N00204.AR.004810
NAS PENSACOLA
5090.3a

RECOVERY WELL MAINTENANCE PLAN WASTEWATER TREATMENT PLANT NAS PENSACOLA FL
5/1/1995
RUST ENVIRONMENTAL & INFRASTRUCTURE INC

RECOVERY WELL MAINTENANCE PLAN

WASTEWATER TREATMENT PLANT
NAVAL AIR STATION PENSACOLA, FLORIDA

QUALITY

INTEGRITY

CREATIVITY

RESPONSIVENESS

RUST ENVIRONMENT & INFRASTRUCTURE

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1.0 INTRODUCTION

The purpose of this Recovery Well Maintenance Plan is to present a plan for evaluation and maintenance of the recovery well system at the Wastewater Treatment Plant (WWTP) at the Naval Air Station (NAS) in Pensacola, Florida. This Plan describes the operations and details the procedures that will be followed by Rust Environment and Infrastructure (Rust) and its subcontractors to conduct the field work for the recovery well maintenance. The goal is to monitor recovery well performance and maintain specific capacity at acceptable, sustainable levels in five (5) of the seven (7) recovery wells RW-3, RW-4, RW-5A, RW-6 and RW-7. This plan is presented in accordance with the Southern Division Naval Facilities Engineering Command (NAVFAC) Statement of Work dated May 20, 1994 for the Contract No. N62467-93-D-0662/1826/04.

2.0 PROJECT DESCRIPTION

2.1 Objectives

The primary objective of the activities described in this plan is to fulfill the requirements specified in the NAVFAC Statement of Work dated May 20, 1994 for the Contract No. N62467-93-D-0662/1826/04. The previous activities which had been contracted to Rust are:

1) Phase 1 - Design of Recovery Well Rehabilitation and Preliminary Maintenance Plan for Recovery Wells RW-3, RW-4, RW-5A, RW-6 and RW-7.

2) Phase 2 - Implementation of Recovery Well Rehabilitation and Finalizing the Maintenance Plan; and

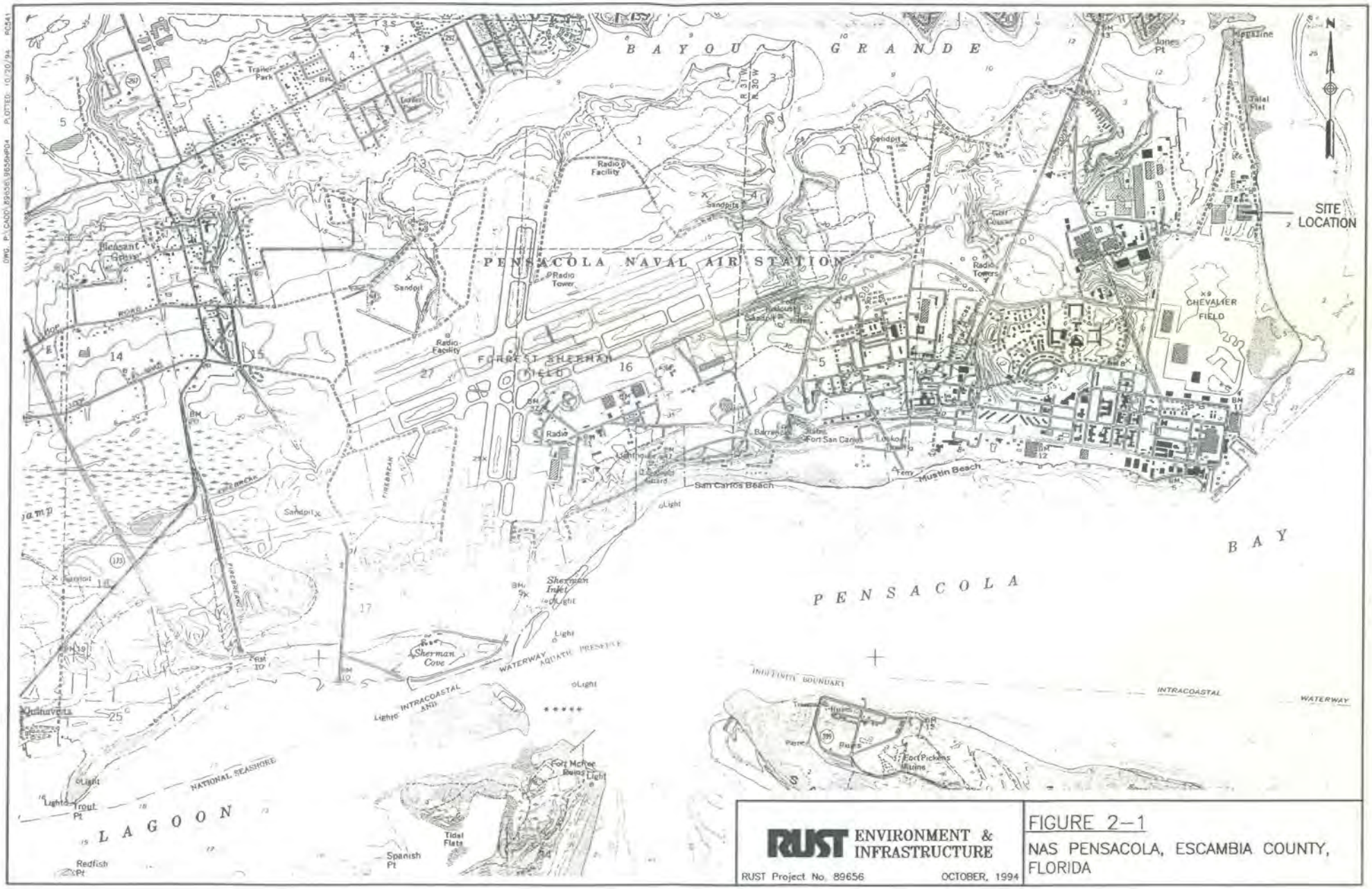
The activities which will be contracted to Rust are:

1) Phase 3 - Implementation of Periodic Maintenance Requirements.

2.2 Site Description

NAS Pensacola occupies approximately 5800 acres on a peninsula in southern Escambia County, 5 miles southwest of the city of Pensacola (Figure 2-1). The sludge drying beds and surge pond are located on a peninsula in the northeast corner of NAS between Pensacola Bay and Bayou Grande (Figure 2-2). The drying beds and surge pond were associated with the WWTP which received wastewater generated by activities on NAS property.

A total of 49 ground-water monitoring wells and seven (7) recovery wells are located at the WWTP (Figure 2-2). These wells are divided into three categories--shallow (12-15 feet below land surface (bls)), intermediate (40-48 feet bls), and deep (65-70 feet bls). The majority of the monitoring wells on the site are shallow, but four clusters include one each of the three depth categories. Nineteen (19) of these wells are used as ground-water sampling points under the current RCRA Post-Closure permit. Table 2-1 provides the well construction information for all of the on-site wells at the WWTP. Also included on this table are the water levels and calculated water level elevations for the WWTP wells

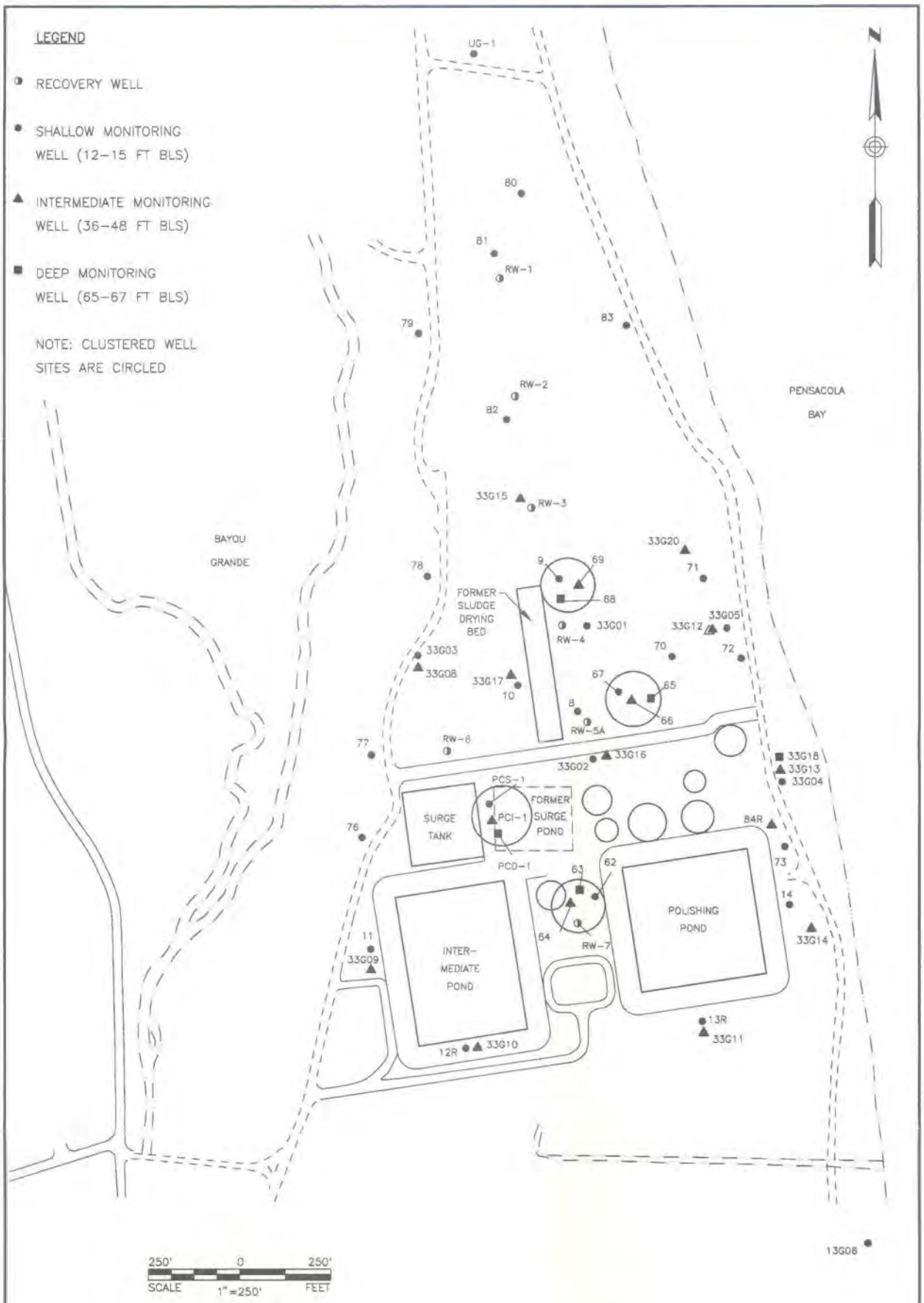


RUST ENVIRONMENT & INFRASTRUCTURE

RUST Project No. 89656 OCTOBER, 1994

FIGURE 2–1

NAS PENSACOLA, ESCAMBIA COUNTY, FLORIDA



SOURCE: E & E, 1992
AND
ENSAFE, 1994

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-2
LOCATION OF MONITORING AND RECOVERY WELLS
NAS PENSACOLA WWTP, PENSACOLA, FLORIDA
RUST Project No. 89656.000
APRIL, 1995

TABLE 2-1
CONSTRUCTION DETAILS OF MONITORING AND RECOVERY WELLS*
WATER LEVEL ELEVATIONS - JANUARY 23. 1995
NAS PENSACOLA WWTP

WELL DESIGNATION	INSTALLATION DATE	TOTAL DEPTH DRILLED (ft)	SCREENED INTERVAL (ft)	DEPTH TO FILTER PACK (ft)	TOC ELEVATION (ft/msl)	TOTAL DEPTH BTOC (1/23/95)	DEPTH TO WATER (ft BTOC) (1/23/95)	WATER LEVEL ELEVATION (ft msl) (1/23/95)
SHALLOW ZONE WELLS								
GM-8	3/84	12.00	9.5 - 12.0	5.50	5.94	12.76	4.50	1.44
GM-9	3/84	12.00	9.3 - 11.8	5.30	5.47	12.76	3.90	1.57
GM-10	3/84	12.00	9.5 - 12.0	5.50	5.67	12.73	3.85	1.82
GM-11	3/84	12.00	9.3 - 11.8	5.50	5.75	12.72	3.68	2.07
GM-12R[a]	4/88	15.00	11.0 - 14.0	NA	9.66	17.46	7.20	2.46
GM-13R[b]	11/91	12.00	9.5 - 12.0	5.50	7.27	14.86	5.51	1.76
GM-14	3/84	12.00	8.9 - 11.4	5.00	4.40	12.77	5.17	-1.78
GM-62	8/85	15.00	12.5 - 15.0	4.00	6.95	17.83	3.46	0.94
GM-67	8/85	15.00	12.5 - 15.0	8.00	6.23	17.85	4.87	1.36
GM-70	8/85	15.50	12.5 - 15.0	7.00	6.96	----[c]	DRY[c]	DRY[c]
GM-71	8/85	12.50	10.0 - 12.5	7.00	6.60	12.85	5.49	1.11
GM-72	8/85	12.50	10.0 - 12.5	7.00	7.25	12.85	6.44	0.81
GM-73	8/85	15.00	12.5 - 15.0	7.00	12.23	17.86	11.66	0.57
GM-76	NA	13.50	11.0 - 13.5	6.00	7.72	12.84	6.05	1.67
GM-77	NA	13.50	11.0 - 13.5	5.00	4.55	12.9	3.61	0.94
GM-78	NA	13.00	10.5 - 13.0	8.00	6.86	12.88	5.18	1.68
GM-79	NA	12.50	10.0 - 12.5	7.00	4.60	12.85	3.10	1.11
GM-80	NA	13.50	11.0 - 13.5	8.00	4.56	12.9	3.44	1.12
GM-81	NA	12.50	10.0 - 12.5	8.00	4.21	12.87	2.72	1.49
GM-82	NA	12.50	10.0 - 12.5	7.00	3.59	13.62	2.81	0.78
GM-83	NA	12.50	10.0 - 12.5	8.00	4.74	12.84	4.26	0.48
PCS-1	3/90	20.00	15.0 - 19.75	14.00	11.22	22.34	4.58	1.64
UG-1	1981	10.40	5.4 - 10.4	NA	8.20	-----	7.45	0.75
33G01	NA	15.00	5.0-15.0	NA	7.35	15.0	6.85	0.50
33G02	NA	15.00	5.0-15.0	NA	7.82	15.0	6.36	1.46
33G03	NA	15.00	5.0-15.0	NA	6.28	15.0	4.39	1.89
33G04	NA	15.00	5.0-15.0	NA	11.78	15.0	11.26	0.52
33G05	NA	15.00	5.0-15.0	NA	7.44	15.0	6.81	0.63
13G06	NA	15.00	5.0-15.0	NA	6.99	15.0	6.33	0.66
INTERMEDIATE ZONE WELLS								
GM-64	8/85	40.00	37.5 - 40.0	35.00	6.09	42.94	4.58	1.51
GM-66	8/85	40.00	37.5 - 40.0	31.00	7.33	42.85	6.39	0.94
GM-69	8/85	40.00	37.5 - 40.5	32.00	7.70	42.87	6.30	1.40
GM-84R[d]	2/92	49.00	43.0 - 48.0	36.00	12.26	49.35	11.69	0.57
PCI-1	3/90	45.00	40.0 - 44.75	39.00	11.08	46.74	9.50	1.80
33G08	NA	42.00	32.0-42.0	NA	6.02	42.0	4.48	1.54
33G09	NA	43.00	33.0-43.0	NA	7.53	43.0	5.49	2.04

TABLE 2-1
CONSTRUCTION DETAILS OF MONITORING AND RECOVERY WELLS*
WATER LEVEL ELEVATIONS - JANUARY 23, 1995
NAS PENSACOLA WWTP

WELL DESIGNATION	INSTALLATION DATE	TOTAL DEPTH DRILLED (ft)	SCREENED INTERVAL (ft)	DEPTH TO FILTER PACK (ft)	TOC ELEVATION (ft/msl)	TOTAL DEPTH BTOC (1/23/95)	DEPTH TO WATER (ft BTOC) (1/23/95)	WATER LEVEL ELEVATION (ft msl) (1/23/95)
33G10	NA	46.00	36.0-46.0	NA	10.73	46.0	8.24	2.49
33G11	NA	42.00	32.0-42.0	NA	7.60	42.0	5.86	1.74
33G12	NA	36.5	26.5-36.5	NA	7.33	36.5	6.71	0.62
33G14	NA	42.00	32.0-42.0	NA	10.51	42.0	9.78	0.73
33G15	NA	36.00	26.0-36.0	NA	5.39	36.0	3.71	1.68
33G16	NA	39.00	29.0-39.0	NA	7.84	39.0	6.43	1.41
33G17	NA	37.00	27.0-37.0	NA	7.75	37.0	6.15	1.60
33G20	NA	37.5	26.5-37.5	NA	3.85	37.5	2.77	1.08
DEEP ZONE WELLS								
GM-63	8/85	65.00	62.5 - 65.0	56.00	6.80	65.54	4.52	2.38
GM-65	8/85	65.00	62.5 - 65.0	58.00	6.51	67.86	4.24	2.27
GM-68	8/85	65.00	62.5 - 65.0	56.00	6.83	67.87	3.53	3.30
PCD-1	3/90	70.00	65.0 - 69.75	64.00	10.83	68.69	8.51	2.32
33G18	NA	77.00	67.0-77.0	NA	12.05	77.0	9.71	2.34
RECOVERY WELLS								
RW-1	10/86	30.00	15.0 - 30.0	NA	6.67	NA	3.24	3.43
RW-2	10/86	37.00	22.0 - 37.0	NA	5.71	NA	4.25	1.46
RW-3	10/86	37.00	22.0 - 37.0	NA	7.36	NA	3.84	3.52
RW-4	10/86	39.00	24.0 - 39.0	NA	5.35	NA	1.97	3.38
RW-5A	11/93	40.00	24.5 - 39.5	21.00	3.99	40.5	4.18	-0.19
RW-6	10/86	39.50	24.5 - 39.5	NA	2.43	NA	11.66	-9.23
RW-7	10/86	39.00	24.0 - 39.0	NA	3.16	NA	1.35	1.81

a GM-12 was originally installed in March 1984, but was damaged and replaced with GM-12R in April 1988.
b GM-13 was originally installed in March 1984, but was damaged and replaced with GM-13R in November 1991.
c Water level not collected due to siltation in well.
d Gm-84 was damaged and replaced with GM-84R in February 1992.
* Installed by E&E, Geraghty and Miller, Inc., and Missimer and Associates, Inc.
f Depth to water measurements were made from top of metal well cap, not top of casing. Metal thickness approximately 0.10 inch.
msl = Mean sea level
BTOC = Below top of casing

Source: RUST E&I, May, 1993; Ecology and Environment, Inc., September, 1992.

measured on January 1995, as well as the total well depth for each well.

