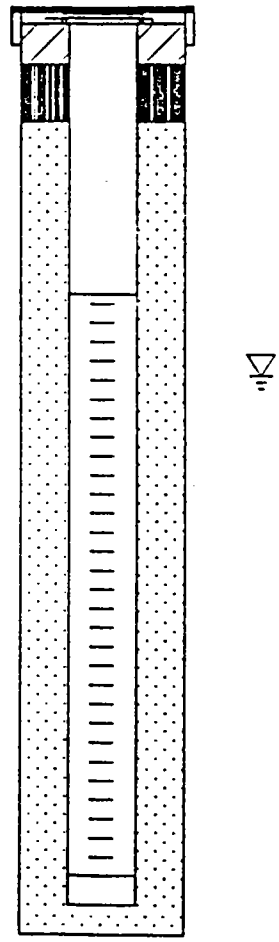
C-E ENVIRONMENTAL, INC.

Southern Division Naval FAC. Eng. Com.

Monitoring Well Diagram

LOCATION NAS, Jacksonville

LOG OF BORING NO. JAX-873-1-3 LOG OF WELL NO. JAX-873-1-3

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
0			Dark brown topsoil	
5			Medium brown fine sand, damp	
			Brown-grey fine sand, semi-saturated	
10				
			Saturated	
15			TD = 15' BLS	
20				

Boring Completion Date: 10-24-89
Well Completion Date: 10-24-89
Well Development Date: 10-24-89
Drilling Method: HSA
Depth to Water: 5.4 FT.

Boring Diameter: 8 in
Ground Elevation:
Top of Casing Elevation:
Driller: NPTC

C-E ENVIRONMENTAL, INC.

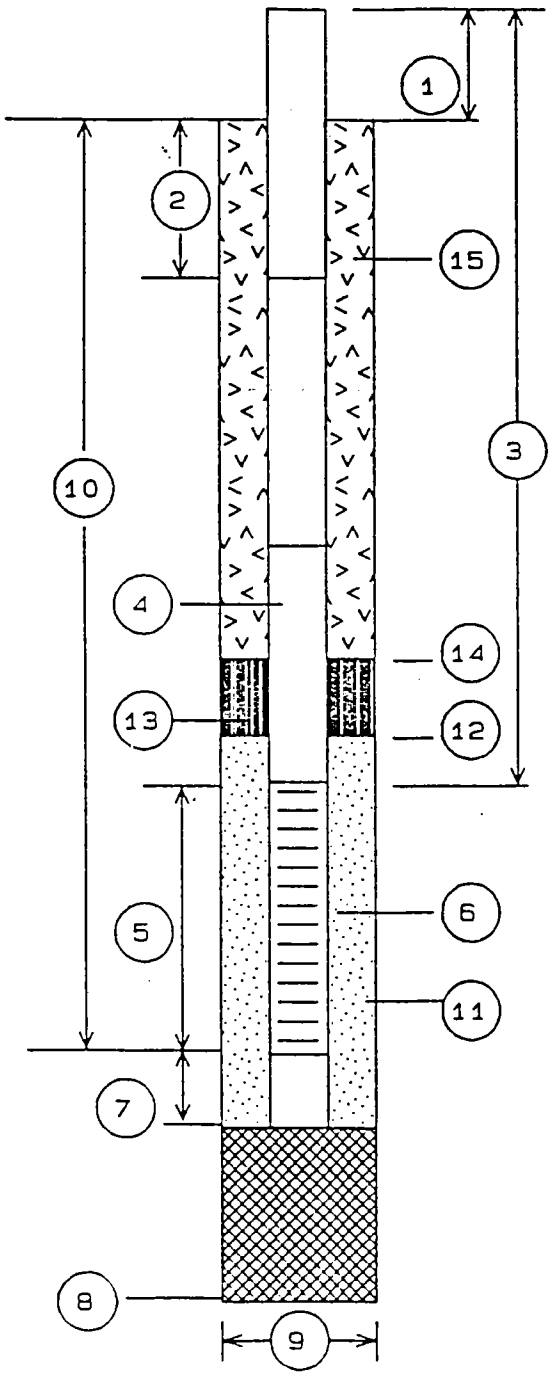
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

WELL CONSTRUCTION DETAIL

WELL NUMBER: JAX-873-1-3

DATE OF INSTALLATION: 10-24-89



1. Height of Casing above ground: 0
2. Depth to first Coupling: 5 feet
   Coupling Interval Depths: 10
3. Total Length of Riser Pipe: 5 feet
4. Type of Riser Pipe: 2 in. SCH 40 PVC
5. Length of Screen: 10 feet
6. Type of Screen: 2 in. dia. SCH 40 w/0.010 in. slots
7. Length of Sump: 6 in.
8. Total Depth of Boring: 15 feet
9. Diameter of Boring: 8 in.
10. Depth to Bottom of Screen: 15 feet
11. Type of Screen Filter: coarse sand
    Quantity Used: 325 lbs. Size: 20/30
12. Depth to Top of Filter: 1.5 feet
13. Type of Seal: Bentonite pellets
    Quantity Used: 1/2 bucket (5 gal.)
14. Depth to Top of Seal: 0.5 feet
15. Type of Grout: Cement
    Grout Mixture: .
    Method of Placement: .
16. Stabilizers: .

COMMENTS ON INSTALLATION

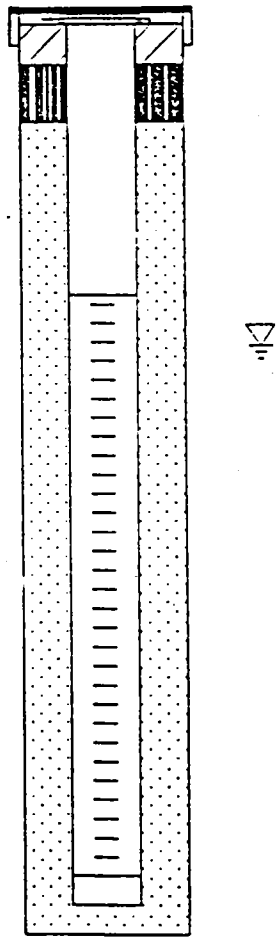
C-E ENVIRONMENTAL, INC.

Southern Division Naval FAC. Eng. Com.

Monitoring Well Diagram

LOCATION NAS, Jacksonville

LOG OF BORING NO. JAX-873-1-4 LOG OF WELL NO. JAX-873-1-4

DEPTH IN FEET	SYMBOL	SAMPLES	MATERIAL DESCRIPTION	WELL CONSTRUCTION
0			Dark brown topsoil	
			Medium brown-grey fine sand, damp	
5			Medium grey fine sand trace shells, moist	
			Dk. grey very fine sand, moist to saturated odor	
10			Saturated, odor	
15			TD = 15' BLS	
20				

Boring Completion Date: 10-25-89
Well Completion Date: 10-25-89
Well Development Date: 10-25-89
Drilling Method: HSA
Depth to Water: 5.9 FT.

Boring Diameter: 8 in
Ground Elevation:
Top of Casing Elevation:
Driller: NPTC

C-E ENVIRONMENTAL, INC.

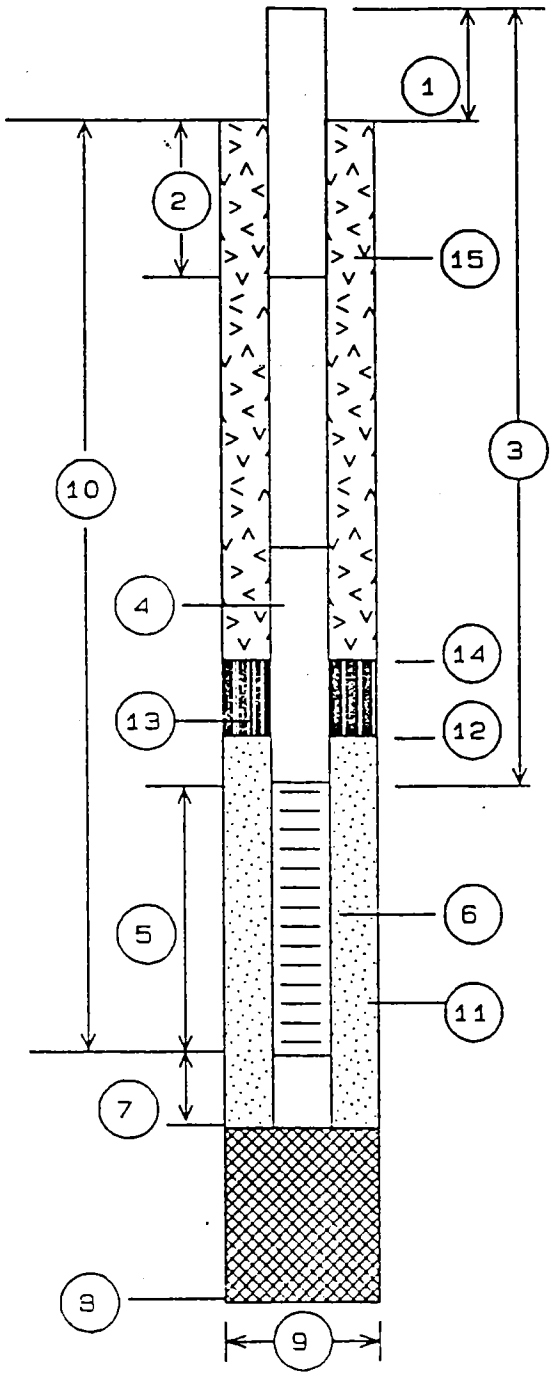
DEPARTMENT OF THE NAVY

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA

WELL CONSTRUCTION DETAIL

WELL NUMBER: JAX-873-1-4

DATE OF INSTALLATION: 10-25-89



1. Height of Casing above ground: 0
2. Depth to first Coupling: 5 feet
   Coupling Interval Depths: 10
3. Total Length of Riser Pipe: 5 feet
4. Type of Riser Pipe: 2 in. SCH 40 PVC
5. Length of Screen: 10 feet
6. Type of Screen: 2 in. dia. SCH 40 w/0.010 in. slots
7. Length of Sump: 6 in.
8. Total Depth of Boring: 15 feet
9. Diameter of Boring: 8 in.
10. Depth to Bottom of Screen: 15 feet
11. Type of Screen Filter: coarse sand
    Quantity Used: 325 lbs. Size: 20/30
12. Depth to Top of Filter: 1.5 feet
13. Type of Seal: Bentonite pellets
    Quantity Used: 1/2 bucket (5 gal.)
14. Depth to Top of Seal: 0.5 feet
15. Type of Grout: Cement
    Grout Mixture: .
    Method of Placement: .
16. Stabilizers: .

