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FEASIBILITY STUDY AND CONCEPTUAL DESIGN REPORT FOR GROUNDWATER PRETREATMENT SYSTEM NAS PENSACOLA FL

6/1/1995

RUST ENVIRONMENT & INFRASTRUCTURE

FEASIBILITY STUDY AND CONCEPTUAL DESIGN REPORT FOR GROUNDWATER PRETREATMENT SYSTEM

NAVAL AIR STATION PENSACOLA, FLORIDA

JUNE, 1995

SOUTHERN DIVISION
NAVAL FACILITY ENGINEERING COMMAND
CONTRACT N62467-93-D-0662
CHARLESTON, SOUTH CAROLINA
29411-0068

FEASIBILITY STUDY
AND CONCEPTUAL DESIGN REPORT
FOR GROUNDWATER
PRETREATMENT SYSTEM

NAVAL AIR STATION
PENSACOLA, FLORIDA

Prepared For

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

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Rust E&I Project No. 33462.400
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1.0 EXECUTIVE SUMMARY

The Naval Air Station in Pensacola, Florida (NAS Pensacola), operates groundwater recovery wells from a RCRA post closure and corrective action program for Sludge Drying Beds and Surge Pond sites. In the past, groundwater was discharged to the industrial wastewater treatment (IWTP) located on site. However, the IWTP is being converted to a domestic wastewater treatment plant (WWTP) and will no longer accept untreated groundwater.

Rust Environment and Infrastructure (Rust) has been contracted by Southern Division Naval Facilities Engineering Command (SOUTHDIV - NAVFACENGCOM) to determine a pretreatment system to treat the contaminated groundwater. Recovery well sampling results indicate volatile organic compounds, semivolatile organic compounds, and metals will require treatment before being discharged to the WWTP. Pretreatment objectives were developed from the new WWTP Discharge Permit No. FL0002500.

Air stripping and carbon adsorption were evaluated for removal of volatile and semivolatile organic compounds from the groundwater. Although both technologies were able to treat organic compounds to pretreatment objectives, air stripping provided a more cost effective solution. Cost savings for the operation and maintenance (O&M) of air stripping are demonstrated, enabling air stripping to be the selected alternative for treatment of volatile and semivolatile organic compounds.

Similarly, chemical precipitation and ion exchange technologies were evaluated for removal of metals from the groundwater. Again, both technologies were able to treat metals to pretreatment objectives, however, chemical precipitation provided a more cost effective alternative. Capital and O&M costs were lower using chemical precipitation for treatment. Therefore, chemical precipitation was the selected alternative for treatment of metals.

Chemical precipitation and air stripping are the recommended technologies for pretreatment of groundwater. Groundwater will be pumped with the existing recovery well pumps to a reaction tank where potassium permanganate and sodium hydroxide will be added to oxidize and raise the pH of the solution, respectively. Oxidation will convert ferrous iron to ferric iron and the rise in pH will create an insoluble form of iron (ferric hydroxide). Polymer will

be added in the flocculation/coagulation tank to aid in the settling of solids when the groundwater enters the clarifier. The clarifier discharge will enter the air stripper for removal of volatile and semivolatile organic compounds and then be discharged to the pump dock of the existing WWTP.

Life cycle cost analyses was performed for each treatment technology evaluation. Air stripping and chemical precipitation are recommended as the most cost effective treatment alternatives.

2.0 INTRODUCTION

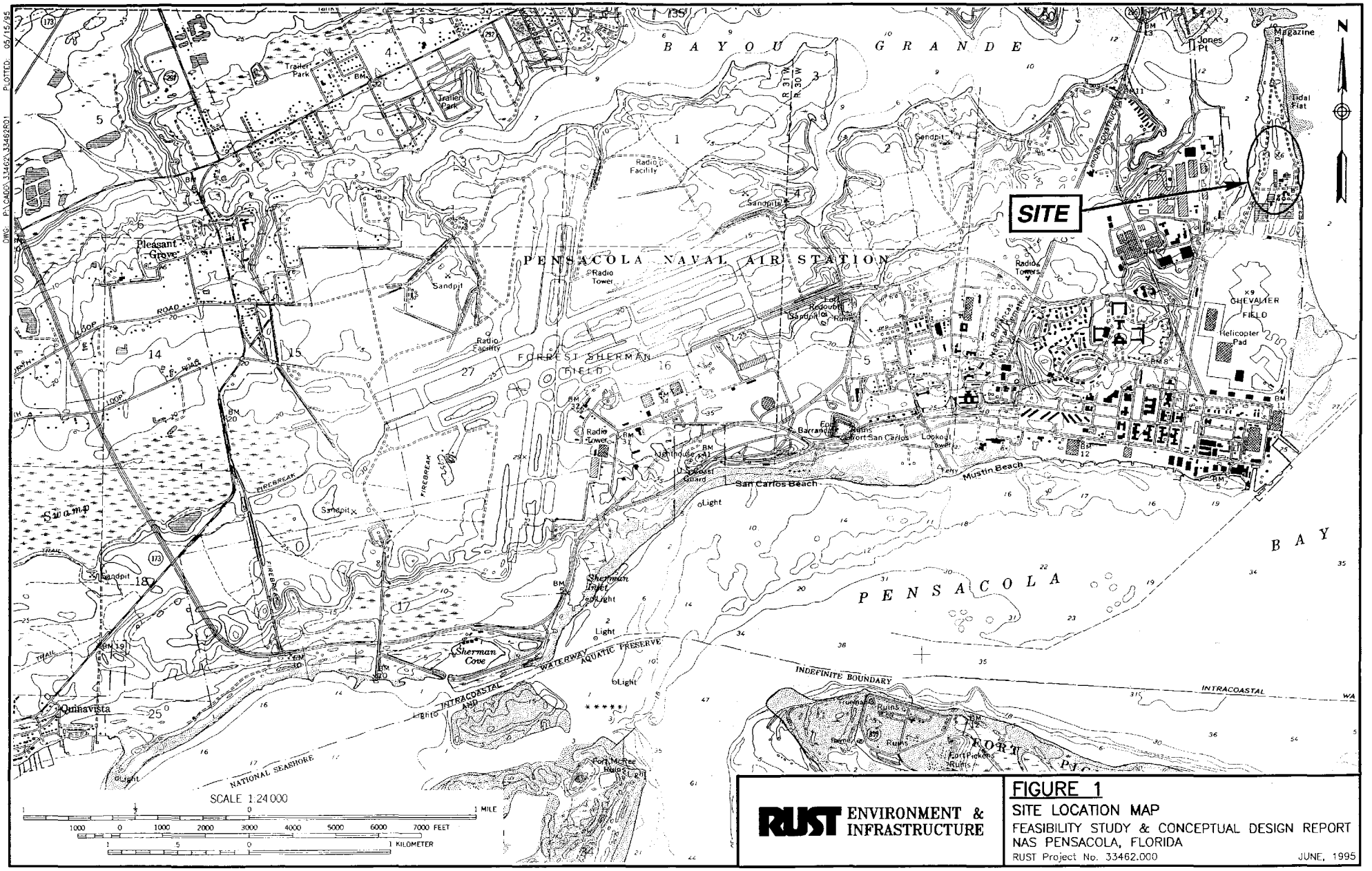
2.1 General Site Description

The Naval Air Station in Pensacola Florida (NAS Pensacola), is currently recovering contaminated groundwater from closed Sludge Drying Beds and Surge Pond sites located at the northeast corner of the facility. A Site Location Map is included as Figure 1. These sites are regulated under the Resource Conservation Recovery Act (RCRA) post closure and corrective action programs and are currently included in Permit/Certification No. HF17-170951 issued on September 20, 1991. The permit is included in Appendix A. Previously, groundwater was discharged and treated at the on-site Industrial Wastewater Treatment Plant (IWTP). Due to the Base Realignment and Closure (BRAC) actions taking place at NAS Pensacola, the IWTP is being converted to a domestic Wastewater Treatment Plant (WWTP). After the conversion, the new plant will be unable to accept untreated groundwater from the RCRA recovery wells. The new domestic WWTP Discharge Permit is included in Appendix B.

Southern Division Naval Facilities Engineering Command (SOUTHDIV - NAVFACENGCOM) has contracted Rust Environment and Infrastructure (Rust) to perform an investigative study to determine the type of pretreatment system necessary to remove certain constituents from groundwater produced by the recovery wells. Performance level design and specifications will be developed for the selected treatment alternative. The new pretreatment system is scheduled to be operational when the IWTP is converted to a WWTP. Design of the pretreatment system is in accordance with Florida Department of Environmental Protection (FDEP) pretreatment standards and RCRA corrective action measures.

2.2 Groundwater Monitoring History

Semi-annual sampling has been performed every January and July at monitoring wells associated with the Sludge Drying Beds and Surge Pond under the current RCRA monitoring permit. Analytical results from the sampling events are presented in the Semi-Annual Reports on Ground-Water Monitoring, Industrial Wastewater Treatment Plant, Naval Air Station, Pensacola, Florida prepared by Rust. The last semi-annual report was submitted in April 1995. Copies of the Semi-Annual Reports are sent to Florida



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 1

SITE LOCATION MAP

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

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JUNE, 1995

Department of Environmental Protection (FDEP) as a condition of the permit. Maximum groundwater monitoring well concentrations are summarized in Table 1 for the period July 1992 to January 1995. Contaminant concentrations from groundwater monitoring were used initially to identify potential contaminants of concern for the pretreatment system feasibility study and conceptual system design.

2.3 Feasibility Study Approach

This study presents the design basis for the pretreatment system. The design basis, as explained in Section 3.0, defines influent groundwater characteristics and identifies parameters requiring treatment. Pretreatment objectives are based on the new WWTP Discharge Permit Limits and Florida Drinking Water Standards.

Treatment technologies were evaluated for volatile and semivolatile organic compounds and metals. This evaluation includes a brief description of the technology, removal efficiency and cost analysis, and concludes with the selected pretreatment system.

Section 5.0 focuses on the conceptual design of the selected pretreatment system. This section details treatment system layout, constructability and operation. Performance level specifications and design will be developed for identification of equipment, installation and system operation details.

Life cycle cost analyses for the pretreatment system are presented in Section 6.0. The cost analysis compares turn-key installation and turn-key supply and installation purchasing alternatives. Leasing alternatives were not considered due to equipment exposure to hazardous waste. Salvage value of the purchased equipment is also estimated.

A project schedule for the installation and start-up of the pretreatment system is shown in Section 7.0. The schedule includes FDEP approval, purchasing time of long lead items, installation, start-up and system stabilization.

Performance level design drawings and specifications will be developed based on this feasibility study and conceptual design report and will be presented as a separate submittal.

TABLE 1

MAXIMUM MONITORING WELL GROUNDWATER CONCENTRATIONS

JULY 1992 TO JANUARY 1995

NAS PENSACOLA, PENSACOLA FLORIDA

		Pretreatment	FL Drinking	Shallow Wells											Intermediate Wells				Deep Wells						
Parameter	Units	Objectives	Water MCLs	UG-1	GM-8	GM-9	GM-10	GM-11	GM-12R	GM-13R	GM-14	GM-62	GM-67	PCS-1	GM-64	GM-66	GM-69	PCI-1	GM-63	GM-65	GM-68	PCD-1	Min	Max.	Ave
pH	s.u.	6.5 - 8.5	6.5 - 8.5	6.2	6.7	6.6	6.6	6.9	6.9	6.9	6.3	6.2	6.6	6.9	6.9	3.2	7.2	7.2	6.8	6.9	9	6.7	3.2	9	6.7
Cyanide, Total	mg/l	0.005	0.2	<0.01	<0.01	0.016	<0.01	0.12	<0.01	<0.01	0.011	0.033	2.8	0.035	0.12	0.03	0.14	0.65	<0.01	<0.01	<0.01	<0.01	<0.01	2.8	0.208
Chloride	mg/l	NE	250	17	30	6.6	26	NA	NA	NA	NA	10	250	5.6	51	740	830	450	960	210	160	340	5.6	960	215
Fluoride	mg/l	NE	4	<0.2	0.54	0.23	<0.2	NA	NA	NA	NA	0.35	1.2	0.24	0.48	6	0.3	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	6	0.5
Sulfate	mg/l	NE	250	25	62	19	38	NA	NA	NA	NA	79	180	23	76	9400	300	120	85	16	9000	30	16	9400	1024
Cadmium, Total	mg/l	0.0093	0.005	<0.005	0.009	<0.005	<0.005	NA	NA	NA	NA	0.014	<0.005	<0.005	<0.005	0.044	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.044	0.004
Chromium, Total	mg/l	0.050	0.1	0.041	0.013	<0.01	0.017	NA	NA	NA	NA	0.019	0.023	<0.01	<0.01	0.43	<0.01	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.43	0.034
Iron, Total	mg/l	0.3	0.300	2.7	2.3	2.4	0.91	NA	NA	NA	NA	2.5	29	3.5	0.37	470	0.26	1.4	1.3	0.97	1.2	0.6	0.26	470	1.2
Lead, Total	mg/l	0.0056	0.015	0.0056	<0.005	0.008	0.0073	NA	NA	NA	NA	<0.005	0.0053	<0.005	<0.005	<0.005	<0.005	<0.005	0.014	0.028	0.018	0.009	<0.005	0.028	0.005
Manganese	mg/l	NE	0.05	<0.01	0.22	0.033	0.068	NA	NA	NA	NA	0.27	0.34	0.1	0.83	1.9	0.1	0.038	0.054	0.1	0.059	0.061	<0.01	1.9	0.22
Nickel, Total	mg/l	0.0083	0.1	0.026	<0.02	<0.02	<0.02	NA	NA	NA	NA	0.03	0.024	<0.02	<0.02	0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.2	<0.02
Benzene	ug/l	NE	1	<5	390	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5	<5	<5	<5	<5	<5	6.5	<5	<5	390	21
Vinyl Chloride	ug/l	NE	1	<10	36	<10	<10	NA	NA	NA	NA	<10	<10	<10	<10	140	<10	<10	<10	<10	<10	<10	<10	140	9
1,1-Dichloroethene	ug/l	NE	NE	<5	<5	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5	750	<5	<5	<5	<5	<5	<5	<5	750	39
1,1-Dichloroethane	ug/l	NE	NE	<5	<5	39	<5	NA	NA	NA	NA	<5	<5	<5	<5	97	10	<5	<5	<5	<5	<5	<5	97	8
Trichloroethene	ug/l	NE	3	<5	<5	<5	<5	NA	NA	NA	NA	<5	<5	<5	<5	4600	<5	<5	<5	<5	<5	<5	<5	4600	242
Chlorobenzene	ug/l	NE	100	<5	11	210	<5	NA	NA	NA	NA	<5	<5	<5	<5	170	160	65	<5	<5	<5	<5	<5	210	32
Bis (2-ethylhexyl) phthalate	ug/l	NE	NE	<10	<10	13	<10	NA	NA	NA	NA	<10	<10	<10	210	53	<10	19	18	15	22	12	<10	210	19
1,2-Dichlorobenzene	ug/l	NE	600	<10	780	<10	<10	NA	NA	NA	NA	<10	<10	<10	<10	650	730	13	<10	<10	<10	<10	<10	780	114
1,3-Dichlorobenzene	ug/l	NE	NE	<10	1800	<10	<10	NA	NA	NA	NA	<10	<10	<10	<10	950	1000	<10	<10	<10	<10	<10	<10	1800	197
1,4-Dichlorobenzene	ug/l	NE	75	<10	2000	<10	<10	NA	NA	NA	NA	<10	<10	<10	<10	820	860	<10	<10	<10	<10	<10	<10	2000	194
Gross Alpha	pCi/l	NE	15	<2	6.8	<2	<2	NA	NA	NA	NA	8	<2	<2	4.2	141	32	16.1	20.7	3.9	2.5	12.6	<2	141	13
Radium-228	pCi/l	NE	5	<2	3.4	3.4	3.4	NA	NA	NA	NA	3.4	2.1	8.3	<2	36.5	2.7	3.1	3.4	3.4	2.2	3.4	<2	36.5	3.1

Notes: NA - Not Analyzed

NE - Not Established

3.0 DESIGN BASIS

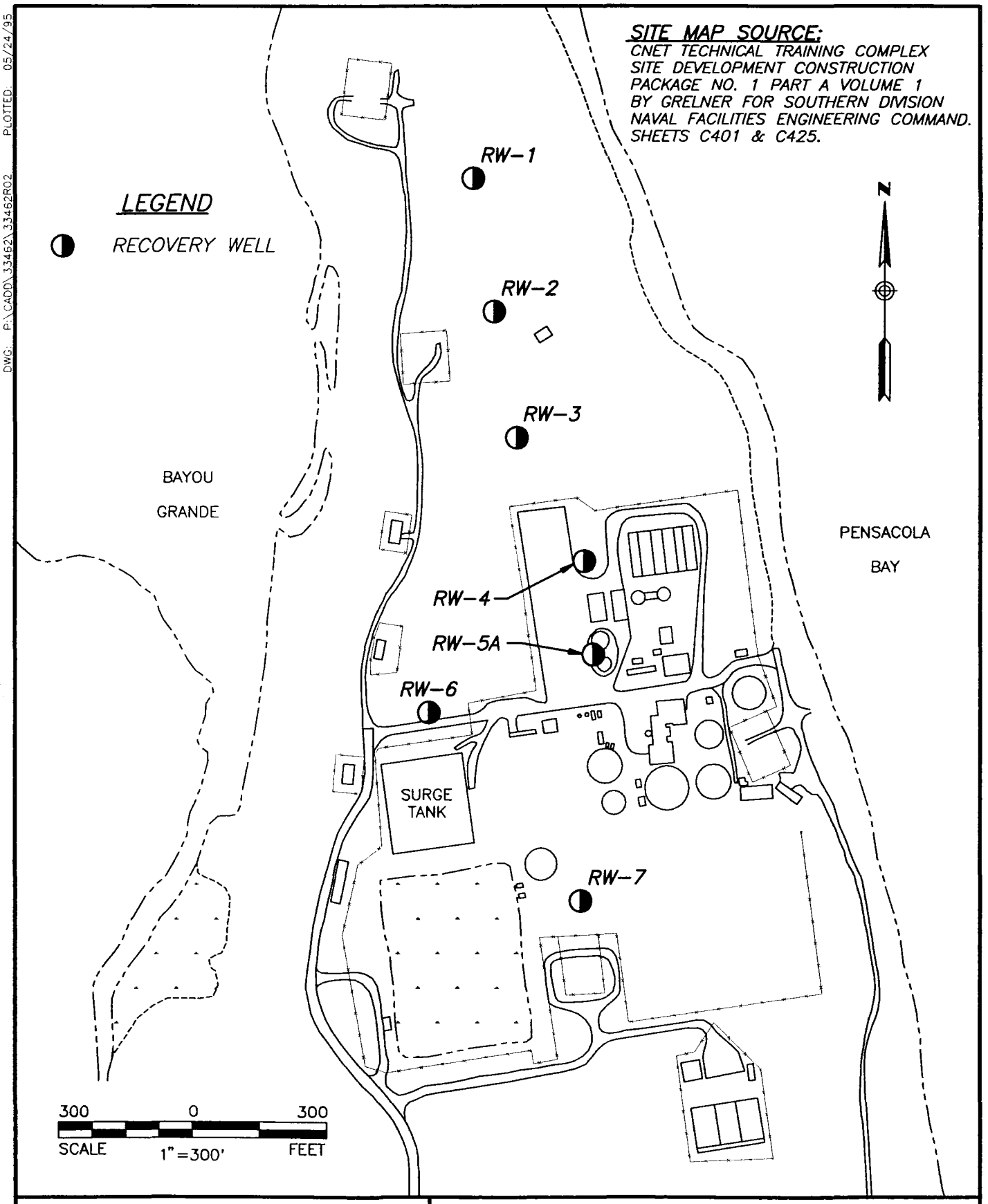
3.1 Design Approach

The design approach focuses on identifying groundwater characteristics from the recovery well analytical sampling data for parameters requiring pretreatment based on effluent limits under the new WWTP discharge permit. Effluent limits under the new WWTP discharge permit have been used as the pretreatment objectives for the system. Existing analytical data from the monitoring wells was used as a preliminary indication of potential contaminants requiring treatment. Preliminary indications from monitoring well data shows organic, metals and radioactive nuclides as potential contaminants.

3.2 Influent Groundwater

Influent groundwater is pumped from five of seven, on-site recovery wells as shown on Figure 2. One pump services recovery wells No. 1, No. 2 and No. 3. Currently, groundwater is not pumped from recovery well No. 1 and only half the well yield is pumped from recovery well No. 2. The existing groundwater recovery pumps operate continuously 24 hours per day, 365 days per year. Occasionally, the pumps require maintenance and are turned off for short periods of time. Flow rates in gallons per minute (gpm) from the recovery wells are presented in Table 2 for the period September 1993 to April 1995. Average and maximum flow rates were calculated for each well or wells. A percentage of the total flow was also calculated for each well for the average and maximum flow rates. Collectively, the total average and maximum flow rates are 18.58 and 35.37 gpm, respectively. To allow additional hydraulic capacity, a design flow rate of 40 gpm is used for this evaluation.

Samples were collected and analyzed from the recovery wells on April 13, 1995. The samples were analyzed for parameters listed in the NAS Pensacola RCRA corrective action monitoring permit and the new WWTP discharge permit. The results are summarized in Table 3. Analytical data is included in Appendix C along with the laboratory quality control report. Filtered and unfiltered samples were collected for metals and radioactive nuclides to determine solubility. Minimum and maximum concentrations for each parameter are also listed in Table 3. In addition, a flow weighted composite sample was calculated based on the maximum flow rate from each recovery well.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2

RECOVERY WELL LOCATIONS

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT
NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

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TABLE 2
RECOVERY WELL FLOW RATES
SEPTEMBER 1993 THROUGH APRIL 1995
NAS PENSACOLA, PENSACOLA FLORIDA

DATE	RW 1,2,&3 FLOW (gpm)	RW 4&6 FLOW (gpm)	RW 5A FLOW (gpm)	RW 7 FLOW (gpm)	TOTAL FLOW (gpm)
9/2/93	7.05	8.05	1.23	2.67	19.00
9/16/93	6.73	7.42	0.00	2.46	16.61
9/28/93	5.77	6.69	0.71	2.14	15.30
10/12/93	6.75	7.58	0.65	2.32	17.30
10/26/93	7.05	7.69	0.74	2.23	17.70
11/9/93	7.42	7.84	1.31	2.30	18.87
11/23/93	7.27	7.80	1.55	2.18	18.81
12/7/93	7.19	7.64	0.80	2.19	17.82
12/21/93	6.91	7.62	0.67	2.11	17.31
1/4/94	7.39	7.85	0.55	2.32	18.11
1/18/94	6.10	7.69	0.25	2.34	16.38
2/1/94	6.64	7.67	1.23	2.37	17.91
2/15/94	6.22	7.72	1.32	2.34	17.59
2/28/94	6.13	7.05	0.24	2.10	15.51
3/14/94	5.64	7.75	2.57	2.25	18.21
3/28/94	6.45	7.41	1.30	2.25	17.40
4/11/94	3.10	9.19	0.00	2.31	14.60
4/26/94	5.68	9.54	0.00	2.37	17.59
5/10/94	4.74	8.76	0.00	2.22	15.72
5/24/94	4.69	7.92	0.27	2.14	15.02
6/7/94	4.74	7.60	0.03	2.15	14.53
6/20/94	4.67	6.82	2.07	1.99	15.55
7/5/94	6.06	8.23	0.00	2.49	16.78
7/19/94	5.09	7.58	3.56	2.39	18.62
8/2/94	5.70	7.29	0.42	2.28	15.69
8/16/94	5.97	7.30	15.61	2.17	31.05
8/30/94	1.43	7.25	12.88	2.17	23.73
9/13/94	5.42	7.10	0.06	2.05	14.63
9/27/94	0.99	7.28	11.91	1.93	22.11
10/11/94	1.91	7.47	1.20	2.15	12.74
10/25/94	6.79	7.24	8.34	0.43	22.80
11/8/94	6.83	7.13	7.92	1.98	23.86
11/22/94	6.47	6.97	7.11	1.82	22.37
12/6/94	6.28	6.98	0.13	1.74	15.12
12/20/94	6.11	7.00	3.31	1.83	18.24
1/3/95	6.15	7.02	0.13	1.83	15.13
1/17/95	6.01	7.00	5.14	1.87	20.02
1/31/95	1.02	7.10	7.96	0.38	16.46
2/14/95	5.86	6.91	1.66	1.94	16.37
2/28/95	5.56	6.18	9.72	1.84	23.30
3/14/95	6.11	9.67	9.45	2.26	27.49
3/28/95	6.23	7.58	7.31	2.29	23.41
4/11/95	6.03	9.16	0.10	2.28	17.57
4/25/95	6.28	7.33	11.13	2.34	27.08
Average	5.65	7.59	3.24	2.10	18.58
Percent	30%	41%	17%	11%	100%
Maximum	7.42	9.67	15.61	2.67	35.37
Percent	21%	27%	44%	8%	100%

TABLE 3
RECOVERY WELL GROUNDWATER CONCENTRATIONS
APRIL 1995
NAS PENSACOLA, PENSACOLA FLORIDA

Parameter	Units	Pretreatment Objectives	FL Drinking Water MCLs	Detection Limit	EPA Method	RW-3		RW-4		RW-5A		RW-6		RW-7		COMPOSITE			
						Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Min	Max
Volatile Organics																			
Vinyl chloride	ug/l	NE	1	10	8240	NA	<10	NA	<10	NA	25	NA	<10	NA	<10	NA	17	<10	25
Chloroethane	ug/l	NE	NE	10	8240	NA	<10	NA	<10	NA	<10	NA	<10	NA	38	NA	12	<10	38
Methylene chloride	ug/l	NE	5	5.0	8240	NA	12	NA	<5	NA	<5	NA	<5	NA	<5	NA	6.5	<5	12
1,1-Dichloroethane	ug/l	NE	NE	5.0	8240	NA	<5	NA	<5	NA	<5	NA	<5	NA	8.9	NA	5.3	<5	8.9
1,2-Dichloroethane	ug/l	NE	3	5.0	8240	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
Carbon tetrachloride	ug/l	NE	3	5.0	8240	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
Vinyl acetate	ug/l	NE	NE	10	8240	NA	<10	NA	<10	NA	12	NA	<10	NA	<10	NA	11	<10	12
Trichloroethene	ug/l	NE	3	5.0	8240	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
Benzene	ug/l	NE	1	5.0	8240	NA	<5	NA	66	NA	190	NA	<5	NA	<5	NA	94.6	<5	190
Tetrachloroethene	ug/l	NE	3	5.0	8240	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
Chlorobenzene	ug/l	NE	100	5.0	8240	NA	15	NA	390	NA	3600	NA	<5	NA	14	NA	*641	<5	3600
Semivolatile Organics																			
1,3-Dichlorobenzene	ug/l	NE	NE	10	8270	NA	29	NA	39	NA	540	NA	<10	NA	<10	NA	295	<10	540
1,4-Dichlorobenzene	ug/l	NE	75	10	8270	NA	23	NA	43	NA	1100	NA	<10	NA	<10	NA	497	<10	1100
1,2-Dichlorobenzene	ug/l	NE	600	10	8270	NA	18	NA	53	NA	480	NA	<10	NA	<10	NA	226	<10	480
Naphthalene	ug/l	NE	NE	10	8270	NA	<10	NA	<10	NA	72	NA	<10	NA	<10	NA	37	<10	72
Hexachlorobenzene	ug/l	NE	1	10	8270	NA	<10	NA	<10	NA	<10	NA	<10	NA	<10	NA	<10	<10	<10
Heptachlor	ug/l	NE	0.4	*20	8270	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	<20	<20
Heptachlor epoxide	ug/l	NE	0.2	*20	8270	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	<20	<20
Endrin	ug/l	NE	2	*20	8270	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	NA	<20	<20	<20
Chlordane	ug/l	NE	2	*50	8270	NA	<50	NA	<50	NA	<50	NA	<50	NA	<50	NA	<50	<50	<50
Toxaphene	ug/l	NE	3	*2000	8270	NA	<2000	NA	<2000	NA	<2000	NA	<2000	NA	<2000	NA	<2000	<2000	<2000
Aroclor-1016	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1221	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1232	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1242	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1248	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1254	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
Aroclor-1260	ug/l	NE	0.5	*500	8270	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	NA	<500	<500	<500
2-Chlorophenol	ug/l	400	NE	5.0	8270	NA	<5	NA	<5	NA	8.0	NA	<5	NA	<5	NA	6.3	<5	8.0
Phenol	ug/l	580	NE	5.0	8270	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
2,4-Dichlorophenol	ug/l	790	NE	5.0	8270	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
2,4,6-Trichlorophenol	ug/l	6.5	NE	5.0	8270	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
3-Methyl-4-Chlorophenol	ug/l	0.1	NE	5.0	8270	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	NA	<5	<5	<5
Pentachlorophenol	ug/l	7.9	1	10	8270	NA	<10	NA	<10	NA	<10	NA	<10	NA	<10	NA	<10	<10	<10

NA - Not Anaylzed

NE -Not Established

*Note: Elevated Detection Limit due to EPA Analytical Method used.

