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NAS JACKSONVILLE
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MONITORING WELL COMPLETION REPORT NAS JACKSONVILLE FL
6/1/1991
IT CORPORATION

**MONITOR WELL
COMPLETION REPORT
NAVAL AIR STATION
JACKSONVILLE, FLORIDA**

PREPARED FOR

**NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
CHARLESTON, SOUTH CAROLINA**

PREPARED BY

**IT CORPORATION
8600 HIDDEN RIVER PARKWAY, SUITE 100
TAMPA, FLORIDA 33637**

**PROJECT NO. 453097
JUNE 1991**

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1	<i>Monitoring Well Elevations</i>

Introduction

IT Corporation (IT) installed twelve (12) new monitoring wells at the Naval Air Station, in Jacksonville, Florida. IT installed these wells from May 8, 1989 to May 17, 1989. Described below is information required by Permit conditions for these wells. In addition, Installation Restoration (IR) wells NAS4-6 and NAS4-8 are included. Well construction data for these wells were obtained from a Geraghty and Miller Well Completion Report, 1984. Please note that IR well 4-7 has been destroyed and replaced by IT well 42-4.

Monitor Well Completion Information

The following general information, required by permit specifications, is provided in the following pages and in Appendices A and B.

- Well location map with scale and orientation (Appendix A)
- Type of casing material
- Length and diameter of well casing
- Elevation of ground surface, elevation of top of casing and length of stick-up, and name and qualifications of surveyor
- Borehole depth and diameter
- Detailed lithologic borehole descriptions
- Type of seal and seal interval
- Size of screen slot and statement that it was manufactured rather than field slotted
- Screened interval
- Length of well screen
- Materials and methods used to fill annulus
- Size and type of filter pack

- Method of installation and date of installation
- Well development procedures and disposal method of development water, drilling fluids and soils
- Security devices
- Decontamination procedures used on equipment between borings
- Any problems encountered during boring or well installation
- Method of coupling casing sections and screens
- Driller's complete name(s)
- Duration of well development
- Well Completion Report
- Florida Department of Environmental Regulation (FDER) Well Completion Report
- Visual Classification of Soils
- Monitoring Well Installation Sheet
- Monitoring Well Installation Sketch.

Monitoring Well Installation

IT installed 6 wells around the DSDB's and 6 wells around the polishing pond (Appendix A). At the DSDBs one well was considered a deep (30-35 feet) well. At the polishing pond, two wells were considered deep (30-35 feet) wells. Lithologic logs were developed by the on site IT geologist from observations of the soil cuttings from the drilling process. Appendix B contains a summary of this information. The drilling equipment was steam cleaned between each well. All water and sediment generated as part of the decontamination process was discharged into the Domestic Waste Water Treatment Plant (DWTP) to prevent the possible spread of contamination. The wells were surveyed and located horizontally on the State Plane Coordinate System. The elevation was measured from the north side of the top of the well casing and was established in relation to mean sea level (MSL) (Table 1).

Shallow Monitoring Wells

Shallow wells were drilled by the hollow stem auger method. All shallow wells have two inch diameter Schedule 40 PVC well screens and blank riser pipe. The screens are five foot long, with .010 inch slots (10 slot). Approximately 10 feet of blank riser pipe was flush threaded to the screens. A 20/30 silica sand filter pack surrounds the screens and extends to two feet above the screens. The filter pack was overlain with a two foot bentonite seal that was allowed to hydrate for a minimum of twelve hours. The well was grouted to the surface with Type I portland cement/bentonite mixture and allowed to cure for 24 hours before well development. The wells were developed by a centrifugal pump until a sand free discharge was obtained. Approximately 25 gallons of ground water was pumped out of each shallow well and discharged to the Domestic Wastewater Treatment Plant (DWTP). Each shallow well is protected by a six inch diameter protective casing, a 5' x 5' concrete pad, and four steel protective posts.

Deep Monitoring Wells

Deep wells were drilled with a combination of hollow stem augers and rotary wash methods. To avoid cross contamination between upper and lower aquifers, drilling was initially carried out to a depth of approximately 15 feet using an 8 inch internal diameter (ID) hollow stem auger. A 6-inch diameter Schedule 40 PVC surface casing was then installed. This surface casing was grouted into place and allowed to cure at least 20 hours. After curing, drilling proceeded to a depth of 35 feet using rotary methods. All deep wells, like the shallow wells, have two inch diameter Schedule 40 PVC screens and blank riser pipe. Screens are five foot in length, consist of .010 inch slots (10 slot), and are flush threaded to 32 feet of blank riser pipe. Each deep well screen is surrounded with a 20/30 silica sand filter pack to two feet above the screen. A two foot bentonite seal overlays the filter pack and the well is grouted to the surface with Type 1 portland cement/bentonite mixture. Protection systems are similar to those of the shallow wells: a four to six inch diameter steel casing, a 5' x 5' concrete pad, and four steel protective posts. The wells were developed using a centrifugal pump until a sand-free discharge was obtained. Approximately 40 gallons of ground water were pumped out of each well and discharged to the DWTP.

The well location map, information sheets, and sketches are provided in Appendix B.

Because all permit requirements are not incorporated on these forms, the following information completes the requirements:

- Name and qualifications of surveyor:
Robert M. Angus & Associates
Planners, Civil Engineers & Land Surveyors
Jacksonville, Florida
Philip M. Ghiotto, Florida Registered Surveyor No. 4195
- Well development procedures and disposal method: After completion of the monitor well, it was purged using a centrifugal pump until the water was clear and free of sediment. Each well was pumped for approximately 15 to 30 minutes. Development, and decontamination waters were placed into 55 gallon drums and disposed at the DWTP.
- Drillers name:
Mr. Mike Rice, IT Corporation
Ocala, Florida
Drillers License No. 7091
- Decontamination procedures: All drilling equipment and down hole material (i.e. split spoons) was steam cleaned and allowed to air dry between bore holes.
- Sand and grout used in construction of the wells were emplaced with a tremie pipe, Bentonite was poured in.

Lithologic Borehole Description

The following general information is required:

- Detailed lithologic description of each unit
- Soil sample locations, method of sampling, and percent recovery
- Soil classification used
- Depth to first water encountered
- Reason for termination of boring
- Raw data and results of any soils test performed.

The lithologic logs are provided in Appendix B.

Table 1
Monitoring Well Elevations

MW No.	Elevations Relative to Mean Seal Level	
	T.O.C. ¹	Ground Surface
41-1	(19.52)	(17.8)
41-2	(19.56)	(17.9)
41-3	(20.09)	(18.4)
41-4	(20.64)	(18.5)
41-5	(19.81)	(18.2)
41-6	(20.25)	(18.3)
42-4	(15.24)	(13.4)
42-5	(18.57)	(16.5)
42-6	(18.18)	(16.0)
42-7	(18.19)	(16.0)
42-8	(18.06)	(16.2)
42-9	(11.93)	(12.3)

NOTE:

¹ TOC = Top of Casing

Geraghty & Miller, Inc.

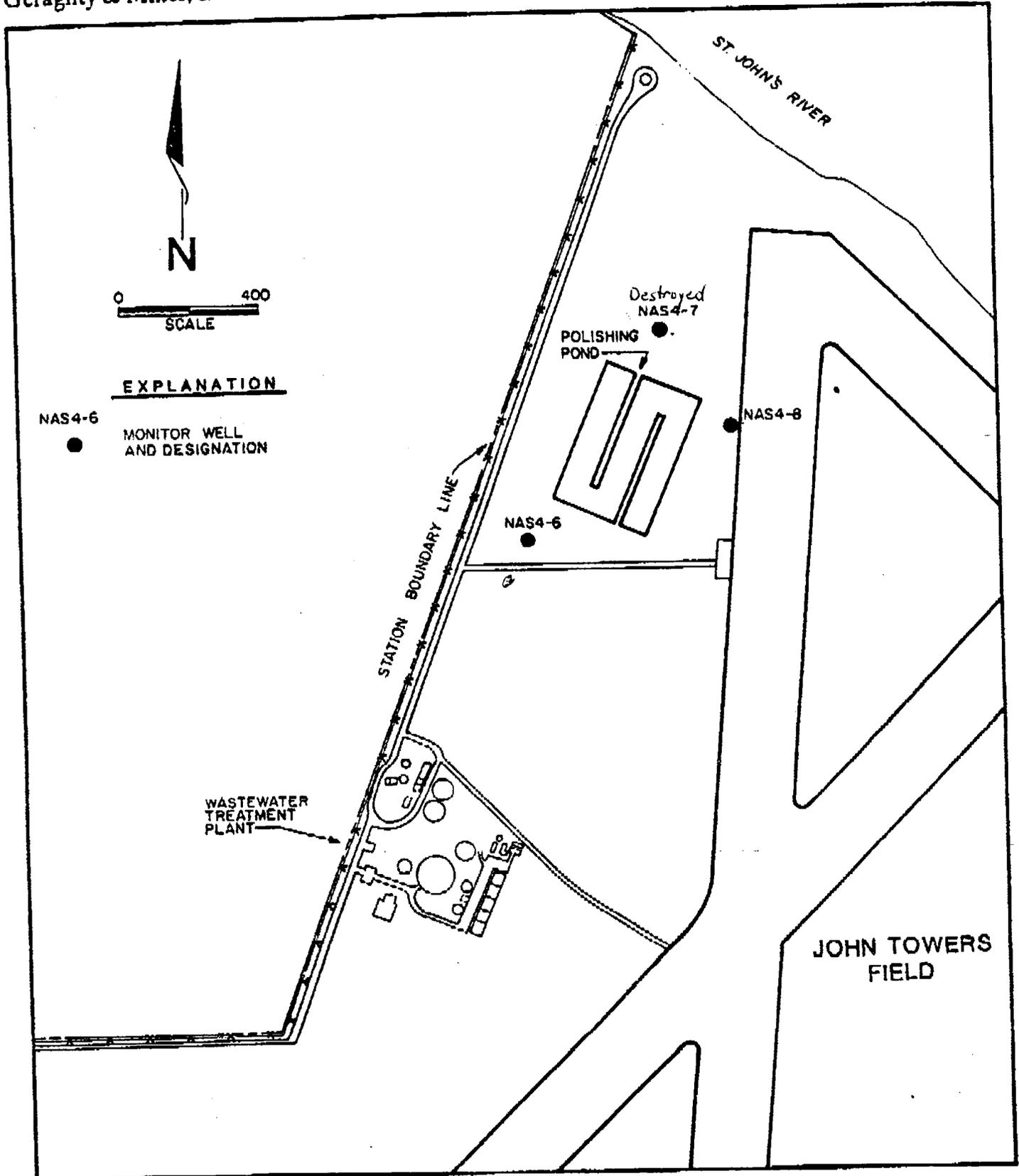


Figure 1. Location Map of WWTP and Monitor Wells

**Summary
Lithologic Logs
Monitoring Well Construction
NAS-Jacksonville, Florida**

Page 1 of 3

DESCRIPTION	DEPTH (ft)	THICKNESS (ft)
Wells at the Domestic Sludge Drying Beds		
Lithologic Log of Monitoring Well 41-1 (Determined from Auger Cuttings)		
Sand, Light Brown-Tan, Fine Grain	0 - 3	3
Sand, Brown	3 - 6	3
Clayey Sand, Light Gray	6 - 14	7
Lithologic Log of Monitoring Well 41-2 (Determined from Auger Cuttings)		
Sand, Light Brown	0 - 3	3
Sand, Brown	3 - 7	4
Clayey Sand, Light Gray	7 - 14	7
Clay	14 - 29	14
Sand, Gray	29 - 31	2
Sandy Clay, Gray-Green	31 - 33	2
Lithologic Log of Monitoring Well 41-3 (Determined from Auger Cuttings)		
Sand, Light Brown, Fine	0 - 3	3
Sand, Brown, Fine	3 - 7	4
Clayey Sand, Light Gray	7 - 14	7
Lithologic Log of Monitoring Well 41-4 (Determined from Auger Cuttings)		
Sand, Brown-Tan	0 - 7	7
Clayey Sand, Gray	7 - 14	7

**Summary
Lithologic Logs
Monitoring Well Construction
NAS-Jacksonville, Florida**

Page 2 of 3

DESCRIPTION	DEPTH (ft)	THICKNESS (ft)
Lithologic Log of Monitoring Well 41-5 (Determined from Auger Cuttings)		
Sand, Dark Brown	0 - 1	1
Sand, Light Brown	1 - 5	5
Sand, Light Brown, Saturated	5 - 7	2
Clayey Sand, Gray	7 - 14	7
Lithologic Log of Monitoring Well 41-6 (Determined from Auger Cuttings)		
Sand, Dark Brown	0 - 2	2
Sand, Light Tan	2 - 7	5
Clayey Sand, Gray	5 - 7	2
Clay Gray	7 - 14	7
Wells at the Polishing Pond		
Lithologic Log of Monitoring Well 42-5 (Determined from Auger Cuttings)		
Sand, Dark Brown	0 - 2	2
Sand, Brown-Tan	2 - 5	3
Sand, Tan	5 - 7	2
Clayey Sand, Gray	7 - 10	4
Clayey Sand, Gray, Saturated	10 - 12	3
Lithologic Log of Monitoring Well 42-6 (Determined from Auger Cuttings)		
Sand, Brown	0 - 7	7

**Summary
Lithologic Logs
Monitoring Well Construction
NAS-Jacksonville, Florida**

Page 3 of 3

DESCRIPTION	DEPTH (ft)	THICKNESS (ft)
Sandy Clay, Dark Gray	7 - 8	1
Clay, Gray, Saturated	8 - 28	21
Sand, Tan	28 - 35	8
Lithologic Log of Monitoring Well 42-7 (Determined from Auger Cuttings)		
Sand, Dark Brown	0 - 5	5
Sand, Gray-Brown	5 - 6	1
Sand, Dark Brown	6 - 10	4
Clay, Green-Gray	10 - 11	1
Lithologic Log of Monitoring Well 42-8 (Determined from Auger Cuttings)		
Sand, Brown to White	0 - 2	2
Sandy Clay, Brown	2 - 4	2
Sandy Clay, Gray	4 - 13	9
Lithologic Log of Monitoring Well 42-9 (Determined from Auger Cuttings)		
Sand, Brown to White, Fine	0 - 2	2
Sand, Tan	2 - 8	6
Clayey Sand, Tan	8 - 13	5
Sandy Clay, Gray	13 - 19	6
Clay, Gray	19 - 32	13
Sand, Tan to White	32 - 37	5

Graghty & Miller, Inc.

LITHOLOGIC LOG FOR MONITOR WELL NAS4-6

<u>Description</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
Sand, silty, fine-grained, dark brown to gray.....	0 - 7.5	7.5
Sand, clayey, fine-grained, gray.....	7.5 - 9	1.5
Clay, sandy, gray, firm.....	9 - 11.5	2.5
Sand, clayey, fine-grained, gray.....	11.5 - 14	2.5

LITHOLOGIC LOG FOR MONITOR WELL NAS4-7

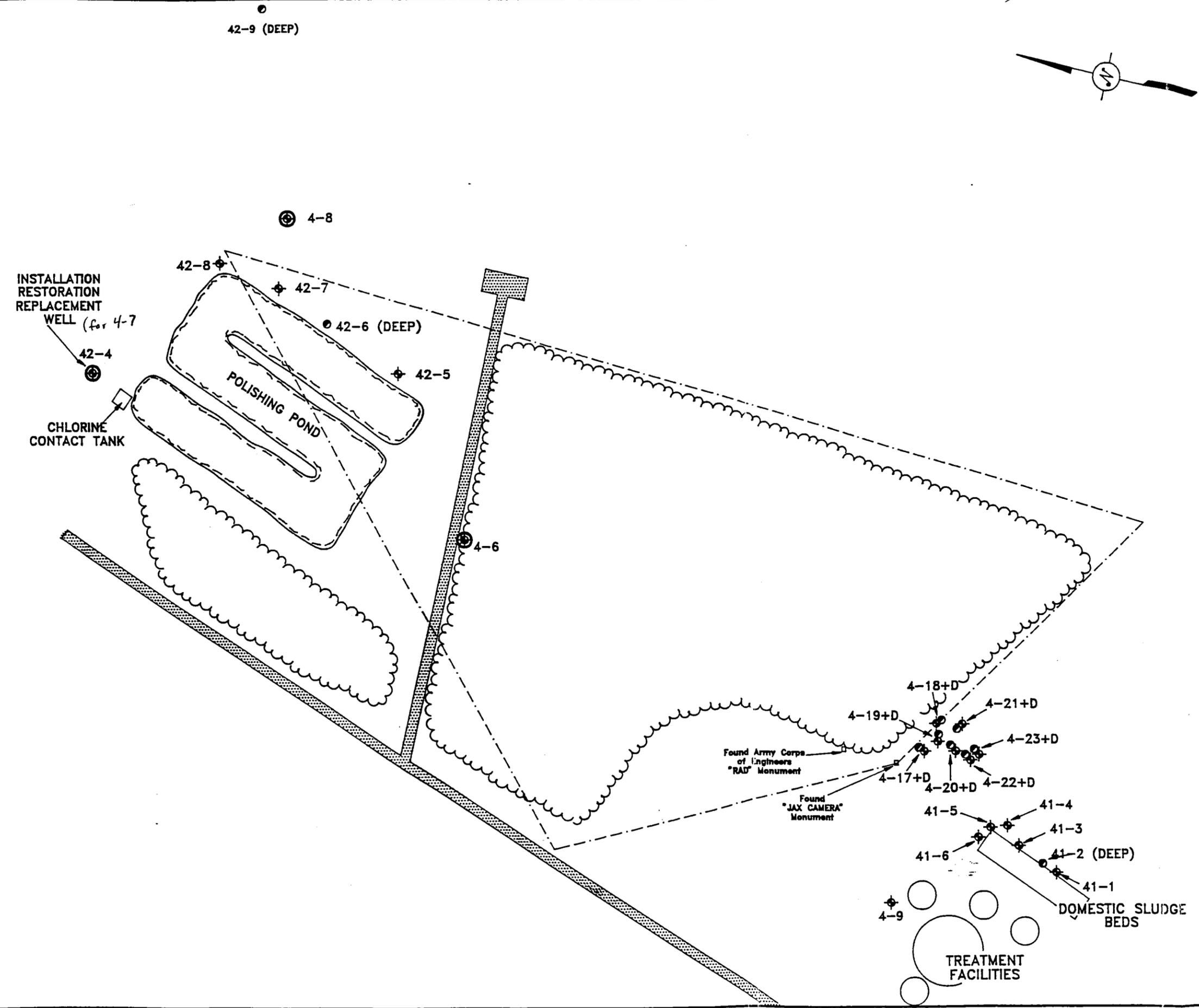
<u>Description</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
Sand, silty, fine-grained, gray to tan....	0 - 5	5
Sand, clayey, fine-grained, gray.....	5 - 7	2
Clay, sandy, gray, firm.....	7 - 7.5	0.5
Clay, gray, stiff.....	7.5 - 11	3.5
Clay, sandy, green to gray, firm.....	11 - 14	3

LITHOLOGIC LOG FOR MONITOR WELL NAS4-8

<u>Description</u>	<u>Depth (ft)</u>	<u>Thickness (ft)</u>
Sand, fine-grained, brown to gray.....	0 - 2.5	2.5
Sand, silty, fine-grained, tan to brown...	2.5 - 8	5.5
Sand, clayey, fine-grained, green.....	8 - 11.5	3.5
Sand, silty, fine-grained, green.....	11.5 - 14	2.5

Appendix A
Well Location Map and Summary Lithologic Logs

STARTING DATE: 1/22/81
 DRAWN BY: JREILLYMYSERS
 LAST REV DATE: 03/21/81
 DRAWN BY: KTristy
 CHECKED BY: JFC
 APPROVED BY:
 3-22-81
 INITIATOR: JCastello
 PROJ. MGR.: MHampton
 DRAWING NO.: AB200798
 PROJ. NO.: 585411
 STORED: JMR\AGI\ACAD
 ARCHIVED: N/A



- LEGEND:**
- ◆ SHALLOW WELLS
 - DEEP WELLS
 - 4-21+D INDUSTRIAL SLUDGE BEDS
 - 42-9 POLISHING POND
 - 41-4 DOMESTIC SLUDGE BEDS
 - 4-9 BACKGROUND WELL
 - ▨ ASPHALT PAVING
 - SURVEYING POINTS OF REFERENCE
 - ~ APPROXIMATE EDGE OF WOODED AREA
 - ⊕ INSTALLATION RESTORATION WELLS 4-6, 4-8, 42-4

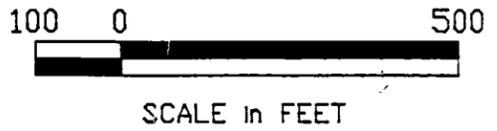


FIGURE 1
MONITORING WELL
LOCATION MAP
 NAS-JACKSONVILLE
 JACKSONVILLE, FLORIDA
Prepared for:
 NAS JAX
 JACKSONVILLE, FLORIDA



Appendix B
Well Completion Report, Monitoring Well Completion Report,
Visual Classification of Soils, Monitoring Well Installation Sheet,
Monitoring Well Installation Sketch

MONITOR WELL COMPLETION REPORT

DATE: 5-8-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 87-0503 GMS NO.: 41-1

WELL NO.: 41-1 WELL NAME: 41-1

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUER

TOTAL DEPTH: 14' (bls) DEPTH OF SCREEN: 9'-14' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 19.8'

GROUND SURFACE ELEVATION (MSL): 17.8'

COMPLETION DATE: 5-8-87

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP ; 25 GALLONS UNTIL
DISCHARGE WAS CLEAR.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-3' LGT BRN-TAN SAND (SM);
3-6' BRN SAND (SM); 6-14' LGT. GREY, CLAYEY SAND (SC); 14' GREY, CLAYEY SAND (SC) -
CONFINING UNIT AT 14'

REPORT PREPARED BY : SHARI BARTOLOTTI, I.T. CORPORATION, (813) 771-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: AAS TAX		
BORING NUMBER: 41-1	COORDINATES:	DATE: 5/8/89	
ELEVATION: 17.8	GWL: Depth	Date/Time	DATE STARTED: 5/2/89
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time	DATE COMPLETED: 5/2/89
DRILLING METHODS: hollow stem auger	PAGE 1 OF 2		

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-3' Light brown-tan sand	SM			
5				3-6' Brown sand	SM			
10				6-14' Light gray clayey sand	SC			
15				14' - Grey clayey sand	SC			

Sand pack 7'
Bentonite pellet
2'
2 bags grout

NOTES:
Boring terminated at 14 ft, encountered confining unit at this depth.