COMMENTS ON INSTALLATION

C-E ENVIRONMENTAL, INC.

APPENDIX D

AQUIFER TEST CALCULATIONS AND DATA

Ground-water Hydraulic Conductivity Testing Results

Average Pore Water Velocity Calculations

An estimate of the average linear pore water velocity were derived employing the following variation of Darcy's Law:

$$V = (K * I_{av})/n$$

where

V = average pore water velocity (ft/day),

K = hydraulic conductivity (ft/day,

I_{av} = average hydraulic gradient across site, and

n = estimated porosity

Assuming an average porosity of 30 percent, a hydraulic gradient across the site of .002, and the average horizontal hydraulic conductivity from shallow well JAX-873-4 (K = 8.58 ft/day), the calculated pore water velocity is:

$$V = (8.58 * .002)/.30$$

$$V = 0.057 \text{ feet/day.}$$

Transmissivity

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

$$T = K * b$$

where

T = transmissivity (ft^2/day),

K = hydraulic conductivity (ft/day), and

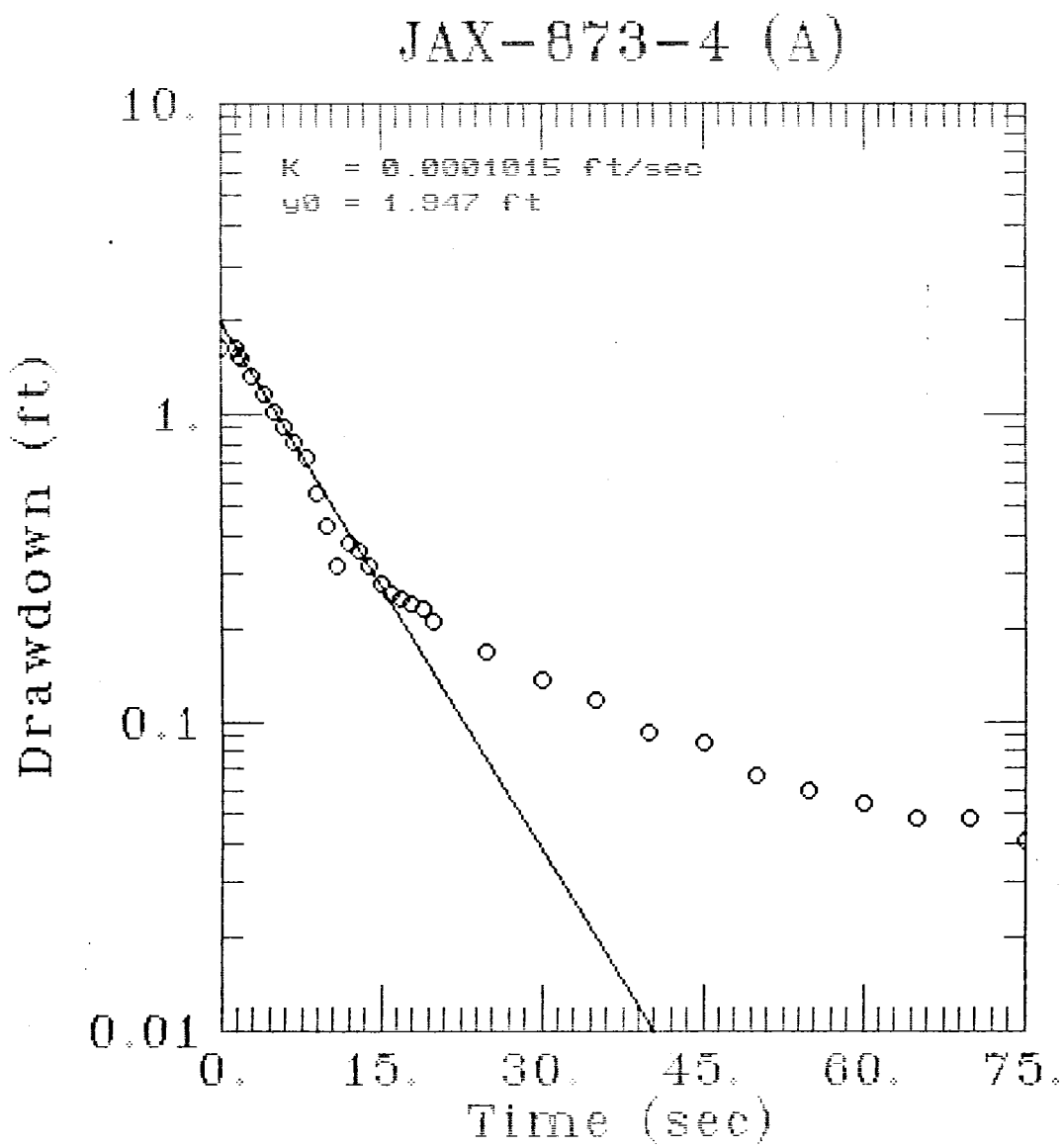
b = aquifer test interval or thickness (ft).

For monitoring well JAX-873-4, using a K value of 8.58 ft/day and a b value of 6.7 ft, the calculated transmissivity is as follows:

$$T = 8.58 * 6.7$$

$$T = 57.5 \text{ ft}^2\text{/day}$$

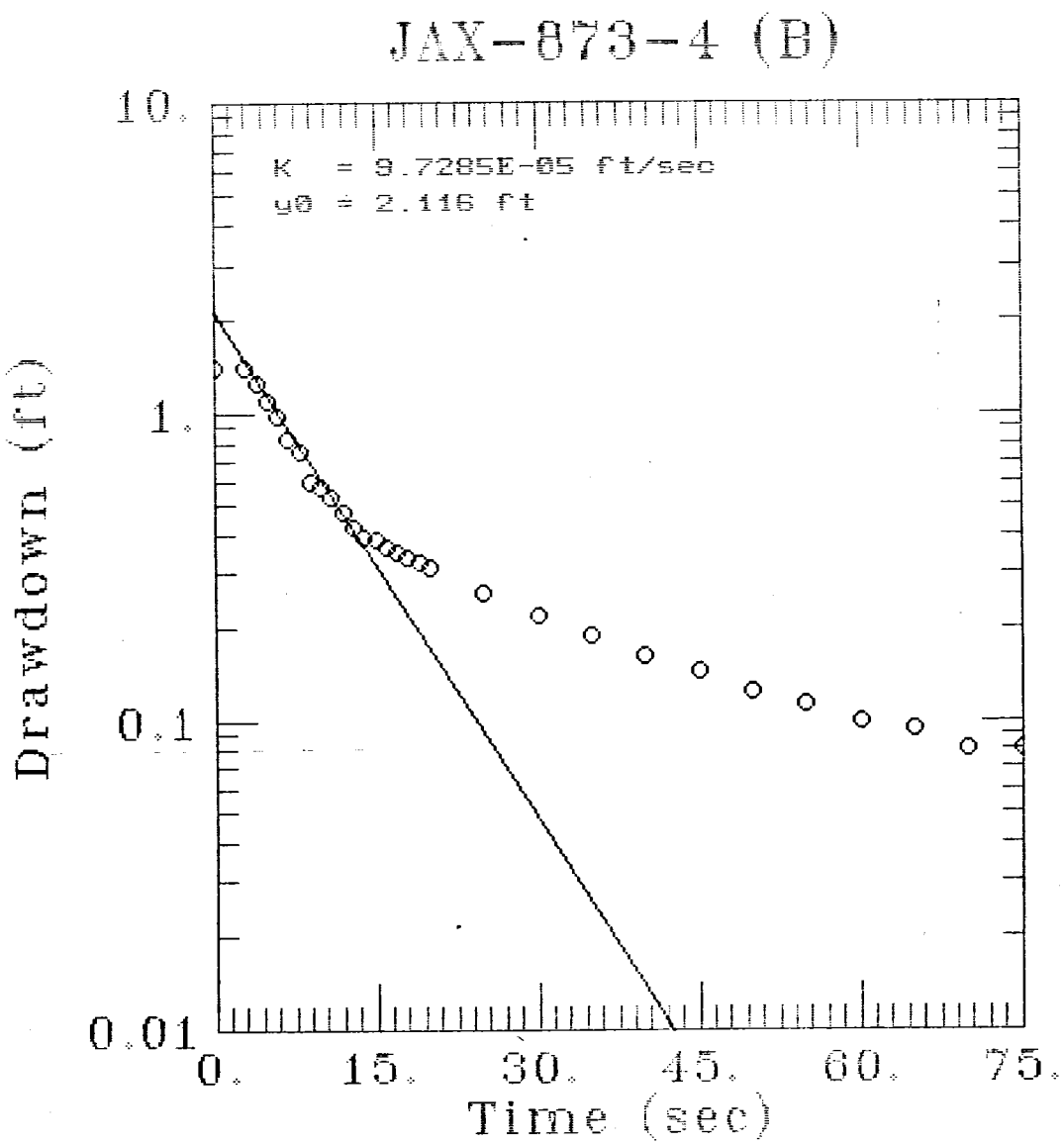
Employing the same methods to deep well JAX-873-5 produced a calculated pore water velocity of 0.013 ft/day and a transmissivity of 36.7 ft^2/day.



AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

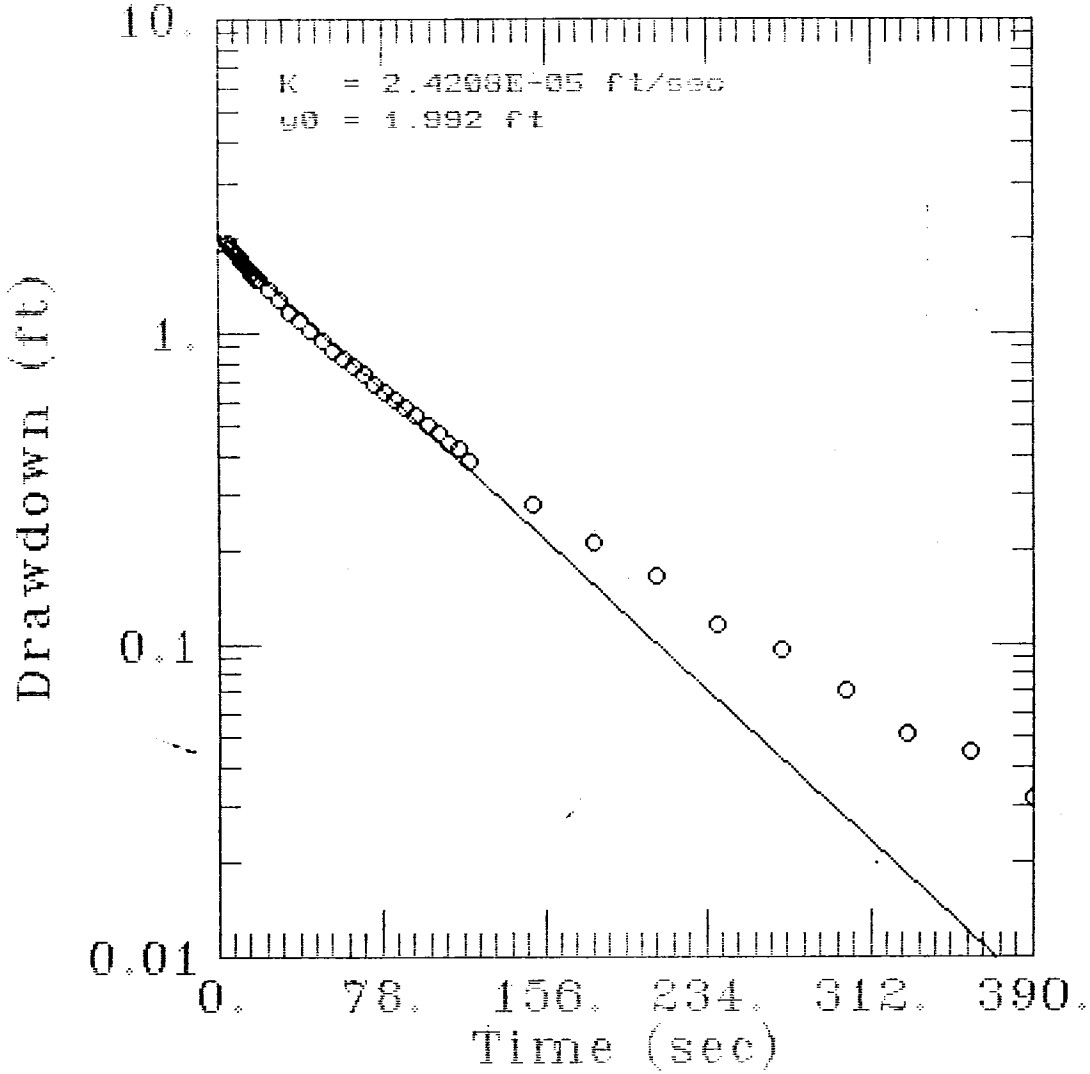


AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

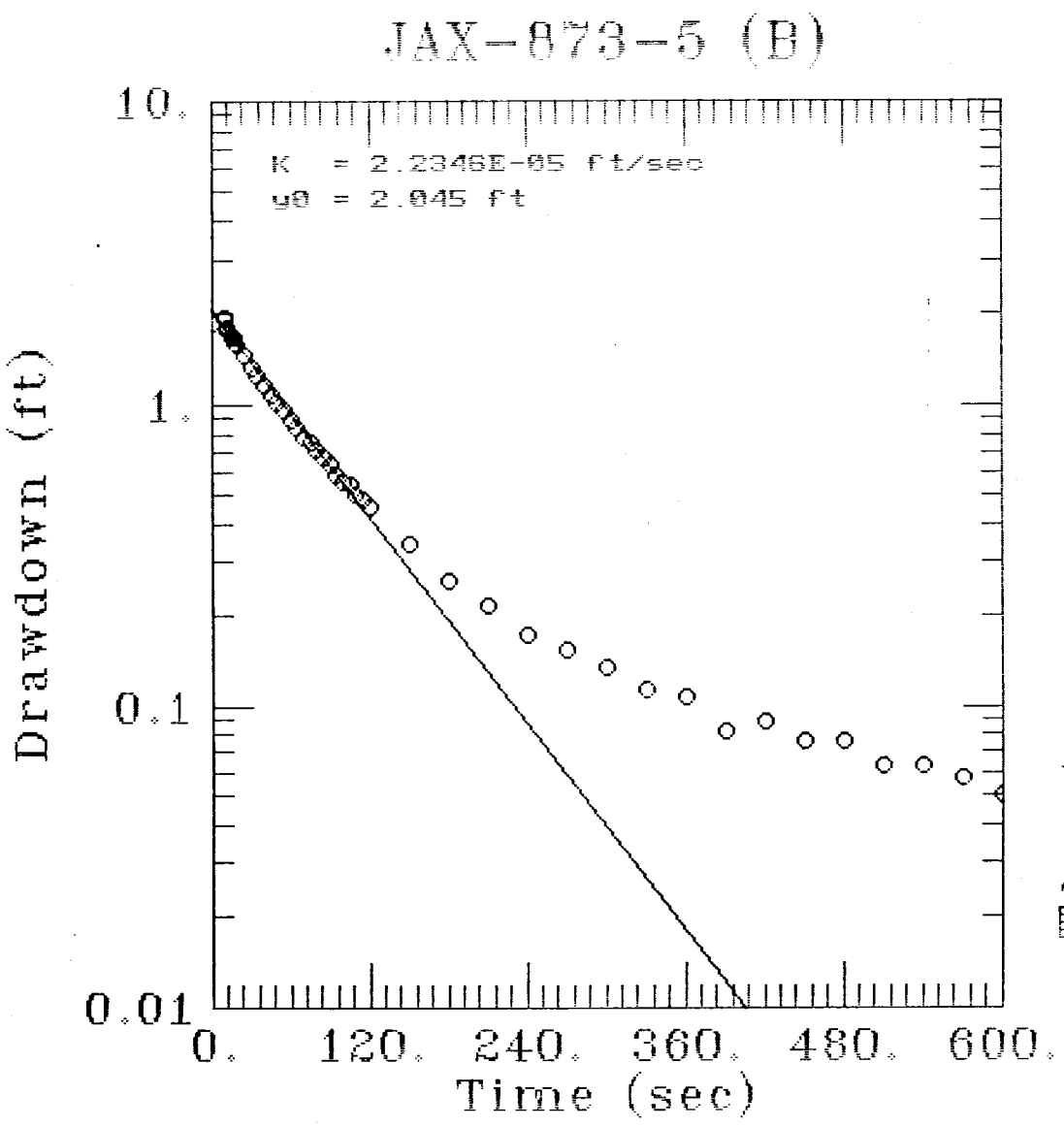
JAX-873-5 (A)



AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group



AQTESOLV

GERAGHTY & MILLER, INC.