= Concentration Above Pretreatment Objective or Florida Drinking Water MCL

= Concentration Above Method Detection Limit

TABLE 3 (Continued)
RECOVERY WELL GROUNDWATER CONCENTRATIONS
APRIL 1995
NAS PENSACOLA, PENSACOLA FLORIDA

Parameter	Units	Pretreatment Objectives	FL Drinking Water MCLs	Detection Limit	EPA Method	RW-3		RW-4		RW-5A		RW-6		RW-7		COMPOSITE			
						Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Filtered	Unfiltered	Min	Max
Wet Chemistry																			
Oil & Grease	mg/l	5	NE	1.0	413.1	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	NA	<1.0	<1.0	<1.0
Biochemical Oxygen Demand	mg/l	30	NE	2.0	SM 507	NA	<2.0	NA	2.5	NA	5.2	NA	<2.0	NA	<2.0	NA	3.5	<2.0	5.2
Chloride	mg/l	NE	250	0.05	325.3	NA	97	NA	18	NA	22	NA	4.5	NA	120	NA	42.7	4.5	120
Residual Chlorine	mg/l	0.01	NE	0.05	STM 408D	NA	0.18	NA	<0.05	NA	0.10	NA	<0.05	NA	<0.05	NA	0.10	<0.05	0.18
Fluoride	mg/l	NE	4	0.20	340.2	NA	<0.20	NA	0.42	NA	0.44	NA	<0.20	NA	0.23	NA	0.34	<0.20	0.44
Nitrate Nitrogen	mg/l	NE	10	0.10	353.2	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	<0.10	<0.10
Sulfate	mg/l	NE	250	1.0	375.3	NA	90	NA	19	NA	<1.0	NA	120	NA	5.3	NA	25.6	<1.0	120
Total Suspended Solids	mg/l	25	NE	2.0	160.2	NA	<2.0	NA	<2.0	NA	<2.0	NA	6.2	NA	<2.0	NA	2.6	<2.0	6.2
Kjeldahl Nitrogen	mg/l	3	NE	1.0	351.3	NA	1.7	NA	1.2	NA	1.7	NA	0.77	NA	17	NA	2.73	0.77	17
Cyanide	mg/l	0.005	0.2	0.010	9012	NA	<0.01	NA	<0.01	NA	<0.01	NA	<0.01	NA	<0.01	NA	<0.01	<0.01	<0.01
Phosphorus	mg/l	3	NE	0.050	365.3	NA	0.068	NA	0.22	NA	0.083	NA	0.068	NA	0.31	NA	0.114	0.068	0.310
Surfactants	mg/l	0.5	NE	0.10	425.1	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	NA	<0.10	<0.10	<0.10
pH	s.u.	6.5 - 8.5	6.5-8.5	2.0-12.0	9045	NA	6.4	NA	7.0	NA	6.9	NA	7.1	NA	7.0	NA	6.8	6.4	7.1
Metals																			
Aluminum	mg/l	NE	0.2	0.10	6010	0.42	0.78	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.17	0.24	<0.10	0.78
Arsenic	mg/l	NE	0.050	0.0020	7061	<0.0020	<0.0020	0.0021	0.0020	<0.0020	<0.0020	0.0039	0.0046	0.0022	<0.0020	0.0022	0.0024	<0.0020	0.0046
Barium	mg/l	NE	2	0.010	6010	<0.010	<0.010	0.021	0.020	0.029	0.025	0.028	0.028	0.020	0.018	0.021	0.019	<0.010	0.029
Beryllium	mg/l	NE	0.004	0.0050	6010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cadmium	mg/l	0.0093	0.005	0.0050	6010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Calcium	mg/l	NE	NE	0.1	6010	13	12	74	70	40	38	74	69	58	51	45	42	12	74
Chromium	mg/l	0.050	0.1	0.010	6010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Copper	mg/l	0.015	1	0.010	6010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Iron	mg/l	0.30	0.3	0.01	6010	20	2.3	0.31	0.63	0.30	0.51	0.46	1.3	1.4	1.3	4.55	0.98	0.30	20
Lead	mg/l	0.0056	0.015	0.0050	7421	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium	mg/l	NE	NE	0.1	6010	9.5	9.2	6.5	5.9	4.4	4.1	1.0	0.9	17	15	6.3	5.9	0.9	17
Manganese	mg/l	NE	0.05	0.01	6010	0.42	0.044	0.076	0.068	0.053	0.051	0.09	0.087	0.22	0.20	0.152	0.069	0.044	0.420
Mercury	mg/l	0.0001	0.002	0.00010	7470	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Nickel	mg/l	0.0083	0.1	0.0083	6010	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083
Potassium	mg/l	NE	NE	1.0	6010	4.6	4.4	2.3	2.2	3.8	3.8	<1.0	<1.0	7.9	7.8	3.6	3.5	<1.0	7.9
Silver	mg/l	0.050	0.1	0.010	6010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	mg/l	NE	160	1.0	6010	60	60	14	13	13	13	2.9	2.9	93	88	28.0	27.5	2.9	93
Vanadium	mg/l	NE	NE	0.010	6010	0.016	0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.012	<0.010	0.020
Zinc	mg/l	0.086	5	0.020	6010	0.19	0.12	<0.020	<0.020	<0.020	<0.020	<0.020	0.026	<0.020	<0.020	0.056	0.042	<0.020	0.190
Radionuclides																			
Gross Alpha	pCi/l	NE	15	2.0	900.0	3.4	3.8	2.2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	7.4	2.3	2.8	<2.0	7.4
Gross Beta	pCi/l	NE	NE	2.0	900.0	10.0	6.0	<2.0	<2.0	2.6	2.6	<2.0	<2.0	12.0	10.0	4.7	3.7	<2.0	12.0
Radium-226	pCi/l	NE	5	0.60	903.1	<0.60	<0.06	<0.60	<0.60	<0.60	<0.60	<0.60	<0.60	0.88	0.72	0.62	0.61	<0.60	0.88
Radium-228	pCi/l	NE	5	3.4	904.0	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4	<3.4

NA - Not Anaytzed

NE -Not Established

= Concentration Above Pretreatment Objective or Florida Drinking Water MCL

= Concentration Above Method Detection Limit

Samples were collected and preserved in accordance FDEP sampling requirements. A chain of custody accompanied all samples and are also included in Appendix C. Samples were analyzed for volatile and semivolatile organic compounds, wet chemistry, metals and radioactive nuclides.

3.3 Pretreatment Objectives

Discharge limits from the pretreatment system were established by the new Wastewater Treatment Plant Discharge Permit No. FL0002500. These are indicated as the Pretreatment Objectives on Table 3. Discharge limits for parameters not included in the WWTP discharge permit are based on Florida Drinking Water MCLs. Table 3 lists all parameters with results exceeding either the pretreatment objective or the Florida MCL. Additionally, those parameters with results higher than the method detection limit or with a method detection limit greater than the pretreatment objective of Florida MCL are also listed. Analyzed parameters that were below the method detection limit, Florida Drinking Water MCLs and the pretreatment objectives in the new WWTP permit, are not included in Table 3. Data on these parameters can be referenced in analytical reports contained in Appendix C.

The WWTP will act as a final polishing unit should occasional system upsets occur in the pretreatment system. The pretreatment system will minimize the potential for the Wastewater Treatment Plant sludge to contain metallic components.

3.4 Contaminants of Concern

Analytical groundwater results from the recovery wells indicate that several volatile and semivolatile organic compounds along with iron require treatment to meet the required pretreatment objectives. Contaminants of concern from the groundwater recovery system unfiltered composite sample are summarized below, compared with pretreatment objectives obtained from the new WWTP permit, and Florida Drinking Water MCLs.

CONTAMINANT	INFLUENT COMPOSITE (UNFILTERED)	PRETREATMENT OBJECTIVES	FLORIDA DRINKING WATER MCLs
Vinyl Chloride (μg/l)	17	Not established	1
Methylene Chloride (μg/l)	6.5	Not established	5
Benzene (μg/l)	94.6	Not established	1
Chlorobenzene (μg/l)	1,642	Not established	100
1,4-Dichlorobenzene (μg/l)	497	Not established	75
Iron (mg/l)	0.98	0.3	0.3

Additional contaminants, where individual well concentrations exceed pretreatment objectives, include aluminum, manganese and zinc. However, aluminum, manganese and zinc will also undergo some degree of removal with the selected treatment alternatives. Treatment technology alternatives are evaluated in Section 4.0 to identify a pretreatment system to reduce the contaminants listed above to below pretreatment levels.

4.0 TREATMENT TECHNOLOGY ALTERNATIVES

Specific treatment technologies were evaluated for removal of the contaminants of concern. The contaminants of concern include volatile and semivolatile organic compounds and metals. The following current treatment technologies were considered and evaluated:

Volatile and Semivolatile Organics
- Air Stripping
- Carbon Adsorption
- Ultra-violet Peroxidation

Metals
- Filtration
- Chemical Precipitation
- Ion Exchange

4.1 Volatile and Semivolatile Organic Compounds

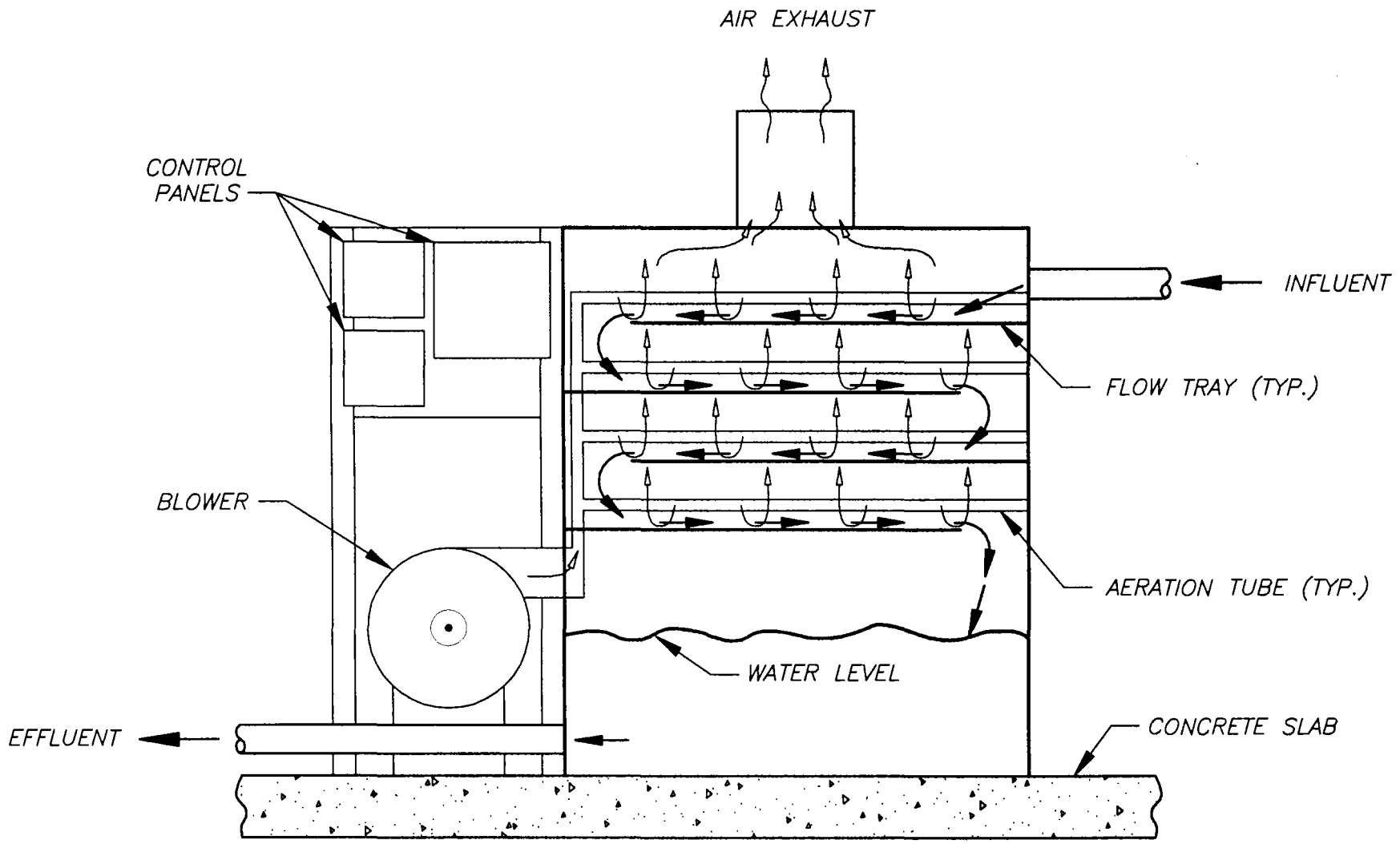
Volatile and semi-volatile organic compounds can be removed from groundwater by several treatment methods. Treatment technologies generally include air stripping and carbon adsorption. Ultra-violet (UV) peroxidation was not further evaluated because it is more cost effective for removal of organic compounds at higher concentrations. Therefore, air stripping and carbon adsorption treatment technologies were evaluated and are presented below along with a life cycle cost analysis for each technology.

4.1.1 Air Stripping

Air stripping uses the process of mass transfer where contaminants in groundwater are physically transferred to air. The mass transfer usually occurs through the use of a packed tower or tray (low profile) aeration system. The air stripping system allows the contaminants in the water to reach equilibrium with the air. Through this process, the transfer of groundwater contaminants from water to air takes place.

Figure 3 shows components of a tray air stripper. Air is provided to the system by a blower located near the base of the unit and is distributed into a series of trays. Water cascades by gravity down through the trays where contaminants in the groundwater are transferred

DWG: P:\CADD\33462\33462R03 PLOTTED: 05/24/95



LEGEND

AIR FLOW

WATER FLOW

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3

AIR STRIPPING TREATMENT PROCESS

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT
NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

to the air stream. The air stream is vented to the atmosphere unless emission control is warranted. Treated water is released at the bottom of unit.

The degree to which contaminants are removed are determined by Henry's Law. In general, Henry's Law states that the partial pressure of a chemical compound in the air is directly proportional to its concentration in water. Therefore, the degree of mass transfer of a compound is determined by the concentration gradient between the air and water. Vinyl chloride exhibits a high value for Henry's Law Constant (3.4) and is easily strippable since a high concentration can concurrently exist in air. Benzene, chlorobenzene, methylene chloride and 1,4-Dichlorobenzene have Henry's Law Constants of 0.23, 0.16, 0.13 and 0.12 and are generally of average difficulty to strip.

To evaluate air stripping as a treatment technology, a computer modeling program, AirStrip Release 1.2©, was utilized. This program evaluates packed tower air stripping based on a number of parameters concerning the air stripping process and allows modeling of multiple air stripper designs for feasibility purposes only. Low profile cascading tray stripper models are manufacturer specific due to the configuration of the air stripping system and are considered proprietary information. For this reason, the packed tower model is presented to show the effectiveness of air stripping as it pertains to the volatile and semivolatile contaminants of concern.

The AirStrip program generates a design using one contaminant at a time. Each contaminant requiring treatment was modeled to determine the controlling contaminant. Only contaminants that exceed treatment objectives were evaluated. Of the five, benzene, chlorobenzene, methylene chloride, vinyl chloride and 1,4-Dichlorobenzene, the controlling contaminant was identified as benzene. AirStrip modeling matrices for benzene, chlorobenzene, methylene chloride, vinyl chloride and 1, 4-Dichlorobenzene are shown in Table 4.

Based on the results presented in Table 4, organic removal using air stripping was able to achieve the treatment objectives. The air stripper design included a 12 ft packing depth and an air to water ratio of 30:1. Due to the potential for iron fouling, a low profile cascading tray air stripper will be used instead of a packed tower air stripper. The low profile stripper will perform similarly to a packed tower and will require the same removal efficiency to

TABLE 4
AIRSTRIP MODELING MATRICIES
NAS PENSACOLA, PENSACOLA FLORIDA

Parameters Input For All Contaminant Models:

Packing Type:	1.0 inch P-Jaeger Tripacks
Design Temperature :	68.0 °F
Atmospheric Pressure :	1.0 atm
Liquid Loading Rate :	12.70 gpm / ft²

Contaminant : **Benzene**
Influent Concentration : **95** **ug / L**
Pretreatment Objective/MCL **1** **ug / L**

= Effluent Levels Below Pretreatment Objective
= Selected Air Stripper Design

Packing Depth (feet)	Concentration Remaining (ug / L) Air/Water Ratio = 10	Air/Water Ratio = 20	Air/Water Ratio = 30	Air/Water Ratio = 40	Air/Water Ratio = 50
8.0	8.8	4.6	3.5	3.1	2.8
10.0	5.3	2.3	1.6	1.3	1.2
12.0	3.3	1.1	0.7	**0.6**	**0.5**
14.0	2.0	**0.6**	**0.3**	**0.3**	**0.2**
16.0	1.3	**0.3**	**0.2**	**0.1**	**0.1**

% Efficiency Removal of Benzene Using Selected Air Stripper Design = **99.2 %**

Contaminant : **Chlorobenzene**
Influent Concentration : **1642** **ug / L**
Pretreatment Objective/MCL **100** **ug / L**

= Effluent Levels Below Pretreatment Objective
= Selected Air Stripper Design

Packing Depth (feet)	Concentration Remaining (ug / L) Air/Water Ratio = 10	Air/Water Ratio = 20	Air/Water Ratio = 30	Air/Water Ratio = 40	Air/Water Ratio = 50
8.0	277.4	142.1	105.1	**88.3**	**78.8**
10.0	200.6	**82.5**	**55.4**	**44.0**	**37.9**
12.0	147.6	**48.2**	29.3	**22.0**	**18.3**
14.0	109.8	**28.3**	**15.5**	**11.0**	**8.8**
16.0	**82.4**	**16.6**	**8.2**	**5.5**	**4.3**

% Efficiency Removal of Chlorobenzene Using Selected Air Stripper Design = **98.2 %**

Contaminant : **1,4-Dichlorobenzene**
Influent Concentration : **497** **ug / L**
Pretreatment Objective/MCL **75** **ug / L**

= Effluent Levels Below Pretreatment Objective
= Selected Air Stripper Design

Packing Depth (feet)	Concentration Remaining (ug / L) Air/Water Ratio = 10	Air/Water Ratio = 20	Air/Water Ratio = 30	Air/Water Ratio = 40	Air/Water Ratio = 50
8.0	120.0	**59.4**	**42.0**	**34.2**	**29.8**
10.0	96.4	**38.0**	**24.1**	**18.3**	**15.3**
12.0	79.1	**24.6**	13.8	**9.9**	**7.9**
14.0	**65.9**	**16.0**	**8.0**	**5.3**	**4.1**
16.0	**55.6**	**10.5**	**4.6**	**2.9**	**2.1**

% Efficiency Removal of 1,4-Dichlorobenzene Using Selected Air Stripper Design = **97.2 %**

TABLE 4 (continued)
AIRSTRIP MODELING MATRICIES
NAS PENSACOLA, PENSACOLA FLORIDA

Parameters Input For All Contaminant Models:

Packing Type:	1.0 inch P-Jaeger Tripacks
Design Temperature :	68.0 °F
Atmospheric Pressure :	1.0 atm
Liquid Loading Rate :	12.70 gpm / ft²

Contaminant : **Vinyl Chloride**
Influent Concentration : **17** **ug / L**
Pretreatment Objective/MCL **1** **ug / L**

= Effluent Levels Below Pretreatment Objective
= Selected Air Stripper Design

Packing Depth (feet)	Concentration Remaining (ug / L) Air/Water Ratio = 10	Air/Water Ratio = 20	Air/Water Ratio = 30	Air/Water Ratio = 40	Air/Water Ratio = 50
8.0	**0.22**	**0.20**	**0.20**	**0.19**	**0.19**
10.0	**0.07**	**0.07**	**0.06**	**0.06**	**0.06**
12.0	**0.03**	**0.02**	**0.02**	**0.02**	**0.02**
14.0	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**
16.0	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

% Efficiency Removal of Vinyl Chloride Using Selected Air Stripper Design = **99.9 %**

Contaminant : **Methylene Chloride**
Influent Concentration : **6.5** **ug / L**
Pretreatment Objective/MCL **5** **ug / L**

= Effluent Levels Below Pretreatment Objective
= Selected Air Stripper Design

Packing Depth (feet)	Concentration Remaining (ug / L) Air/Water Ratio = 10	Air/Water Ratio = 20	Air/Water Ratio = 30	Air/Water Ratio = 40	Air/Water Ratio = 50
8.0	**2.06**	**0.84**	**0.51**	**0.37**	**0.30**
10.0	**1.83**	**0.58**	**0.30**	**0.19**	**0.15**
12.0	**1.67**	**0.40**	**0.17**	**0.10**	**0.07**
14.0	**1.56**	**0.28**	**0.10**	**0.05**	**0.03**
16.0	**1.47**	**0.20**	**0.06**	**0.03**	**0.02**

% Efficiency Removal of Methylene Chloride Using Selected Air Stripper Design = **97.4 %**

achieve pretreatment objectives. Removal efficiencies for volatile and semivolatile organic compounds are listed below.

Parameter	Influent Concentration (μg/l)	Pretreatment Objective/MCL (μg/l)	Percent Removal
Benzene	94.6	1	98.9
Chlorobenzene	1642	100	93.9
Methylene Chloride	6.5	5	23.1
Vinyl chloride	17	1	94.1
1, 4-Dichlorobenzene	497	75	84.9

Air dispersion modeling was performed to calculate the maximum potential emissions of regulated air pollutants from a low profile cascading air stripper that will be installed adjacent to the pump dock at the WWTP. The air pollutants that may be emitted from the air stripper (based upon laboratory analysis of recovery well samples) include, vinyl chloride, chloroethane, methylene chloride, 1,1-dichloroethane, vinyl acetate, benzene, chlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichlorobenzene, naphthalene and 2-chlorophenol.

The following assumptions were made regarding the air stripper:

1. A flow weighted composite obtained from five recovery well effluent streams was used as the air stripper's input concentration. Contaminants showing concentrations less than the detection limit were not considered among the list of chemicals that could be emitted from the stripper, although they were used in calculating the weighted average input concentration. The throughput rate used for modeling was 40 gpm.

2. The exit velocity was calculated using the stripper's volumetric flow rate and exit diameter (this is based upon the design criteria supplied by an air stripper manufacturer, see attached calculations in Appendix E).

3. The release height was assumed to be 12 feet high, (this is based upon the design criteria supplied by an air stripper manufacturer).

4. The distance of the air stripper to the base fenceline was assumed to be 1,000 feet.

Modeling was performed using the U.S. Environmental Protection Agency's (EPA's) TSCREEN air dispersion model. A summary of stack information has been provided in Table 5a. A generic 1 lb per hour emission rate was used and scaled by the actual emission rate of each pollutant to determine the maximum border concentration for each pollutant in Table 5b.

Table 5a. Summary of TSCREEN Modeling Information

Source Type	**Point Source**
Input Concentration	2.85 mg/L
Throughput Rate	40 gpm (151.4 L/min)
Stack Height	12 ft (3.658 m)
Stack Inside Diameter	8 in (0.203 m)
Stack Exit Velocity	5.84 m/s
Stack Gas Exit Temperature	68 degrees F (293 K)
Ambient Air Temperature	68 degrees F (293 K)
Receptor Height	0.0 m (i.e. ground level)
Building Height	12 ft (3.658 m)
Min. Horizontal Bldg Dimension	8 ft (2.438 m)
Max. Horizontal Bldg Dimension	8 ft (2.438 m)

TABLE 5b
TSCREEN MODELING SUMMARY
NAS PENSACOLA, PENSACOLA FLORIDA

Pollutant	Emission Rate (lbs/hour)	TSCREEN 1 lb/hr Max. Concentration (ug/cubic meter)	Averaging Period	Modeled Concentration (ug/cubic meter)	No Threat Levels (ug/cubic meter)
Benzene	0.0019	289.59	8 hour	0.55	30
		165.48	24 hour	0.31	7.2
		33.1	annual	0.06	0.12
Clorobenzene	0.0329	289.59	8 hour	9.51	3450
		165.48	24 hour	5.44	828
		33.1	annual	1.09	N/A
Chloroethane	0.0002	289.59	8 hour	0.07	N/A
		165.48	24 hour	0.04	N/A
		33.1	annual	0.01	N/A
2-Chlorophenol	0.0001	289.59	8 hour	0.04	N/A
		165.48	24 hour	0.02	N/A
		33.1	annual	0.00	N/A
1,2-Dichlorobenzene	0.0045	289.59	8 hour	1.31	3010
		165.48	24 hour	0.75	722.4
		33.1	annual	0.15	10
1,3-Dichlorobenzene	0.0059	289.59	8 hour	1.71	N/A
		165.48	24 hour	0.98	N/A
		33.1	annual	0.20	N/A
1,4-Dichlorobenzene	0.0099	289.59	8 hour	2.88	4510
		165.48	24 hour	1.65	1082.4
		33.1	annual	0.33	10
1,1-Dichloroethane	0.0001	289.59	8 hour	0.03	8100
		165.48	24 hour	0.02	1944
		33.1	annual	0.00	N/A
Methylene Chloride	0.0001	289.59	8 hour	0.04	N/A
		165.48	24 hour	0.02	N/A
		33.1	annual	0.00	N/A
Naphthalene	0.0007	289.59	8 hour	0.21	520
		165.48	24 hour	0.12	124.8
		33.1	annual	0.02	N/A
Vinyl Acetate	0.0002	289.59	8 hour	0.06	350
		165.48	24 hour	0.04	84
		33.1	annual	0.01	200
Vinyl Chloride	0.0003	289.59	8 hour	0.10	130
		165.48	24 hour	0.06	31.2
		33.1	annual	0.01	N/A

N/A - A threat level was not published for this emission.

A life cycle cost analysis was performed for pretreatment of organic compounds using air stripping. The cost analysis includes purchase alternatives for supply and installation, operation and maintenance costs and expected salvage value. The salvage value for equipment is calculated at 50 percent of the original value after year 1, 25 percent after year 6 and 5 percent for years 11, 16 and 21. Life cycle costs for air stripping are presented in Table 6. Present worth costs at a rate of 8 percent are calculated for 1, 6, 11, 16 and 21 year intervals for air stripping. These years coincide with renewal dates for the RCRA permit for the sludge drying beds and surge pond.

4.1.2 Carbon Adsorption

The second treatment technology evaluated for organic compound removal from groundwater is carbon adsorption. Carbon adsorption uses the process of sorption to remove organic contaminants from groundwater. Sorption is the attachment of organic material to the carbon and occurs at the liquid/solid interface. Activated carbon is composed of many micro pores which create a large surface area for sorption to occur. When the rate of sorption equals the rate of desorption, equilibrium is achieved and the capacity of the carbon is reached.

Figure 4 shows components of a carbon adsorption system. Two carbon canisters are arranged in series. Influent water enters at the bottom of each contractor and passes through each carbon bed, exiting at the top. The carbon is held in place by a grate at the top and bottom of the contractor. The up-flow carbon adsorption system does not require a backwash system to remove particulate matter within the carbon bed.

The degree to which contaminants are removed depends on the empty bed contact time of the contractor. The empty bed contact time is the time it takes for the design flow (40 gpm) to fill a corresponding volume of activated carbon. Relatively short empty bed contact times are required for the removal of benzene, chlorobenzene, methylene chloride, vinyl chloride and 1,4-Dichlorobenzene due to each chemical's adsorption with carbon . Therefore, treatment using carbon adsorption is effective in removing contaminants of concern to low concentrations.

TABLE 6
AIR STRIPPING EVALUATION
NAS PENSACOLA, PENSACOLA FLORIDA

1. DESIGN

Design Flow Rate:	40	gpm
Tower Diameter:	2	ft
Packing Depth:	12	ft
Cross Sectional Area:	3.1	sqft
Liquid Loading Rate:	12.7	gpm/sqft
Temperature:	68	F
Atmospheric Pressure:	1.0	atm
Air Flow Rate:	160	scfm
Air To Water Ratio:	30	
Packing Material:	1.0 " P-Jaeger Tripacks	
Air Pressure Gradient:	0.062	" H20/ft
Stripping Factor:	6.7	

2. AIR STRIPPING PERFORMANCE

Contaminants	Henry's Law Constant	Concentration (ug/l) Influent	Effluent	Pretreatment Object./MCL (ug/l)	Percent Removal
Benzene	0.23	95	0.7	1	99.3
Vinyl Chloride	3.4	17	0.1	1	99.4
Chlorobenzene	0.16	1642	29.3	100	98.2
1,4-Dichlorobenzene	0.12	497	13.8	75	97.2
Methylene Chloride	0.084	7	0.17	5	97.4

3. CAPITAL COSTS

		Turn-Key Installation	Turn-Key Supply and Installation
Equipment			
Air Stripper:	Cascading Low Profile	$14,805	$17,026
Installation & Start-up			
30%	of Equipment Costs	$4,442	$5,108
	Subtotal:	$19,247	$22,133
Contingency:	20%	$3,849	$4,427
	Total:	$23,096	$26,560

4. YEARLY O&M COSTS

Electrical:	32,675	KWH	$0.07	per KWH	$2,287	
Maintenance:	2	hrs/week @	$25	per hr	$2,600	
Analytical:	24	samples	$600	per sample	$14,400	
				Total:	$19,287	
Power Requirements						
Blower	5	Hpx1KW/1.341Hp	8760	Hours =	32,675	KWH

5. FIRST YEAR TOTALS

Turn-Key Installation	Turn-Key Supply and Installation
$42,383	$45,847

6. LIFE CYCLE COST ANALYSIS

Turn-Key Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$42,383	$114,840	$162,082	$193,748	$214,975
Salvage Value	$7,403	$3,701	$740	$740	$740
Total	$34,981	$111,139	$161,341	$193,008	$214,235

Turn-Key Supply and Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$45,847	$117,395	$164,637	$196,303	$217,530
Salvage Value	$7,403	$3,701	$740	$740	$740
Total	$38,445	$113,694	$163,897	$195,563	$216,790

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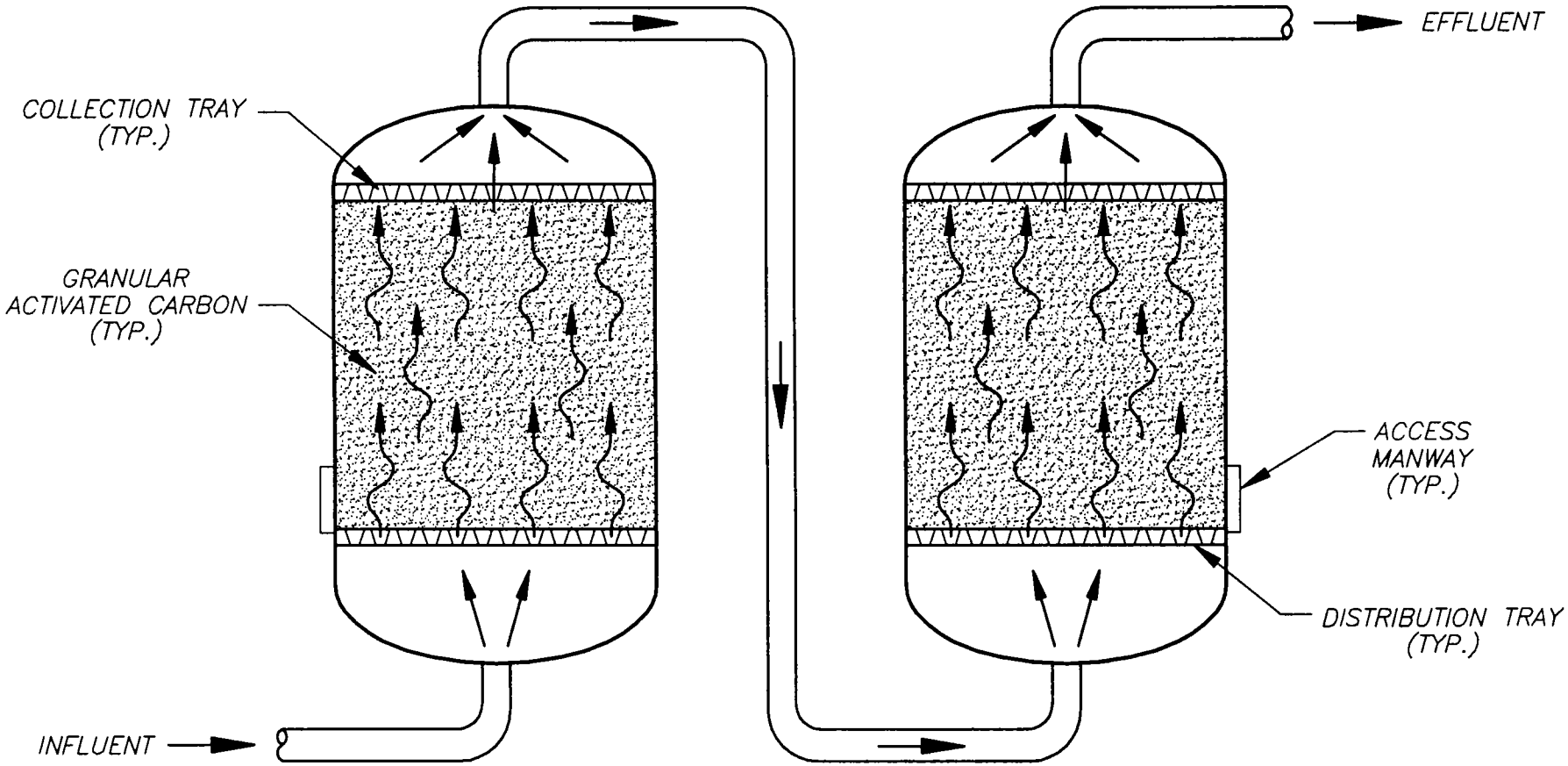

LEGEND

WATER FLOW

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 4

CARBON ADSORPTION TREATMENT PROCESS

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

The capacity of activated carbon is determined by the contaminants adsorption isotherm. The Freundlich isotherm is most commonly used for water and wastewater treatment. Freundlich isotherm data is used in Table 7 to estimate carbon consumption for organic compounds present in groundwater at NAS Pensacola.