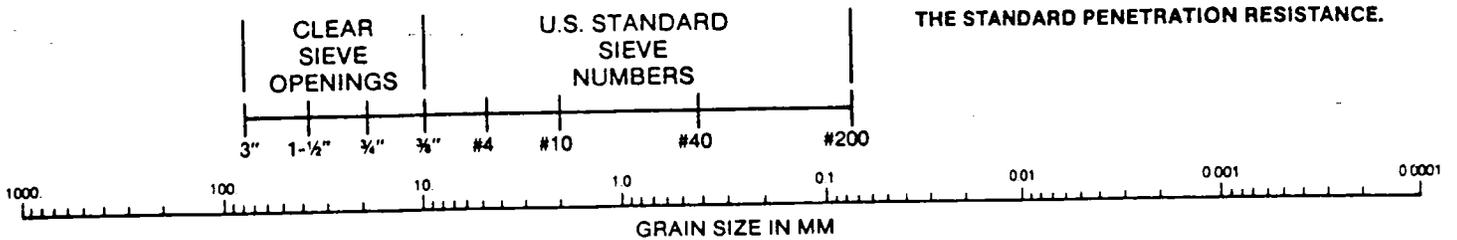
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS. GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS. SAND-SILT MIXTURES
	SC	CLAYEY SANDS. SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS. ROCK FLOUR. SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY. GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS. MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY. FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY. ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



ITC CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS JAX FIELD ENG./GEO Steve Bruder DATE 5/8/89
 PROJECT NO. 453058 CHECKED BY M. Hampton DATE 10-10-89
 BORING NO. 41-1 DATE OF INSTALLATION 5/8/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID(S) USED: <u>none</u>	CASING SIZE (S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>2" SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4"</u> I.D. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.01 inch</u>	JOINING METHOD <u>flush threaded</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5' x 5' concrete</u>
PROTECTIVE PIPE O.D. <u>6"</u>	<u>and w/ steel posts</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	+2		19.8	
GROUND SURFACE	0.0		17.8	
BOTTOM OF PROTECTIVE PIPE	-3		14.8	
BOREHOLE FILL MATERIALS:				
	GROUT Type I Portland	TOP 0 BOTTOM 5'	TOP 17.8	BOTTOM 12.8
	BENTONITE 3/8" pellets	TOP 5' BOTTOM 7'	TOP 12.8	BOTTOM 10.2
	SAND 20/30 silica	TOP 7' BOTTOM 14'	TOP 10.8	BOTTOM 3.8
GRAVEL n/a	TOP _____ BOTTOM _____	TOP _____	BOTTOM _____	
PERFORATED SECTION	TOP 9' BOTTOM 14'	TOP 8.8	BOTTOM 3.8	
PIEZOMETER TIP	14'		3.8	
BOTTOM OF BOREHOLE	14'		3.8	
GWL AFTER INSTALLATION	n/a		n/a	

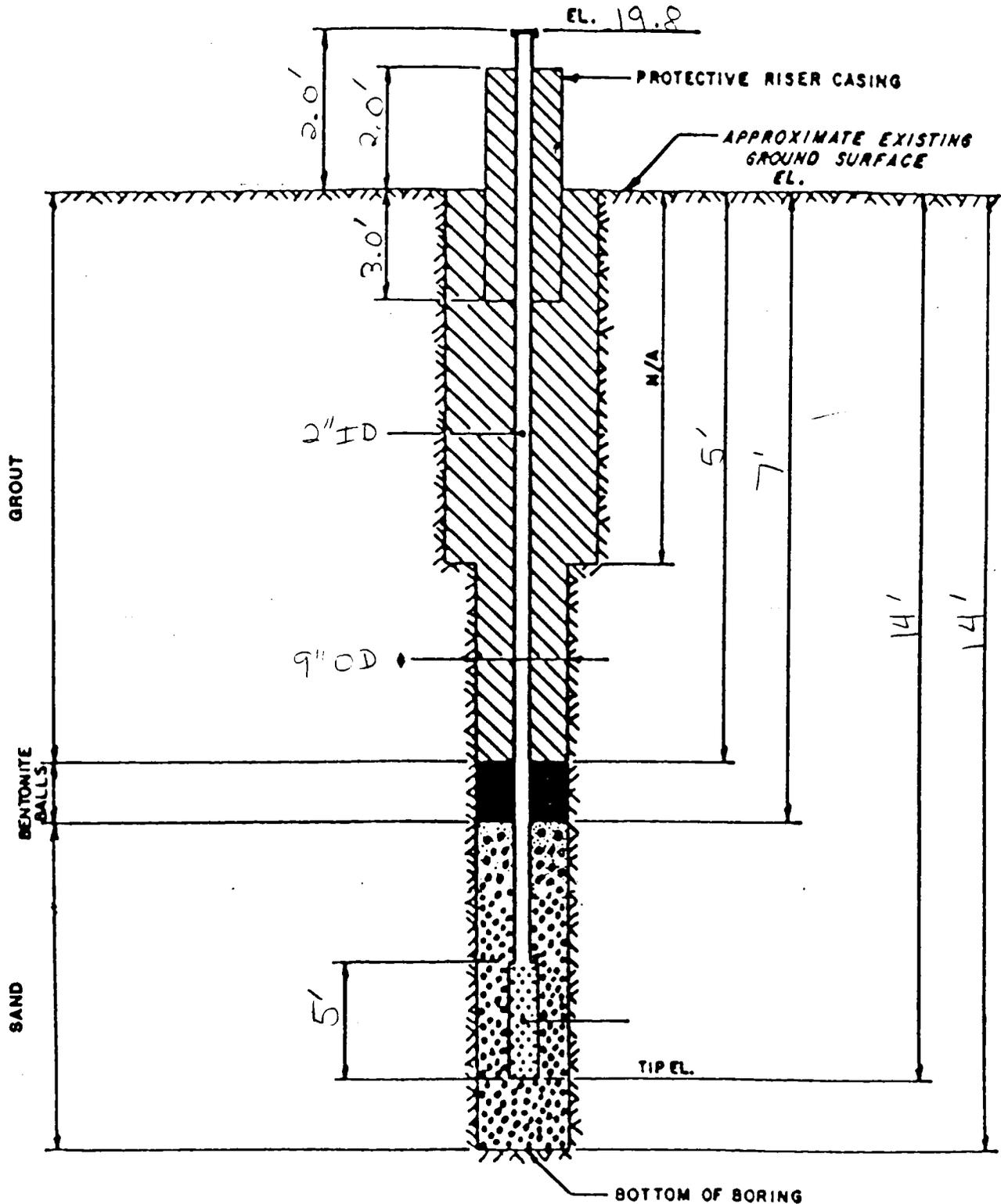
WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; 25 gallons removed; discharge was clear

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS JAY
 PROJECT NO. 45305D -
 BORING NO. 41-1

INSTALLED BY Steve Brudner DATE 5/8/89
 CHECKED BY M. Hampton DATE 10-10-89



MONITOR WELL COMPLETION REPORT

DATE: 5-11-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0523 GMS NO.: 41-2

WELL NO.: 41-2 WELL NAME: 41-2

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUDER

TOTAL DEPTH: 33' (bls) DEPTH OF SCREEN: 28'-33' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 28' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 17.9'

GROUND SURFACE ELEVATION (MSL): 17.9'

COMPLETION DATE: 5-11-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP ; APPROXIMATELY 40
GALLONS UNTIL DISCHARGE WAS CLEAR

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-3' LGT. BEN-CREAM SAND (SM);
3-7' BEN, CLEAN SAND (SM); 7-14' LGT. GREY, CLAYEY SAND (SC); 14-29' CLAY (CH);
29-31' SAND (SM); 31-33' GREY-GREEN, SANDY CLAY (CH)-CONFINING UNIT AT 14'

REPORT PREPARED BY: SHARI BARTOLOTTI, I.T. CORPORATION, (813) 971-2401
(name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
(bls) = Below Land Surface

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: PAS TAY		
BORING NUMBER: 41-2	COORDINATES:		DATE: 5/11/89
ELEVATION: 17.9	GWL: Depth	Date/Time	DATE STARTED: 5/11/89
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time	DATE COMPLETED: 5/11/89
DRILLING METHODS: hollow stem auger w/ rotary wash			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER ()	RECOVERY ()	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-3' Light brown-cream sand	SM			Finish 1000
7				3-7' Brown, clean sand	SM			
14				7-14' Light grey clayey sand	SC			
21				14-29' clay	CH			
28				29-31' Sand	SM			
33				31-33' - Grey-green sandy clay	CH			5' of screen Sand pack of 7' Bentonite pellet 2' 4 bags grit

NOTES:

Boring terminated at 33 ft.

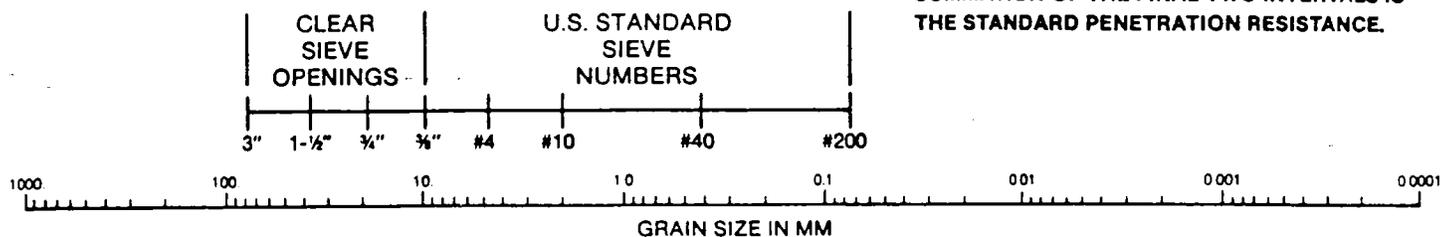
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS. GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS. SAND-SILT MIXTURES
	SC	CLAYEY SANDS. SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS. ROCK FLOUR. SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY. GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS. MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY. FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY. ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS JAX FIELD ENG./GEO. Steve Brucher DATE 5/11/89
 PROJECT NO. 453058 CHECKED BY M Hampton DATE 11-10-89
 BORING NO. 41-2 DATE OF INSTALLATION 5/11/89

BOREHOLE DRILLING

DRILLING METHOD <u>Hollow Stem Auger</u>	TYPE OF BIT <u>6" 8"</u>
DRILLING FLUID(S) USED: <u>Rotary wash</u>	CASING SIZE (S) USED:
FLUID <u>water</u> FROM <u>surface</u> TO <u>bottom</u>	SIZE <u>8 3/4"</u> FROM <u>surface</u> TO <u>14'</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4"</u> I.D. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.01 inch</u>	JOINING METHOD <u>flush threaded</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5' X 5' concrete pad with steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (msl)	
TOP OF RISER PIPE	2.0		19.9	
GROUND SURFACE	0.0		17.9	
BOTTOM OF PROTECTIVE PIPE	3.0		14.9	
BOREHOLE FILL MATERIALS:				
GROUT Type I Portland	TOP 0	BOTTOM 24	TOP 17.9	BOTTOM -6.1
BENTONITE 3/8" pellets	TOP 24	BOTTOM 26	TOP -6.1	BOTTOM -8.1
SAND 20/30 silica	TOP 26	BOTTOM 33	TOP -8.1	BOTTOM -15.1
GRAVEL N/A	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 28	BOTTOM 33	TOP -10.1	BOTTOM -1'
PIEZOMETER TIP	33		-15.1	
BOTTOM OF BOREHOLE	33		-15.1	
GWL AFTER INSTALLATION	N/A		N/A	

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO

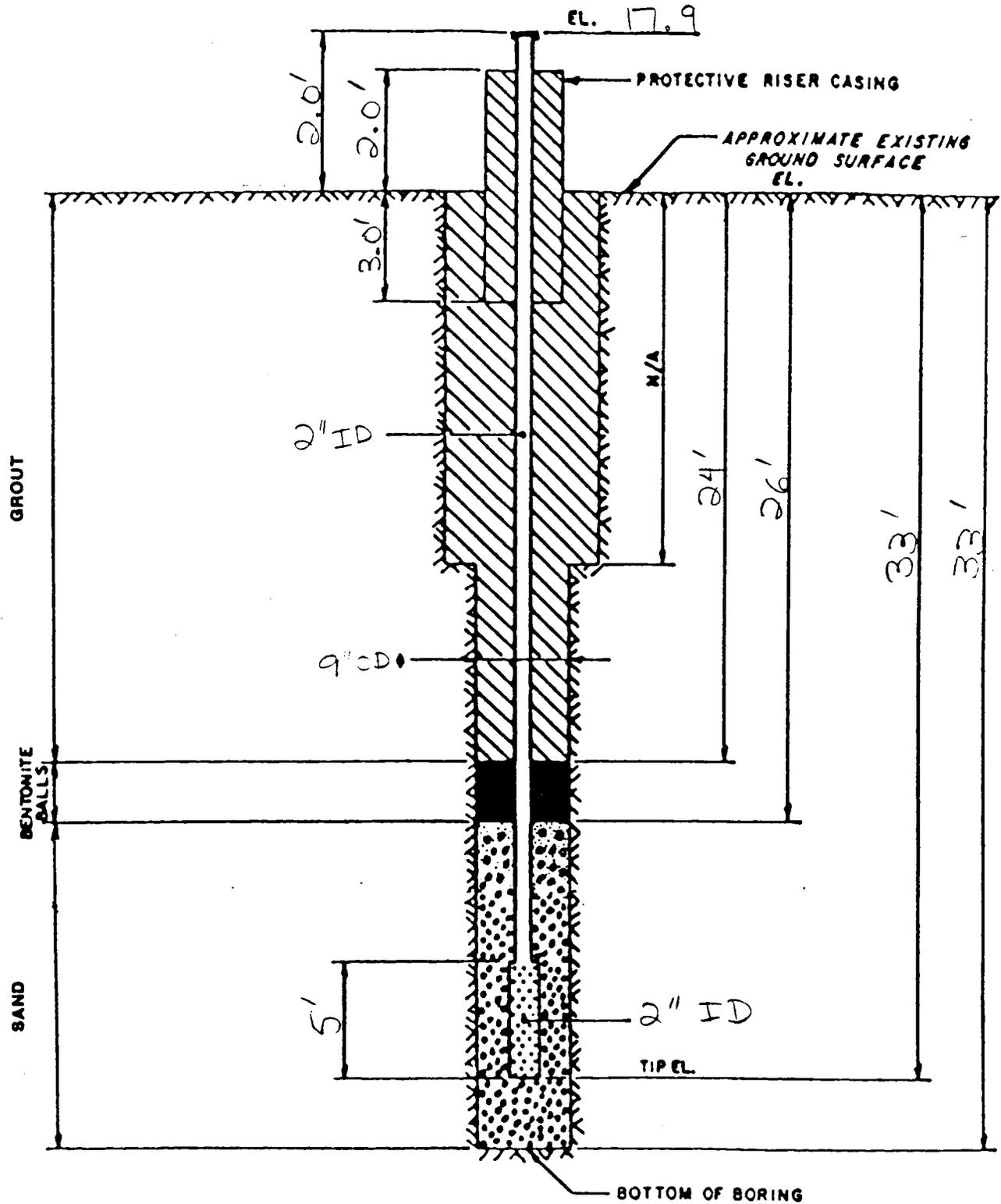
WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; approx 4 gallons were removed; discharge was clear

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS TAY
PROJECT NO. 453058 -
BORING NO. 41-2

INSTALLED BY Steve Brucker DATE 5/11/89
CHECKED BY M. Hargrave DATE 10-10-89



MONITOR WELL COMPLETION REPORT

DATE: 5-8-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0504 GMS NO.: 41-3

WELL NO.: 41-3 WELL NAME: 41-3

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUER

TOTAL DEPTH: 14' (bls) DEPTH OF SCREEN: 9'-14' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 20.4

GROUND SURFACE ELEVATION (MSL): 18.4

COMPLETION DATE: 5-8-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP ; 25 GALLONS
UNTIL DISCHARGE WAS CLEAR.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-3' LGT. BRN, FINE SAND (SM);
3-7' BRN, FINE SAND (SM); 7-14' LGT. GREY, CLAYEY SAND (SC); 14' SANDY CLAY (CH) -
CONFINING UNIT AT 14'

REPORT PREPARED BY : SHAEL BARTOLOTTI, I.T. CORPORATION, (813) 971-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: AAS JAY		
BORING NUMBER: 41-3	COORDINATES:		DATE: 5/8/89
ELEVATION: 18.4	GWL: Depth	Date/Time	DATE STARTED: 5/7/89
ENGINEER/GEOLOGIST: Steve Brubaker	Depth	Date/Time	DATE COMPLETED: 5/11/89
DRILLING METHODS: hollow stem auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-3' Light brown, fine sand	SM			
5				3-7' Brown, fine sand	SM			
10				7-14' Light grey clayey sand	SC			
15				14' - Sandy clay	CH			
								Sand present at 7' Borehole, pellet at 2' 2 bags of grout used

NOTES:

Boring terminated at 14 feet, encountered confining unit at this depth.

