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SEMI-ANNUAL GROUND-WATER MONITORING REPORT - JULY 1996 SAMPLING EVENT

RCRA MONITORING - INDUSTRIAL SLUDGE DRYING BEDS, DOMESTIC SLUDGE DRYING BEDS, AND POLISHING POND

NAVAL AIR STATION JACKSONVILLE, FLORIDA

OCTOBER 1996

SOUTHERN DIVISION
NAVAL FACILITY ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
29419-9010

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SEMI-ANNUAL REPORT ON GROUND-WATER MONITORING JULY 1996 SAMPLING EVENT

INDUSTRIAL SLUDGE DRYING BEDS, DOMESTIC SLUDGE DRYING BEDS, AND POLISHING POND NAVAL AIR STATION, JACKSONVILLE, FLORIDA

Prepared For

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
North Charleston, South Carolina

Contract No. N62467-93-D-0662
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1.0 INTRODUCTION

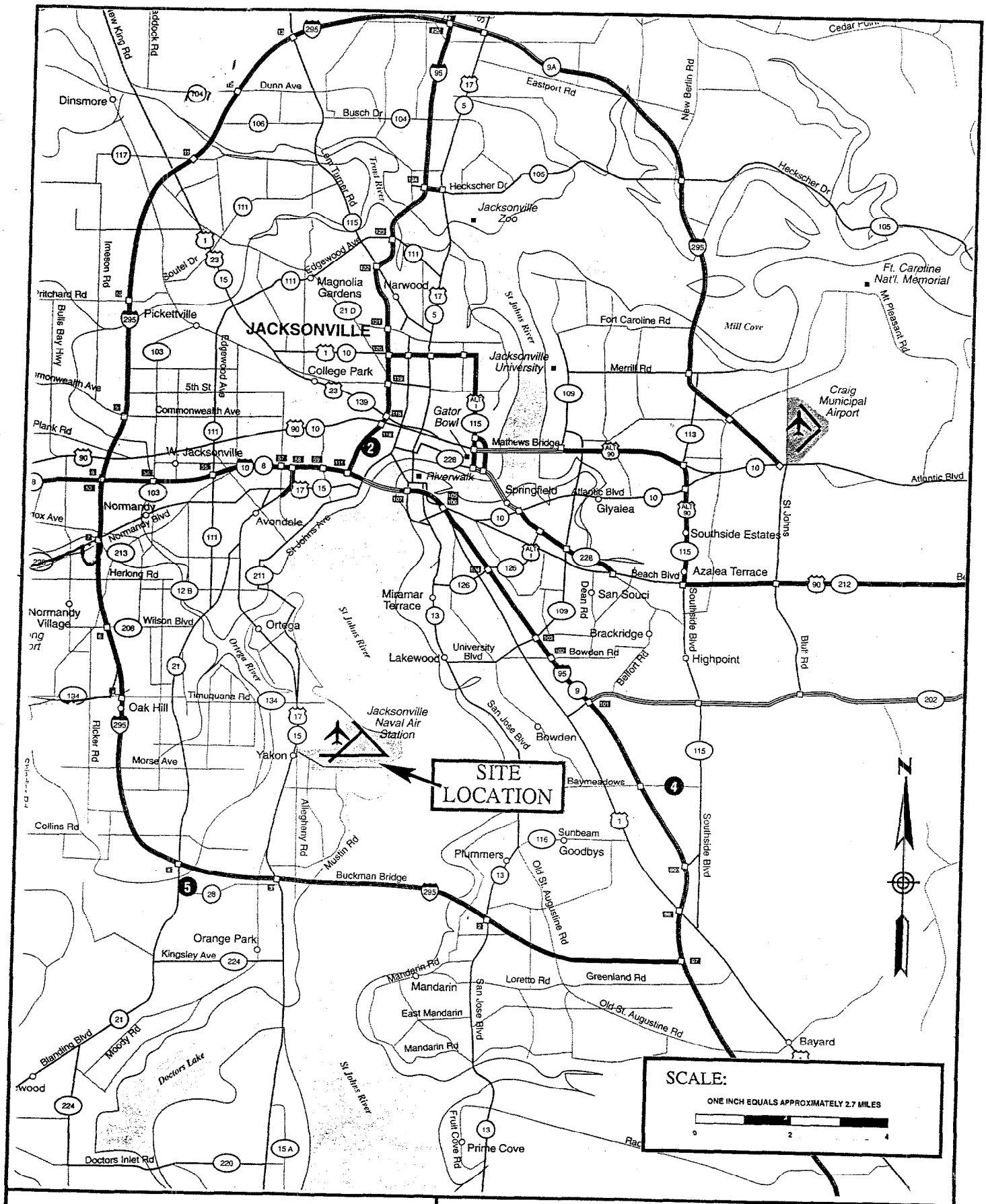
This semi-annual ground-water monitoring report provides the results of the April 22, 1996 water level measurements and the July 29 and 30, 1996 water level measurements and ground-water sampling activities performed in areas adjacent to the Industrial Sludge Drying Beds (ISDB), Domestic Sludge Drying Beds (DSDB), and Polishing Pond (PP) located at the Naval Air Station (NAS) in Jacksonville, Florida. This report has been prepared by Rust Environment and Infrastructure (Rust) for the Naval Facilities Engineering Command, Southern Division, Contract No. N62467-93-D-0662. The information provided in this report is based on information and file documents provided by the Navy and on information gathered during field work conducted April 22, 1996 and July 29 and 30, 1996 by Rust.

All work at the ISDB and DSDB was conducted in accordance with the approved documents prepared by Rust. These documents included the Sampling and Analytical Project Plan/Quality Assurance Project Plan dated January 1995, the Health and Safety Plan dated January 1995 and Rust Comprehensive Quality Assurance Plan (number 880742G). The work was also conducted in accordance with the Florida Department of Environmental Protection (FDEP) regulations.

1.1 Site Description

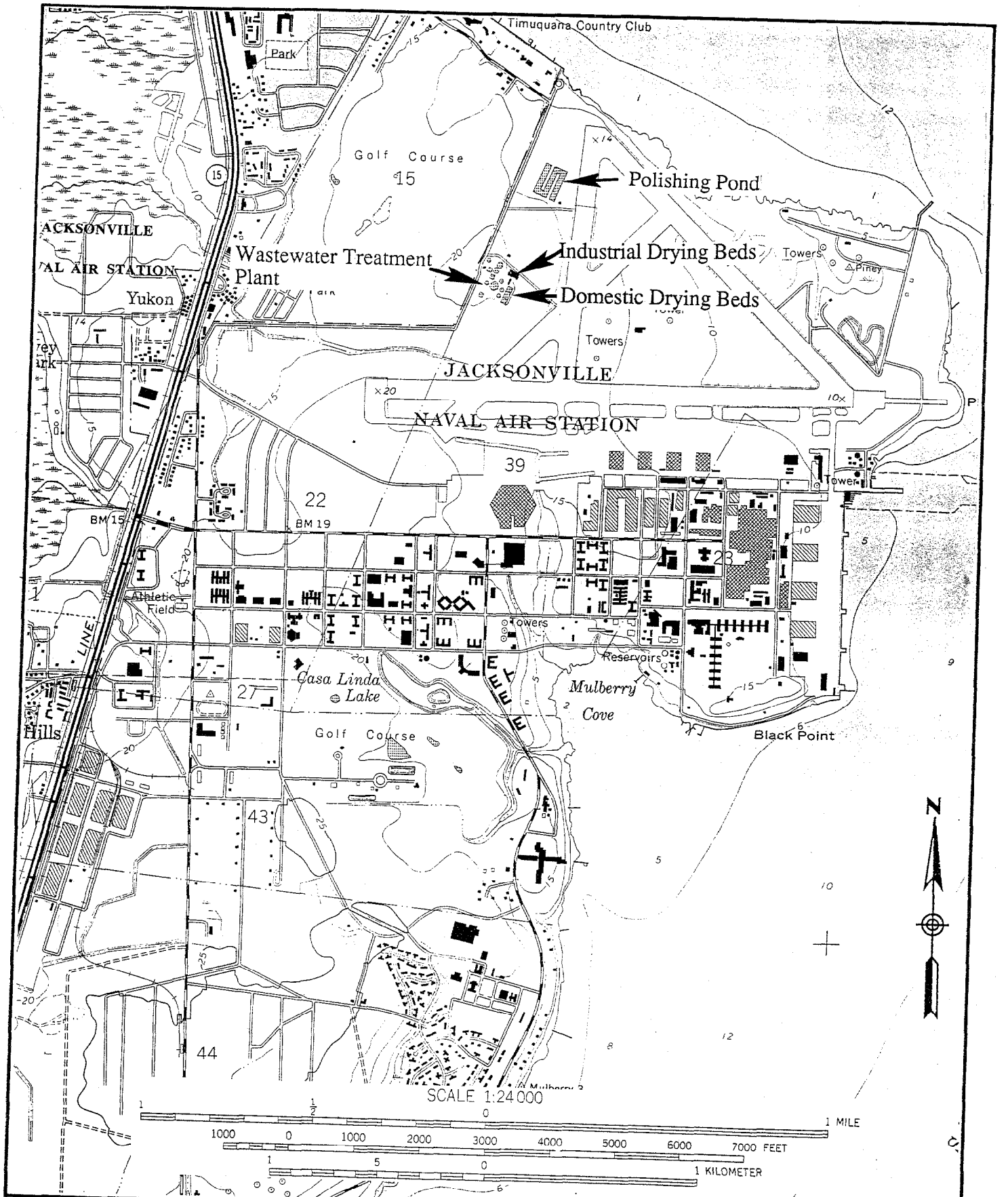
NAS Jacksonville is located on the west side of the St. Johns River in central Duval County, within the city of Jacksonville, Florida (Figure 1-1). The DSDB and ISDB are located immediately east of the existing wastewater treatment plant and the closed PP is located approximately 1500 feet north of the wastewater treatment plant (Figure 1-2). The drying beds and polishing pond were associated with the Wastewater Treatment Plant (WWTP) which received wastewater generated by activities on NAS property. The PP is currently undergoing remediation activities and the monitoring well network surrounding the PP has been abandoned. Upon completion of the remediation activities, the abandoned wells will be replaced.

Since the wells adjacent to the PP have been abandoned only 9 of the original 13 monitoring wells were included in the recent NAS Jacksonville post-closure monitoring activities (Figure 1-3). These wells are divided into two (2) categories: shallow (13-17 feet below ground surface (bgs)) and deep (35 feet bgs). Of the 9 wells, seven (7) are screened in the shallow zone and two (2) are screened in the deep zone.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 1-1
SITE LOCATION MAP
NAS-JACKONVILLE, FLORIDA
SEMI-ANNUAL GROUND-WATER
MONITORING REPORT



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 1-2 LOCATION OF DRYING BEDS AND POLISHING POND
NAS-JACKONVILLE, FLORIDA
SEMI-ANNUAL GROUND-WATER MONITORING REPORT

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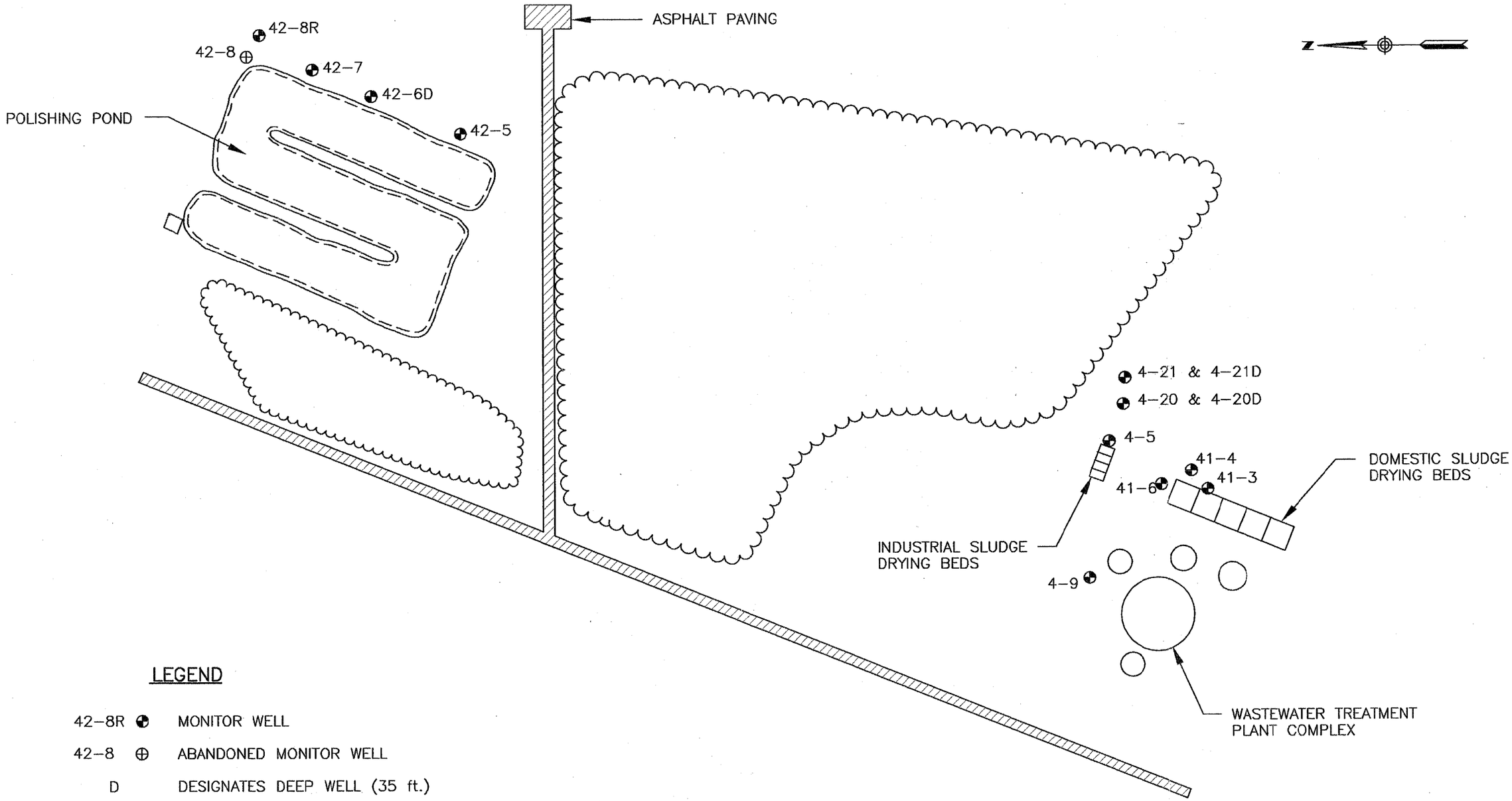

LEGEND

42-8R	⊕	MONITOR WELL
42-8	⊕	ABANDONED MONITOR WELL
D		DESIGNATES DEEP WELL (35 ft.)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 1-3
LOCATION OF MONITORING WELLS
NAS JACKSONVILLE
JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER, 1996

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1.2 Previous Investigations

Activities on NAS property which involved handling of hazardous materials included: fuel handling and management, painting and paint stripping, waste solvent disposal, fire fighting and crash training, aircraft maintenance, metal plating, low-level radioactive materials handling, and operation of general waste management facilities. Sampling activities conducted at the ISDB, DSDB and PP indicated that the ground-water in the vicinity of the site has been impacted by volatile organic compounds (VOCs), base-neutral/acid extractable organic compounds (BNAs), and metals.

Environmental Science & Engineering, Inc. (ESE) previously performed six (6) rounds of semi-annual sampling in January and July of 1992, 1993 and 1994, including redevelopment of the 13 monitor wells in January 1992 and the replacement of NAS 42-8 in April 1992. Results from these sampling efforts were presented in reports submitted in April 1992, October 1993, April 1994 and October 1994. Rust assumed the semi-annual ground-water monitoring in January 1995 under Naval Facilities Engineering Command, Southern Division Contract No. N62467-93-D-0662.

2.0 WORK PERFORMED

2.1 Hydrologic Assessment

The existing nine (9) wells monitor two (2) zones within a surficial aquifer underlying the site. Shallow wells monitor an upper, unconfined aquifer zone composed of fine, silty sand deposits encountered from the land surface to approximately 14 feet below land surface (ft-bls). Shallow monitor wells are generally 13 to 12 feet (ft) deep, screened over the bottom 5 ft of the well. A clay-rich layer, approximately 16 to 18 ft thick, separates the shallow aquifer zone from a deeper aquifer zone. The deep zone is defined by a layer of sand with an approximate thickness of 5 ft. Deep zone wells are generally 35 ft deep and are also screened over the bottom 5 ft. Since water levels rise above the top of the sand layer in the deep monitor wells, this zone is considered to be confined (SOUTHDIV, 1990, 1991).

As previously stated, the four (4) monitoring wells adjacent to the PP were abandoned in April 1996 as part of the remediation of the PP. Therefore, the hydrologic assessment at the remaining closed impoundments (DSDBs and ISDBs) included the measurement of water levels and total well depths in only nine (9) monitoring wells, the calculation of water level elevations, the determination of ground-water flow directions in each zone, and the calculation of the average ground-water flow rate in each zone. Static water levels were measured on April 22, 1996 and July 29, 1996 by Rust personnel. Appendix A contains water level data summary reports for the April and July 1996 events. The ground-water elevations were calculated using these water level measurements and previously determined elevations of the top of casing level for each well. Using the observed elevations, ground-water flow direction and horizontal hydraulic gradients in the shallow zone was determined. The vertical hydraulic gradient between the two (2) monitored zones was also determined in the vicinity of the drying beds.

In addition to the ground-water flow direction, an estimate of the ground-water flow rate in each of the monitored zones was determined. The average estimated values for hydraulic conductivity (K) reported by ESE (July 1994) were used to calculate the ground-water flow rate for each zone.

K values were determined during several previous investigations using various methods. Hydraulic conductivity values reported for the shallow aquifer from the different methodologies were generally similar, ranging from 0.23 to 9.33 ft/day (SOUTHDIV, 1990, 1991). This is the range of K values used to calculate groundwater velocities in the shallow aquifer. In the deep aquifer zone, the K values differed depending on the method of calculation and had quite a large range, from 0.36 to

142.5 ft/day (SOUTHDIV, 1990, 1991; ESE, 1992a). For the calculation of ground-water velocities in this zone, a more moderate range of K values was used, 3.54 to 81.35 ft/day (IT, 1991a). Assuming an effective porosity of 20%, an average flow-rate for each zone was determined using the average estimated K values and a derivation of Darcy's Law:

$$V = \frac{Ki}{n_e}$$

where:

V	=	Average Flow Rate (velocity) (ft/day)
K	=	Hydraulic Conductivity (ft/day)
i	=	Horizontal Hydraulic Gradient (ft/ft)
n_e	=	Effective Porosity

Ground-water level elevation data, flow direction and flow rates are provided in Section 3.1

2.2 Ground-Water Sampling and Analyses

A total of nine (9) ground-water samples, two (2) duplicate samples (D and DD) and two (2) equipment rinsate blanks (EB) were collected and/or analyzed during the July 1996 semi-annual sampling event. The sampling procedures were performed in accordance with the Sampling and Analytical Project Plan, Quality Assurance Project Plan dated January 1995; Sampling Procedures (Section 4.2), Water Level Measurements (Section 4.2), Decontamination Procedures (Section 4.3), Field Measurements (Section 5.1) and Field Quality Assurance/Quality Control (Section 6.2).

Table 2-1 lists the nine (9) monitoring wells that were sampled in July 1996 and the parameters and analytical methods for each analysis. Each shallow monitoring well was purged with a teflon bailer or a disposable teflon bailer. The deep monitoring wells were purged with a disposable submersible pump. Ground-water quality parameters including pH, specific conductivity, temperature, salinity, dissolved oxygen and turbidity were measured during well purging activities. Well purging details are summarized in Field Data Information Logs included in Appendix B. Sample analyses were performed by Savannah Laboratories, Inc. located in Savannah, Georgia. Savannah Laboratories, Inc. has an approved Comprehensive Quality Assurance Plan (No. 890142G) with the FDEP.

Distribution of concentration maps were prepared for the shallow aquifer zone depicting several compounds which had previously been contoured or which represented a typical distribution of the compounds. Because only two data points are available in the deeper aquifer zone, no contour maps for this zone were prepared.

TABLE 2-1

GROUND-WATER SAMPLING SPECIFICATIONS

NAS JACKSONVILLE

SAMPLE PARAMETER	ANALYTICAL METHOD	MONITORING WELL ID												
		NAS 4-9*	NAS 4-5	NAS 4-20	NAS 4-20D	NAS 4-21	NAS 4-21D	NAS 41-3	NAS 41-4	NAS 4-6	NAS 42-5***	NAS 42-6D***	NAS 42-7***	NAS 42-8R***
VOCs	8240	X	X	X	X	X	X	X	X	X	X	X	X	X
SVOCs	8270	X	X	X	X	X	X	X	X	X	X	X	X	X
METALS	6010/7000**	X	X	X	X	X	X	X	X	X	X	X	X	X
COPPER	220.1	X	X	X	X	X	X	X	X	X	X	X	X	X
IRON	236.1	X	X	X	X	X	X	X	X	X	X	X	X	X
MANGANESE	243.1	X	X	X	X	X	X	X	X	X	X	X	X	X
ZINC	289.1	X	X	X	X	X	X	X	X	X	X	X	X	X
NICKEL	249.1	X	X	X	X	X	X	X	X	X	X	X	X	X
SODIUM	273.1	X	X	X	X	X	X	X	X	X	X	X	X	X
VANADIUM	279.2	X	X	X	X	X	X	X	X	X	X	X	X	X
FLUORIDE	340.2	X	X	X	X	X	X	X	X	X	X	X	X	X
SULFATE	9036	X	X	X	X	X	X	X	X	X	X	X	X	X
NITRATE (AS N)	352.1	X	X	X	X	X	X	X	X	X	X	X	X	X
COMPLEXED CYANIDES	9012	X	X	X	X	X	X	X	X	X	X	X	X	X
GROSS ALPHA	900.0	X	X	X	X	X	X	X	X	X	X	X	X	X
GROSS BETA	900.0	X	X	X	X	X	X	X	X	X	X	X	X	X
RADIUM-226	903.1	X	X	X	X	X	X	X	X	X	X	X	X	X
RADIUM-228	904.0	X	X	X	X	X	X	X	X	X	X	X	X	X
TURBIDITY	180.1	X	X	X	X	X	X	X	X	X	X	X	X	X
pH	150.1	X	X	X	X	X	X	X	X	X	X	X	X	X
SPECIFIC CONDUCTANCE	120.1	X	X	X	X	X	X	X	X	X	X	X	X	X
TOTAL COLIFORM	909A	X	X	X	X	X	X	X	X	X	X	X	X	X

* NAS 4-9 and two (2) duplicate samples 4-9D and 4-9DD

** 8 RCRA Metals - Analytical Methods are 6000/7000 series

*** The monitoring wells adjacent to the Polishing Pond were abandoned in April 1996 during a seperate remediation project under a CERCLA project.

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3.0 DISCUSSION AND RESULTS

3.1 Hydrologic Assessment

As previously stated, water level measurements were collected from nine (9) monitoring wells on April 22, 1996 and July 29, 1996. Site specific hydrologic information including ground-water flow direction and horizontal and vertical hydraulic gradients were determined using ground-water elevations.

3.1.1 Ground-Water Flow Direction and Horizontal Hydraulic Gradient

April 22, 1996

During the April 1996 water level measuring event, construction activities at the WWTP had been completed allowing access to wells NAS 41-3, NAS 41-4, and NAS 41-6. Therefore, water level measurements were obtained from these wells. However, remediation of the PP has required the closure of monitoring wells NAS 42-5, NAS 42-6D, NAS 42-7 and NAS 42-8R. The water level measurements and calculated water level elevations for wells screened in the shallow zone are provided in Table 3-1. Figure 3-1 shows the April 22, 1996 water level elevations and the approximate groundwater flow direction for the shallow zone. Based on ground-water elevations obtained during the April 1996 measuring event, ground-water in the shallow zone beneath the ISDB and DSDB appears to flow to the southeast. Ground-water flow direction in the shallow zone beneath the PP could not be calculated.

Ground-water elevations were used to determine the ground-water flow direction and the horizontal hydraulic gradient between the ISDBs and DSDBs. Based on the April 22, 1996 ground-water elevations, the horizontal hydraulic gradient is 4.0×10^{-3} ft/ft (Appendix C).

Figure 3-2 shows the April 1996 water level elevations for the two (2) deep zone monitoring wells NAS 4-20D and NAS 4-21D. The water level measurements and the calculated water level elevations for the wells screened in the deep zone are provided in Table 3-1.

A horizontal hydraulic gradient for the deep zone could not be determined using the ground-water elevations from only two (2) monitoring wells.