A life cycle cost analysis is presented for pretreatment of organic compounds using carbon adsorption. The cost analysis includes purchase alternatives for supply and installation, operation and maintenance costs and expected salvage value. The salvage value for equipment is calculated at 50 percent of the original value after year 1, 25 percent after year 6 and 5 percent for years 11, 16 and 21. Life cycle costs are also presented in Table 7. Present worth costs at a rate of 8 percent are calculated for 1, 6, 11, 16 and 21 year intervals for carbon adsorption. These years coincide with renewal dates for the RCRA permit for the sludge drying beds and surge pond.

4.2 Metals

Treatment technologies effective in the removal of metallic compounds in groundwater include filtration, chemical precipitation and ion exchange. Filtered samples from the recovery wells indicate that filtration does not reduce metallic concentrations to below pretreatment objectives. Therefore, filtration is not further evaluated as a treatment option. Chemical precipitation and ion exchange treatment technologies are described and evaluated below. A life cycle cost analysis is also included for each technology.

4.2.1 Chemical Precipitation

One of the standard treatment processes for removal of metals from groundwater is chemical precipitation. Chemical precipitation is the process where metal hydroxides are formed and removed by coagulation-sedimentation and/or filtration. The typical chemical precipitation process includes a rapid mix tank for chemical addition, flocculation/coagulation tank for particle growth and a sedimentation tank for solids removal. Figure 5 shows the chemical precipitation treatment process.

Chemical precipitation of iron generally starts with oxidation of the Iron (II)(Fe^{2+}) to form the stable, oxidized, insoluble form of Iron (III)(Fe^{3+}). Potassium permanganate ($KMNO_4$) is generally one of the chemicals used to reduce iron. Theoretically, 1 mg/l of potassium permanganate will oxidize 1.06 mg/l of iron. In addition, depending on the concentration,

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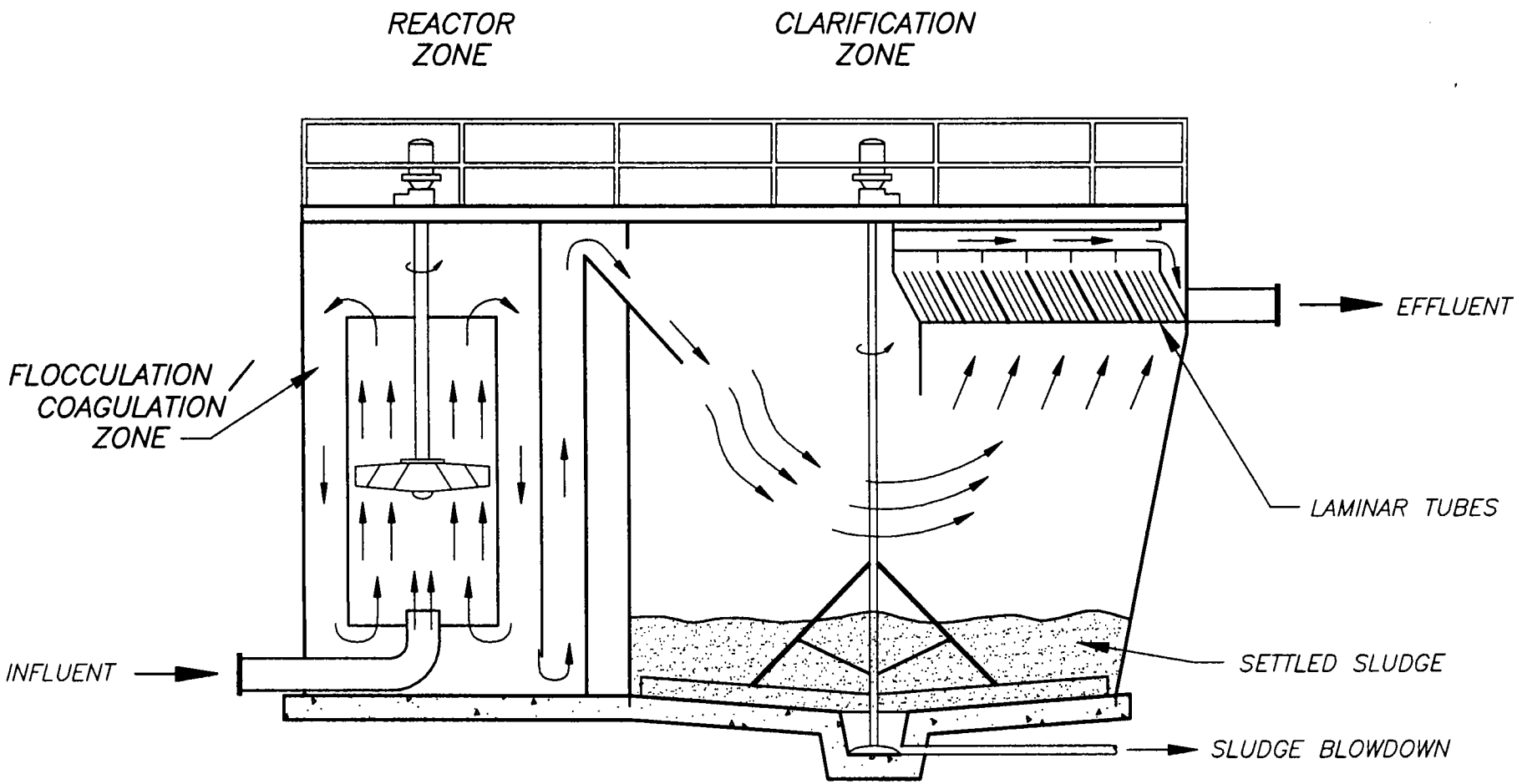

LEGEND

→ WATER FLOW

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 5

CHEMICAL PRECIPITATION TREATMENT PROCESS

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

TABLE 7
LIQUID GRANULAR ACTIVATED CARBON EVALUATION
NAS PENSACOLA, PENSACOLA FLORIDA

1. DESIGN

Design Flow Rate:	40	gpm
No. of Contact Vessels:	2	
Contact Vessel Arrangement:	Series	
Contact Vessel Diameter:	31	inches
Carbon Per Vessel:	500	lbs
Cross Sectional Area:	5.2	sqft
Hydraulic Loading:	7.6	gpm/sqft
Carbon Depth:	3.18	ft
Carbon Volume:	17	cuft
Empty Bed Contact Time:	3.12	minutes
Total Empty Bed Contact Time:	6.23	minutes

2. GRANULAR ACTIVATED CARBON PERFORMANCE

	Concentration (ug/l)		Pretreatment			ug cont.	lbs carbon
Contaminants	Influent	Effluent	Object./MCL (ug/l)	K	1/n	/g carbon	per year
Benzene	95	<1	1	1	1.6	13,133	1,263
Vinyl Chloride	17	<1	2	3.6	0.83	13,691	213
Chlorobenzene	1642	<5	100	91	0.99	447,736	643
1,2-Dichlorobenzene	226	<10	600	129	0.43	257,719	154
1,3-Dichlorobenzene	295	<10	Not Established	118	0.45	243,455	212
1,4-Dichlorobenzene	497	<10	75	121	0.47	257,811	338
						Total	2,822

3. CAPITAL COSTS

		Turn-Key Installation	Turn-Key Supply and Installation
Equipment			
Carbon Contactors:	Two - 500 lb Contactors Arranged in Series	$9,084	$10,447
Installation & Start-up			
	30% of Equipment Costs	$2,725	$3,134
	Subtotal:	$11,809	$13,581
Contingency:	20%	$2,362	$2,716
	Total:	$14,171	$16,297

4. YEARLY O&M COSTS

Carbon Usage:	2,822	lbs/yr @	$2.50	per lb	$7,055
Maintenance:	2	hrs/week @	$25	per hr	$2,600
Disposal:	2,822	lbs/yr @	$0.50	per lb	$1,411
Analytical:	36	samples	$600	per sample	$21,600
				Total:	$32,666

5. FIRST YEAR TOTALS

Turn-Key Installation	Turn-Key Supply and Installation
$46,837	$48,963

6. LIFE CYCLE COST ANALYSIS

Turn-Key Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$46,837	$163,690	$243,701	$297,334	$333,286
Salvage Value	$4,542	$2,271	$454	$454	$454
Total	$42,295	$161,419	$243,247	$296,880	$332,832

Turn-Key Supply and Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$48,963	$165,815	$245,827	$299,460	$335,412
Salvage Value	$4,542	$2,271	$454	$454	$454
Total	$44,421	$163,544	$245,373	$299,006	$334,957

potassium permanganate can provide algae control and aid in the removal of organics, phenols, sulfur, cyanide and other compounds.

After oxidation, a dilute solution of sodium hydroxide is added to raise the pH to approximately 8.0 standard units (s.u.) to create an insoluble form of iron along with other metals. Polymer is then added to flocculate/coagulate the insoluble particles. A cationic polymer is used for the flocculation/coagulation process to combine the particles present in the water. The coagulated particles are removed by sedimentation in the clarifier.

Jar tests were performed using the chemical precipitation process described above to evaluate removal efficiencies for iron. Field procedures and analytical results are included in Appendix D. A summary of the analytical results are shown in Table 8. Results indicate that iron was reduced from 0.98 mg/l to 0.043 mg/l on the composite sample. In addition, zinc was also reduced from 0.042 mg/l to <0.02 mg/l during the chemical precipitation process. Jar test results show aluminum was not removed and due to the addition of potassium permanganate during the jar test, manganese concentrations increased slightly. Although concentrations of aluminum and manganese are above the Florida secondary drinking water standards, optimum chemical feed adjustments made during system start-up will reduce these concentrations in the final effluent. Sludge recycle will also aid in the flocculation/coagulation process and provide a higher degree of metals reduction from the results shown in the jar test.

Chemical precipitation performance is indicated by analytical results obtained during field jar tests and subsequent analytical data obtained from the jar test samples. Influent iron concentrations of 0.98 mg/l were reduced to 0.043 mg/l, which correspond to 95.6 percent removal efficiency. Therefore, the jar tests indicate that treatment objectives may be achieved using chemical precipitation as the treatment technology for iron removal.

A life cycle cost analysis is presented for pretreatment of metals using chemical precipitation. The cost analysis includes purchase alternatives for supply and installation, operation and maintenance costs and expected salvage value. The salvage value for equipment is calculated at 50 percent of the original value after year 1, 25 percent after year 6 and 5 percent for years 11, 16 and 21. Life cycle costs are also presented in Table 9. Present worth costs at a rate of 8 percent are calculated for 1, 6, 11, 16 and 21 year intervals

TABLE 8
JAR TEST ANALYTICAL RESULTS
APRIL 1995
NAS PENSACOLA, PENSACOLA FLORIDA

Parameter	Units	Pretreatment Objectives	FL Drinking Water MCL's	Detection Limit	EPA Method	RW - 5A			RW - 4&6			Composite		
						Unfiltered	Filtered	Treated	Unfiltered	Filtered	Treated	Unfiltered	Filtered	Treated
Aluminum	mg/l	NE	0.2	0.10	6010	<0.10	<0.10	0.34	<0.10	<0.10	<0.10	0.17	0.24	0.58
Arsenic	mg/l	NE	0.050	0.0020	7061	<0.0020	<0.0020	<0.0020	0.003	0.0023	<0.0020	0.0022	0.0024	<0.0020
Barium	mg/l	NE	2	0.010	6010	0.029	0.025	0.013	0.0245	0.024	<0.010	0.021	0.019	<0.010
Beryllium	mg/l	NE	0.004	0.0050	6010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cadmium	mg/l	0.0093	0.005	0.0050	6010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Calcium	mg/l	NE	NE	0.1	6010	40	38	56	74	69.5	40	45.0	42	43
Chromium	mg/l	0.050	0.1	0.010	6010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Copper	mg/l	0.015	1	0.010	6010	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	<0.010
Iron	mg/l	0.30	0.3	0.01	6010	0.3	0.31	0.034	0.385	0.965	0.13	4.55	0.98	0.043
Lead	mg/l	0.0056	0.015	0.0050	7421	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium	mg/l	NE	NE	0.1	6010	4.4	4.1	11	3.75	3.4	12	6.3	5.9	11
Manganese	mg/l	NE	0.05	0.01	6010	0.053	0.051	0.37	0.083	0.0775	0.74	0.152	0.069	0.43
Mercury	mg/l	0.0001	0.002	0.00010	7470	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Nickel	mg/l	0.0083	0.1	0.0083	6010	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083
Potassium	mg/l	NE	NE	1.0	6010	3.8	3.8	6.6	1.15	1.1	6.9	3.6	3.5	6.3
Silver	mg/l	0.050	0.1	0.010	6010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Sodium	mg/l	NE	160	1.0	6010	13	13	100	8.45	7.95	85	28	27.5	88
Vanadium	mg/l	NE	NE	0.010	6010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.015	0.012	<0.010
Zinc	mg/l	0.086	5	0.020	6010	<0.020	<0.020	<0.020	<0.020	0.023	<0.020	0.056	0.042	<0.020

NE - Not Established

TABLE 9
CHEMICAL PRECIPITATION EVALUATION
NAS PENSACOLA, PENSACOLA FLORIDA

1. DESIGN

Flow Rate	40	gpm
Reaction Tank Volume	120	gallons
Reaction Tank Retention Time	3	Minutes
Reaction Tank Mixer	0.5	Hp
Coagulation Tank Volume	400	gallons
Coagulation Tank Retention Time	10	Minutes
Coagulation Tank Mixer	0.1	Hp
Clarifier Loading Rate	0.3	gpm/sq ft
Clarifier Surface Area	133	sq ft

2. CHEMICAL PRECIPITATION PERFORMANCE

	Concentration (ug/l)		Pretreatment	Percent
Contaminants	Influent	Effluent	Object./MCL (ug/l)	Removal
Iron	0.98	0.043	0.300	95.6
Zinc	0.042	0.02	0.086	52.4

3. CAPITAL COSTS

		Turn-Key Installation	Turn-Key Supply and Installation
Equipment			
Clarifier:	Rapid mix, flocculation and clarifier	$170,000	$195,500
Installation & Start-up			
	30% of Equipment Costs	$51,000	$58,650
	Subtotal:	$221,000	$254,150
Contingency:	20%	$44,200	$50,830
	Total:	$265,200	$304,980

4. YEARLY O&M COSTS

Chemicals						
Potassium Permanganate:	2	mg/l @	$2.75	per lb	$964	
Sodium Hydroxide:	1	mg/l @	$1.00	per lb	$175	
Polymer:	2	mg/l @	$4.50	per lb	$1,577	
				Subtotal:	$2,717	
Sludge Disposal:	5	tons/yr @	$400	per ton	$2,000	
Electrical:	34,635	KWH @	$0.07	per KWH	$2,424	
Maintenance:	4	hrs/week @	$25	per hr	$5,200	
Analytical:	24	samples	$500	per sample	$12,000	
				Subtotal:	$21,624	
				Total:	$24,341	
Electrical Output						
Scraper Drive Motor:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
Reaction Tank Mixer:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
Chemical Feeders:	0.3	Hpx1KW/1.341Hp	8,760	Hours =	1,960	KWH
Chemical Mixers:	1	Hpx1KW/1.341Hp	8,760	Hours =	6,535	KWH
Sludge Pump:	5	Hpx1KW/1.341Hp	4,380	Hours =	16,337	KWH
Instrumentation:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
					34,635	KWH

5. FIRST YEAR TOTALS

Turn-Key Installation	Turn-Key Supply and Installation
$289,541	$329,321

6. LIFE CYCLE COST ANALYSIS

Turn-Key Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$289,541	$376,613	$436,234	$476,198	$502,987
Salvage Value	$85,000	$42,500	$8,500	$8,500	$8,500
Total	$204,541	$334,113	$427,734	$467,698	$494,487

Turn-Key Supply and Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$329,321	$416,393	$476,014	$515,978	$542,767
Salvage Value	$85,000	$42,500	$8,500	$8,500	$8,500
Total	$244,321	$373,893	$467,514	$507,478	$534,267

for chemical precipitation. These years coincide with renewal dates for the RCRA permit for the sludge drying bed and surge pond.

4.2.2 Ion Exchange

Treatment by ion exchange is the process of displacing ions from an insoluble exchange material with ions of a different species in solution. Synthetic resins are currently used for most ion exchange applications. Due to the positive charge associated with ferric or ferrous ions, a cationic resin will be used as the exchange media. The resin will replace hydrogen ions for positively charged (metal) ions. The affinity of the resin to attract positive ions is based on the ion and the strength of the solution. Therefore, not all ions are removed equally and some ions only partially removed.

An ion exchange process typically resembles two packed columns arranged in series as shown in Figure 6. Groundwater enters the top of the column, passes down through the resin bed, and is removed at the bottom. When the resin capacity is exhausted, the column is backwashed to remove trapped solids and then regenerated.

Cationic resin is regenerated with a strong acid usually sulfuric or hydrochloric acid. The metal ions are carried away with the regeneration solution and disposed. The resin is then backwashed with water and returned to service. Pretreatment by ion exchange can generally reduce metallic concentrations to the lower parts per billion depending on the type of resin.

Depending on the number of ions captured, and hydrogen ions released, the pH of the water will become sightly acidic. The pH of the water may require adjustment using sodium hydroxide or another basic solution before being discharged.

Removal efficiency for ion exchange varies with the resin selection. However, ion exchange is capable of removing influent concentrations to approximately 0.01 mg/l depending on the amount of ionized iron. The corresponding percent removal would be approximately 99 percent. Treatment for iron using ion exchange would most likely exceed treatment objectives.

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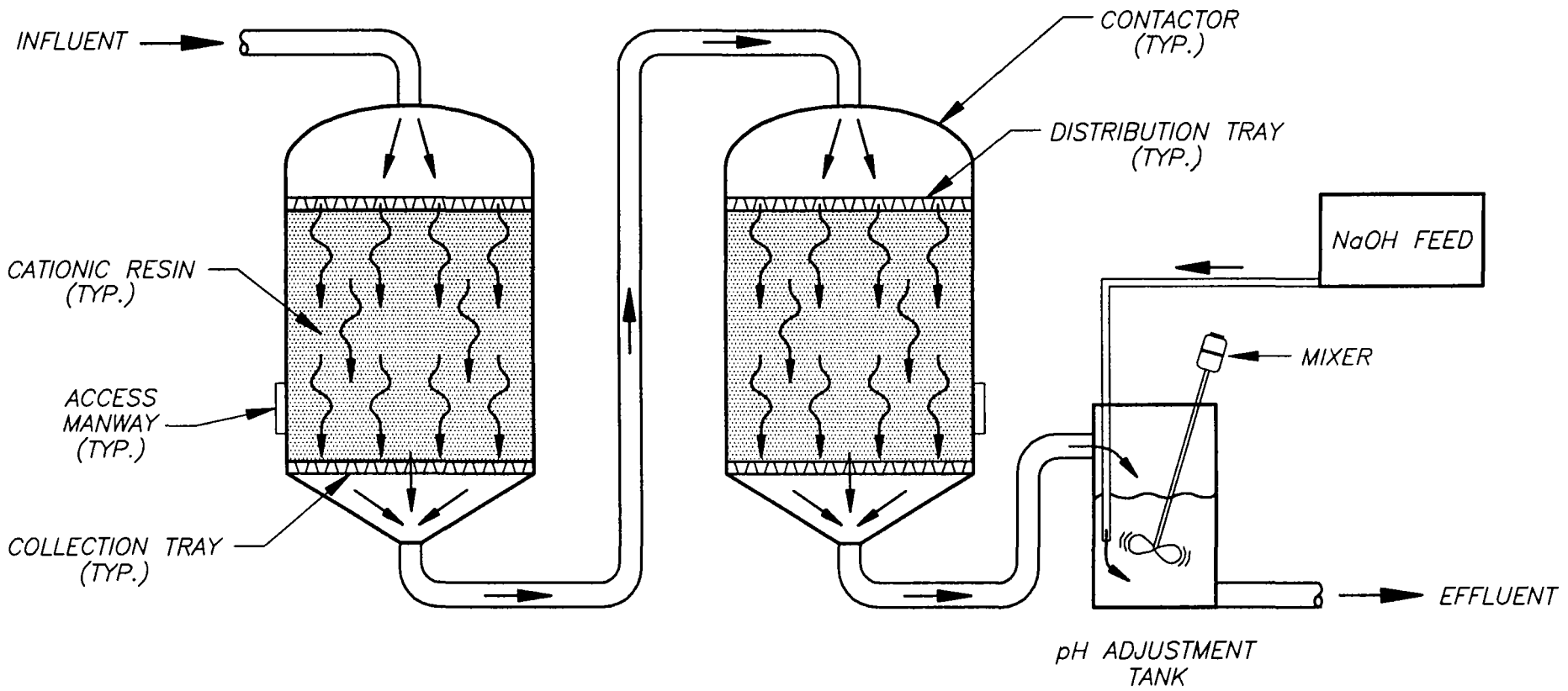

LEGEND

→ WATER FLOW

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 6

ION EXCHANGE TREATMENT PROCESS

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

A life cycle cost analysis is presented for pretreatment of metals using ion exchange. The cost analysis includes purchase alternatives for supply and installation, operation and maintenance costs and expected salvage value. The salvage value for equipment is calculated at 50 percent of the original value after year 1, 25 percent after year 6 and 5 percent for years 11, 16 and 21. Life cycle costs are also presented in Table 10. Present worth costs at a rate of 8 percent are calculated for 1, 6, 11, 16 and 21 year intervals for ion exchange. These years coincide with renewal dates for the RCRA permit for the sludge drying beds and surge pond.

4.3 Technology Evaluation Summary and Selected Alternative

Air stripping and carbon adsorption treatment technologies are capable of removing organic compounds to concentrations below the treatment objectives. Capital costs for turn-key supply and installation, and yearly operation and maintenance (O&M) costs are summarized below for air stripping and carbon adsorption.

Treatment Technology	Capital Costs	O&M Costs
Air Stripping	$26,560	$19,287
Carbon Adsorption	$16,297	$32,666

Treatment technologies using chemical precipitation and ion exchange are capable of removing iron from influent groundwater concentrations to below the treatment objectives. Capital and yearly O&M costs are summarized below for chemical precipitation and ion exchange.

Treatment Technology	Capital Costs	O&M Costs
Chemical Precipitation	$304,980	$24,341
Ion Exchange	$291,704	$50,093

A life cycle cost analysis was performed on the capital and O&M costs for each alternative. A rate of 8 percent at 1, 6, 11, 16 and 21 years were calculated. In addition, the salvage value of the equipment was also calculated as shown as a credit. The total project costs for each treatment technology are summarized below and are intended only to compare the different treatment alternatives. These costs are not estimated construction costs and should not be considered fixed costs for the treatment system.

TABLE 10
ION EXCHANGE EVALUATION
NAS PENSACOLA, PENSACOLA FLORIDA

1. DESIGN

Flow Rate	40	gpm
No. of Contact Vessels:	2	
Contact Vessel Arrangement:	Series	
Diameter	3.5	ft
Cross Sectional Area	9.6	sq ft
Hydraulic Loading	4	gpm/sq ft
Maximum Depth	4	ft
Resin Volume per Vessel	38	cu ft
Contact Time per Vessel	7.20	minutes
Total Contact Time	14.39	minutes
Volumes Between Regeneration	1000	
Time Between Regeneration	5.0	days
Regeneration Acid Concentration	10%	
Regenerant Bed Volumes	4	
Regeneration Acid Used (50%)	230	gallons
Backwash Rate	0.8	gpm/sq ft
Backwash Flow	7.70	gpm
Final pH Adjustment Tank Volume	400	gallons
Hydraulic Detention Time	10	minutes
Final pH Adjustment Mixer	0.5	Hp

2. ION EXCHANGE PERFORMANCE

	Concentration (ug/l)		Pretreatment	Percent
Contaminants	Influent	Effluent	Object./MCL (ug/l)	Removal
Iron	0.98	0.01	0.300	99.0
Zinc	0.042	0.01	0.086	76.2

3. CAPITAL COSTS

			Turn-Key Installation	Turn-Key Supply and Installation
Equipment				
Ion Exchange Vessels:	2 Contactors arranged in in series, 1 standby		$150,000	$172,500
pH Adjustment System:	Acid feed with mixer		$12,600	$14,490
		Subtotal:	$162,600	$186,990
Installation & Start-up				
	30% of Equipment Costs		$48,780	$56,097
		Subtotal:	$211,380	$243,087
Contingency:	20%		$42,276	$48,617
		Total:	$253,656	$291,704

4. YEARLY O&M COSTS

Chemicals						
Regeneration Acid:	16,819	gallons	$1.50	per gallon	$25,229	
pH Adjustment Caustic:	841	gallons	$1.00	per gallon	$841	
Maintenance:	4	hrs/week @	$25	per hr	$5,200	
Electrical:	7,288	KWH	$0.07	per KWH	$510	
Analytical:	24	samples	$500	per sample	$12,000	
Regenerant Disposal:	25,251	gallons/year	$0.25	per gallon	$6,313	
				Total:	$50,093	
Electrical Output						
pH Adjustment Mixer:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
pH Adjustment Acid Feeder:	0.1	Hpx1KW/1.341Hp	8,690	Hours =	648	KWH
Regeneration Pump:	2	Hpx1KW/1.341Hp	47	Hours =	70	KWH
Backwash Pump:	2	Hpx1KW/1.341Hp	23	Hours =	35	KWH
Instrumentation:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
				Total:	7,288	KWH

5. FIRST YEAR TOTALS

Turn-Key Installation	Turn-Key Supply and Installation
$303,749	$341,797

6. LIFE CYCLE COST ANALYSIS

Turn-Key Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$303,749	$482,937	$605,632	$687,876	$743,006
Salvage Value	$81,300	$40,650	$8,130	$8,130	$8,130
Total	$222,449	$442,287	$597,502	$679,746	$734,876

Turn-Key Supply and Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$341,797	$520,985	$643,680	$725,925	$781,055
Salvage Value	$81,300	$40,650	$8,130	$8,130	$8,130
Total	$260,497	$480,335	$635,550	$717,795	$772,925

Summary of Total Project Costs

Technology	yr 1	yr 6	yr 11	yr 16	yr 21
Air Stripping	$45,847	$117,395	$164,637	$196,303	$217,530
Carbon Adsorption	$48,963	$165,815	$245,827	$299,460	$335,412
Chemical Precip.	$329,321	$416,393	$476,014	$515,978	$542,767
Ion Exchange	$341,797	$520,985	$643,680	$725,925	$781,055

Based on our evaluation of each treatment technology to remove contaminants of concern, Rust recommends the most cost effective technologies as the treatment alternatives. Air stripping and chemical precipitation are the recommended pretreatment technologies for removal of volatile organic compounds, semivolatile organic compounds and iron from groundwater at NAS Pensacola.

A conceptual design using air stripping and chemical precipitation treatment technologies for pretreatment of groundwater is presented in Section 5.0.

5.0 CONCEPTUAL DESIGN OF SELECTED ALTERNATIVES

A conceptual design of the pretreatment system using chemical precipitation and air stripping is presented below. This section will conceptually detail the treatment system layout, constructability, and system operation. Figure 7 shows a process schematic of the chemical precipitation and air stripping treatment system.

5.1 Treatment System Layout

Figure 8 shows the proposed layout of the pretreatment system and approximate location of the existing and future recovery well piping. The proposed location of the pretreatment system is on the north side of the WWTP adjacent to the influent structure. The layout also shows the spacing and physical dimensions of the rapid mix tank, flocculation/coagulation tank, clarifier, and air stripper.

5.2 Constructability

Construction and installation will be performed by a qualified contractor. The pretreatment system equipment will be skid mounted and anchored to a concrete slab. All electrical equipment will be NEMA 4 rated (outdoor weatherproof). Recovery well piping tie-in locations will be confirmed in the field and routed underground to the pretreatment system. Appropriate construction methods will be used for any trenching and disturbed areas will be restored to the original conditions. Electricity will be obtained from an on-site pole supplying three phase power. In addition, a potable water supply will be required for the chemical mix tanks.

5.3 System Operation

The pretreatment system operation includes equipment operation, start-up and stabilization, monitoring and performance, and maintenance. Detailed system operation will be presented in the Operation and Maintenance (O&M) Manual developed after construction and installation.