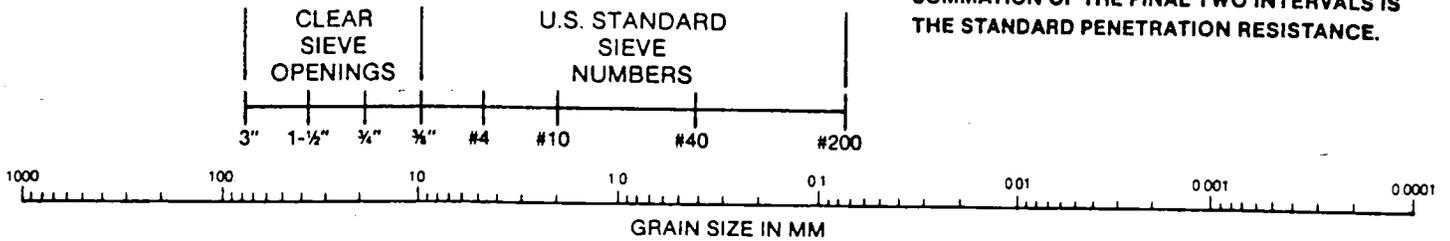
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS JAX FIELD ENG./GEO. Steve Brudler DATE 5/8/89
 PROJECT NO. 453050 CHECKED BY M. Hampton DATE 10-1-89
 BORING NO. 41-3 DATE OF INSTALLATION 5/8/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID(S) USED: <u>none</u>	CASING SIZE(S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS: O.D. <u>2 1/4"</u> I.D. <u>2"</u>
PERFORATION TYPE: <u>manufactured</u>	LENGTH OF PIPE SECTIONS <u>10'</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	JOINING METHOD <u>flush threaded</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 in.</u>	
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5' x 5' concrete pad w/ steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2.0		20.4	
GROUND SURFACE	0.0		18.4	
BOTTOM OF PROTECTIVE PIPE	3.0		15.4	
BOREHOLE FILL MATERIALS:	TOP	BOTTOM	TOP	BOTTOM
	GROUT <u>Type 2 Portland</u>	0' 5'	18.4	13.4
	BENTONITE <u>3/8" Pellets</u>	5' 7'	13.4	11.4
	SAND <u>20/30</u>	7' 14'	11.4	4.4
GRAVEL <u>n/a</u>	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	9	14'	9.4	4.4
PIEZOMETER TIP	14'		4.4	
BOTTOM OF BOREHOLE	14'		4.4	
GWL AFTER INSTALLATION	<u>n/a</u>			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump, 25 gallons removed, discharge was clear

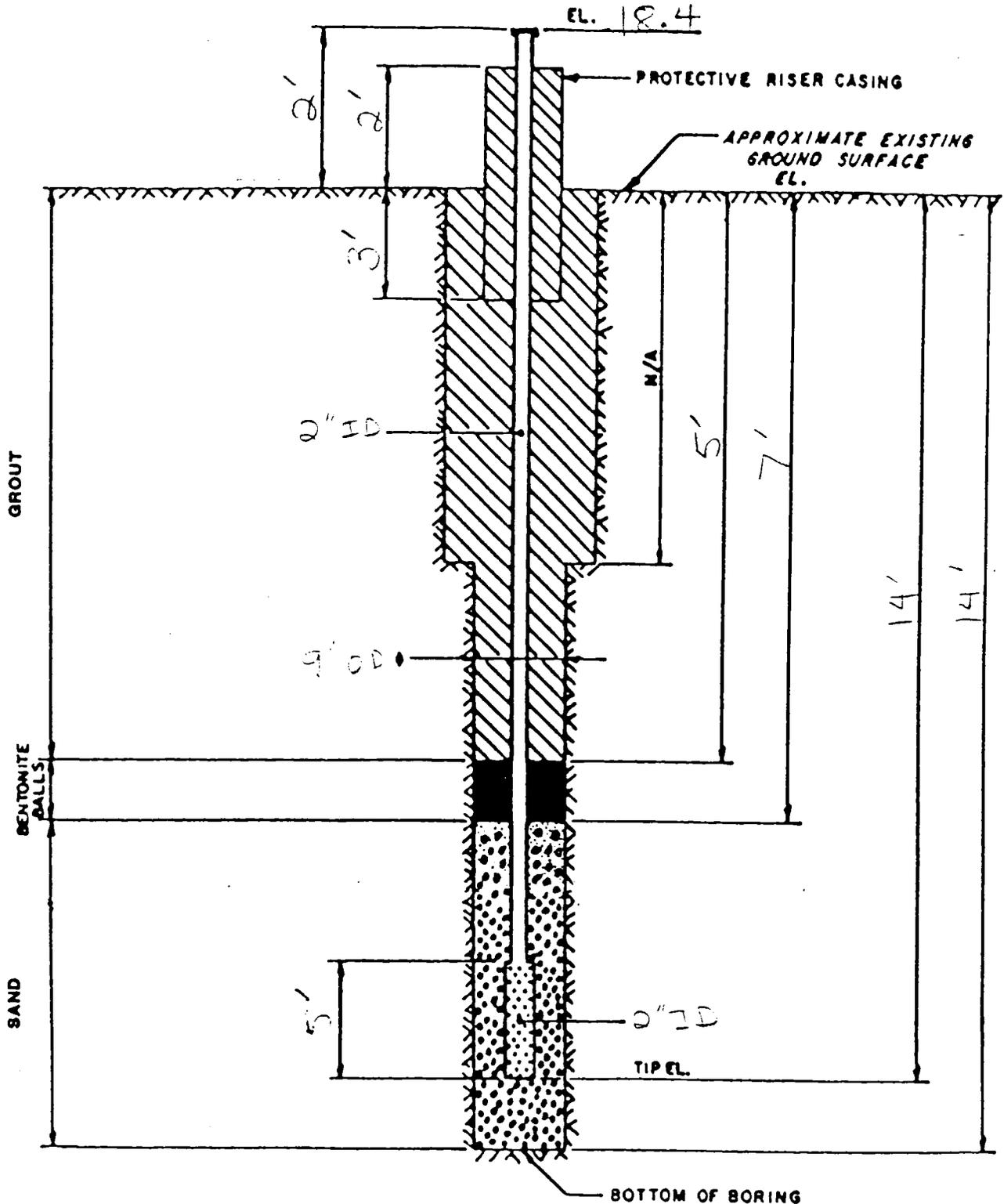


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MONITOR WELL INSTALLATION SKETCH

PROJECT NAME DAS JAX
PROJECT NO. 453052 -
BORING NO. 41-E

INSTALLED BY Steve E. Miller DATE 5/8/89
CHECKED BY W. J. Langston DATE 10-10-89



MONITOR WELL COMPLETION REPORT

DATE: 5-7-89
 INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL
 DER PERMIT NUMBER: 89-0505 GMS NO.: 41-4
 WELL NO.: 41-4 WELL NAME: 41-4
 DESIGNATION: Background Intermediate Compliance X
 LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W
 AQUIFER MONITORED: SURFICIAL
 INSTALLATION METHOD: HOLLOW STEM AUGER
 INSTALLED BY: STEVE BRUER
 TOTAL DEPTH: 14' (bls) DEPTH OF SCREEN: 9'-14' (bls)
 SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC
 CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC
 LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND
 TOP OF CASING ELEVATION (MSL): 20.5'
 GROUND SURFACE ELEVATION (MSL): 18.5'
 COMPLETION DATE: 5-7-89
 DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP ; APPROXIMATELY 25
GALLONS UNTIL DISCHARGE WAS CLEAR
 POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken
 DATE AND TIME MEASURED: N/A
 REMARKS (Soils information, Stratigraphy, etc.): 0-7' BRN-TAN SAND (SM) ;
7-14' GREY SANDY CLAY (CH) - CONFINING UNIT AT 14'
 REPORT PREPARED BY : Shari Bartolotti, IT Corporation (813) 951-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: AAS JAY		
BORING NUMBER: 41-4	COORDINATES:		DATE: 5/9/89
ELEVATION: 18.5	GWL: Depth	Date/Time	DATE STARTED: 5/9/89
ENGINEER/GEOLOGIST: Steve Bricker	Depth	Date/Time	DATE COMPLETED: 5/9/89
DRILLING METHODS: hollow stem auger			PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-7' Brown-tan sand	sm			0745 start
5				7-14' Grey sandy clay	ch			0830 Sand pack going in 0815
10								0835 finish
15								

NOTES:

Boring terminated at 14 ft; encountered confining unit at this depth.



MONITOR WELL INSTALLATION SHEET

PROJECT NAME: D&E TAX PROJECT NO.: 4114 BORING NO.: 4114
 FIELD ENG./GEO.: Steve Buder CHECKED BY: W. H. [Signature] DATE: 11/11/89
 DATE OF INSTALLATION: 5/19/89

BOREHOLE DRILLING

DRILLING METHOD: <u>Hollow Stem Auger</u> DRILLING FLUID (S) USED: <u>none</u>	FLUID: _____ FROM _____ TO _____ FLUID: _____ FROM _____ TO _____
TYPE OF BIT: <u>two tooth sand bit</u> CASING SIZE (S) USED: <u>none</u>	SIZE: _____ FROM _____ TO _____ SIZE: _____ FROM _____ TO _____

DESCRIPTION

TYPE: <u>SCH 40 PVC</u> DIAMETER OF PERFORATED SECTION: <u>2"</u> PERFORATION TYPE: <u>manufactured</u> <input type="checkbox"/> HOLES <input type="checkbox"/> SLOTS <input checked="" type="checkbox"/> SCREEN	TOTAL PERFORATED AREA: <u>5'</u> AVERAGE SIZE OF PERFORATIONS: <u>0.010 in</u>
RISER PIPE MATERIALS: <u>SCH 40 PVC</u> RISER PIPE DIAMETERS: <u>0.0. 2 1/2" 1.0. 2"</u> LENGTH OF PIPE SECTIONS: <u>12'</u> JOINING METHOD: <u>flush threaded</u>	RISER PROTECTIVE PIPE LENGTH: <u>5'</u> PROTECTIVE PIPE O.D.: <u>6"</u>

PROTECTION SYSTEM

OTHER PROTECTION: <u>5' X 5' concrete pad with steel posts</u>	PROTECTIVE PIPE O.D.: <u>6"</u>
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ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)	ELEVATION (MSL)	PERFORMED SECTION
TOP OF RISER PIPE	0.0	00.5	TOP 0' BOTTOM 5'
GROUND SURFACE	0.0	18.5	TOP 5' BOTTOM 7'
BOTTOM OF PROTECTIVE PIPE	3.0	15.5	TOP 7' BOTTOM 14'
BOREHOLE FILL MATERIALS:			TOP 14' BOTTOM 17'
GROUT Type I Portland			TOP 17' BOTTOM 17.5'
BENTONITE 3/8 pellets			TOP 17.5' BOTTOM 18.5'
SAND 20/30 silica			TOP 18.5' BOTTOM 19.5'
GRAVEL 1/4			TOP 19.5' BOTTOM 20.5'
PIEZOMETER TIP	14'	4.5	TOP 20.5' BOTTOM 21.5'
BOTTOM OF BOREHOLE	14'	4.5	
GWL AFTER INSTALLATION	n/a		

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS: Well developed on centrifugal pump. approximately 0.5 gallons removed, discharge was clear.

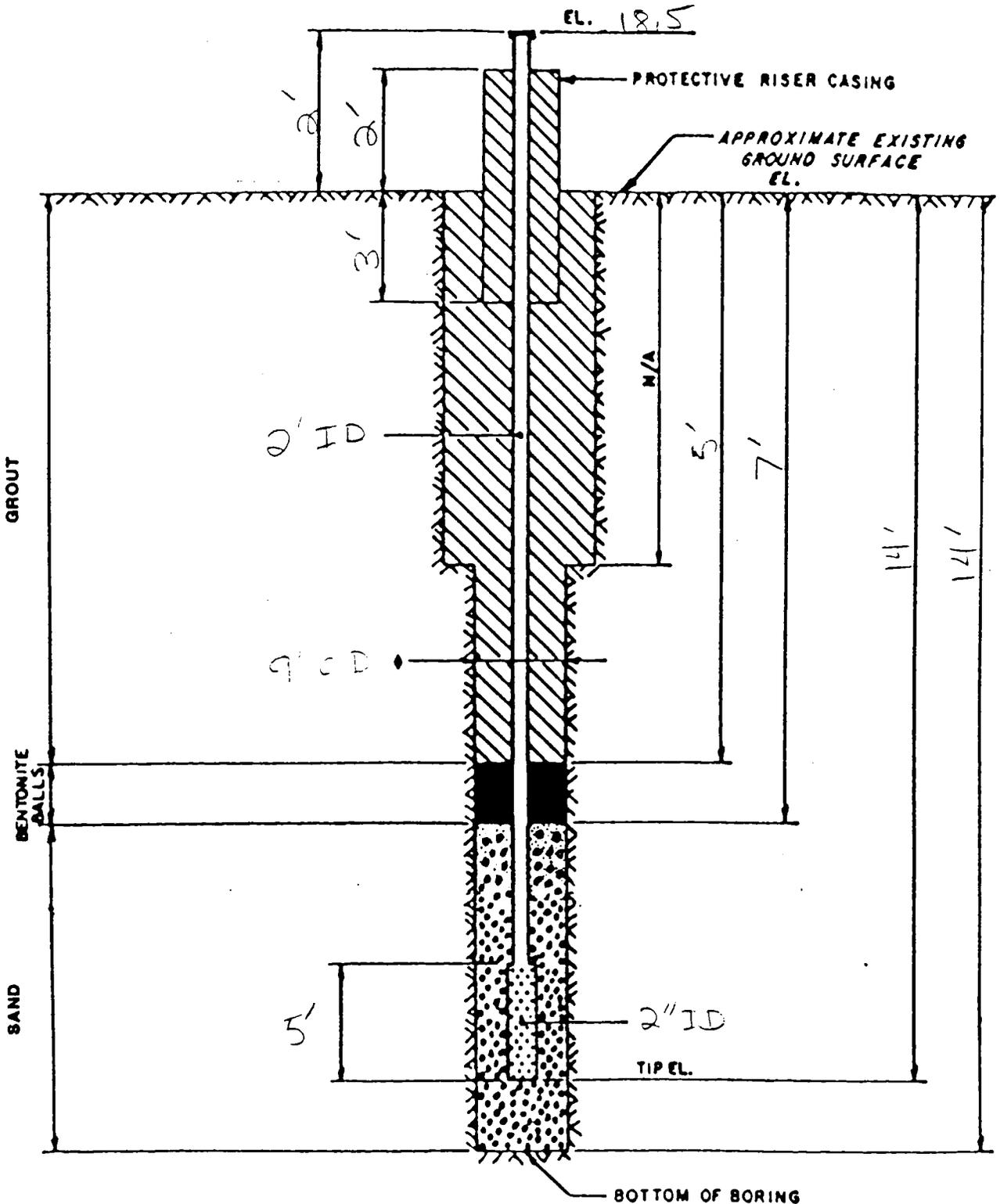


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MONITOR WELL INSTALLATION SKETCH

PROJECT NAME DAS JAX
PROJECT NO. 452058 -
BORING NO. 41-4

INSTALLED BY Steve Brader DATE 5/9/89
CHECKED BY M. Kingston DATE 10-10-89



MONITOR WELL COMPLETION REPORT

DATE: 5-7-89
 INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL
 DER PERMIT NUMBER: 89-0506 GMS NO.: 41-5
 WELL NO.: 41-5 WELL NAME: 41-5
 DESIGNATION: Background Intermediate Compliance X
 LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W
 AQUIFER MONITORED: SUPFICIAL
 INSTALLATION METHOD: HOLLOW STEM AUGER
 INSTALLED BY: STEVE BRUER
 TOTAL DEPTH: 14' (bls) DEPTH OF SCREEN: 9'-14' (bls)
 SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC
 CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC
 LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND
 TOP OF CASING ELEVATION (MSL): 20.2'
 GROUND SURFACE ELEVATION (MSL): 18.2'
 COMPLETION DATE: 5-9-91
 DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP; 25 GALLONS UNTIL
DISCHARGE WAS CLEAR
 POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken
 DATE AND TIME MEASURED: N/A
 REMARKS (Soils information, Stratigraphy, etc.): 0-1' DRK BRN SAND (SM);
1-5' LGT BRN SAND (SM); 5-7' SATURATED LGT BRN SAND (SM); 7-14' LGT. GREY, CLAYEY
SAND (SC); 14' HANTHORNE, GREY, SANDY CLAY (CH) - CONFINING UNIT AT 14'
 REPORT PREPARED BY: SHARL BARTOLOTTI, I.T. CORPORATION, (813) 171-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058		PROJECT NAME: N.A.S. TAY.	
BORING NUMBER: 41-5		COORDINATES:	DATE: 5/9/89
ELEVATION: 18.2	GWL: Depth	Date/Time	DATE STARTED: 5/9/89
ENGINEER/GEOLOGIST: Steve Bruder		Depth	Date/Time
DRILLING METHODS: <i>rotary open auger</i>		PAGE 1	OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-1' Dark brown sand	SM			start 0930 Required to make 2' to max 08 pps start 1000 auger finish 1030
				1-5' Light brown sand	Sm			
5				5-7' Saturated light brown sand	SM			
				7-14' Light gray clayey sand	SC			
10				14' Hawthorne <u>sandy</u> clay, <u>grey</u> .	CH			
15								Sand pack 2' above screen with 2' of Bentonite pellets on top

NOTES:
Boring terminated at 14 ft; encountered confining unit at this depth.

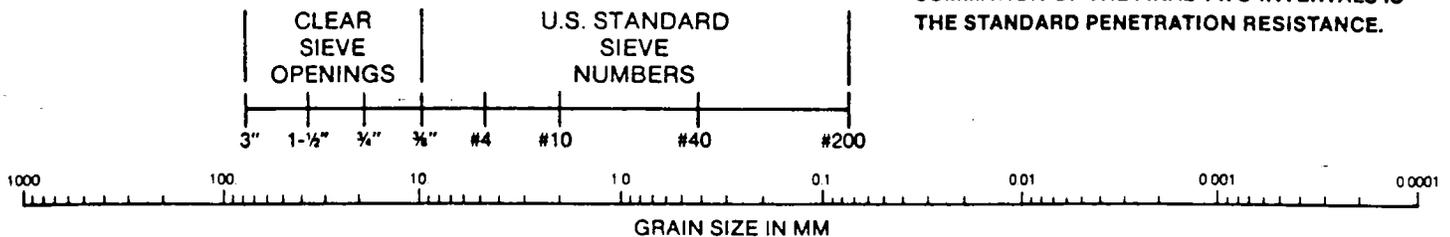
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS JAY FIELD ENG./GEO. Steve Bruder DATE 5/9/89
 PROJECT NO. 453058 CHECKED BY H. Hampton DATE 6-10-89
 BORING NO. 41-5 DATE OF INSTALLATION 5/9/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID(S) USED: <u>none</u>	CASING SIZE(S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS: O.D. <u>2 1/2"</u> I.D. <u>2"</u>
PERFORATION TYPE: <u>manufactured</u>	LENGTH OF PIPE SECTIONS <u>10'</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	JOINING METHOD <u>flush thread</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 inch</u>	
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>3'x5' concrete pad w/ steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2		20.2	
GROUND SURFACE	0.0		18.2	
BOTTOM OF PROTECTIVE PIPE	3		15.2	
BOREHOLE FILL MATERIALS: GROUT Type I Portland BENTONITE 3/8" pellets SAND 2-1/30 silica GRAVEL n/a	TOP	BOTTOM 5	TOP 18.2	BOTTOM 13.2
	TOP 0	BOTTOM 7	TOP 13.2	BOTTOM 11.2
	TOP 5	BOTTOM 14	TOP 11.2	BOTTOM 4.2
	TOP 7	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 9	BOTTOM 14	TOP 9.2	BOTTOM 4.2
PIEZOMETER TIP	14		4.2	
BOTTOM OF BOREHOLE	14		4.2	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump, 25 gallons removed, discharge was clear

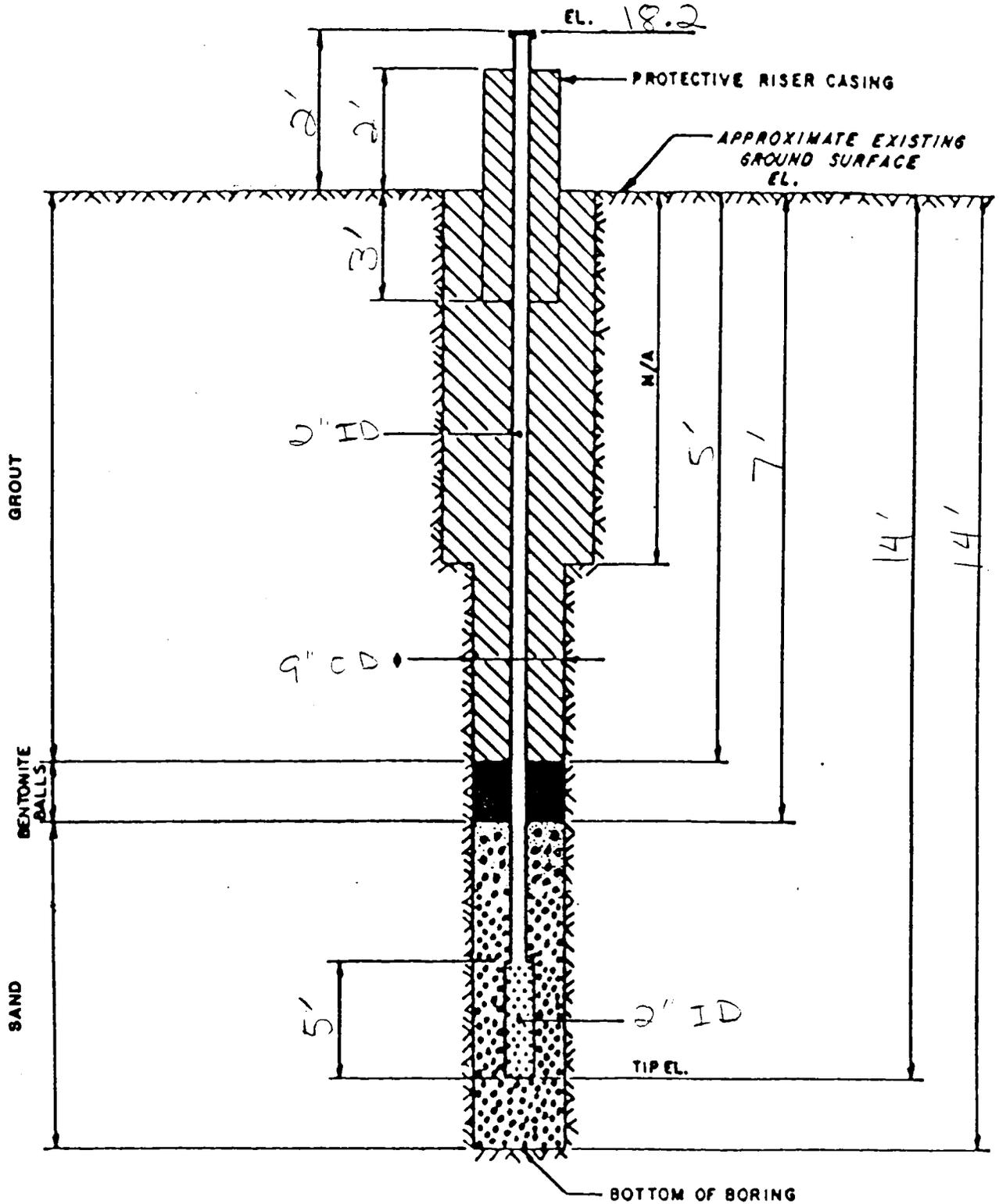


INTERNATIONAL
TECHNOLOGY
CORPORATION

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS JAX
PROJECT NO. 453052 -
BORING NO. 41-5

INSTALLED BY Steve P. [unclear], DATE 5/9/89
CHECKED BY M. H. [unclear], DATE 7/12/89



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: AAS JAX		
BORING NUMBER: 41-6	COORDINATES:	DATE: 5/9/89	
ELEVATION: 18.3	GWL: Depth	Date/Time	DATE STARTED: 5/9/89
ENGINEER/GEOLOGIST: Steve Bender	Depth	Date/Time	DATE COMPLETED: 5/9/89
DRILLING METHODS: hollow stem auger	PAGE 1 OF 2		

DEPTH ()	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER SAMPLER	RECOVERY ()	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-2' Dark brown clean sand	SM			Start - 0845
				2-5' Tan brown sand	SM			Finish 0910
5				5-7' Tan clayey sand	SC			
				7-14' Grey clayey sand	SC			
10								
15				14' Grey clay	CH			
								Sand pack of 7' in at 0900

NOTES:

Boring terminated at 14 ft; encountered confining unit at this depth.