July 29, 1996

Figure 3-3 shows the July 29, 1996 water level elevations and the approximate groundwater flow direction for the shallow zone. The water level measurements and calculated water level elevations

TABLE 3-1
WATER LEVEL ELEVATIONS
April 22, 1996
ISDB and DSDB
NAS JACKSONVILLE
Jacksonville, Florida

WELL NUMBER	MEASURED DEPTH OF WELL (ft from toc)	TOP OF CASING ELEVATION (ft-msl)*	DEPTH TO WATER (ft-msl)	WATER LEVEL ELEVATION (ft-msl)
NAS 4-9	14.2	23.52	6.94	16.58
NAS 4-5	13.61	20.62	5.00	15.62
NAS 4-20	14.11	20.81	5.43	15.38
NAS 4-20D	35.24	20.67	5.32	15.35
NAS 4-21	15.35	20.45	5.25	15.20
NAS 4-21D	35.06	19.95	4.78	15.17
NAS 41-3	14.72	20.09	4.82	15.27
NAS 41-4	16.51	20.64	5.39	15.25
NAS 41-6	13.02	20.25	4.77	15.48
NAS 42-5**	NA	NA	NA	NA
NAS 42-6D**	NA	NA	NA	NA
NAS 42-7**	NA	NA	NA	NA
NAS 42-8R**	NA	NA	NA	NA

* Source: ESE, 1994

** Monitoring wells NAS 42-5, NAS 42-6D, NAS 42-7 and NAS 42-8R have been abandoned due to remediation activities at the Polishing Pond.

NA - Not applicable

toc - top of casing

msl - mean sea level

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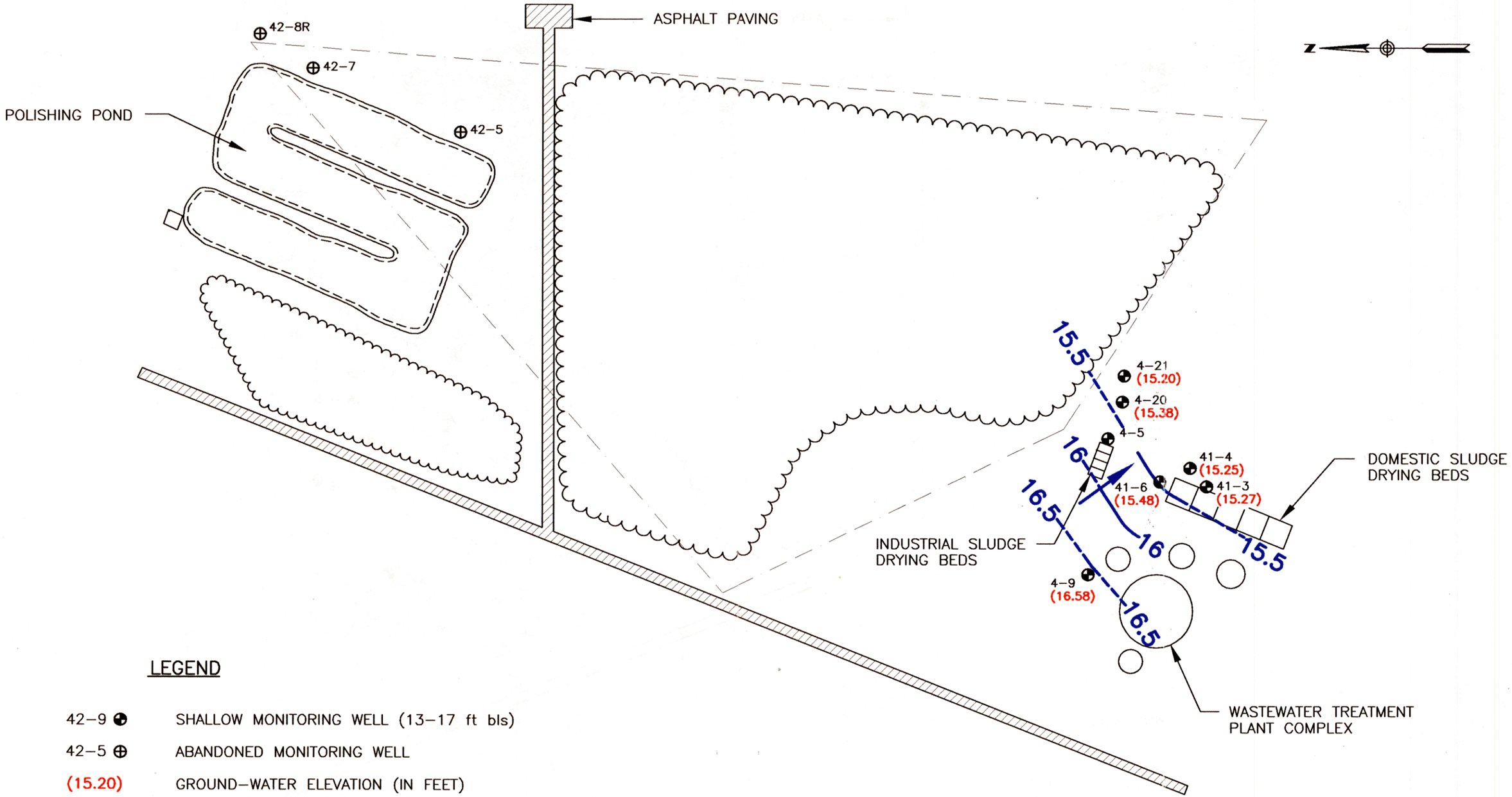

LEGEND

42-9 ◉	SHALLOW MONITORING WELL (13-17 ft bls)
42-5 ⊕	ABANDONED MONITORING WELL
(15.20)	GROUND-WATER ELEVATION (IN FEET)
—16—	GROUND-WATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
→	DIRECTION OF GROUND-WATER FLOW

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-1
GROUND-WATER ELEVATION CONTOUR MAP
SHALLOW ZONE (APRIL 22, 1996)
DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

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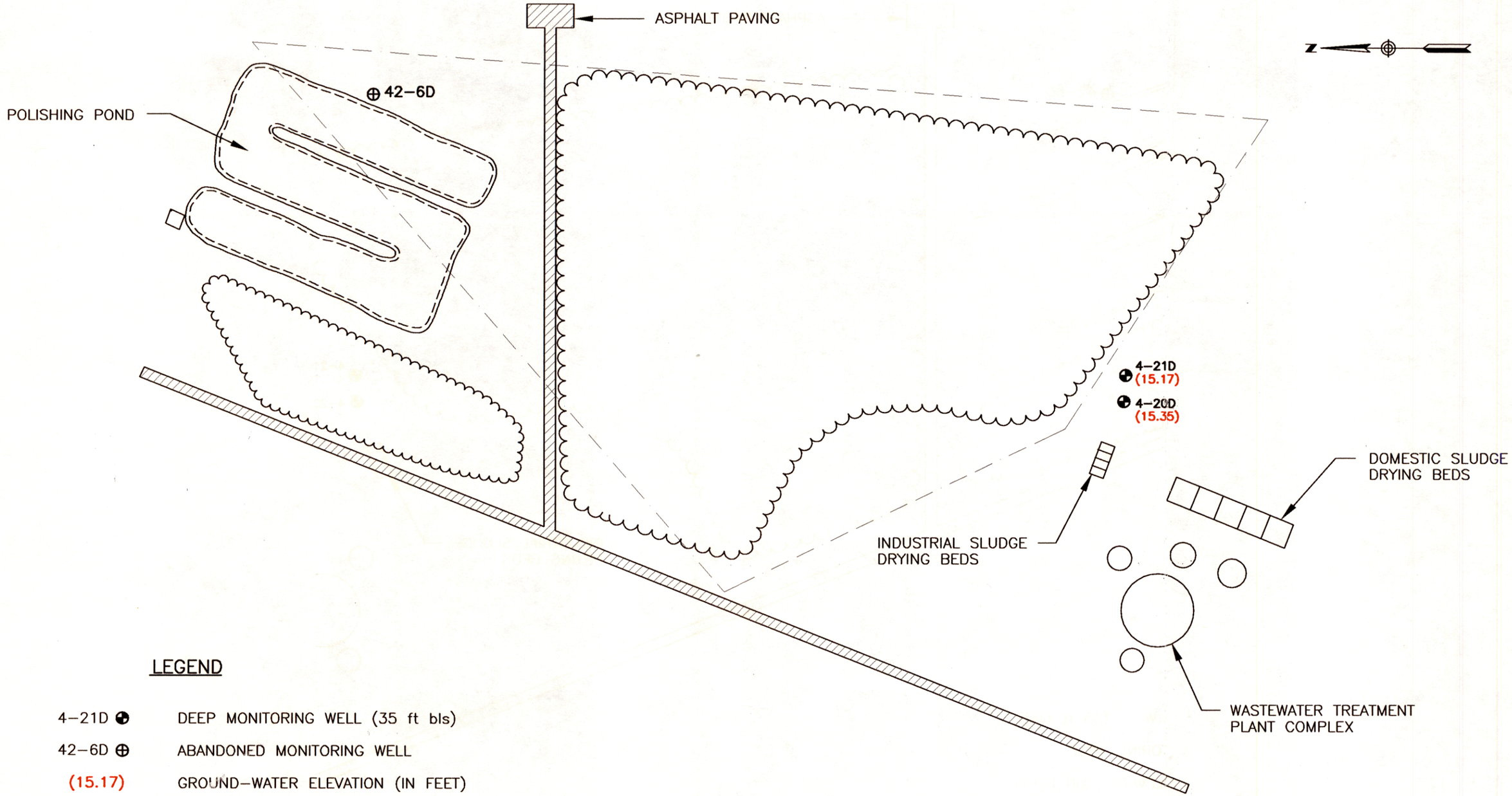

LEGEND

4-21D ◓	DEEP MONITORING WELL (35 ft bls)
42-6D ⊕	ABANDONED MONITORING WELL
(15.17)	GROUND-WATER ELEVATION (IN FEET)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-2
GROUND-WATER ELEVATIONS IN DEEP ZONE
(APRIL 22, 1996)
DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

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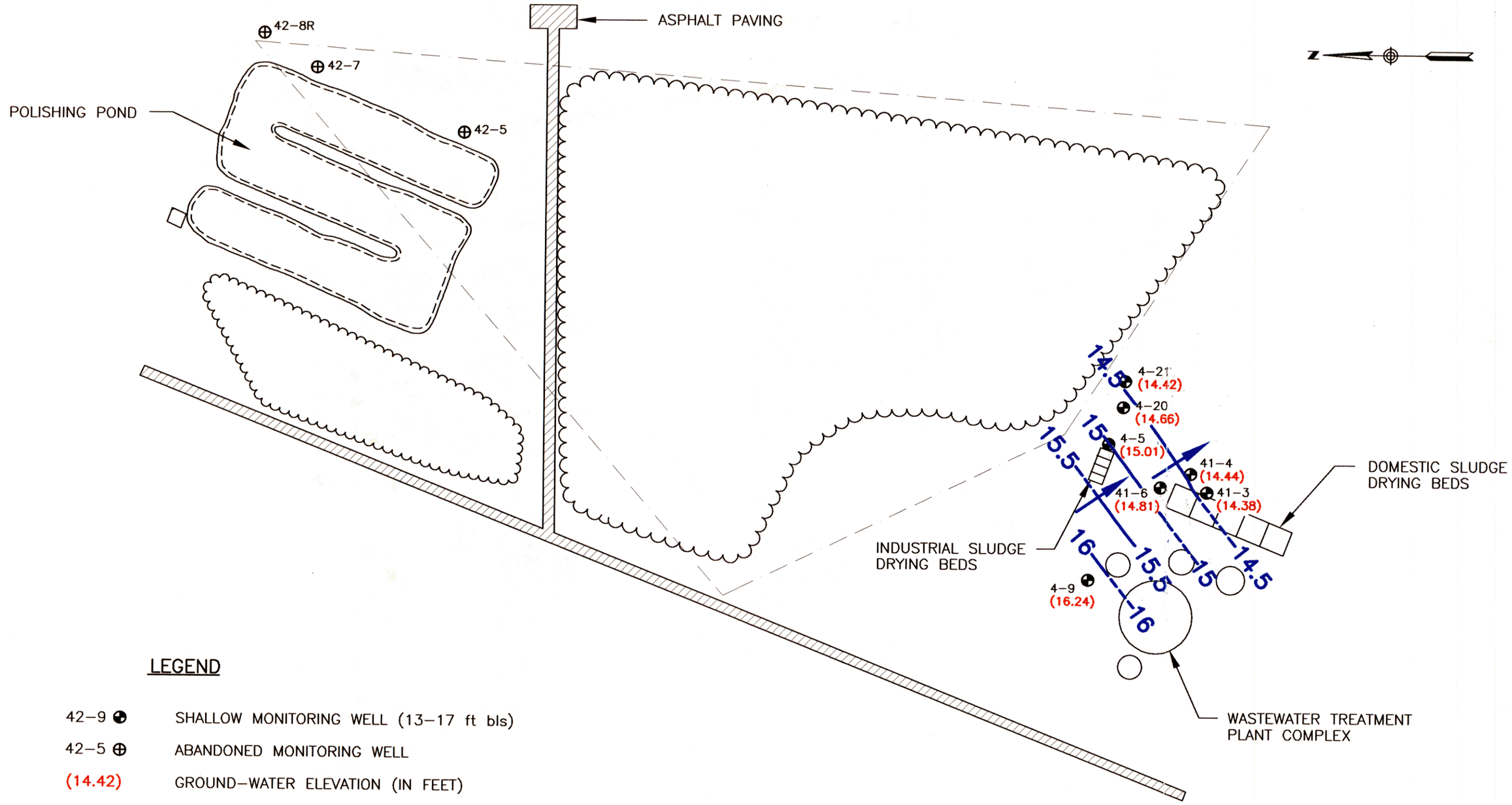

LEGEND

42-9 ⊕	SHALLOW MONITORING WELL (13-17 ft bls)
42-5 ⊕	ABANDONED MONITORING WELL
(14.42)	GROUND-WATER ELEVATION (IN FEET)
—16—	GROUND-WATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
→	DIRECTION OF GROUND-WATER FLOW

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-3
GROUND-WATER ELEVATION CONTOUR MAP
SHALLOW ZONE (JULY 29, 1996)
DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

for wells screened in the shallow zone are provided in Table 3-2. Based on the July 29, 1996 water level measurements, ground-water in the shallow zone beneath the ISDB and DSDB appears to flow to the southeast. The direction of ground-water flow in the shallow zone beneath the PP could not be calculated due to the closure of monitoring wells adjacent to the PP.

Figure 3-4 shows the July 1996 water level elevations for the two (2) deep zone monitoring wells NAS 4-20D and NAS 4-21D. The water level measurements and the calculated water level elevations for the wells screened in the deep zone are provided in Table 3-2.

A horizontal hydraulic gradient for the deep zone could not be determined using the ground-water elevations from only two (2) monitoring wells.

Water Level Data Summary Reports and Ground-Water Level Monitoring Reports for April 22, 1996 and July 29, 1996 are included in Appendix A. Horizontal hydraulic gradient calculations for April 22, 1996 and July 29, 1996 are included in Appendix C.

3.1.2 Vertical Hydraulic Gradients

April 22, 1996

Vertical hydraulic gradients were calculated by dividing the difference in water level elevations in the shallow and deep wells by the distance between the bottom of the shallow well screen and the top of the deep well screen. Since well clusters NAS4-20 and NAS4-21D and NAS4-21 and NAS4-21D are in the ISDB and DSDB area, the calculated vertical hydraulic gradients for these clusters were used to calculate an average vertical gradient for the area.

Vertical flow gradients were generally downward between the shallow and deep aquifer zones. The magnitude of the vertical gradient near the ISDBs and DSDBs was determined by comparison of water levels in NAS 4-20 and NAS 4-20D and in NAS 4-21 and NAS 4-21D.

Analysis of the April 1996 measurements indicated a vertical gradient between NAS 4-20 and NAS 4-20D of 1.85×10^{-3} ft/ft, and a vertical gradient between NAS 4-21 and NAS 4-21D of 2.0×10^{-3} ft/ft. The average vertical gradient near the drying beds was determined to be 1.9×10^{-3} ft/ft. These vertical gradients are consistent with the average gradients previously reported at the site. The calculations for these gradients are also included in Appendix C. In the PP area, the vertical gradient could not be determined because monitoring wells NAS 42-7 and NAS 42-6D were closed.

TABLE 3-2
WATER LEVEL ELEVATIONS
July 29, 1996
ISDB and DSDB
NAS JACKSONVILLE
Jacksonville, Florida

WELL NUMBER	MEASURED DEPTH OF WELL (ft from toc)	TOP OF CASING ELEVATION (ft-msl)*	DEPTH TO WATER (ft-msl)	WATER LEVEL ELEVATION (ft-msl)
NAS 4-9	14.20	23.52	7.28	16.24
NAS 4-5	13.61	20.62	5.61	15.01
NAS 4-20	14.11	20.81	6.15	14.66
NAS 4-20D	35.24	20.67	6.04	14.63
NAS 4-21	15.35	20.45	6.03	14.42
NAS 4-21D	35.06	19.95	5.55	14.40
NAS 41-3	14.72	20.09	5.71	14.38
NAS 41-4	16.51	20.64	6.2	14.44
NAS 41-6	13.02	20.25	5.44	14.81
NAS 42-5**	NA	NA	NA	NA
NAS 42-6D**	NA	NA	NA	NA
NAS 42-7**	NA	NA	NA	NA
NAS 42-8R**	NA	NA	NA	NA

* Source: ESE, 1994

** Monitoring wells temporarily closed due to remediation of polishing pond.

NA - Not applicable

toc - top of casing

msl - mean sea level

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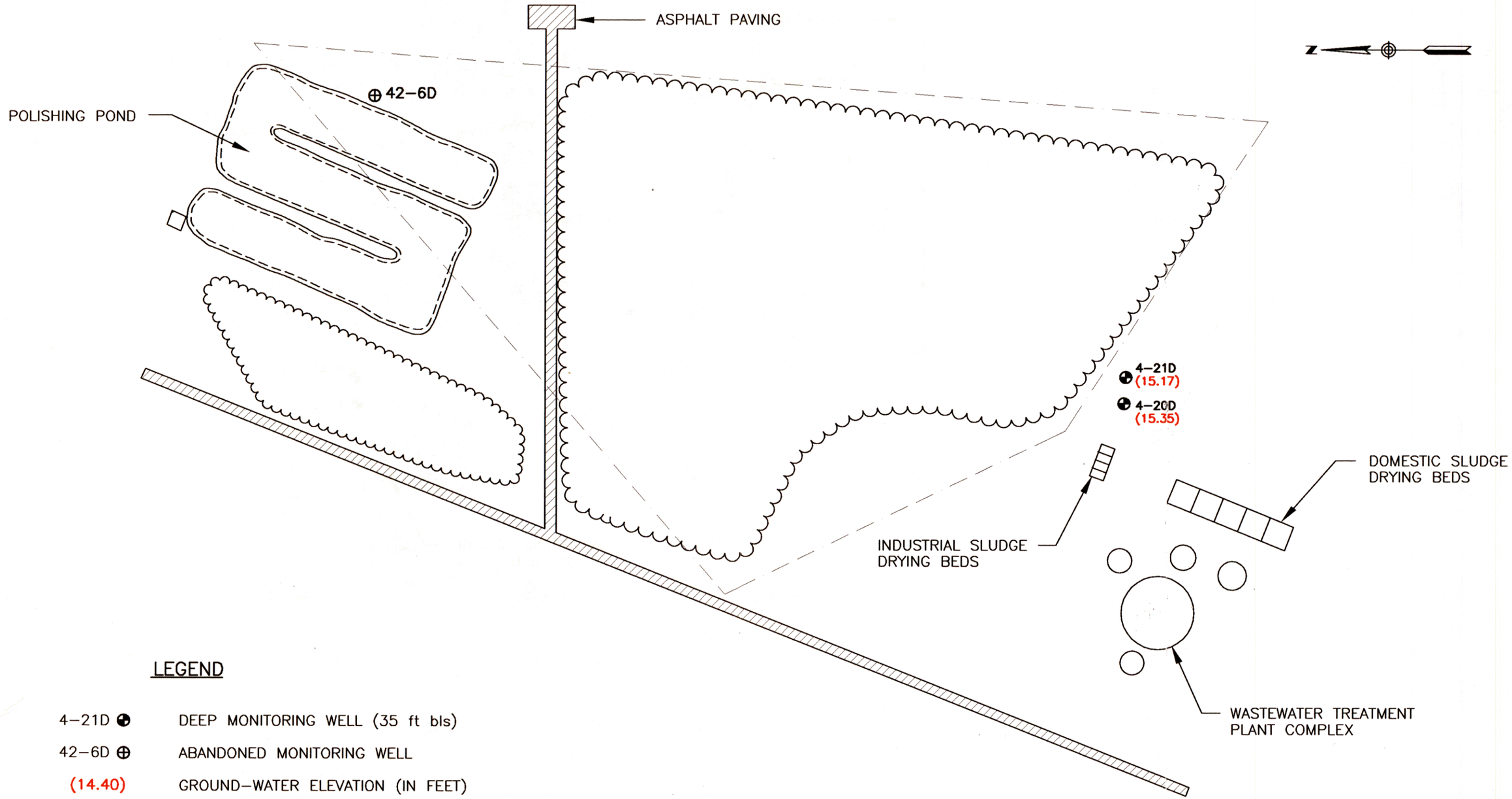

LEGEND

4-21D ◐	DEEP MONITORING WELL (35 ft bls)
42-6D ⊕	ABANDONED MONITORING WELL
(14.40)	GROUND-WATER ELEVATION (IN FEET)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-4
GROUND-WATER ELEVATIONS IN DEEP ZONE
(JULY 29, 1996)
DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

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July 29, 1996

Vertical flow gradients were generally downward between the shallow and deep aquifer zones. The magnitude of the vertical gradient near the ISDBs and DSBSs was determined by comparison of water levels in NAS 4-20 and NAS 4-20D and in NAS 4-21 and NAS 4-21D.

Analysis of the July 1996 measurements indicated a vertical gradient between NAS 4-20 and NAS 4-20D of 1.8×10^{-3} ft/ft, and a vertical gradient between NAS 4-21 and NAS 4-21D of 1.4×10^{-3} ft/ft, for an average of 1.6×10^{-3} ft/ft. The calculations for these gradients are also included in Appendix C. As stated previously, the vertical gradient in the PP area could not be calculated.

3.1.3 Ground-Water Flow Rates

April 22, 1996

Using the horizontal hydraulic gradient that was provided in the preceding section and the aquifer property (K) that was calculated by ESE (April 1994) the average estimated ground-water flow rate was calculated for the shallow ground-water zone beneath the ISDB and DSDB in April 1996. The flow rate was calculated using the equation discussed in Section 2.1.

Based on the horizontal gradient beneath the drying beds (40×10^{-3}) the horizontal flow rate ranged from 0.005 f/t day to 0.19 ft/day (1.83 to 69.35 ft/year). This and results from previous reports are presented in Table 3-3.

July 29, 1996

Based on the horizontal hydraulic gradient for the shallow zone beneath the drying beds (6.0×10^{-3} ft/ft), the hydraulic conductivity (K) that was calculated by ESE (April 1994), and the effective porosity (20%) of the surficial aquifer, the ground-water flow rates ranged between 0.007 to 0.28 ft/day (2.55 to 102.2 ft/year) in July 1996 (Table 3-3).

3.2 Chemical Analyses

Ground-water samples were collected from nine (9) monitoring wells designated in the FDEP permit. The following section provides a summary of analytical results for the ground-water samples collected from the monitoring well network in July 1996. Complete analytical results, including detection limits, are presented in Appendix D along with all QA/QC data developed for the analyses.