Modeling Group

APPENDIX E

LABORATORY ANALYTICAL RESULTS

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-40169

Received: 10 JAN 92

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-1	JAX-873-1	01-08-92
40169-2	JAX-873-2	01-08-92
40169-3	JAX-873-3	01-08-92
40169-4	JAX-873-4	01-09-92
40169-5	JAX-873-5	01-09-92

PARAMETER	40169-1	40169-2	40169-3	40169-4	40169-5
Purgeable Halocarbons (601)					
Bromodichloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl Ether, ug/l	<10	<10	<10	<10	<10
Chloroform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	2.8	<1.0	<1.0	<1.0	<1.0

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

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40169-1	JAX-873-1	01-08-92
40169-2	JAX-873-2	01-08-92
40169-3	JAX-873-3	01-08-92
40169-4	JAX-873-4	01-09-92
40169-5	JAX-873-5	01-09-92

PARAMETER	40169-1	40169-2	40169-3	40169-4	40169-5
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate - Bromochloromethane (70-130) % Rec	79 %	76 %	73 %	81 %	71 %

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40169-2	JAX-873-2	01-08-92
40169-3	JAX-873-3	01-08-92
40169-4	JAX-873-4	01-09-92
40169-5	JAX-873-5	01-09-92

PARAMETER	40169-1	40169-2	40169-3	40169-4	40169-5
Purgeable Aromatics (602/8020)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	2.4	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10	<10
Total Volatile Organic Aromatics, ug/l	<1.0	<1.0	2.4	<1.0	<1.0
Surrogate - Trifluoro-toluene (70-130 % Rec)	102 %	107 %	105 %	88 %	103 %
1,2-Dibromoethane (EDB) , ug/l	<0.020	<0.020	<0.020	<0.020	<0.020

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-1	JAX-873-1	01-08-92
40169-2	JAX-873-2	01-08-92
40169-3	JAX-873-3	01-08-92
40169-4	JAX-873-4	01-09-92
40169-5	JAX-873-5	01-09-92

PARAMETER	40169-1	40169-2	40169-3	40169-4	40169-5
Polynuclear Aromatic Hydrocarbons (610/8100)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	11	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	<10	11	<10
1-Methylnaphthalene, ug/l	<10	<10	<10	18	<10
Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
Lead, mg/l	0.016	0.037	0.024	0.0090	0.0060

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-6	JAX-873-6	01-09-92
40169-7	JAX-873-7	01-09-92
40169-8	JAX-873-8	01-09-92
40169-9	JAX-873-9	01-09-92
40169-10	JAX-873-10	01-09-92

PARAMETER	40169-6	40169-7	40169-8	40169-9	40169-10
Purgeable Halocarbons (601)					
Bromodichloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl Ether, ug/l	<10	<10	<10	<10	<10
Chloroform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	<1.0	<1.0	<1.0	3.2

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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P. O. Box 889
Savannah, Georgia 31402-0889

Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-6	JAX-873-6	01-09-92
40169-7	JAX-873-7	01-09-92
40169-8	JAX-873-8	01-09-92
40169-9	JAX-873-9	01-09-92
40169-10	JAX-873-10	01-09-92

PARAMETER	40169-6	40169-7	40169-8	40169-9	40169-10
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate - Bromochloromethane (70-130) % Rec	75 %	74 %	74 %	74 %	76 %

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& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-40169

Received: 10 JAN 92

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-6	JAX-873-6	01-09-92
40169-7	JAX-873-7	01-09-92
40169-8	JAX-873-8	01-09-92
40169-9	JAX-873-9	01-09-92
40169-10	JAX-873-10	01-09-92

PARAMETER	40169-6	40169-7	40169-8	40169-9	40169-10
Purgeable Aromatics (602/8020)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10	<10	<10
Total Volatile Organic Aromatics, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Surrogate - Trifluoro-toluene (70-130 % Rec)	104 %	104 %	107 %	106 %	107 %
1,2-Dibromoethane (EDB) , ug/l	<0.020	<0.020	<0.020	<0.020	<0.020

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-6	JAX-873-6	01-09-92
40169-7	JAX-873-7	01-09-92
40169-8	JAX-873-8	01-09-92
40169-9	JAX-873-9	01-09-92
40169-10	JAX-873-10	01-09-92

PARAMETER	40169-6	40169-7	40169-8	40169-9	40169-10
Polynuclear Aromatic Hydrocarbons (610/8100)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
1-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
Lead, mg/l	0.034	0.036	0.050	0.024	0.020

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Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-11	JAX-873-9 DUP	01-09-92
40169-12	JAX-873-Rinsate Blank	01-09-92
40169-13	JAX-873-MW2	01-09-92

PARAMETER	40169-11	40169-12	40169-13
Purgeable Halocarbons (601)			
Bromodichloromethane, ug/l	<1.0	<1.0	<1.0
Bromoform, ug/l	<5.0	<5.0	<5.0
Bromomethane, ug/l	<1.0	<1.0	<1.0
Carbon Tetrachloride, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
Chloroethane, ug/l	<1.0	<1.0	<1.0
2-Chloroethylvinyl Ether, ug/l	<10	<10	<10
Chloroform, ug/l	<1.0	<1.0	<1.0
Chloromethane, ug/l	<1.0	<1.0	<1.0
Dibromochloromethane, ug/l	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0
1,1-Dichloroethene, ug/l	<1.0	<1.0	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0

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Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-11	JAX-873-9 DUP	01-09-92
40169-12	JAX-873-Rinsate Blank	01-09-92
40169-13	JAX-873-MW2	01-09-92

PARAMETER	40169-11	40169-12	40169-13
Methylene Chloride, ug/l	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0
Vinyl Chloride, ug/l	<1.0	<1.0	<1.0
Surrogate - Bromochloromethane (70-130) % Rec	76 %	80 %	87 %
Purgeable Aromatics (602/8020)			
Benzene, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10	<10
Total Volatile Organic Aromatics, ug/l	<1.0	<1.0	<1.0
Surrogate - Trifluoro- toluene (70-130 % Rec)	105 %	104 %	77 %
1,2-Dibromoethane (EDB) , ug/l	<0.020	<0.020	<0.020

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
40169-11	JAX-873-9 DUP	01-09-92
40169-12	JAX-873-Rinsate Blank	01-09-92
40169-13	JAX-873-MW2	01-09-92

PARAMETER	40169-11	40169-12	40169-13
Polynuclear Aromatic Hydrocarbons (610/8100)			
Acenaphthene, ug/l	<10	<10	14
Acenaphthylene, ug/l	<10	<10	13
Benzo(a)pyrene, ug/l	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10
Fluoranthene, ug/l	<10	<10	10
Fluorene, ug/l	<10	<10	32
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	26
Pyrene, ug/l	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	96
1-Methylnaphthalene, ug/l	<10	<10	70
Petroleum Hydrocarbons (418.1), mg/l	<1.0	<1.0	<1.0
Lead, mg/l	0.025	<0.0050	0.029

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Savannah, Georgia 31402-0889

Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40169-14	Method Blank-Water
40169-15	Lab Control Standard
40169-16	Precision (% RPD)-Water
40169-17	Date Extracted-Water
40169-18	Date Analyzed-Water

PARAMETER	40169-14	40169-15	40169-16	40169-17	40169-18
Purgeable Halocarbons (601)					
Bromodichloromethane, ug/l	<1.0	---	---	---	01.16.92
Bromoform, ug/l	<5.0	---	---	---	01.16.92
Bromomethane, ug/l	<1.0	---	---	---	01.16.92
Carbon Tetrachloride, ug/l	<1.0	---	---	---	01.16.92
Chlorobenzene, ug/l	<1.0	19.8	1.0 %	---	01.16.92
Chloroethane, ug/l	<1.0	---	---	---	01.16.92
2-Chloroethylvinyl Ether, ug/l	<10	---	---	---	01.16.92
Chloroform, ug/l	<1.0	---	---	---	01.16.92
Chloromethane, ug/l	<1.0	---	---	---	01.16.92
Dibromochloromethane, ug/l	<1.0	---	---	---	01.16.92
1,2-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
1,3-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
1,4-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
Dichlorodifluoromethane, ug/l	<1.0	---	---	---	01.16.92
1,1-Dichloroethane, ug/l	<1.0	---	---	---	01.16.92
1,2-Dichloroethane, ug/l	<1.0	---	---	---	01.16.92
1,1-Dichloroethene, ug/l	<1.0	19.2	8.3 %	---	01.16.92
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	---	---	---	01.16.92

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40169-14	Method Blank-Water
40169-15	Lab Control Standard
40169-16	Precision (% RPD)-Water
40169-17	Date Extracted-Water
40169-18	Date Analyzed-Water

PARAMETER	40169-14	40169-15	40169-16	40169-17	40169-18
1,2-Dichloropropane, ug/l	<1.0	---	---	---	01.16.92
Cis-1,3-Dichloropropene, ug/l	<1.0	---	---	---	01.16.92
Trans-1,3-Dichloropropene, ug/l	<1.0	---	---	---	01.16.92
Methylene Chloride, ug/l	<1.0	---	---	---	01.16.92
1,1,2,2-Tetrachloroethane, ug/l	<1.0	---	---	---	01.16.92
Tetrachloroethene, ug/l	<1.0	---	---	---	01.16.92
1,1,1-Trichloroethane, ug/l	<1.0	---	---	---	01.16.92
1,1,2-Trichloroethane, ug/l	<1.0	---	---	---	01.16.92
Trichloroethene, ug/l	<1.0	17.6	6.8 %	---	01.16.92
Trichlorofluoromethane, ug/l	<1.0	---	---	---	01.16.92
Vinyl Chloride, ug/l	<1.0	---	---	---	01.16.92
Purgeable Aromatics (602/8020)					
Benzene, ug/l	<1.0	20.8	2.9 %	---	01.16.92
Chlorobenzene, ug/l	<1.0	20.4	2.0 %	---	01.16.92
1,2-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
1,3-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
1,4-Dichlorobenzene, ug/l	<1.0	---	---	---	01.16.92
Ethylbenzene, ug/l	<1.0	---	---	---	01.16.92
Toluene, ug/l	<1.0	19.8	3.0 %	---	01.16.92
Xylenes, ug/l	<1.0	---	---	---	01.16.92
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	---	01.16.92