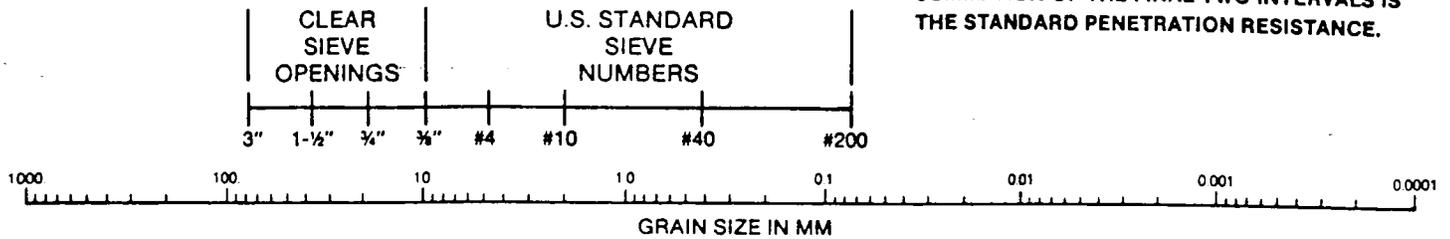
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

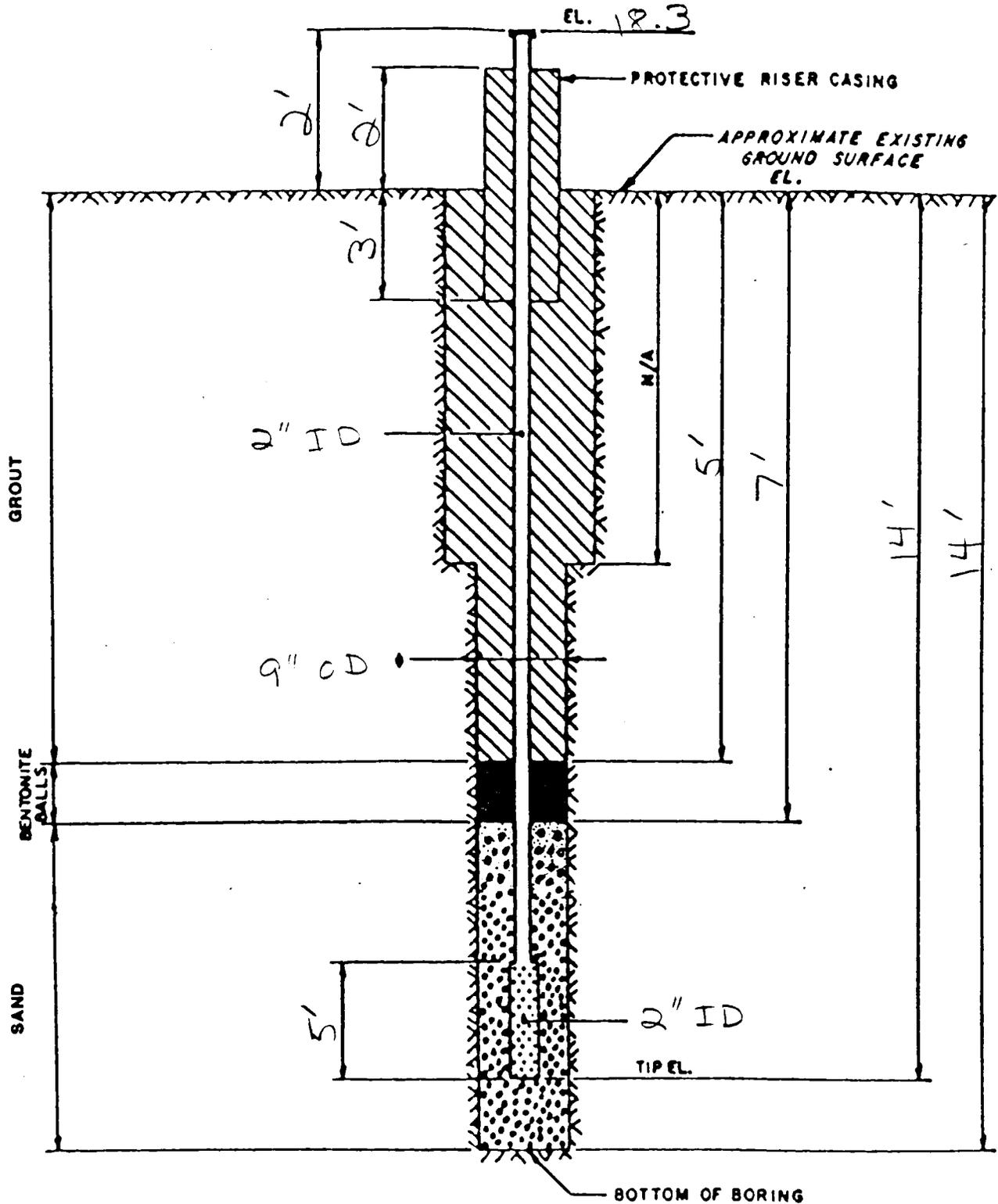


INTERNATIONAL
TECHNOLOGY
CORPORATION

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME DAS JAY
PROJECT NO. 453058 -
BORING NO. 41-6

INSTALLED BY Steve Bruder DATE 5/9/89
CHECKED BY M. Hays DATE 10-10-89



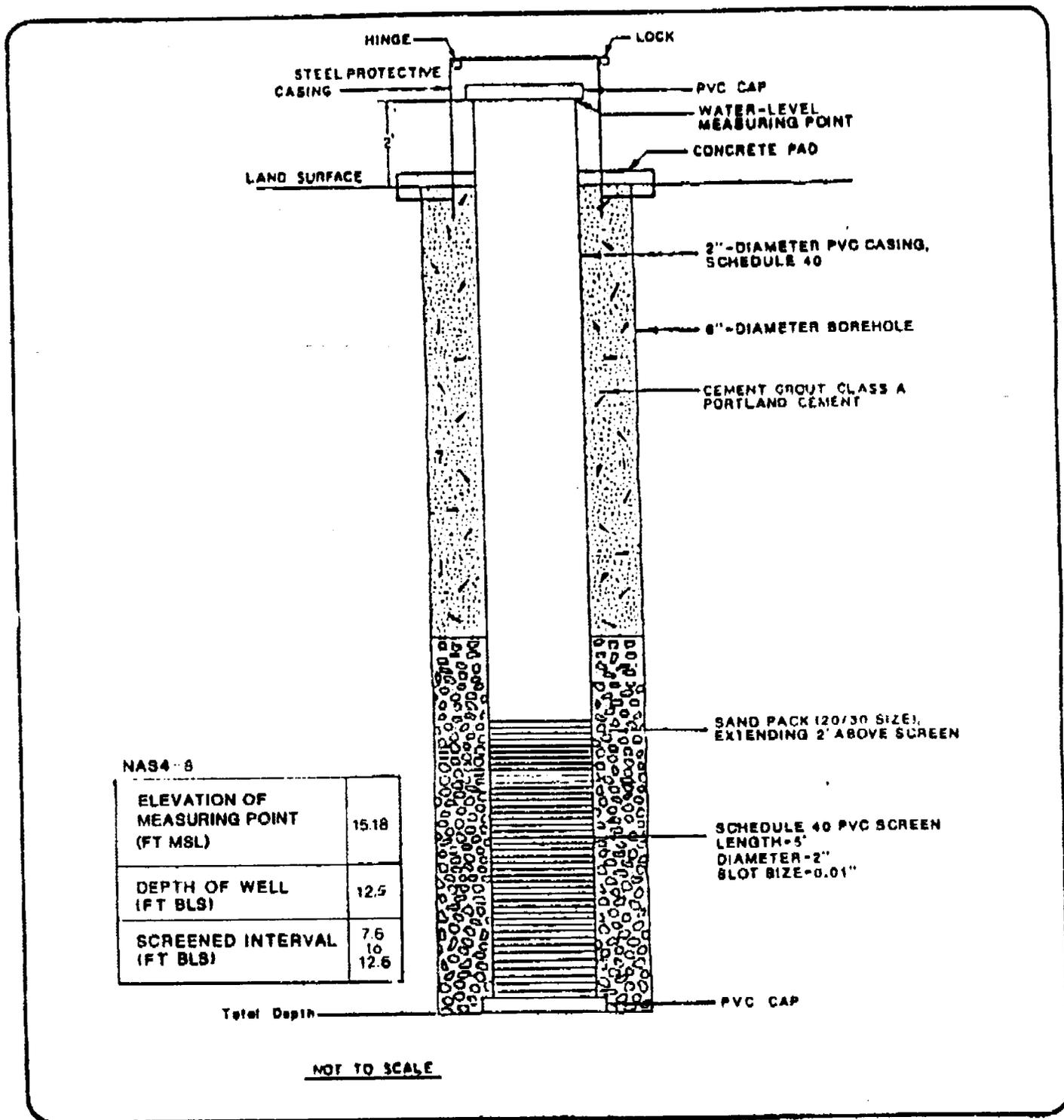


FIGURE II.M.8-6
MONITORING WELL
CONSTRUCTION DIAGRAM
NAS JACKSONVILLE

SOURCE: GERAGHTY & MILLER, INC.

MONITOR WELL COMPLETION REPORT

DATE: 5-11-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0514 GMS NO.: 42-4

WELL NO.: 42-4 WELL NAME: 42-4

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 10' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUER

TOTAL DEPTH: 13' (bls) DEPTH OF SCREEN: 8'-13' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 8' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 15.24'

GROUND SURFACE ELEVATION (MSL): 13.24'

COMPLETION DATE: 5-11-91

DESCRIBE WELL DEVELOPMENT: Centrifugal Pump; 25 gallons until discharge was clean.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-5' ORG BAN SAND (SM);
5-7' BRN, SLAYED SAND (SC); 7-9' GRAY, NET, SANDY CLAY (SC); 9-12' clay (CH); 12-13' clay (CH);
13' clay (CH) - Confining Unit at 13'

REPORT PREPARED BY: SHAEL BARTOLOTTI, I.T. CORPORATION (813) 271-2701
(name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
(bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: NAS -JACKSONVILLE		
BORING NUMBER: 42-4	COORDINATES:		DATE: 5/11/89
ELEVATION: TOC 15.24'	GWL: Depth	Date/Time	DATE STARTED: 5/11/89
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time	DATE COMPLETED: 5/11/89
DRILLING METHODS: Auger	PAGE		OF

DEPTH	SAMPLE TYPE & NO	BLOWS ON SAMPLER PER	RECOVERY	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	REMARKS
0				dark brown sand	sm		start 0800 finish 0900
5				brown, clayey sand	sc		
				at about 7' into sandy clay, gray	sc		
10				real well at about 9' into real marine gray clay; little sand	ch		
				high clay content about 12'	ch		
15				bottom 13'			
				5' screen section, 10 slot			sand pack 7' bentonite pellets 2' grout to top

NOTES

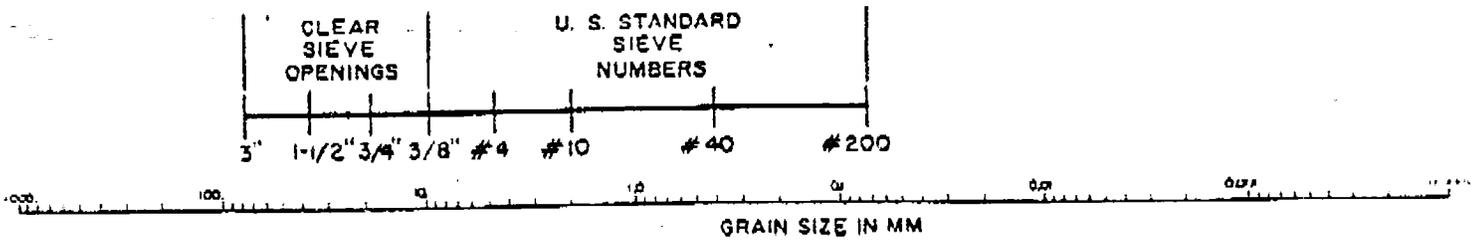
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH(TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 TO 0.50
MEDIUM STIFF	0.50 TO 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

(1) STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

U S C S CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS JACKSONVILLE FIELD ENG./GEO. Steve Bruder DATE 5/11/89
 PROJECT NO. 453058 CHECKED BY _____ DATE _____
 BORING NO. 42-4 DATE OF INSTALLATION 5/11/89

BOREHOLE DRILLING

DRILLING METHOD <u>Auger</u> DRILLING FLUID (S) USED: <u>None</u> FLUID _____ FROM _____ TO _____ FLUID _____ FROM _____ TO _____	TYPE OF BIT _____ GASING SIZE (S) USED: SIZE _____ FROM _____ TO _____ SIZE _____ FROM _____ TO _____
--	--

DESCRIPTION

TYPE <u>SCH 40 PVC</u> DIAMETER OF PERFORATED SECTION <u>2"</u> PERFORATION TYPE: <u>Manufactured</u> SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/> AVERAGE SIZE OF PERFORATIONS <u>10 SLOT</u> TOTAL PERFORATED AREA _____	RISER PIPE MATERIAL <u>SCH 40 PVC</u> RISER PIPE DIAMETERS: O.D. <u>2 1/2"</u> I.D. <u>2"</u> LENGTH OF PIPE SECTIONS <u>10'</u> JOINING METHOD <u>FLUSH THREAD</u>
---	---

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u> PROTECTIVE PIPE O.D. <u>6"</u>	OTHER PROTECTION <u>5' x 5' concrete pad w/steel posts</u>
--	--

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (FT)	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	1.84		15.24	
GROUND SURFACE	0.0		13.40	
BOTTOM OF PROTECTIVE PIPE	3.16		10.40	
BOREHOLE FILL MATERIALS:				
	GROUT/SLURRY	TOP 0 BOTTOM 4	TOP 13.40	BOTTOM 9.40
	BENTONITE	TOP 4 BOTTOM 6	TOP 9.40	BOTTOM 7.40
	SAND	TOP 6 BOTTOM 13	TOP 7.40	BOTTOM 0.40
GRAVEL	TOP -- BOTTOM --	TOP --	BOTTOM --	
PERFORATED SECTION	TOP 8 BOTTOM 13	TOP 5.40	BOTTOM 0.40	
BOTTOM OF BOREHOLE	13'		0.40	
GWL AFTER INSTALLATION				

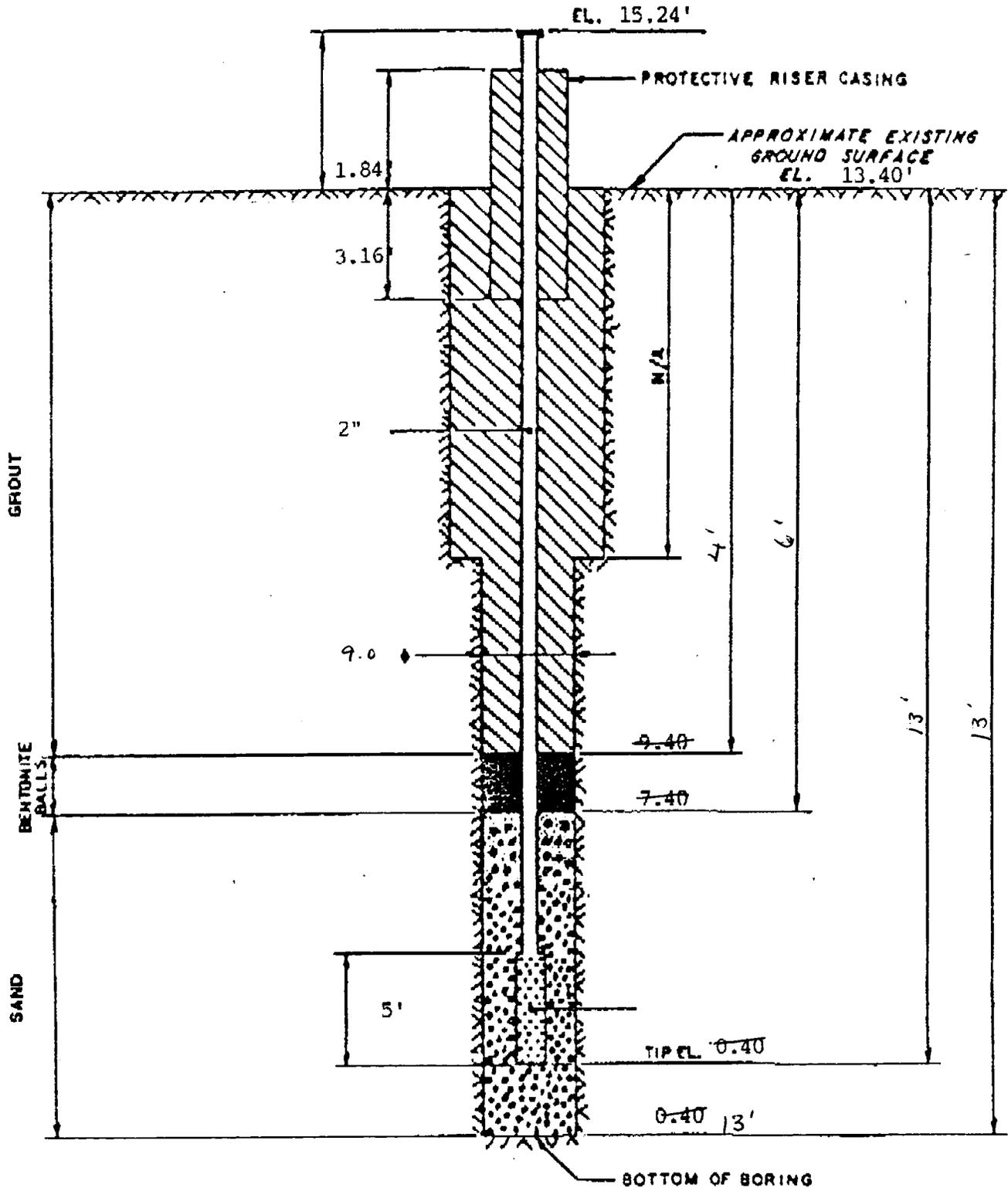
FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS _____



MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS - JAX INSTALLED BY S. Bruder DATE 5/11/90
 PROJECT NO. 453058 CHECKED BY _____ DATE _____
 BORING NO. 42-4



MONITOR WELL COMPLETION REPORT

DATE: 5-11-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 81-0515 GMS NO.: 42-5

WELL NO.: 42-5 WELL NAME: 42-5

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUER

TOTAL DEPTH: 12' (bls) DEPTH OF SCREEN: 7'-12' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 7' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 18.5'

GROUND SURFACE ELEVATION (MSL): 16.5'

COMPLETION DATE: 5-11-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP; 25 GALLONS UNTIL
DISCHARGE WAS CLEAR

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-2' ORG. ORN SAND (SM);
2-5' BRN-TAN SAND (SM); 5-7' SATURATED, TAN SAND (SM); 7-10' GRAY, CLAYEY SAND (SC);
10-12' SATURATED, GRAY, CLAYEY SAND (SC); 12' GRAY CLAY (CH) - CONFINING UNIT AT 12'

REPORT PREPARED BY: SHARI BARTOLOTTI, I.T. CORPORATION, (813) 971-2901
(name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
(bls) = Below Land Surface

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: AA-S JAX	
BORING NUMBER: 42-5	COORDINATES:	DATE: 5/11/89
ELEVATION: 16.5	GWL: Depth	Date/Time
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time
DRILLING METHODS: hollow stem auger	PAGE: 1	OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER SAMPLER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-2' Dark brown sand	SM			Started 1300 Finished 1345
				2-5' Brown tan sand	SM			
5				5-7' Saturated tan sand	SM			
				7-10' Grey clayey sand	SC			
10				10-12' Saturated grey clayey sand	SC			
15				12' - Grey clay	CH			

NOTES:

Boring terminated at 12 ft; encountered confining unit at this depth.

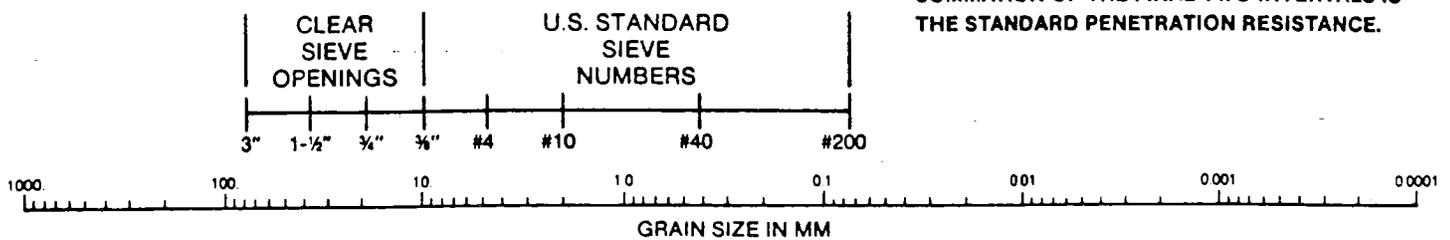
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME DAS JAX FIELD ENG./GEO. Steve Brudner DATE 5/11/89
 PROJECT NO. 453058 CHECKED BY M. Hanger DATE 10-10-89
 BORING NO. 42-5 DATE OF INSTALLATION 5/11/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID (S) USED: <u>none</u>	CASING SIZE (S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4"</u> I.O. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 inch</u>	JOINING METHOD <u>flush thread</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5' x 5' concrete pad with steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2		18.5	
GROUND SURFACE	0.0		16.5	
BOTTOM OF PROTECTIVE PIPE	3		13.5	
BOREHOLE FILL MATERIALS:				
GROUT Type I Portland	TOP 0	BOTTOM 3	TOP 16.5	BOTTOM 13.5
BENTONITE 3/8" pellets	TOP 3	BOTTOM 5	TOP 13.5	BOTTOM 11.5
SAND 20/30 silica	TOP 5	BOTTOM 12	TOP 11.5	BOTTOM 4.5
GRAVEL n/a	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 7	BOTTOM 12	TOP 9.5	BOTTOM 4.5
PIEZOMETER TIP	12		4.5	
BOTTOM OF BOREHOLE	12		4.5	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; 25 gallons removed; discharge was clear.