The analytical parameters are those listed in the FDEP permit, Part V-Conditions 8 and 9. Table 3-4 summarizes the analytical results for Condition 8 parameters. To evaluate permit compliance, the

TABLE 3-3
SUMMARY OF SHALLOW AND DEEP ZONE CHARACTERISTICS
ISDB, DSDB, and PP
NAS JACKSONVILLE

	Shallow Zone				Deep Zone		Vertical Hydraulic Gradient	
	ISDBs and DSDBs Area		PP (+)					
DATE	Average Horizontal Gradient (ft/ft)	Range of Ground-water Flow Rates (ft/yr)*	Average Horizontal Gradient (ft/ft)	Range of Ground-water Flow Rates (ft/yr)*	Average Horizontal Gradient (ft/ft)	Range of Ground-water Flow Rates (ft/yr)*	Average Vertical Gradient ISDB and DSDBs Area** (ft/ft)	PP Area (ft/ft)
Jan-92	2.20E-03	0.92 - 37.46	3.39E-02	14.23 - 577.22	4.20E-03	27.13 - 623.55	5.60E-03	2.60E-01
Apr-92	3.90E-03	1.64 - 66.41	2.78E-02	11.67 - 473.36	3.82E-03	24.68 - 567.13	1.77E-03	2.11E-01
Jul-92	2.00E-03	0.84 - 34.05	2.19E-02	9.19 - 372.9	3.83E-03	24.74 - 568.62	2.90E-03	1.87E-01
Jan-93	7.11E-03	0.3 - 12.11	1.40E-02	5.88 - 238.38	4.60E-03	29.72 - 682.93	2.06E-03	2.15E-01
Jun-93	3.22E-03	1.35 - 54.83	7.20E-03	3.02 - 122.6	3.90E-03	25.16 - 578.27	2.35E-03	2.08E-01
Jul-93	1.84E-03	0.77 - 31.33	7.04E-03	2.96 - 119.87	4.33E-03	27.97 - 642.85	2.35E-03	2.07E-01
Oct-93	3.93E-03	1.65 - 66.91	4.56E-03	1.91 - 77.64	4.23E-03	27.36 - 628.68	1.47E-03	1.62E-01
Jan-94	3.54E-03	1.49 - 60.35	4.08E-03	1.71 - 69.47	4.61E-03	29.79 - 684.58	1.47E-03	1.92E-01
Apr-94	1.53E-03	0.64 - 25.98	5.60E-03	2.35 - 95.35	NA	NA	NA	2.11E-01
Jul-94	9.11E-04	0.38 - 15.51	2.80E-03	1.18 - 47.68	3.49E-03	22.57 - 518.71	2.41E-03	1.83E-01
Jan-95	4.00E-03	1.83 - 69.35	3.40E-03	1.3 - 51.08	5.00E-03	32.85 - 740.95	3.19E-03	1.90E-01
May-95	5.00E-03	2.09 - 85.13	6.57E-03	2.75 - 111.86	7.90E-03	49.74-1172.86	1.59E-03	2.50E-01
Jul-95	2.90E-03	1.22 - 51.11	2.50E-03	1.05 - 42.57	5.30E-03	33.95 - 784.75	1.63E-03	2.38E-01
Oct-95	1.81E-03	0.76 - 30.8	5.14E-03	2.16 - 87.5	3.86E-03	24.94 - 573.07	9.60E-04	2.22E-01
Jan-96	2.00E-03	0.84 - 34.05	5.29E-03	2.22 - 90.24	2.40E-03	15.51 - 356.3	1.32 E-03	2.40E-02
*** Apr-96	4.00E-03	1.83 - 69.35	NA	NA	NA	NA	1.9 E -03	NA
Jul-96	6.00E-03	2.55 - 102.2	NA	NA	NA	NA	1.6 E -03	NA
Averages	3.29E-03	1.24 - 49.82	1.17E-02	4.55 - 184.61	5.12E-03	29.62 - 682.82	2.48E-03	2.28E-01

NOTES: * Range of Ground-water flow rates were calculated using the range of hydraulic conductivity values provided by ES&E, 1994.
** Average vertical gradient for ISDBs and DSDBs was determined via well clusters NAS 4-20 and NAS 4-20D and NAS 4-21 and NAS 4-21D. (+) In the PP area, the gentle gradient was calculated between NAS 42-7 and NAS 42-6D
NA - *data not available*
*** The horizontal gradient beneath the drying beds was used to determine the range of ground-water flow rates in the shallow zone during April and July 1996.

TABLE 3-4
SUMMARY OF ANALYTICAL RESULTS FOR CONDITION 8 PARAMETERS
JULY 29 - 30, 1996
NAS JACKSONVILLE
Jacksonville, Florida

Compound Name	Units	Analytical Method	Monitoring Well Identification									
			NAS4-5	NAS4-9	NAS4-20	NAS4-20D	EB-1	NAS4-21	NAS4-21D	NAS41-3	NAS41-4	NAS41-6
Phenols	ug/L	8270	<10	<10	<10	<10	<10	<10	<10	<10	51	<10
Arsenic	ug/L	7060	<10	<10	<10	<10	<10	<10	<10	<10	17	<10
Barium	ug/L	6010	<10	20	74	49	<10	96	36	1100	110	46
Cadmium	ug/L	6010	24	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chromium	ug/L	6010	<10	<10	15	<10	<10	23	<10	13	48	<10
Lead	ug/L	7421	<5	<5	5.6	<5	<5	9.3	<5	<5	28	<5
Mercury	ug/L	7470	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nickel	ug/L	6010	<40	<40	<40	<40	<40	<40	<40	<40	50	<40
Silver	ug/L	6010	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Toluene	ug/L	8240	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon Disulfide	ug/L	8240	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	ug/L	8240	<5	<5	<5	<5	4.1	<5	<5	<5	<5	<5
Tetrachloroethene	ug/L	8240	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

ug/L = micrograms per liter
EB-1 = Equipment blank # 1. Collected from distilled water.

TABLE 3-4 (Cont.)
SUMMARY OF ANALYTICAL RESULTS FOR CONDITION 8 PARAMETERS
JULY 29-30, 1996
NAS JACKSONVILLE
Jacksonville, Florida

Compound Name	Units	Analytical Method	Monitoring Well Identification								
			NAS42-5	NAS42-6D	NAS42-7	EB-2	NAS42-8R	NAS4-9D*	NAS4-9DD*	TRIP BLK	TRIP BLK
Phenols	ug/L	8270	NS	NS	NS	<10	NS	<10	<10	NR	NR
Arsenic	ug/L	7060	NS	NS	NS	<10	NS	<10	<10	NR	NR
Barium	ug/L	6010	NS	NS	NS	26	NS	20	20	NR	NR
Cadmium	ug/L	6010	NS	NS	NS	<5	NS	<5	<5	NR	NR
Chromium	ug/L	6010	NS	NS	NS	<10	NS	<10	<10	NR	NR
Lead	ug/L	7421	NS	NS	NS	<5	NS	<5	<5	NR	NR
Mercury	ug/L	7470	NS	NS	NS	<0.2	NS	<0.2	<0.2	NR	NR
Nickel	ug/L	6010	NS	NS	NS	<40	NS	<40	<40	NR	NR
Silver	ug/L	6010	NS	NS	NS	<10	NS	<10	<10	NR	NR
Toluene	ug/L	8240	NS	NS	NS	<5	NS	<5	<5	<5	<5
Carbon Disulfide	ug/L	8240	NS	NS	NS	<5	NS	<5	<5	<5	<5
Chloroform	ug/L	8240	NS	NS	NS	19	NS	<5	<5	<5	<5
Tetrachloroethene	ug/L	8240	NS	NS	NS	<5	NS	<5	<5	<5	<5

ug/L = micrograms per liter.
EB-2 = Equipment blank #2. Collected from potable water source at wastewater plant.
NS = Not sampled. Wells abandoned in April 1996.
* NAS4-9D and NAS4-9DD are duplicate samples of NAS4-9.

analytical results for the Condition 8 compounds were compared to permit standards or background concentrations.

FDEP permit condition Part V-Condition 10 states:

> Background concentrations shall be established through sampling at the upgradient background wells (NAS 4-9) each time ground-water is sampled at the Point of Compliance. The background concentration limit shall be the mean of the four (4) most recent background samples of the hazardous constituent [40 Code of Federal Regulations (CFR) part 264.99(c)(1)].

To aid in the determination of background concentrations, Table 3-5 was prepared showing the results of the four (4) most recent sampling events from NAS 4-9 for the various compounds listed in Condition 8. For the parameters listed in the table that have never been detected in NAS 4-9, the permit standard, defined as the Ground-water Protection Standard of Background, was determined to be the most recent (July 1996) detection limit for that compound.

Only two (2) condition 8 parameters, carbon disulfide and barium had sufficient results over their respective detection limits during the last four (4) sampling efforts from which to obtain an average; and one (1) of these, carbon disulfide was detected in only one (1) sample (July 1995) above the detection limit. For carbon disulfide and barium, average concentrations were calculated also using the detection limits as values (i.e., a detection limit of <1.0 equaled 1.0). These results are shown as the Mean of Detections in Table 3-5. By this method, the permit standard for carbon disulfide is 8.5 micrograms per liter (μg/l). For each metal, except barium, the permit standard is defined as the Florida Secondary Drinking Water Standards (FPDWS), so averaging was not necessary. The FPDWS for the various compounds, where available, are also provided in Table 3-5. Guidance concentrations were available for some compounds. These values were obtained from an FDEP guidance document (Merchant, 1989). The regulatory standards are shown for reference only, because they are not necessarily the permit standards. The parameters exceeding the permit standards and the wells in which they were exceeded are summarized in Table 3-6.

Table 3-7 summarizes the analytical results for Condition 9 parameters. For the Condition 9 parameters, a Ground-water Protection Standard was not designated in the permit. Table 3-8 shows the results of the four (4) most recent sampling events for these compounds in the background well NAS 4-9. A Mean of Detections is also included in this table; however, in some cases, there are four

TABLE 3-5
MEAN CONCENTRATIONS OF CONDITION 8 PARAMETERS IN BACKGROUND WELL - NAS4-9
ISDB and DSDB - July, 1996
NAS JACKSONVILLE

Compound Name	Units	Date of Most Recent Sampling Events				Mean of Detections*	Permit Standard**	Regulatory Standard (for reference only)
		July 1996	Jan. 1996	July 1995	Jan. 1995			
Tetrachloroethylene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	3 Primary
Methylene Chloride	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	5 Guidance
Trichloroethylene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	3 Primary
1,1,2 Trichloroethylene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	1 Guidance
Toluene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	24 Guidance
Carbon Tetrachloride	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	3 Primary
Chloroform	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	100 Primary
Methyl Ethyl Ketone	ug/L	<25.0	<25.0	<25.0	<1.0		25.0	170 Guidance
Ethylene Dibromide (EDB)	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	0.02 Primary
Benzene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	1 Primary
1,2 Dichlorobenzene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	10 Guidance
Chlorobenzene	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	10 Guidance
Vinyl Chloride	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	1 Primary
Total Cresols	ug/L	<10.0	<10.0	<10.0	<1.0		10.0	3000 Guidance
Cryselic Acid	ug/L			same compounds as total cresols				NC
Total Phenols	ug/L	<10.0	<10.0	<10.0	<10.0		10.00	20 Guidance
Total Xylenes	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	50 Guidance
Carbon Disulfide	ug/L	<5.0	<5.0	23	<1.0	8.5	8.50	NC
Trichloroflouromethane	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	NC
Pyridine	ug/L	<200	<200	<200	<200		200.0	NC
2-nitropropane	ug/L	<5.0	<5.0	<5.0	<5.0		5.0	NC
Nitrobenzene	ug/L	<10.0	<10.0	<10.0	<10.0		10.0	30 Guidance
1,2 dichloropropane	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	10 Guidance
1,2,3 trichloropropane	ug/L	<5.0	<5.0	<5.0	<1.0		5.0	10 Guidance
Arsenic	ug/L	<10.0	<10.0	<10.0	<10.0		10.0	50 Primary
Barium	ug/L	20	33	21	37	27.75	27.75	1000 Primary
Cadmium	ug/L	<5.0	<5.0	<5.0	<5.0		5.0	10 Primary
Total Chromium	ug/L	<10.0	<10.0	<10.0	<10.0		10.0	50 Primary
Lead	ug/L	<5.0	<5.0	<5.0	<5.0		5.0	15 Primary
Silver	ug/L	<10.0	<10.0	<10.0	<10.0		10.0	50 Primary
Nickel	ug/L	<40.0	<40.0	<40.0	<40.0		40.00	15 Guidance
Mercury	ug/L	<0.2	<0.2	<0.2	<0.2		0.2	0.2 Primary
Selenium	ug/L	<10.0	<10.0	<10	<10		10.0	10 Primary
Cyanide	ug/L	<10.0	<10.0	<10	<10		10.00	154 Guidance

* Means of detection were calculated only on compounds which had at least one value above the detection limit. For the calculations, values below the detection were assumed to be the value of the detection limit.

** For barium the permit standard equals the average background concentrations; if all values are BDL, the permit standard is the July 1996 detection limit. For all metals(excluding barium) the permit standard equals the Florida Primary Drinking Water Standard(FPDWS)

(1)Regulatory Standard is Total Trihalomethanes

Notes: Guidance = FDEP Guidance Concentration (Merchant, 1989); NC = No criteria; Primary = Florida Primary Drinking Water Standard (F.A.C. 17-555.310); Secondary = Florida Secondary Drinking Water Standard (F.A.C. 17-550.320).

TABLE 3-6

PARAMETERS EXCEEDING CONDITION 8 PERMIT STANDARDS - JULY 1996

ISDB, DSDB, and PP

NAS JACKSONVILLE

Jacksonville, Florida

PARAMETER	PERMIT STANDARD	Monitoring Well Identification													No. of Wells Exceeding Permit Standard
		Point of Compliance Wells													
		4-9	4-5	41-3	41-4	41-6	42-5*	42-6D*	42-7*	42-8R*	4-20	4-20D	4-21	4-21D	
TOTAL PHENOLS (ug/L)	8.95				51										1
ARSENIC (ug/L)	10				17										1
CADMIUM (ug/L)	5		24												1
TOTAL LEAD (ug/L)	5				28						5.6		9.3		3
NICKEL (ug/L)	40				50										1
BARIUM (ug/L)	29.38			1100	110	46					74	49	96	36	7

* Monitoring wells adjacent to the polishing pond were abandoned during remediation of polishing pond area.

NAS 4-9 is the background well.

Spaces left blank indicate parameter concentrations were below permit standards.

Source: ESE, 1994

TABLE 3-7
SUMMARY OF ANALYTICAL RESULTS FOR CONDITION 9 PARAMETERS
JULY 29 - 30, 1996
NAS JACKSONVILLE
Jacksonville, Florida

Compound Name	Units	Analytical Method	Monitoring Well Identification									
			NAS4-5	NAS4-9	NAS4-20	NAS4-20D	EB-1	NAS4-21	NAS4-21D	NAS41-3	NAS41-4	NAS41-6
pH	NA	150.1	6.7	6.5	5.5	5.6	5.4	4.7	6.1	6.2	8.7	6.7
Specific Conductance	umhos/cm	120.1	360	530	120	180	2	74	180	2300	2400	370
Turbidity	NTU	180.1	9.6	12	310	2.1	0.23	22	3.5	30	55	29
Nitrogen, NO2	mg/L	353.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.082	0.066
Chloride	mg/L	325.2	8.2	5.8	5	18	<1.0	2.9	9.3	120	110	8.4
Sulfate	mg/L	375.4	24	31	24	5.4	<5.0	41	5.2	68	<5.0	56
Fluoride	mg/L	340.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	1.6	<0.20
Gross Alpha	pCi/L	9310	<3.0	<3.0	<3.0	<3.0	<3.0	3.8+/-2.0	<3.0	<3.0	14+/-29	3.9+/-3.6
Gross Beta	pCi/L	9310	<4.0	4.5+/-3.8	4.6+/-2.0	<4.0	<4.0	<4.0	<4.0	160+/-22	14+/-17	38+/-4.0
Radium 226	pCi/L	903.1	<0.6	<0.6	<0.6	<0.6	<0.6	0.84+/-0.07	<0.6	7.4+/-0.22	<0.6	0.96+/-0.08
Radium 228	pCi/L	904	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4+/-0.55	<1.0	<1.0
Copper	ug/L	6010	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Iron	ug/L	6010	210	710	3600	8400	<50	10000	1800	15000	2600	320
Manganese	ug/L	6010	13	100	10	31	<10.0	20	27	780	20	25
Sodium	mg/L	6010	34	2.5	5.6	19	<0.05	4.8	9.8	150	590	6.4
Vanadium	ug/L	6010	55	<10	59	<10	<10	36	<10	14	150	<10
Zinc	ug/L	6010	<20	<20	<20	26	<20	<20	<20	<20	<20	<20
1,1-Dichloroethane	ug/L	8240	<5.0	<5.0	<5.0	7.5	<5.0	<5.0	1.2	<5.0	1.1	<5.0

NTU = nephlometric turbidity units.
mg/L = milligrams per liter.
ug/L = micrograms per liter.
pCi/L = picocuries per liter.
EB-1 = Equipment blank #1. Collected from distilled water.
pH, specific conductance, and turbidity values are field measurements.

TABLE 3-7 (Cont.)
SUMMARY OF ANALYTICAL RESULTS FOR CONDITION 9 PARAMETERS
JULY 29 - 30, 1996
NAS JACKSONVILLE
Jacksonville, Florida

Compound Name	Units	Analytical Method	Monitoring Well Identification								
			NAS42-5	NAS42-6D	NAS42-7	EB-2	NAS42-8R	NAS4-9D*	NAS4-9DD*	TRIP BLK	TRIP BLK
pH	NA	150.1	NA	NA	NA	8	NA	6.5	6.5	NR	NR
Specific Conductance	umhos/cm	120.1	NA	NA	NA	620	NA	530	520	NR	NR
Turbidity	NTU	180.1	NA	NA	NA	0.94	NA	6.8	10	NR	NR
Nitrogen, NO2	mg/L	353.2	NA	NA	NA	<0.05	NA	<0.05	<0.05	NR	NR
Chloride	mg/L	325.2	NA	NA	NA	15	NA	5.6	5.9	NR	NR
Sulfate	mg/L	375.4	NA	NA	NA	200	NA	32	29	NR	NR
Fluoride	mg/L	340.2	NA	NA	NA	0.47	NA	<0.20	<0.20	NR	NR
Gross Alpha	pCi/L	9310	NA	NA	NA	<3.0	NA	<3.0	<3.0	NR	NR
Gross Beta	pCi/L	9310	NA	NA	NA	<4.0	NA	6.3+/-4.2	7.9+/-3.5	NR	NR
Radium 226	pCi/L	903.1	NA	NA	NA	<0.6	NA	<0.6	<0.6	NR	NR
Radium 228	pCi/L	904	NA	NA	NA	<1.0	NA	1.5+/-0.43	<1.0	NR	NR
Copper	ug/L	6010	NA	NA	NA	<25	NA	<25	<25	NR	NR
Iron	ug/L	6010	NA	NA	NA	86	NA	840	860	NR	NR
Manganese	ug/L	6010	NA	NA	NA	<10	NA	100	100	NR	NR
Sodium	mg/L	6010	NA	NA	NA	9.3	NA	2.5	2.4	NR	NR
Vanadium	ug/L	6010	NA	NA	NA	<10	NA	<10	<10	NR	NR
Zinc	ug/L	6010	NA	NA	NA	30	NA	<20	<20	NR	NR
1,1-Dichloroethane	ug/L	8240	NA	NA	NA	<5.0	NA	<5.0	<5.0	<5	<5

NTU = nephlometric turbidity units.
NR = Not required.
mg/L = milligrams per liter.
ug/L = micrograms per liter.
pCi/L = picocuries per liter.
EB-2 = Equipment blank #2. Collected from potable water source at wastewater plant..
pH, specific conductance, and turbidity values are field measurements.
NR = Not required.
NA = Not analyzed
* NAS4-9D and NAS4-9DD are duplicate samples of NAS4-9.

TABLE 3-8
MEAN CONCENTRATIONS OF CONDITION 9 PARAMETERS IN BACKGROUND WELL - NAS4-9
ISDB, DSDB, and PP - JULY 1996
NAS JACKSONVILLE

Compound Name	Units	Date of Most Recent Sampling Events				Mean of Detections*	Permit Standard	Regulatory Standard (for reference only)
		July 1996	Jan. 1996	July 1995	Jan. 1995			
pH	NA	6.5	6.35	6.21	6.5		NC	6.5 - 8.5 Secondary
Specific Conductance	umhos/cm	530	468	542	790	582.4	NC	500 Secondary
Turbidity (1)	NTU	12	171	116	29	82	NC	1 Primary
Total Coliform	#/100 ml	<1.0	<1.0	<1.0	<1.0		NC	<1/100 ml Primary
Nitrogen, NO2	mg/L	<0.05	<0.05	<0.05	<1.0		NC	10 Primary
Chloride	mg/L	5.8	6.4	4.1	6.3	5.65	NC	250 Secondary
Sulfate	mg/L	31	5.4	6.4	6.3	12.28	NC	250 Secondary
Fluoride	mg/L	<0.2	<0.2	<0.2	<10		NC	2 Secondary
Gross Alpha	pCi/L	<3.0	<3.0	4	<2.0	3	NC	15 Primary
Gross Beta	pCi/L	4.5	5.2	6.5	9.4	6.4	NC	NC
Radium 226**	pCi/L	<0.6	0.71	<0.6	<0.6	0.63	NC	**
Radium 228**	pCi/L	<1.0	1.3	<2.0	<2.0	1.58	NC	**
Copper	ug/L	<25	<25	<2.5	<2.5		NC	1000 Secondary
Iron	ug/L	710	2300	950	3200	1790	NC	300 Secondary
Manganese	ug/L	100	140	130	240	152.5	NC	50 Secondary
Sodium	mg/L	2.5	2.3	2.7	4.6	3.03	NC	160 Primary
Vanadium	ug/L	<10	14	<10	<10	11	NC	NC
Zinc	ug/L	<20	<20	<20	<20		NC	50 Secondary
1,1 Dichloroethane	ug/L	<1.0	<5.0	<5.0	<1.0		NC	2400 Guidance
1,2 Dichloroethane	ug/L	<1.0	<5.0	<5.0	<1.0		NC	3 Primary
1,1,1-trichloroethane	ug/L	<1.0	<5.0	<5.0	<200		NC	200 Primary
Isobutanol	ug/L		<1.0	<1.0	<5.0		NC	NC
1,1,2-trichloro-1,2,2-tri-flouroethane	ug/L	<1.0	<5.0	<5.0	<1.0		NC	NC
2-ethoxyethanol	ug/L	<20	<20	<20	<1.0		NC	NC

* Means of detection were calculated only on compounds which had at least one value above the detection limit. For the calculations, values below the detection were assumed to be the value of the detection limit.

** Regulatory standard for radium 226 and radium 228 states the total of both compounds should be less than or equal to 5 picocuries per liter (pCi/L

(1) Laboratory turbidity values. Field turbidity values were not measured prior to January 1995 sampling event.

Notes: Guidance = FDEP Guidance Concentration (Merchant, 1989); NC = No criteria; Primary = Florida Primary Drinking Water Standard (F.A.C. 17-555.310); Secondary = Florida Secondary Drinking Water Standard (F.A.C. 17-550.320).

or five values above the detection limit. In these cases, the Mean of Detections was calculated also using the detection limits as values (i.e., a detection limit of <1.0 equals 1.0). Table 3-9 lists the Condition 9 parameters detected above regulatory standards which are based either on the Primary or Secondary Drinking Water Standards or the previously mentioned FDEP guidance document (Merchant, 1989).

3.2.1 Permit Part V-Condition 8 Parameters

Six (6) parameters were detected that exceeded the standards associated with the FDEP Permit, Part V-Condition 8 in the shallow aquifer zone in July 1996. These parameters included five (5) metals and one (1) organic compound. Two (2) Condition 8 metals were also detected above permit standards in two (2) deep zone samples (Table 3-6).

3.2.1.1 Metals

Metals exceeding the permit standards were arsenic, barium, cadmium, lead and nickel. The standards designated in the permit for these metals are equivalent to, or in the case of barium, lower than, the FPDWS. Figure 3-5 shows the distribution of Condition 8 metals detected in the shallow zone in July 1996.

Arsenic was detected at concentrations exceeding or equivalent to the permit standard of 10 μg/l in only one (1) well, NAS 41-4 (17 μg/l), which is located adjacent to the DSDB (Figure 3-5).

Barium was detected above its permit standard (29.38 μg/l) in seven (7) wells (NAS 41-3, NAS 41-6, NAS 41-4, NAS 4-20, NAS 4-20D, NAS 4-21, and NAS4-21D) which are located adjacent to the DSDBs and ISDSs (Figure 3-5).

Cadmium was again detected above its permit standard (5 μg/l) in only one (1) well, NAS 4-5 at 24 μg/l, which is located adjacent to the ISDBs.

Total lead concentrations exceeding the permit standard were found in three (3) wells (NAS 4-20, NAS 4-21 and NAS 41-4), which are located downgradient of the ISDBs and immediately adjacent to the DSDBs.