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Project: Bldg 873 Jacksonville NAS
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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
40169-14	Method Blank-Water
40169-15	Lab Control Standard
40169-16	Precision (% RPD)-Water
40169-17	Date Extracted-Water
40169-18	Date Analyzed-Water

PARAMETER	40169-14	40169-15	40169-16	40169-17	40169-18
Total Volatile Organic Aromatics, ug/l	<1.0	---	---	---	01.16.92
1,2-Dibromoethane (EDB) , ug/l	<0.020	106 %	2.8 %	01.13.92	01.14.92
Lead, mg/l	<0.0050	104 %	0.96 %	---	01.22.92
Polynuclear Aromatic Hydrocarbons (610/8100)					
Acenaphthene, ug/l	<10	69 %	14 %	01.15.92	01.18-19
Acenaphthylene, ug/l	<10	---	---	01.15.92	01.18-19
Benzo(a)pyrene, ug/l	<10	76 %	21 %	01.15.92	01.18-19
Benzo(g,h,i)perylene, ug/l	<10	---	---	01.15.92	01.18-19
Benzo(b,k)fluoranthene, ug/l	<10	---	---	01.15.92	01.18-19
Chrysene + Benzo(a)anthracene, ug/l	<10	---	---	01.15.92	01.18-19
Fluoranthene, ug/l	<10	---	---	01.15.92	01.18-19
Fluorene, ug/l	<10	72 %	14 %	01.15.92	01.18-19
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	---	---	01.15.92	01.18-19
Naphthalene, ug/l	<10	71 %	20 %	01.15.92	01.18-19
Phenanthrene + Anthracene, ug/l	<10	---	---	01.15.92	01.18-19
Pyrene, ug/l	<10	76 %	16 %	01.15.92	01.18-19
2-Methylnaphthalene, ug/l	<10	---	---	01.15.92	01.18-19
1-Methylnaphthalene, ug/l	<10	---	---	01.15.92	01.18-19
Petroleum Hydrocarbons (418.1), mg/l	<1.0	4.33	8.7 %	01.27.92	01.27.92

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Contract: #DACA21-92-M0181

Project: Bldg 873 Jacksonville NAS
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES
40169-19	JAX-873-Trip Blank

PARAMETER	40169-19
Purgeable Halocarbons (601)	
Bromodichloromethane, ug/l	<1.0
Bromoform, ug/l	<5.0
Bromomethane, ug/l	<1.0
Carbon Tetrachloride, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
Chloroethane, ug/l	<1.0
2-Chloroethylvinyl Ether, ug/l	<10
Chloroform, ug/l	<1.0
Chloromethane, ug/l	<1.0
Dibromochloromethane, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Dichlorodifluoromethane, ug/l	<1.0
1,1-Dichloroethane, ug/l	<1.0
1,2-Dichloroethane, ug/l	<1.0
1,1-Dichloroethene, ug/l	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0
1,2-Dichloropropane, ug/l	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0
Methylene Chloride, ug/l	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0

SL SAVANNAH LABORATORIES ENVIRONMENTAL SERVICES, INC.

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

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

(Fla. Kerosene Group)

P.O. NUMBER	PROJECT NUMBER	PROJECT NAME	MATRIX TYPE	REQUIRED ANALYSES	PAGE	OF
		Bldg. 873 Jacksonville NAS			1	2

CLIENT NAME: U.S. Army Corps of Engineers - Savannah Dist.
TELEPHONE/FAX NO.: 912-944-5674
CLIENT ADDRESS: P.O. Box 889
CITY, STATE, ZIP CODE: Savannah, GA 31402
SAMPLER(S) NAME(S): C. Smith, M. Fife
CLIENT PROJECT MANAGER: Cardwell Smith

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

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	TPH	Lead	601/602/EDB	610								
1-8-92	1638	JAX-873-1	X				1	1	5	2							9	Containers
"	1659	JAX-873-2	X				1	1	5	2							9	"
"	1727	JAX-873-3	X				1	1	5	2							9	"
"	1745	JAX-873-4	X				1	1	5	2							9	"
1-9-92	0755	JAX-873-5	X				1	1	5	2							9	"
"	0945	JAX-873-6	X				1	1	5	2							9	"
"	0920	JAX-873-7	X				1	1	5	2							9	"
"	0905	JAX-873-8	X				1	1	5	2							9	"
"	0815	JAX-873-9	X				1	1	5	2							9	"
"	0850	JAX-873-10	X				1	1	5	2							9	"
"	1010	873-MW2	X				1	1	5	2							9	"
—	—	JAX-873 Trip Blank	X						5								5	"

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]	01/07	8:00	[illegible]	01/07	0830	[illegible]	01/09	1500
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[illegible]	1/9	1500	[illegible]	1/10	1420	[illegible]	1/10/92	2.25

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.	LABORATORY REMARKS
[illegible]	1/10/92	2.25	☒ YES ☐ NO		40169	

ORIGINAL

SAVANNAH LABORATORIES
ENVIRONMENTAL SERVICES, INC.

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

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER:
PROJECT NAME: Bldg. 873 Jacksonville NAS
MATRIX TYPE: (F/2 KEROSENE GRP)
REQUIRED ANALYSES:
PAGE 2 OF 2

CLIENT NAME: U.S. Army Corps of Engineers - Savannah Dist.
TELEPHONE/FAX NO.: 912-944-6674
CLIENT ADDRESS: P.O. Box 889
CITY, STATE, ZIP CODE: Savannah, GA 31402
SAMPLER(S) NAME(S): C. Smith, M. Fife
CLIENT PROJECT MANAGER: Cardwell Smith

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

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	TPH	Lead	601/602/EDB	610								
			NUMBER OF CONTAINERS SUBMITTED															
1-8-92	0850	JAX-873 Rinsate Blank (Equip)	X				1	1	5	2								9 Containers
1-9-92	0815	JAX-873-9 Duplicate	X				1	1	5	2								9 "
																		122 Containers TOTAL

NOTE: Please provide Level II Reporting.

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[signature]	01/07	8:00	[signature]	01/07	0830	[signature]	01/09	1500
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
[signature]	1/9	1500	[signature]	1/10	1420	[signature]	1/10/92	2:25

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
[signature]	1/10/92	2:25	☒ YES ☐ NO		40169

LABORATORY REMARKS

ORIGINAL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-41708

Received: 11 APR 92

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA21-91-MO378

Project: Jacksonville Naval Air Station,Bldg.873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
41708-1	JAX-873-1-3	04-10-92

PARAMETER	41708-1
Purgeable Aromatics (602/8020)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Surrogate - Trifluoro - toluene % Rec, %	95 %
Polynuclear Aromatics (610)	
Acenaphthene, ug/l	<10
Acenaphthylene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
Benzo(b,k)fluoranthene, ug/l	<10
Chrysene + Benzo(a)anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Fluorene, ug/l	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10
Naphthalene, ug/l	<10
Phenanthrene + Anthracene, ug/l	<10
Pyrene, ug/l	<10
Surrogate - 2-Fluorobiphenyl	65 %

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-41708

Received: 11 APR 92

Contract: DACA21-91-MO378

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Project: Jacksonville Naval Air Station,Bldg.873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41708-2	Detection Limits-Liquid
41708-3	Method Blank Result-Liquid
41708-4	Lab Control Standard Result/Duplicate
41708-5	LCS Expected Value
41708-6	LCS % Recovery/Duplicate

PARAMETER	41708-2	41708-3	41708-4	41708-5	41708-6
Purgeable Aromatics (602/8020)					
Benzene, ug/l	1.0	<1.0	8.8/9.5	10	88/95 %
Chlorobenzene, ug/l	1.0	<1.0	9.3/9.5	10	93/95 %
1,2-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
1,3-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
1,4-Dichlorobenzene, ug/l	1.0	<1.0	---	---	---
Ethylbenzene, ug/l	1.0	<1.0	---	---	---
Toluene, ug/l	1.0	<1.0	9.6/9.9	10	96/99 %
Xylenes, ug/l	1.0	<1.0	---	---	---

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& ENVIRONMENTAL SERVICES, INC.

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LOG NO: S2-41708

Received: 11 APR 92

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA21-91-MO378

Project: Jacksonville Naval Air Station,Bldg.873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41708-2	Detection Limits-Liquid
41708-3	Method Blank Result-Liquid
41708-4	Lab Control Standard Result/Duplicate
41708-5	LCS Expected Value
41708-6	LCS % Recovery/Duplicate

PARAMETER	41708-2	41708-3	41708-4	41708-5	41708-6
Polynuclear Aromatics (610)					
Acenaphthene, ug/l	10	<10	37.6/35.1	50	75/70 %
Acenaphthylene, ug/l	10	<10	---	---	---
Benzo(a)pyrene, ug/l	10	<10	38.5/34.9	50	77/70 %
Benzo(g,h,i)perylene, ug/l	10	<10	---	---	---
Benzo(b,k)fluoranthene, ug/l	10	<10	---	---	---
Chrysene + Benzo(a)anthracene, ug/l	10	<10	---	---	---
Fluoranthene, ug/l	10	<10	---	---	---
Fluorene, ug/l	10	<10	37.2/35.0	50	74/70 %
Indeno(1,2,3-cd)pyrene+Dibe nzo(a,h)anthracene, ug/l	10	<10	---	---	---
Naphthalene, ug/l	10	<10	38.0/36.7	50	76/73 %
Phenanthrene + Anthracene, ug/l	10	<10	---	---	---
Pyrene, ug/l	10	<10	49.5/45.1	50	99/90 %
Surrogate - 2-Fluorobiphenyl	---	80 %	69/69 %	---	---