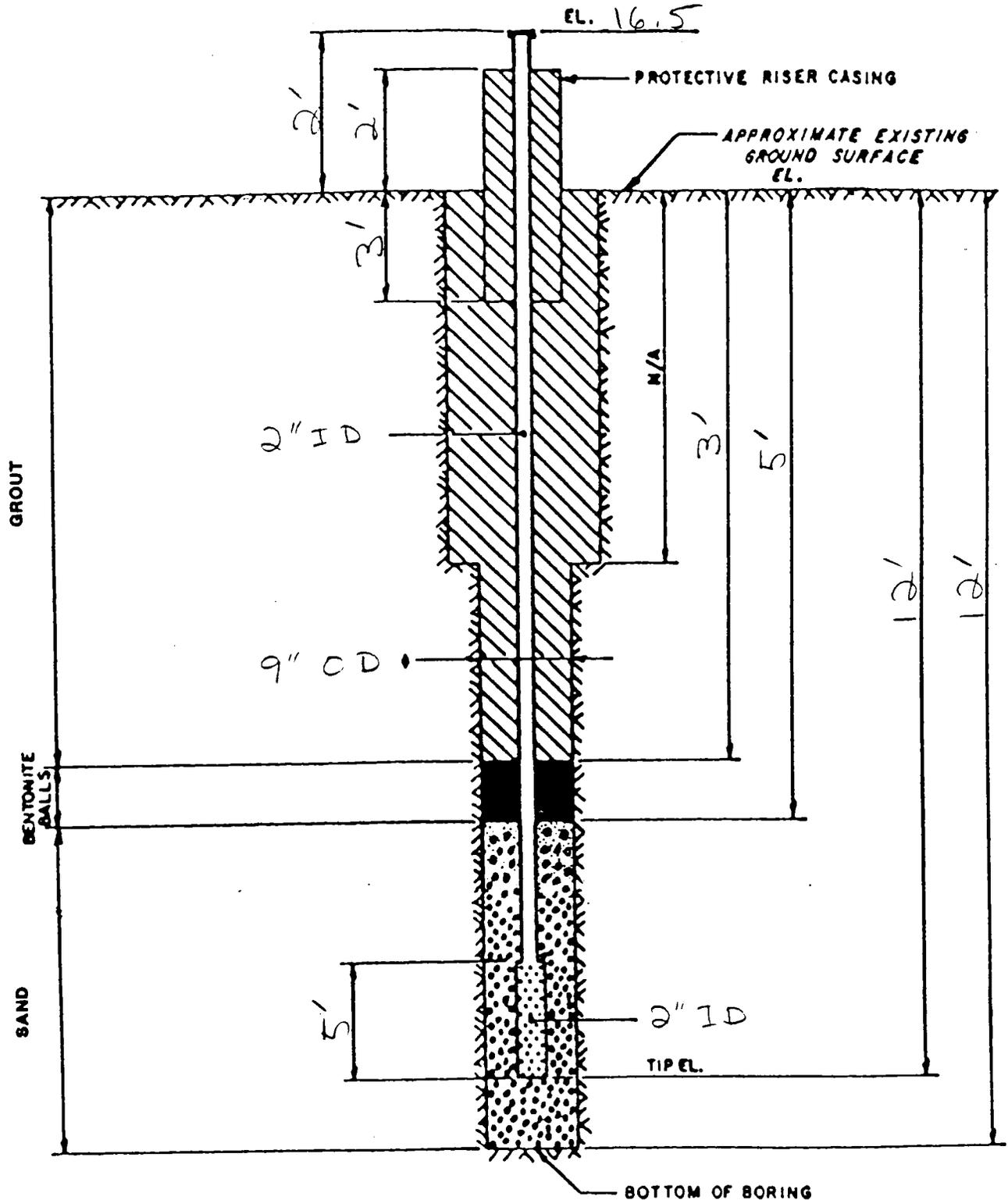


INTERNATIONAL
TECHNOLOGY
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MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS TAX
PROJECT NO. 453058 -
BORING NO. 42-5

INSTALLED BY Steve Bruders DATE 5/11/89
CHECKED BY M. Hynton DATE 10-10-89



WELL COMPLETION REPORT (USE BALL POINT PEN - PRESS FIRMLY)

PERMIT NO. 29-0499

United States Navy
Address

JACKSONVILLE
City

FL.
State

35
Zip

[Signature]
Contractor's Signature

7039
License No.

5-15-53
Completion Date

30
CASING DEPTH

35
Total Depth

[Signature]
Drillers Signature

Registration No.

Type of work: Construct Repair Abandon

Well Use: Private Public Monitor Irrigation
Industrial Recharge Other

Method: Rotary Cable Tool Jet Combination
Other

Casing: Black Steel Galvanized PVC Other
Screened From 30 Ft. to 35 Ft.

Bags of Grout 6 Interval Grouted 0 Ft. to 26 Ft.

Static Water Level 4' Ft. below Top of Casing

Pumping Water Level Ft. after Hrs. at GPM

Pump Size H.P. Capacity GPM

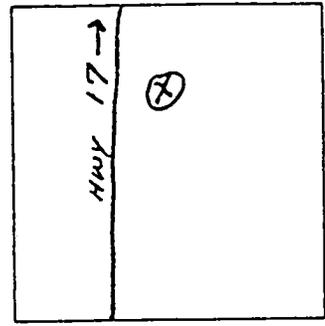
WELL LOCATION

Address JACKSONVILLE, NAVAL
AIR base

Subdivision _____ Lot # _____

Latitude - Longitude

County DUVAL
23 35 27E
Section Township Range



Located Near

Grout Thick- ness & Depth	Casing		Depth (ft.)		Examine cuttings at 20 ft. or smaller intervals and at changes. Give color, grain-size and type of material. Note any cavities. Indicate producing zones. Attach additional sheets necessary.
	Diam.	Depth	From	To	
<u>4" x 26'</u>	<u>2'</u>	<u>30</u>	<u>0</u>	<u>8</u>	<u>BROWN SAND</u>
			<u>8</u>	<u>12</u>	<u>TAN CLAYEY SAND</u>
			<u>12</u>	<u>26</u>	<u>GREY CLAY</u>
			<u>26</u>	<u>35</u>	<u>TAN SAND</u>
					<u>Well #6</u>
					<u>20/30 SAND</u>
					<u>GROUT</u>

Cuttings sent to District? () Yes () No

Latitude = 30° 14' 20" N
Longitude = 81° 40' 50" W

Well 42-6

MONITOR WELL COMPLETION REPORT

DATE: 5-15-91

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0499 GMS NO.: 42-6

WELL NO.: 42-6 WELL NAME: 42-6

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUER

TOTAL DEPTH: 35' (bls) DEPTH OF SCREEN: 30'-35' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 18.0'

GROUND SURFACE ELEVATION (MSL): 16.0'

COMPLETION DATE: 5-15-91

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP; APPROXIMATELY 40
GALLONS UNTIL DISCHARGE WAS CLEAR.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): NOT TAKEN

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-7' BEN SAND (SM);
7' DRX ECLY, SANDY CLAY (CH); 8-28' SATURATED GREY CLAY (CH)

REPORT PREPARED BY: SHAEL BARTOLOTTI, I.T. CORPORATION, (813) 971-2701
(name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
(bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: NAS TAX		
BORING NUMBER: 42-6	COORDINATES:		DATE: 5/15/89
ELEVATION: 16.0	GWL: Depth	Date/Time	DATE STARTED: 5/15/89
ENGINEER/GEOLOGIST: Mark Hampton	Depth	Date/Time	DATE COMPLETED: 5/15/89
DRILLING METHODS: hollow stem auger w/ rotary wash			PAGE 1 OF 2

DEPTH (ft)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-7' Brown sand	SM			0700 start 0800 finish
7				7' Dark grey sandy clay	CH			
14				8-28' Saturated grey clay	CH			
21								
28								
35				28-35' - Tan sand	SM			

NOTES:

Boring terminated at 35 ft.

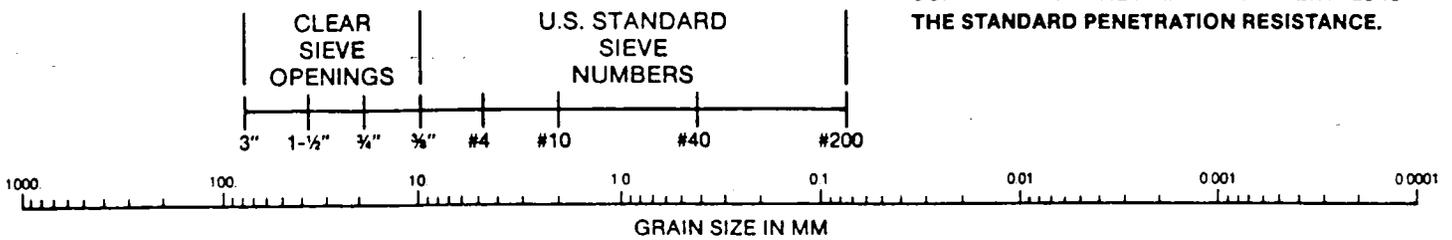
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS. GRAVEL-SAND MIXTURES. LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS. GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS. GRAVELLY SANDS. LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS. SAND-SILT MIXTURES
	SC	CLAYEY SANDS. SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICEACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS TAX FIELD ENG./GEO. Mark Hampton DATE 5/15/89
 PROJECT NO. 453058 CHECKED BY M. Hampton DATE 10-10-89
 BORING NO. 42-6 DATE OF INSTALLATION 5/15/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger / rotary wash</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID(S) USED: <u>water</u>	CASING SIZE(S) USED: <u>SCH 40 PVC</u>
FLUID <u>water</u> FROM <u>15'</u> TO <u>35'</u>	SIZE <u>8"</u> FROM <u>0</u> TO <u>15'</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS: O.D. <u>2 1/4"</u> I.D. <u>2"</u>
PERFORATION TYPE: <u>manufactured</u>	LENGTH OF PIPE SECTIONS <u>10'</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	JOINING METHOD <u>flush thread</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 mesh</u>	
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5x5 concrete</u>
PROTECTIVE PIPE O.D. <u>6"</u>	<u>and with steel posts</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2		18.0	
GROUND SURFACE	0.0		16.0	
BOTTOM OF PROTECTIVE PIPE	3		13.0	
BOREHOLE FILL MATERIALS:				
GROUT Type I Portland	TOP 0	BOTTOM 26	TOP 16.0	BOTTOM -10.0
BENTONITE 3/8" pellets	TOP 26	BOTTOM 28	TOP -10.0	BOTTOM -12.0
SAND 20/30 silica	TOP 28	BOTTOM 30	TOP -12.0	BOTTOM -14.0
GRAVEL n/a	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 30	BOTTOM 35	TOP -14.0	BOTTOM -19.0
PIEZOMETER TIP	35		-19.0	
BOTTOM OF BOREHOLE	35		-19.0	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; approximately 40 gallons removed; discharge was clear.

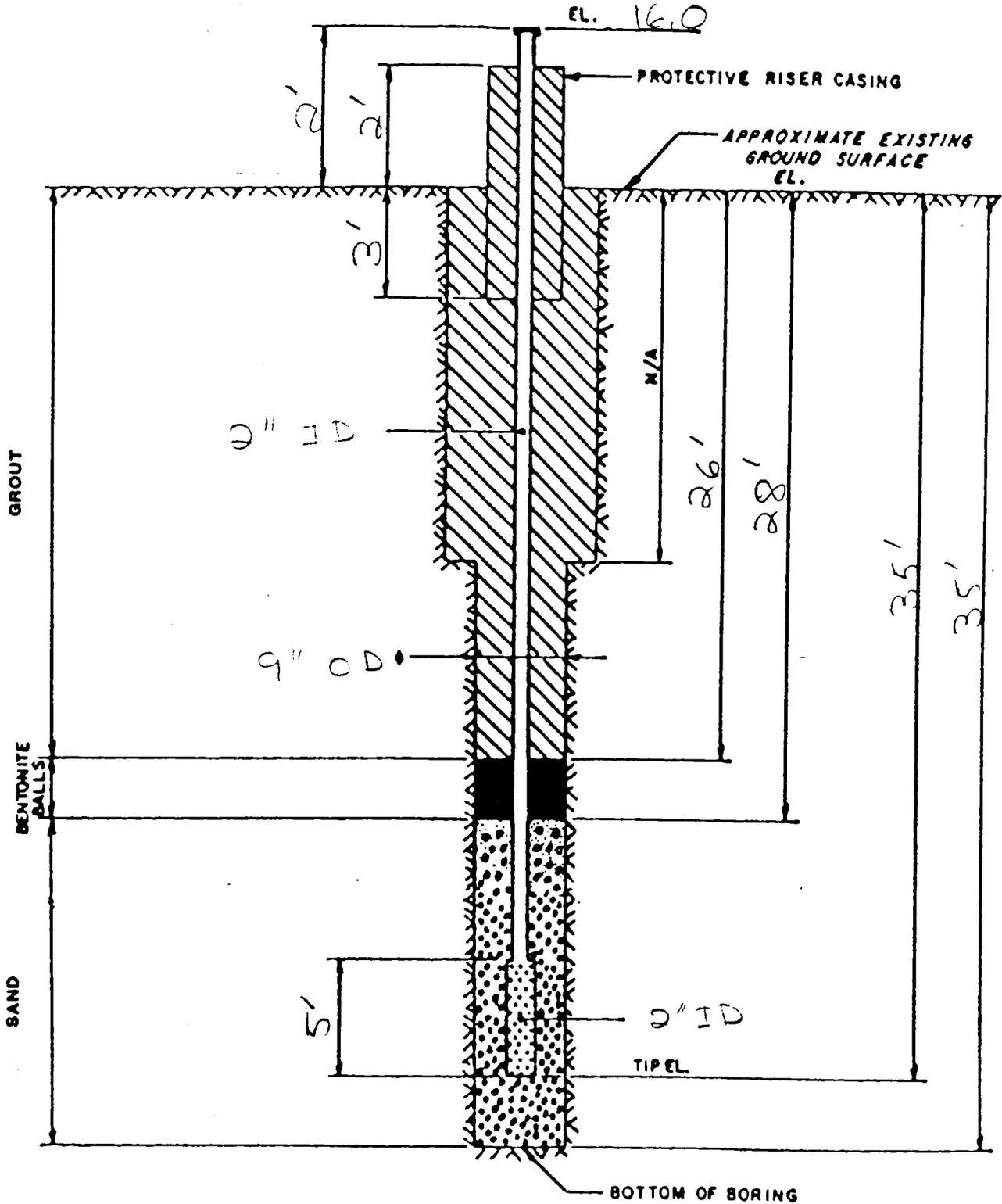


INTERNATIONAL
TECHNOLOGY
CORPORATION

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS TAX
 PROJECT NO. 453058-
 BORING NO. 42-6

INSTALLED BY Mark Harris DATE 5/15/89
 CHECKED BY M. Hampton DATE 10-10-89



MONITOR WELL COMPLETION REPORT

DATE: 5-11-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0516 GMS NO.: 42-7

WELL NO.: 42-7 WELL NAME: 42-7

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUDER

TOTAL DEPTH: 11' (bls) DEPTH OF SCREEN: 6'-11' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 6' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 18.0'

GROUND SURFACE ELEVATION (MSL): 16.0'

COMPLETION DATE: 5-11-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP ; 25 GALLONS UNTIL
DISCHARGE WAS CLEAR

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-5' DRK BRN SAND (SM);
5-6' GREY-BRN SAND (SM); 6-10' TAN-DRK BRN SAND (SM); 10-11' GREEN-GRAY CLAY (CH)-
CONFINING LAYER AT 11'

REPORT PREPARED BY : SHARI BARTOLOTTI, I.T. CORPORATION (813) 971-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface

VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: PAS JAX		
BORING NUMBER: 42-7	COORDINATES:		DATE: 5/11/89
ELEVATION: 16.0	GWL: Depth	Date/Time	DATE STARTED: 5/11/89
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time	DATE COMPLETED: 5/11/89
DRILLING METHODS: hollow stem auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-5' Dark brown sand	SM			Start 1400 finish 1445
5				5-6' Grey brown sand	SM			
10				6-10' Tan, dark brown sand	SM			
15				10-11' Green gray clay	CH			

NOTES:

Boring terminated at 11 ft; encountered confining unit at this depth.

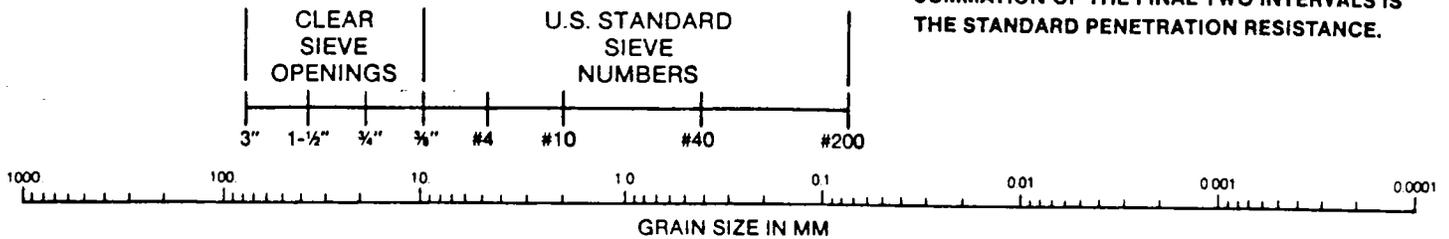
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME AAS TAX FIELD ENG./GEO. Steve Bruder DATE 5/11/89
 PROJECT NO. 453058 CHECKED BY M. King Ten DATE 10-10-89
 BORING NO. 42-7 DATE OF INSTALLATION 5/11/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two teeth sand bit</u>
DRILLING FLUID(S) USED: <u>none</u>	CASING SIZE (S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4"</u> I.D. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.016 inch</u>	JOINING METHOD <u>flush thread</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5'x5' concrete pad</u>
PROTECTIVE PIPE O.D. <u>6"</u>	<u>w/ steel posts</u>

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2		18.0	
GROUND SURFACE	0.0		16.0	
BOTTOM OF PROTECTIVE PIPE	3		13.0	
BOREHOLE FILL MATERIALS: GROUT Type I Portland BENTONITE 3/8" pellets SAND 20/30 silica GRAVEL n/a	TOP	BOTTOM 2'	TOP 16.0	BOTTOM 14.0
	TOP 2'	BOTTOM 4'	TOP 14.0	BOTTOM 13.0
	TOP 4'	BOTTOM 11'	TOP 12.0	BOTTOM 5.0
	TOP	BOTTOM	TOP	BOTTOM
PERFORATED SECTION	TOP 6'	BOTTOM 11'	TOP 10.0	BOTTOM 5.0
PIEZOMETER TIP	11'		5.0	
BOTTOM OF BOREHOLE	11'		5.0	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO

WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; 25 gallons removed; discharge was clear.