The wells most commonly exceeding a permit standard in July 1996, and the wells with the highest concentrations are those closest to the ISDBs and DSDBs. In general, the highest metals concentrations were found in NAS 41-3, NAS 41-6 and NAS 41-4 directly downgradient of the

TABLE 3-9
CONDITION 9 PARAMETERS DETECTED ABOVE OR OUTSIDE PRIMARY OR SECONDARY STANDARDS
ISDB, DSDB, and PP
NAS JACKSONVILLE
July 1996

PARAMETER	UNITS	REGULATORY STANDARD	Monitoring Well Identification													No. of Wells Exceeding Standards
				Point of Compliance Wells												
			4-9	4-5	41-3	41-4	41-6	42-5*	42-6D*	42-7*	42-8R*	4-20	4-20D	4-21	4-21D	
pH	NA	6.5 - 8.5** (S)			6.2	8.7						5.50	5.60	4.70	6.10	6
Spec. Conductance	umhos/cm	500 (S)	530		2300	2400										3
Turbidity	NTU	1 (P)	12	9.6	30	55	29					310	2.1	22	3.5	9
Gross Alpha	pCi/L	15 (P)				26										1
Iron	ug/L	300 (S)	710		15000	2600	320					3600	8400	10000	1800	8
Manganese	ug/L	50 (S)	100		780											2
Sodium	mg/L	160 (P)				590										1

(S) Florida Secondary Drinking Water Standard (FSDWS)
(P) Florida Primary Drinking Water Standard (FPDWS)
pH, Specific Conductivity, and Turbidity values were measured in the field
* Monitoring wells abandoned during remediation of polishing pond area.
** FSDWS Range 6.5 - 8.5
NAS 4-9 is the background well
Spaces left blank indicate parameter concentrations were below regulatory standards
(1)Regulatory Standard for Radium 226 and Radium 228 states that the total of both compounds should be less than or equal to 5 pCi/L

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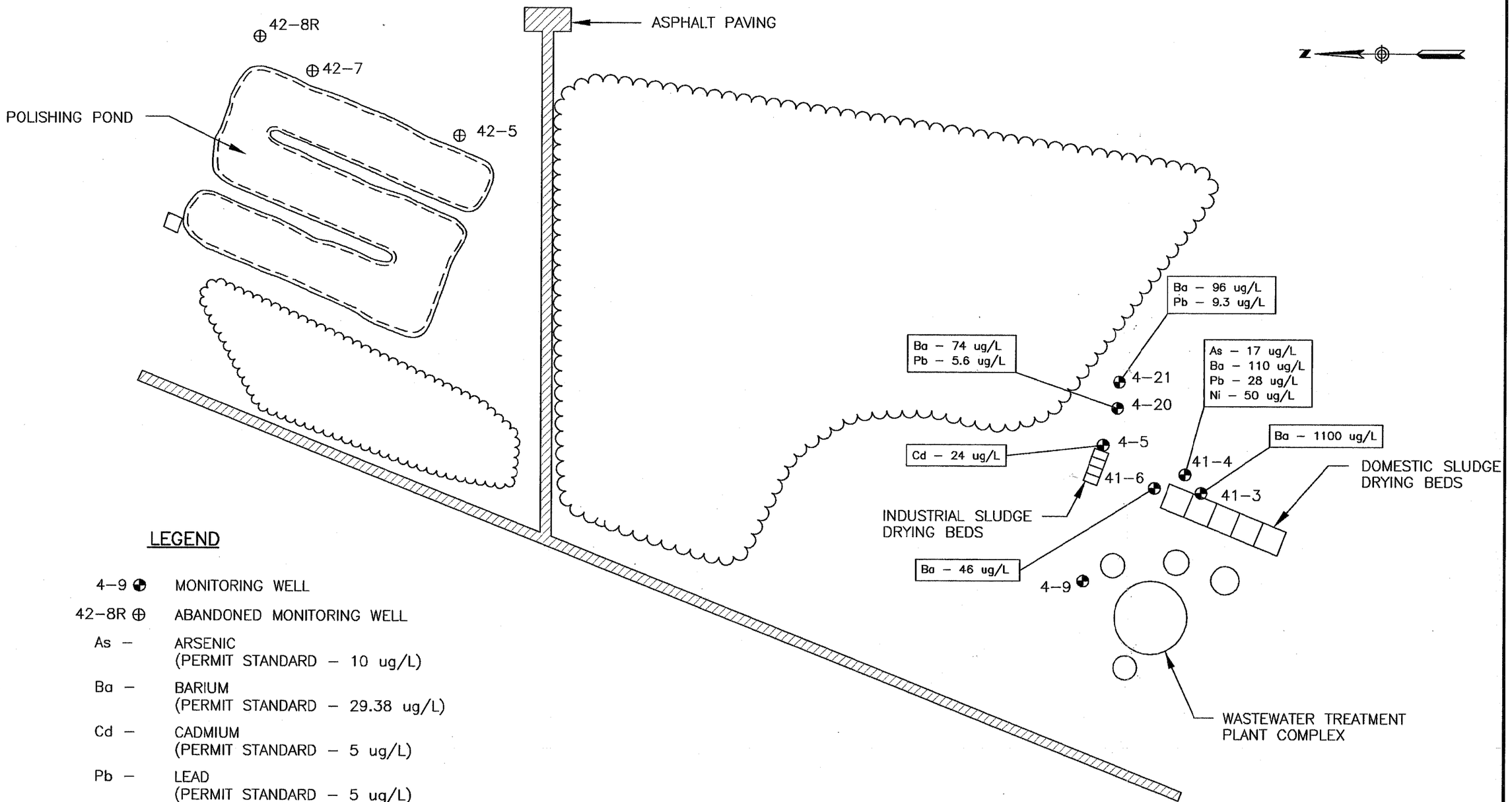

LEGEND

4-9 ⊕	MONITORING WELL
42-8R ⊕	ABANDONED MONITORING WELL
As -	ARSENIC (PERMIT STANDARD - 10 ug/L)
Ba -	BARIUM (PERMIT STANDARD - 29.38 ug/L)
Cd -	CADMIUM (PERMIT STANDARD - 5 ug/L)
Pb -	LEAD (PERMIT STANDARD - 5 ug/L)
Ni -	NICKEL (PERMIT STANDARD - 40 ug/L)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-5

DISTRIBUTION OF CONDITION 8 METALS DETECTED ABOVE PERMIT STANDARD IN THE SHALLOW ZONE (JULY 29-30, 1996)

NAS JACKSONVILLE, FLORIDA

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01031B042

DSDBs and NAS 4-20 and NAS 4-21 downgradient of the ISDBs. Overall Condition 8 metals concentrations exceeding permit standards in July 1996 were comparable to those detected in January 1996.

3.2.1.2 Organic Compounds

During the July 1996 sampling event, total phenols were detected above the permit standard in only one (1) well, (NAS 41-4), which is located near the DSDBs. Historically, this well has always had the highest phenols concentrations at this site. The total phenols concentration detected during this sampling event was slightly higher than during the January 1996 sampling event. Figure 3-6 shows the distribution of Condition 8 organic compounds detected in the shallow zone in July 1996.

Carbon disulfide was not detected above its permit standard or the laboratory detection limit in any samples collected in July 1996. This is a significant decrease in concentrations from the July 1995 sampling event.

3.2.2 Permit Part V-Condition 9 Parameters

Several compounds associated with requirements of the FDEP Permit Part V-Condition 9 were detected during the July 1996 sampling event (Table 3-7). Although there are no permit standards for these compounds, there are, however, FPDWS or FSDWS for several of the Condition 9 parameters (Table 3-8). Parameter concentration maps were prepared to show the distribution of some of these parameters in the shallow aquifer zone, but none for the deep zone because only two (2) wells (NA4-200 and NAS 4-210) were sampled during this sampling event. NAS 42-60 was abandoned during remediation of the PP. Table 3-9 shows the Condition 9 parameters detected above or outside of their respective FPDWS or FSDWS in each sample.

3.2.2.1 Field Parameters

A parameter distribution map showing the field pH values for the shallow zone obtained prior to sample collection is shown in Figure 3-7. Field pH values were outside the FSDWS range (6.5 to 8.5) in six (6) of the shallow samples collected in July 1996. However, as shown in Table 3-7, the typical pH range for the shallow aquifer samples appears to be between 4.7 and 8.7, which falls within the range of values obtained during previous sampling events.

Specific conductance was also measured during sample collection. The highest value was observed near the DSDBs, 1,980 micromohós per centimeter (μmhos/cm) in NAS 41-4 (Figure 3-7). As shown in Table 3-9, specific conductance values were measured above the FSDWS in three (3) of

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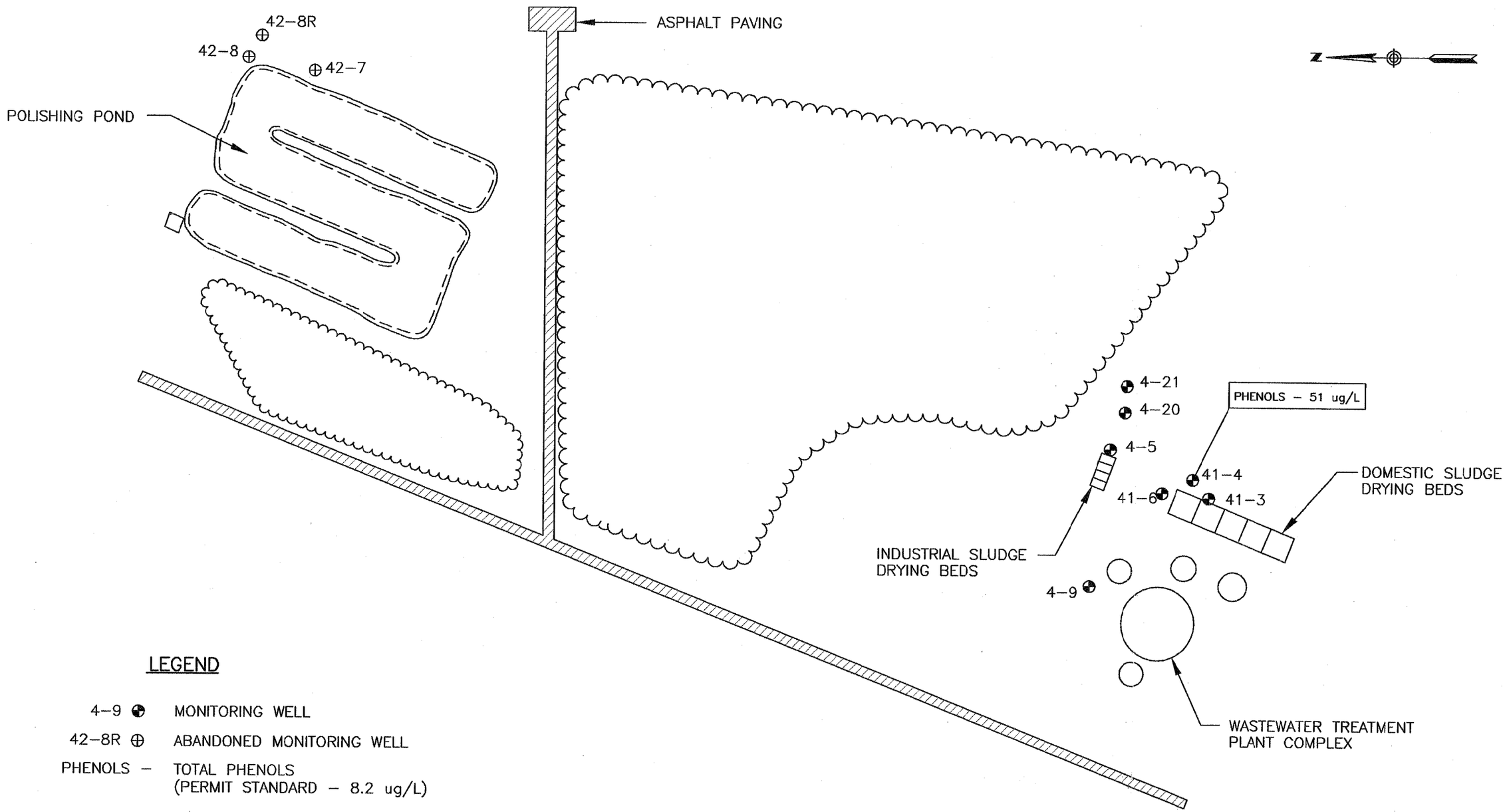

LEGEND

4-9 ⊕	MONITORING WELL
42-8R ⊕	ABANDONED MONITORING WELL
PHENOLS -	TOTAL PHENOLS (PERMIT STANDARD - 8.2 ug/L)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-6
DISTRIBUTION OF CONDITION 8 ORGANIC COMPOUNDS DETECTED ABOVE PERMIT STANDARDS IN THE SHALLOW ZONE - JULY 29-30, 1996
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000
OCTOBER 1996

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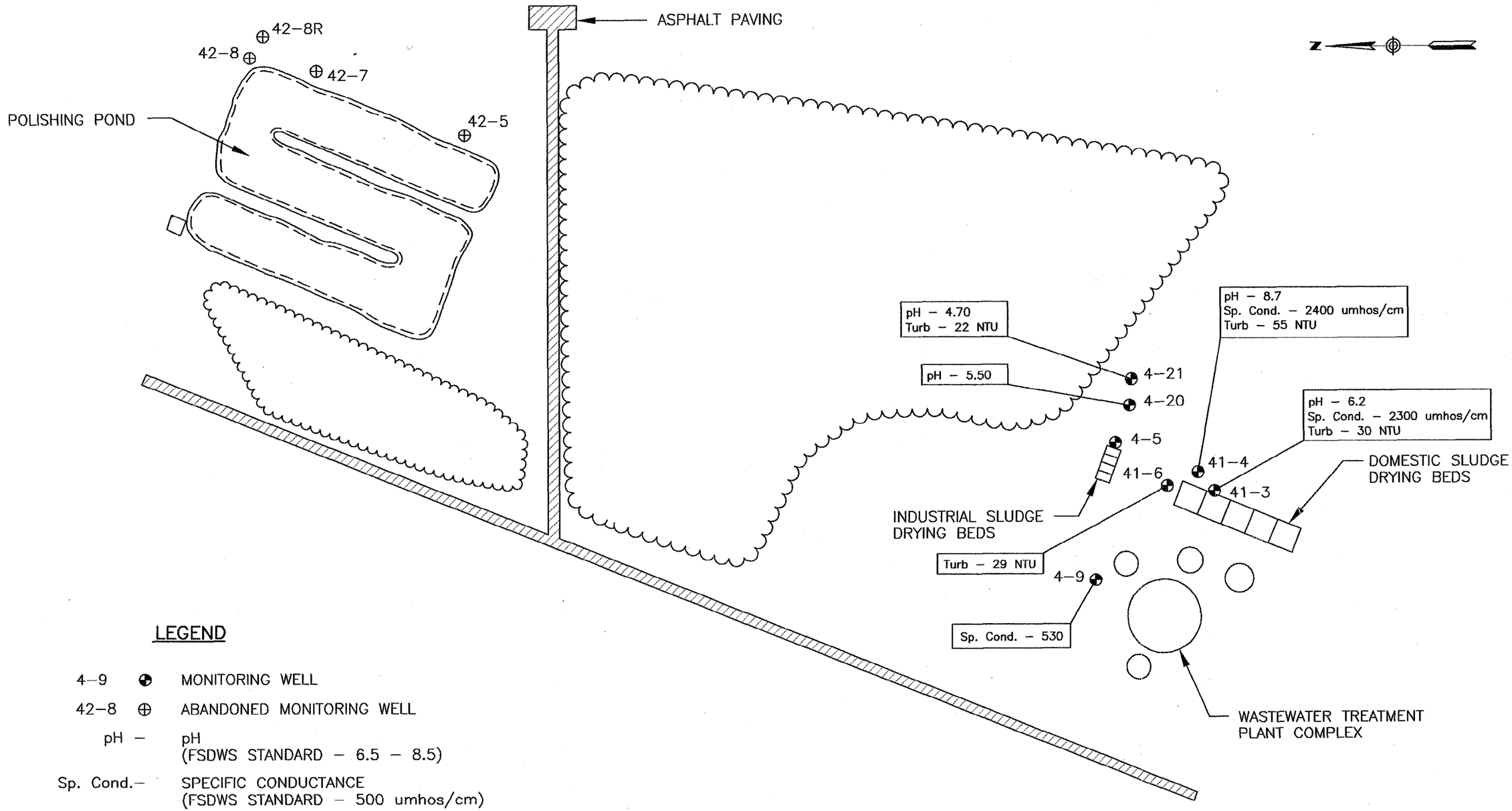

LEGEND

4-9	◐	MONITORING WELL
42-8	⊕	ABANDONED MONITORING WELL
pH -		pH (FSDWS STANDARD - 6.5 - 8.5)
Sp. Cond.-		SPECIFIC CONDUCTANCE (FSDWS STANDARD - 500 umhos/cm)
Turb -		TURBIDITY (FPDWS STANDARD - 10 NTU)

200 0 200
SCALE 1"=200' FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-7
DISTRIBUTION OF FIELD PARAMETERS DETECTED OUTSIDE OR ABOVE REGULATORY STANDARDS THE SHALLOW ZONE - JULY 29-30, 1996
NAS JACKSONVILLE, FLORIDA
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the shallow samples collected in July 1996. Two (2) samples had specific conductance values above the Mean of Detections (582.4). Overall, the values measured in the shallow zone samples were slightly lower than those measured in January 1996. The specific conductance values in NAS 41-6 and NAS 41-4 decreased slightly since January 1996.

Turbidity values were measured in the field prior to sample collection as well as in the laboratory. Figure 3-7 also shows the distribution of field turbidity values above the FPDWS in the shallow zone as measured in July 1996. Turbidity values were measured above the FPDWS in six (6) shallow samples in July 1996 (Table 3-9). The turbidity meter was malfunctioning at monitoring well NAS 4-20; therefore, a field turbidity reading could ot be obtained. Turbidity values in the deep samples were slightly above the FPDWS. Although many of the samples had high turbidity values, all of these samples were either clear or only slightly cloudy.

The highest value was found in NAS 41-6 at 767 nephelometric turbidity units (NTUs). Turbidity values were not measured in the field during sampling events prior to January 1995, therefore, a detailed comparison of field turbidity to previous sampling events is not possible. The turbidity value measured in the laboratory in sample NAS 41-6 was 29 NTU which is lower than the laboratory value measured in this sample in January 1996. The laboratory turbidity values measured in the samples collected in July 1996 were generally higher, as compared to the January 1996 laboratory values. Several wells had turbidity values which were lower in the July 1996 sampling event than the January 1996 event (NAS 41-3, NAS 41-6, NAS 4-9 and NAS 4-21).

3.2.2.2 Total Coliform

Coliform bacteria were detected in one (1) sample collected from the site in July 1996. Coliform bacteria were detected at 30 col/100 mls in monitoring well NAS 41-4, which is located adjacent to the DSDBs. The laboratory reported that the presence of confluent growth may have suppressed coliform growth; thus, sample results may be biased low. Coliform bacteria have not been detected from this site since July 1994.

3.2.2.3 Radionuclides

Gross alpha concentrations did not exceed the FPDWS of 15 picocuries per liter (pCi/L) in any ground-water samples collected in July 1996. Gross alpha concentrations exceeded the Mean of Detections (3.54 pCi/L) in three (3) ground-water samples collected from the site (Table 3-7). The highest concentration, 14 ± 29 pCi/L, was detected in NAS 41-4, adjacent to the DSDBs. These results show a general decrease in concentration as compared to the January 1996 results. The

maximum gross alpha concentrations detected at this site in January 1996 were 26 ± 23 pCi/L (NAS41-4) and 10 ± 9.5 pCi/L (NAS41-3), respectively.

Gross beta was detected in five (5) shallow zone wells in July 1996. There is no permit standard for gross beta. However, FDEP has adopted the USEPA MCL of 4 mrem/yr for Gross beta. Gross beta concentrations are reported in pCi/L and there is no direct correlation between mrem/yr and pCi/L. Therefore, gross beta concentrations will be compared to the Mean of Detections concentration (6.12 pCi/L) for the background well NAS 4-9 (Table 3-8). Gross beta was detected above the Mean of Detections concentration in only three (3) samples, NAS 41-3 (160 ± 22 pCi/L), NAS 41-4 (14 ± 17 pCi/L) and NAS 41-6 (38 ± 4.0 pCi/L) (Table 3-7).

FDEP has adopted a FPDWS of 5 pCi/L for Radium 226 and Radium 228 combined. This regulatory standard was exceeded in one (1) sample collected from the site in July 1996. Radium 226 and Radium 228 were detected in several samples collected in July 1996. Radium 226 was detected at 0.84 ± 0.07 pCi/L in NAS 4-21, 7.4 ± 0.22 pCi/L in NAS 41-3, and 0.96 ± 0.08 pCi/L in NAS 41-6. Radium 228 was detected at 3.4 ± 0.55 pCi/L in NAS 41-3.

3.2.2.4 Inorganics

Nitrogen as Nitrate (NO^-_2) was not detected above its FPDWS (10 mg/l) in any samples collected in July 1996. Nitrate was however detected at minor concentrations in NAS 41-4 at 0.082 mg/l and NAS 41-6 at 0.066 mg/l (Table 3-7).

Chloride was not detected above its FSDWS in any samples collected in July 1996. Overall, chloride concentrations detected in July 1996 are similar to values detected during previous sampling events (Table 3-7). These and previous results indicate the source of the chloride is associated with the DSDBs and ISDBs.

Iron concentrations were detected at or above the FSDWS of 300 μg/l in all but one (1) ground-water sample collected in July 1996 (NAS 4-5). Iron was also detected above the Mean of Background Detections (1974 μg/l) in five (5) samples collected from the site (Table 3-7). Iron concentrations ranged from 210 μg/l in NAS 4-5 to as high as 15,000 μg/l in NAS 41-3 which is located adjacent to the DSDBs. The distribution of iron concentrations were generally associated with the areas of concern near the DSDBs and the ISDBs. These results indicate that the concentrations increased in wells immediately adjacent to the areas of concern. Figure 3-8 depicts the distribution of Condition 9 parameter concentrations (iron, manganese and sodium) detected above FSDWS or FPDWS in the

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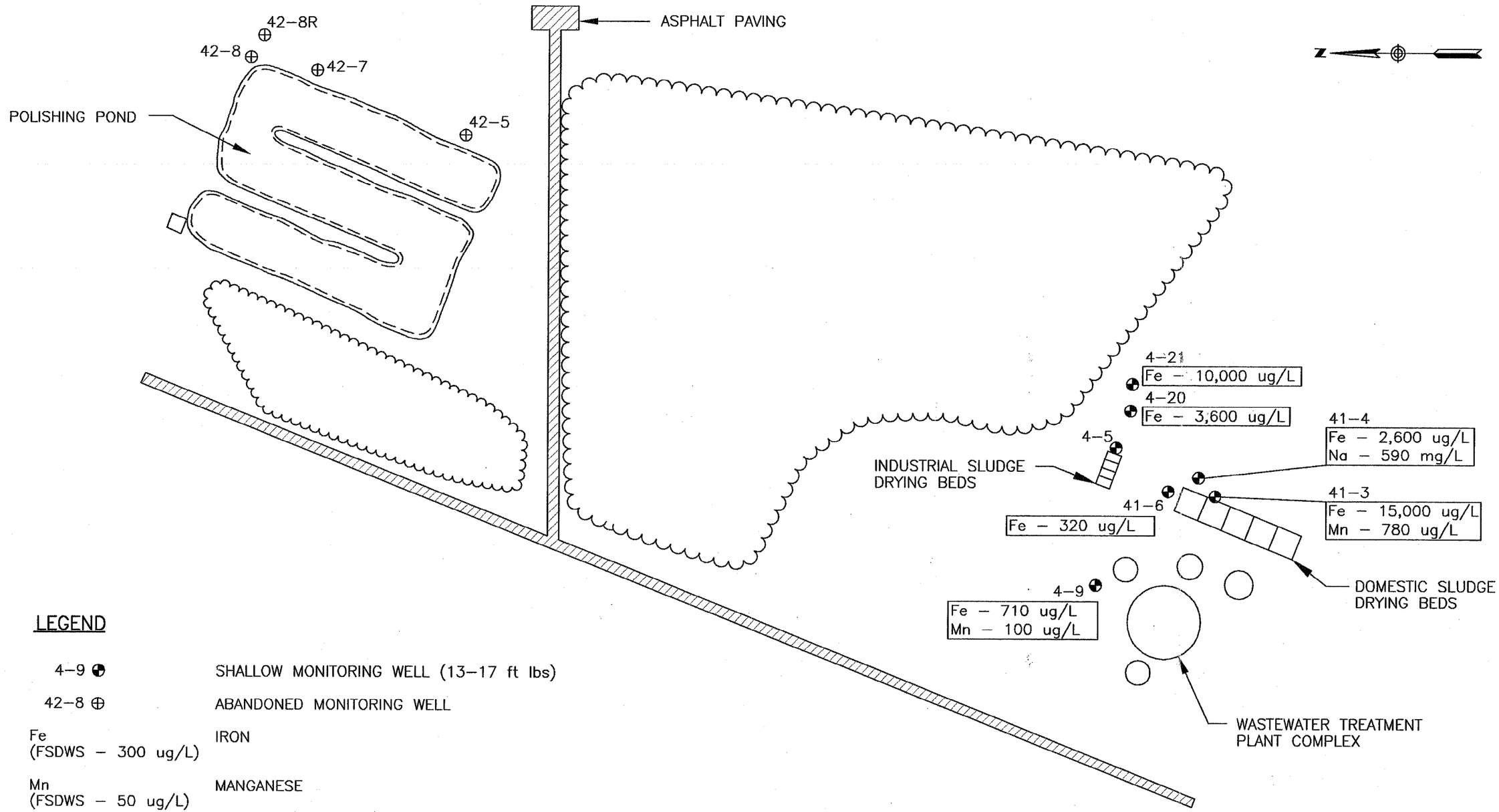

LEGEND

4-9 ⊕	SHALLOW MONITORING WELL (13-17 ft lbs)
42-8 ⊕	ABANDONED MONITORING WELL
Fe (FSDWS – 300 ug/L)	IRON
Mn (FSDWS – 50 ug/L)	MANGANESE
Na (FSDWS – 160 mg/L)	SODIUM

200 0 200
SCALE 1"=200' FEET

SOURCE: ESE, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-8

DISTRIBUTION OF CONDITION 9 INORGANIC PARAMETERS IN EXCESS OF REGULATORY STANDARDS IN IN THE SHALLOW ZONE – JULY 29-30, 1996

NAS JACKSONVILLE, FLORIDA

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shallow zone in July 1996.

Manganese was detected above its FSDWS (50 μg/l) in two (2) samples collected from the shallow zone in July 1996 (Table 3-9). The highest manganese concentration was reported at 780 μg/l in NAS 41-3 (Figure 3-8). Manganese concentrations were above the FSDWS in two (2) samples collected in July 1996, as opposed to seven (7) in January 1996.