5.3.1 Equipment Operation

Chemical precipitation will take place in the rapid mix tank. Potassium permanganate will be added to oxidize any ferrous iron and provide algae control throughout the pretreatment system. Iron will be precipitated as ferric hydroxide by raising the pH with

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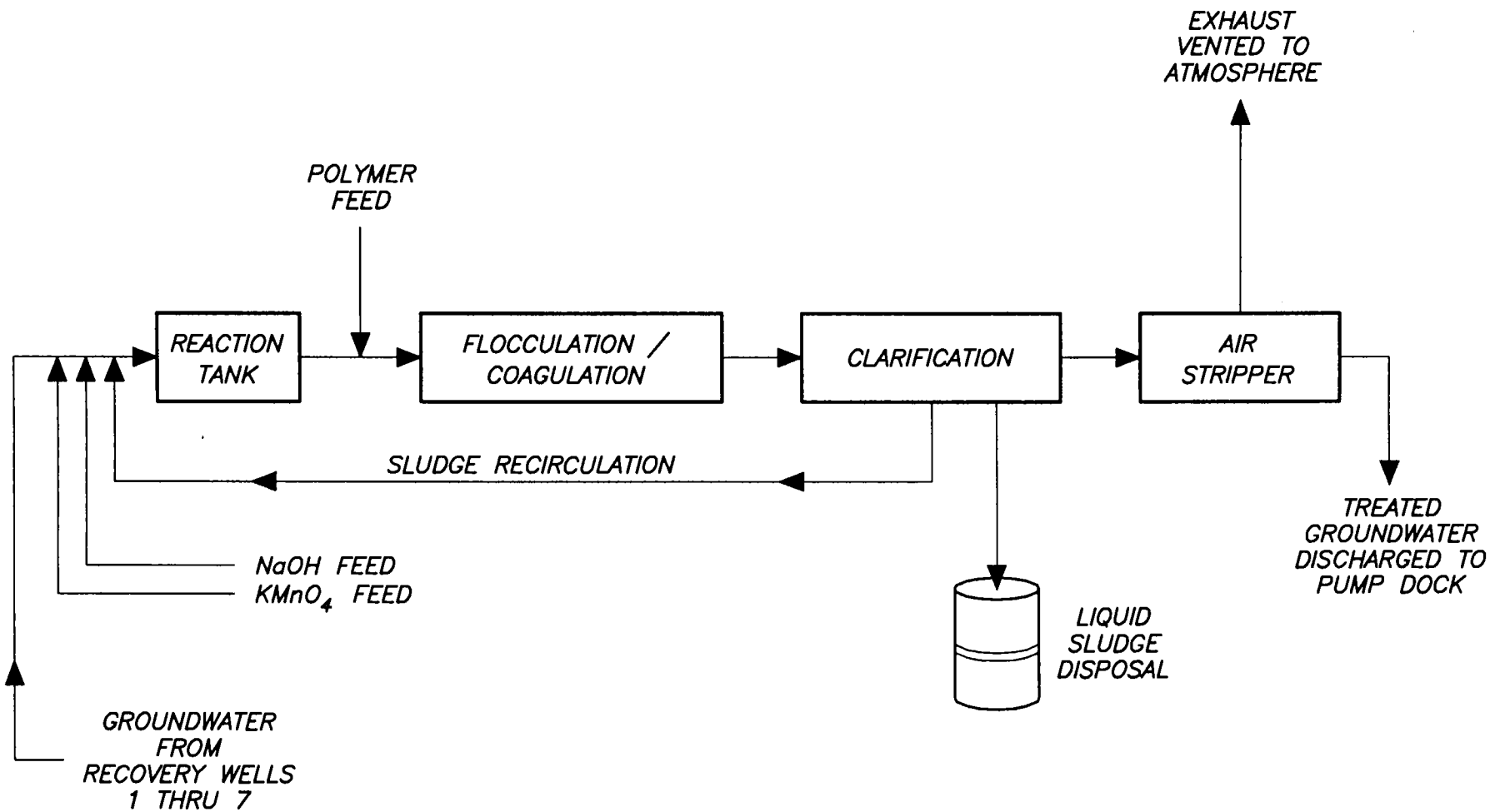

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 7

PROCESS SCHEMATIC

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

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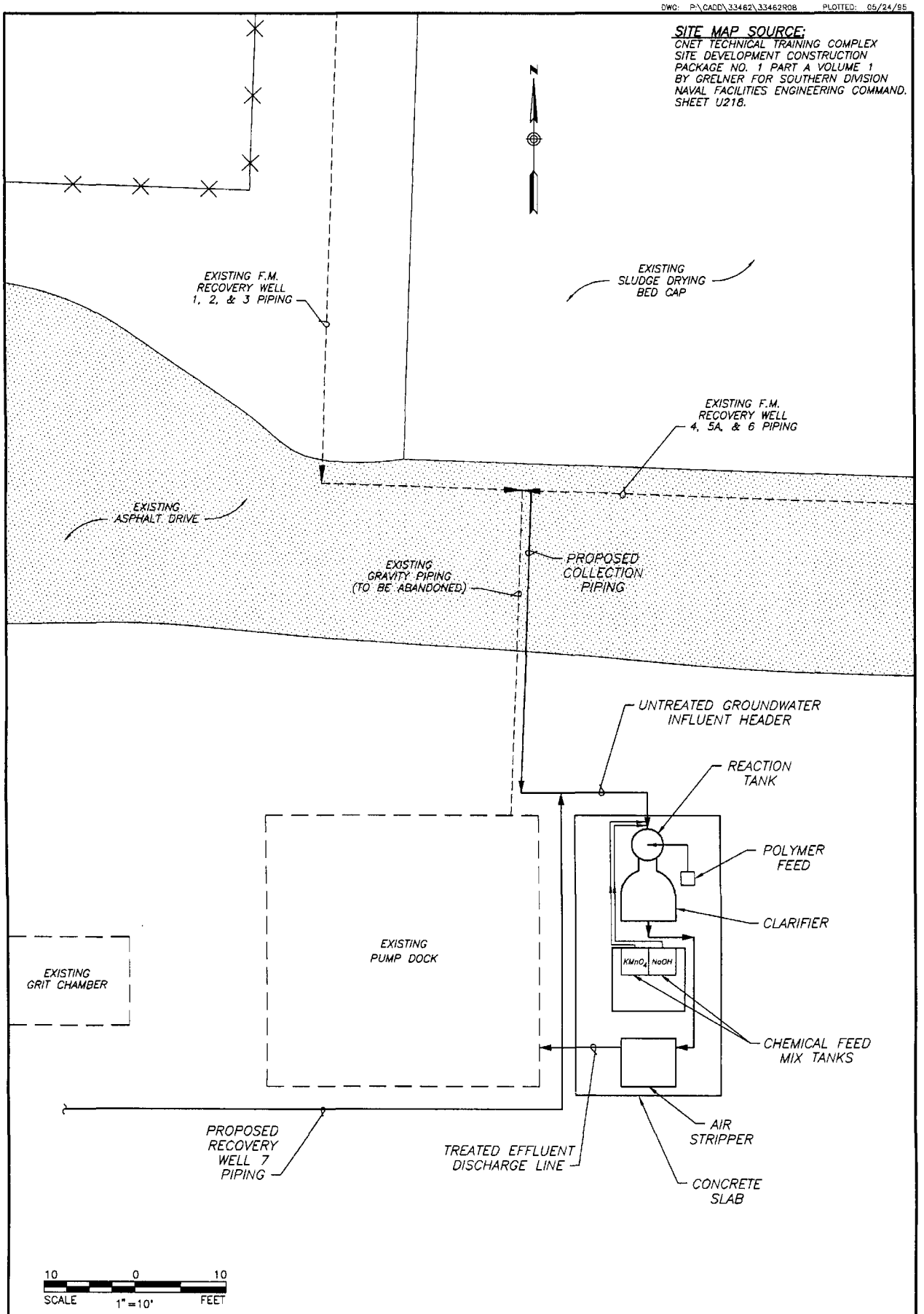


RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 8

PRETREATMENT SYSTEM LAYOUT

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT

NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

sodium hydroxide to approximately 8.0 standard units (s.u.). A 0.5 Hp variable speed mixer will provide mechanical mixing in the rapid mix tank. Water from the rapid mix tank will flow into the flocculation/coagulation tank. Polymer will be added to aid in the formation of settleable particles.

Gravity settleable solids discharged from the flocculation/coagulation tank will be removed in the clarifier. The clarifier will be supplied with a 5 Hp pump to recirculate solids to the rapid mix tank to aid in flocculation/coagulation. The clarifier will also have a capacity to store sludge and be provided with a sludge draw off valve in order to remove the solids.

Overflow from the clarifier will enter the air stripper where ambient air will be supplied to remove volatile and semi-volatile organic compounds. The air stripper performance will result in a minimum of 98.9 % reduction in benzene. A blower will be used to supply air to the trays. The air stripper effluent will flow from the air stripper by gravity to the WWTP influent structure.

The pretreatment system equipment includes electrical and mechanical controls and interlocks to prevent the escape of untreated groundwater. Control systems are integrated so all treatment components and influent pumps can be shut-off during routine maintenance activities.

Chemical feed systems will supply potassium permanganate, sodium hydroxide and polymer to the rapid mix and flocculation tanks. Feed rates are based on quantities used during jar testing. The chemical feed rate for potassium permanganate will be approximately 2 mg/l which equates to 350 lbs per year. The potassium permanganate can be supplied in solution or as a solid and mixed before addition. Based on jar test results, feed rates for sodium hydroxide will be 1 mg/l to raise the pH to 8.0. Approximately 35 gallons of a 50% sodium hydroxide solution will be required. A feed rate of 2 mg/l of polymer will be used for coagulation or approximately 350 lbs per year. The polymer can be supplied as a solution or dry solid. Chemical feed rates will be confirmed and adjusted during start-up to correlate with efforts to reduce manganese and aluminum as well as iron concentrations. All chemicals will be stored in an existing building at the WWTP and in quantities sufficient for three months of operation.

The clarifier will provide storage capacity for sludge. Sludge will be drawn off from the bottom of the clarifier into 55 gallon drums for disposal. Due to the small amount and type of sludge (iron) produced by the treatment system, dewatering of sludge will not be required. It is anticipated that 10,000 lbs or 20, 55 gallon drums of potentially hazardous sludge may be produced per year. Hazard classification for the sludge has not been determined but preliminarily characterized to be hazardous until testing after system start-up proves otherwise.

5.3.2 Start-up and Stabilization

Start-up procedures of the pretreatment system will require a check on all electrical and mechanical control systems. Chemical feed solutions will be prepared and the activation and adjustment of chemical feed rates performed. Due to the use of sludge recirculation, settleable solids will have to build up in the clarifier before system stabilization occurs. After stabilization, optimum chemical feed rates will be established for potassium permanganate, sodium hydroxide and polymer addition. Samples will be collected and analyzed during the system start-up and stabilization to identify optimum operating conditions.

5.3.3 Monitoring and Performance

System performance will be evaluated based on sampling results collected at various locations throughout the pretreatment system. Samples will be collected and analyzed for metals before the rapid mix tank and after the clarifier to determine chemical precipitation efficiency. Volatile and semivolatile organic samples will be collected and analyzed before and after the air stripper to determine the efficiency of the air stripper. The system may be adjusted periodically based on monthly sampling results.

5.3.4 Maintenance

System maintenance will be performed both on a routine and as-needed basis. Routine maintenance procedures include restocking chemicals and chemical feeders, sludge drawoff from the clarifier, lubrication of electrical and mechanical equipment, collection of analytical samples, and documentation of system, pH, pressures, levels and chemical usage. Periodic or emergency maintenance will be required to replace or repair equipment and to restart and stabilize the system. Maintenance procedures will be described in detail in the contractor prepared O&M manual.

6.0 LIFE CYCLE COST ANALYSIS

A life cycle cost analysis is presented for chemical precipitation and air stripping. Life cycle costs include capital, yearly O&M and salvage value costs and are presented in Table 11. Capital costs include equipment and installation and start-up costs and are provided with a 20 percent contingency.

Equipment costs include the rapid mix and coagulation tanks, clarifier, rapid mix and coagulation mixers, potassium permanganate, sodium hydroxide and polymer chemical feeders, air stripping unit and system instrumentation. The subtotal for turn-key supply and installation equipment costs are approximately $212,526.

Installation costs include site work, system and field piping and electrical connections. System piping and electrical costs were estimated by the vendor. The total turn-key supply and installation costs are estimated at $63,758.

A contingency of 20 percent of the equipment and installation costs is provided due to price variations. Total turn-key supply and installation capital costs for the pretreatment system are approximately $331,540.

Yearly O&M costs include chemical supply, sludge disposal, electrical, maintenance and analytical costs.

- Chemical costs include potassium permanganate, sodium hydroxide and polymer and are estimated to be approximately $2,700 per year.

- Hazardous sludge disposal is estimated to be approximately 5 tons lbs per year at $400 per ton.

- Electrical costs include the reaction tank mixer, chemical feeders and mixers, sludge pump, scraper drive motor, air stripper blower and the instrumentation panel at a cost of $0.07 per kilo watt hour (KWH).

TABLE 11
AIR STRIPPING AND CHEMICAL PRECIPITATION
LIFE CYCLE COSTS ANALYSIS
NAS PENSACOLA, PENSACOLA FLORIDA

1. CAPITAL COSTS			Turn-Key Installation	Turn-Key Supply and Installation
Equipment				
Air Stripper:	Cascading Low profile		$14,805	$17,026
Clarifier System:	Rapid mix, flocculation and clarifier		$170,000	$195,500
		Subtotal:	$184,805	$212,526
Installation & Start-up				
30%	of Equipment Costs		$55,442	$63,758
		Subtotal:	$240,247	$276,283
Contingency:	20%		$48,049	$55,257
		Total:	$288,296	$331,540

2. YEARLY O&M COSTS						
Chemical s						
Potassium Permanganate:	2	mg/l @	$2.75	per lb	$964	
Sodium Hydroxide:	1	mg/l @	$1.00	per lb	$175	
Polymer:	2	mg/l @	$4.50	per lb	$1,577	
				Subtotal:	$2,717	
Sludge Disposal:	5	tons/yr @	$400	per ton	$2,000	
Electrical:	67,310	KWH @	$0.07	per KWH	$4,712	
Maintenance:	4	hrs/week @	$25	per hr	$5,200	
Analytical:	24	samples	$1,100	per sample	$26,400	
				Subtotal:	$38,312	
				Total:	$41,029	
Power Requirements						
Blower:	5	Hpx1KW/1.341Hp	8760	Hours =	32,675	KWH
Scraper Drive Motor:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
Reaction Tank Mixer:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
Chemical Feeders:	0.3	Hpx1KW/1.341Hp	8,760	Hours =	1,960	KWH
Chemical Mixers:	1	Hpx1KW/1.341Hp	8,760	Hours =	6,535	KWH
Sludge Pump:	5	Hpx1KW/1.341Hp	4,380	Hours =	16,337	KWH
Instrumentation:	0.5	Hpx1KW/1.341Hp	8,760	Hours =	3,267	KWH
				Total:	67,310	KWH

5. FIRST YEAR TOTALS	Turn-Key Installation	Turn-Key Supply and Installation
	$329,324	$372,569

6. LIFE CYCLE COST ANALYSIS

Turn-Key Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$329,324	$476,089	$576,582	$643,945	$689,099
Salvage Value	$92,403	$46,201	$9,240	$9,240	$9,240
Total	$236,922	$429,887	$567,342	$634,704	$679,859

Turn-Key Supply and Installation

Year	1	6	11	16	21
Annual Percentage Rate 8%	$372,569	$519,333	$619,826	$687,189	$732,343
Salvage Value	$92,403	$46,201	$9,240	$9,240	$9,240
Total	$280,166	$473,132	$610,586	$677,949	$723,103

- System maintenance is estimated at 4 hours per week at $25 per hour or approximately $5,200 per year.

- Analytical costs for 24 samples at $1,100 per sample total $26,400 per year.

- Total O&M costs are approximately $41,000 per year.

7.0 SCHEDULE

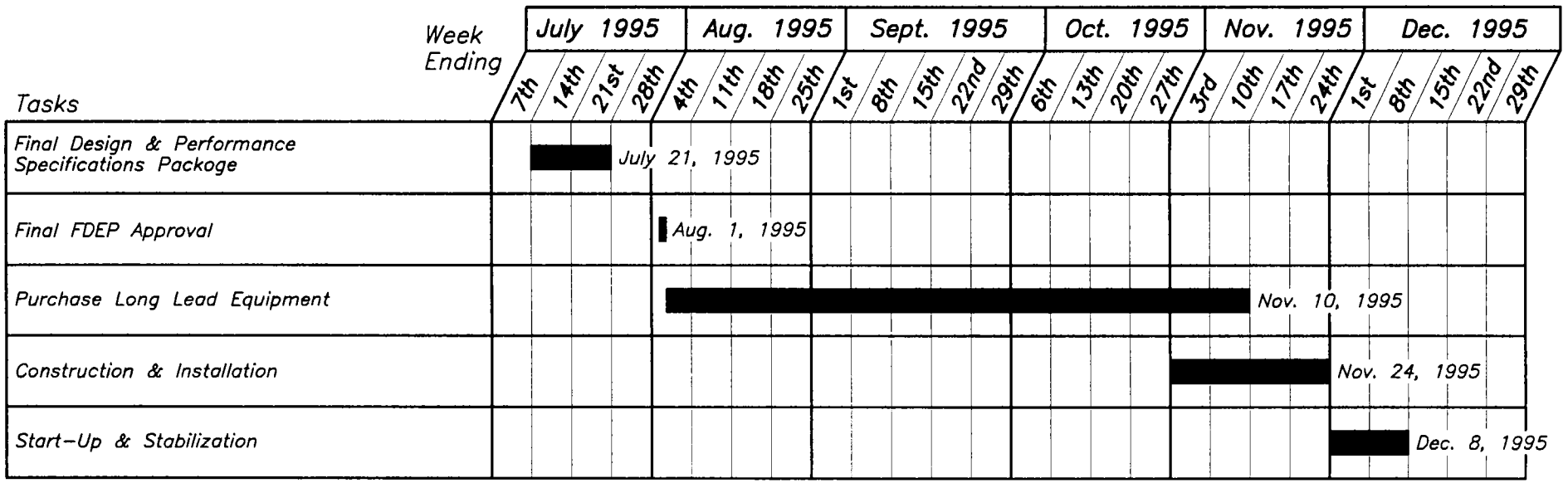
A project schedule is presented in Figure 9. The project schedule includes the following major tasks:

- FDEP approval of performance design package
- Purchase of equipment (long lead items)
- Construction and installation
- Start-up and stabilization

Lead times for purchasing equipment are shown below.

Equipment	Lead Time
Chemical Precipitation System	14 - 16 weeks
Air Stripper	4 weeks

Construction and installation permitting required for the project will be conducted by the installing Contractor.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 9

PROJECT SCHEDULE

FEASIBILITY STUDY & CONCEPTUAL DESIGN REPORT
NAS PENSACOLA, FLORIDA

RUST Project No. 33462.000 JUNE, 1995

APPENDIX A

RCRA PERMIT FOR SLUDGE DRYING BEDS/SURGE POND

Rec'd 9/23

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

September 20, 1991

CERTIFIED MAIL

P 318 725 808

Captain T.W. Bone, CEC, USN
Commanding Officer
Naval Public Works Center, Code 480
U.S. Naval Air Station
Pensacola, Florida 32508-6500

Subject: Navy Public Works Center
FL9 170 024 567
HF17-170951
Escambia County - Hazardous Waste

Dear Captain Bone:

Enclosed is Permit Number HF17-170951 dated September 20, 1991 to conduct post-closure activities at the regulated units at your facility, issued pursuant to Section 403.722, Florida Statutes and Florida Administrative Code 17-730.260. Acceptance of the permit constitutes notice and agreement that the Department may periodically review this permit for compliance, including site inspections where applicable, and may initiate enforcement actions for violation of the conditions and requirements thereof.

Any party to this permit has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice accompanied by the applicable filing fees with the appropriate District Court of Appeals.

The Notice of Appeals must be filed within thirty (30) days from the date this permit is issued.

Sincerely,

John M. Ruddell, Director
Division of Waste Management

JR/SGO
Enclosure

cc w/enclosure:
Robert Kriegel, DER/Pensacola
Eric Nuzie, BWC
Jim Scarbrough, EPA/Region IV
Bill Kellenberger, DER/Pensacola
Kent Williams, EPA/Region IV
Honorable Jerry Maygarden, Mayor of Pensacola
Honorable Dave Pamlock, Chairman of County Commissioners, Escambia County

Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

PERMITTEE:
Naval Public Works Center, Code 480
U.S. Naval Air Station
Pensacola, Florida 32508-6500

Attention:
Commanding Officer, CEC, USN

I.D. Number: FL9 170 024 567
Permit/Certification No.: HF17-170951
Date of Issue: September 20, 1991
Expiration Date: September 20, 1996
County: Escambia
Latitude/Longitude: 30°21'54"N/87°15'52"W
Section/Township/Range: 1/T3S/R30W
Project: Post-Closure of Surge Pond and Sludge Drying Beds.

This permit is issued under the provision of Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-3, 17-4, 17-25, 17-532, 17-550 and 17-730. The above named permitted is hereby authorized to perform the work or operate the facility shown on the application and approved drawings, plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

To post-close the sludge drying beds and surge pond which contained hazardous waste generated from the U.S. Naval Air Station - Pensacola. These units were closed under the provisions of hazardous waste closure permit numbers HF17-134657 and HF17-148989, respectively. As such, these units are no longer in operation.

The application named in this permit consists of the following documents which are considered a part thereof:

1. Semi-annual Report Corrective Action Programs dated August, 1988.

2. Federal Facilities Agreement between United States Environmental Protection Agency, Florida Department of Environmental Regulation for the State of Florida and United States Department of the Navy for the United States Naval Air Station Pensacola, Pensacola, Florida dated October 23, 1990.

3. Revised post-closure permit application for the surge pond and sludge drying beds dated February 28, 1991.

Recycled Paper

PERMITTEE
Naval Public Works Cntr. - Pensacola
Naval Air Station
Pensacola, Florida 32508-6500

I.D. Number: FL9 170 024 567
Permit/Certification No.: HF17-170951
Date of Issue: September 20, 1991
Expiration Date: September 20, 1996

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.727, or 403.859 through 403.861, F.S. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the state. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times access to the premises where the permitted activity is located or conducted to:

   (a) Have access to and copying any records that must be kept under conditions of the permit;

   (b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

   (c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

   (a) A description of and cause of noncompliance; and

   (b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Section 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. A reasonable time for compliance with a new or amended surface water quality standard, other than those standards addressed in Rule 17-3.051, shall include a reasonable time to obtain or be denied a mixing zone for the new or amended standard.

11. This permit is transferable only upon Department approval in accordance with Rules 17-4.120 and 17-730.300 F.A.C., as applicable. The permittee shall be liable for any noncompliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof is required to be kept at the work site of the permitted activity.

13. This permit also constitutes:

    (a) Determination of Best Available Control Technology (BACT)

    (b) Determination of Prevention of Significant Deterioration (PSD)

    (c) Certification of Compliance with State Water Quality Standards (Section 401, PL 92-500)

    (d) Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

    (a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

    (b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by this permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report or application unless otherwise specified by Department rule.

(c) Records of monitoring information shall include:

1. the date, exact place, and time of sampling or measurements;
2. the person responsible for performing the sampling or measurements;
3. the dates analyses were performed;
4. the person responsible for performing the analyses;
5. the analytical techniques or methods used;
6. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

16. The following conditions shall also apply to a hazardous waste facility permit:

(a) The following reports shall be submitted to the Department:

1. Manifest discrepancy report. If a significant discrepancy in a manifest is discovered, the permittee shall attempt to rectify the discrepancy. If not resolved within 15 days after the waste is received, the permittee shall immediately submit a letter report, including a copy of the manifest, to the Department.

2. Unmanifested waste report. The permittee shall submit an unmanifested waste report to the Department within 15 days of receipt of unmanifested waste.

3. Biennial report. An biennial report covering facility activities during the previous calendar year shall be submitted to the Department by March 1, of each even numbered year pursuant to Chapter 17-730, F.A.C.

(b) Notification of any noncompliance which may endanger health or the environment including the release of any hazardous waste that may endanger public drinking water supplies, or the occurrence of a fire or explosion from the facility which could threaten the environment or human health outside the facility, shall be reported verbally to the Department within 24 hours, and a written report shall be provided within 5 days. The verbal report within 24 hours shall contain the name, address, I.D. number and telephone number of the facility, its owner or operator, the name and quantity of materials involved, the extent of any injuries, an assessment of actual or potential hazards, and the estimated quantity and disposition of recovered material. The written submission shall contain:

1. A description of cause of the noncompliance.

2. If not corrected, the expected time of correction and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

(c) Reports of compliance or noncompliance with, or any progress reports on, requirements contained in any compliance schedule shall be submitted no later than 14 days after each schedule date.

(d) All reports or information required by the Department by a hazardous waste permittee shall be signed by a person authorized to sign a permit application.

SPECIFIC CONDITIONS:

PART I - STANDARD REQUIREMENTS:

1. Two submittals in response to these permit conditions shall be submitted to:

   Federal Facilities Coordinator
   Bureau of Waste Cleanup
   Department of Environmental Regulation
   2600 Blair Stone Road
   Tallahassee, Florida 32399-2400

   One submittal in response to these permit conditions shall be submitted to:

   District Manager
   Department of Environmental Regulation
   Northwest District Office
   160 Governmental Center
   Pensacola, Florida 32501-5794

   One submittal in response to these permit conditions shall be submitted to:

   Mr. James H. Scarbrough, P.E., Chief
   Waste Management Division
   U.S. Environmental Protection Agency
   Region IV
   345 Courtland Street
   Atlanta, Georgia 30365

2. All documents submitted pursuant to the conditions of this permit shall be accompanied by a cover letter stating the name and date of the document submitted, the number(s) of the Specific Condition(s) affected, and the

permit number and project name of the permit involved. All submittals modifying the approved Post-closure Plan shall be certified by the owner and operator and signed, sealed and certified by a professional engineer registered in the State of Florida except when exempted in accordance with 17-4.050 and 17-730.220(5), FAC.

3. The Department may modify, revoke, reissue, or terminate for cause this permit. The filing of a request for a permit modification, revocation, reissuance, or termination, or the notification of planned changes or anticipated noncompliance on the part of the permittee does not stay applicability or enforceability of any permit condition. The permittee may submit any subsequent revisions to the Department for approval. Should these revisions constitute a major modification to the permit, the permittee shall meet the requirements of 17-730.290, FAC.

4. Prior to 135 calendar days before the expiration of this permit, the permittee shall submit a complete application for renewal of the permit on forms and in a manner prescribed by the Department, unless post-closure has been completed and certified in accordance with Specific Condition II.6 and accepted by the Department [17-730.300(1), FAC].

5. The Department of Environmental Regulation's 24-hour emergency telephone number is 904/488-1320. During normal business hours, the DER District Office may be contacted at 904/436-8300, and the Bureau of Waste Cleanup may be contacted at 904/488-0190.

6. The permittee shall keep a written operating record at the facility which includes:

   a. A summary report and details of incidents that require implementation of the contingency plan.

   b. The results of inspections.

   c. Post-closure plan.

   d. Monitoring, testing or analytical data where required by 40 CFR Part 264 Subparts F and G.

   These records must be maintained at the facility until completion and certification of post-closure [40 CFR Parts 264.73 and .74].

7. The permittee shall comply with the applicable portions of 40 CFR Parts 260 through 268 and those conditions required by 40 CFR Part 270.30 and 270.31 (17-730.280, FAC).

8. The permittee shall revise "Part I - General" of the Application for a Hazardous Waste Facility Permit (17-730.900(2), FAC) within thirty (30) calendar days of any changes in the Part I. The revised "Part I - General" must be submitted to the Department within thirty (30) calendar days of such changes.

9. If at any time the permittee determines that actions undertaken as part of associated monitoring program no longer satisfy the requirements set forth in this permit, the permitttee shall, within seven (7) calendar days, notify the Department of this finding. If the Department determines that a major modification of the permit is required, the permittee shall, within sixty (60) calendar days, submit an application for a permit modification in accordance with 17-730.290 FAC, to make any appropriate changes to the permit.

PART II - POST-CLOSURE PROGRAM:

1. Upon the effective date of this post-closure permit, the permittee shall:

   a. Continue post-closure care in accordance with 40 CFR Part 264.117(a). The post-closure care period began October 24, 1990 and shall continue for thirty years after that date.

   b. Maintain compliance with security provisions of 40 CFR Part 264.14 throughout the post-closure care period to prevent the unauthorized entry of persons or livestock onto the facility [40 CFR Part 264.117(b)].

   c. Never disturb the final cover or any other components of the associated structures unless previous Department approval has been provided pursuant to 40 CFR Part 264.117(c).

   d. Ensure that all post-closure care activities be in accordance with the revised February 28, 1991 Post-closure Plan required by 40 CFR Part 264.118 [40 CFR Part 264.117(d)].

2. The permittee shall inspect the Waste Management Area and monitoring well system on a quarterly basis and after any substantial rainfall event. The permittee shall maintain an inspection log taken to record findings and remedial action taken in maintaining the final cover, containment

structures, groundwater monitoring equipment, corrective action, control of vegetative growth, surveying benchmarks and security devices. Each item to be inspected shall be addressed and space provided to describe any defects and follow-up action to ensure repair. The inspector's name, and inspection date and time shall be included [40 CFR Part 264.118(b)].

3. The permittee shall keep a copy of the Post-closure Plan and all revisions to the plan at the facility until post-closure care is completed and certified in accordance with 40 CFR Part 264.120 [40 CFR Part 264.118(c)].

4. Any proposed amendments to the Post-closure Plan shall be submitted to the Department for review and approval [40 CFR Part 264.118(d)].

5. The permittee shall comply with the requirements of 40 CFR Part 264.119(b) (Notice in deed to property). The notice shall be submitted to the Department within sixty (60) days of permit issuance.

6. Within sixty (60) days from the completion of the established post-closure care period, the permittee shall submit to the Department by certified mail or hand delivery, a letter signed by the permittee and an independent professional engineer registered in the State of Florida, except when exempted in accordance with 17-4.050 and 17-730.220(5), FAC, stating that the post-closure care for the hazardous waste disposal unit was performed in accordance with the specifications in the approved Post-closure Plan [40 CFR Part 264.120].

7. The permittee shall comply with all applicable portions of 40 CFR Parts 260 through 268 until released from post-closure care requirements.

PART III - GROUNDWATER MONITORING PROGRAM:

1. The Waste Management Area shall be imaginary lines circumscribing the Sludge Drying Beds and Surge Pond designated on Attachment A [40 CFR Part 264.95(b)(1) and (2)]. The Point of Compliance shall be the northern, western, and eastern boundaries of the Waste Management Area [40 CFR Part 264.95(a)].

2. The background water quality monitoring well for the Waste Management Area shall be Well UG-1 (Attachment B).

3. The point-of-compliance (POC) wells for the Sludge Drying Beds and Surge Pond shall be PCS-1, PCI-1, PCD-1, GM-8, GM-9, GM-10, GM-68 and GM-69 (Attachment B). If future groundwater monitoring indicates a change in groundwater flow direction within the surficial aquifer, this permit may be modified to require the installation of additional point-of-compliance monitoring wells.

4. All groundwater sampling shall be conducted in accordance with an approved Quality Assurance Plan (Appendix F-5 of the revised application dated February 28, 1991). If there are any changes in the Groundwater Monitoring Plan at the facility, including changes in personnel or contractor, a revised Quality Assurance Project Plan in accordance with 17-160.220, FAC, must be submitted to the Department for review within thirty (30) days.

5. The permittee shall sample the background well, all point-of-compliance wells and assessment wells GM-62, GM-63, GM-64, GM-65, GM-66, and GM-67 (Attachment B) in January and July of each year throughout the Compliance Period specified in Specific Condition 12 of this Part. Each of these wells must be sampled for the constituents listed in Specific Conditions 7 and 10 of this Part. In addition, wells GM-11, GM-12R, GM-13 and GM-14 must be sampled for complexed cyanide in January and July of each year throughout the Compliance Period.

6. The permittee shall submit to the Department groundwater monitoring reports that provide analytical data and information requested in Specific Conditions 5, 9, 14, 15 and 18 of this Part and Specific Condition V.2. The groundwater monitoring data from each January sampling event shall be submitted no later than the following April 30 and data from each July sampling event shall be submitted no later than the following October 31. If for any reason the permittee is unable to submit analyses within the specified time, the permittee must comply with General Condition 8.