2.3 Recovery Well Installation

According to the Ecology and Environment, Inc. (E&E) report dated September 1992, Geraghty and Miller, Inc. (G&M) installed 28 monitoring wells and seven (7) recovery wells at the WWTP between 1984 and 1986 as part of a water quality assessment program. In November 1993, Rust was retained to replace recovery well RW-5 and it's pump station because it was malfunctioning due to build up of sludge material in the suction and discharge lines. Recovery well RW-5 was abandoned and replaced with recovery well RW-5A.

The seven (7) recovery wells RW-1, RW-2, RW-3, RW-4, RW-5A, RW-6 and RW-7 are screened in the intermediate zone. Recovery wells RW-1, RW-2 and RW-3 are connected to the same pump system. At this time no water is extracted from RW-1 (suction valve is closed); the suction valve for RW-2 is partially open allowing a small amount of water to be extracted; and the suction valve for RW-3 is fully open. Because there are no flow meters on the suction lines from these wells, the amount of water withdrawn from RW-2 and RW-3 is not known. Only total flow discharging from the pump system is measured with a flow meter.

RW-4 and RW-6 are also attached to the same pump system. It is not known how much water is extracted from either of these two (2) wells separately. Only total flow discharging from the pump system is gauged with a flow meter.

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728/3642
DSN 922-4728/3642

Client: Rust Environmental
Address Charleston, SC
Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62422_3
Sample Date: 05/31/96
Received Date: 05/31/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

LAB Sample ID#	1- 62422			2- 62423		
Sample Name / Location	WWTP Airstripper Influent			WWTP Airstripper Effluent		
Collector's Name	P. Keane			P. Keane		
Date & Time Collected	05/31/96 @ 1000			05/31//96 @ 1005		
Sample Type (composite or grab)	Grab			Grab		
Analyst	J. Moore			J. Moore		
Date of Extraction / Initials	05/31/96 / JWM			05/31/96 / JWM		
Date of Analysis	05/31/96			05/31/96		
Sample Matrix	GW			GW		
Dilution	X 1			X 1		
COMPOUND NAME	1- 62422	units	Det. Limit	1- 62423	units	Det. Limit
Benzene	27	UG/L	1	BDL	UG/L	1
Bromobenzene	BDL	UG/L	1	BDL	UG/L	1
Bromochloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromodichloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromoform	BDL	UG/L	2	BDL	UG/L	2
Bromomethane	BDL	UG/L	3	BDL	UG/L	3
n-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
sec-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
tert-Butylbenzene	BDL	UG/L	2	BDL	UG/L	2
Carbon Tetrachloride	BDL	UG/L	1	BDL	UG/L	1
Chlorobenzene	67	UG/L	1	BDL	UG/L	1
Chloroethane	BDL	UG/L	1	BDL	UG/L	1
Chloroform	BDL	UG/L	1	BDL	UG/L	1
Chloromethane	BDL	UG/L	1	BDL	UG/L	1
2-Chlorotoluene *	3	UG/L	1	BDL	UG/L	1
4-Chlorotoluene *	BDL	UG/L	1	BDL	UG/L	1
Dibromochloromethane	BDL	UG/L	1	BDL	UG/L	1
1,2-Dibromo-3-chloropropane *	BDL	UG/L	5	BDL	UG/L	5
1,2-Dibromoethane	BDL	UG/L	1	BDL	UG/L	1
Dibromomethane	BDL	UG/L	3	BDL	UG/L	3
1,2-Dichlorobenzene	82	UG/L	1	BDL	UG/L	1
1,3-Dichlorobenzene	48	UG/L	1	BDL	UG/L	1
1,4-Dichlorobenzene	59	UG/L	1	BDL	UG/L	1
Dichlorodiflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethane	6	UG/L	1	BDL	UG/L	1
1,2-Dichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
cis-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
trans-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
1,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,3-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
2,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloropropene	BDL	UG/L	1	BDL	UG/L	1
Ethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Ethyl ether *	BDL	UG/L	2	BDL	UG/L	2
Hexachlorobutadiene	BDL	UG/L	3	BDL	UG/L	3
2-Hexanone *	BDL	UG/L	1	BDL	UG/L	1
Isopropylbenzene	BDL	UG/L	1	BDL	UG/L	1
p-Isopropyltoluene	BDL	UG/L	5	BDL	UG/L	5

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
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Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62422_3
Sample Date: 05/31/96
Received Date: 05/31/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

COMPOUND NAME	62422	units	Det. Limit	62423	units	Det. Limit
Methylene Chloride	BDL	UG/L	5	BDL	UG/L	5
Methyl ethyl ketone (MEK) *	BDL	UG/L	5	BDL	UG/L	5
Methyl isobutyl ketone (MIBK) *	BDL	UG/L	5	BDL	UG/L	5
Naphthalene	BDL	UG/L	5	BDL	UG/L	5
n-Propylbenzene	BDL	UG/L	1	BDL	UG/L	1
Styrene	BDL	UG/L	1	BDL	UG/L	1
1,1,1,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
Tetrachloroethene	BDL	UG/L	1	BDL	UG/L	1
Toluene	BDL	UG/L	1	BDL	UG/L	1
1,2,3-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,1,1-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
Trichloroethene	BDL	UG/L	1	BDL	UG/L	1
Trichloroflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane *	4	UG/L	2	BDL	UG/L	2
1,2,3-Trichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
1,3,5-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Vinyl Chloride	BDL	UG/L	1	BDL	UG/L	1
m,p-Xylene	BDL	UG/L	1	BDL	UG/L	1
o-Xylene	BDL	UG/L	1	BDL	UG/L	1

SURROGATE SPIKE RECOVERIES

	Acceptance Limits	62422	62423
1,2-Dichloroethane-d4	75-133	125	121
Toluene-d8	86-119	102	100
Bromoflourobenzene	85-116	105	104

COMMENTS :

BDL = Below detection limit. UG/L = Microgram per liter. * = FL HRS certification pending

Approved by : Jim Taylor for J. Dees Date : 6/4/96

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728/3642
DSN 922-4728/3642

Client: Rust Environmental
Address Charleston, SC

Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62435_6
Sample Date: 05/31/96
Received Date: 05/31/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

LAB Sample ID#	1- 62435			2- 62436		
Sample Name / Location	WWTP Airstripper Influent			WWTP Airstripper Effluent		
Collector's Name	P. Keane			P. Keane		
Date & Time Collected	05/31/96 @ 1400			05/31//96 @ 1405		
Sample Type (composite or grab)	Grab			Grab		
Analyst	J. Moore			J. Moore		
Date of Extraction / Initials	05/31/96 / JWM			05/31/96 / JWM		
Date of Analysis	05/31/96			05/31/96		
Sample Matrix	GW			GW		
Dilution		X	1		X	1
COMPOUND NAME	1- 62435	units	Det. Limit	1- 62436	units	Det. Limit
Benzene	15	UG/L	1	BDL	UG/L	1
Bromobenzene	BDL	UG/L	1	BDL	UG/L	1
Bromochloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromodichloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromoform	BDL	UG/L	2	BDL	UG/L	2
Bromomethane	BDL	UG/L	3	BDL	UG/L	3
n-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
sec-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
tert-Butylbenzene	BDL	UG/L	2	BDL	UG/L	2
Carbon Tetrachloride	BDL	UG/L	1	BDL	UG/L	1
Chlorobenzene	45	UG/L	1	BDL	UG/L	1
Chloroethane	BDL	UG/L	1	BDL	UG/L	1
Chloroform	BDL	UG/L	1	BDL	UG/L	1
Chloromethane	BDL	UG/L	1	BDL	UG/L	1
2-Chlorotoluene *	2	UG/L	1	BDL	UG/L	1
4-Chlorotoluene *	BDL	UG/L	1	BDL	UG/L	1
Dibromochloromethane	BDL	UG/L	1	BDL	UG/L	1
1,2-Dibromo-3-chloropropane *	BDL	UG/L	5	BDL	UG/L	5
1,2-Dibromoethane	BDL	UG/L	1	BDL	UG/L	1
Dibromomethane	BDL	UG/L	3	BDL	UG/L	3
1,2-Dichlorobenzene	47	UG/L	1	BDL	UG/L	1
1,3-Dichlorobenzene	32	UG/L	1	BDL	UG/L	1
1,4-Dichlorobenzene	37	UG/L	1	BDL	UG/L	1
Dichlorodiflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethane	4	UG/L	1	BDL	UG/L	1
1,2-Dichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
cis-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
trans-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
1,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,3-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
2,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloropropene	BDL	UG/L	1	BDL	UG/L	1
Ethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Ethyl ether *	BDL	UG/L	2	BDL	UG/L	2
Hexachlorobutadiene	BDL	UG/L	3	BDL	UG/L	3
2-Hexanone *	BDL	UG/L	1	BDL	UG/L	1
Isopropylbenzene	BDL	UG/L	1	BDL	UG/L	1
p-Isopropyltoluene	BDL	UG/L	5	BDL	UG/L	5

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728 / -3642
DSN 922-3642

Client: Rust Environmental
Address Charleston, SC

Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62435_6
Sample Date: 05/31/96
Received Date: 05/31/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

COMPOUND NAME	62435	units	Det. Limit	62436	units	Det. Limit
Methylene Chloride	BDL	UG/L	5	BDL	UG/L	5
Methyl ethyl ketone (MEK) *	BDL	UG/L	5	BDL	UG/L	5
Methyl isobutyl ketone (MIBK) *	BDL	UG/L	5	BDL	UG/L	5
Naphthalene	BDL	UG/L	5	BDL	UG/L	5
n-Propylbenzene	BDL	UG/L	1	BDL	UG/L	1
Styrene	BDL	UG/L	1	BDL	UG/L	1
1,1,1,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
Tetrachloroethene	BDL	UG/L	1	BDL	UG/L	1
Toluene	BDL	UG/L	1	BDL	UG/L	1
1,2,3-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,1,1-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
Trichloroethene	BDL	UG/L	1	BDL	UG/L	1
Trichloroflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane *	2	UG/L	2	BDL	UG/L	2
1,2,3-Trichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
1,3,5-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Vinyl Chloride	BDL	UG/L	1	BDL	UG/L	1
m,p-Xylene	BDL	UG/L	1	BDL	UG/L	1
o-Xylene	BDL	UG/L	1	BDL	UG/L	1

SURROGATE SPIKE RECOVERIES

	Acceptance Limits	62435	62436
1,2-Dichloroethane-d4	75-133	108	111
Toluene-d8	86-119	103	102
Bromoflourobenzene	85-116	106	105

COMMENTS :

BDL = Below detection limit. UG/L = Microgram per liter. * = FL HRS certification pending

Approved by : Jim Taylor for J. Dees Date : 6/4/96

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728/3642
DSN 922-4728/3642

Client: Rust Environmental
Address Charleston, SC
Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62441_2
Sample Date: 6/2/96
Received Date: 6/3/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

LAB Sample ID#	1- 62441			2- 62442		
Sample Name / Location	WWTP Airstripper Influent			WWTP Airstripper Effluent		
Collector's Name	P. Keane			P. Keane		
Date & Time Collected	06/02/96 @ 0800			06/02/96 @ 0805		
Sample Type (composite or grab)	Grab			Grab		
Analyst	J. Moore			J. Moore		
Date of Extraction / Initials	06/03/96 / JWM			06/03/96 / JWM		
Date of Analysis	06/03/96			06/03/96		
Sample Matrix	GW			GW		
Dilution	X 1			X 1		
COMPOUND NAME	1- 62441	units	Det. Limit	1- 62442	units	Det. Limit
Benzene	23	UG/L	1	BDL	UG/L	1
Bromobenzene	BDL	UG/L	1	BDL	UG/L	1
Bromochloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromodichloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromoform	BDL	UG/L	2	BDL	UG/L	2
Bromomethane	BDL	UG/L	3	BDL	UG/L	3
n-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
sec-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
tert-Butylbenzene	BDL	UG/L	2	BDL	UG/L	2
Carbon Tetrachloride	BDL	UG/L	1	BDL	UG/L	1
Chlorobenzene	78	UG/L	1	BDL	UG/L	1
Chloroethane	BDL	UG/L	1	BDL	UG/L	1
Chloroform	BDL	UG/L	1	BDL	UG/L	1
Chloromethane	BDL	UG/L	1	BDL	UG/L	1
2-Chlorotoluene *	3	UG/L	1	BDL	UG/L	1
4-Chlorotoluene *	BDL	UG/L	1	BDL	UG/L	1
Dibromochloromethane	BDL	UG/L	1	BDL	UG/L	1
1,2-Dibromo-3-chloropropane *	BDL	UG/L	5	BDL	UG/L	5
1,2-Dibromoethane	BDL	UG/L	1	BDL	UG/L	1
Dibromomethane	BDL	UG/L	3	BDL	UG/L	3
1,2-Dichlorobenzene	74	UG/L	1	BDL	UG/L	1
1,3-Dichlorobenzene	48	UG/L	1	BDL	UG/L	1
1,4-Dichlorobenzene	58	UG/L	1	BDL	UG/L	1
Dichlorodiflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethane	6	UG/L	1	BDL	UG/L	1
1,2-Dichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
cis-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
trans-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
1,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,3-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
2,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloropropene	BDL	UG/L	1	BDL	UG/L	1
Ethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Ethyl ether *	BDL	UG/L	2	BDL	UG/L	2
Hexachlorobutadiene	BDL	UG/L	3	BDL	UG/L	3
2-Hexanone *	BDL	UG/L	1	BDL	UG/L	1
Isopropylbenzene	BDL	UG/L	1	BDL	UG/L	1
p-Isopropyltoluene	BDL	UG/L	5	BDL	UG/L	5

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728 / -3642
DSN 922-3642

Client: Rust Environmental
Address Charleston, SC

Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62441_2
Sample Date: 6/2/96
Received Date: 6/3/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

COMPOUND NAME	62441	units	Det. Limit	62442	units	Det. Limit
Methylene Chloride	BDL	UG/L	5	BDL	UG/L	5
Methyl ethyl ketone (MEK) *	BDL	UG/L	5	BDL	UG/L	5
Methyl isobutyl ketone (MIBK) *	BDL	UG/L	5	BDL	UG/L	5
Naphthalene	BDL	UG/L	5	BDL	UG/L	5
n-Propylbenzene	BDL	UG/L	1	BDL	UG/L	1
Styrene	BDL	UG/L	1	BDL	UG/L	1
1,1,1,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
Tetrachloroethene	BDL	UG/L	1	BDL	UG/L	1
Toluene	BDL	UG/L	1	BDL	UG/L	1
1,2,3-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,1,1-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
Trichloroethene	BDL	UG/L	1	BDL	UG/L	1
Trichloroflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane *	3	UG/L	2	BDL	UG/L	2
1,2,3-Trichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
1,3,5-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Vinyl Chloride	BDL	UG/L	1	BDL	UG/L	1
m,p-Xylene	BDL	UG/L	1	BDL	UG/L	1
o-Xylene	BDL	UG/L	1	BDL	UG/L	1

SURROGATE SPIKE RECOVERIES

	Acceptance Limits	62441	62442
1,2-Dichloroethane-d4	75-133	114	111
Toluene-d8	86-119	107	107
Bromoflourobenzene	85-116	110	106

COMMENTS :

BDL = Below detection limit. UG/L = Microgram per liter. * = FL HRS certification pending

Approved by : Tom Taylor for J. Dees Date : 6/4/96

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728/3642
DSN 922-4728/3642

Client: Rust Environmental
Address Charleston, SC
Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62441_2
Sample Date: 6/2/96
Received Date: 6/3/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