Sodium was detected above its FPDWS (160 mg/l) in only one (1) sample (NAS 41-4) collected in July 1996 as opposed to two (2) samples in January 1996 (Table 3-9). The concentration detected in NAS 41-4 (530 mg/l) is slightly lower than the sodium concentration detected in this well in January 1996. Figure 3-8 shows the sodium concentrations detected in excess of the FPDWS in samples collected from the shallow zone in July 1996.

Overall, the chemical data for the shallow aquifer appear generally consistent with previous data. As expected, the highest areas of contamination correspond to the known source areas.

3.2.3 Deep Aquifer

Generally, in the deep aquifer zone, fewer compounds were detected exceeding the permit standards than in the shallow zone. Results of deep zone well analysis are included in Tables 3-4 and 3-7.

Barium was the only Condition 8 parameter detected above the permit standards in the deep aquifer wells. Barium was reported in NAS 4-20D at 49 μg/l and NAS 4-21D at 36 μg/l (Figure 3-9).

Concentrations of the Permit Part V-Condition 9 parameters found in the deep wells at the site were generally similar to concentrations found in nearby shallow wells at the ISDBs. The only Condition 9 parameters detected with concentrations above or outside of the regulatory standards (no permit standards were specified) in the deep zone were field pH, turbidity and iron which may be naturally occurring. pH values measured in each of the two (2) deep zone samples were below the FSDWS (6.5 to 8.5). Figure 3-10 shows field pH values measured in the deep zone samples prior to sample collection. pH values were slightly higher in the deep zone samples collected in July 1996 than in those collected in January 1996 (Rust, 1996).

Field turbidity was measured above the FPDWS (1 NTU) in either of the deep zone samples collected in July 1996.

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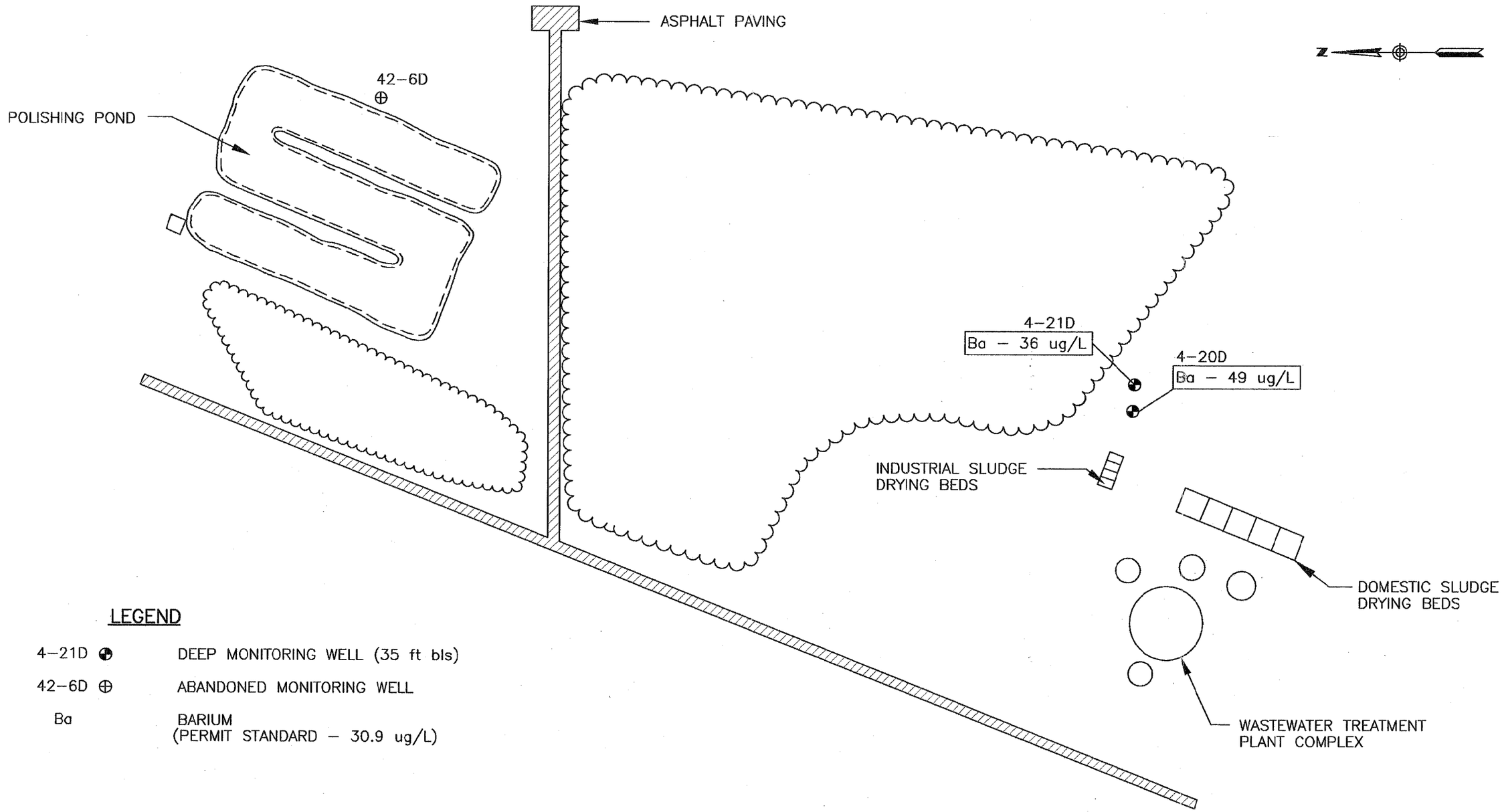

SOURCE: ESE, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-9

DISTRIBUTION OF CONDITION 8 METALS ABOVE PERMIT STANDARDS IN THE DEEP ZONE JULY 29-30, 1996

NAS JACKSONVILLE, FLORIDA

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01031B092

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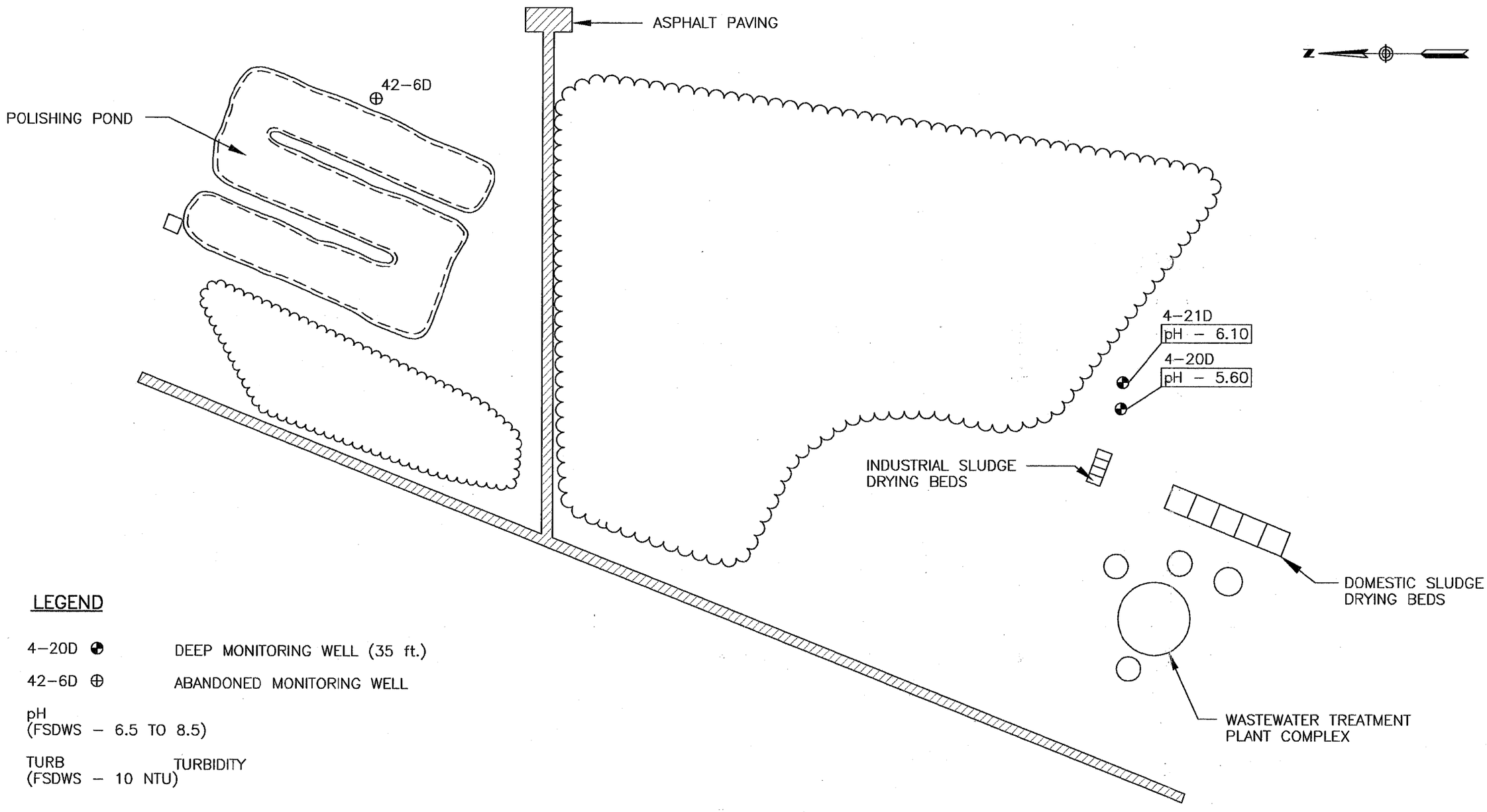

LEGEND

4-20D ◐ DEEP MONITORING WELL (35 ft.)

42-6D ⊕ ABANDONED MONITORING WELL

pH
(FSDWS - 6.5 TO 8.5)

TURB TURBIDITY
(FSDWS - 10 NTU)

200 0 200
SCALE 1"=200' FEET

SOURCE: ESE, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-10
DISTRIBUTION OF FIELD PARAMETERS DETECTED OUTSIDE OR ABOVE REGULATORY STANDARDS IN THE DEEP ZONE - JULY 29-30, 1996
NAS JACKSONVILLE, FLORIDA
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Iron was found in all deep zone wells at concentrations higher than the FSDWS of 300 μg/l, with the highest value in NAS 4-20D (8,400 μg/l). Iron concentrations decreased between January 1996 and July 1996 in one (1) of two (2) deep wells (Rust, 1996). Figure 3-11 depicts the distribution of iron concentrations detected in the deep monitoring wells in July 1996.

Overall, concentrations of most compounds detected in the deep aquifer zone were typically similar to the concentrations of those same compounds detected in near-by shallow zone wells. Compound concentrations were slightly higher than concentrations detected previously in the deep zone (Rust, 1996).

3.2.4 Results of QA/QC Samples

Field QA/QC samples included the collection of two duplicate samples and two equipment blanks. Duplicate samples represented 10 percent of the number of samples collected and were both obtained from NAS 4-9 (NAS 4-9D and NAS 4-9DD). Two equipment blank (EB) samples (EB #1 and EB #2) were collected during the July 1996 sampling event. EB #1 was collected by pouring distilled water through a disposable teflon bailer and then dispensing the water into the appropriate sample containers. EB #2 was collected by dispensing tap water used to decontaminate any reusable sampling equipment into the appropriate sample containers. The analytical results for the QA/QC samples are shown in Tables 3-4 and 3-7 and in Appendix D.

Results of the duplicate samples from NAS 4-9D and NAS 4-9DD were slightly varied, but agreed relatively well with their respective well samples. Values for most compounds varied only slightly between the original sample and the two (2) duplicate samples. Iron was detected in NAS 4-9 at 710 μg/l, but in NAS 4-9D and NAS 4-9DD at 840 μg/l and 860 μg/l, respectively. Radium 228 was detected in NAS 4-9D, but not in NAS 4-9 and NAS 4-9DD. Gross beta was detected in NAS 4-9 at 4.5± 3.8 pCi/L, NAS 4-9D at 6.3±4.2 pCi/L and NAS 4-9DD at 7.9±3.5 pCi/L.

The equipment blank samples contained generally low concentrations of various compounds. Only chloroform was detected in EB #1 (distilled water). Barium, iron, sodium, zinc, chloride, fluoride, sulfate and chloroform were detected in EB #2 (tap water). An elevated specific conductivity value (620 umhos/cm) was also measured in EB#2. The concentrations of these compounds observed in the EB samples were relatively small and were likely present in the sample sources (EB #1 bottled distilled water, EB #2 tap water at wastewater plant). None of these compounds were found in abnormally high concentrations in any of the well samples. This indicates that contaminants detected in the equipment blank did not adversely affect any ground-water samples from the site.

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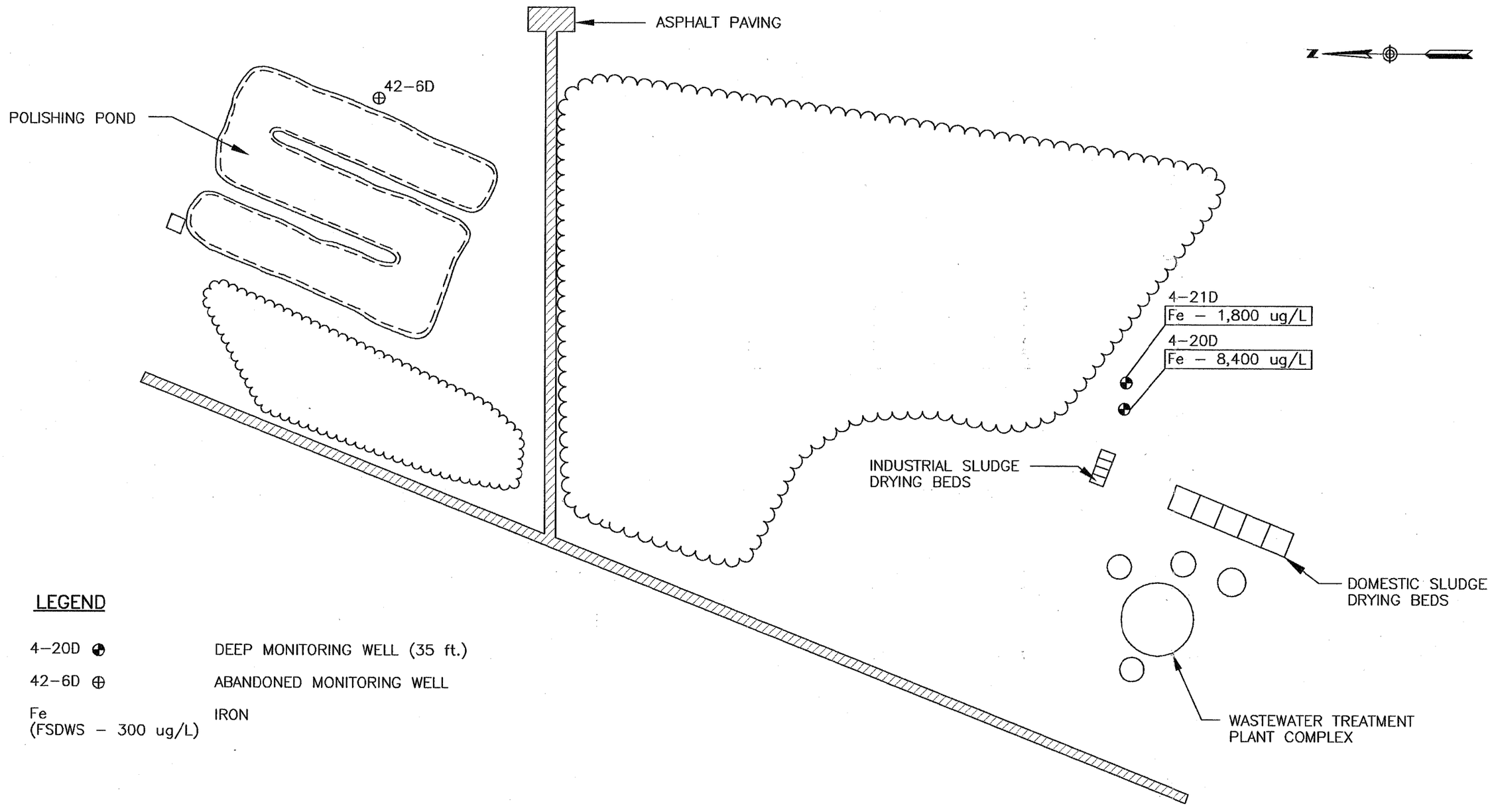

LEGEND

4-20D ◐	DEEP MONITORING WELL (35 ft.)
42-6D ⊕	ABANDONED MONITORING WELL
Fe (FSDWS - 300 ug/L)	IRON

200 0 200
SCALE 1"=200' FEET

SOURCE: ESE, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-11
DISTRIBUTION OF IRON CONCENTRATIONS IN EXCESS OF FSDWS IN THE DEEP ZONE
JULY 29-30, 1996
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

01031B087

4.0 CONCLUSIONS

As part of this contract to date, six (6) rounds of quarterly ground-water level measurements have been obtained. The first round of measurements was collected in January 1995, the second round in May 1995, the third round in July 1995, the fourth round in October 1995, the fifth round in January 1996 and the sixth round was collected in July 1996 by Rust personnel.

In early April 1996, the monitoring wells adjacent to the PP were abandoned during activities associated with remediation of the PP under CERCLA. The removal of these wells limited all water level measurements and sampling activities associated with this project to those wells surrounding the drying beds. Therefore hydraulic characteristics and ground-water quality were not determined between the drying beds and PP and adjacent to the PP during April and July 1996 and will not be determined until the well network near the PP is replaced.

Based on ground-water elevations measured on April 22, 1996, the direction of ground-water flow in the shallow zone appears to be to the southeast.

Based on ground-water elevations collected on July 29, 1996, the direction of ground-water flow in the shallow zone beneath the DSDBs and ISDBs is generally to the southeast. The direction of ground-water flow beneath the drying beds, as determined in July 1996, is consistent with the ground-water flow direction determined for this area during previous events. The general direction of ground-water flow near the DSDBs and ISDBs in July 1994 was northeast. However, the flow direction beneath the drying beds since January 1995 has been to the east-southeast.

The horizontal gradient for the shallow zone between the DSDB and the PP in January 1996 was 4.0 x 10^{-3} ft/ft. The horizontal gradient for the shallow zone between the drying beds and the PP in July 1996 was 6.0 x 10^{-3} ft/ft.

Vertical flow gradients were generally downward between the shallow and deep aquifer zones. The average vertical gradient for the area near the DSDBs and ISDBs in April 1996 was 1.90 x 10^{-3} ft/ft and 1.6 x 10^{-3} ft/ft in July 1996. These values are consistent with or slightly higher than those determined during previous events.

The ground-water flow rate for the shallow zone beneath the DSDBs and ISDBs was 0.005 ft/day to 0.19 ft/day (1.83 to 69.35 ft/year) in January 1996. The flow rates for the shallow zone beneath

the drying beds are similar to those determined during the past four (4) water level measurement events.

A horizontal gradient of 6.0 x 10^{-3} ft/ft was used to calculate the ground-water flow rate of 0.007 ft/day to 0.28 ft/day (2.55 ft/year to 102.2 ft/year) for the area near the PP in July 1996.

As previously stated six (6) parameters exceeded condition 8 permit standards at the point of compliance wells in the shallow aquifer zone during the July 1996 sampling event. These parameters included five (5) metals in the remaining four (4) point of compliance wells. Barium exceeded the standards most frequently, with arsenic, cadmium, lead and nickel detected above permit standards in only one well each. During the July 1994 sampling event, total phenols and 2 cresol compounds, 2-methyl phenol and 4-methyl phenol were detected above the permit standard in NAS 41-4, adjacent to the DSDBs. However, the only organic parameter detected during the July 1996 sampling event was total phenols. Total phenols were detected in NAS 41-4 at 51 μg/l which is lower than the concentration for this compound in July 1995. Carbon disulfide was not detected in any ground-water samples collected in July 1996 including the background well NAS 4-9. The overall analytical data for the shallow aquifer zone demonstrate an influence of the two remaining source areas on the quality of the shallow ground-water near the areas. The DSDBs appear to have the most significant impact on the quality of the shallow aquifer ground-water.

During the July 1996 sampling event, only one (1) condition 8 compound, barium, was detected above permit standards in a deep zone sample. Barium was detected in NAS 4-20D at 49 μg/l and NAS 4-21D at 36 μg/l (Table 3-6).

The number of condition 9 parameters detected above or outside of the FSDWS or FPDWS has increased from three (3) to seven (7) since January 1996. The condition 9 parameters iron, pH, specific conductance, turbidity, gross alpha, manganese, and sodium were detected above or outside of their respective FSDWS or FPDWS in several shallow wells. Generally, the concentrations of the various condition 9 compounds in the deep zone wells were similar to the concentrations of the same detected parameters in the shallow zone wells. Three (3) condition 9 parameters, pH, turbidity, and iron were detected above or outside of the FSDWS and FPDWS in both deep wells sampled in July 1996 (NAS 4-20D and 4-21D).

Results of QA/QC samples document that the sampling and analysis was performed properly. No compounds were detected in any of the method blanks or trip blanks. Chloroform was detected at

very low concentrations in EB-1 and EB-2. It is possible that the bailers used to collect these samples may have been contaminated or both sources of the samples (EB-1 - distilled water and EB-2 - potable water) contained chloroform. However, this compound was not detected in any ground-water samples. Therefore, this sampling event has not been compromised.

Phenol, barium, iron, sodium, zinc, fluoride, chloride and sulfate were detected in EB-2 which was collected from a potable water tap at the wastewater treatment facility. These compounds were likely present in the sample source. In that these compounds were not found in abnormally high concentrations in the well samples, these contaminants did not adversely affect any ground-water samples at the site.

5.0 CERTIFICATION

The Semi-Annual Report on Ground-Water Monitoring at the Domestic Sludge Drying Beds, Industrial Sludge Drying Beds, and Polishing Pond, Naval Air Station, Jacksonville, Florida has been prepared in accordance with The Florida statutes and applicable rules and regulations. The information and data contained within this is to the best of my knowledge and belief, true, accurate and complete.

By: James L. Brickell, Ph.D., PE

Signature _____
Florida P.E. # 47202

Firm: Rust Environment and Infrastructure

Date: 10/30/96

Seal:

6.0 REFERENCES

Rust Environment and Infrastructure. Comprehensive Quality Assurance Plan No. 880742G.

Rust Environment and Infrastructure, January 1995. Health and Safety Plan, NAS Jacksonville, RCRA Monitoring.

Rust Environment and Infrastructure, January 1995. Sampling and Analytical Project Plan, Quality Assurance Project Plan, Domestic Sludge Drying Beds, Industrial Sludge Drying Beds, and Polishing Pond, Naval Air Station, Jacksonville, Florida.

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Merchant, R. 1989. Ground Water Guidance Concentrations. Florida Department of Environmental Regulation, Division of Water Facilities, Bureau of Ground Water Protection, Tallahassee, FL.

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APPENDIX A

WATER LEVEL DATA SUMMARY REPORTS

RUST ENVIRONMENT & INFRASTRUCTURE

GROUND-WATER LEVEL DATA SUMMARY

PROJECT: RCRA Monitoring -DSDB, ISDB, PP

LOCATION: NAS Jacksonville, Fla.

CLIENT: NAVFAC

SURVEY DATUM: MSL

MEASURING DEVICE: Solinst Water Level Probe

JOB NUMBER 34921.000

DATE 4-22-96

MEASURED BY Cheri Parsons/Cliff White

WELL NUMBER	MEASURING POINT		DEPTH TO WATER (FT)	ELEVATION OF WATER (FT)	COMMENTS	Airspace Monitoring (parts per million):	
	Description	Elevation (FT)			Total Depth	Bkgrd	Wellhead
NAS 4-9	TOC	23.52	6.94	16.58	14.20	NR	NR
NAS 4-5	"	20.62	5.00	15.62	13.61		
NAS 4-20	"	20.81	5.43	15.38	14.11	OVA not working.	
NAS 4-20D	"	20.67	5.32	15.35	35.24		
NAS 4-21	"	20.45	5.25	15.20	15.35		
NAS 4-21D	"	19.95	4.78	15.17	35.06		
NAS 41-4	"	20.64	5.39	15.25	16.51		
NAS 41-3	"	20.09	4.82	15.27	14.72		
NAS 41-6	"	20.25	4.77	15.48	13.02		
NAS 42-5	"	18.57	NA	NA	NA		
NAS 42-6D	"	18.18	NA	NA	NA		
NAS 42-7	"	18.19	NA	NA	NA		
NAS 42-8R	"	18.19	NA	NA	NA		

RUST ENVIRONMENT & INFRASTRUCTURE

GROUND-WATER LEVEL DATA SUMMARY

PROJECT: RCRA Monitoring -DSDB, ISDB, PP

LOCATION: NAS Jacksonville, Fla.