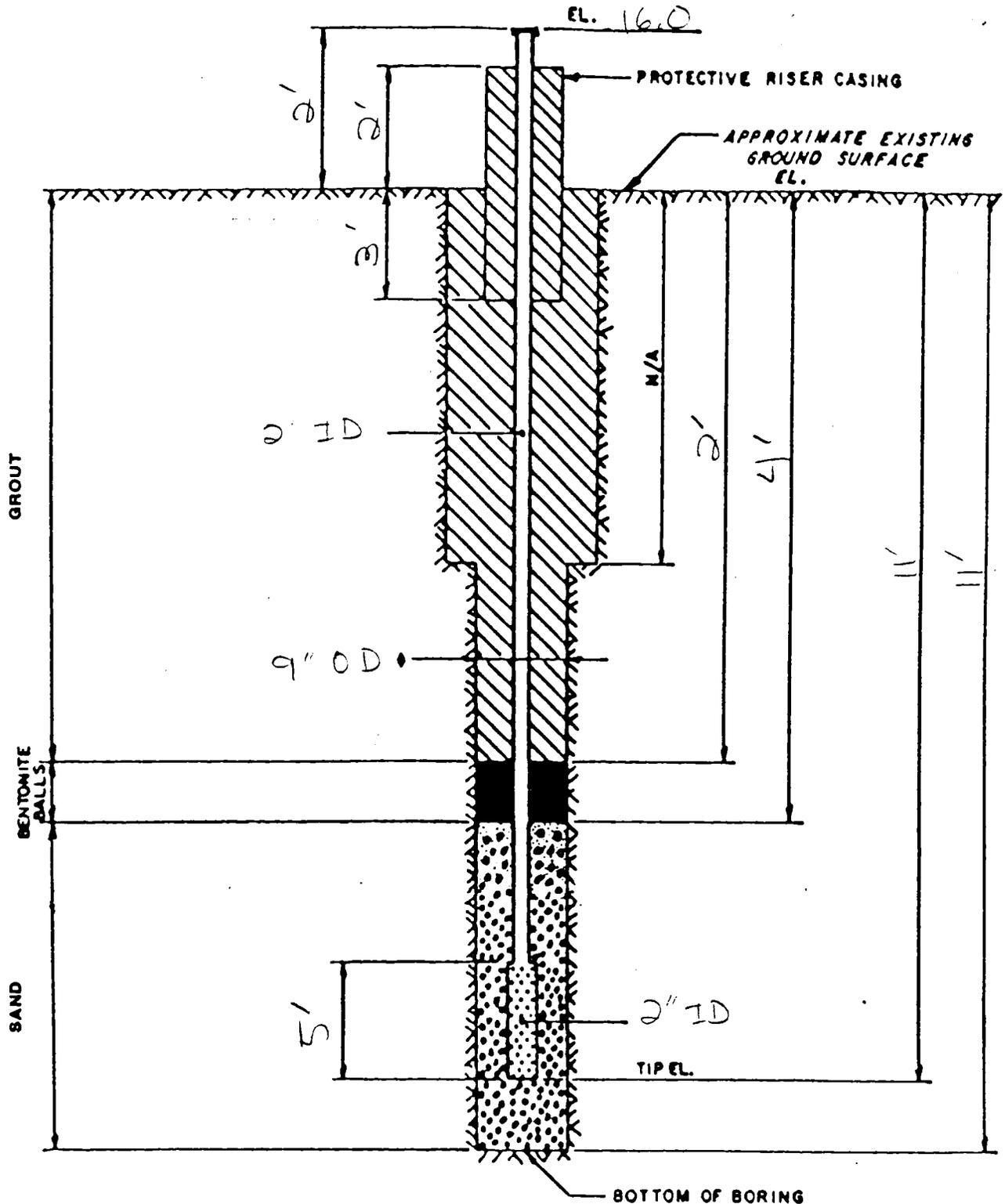


INTERNATIONAL
TECHNOLOGY
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MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS TAX
PROJECT NO. 453058 -
BORING NO. 42-7

INSTALLED BY Steve B... DATE 5/11/89
CHECKED BY M. K... DATE 10/10/89



MONITOR WELL COMPLETION REPORT

DATE: 5-11-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0517 GMS NO.: 42-8

WELL NO.: 42-8 WELL NAME: 42-8

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 00" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUDER

TOTAL DEPTH: 13' (bls) DEPTH OF SCREEN: 8'-13' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 9' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 18.2'

GROUND SURFACE ELEVATION (MSL): 16.2'

COMPLETION DATE: 5-11-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP; 25 GALLONS
UNTIL DISCHARGE WAS CLEAR.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-2' DRK CREAM SAND (SM);
2-4' DRK GRN SAND w/ SOME CLAY (SC); 4-13' GREY SANDY CLAY (CH) - CONFINING
LAYER AT 13'

REPORT PREPARED BY: SHARI BARTOLOTTI, I.T. CORPORATION, (813) 971-2701
 (name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
 (bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 4153058	PROJECT NAME: NASTAY		
BORING NUMBER: 42-8	COORDINATES:		DATE: 5/11/89
ELEVATION: 16.2	GWL: Depth	Date/Time	DATE STARTED: 5/11/89
ENGINEER/GEOLOGIST: Steve Bruder	Depth	Date/Time	DATE COMPLETED: 5/11/89
DRILLING METHODS: hollow stem auger			PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-2' Dark cream sand	SM			start 0700
5				2-4' Dark brown sand w/ some clay	SC			finish
10				4-13' Grey sandy clay	CH			
15								sand pack 7' Bentonite pellets 2'

NOTES:

Boring terminated at 13 ft.; encountered confining unit at this depth.

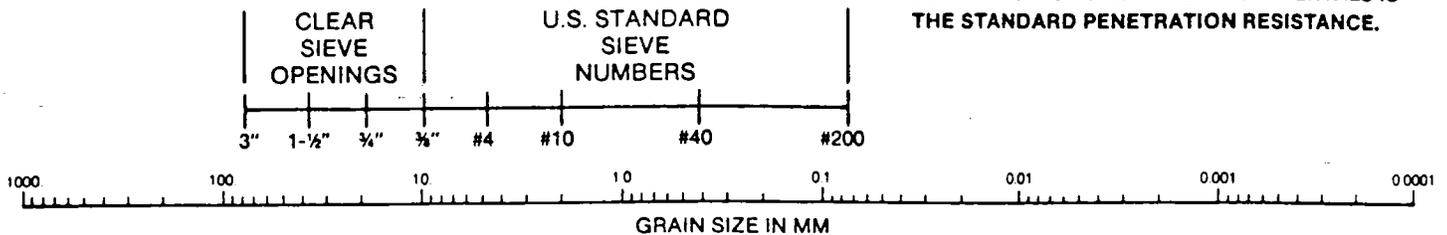
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME DAS JAX FIELD ENG./GEO. Steve Bruder DATE 5/11/89
 PROJECT NO. 452052 CHECKED BY M. Hampton DATE 10-12-95
 BORING NO. 42-8 DATE OF INSTALLATION 5/11/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID (S) USED: <u>none</u>	CASING SIZE (S) USED: <u>none</u>
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4"</u> I.D. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 inch</u>	JOINING METHOD <u>flush thread</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5'x5' concrete pad w/ steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
	TOP	BOTTOM	TOP	BOTTOM
TOP OF RISER PIPE	2		18.2	
GROUND SURFACE	0.0		16.2	
BOTTOM OF PROTECTIVE PIPE	3		13.2	
BOREHOLE FILL MATERIALS: GROUT <u>Type I Portland</u> BENTONITE <u>3/8" pellets</u> SAND <u>20/30 silica</u> GRAVEL <u>n/a</u>	TOP	0	TOP	16.2
	BOTTOM	4	BOTTOM	12.2
	TOP	4	TOP	12.2
	BOTTOM	6	BOTTOM	10.2
	TOP	6	TOP	10.2
	BOTTOM	13	BOTTOM	3.2
	TOP		TOP	
	BOTTOM		BOTTOM	
PERFORATED SECTION	TOP	8	TOP	8.2
	BOTTOM	13	BOTTOM	3.2
PIEZOMETER TIP	13		3.2	
BOTTOM OF BOREHOLE	13		3.2	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

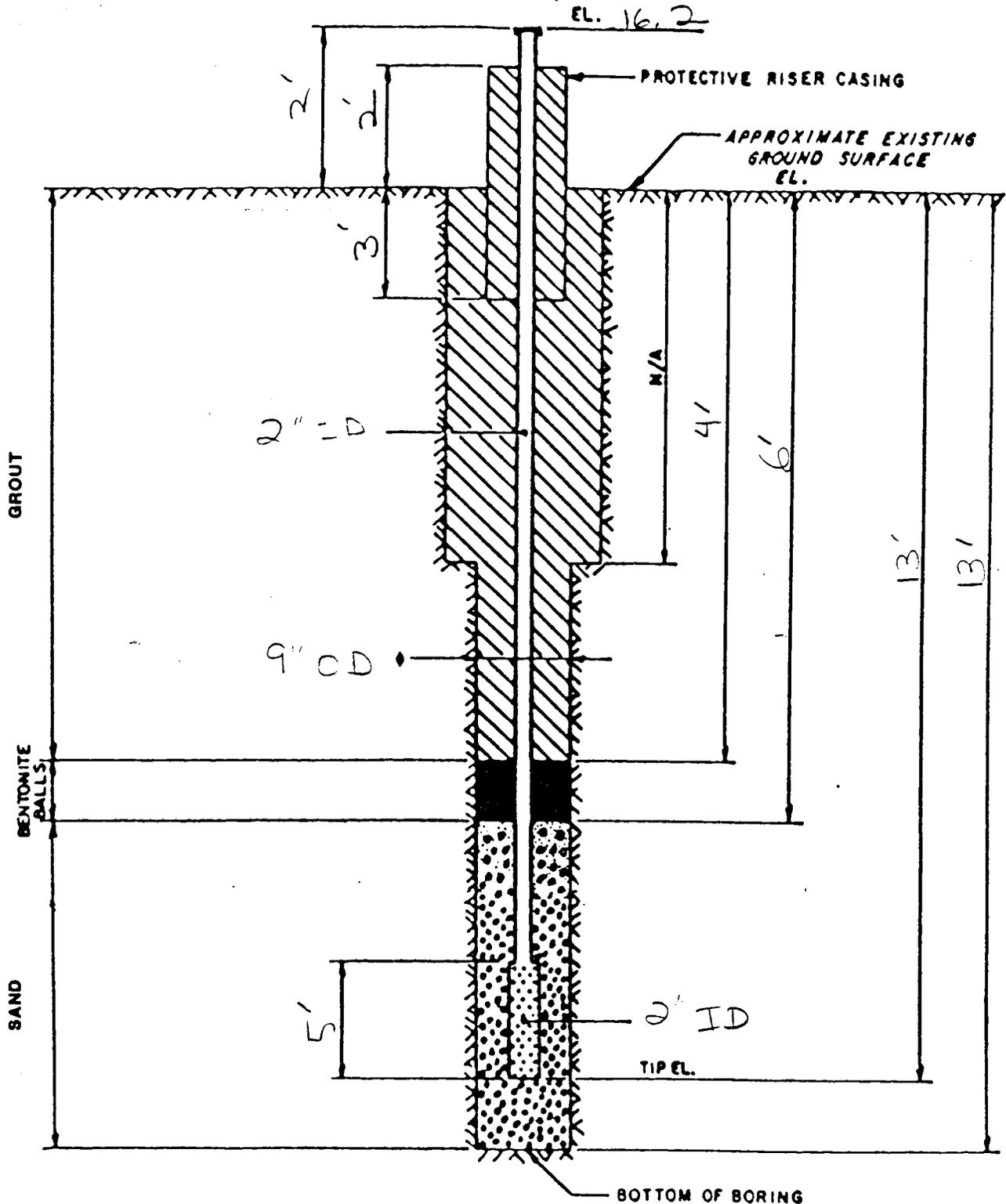
REMARKS Well developed by centrifugal pump, 25 gallons removed, discharge was clear.



MONITOR WELL INSTALLATION SKETCH

PROJECT NAME DAS JAX
 PROJECT NO. 45305 8 -
 BORING NO. 42-8

INSTALLED BY Steve Bruder DATE 5/11/89
 CHECKED BY M. King-Tow DATE 10/10/89



WELL COMPLETION REPORT (USE BALL POINT PEN - PRESS FIRMLY)

PERMIT NO. 89-0498

United States Navy

Jacksonville

Fl.

Address

7039

City
5-17-89

State
32

Zip
37

Contractor's Signature

License No.

Completion Date

CASING DEPTH

Total Depth

Driller's Signature

Registration No.

Type of work: Construct Repair Abandon

Well Use: Private Public Monitor Irrigation

Industrial Recharge Other

Method: Rotary Cable Tool Jet Combination

Other

Casing: Black Steel Galvanized PVC Other

Screened From 32 Ft. to 37 Ft.

Bags of Grout 6 Interval Grouted 0 Ft. to 26 Ft.

Static Water Level 4 Ft. below Top of Casing

Pumping Water Level Ft. after Hrs. at GPM

Pump Size H.P. Capacity GPM

WELL LOCATION

Address HWY 17 JACKSONVILLE

NAVAL A.F. base

Subdivision

Lot #

Latitude - Longitude

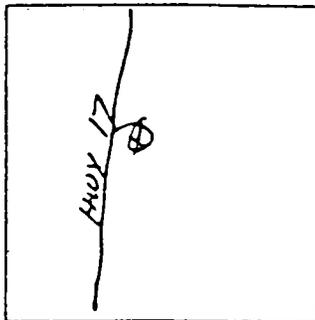
County DUVAL

23 35 27E

Section

Township

Range



Located Near

Grout Thick- ness & Depth	Casing		Depth (ft.)		Examine cuttings at 20 ft. or smaller interval and at changes. Give color, grain-size - type of material. Note any cavities, indicating producing zones. Attach additional sheets necessary.
	Diam	Depth	From	To	
	2	32	0	2	BROWN SAND
			2	8	TAN SAND
			8	13	TAN CLAYEY SAND
			13	19	grey clay
			19	27	BLACK CLAY
			27	32	grey clay
			32	37	TAN SAND
					#5
					20/30 SAND
					9GROUT

Cuttings sent to District? () Yes (X) No

Latitude = 30° 14' 20" N

Longitude = 81° 40' 50" W

Well 42-9

RECEIVED

JUL 12 7 1989

**I.T. CORPORATION
TAMPA, FLORIDA**

MONITOR WELL COMPLETION REPORT

DATE: 5-17-89

INSTALLATION NAME: U.S. NAVAL AIR STATION JACKSONVILLE, FL

DER PERMIT NUMBER: 89-0498 GMS NO.: 42-9

WELL NO.: 42-9 WELL NAME: 42-9

DESIGNATION: Background Intermediate Compliance X

LATITUDE/LONGITUDE: 30° 14' 20" N / 81° 40' 50" W

AQUIFER MONITORED: SURFICIAL

INSTALLATION METHOD: HOLLOW STEM AUGER

INSTALLED BY: STEVE BRUDER

TOTAL DEPTH: 37' (bls) DEPTH OF SCREEN: 32'-37' (bls)

SCREEN LENGTH: 5' SCREEN SLOT SIZE: 0.01" SCREEN TYPE: 2" SCH 40 PVC

CASING DIAMETER: 9" CASING TYPE: 2" SCH 40 PVC

LENGTH OF CASING: 32' FILTER PACK MATERIAL: SAND

TOP OF CASING ELEVATION (MSL): 14.3'

GROUND SURFACE ELEVATION (MSL): 12.3'

COMPLETION DATE: 5-17-89

DESCRIBE WELL DEVELOPMENT: CENTRIFUGAL PUMP; APPROXIMATELY 40 GALLONS UNTIL DISCHARGE WAS CLEAR.

POST DEVELOPMENT WATER LEVEL ELEVATION (MSL): Not Taken

DATE AND TIME MEASURED: N/A

REMARKS (Soils information, Stratigraphy, etc.): 0-2' GRN TO WHITE, FINE CLEAN SAND (SM); 2-8' TAN, CLEAN SAND (SM); 8-13' TAN, CLAYEY SAND (SC); 13-19' GREY, SANDY CLAY (CH); 19-32' GREY TO BLK CLAY (CH); 32-37' TAN TO WHITE FINE SAND (SM)

REPORT PREPARED BY: SHAEL BARTOLOTTI, I.T. CORPORATION, (813) 971-2701
(name, company, phone no.)

NOTE: PLEASE ATTACH BORING LOG.
(bls) = Below Land Surface



VISUAL CLASSIFICATION OF SOILS

PROJECT NUMBER: 453058	PROJECT NAME: NAS JAY	
BORING NUMBER: 42-9	COORDINATES:	DATE: 5/17/89
ELEVATION: 12.3	GWL: Depth Date/Time	DATE STARTED: 5/17/89
ENGINEER/GEOLOGIST: Hampton	Depth Date/Time	DATE COMPLETED: 5/17/89
DRILLING METHODS: hollow stem auger / rotary wash		PAGE 1 OF 2

DEPTH (FT)	SAMPLE TYPE & NO.	BLOWS ON SAMPLER PER FOOT	RECOVERY (%)	DESCRIPTION	USCS SYMBOL	MEASURED CONSISTENCY (TSF)	WELL CONSTRUCTION	REMARKS
0				0-2' Brown to white fine clean sand	SM			
7				2-8' Tan clean sand	SM			
14				8-13' Tan clayey sand	SC			
21				13-19' Gray sandy clay	CH			
28				19-32' Gray to black clay	CH			
35				32-37' Tan to white fine sand	SM			

NOTES:

Boring terminated at 37 ft.

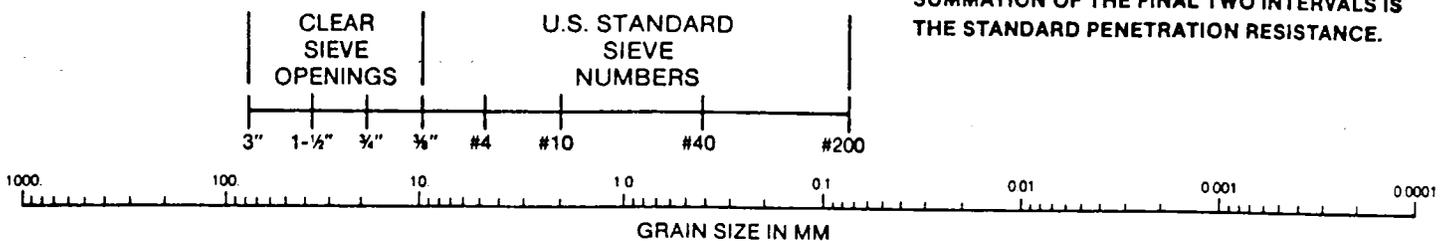
CONSISTENCY OF COHESIVE SOILS

CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (TONS PER SQUARE FOOT)
VERY SOFT	LESS THAN 0.25
SOFT	0.25 to 0.50
MEDIUM STIFF	0.50 to 1.0
STIFF	1.0 TO 2.0
VERY STIFF	2.0 TO 4.0
HARD	MORE THAN 4.0

DENSITY OF GRANULAR SOILS

DENSITY	STANDARD PENETRATION RESISTANCE ⁽¹⁾
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

⁽¹⁾ STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

USCS CLASSIFICATION FOR SOILS

COARSE-GRAINED SOILS

CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
	GC	CLAYEY GRAVELS GRAVEL-SAND-CLAY MIXTURES
CLEAN SANDS (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES

FINE-GRAINED/HIGHLY ORGANIC SOILS

SILTS AND CLAYS LIQUID LIMIT (LESS THAN 50)	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
SILTS AND CLAYS LIQUID LIMIT (GREATER THAN 50)	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS	PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS



MONITOR WELL INSTALLATION SHEET

PROJECT NAME NAS TAX FIELD ENG./GEO. Mark Hampton DATE 5/17/89
 PROJECT NO. 453058 CHECKED BY M. Hampton DATE 12-10-89
 BORING NO. 42-9 DATE OF INSTALLATION 5/17/89

BOREHOLE DRILLING

DRILLING METHOD <u>hollow stem auger/</u>	TYPE OF BIT <u>two tooth sand bit</u>
DRILLING FLUID(S) USED: <u>water rotary wash</u>	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE <u>SCH 40 PVC</u>	RISER PIPE MATERIAL <u>SCH 40 PVC</u>
DIAMETER OF PERFORATED SECTION <u>2"</u>	RISER PIPE DIAMETERS:
PERFORATION TYPE: <u>manufactured</u>	O.D. <u>2 1/4</u> I.D. <u>2"</u>
SLOTS <input type="checkbox"/> HOLES <input type="checkbox"/> SCREEN <input checked="" type="checkbox"/>	LENGTH OF PIPE SECTIONS <u>10'</u>
AVERAGE SIZE OF PERFORATIONS <u>0.010 inch</u>	JOINING METHOD <u>flush thread</u>
TOTAL PERFORATED AREA <u>5'</u>	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH <u>5'</u>	OTHER PROTECTION <u>5' x 5' concrete pad w/ steel posts</u>
PROTECTIVE PIPE O.D. <u>6"</u>	