LAB Sample ID#	1- 62443			2- 62444		
Sample Name / Location	WWTP Airstripper Influent			WWTP Airstripper Effluent		
Collector's Name	P. Keane			P. Keane		
Date & Time Collected	06/02/96 @ 1200			06/02/96 @ 1205		
Sample Type (composite or grab)	Grab			Grab		
Analyst	J. Moore			J. Moore		
Date of Extraction / Initials	06/03/96 / JWM			06/03/96 / JWM		
Date of Analysis	06/03/96			06/03/96		
Sample Matrix	GW			GW		
Dilution		X	1		X	1
COMPOUND NAME	1- 62443	units	Det. Limit	1- 62444	units	Det. Limit
Benzene	15	UG/L	1	BDL	UG/L	1
Bromobenzene	BDL	UG/L	1	BDL	UG/L	1
Bromochloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromodichloromethane	BDL	UG/L	1	BDL	UG/L	1
Bromoform	BDL	UG/L	2	BDL	UG/L	2
Bromomethane	BDL	UG/L	3	BDL	UG/L	3
n-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
sec-Butylbenzene	BDL	UG/L	1	BDL	UG/L	1
tert-Butylbenzene	BDL	UG/L	2	BDL	UG/L	2
Carbon Tetrachloride	BDL	UG/L	1	BDL	UG/L	1
Chlorobenzene	52	UG/L	1	BDL	UG/L	1
Chloroethane	BDL	UG/L	1	BDL	UG/L	1
Chloroform	BDL	UG/L	1	BDL	UG/L	1
Chloromethane	BDL	UG/L	1	BDL	UG/L	1
2-Chlorotoluene *	2	UG/L	1	BDL	UG/L	1
4-Chlorotoluene *	BDL	UG/L	1	BDL	UG/L	1
Dibromochloromethane	BDL	UG/L	1	BDL	UG/L	1
1,2-Dibromo-3-chloropropane *	BDL	UG/L	5	BDL	UG/L	5
1,2-Dibromoethane	BDL	UG/L	1	BDL	UG/L	1
Dibromomethane	BDL	UG/L	3	BDL	UG/L	3
1,2-Dichlorobenzene	59	UG/L	1	BDL	UG/L	1
1,3-Dichlorobenzene	41	UG/L	1	BDL	UG/L	1
1,4-Dichlorobenzene	46	UG/L	1	BDL	UG/L	1
Dichlorodiflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethane	5	UG/L	1	BDL	UG/L	1
1,2-Dichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
cis-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
trans-1,2-Dichloroethene	BDL	UG/L	1	BDL	UG/L	1
1,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,3-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
2,2-Dichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,1-Dichloropropene	BDL	UG/L	1	BDL	UG/L	1
Ethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Ethyl ether *	BDL	UG/L	2	BDL	UG/L	2
Hexachlorobutadiene	BDL	UG/L	3	BDL	UG/L	3
2-Hexanone *	BDL	UG/L	1	BDL	UG/L	1
Isopropylbenzene	BDL	UG/L	1	BDL	UG/L	1
p-Isopropyltoluene	BDL	UG/L	5	BDL	UG/L	5

Navy Public Works Center
Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, FL 32508 - 6500
Phone (904) 452-4728 / -3642
DSN 922-3642

Client: Rust Environmental
Address Charleston, SC

Phone 803-572-5600
Contact Scott Ross/ Tom Kelly

Analytical Report
Volatiles by Method 8260

Lab Report Number: 62441_2
Sample Date: 6/2/96
Received Date: 6/3/96
Sample Site: NASP Bldg 3297
Job Order No.: 120 4063

COMPOUND NAME	62443	units	Det. Limit	62444	units	Det. Limit
Methylene Chloride	BDL	UG/L	5	BDL	UG/L	5
Methyl ethyl ketone (MEK) *	BDL	UG/L	5	BDL	UG/L	5
Methyl isobutyl ketone (MIBK) *	BDL	UG/L	5	BDL	UG/L	5
Naphthalene	BDL	UG/L	5	BDL	UG/L	5
n-Propylbenzene	BDL	UG/L	1	BDL	UG/L	1
Styrene	BDL	UG/L	1	BDL	UG/L	1
1,1,1,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2,2-Tetrachloroethane	BDL	UG/L	1	BDL	UG/L	1
Tetrachloroethene	BDL	UG/L	1	BDL	UG/L	1
Toluene	BDL	UG/L	1	BDL	UG/L	1
1,2,3-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trichlorobenzene	BDL	UG/L	1	BDL	UG/L	1
1,1,1-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloroethane	BDL	UG/L	1	BDL	UG/L	1
Trichloroethene	BDL	UG/L	1	BDL	UG/L	1
Trichloroflouromethane	BDL	UG/L	1	BDL	UG/L	1
1,1,2-Trichloro-1,2,2-Trifluoroethane *	2	UG/L	2	BDL	UG/L	2
1,2,3-Trichloropropane	BDL	UG/L	1	BDL	UG/L	1
1,2,4-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
1,3,5-Trimethylbenzene	BDL	UG/L	1	BDL	UG/L	1
Vinyl Chloride	BDL	UG/L	1	BDL	UG/L	1
m,p-Xylene	BDL	UG/L	1	BDL	UG/L	1
o-Xylene	BDL	UG/L	1	BDL	UG/L	1

SURROGATE SPIKE RECOVERIES

	Acceptance Limits	62443	62444
1,2-Dichloroethane-d4	75-133	117	114
Toluene-d8	86-119	105	107
Bromoflourobenzene	85-116	104	106

COMMENTS :

BDL = Below detection limit. UG/L = Microgram per liter. * = FL HRS certification pending

Approved by : Jim Taylor for J. Dees Date : 6/4/96

HAZARDOUS WASTE CHAIN OF CUSTODY/REQUEST FOR ANALYSIS

NPWC Environmental Laboratory

Bldg. 3887, Code 920
NAS Pensacola, Fl. 32508
Ph#: (904) 452-4728/3642
DSN: 922-4728/3642
FAX: (904) 452-2799/2387

Requester: Rust E&I
Address: Charleston S.C.
Phone #: 803 572-5600
Contact: Scott Ross / Tom Kelly
Job Order #: 1204-063

Report Required? Yes No DEP? Yes No
Lab ID Number:
Sample Date: 5/31/96
Received Date:
Sample Site:
Lab Due Date:

Sample ID #	Lab	#1- 6-2422	#2- 6-2423	#3-	#4-
Sample Name	----------	WWTP INF	WWTP EFF		
or Location	----------	Bldg 3297	Bldg 3297		
Sampled by	----------	C Tucker	C Tucker		
Collection	Date	5/31/96	5/31/96		
Date/Time	Time	1000	1005		
Sample Matrix	----------	water	water		

Notes:
#1 INFluent
#2 EFFluent
RUSH

GROUP PARAMETERS by Method Name	METHOD #	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	Billing Units	Containers Required (L/S)	Preservative(s) Used (Liquids)
HW Charact. (complete)	EPA SW 846									60	See below	See below
Ignitability (Flashpoint)	SW 846 1010								~	2	250ml/4 oz.	4° C
Reactivity (Cyanide & Sulfide)	EPA SW-846									4	1L/4 oz.	4° C
Corrosivity (pH)	SW 846 9040/9045									1	250ml/4 oz.	4° C
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
TCLP Non Volatile Extraction	SW 846 1311									5	40 mlx3/4 oz.	4° C
TCLP Volatile ZHE Extraction	SW 846 1311									5	1Lx4/32 oz.	HCl to pH<2/4° C
TCLP BNA Extractables	SW 846 8270									18	1Lx3/4 oz.	4° C
TCLP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP Pesticides	SW 846 8080									10	1Lx3/4 oz.	4° C
TCLP Herbicides	SW 846 8150									10	1Lx3/4 oz.	4° C
TCLP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
TCLP Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
Complete Priority Pollutants	EPA SW-846									42	See below	See below
PP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP Pesticide/PCB's	SW 846 8080									10	1Lx3/4 oz.	4° C
PP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
PP Metals (13)	EPA SW-846									9	500 ml/4 oz.	HNO_3 to pH<2
PP Cyanide/Phenol	EPA SW-846									4	1L Plastic/1L Glass	$NaOH/H_2SO_4$
Toxicity (TCLP) less Pest/Herb	EPA SW-846									40	See below	See below
F001 - F005 Solvents	EPA SW-846									28	1Lx2&40mlx3/16 oz.	4° C
Total Volatiles	SW 846 8260	X	1,2,3,4	X	1,2,3,4					9	40 mlx3/4 oz.	HCl to pH<2/4° C
Total BNA Extractables	SW 846 8270									18	1Lx2/16 oz.	4° C
Total RCRA Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
PCB's in Oil	SW 846 8080									3	40 ml/4 oz.	None
PCB's in Water/Soil/Wipes	SW 846 8080									4	1L/4 oz.	None
Other:												

Comments: Samples collected from Air stripper located within WWTP.

Relinquished by: Charles [illegible]
Date/Time: 5/31/96 1015

Received by: J W Moore
Date/Time: 5-31-96 1015

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HAZARDOUS WASTE CHAIN OF CUSTODY/REQUEST FOR ANALYSIS

NPWC Environmental Laboratory

Bldg. 3887, Code 920
NAS Pensacola, Fl. 32508
Ph#: (904) 452-4728/3642
DSN: 922-4728/3642
FAX: (904) 452-2799/2387

Requester: Rust EVI
Address:
Charleston S.C.
Phone #: 803 572-5600
Contact: Seth Ross / Tom Kelly
Job Order #: 1204-063

Report Required? Yes No DEP? Yes No
Lab ID Number:
Sample Date: 5/31/96
Received Date:
Sample Site:
Lab Due Date:

Sample ID #	Lab	#1- 6-2422	#2- 6-2423	#3-	#4-
Sample Name	----------	WWTP INF	WWTP EFF		
or Location	----------	Bldg 3297	Bldg 3297		
Sampled by	----------	C Tucker	C Tucker		
Collection	Date	5/31/96	5/31/96		
Date/Time	Time	1000	1005		
Sample Matrix	----------	water	water		

Notes: #1 INFluent #2 EFFluent RUSH

GROUP PARAMETERS by Method Name	METHOD #	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	Billing Units	Containers Required (L/S)	Preservative(s) Used (Liquids)
HW Charact. (complete)	EPA SW 846									60	See below	See below
Ignitability (Flashpoint)	SW 846 1010								–	2	250ml/4 oz.	4° C
Reactivity (Cyanide & Sulfide)	EPA SW-846									4	1L/4 oz.	4° C
Corrosivity (pH)	SW 846 9040/9045									1	250ml/4 oz.	4° C
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
TCLP Non Volatile Extraction	SW 846 1311									5	40 mlx3/4 oz.	4° C
TCLP Volatile ZHE Extraction	SW 846 1311									5	1Lx4/32 oz.	HCl to pH<2/4° C
TCLP BNA Extractables	SW 846 8270									16	1Lx3/4 oz.	4° C
TCLP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP Pesticides	SW 846 8080									10	1Lx3/4 oz.	4° C
TCLP Herbicides	SW 846 8150									10	1Lx3/4 oz.	4° C
TCLP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
TCLP Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
Complete Priority Pollutants	EPA SW-846									42	See below	See below
PP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP Pesticide/PCB's	SW 846 8080									10	1Lx3/4 oz.	4° C
PP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
PP Metals (13)	EPA SW-846									9	500 ml/4 oz.	HNO_3 to pH<2
PP Cyanide/Phenol	EPA SW-846									4	1L Plastic/1L Glass	$NaOH/H_2SO_4$
Toxicity (TCLP) less Pest/Herb	EPA SW-846									40	See below	See below
F001 – F005 Solvents	EPA SW-846									28	1Lx2&40mlx3/16 oz.	4° C
Total Volatiles	SW 846 8260	X	1,2,3,4	X	1,2,3,4					9	40 mlx3/4 oz.	HCl to pH<2/4° C
Total BNA Extractables	SW 846 8270									16	1Lx2/16 oz.	4° C
Total RCRA Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
PCB's in Oil	SW 846 8080									3	40 ml/4 oz.	None
PCB's in Water/Soil/Wipes	SW 846 8080									4	1L/4 oz.	None
Other:												

Comments: Samples collected from Air stripper located within WWTP.

Relinquished by: Charles [illegible]
Date/Time: 5/31/96 1015

Received by: J W Moore
Date/Time: 5-31-96 1015

HAZARDOUS WASTE CHAIN OF CUSTODY/REQUEST FOR ANALYSIS

NPWC Environmental Laboratory
Bldg. 3887, Code 920
NAS Pensacola, Fl. 32508
Ph#: (904) 452-4728/3642
DSN: 922-4728/3642
FAX: (904) 452-2799/2387

Requester: Rust E&I
Address: Charleston, S.C.
Phone #: 803-572-5600
Contact: Scott Ross
Job Order #: 1204-063

Report Required? Yes No DEP? Yes No
Lab ID Number:
Sample Date: 6-2-96
Received Date: 6/3/96
Sample Site: Airstripper, WWTP
Lab Due Date:

Sample ID #	Lab	#1 6-2441	#2 6-2442	#3 6-2443	#4 6-2444	Notes:
Sample Name	----------	WWTP	WWTP	WWTP	WWTP	#1, 3 - Influent
or Location	----------	Bldg. 3297	Bldg 3297	Bldg 3297	Bldg 3297	
Sampled by	----------	C. Tucker	C Tucker	C. Tucker	C Tucker	#2, 4 - Effluent
Collection	Date	6/2/96	6/2/96	6/2/96	6/2/96	
Date/Time	Time	0800	0805	1200	1205	
Sample Matrix	----------	INF. WATER	EFF. WATER	INF. WATER	EFF WATER	

GROUP PARAMETERS by Method Name	METHOD #	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	X	Bottle ID #'s	Billing Units	Containers Required (L/S)	Preservative(s) Used (Liquids)
HW Charact. (complete)	EPA SW 846									60	See below	See below
Ignitability (Flashpoint)	SW 846 1010									2	250ml/4 oz.	4° C
Reactivity (Cyanide & Sulfide)	EPA SW-846									4	1L/4 oz.	4° C
Corrosivity (pH)	SW 846 9040/9045									1	250ml/4 oz.	4° C
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
Toxicity (TCLP) complete	EPA SW-846									55	See below	See below
TCLP Non Volatile Extraction	SW 846 1311									5	40 mlx3/4 oz.	4° C
TCLP Volatile ZHE Extraction	SW 846 1311									5	1Lx4/32 oz.	HCl to pH<2/4° C
TCLP BNA Extractables	SW 846 8270									18	1Lx3/4 oz.	4° C
TCLP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
TCLP Pesticides	SW 846 8080									10	1Lx3/4 oz.	4° C
TCLP Herbicides	SW 846 8150									10	1Lx3/4 oz.	4° C
TCLP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
TCLP Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
Complete Priority Pollutants	EPA SW-846									42	See below	See below
PP Acid Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP B/N Extractables	SW 846 8270									10	1Lx3/4 oz.	4° C
PP Pesticide/PCB's	SW 846 8080									10	1Lx3/4 oz.	4° C
PP Volatiles	SW 846 8260									9	40 ml x 3/4 oz.	HCl to pH<2/4° C
PP Metals (13)	EPA SW-846									9	500 ml/4 oz.	HNO_3 to pH<2
PP Cyanide/Phenol	EPA SW-846									4	1L Plastic/1L Glass	$NaOH/H_2SO_4$
Toxicity (TCLP) less Pest/Herb	EPA SW-846									40	See below	See below
F001 - F005 Solvents	EPA SW-846									28	1Lx2&40mlx3/16 oz.	4° C
Total Volatiles	SW 846 8260	X	1,2,3,4	X	1,2,3,4	X	1,2,3,4	X	1,2,3,4	9	40 mlx3/4 oz.	HCl to pH<2/4° C
Total BNA Extractables	SW 846 8270									18	1Lx2/16 oz.	4° C
Total RCRA Metals (8)	EPA SW-846									7	500 ml/4 oz.	HNO_3 to pH<2
PCB's in Oil	SW 846 8080									3	40 ml/4 oz.	None
PCB's in Water/Soil/Wipes	SW 846 8080									4	1L/4 oz.	None
Other:												

Comments: Samples collected from Airstripper located within WWTP NAS Pensacola.

Relinquished by: [signature]
Date/Time: 6/2/96 1210

Received by: [signature]
Date/Time: 3 June 96 0700

\123r24\forms\custody\hazwaste0.wk1 rev 5/24/96

3.0 INITIAL RECOVERY WELL REHABILITATION

The Recovery Well Rehabilitation Design and Preliminary Maintenance Plan dated November 1994 was based on the assumption that the integrity of the recovery wells construction had not been compromised. As previously stated, one (1) recovery well RW-5 was abandoned and replaced as RW-5A. Although recovery well RW-5A was constructed and developed properly, the recovery system still had a problem with build up of sludge material in the suction and discharge line. In addition, recovery well RW-3 had begun to indicate a similar problem of black particles in the water. Therefore, it appeared that the performance of the recovery well systems had been affected by the native formations rather than poor construction or location of the recovery wells. As such, chemical and physical rehabilitation options for the five (5) designated recovery wells was presented in this referenced plan.

In February 1995, representatives with Layne, Inc. collected samples from five (5) recovery wells RW-3, RW-4, RW-5A, RW-6 and RW-7. Recovery well samples were analyzed for various bacteria using the Biological Activity Reaction Tests System (BARTS). BARTS is a simple and economic testing system that enabled a more accurate determination of the kind of initial rehabilitation program that needed to be implemented.

Results of the BARTS testing indicated that various types of bacteria were building up in the recovery wells. Appendix A contains a BARTS Evaluation Chart showing results of testing at each recovery well. Based on these results, a combination of three (3) methods were used to perform the initial recovery well rehabilitation. The methods included injection of Well Klean II, a chemical used to dissolve iron and sulfate reducing bacteria; injection of sodium hypochlorite solution (bleach) to dissolve slime forming bacteria; and swabbing the well screen in conjunction with the injection of one or both of the above mentioned solutions.

The types of bacteria detected in the wells using the BARTS and the initial well rehabilitation methods used are summarized in Table 3-1.