CLIENT: NAVFAC

SURVEY DATUM: MSL

MEASURING DEVICE: Solinst Water Level Probe

JOB NUMBER 34921.000

DATE 7-29-96

MEASURED BY Dana Turner / Michael Cain

WELL NUMBER	MEASURING POINT		DEPTH TO WATER (FT)	ELEVATION OF WATER (FT)	COMMENTS	Airspace Monitoring (parts per million):	
	Description	Elevation (FT)			Total Depth	Bkgrd	Wellhead
NAS 4-9	TOC	23.52	7.28	16.24	14.20	0.0	0.0
NAS 4-5	"	20.62	5.61	15.01	13.61	0.0	0.0
NAS 4-20	"	20.81	6.15	14.66	14.11	0.0	0.0
NAS 4-20D	"	20.67	6.04	14.63	35.24	0.0	0.0
NAS 4-21	"	20.45	6.03	14.42	15.35	0.0	0.0
NAS 4-21D	"	19.95	5.55	14.40	35.06	0.0	0.0
NAS 41-4	"	20.64	6.20	14.44	16.51	0.0	0.0
NAS 41-3	"	20.09	5.71	14.38	14.72	0.0	0.0
NAS 41-6	"	20.25	5.44	14.81	13.02	0.0	0.0
NAS 42-5	"	18.57	NA	NA	NA	NA	NA
NAS 42-6D	"	18.18	NA	NA	NA	NA	NA
NAS 42-7	"	18.19	NA	NA	NA	NA	NA
NAS 42-8R	"	18.19	NA	NA	NA	NA	NA
					NAS 42-5, 42-6D, 42-7, and 42-8R were destroyed		
					during remediation at the polishing pond.		

APPENDIX B

FIELD DATA INFORMATION LOG FOR GROUND-WATER SAMPLING REPORTS

Field Data Information Lc r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-9 / NAS 4-9D (Dup. #1)/ NAS 4-9DD (Dup. #2)
X Upgradient ____ Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 14.20 1/100 ft
Depth to Ground Water (DGW) = 7.31 Groundwater Elevation (ft msl) 16.21
Length of Water Column (LWC) = TWD - DGW = 6.89 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.12 gal
5 Casing Volumes = 5.62 gal = Standard Evacuation Volume
Method of Well Evacuation Teflon Bailer
Method of Sample Collection Teflon Bailer
Total Volume of Water Removed 6 gal

Casing Diameter 2 in inches
Casing Material Schd. 40 PVC
Measuring Point Elevation TOC 23.52 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 9.20 - 14.20 1/100 ft
Dedicated Pump or Bailer YES x NO ____ Type bailer
Steel Guard Pipe Around Casing YES x NO ____
Locking Cap YES x NO ____
Protective Post/Abutment YES ____ NO x
Well Integrity Satisfactory YES x NO ____
Well Yield LOW ____ MODERATE ____ HIGH x
Remarks Duplicae sample times : 0850 / 0900
Sample Time : 0840
Purge Time : 0805
Coliform Sample Time: 1641 / 1642 / 1643

Field Analysis

Volume (gallons)	6.0						
Time (military)	0850						
pH (S.U.)	6.08						
Salinity (%)	0.01						
Sp. Cond. (µS/cm)	0.436						
Water Temp. (C)	27.2						
Turbidity (NTU)	180*						
D.O. (mg/L)	9.51						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

Field Data Information Lc r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-5
___ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 13.61 1/100 ft
Depth to Ground Water (DGW) = 5.65 Groundwater Elevation (ft msl) 14.97
Length of Water Column (LWC) = TWD - DGW = 7.96 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.30 gal
5 Casing Volumes = 6.49 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 6.5 gal

Casing Diameter 2 inches
Casing Material Sched. 40 PVC
Measuring Point Elevation TOC 20.62 1/100 ft
Height of Riser (above land surface) - 1/100 ft
Land Surface Elevation - 1/100 ft
Screened Interval 8.61 - 13.61 1/100 ft
Dedicated Pump or Bailer YES ___ NO X Type bailer
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Well Yield LOW ___ MODERATE ___ HIGH X
Remarks Purge time: 1610
Sample time: 1640
Coliform sample time: 1640

Field Analysis

Volume (gallons)	6.5						
Time (military)	1630						
pH (S.U.)	6.47						
Salinity (%)	0.01						
Sp. Cond. (µS/cm)	0.280						
Water Temp. (C)	34.5						
Turbidity (NTU)	24*						
D.O. (mg/L)	5.15						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

Field Data Information Lc ›r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-20
____ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 14.11 1/100 ft
Depth to Ground Water (DGW) = 6.22 Groundwater Elevation (ft msl) 14.59
Length of Water Column (LWC) = TWD - DGW = 7.89 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.29 gal
5 Casing Volumes = 6.43 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 4 gal

Casing Diameter 2 Inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.81' 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 9.11 - 14.11 1/100 ft
Dedicated Pump or Bailer YES X NO ____ Type bailer
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES X NO ____
Well Yield LOW X MODERATE ____ HIGH ____
Remarks Well purged dry after removing 4 gallons.
Purge time: 1029
Sample Time: 1100
Coliform Sample Time: 1630
Turbidity meter not functioning properly.

Field Analysis

Volume (gallons)	4						
Time (military)	1055						
pH (S.U.)	5.24						
Salinity (%)	0.00						
Sp. Cond. (µS/cm)	0.089						
Water Temp. (C)	28.3						
Turbidity (NTU)	999*						
D.O. (mg/L)	10.08						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

fldinfo 10/87

Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-20D
____ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 35.24 1/100 ft
Depth to Ground Water (DGW) = 6.08 Groundwater Elevation (ft msl) 14.59
Length of Water Column (LWC) = TWD - DGW = 29.16 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 4.75 gal
5 Casing Volumes = 23.77 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 24 gal

Casing Diameter 2 inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.67' 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 30.24 - 35.24 1/100 ft
Dedicated Pump or Bailer YES ___ NO X Type bailer
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Well Yield LOW ___ MODERATE ___ HIGH X
Remarks Purge Time : 1020
Sample Time: 1050
Coliform Sample Time: 1635

Field Analysis

Volume (gallons)	24						
Time (military)	1045						
pH (S.U.)	5.44						
Salinity (%)	0.00						
Sp. Cond. (µS/cm)	0.139						
Water Temp. (C)	27.7						
Turbidity (NTU)	21*						
D.O. (mg/L)	10.32						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

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Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-21
____ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 15.35 1/100 ft
Depth to Ground Water (DGW) = 6.08 Groundwater Elevation (ft msl) 14.37
Length of Water Column (LWC) = TWD - DGW = 9.27 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.51 gal
5 Casing Volumes = 7.56 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 3 gal

Casing Diameter 2 inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.45' 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 10.35 - 15.35 1/100 ft
Dedicated Pump or Bailer YES X NO ____ Type bailer
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES X NO ____
Well Yield LOW X MODERATE ____ HIGH ____
Remarks Purge Time: 1135
Sample Time: 1150
Coliform Sample Time: 1640
Well purged dry after removing 3 gallons total.

Field Analysis

Volume (gallons)	3.0						
Time (military)	1145						
pH (S.U.)	4.65						
Salinity (%)	0.00						
Sp. Cond. (µS/cm)	0.062						
Water Temp. (C)	29.0						
Turbidity (NTU)	59*						
D.O. (mg/L)	10.12						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity > 10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

fldinfo 10/87

Field Data Information Lc ›r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 4-21D
____ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 35.06 1/100 ft
Depth to Ground Water (DGW) = 5.60 Groundwater Elevation (ft msl) 14.85
Length of Water Column (LWC) = TWD - DGW = 29.46 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 4.80 gal
5 Casing Volumes = 24.01 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 24.0 gal

Casing Diameter 2 inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.45' 1/100 ft
Height of Riser (above land surface) ____ 1/100 ft
Land Surface Elevation ____ 1/100 ft
Screened Interval 30.06 - 35.06 1/100 ft
Dedicated Pump or Bailer YES X NO ____ Type bailer
Steel Guard Pipe Around Casing YES X NO ____
Locking Cap YES X NO ____
Protective Post/Abutment YES X NO ____
Well Integrity Satisfactory YES ____ NO x
Well Yield LOW ____ MODERATE ____ HIGH X
Remarks Purge Time: 1130
Sample Time: 1220
Coliform Sample Time: 1645

Field Analysis

Volume (gallons)	24.0						
Time (military)	1215						
pH (S.U.)	5.82						
Salinity (%)	0.00						
Sp. Cond. (µS/cm)	0.141						
Water Temp. (C)	29.0						
Turbidity (NTU)	22*						
D.O. (mg/L)	9.91						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 41-4
___ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 16.51 1/100 ft
Depth to Ground Water (DGW) = 6.26 Groundwater Elevation (ft msl) 14.38
Length of Water Column (LWC) = TWD - DGW = 10.25 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.67 gal
5 Casing Volumes = 8.35 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 5.0 gal

Casing Diameter 2 Inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.64' 1/100 ft
Height of Riser (above land surface) ___ 1/100 ft
Land Surface Elevation ___ 1/100 ft
Screened Interval 11.51 - 16.51 1/100 ft
Dedicated Pump or Bailer YES x NO ___ Type bailer
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Well Yield LOW ___ MODERATE ___ HIGH X
Remarks Purge time: 1550
Sample time: 1615
Coliform sample time: 1615

Field Analysis

Volume (gallons)	5.0						
Time (military)	1610						
pH (S.U.)	8.89						
Salinity (%)	0.09						
Sp. Cond. (µS/cm)	1.98						
Water Temp. (C)	35.4						
Turbidity (NTU)	454*						
D.O. (mg/L)	5.05						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample was only slightly cloudy, therefore ground-water sample collected.

fldinfo 10/87

Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 41-3
___ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 14.72 1/100 ft
Depth to Ground Water (DGW) = 5.76 Groundwater Elevation (ft msl) 14.33
Length of Water Column (LWC) = TWD - DGW = 8.96 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.46 gal
5 Casing Volumes = 7.30 gal = Standard Evacuation Volume
Method of Well Evacuation Disposable Bailer
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed 7.5 gal

Casing Diameter 2 inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.09' 1/100 ft
Height of Riser (above land surface) ___ 1/100 ft
Land Surface Elevation ___ 1/100 ft
Screened Interval 9.72 - 14.72 1/100 ft
Dedicated Pump or Bailer YES X NO ___ Type bailer
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Well Yield LOW ___ MODERATE ___ HIGH X
Remarks Purge time: 1400
Sample time: 1515
Coliform sample time: 1515

Field Analysis

Volume (gallons)	7.5						
Time (military)	1510						
pH (S.U.)	6.22						
Salinity (%)	0.08						
Sp. Cond. (µS/cm)	1.85						
Water Temp. (C)	34.7						
Turbidity (NTU)	381*						
D.O. (mg/L)	5.56						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity > 10 NTU. Sample only slightly cloudy, threrfore ground-water sample collected.

fldinfo 10/87

Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # NAS 41-6
___ Upgradient X Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = 13.02 1/100 ft
Depth to Ground Water (DGW) = 5.50 Groundwater Elevation (ft msl) 14.75
Length of Water Column (LWC) = TWD - DGW = 7.52 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 1.23 gal
5 Casing Volumes = 6.13 gal = Standard Evacuation Volume
Method of Well Evacuation Teflon Bailer
Method of Sample Collection Teflon Bailer
Total Volume of Water Removed 3.0 gal

Casing Diameter 2 inches
Casing Material Schedule 40 PVC
Measuring Point Elevation TOC 20.25' 1/100 ft
Height of Riser (above land surface) ___ 1/100 ft
Land Surface Elevation ___ 1/100 ft
Screened Interval 8.02 - 13.02 1/100 ft
Dedicated Pump or Bailer YES X NO ___ Type bailer
Steel Guard Pipe Around Casing YES X NO ___
Locking Cap YES X NO ___
Protective Post/Abutment YES X NO ___
Well Integrity Satisfactory YES X NO ___
Well Yield LOW X MODERATE ___ HIGH ___
Remarks Purge time: 1405
Sample time: 1600
Coliform sample time: 1600
Well purged dry after removing 3 gallons.

Field Analysis

Volume (gallons)	3.0						
Time (military)	1555						
pH (S.U.)	6.55						
Salinity (%)	0.01						
Sp. Cond. (µS/cm)	0.289						
Water Temp. (C)	32.3						
Turbidity (NTU)	767*						
D.O. (mg/L)	4.82						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS: * Turbidity >10 NTU. Sample only slightly cloudy, therefore ground-water sample collected.

fldinfo 10/87

Field Data Information Lo r Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # EB-1 (DI water through bailer)
____ Upgradient ____ Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = NA 1/100 ft
Depth to Ground Water (DGW) = NA Groundwater Elevation (ft msl) 0
Length of Water Column (LWC) = TWD - DGW = 0 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 0.00 gal
5 Casing Volumes = 0.00 gal = Standard Evacuation Volume
Method of Well Evacuation NA
Method of Sample Collection Disposable Bailer
Total Volume of Water Removed NA gal

Casing Diameter NA Inches
Casing Material NA
Measuring Point Elevation NA 1/100 ft
Height of Riser (above land surface) NA 1/100 ft
Land Surface Elevation NA 1/100 ft
Screened Interval NA 1/100 ft
Dedicated Pump or Bailer YES x NO ___ Type ___
Steel Guard Pipe Around Casing YES ___ NO ___
Locking Cap YES ___ NO ___
Protective Post/Abutment YES ___ NO ___
Well Integrity Satisfactory YES ___ NO ___
Well Yield LOW ___ MODERATE ___ HIGH ___
Remarks Sample Time: 1500
Coliform Sample Time: 1500

Field Analysis

Volume (gallons)	NA						
Time (military)	1458						
pH (S.U.)	5.93						
Salinity (%)	0.00						
Sp. Cond. (µS/cm)	0.000						
Water Temp. (C)	33.9						
Turbidity (NTU)	-0						
D.O. (mg/L)	7.12						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

COMMENTS/OBSERVATIONS:

fldinfo 10/87

Field Data Information Log for Ground Water Sampling

RUST ENVIRONMENT & INFRASTRUCTURE

Date (yr/mo/day) 96/7/30
Field Personnel Dana Turner / Michael Cain
Site Name NAS Jacksonville
RUST E&I Project 34921.000
Well ID # EB-2 (Potable Decon Water)
____ Upgradient ____ Downgradient
Weather Conditions Sunny, hot
Air Temperature 90 °F
Total Well Depth (TWD) = NA 1/100 ft
Depth to Ground Water (DGW) = NA Groundwater Elevation (ft msl) 0
Length of Water Column (LWC) = TWD - DGW = 0 1/100 ft
1 Casing Volume (OCV) = LWC x 0.163 = 0.00 gal
5 Casing Volumes = 0.00 gal = Standard Evacuation Volume
Method of Well Evacuation NA
Method of Sample Collection NA
Total Volume of Water Removed ____ gal

Casing Diameter NA inches
Casing Material NA
Measuring Point Elevation NA 1/100 ft
Height of Riser (above land surface) NA 1/100 ft
Land Surface Elevation NA 1/100 ft
Screened Interval NA 1/100 ft
Dedicated Pump or Bailer YES ____ NO ____ Type ____
Steel Guard Pipe Around Casing YES ____ NO ____
Locking Cap YES ____ NO ____
Protective Post/Abutment YES ____ NO ____
Well Integrity Satisfactory YES ____ NO ____
Well Yield LOW ____ MODERATE ____ HIGH ____
Remarks Sample Time: 1650
Coliform Sample Time: 1650

Field Analysis

Volume (gallons)	NA						
Time (military)	1645						
pH (S.U.)	7.36						
Salinity (%)	0.02						
Sp. Cond. (µS/cm)	0.507						
Water Temp. (C)	34.3						
Turbidity (NTU)	3						
D.O. (mg/L)	3.69						
T.D.S. (mg/L)	NA						

* (1) Clear (2) Slight (3) Moderate (4) High

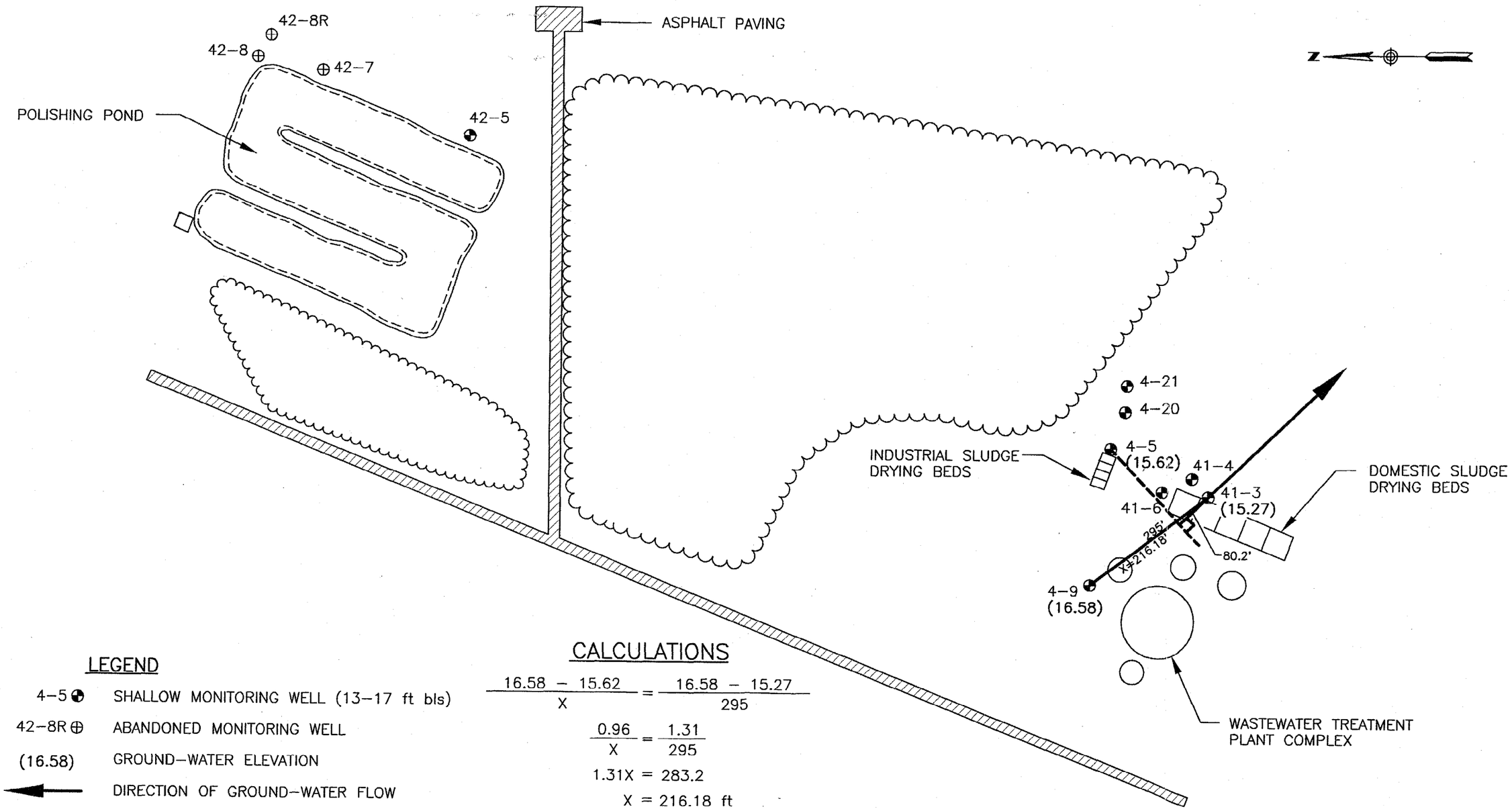
COMMENTS/OBSERVATIONS: ____

fldinfo 10/87

APPENDIX C

HORIZONTAL AND VERTICAL HYDRAULIC GRADIENT CALCULATIONS

DWG: P:\CADD\34921\34921H57 PLOTTED: 10/01/96



LEGEND

4-5 ◐	SHALLOW MONITORING WELL (13-17 ft bls)
42-8R ⊕	ABANDONED MONITORING WELL
(16.58)	GROUND-WATER ELEVATION
◄	DIRECTION OF GROUND-WATER FLOW
- - - - -	EQUIPOTENTIAL LINE
———	TRANSECT FROM HIGHEST TO LOWEST WATER TABLE WELL

200 0 200
SCALE 1"=200' FEET

SOURCE: ESE, 1994

CALCULATIONS

$$\frac{16.58 - 15.62}{X} = \frac{16.58 - 15.27}{295}$$

$$\frac{0.96}{X} = \frac{1.31}{295}$$

$$1.31X = 283.2$$

$$X = 216.18 \text{ ft}$$

$$\text{HYDRAULIC GRADIENT} = \frac{15.62 - 15.27}{80.2 \text{ ft}} = 0.004 \text{ ft/ft}$$

RUST ENVIRONMENT & INFRASTRUCTURE

HORIZONTAL HYDRAULIC GRADIENT CALCULATIONS – APRIL 22, 1996
SHALLOW ZONE – DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000 OCTOBER 1996

010318092

Vertical Hydraulic Gradient Calculations
NAS Jacksonville
Semi-Annual Ground-Water Monitoring Program - April 22, 1996

$$\frac{\text{Shallow Well Ground-water Elevation} - \text{Deep Well Ground-water Elevation}}{\text{Distance between bottom of the shallow well and top of deep well screen}} = \text{Vertical Hydraulic Gradient}$$

DSDBs & ISDBs

Well #	Ground-Water Elevation
NAS 4-20	15.38
NAS 4-20D	15.35

Vertical Gradient:

$$\frac{15.38 - 15.35}{16.13} = 1.85E\text{-}03 \text{ ft/ft}$$

Average Hydraulic Gradient ISDBs & DSDBs:

$$\frac{1.85E\text{-}03 + 2.0E\text{-}03}{2} =$$

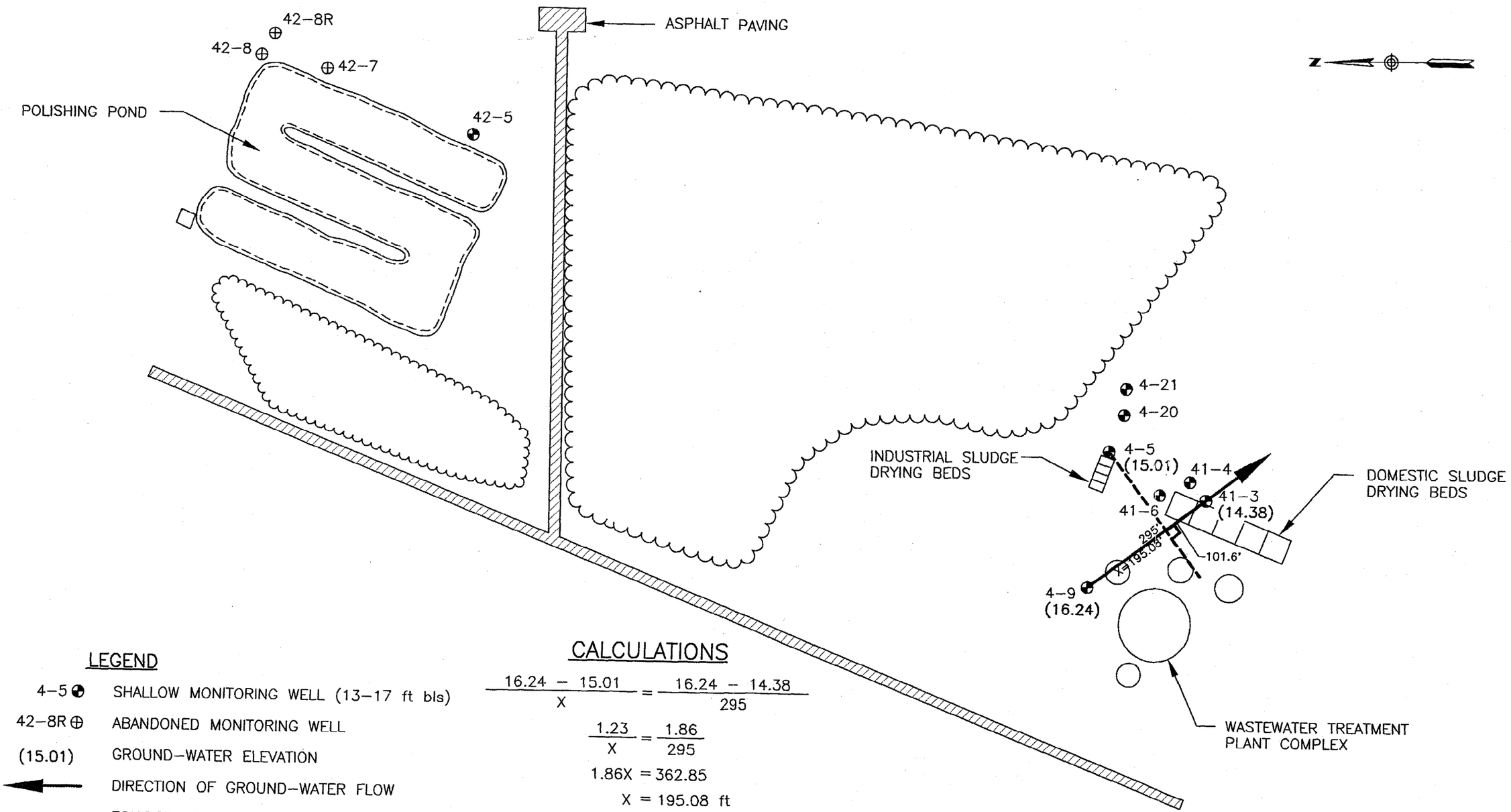
1.9E-03 ft/ft

Well #	Ground-Water Elevation
NAS 4-21	15.20
NAS 4-21D	15.17

Vertical Gradient:

$$\frac{15.20 - 15.17}{14.71} = 2.0E\text{-}03 \text{ ft/ft}$$

DWG: P:\CADD\34921\34921H58 PLOTTED: 10/01/96



LEGEND

4-5 ◐	SHALLOW MONITORING WELL (13-17 ft bls)
42-8R ⊕	ABANDONED MONITORING WELL
(15.01)	GROUND-WATER ELEVATION
←	DIRECTION OF GROUND-WATER FLOW
- - - -	EQUIPOTENTIAL LINE
———	TRANSECT FROM HIGHEST TO LOWEST WATER TABLE WELL