Methods: EPA 40 CFR Part 136

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue • Savannah, GA 31404 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S2-41708

Received: 11 APR 92

Mr. Cardwell Smith
U.S. Army Engineer District, Savh
P. O. Box 889
Savannah, Georgia 31402-0889

Contract: DACA21-91-MO378

Project: Jacksonville Naval Air Station,Bldg.873
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
41708-7	LCS Control Limit
41708-8	LCS % RPD
41708-9	% RPD Control Limit
41708-10	Control Limits Source

PARAMETER	41708-7	41708-8	41708-9	41708-10
Purgeable Aromatics (602/8020)				
Benzene, %	61-131 %	7.6 %	<25 %	SL
Chlorobenzene, %	54-136 %	2.1 %	<24 %	SL
Toluene, %	64-144 %	3.1 %	<29 %	SL
Polynuclear Aromatics (610)				
Acenaphthene, %	38-111 %	6.9 %	<21 %	SL
Benzo(a)pyrene, %	24-132 %	9.5 %	<78 %	SL
Fluorene, %	39-115 %	5.6 %	<23 %	SL
Naphthalene, %	34-103 %	4.0 %	<25 %	SL
Pyrene, %	36-124 %	9.5 %	<37 %	SL

Methods: EPA 40 CFR Part 136

Steven J. White

Steven J. White

SAVANNAH LABORATORIES
ENVIRONMENTAL SERVICES, INC.
02 Lal[illegible]venue [illegible]nah, G[illegible] 4 — Phor[illegible] 354-7[illegible] — [illegible]2) 352[illegible]
2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

P.O. NUMBER:
PROJECT NUMBER:
PROJECT NAME: Jacksonville Naval Air Station
CLIENT NAME: U.S. Army Corps of Engineers - Sav. Dist
TELEPHONE/FAX NO.: 912-652-5674
CLIENT ADDRESS: P.O. Box 889
CITY, STATE, ZIP CODE: Savannah, GA 31402 ~~31410~~
SAMPLER(S) NAME(S): C. Smith
CLIENT PROJECT MANAGER: Cardwell Smith

PAGE [illegible] OF [illegible]

[ ] STANDARD TAT
[X] EXPEDITED TAT *
REPORT DUE DATE 8-14 days
* SUBJECT TO RUSH FEES

REQUIRED ANALYSES

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	MATRIX: AQUEOUS MATRIX	MATRIX: NONAQUEOUS MATRIX	MATRIX: OIL MATRIX	MATRIX: AIR MATRIX	601, 602, EDB, MTBE (NUMBER OF CONTAINERS SUBMITTED)	Lead (NUMBER OF CONTAINERS SUBMITTED)	602 (NUMBER OF CONTAINERS SUBMITTED)	610 (NUMBER OF CONTAINERS SUBMITTED)					
		Building 880													
4-10-92	0920	JAX-880-12	X				6	1							
"	1015	JAX-880-13	X				6	1							41707
		Trip Blank	X				4								
		Building 873													
4-10-92	11:15	JAX-873-1-3	X						4	1					41708
		Note: Please Provide Level II Reporting													

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]	4/8	8:30	Cardwell Smith	4-8	8:30	Cardwell Smith	4-11-92	11:30
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
Y. Johnson	4/11/92	11:30	[X] YES [ ] NO		See above

LABORATORY REMARKS: RUSH

APPENDIX F

TANK TESTING RESULTS

PETRO Environmental Services, Inc.

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 10
To FITE	From GATZLAND
Co. LOE	Co. PW
Dept. GEOTECHNICAL	Phone # 904 772-2777
Fax # 912 652-5311	Fax # 904 772-3056

UNDERGROUND STORAGE TANK AND PRODUCT LINE TEST REPORT

FOR

NAVAL AIR STATION

OFFICER IN CHARGE, BLK. 6

P.O. BOX 5 CODE 187

JACKSONVILLE, FLORIDA 32212-5000

1454 Prudential Drive ■ Jacksonville, FL 32207 ■ 904•399•0611 ■ FAX 399•0612

TANK AND LINE TEST REPORT

DATE: August 22, 1991

LOCATION: Naval Air Station
Jacksonville, FL

TIME OF TEST: 0800-1700

TANK TESTING REPORT

TANK 6
REGULAR UNLEADED
CAPACITY 10,000 GALS.
TEMPERATURE COEFFICIENT 673 PPM
RELATIVE FUEL TEMP. 86.41
TIME 14:06 - 15:23
VOLUME RATE OF CHANGE -.145 GPH

RESULTS: TANK 6 FAILED TEST. TANK AND CONNECTING LINE FOUND TO LEAK. BEST COURSE OF ACTION WOULD BE TO ISOLATE PRODUCT LINE FROM TANK, RETEST LINE AND RETEST TANK.

TANK 7
UNLEADED PLUS
CAPACITY 10,000 GALS.
TEMPERATURE COEFFICIENT 673 PPM
RELATIVE FUEL TEMP. 86.41
TIME 15:27 - 16:44
VOLUME RATE OF CHANGE +.007 GPH

RESULTS: TANK 7 PASSED TEST.

TANK 1 - SERIES # 873
JP-5 FUEL
CAPACITY 25,000 GALS.
TEMPERATURE COEFFICIENT 460 PPM
RELATIVE FUEL TEMP. 97.00
TIME 7:00 - 10:30
VOLUME RATE OF CHANGE +.018 GPH

RESULTS: TANK 1 PASSED TEST. FOUND TANK TO BE TIGHT. MANWAYS ON TOP OF TANK WILL LEAK IF FILLED TO TOP. SOIL AROUND TANK IS HIGHLY CONTAMINATED WITH JP-5. MANWAY GASKETS AND OTHER FITTINGS NEED TO BE REPLACED.

ALL CONNECTING PRODUCT LINES **PASSED** ON TANKS #7
AND # 1-Series #873.

THE TESTING EQUIPMENT USED TO PERFORM THE TIGHTNESS TEST ON THE ABOVE TANKS IS MANUFACTURED BY HORNER CREATIVE PRODUCTS, INC. AND IS CALLED THE EZY CHEK II.

J.S. EVANS
TESTING SPECIALIST
STATE CERT. #RQ0060305

TESTING METHODOLOGY

The testing instrumentation provided to the technician yields two very important bits of information on the underground tank system that is being tested:

1. The actual amount of liquid volume change during the test.
2. The calculated volume change due to temperature change (liquids expand and contract) during the test.

The mathematical result will be determined by subtracting one from the other. This result is compared to the criteria established by the National Fire Protection Association (NFPA) 329.

During the course of the test, the technician must eliminate/control/minimize the effects of the testing variables.

TESTING CRITERIA

In September of 1988 the United States Environmental Protection Agency (USEPA) released its regulations on underground storage tanks in the Federal Register.

Section 280-43 of the regulations include tank tightness testing as a method of release detection for tanks combined with inventory control. The regulations state "Tank tightness testing (or another test of equivalent performance) must be capable of detecting a 0.1 gallon per hour leak from any portion of the tank that routinely contains product while accounting for the effects of thermal expansion or contraction of the product, vapor pockets, tank deformation, evaporation or condensation, and the location of the water table."

Furthermore, in the preamble of the regulations it is stated "It is intended that all release detection equipment be operated at least at the level of sensitivity indicated in the performance standard. For example, 2 years after the effective date of the rule, the tightness test threshold (i.e., test results that indicates a suspected release) should be set to detect 0.1 gallon per hour leak rates with a PD of 95 percent and a PFA of 5 percent; this threshold value may differ for various tightness testing devices. Manufacturers of the release detection equipment must determine what this threshold value must be to meet the performance standard and inform operators of their equipment. Until the manufacturer sets such a threshold, tank test operators should continue to use the current 0.05 gallon per hour threshold. For most tank testing methods, this will approximate the threshold level for detecting 0.1 gallon per hour leaks. The owner and operator would report a suspected release when a test result exceeds 0.05 gallons per hour or the threshold value provided by the manufacturer in accordance with 280.50.

JACSONVILLE NAS
ROOSEVELT BLVD
JAX
DATE: 08/22/91 TIME: 14:06
FUEL TYPE: REGULAR UNL
CAPACITY TANK 1: 9920 GALLONS
TEST CRITERIA: +0.00 GPH TO +0.00 GPH
TEMPERATURE COEFFICIENT: 673 ppm/deg F
RELATIVE FUEL TEMPERATURE 86.41 deg F
VOLUME CHANGE PER DEG F: 6.68 GALLONS