TABLE 3-1
SUMMARY OF BARTS RESULTS AND
INITIAL RECOVERY WELL REHABILITATION METHODS
WWTP - NAS PENSACOLA, FLORIDA

RECOVERY WELL #	DESCRIPTION OF BACTERIA	INITIAL WELL REHABILITATION METHOD
RW-3	Slime Forming Bacteria	Approximately 15 gallons of sodium hypochlorite (3000 to 4000 ppm) was injected into well. Bleach solution was swabbed into formation with agitator. Swabbing was performed intermittently at short (10 minute) intervals for six (6) hours over two (2) days. After allowing solution to sit in well overnight, solution was pumped out of well through discharge piping into WWTP.
RW-4	Sulfate Reducing Bacteria and Slime Forming Bacteria	Well was super chlorinated following the same procedure used in RW-3. After evacuating bleach solution, a solution of Well Klean II, muriatic acid and water were injected into well. Solution was then swabbed into formation with agitator. Swabbing was performed intermittently at short (10 minute) intervals for at least six (6) hours. After allowing solution to sit in well overnight, solution was pumped out of well through discharge piping into WWTP.
RW-5A	Slime Forming Bacteria	Same as RW-3
RW-6	Slime Forming Bacteria, Iron Reducing Bacteria, Sulfate Reducing Bacteria	Same as RW-4
RW-7	Slight Growth of Slime Forming Bacteria	Same as RW-3

4.0 EFFECTIVENESS OF WELL REHABILITATION

The recovery well rehabilitation field activities took place the weeks of February 13, 20 and 27, 1995. Discharge pressures for each recovery system measured the last week of January 1995 and the last week of April 1995 were as follows:

	January 1995	**April 1995**
RW-1, 2, 3	6.0 psig	6.0 psig
RW-4, 6	6.0 psig	10.0 psig
RW-5A	28.0 psig	24.0 psig
RW-7	5.0 psig	4.0 psig

The discharge pressure for RW-4, 6 has increased since January 1995, indicating increased effectiveness.

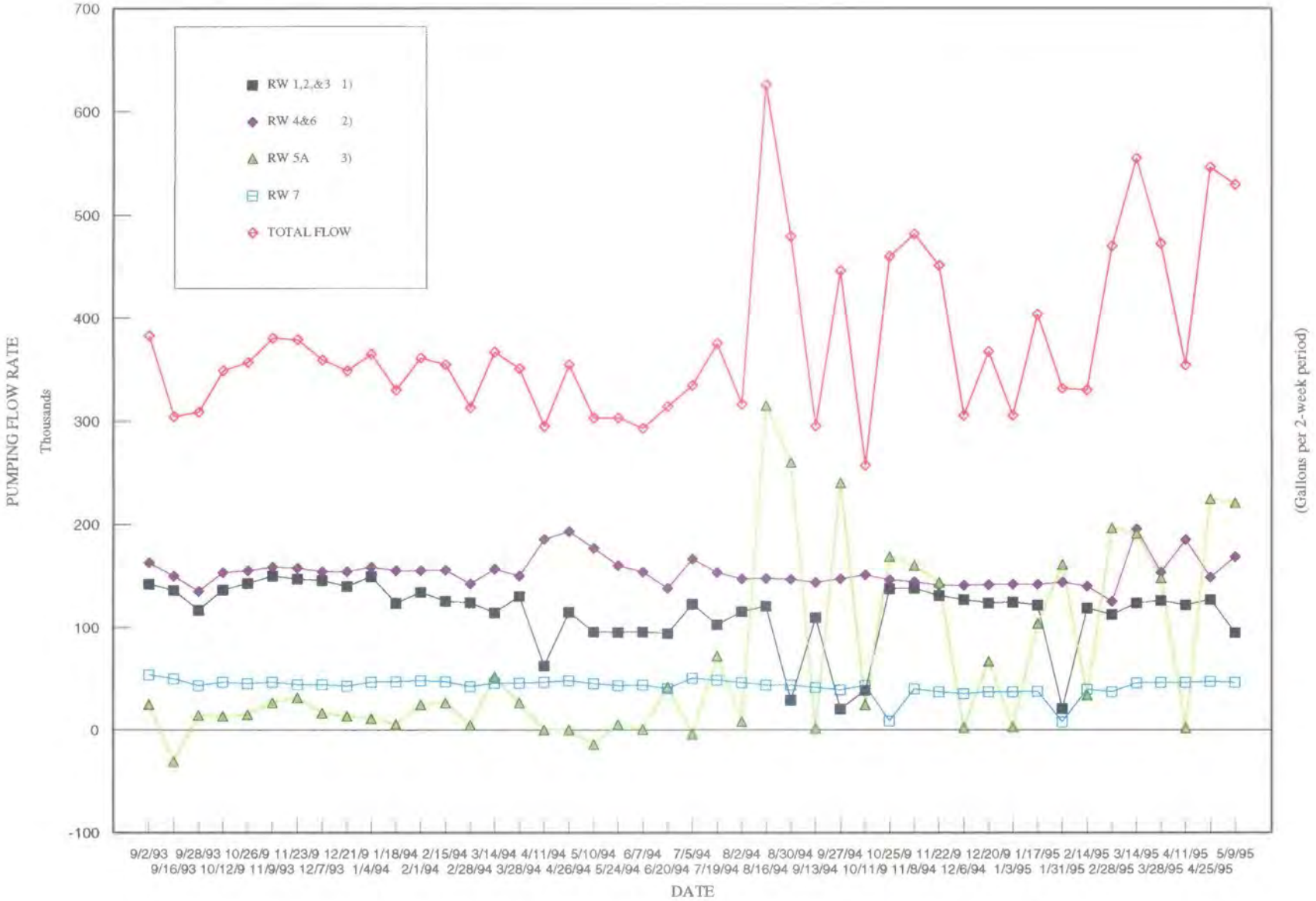
Figure 4-1 illustrates the flow data per pump station, as well as the total flow since September 1993. Discharge rates do appear to have increased after rehabilitation, as did the total flow.

Table 4-1 summarizes the measured flow rates for each recovery well since September 1993. As shown in Table 4-1, discharge rates from each recovery well have constantly fluctuated due to the malfunction of equipment (leaking pressure gauges, pumps, etc.). The discharge rate increased only slightly in the RW-1, 2, 3 pump station after the rehabilitation. It appears that, although they have fluctuated, discharge rates have increased in pump stations RW-4, 6, RW-5A, and RW-7 since the initial rehabilitation.

Table 4-2 lists the date of well rehabilitation and allows a comparison of average flow rates measured prior to rehabilitation and after rehabilitation. Table 4-2 indicates an overall increase in discharge rates after rehabilitation.

Figure 4-2 is a water level elevation map depicting ground-water elevations in the

FIGURE 4-1
RECOVERY WELL FLOW DATA



1) RW1, 2, & 3 are connected to the same pumphouse. Presently, RW1 is closed, RW2 is partially open, and RW3 is fully open.
2) RW4, & 6 are connected to the same pumphouse.
3) RW5 relocated and pump replaced 11/23/93, renamed RW5a.

TABLE 4-1
NAS PENSACOLA WWTP RCRA RECOVERY WELL FLOW DATA

DATE	RW 1,2,&3** FLOW (GALS/2wks)	RW 4&6 FLOW (GALS/2wks)	RW 5A* FLOW (GALS/2wks)	RW 7 FLOW (GALS/2wks)	TOTAL FLOW (GALS/2wks)
9/2/93	142110	162340	24760	53830	383040
9/16/93	135670	149590	-30700	49630	304190
9/28/93	116270	134810	14330	43120	308530
10/12/93	136130	152720	13160	46830	348840
10/26/93	142140	154940	14830	45010	356920
11/9/93*	149620	158140	26400	46350	380510
11/23/93*	146570	157290	31320	43950	379130
12/7/93	144880	154010	16110	44160	359160
12/21/93	139320	153600	13510	42630	349060
1/4/94	149060	158250	11050	46720	365080
1/18/94	123050	154960	5120	47100	330230
2/1/94	133870	154620	24713	47830	361033
2/15/94	125390	155560	26547	47110	354607
2/28/94	123660	142080	4750	42250	312740
3/14/94	113800	156140	51810	45330	367080
3/28/94	129980	149390	26114	45340	350824
4/11/94	62480	185229	0	46667	294376
4/26/94	114540	192381	0	47693	354614
5/10/94	95550	176590	-13904	44760	302996
5/24/94	94640	159660	5466	43110	302876
6/7/94	95650	153210	674	43420	292954
6/20/94	94086	137550	41772	40140	313548
7/5/94	122174	165870	-3652	50170	334562
7/19/94	102520	152770	71814	48230	375334
8/2/94	114960	146980	8396	46040	316376
8/16/94	120305	147250	314706	43740	626001
8/30/94	28735	146150	259724	43840	478449
9/13/94	109247	143172	1300	41266	294985
9/27/94	19933	146778	240010	38974	445695
10/11/94	38450	150690	24290	43310	256740
10/25/94	136920	145910	168195	8650	459675
11/8/94	137634	143830	159625	39953	481042
11/22/94	130526	140433	143430	36652	451041
12/6/94	126543	140687	2578	35103	304911
12/20/94	123081	141034	66629	36927	367671
1/3/95	124006	141588	2629	36814	305037
1/17/95	121155	141168	103562	37668	403553
1/31/95	20528	143045	160533	7741	331847
2/14/95	118171	139268	33440	39172	330051
2/28/95	112145	124628	195889	37053	469715
3/14/95	123141	194925	190593	45607	554266
3/28/95	125571	152781	147296	46200	471848
4/11/95	121568	184651	2015	45893	354127
4/25/95	126623	147850	224282	47128	545883
5/9/95	94185	167684	220647	46206	528722

* RW 5 relocated and pump replaced 11/12/93, renamed RW 5A.

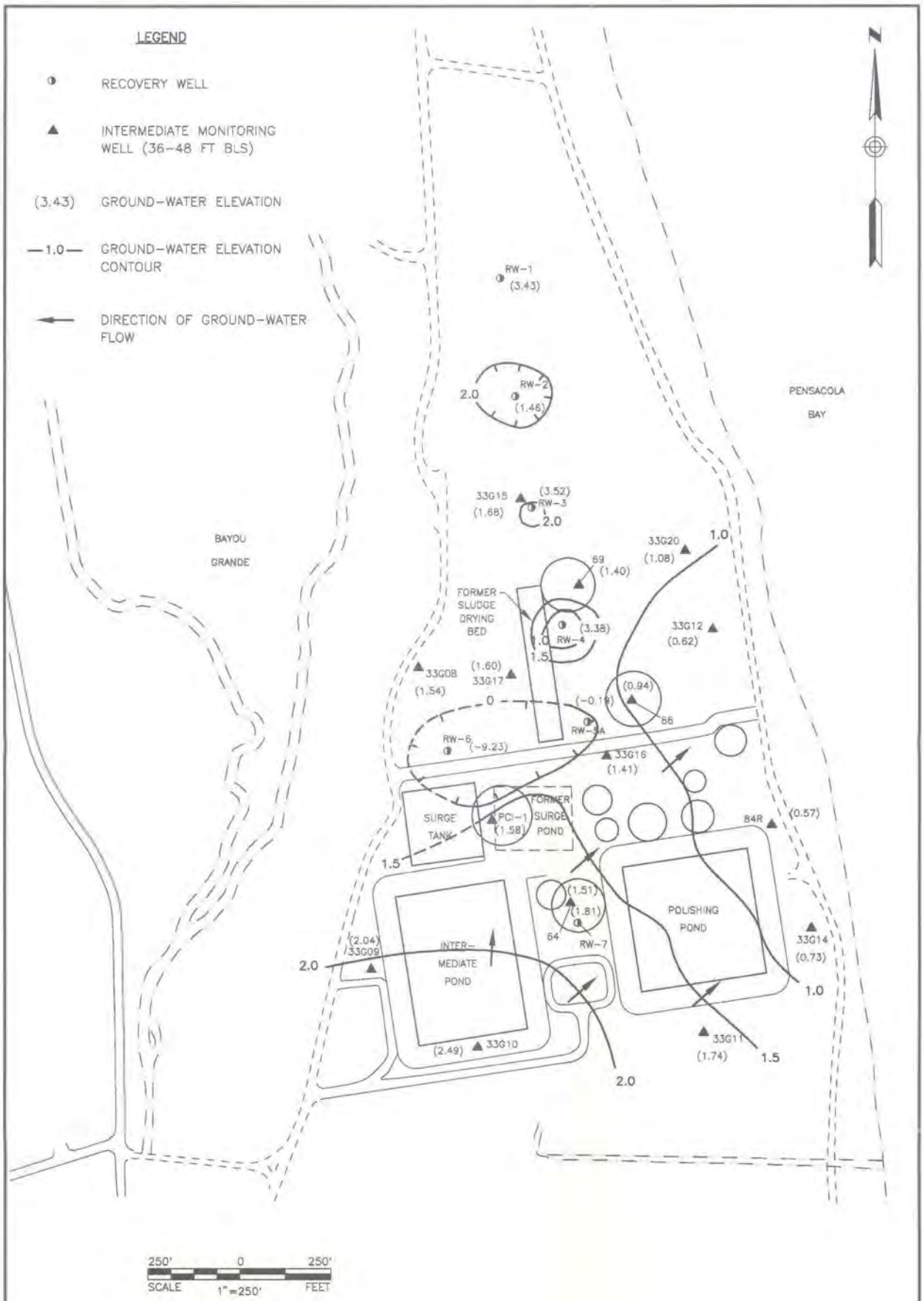
** RW 2 only being purged 9/2/93 thru 3/28/94; RW 3 only being purged 3/28/94 to present. (RW 1 suction valve is presently in the closed position; RW 2 suction valve is presently in the slightly opened position; RW 3 suction valve is presently in the full open position.)

Table 4-2
Comparison of Discharge Rates
Ground-water Recovery Systems
NAS Pensacola, Florida

Recovery Well #	Week of Rehabilitation	Average Discharge Prior To Rehabilitation	Average Discharge After Rehabilitation	Percent Increase
RW-1,2,3	Febraury 14, 1995	105,580.60	117,205.50	11%
RW-4,6	Febraury 21, 1995	141,131.60	162,086.50	14%
RW-5A	February 14, 1995	61,561.80	163,453.60	165%
RW-7	February 28, 1995	39,615.00	46,206.80	16%

Avearge discharge volumes for systems RW-1,2,3 , RW-4, 6 , and RW-5A were calculated using discharge volumes measured during the last six (6) O&M visits prior to well rehabilitation and the volumes measured during the six (6) O&M visits since the initial rehabilitation.

Avearge discharge volumes for RW-7 were calculated using the volume measured during the last five (5) O&M visits prior to rehabilitation and the five (5) visits since the rehabilitation.



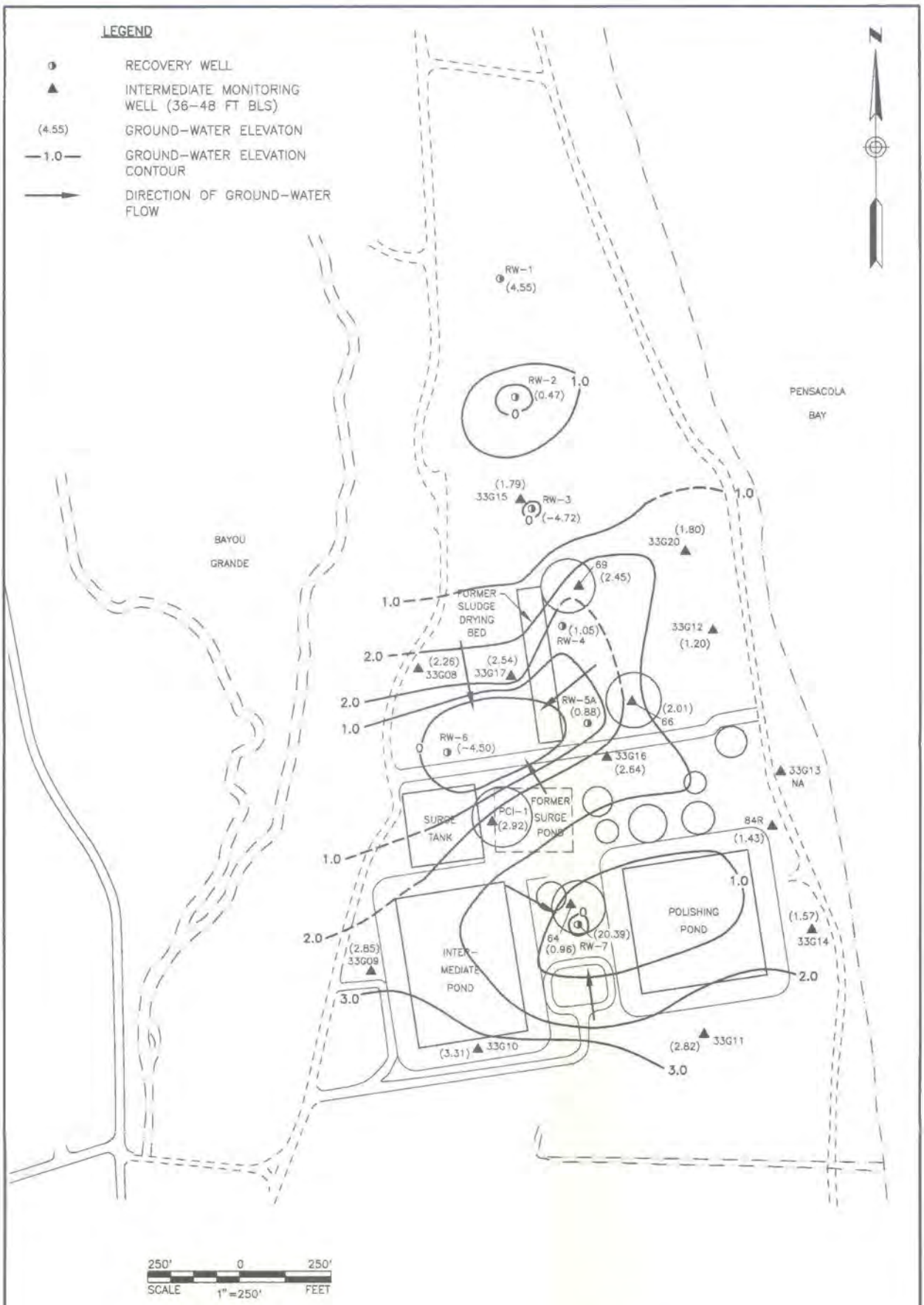
SOURCE: E & E, 1992

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-2
WATER LEVEL ELEVATION MAP FOR THE INTERMEDIATE ZONE JANUARY 23, 1995
NAS PENSACOLA WWTP, PENSACOLA, FLORIDA
RUST Project No. 89656.000

intermediate zone monitoring wells and recovery wells as measured in January 1995. Figure 4-3 is a water level elevation map for the intermediate zone as measured in April 1995. A comparison of the water level elevation maps indicates that cones of influence have increased since January 1995, due to elevated discharge rates.