200 0 200
SCALE 1"=200' FEET

SOURCE: ESE, 1994

CALCULATIONS

$$\frac{16.24 - 15.01}{X} = \frac{16.24 - 14.38}{295}$$

$$\frac{1.23}{X} = \frac{1.86}{295}$$

$$1.86X = 362.85$$

$$X = 195.08 \text{ ft}$$

$$\text{HYDRAULIC GRADIENT} = \frac{15.01 - 14.38}{101.6 \text{ ft}} = 0.006 \text{ ft/ft}$$

RUST ENVIRONMENT & INFRASTRUCTURE

HORIZONTAL HYDRAULIC GRADIENT CALCULATIONS – JULY 30, 1996
SHALLOW ZONE – DSDB AND ISDB
NAS JACKSONVILLE, FLORIDA
RUST Project No. 34921.000

OCTOBER 1996

Vertical Hydraulic Gradient Calculations
NAS Jacksonville
Semi-Annual Ground-Water Monitoring Program - July 29, 1996

$$\frac{\text{Shallow Well Ground-water Elevation} - \text{Deep Well Ground-water Elevation}}{\text{Distance between bottom of the shallow well and top of deep well screen}} = \text{Vertical Hydraulic Gradient}$$

DSDBs & ISDBs

Well #	Ground-Water Elevation
NAS 4-20	14.66
NAS 4-20D	14.63

Vertical Gradient:

$$\frac{14.66 - 14.63}{16.13} = 1.8E\text{-}03 \text{ ft/ft}$$

Average Hydraulic Gradient ISDBs & DSDBs:

$$\frac{1.8E\text{-}03 + 1.4E\text{-}03}{2} =$$

1.6E-03 ft/ft

Well #	Ground-Water Elevation
NAS 4-21	14.42
NAS 4-21D	14.40

Vertical Gradient:

$$\frac{14.42 - 14.40}{14.71} = 1.4E\text{-}03 \text{ ft/ft}$$

APPENDIX D

LABORATORY ANALYTICAL DATA REPORTS

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S6-84428
Received: 31 JUL 96
Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Volatiles by GC/MS (8240)					
Vinyl chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane), ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon disulfide, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	7.5
Chloroform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK), ug/l	<10	<10	<10	<10	<10
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<2.0	<2.0	<2.0	<2.0	<2.0
Surrogate - Toluene-d8	94 %	92 %	93 %	91 %	94 %

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Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Surrogate - 4-Bromofluorobenzene	88 %	89 %	96 %	87 %	92 %
Surrogate - 1,2-Dichloroethane-d4	88 %	85 %	86 %	85 %	84 %
Date Analyzed	08.03.96	08.03.96	08.03.96	08.03.96	08.03.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0802C	0802C	0802C	0802C	0802C
Clock ID	2H0802	2H0802	2H0802	2H0802	2H0802
1,2-Dibromoethane (EDB) , ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Isobutyl alcohol, ug/l	<200	<200	<200	<200	<200
1,1,2-Trichloro-1,2,2-trifluoroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0

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84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
TCL Semivolatiles (8270)					
Phenol, ug/l	<10	<10	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<10	<10
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	<10	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10	<10
2-Nitrophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50	<50
4-Nitrophenol, ug/l	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol, ug/l	<50	<50	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50	<50	<50
Surrogate - Phenol d5	74 %	80 %	80 %	80 %	81 %
Surrogate - 2-Fluorophenol	67 %	70 %	71 %	71 %	71 %

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84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Surrogate - 2,4,6-Tribromophenol	99 %	110 %	100 %	100 %	110 %
Surrogate - Nitrobenzene - d5	68 %	70 %	74 %	74 %	76 %
Surrogate - 2-Fluorobiphenyl	70 %	74 %	72 %	72 %	74 %
Surrogate - Terphenyl - d14	44 %	72 %	28 %	28 %	76 %
Date Extracted	08.01.96	07.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.08.96	08.08.96	08.08.96	08.08.96	08.08.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801A	0801A	0801A	0801A	0801A
Instrument ID	MSD5970	MSD5970	MSD5970	MSD5970	MSD5970
Cresylic Acid, ug/l	<10	<10	<10	<10	<10
Pyridine, ug/l	<50	<50	<50	<50	<50
Alcohols & Acetates (DAI)					
Ethyl Cellosolve (2-Ethoxy Ethanol), mg/l	<20	<20	<20	<20	<20
2-Nitropropane, mg/l	<5.0	<5.0	<5.0	<5.0	<5.0
Date Analyzed	08.23.96	08.23.96	08.23.96	08.23.96	08.23.96
Arsenic (7060)					
Arsenic (7060), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G

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84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Barium (6010)					
Barium (6010), mg/l	0.020	0.020	0.020	0.074	0.049
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Cadmium (6010)					
Cadmium (6010), mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Chromium (6010)					
Chromium (6010), mg/l	<0.010	<0.010	<0.010	0.015	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: S6-84428
Received: 31 JUL 96
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Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Mercury (7470)					
Mercury (7470), mg/l	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Preparation Date	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0802S	0802S	0802S	0802S	0802S
Lead (7421)					
Lead (7421), mg/l	<0.0050	<0.0050	<0.0050	0.0056	<0.0050
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G
Selenium (7740)					
Selenium (7740), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Copper (6010)					
Copper (6010), mg/l	<0.025	<0.025	<0.025	<0.025	<0.025
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Iron (6010)					
Iron (6010), mg/l	0.71	0.84	0.86	3.6	8.4
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Manganese (6010)					
Manganese (6010), mg/l	0.10	0.10	0.10	0.010	0.031
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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LOG NO: S6-84428
Received: 31 JUL 96
Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Nickel (6010)					
Nickel (6010), mg/l	<0.040	<0.040	<0.040	<0.040	<0.040
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Sodium (6010)					
Sodium (6010), mg/l	2.5	2.5	2.4	5.6	19
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Vanadium (6010)					
Vanadium (6010), mg/l	<0.010	<0.010	<0.010	0.059	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

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84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Zinc (6010)					
Zinc (6010), mg/l	<0.020	<0.020	<0.020	<0.020	0.026
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Silver (6010)					
Silver (6010), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Total Cyanide (9012)					
Cyanide, Total (9012), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801A	0801A	0801A	0801A	0801A
pH (150.1)					
pH, units	6.5	6.5	6.5	5.5	5.6
Date Analyzed	07.31.96	07.31.96	07.31.96	07.31.96	07.31.96
Batch ID	0731B	0731B	0731B	0731B	0731B

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Specific Conductance (120.1)					
Specific Conductance, umhos/cm	530	530	520	120	180
Date Analyzed	08.01.96	08.08.96	08.08.96	08.08.96	08.08.96
Batch ID	0801A	0801A	0801A	0801A	0801A
Turbidity (180.1)					
Turbidity (180.1), NTU	12	6.8	10	310	2.1
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Batch ID	0801A	0801A	0801A	0801A	0801A
Nitrate-N (353.2)					
Nitrate-N, mg/l	<0.050	<0.050	<0.050	<0.050	<0.050
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0813A	0806C	0806C	0806C	0806C
Chloride (325.2)					
Chloride (325.2), mg/l	5.8	5.6	5.9	5.0	18
Date Analyzed	08.05.96	08.05.96	08.05.96	08.05.96	08.05.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0805B	0805C	0805C	0805C	0805C
Fluoride (340.2)					
Fluoride, mg/l	<0.20	<0.20	<0.20	<0.20	<0.20
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96

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84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Sulfate as SO4					
Sulfate as SO4, mg/l	31	32	29	24	5.4
Date Analyzed	08.06.96	08.06.96	08.06.96	08.06.96	08.06.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0806B	0806B	0806B	0806B	0806B
Radium - 226 (903.1)					
Radium - 226, pCi/l	<0.60	<0.60	<0.60	<0.60	<0.60
Prep or Extraction Date	08.06.96	08.06.96	08.06.96	08.06.96	08.06.96
Date Analyzed	08.13.96	08.13.96	08.13.96	08.13.96	08.13.96
Batch ID	072996R	072996R	072996R	072996R	072996R
Radium - 228 (904.0)					
Radium - 228, pCi/l	<1.0	1.5+/-0.43	<1.0	<1.0	<1.0
Prep or Extraction Date	08.13.96	08.13.96	08.13.96	08.13.96	08.13.96
Date Analyzed	08.15.96	08.15.96	08.16.96	08.15.96	08.16.96
Batch ID	073096G	073096G	073096G	073096G	073096G
Gross Alpha Radioactivity (9310/900.0)					
Gross Alpha, pCi/l	<3.0	<3.0	<3.0	<3.0	<3.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96	08.14.96	08.14.96
Date Analyzed	08.17.96	08.16.96	08.17.96	08.17.96	08.17.96
Batch ID	080996A	080996A	080996A	080996A	080996A

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84428-1	4-9	07-30-96/0840
84428-2	4-9D	07-30-96/0850
84428-3	4-9DD	07-30-96/0900
84428-4	4-20	07-30-96/1100
84428-5	4-20D	07-30-96/1050

PARAMETER	84428-1	84428-2	84428-3	84428-4	84428-5
Gross Beta Radioactivity (9310/900.0)					
Gross Beta, pCi/l	4.5+/-3.8	6.3+/-4.2	7.9+/-3.5	4.6+/-2.0	<4.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96	08.14.96	08.14.96
Date Analyzed	08.17.96	08.16.96	08.17.96	08.17.96	08.17.96
Batch ID	080996A	080996A	080996A	080996A	080996A

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-6	4-21	07-30-96/1150
84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Volatiles by GC/MS (8240)					
Vinyl chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane), ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon disulfide, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	1.2	<1.0	<1.0	<1.0
Chloroform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone (MEK), ug/l	<10	<10	<10	<10	<10
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<2.0	<2.0	<2.0	<2.0	<2.0
Surrogate - Toluene-d8	93 %	92 %	85 %	91 %	97 %

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-6	4-21	07-30-96/1150
84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Surrogate - 4-Bromofluorobenzene	96 %	94 %	100 %	98 %	87 %
Surrogate - 1,2-Dichloroethane-d4	87 %	84 %	86 %	88 %	84 %
Date Analyzed	08.03.96	08.03.96	08.03.96	08.03.96	08.05.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0802C	0802C	0802C	0802C	0802C
Clock ID	2H0802	2H0802	2H0802	2H0802	1H0805
1,2-Dibromoethane (EDB) , ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Isobutyl alcohol, ug/l	<200	<200	<200	<200	<200
1,1,2-Trichloro-1,2,2-trifl uoroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0

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84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
TCL Semivolatiles (8270)					
Phenol, ug/l	<10	<10	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<10	<10
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	<10	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10	<10
2-Nitrophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50	<50
4-Nitrophenol, ug/l	<50	<50	<50	<50	<50
4,6-Dinitro-2-methylphenol, ug/l	<50	<50	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50	<50	<50
Surrogate - Phenol d5	85 %	90 %	87 %	80 %	87 %
Surrogate - 2-Fluorophenol	72 %	78 %	77 %	67 %	76 %

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84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Surrogate - 2,4,6-Tribromophenol	120 %	130 %	120 %	120 %	120 %
Surrogate - Nitrobenzene - d5	76 %	80 %	78 %	72 %	78 %
Surrogate - 2-Fluorobiphenyl	74 %	78 %	74 %	68 %	74 %
Surrogate - Terphenyl - d14	50 %	112 %	42 %	42 %	64 %
Date Extracted	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.08.96	08.08.96	08.08.96	08.08.96	08.08.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801A	0801A	0801A	0801A	0801A
Instrument ID	MSD5970	MSD5970	MSD5970	MSD5970	MSD5970
Cresylic Acid, ug/l	<10	<10	<10	<10	<10
Pyridine, ug/l	<50	<50	<50	<50	<50
Alcohols & Acetates (DAI)					
Ethyl Cellosolve (2-Ethoxy Ethanol), mg/l	<20	<20	<20	<20	<20
2-Nitropropane, mg/l	<5.0	<5.0	<5.0	<5.0	<5.0
Date Analyzed	08.23.96	08.23.96	08.24.96	08.24.96	08.24.96
Arsenic (7060)					
Arsenic (7060), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G

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84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Barium (6010)					
Barium (6010), mg/l	0.096	0.036	1.1	0.046	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Cadmium (6010)					
Cadmium (6010), mg/l	<0.0050	<0.0050	<0.0050	<0.0050	0.024
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Chromium (6010)					
Chromium (6010), mg/l	0.023	<0.010	0.013	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S6-84428
Received: 31 JUL 96
Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-6	4-21	07-30-96/1150
84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Mercury (7470)					
Mercury (7470), mg/l	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Preparation Date	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0802S	0802S	0802S	0802S	0802S
Lead (7421)					
Lead (7421), mg/l	0.0093	<0.0050	<0.0050	<0.0050	<0.0050
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G
Selenium (7740)					
Selenium (7740), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G	0801G	0801G

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84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Copper (6010)					
Copper (6010), mg/l	<0.025	<0.025	<0.025	<0.025	<0.025
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Iron (6010)					
Iron (6010), mg/l	10	1.8	15	0.32	0.21
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Manganese (6010)					
Manganese (6010), mg/l	0.020	0.027	0.78	0.025	0.013
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

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84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Nickel (6010)					
Nickel (6010), mg/l	<0.040	<0.040	<0.040	<0.040	<0.040
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Sodium (6010)					
Sodium (6010), mg/l	4.8	9.8	150	6.4	34
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Vanadium (6010)					
Vanadium (6010), mg/l	0.036	<0.010	0.014	<0.010	0.055
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H

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84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Zinc (6010)					
Zinc (6010), mg/l	<0.020	<0.020	<0.020	<0.020	<0.020
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Silver (6010)					
Silver (6010), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H	0801H	0801H
Total Cyanide (9012)					
Cyanide, Total (9012), mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0801A	0801A	0801A	0801B	0801B
pH (150.1)					
pH, units	4.7	6.1	6.2	6.7	6.7
Date Analyzed	07.31.96	07.31.96	07.31.96	07.31.96	07.31.96
Batch ID	0731B	0731B	0731B	0731B	0731B

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84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Specific Conductance (120.1)					
Specific Conductance, umhos/cm	74	180	2300	370	360
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.08.96
Batch ID	0801B	0801B	0801B	0801B	0801A
Turbidity (180.1)					
Turbidity (180.1), NTU	22	3.5	30	29	9.6
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Batch ID	0801A	0801A	0801A	0801A	0801A
Nitrate-N (353.2)					
Nitrate-N, mg/l	<0.050	<0.050	<0.050	0.066	<0.050
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0806C	0806C	0806C	0806C	0813A
Chloride (325.2)					
Chloride (325.2), mg/l	2.9	9.3	120	8.4	8.2
Date Analyzed	08.05.96	08.05.96	08.05.96	08.05.96	08.05.96
Dilution factor	1.0	1.0	10	1.0	1.0
Batch ID	0805B	0805C	0805E	0805C	0805C
Fluoride (340.2)					
Fluoride, mg/l	<0.20	<0.20	<0.20	<0.20	<0.20
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96

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84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Sulfate as SO4					
Sulfate as SO4, mg/l	41	5.2	68	56	24
Date Analyzed	08.06.96	08.06.96	08.06.96	08.06.96	08.06.96
Dilution factor	1.0	1.0	1.0	1.0	1.0
Batch ID	0806B	0806B	0806B	0806B	0806B
Radium - 226 (903.1)					
Radium - 226, pCi/l	0.84+/-.07	<0.60	7.4+/-0.22	0.96+/-.08	<0.60
Prep or Extraction Date	08.06.96	08.07.96	08.07.96	08.07.96	08.07.96
Date Analyzed	08.13.96	08.15.96	08.15.96	08.15.96	08.15.96
Batch ID	072996R	072996R	072996R	072996R	072996R
Radium - 228 (904.0)					
Radium - 228, pCi/l	<1.0	<1.0	3.4+/-0.55	<1.0	<1.0
Prep or Extraction Date	08.13.96	08.14.96	08.14.96	08.14.96	08.14.96
Date Analyzed	08.19.96	08.19.96	08.19.96	08.19.96	08.19.96
Batch ID	080796G	080796G	080796G	080796G	080796G
Gross Alpha Radioactivity (9310/900.0)					
Gross Alpha, pCi/l	3.8+/-2.0	<3.0	<3.0	3.9+/-3.6	<3.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96	08.14.96	08.14.96
Date Analyzed	08.16.96	08.17.96	08.16.96	08.16.96	08.17.96
Batch ID	080996A	080996A	080996A	080996A	080996A

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84428-6	4-21	07-30-96/1150
84428-7	4-21D	07-30-96/1220
84428-8	41-3	07-30-96/1515
84428-9	41-6	07-30-96/1600
84428-10	4-5	07-30-96/1640

PARAMETER	84428-6	84428-7	84428-8	84428-9	84428-10
Gross Beta Radioactivity (9310/900.0)					
Gross Beta, pCi/l	<4.0	<4.0	160+/-22	38+/-4.0	<4.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96	08.14.96	08.14.96
Date Analyzed	08.16.96	08.17.96	08.16.96	08.16.96	08.17.96
Batch ID	080996A	080996A	080996A	080996A	080996A

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84428-11	41-4	07-30-96/1615
84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Volatiles by GC/MS (8240)			
Vinyl chloride, ug/l	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane), ug/l	<5.0	<5.0	<5.0
Carbon disulfide, ug/l	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	1.1	<1.0	<1.0
Chloroform, ug/l	<1.0	4.1	19
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0
2-Butanone (MEK), ug/l	<10	<10	<10
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0
Carbon tetrachloride, ug/l	<1.0	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0
Benzene, ug/l	<1.0	<1.0	<1.0
Tetrachloroethene, ug/l	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0
Xylenes, ug/l	<2.0	<2.0	<2.0
Surrogate - Toluene-d8	93 %	100 %	94 %
Surrogate - 4-Bromofluorobenzene	93 %	92 %	93 %
Surrogate - 1,2-Dichloroethane-d4	82 %	82 %	84 %
Date Analyzed	08.05.96	08.05.96	08.05.96

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Dilution factor	1.0	1.0	1.0
Batch ID	0802C	0802C	0802C
Clock ID	1H0805	1H0805	1H0805
1,2-Dibromoethane (EDB) , ug/l	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0
1,2,3-Trichloropropane, ug/l	<1.0	<1.0	<1.0
Isobutyl alcohol, ug/l	<200	<200	<200
1,1,2-Trichloro-1,2,2-trifluoroethane, ug/l	<1.0	<1.0	<1.0

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
TCL Semivolatiles (8270)			
Phenol, ug/l	51	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10
2-Nitrophenol, ug/l	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10
2,4,5-Trichlorophenol, ug/l	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50
4-Nitrophenol, ug/l	<50	<50	<50
4,6-Dinitro-2-methylphenol, ug/l	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50
Surrogate - Phenol d5	88 %	92 %	89 %
Surrogate - 2-Fluorophenol	77 %	80 %	79 %
Surrogate - 2,4,6-Tribromophenol	120 %	130 %	120 %
Surrogate - Nitrobenzene - d5	82 %	84 %	82 %
Surrogate - 2-Fluorobiphenyl	48 %	80 %	80 %

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Surrogate - Terphenyl - d14	6.0 %	108 %	112 %
Date Extracted	08.01.96	08.01.96	08.01.96
Date Analyzed	08.08.96	08.08.96	08.08.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801A	0801A	0801A
Instrument ID	MSD5970	MSD5970	MSD5970
Cresylic Acid, ug/l	<10	<10	<10
Pyridine, ug/l	<50	<50	<50
Alcohols & Acetates (DAI)			
Ethyl Cellosolve (2-Ethoxy Ethanol), mg/l	<20	<20	<20
2-Nitropropane, mg/l	<5.0	<5.0	<5.0
Date Analyzed	08.24.96	08.23.96	08.23.96
Arsenic (7060)			
Arsenic (7060), mg/l	0.017	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G
Barium (6010)			
Barium (6010), mg/l	0.11	<0.010	0.026
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H

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LOG NO: S6-84428
Received: 31 JUL 96
Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-11	41-4	07-30-96/1615
84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Cadmium (6010)			
Cadmium (6010), mg/l	<0.0050	<0.0050	<0.0050
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Chromium (6010)			
Chromium (6010), mg/l	0.048	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Mercury (7470)			
Mercury (7470), mg/l	<0.00020	<0.00020	<0.00020
Preparation Date	08.02.96	08.02.96	08.02.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0802S	0802S	0802S
Lead (7421)			
Lead (7421), mg/l	0.028	<0.0050	<0.0050
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Selenium (7740)			
Selenium (7740), mg/l	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801G	0801G	0801G
Copper (6010)			
Copper (6010), mg/l	<0.025	<0.025	<0.025
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Iron (6010)			
Iron (6010), mg/l	2.6	<0.050	0.086
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Manganese (6010)			
Manganese (6010), mg/l	0.020	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Nickel (6010)			
Nickel (6010), mg/l	0.050	<0.040	<0.040
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Sodium (6010)			
Sodium (6010), mg/l	590	<0.50	9.3
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Vanadium (6010)			
Vanadium (6010), mg/l	0.15	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Zinc (6010)			
Zinc (6010), mg/l	<0.020	<0.020	0.030
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Silver (6010)			
Silver (6010), mg/l	<0.010	<0.010	<0.010
Preparation Date	08.01.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.02.96	08.02.96
Dilution factor	1.0	1.0	1.0
Batch ID	0801H	0801H	0801H
Total Cyanide (9012)			
Cyanide, Total (9012), mg/l	0.019	<0.010	<0.010
Preparation Date	08.02.96	08.01.96	08.01.96
Date Analyzed	08.02.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0
Batch ID	0802A	0801B	0801B
pH (150.1)			
pH, units	8.7	5.4	8.0
Date Analyzed	07.31.96	07.31.96	07.31.96
Batch ID	0731B	0731B	0731B
Specific Conductance (120.1)			
Specific Conductance, umhos/cm	2400	2.0	620
Date Analyzed	08.01.96	08.01.96	08.01.96
Batch ID	0801B	0801A	0801A
Turbidity (180.1)			
Turbidity (180.1), NTU	55	0.23	0.94
Date Analyzed	08.01.96	08.01.96	08.01.96
Batch ID	0801B	0801B	0801B

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84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Nitrate-N (353.2)			
Nitrate-N, mg/l	0.082	<0.050	<0.050
Date Analyzed	08.01.96	08.01.96	08.01.96
Dilution factor	1.0	1.0	1.0
Batch ID	0813A	0806C	0806C
Chloride (325.2)			
Chloride (325.2), mg/l	110	<1.0	15
Date Analyzed	08.05.96	08.05.96	08.05.96
Dilution factor	10	1.0	1.0
Batch ID	0805E	0805C	0805C
Fluoride (340.2)			
Fluoride, mg/l	1.6	<0.20	0.47
Date Analyzed	08.01.96	08.01.96	08.01.96
Sulfate as SO4			
Sulfate as SO4, mg/l	<5.0	<5.0	200
Date Analyzed	08.06.96	08.06.96	08.06.96
Dilution factor	1.0	1.0	1.0
Batch ID	0806B	0806B	0806B
Radium - 226 (903.1)			
Radium - 226, pCi/l	<0.60	<0.60	<0.60
Prep or Extraction Date	08.07.96	08.07.96	08.07.96
Date Analyzed	08.15.96	08.15.96	08.15.96
Batch ID	072996R	072996R	072996R

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84428-11	41-4	07-30-96/1615
84428-12	EB-1	07-30-96/1500
84428-13	EB-2	07-30-96/1650

PARAMETER	84428-11	84428-12	84428-13
Radium - 228 (904.0)			
Radium - 228, pCi/l	<1.0	<1.0	<1.0
Prep or Extraction Date	08.15.96	08.15.96	08.15.96
Date Analyzed	08.19.96	08.19.96	08.19.96
Batch ID	080796G	080796G	080796G
Gross Alpha Radioactivity (9310/900.0)			
Gross Alpha, pCi/l	14+/-29	<3.0	<3.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96
Date Analyzed	08.16.96	08.17.96	08.20.96
Batch ID	080996A	080996A	080996A
Gross Beta Radioactivity (9310/900.0)			
Gross Beta, pCi/l	14+/-17	<4.0	<4.0
Prep or Extraction Date	08.14.96	08.14.96	08.14.96
Date Analyzed	08.16.96	08.17.96	08.20.96
Batch ID	080996A	080996A	080996A