7. The Groundwater Protection Standard (40 CFR Part 264.92) shall be:

Parameters	Concentration Limits
arsenic	0.05 mg/l
barium	1.0 mg/l
cadmium	0.01 mg/l
total chromium	0.05 mg/l
lead	0.05 mg/l
mercury	0.002 mg/l
selenium	0.01 mg/l
silver	0.05 mg/l
nickel	background
vanadium	background
zinc	background
complexed cyanide	background
2-chlorophenol	PQL
2,4-dichlorophenol	PQL
2,4-dimethylphenol	PQL
4,6-dinitro-o-cresol	PQL

2,4-dinitrophenol	PQL
2-nitrophenol	PQL
4-nitrophenol	PQL
p-chloro-m-cresol	PQL
pentachlorophenol	PQL
phenol	PQL
2,4,6-trichlorophenol	PQL
2-methyl phenol	PQL
p-methyl phenol	PQL
methyl ethyl phenol	PQL
dimethyl ethyl phenol	PQL
tetramethyl butyl phenol	PQL
acenaphthene	PQL
acenaphthylene	PQL
anthracene	PQL
benzidine	PQL
benzo(a)anthracene	PQL
benzo(a)pyrene	PQL
3,4-benzofluoranthene	PQL
benzo(ghi)perylene	PQL
bis(2-chloroethoxy)methane	PQL
bis(2-chloroethyl)ether	PQL
bis(2-chloroisopropyl)ether	PQL
bis(2-ethylhexyl)phthalate	PQL
4-bromophenyl phenyl ether	PQL
butylbenzyl phthalate	PQL
2-chloronaphthalene	PQL
4-chlorophenyl phenyl ether	PQL
chrysene	PQL
dibenzo(a,h)anthracene	PQL
1,2-dichlorobenzene	PQL
1,3-dichlorobenzene	PQL
1,4-dichlorobenzene	PQL
3,3-dichlorobenzidine	PQL
1,2-dichloropropane	PQL
1,2-dichloropropylene	PQL
ethylbenzene	PQL
methyl bromide	PQL
methyl chloride	PQL
methyl ethyl ketone	PQL
methylene chloride	PQL
1,1,2,2-tetrachloroethane	PQL
tetrachloroethylene	PQL
toluene	PQL
1,2-trans-dichloroethylene	PQL

1,1,1-trichloroethane	PQL
1,1,2-trichloroethane	PQL
trichloroethylene	PQL
trichlorofluoromethane	PQL
vinyl chloride	PQL
benzyl alcohol	PQL
methyl dihydro indene	PQL
tetramethylbenzene	PQL
"alkylated" benzene	PQL
2-hexanone	PQL
trimethyl benzene	PQL
hydroxymethyl pentanone	PQL
diethylphthalate	PQL
dimethylphthalate	PQL
di-n-butyl phthalate	PQL
2,4-dinitrotoluene	PQL
di-n-octyl-phthalate	PQL
1,2-diphenylhydrazine	PQL
fluoranthene	PQL
hexachlorobenzene	PQL
hexachlorobutadiene	PQL
hexachlorocyclopentadiene	PQL
hexachloroethane	PQL
indeno(1,2,3-cd)pyrene	PQL
isophorone	PQL
methyl napthalene	PQL
2-methyl naphthalene	PQL
naphthalene	PQL
nitrobenzene	PQL
n-nitrosodimethylamine	PQL
n-nitrosodi-n-propylamine	PQL
n-nitrosodiphenylamide	PQL
phenanthrene	PQL
pyrene	PQL
1,2,4-trichlorobenzene	PQL
acrolein	PQL
acrylonitrile	PQL
benzene	PQL
bis(chloromethyl) ether	PQL
bromoform	PQL
carbon tetrachloride	PQL
chlorobenzene	PQL
chlorodibromomethane	PQL
chloroethane	PQL
2-chloroethylvinyl ether	PQL
chloroform	PQL

dichlorobromomethane	PQL
dichlorodifluoromethane	PQL
1,1-dichloroethane	PQL
1,2-dichloroethane	PQL
1,1-dichloroethylene	PQL

PQL = practical quantification limit (see Specific Condition 8 of this Part); mg/l = milligrams per liter; background is defined in Specific Condition 9 of this Part.

8. The Practical Quantification Limit (PQL) shall be the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. PQLs must not routinely exceed maximum contaminant levels of 17-550.310 and .320, FAC.

9. Background concentrations shall be established through sampling at the upgradient background well each time groundwater is sampled at the Point of Compliance. Background concentration for any given constituent for the purpose of this permit (see Specific Condition 7 of this Part) shall be defined as the mean of the four most recent analytical results of that constituent from well UG-1.

10. The following additional constituents shall be sampled on a semiannual basis:

turbidity	specific conductance
sodium	chloride
total coliform	copper
nitrate (as N)	iron
radium 226	fluoride
radium 228	manganese
gross alpha	sulfate
gross beta	pH

11. The permittee may apply for Alternate Concentration Limits (ACLs) for any constituent included with Specific Condition 7 of this Part in accordance with 40 CFR Part 264.94. In accordance with 40 CFR Part 264.94(b), the Department shall establish Alternate Concentration Limits (ACLs) upon approval of the ACL demonstration.

12. The Compliance Period (40 CFR Part 264.96) for the Waste Management Area began August 20, 1984 and shall be 19 years long. If the permittee is engaged in a corrective action program at the end of the Compliance Period, the Compliance Period is extended until the permittee can demonstrate that the Groundwater Protection Standard (40 CFR Part 264.92) specified in Specific Condition 7 of this Part has not been exceeded for a period of three consecutive years (40 CFR Part 264.96(c)).

13. Groundwater elevations for all existing monitoring wells must be measured in January, April, July and October of each year. All groundwater elevations must be measured within the same eight hour period and must be measured prior to well purging whenever samples are to be taken. The January groundwater elevation data must be submitted no later than the following April 30; the April groundwater elevation data must be submitted no later than the following July 31; the July groundwater elevation data must be submitted no later than the following October 31; and the October groundwater elevation data must be submitted no later than January 31 of the following year. In addition, in January and July of each year, the total depth of all wells included in the groundwater monitoring program (Specific Conditions 2, 3 and 5 of this Part) must be determined by physical measurement prior to sampling to determine if siltation is occurring and to calculate the casing volume to be purged. If infilling or siltation is determined, then discovery and other corrective action taken shall be reported to the Department within fifteen (15) days.

14. The permittee shall notify the Department in writing if any damage to the groundwater monitoring wells occurs. Damage subject to this notification will be that requiring repair, not maintenance. Notification describing corrective action taken shall be given after damage has been corrected, or within fifteen (15) days from the date the damage was detected, whichever occurs first. Description of corrective action taken shall be submitted in writing to the Department, in any case, within fifteen (15) days of completion date.

15. The horizontal groundwater flow rates and directions shall be determined for each affected aquifer quarterly. This information shall be submitted to the Department with the reports required by Specific Condition 6. of this Part.

16. The permitttee shall provide the Department with opportunities to observe groundwater sampling and split samples by providing notification at least ten (10) days prior to each groundwater sampling event.

17. Any proposed modifications to the Groundwater Monitoring Plan must be submitted to the Department for review. Upon Department approval, the permit shall be modified in accordance with 17-730.290, FAC.

18. If wells are to be abandoned, they shall be abandoned in accordance with 17-532.500(4), FAC.

PART IV - POST-CLOSURE ASSESSMENT:

1. Additional assessment of contaminated groundwater must continue in conjunction with the CERCLA Remedial Investigation/Feasibility Study.

PART V - POST-CLOSURE CORRECTIVE ACTION:

1. The permittee shall maintain the on-going corrective action plan as described in the "Semi-annual Report Corrective Action Programs", dated August, 1988, and modified in Section II.M.8.d of the application to meet the requirements of 40 CFR Part 264.100 and CERCLA requirements.

2. The permittee shall submit to the Department in April and October of each year a report on the effectiveness of the corrective action program [40 CFR Part 264.100(g)]. At a minimum, the following information must be submitted:

   a. A narrative summary on the effectiveness of the corrective action program (CAP).

   b. Any minor revisions or adjustments to the corrective action system or plan.

   c. Any proposed modifications to the CAP and/or Post-Closure Plan.

   d. Record of when treatment system is on/off.

   e. Total volume of processed groundwater.

   f. Chain-of-custodies and lab reports.

   g. Summary of groundwater data with emphasis (including graphic representation) on the most common contaminants, and those most difficult to treat.

   h. Groundwater elevation contour maps for previous six months. Separate maps must be prepared for the shallow, intermediate and deep wells.

3. The permittee must continue corrective action measures during the Compliance Period to the extent necessary to ensure that the Groundwater Protection Standard is not exceeded. If the permittee is conducting corrective action at the end of the Compliance Period, the permittee shall continue that corrective action until groundwater monitoring data demonstrate that the Groundwater Protection Standard has not been exceeded for a period of three consecutive years [40 CFR Part 264.96(c) and .100(f)].

PERMITTEE
Naval Public Works Cntr. - Pensacola
Naval Air Station
Pensacola, Florida 32508-6500

I.D. Number: FL9 170 024 567
Permit/Certification No.: HF17-170951
Date of Issue: September 20, 1991
Expiration Date: September 20, 1996

4. If corrective action is terminated prior to the termination of the post-closure care period, this permit shall be modified to address at a minimum, semi-annual groundwater monitoring throughout the remainder of the post-closure care period.

5. The corrective action program set forth in 40 CFR Part 264.100 shall extend beyond the facility property boundary [17-730.180(5)(b), FAC].

ISSUED 9/20/91

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

John M. Ruddell

John M. Ruddell, Director
Division of Waste Management

Filing and Acknowledgement
Filed on this date, pursuant
to Section 120.52, Florida
Statutes, with the designated
Clerk, receipt of which is acknowledged

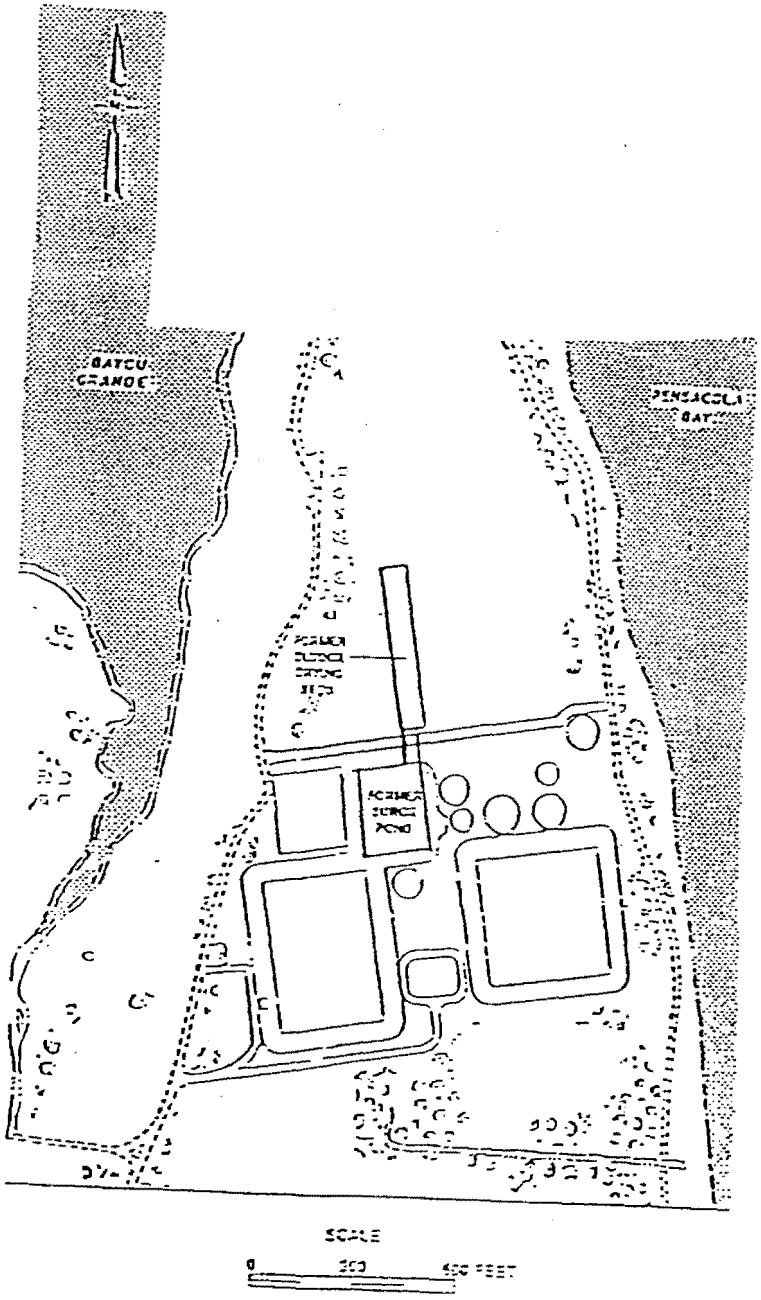
Debra Cutley 9/20/91
CLERK DATE

This is to certify that this Notice of Permit was mailed before the close of business on September 20, 1991.

PERMITTEE
Naval Public Works Cntr. - Pensacola
Naval Air Station
Pensacola, Florida 32508-6500

I.D. Number: FL9 170 024 567
Permit/Certification No.: HF17-170951
Date of Issue: September 20, 1991
Expiration Date: September 20, 1996

ATTACHMENT A
WASTE MANAGEMENT AREA



PERMITTEE
Naval Public Works Cntr. - Pensacola
Naval Air Station
Pensacola, Florida 32508-6500

I.D. Number: FL9 170 024 567
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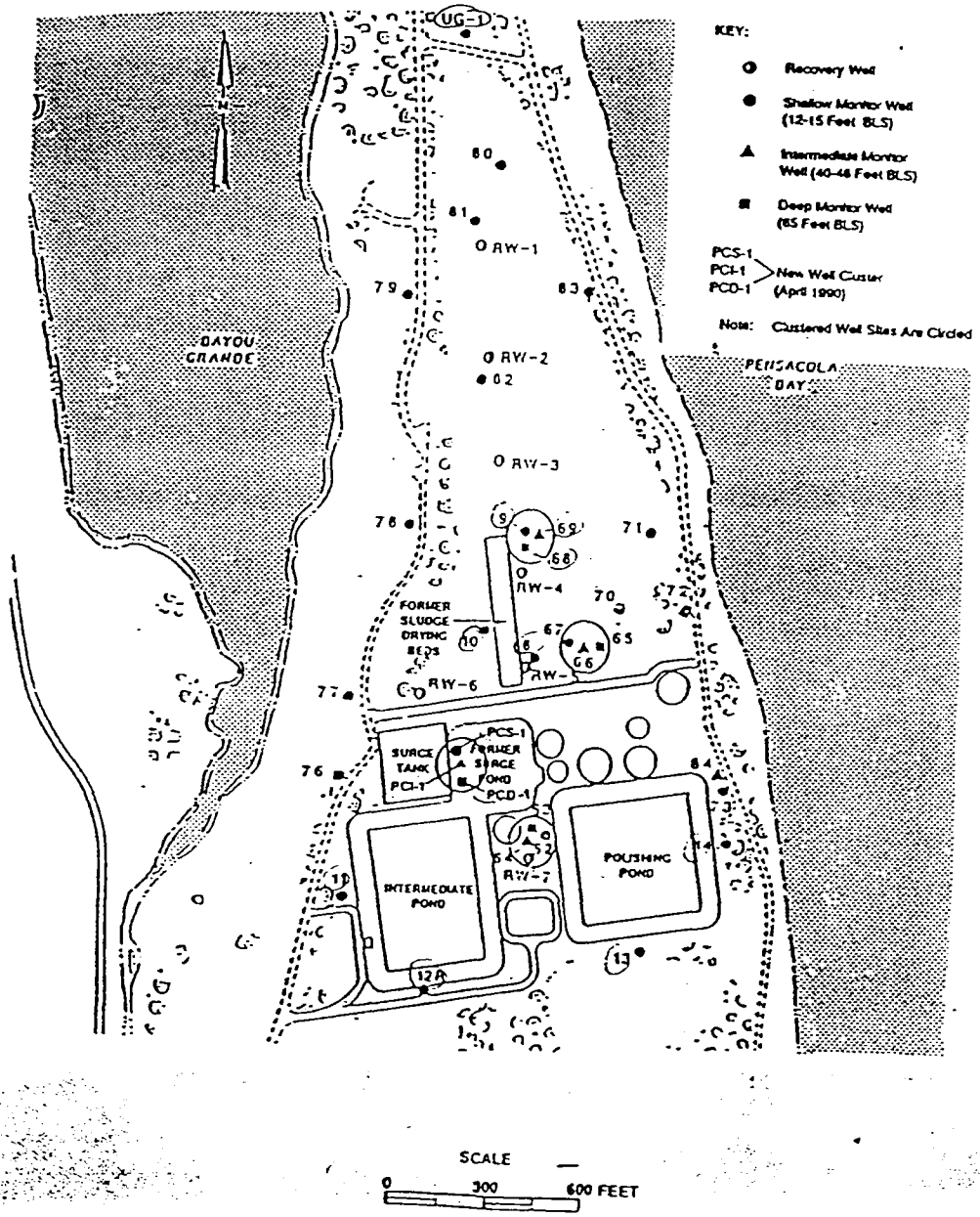
ATTACHMENT B
GROUNDWATER MONITORING WELLS



APPENDIX B

WASTEWATER TREATMENT PLANT DISCHARGE PERMIT NO. FL0002500

PERMIT FILE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

SEP 30 1993

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

REF: 4WM-WPEB

J. S. Spore III
Captain, CEC, USN
Navy Public Works Center
310 John Tower Road
Pensacola, FL 32508-5303

RE: Final Issuance of NPDES Permit No. FL0002500
Navy Public Works Center Pensacola

Dear Captain Spore:

Enclosed is the National Pollutant Discharge Elimination System (NPDES) permit for the above-referenced facility. This action constitutes the Environmental Protection Agency's final permit decision in accordance with Title 40, Code of Federal Regulations (CFR) Section 124.15(a). The permit will become effective as specified, provided that no timely request for an evidentiary hearing is received by the Agency.

Any interested person may contest this decision by submitting a timely request for an evidentiary hearing (hearing) pursuant to the procedures at 40 CFR § 124.74. If a request for a hearing is received by the Agency, following review, a determination will be made and the requester advised of the Agency's decision on the request. Until that time, please be advised that any request will render the permit ineffective pursuant to 40 CFR § 124.15(b). For a new source, a new discharger, a recommencing discharger, or a facility for which an untimely permit renewal application was submitted, a hearing request renders the facility without an NPDES permit and the facility may not discharge (unless relief is granted by the Presiding Officer under 40 CFR § 124.60(a)).

If the evidentiary hearing request is granted, in whole or part, to an existing source, the effect of the contested provision(s), and any other conditions not severable from those conditions, will be stayed and not subject to judicial review pending final Agency action. In this case, all provisions of the prior permit, as well as, all uncontested provisions of the reissued permit shall continue fully enforceable and effective pending final Agency action on the permit appeal. See 40 CFR § 124.60.

To request an evidentiary hearing under 40 CFR § 124.74, you must submit an original and two copies of the request to the Regional Hearing Clerk at the letterhead address within thirty (30) days from service of this notice. A copy of the procedures and requirements for evidentiary hearing requests and appeals to the Administrator is enclosed.

For purposes of judicial review under the Clean Water Act, 33 U.S.C. § 1251 et seq., final Agency action on a permit does not occur unless and until a party has exhausted its administrative remedies as required by 40 CFR Part 124.

Further information on procedures pertaining to the filing of an evidentiary hearing request or other legal matters may be obtained by contacting Ms. Gwen Eason, Assistant Regional Counsel, at (404) 347-2309, extension 2906.

Sincerely,

For James H Scarbrough

Robert F. McGhee
Acting Director
Water Management Division

Enclosures (3)
1. Evidentiary Hearing Procedures
2. Final NPDES Permit
3. Amendment to Fact Sheet

cc: Florida DEP (with all enclosures, except Evid. Hearing Procedures)

U.S. Fish & Wildlife Service, Vero Beach Field Office (with all enclosures, except Evid. Hearing Procedures)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365

September 29, 1994

AMENDMENT TO THE FACT SHEET AT THE TIME OF FINAL PERMIT ISSUANCE

APPLICATION NUMBER: FL0002500

NAME OF APPLICANT: NAVY PUBLIC WORKS CENTER PENSACOLA
PENSACOLA, FLORIDA

1. Changes to the Final Permit from the Draft Permit:

   The limitation on Cadmium for Outfall 001 has been changed to 9.3 micrograms per liter (0.0093 milligrams per liter) and a limit for Mercury at 0.1 micrograms per liter at Outfall 001 has been added to the permit as requested by the State of Florida DEP in its certification letter.

2. Public Comment:

   No comments were received from the public regarding this permit.

3. State Certification:

   State Certification was requested on July 29, 1994. State certification was received with conditions on
   The conditions enclosed in the state certification letter have been incorporated as conditions of the permit.

PERMIT NUMBER **FL0002500**
MAJOR non-POTW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IV

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et seq, the "Act"):

United States Department of the Navy
Public Works Center Pensacola

is authorized to discharge from a facility located at

Naval Air Station Pensacola
Escambia County, Florida 32508

to receiving waters named

Pensacola Bay

in accordance with the effluent limitations, monitoring requirements, and other conditions set forth herein. The permit consists of this cover sheet, Part I 9 pages, Part II 16 pages, Part III 1 page, and Part IV 1 pages.

This permit shall become effective on January 1, 1995.

This permit and the authorization to discharge shall expire at midnight, December 31, 1999.

SEP [illegible]
Date Issued

For James H Scarbrough
Robert F. McGhee,
Acting Director,
Water Management Division

Part I

A. Final Effluent Monitoring Point Requirements

A.1. During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge treated sanitary and industrial wastewater from outfall 001. Limits are effective on the final effluent (see item e.) unless noted otherwise. Such discharges shall be limited as specified below:

a. PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Frequency	Sample Type
Temperature, Celsius	--	--	--	Report	Continuous	Recorder
Dissolved Oxygen, mg/L	--	--	--	5.0 minimum	Daily	Grab
5-Day Carbonaceous Biochemical Oxygen Demand, mg/L	20.0	20.0	30.0	--	2/Week	24 Hour composite
Total Suspended Solids, mg/L	20.0	20.0	25.0	--	2/week	24 Hour composite
Oil and Grease, mg/L	--	--	--	5.0	2/week	Grab
Total Kjeldahl Nitrogen, mg/l	--	--	--	3.0	2/week	24 Hour composite
Total Phosphorus, mg/L	--	--	--	3.0	2/week	24 Hour composite
Total Cyanide, mg/L	--	--	--	0.005	2/week	Grab
Cadmium, Total Recoverable mg/L (see item f.)	--	--	--	0.0093	2/week	24 Hour composite

A.1.a Continued:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Frequency	Sample Type
Chromium, Total Recoverable mg/L (f.)	--	--	--	0.050	2/week	24 Hour composite
Copper, Total Recoverable, mg/L	--	--	--	0.015	2/week	24 Hour composite
Iron, Total Recoverable, mg/L	--	--	--	0.300	2/week	24 Hour composite
Lead, Total Recoverable, mg/L (f.)	--	--	--	0.0056	2/week	24 Hour composite
Nickel, Total Recoverable, mg/L (f.)	--	--	--	0.0083	2/week	24 Hour composite
Silver, Total Recoverable, micrograms/L	--	--	--	0.050	2/week	24 Hour composite
Zinc, Total Recoverable, mg/L (f.)	--	--	--	0.086	2/week	24 Hour composite
Surfactants (MBAS), mg/L	--	--	--	0.5	2/week	24 Hour composite
Flow, MGD	--	--	Report	--	Continuous	Recorder
Total Residual Chlorine, mg/L (d.)	--	--	--	0.01	Daily	Grab
Phenol, mg/L	--	--	--	0.580	1/week	Grab

A.1.a Continued:

PARAMETER	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
	Annual Average	Monthly Average	Weekly Average	Daily Maximum	Frequency	Sample Type
3-Methyl-4-Chlorophenol (P-Chloro-m-cresol), micrograms/L	--	--	--	0.1	1/week	Grab
2-Chlorophenol, micrograms/L	--	--	--	400	1/week	Grab
2,4-Dichlorophenol, micrograms/L	--	--	--	790	1/week	Grab
2,4,6-Trichlorophenol, micrograms/L	--	--	--	6.5	1/week	Grab
Pentachlorophenol, micrograms/L	--	--	--	7.9	1/week	Grab
Fecal Coliform, #/100 mL (b.)	200	200	--	800	1/week	Grab
pH (see item c.)					Continuous	Recorder
Mercury, Total Recoverable, micrograms/L	--	--	--	0.1	2/week	24 Hour composite

b. Fecal Coliform shall be limited and monitored as follows:
   (1) The geometric mean of the fecal coliform values collected during a month shall not exceed 200 per 100 mL.
   (2) Any one sample shall not exceed 800 per 100 mL.
   (3) One grab sample shall be taken per week from the effluent location specified in stipulation e. below.
   (4) The arithmetic mean of the monthly values collected during an annual period shall not exceed 200 per 100 mL of effluent.

c. The pH shall be monitored continuously using a recorder. The pH values shall not deviate outside the range of 6.5 to 8.5 more than 1% of the time in any calendar month, and no individual excursion shall exceed 60 minutes. An "excursion" is an unintentional and temporary incident in which the pH value of discharged wastewater exceeds the range set forth here. Report the minimum and maximum measured pH values for each month.

d. Testing for total residual chlorine in the final effluent shall be conducted according to either the low-level amperometric titration method or the DPD colorimetric method as specified in Section 4500-Chlorine E. or 4500-Chlorine G., respectively, Standard Methods for the Examination of Water and Wastewater, 18th Edition, or most current edition.

e. Samples taken in compliance with the monitoring requirements specified in this part (Part I.A.1) shall be taken after final treatment at the nearest accessible point prior to the actual discharge/mixing with the receiving waters.

f. Monitoring of these parameters is required when they are subject to being discharged, including but not limited to any month when the industrial wastewater treatment facility is used or when electroplating or metal finishing process wastewater is discharged to the sanitary collection system.

g. The effluent shall not cause a visible sheen on the receiving waters. There shall be no discharge of floating solids or visible foam in other than trace amounts.

h. Any bypass of the treatment facility, which is not included in the effluent monitored above, is to be monitored for flow and all other parameters (except whole effluent acute toxicity testing). For parameters other than flow, at least one grab sample per day shall be monitored. Daily flow shall be monitored or estimated, as appropriate, to obtain reportable data. All monitoring results shall be reported on a Discharge Monitoring Report ("DMR") Form (3320-1). Bypasses are strictly limited to the conditions contained in Section II of this permit.

i. If the results for a given sample analysis are such that any parameter (other than fecal coliform) is not detected at or above the minimum level for the test method used, a value of zero will be used for that sample in calculating an arithmetic mean value for the parameter. If the resulting calculated arithmetic mean value for that reporting value is zero, the permittee shall report "NODI=B" on the Discharge Monitoring Report (DMR) Form (EPA Form No. 3320-1). For fecal coliform, a value of 1.0 shall be used in calculating the geometric mean. If the resulting fecal coliform mean value is 1.0, the permittee shall report "NODI=B" on the DMR. For each quantitative sample value that is not

detectable, the test method used and the minimum level for that method for that parameter shall be attached to and submitted with the DMR. The permittee shall then be considered in compliance with the appropriate effluent limitation and/or reporting requirement.

j. No hazardous wastes may be discharged to the collection system, subject to the exclusions listed in Section 108 of the Federal Facility Compliance Act of 1992.

k. Toxicity Testing Requirements: An LC_{50} of 100% or less in a test of 96 hours duration or less will constitute a violation of FAC (February 2, 1994) Section 17-4.244(3)(a) and the terms of this permit. The testing for this requirement must conform with Part IV of this permit.

l. Overflow identification: The permittee shall identify all wastewater discharges, at locations not authorized as permitted outfalls, that occur prior to the headworks of the wastewater treatment plant covered by this permit. The permittee shall submit, with the scheduled Discharge Monitoring Report (DMR) Form, the following information for each discharge event at each source that occurs during the reporting period covered by the DMR:

(1) the cause of the discharge;
(2) duration and volume (estimate if unknown);
(3) description of the source, e.g., manhole cover, pump station;
(4) type of collection system that overflowed, i.e., combined or separate;
(5) location by street address, or any other appropriate method;
(6) date of event;
(7) the ultimate destination of the flow, e.g., surface water body, land use location, via municipal separate storm sewer system to a surface water body, (show location on a USGS map or copy thereof); and
(8) corrective actions or plans to eliminate future discharges.

The permittee shall refer to Part II.D.8 of this permit which contains information about reporting unpermitted discharge events. Submittal or reporting of any of this information does not provide relief from any subsequent enforcement actions for unpermitted discharges to waters of the United States.

A.2. Thermal discharges:
During the period beginning on the effective date and lasting through the expiration date of this permit, the permittee is authorized to discharge cooling water from outfalls 008 and 009. Limits are effective on the final effluent (see item d.) unless noted otherwise. Such discharges shall be limited as specified below:

a. PARAMETER	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Average	Daily Maximum	Frequency	Sample Type
Temperature, C	--	Report only	Daily (e.)	Grab

b. Report total pump hours and estimate volume discharged on a monthly basis for each discharge.

c. Report temperature at steady state operation.

d. Samples taken in compliance with the monitoring requirements specified in this part (Part I.A.2) shall be taken at the nearest accessible point prior to the actual mixing with the receiving waters.

e. Samples required only on days when discharge occurs.

f. The effluent shall not cause a visible sheen on the receiving waters. There shall be no discharge of floating solids or visible foam in other than trace amounts.

B. SLUDGE MANAGEMENT PRACTICES

1. The permittee shall sample and analyze the sludge and report to EPA the quantitative data for the 125 priority pollutants listed in 40 CFR Part 122, Appendix D, Tables II and III. Qualitative data for 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD) shall also be submitted if the permittee knows or has reason to believe that TCDD is or may be present in the sludge. The permittee shall submit this data within 1 year of the effective date of this permit.

2. Annually, the permittee shall sample and analyze the sludge and report to EPA the quantitative data for arsenic, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc. The permittee shall submit this data within 1 year of the effective date of this permit, and report annually thereafter.

3. The permittee shall submit within 30 days of the effective date of this permit the sludge production volume (specify if daily or annual; if actual volume is not known, estimate the quantity of sludge being handled and so indicate) and the sludge disposal practice.

4. The permittee shall provide sludge inventory data to the State and EPA, as part of EPA's inventory updates as requested. The data should include, but not be limited to, sludge quantity and characteristics.

5. Reopener. If an applicable "acceptable management practice" or numerical limitation for pollutants in sewage sludge promulgated under Section 405(d)(2) of the Clean Water Act, as amended by the Water Quality Act of 1987, is more stringent than the sludge pollutant limit or acceptable management practice in this permit or controls a pollutant not limited in this permit, this permit shall be promptly modified or revoked and reissued to conform to the requirements promulgated under Section 405(d)(2). The permittee shall comply with the limitations by no later than the compliance deadline specified in the applicable regulations as required by Section 405(d)(2)(D) of the Clean Water Act.

6. Notice of change in sludge disposal practice. The permittee shall give prior notice to the Regional Administrator of any change planned in the permittee's sludge disposal practice.

7. Cause for modification. 40 CFR §122.62(a)(1) provides that the following is a cause for modification but not revocation and reissuance of permits except when the permittee requests or agrees. (a) Alterations. There are material and substantial changes or additions to the permitted facility or activity which occurred after permit issuance which justify the application of permit conditions that are different or absent in the existing permit.

8. Upon review of information provided by the permittee as required by the above items, or results from an on-site inspection, the permit shall be subject to modification to incorporate appropriate requirements.