Although the discharge rates from these wells did increase, it also appears that discharge rates may be slowly declining to pretreatment levels. this decline is likely due to the aggressive growth of naturally occurring bacteria. Therefore, additional rehabilitation activities are warranted to maintain higher discharge rates.



SOURCE: E & E, 1992

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4-3

WATER LEVEL ELEVATION MAP FOR THE INTERMEDIATE ZONE APRIL 12, 1995

NAS PENSACOLA WWTP, PENSACOLA, FLORIDA

RUST Project No. 89656.000

DWG: R:\CADD\89656\PENS0123 PLOTTED: 05/18/95 PES41

5.0 MAINTENANCE PLAN

In order to ensure specific capacities are maintained at acceptable levels in each recovery well, periodic maintenance should be conducted to rehabilitate the recovery well system.

Although the Recovery Well Rehabilitation Design and Preliminary Maintenance Plan (November 1994) stated that the recovery well system would be evaluated for three (3) months after the initial well rehabilitation activities, it is already apparent that continued rehabilitation/maintenance will be necessary. In that Rust is currently performing bi-weekly Operations and Maintenance (O&M) site visits as part of a separate statement of work for the recovery well system at the WWTP, the rehabilitation maintenance can occur concurrently with these O&M visits either by sub-contract or separate well maintenance contract.

In that recovery wells RW-3 and RW-7 were relatively "clean" and maintained their flow rates after rehabilitation, it is recommended that these wells be rehabilitated once per year in accordance with the previously used rehabilitation methods. A brief description of well rehabilitation activities are as follows:

RW-3 Super chlorinate with 3000 to 4000 ppm of sodium hypochlorite to eliminate bacteria growth. Swab the well with an agitator to distribute the solution into the formation.

RW-7 Use a light sodium hypochlorite treatment to eliminate bacteria growth and swab. Swab well with an agitator to distribute the solution into the formation.

Appendix B contains a detailed description of the recovery system rehabilitation procedures.

Recovery wells RW-4, RW-5A and RW-6 were the "dirtiest" and did indicate increased flow rates after rehabilitation activities. It is recommended that these wells be rehabilitated quarterly per year in accordance with the previously used rehabilitation methods. A brief description of well rehabilitation activities are as follows:

RW-4 Super chlorinate the well with 3000 to 4000 ppm sodium hypochlorite. Swab the well with an agitator to distribute the solution into the formation.

Following the agitation, a solution of Well Klean II, muriatic acid, a surfactant and fresh water will be placed in the well and left overnight for an extended contact time. This combination of bleach and acid will help break down the continuing growth of bacteria.

RW-5A Super chlorinate with 3000 to 4000 ppm of sodium hypochlorite to eliminate bacteria growth. Swab the well with an agitator to distribute the solution into the formation.

RW-6 Super chlorinate the well with sodium hypochlorite and then agitate with the swab. Place a solution of Well Klean II, muriatic acid, a surfactant and fresh water in the well with a contact time of 12 hours. This combination of bleach and acid will help break down the continuing growth of bacteria.

Appendix B contains a detailed description of the rehabilitation procedures that will be used on these three (3) wells. Appendix C contains MSDS for the chemicals used during recovery system rehabilitation procedures. It should be noted that the WWTP should be notified prior to rehabilitation activities and the WWTP personnel should be provided copies of the MSDS sheets in order to ensure the plant can accept the chemicals. If the WWTP cannot accept the chemicals, an alternative method of disposal will be identified at the time.

Recovery well performance and the effectiveness of periodic maintenance efforts will be continually monitored by the bi-weekly O&M contractor. Recovery well drawdown, discharge rates, discharge and suction line pressures will be monitored as part of the O&M visits. The O&M contractor, in coordination with the well maintenance contractor, shall perform additional periodic BARTS testing as required to verify the adequacy of the periodic well treatment methods. Appendix D contains a summary of BARTS sampling and testing procedures.

6.0 SCHEDULE

Upon approval of this Recovery Well Maintenance Plan, Phase 3 (Periodic Well Maintenance) of this rehabilitation program can be implemented. As previously stated, Periodic Well Maintenance will be performed by a qualified, licensed well contractor, concurrently with ongoing, bi-weekly O&M inspections. The rehabilitation/maintenance of recovery wells RW-3 and RW-7 will occur (annually) the first quarter of 1996. The rehabilitation/maintenance of recovery wells RW-4, RW-5A and RW-6 will occur beginning June 1995.

7.0 SUMMARY

The initial recovery well rehabilitation was performed because naturally occurring bacteria are believed to be reducing the effectiveness of the ground-water recovery systems. As part of the initial recovery system rehabilitation, samples were collected from recovery wells RW-3, RW-4, RW-5A, RW-6 and RW-7 in February 1995. Samples from each well were analyzed for various bacteria using the BARTS testing system. Results of the BARTS testing indicated that various types of bacteria were building up the recovery wells. Slime forming bacteria was detected in wells RW-3, RW-5A and RW-7. Sulfate reducing bacteria, slime forming bacteria and iron reducing bacteria were detected in wells RW-4 and RW-6.

The initial rehabilitation of the five (5) recovery wells was performed in February 1995. Based on the results of BARTS testing recovery systems, RW-3, RW-5A and RW-7 were rehabilitated via swabbing the wells and flushing the discharge piping with a sodium hypochlorite (bleach) solution. Recovery systems RW-4 and RW-6 were also initially swabbed and flushed using sodium hypochlorite. They were then swabbed and flushed using a Well Kleen II and muriatic acid solution.

Overall, results of the initial rehabilitation activities have increased discharge rates from the recovery systems. A comparison of water level elevation maps for the intermediate aquifer zone indicated that the cones of influence surrounding the recovery wells have increased since January 1995 due to the increased discharge rates. A comparison of discharge pressures for each recovery system indicate that only the pressure in RW-4, 6 has increased since the rehabilitation activities.

Although discharge rates are slightly higher than the last several O&M visits prior to the rehabilitation, they may be declining to pre-treatment levels as a result of the active growth of bacteria. Therefore, a maintenance plan is required to ensure effective flow rates for the recovery well system. Recovery systems RW-1, 2, 3 and RW-7 will be rehabilitated annually and recovery systems RW-4, 6 and RW-5A will be rehabilitated quarterly. The rehabilitation methods will be the same as those used during the initial rehabilitation. Well rehabilitation procedures for each well are detailed in Appendix B.

Upon approval of this plan, Phase 3 will be estimated and then implemented upon receipt of the modification to the current contract.

Tim Kelly ROICC NAS Pensacola

ORDER FOR SUPPLIES OR SERVICES

(CONTRACTOR MUST SUBMIT FOUR COPIES OF INVOICE)

Form Approved OMB No. 0704-00187 Expires Aug. 31, 1992

PAGE 1 OF

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N62467-93-D-0662	0045	95 Apr 03		DO- N/A

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NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DRIVE, P.O. BOX 10068
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Eric Nass, Code 0233EN, 803-743-0919

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2694A lake Park Drive
Charleston, SC 29418

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This delivery order is issued on another Government agency or in accordance with and subject to terms and conditions of above numbered contract.

Reference your furnish the following on terms specified herein.

ACCEPTANCE. THE CONTRACTOR HEREBY ACCEPTS THE OFFER REPRESENTED BY THE NUMBERED PURCHASE ORDER AS IT MAY PREVIOUSLY HAVE BEEN OR IS NOW MODIFIED, SUBJECT TO ALL OF THE TERMS AND CONDITIONS SET FORTH, AND AGREES TO PERFORM THE SAME.

NAME OF CONTRACTOR | SIGNATURE | TYPED NAME AND TITLE | DATE SIGNED

If this box is marked, supplier must sign Acceptance and return the following number of copies:

17. ACCOUNTING AND APPROPRIATION DATA/LOCAL USE

AA 17 95951804 KU2N 0000 62467 D 062467 2D N65114 AA9306620045 $219,587.73

18. ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICE	20. QUANTITY ORDERED/ ACCEPTED*	21. UNIT	22. UNIT PRICE	23. AMOUNT
0001	A/E SERVICES for ground water recovery and monitoring wells at the waste water treatment plant at Naval Air Station, Pensacola, FL. THE NEW TOTAL THIS CONTRACT IS $3,381,849.92. ALL WORK SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE ATTACHED STATEMENT OF WORK DATED 15 Feb 95. Copy to: NAS, Pensacola, FL, DFAS,	1	JOB		$219,587.73

RECEIVED APR 10 11 47 AM '95 OICC/ROICC NAS PENSACOLA, FL

*If quantity accepted by the Government is same as quantity ordered, indicate by x. If different, enter actual quantity accepted below quantity ordered and encircle.

24. UNITED STATES OF AMERICA
Dwight Cargile
BY: Dwight Cargile, Contracting Officer

25. TOTAL $219,587.73

29. DIFFERENCES

26. QUANTITY IN COLUMN 20 HAS BEEN
( ) INSPECTED ( ) RECEIVED ( ) ACCEPTED AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED

DATE SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

27. SHIP NO.
( ) PARTIAL
( ) FINAL

28. D.O. VOUCHER NO.

30. INITIALS

32. PAID BY

33. AMOUNT VERIFIED CORRECT FOR

36. I certify this account is correct and proper for payment

DATE SIGNATURE AND TITLE OF CERTIFYING OFFICER

31. PAYMENT
( ) COMPLETE
( ) PARTIAL
( ) FINAL

34. CHECK NUMBER

35. BILL OF LADING NO.

37. RECEIVED AT	38. RECEIVED BY	39. DATE RECEIVED	40. TOTAL CONTAINERS	41. S/R ACCOUNT NUMBER	42. S/R VOUCHER NO.

FOR OFFICIAL USE ONLY

15 FEB 95
CODE 1826

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DRIVE, P.O. BOX 190010
NORTH CHARLESTON, SC 29419-9010

STATEMENT OF WORK
CONTRACT 0662\1826\05

I. PROJECT DESCRIPTION:

Naval Air Station Pensacola, FL
Groundwater Recovery and Monitoring Wells at Wastewater Treatment Plant

II. PROJECT IDENTIFICATION:

A. The contractor shall follow the special instructions listed in III.A.

B. The contractor shall perform groundwater monitoring events that include field sampling, laboratory analysis, groundwater level measurements, and preparation of reports as required by current Permit/Certification Number: HF17-170951.

C. The contractor shall perform operation and maintenance (O&M) work for seven recovery wells that are performing RCRA corrective action at the wastewater treatment plant. This work will consist of 26 biweekly O&M visits starting with the first visit in the last week of July 1995 and ending with the last visit in the second week of July 1996.

D. The contractor shall submit reports as detailed in III.D.

III. SCOPE OF WORK:

A. Special Instructions

1. The contractor shall provide all personnel, material and equipment to complete work under this contract.

2. A schedule of all on-base work shall be coordinated with the NAS Pensacola Environmental Coordinator (Bill Taylor, 904-452-3900) and the Public Work Center Pensacola Environmental Coordinator (Tom Kelly 904-452-2170). The contractor shall notify the NAVFAC

Southern Division Engineer-In-Charge (EIC) (Tom Sailors, Code 1826, 803-743-0879) of this schedule as soon as it is decided.

3. The contractor shall not publicize or release any information regarding this project. Any inquiries regarding this project shall be referred to the NAVFAC Southern Division EIC.

4. Work shall be performed using the quality assurance project plan and the sampling and analysis project plan, which were prepared in accordance with 17-160.220, FAC, and previously approved for this project.

The contractor shall also perform work using the project health and safety plan, which was prepared in accordance with CFR 1910.120 and previously approved for this project.

5. The contractor shall follow the general format of the Semi-annual Groundwater Monitoring Reports prepared under the previous task order for this contract.

6. All investigative derived waste consisting of purged groundwater from monitoring wells shall be sent to the wastewater treatment plant for treatment, as long as Public Works Department is aware of this discharge. (The wastewater treatment plant will be converted to a domestic plant beginning approximately October 1995) After the plant is converted no investigative derived waste consisting of groundwater will be allowed in the plant for treatment. All other investigation derived waste shall be contained in 55 gallon drums, properly labeled and left on site. The contractor shall notify the environmental coordinators of Naval Air Station Pensacola and Public Work Center Pensacola of the contents of the drums. The Public Works Center shall be responsible for handling, testing, manifesting, and storing until drums are transported for disposal as hazardous waste by Defense Reutilization and Marketing Office (DRMO).

7. The contractor shall bring any discrepancies that occur between permit number HF17-170951 and this statement of work to the attention of the engineer-in-charge immediately for resolution.

B. Groundwater Monitoring Requirements

1. Monitoring Wells

The monitoring wells that will be sampled include 12 point of compliance wells (PCS-1, PCI-1, PCD-1, GM-8, GM-9, GM-10, GM-11, GM-12R, GM-13, GM-14, GM-68, and GM-69), six assessment wells (GM-62, GM-63, GM-64, GM-65, GM-66, and GM-67), and one background well (UG-1).

Quality Assurance samples will be taken in accordance with the Navy Installation Restoration Program "Basic Sampling and Analysis Plan".

2. Analytical Testing

Groundwater sampling will take place in January and July 1996. The following lists will outline which samples will be tested for certain parameters.

All well samples and the two duplicate samples (DUP) 1 and 2 will be tested for pH and specific conductance.

Samples from Wells: PCS-1, PCI-1, PCD-1, UG-1, GM-8, GM-9, GM-10, GM-62, GM-63, GM-64, GM-65, GM-66, GM-67, GM-68, and GM-69 will be tested for using EPA Methods:

Volatile Organic Compounds (8240)
BNAs (8270)
Method 6010 Metals
- Barium
- Cadmium
- Total Chromium
- Copper
- Iron
- Manganese
- Nickel
- Silver
- Sodium
- Vanadium
- Zinc

Arsenic (7060)
Lead (7421)
Mercury (7470)
Selenium (7740)
Chloride (325.3)
Fluoride (340.2)
Sulfate (9036)
Nitrate (352.1)
Complex Cyanide (9012)
Gross Alpha (900.0)
Gross Beta (900.0)
Radium-226 (903.1)
Radium-228 (904.0)
Turbidity (180.1)
Total Coliform (909A)

Samples from wells GM-11, GM-12R, GM-13, and GM-14 will be tested for complex cyanide (9012).

The preservative blank PB-1 will be tested for volatile organic compounds (8240), complex cyanide (9012), and the following metals:.Method 6010 Metals

- Barium
- Cadmium
- Total Chromium
- Copper
- Iron
- Manganese
- Nickel
- Silver
- Sodium
- Vanadium
- Zinc

Arsenic (7060)
Lead (7421)
Mercury (7470)
Selenium (7740)

Quality assurance samples will be tested as required by the hazardous waste permit (HF17-170951) and/or the Navy Installation Restoration Program "Basic Sampling and Analysis Plan".

3. Groundwater Level Measurements

Groundwater level measurements will be taken in October of 1995 and January, April, and July of 1996. This will include the wells that will be sampled during semi-annual groundwater monitoring events plus the following additional wells: GM-70, GM-71, GM-72, GM-73, GM-76, GM-77, GM-78, GM-79, GM-80, GM-81, GM-82, GM-83, GM-84R.

Additionally, the groundwater level in 20 monitoring wells installed during the remedial investigation phase of an Installation Restoration project at this site (Operable Unit (OU) 10 and Site 13) will also be measured. These monitoring wells are identified as 33G01, 33G02, 33G03, 33G04, 33G05, 33G08, 33G09, 33G10, 33G11, 33G12, 33G14, 33G15, 33G16, 33G17, 33G18, 33G20, 13G06, 13G07, and 13G19. Information concerning completion depths and screened intervals are summarized in Table 5-3 of the Draft Final Remedial Investigative Report, NAS Pensacola Operable Unit 10 and Site 13, prepared by Ensafe/Allen & Hoshall, November 13, 1993. This remedial investigation report, page 6-13, noted discrepancies in previously used well elevation data, and as a result all wells were resurveyed to the same datum. All groundwater elevations, therefore, shall be calculated based on the groundwater levels measured and the resurveyed top of casing elevations listed in Table 6-1 of the remedial investigation (RI) report.

To minimize tidal influence, measurements must take place in an eight hour period either 4 hours before to 4 hours after high ground water levels occur or 4 hours before to 4 hours after low ground water levels occur. Based on results of the RI performed by Ensafe/Allen & Hoshall, high and low groundwater levels lag behind the high and low tide data for Warrington, FL by an average of 4 hours and 40 minutes.

The time for each groundwater measurement shall be recorded. Record whether measurements were made at high or low groundwater levels and the published elevation and time for the corresponding high and low tide at Warrington, FL.

Each measurement must be made prior to any scheduled well purging.

In addition in January and July, the total depth of wells to be sampled must be determined by physical measurement prior to sampling to calculate the casing volume to be purged. These total depth measurements shall also be compared with original well installation depths and determine if any infilling or siltation of wells is occurring.

4. Groundwater Flow Rate

The horizontal groundwater flow rates and directions for each of the three aquifer zones must be determined in October of 1995 and January, April, and July of 1996 from the groundwater level measurements. Hydraulic conductivity's and transmissivities to be used for calculating flow rates in the three groundwater zones shall be geometric mean average values determined during the remedial investigation referenced in paragraph 3 above. These mean values from specific capacity and slug tests of hydraulic conductivity and transmissivity are listed on pages 6-30 (for the deep zone, well 33G18) and 6-32 (for the shallow and intermediate zones) of the referenced RI report.