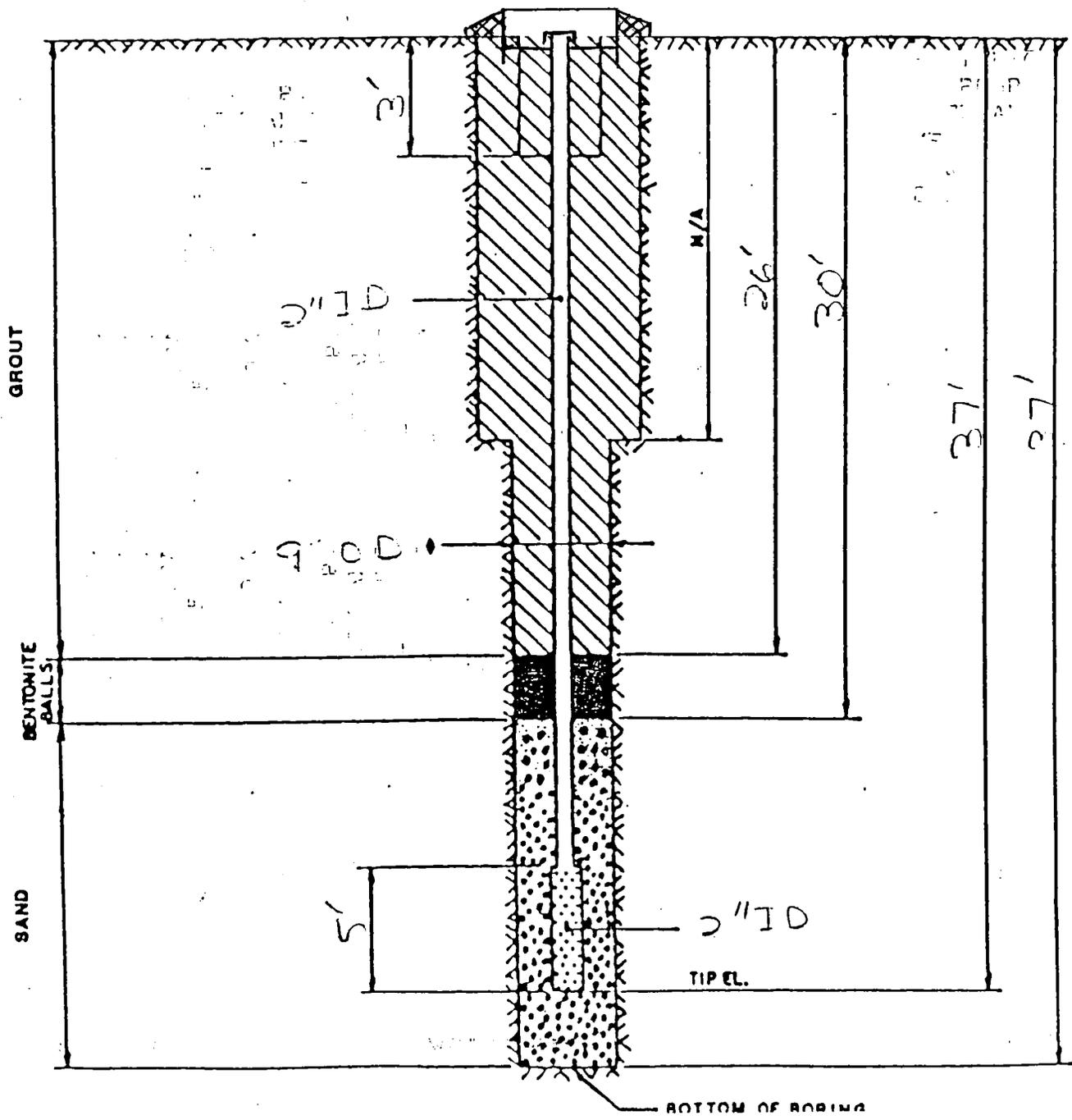
ITEM	DISTANCE ABOVE / BELOW GROUND SURFACE (FT)		ELEVATION (MSL)	
TOP OF RISER PIPE	2		14.3	
GROUND SURFACE	0.0		12.3	
BOTTOM OF PROTECTIVE PIPE	3		9.3	
BOREHOLE FILL MATERIALS:				
	GROUT <u>Type I Portland</u>	TOP 0 BOTTOM 26	TOP 12.3	BOTTOM -13.7
	BENTONITE <u>3/8" pellets</u>	TOP 26 BOTTOM 30	TOP -13.7	BOTTOM -17.7
	SAND <u>20/30 silica</u>	TOP 30 BOTTOM 37'	TOP -17.7	BOTTOM -24.7
GRAVEL <u>n/a</u>	TOP _____ BOTTOM _____	TOP _____	BOTTOM _____	
PERFORATED SECTION	TOP 30' BOTTOM 37'	TOP -19.7	BOTTOM -24.7	
PIEZOMETER TIP	37'		-24.7	
BOTTOM OF BOREHOLE	37		-24.7	
GWL AFTER INSTALLATION	n/a			

WAS THE PIEZOMETER FLUSHED AFTER INSTALLATION? YES NO
 WAS A SENSITIVITY TEST PERFORMED ON THE PIEZOMETER? YES NO

REMARKS Well developed by centrifugal pump; approximately 40 gallons removed; discharge was clear.

MONITOR WELL INSTALLATION SKETCH

PROJECT NAME NAS TANK INSTALLED BY Mark Hamilton DATE 5/1/89
 PROJECT NO. 453058 - CHECKED BY W. H. [unclear] DATE 12-15-89
 BORING NO. 42-9



PSC 41+43

DRAFT QUARTERLY COMPLIANCE MONITORING
OF POLISHING POND AND
DOMESTIC SLUDGE DRYING BEDS
MAY 1991 SAMPLING DATE
NAVAL AIR STATION, JACKSONVILLE
JACKSONVILLE, FLORIDA

PREPARED FOR

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
NORTH CHARLESTON, SOUTH CAROLINA

PREPARED BY

IT CORPORATION
8600 HIDDEN RIVER PARKWAY
SUITE 100
TAMPA, FLORIDA 33637

PROJECT NO. 595411
JULY 1991

**TABLE 2
SUMMARY
GROUNDWATER SAMPLING ANALYTICAL RESULTS
DOMESTIC SLUDGE DRYING BEDS
Naval Air Station
Jacksonville, Florida
IT Project No. 595411**

PARAMETERS	ANALYTICAL METHOD DETECTION LIMITS	PERMIT ¹ STANDARD	MONITORING WELLS										
			41-1	41-2	41-3	41-4	41-5	41-6	41-7 DUP OF 41-2	41-8	41-9	TRIP BLANK	
Indicator Parameters (40 CFR 264.98(a))													
pH (Field)	NA	5.70	5.5	5.80	5.90	9.30	5.90	7.30	5.80	NZ	NZ	NZ	
Specific Conductance (Field) (umho/cm)	NA	308	610	160	1280	2700	980	575	160	NZ	NZ	NZ	
Total Organic Carbon (mg/l)	1	13	13	2	28	400	120	100	2	<1	<1	NZ	
Total Organic Halides (mg/l)	0.001	0.066	0.032	0.031	0.104	0.402	0.364	0.179	0.013	<1	<1	NZ	
F006 Parameters (40 CFR 261 Appendix VII)													
Cadmium (mg/l)	.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NZ
Chromium, Hexavalent (mg/l)	0.02	0.02	<0.02	<0.02	<0.02	<0.50 ²	<0.02	<0.50 ²	<0.02	<0.02	<0.02	<0.02	NZ
Cyanide, Complexed (mg/l)	0.01	0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NZ
Nickel (mg/l)	0.02	0.02	0.03	<0.02	0.03	0.08	0.02	0.03	<0.02	<0.02	<0.02	<0.02	NZ
Carbon Disulfide (ug/l)	1	1	<1	16	<1	1	<1	2	13	<1	<1	<1	
Tetrachloroethene (ug/l)	1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	

- ¹ Permit standard is the mean of the last four sampling events of Well 4-9, Primary Drinking Water Standards, Secondary Drinking Water Standards, or the Method Detection Limit.
- ² Elevated detection limits due to matrix influences.
- ³ Variances in detection limits are due to dilution factors.
- ⁴ Indicates a value less than the detection limit.
- ⁵ Compound exceeded calibration range, but was within instruments linear range.
- NA Not Applicable
- NZ Not Analyzed
- * Methods used do not result in detection of this parameter.
- ** Data not received from laboratory, will forward when available.

TABLE 3
SUMMARY
GROUNDWATER SAMPLING ANALYTICAL RESULTS
POLISHING POND
Naval Air Station
Jacksonville, Florida
IT Project No. 595411

PARAMETERS	ANALYTICAL METHOD DETECTION LIMITS	PERMIT ¹ STANDARD	MONITORING WELLS							
			42-5	42-6	42-7	42-8	42-9	EQUIP. RINSATE 42-10	DUP OF 42-6 4-11	TRIP BLANK (#2)
Indicator Parameters (40 CFR 264.98(a))										
pH (Field)	NA	5.70	5.00	5.30	5.01	5.60	5.40	NZ	5.40	NZ
Specific Conductance (Field) (umho/cm)	NA	308	NZ	95	1820	1590	78	NZ	78	NZ
Total Organic Carbon (mg/l)	1	13	14	4	29	20	3	<1	4	NZ
Total Organic Halides (mg/l)	0.001	0.066	0.062	0.015	0.095	0.056	<0.01	<0.01	0.012	NZ
F006 Parameters (40 CFR 261 Appendix VII)										
Cadmium (mg/l)	.005	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NZ
Chromium, Hexavalent (mg/l)	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NZ
Cyanide, Complexed (mg/l)	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NZ
Nickel (mg/l)	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	NZ
Carbon Disulfide (ug/l)	1	1	<1	1	1	<1	5	3	3	<1
Tetrachloroethene (ug/l)	1	3	<1	<1	<1	<1	<1	<1	<1	<1
1,1,2 Trichloroethane (ug/l)	1	1	<1	<1	<1	<1	<1	<1	<1	<1
1,2 Dichlorobenzene (ug/l)	10	10	<10	<10	<10	<10	<10	<10	<10	<10

- ¹ Permit standard is mean of last four sampling events of Well 4-9, Primary Drinking Water Standards, Secondary Drinking Water Standards, or the Method Detection Limit.
- ² Elevated detection limits due to matrix influences.
- ³ Variances in detection limits are due to dilution factors.
- NA Not Applicable
- NZ Not Analyzed
- * Methods used do not result in detection of this parameter.
- ** Data not received from laboratory, will forward when available.

**TABLE 3
SUMMARY
GROUNDWATER SAMPLING ANALYTICAL RESULTS
POLISHING POND
Naval Air Station
Jacksonville, Florida
IT Project No. 595411**

PARAMETERS	ANALYTICAL METHOD DETECTION LIMITS	PERMIT ¹ STANDARD	MONITORING WELLS							
			42-5	42-6	42-7	42-8	42-9	EQUIP. RINSATE 42-10	DUP OF 42-6 4-11	TRIP BLANK (#2)
Barium (mg/l)	0.002	1	0.061	0.026	0.095	0.10	0.017	<0.002	0.023	NZ
Chromium (mg/l)	0.01	0.05	0.01	<0.01	0.02	0.01	0.01	<0.01	<0.01	NZ
Lead (mg/l)	0.002	0.05	0.001	0.002	0.008	0.005	0.002	<0.002	<0.002	NZ
Mercury (mg/l)	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NZ
Selenium (mg/l)	0.002	0.01	<0.010 ²	<0.004 ²	<0.006 ²	<0.004 ²	<0.010 ²	<0.002	<0.002	NZ
Silver (mg/l)	0.005	0.05	0.006	<0.005	0.007	0.007	<0.005	<0.005	<0.005	NZ
FAC Ch. 17-550.310 and Primary Drinking Water Standards										
Turbidity (ntu)	0.5	NA	24	24	230	600	90	<0.5	24	NZ
1,2 Dibromoethane (ug/l)	1	0.02	<1	<1	<1	<1	<1	<1	<1	<1
Sodium (mg/l)	0.2	160	29	9.3	58.2	28.2	8.8	1.0	9.6	NZ
Total Coliform (colonies/100 ml)	<1	NA	<1	<1	<1	<1	<1	<1	<1	NZ
Chloroform (ug/l)	1	100	<1	<1	<1	<1	<1	4	<1	<1
Vinyl Chloride (ug/l)	1	1	<1	<1	<1	<1	<1	<1	<1	<1
Nitrate (as N) (mg/l)	0.02	10	8.5	<0.02	50	8.4	<0.02	0.03	<0.02	NZ

- 1 Permit standard is mean of last four sampling events of Well 4-9, Primary Drinking Water Standards, Secondary Drinking Water Standards, or the Method Detection Limit.
- 2 Elevated detection limits due to matrix influences.
- 3 Variances in detection limits are due to dilution factors.
- NA Not Applicable
- NZ Not Analyzed
- * Methods used do not result in detection of this parameter.
- ** Data not received from laboratory, will forward when available.

TABLE 2
SUMMARY
GROUNDWATER SAMPLING ANALYTICAL RESULTS
DOMESTIC SLUDGE DRYING BEDS
Naval Air Station
Jacksonville, Florida
IT Project No. 595411

PARAMETERS	ANALYTICAL METHOD DETECTION LIMITS	PERMIT ¹ STANDARD	MONITORING WELLS										
			41-1	41-2	41-3	41-4	41-5	41-6	41-7 DUP OF 41-2	41-8	41-9	TRIP BLANK	
2-Nitropropane (ug/l)	2	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<5
Carbon Tetrachloride (ug/l)	1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Drinking Water Supply Parameters (40 CFR 264.94)													
Arsenic (mg/l)	0.002	0.05	0.006	<0.002	<0.002	0.029	0.007	<0.002	<0.002	<0.002	<0.002	<0.002	NZ
Barium (mg/l)	0.002	1	0.047	0.041	0.26	0.074	0.11	0.17	0.040	<0.002	<0.002	<0.002	NZ
Chromium (mg/l)	0.01	0.05	<0.01	<0.01	<0.01	0.03	<0.01	0.13	<0.01	<0.01	<0.01	<0.01	NZ
Lead (mg/l)	0.002	0.05	0.002	<0.002	0.002	0.023	<0.002	0.026	<0.002	<0.002	<0.002	<0.002	NZ
Mercury (mg/l)	0.001	0.002	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	NZ
Selenium (mg/l)	0.002	0.01	<0.002	<0.010	0.002	<0.010 ²	0.002	<0.010 ²	<0.010	<0.002	<0.002	<0.002	NZ
Silver (mg/l)	0.005	0.05	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NZ
FAC Ch. 17-22.210 and Primary Drinking Water Standards FAC Ch. 17-28.700 and 17-4.246 Parameters													

1 Permit standard is the mean of the last four sampling events of Well 4-9, Primary Drinking Water Standards, Secondary Drinking Water Standards, or the Method Detection Limit.
2 Elevated detection limits due to matrix influences.
3 Variances in detection limits are due to dilution factors.
4 Indicates a value less than the detection limit.
5 Compound exceeded calibration range, but was within instruments linear range.
NA Not Applicable
NZ Not Analyzed
* Methods used do not result in detection of this parameter.
** Data not received from laboratory, will forward when available.



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ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

July 5, 1991

IT Corporation
8600 Hidden River Parkway, Suite 100
Tampa, FL 33637
ATTN: Mark Hampton

Job Number: ITCY 48442

P.O. Number: 595411

This is the Certificate of Analysis for the following samples:

Client Project ID:	NAS JAX
Date Received by Lab:	05/09/91
Number of Samples:	Eight (8)
Sample Type:	Water - seven (7), Trip Blank - one (1)

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I. Introduction

On 05/09/91, seven (7) water samples and one (1) trip blank arrived at the ITAS-Knoxville, Tennessee, laboratory from IT-Tampa, Florida in support of the NAS JAX project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that the data are not blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The total organic halide (TOX) analysis was performed at the IT-Mixed Waste Laboratory (MWL) in Oak Ridge, Tennessee. A copy of the laboratory report for this analysis was submitted under separate cover with ITAS project ITCY 48426.

The samples were analyzed for radiological parameters at the IT-Radiological Services Laboratory (RSL) in Oak Ridge, Tennessee. A copy of the laboratory report for this analysis was submitted under separate cover with ITAS project ITCY 48426.

Reviewed and Approved:

Alyce R. Moore
Alyce R. Moore
Laboratory Manager

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48442

II. Analytical Results/Methodology (continued)

The samples were analyzed for the requested volatile organic compounds by gas chromatography/mass spectroscopy (GC/MS) based on EPA SW-846 method 8240.

The samples were analyzed for the requested semivolatile organic compounds by GC/MS based on EPA SW-846 method 8270.

The samples were analyzed for the requested pesticides and herbicides by gas chromatography/electron capture detection (GC/ECD) based on EPA method 608 and Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985, method 509B.

The samples were analyzed for the requested metals by cold vapor atomic absorption spectroscopy (CVAA), graphite furnace atomic absorption spectroscopy (GFAA) and inductively coupled plasma spectroscopy (ICP) based on EPA SW-846 methods 3010, 3020, 7060, 7421, 7740, 7470 and 6010.

The samples were analyzed for total organic carbon (TOC) by chemical wet oxidation/infrared detection using EPA method 415.1.

The samples were analyzed for turbidity according to EPA method 180.1.

The samples were analyzed for nitrate and sulfate by colorimetric determination based on EPA methods 353.3 and 375.4, respectively.

The samples were analyzed for chloride by titrimetric determination according to EPA method 325.3.

The samples were analyzed for fluoride by ion selective electrode using EPA method 340.2.

The total coliform bacterial density was determined using the membrane filter technique described in method 909A, Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

The samples were analyzed for cyanide by manual distillation/colorimetric determination using EPA method 335.2.

The samples were analyzed for hexavalent chromium according to method 312B, Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

Corporation
y 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48442

III. Quality Control

Routine laboratory level I QC was followed.

The volatiles analyses were performed on 05/21/91 by purge and trap with a J&W DB-624 megabore column on a Finnigan OWA GC/MS/DS. The volatiles runs generally went well. Because of tendency to soil the system, isobutanol was searched for without standard, by examining for peaks in its known retention time window. Ethoxyethanol was also evaluated without standard, by spectral matching of any peaks of apparent 1 µg/liter or greater concentration: this compound continues to be reported without quantitation limit, because our attempts at standardization have not been successful: it appears that the compound induces artifacts, but no clear spectrum has been obtained at levels up to 50 µg/ml. Other compounds (dibromoethane; 2-nitropropane; trichlorotrifluoroethane; 1,2,3-trichloropropane) were based on daily standards, and the rest were evaluated with initial and continuing calibrations. As was seen in an earlier project, some surrogate deviations were seen in the samples: 42-5, 42-6, 42-10 and 42-11. Each had one surrogate a little low and was reanalyzed; except for 42-6, the reruns showed similar results. The surrogate variations did not appear large enough to have significant data effect; all run data were reported. There were no other problems seen in final review of the data. F

The semivolatiles analyses were performed on 06/06, 06/07 and 06/21/91 by direct injection of sample extract on a Restek XT1-5 capillary column on a VG TR10-2 GC/MS/DS. The semivolatiles runs also went well in general. Sample 42-9 originally showed no acid surrogate recoveries, and was reextracted (outside holding time) and reanalyzed. Both run data were reported. Cresylic acid was evaluated as any mono- to tetra-methyl phenols; of these standards were run of all mono- and one isomer, and the rest were searched for based on spectral evaluation of sample peaks. Pyridine and m-cresol standard was not run on 06/21 (date of 42-9 rerun), but this did not affect results. There were no other problems seen in final review of the data. D

The samples were extracted for pesticides on 05/15/91 and were analyzed on 05/20/91. No problems were encountered.

The samples were extracted for herbicides on 05/15/91 and were analyzed on 06/11/91. The solvent methyltertbutylether (MTBE) was used in the extraction procedure in place of ethyl ether prior to derivitization for the purpose of improving recoveries. No problems were encountered.

The samples were digested on 05/21/91 for ICP and GFAA. The samples for mercury analysis were prepared just prior to analysis. The CVAA analysis for mercury was performed on 05/22/91; the GFAA analyses for arsenic, lead and selenium were performed on 05/21 and 05/22/91; the remaining metals were analyzed by ICP on 05/22/91. All run QC was acceptable. Matrix interferences were encountered in the selenium analysis by GFAA, resulting in elevated detection limits for some samples. No other problems were encountered.

IT Corporation
May 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48442

III. Quality Control (continued)

The samples were analyzed for TOC on 05/29/91. No problems were encountered.
The turbidity of the samples was measured on 05/09/91. No problems were encountered.
The samples were analyzed for nitrate and sulfate on 05/30 and 05/23/91, respectively. No problems were encountered.
The samples were analyzed for chloride on 05/14/91. No problems were encountered.
The samples were analyzed for fluoride on 05/10/91. No problems were encountered.
The total coliform determination was performed on 05/09/91. No problems were encountered.
The samples were analyzed for cyanide on 05/10/91. No problems were encountered.
The samples were analyzed for hexavalent chromium on 05/09/91. No problems were encountered.

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IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48442

HEXAVALENT CHROMIUM ANALYSIS

Results in mg/liter (ppm)

Sample Matrix: Water

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Result</u>
Method Blank	P2395	0.02 U
42-5	BB5337	0.02 U
42-6	BB5338	0.02 U
42-7	BB5339	0.02 U
42-8	BB5340	0.02 U
42-9	BB5341	0.02 U
42-10	BB5342	0.02 U
42-11	BB5343	0.02 U

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U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

Date of Analysis: 05/09/91



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ANALYTICAL SERVICES

CERTIFICATE OF ANALYSIS

IT Corporation
8600 Hidden River Parkway, Suite 100
Tampa, FL 33637
ATTN: Mark Hampton

July 5, 1991

Job Number: ITCY 48426

P.O. Number: 595411

This is the Certificate of Analysis for the following samples:

Client Project ID: NAS JAX
Date Received by Lab: 05/08/91
Number of Samples: Ten (10)
Sample Type: Water - nine (9), Trip Blank - one (1)

I. Introduction

On 05/08/91, nine (9) water samples and one (1) trip blank arrived at the ITAS-Knoxville, Tennessee, laboratory from IT-Tampa, Florida in support of the NAS JAX project. The list of analytical tests performed, as well as date of receipt and analysis, can be found in the attached report.

II. Analytical Results/Methodology

The analytical results for this report are presented by analytical test. Each set of data will include sample identification information and the analytical results. Please note that the data are not blank corrected, i.e., if any compound is found in the corresponding laboratory blank, it is subtracted from the analytical result before it is reported.

The total organic halide (TOX) analysis was performed at the IT-Mixed Waste Laboratory (MWL) in Oak Ridge, Tennessee. A copy of the laboratory report for this analysis is included.

The samples were analyzed for the requested radiological parameters at the IT-Radiological Services Laboratory (RSL) in Oak Ridge, Tennessee. A copy of the laboratory report for these analyses is included.