9. The permittee shall perform a Toxicity Characteristic Leaching Procedure test (TCLP) in accordance with 40 CFR Part 261, as published on March 29, 1990, Volume 55, Number 61 Federal Register 11798. This test shall be performed annually with test results reported on the anniversaries of the effective date of this permit. Test results from any additional tests that are performed shall also be reported. In addition, the test shall be performed if the permittee knows or has reason to believe that its sewage sludge may fail the TCLP test as a result of changes in its sewage sludge characteristics from prior tests. The permittee shall submit a separate report attached to the Discharge Monitoring Report (DMR) which shows the date of the test and the test results. Should a sewage sludge fail the TCLP test, the permittee shall immediately halt all sludge use or disposal activities. In addition, the permittee shall submit written notification to EPA within ten (10) calendar days of test failure.

10. Should the permittee's sewage sludge be disposed of in a solid-waste landfill, the permittee shall demonstrate the absence of free liquids in its sewage sludge through the utilization of Test Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Publication No. SW-846). These tests shall be conducted on representative samples of all sewage sludge prior to each disposal at solid-waste landfills. A successful demonstration shall be performed before the permittee's sewage sludge is allowed to be disposed of at a solid-waste landfill. The permittee shall: 1) report on the DMR only the number of tests that failed during the quarter and 2) in any quarter where one or more tests failed, submit a separate report attached to the DMR which shows the date of each failed and subsequent passing test along with their respective results. Prior notice shall be given to the EPA of any changes in disposal practice resulting from test failures.

11. The permittee shall ensure that the sludge generated by its facility will be disposed of in accordance with the requirements of 40 CFR § 503.

C. SCHEDULE OF COMPLIANCE

1. The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

   Discharges 001, 008 and 009:
   Operational level attained. . . Effective Date of Permit

2. No later than 14 days following a date identified in the above schedule of compliance, the permittee shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or non-compliance. In the latter case, the notice shall include the cause of non-compliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

PART II
STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. Penalties for Violations of Permit Conditions

Any person who violates any permit condition is subject to a civil penalty not to exceed $25,000 per day for each violation. Any person who negligently violates any permit condition is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment for not more than 1 year, or both. Any person who knowingly violates any permit condition is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. Also, any person who violates any permit condition may be assessed an administrative penalty not to exceed $10,000 per violation or $10,000 per day for each day during which the violation continues, with the maximum amount not to exceed $125,000. [Ref: 40 CFR 122.41(a)]

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Permit Modification, Revocation or Termination

After notice and opportunity for a hearing, this permit may be modified, terminated, or revoked for cause including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts;

c. A change in any condition that requires either temporary interruption or elimination of the permitted discharge or sludge use or disposal practice controlled by the permit; or

d. Information newly acquired by the Agency indicating that the permitted activity poses a threat to human health or the environment.

If the permittee believes that any past or planned activity would be cause for modification or revocation and reissuance under 40 CFR 122.62, the permittee must report such information to the Permit Issuing Authority. Submission of a new application may be required of the permittee. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

5. Toxic Pollutants

Notwithstanding Paragraph A-4, above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and such standard or prohibition is more stringent than any limitation of such pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the permittee so notified.

6. Civil and Criminal Liability

Except as provided in permit conditions on "Bypassing" Section B, Paragraph B-3, and "Upset" Section B, Paragraph B-4, nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

7. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

8. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

10. Onshore or Offshore Construction

This permit does not authorize or approve the construction of any onshore or offshore physical structures or facilities or the undertaking of any work in any waters of the United States.

11. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

12. Duty to Provide Information

The permittee shall furnish to the Permit Issuing Authority, within a reasonable time, any information which the Permit Issuing Authority may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Permit Issuing Authority upon request, copies of records required to be kept by this permit.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Bypass

a. Definitions

(1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility, which is not a designed or established operating mode for the facility; or the intentional diversion of waste streams from any portion of the wastewater collection system which is tributary to the permitted facility, including transmission lines or pump stations (and related appurtenances).

(2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if the discharge is through the permitted outfall, and it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Paragraphs c. and d. of this Section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass; including an evaluation of the anticipated quality and effect of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section D, Paragraph D-8 (24-hour notice).

d. Prohibition of bypass

(1) Bypass is prohibited and the Permit Issuing Authority may take enforcement action against a permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(c) The permittee submitted notices as required under Paragraph c. of this section.

(2) The Permit Issuing Authority may approve an anticipated bypass, after considering its adverse effects, if the Permit Issuing Authority determines that it will meet the three conditions listed above in Paragraph d.(1) of this section.

4. Upset

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventive maintenance, or careless or improper operation. An upset constitutes an affirmative defense to an action brought for non-compliance with such technology based permit limitation if the requirements of 40 CFR 122.41(n)(3) are met.

5. Removed Substances

This permit does not authorize discharge of solids, sludge, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters of the United States unless specifically limited in Part I.

SECTION C. MONITORING AND RECORDS

1. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge. All samples shall be taken at the monitoring points specified in this permit and, unless otherwise specified, before the effluent joins or is diluted by any other wastestream, body of water, or substance. Monitoring points shall not be changed without notification to and the approval of the Permit Issuing Authority.

2. Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from the true discharge rates throughout the range of expected discharge volumes. Once-through condenser cooling water flow which is monitored by pump logs, or pump hour meters as specified in Part I of this permit and based on the manufacturer's pump curves shall not be subject to this requirement. Guidance in selection, installation, calibration, and operation of acceptable flow measurement devices can be obtained from the following references. These references are available in either paper copy or microfiche from National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. (703) 487-4650.

"A Guide to Methods and Standards for the Measurement of Water Flow", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 100 pp. (Order by NTIS No. COM-7510683.)

"Water Measurement Manual", U.S. Department of Interior, Bureau of Reclamation, Revised Edition, 1984, 343 pp. (Order by NTIS No. PB-85221109.)

"Flow Measurement in Open Channels and Closed Conduits", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Order by NTIS No. PB-273535.)

"NPDES Compliance Flow Measurement Manual", U.S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-77, September 1981, 149 pp. (Order by NTIS No. PB-82131178.)

3. Monitoring Procedures

Monitoring shall be conducted according to test procedures approved under 40 CFR Part 136 or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in this permit.

4. Penalties for Tampering

The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both.

5. Retention of Records

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by the Permit Issuing Authority at any time. Records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503).

6. Record Contents

Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

7. Inspection and Entry

The permittee shall allow the Permit Issuing Authority, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to;

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable time any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

SECTION D. REPORTING REQUIREMENTS

1. Change in Discharge

The permittee shall give notice to the Permit Issuing Authority as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

a. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source; or

b. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under Section D, Paragraph D-10;

c. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify applying new or revised permit conditions, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

2. Anticipated Noncompliance

The permittee shall give advance notice to the Permit Issuing Authority of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements. Any maintenance of facilities, which might necessitate unavoidable interruption of operation and degradation of effluent quality, shall be scheduled during noncritical water quality periods and carried out in a manner approved by the Permit Issuing Authority.

3. Transfer of Ownership or Control

A permit may be automatically transferred to another if:

a. The permittee notifies the Permit Issuing Authority of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

c. The Permit Issuing Authority does not notify the existing permittee of his or her intent to modify or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in Paragraph b.

4. Monitoring Reports

See Part III of this permit. Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Permit Issuing Authority for reporting results of sludge use or disposal practices.

5. Additional Monitoring by the Permittee

If the permittee monitors any pollutant more frequently than required by this permit using test procedures approved under 40 CFR 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report (DMR) or sludge reporting form specified by the Permit Issuing Authority. Such increased frequency shall also be indicated.

6. Averaging of Measurements

Calculations for limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Permit Issuing Authority in the permit.

7. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

8. Twenty-Four Hour Reporting

The permittee shall orally report any noncompliance which may endanger health or the environment, within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written

submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including the exact dates and times; and if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Permit Issuing Authority may verbally waive the written report, on a case-by-case basis, when the oral report is made.

The following violations shall be included in the 24-hour report when they might endanger health or the environment:

a. Any unanticipated bypass which exceeds any effluent limitation in the permit.

b. Any upset which exceeds any effluent limitation in the permit.

9. Other Noncompliance

The permittee shall report in narrative form, all instances of noncompliance not previously reported under Section D, Paragraphs D-2, D-4, D-7, and D-8 at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D-8.

10. Changes in Discharges of Toxic Substances

The permittee shall notify the Permit Issuing Authority as soon as s/he knows or has reason to believe:

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant (listed at 40 CFR 122, Appendix D, Tables II and III) which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

(1) One hundred micrograms per liter (100 ug/l);

(2) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony; or

(3) Five (5) times the maximum concentration value reported for that pollutant in the application.

b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant (listed at 40 CFR 122, Appendix D, Tables II and III) which is not limited in

the permit, if that discharge will exceed the highest of the following "notification levels":

(1) Five hundred micrograms per liter (500 ug/l);

(2) One milligram per liter (1 mg/l) for antimony; or

(3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application.

11. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit. The Permit Issuing Authority may grant permission to submit an application less than 180 days in advance but not later than the permit expiration date.

Where EPA is the Permit Issuing Authority, the terms and conditions of this permit are automatically continued in accordance with 40 CFR 122.6, only when the permittee has submitted a timely and complete application for a renewal permit and the Permit Issuing Authority is unable through no fault of the permittee to issue a new permit before the expiration date.

12. Signatory Requirements

All applications, reports, or information submitted to the Permit Issuing Authority shall be signed and certified.

a. All permit applications shall be signed as follows:

(1) For a corporation: by a responsible corporate officer. For the purpose of this Section, a responsible corporate officer means: (i) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or (ii) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

(3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

b. All reports required by the permit and other information requested by the Permit Issuing Authority shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

(1) The authorization is made in writing by a person described above;

(2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and

(3) The written authorization is submitted to the Permit Issuing Authority.

c. Certification. Any person signing a document under Paragraphs a. or b. of this Section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

13. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of

the Permit Issuing Authority. As required by the Act, permit applications, permits and effluent data shall not be considered confidential.

14. Penalties for Falsification of Reports

The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or both.

SECTION E. DEFINITIONS

1. Permit Issuing Authority

The Regional Administrator of EPA Region IV or his/her designee, unless at some time in the future the State receives authority to administer the NPDES program and assumes jurisdiction over the permit; at which time, the Director of the State program receiving the authorization becomes the issuing authority.

2. Act

"Act" means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) Public Law 92-500, as amended by Public Law 95-217 and Public Law 95-576, 33 U.S.C. 1251 et seq.

3. Mass/Day Measurements

a. The **"average monthly discharge"** is defined as the total mass of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month. It is therefore, an arithmetic mean determined by adding the weights of the pollutant found each day of the month and then dividing this sum by the number of days the tests were reported. This limitation is identified as **"Daily Average"** or **"Monthly Average"** in Part I of the permit and the average monthly discharge value is reported in the "Average" column under "Quantity or Loading" on the Discharge Monitoring Report (DMR).

b. The **"average weekly discharge"** is defined as the total mass of all daily discharges sampled and/or measured during the calendar week on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such week.

It is, therefore, an arithmetic mean determined by adding the weights of pollutants found each day of the week and then dividing this sum by the number of days the tests were reported. This limitation is identified as **"Weekly Average"** in Part I of the permit and the average weekly discharge value is reported in the "Maximum" column under "Quantity or Loading" on the DMR.

c. The **"maximum daily discharge"** is the total mass (weight) of a pollutant discharged during a calendar day. If only one sample is taken during any calendar day the weight of pollutant calculated from it is the "maximum daily discharge". This limitation is identified as **"Daily Maximum"**, in Part I of the permit and the highest such value recorded during the reporting period is reported in the "Maximum" column under "Quantity or Loading" on the DMR.

d. The **"average annual discharge"** is a rolling average equal to the arithmetic mean of the mass measured in all discharges sampled and/or measured during consecutive reporting periods which comprise one year. For parameters that are measured at least once per month, the annual average shall be computed at the end of each month and is equal to the arithmetic mean of the monthly average of the month being reported and each of the previous eleven months. This limitation is defined as **"Annual Average"** in Part I of the permit and the average annual discharge value is reported in the "Average" column under "Quantity or Loading" on the DMR.

4. <u>Concentration Measurements</u>

a. The **"average monthly concentration"**, other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar month on which daily discharges are sampled and measured, divided by the number of daily discharges sampled and/or measured during such month (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. This limitation is identified as **"Monthly Average"** or **"Daily Average"** under "Other Limits" in Part I of the permit and the average monthly concentration value is reported under the "Average" column under "Quality or Concentration" on the DMR.

b. The **"average weekly concentration"**, other than for fecal coliform bacteria, is the sum of the concentrations of all daily discharges sampled and/or measured during a calendar week on which daily discharges are sampled and measured divided by the number of daily discharges sampled and/or measured during such week (arithmetic mean of the daily concentration values). The daily concentration value is equal to the concentration of a composite sample or in the the case of grab samples is the arithmetic mean (weighted by flow value) of all the samples collected during that calendar day. This limitation is identified as **"Weekly Average"** under "Other Limits" in Part I of the permit and the average weekly concentration value is reported under the "Maximum" column under "Quality or Concentration" on the DMR.

c. The **"maximum daily concentration"** is the concentration of a pollutant discharged during a calendar day. It is identified as **"Daily Maximum"** under "Other Units" in Part I of the permit and the highest such value recorded during the reporting period is reported in the "Maximum" column under "Quality or Concentration" on the DMR.

d. The **"average annual concentration"**, other than for fecal coliform bacteria, is a rolling average equal to the arithmetic mean of the effluent or influent samples collected during consecutive reporting periods which comprise one year. For parameters that are measured at least once per month, the annual average shall be computed at the end of each month and is equal to the arithmetic mean of the monthly average of the month being reported and the monthly average of each of the previous eleven months. This limitation is identified as **"Annual Average"** under "Other Limits" in Part I of the permit and the average annual concentration value is reported in the "Average" column under "Quality or Concentration" on the DMR.

5. <u>Other Measurements</u>

a. The effluent flow expressed as million gallons per day (MGD) is the 24-hour average flow averaged over a monthly period. It is the arithmetic mean of the total daily flows recorded during the calendar month. Where monitoring requirements for flow are specified in Part I of the permit, the flow rate values are reported in the "Average" column under "Quantity or Loading" on the DMR.

b. An "instantaneous flow measurement" is a measure of flow taken at the time of sampling, when both the sample and flow are representative of the total

discharge.

c. Where monitoring requirements for pH, dissolved oxygen or fecal coliform bacteria are specified in Part I of the permit, the values are generally reported in the "Quality or Concentration" column on the DMR.

d. The "average annual discharge" for fecal coliform bacteria shall be calculated in the same manner as that for mass limitations (see Item II.E.3.d.).

6. Types of Samples

a. Composite Sample: A "composite sample" is a combination of not less than 8 influent or effluent portions, of at least 100 ml, collected over the full time period specified in Part I.A. The composite sample must be flow proportioned by either a time interval between each aliquot or by volume as it relates to effluent flow at the time of sampling or total flow since collection of the previous aliquot. Aliquots may be collected manually or automatically.

b. Grab Sample: A "grab sample" is a single influent or effluent portion which is not a composite sample. The sample(s) shall be collected at the period(s) most representative of the total discharge.

7. Calculation of Means

a. Arithmetic Mean: The "arithmetic mean" of any set of values is the sum of the individual values divided by the number of individual values.

b. Geometric Mean: The "geometric mean" of any set of values is the Nth root of the product of the individual values where N is equal to the number of individual values. The geometric mean is equivalent to the antilog of the arithmetic mean of the logarithms of the individual values. For purposes of calculating the geometric mean, values of zero (0) shall be considered to be one (1).

c. Weighted by Flow Value: "Weighted by flow value" means the sum of each concentration times its respective flow divided by the sum of the respective flows.

8. Calendar Day

A "calendar day" is defined as the period from midnight of one day until midnight of the next day. However, for purposes of this permit, any consecutive 24-hour period that reasonably represents the calendar day may be used for sampling.

9. Hazardous Substance

A "hazardous substance" means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the Clean Water Act.

10. Toxic Pollutants

A "toxic pollutant" is any pollutant listed as toxic under Section 307(a)(1) of the Clean Water Act.

Part III
OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained for each calendar month shall be summarized for that month and reported on a Discharge Monitoring Report Form (EPA No. 3320-1), postmarked no later than the 28th day of the month following the completed calendar month. (For example, data for January shall be submitted by February 28.) Signed copies of these, and any other reports required by Section D of Part II, Reporting Requirements, shall be submitted to the Permit Issuing Authority at the following address:

Environmental Protection Agency Region IV
Federal Facility Coordinator's Office
345 Courtland Street, N.E.
Atlanta, GA 30365

If no discharge occurs during the reporting period, the sampling requirements of this permit do not apply, and "No Discharge" shall be indicated on the DMR form. If, during the term of this permit, the facility ceases discharge to surface waters, the Permit Issuing Authority and the State shall be notified immediately upon cessation of discharge. This notification shall be in writing.

B. Reopener Clause

This permit shall be modified, or alternatively, revoked and reissued, to comply with any applicable effluent standard or limitation, or sludge disposal requirement issued or approved under Sections 301(b)(2)(C) & (D), 304(b)(2), 307(a)(2), and 405(d)(2)(D) of the Clean Water Act, as amended, if the effluent standard or limitation, or sludge disposal requirement so issued or approved:

1. Contains different conditions or is otherwise more stringent than any condition in the permit; or

2. Controls any pollutant or disposal method not addressed in the permit.

The permit as modified or reissued under this paragraph shall contain any other requirements of the Act then applicable.

PART IV
Whole Effluent Toxicity Testing Program

As required by Part I of this permit, the permittee shall initiate the series of tests described below beginning in January, 1995 to evaluate whole effluent toxicity of the discharge from outfall 001. All test species, procedures and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-90/027F, or the most current edition. The dilution/control water and effluent used will be adjusted to a salinity of 20 parts per thousand using artificial sea salts as described in EPA/600/4-90/027F, Section 7 (or the most current edition). A standard reference toxicant quality assurance test shall be conducted concurrently with each species used in the toxicity tests and the results submitted with the discharge monitoring report (DMR). Alternatively, if monthly QA/QC reference toxicant tests are conducted, these results must be submitted with the DMR.

1. The permittee shall conduct 96-hour acute static-renewal multi-concentration toxicity tests using the mysid shrimp (Mysidopsis bahia) and the inland silverside (Menidia beryllina). All tests shall be conducted on four separate grab samples collected at evenly-spaced (6-hr) intervals over a 24-hour period and used in four separate tests in order to catch any peaks of toxicity and to account for daily variations in effluent quality. All tests shall be conducted on a control (0%) and the following dilution concentrations at a minimum: 100.0%, 50.0%, 25.0%, 12.5%, and 6.25%.

2. If control mortality exceeds 10% for either species in any test, the test(s) for that species (including the control) shall be repeated. A test will be considered valid only if control mortality does not exceed 10% for either species.

3. The toxicity tests specified above shall be conducted once every six months for the duration of the permit, unless notified otherwise by the permit issuing authority. These tests are referred to as "routine" tests.

4. If unacceptable acute toxicity (an LC_{50} of 100% or less occurs in either test species in any of the four separate grab sample tests within the specified time) is found in a "routine" test, the permittee shall conduct two additional acute toxicity tests in the same manner as the "routine" test on the specie(s) indicating unacceptable toxicity. For each additional test, the sample collection requirements and test acceptability criteria specified in Section 1 above must be met for the test to be considered valid. The first test shall begin within two weeks of the end of the "routine" tests, and shall be conducted weekly thereafter until two additional, valid tests are completed. The additional tests will be used to determine if the toxicity found in the "routine" test is still present. Results from additional tests, required due to unacceptable acute toxicity in the "routine" test(s), must be reported on the Discharge Monitoring Report (DMR) Form for the month in which the test was begun. Such test results must be submitted within 45 days of completion of the second additional, valid test.

Public Notice Date: August 18, 1994

FACT SHEET

APPLICATION FOR NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT TO DISCHARGE TO WATERS OF THE U.S.

Application No. FL0002500
Application Date: February 25, 1994
Permit Writer: Mark E. Robertson

1. SYNOPSIS OF APPLICATION

A. Name and Address of Applicant:
United States Department of Navy
Pensacola Public Works Center
Pensacola, FL 32508-5303

B. Type of Discharge: Sanitary Wastewater Treatment Plant (Outfall 001) and two small thermal discharges (Outfalls 008 & 009) at the Naval Air Station Pensacola. The SIC code for this facility is 9711. The wastewater treated includes an industrial component which will be phased out during this permit as a result of the closing of the Naval Aviation Depot mandated by the Base Realignment and Closure ("BRAC") process. The previous permit also included outfalls 002-007 which regulated stormwater discharges. Because these outfalls are the responsibility of another command, they will be covered under a separate permit.

C. Design Capacity of Facility: 4.0 MGD

D. Receiving Water:
Pensacola Bay is a Class III waterway, 17 FAC 302.600(3)(b)17. A Class III waterway is designated for Recreation, Propagation and Maintenance of a Healthy, Well-Balanced Population of Fish and Wildlife. For a sketch showing the location of the discharge, see Attachment A.

E. Description of Wastewater Treatment Facilities for Outfall 001:
Biological treatment consisting of grit removal, activated sludge aeration, primary and secondary clarification, filtration, chlorination, and de-chlorination. Industrial pretreatment includes oil/water separation, primary clarification, chemical mixing, and flocculation/clarification unit operations prior to discharge to the sanitary treatment plant. Most, if not all, of the industrial wastewater will be removed as a part of the BRAC process, so the industrial treatment facilities will be converted to extra capacity for sanitary treatment or removed from service during this permit's effective period.

F. Description of Discharges (as reported by applicant)

(1) Outfall 001 - treated wastewater:
Annual Average Flow (MGD): 1.58
pH range: 6.5 - 8.3

Parameter	Annual Average	Highest Monthly Av.
BOD_5, mg/l	2.4	2.94
TSS mg/l	3.37	6.41
Fecal Coliform (N/100 ml)	5.2	13.2
Total Residual Chlorine mg/L	Below detection	

(2) Outfalls 008 & 009 - non-contact cooling water:
These discharges will be of untreated saltwater obtained from the Bay which will pass once through an air compressor (008) and through jackets on water pumps which will supply water in case of a pier fire (009). The only pollutant added will be thermal energy; no other treatment of the water will occur. Because of this, further analytical information has not been required.

The compressor will generate about 495,000 BTU/hour, and will be used only when a carrier is in port. The fire pumps will generate around 675,000 BTU/hour, but will only be run about 30 minutes per month for a maintenance check, and will not contribute a significant amount of thermal energy to the Bay.

2. PROPOSED EFFLUENT LIMITATIONS FOR OUTFALL 001, 008 and 009

Proposed effluent limitations are indicated on the attached draft permit. The applicant will be required to monitor with sufficient frequency to ensure adequate data are collected for compliance reviews. Frequency, methods of sampling, and reporting dates are specified in the attached draft permit.

3. BASIS FOR FINAL EFFLUENT LIMITS AND PERMIT CONDITIONS

A. The limitation on dissolved oxygen is adapted from the Florida Administrative Code ("FAC") Section 17-302.530(31) dated April 25, 1993, with measurement frequency based on FAC §17-601.500, dated May 31, 1993.

B. This permit will match the current Florida practice of substitution of the parameter Carbonaceous Biochemical Oxygen Demand ("$CBOD_5$") for Biochemical Oxygen Demand ("BOD_5"). The annual limit is derived from FAC §17-600.740(1)(b) (June 8, 1993), while the monthly and weekly limits have been carried over from the previous permit per 40 CFR 122.44(l)(1).

C. The limitation on Total Suspended Solids is retained from the previous permit per 40 CFR 122.44(l)(1), in addition to the annual average requirement mandated by FAC §17-600.740(1)(b) (June 8, 1993).

D. The effluent limits for pH are based on FAC §17-302.530(52)(c), (April 25, 1993).

E. The Oil and Grease limit is based on FAC §17-302.530(50)(a), (April 25, 1993).

F. The limit on Total Kjeldahl Nitrogen is based on the limit contained in the previous permit based on 40 CFR 122.44(l)(1), which also supersedes the previous limitation on ammonia-nitrogen.

G. The limits on Total Phosphorus, Total Cyanide, Temperature, Iron, Cadmium, Chromium, Copper, Silver, and Surfactants (previously denoted as detergents) are based on the limitation against backsliding in permit effluent limits and are carried over from the previous permit based on 40 CFR 122.44(l)(1). Limitations carried over from the previous permit are at least as stringent as the acute toxicity criteria.

H. The limit on Nickel is based on FAC §17-302.530(45), (April 25, 1993).

I. The limit on Zinc is based on FAC §17-302.530(72), (April 25, 1993).

J. The limit on Lead is based on FAC §17-302.530(40), (April 25, 1993).

K. Monitoring of Cadmium, Chromium, Nickel, Lead, and Zinc is required when they are subject to being discharged, including but not limited to any month when the industrial wastewater treatment facility is used or when electroplating or metal finishing process wastewater is discharged to the sanitary collection system.

L. Limitations for Total Residual Chlorine are carried over from the existing NPDES permit based on 40 CFR 122.44(l)(1), and are in accordance with the April 11, 1986, EPA Region 4 memo entitled "Region IV NPDES Permits Chlorine Strategy," as well as FAC §17-302.530(19), (April 25, 1993).

M. Fecal Coliform limitations have been adopted from FAC §§17-600.440(4), (June 8, 1993) and 17-302.530(6) (April 25, 1993).

N. Phenolic Compounds: The limitation in the previous permit on total phenols has been changed to be more specific, in line with Florida standards. The limit on phenol is based on EPA's "Gold Book" criteria. The limit on p-Chloro-m-Cresol is based on the text in FAC §17-302.530(53)(a) (April 25, 1993). The limit on 2,4-Dichlorophenol is based on FAC §17-302.530(53)(b)(2) (April 25, 1993). The limit in 2,4,6-Trichlorophenol is based on FAC §17-302.530(53)(b)(4) (April 25, 1993). The limit for Pentachlorophenol is based on FAC §17-302.530(53)(b)(5) (April 25, 1993).

O. The limitation on discharge of floating solids or visible foam is based on requirements contained in FAC §17-302.500(1)(b), (April 25, 1993).

P. The limitation on visible sheens on the receiving waters is based on requirements in FAC 17-302.530(50)(b), (April 25, 1993).

Q. The restriction on discharge of hazardous waste to the sanitary collection system is based on requirements of section 108 of the Federal Facility Compliance Act of 1992, as it amends Subtitle C of the Solid Waste Disposal Act.

R. Toxicity Testing Requirements:
Recent acute toxicity tests conducted on the effluent from this treatment plant have not shown acute toxicity. However, the anti-backsliding regulation requires that the permit continue to limit toxicity. The frequency of this testing has been set to once per 6 months based on the writer's best professional judgement. Therefore, toxicity testing requirements and limits are contained in Part I.A.2 on Page I-2 and in Part IV to ensure that the effluent from Outfall 001 conforms with FAC Sections 17-302.530(62) (April 25, 1993) and 17-4.244(3)(a) (February 2, 1994). These requirements are based on the rationale contained in the Regional policy document, "Whole Effluent Toxicity Testing Policy for Florida" (dated May 5, 1986.) The inclusion of a whole effluent toxicity limit in the permit is also authorized and required by 40 CFR 122.44(d)(1)(v).

The Receiving Water Concentration (RWC) is used to determine the type of whole effluent toxicity testing required in a permit. In this situation, it is not possible to calculate a dilution factor because of the size of the receiving water. For this facility, the RWC is assumed to be less than 1% of the receiving water "flow" at appropriate low flow conditions; therefore, acute toxicity requirements were selected.

S. Sludge monitoring provisions have been included to conform with Section 405(d)(4) of the Clean Water Act and in accordance with a Region IV memorandum dated September 11, 1992.

T. Provisions have been included in Parts I & II of the permit to address wastewater discharges from the collection system that may occur prior to the headworks of the wastewater treatment plant. The language highlights that fact that any such discharge is unpermitted and establishes a requirement for reporting an occurrence.

U. The thermal measurement and volume estimates for outfalls 008 and 009 are based upon the permit writer's best professional judgement, because these proposed outfalls are below threshold criteria for Florida's thermal discharge regulation §FAC 17-302.520 (April 25, 1993).

4. REQUESTED VARIANCES OR ALTERNATIVES TO REQUIRED STANDARDS

None.

5. EFFECTIVE DATE OF PROPOSED EFFLUENT LIMITS AND COMPLIANCE SCHEDULE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:
Discharge 001 - Final: effective date of permit.
Discharge 008 and 009 - Final: effective date of permit.

6. STATE CERTIFICATION REQUIREMENTS

State certification is being requested on the draft permit.

7. EPA CONTACT

Additional information concerning the permit may be obtained at the address and during the hours noted in Item 8 from:

Mr. Mark Robertson
(404) 347-3776

9. THE ADMINISTRATIVE RECORD, including application, draft permit, fact sheet, public notice (after release), State Certification (after receipt), comments received and additional information is available by writing the permit writer at EPA, Region IV; or for review and copying at 345 Courtland Street, N.E., 4th floor, Atlanta, Georgia, 30365, between the hours of 8:15 A.M. and 4:30 P.M., Monday through Friday. Copies will be provided at a minimal charge per page.

10. PROPOSED SCHEDULE FOR PERMIT ISSUANCE
Proposed State Certification Request: July 29, 1994
Proposed Public Notice Date: August 30, 1994
Proposed Issuance Date: September 30, 1994
Proposed Effective Date: January 1, 1995

11. PROCEDURES FOR THE FORMULATION OF FINAL DETERMINATIONS

A. Comment Period

The Environmental Protection Agency proposes to issue an NPDES permit to this applicant subject to the aforementioned effluent limitations and special conditions. These determinations are tentative and open to comment from the public.

Interested persons are invited to submit written comments regarding permit issuance or the proposed permit limitations and conditions to the following address:

Office of Public Affairs
Environmental Protection Agency
345 Courtland Street, NE
Atlanta, Georgia 30365
ATTN: Lena Scott, Public Notice Coordinator

All comments received within thirty (30) days following the date of public notice will be considered in the formulation of final determinations with regard to proposed permit issuance.

B. Public Hearing

The EPA Regional Administrator will hold a public hearing if there is a significant degree of public interest in a proposed permit or group of permits, or if he determines that useful information and data may be obtained thereby. Public Notice of such a hearing will be circulated at least thirty days prior to the hearing.

C. Issuance of the Permit

After consideration of all written comments and of the requirements and policies in the Clean Water Act (the Act) and appropriate regulations, and, if a public hearing is held, after consideration of all comments, statements, and data presented at the hearing, the EPA Regional Administrator will make determinations regarding the permit issuance. If the determinations are substantially unchanged from the tentative determinations outlined above, the Regional Administrator will so notify all persons submitting written comments, and, if a public hearing was held, all persons participating in the hearing. If the determinations are substantially changed, the EPA Regional Administrator will issue a public notice indicating the revised determinations.

Unless a request for an evidentiary hearing is granted, the proposed permit contained in the Regional Administrator's determinations shall become issued and effective and will be the final action of the U.S. Environmental Protection Agency.