C. Operation and Maintenance of Recovery Wells

Implement routine bi-weekly O&M visits for the groundwater recovery well system at the NAS Wastewater Treatment Plant. The system consists of recovery wells RW-1 through RW-7 and all associated ancillary mechanical and electrical equipment. The O&M programs shall consist of the following:

1. Visually inspect all above ground mechanical and electrical components for damage/deterioration.

2. Perform all of the following bi-weekly Preventative Maintenance (PM) tasks:

a. Check all screens for build up of debris or siltation. Remove any debris or siltation, flush, surge and clean the screens to improve transmitting capacity. When necessary, replace the screens.

b. Measure pump output using a totalizing flowmeter. If pump output is at a reduced capacity, consult the troubleshoot guides in the owners manual and follow recommended corrective actions.

c. Check pump cycling times. If pump cycles more frequently than 15-30 minutes at optimum flow, follow recommended corrective actions.

d. Measure the well water levels using electronic sensor through the top of the cap on the well casing.

3. Provide a monthly letter report documenting the inspections, any noted deficiencies and the corrective actions.

4. Data to be taken during the biweekly inspections and included in the letter reports shall include:

- inspection date and inspector's name
- pump cycle time
- instantaneous pumping flow rate
- discharge pressure and suction vacuum
- well water level
- flow meter reading
- elapsed time
- calculated Bi-weekly pump flow rate

The calculated bi-weekly pump flow rates and measured well water levels shall be plotted in a time series graph to facilitate evaluation of the performance and maintenance requirements of the recovery wells and pumps.

5. All necessary repairs and adjustments to ensure all pumps are operating at optimum conditions shall be made during the bi-weekly visits.

6. Remove and inspect the level electrode and probes and clean with a mild, dilute detergent solution.

7. Check for loose or broken wires in the electrical control panel box and electrode leads.

8. The flow meter strainer should be cleaned of any debris.

D. Reports

1. Semi-annual Groundwater Monitoring Reports

Prepare and submit draft semi-annual groundwater monitoring reports within 60 days of the January and July 1996 sampling events. Submit the final semi-annual groundwater monitoring reports within 75 days of the January and July 1996 sampling events. Each report, at a minimum, should include the following:

- A summary of the groundwater analytical data with emphasis on the most common contaminants and/or those which exceed maximum contaminant levels. This section shall include well location figures, groundwater analytical data figures and summary tables.

- A summary of the groundwater flow rates and directions in each of the three groundwater zones (shallow, intermediate, deep). Include groundwater contour maps, hydraulic conductivity and transmissivity parameters, and groundwater flow rates. Also include six groundwater elevation contour

maps (one for each zone and measurement event), two water level tables, and two groundwater flow rate summary tables.

- A summary of the effectiveness of the corrective action program. The following information will be included:

a. A narrative summary of the effectiveness of the Corrective Action Program.
b. Any minor revisions or adjustments to the Corrective Action System or Plan.
c. Any proposed modifications to the Corrective Action Program and or the Post-Closure Plan.
d. Record of when the treatment system is on/off.
e. Total volume of processed groundwater.
f. Chain-of-custody forms and lab reports.
g. Summary of groundwater data with emphasis (including graphic representation) on the most common contaminants, and those most difficult to treat. The graphic representations as a minimum shall include time series graphs of analytical data for wells exhibiting a history of these contaminants of primary concern. Approximate concentration contour maps shall also be plotted for these contaminants where sufficient data is available. These graphs and maps shall be analyzed to help evaluate the migration of contaminants and the effectiveness of the corrective action program.
h. Groundwater elevation contour maps for the two measurements events during the previous six months. Separate maps must be prepared for the shallow, intermediate and deep wells.

- All well measurement data taken since the last groundwater monitoring event, including groundwater level measurements, total depth of well measurements and calculated depth of infilling or siltation by comparison with well installation records.

- The complete laboratory analytical data, and the required Florida Department of Environmental Regulation parameter monitoring report forms.
- A one to two page data validation summary and laboratory case narrative.

2. Recovery Wells Operation and Maintenance Reports

An Operations and Maintenance Report will be submitted within 5 days of the last operation and maintenance visit of each month. This report will include data collected and a summary of the status of the recovery well system, any deficiencies noted, and corrective actions performed. The report shall also include updates of the data tables and time series graphs for the pump flow rates and well water levels. The summary of the status of the recovery well system will also include an analysis of these graphs to help evaluate the performance of the overall system and individual wells and pumps.

IV. Schedule

Deliverable	Due Date
1995	
Monitoring well Groundwater Elevation Measurements	Oct 9-13
1996	
1st Semi-Annual Monitoring Well Sampling/Measurements Event	Jan 8-12
Draft Report	Feb 27
Final Report	Mar 29
Monitoring Well Groundwater Elevation Measurements	April 8-12
2nd Semi-annual Monitoring Well Sampling Measurements/Event	July 8-12
Draft Report	Aug 28
Final Report	Sep 27
1995-1996	
Monthly Recovery Wells Operations and Maintenance Reports	Within 5 Days of last bi-weekly O&M visit of each month

V. Submittals

Submittals shall be sent to the following persons:

(1)	Commanding Officer Naval Public Works Center, Code 480 Attn: Mr. Tom Kelly Naval Air Station Pensacola, Florida 32508-6500	4 copies
(2)	Southern Division NAVFACENGCOM Attn: Tom Sailors, Code 1826 2155 Eagle Dr., PO Box 190010 Charleston, South Carolina 29419-9010	2 copies

(3) Commander
Naval Air Station
Environmental Division
Attn: Bill Taylor
Bldg 3813
Pensacola, Fl 32058-5217

2 copies

8.0 REFERENCES

Ecology and Environment, Inc., 1992a. Generic Quality Assurance Project Plan, Contamination Assessments and remedial Activities, Naval Air Station, Pensacola, Florida.

Ecology and Environment, Inc., 1992b. Semi-Annual Report on Groundwater Monitoring, Industrial Wastewater Treatment Plant, Naval Air Station, Pensacola, Florida.

Geraghty and Miller, Inc., 1984. Verification Study, Assessment of Potential Ground-Water Pollution at Naval Air Station, Pensacola, Florida.

Geraghty and Miller, Inc., 1986. Characterization Study, Assessment of Potential Ground-Water Pollution at Naval Air Station, Pensacola, Florida.

Rust Environment and Infrastructure, 1994. Recovery Well Rehabilitation Design and Preliminary Maintenance Plan, Industrial Wastewater Treatment Plant, Naval Air Station, Pensacola, Florida.

APPENDIX A

BARTS Evaluation Chart
February 1995

RESULTS OF INITIAL BARTS SAMPLING

In February 1995, personnel with Layne, Inc. collected samples from each of the five (5) recovery wells, RW-3, RW-4, RW-5A, RW-6 and RW-7, and analyzed the samples using the Biological Activity Reaction Test System (BARTs). BARTs kits were used to monitor the population size and/or activity of specific groups of bacteria in water. The three most common groups involved in biofouling of a well are Iron Related Bacteria (IRB), Sulfate Reducing Bacteria (SRB), and Slime Forming Bacteria (SFB). BARTs kits were used to test for these bacteria on samples from each of the five (5) recovery wells.

An explanation for the attached sample chart is as follows:

SRB - Sulfate Reducing Bacteria
SFB - Slime Forming Bacteria
IRB - Iron Related Bacteria

Zero (0) sample time is the initial time the sample was collected. Five (5), 30 and 60 minute sample times are 5, 30, and 60 minutes from zero sample time.

One 15 ml sample to be tested for each type of bacteria was collected from each well at each sample interval. After collection, samples were allowed to incubate for 3 days. Conditions in the samples containers at the end of the 3-day incubation period were documented and the results are summarized in the attached evaluation chart.

BART'S Evaluation Chart

Well Number Sample Time	SRB Description of Reaction	SFB Description of Reaction	IRB Description of Reaction	Recommended Rehabilitation Method
RW 5 0 Minutes	Clear No Reaction	Intense clouding, dark colored swirls distributed throughout sample when shaken. Growth became prevalent during the third day of incubation.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	Super chlorinate well with 3000 to 4000 ppm of a sodium hypochlorite. Swab well with agitator to distribute solution into the formation. The three day delay for the sample to react indicates high colony counts relatively close to the screen zone. These colonies are characterized by covert dense slime formers that are best treated with the bleach treatment.
RW 5 5 Minutes	Clear No Reaction	Light clouding of sample fluid; fluid is light brown to rust colored, however the fluid does not have any bacteria colonies.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 5 30 Minutes	Clear No Reaction	Intense clouding, dark colored swirls distributed throughout sample when shaken. Growth became prevalent during the third day of incubation.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 5 60 Minutes	Clear No Reaction	Light clouding of sample fluid; fluid is light brown to rust colored, however the fluid does not have any bacteria colonies.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 6 0 Minutes	Slight detection of SFB at the base of the sample tube a, characterized by a dark ring at interface between the dried matrix and the fluid.	The sample is dominated by a gel-lik growth near the interface between the dried matrix and the test fluid. There are no characteristic black rings.	The sample is light green to yellow but has clouding throughout and a slime ring near the base of the sampl tube.	This well is the worst of the five that were sample. It had positive reactions to all 3 tests. The reactions occurred within three to four days. The recommended treatment for this well is an initial super chlorination with sodium hypochlorite, thorough agitation with the swab and finally place a solution of Well Klean II, murati acid, a surfactant and fresh water into the well with a contact time of 12 hours. The bateria samples are thick and close to the screen.
RW 6 5 Minutes	The presence of the bacteria becomes more apparent. The dark ring is thicker and more pronounced.	Intense clouding, dark colored swirls distributed throughout sample when shaken. Growth became prevalent during the third day of incubation.	The sample is light green to yellow but has clouding throughout and a slime ring near the base of the sampl tube.	
RW 6 30 Minutes	The sample is completely over run with the black growth. The base of the sample is thick with a black grow	The sample is gray to black with thic slime growth that extends upward to the FID ball.	The clouding described in the previous two samples has lessened and the is no ring at the base of the sample.	
RW 6 60 Minutes	Clear No Reaction	The sample fluid is rust colored with a black base near the dried matrix at the bottom of the sample tube.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	

Well Number Sample Time	SRB Description of Reaction	SFB Description of Reaction	IRB Description of Reaction	Recommended Rehabilitation Method
RW 3 0 Minutes	Cloudy ring at the interface between sample & the dried matrix. Sample fluid is clear indicating no presence of SRB.	Light clouding of sample fluid; fluid is light brown to rust colored, however the fluid does not have any bacteria colonies.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	Super chlorinate well with 3000 to 4000 ppm of a sodium hypochlorite. Swab well with agitator to distribute solution into the formation. The three day delay for the sample to react indicates high colony counts relatively close to the screen zone. These colonies are characterized by covert dense slime formers that are best treated with the bleach treatment.
RW 3 5 Minutes	Cloudy ring at the interface between sample & the dried matrix. Sample fluid is clear indicating no presence of SRB.	Intense clouding, dark colored swirls distributed throughout sampl when shaken. Growth became prevalent during the third day of incubation.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 3 30 Minutes	Cloudy ring at the interface between sample & the dried matrix. Random spotting of FID ball; no bacteria present.	Light clouding of sample fluid; fluid is light brown to rust colored, however the fluid does not have any bacteria colonies.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 3 60 Minutes	Cloudy ring at the interface between sample & the dried matrix. Random spotting of FID ball; no bacteria present.	Light clouding of sample fluid; fluid is light brown to rust colored, however the fluid does not have any bacteria colonies.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 4 0 Minutes	Deep seated SRB community, black deposits are at the base of test tube. The reaction became evident on the fourth day of monitoring.	Intense clouding, dark colored swirls distributed throughout sample when shaken. Growth became prevalent during the third day of incubation.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	Super chlorinate well with 3000 to 4000 ppm of a sodium hypochlorite. Swab well with agitator to distribute solution into the formation. Following the agitation, place a solution of Well Klean II, muratic acid, a surfactan and fresh water into the well and leave overnight for an extended contact time. The three and four day reaction time indicates that there is a heavy growth of bacteria relatively close to the screen. The combination of bleach and acid wi break down the resistance of the bacteria.
RW 4 5 Minutes	Deep seated SRB community, black deposits are at the base of test tube. The reaction became evident on the fourth day of monitoring.	Light clouding of sample fluid; fluid is light brown to rust colored, slime is apparent on the bottom of the test tube.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 4 30 Minutes	Deep seated SRB community, black deposits are at the base of test tube. The reaction became evident on the fourth day of monitoring.	Light clouding of sample fluid; fluid is light brown to rust colored, slime is apparent on the bottom of the test tube.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	
RW 4 60 Minutes	Sample clear of any Reaction. There is no apparent growth of bacteria.	Light clouding of sample fluid; fluid is light brown to rust colored, slime is apparent on the bottom of the test tube.	Sample fluid light green to yellow, but is clear of any growth, indicating no presence of IRB.	

Well Number Sample Time	SRB Description of Reaction	SFB Description of Reaction	IRB Description of Reaction	Recommended Rehabilitation Method
RW 7 0 Minutes	Clear No Reaction	The sample has a slight growth that becomes more apparent when swirled.	Clear No Reaction	This recovery well is the cleanest of the five tested. The only bacteria growth that had any measurable content was the SFB. This particular well does not require a significant amount of rehabilitation, but would benefit from a light bleach treatment.
RW 7 5 Minutes	Clear No Reaction	Clear No Reaction	Clear No Reaction	
RW 7 30 Minutes	Clear No Reaction	Clear No Reaction	Clear No Reaction	
RW 7 60 Minutes	Clear No Reaction	Clear No Reaction	Clear No Reaction	

BIOLOGICAL ACTIVITY REACTION TEST SYSTEMS BARTS

WHAT ARE BARTS?

Biological Activity Reaction Test Systems (BARTS) have been designed as field test kits to monitor the population size and/or activity of specific groups of bacteria in water.

BARTS offer the capability of monitoring for Iron Related Bacteria (IRB's), Sulfate Reducing Bacteria (SRB's) and Slime Forming Bacteria (SFB's). These three groups are the most important agents involved in biofouling.

BARTS are simple in design and interpretation, and can be used without expensive equipment. Incubation occurs in a few days at normal room temperature. Refer to diagram for description on how the test works.

WHAT ARE APPLICATIONS FOR BARTS?

BARTS were originally designed for the diagnosis of biofouled wells. In addition this test has many other applications:

_____ *1. Routine monitoring of surface, ground and industrial waters.*

_____ *2. Assessing the bacterial population type or size wherever there is a need.*

_____ *3. Monitoring biofouling of water wells on a routine basis, to be used as an early warning test of potential problems.*

_____ *4. Monitoring water treatment media (i.e. ion exchange resin, GAC filters, filtration media, etc.)*

_____ *5. Determining biological presence in distribution lines.*

WHAT BARTS PRODUCTS ARE AVAILABLE?

The Barts products currently available are:

- Iron Related Bacteria - IRB-BART
- Sulfate Reducing Bacteria - SRB-BART
- Slime Forming Bacteria - SLYM-BART

In addition to the BARTS products, two dippaddles for bacteria enumeration are also available including tests for:

- Heterotrophic Plate Count - GACO-Dippaddle
- Low Mesotrophic Coliforms - GACO-Dippadle
- Iron Related Bacteria Plate Count - PIRB-Dippaddle
- Pseudomonads - PIRB-Dippaddle

LW812-1

Layne-Western Company, Inc. A Marley Company 1-800-433-6776

1900 Shawnee Mission Parkway • P.O. Box 333 • Shawnee Mission, Kansas 66201 • 913/362-0510

SAMPLING AND PERFORMING A TEST

Instructions for the use of BARTS are provided with the tests. These should be followed carefully. It is important to keep in mind the following points:

1. Proper disposal instructions are contained in the instruction pamphlet and should be observed.
2. Live bacterial cultures are being grown and tubes should not be opened.
3. Sampling should be performed according to standard methods.
4. During transport it is important to keep the test out of direct sunlight.
5. Do not allow test to become too hot or freeze.
6. The tube should be kept in an upright position during transport to allow an oxygen gradient to establish in the tube.
7. The test is incubated at room temperature and observed daily for reaction.
8. The day a positive reaction occurs and the reaction type are recorded.
9. The longer it takes for a positive reaction to occur, the lower the population and/or activity level for the target recognized bacterial group.

HOW WILL BARTS BE OFFERED

Each individual test will consist of: (1) test vial with media and floating ball; (2) outer tube for spill containment, odor control, sterilization and disposal; (3) instruction pamphlet. An interpretation color poster is available from DESI. Each individual BARTS test is color coded for quick and easy recognition. Three basic configurations have been chosen as follows for marketing BARTS:

1. ***Tubular Mailer*** is a combination of two tests available in a mailer tube or one test with a sterile sampling tube. These tests can be mailed directly to the client in a mailer tube.

2. ***Six-Pak*** or ***Mix-Pak*** consists of either a package of one tube of each kind plus a sterile sampling bottle (six-pak) or any combination of six tests (mix-pak).