Reviewed and Approved:

Alyce R. Moore
Alyce R. Moore
Laboratory Manager

American Council of Independent Laboratories
International Association of Environmental Testing Laboratories
American Association for Laboratory Accreditation

IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48426

II. Analytical Results/Methodology (continued)

The samples were analyzed for the requested volatile organic compounds by gas chromatography/mass spectroscopy (GC/MS) based on EPA SW-846 method 8240.

The samples were analyzed for the requested semivolatile organic compounds by GC/MS based on EPA SW-846 method 8270.

The samples were analyzed for the requested pesticides and herbicides by gas chromatography/electron capture detection (GC/ECD) based on EPA method 608 and Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985, method 509B.

The samples were analyzed for the requested metals by cold vapor atomic absorption spectroscopy (CVAA), graphite furnace atomic absorption spectroscopy (GFAA) and inductively coupled plasma spectroscopy (ICP) based on EPA SW-846 methods 7060, 7421, 7740, 7470 and 6010.

The samples were analyzed for total organic carbon (TOC) ^F chemical wet oxidation/infrared detection using EPA method 415.1.

The samples were analyzed for turbidity according to EPA method 180.1.

The samples were analyzed for nitrate and sulfate by colorimetric determination based on EPA methods 353.3 and 375.4, respectively.

The samples were analyzed for chloride by titrimetric determination according to EPA method 325.3.

The samples were analyzed ^D for fluoride by ion selective electrode using EPA method 340.2.

The total coliform bacterial density was determined using the membrane filter technique described in method 909A, Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

The samples were analyzed for cyanide by manual distillation/colorimetric determination using EPA method 335.2.

The samples were analyzed for hexavalent chromium according to method 312B, Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985.

IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48426

III. Quality Control

Routine laboratory level I QC was followed.

The volatiles analyses were performed on 05/16 and 05/20/91 by purge and trap with a J&W DB-624 megabore column on a Finnigan OWA GC/MS/DS. The volatiles runs went well. Because of its tendency to soil the system and create false positives, isobutanol was searched for without standard, but by examining for peaks in its known retention time window. Ethoxyethanol was also evaluated without standard, by spectral matching of any peaks of apparent 1 µg/liter level or greater: this compound has shown very poor response with the method, and we could only provide information on whether or not it was found, but no definite quantitation limit could be given. Other compounds were based on at least daily standards (dibromoethane; 2-nitropropane; trichlorotrifluoroethane; 1,2,3-trichloropropane), or by both initial and continuing calibration standards. Some surrogate deviations were seen in the samples: 41-3 was run twice and some low recoveries were seen both times; 41-5 had one low surrogate recovery which was corrected by dilution. The surrogate variations appeared marginal and not significant to the results, and all run data were reported. There were no other problems seen in final review of the data.

The semivolatiles analyses were performed on 06/05 and 06/06/91 by direct injection of sample extract on a Restek XTI-5 capillary column on a VG TRIO-2 GC/MS/DS. The semivolatiles runs also went well. Cresylic acid was evaluated as any mono- to tetra-methyl phenols; of these, standards were run of all mono- and one diisomer, and the rest were searched for based on spectral evaluation of sample peaks. There were no other problems seen in final review of the data.

The samples were extracted for pesticides on 05/14/91 and were analyzed on 05/20/91. No problems were encountered.

The samples were extracted for herbicides on 05/14/91 and were analyzed on 06/11, 06/12 and 06/22/91. The solvent methyltertbutylether (MTBE) was used in the extraction procedure in place of ethyl ether prior to derivitization for the purpose of improving recoveries. Matrix interferences were encountered, resulting in elevated detection limits for some samples. No other problems were encountered.

The samples were digested on 05/09/91 for ICP and GFAA. The samples for mercury analysis were prepared just prior to analysis. The CVAA analysis for mercury was performed on 05/14/91; the GFAA analyses for arsenic, lead and selenium were performed from 05/09 to 05/13/91; the remaining metals were analyzed by ICP on 05/13/91. All run QC was acceptable. Matrix interferences were encountered in the selenium analysis by GFAA, resulting in elevated detection limits in some cases. No other problems were encountered.

The samples were analyzed for TOC on 05/29/91. No problems were encountered.

The turbidity of the samples was measured on 05/09/91. No problems were encountered.

IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48426

III. Quality Control (continued)

The samples were analyzed for nitrate and sulfate on 05/30 and 05/23/91, respectively. No problems were encountered.

The samples were analyzed for chloride on 05/14/91. No problems were encountered.

The samples were analyzed for fluoride on 05/10/91. No problems were encountered.

The total coliform determination was performed on 05/08/91. No problems were encountered.

The samples were analyzed for cyanide on 05/08/91. No problems were encountered.

The samples were analyzed for hexavalent chromium on 05/08/91. No problems were encountered.

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IT Corporation
July 5, 1991

IT ANALYTICAL SERVICES
5815 MIDDLEBROOK PIKE
KNOXVILLE, TN

Client Project ID: NAS JAX

Job Number: ITCY 48426

HEXAVALENT CHROMIUM ANALYSIS

Results in mg/liter (ppm)

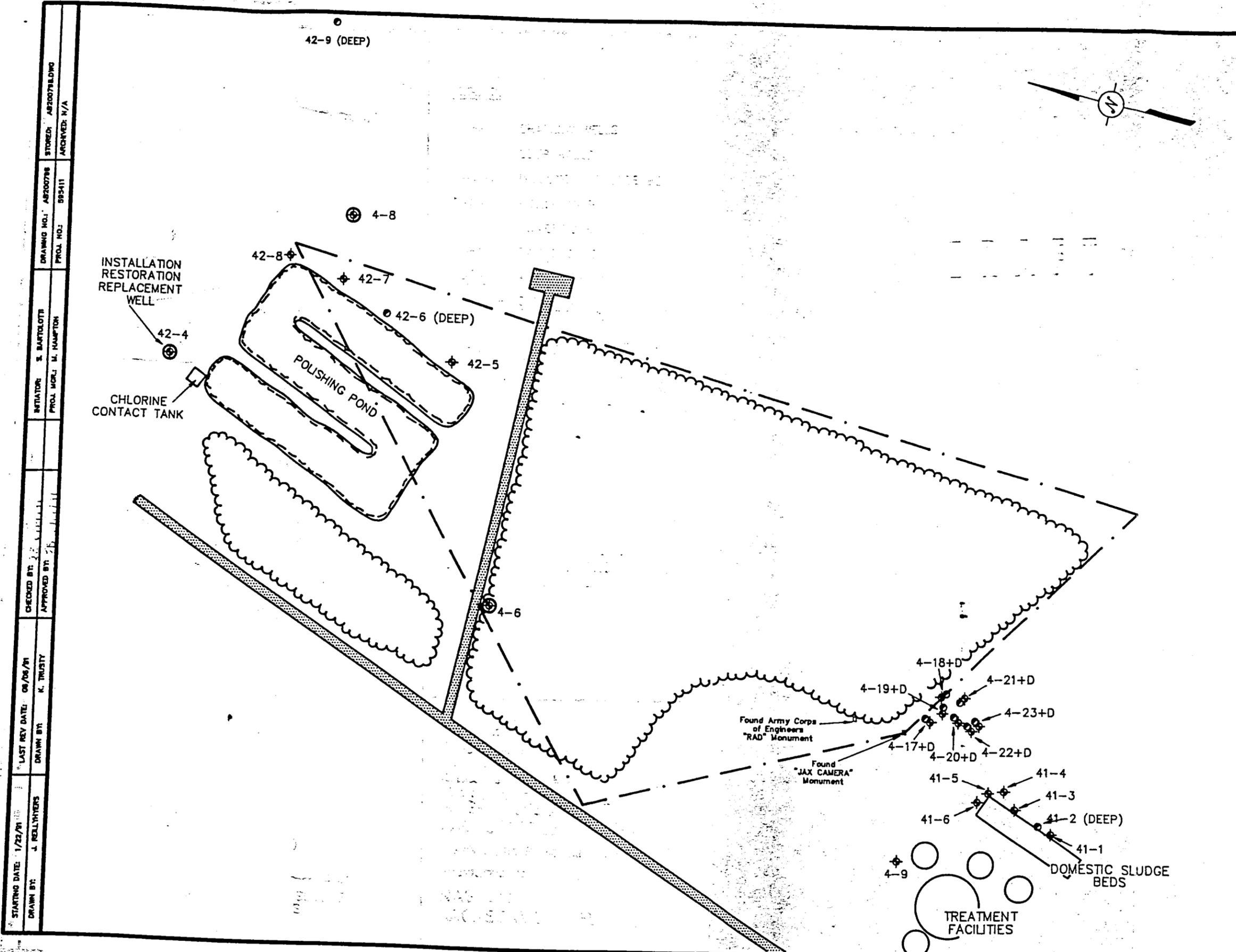
Sample Matrix: Water

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Result</u>
Method Blank	P2394	0.02 U
41-1	BB5163	0.02 U
41-2	BB5164	0.02 U
41-3	BB5165	0.02 U
41-4	BB5166	0.50 U*
41-5	BB5167	0.02 U
41-6	BB5168	0.50 U*
41-7	BB5169	0.02 U
41-8	BB5170	0.02 U
41-9	BB5171	0.02 U

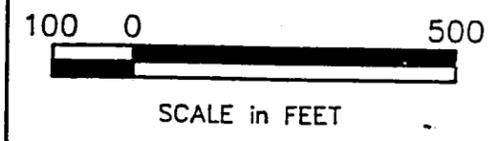
U - Compound was analyzed for but not detected. The number is the detection limit for the sample.

* - Detection limit higher than normal due to sample matrix interferences.

Date of Analysis: 05/08/91



- LEGEND:**
- ◆ SHALLOW WELLS
 - DEEP WELLS
 - 4-21+D INDUSTRIAL SLUDGE BEDS
 - 42-9 POLISHING POND
 - 41-4 DOMESTIC SLUDGE BEDS
 - 4-9 BACKGROUND WELL
 - ▨ ASPHALT PAVING
 - └ SURVEYING POINTS OF REFERENCE
 - ~ APPROXIMATE EDGE OF WOODED AREA
 - ⊕ INSTALLATION RESTORATION WELLS 4-6, 4-8, 42-4



DRAWING NO.: AF200798
 PROJ. NO.: 99-411
 STORED: AF200798
 ARCHIVED: N/A
 INITIATOR: S. BARTOLOTTI
 PROJ. MGR.: M. HAMPTON
 CHECKED BY: [Signature]
 APPROVED BY: [Signature]
 LAST REV DATE: 08/06/91
 DRAWN BY: K. TRUSTY
 STARTING DATE: 1/22/91
 DRAWN BY: J. REILLY

FIGURE 2-1
MONITORING WELL
LOCATION MAP
 NAS-JACKSONVILLE
 JACKSONVILLE, FLORIDA
 MAY-1991 SAMPLING DATE
 Prepared for:
 NAS JAX
 JACKSONVILLE, FLORIDA



PSC 41+43

**GROUNDWATER MONITORING
INDUSTRIAL SLUDGE DRYING BEDS
AUGUST 1991
NAVAL AIR STATION, JACKSONVILLE**

JACKSONVILLE, FLORIDA

PREPARED FOR

**NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
NORTH CHARLESTON, SOUTH CAROLINA**

PREPARED BY

**IT CORPORATION
8600 HIDDEN RIVER PARKWAY
SUITE 100
TAMPA, FLORIDA 33637**

**PROJECT NO. 595545
NOVEMBER 1991**

1 2
SUMMARY
GROUND WATER SAMPLING ANALYTICAL RESULTS
COMPLIANCE PARAMETERS
INDUSTRIAL SLUDGE DRYING BEDS
NAVAL AIR STATION
JACKSONVILLE, FLORIDA
PROJECT NO. 595545
Page 1 of 12

PARAMETERS	PERMIT ¹ STANDARDS	ANALYTICAL METHOD DETECTION LIMITS	BACKGROUND WELL	MONITORING WELLS								
			4-9	4-4	4-5	4-10	4-11	4-12D	4-13	4-13D	4-14	4-15
Indicator Parameters (40CFR264.98(a))												
pH (Field)	5.82	NA	6.00	4.66	6.40	5.20	4.90	5.60	6.40	5.70	6.80	6.00
Specific Conductance (Field) (umho/cm)	291	NA	294	386	372	419	383	219	167	167	465	163
Total Organic Carbon (mg/l)	15	1	21	4.7	11	11	24	12	4.9	11	8.4	11
Total Organic Halogen (mg/l)	0.064	0.01	0.075	0.11	0.11	0.045	0.063	0.029	0.043	0.037	0.015	0.036
Appendix VII Parameters (40CFR261)												
Cadmium (mg/l)	0.01	0.0050	<0.0050	<0.0050	0.40	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chromium, Hexavalent (mg/l)	0.02	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cyanide, Total (mg/l)	0.01	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel (mg/l)	0.04	0.040	<0.040	<0.040	0.32	0.19	0.74	<0.040	<0.040	<0.040	<0.040	<0.040
Drinking Water Supply Parameters (40CFR264.94(a)(2))												
Arsenic (mg/l)	0.05	0.010	<0.010	<0.010	<0.010	<0.010	0.010	0.017	<0.010	0.013	0.010	0.010
Barium (mg/l)	1.0	0.01	0.024	0.036	0.031	0.032	0.050	<0.082	0.037	0.056	0.073	0.11
Chromium (mg/l)	0.05	0.010	<0.010	<0.010	0.047	0.014	0.047	<0.010	<0.010	<0.010	<0.010	0.028
Lead (mg/l)	0.05	0.0050	0.0064	0.013	0.062	<0.0050	0.0089	<0.0050	0.0058	0.0050	0.0055	0.020
Mercury (mg/l)	0.002	0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Selenium (mg/l)	0.01	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Silver (mg/l)	0.05	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
FAC Chapter 17-4.295(b) and 17-4.246 Parameters												
Benzene (ug/L)	1	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride (ug/L)	1	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (ug/L)	3	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

¹ Permit Standards used are the mean of the last four sampling events of Well 4-9, or Primary Drinking Water Standards, or Secondary Drinking Water Standards, or the analytical Detection Limit.
^{*} Elevated Detection Limits due to matrix interference.
 NA - Not Applicable
 NZ - Not Analyzed

TABLE 2
SUMMARY
GROUND WATER SAMPLING ANALYTICAL RESULTS
COMPLIANCE PARAMETERS
INDUSTRIAL SLUDGE DRYING BEDS
NAVAL AIR STATION
JACKSONVILLE, FLORIDA
PROJECT NO. 595545
Page 4 of 12

PARAMETERS	PERMIT ¹ STANDARDS	ANALYTICAL METHOD DETECTION LIMITS	MONITORING WELLS									
			4-16	4-17	4-17D	4-18	4-18D	4-19	4-19D	4-20	4-20D	4-21
Indicator Parameters (40CFR264.98(a))												
pH (Field)	5.82	NA	9.30	6.10	6.30	6.70	6.80	6.00	6.60	4.93	5.80	5.00
Specific Conductance (Field) (umho/cm)	291	NA	1966	111	113	98	163	70	131	124	130	70
Total Organic Carbon (mg/l)	15	1	26	12	6.2	11	3.6	4.1	4.2	6.9	4.1	7.1
Total Organic Halogen (mg/l)	0.064	0.01	0.071	0.035	<0.010	0.035	<0.010	<0.010	<0.010	0.020	<0.010	<0.010
Appendix VII Parameters (40CFR261)												
Cadmium (mg/l)	0.01	0.005	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chromium, Hexavalent (mg/l)	0.02	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cyanide, Total (mg/l)	0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Nickel (mg/l)	0.04	0.04	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
Drinking Water Supply Parameters (40CFR264.94(a)(2))												
Arsenic (mg/l)	0.05	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Barium (mg/l)	1.0	0.01	0.078	0.068	0.057	0.050	0.057	0.079	0.10	0.097	0.057	0.062
Chromium (mg/l)	0.05	0.01	0.050	<0.010	0.012	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.010
Lead (mg/l)	0.05	0.001	0.027	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0096	0.0080	<0.0050	<0.0050
Mercury (mg/l)	0.002	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Selenium (mg/l)	0.01	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Silver (mg/l)	0.05	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
FAC Chapter 17-4.295(b) and 17-4.246 Parameters												
Benzene (ug/L)	1	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride (ug/L)	1	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethene (ug/L)	3	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50

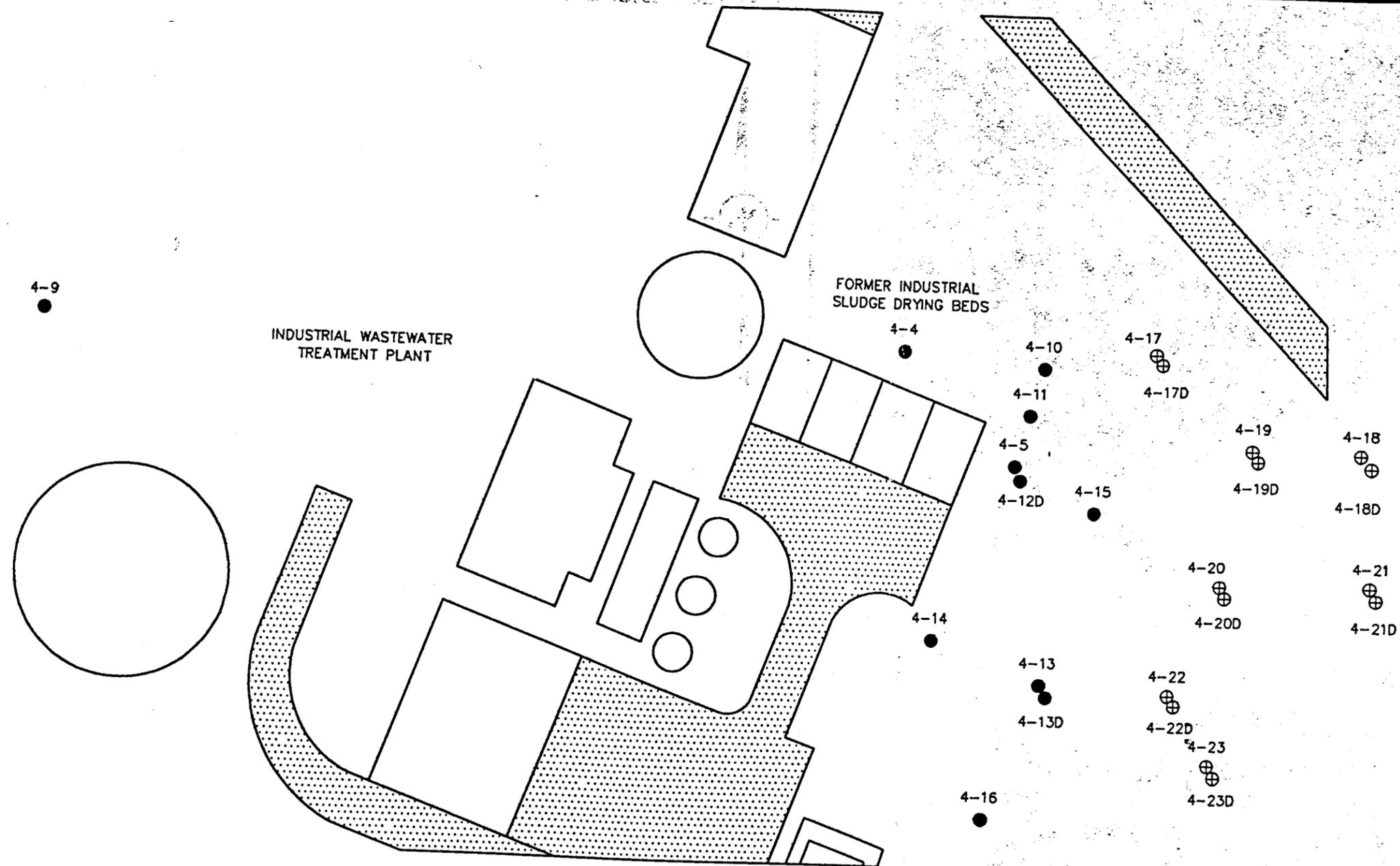
¹ Permit Standards used are the mean of the last four sampling events of Well 4-9, or Primary Drinking Water Standards, or Secondary Drinking Water Standards, or the analytical Detection Limit.

* Elevated Detection Limits due to matrix interference.

NA - Not Applicable

NZ - Not Analyzed

ST: 10	DATE: 3/1/91	BY: JRELLIHYERS	LAST REV DATE: 10/31/91	BY: L. NIST	CHECKED BY: S. B. BOYD	INITIATOR: JCOSTELLO	DRAWING NO.: AB200782	CAD FILE: AB200782.DWG
					APPROVED BY: M. H. HANCOCK	PROJ. MGR.: M. HANCOCK	PROJ. NO.: 593343	ARCHIVED:



NOTE:
The letter "D" after well number denotes DEEP well at same location.

LEGEND:

- MONITORING WELL LOCATIONS (INSTALLED BY GERAGHTY & MILLER)
4-12D
- ⊕ MONITORING WELL LOCATIONS (INSTALLED BY IT CORPORATION)
4-17D

0 25 50
SCALE IN FEET

FIGURE 2-1
MONITORING WELL LOCATION MAP
INDUSTRIAL WASTEWATER TREATMENT PLANT SLUDGE DRYING BEDS
AUGUST 1991 SAMPLING DATE
Prepared for:
NAVAL AIR STATION
JACKSONVILLE, FLORIDA
INTERNATIONAL TECHNOLOGY CORPORATION