D. Evidentiary Hearing

If the determinations are substantially unchanged, any interested person may submit a request for an evidentiary hearing on the permit and its conditions within thirty (30) days of the receipt of the notice described in section C. If the determinations are substantially changed, any interested person may submit a request for an evidentiary hearing within thirty days of the date of the public notice or of the date of becoming aware of the determinations, whichever comes first. Such requests will be considered timely if mailed by certified mail within the thirty day comment period to the Regional Hearing Clerk, Environmental Protection Agency, 345 Courtland Street, N.E., Atlanta, Georgia 30365. All requests must contain:

(1) The name, mailing address, and telephone number of the person making such request.

(2) A clear and concise factual statement of the nature and scope of the interest of the requester.

(3) The names and addresses of all persons whom the requester represents.

(4) A statement by the requester that, upon motion of any party, or sua sponte by the Presiding Officer and without cost or expense to any other party, the requester shall make available to appear and testify, the following:

(i) The requester;
(ii) All persons represented by the requester;
and
(iii) All officers, directors, employees, consultants, and agents of the requester and the persons represented by the requester.

(5) Specific references to the contested permit terms and conditions, as well as suggested revised or alternative permit terms and conditions (not excluding permit denial) which, in the judgement of the requester, would be required to implement the purposes and policies of the Act.

(6) In the case of challenges to the application of control or treatment technologies identified in the statement of basis or fact sheet, identification of the basis for the objection, and the alternative technologies or combination of technologies which the requester believes are necessary to meet the requirements of the Act.

(7) Specific identification of each of the discharger's obligations which should be stayed if the request is granted. If the request contests more than one permit term/condition then each obligation which is proposed to be stayed must be referenced to the particular contested term/condition warranting the stay.

(8) Each legal or factual question alleged to be at issue and its relevance to the permit decision.

(9) An estimate of the hearing time necessary for adjudication.

(10) Information supporting the request or relied upon which is not already a part of the administrative record required by 40 C.F.R. Section 124.18 (48 Federal Register 14272, April 1, 1983).

The granting of a request will stay only the contested portions of the permit. Uncontested provisions of the permit shall be considered issued and effective and the permittee must comply with such provisions. Except, if the permit is for a new source or new discharge, the applicant will be without a permit for the proposed new source or new discharge, pending final Agency action. The final Agency decision on the permit provisions contested at an evidentiary hearing will be made in accordance with Title 40, Code of Federal Regulations, Part 124, Subpart E, found at 48 Federal Register 14278, et seq. Prior to granting an evidentiary hearing request, the entire final permit is not effective, in accordance with 40 C.F.R. Section 124.15(b)(2).

E. Panel Hearing

In the case of an "initial license," including the first grant of an NPDES permit, or the first decision on a requested variance, if the Regional Administrator elects to apply the provisions of 40 C.F.R. Part 124, Subpart F and so states in the public notice of the draft permit, any person may request the Regional Administrator to hold a panel hearing on the permit. Such a request must be made within the comment period of the notice described above. Requests will be considered timely if mailed by certified mail within the comment period. All requests must contain:

(1) A brief statement of the interest of the person requesting the hearing.

(2) A statement of any objections to the draft permit.

(3) A statement of the issues which such person proposes to raise for consideration at the hearing.

(4) The name, mailing address, and telephone number of the person making such request.

(5) A clear and concise factual statement of the nature and scope of the interest of the requester.

(6) The names and addresses of all persons whom the requester represents.

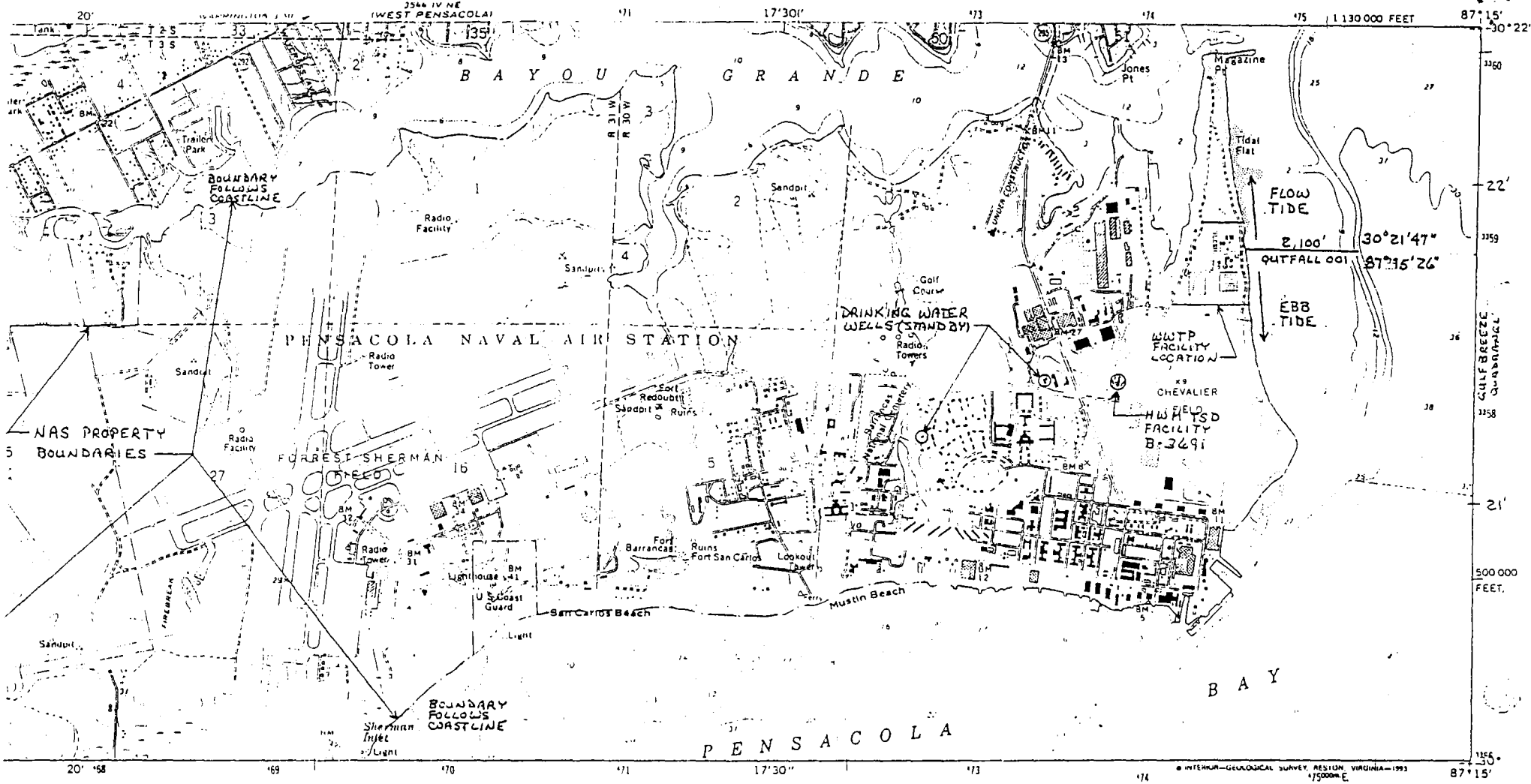
(7) A statement by the requester that, upon motion of any party, or sua sponte by the Presiding Officer and without cost or expense to any other party, the requester shall make available to appear and testify, the following:
(i) The requester;
(ii) All persons represented by the requester; and
(iii) All officers, directors, employees, consultants, and agents of the requester and the persons represented by the requester.

(8) Specific references to the contested permit terms/conditions, as well as suggested revised or alternative permit terms/conditions (not excluding permit denial), which, in the judgement of the requester, would be required to implement the purposes and policies of the Act.

If the permit for which a panel hearing is requested is for a new source or new discharge, the applicant will be without a permit for the proposed new source or new discharge pending final Agency action. Panel hearings will be conducted in accordance with Title 40, Code of Federal Regulations, Part 124, Subpart F, found at 48 Federal Register 14285, et seq.

STATE OF FLORIDA

FORT BARRANCAS QUADRANGLE
FLORIDA–ESCAMBIA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET – DATUM IS MEAN LOWER LOW WATER
THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
THE MEAN RANGE OF TIDE IS APPROXIMATELY 1.3 FEET
IN INLAND WATERS AND NEGLIGIBLE IN THE GULF OF MEXICO

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY
DENVER, COLORADO 80225 OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NORTH
SHEET

ATTACHMENT "A" - MAP
NPDES PERMIT RENEWAL APP.
NPDES PERMIT NO. FL 0000250

FLORIDA

QUADRANGLE LOCATION

Revisions shown in purple and woodland compiled in cooperation with State of Florida agencies from aerial photographs taken 1984 and other sources
This information not field checked. Map edited 1987

ROAD CLASSIFICATION

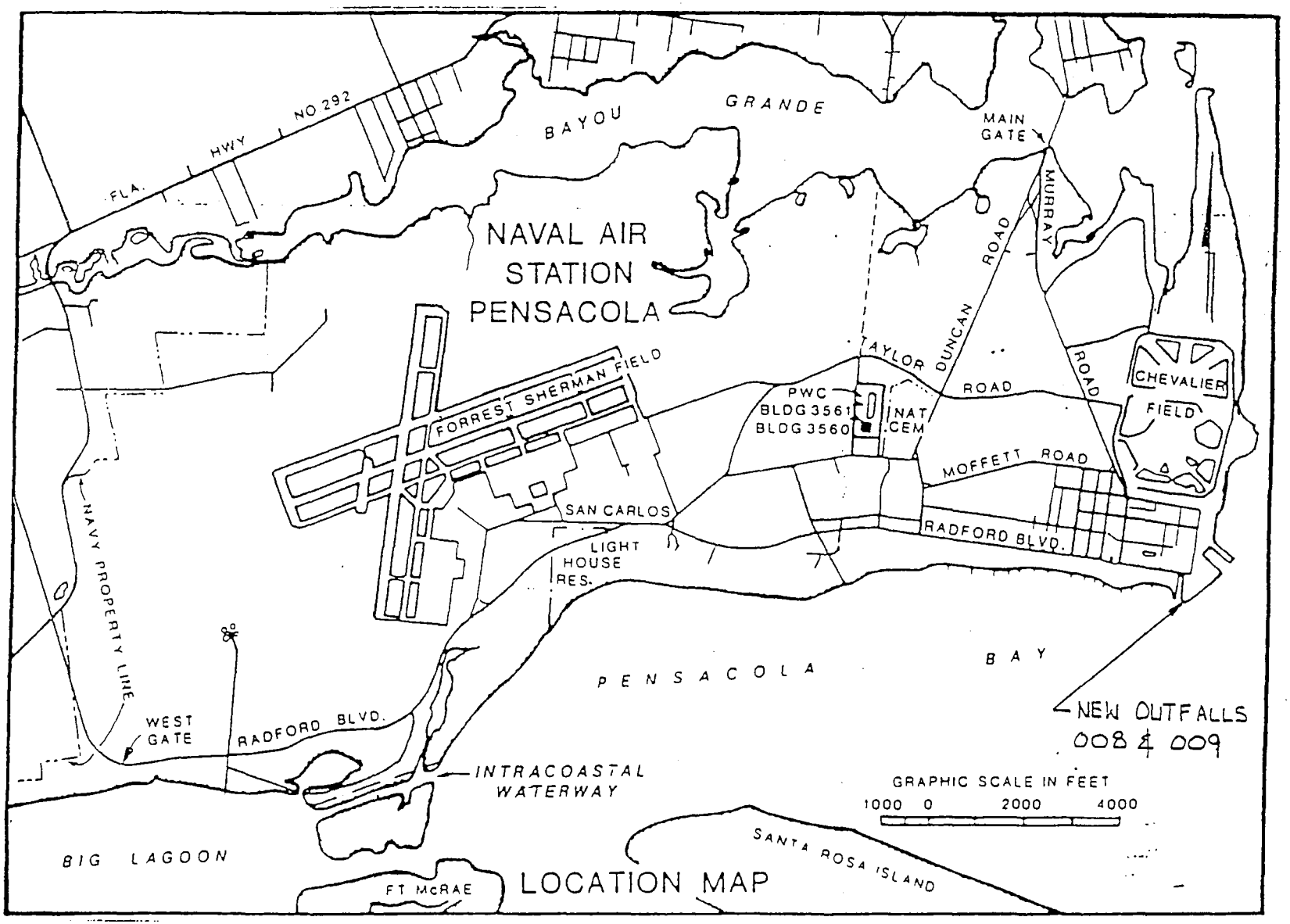
Secondary highway, all weather, hard surface — Light-duty road, all weather, improved surface

Unimproved road, fair or dry weather

State Route

FORT BARRANCAS, FLA.
30087-C3-TF-024

1970
PHOTOREVISED 1987
MINOR REVISION 1992
DMA 3544 IV SE – SERIES V847



LOCATION MAP

ENCLOSURE(1)

FORM 3510-1

APPENDIX C

ANALYTICAL RESULTS FOR RECOVERY WELLS

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

900 Lakeside Drive • Mobile, Alabama 36693-5118 • (334) 666-6633 • Fax (334) 666-6696

LOG NO: M5-02462

Received: 26 APR 95

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

Project: 33462.200/NAS Pensacola
Sampled By: S. Ross/R. Barowstei

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02462-1	RW-5A	05-26-95
02462-2	RW- 4 & 6	05-26-95
02462-3	Composite	05-26-95

PARAMETER	02462-1	02462-2	02462-3
Arsenic (EPA 7061)			
Arsenic, mg/l	<0.0020	<0.0020	<0.0020
Date Analyzed	05.04.95	05.04.95	05.04.95
Cadmium (EPA 6010)			
Cadmium, mg/l	<0.0050	<0.0050	<0.0050
Date Analyzed	05.02.95	05.02.95	05.02.95
Chromium (EPA 6010)			
Chromium, mg/l	<0.010	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95
Copper (EPA 6010)			
Copper, mg/l	<0.010	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95
Lead (EPA 7421)			
Lead, mg/l	<0.0050	<0.0050	<0.0050
Date Analyzed	05.02.95	05.02.95	05.02.95
Mercury (EPA 7470)			
Mercury, mg/l	<0.00010	<0.00010	<0.00010
Date Analyzed	05.05.95	05.05.95	05.05.95
Manganese (EPA 6010)			
Manganese, mg/l	0.37	0.74	0.43
Date Analyzed	05.02.95	05.02.95	05.02.95
Nickel (EPA 6010)			
Nickel, mg/l	<0.0083	<0.0083	<0.0083
Date Analyzed	05.02.95	05.02.95	05.02.95

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LOG NO: M5-02462

Received: 26 APR 95

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

Project: 33462.200/NAS Pensacola
Sampled By: S. Ross/R. Barowstei

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02462-1	RW-5A	05-26-95
02462-2	RW- 4 & 6	05-26-95
02462-3	Composite	05-26-95

PARAMETER	02462-1	02462-2	02462-3
Selenium (EPA 7741)			
Selenium, mg/l	<0.0020	<0.0020	<0.0020
Date Analyzed	05.04.95	05.04.95	05.04.95
Silver (EPA 6010)			
Silver, mg/l	<0.010	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95
Zinc (EPA 6010)			
Zinc, mg/l	<0.020	<0.020	<0.020
Date Analyzed	05.02.95	05.02.95	05.02.95
Iron (EPA 6010)			
Iron, mg/l	0.034	0.13	0.043
Date Analyzed	05.02.95	05.02.95	05.02.95
Aluminum (EPA 6010)			
Aluminum, mg/l	0.34	<0.10	0.58
Date Analyzed	05.02.95	05.02.95	05.02.95
Barium (EPA 6010)			
Barium, mg/l	0.013	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95
Beryllium (EPA 6010)			
Beryllium, mg/l	<0.0050	<0.0050	<0.0050
Date Analyzed	05.02.95	05.02.95	05.02.95
Cobalt (EPA 6010)			
Cobalt, mg/l	<0.010	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02462-1	RW-5A	05-26-95
02462-2	RW- 4 & 6	05-26-95
02462-3	Composite	05-26-95

PARAMETER	02462-1	02462-2	02462-3
Potassium (EPA 6010)			
Potassium, mg/l	6.6	6.9	6.3
Date Analyzed	05.02.95	05.02.95	05.02.95
Magnesium (EPA 6010)			
Magnesium, mg/l	11	12	11
Date Analyzed	05.02.95	05.02.95	05.02.95
Antimony (EPA 6010)			
Antimony, mg/l	<0.050	<0.050	<0.050
Date Analyzed	05.02.95	05.02.95	05.02.95
Vanadium (EPA 6010)			
Vanadium , mg/l	<0.010	<0.010	<0.010
Date Analyzed	05.02.95	05.02.95	05.02.95
Sodium (EPA 6010)			
Sodium, mg/l	100*F	85*F	88*F
Date Analyzed	05.02.95	05.02.95	05.02.95
Calcium (EPA 6010)			
Calcium, mg/l	56*F	40*F	43*F
Date Analyzed	05.02.95	05.02.95	05.02.95

REFERENCE: EPA SW-846 3rd Edition, 1986
*F = Reported values are estimated due to sample batch laboratory control standard recoveries falling outside advisory limits.

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
02462-4	Laboratory Blank
02462-5	Accuracy (% Recovery for LCS/LCSD)
02462-6	Precision (Relative % Difference)

PARAMETER	02462-4	02462-5	02462-6
Arsenic, mg/l	<0.0020	88/86 %	2.3 %
Cadmium, mg/l	<0.0050	102/103 %	0.98 %
Chromium, mg/l	<0.010	104/105 %	0.96 %
Copper, mg/l	<0.010	98/99 %	1.0 %
Lead, mg/l	<0.0050	106/108 %	1.9 %
Mercury, mg/l	<0.00010	106/109 %	2.8 %
Manganese, mg/l	<0.010	103/104 %	0.96 %
Nickel, mg/l	<0.0083	104/106 %	1.9 %
Selenium, mg/l	<0.0020	90/90 %	0 %
Silver, mg/l	<0.010	102/102 %	0 %
Zinc, mg/l	<0.020	105/105 %	0 %
Iron, mg/l	<0.030	102/104 %	1.9 %
Aluminum, mg/l	<0.10	100/98 %	2.0 %
Barium, mg/l	<0.010	98/99 %	1.0 %
Beryllium, mg/l	<0.0050	102/104 %	1.9 %
Cobalt, mg/l	<0.010	104/105 %	0.96 %
Potassium, mg/l	<1.0	89/87 %	2.3 %
Magnesium, mg/l	<0.50	97/96 %	1.0 %
Antimony, mg/l	<0.050	99/99 %	0 %
Vanadium , mg/l	<0.010	99/100 %	1.0 %
Sodium, mg/l	<1.0	127/152 %	18 %
Calcium, mg/l	<0.50	135/113 %	18 %

Jesse L. Smith

Jesse L. Smith

Final Page Of Report

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LOG NO: M5-02217

Received: 14 APR 95

Mr. Scott Ross
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2694 Lake Park Drive
Charleston, SC. 29418

Project: NAS Pensacola
Sampled By: D. Turner/L. Fanning

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Volatiles by GC/MS (8240)					
Chloromethane, ug/l	<10	<10	<10	<10	<10
Bromomethane, ug/l	<10	<10	<10	<10	<10
Vinyl Chloride, ug/l	<10	<10	25	<10	<10
Chloroethane, ug/l	<10	<10	<10	<10	38
Methylene chloride (Dichloromethane), ug/l	12	<5.0	<5.0	<5.0	<5.0
Acetone, ug/l	<25	<25	<25	<25	<25
Carbon disulfide, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane, ug/l	<5.0	<5.0	<5.0	<5.0	8.9
trans-1,2-Dichloroethylene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Chloroform, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2-Butanone (MEK), ug/l	<25	<25	<25	<25	<25
1,1,1-Trichloroethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon tetrachloride, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl acetate, ug/l	<10	<10	12	<10	<10
Bromodichloromethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Trichloroethene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene, ug/l	<5.0	66	190	<5.0	<5.0
cis-1,3-Dichloropropene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chloroethylvinyl ether, ug/l	<50	<50	<50	<50	<50
Bromoform, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexanone, ug/l	<25	<25	<25	<25	<25
4-Methyl-2-pentanone (MIBK), ug/l	<25	<25	<25	<25	<25
Tetrachloroethene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene, ug/l	16	390	3600	<5.0	14
Ethylbenzene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Surrogates - Volatiles					
Surrogate - Toluene-d8, % Rec	109 %	110 %	109 %	110 %	111 %
Surrogate - 4-Bromofluorobenzene, % Rec	99 %	103 %	113 %	104 %	106 %
Surrogate - 1,2-Dichloroethane-d4, % Rec	114 %	120 %	118 %	122 %	114 %
Date Analyzed	04.19.95	04.20.95	04.20.95	04.20.95	04.20.95

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02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Semivolatile Organics (8270)					
1,3-Dichlorobenzene, ug/l	29	39	640	<10	<10
1,4-Dichlorobenzene, ug/l	23	43	1100	<10	<10
Hexachloroethane, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroethyl)ether, ug/l	<10	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	18	63	480	<10	<10
bis(2-Chloroisopropyl)ether, ug/l	<10	<10	<10	<10	<10
N-Nitrosodi-N-Propylamine, ug/l	<10	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10	<10
Hexachlorobutadiene, ug/l	<10	<10	<10	<10	<10
1,2,4-Trichlorobenzene, ug/l	<10	<10	<10	<10	<10
Isophorone, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	72	<10	<10
bis(2-Chloroethoxy)methane, ug/l	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene, ug/l	<10	<10	<10	<10	<10
2-Chloronaphthalene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Dimethylphthalate, ug/l	<10	<10	<10	<10	<10
2,6-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
4-Chlorophenyl-phenyl ether, ug/l	<10	<10	<10	<10	<10

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02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
2,4-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10
Diethylphthalate, ug/l	<10	<10	<10	<10	<10
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	<10	<10	<10	<10
Hexachlorobenzene, ug/l	<10	<10	<10	<10	<10
gamma-BHC, ug/l	<10	<10	<10	<10	<10
4-Bromophenyl phenyl ether, ug/l	<10	<10	<10	<10	<10
delta-BHC, ug/l	<10	<10	<10	<10	<10
Phenanthrene, ug/l	<10	<10	<10	<10	<10
Anthracene, ug/l	<10	<10	<10	<10	<10
beta-BHC, ug/l	<10	<10	<10	<10	<10
Heptachlor, ug/l	<20	<20	<20	<20	<20
alpha-BHC, ug/l	<10	<10	<10	<10	<10
Aldrin, ug/l	<10	<10	<10	<10	<10
Di-n-butylphthalate, ug/l	<10	<10	<10	<10	<10
Heptachlor epoxide, ug/l	<20	<20	<20	<20	<20
Endosulfan I, ug/l	<20	<20	<20	<20	<20
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Dieldrin, ug/l	<10	<10	<10	<10	<10
4,4'-DDE, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
Endrin, ug/l	<20	<20	<20	<20	<20

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02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Endosulfan II, ug/l	<20	<20	<20	<20	<20
4,4'-DDD, ug/l	<10	<10	<10	<10	<10
Benzidine, ug/l	<80	<80	<80	<80	<80
4,4'-DDT, ug/l	<10	<10	<10	<10	<10
Endosulfan sulfate, ug/l	<20	<20	<20	<20	<20
Endrin Aldehyde, ug/l	<50	<50	<50	<50	<50
Butylbenzylphthalate, ug/l	<10	<10	<10	<10	<10
bis(2-Ethylhexyl)phthalate, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
Chrysene, ug/l	<10	<10	<10	<10	<10
Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine, ug/l	<20	<20	<20	<20	<20
Di-n-octylphthalate, ug/l	<10	<10	<10	<10	<10
Benzo(b)fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo(k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene, ug/l	<10	<10	<10	<10	<10
Dibenz(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
N-Nitrosodimethylamine, ug/l	<10	<10	<10	<10	<10
Chlordane, ug/l	<50	<50	<50	<50	<50
Toxaphene, ug/l	<2000	<2000	<2000	<2000	<2000
Aroclor-1016, ug/l	<500	<500	<500	<500	<500

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02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Aroclor-1221, ug/l	<500	<500	<500	<500	<500
Aroclor-1232, ug/l	<500	<500	<500	<500	<500
Aroclor-1242, ug/l	<500	<500	<500	<500	<500
Aroclor-1248, ug/l	<500	<500	<500	<500	<500
Aroclor-1254, ug/l	<500	<500	<500	<500	<500
Aroclor-1260, ug/l	<500	<500	<500	<500	<500
2-Chlorophenol, ug/l	<5.0	<5.0	8.0	<5.0	<5.0
2-Nitrophenol, ug/l	<10	<10	<10	<10	<10
Phenol, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2,4,6-Trichlorophenol, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chloro-3-methylphenol, ug/l	<5.0	<5.0	<5.0	<5.0	<5.0
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50	<50	<50	<50	<50
Pentachlorophenol, ug/l	<10	<10	<10	<10	<10
4-Nitrophenol, ug/l	<50	<50	<50	<50	<50
Benzyl alcohol, ug/l	<10	<10	<10	<10	<10
2-Methylphenol (o-cresol), ug/l	<10	<10	<10	<10	<10
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	<10	<10	<10	<10	<10
Benzoic acid, ug/l	<50	<50	<50	<50	<50

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
4-Chloroaniline, ug/l	<20	<20	<20	<20	<20
2-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
2,4,5-Trichlorophenol, ug/l	<10	<10	<10	<10	<10
2-Nitroaniline, ug/l	<50	<50	<50	<50	<50
3-Nitroaniline, ug/l	<50	<50	<50	<50	<50
Dibenzofuran, ug/l	<10	<10	<10	<10	<10
4-Nitroaniline, ug/l	<50	<50	<50	<50	<50
Surrogates - Semivolatiles					
Surrogate - Phenol d-5, % Rec	68 %	61 %	74 %	62 %	54 %
Surrogate - 2-Fluorophenol, % Rec	66 %	60 %	65 %	60 %	51 %
Surrogate - 2,4,6-Tribromophenol, % Rec	86 %	81 %	80 %	92 %	73 %
Surrogate - Nitrobenzene d-5, % Rec	69 %	59 %	55 %	68 %	59 %
Surrogate - 2-Fluorobiphenyl, % Rec	68 %	57 %	61 %	65 %	60 %
Surrogate-p-Terphenyl d-14, % Rec	65 %	87 %	64 %	68 %	41 %
Date Extracted	04.18.95	04.18.95	04.18.95	04.18.95	04.18.95
Date Analyzed	04.25.95	04.25.95	04.25.95	04.25.95	04.25.95
Oil & Grease, Total (EPA 413.1)					
O&G (EPA 413.1), mg/l	<1.0	<1.0	<1.0	<1.0	<1.0
Date Analyzed	04.17.95	04.17.95	04.17.95	04.17.95	04.17.95

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LOG NO: M5-02217

Received: 14 APR 95

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Rust Environment & Infrastructure
2694 Lake Park Drive
Charleston, SC. 29418

Project: NAS Pensacola
Sampled By: D. Turner/L. Fanning

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Biochemical Oxygen Demand (BOD)					
5 Day BOD (SM 507), mg/l	<2.0	2.5	5.2	<2.0	<2.0
Date Analyzed	04.14.95	04.14.95	04.14.95	04.14.95	04.14.95
Chloride (EPA 325.3)					
Chloride, mg/l	97	18	22	4.5	120
Date Analyzed	04.25.95	04.25.95	04.25.95	04.25.95	04.25.95
Residual Chlorine (STM 408D)					
Residual Chlorine, mg/l	0.18	<0.05	0.10	0.05	<0.05
Date Analyzed	04.14.95	04.14.95	04.14.95	04.14.95	04.14.95
Fluoride (EPA 340.2)					
Fluoride, mg/l	<0.20	0.42	0.44	<0.20	0.23
Date Analyzed	04.19.95	04.19.95	04.19.95	04.19.95	04.19.95
Nitrate Nitrogen as N (EPA 353.2)					
Nitrate-N, mg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Date Analyzed	04.14.95	04.14.95	04.14.95	04.14.95	04.14.95
Sulfate as SO4 (EPA 375.3)					
Sulfate, mg/l	30	19	<1.0	120	5.3
Date Analyzed	04.21.95	04.21.95	04.21.95	04.21.95	04.21.95
Total Suspended Solids (160.2)					
TSS (EPA 160.2), mg/l	<2.0	<2.0	<2.0	6.2	<2.0
Date Analyzed	04.19.95	04.19.95	04.19.95	04.19.95	04.19.95
Kjeldahl Nitrogen as N, Total (EPA 351.3)					
Kjeldahl Nitrogen-N, mg/l	1.7	1.2	1.7	0.77	17
Date Analyzed	04.24.95	04.24.95	04.24.95	04.24.95	04.24.95

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Cyanide, Total (9012)					
Cyanide, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.24.95	04.24.95	04.24.95	04.24.95	04.24.95
Phosphorus as P (EPA 365.3)					
Phosphorus, Total, mg/l	0.068	0.22	0.083	0.068	0.31
Date Analyzed	04.24.95	04.24.95	04.24.95	04.24.95	04.24.95
Surfactants (MBAS-EPA 425.1)					
Surfactants (MBAS-EPA 425.1), mg/l	<0.10	<0.10	<0.10	<0.10	<0.10
Date Analyzed	04.17.95	04.17.95	04.17.95	04.17.95	04.17.95
Turbidity					
Turbidity (180.1), NTU	1.8	2.6	6.5	2.0	2.0
Date Analyzed	04.14.95	04.14.95	04.14.95	04.14.95	04.14.95
Laboratory pH (EPA 9045)					
pH , units	6.4	7.0	6.9	7.1	7.0
Date Analyzed	04.14.95	04.14.95	04.14.95	04.14.95	04.14.95
Specific Conductance (EPA 120.1)					
Specific Conductance, umhos/cm	460	450	290	340	950
Date Analyzed	04.18.95	04.18.95	04.18.95	04.18.95	04.18.95
Aluminum (EPA 6010)					
Aluminum, mg/l	0.78	<0.10	<0.10	<0.10	<0.10
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95

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02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Antimony (EPA 6010)					
Antimony, mg/l	<0.050	<0.050	<0.050	<0.050	<0.050
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Arsenic (EPA 7061)					
Arsenic, mg/l	<0.0020	0.0020	<0.0020	0.0046	<0.0020
Date Analyzed	04.27.95	04.27.95	04.27.95	04.27.95	04.27.95
Barium (EPA 6010)					
Barium, mg/l	<0.010	0.020	0.025	0.028	0.018
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Beryllium (EPA 6010)					
Beryllium, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.25.95	04.25.95	04.25.95	04.25.95	04.25.95
Cadmium (EPA 6010)					
Cadmium, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Calcium (EPA 6010)					
Calcium, mg/l	12	70	38	69	51
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Chromium (EPA 6010)					
Chromium, mg/l	0.011	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Cobalt (EPA 6010)					
Cobalt, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95