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-14	4-9	07-30-96/1641
84428-15	4-9D	07-30-96/1642
84428-16	4-9DD	07-30-96/1643
84428-17	4-20	07-30-96/1630
84428-18	4-20D	07-30-96/1635

PARAMETER	84428-14	84428-15	84428-16	84428-17	84428-18
Total Coliform (MF)					
Total Coliform MF, col/100mls	<1	<1	<1*F9	<1*F9	<1
Date Analyzed	07.31.96	07.31.96	07.31.96	07.31.96	07.31.96

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-19	4-21	07-30-96/1640
84428-20	4-21D	07-30-96/1645
84428-21	41-3	07-30-96/1515
84428-22	41-6	07-30-96/1600
84428-23	4-5	07-30-96/1640

PARAMETER	84428-19	84428-20	84428-21	84428-22	84428-23
Total Coliform (MF)					
Total Coliform MF, col/100mls	<1	<1*F9	<1	<1*F9	1*F9
Date Analyzed	07.31.96	07.31.96	07.31.96	07.31.96	07.31.96

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
84428-24	41-4	07-30-96/1615
84428-25	EB-1	07-30-96/1500
84428-26	EB-2	07-30-96/1650

PARAMETER	84428-24	84428-25	84428-26
Total Coliform (MF)			
Total Coliform MF, col/100mls	30*F8	<1	<1
Date Analyzed	07.31.96	07.31.96	07.31.96

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
84428-27	Practical Quantitation Limits
84428-28	Method Blank Result
84428-29	Lab Control Standard (LCS) Result
84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Volatiles by GC/MS (8240)					
Vinyl chloride, ug/l	1.0	<1.0	---	---	---
Methylene chloride (Dichloromethane), ug/l	5.0	<5.0	---	---	---
Carbon disulfide, ug/l	1.0	<1.0	---	---	---
1,1-Dichloroethane, ug/l	1.0	<1.0	---	---	---
Chloroform, ug/l	1.0	<1.0	---	---	---
1,2-Dichloroethane, ug/l	1.0	<1.0	---	---	---
2-Butanone (MEK), ug/l	10	<10	---	---	---
1,1,1-Trichloroethane, ug/l	1.0	<1.0	---	---	---
Carbon tetrachloride, ug/l	1.0	<1.0	---	---	---
1,2-Dichloropropane, ug/l	1.0	<1.0	---	---	---
Trichloroethene, ug/l	1.0	<1.0	9.8	10	10
1,1,2-Trichloroethane, ug/l	1.0	<1.0	---	---	---
Benzene, ug/l	1.0	<1.0	9.4	9.9	10
Tetrachloroethene, ug/l	1.0	<1.0	---	---	---
Toluene, ug/l	1.0	<1.0	9.6	10	10
Chlorobenzene, ug/l	1.0	<1.0	9.9	10	10
Xylenes, ug/l	2.0	<2.0	---	---	---
1,2-Dibromoethane (EDB) , ug/l	1.0	<1.0	---	---	---

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84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Trichlorofluoromethane, ug/l	1.0	<1.0	---	---	---
1,2,3-Trichloropropane, ug/l	1.0	<1.0	---	---	---
Isobutyl alcohol, ug/l	200	<200	---	---	---
1,1,2-Trichloro-1,2,2-trifl uoroethane, ug/l	1.0	<1.0	---	---	---
1,1-Dichloroethene, ug/l	---	<1.0	9.4	10	10
Surrogate - Toluene-d8	---	97 %	94 %	92 %	---
Surrogate - 4-Bromofluorobenzene	---	96 %	95 %	92 %	---
Surrogate - 1,2-Dichloroethane-d4	---	91 %	83 %	85 %	---
Date Analyzed	---	08.02.96	08.02.96	08.05.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0802C	0802C	0802C	---
Clock ID	---	2H0802	2H0802	1H0805	---

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84428-28	Method Blank Result
84428-29	Lab Control Standard (LCS) Result
84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
TCL Semivolatiles (8270)					
Phenol, ug/l	10	<10	74	75	100
2-Chlorophenol, ug/l	10	<10	78	80	100
1,4-Dichlorobenzene, ug/l	10	<10	35	36	50
1,2-Dichlorobenzene, ug/l	10	<10	---	---	---
2-Methylphenol (o-cresol), ug/l	10	<10	---	---	---
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	10	<10	---	---	---
N-Nitroso-di-n-propylamine, ug/l	10	<10	44	46	50
Nitrobenzene, ug/l	10	<10	---	---	---
2-Nitrophenol, ug/l	10	<10	---	---	---
2,4-Dimethylphenol, ug/l	10	<10	---	---	---
2,4-Dichlorophenol, ug/l	10	<10	---	---	---
1,2,4-Trichlorobenzene, ug/l	10	<10	40	42	50
4-Chloro-3-methylphenol, ug/l	10	<10	85	88	100
2,4,6-Trichlorophenol, ug/l	10	<10	---	---	---
2,4,5-Trichlorophenol, ug/l	10	<10	---	---	---
Acenaphthene, ug/l	10	<10	40	41	50
2,4-Dinitrophenol, ug/l	50	<50	---	---	---
4-Nitrophenol, ug/l	50	<50	64	65	100

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PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
2,4-Dinitrotoluene, ug/l	10	<10	35	36	50
4,6-Dinitro-2-methylphenol, ug/l	50	<50	---	---	---
Pentachlorophenol, ug/l	50	<50	85	97	100
Pyrene, ug/l	10	<10	66	68	50
Cresylic Acid, ug/l	10	<10	---	---	---
Pyridine, ug/l	50	<50	---	---	---
Surrogate - Phenol d5	---	88 %	87 %	88 %	---
Surrogate - 2-Fluorophenol	---	79 %	78 %	80 %	---
Surrogate - 2,4,6-Tribromophenol	---	110 %	110 %	120 %	---
Surrogate - Nitrobenzene - d5	---	78 %	78 %	80 %	---
Surrogate - 2-Fluorobiphenyl	---	80 %	76 %	80 %	---
Surrogate - Terphenyl - d14	---	120 %	120 %	122 %	---
Date Extracted	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.07.96	08.07.96	08.07.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801A	0801A	0801A	---
Instrument ID	---	MSD5970	MSD5970	MSD5970	---
Alcohols & Acetates (DAI)					
Ethyl Cellosolve (2-Ethoxy Ethanol), mg/l	20	<20	---	---	---
2-Nitropropane, mg/l	5.0	<5.0	---	---	---
Date Analyzed	---	08.23.96	---	---	---

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84428-27	Practical Quantitation Limits
84428-28	Method Blank Result
84428-29	Lab Control Standard (LCS) Result
84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Arsenic (7060)					
Arsenic (7060), mg/l	0.010	<0.010	0.0515	0.0525	0.0500
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801G	0801G	0801G	---
Barium (6010)					
Barium (6010), mg/l	0.010	<0.010	0.945	0.973	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Cadmium (6010)					
Cadmium (6010), mg/l	0.0050	<0.0050	1.04	1.02	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---

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Mr. Scott Ross
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2694A Lake Park Drive
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Project: 89810.000/NAS JAX
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REPORT OF RESULTS

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84428-27	Practical Quantitation Limits
84428-28	Method Blank Result
84428-29	Lab Control Standard (LCS) Result
84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Chromium (6010)					
Chromium (6010), mg/l	0.010	<0.010	1.22	1.11	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Mercury (7470)					
Mercury (7470), mg/l	0.00020	<0.00020	0.00267	0.00257	0.00300
Preparation Date	---	08.02.96	08.02.96	08.02.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0802S	0802S	0802S	---
Lead (7421)					
Lead (7421), mg/l	0.0050	<0.0050	0.0527	0.0529	0.0500
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801G	0801G	0801G	---

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PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Selenium (7740)					
Selenium (7740), mg/l	0.010	<0.010	0.0516	0.0543	0.0500
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801G	0801G	0801G	---
Copper (6010)					
Copper (6010), mg/l	0.025	<0.025	1.07	1.04	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Iron (6010)					
Iron (6010), mg/l	0.050	<0.050	1.36	1.07	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---

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84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Manganese (6010)					
Manganese (6010), mg/l	0.010	<0.010	1.07	1.03	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Nickel (6010)					
Nickel (6010), mg/l	0.040	<0.040	1.07	1.01	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Sodium (6010)					
Sodium (6010), mg/l	0.50	<0.50	0.985	1.02	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---

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PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Vanadium (6010)					
Vanadium (6010), mg/l	0.010	<0.010	1.08	1.04	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Zinc (6010)					
Zinc (6010), mg/l	0.020	<0.020	1.03	1.01	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---
Silver (6010)					
Silver (6010), mg/l	0.010	<0.010	0.949	0.982	1.00
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.02.96	08.02.96	08.02.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801H	0801H	0801H	---

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PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Total Cyanide (9012)					
Cyanide, Total (9012), mg/l	0.010	<0.010	0.192	0.182	0.20
Preparation Date	---	08.01.96	08.01.96	08.01.96	---
Date Analyzed	---	08.01.96	08.01.96	08.01.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0801B	0801B	0801B	---
pH (150.1)					
pH, units	---	---	8.18	8.47	9.09
Date Analyzed	---	---	07.31.96	07.31.96	07.31.96
Batch ID	---	---	0731B	0731B	0731B
Specific Conductance (120.1)					
Specific Conductance, umhos/cm	1.0	<1.0	1348.5	1338.4	1326.6
Date Analyzed	08.01.96	08.01.96	08.01.96	08.01.96	08.01.96
Batch ID	0801A	0801A	0801A	0801A	0801A
Turbidity (180.1)					
Turbidity (180.1), NTU	0.10	<0.10	3.52	3.48	3.50
Date Analyzed	---	08.01.96	08.01.96	08.01.96	---
Batch ID	---	0801B	0801B	0801B	---

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84428-29	Lab Control Standard (LCS) Result
84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Nitrate-N (353.2)					
Nitrate-N, mg/l	0.050	<0.050	0.441	0.443	0.500
Date Analyzed	---	08.01.96	08.01.96	08.01.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0806C	0806C	0806C	---
Chloride (325.2)					
Chloride (325.2), mg/l	1.0	<1.0	12.6	13.0	12.8
Date Analyzed	---	08.05.96	08.05.96	08.05.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0805B	0805B	0805B	---
Fluoride (340.2)					
Fluoride, mg/l	0.20	<0.20	1.21	1.21	1.18
Date Analyzed	---	08.01.96	08.01.96	08.01.96	---
Sulfate as SO4					
Sulfate as SO4, mg/l	5.0	<5.0	19.6	21.0	21.0
Date Analyzed	---	08.06.96	08.06.96	08.06.96	---
Dilution factor	---	1.0	1.0	1.0	---
Batch ID	---	0806B	0806B	0806B	---
Total Coliform (MF)					
Total Coliform MF, col/100ml	---	<1	---	---	---
Date Analyzed	---	07.31.96	---	---	---

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84428-28	Method Blank Result
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84428-30	LCS Duplicate Result
84428-31	LCS Expected Value

PARAMETER	84428-27	84428-28	84428-29	84428-30	84428-31
Radium - 226 (903.1)					
Radium - 226, pCi/l	0.60	<0.60	25+/-0.34	26+/-0.35	28
Prep or Extraction Date	---	07.29.96	07.29.96	07.29.96	---
Date Analyzed	---	08.08.96	08.08.96	08.08.96	---
Batch ID	---	072996R	072996R	072996R	---
Radium - 228 (904.0)					
Radium - 228, pCi/l	1.0	<1.0	51+/-1.4	41+/-1.2	44
Prep or Extraction Date	---	07.30.96	07.30.96	07.30.96	---
Date Analyzed	---	08.01.96	08.01.96	08.01.96	---
Batch ID	---	073096G	073096G	073096G	---
Gross Alpha Radioactivity (9310/900.0)					
Gross Alpha, pCi/l	3.0	<3.0	28+/-3.9	31+/-4.1	30
Prep or Extraction Date	---	08.09.96	08.09.96	08.09.96	---
Date Analyzed	---	08.11.96	08.11.96	08.12.96	---
Batch ID	---	080996A	080996A	080996A	---
Gross Beta Radioactivity (9310/900.0)					
Gross Beta, pCi/l	4.0	<4.0	55+/-4.0	58+/-4.1	46
Prep or Extraction Date	---	08.09.96	08.09.96	08.09.96	---
Date Analyzed	---	08.11.96	09.11.96	08.12.96	---
Batch ID	---	080996A	080996A	080996A	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
84428-32	LCS/Duplicate % Recovery
84428-33	LCS Control Limits
84428-34	LCS % RPD
84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36
Volatiles by GC/MS (8240)					
1,1-Dichloroethene, %	94/100 %	60-149 %	6 %	<16 %	SL
Trichloroethene, %	98/100 %	83-122 %	2 %	<24 %	SL
Benzene, %	94/99 %	68-147 %	5 %	<35 %	SL
Toluene, %	96/100 %	76-131 %	4 %	<24 %	SL
Chlorobenzene, %	99/100 %	55-154 %	1 %	<16 %	SL

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84428-34	LCS % RPD
84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36
TCL Semivolatiles (8270)					
Phenol, %	74/75 %	13-134 %	1 %	<37 %	SL
2-Chlorophenol, %	78/80 %	37-119 %	2 %	<35 %	SL
1,4-Dichlorobenzene, %	70/72 %	28-126 %	3 %	<43 %	SL
N-Nitroso-di-n-propylamine, %	88/92 %	33-157 %	4 %	<39 %	SL
1,2,4-Trichlorobenzene, %	80/84 %	39-123 %	5 %	<28 %	SL
4-Chloro-3-methylphenol, %	85/88 %	25-141 %	3 %	<29 %	SL
Acenaphthene, %	80/82 %	34-134 %	2 %	<30 %	SL
4-Nitrophenol, %	64/65 %	10-144 %	2 %	<39 %	SL
2,4-Dinitrotoluene, %	70/72 %	31-145 %	3 %	<54 %	SL
Pentachlorophenol, %	85/97 %	17-120 %	13 %	<37 %	SL
Pyrene, %	132/136 %	34-160 %	3 %	<36 %	SL
Surrogate - Phenol d5	---	14-136 %	---	---	SL
Surrogate - 2-Fluorophenol	---	18-123 %	---	---	SL
Surrogate - 2,4,6-Tribromophenol	---	10-162 %	---	---	SL
Surrogate - Nitrobenzene - d5	---	29-120 %	---	---	SL
Surrogate - 2-Fluorobiphenyl	---	25-129 %	---	---	SL
Surrogate - Terphenyl - d14	---	11-144 %	---	---	SL

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84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36
Alcohols & Acetates (DAI)					
Ethyl Cellosolve (2-Ethoxy Ethanol), %	---	---	---	---	---
2-Nitropropane, %	---	---	---	---	---
Ethyl acetate, mg/l	---	---	---	---	---
Sec-butyl Acetate, mg/l	---	---	---	---	---
Arsenic (7060)					
Arsenic (7060), %	103/105 %	80-120 %	1.9 %	<20 %	SL
Barium (6010)					
Barium (6010), %	94/97 %	80-120 %	3.1 %	<20 %	SL
Cadmium (6010)					
Cadmium (6010), %	104/102 %	80-120 %	1.9 %	<20 %	SL
Chromium (6010)					
Chromium (6010), %	122/111 %	80-120 %	9.4 %	<20 %	SL
Mercury (7470)					
Mercury (7470), %	89/86 %	80-120 %	3.4 %	<20 %	SL
Lead (7421)					
Lead (7421), %	105/106 %	80-120 %	0.95 %	<20 %	SL
Selenium (7740)					
Selenium (7740), %	103/109 %	80-120 %	5.7 %	<20 %	SL
Copper (6010)					
Copper (6010), %	107/104 %	80-120 %	2.8 %	<20 %	SL

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84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36
Iron (6010)					
Iron (6010), %	136/107 %	80-120 %	24 %	<20 %	SL
Manganese (6010)					
Manganese (6010), %	107/103 %	80-120 %	3.8 %	<20 %	SL
Nickel (6010)					
Nickel (6010), %	107/101 %	80-120 %	5.8	<20 %	SL
Sodium (6010)					
Sodium (6010), %	98/102 %	80-120 %	4.0 %	<20 %	SL
Vanadium (6010)					
Vanadium (6010), %	108/104 %	80-120 %	3.8 %	<20 %	SL
Zinc (6010)					
Zinc (6010), %	103/101 %	80-120 %	2.0 %	<20 %	SL
Silver (6010)					
Silver (6010), %	95/98 %	80-120 %	3.1 %	<20 %	SL
Total Cyanide (9012)					
Cyanide, Total (9012), %	96/91 %	85-115 %	5.3 %	<30 %	SL
pH (150.1)					
pH, %	90/93 %	90-110 %	3.3 %	<10 %	SL
Specific Conductance (120.1)					
Specific Conductance, %	102/101 %	90-110 %	0.98 %	<10 %	SL
Turbidity (180.1)					
Turbidity (180.1), %	101/99 %	90-110 %	2.0 %	<30 %	SL

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84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36
Nitrate-N (353.2)					
Nitrate-N, %	88/89 %	85-115 %	1.1 %	<30 %	SL
Chloride (325.2)					
Chloride (325.2), %	98/102 %	85-115 %	4.0 %	<30 %	SL
Fluoride (340.2)					
Fluoride, %	103/103 %	85-115 %	0 %	<30 %	SL
Sulfate as SO4					
Sulfate as SO4, %	93/100 %	75-125 %	7.3 %	<30 %	SL
Total Coliform (MF)					
Total Coliform MF, %	---	---	---	---	SL
Radium - 226 (903.1)					
Radium - 226, %	87/93 %	48-145 %	6.5 %	<49 %	SL
Radium - 228 (904.0)					
Radium - 228, %	114/93 %	45-150 %	21 %	<50 %	SL
Gross Alpha Radioactivity (9310/900.0)					
Gross Alpha, %	94/103 %	64-145 %	8.9 %	<31 %	SL
Gross Beta Radioactivity (9310/900.0)					
Gross Beta, %	118/125 %	67-140 %	5.2 %	<28 %	SL

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

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

LOG NO: S6-84428
Received: 31 JUL 96
Reported: 03 SEP 96

Mr. Scott Ross
RUST Environment & Infrastructure
2694A Lake Park Drive
Charleston, SC 29418

Project: 89810.000/NAS JAX
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
84428-32	LCS/Duplicate % Recovery
84428-33	LCS Control Limits
84428-34	LCS % RPD
84428-35	% RPD Control Limits
84428-36	Control Limits Source

PARAMETER	84428-32	84428-33	84428-34	84428-35	84428-36

Methods: EPA SW-846 and 40 CFR Part 136.
*F8 = Coliforms were detected, but the presence of confluent growth may have suppressed coliform growth; thus, sample results may be biased low.

*F9 = Coliforms were not detected, but the presence of confluent growth may have suppressed coliform growth; thus, sample results may be biased low.

Steven J. White
Steven J. White, Project Manager

Final Page Of Report

Serial Number

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☑ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — Fax: (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax: (904) 878-9504
☐ 414 SW 12th Avenue, Deerfield Beach, FL 33442 — Phone: (954) 421-7400 — Fax: (954) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (334) 666-6633 — Fax: (334) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax: (813) 885-7049
☐ 100 Alpha Drive, Suite 110, Destrehan, LA 70047 — Phone: (504) 764-1100 — Fax: (504) 725-1163

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PROJECT REFERENCE: *NAS JAX
PROJECT NO.: 89810.000
P.O. NUMBER: 89810.000
PAGE 1 OF 1

PROJECT LOC. (State): FL
SAMPLER(s) NAME: D. Turner / M. Cain
PHONE: 8035125600
FAX: 8035125661

CLIENT NAME: Rust
CLIENT PROJECT MANAGER: Scott Ross
CLIENT ADDRESS (CITY, STATE, ZIP): 2694 Lake Park Dr. N. Chas. SC 29406

☑ STANDARD REPORT DELIVERY
☐ EXPEDITED REPORT DELIVERY (surcharge)
Date Due: _____

MATRIX TYPE: AQUEOUS (WATER) / SOLID OR SEMISOLID / AIR / NONAQUEOUS LIQUID (oil, solvent, etc)

REQUIRED ANALYSES — NUMBER OF CONTAINERS SUBMITTED

SAMPLE DATE 1996	TIME	SL NO.	SAMPLE IDENTIFICATION	Coliform Time:	AQUEOUS (WATER)	SOLID OR SEMISOLID	AIR	NONAQUEOUS LIQUID	VOC	SVOC	Metals	Cyanide	Cl, F, SO4, NO3	Turbid, pH, SC	Gross Alpha Beta	Ra226/228	Mercury	Total Coliform	REMARKS
7-30	0840		NAS4-9	1641	X				3	2	1	1	1	1	2	2	1	2	*Please check
"	0850		" 4-9D	1642	X				3	2	1	1	1	1	2	2	1	2	and add
"	0900		" 4-9DD	1643	X				3	2	1	1	1	1	2	2	1	2	preservative
"	1100		" 4-20	1630	X				3	2	1	1	1	1	2	2	1	2	if needed.
"	1050		" 4-20D	1635	X				3	2	1	1	1	1	2	2	1	2	
"	1150		" 4-21	1640	X				3	2	1	1	1	1	2	2	1	2	
"	1220		" 4-21D	1645	X				3	2	1	1	1	1	2	2	1	2	Call Dana
"	1515		" 41-3	1515	X				3	2	1	1	1	1	2	1	1	2	Turner with
"	1600		" 41-6	1600	X				3	2	1	1	1	1	2	1	1	2	any questions
"	1640		" 41-5	1640	X				3	2	1	1	1	1	2	1	1	2	
"	1615		" 41-4	1615	X				3	2	1	1	1	1	2	1	1	2	
"	1500		EB-1	1500	X				3	2	1	1	1	1	1	1	1	2	
"	1650		EB-2	1650	X				3	2	1	1	1	1	2	1	1	2	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
S. Campbell	7-30-96	2:00	Dana Turner	7-30-96	1900			
RECEIVED BY: (SIGNATURE)	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**	**RECEIVED BY: (SIGNATURE)**	**DATE**	**TIME**
Dana Turner	7-30-96	0800	Fed Ex	7-30-96	1900			

LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	SL LOG NO.	LABORATORY REMARKS:
A. Campbell	7/31/96	1:50	☑ YES ☐ NO		~~36-84435~~ 36-84436	

FedEx *USA Airbill*

Tracking Number 0857990405

SC-84428

Recipient's Copy

183 200 6384A070 6158M

1 From

Date 7-30-96

Sender's Name Dana Turner Phone 803572-5600

Dept./Floor/Suite/Room

Company RU F A I

Address 2694-A LAKE PARK DR

City CHARLESTON State SC Zip 29406

2 Your Internal Billing Reference Information 89810.000

3 To

Recipient's Name Sample Custodian Phone 912 354-7858

Dept./Floor/Suite/Room

Company Savannah Labs

Address 5102 La Roche Ave.

(To "HOLD" at FedEx location, print FedEx address here)

City Savannah State GA Zip 31404

For HOLD at FedEx Location check here

- [ ] Hold Weekday (Not available with FedEx First Overnight)
- [ ] Hold Saturday (Not available at all locations) (Not available with FedEx First Overnight or FedEx Standard Overnight)

For Saturday Delivery check here

- [ ] (Extra Charge. Not available to all locations) (Not available with FedEx First Overnight or FedEx Standard Overnight)

4 Service Delivery commitment may be later in some areas.

- [x] FedEx Priority Overnight (Next business morning)
- [ ] FedEx Standard Overnight (Next business afternoon)
- [ ] FedEx 2Day* (Second business day)
- [ ] FedEx Govt. Overnight (Authorized user only)
- [ ] DESCRIPTION
- [ ] FedEx Overnight Freight
- [ ] FedEx 2Day Freight

(For packages over 150 pounds. Call for delivery schedule.)

- [ ] NEW FedEx First Overnight (Earliest next business morning delivery to select locations) (Higher rates apply)

*FedEx Letter Rate not available. Minimum charge: One pound FedEx 2Day rate.

5 Packaging

- [ ] FedEx Letter*
- [ ] FedEx Pak*
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other Packaging

Declared value limit $500.

6 Special Handling

Does this shipment contain dangerous goods?

- [ ] Yes (As per attached Shipper's Declaration)
- [ ] Yes (Shipper's Declaration not required)
- [ ] Dry Ice — Dry Ice, 9, UN 1845 III ____ x ____ kg. 904 (Dangerous Goods Shipper's Declaration not required)
- [ ] CA Cargo Aircraft Only

7 Payment

Bill to:

- [x] Sender (Account no. in section 1 will be billed)
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check
- [ ] Obtain Recipient FedEx Account No.

(Enter FedEx account no. or Credit Card no. below)

Total Packages	Total Weight	Total Declared Value	Total Charges
8	10	$ 16,000 .00	$

*When declaring a value higher than $100 per package, you pay an additional charge. See SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY section for further information.

Credit Card Auth.

8 Release Signature

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.

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FORM ID NO. 0200

WCSL 0396
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