3. ***Bulk-Pak*** makes available in bulk quantity any combination of 36 tests

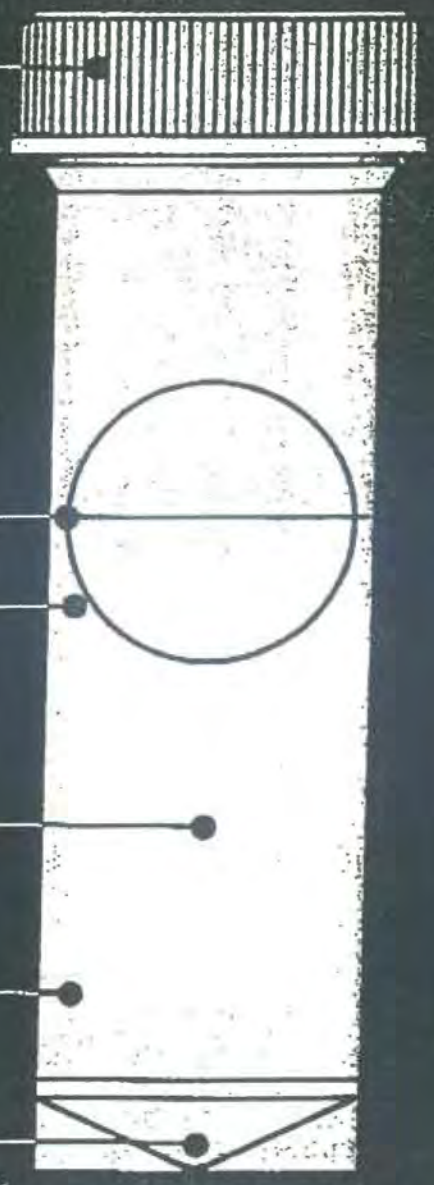
LW812-2

Layne

1-800-433-6776

1900 Shawnee Mission Parkway • P.O. Box 383 • Shawnee Mission, Kansas 66201 • 913/362-0510

How The BARTS™ Test Works



The screw cap should be tightened on the BARTS tube so that casual leakage in the case of the tube tipping over can be prevented.

Fifteen milliliters of water-samples are used to bring the BARTS-BALL up to the correct level. Nutrients will gradually diffuse up the water column to support this aerobic growth.

Aerobic growth of bacteria will occur at the surface of the medium between the BARTS-BALL and the wall of the BARTS tube.

Once the oxygen has been used by the aerobes, this zone becomes free of oxygen and anaerobic growth will dominate.

Intense aerobic activity at the surface will exclude aerobic growth in this zone.

Nutrient media for growth is provided as a sterile dried matrix on the floor of the tube. DO NOT SHAKE.

Patent Pending

LW812-3

Layne

1-800-433-6776

1900 Shawnee Mission Parkway • P.O. Box 363 • Shawnee Mission, Kansas 66201 • 913/362-0510

REHABILITATION PROCEDURES FOR RECOVERY SYSTEMS
RW-1, 2, 3 AND RW-7

- Shut down recovery system, disconnect suction piping, and remove suction piping and sensor probes from well.
- Install tremie pipe with "swab" attachment into recovery well.
- Inject 15 gallons of sodium hypochlorite (bleach - 3000 to 4000 ppm) through tremie pipe and swab into well. Bleach solution must have a contact time of at least 12 hours.
- Inject 15 gallons of bleach solution into discharge piping and allow the solution to sit until well rehabilitation is complete.
- Inject 5 gallons of water through tremie pipe and initiate swabbing of well.
- Swab well for 5 to 10 minutes at 20 minute intervals for 4 to 6 hours. (If necessary, well can sit overnight with solution in place).
- If well is allowed to sit overnight, swabbing should be performed for at least one (1) hour prior to evacuating solution from well.
- Remove tremie pipe and disconnect swab. Re-install tremie pipe and connect pipe to pump and recovery system discharge line.
- Pump excess bleach solution out of well, flushing discharge piping.
- Disconnect and remove tremie system from well.
- Re-install suction piping and sensor probes and re-start recovery system.

REHABILITATION PROCEDURES FOR RECOVERY SYSTEMS RW-4, 6 AND RW-5A

Each of these wells will first go through the same "bleach" process as RW-3 and RW-7. After the bleach solution is pumped out of the well and flushed through the discharge piping, the following activities will be performed.

- Re-install tremie pipe with "swab" attachment into recovery well.
- Inject 15 gallons of Well Klean II and muriatic acid solution (1 part Well Klean II to four (4) parts muriatic acid (31.5% HCL) through tremie pipe and swab into well.
- Inject 15 gallons of Well Klean II and muriatic acid solution into discharge piping and allow the solution to sit until well rehabilitation is complete.
- Swab well for 5 to 10 minutes at 20 minute intervals for several hours. This solution must have, at a minimum, a 12 hour contact time. (If necessary, well can sit overnight with solution in place).
- If well is allowed to sit overnight, swabbing should be performed for at least one (1) hour prior to evacuating solution from well.
- Remove tremie pipe and disconnect swab. Re-install tremie pipe and connect pipe to pump and recovery system discharge line.
- Pump excess bleach solution out of the well, flushing discharge piping.
- Disconnect and remove tremie system from well.
- Re-install suction piping and sensor probes and re-start recovery system.

APPENDIX C

MSDS Sheets for Well Rehabilitation Chemicals

MATERIAL SAFETY DATA SHEET

TION I — PRODUCT IDENTIFICATION

PRODUCT NAME: Well Klean II Concentrate

CHEMICAL NAME: Water Treatment Chemical.

MANUFACTURER: h.e.r.o. Incorporated
1748 West Fillmore
Phoenix, Arizona 85007-2229

EFFECTIVE DATE: 01/01/85 EMERGENCY PHONE: (602) 258-2816

SECTION II — HAZARDOUS INGREDIENTS

MATERIAL	CAS NO.	AMOUNT	TLV	PEL(TWA)	STEL

* None of the ingredients used in this formulation are known to be hazardous ingredient under current Department of Labor OSHA - American Conference of Governmental Hygenists. Registry List of Toxic Effects - National Toxiological Program - International Agency for Research on Cancer, definitions. Further, there are no known restrictions under current TSCA nor EPA guidelines."

TION III — PHYSICAL DATA

BOILING POINT: 100.5 deg. C.

VAPOR PRESSURE: Zero mm Hg @60 deg. C.

VAPOR DENSITY: (air=1) 1.

SPECIFIC GRAVITY: 1.08.

PERCENT VOLATILE BY VOLUME: Zero.

EVAPORATION RATE: (1=1) 1.1

pH: 3.6

FREEZE POINT: <0 deg. F.

APPEARANCE & ODOR: Light amber. Mild like burnt sugar.

SOLUBILITY IN WATER: Complete.

SECTION IV — FIRE & EXPLOSIVE HAZARDS

FLASH POINT: Non-flammable.

EXTINGUISHING MEDIA: N/A.

FLAMMABILITY LIMITS LEL/UEL: N/A.

METHOD USED: Closed cup.

UNUSUAL FIRE & EXPLOSION HAZARDS: None.

SECTION V HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE

EYE CONTACT: Moderately irritating to the eyes.

SKIN CONTACT: Non-irritating.

INHILATION: Prolonged exposure to vapors is non-irritating.

INGESTION: Found to be and considered non-toxic at less than 5000 mg/kg.

FIRST AID PROCEDURES

EYES: Flush with water for at least 15 minutes. If irritation persists, call a physician.

SKIN: Remove contaminated clothing, flush with water for at least 15 minutes, if irritation persists, contact a physician.

INGESTION: If swallowed, drink milk, raw egg white, mucilage, or gelatin solution. If these are not available drink large quantities of water. If irritation appears, contact a physician.

SECTION VI REACTIVITY DATA

STABILITY: Stable.

INCOMPATIBILITY: Do not mix with other chemicals.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: N/A.

STORAGE: Store at room temperatures.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO CONTAIN: Wear appropriate protective clothing and or equipment. Neutralize with lime or soda ash, or a suitable absorbant may be used. Remove contaminated absorbant, flush spill area with water.

WASTE DISPOSAL: Comply with Local, State, and Federal regulations. If permissable, flush to drain Neutralize with lime or soda ash, if required, then flush to drain.

SECTION VIII SPECIAL PROTECTION DATA

RESPIRATORY: None required.

EYES: None required but recommended.

SKIN: None required but recommended. Suggest rubber apron, and gloves.

ADDITIONAL COMMENTS: Eye washes and safety showers should be available when handling chemicals, but are not required with this product. Educate and train users and employees in the safe and proper use of this product and all products. Do not use products outside their labeled directions.

SECTION IX SPECIAL PRECAUTIONS

Do not use inconsistent with labeling. Do not mix with other chemicals. Keep out of reach of children and un-trained users. Store at room temperature avoiding extreme heat or cold.

SECTION X USERS RESPONSIBILITY

It is the responsibility of the buyer to maintain a safe workplace for the user. The user should consider the health & safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop protective work procedures for a safe environment.

SECTION XI MANUFACTURERS STATEMENT & LIABILITY CLAUSE

The information contained herein is to the best of our knowledge and belief, accurate based on data available at this time. We accept no liability for damages incurred outside the spectrum of the label of the product.

SECTION XII SHIPPING CLASSIFICATION

Cleaning compound - Item 48580 - Sub 3 - Class 55.

Form No. MSDSELIN/TE/110989.

Material Safety Data Sheet-
Well Klean Surfactant-C & Well Klean Surfactant-W

Section I PRODUCT IDENTIFICATION

Revision No.: 5

Revision Date: 4/30/90

Product Code: COE564561

File Number: CPE00420.0001

Product Name: Poly-Tergent(R) P-32A & P-17A (Well Klean C & W)

Synonyms: Poly(oxyethylene/oxypropylene) glycol

Chemical Family: Surfactant

Formula: $H(C_2H_4O)_x(C_3H_6O)_y(C_2H_4O)_zH$

Description: Cleaning compound

OSHA Hazard Classifications: Eye and skin irritant, mutagenic toxin

Section II COMPONENT DATA

Product Composition

CAS or Chemical Name: Poly(oxyethylene/oxypropylene) glycol
CAS Number: 9003-11-6
Percentage Range: 90 - 100%
Hazardous per 29 CFR 1910.1200: Yes
Exposure Standards: None established

Section III PRECAUTIONS FOR SAFE HANDLING AND STORAGE

Do not take internally. Avoid contact with skin, eyes and clothing. Upon contact with skin or eyes, wash off with water.

Storage Conditions: **Do not store at temperatures above 49°C (120°F).** Product may discolor at higher temperatures.

Product Stability and Compatibility

Shelf Life Limitations: 12 months in drums; 24 months in bulk under proper storage conditions.

Incompatible Materials for Packaging: Contact with unlined mild steel will cause product discoloration.

Incompatible Materials for Storage or Transport: Do not store or ship with strong oxidizers.

Section IV PHYSICAL DATA

Appearance: Clear to hazy viscous liquid with slight yellow color

Freezing Point: -47 to 15°C (-53 to 59°F)

Boiling Point: Not applicable

Decomposition Temperature: 218°C (450°F)

Specific Gravity: 1.01-1.06

Bulk Density: 8.4-8.8 lbs./gal.

pH @ 25°C: 4.5-7.5

Vapor Pressure @ 25°C: <0.1 mm Hg

Solubility in Water: Complete below the cloud point (range 15-81°C)

Volatiles, Percent by Volume: <0.1%

Evaporation Rate: Not applicable

Vapor Density: No data

Molecular Weight: 2000-6000

Odor: Typical polyol odor

Coefficient of Oil/Water Distribution: No data

Section V PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Personal Protection for Routine Use of Product

Respiratory Protection: Respirator protection not normally needed since the volatility and toxicity are low. If vapors, mists, or aerosols are generated, wear a NIOSH/MSHA approved respirator.

Ventilation: Local exhaust ventilation is recommended if vapors, mists or aerosols are generated. Otherwise, use general exhaust ventilation.

Skin and Eye Protective Equipment: Use chemical goggles and impermeable gloves

Equipment Specifications (When Applicable)

Respirator Type: NIOSH/MSHA approved full facepiece organic vapor plus prefilter.

Protective Clothing Type (this includes: gloves, boots, apron, protective suit): Impervious

Section VI FIRE AND EXPLOSION HAZARD INFORMATION

Flammability Data

Flammable: No
Combustible: No
Pyrophoric: No
Flash Point: 227-246°C (440-475°F)
Test Method: Cleveland open cup

Autoignition Temperature: No data
Flammable Limits At Normal Atmospheric Temperature And Pressure (Percent Volume In Air):
LEL - no data; UEL - no data

NFPA Ratings: Not established

HMIS Ratings:
Health: 1
Flammability: 0
Reactivity: 1

Extinguishing Media: Alcohol foam, carbon dioxide, dry chemical, soda acid, water spray.

Fire Fighting Techniques And Comments: Use water to cool containers exposed to fire. See Section XI for protective equipment for fire fighting.

Section VII REACTIVITY INFORMATION

Conditions Under Which This Product May be Unstable

Temperatures above: 218°C (450°F) product may undergo thermal decomposition.
Mechanical shock or impact: No
Electrical (static) discharge: No
Hazardous polymerization: Will not occur
Incompatible materials: Strong oxidizers
Hazardous decomposition products: Carbon dioxide and carbon monoxide

Summary of Reactivity
Oxidizer: No
Pyrophoric: No
Organic peroxide: No
Water reactive: No

Section VI FIRE AND EXPLOSION HAZARD INFORMATION

Flammability Data

Flammable: No
Combustible: No
Pyrophoric: No
Flash Point: 227-246°C (440-475°F)
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Health: 1
Flammability: 0
Reactivity: 1

Extinguishing Media: Alcohol foam, carbon dioxide, dry chemical, soda acid, water spray.

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Hazardous polymerization: Will not occur
Incompatible materials: Strong oxidizers
Hazardous decomposition products: Carbon dioxide and carbon monoxide

Summary of Reactivity
Oxidizer: No
Pyrophoric: No
Organic peroxide: No
Water reactive: No

Section VIII FIRST AID

Eyes: Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Call a physician at once.

Skin: Immediately flush with water for 15 minutes. Wash the contaminated skin with soap and water. If irritation develops, call a physician. If clothing comes in contact with the product, the clothing should be laundered before re-use.

Ingestion: Immediately drink large quantities of water. Induce vomiting. Call a physician at once. Do not give anything by mouth if the person is unconscious or if having convulsions.

Inhalation: This product is not toxic by inhalation. Remove individual to fresh air.

Section IX TOXICOLOGY AND HEALTH INFORMATION

Routes of Absorption: Eye and dermal contact, ingestion.

Warning Statements and Warning Properties: Harmful if swallowed. May cause mild eye and mucous membrane irritation. May cause mild skin irritation.

Human Threshold Response Data

Odor Threshold: No data
Irritation Threshold: No data
Immediately Dangerous to Life or Health: The IDLH concentration has not been established for this product.

Signs, Symptoms, and Effects of Exposure

Inhalation: *Acute* — no significant adverse effects to health will occur from inhalation.
Chronic — there are no known or reported effects from chronic exposure.

Skin: *Acute* — skin contact may cause a mild irritation consisting of transient redness. This irritant effect would not be expected to result in permanent damage.
Chronic — there are no known or reported effects from chronic exposure except for effects similar to those experienced from single exposure.

Eyes: Contact with the eyes may cause a mild irritation consisting of reversible redness, swelling and mucous membrane discharge to the conjunctiva. No corneal involvement or visual impairment would be expected.

Ingestion: *Acute* — Ingestion may cause gastrointestinal discomfort with any or all of the following symptoms: nausea, vomiting, lethargy or diarrhea.
Chronic — There are no known or reported effects from chronic exposure except for effects similar to those experienced from single exposure.

Medical Conditions Aggravated by Exposure: None known or reported

Interactions with Other Chemicals which Enhance Toxicity: None known or reported

Animal Toxicology

Acute Toxicity:

Inhalation LC 50: No available data, but toxicity is considered low via this route of exposure.
Dermal LD 50: > 2 g/kg (rabbit)
Oral LD 50: 1.72 g/kg (rat), based on similar product
Irritation: May cause mild skin, eye and mucous membrane irritation.

Acute Target Organ Toxicity: No organs known to be damaged from exposure to this product.

Chronic Target Organ Toxicity: There are no known or reported effects from repeated exposure.

Reproductive and Developmental Toxicity: There are no known or reported effects on reproductive function or fetal development.

Carcinogenicity: This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP or EPA.

Mutagenicity: A similar product has been shown to be positive for mutagenicity in the Ames Salmonella/microsome mutagenesis assay.

Aquatic Toxicity: Fathead minnow, 96 hr. LC50: > 1000 ppm (based on a similar product).

Section X TRANSPORTATION INFORMATION

This material is not regulated as a DOT hazardous material.

Section XI SPILL AND LEAKAGE PROCEDURES

For all transportation accidents, call Chemtrec at 800-424-9300.

Reportable Quantity: Not applicable

Spill Mitigation Procedures: Evacuation procedures must be placed into effect. Hazardous concentrations in air may be found in local spill area. Utilize emergency response personal protective equipment prior to the start of any response. Remove all sources of ignition. Stop source of spill as soon as possible and notify appropriate personnel.

Air Release: Vapors may be suppressed by the use of water fog. Contain all liquid for treatment and/or disposal as a (potential) hazardous waste.

Water Release: This material is heavier than and soluble in water. Notify all downstream water users of possible contamination. Divert water flow around spill if possible and safe to do so. If unable to divert, create an overflow dam to contain material. Continue to handle as described in land spill.

Land Spill: Create a dike or trench to contain materials. Spill materials may be absorbed using sand, clay or commercial absorbent. Do not place spill materials back in their original container. Containerize and label all spill materials properly. Decontaminate all clothing and the spill area using strong detergent and flush with large amounts of water.

Spill Residues: Dispose of per guidelines under Section XII, waste disposal.

Personal protection for emergency spill and fire-fighting situations:

Additional respiratory protection is necessary when a spill or fire involving this product occurs. You are recommended to use a cartridge type NIOSH approved respirator with organic vapor cartridges.

Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to boots, gloves, hard hat, splash-proof goggles, full face shield and impervious clothing, i.e., chemically impermeable suit.