TANK TESTER VER 2.01

	TANK 1 CAPACITY CHANGE GALLONS				TANK 2 CAPACITY CHANGE GALLONS			
TIME	VOLUME	TEMP.	NET	RATE GPH	VOLUME	TEMP.	NET	RATE GPH
14:06	+0.0000	+0.0000	+0.0000	+0.000				
14:07	-0.0002	-0.0000	-0.0002	-0.021				
14:07	-0.0003	-0.0000	-0.0003	-0.027				
14:08	-0.0005	+0.0000	-0.0005	-0.035				
14:08	-0.0005	+0.0001	-0.0006	-0.043				
14:09	-0.0006	+0.0000	-0.0007	-0.049				
14:09	-0.0007	+0.0001	-0.0008	-0.056				
14:10	-0.0008	-0.0000	-0.0008	-0.061				
14:11	-0.0008	-0.0000	-0.0008	-0.065				
14:11	-0.0008	-0.0001	-0.0007	-0.068				
14:12	-0.0009	-0.0001	-0.0008	-0.070				
14:12	-0.0009	-0.0000	-0.0009	-0.072				
14:13	-0.0009	-0.0002	-0.0007	-0.074				
14:13	-0.0010	-0.0002	-0.0008	-0.075				
14:14	-0.0010	-0.0002	-0.0008	-0.076				
14:15	-0.0010	-0.0002	-0.0008	-0.076				
14:15	-0.0009	-0.0002	-0.0008	-0.078				
14:16	-0.0009	-0.0002	-0.0008	-0.078				
14:16	-0.0009	-0.0002	-0.0007	-0.079				
14:17	+0.0000	+0.0000	+0.0000	+0.000*				
14:17	-0.0009	-0.0002	-0.0007	-0.072				
14:18	-0.0008	-0.0002	-0.0006	-0.067				
14:18	-0.0008	-0.0002	-0.0006	-0.066				
14:19	-0.0007	-0.0002	-0.0005	-0.062				
14:20	-0.0007	-0.0002	-0.0005	-0.060				
14:20	-0.0008	-0.0002	-0.0006	-0.060				
14:21	-0.0008	-0.0002	-0.0006	-0.059				
14:21	-0.0008	-0.0002	-0.0005	-0.059				
14:22	-0.0008	-0.0002	-0.0006	-0.059				
14:22	-0.0008	-0.0002	-0.0006	-0.059				
14:23	-0.0008	-0.0002	-0.0006	-0.060				
14:24	-0.0009	-0.0002	-0.0007	-0.060				
14:24	-0.0010	-0.0002	-0.0007	-0.061				
14:25	-0.0011	-0.0002	-0.0009	-0.062				
14:25	-0.0012	-0.0002	-0.0010	-0.064				
14:26	-0.0014	-0.0002	-0.0012	-0.067				
14:26	-0.0014	-0.0001	-0.0014	-0.070				
14:27	-0.0017	-0.0001	-0.0016	-0.074				
14:27	-0.0018	-0.0001	-0.0016	-0.078				
14:28	-0.0017	-0.0000	-0.0017	-0.083				
14:29	-0.0013	-0.0002	-0.0011	-0.086				

14:29	-0.0018	+0.0000	-0.0018	-0.090
14:30	-0.0017	-0.0000	-0.0017	-0.094
14:30	-0.0017	-0.0000	-0.0017	-0.098
14:31	-0.0010	-0.0001	-0.0009	-0.101
14:31	-0.0010	-0.0001	-0.0009	-0.104
14:32	-0.0010	-0.0000	-0.0010	-0.106
14:32	-0.0009	+0.0000	-0.0009	-0.107
14:33	-0.0010	-0.0001	-0.0009	-0.108
14:34	-0.0009	-0.0001	-0.0008	-0.109
14:34	-0.0010	-0.0002	-0.0008	-0.110
14:35	-0.0012	-0.0001	-0.0011	-0.110
14:35	-0.0011	+0.0000	-0.0011	-0.110
14:36	-0.0013	-0.0001	-0.0013	-0.111
14:36	-0.0014	-0.0000	-0.0014	-0.112
14:37	-0.0015	-0.0000	-0.0015	-0.112
14:38	-0.0016	+0.0000	-0.0016	-0.113
14:38	-0.0016	-0.0001	-0.0015	-0.114
14:39	-0.0016	-0.0002	-0.0014	-0.115
14:39	-0.0015	-0.0002	-0.0013	-0.116
14:40	-0.0015	-0.0002	-0.0013	-0.117
14:40	-0.0015	-0.0001	-0.0014	-0.118
14:41	-0.0014	-0.0001	-0.0013	-0.118
14:41	-0.0014	-0.0001	-0.0012	-0.119
14:42	-0.0013	-0.0002	-0.0011	-0.120
14:43	-0.0013	-0.0001	-0.0012	-0.120
14:43	-0.0011	-0.0000	-0.0011	-0.121
14:44	-0.0013	-0.0000	-0.0012	-0.121
14:44	-0.0012	-0.0000	-0.0012	-0.122
14:45	-0.0012	-0.0001	-0.0011	-0.122
14:45	-0.0012	-0.0001	-0.0011	-0.122
14:46	-0.0013	-0.0001	-0.0013	-0.123
14:46	-0.0015	-0.0001	-0.0015	-0.123
14:47	-0.0016	-0.0000	-0.0016	-0.124
14:48	-0.0017	-0.0001	-0.0016	-0.124
14:48	-0.0017	-0.0001	-0.0016	-0.124
14:49	-0.0017	-0.0001	-0.0016	-0.125
14:49	-0.0017	-0.0002	-0.0015	-0.126
14:50	-0.0017	-0.0001	-0.0015	-0.126

VOLUME RATE OF CHANGE -0.126 GPH
95 % CONFIDENCE INTERVAL: +/-0.003 GPH
RELATIVE FUEL TEMPERATURE: 68.41 deg F

14:50	-0.0016	-0.0001	-0.0015	-0.127
14:51	-0.0016	-0.0000	-0.0016	-0.127
14:52	-0.0016	-0.0001	-0.0015	-0.128
14:52	-0.0015	-0.0001	-0.0014	-0.128
14:53	-0.0015	+0.0000	-0.0015	-0.129
14:53	-0.0015	-0.0000	-0.0014	-0.129
14:54	-0.0014	-0.0001	-0.0012	-0.130
14:54	-0.0014	-0.0000	-0.0013	-0.130
14:55	-0.0014	-0.0001	-0.0012	-0.131
14:55	-0.0013	-0.0001	-0.0012	-0.131
14:56	-0.0013	-0.0001	-0.0012	-0.132
14:57	-0.0012	-0.0000	-0.0012	-0.132
14:57	-0.0012	+0.0000	-0.0012	-0.132
14:58	-0.0011	+0.0000	-0.0012	-0.132
14:58	-0.0012	+0.0000	-0.0012	-0.133
14:59	-0.0012	+0.0001	-0.0013	-0.133
14:59	-0.0012	+0.0000	-0.0013	-0.133
15:00	-0.0013	-0.0000	-0.0013	-0.133

15:00	-0.0012	-0.0001	-0.0011	-0.133
15:01	-0.0013	-0.0001	-0.0011	-0.134
15:02	-0.0015	-0.0001	-0.0014	-0.134
15:02	-0.0016	-0.0002	-0.0014	-0.134
15:03	-0.0016	-0.0001	-0.0015	-0.134
15:03	-0.0017	-0.0001	-0.0016	-0.134
15:04	-0.0017	-0.0000	-0.0016	-0.134
15:04	-0.0017	-0.0001	-0.0016	-0.135
15:05	-0.0016	-0.0000	-0.0016	-0.135
15:06	-0.0016	+0.0001	-0.0017	-0.135
15:06	-0.0016	+0.0000	-0.0016	-0.135
15:07	-0.0015	+0.0000	-0.0015	-0.136

VOLUME RATE OF CHANGE -0.136 GPH
95 % CONFIDENCE INTERVAL: +/-0.002 GPH
RELATIVE FUEL TEMPERATURE: 86.41 deg F

15:07	-0.0015	+0.0001	-0.0016	-0.136
15:08	-0.0015	+0.0002	-0.0017	-0.136
15:08	-0.0014	+0.0002	-0.0016	-0.137
15:09	-0.0015	+0.0002	-0.0017	-0.137
15:09	-0.0014	+0.0001	-0.0016	-0.137
15:10	-0.0015	+0.0001	-0.0016	-0.138
15:11	-0.0017	+0.0001	-0.0017	-0.138
15:11	-0.0017	+0.0001	-0.0017	-0.138
15:12	-0.0017	+0.0001	-0.0016	-0.139
15:12	-0.0016	+0.0000	-0.0016	-0.139
15:13	-0.0016	+0.0000	-0.0016	-0.139
15:13	-0.0016	-0.0001	-0.0017	-0.140
15:14	-0.0016	-0.0001	-0.0017	-0.140
15:14	-0.0017	-0.0001	-0.0016	-0.140
15:15	-0.0017	-0.0001	-0.0015	-0.141
15:16	-0.0017	-0.0001	-0.0016	-0.141
15:16	-0.0016	-0.0001	-0.0015	-0.141
15:17	-0.0015	-0.0001	-0.0015	-0.142
15:17	-0.0015	+0.0000	-0.0015	-0.142
15:18	-0.0016	-0.0001	-0.0015	-0.142
15:18	-0.0015	-0.0000	-0.0014	-0.143
15:19	-0.0014	+0.0001	-0.0015	-0.143
15:20	-0.0014	+0.0000	-0.0014	-0.143
15:20	-0.0013	+0.0001	-0.0014	-0.144
15:21	-0.0014	-0.0000	-0.0013	-0.144
15:21	-0.0013	-0.0001	-0.0012	-0.144
15:22	-0.0013	-0.0002	-0.0012	-0.144
15:22	-0.0013	-0.0001	-0.0011	-0.145
15:23	-0.0012	-0.0001	-0.0012	-0.145
15:23	-0.0013	-0.0000	-0.0012	-0.145

VOLUME RATE OF CHANGE -0.145 GPH
95 % CONFIDENCE INTERVAL: +/-0.002 GPH
RELATIVE FUEL TEMPERATURE: 86.41 deg F

JACSONVILLE NAS
RO[illegible]EVELT B[illegible]D.
JAX
DATE: 08/22/91 TIME: 15:26
FUEL TYPE: UNL PLUS
CAPACITY TANK 1: 9920 GALLONS
TEST CRITERIA: +0.00 GPH TO +0.00 GPH
TEMPERATURE COEFFICIENT: 673 ppm/deg F
RELATIVE FUEL TEMPERATURE 86.41 deg F
VOLUME CHANGE PER DEG F: 6.68 GALLONS