Compatible materials for response to this material are neoprene, chlorinated polyethylene, polyvinyl chloride, butyl rubber, viton, polyvinyl alcohol and saranex.

Section XII WASTE DISPOSAL

If this product becomes a waste, it does not meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D.

As a nonhazardous liquid waste, it should be disposed of in accordance with local, state and federal regulations by incineration.

Care must be taken to prevent environmental contamination from the use of this material. The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

Section XIII ADDITIONAL REGULATORY STATUS INFORMATION

Toxic Substances Control Act: This substance is listed on the Toxic Substances Control Act inventory.

Superfund Amendment and Reauthorization Act Title III: Hazard categories, per 40 CFR 370.2:
Health: Immediate (acute)
Physical: None

Emergency Planning and Community Right to Know, per 40 CFR 355, APP.A:
Extremely hazardous substance — threshold planning quantity: None established
Supplier Notification Requirements, per 40 CFR 372.45: None established

HARCROS CHEMICALS INC
KANSAS CITY, KANSAS

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: [redacted] DATE: 11/19/93 PAGE 01
PRODUCT CODE: 16-10717-00

CAS # 007681-52-9

FORMULA: NaOCl

CHEMICAL FAMILY: Hypochlorite

CHEMICAL NAME AND SYNONYMS: Sodium Hypochlorite Solution; Javel Water Bleach; Soda Water Bleach; Hypo; Chlorine Bleach; Vertex Concentrate; Sunny Sol; Super Shock; Dixichlor

SUPPLIERS NAME: Harcros Chemicals Inc
5200 Speaker Rd
Kansas City Ks 66106
SUPPLIERS PHONE NUMBER: 913-321-3131
TRANSPROTATION EMERGENCY PHONE NUMBER: 1-800-424-9300

S.A.R.A. INFORMATION

HAZARDS: Fire:Yes Pressure:No Reactivity:Yes Acute: Yes Chronic:No
PHYSICAL DATA: Mixture:Yes Pure:No Solid:No Liquid:Yes Gas:No

SECTION I Hazardous Ingredients

Ingredient	Percent	TLV
Sodium Hypochlorite (CAS # 7681-52-9)	Approx 12 to 13%	N/E *
Sodium Hydroxide (Caustic Soda) (CAS # 1310-73-2)	1 to 3%	PEL/TLV 2 mg/m(3) ceiling OSHA/ACGIH
* Chlorine (Available) (CAS # 7782-50-5)	Approx 12 to 13% by wt. Approx 15% by vol.	STEL 1 ppm OSHA/ACGIH

SECTION II Health Hazards

Threshold Limit Value: As indicated in Section I.

Potential Effects of Exposure:

Acute - Irritating effects increase with strength of solution and time of exposure.

Chronic - Constant irritant to eyes, throat.

Eyes: Causes severe eye irritation.

Skin: Irritation, reddening, damage with long or repeated exposure.

Inhalation: Fumes from exposed solution very irritating to mucous membranes, may cause sneezing. Grossly excessive exposure can cause bronchitis, and pneumonia, and corrosion of the respiratory tract in severe cases.

Ingestion: Causes irritation of membranes of the mouth and throat, stomach pain and possible ulceration.
In severe cases can produce circulatory collapse, lethargy, delidium, convulsions, and coma. Ingestion of small quantities (a few tablespoons) can be fatal to children.
Oral LD(50) (rat): 13 g/kg with 5.25% NaOCl and 5 g/kg with 12.

CONTINUED ON PAGE 02

SECTION II Health Hazards CONTINUED

NaOCl (Sodium Hypochlorite).

First aid:

Eyes: Flush with water for 15 minutes while holding eyelids open. Get medical attention as soon as possible.

Skin: Flush with water while removing contaminated clothing and shoes. Follow by washing with soap and water. DO NOT reuse clothing or shoes until cleaned. If irritation persists, get medical attention.

Inhalation: Remove person to fresh air. If distress persists call a physician immediately.

Ingestion: If accidentally swallowed, drink water or milk and obtain medical attention promptly. DO NOT induce vomiting, or administer baking soda or acidic antidotes. If vomiting occurs spontaneously, keep head lower than hips to prevent aspiration into lungs.

Other Information: Not listed as carcinogen or potential carcinogen by NTP, IARC or OSHA.

ADVICE TO PHYSICIAN: Antidote - give Sodium Thiosulfate orally.

SECTION III Special Protection Information

Respiratory Protection: When fumes present use NIOSH-approved respirator with a chlorine canister or supplied air respirator, consult your equipment supplier.

Ventilation Required: No special ventilation is needed unless the product is exposed to decomposition conditions; i.e. in a spill or in an acid condition.

Protective Clothing:

Eyes: Splash-proof goggles should be used when dispensing sodium hypochlorite in this concentration.

Skin: Rubber gloves for handling, rubber apron and boots if splashing may occur, and in emergency spill situations.

Additional Protective Measures: Safety shower, eye bath and washing facilities should be available.

SECTION IV Fire & Explosion Hazard Data

Flash Point (Method): Non-flammable

Flammable Limits (% Volume in Air):

Upper: N/A

Lower: N/A

CONTINUED ON PAGE 03

SECTION IV Fire & Explosion Hazard Data CONTINUED

Extinguishing Media: Use water to cool containers, knock down fumes if released.

Special Fire Fighting Procedures: Avoid fumes from spilled or exposed liquid, dilute copiously, ventilate, and be prepared to use respiratory protection if needed. Acid contamination will produce very irritating fumes similar to chlorine gas.

Unusual Fire and Explosion Hazards: Product decomposes when heated; decomposition products may cause containers to rupture or explode. Vigorous reaction possible with organic materials or oxidizing agents; may result in a fire.

SECTION V Physical Data

Boiling Point: Decomposes

Specific Gravity (H(2)O=1): Approx. 1.2

Vapor Pressure (MM HG.): N/E

Vapor Density (AIR=1): N/E

Evaporation Rate (_____=1): N/A

Solubility in Water: Soluble

Percent Volatile by Volume: Variable including water vapor and products of decomposition.

pH: Approx. 12 - 13

Molecular Weight: 74.45

Appearance and Odor: Light yellowish green liquid with chlorine odor.

SECTION VI Reactivity Data

Stability: Solutions of sodium hypochlorite are fairly stable in concentrations below 1%. Stability decreases with concentration, heat, light exposure, decrease in pH, and contamination with heavy metals, such as nickel, cobalt, copper and iron.

Incompatibility: Avoid contamination with heavy metals (act as catalysts), reducing agents, organics, ether, amines, ammonium acetate, cellulose, ammonia, acids, or acid pH.

Hazardous Decomposition Products: Hypochlorous acid (HOCL), chlorine, hydrochloric acid. Composition depends upon temperature and decrease in pH. Additional decomposition products, which depend upon pH, temperature and time, are sodium chloride, sodium chlorate and oxygen.

Hazardous Polymerization: Will not occur

CONTINUED ON PAGE 04

SECTION VII Spill and Leak Procedures

Steps to be taken if material is released or spilled:

Dike to contain spill. DO NOT allow to enter sewers or streams. Flush with water to dilute as much as possible, avoid heat and contamination with acid materials. If using absorbent to soak up a small spill avoid sawdust and other combustibles.

Waste Disposal Method:

Reduce by adding reducing agents such as bisulfites or ferrous salt solutions. Some heat will be produced. May neutralize with reducing agents. Keep on alkaline side and dilute with copious quantities of water. Principal end product is salt water (NaCl). Dispose in conformance with applicable local, state, and federal regulations.

EPA - Resource Conservation and Recovery Act (RCRA) Regulations As produced, this material is a product and not a waste. If discarded or intended to be discarded as is, it is a corrosive hazardous waste as defined in RCRA (40 CFR 261.22). The EPA hazardous waste number is D002.

SECTION VIII D.O.T. Shipping Information

Proper Shipping Name:	HYPOCHLORITE SOLUTIONS
Hazard Class:	8, UN1791, PGIII
Label Requirements:	CORROSIVE
Reportable Quantity:	SHIPMENTS OF 00080 GAL OR MORE ARE REPOR TABLE
Other Information:	

SECTION IX Additional Information

This information may be of importance to you:

Sodium Hypochlorite is manufactured only in solution form. "Household bleach" contains not more than 7% Sodium Hypochlorite (+6.67 wt. % available chlorine) with about .6-1.75% excess Sodium Hydroxide for stability control. Industrial bleach contains from 7% to 15% Sodium Hypochlorite (6.67-13.06 weight % available chlorine) with 1-3% excess Sodium Hydroxide for stability control. Household Bleach is much less hazardous, the less stringent safety measures given on the household bleach container should be observed.

Sodium Hypochlorite does not exist as such in the vapor phase, unless as a component of a mist or fumes. This product is listed in the Toxic Substances Control Act (TSCA) inventory of chemical substances.

CONTINUED ON PAGE 05

SECTION IX Additional Information CONTINUED

Store in vented, closed clean, non-corrodable containers in a cool, dry location, away from direct sunlight and not adjacent to chemicals which may react with the product if spillage occurs. If closed containers become heated, they should be vented to release decomposition products (mainly oxygen under normal decomposition). DO NOT mix or contaminate with ammonia, hydrocarbon acids, alcohols, ethers.

Long storage periods should be avoided as product degrades with age.

Minimize skin contact. Wash with soap and water before eating, drinking, smoking or using toilet facilities.

Containers of this material may be hazardous when emptied. "Empty" containers retain product residues. Observe all hazard precautions outlined in this sheet.

NPCA HMIS 102C

********* E N D O F R E P O R T *********

NAME: GENE TURNER DATE ISSUED: 04/06/1993
DATE REVISED:

< = LESS THAN N/A = NOT APPLICABLE UNK = UNKNOWN
> = MORE THAN N/D = NOT DETERMINED
N/E = NOT ESTABLISHED

The information provided in this Material Safety Data Sheet has been obtained from sources believed to be reliable. Harcros Chemicals Inc provides no warranties, either expressed or implied and assumes no responsibility for the accuracy or completeness of the data contained herein. This information is offered for your information, consideration and investigation. You should satisfy yourself that you have all current data relevant to your particular use. Harcros Chemicals Inc knows of no medical condition, other than those noted on this material safety data sheet, which aregenerally recognized as being aggravated by exposure to this product.

APPENDIX D

BARTS Sampling Procedures

BARTS SAMPLING PROCEDURES

If necessary, any or each of the five (5) recovery wells (RW-3, RW-4, RW-5A, RW-6 and RW-7) will be sampled on a periodic basis by the subcontractor and analyzed using the Biological Activity Reaction Tests System (BARTS). Water samples will be collected and any color changes/growth, etc. will be monitored. These changes will be indicative of various forms of bacteria, iron, encrustation and coliform.

Samples will be collected at each recovery well at any time designated "0", then 5, 30 and 60 minutes after 0 time. Samples can be collected from a small valve installed on the discharge line in the pump house for RW-3, RW-5A, and RW-7. RW-4 and RW-6 are connected to the same pump house, therefore samples can be collected from each of these wells via syphoning the appropriate volume from the well through a disposable 1/4 inch clear, vinyl tube into the sample container. Fifteen milliliters (ml) of ground-water will be collected in a separate BARTS tube at each time interval at each recovery well. Nutrients, which are provided as a sterile dried matrix on the floor of the tube, will gradually diffuse up the water column to support growth of a particular type of bacteria, if it is present.

Aerobic growth of bacteria will occur at the surface, at the medium between the BARTS ball and the wall of the BARTS tube. Once the oxygen has been used by the aerobes, this zone below the BARTS ball will become free of oxygen and anaerobic growth will dominate. Intense aerobic activity at the surface will exclude aerobic growth in the anaerobic zone. Nutrient media for growth is provided as a sterile dried matrix on the floor of the tube. This process will occur over a two (2) to three (3) day incubation period.

After the incubation period, any color changes, growth and/or dried matrix will be noted. As previously stated, these changes are indicative of various forms of bacteria, iron, encrustation and coliform.

BIOLOGICAL ACTIVITY REACTION TEST SYSTEMS BARTS

WHAT ARE BARTS?

Biological Activity Reaction Test Systems (BARTS) have been designed as field test kits to monitor the population size and/or activity of specific groups of bacteria in water.

BARTS offer the capability of monitoring for Iron Related Bacteria (IRB's), Sulfate Reducing Bacteria (SRB's) and Slime Forming Bacteria (SFB's). These three groups are the most important agents involved in biofouling.

BARTS are simple in design and interpretation, and can be used without expensive equipment. Incubation occurs in a few days at normal room temperature. Refer to diagram for description on how the test works.

WHAT ARE APPLICATIONS FOR BARTS?

BARTS were originally designed for the diagnosis of biofouled wells. In addition this test has many other applications:

_____ *1. Routine monitoring of surface, ground and industrial waters.*

_____ *2. Assessing the bacterial population type or size wherever there is a need.*

_____ *3. Monitoring biofouling of water wells on a routine basis, to be used as an early warning test of potential problems.*

_____ *4. Monitoring water treatment media (i.e. ion exchange resin, GAC filters, filtration media, etc.)*

_____ *5. Determining biological presence in distribution lines.*

WHAT BARTS PRODUCTS ARE AVAILABLE?

The Barts products currently available are:

- Iron Related Bacteria - IRB-BART
- Sulfate Reducing Bacteria - SRB-BART
- Slime Forming Bacteria - SLYM-BART

In addition to the BARTS products, two dippaddles for bacteria enumeration are also available including tests for:

- Heterotrophic Plate Count - GACO-Dippaddle
- Low Mesotrophic Coliforms - GACO-Dippadle
- Iron Related Bacteria Plate Count - PIRB-Dippaddle
- Pseudomonads - PIRB-Dippaddle

LW812-1

Layne-Western Company, Inc. A Marley Company 1-800-433-6776

1900 Shawnee Mission Parkway • P.O. Box 389 • Shawnee Mission, Kansas 66201 • 913/362-0510

SAMPLING AND PERFORMING A TEST

Instructions for the use of BARTS are provided with the tests. These should be followed carefully. It is important to keep in mind the following points:

1. Proper disposal instructions are contained in the instruction pamphlet and should be observed.
2. Live bacterial cultures are being grown and tubes should not be opened.
3. Sampling should be performed according to standard methods.
4. During transport it is important to keep the test out of direct sunlight.
5. Do not allow test to become too hot or freeze.
6. The tube should be kept in an upright position during transport to allow an oxygen gradient to establish in the tube.
7. The test is incubated at room temperature and observed daily for reaction.
8. The day a positive reaction occurs and the reaction type are recorded.
9. The longer it takes for a positive reaction to occur, the lower the population and/or activity level for the target recognized bacterial group.

HOW WILL BARTS BE OFFERED

Each individual test will consist of: (1) test vial with media and floating ball; (2) outer tube for spill containment, odor control, sterilization and disposal; (3) instruction pamphlet. An interpretation color poster is available from DESI. Each individual BARTS test is color coded for quick and easy recognition. Three basic configurations have been chosen as follows for marketing BARTS:

1. ***Tubular Mailer*** is a combination of two tests available in a mailer tube or one test with a sterile sampling tube. These tests can be mailed directly to the client in a mailer tube.

2. ***Six-Pak*** or ***Mix-Pak*** consists of either a package of one tube of each kind plus a sterile sampling bottle (six-pak) or any combination of six tests (mix-pak).

3. ***Bulk-Pak*** makes available in bulk quantity any combination of 36 tests

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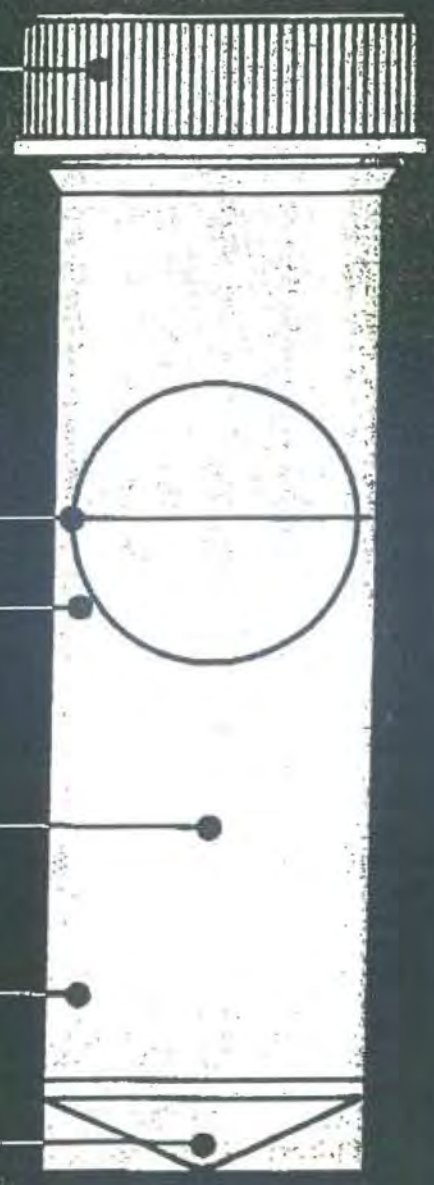
How The BARTS™ Test Works



The screw cap should be tightened on the BARTS tube so that casual leakage in the case of the tube tipping over can be prevented.

Fifteen milliliters of water-samples are used to bring the BARTS-BALL up to the correct level. Nutrients will gradually diffuse up the water column to support this aerobic growth.

Aerobic growth of bacteria will occur at the surface of the medium between the BARTS-BALL and the wall of the BARTS tube.

Once the oxygen has been used by the aerobes, this zone becomes free of oxygen and anaerobic growth will dominate.

Intense aerobic activity at the surface will exclude aerobic growth in this zone.

Nutrient media for growth is provided as a sterile dried matrix on the floor of the tube. DO NOT SHAKE.

Patent Pending

LW812-3

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