TANK TESTER VER 2.01

	TANK 1 CAPACITY CHANGE GALLONS				TANK 2 CAPACITY CHANGE GALLONS			
TIME	VOLUME	TEMP.	NET	RATE GPH	VOLUME	TEMP.	NET	RATE GPH
15:27	+0.0000	+0.0000	+0.0000	+0.000				
15:27	-0.0000	+0.0000	-0.0000	-0.005				
15:28	-0.0000	-0.0000	+0.0000	-0.001				
15:28	-0.0001	-0.0000	-0.0000	-0.001				
15:29	-0.0001	-0.0000	-0.0000	-0.002				
15:30	-0.0000	-0.0001	+0.0000	-0.001				
15:30	-0.0000	-0.0001	+0.0000	-0.000				
15:31	-0.0001	-0.0001	-0.0000	-0.001				
15:31	-0.0000	-0.0000	-0.0000	-0.001				
15:32	-0.0001	-0.0001	+0.0001	-0.000				
15:32	-0.0001	-0.0001	+0.0001	+0.000				
15:33	-0.0001	-0.0000	-0.0001	+0.000				
15:34	+0.0004	-0.0000	+0.0004	+0.002				
15:34	-0.0000	-0.0000	+0.0000	+0.003				
15:35	-0.0001	+0.0000	-0.0001	+0.003				
15:35	-0.0001	+0.0000	-0.0001	+0.003				
15:36	-0.0001	+0.0000	-0.0001	+0.002				
15:36	-0.0001	-0.0000	-0.0000	+0.002				
15:37	+0.0000	+0.0000	+0.0000	+0.000*				
15:37	-0.0001	-0.0001	+0.0000	+0.005				
15:38	-0.0001	-0.0001	+0.0000	+0.004				
15:39	+0.0001	-0.0001	+0.0002	+0.008				
15:39	-0.0001	-0.0001	-0.0000	+0.007				
15:40	-0.0001	-0.0000	-0.0001	+0.004				
15:40	-0.0001	+0.0000	-0.0001	+0.001				
15:41	-0.0001	-0.0000	-0.0001	-0.001				
15:41	-0.0001	-0.0000	-0.0001	-0.002				
15:42	-0.0001	-0.0000	-0.0001	-0.004				
15:42	-0.0001	-0.0001	-0.0000	-0.004				
15:43	-0.0001	-0.0001	-0.0000	-0.005				
15:44	-0.0001	-0.0001	-0.0000	-0.005				
15:44	-0.0002	-0.0000	-0.0001	-0.005				
15:45	-0.0001	+0.0000	-0.0001	-0.006				
15:45	-0.0001	-0.0000	-0.0001	-0.006				
15:46	-0.0001	-0.0001	-0.0000	-0.006				
15:46	-0.0001	-0.0002	+0.0001	-0.006				
15:47	-0.0001	-0.0000	-0.0000	-0.006				
15:48	-0.0001	-0.0000	-0.0001	-0.006				
15:48	-0.0001	-0.0002	+0.0000	-0.006				
15:49	-0.0001	-0.0002	+0.0001	-0.006				

15:50	-0.0001	-0.0002	+0.0000	-0.005
15:51	-0.0001	-0.0002	+0.0001	-0.004
15:51	-0.0001	-0.0002	+0.0000	-0.004
15:52	+0.0001	-0.0002	+0.0002	-0.004
15:53	-0.0001	-0.0002	+0.0000	-0.003
15:53	-0.0001	-0.0001	+0.0000	-0.003
15:54	-0.0001	-0.0001	-0.0001	-0.002
15:54	-0.0001	-0.0001	-0.0000	-0.002
15:55	-0.0001	-0.0002	+0.0000	-0.002
15:55	-0.0002	-0.0001	-0.0000	-0.002
15:56	-0.0001	-0.0000	-0.0001	-0.002
15:56	-0.0001	-0.0001	-0.0001	-0.002
15:57	-0.0001	-0.0002	+0.0000	-0.001
15:58	-0.0000	-0.0002	+0.0002	-0.001
15:58	-0.0001	-0.0002	+0.0001	-0.001
15:59	-0.0001	-0.0002	+0.0001	-0.001
15:59	-0.0001	-0.0002	+0.0001	-0.001
16:00	-0.0001	-0.0002	+0.0000	-0.001
16:00	-0.0002	-0.0001	-0.0000	-0.001
16:01	-0.0001	-0.0001	+0.0000	-0.000
16:02	-0.0001	-0.0001	-0.0000	-0.000
16:02	-0.0001	-0.0001	-0.0000	-0.000
16:03	-0.0002	-0.0002	-0.0000	-0.000
16:03	-0.0001	-0.0001	+0.0000	-0.000
16:04	+0.0002	-0.0001	+0.0003	+0.000
16:04	-0.0001	-0.0001	-0.0000	+0.000
16:05	-0.0002	-0.0001	-0.0001	+0.000
16:05	-0.0001	-0.0001	+0.0000	+0.000
16:06	-0.0002	-0.0002	+0.0000	+0.000
16:07	-0.0001	-0.0002	+0.0000	+0.001
16:07	-0.0001	-0.0002	+0.0001	+0.001
16:08	-0.0002	-0.0002	-0.0000	+0.001
16:08	-0.0001	-0.0002	+0.0001	+0.001
16:09	-0.0001	-0.0001	-0.0000	+0.001
16:09	-0.0001	-0.0001	-0.0000	+0.001
16:10	-0.0002	-0.0000	-0.0002	+0.001

VOLUME RATE OF CHANGE 0.001 GPH
95 % CONFIDENCE INTERVAL: +/-0.001 GPH
RELATIVE FUEL TEMPERATURE: 86.41 deg F

16:10	-0.0001	-0.0001	-0.0000	+0.001
16:11	-0.0001	-0.0000	-0.0001	+0.001
16:12	-0.0002	-0.0001	-0.0000	+0.001
16:12	-0.0001	-0.0002	+0.0001	16:19 -0.0001 -0.0000 -0.0001 +0.001
16:19	-0.0001	+0.0000	-0.0001	+0.001
16:20	-0.0001	+0.0001	-0.0002	+0.001
16:21	-0.0001	-0.0000	-0.0001	+0.001
16:21	-0.0001	-0.0000	-0.0001	+0.000
16:22	-0.0001	-0.0002	+0.0001	+0.000
16:22	-0.0001	-0.0002	+0.0001	+0.000
16:23	-0.0001	-0.0002	+0.0001	+0.000
16:23	-0.0000	-0.0002	+0.0002	+0.000
16:24	-0.0001	-0.0002	+0.0001	+0.000
16:24	-0.0001	-0.0003	+0.0001	+0.000
16:25	-0.0001	-0.0002	+0.0001	+0.000
16:26	-0.0002	-0.0002	+0.0001	+0.000
16:26	-0.0001	-0.0002	+0.0001	+0.000
16:27	-0.0001	-0.0003	+0.0002	+0.000

VOLUME RATE OF CHANGE 0.000 GPH

RELATIVE FUEL TEMPERATURE: 66.40 deg F

16:27	-0.0001	-0.0003	+0.0002	+0.000
16:28	-0.0001	-0.0003	+0.0002	+0.000
16:28	-0.0001	-0.0003	+0.0001	+0.000
16:29	-0.0001	-0.0003	+0.0002	+0.000
16:30	-0.0001	-0.0003	+0.0002	+0.001
16:30	-0.0001	-0.0014	+0.0013	+0.001
16:31	-0.0001	-0.0014	+0.0013	+0.001
16:31	-0.0001	-0.0003	+0.0002	+0.001
16:32	-0.0001	-0.0003	+0.0001	+0.001
16:32	-0.0001	-0.0003	+0.0001	+0.002
16:33	-0.0001	-0.0003	+0.0002	+0.002
16:33	-0.0001	-0.0003	+0.0002	+0.002
16:34	-0.0001	-0.0003	+0.0002	+0.002
16:35	-0.0001	-0.0003	+0.0002	+0.002
16:35	-0.0001	-0.0013	+0.0011	+0.003
16:36	-0.0001	-0.0013	+0.0011	+0.003
16:36	-0.0000	-0.0003	+0.0003	+0.003
16:37	-0.0001	-0.0003	+0.0002	+0.004
16:37	-0.0001	-0.0003	+0.0001	+0.004
16:38	-0.0001	-0.0003	+0.0001	+0.004
16:38	+0.0002	-0.0003	+0.0005	+0.004
16:39	-0.0001	-0.0003	+0.0002	+0.005
16:40	-0.0001	-0.0003	+0.0001	+0.005
16:40	-0.0001	-0.0003	+0.0002	+0.005
16:41	-0.0001	-0.0002	+0.0001	+0.006
16:41	-0.0001	-0.0002	+0.0001	+0.006
16:42	-0.0001	-0.0003	+0.0001	+0.006
16:42	-0.0001	-0.0003	+0.0002	+0.006
16:43	-0.0001	-0.0003	+0.0001	+0.006
16:44	-0.0001	-0.0003	+0.0002	+0.007

VOLUME RATE OF CHANGE: 0.007 GPH

95 % CONFIDENCE INTERVAL: +/-0.001 GPH

[illegible] 66.40 deg F

COMPUTER MALFUNCTION