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02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Copper (EPA 6010)					
Copper, mg/l	<0.010	<0.010	<0.010	0.011	<0.010
Date Analyzed	04.25.95	04.25.95	04.25.95	04.25.95	04.25.95
Iron (EPA 6010)					
Iron, mg/l	2.3	0.63	0.31	1.3	1.3
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Lead (EPA 7421)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.19.95	04.19.95	04.19.95	04.19.95	04.19.95
Magnesium (EPA 6010)					
Magnesium, mg/l	9.2	5.9	4.1	0.90	15
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Manganese (EPA 6010)					
Manganese, mg/l	0.044	0.068	0.051	0.087	0.20
Date Analyzed	04.27.95	04.26.95	04.26.95	04.26.95	04.26.95
Mercury (EPA 7470)					
Mercury, mg/l	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Date Analyzed	04.29.95	04.29.95	04.29.95	04.29.95	04.29.95
Nickel (EPA 6010)					
Nickel, mg/l	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Potassium (EPA 6010)					
Potassium, mg/l	4.4	2.2	3.8	<1.0	7.8
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95

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02217-1	RW-3	04-13-95
02217-2	RW-4	04-13-95
02217-3	RW-5	04-13-95
02217-4	RW-6	04-13-95
02217-5	RW-7	04-13-95

PARAMETER	02217-1	02217-2	02217-3	02217-4	02217-5
Selenium (EPA 7741)					
Selenium, mg/l	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Silver (EPA 6010)					
Silver, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Sodium (EPA 6010)					
Sodium, mg/l	60	13	13	2.9	88
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Thallium (EPA 7841)					
Thallium, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.21.95	04.21.95	04.21.95	04.21.95	04.21.95
Vanadium (EPA 6010)					
Vanadium , mg/l	0.020	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Zinc (EPA 6010)					
Zinc, mg/l	0.12	<0.020	<0.020	0.026	<0.020
Date Analyzed	04.27.95	04.26.95	04.26.95	04.26.95	04.26.95
Gross Alpha, pCi/l	3.8+/-6.6	<2.0	<2.0	<2.0	7.4+/-3.0
Gross Beta, pCi/l	6.0+/-2.8	2.0+/-3.1	2.6+/-2.2	<2.0	10+/-4.8
Radium 226, pCi/l	<0.60	<0.60	<0.60	<0.60	.72+/-0.09
Radium 228, pCi/l	<3.4	<3.4	<3.4	<3.4	<3.4

REFERENCE: EPA SW-846 3rd Edition, 1986

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-6	RW-3 (Filtered)	04-13-95
02217-7	RW-4 (Filtered)	04-13-95
02217-8	RW-5 (Filtered)	04-13-95
02217-9	RW-6 (Filtered)	04-13-95
02217-10	RW-7 (Filtered)	04-13-95

PARAMETER	02217-6	02217-7	02217-8	02217-9	02217-10
Aluminum (EPA 6010)					
Aluminum, mg/l	0.42	<0.10	<0.10	<0.10	<0.10
Date Analyzed	04.26.95	04.20.95	04.20.95	04.20.95	04.20.95
Antimony (EPA 6010)					
Antimony, mg/l	<0.050	<0.050	<0.050	<0.050	<0.050
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Arsenic (EPA 7061)					
Arsenic, mg/l	<0.0020	0.0021	<0.0020	0.0039	0.0022
Date Analyzed	04.27.95	04.27.95	04.27.95	04.27.95	04.27.95
Barium (EPA 6010)					
Barium, mg/l	<0.010	0.021	0.029	0.028	0.020
Date Analyzed	04.26.95	04.20.95	04.20.95	04.20.95	04.20.95
Beryllium (EPA 6010)					
Beryllium, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.25.95	04.19.95	04.19.95	04.19.95	04.19.95
Cadmium (EPA 6010)					
Cadmium, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Calcium (EPA 6010)					
Calcium, mg/l	13	74	40	74	58
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Chromium (EPA 6010)					
Chromium, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95

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02217-6	RW-3 (Filtered)	04-13-95
02217-7	RW-4 (Filtered)	04-13-95
02217-8	RW-5 (Filtered)	04-13-95
02217-9	RW-6 (Filtered)	04-13-95
02217-10	RW-7 (Filtered)	04-13-95

PARAMETER	02217-6	02217-7	02217-8	02217-9	02217-10
Cobalt (EPA 6010)					
Cobalt, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Copper (EPA 6010)					
Copper, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.25.95	04.19.95	04.19.95	04.19.95	04.19.95
Iron (EPA 6010)					
Iron, mg/l	20	0.31	0.30	0.46	1.4
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Lead (EPA 7421)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Date Analyzed	04.19.95	04.19.95	04.19.95	04.19.95	04.19.95
Magnesium (EPA 6010)					
Magnesium, mg/l	9.5	6.5	4.4	1.0	17
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Manganese (EPA 6010)					
Manganese, mg/l	0.42	0.076	0.053	0.090	0.22
Date Analyzed	04.27.95	04.19.95	04.19.95	04.19.95	04.19.95
Mercury (EPA 7470)					
Mercury, mg/l	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Date Analyzed	04.29.95	04.29.95	04.29.95	04.29.95	04.29.95
Nickel (EPA 6010)					
Nickel, mg/l	<0.0083	<0.0083	<0.0083	<0.0083	<0.0083
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95

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02217-7	RW-4 (Filtered)	04-13-95
02217-8	RW-5 (Filtered)	04-13-95
02217-9	RW-6 (Filtered)	04-13-95
02217-10	RW-7 (Filtered)	04-13-95

PARAMETER	02217-6	02217-7	02217-8	02217-9	02217-10
Potassium (EPA 6010)					
Potassium, mg/l	4.6	2.3	3.8	<1.0	7.9
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Selenium (EPA 7741)					
Selenium, mg/l	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
Date Analyzed	04.26.95	04.26.95	04.26.95	04.26.95	04.26.95
Silver (EPA 6010)					
Silver, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.26.95	04.20.95	04.20.95	04.20.95	04.20.95
Sodium (EPA 6010)					
Sodium, mg/l	60	14	13	2.9	93
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Thallium (EPA 7841)					
Thallium, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Date Analyzed	04.21.95	04.21.95	04.21.95	04.21.95	04.21.95
Vanadium (EPA 6010)					
Vanadium , mg/l	0.016	<0.010	<0.010	<0.040	<0.010
Date Analyzed	04.26.95	04.19.95	04.19.95	04.19.95	04.19.95
Zinc (EPA 6010)					
Zinc, mg/l	0.19	<0.020	<0.020	<0.020	<0.020
Date Analyzed	04.27.95	04.19.95	04.19.95	04.19.95	04.19.95
Gross Alpha, pCi/l	3.4+/-1.4	2.2+/-1.7	<2.0	<2.0	<2.0
Gross Beta, pCi/l	10+/-2.6	<2.0	2.6+/-2.0	<2.0	12+/-4.5
Radium 226, pCi/l	<0.60	<0.60	<0.60	<0.60	.88+/-0.10

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02217-6	RW-3 (Filtered)	04-13-95
02217-7	RW-4 (Filtered)	04-13-95
02217-8	RW-5 (Filtered)	04-13-95
02217-9	RW-6 (Filtered)	04-13-95
02217-10	RW-7 (Filtered)	04-13-95

PARAMETER	02217-6	02217-7	02217-8	02217-9	02217-10
Radium 228, pCi/l	<3.4	<3.4	<3.4	<3.4	<3.4

REFERENCE: EPA SW-846 3rd Edition, 1986

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& ENVIRONMENTAL SERVICES, INC.

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LOG NO: M5-02217

Received: 14 APR 95

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

Project: NAS Pensacola
Sampled By: D. Turner/L. Fanning

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
02217-11	RW-3	04-14-95
02217-12	RW-4	04-14-95
02217-13	RW-5	04-14-95
02217-14	RW-6	04-14-95
02217-15	RW-7	04-14-95

PARAMETER	02217-11	02217-12	02217-13	02217-14	02217-15
Total Coliform (MF)					
Total Coliform MF, NO/100ml	<1	<1	<1	<1	<1
Date/Time Analyzed	04.14/1245	04.14/1245	04.14/1245	04.14/1245	04.14/1245
Analyst	AKC	AKC	AKC	AKC	AKC

REFERENCE: EPA SW-846 3rd Edition, 1986

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Volatiles by GC/MS (8240)			
Chloromethane, ug/l	<10	---	---
Bromomethane, ug/l	<10	---	---
Vinyl Chloride, ug/l	<10	---	---
Chloroethane, ug/l	<10	---	---
Methylene chloride (Dichloromethane), ug/l	<5.0	---	---
Acetone, ug/l	<25	---	---
Carbon disulfide, ug/l	<5.0	---	---
1,1-Dichloroethene, ug/l	<5.0	114/106 %	7.3 %
1,1-Dichloroethane, ug/l	<5.0	---	---
trans-1,2-Dichloroethylene, ug/l	<5.0	---	---
Chloroform, ug/l	<5.0	---	---
1,2-Dichloroethane, ug/l	<5.0	---	---
2-Butanone (MEK), ug/l	<25	---	---
1,1,1-Trichloroethane, ug/l	<5.0	---	---
Carbon tetrachloride, ug/l	<5.0	---	---
Vinyl acetate, ug/l	<10	---	---
Bromodichloromethane, ug/l	<5.0	---	---
1,1,2,2-Tetrachloroethane, ug/l	<5.0	---	---
1,2-Dichloropropane, ug/l	<5.0	---	---
trans-1,3-Dichloropropene, ug/l	<5.0	---	---
Trichloroethene, ug/l	<5.0	105/106 %	0.94 %
Dibromochloromethane, ug/l	<5.0	---	---
1,1,2-Trichloroethane, ug/l	<5.0	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Benzene, ug/l	<5.0	108/105 %	2.8 %
cis-1,3-Dichloropropene, ug/l	<5.0	---	---
2-Chloroethylvinyl ether, ug/l	<50	---	---
Bromoform, ug/l	<5.0	---	---
2-Hexanone, ug/l	<25	---	---
4-Methyl-2-pentanone (MIBK), ug/l	<25	---	---
Tetrachloroethene, ug/l	<5.0	---	---
Toluene, ug/l	<5.0	134/109 %	20 %
Chlorobenzene, ug/l	<5.0	104/103 %	0.96 %
Ethylbenzene, ug/l	<5.0	---	---
Styrene, ug/l	<5.0	---	---
Xylenes, ug/l	<5.0	---	---

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REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Semivolatile Organics (8270)			
1,3-Dichlorobenzene, ug/l	<10	---	---
1,4-Dichlorobenzene, ug/l	<10	53/57 %	6.0 %
Hexachloroethane, ug/l	<10	---	---
bis(2-Chloroethyl)ether, ug/l	<10	---	---
1,2-Dichlorobenzene, ug/l	<10	---	---
bis(2-Chloroisopropyl)ether, ug/l	<10	---	---
N-Nitrosodi-N-Propylamine, ug/l	<10	80/77 %	3.9 %
Nitrobenzene, ug/l	<10	---	---
Hexachlorobutadiene, ug/l	<10	---	---
1,2,4-Trichlorobenzene, ug/l	<10	59/57 %	4.6 %
Isophorone, ug/l	<10	---	---
Naphthalene, ug/l	<10	---	---
bis(2-Chloroethoxy)methane, ug/l	<10	---	---
Hexachlorocyclopentadiene, ug/l	<10	---	---
2-Chloronaphthalene, ug/l	<10	---	---
Acenaphthylene, ug/l	<10	---	---
Acenaphthene, ug/l	<10	64/63 %	1.5 %
Dimethylphthalate, ug/l	<10	---	---
2,6-Dinitrotoluene, ug/l	<10	---	---
Fluorene, ug/l	<10	---	---
4-Chlorophenyl-phenyl ether, ug/l	<10	---	---
2,4-Dinitrotoluene, ug/l	<10	46/46 %	0.88 %
Diethylphthalate, ug/l	<10	---	---

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02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
N-Nitrosodiphenylamine/Diphenylamine, ug/l	<10	---	---
Hexachlorobenzene, ug/l	<10	---	---
gamma-BHC, ug/l	<10	---	---
4-Bromophenyl phenyl ether, ug/l	<10	---	---
delta-BHC, ug/l	<10	---	---
Phenanthrene, ug/l	<10	---	---
Anthracene, ug/l	<10	---	---
beta-BHC, ug/l	<10	---	---
Heptachlor, ug/l	<20	---	---
alpha-BHC, ug/l	<10	---	---
Aldrin, ug/l	<10	---	---
Di-n-butylphthalate, ug/l	<10	---	---
Heptachlor epoxide, ug/l	<20	---	---
Endosulfan I, ug/l	<20	---	---
Fluoranthene, ug/l	<10	---	---
Dieldrin, ug/l	<10	---	---
4,4'-DDE, ug/l	<10	---	---
Pyrene, ug/l	<10	53/53 %	0.19 %
Endrin, ug/l	<20	---	---
Endosulfan II, ug/l	<20	---	---
4,4'-DDD, ug/l	<10	---	---
Benzidine, ug/l	<80	---	---
4,4'-DDT, ug/l	<10	---	---
Endosulfan sulfate, ug/l	<20	---	---

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02217-16	Laboratory Blank
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02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Endrin Aldehyde, ug/l	<50	---	---
Butylbenzylphthalate, ug/l	<10	---	---
bis(2-Ethylhexyl)phthalate, ug/l	<5.0	---	---
Chrysene, ug/l	<10	---	---
Benzo(a)anthracene, ug/l	<10	---	---
3,3'-Dichlorobenzidine, ug/l	<20	---	---
Di-n-octylphthalate, ug/l	<10	---	---
Benzo(b)fluoranthene, ug/l	<10	---	---
Benzo(k)fluoranthene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	---	---
Indeno(1,2,3-cd)pyrene, ug/l	<10	---	---
Dibenz(a,h)anthracene, ug/l	<10	---	---
Benzo(g,h,i)perylene, ug/l	<10	---	---
N-Nitrosodimethylamine, ug/l	<10	---	---
Chlordane, ug/l	<50	---	---
Toxaphene, ug/l	<2000	---	---
Aroclor-1016, ug/l	<500	---	---
Aroclor-1221, ug/l	<500	---	---
Aroclor-1232, ug/l	<500	---	---
Aroclor-1242, ug/l	<500	---	---
Aroclor-1248, ug/l	<500	---	---
Aroclor-1254, ug/l	<500	---	---
Aroclor-1260, ug/l	<500	---	---
2-Chlorophenol, ug/l	<5.0	61/61 %	0 %

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02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
2-Nitrophenol, ug/l	<10	---	---
Phenol, ug/l	<5.0	60/59 %	2.0 %
2,4-Dimethylphenol, ug/l	<10	---	---
2,4-Dichlorophenol, ug/l	<5.0	---	---
2,4,6-Trichlorophenol, ug/l	<5.0	---	---
4-Chloro-3-methylphenol, ug/l	<5.0	76/72 %	5.4 %
2,4-Dinitrophenol, ug/l	<50	---	---
2-Methyl-4,6-dinitrophenol, ug/l	<50	---	---
Pentachlorophenol, ug/l	<10	50/44 %	13 %
4-Nitrophenol, ug/l	<50	34/35 %	3.6 %
Benzyl alcohol, ug/l	<10	---	---
2-Methylphenol (o-cresol), ug/l	<10	---	---
3-Methylphenol/4-Methylphenol(m&p-cresol), ug/l	<10	---	---
Benzoic acid, ug/l	<50	---	---
4-Chloroaniline, ug/l	<20	---	---
2-Methylnaphthalene, ug/l	<10	---	---
2,4,5-Trichlorophenol, ug/l	<10	---	---
2-Nitroaniline, ug/l	<50	---	---
3-Nitroaniline, ug/l	<50	---	---
Dibenzofuran, ug/l	<10	---	---
4-Nitroaniline, ug/l	<50	---	---
O&G (EPA 413.1), mg/l	<1.0	100/102 %	2.0 %
5 Day BOD (SM 507), mg/l	<2.0	95/91 %	4.3 %
Chloride, mg/l	<1.0	105/106 %	0.94 %
Residual Chlorine, mg/l	<0.05	---	---
Fluoride, mg/l	<0.20	98/100 %	2.0 %

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02217-16	Laboratory Blank
02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Nitrate-N, mg/l	<0.10	94/94 %	0 %
Sulfate, mg/l	<1.0	105/106 %	0.94 %
TSS (EPA 160.2), mg/l	<2.0	86/90 %	4.5 %
Kjeldahl Nitrogen-N, mg/l	<0.10	92/98 %	6.3 %
Cyanide, Total (9012), mg/l	<0.010	105/110 %	4.6 %
Phosphorus, Total, mg/l	<0.050	93/96 %	3.2 %
Surfactants (MBAS-EPA 425.1), mg/l	<0.10	108/101 %	6.7 %
Aluminum, mg/l	<0.10	101/105 %	3.9 %
Antimony, mg/l	<0.050	100/105 %	4.9 %
Arsenic, mg/l	<0.0020	106/105 %	0.94 %
Barium, mg/l	<0.010	102/98 %	4.0 %
Beryllium, mg/l	<0.0050	105/105 %	0 %
Cadmium, mg/l	<0.0050	102/106 %	3.8 %
Calcium, mg/l	<0.50	113/116 %	2.6 %
Chromium, mg/l	<0.010	103/105 %	1.9 %
Cobalt, mg/l	<0.010	105/108 %	2.8 %
Copper, mg/l	<0.010	103/100 %	2.9 %
Iron, mg/l	0.053	103/106 %	2.9 %
Lead, mg/l	<0.0050	106/107 %	0.94 %
Magnesium, mg/l	<0.50	100/103 %	2.9 %
Manganese, mg/l	<0.010	103/106 %	2.9 %
Mercury, mg/l	<0.00010	104/105 %	0.96 %
Nickel, mg/l	<0.0083	104/108 %	3.8 %
Potassium, mg/l	<1.0	95/98 %	3.1 %
Selenium, mg/l	<0.0020	102/102 %	0 %
Silver, mg/l	<0.010	96/99 %	3.1 %

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LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
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02217-17	Accuracy (% Recovery for LCS/LCSD)
02217-18	Precision (Relative % Difference)

PARAMETER	02217-16	02217-17	02217-18
Sodium, mg/l	<1.0	107/118 %	9.8 %
Thallium, mg/l	<0.010	103/103 %	0 %
Vanadium , mg/l	<0.010	102/104 %	1.9 %
Zinc, mg/l	<0.020	103/107 %	3.8 %
Gross Alpha, pCi/l	<2.0	108 %	0.86 %
Gross Beta, pCi/l	<2.0	95 %	13 %
Radium 226, pCi/l	<0.60	91 %	13 %
Radium 228, pCi/l	<3.4	128 %	3.5 %

Jesse L. Smith

Jesse L. Smith

Final Page Of Report

02217

RUST ENVIRONMENT & INFRASTRUCTURE

Custody Chain and Analytical Request

Page 1 of 1

RUST E&I Project No. 89038
RUST E&I Project Name NASP
Custody No./LIMS No.

Project/Location: NAS Pensacola
Client Name: RUST E&I
Collected By: D. Turner / Leon Fanning

Sample ID (Minimize Characters)	Date 1995	Time (24-Hour)	See Comments: Comp	Grab	Well	Sample Information (location, depth, filtered, etc.)	# Of Containers	See Attachment for Analysis		Total Coliform								COMMENTS (add preservative information)	Cooler Letter
RW-6	4/13	1800			X	RW-6	17											A = Aqueous, S = Solid, M = Aqueous / Solid Mixture, W = Waste	
RW-4	4/13	1715			X	RW-4	17												
RW-5	4/13	1440			X	RW-5	17												
RW-7	4/13	1345			X	RW-6	17											For specific	
RW-3	4/13	1625			X	RW-3	17											Method numbers	
																		call Scott Ross	
RW-6	4/14	0745			X	RW-6	2			2								(RUST) at (803)	
RW-4	4/14	0815			X	RW-4	2			2								572-5600	
RW-5	4/14	0800			X	RW-5	2			2									
RW-7	4/14	0745			X	RW-6	2			2									
RW-3	4/14	0755			X	RW-3	2			2									

SAMPLE ANALYSIS (SPECIFY METHOD)

Custody Transfers Prior to Receipt By Laboratory

	Relinquished by/(Signed) (Organization)	Received by/(Signed) (Organization)	Date	Time
1.	Dina Turner (RUST)	Charles B. Anderson Jr	4/14/95	
2.				
3.				

Sample Delivery Details/Laboratory Receipt

Delivered Directly to Lab ☒ Shipped ☐
Method of Shipment: _____ Airbill #: _____
Analytical Lab: Savannah Labs Location: Mobile, Alabama
Lab Recipient: Charles B. Anderson Jr (Signature) Date: 4-14-95 Time: 1150

Additional Remarks:
(Condition Upon Lab Receipt, Etc.)

Rev. 09/01/93

White - Laboratory; Yellow - RUST E&I; Pink - Project Files

APPENDIX D

AIRSTRIP MODELLING RESULTS

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	68.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0752 lb/ft^3
Viscosity of water	:	6.75E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Benzene
Molecular weight	:	78.1 g/mol
Boiling point	:	176 degrees F.
Molal volume at boiling point	:	0.0960 L/mol
Henry's Constant	:	0.23000
Temperature Constant	:	1849 deg K
Molecular diffusivity in air	:	1.01E-04 ft^2/s
Molecular diffusivity in water	:	9.59E-09 ft^2/s

PACKING PROPERTIES

Name	:	Jaeger Tripacks
Packing Material	:	Plastic
Nominal Size	:	1.00 inch
Specific Area	:	84.7 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	12.0 ft
Air friction factor	:	28

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.76E+00 lb/ft^2.s	*
Air mass loading rate	:	6.39E-02 lb/ft^2.s	*
Water volumetric loading rate	:	1.27E+01 gpm/ft^2	*
Air volumetric loading rate	:	3.81E+02 gpm/ft^2	*
Air pressure gradient	:	<.06 " H2O/ft	#
Volumetric air/water ratio	:	30.0	
Stripping factor	:	6.9	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	39.4 %	
Wetted packing area	:	33.4 ft^2/ft^3	*
Transfer rate constant in water	:	4.27E-04 ft/s	
Transfer rate constant in air	:	2.72E-02 ft/s	
Overall transfer rate constant	:	4.00E-04 ft/s	
Overall mass transfer coefficient	:	1.33E-02 1/s	
NTU	:	5.5079	
HTU	:	2.1787 ft	

CONTAMINANT REMOVAL

Influent concentration	:	9.50E+01 ug/L	
Effluent concentration	:	7.33E-01 ug/L	
Fraction removed	:	99.2 %	
Mass of contaminant removed	:	1.44E-02 lb/ft^2.day	*
Concentration in airstream	:	8.90E-02 mg/ft^3	

* Expressed per unit of stripping tower cross-sectional area

\# Expressed per unit of tower length

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	68.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0752 lb/ft^3
Viscosity of water	:	6.75E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Chlorobenzene
Molecular weight	:	112.6 g/mol
Boiling point	:	270 degrees F.
Molal volume at boiling point	:	0.1319 L/mol
Henry's Constant	:	0.16000
Temperature Constant	:	1904 deg K
Molecular diffusivity in air	:	8.28E-05 ft^2/s
Molecular diffusivity in water	:	7.92E-09 ft^2/s

PACKING PROPERTIES

Name	:	Jaeger Tripacks
Packing Material	:	Plastic
Nominal Size	:	1.00 inch
Specific Area	:	84.7 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	12.0 ft
Air friction factor	:	28

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.76E+00 lb/ft^2.s	
Air mass loading rate	:	6.39E-02 lb/ft^2.s	
Water volumetric loading rate	:	1.27E+01 gpm/ft^2	*
Air volumetric loading rate	:	3.81E+02 gpm/ft^2	
Air pressure gradient	:	<.06 " H2O/ft	#
Volumetric air/water ratio	:	30.0	
Stripping factor	:	4.8	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	39.4 %	
Wetted packing area	:	33.4 ft^2/ft^3	*
Transfer rate constant in water	:	3.88E-04 ft/s	
Transfer rate constant in air	:	2.38E-02 ft/s	
Overall transfer rate constant	:	3.53E-04 ft/s	
Overall mass transfer coefficient	:	1.18E-02 1/s	
NTU	:	4.7978	
HTU	:	2.5011 ft	

CONTAMINANT REMOVAL

Influent concentration	:	1.64 mg/L	
Effluent concentration	:	2.93E+01 ug/L	
Fraction removed	:	98.2 %	
Mass of contaminant removed	:	2.46E-01 lb/ft^2.day	*
Concentration in airstream	:	1.52E+00 mg/ft^3	

* Expressed per unit of stripping tower cross-sectional area

\# Expressed per unit of tower length

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	68.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0752 lb/ft^3
Viscosity of water	:	6.75E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	p-Dichlorobenzene
Molecular weight	:	147.0 g/mol
Boiling point	:	345 degrees F.
Molal volume at boiling point	:	0.1378 L/mol
Henry's Constant	:	0.12000
Temperature Constant	:	1904 deg K
Molecular diffusivity in air	:	7.79E-05 ft^2/s
Molecular diffusivity in water	:	7.72E-09 ft^2/s

PACKING PROPERTIES

Name	:	Jaeger Tripacks
Packing Material	:	Plastic
Nominal Size	:	1.00 inch
Specific Area	:	84.7 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	12.0 ft
Air friction factor	:	28

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.76E+00 lb/ft^2.s	*
Air mass loading rate	:	6.39E-02 lb/ft^2.s	*
Water volumetric loading rate	:	1.27E+01 gpm/ft^2	*
Air volumetric loading rate	:	3.81E+02 gpm/ft^2	*
Air pressure gradient	:	<.06 " H2O/ft	#
Volumetric air/water ratio	:	30.0	
Stripping factor	:	3.6	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	39.4 %	
Wetted packing area	:	33.4 ft^2/ft^3	*
Transfer rate constant in water	:	3.83E-04 ft/s	
Transfer rate constant in air	:	2.29E-02 ft/s	
Overall transfer rate constant	:	3.36E-04 ft/s	
Overall mass transfer coefficient	:	1.12E-02 1/s	
NTU	:	4.5218	
HTU	:	2.6538 ft	

CONTAMINANT REMOVAL

Influent concentration	:	4.97E+02 ug/L	
Effluent concentration	:	1.38E+01 ug/L	
Fraction removed	:	97.2 %	
Mass of contaminant removed	:	7.37E-02 lb/ft^2.day	*
Concentration in airstream	:	4.56E-01 mg/ft^3	

* Expressed per unit of stripping tower cross-sectional area

\# Expressed per unit of tower length

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	68.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0752 lb/ft^3
Viscosity of water	:	6.75E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Vinylchloride
Molecular weight	:	62.5 g/mol
Boiling point	:	9 degrees F.
Molal volume at boiling point	:	0.0653 L/mol
Henry's Constant	:	3.40000
Temperature Constant	:	1904 deg K
Molecular diffusivity in air	:	1.28E-04 ft^2/s
Molecular diffusivity in water	:	1.21E-08 ft^2/s

PACKING PROPERTIES

Name	:	Jaeger Tripacks
Packing Material	:	Plastic
Nominal Size	:	1.00 inch
Specific Area	:	84.7 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	12.0 ft
Air friction factor	:	28

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.76E+00 lb/ft^2.s	*
Air mass loading rate	:	6.39E-02 lb/ft^2.s	*
Water volumetric loading rate	:	1.27E+01 gpm/ft^2	*
Air volumetric loading rate	:	3.81E+02 gpm/ft^2	*
Air pressure gradient	:	<.06 " H2O/ft	#
Volumetric air/water ratio	:	30.0	
Stripping factor	:	102.0	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	39.4 %	
Wetted packing area	:	33.4 ft^2/ft^3	*
Transfer rate constant in water	:	4.80E-04 ft/s	
Transfer rate constant in air	:	3.18E-02 ft/s	
Overall transfer rate constant	:	4.78E-04 ft/s	
Overall mass transfer coefficient	:	1.59E-02 1/s	
NTU	:	6.7447	
HTU	:	1.7792 ft	

CONTAMINANT REMOVAL

Influent concentration	:	1.70E+01 ug/L	
Effluent concentration	:	2.12E-02 ug/L	
Fraction removed	:	99.9 %	
Mass of contaminant removed	:	2.59E-03 lb/ft^2.day	*
Concentration in airstream	:	1.60E-02 mg/ft^3	

* Expressed per unit of stripping tower cross-sectional area

\# Expressed per unit of tower length

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	68.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0752 lb/ft^3
Viscosity of water	:	6.75E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Dichloromethane
Molecular weight	:	84.9 g/mol
Boiling point	:	104 degrees F.
Molal volume at boiling point	:	0.0714 L/mol
Henry's Constant	:	0.08400
Temperature Constant	:	1904 deg K
Molecular diffusivity in air	:	1.15E-04 ft^2/s
Molecular diffusivity in water	:	1.15E-08 ft^2/s

PACKING PROPERTIES

Name	:	Jaeger Tripacks
Packing Material	:	Plastic
Nominal Size	:	1.00 inch
Specific Area	:	84.7 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	12.0 ft
Air friction factor	:	28

******* A N A L Y S I S O F S T R I P P I N G T O W E R *******

PROJECT : NAS Pensacola - RUST Project 33462.400 DATE : 5/17/1995

ENGINEER : RUST Environment & Infrastructure PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.76E+00 lb/ft^2.s	*
Air mass loading rate	:	6.39E-02 lb/ft^2.s	*
Water volumetric loading rate	:	1.27E+01 gpm/ft^2	*
Air volumetric loading rate	:	3.81E+02 gpm/ft^2	*
Air pressure gradient	:	<.06 " H2O/ft	#
Volumetric air/water ratio	:	30.0	
Stripping factor	:	2.5	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	39.4 %	
Wetted packing area	:	33.4 ft^2/ft^3	*
Transfer rate constant in water	:	4.67E-04 ft/s	
Transfer rate constant in air	:	2.96E-02 ft/s	
Overall transfer rate constant	:	3.93E-04 ft/s	
Overall mass transfer coefficient	:	1.31E-02 1/s	
NTU	:	5.2272	
HTU	:	2.2957 ft	

CONTAMINANT REMOVAL

Influent concentration	:	6.50E+00 ug/L	
Effluent concentration	:	1.72E-01 ug/L	
Fraction removed	:	97.3 %	
Mass of contaminant removed	:	9.65E-04 lb/ft^2.day	*
Concentration in airstream	:	5.97E-03 mg/ft^3	

* Expressed per unit of stripping tower cross-sectional area

\# Expressed per unit of tower length

APPENDIX E

TSCREEN AIR DISPERSION MODELLING RESULTS

05/19/95
16:04:17

*** SCREEN2 MODEL RUN ***
** VERSION DATED 92245 ***

AIR STRIPPER NAS PENSACOLA

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	.126000
STACK HEIGHT (M)	=	3.6600
STK INSIDE DIAM (M)	=	.2000
STK EXIT VELOCITY (M/S)	=	5.8400
STK GAS EXIT TEMP (K)	=	293.0000
AMBIENT AIR TEMP (K)	=	293.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	3.6600
MIN HORIZ BLDG DIM (M)	=	2.4400
MAX HORIZ BLDG DIM (M)	=	2.4400

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)	
PLE TERRAIN	413.7	305.	0.	
BUILDING CAVITY-1	9406.	5.	--	(DIST = CAVITY LENGTH)
BUILDING CAVITY-2	9406.	5.	--	(DIST = CAVITY LENGTH)

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .341 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
305.	413.7	6	1.0	1.0	10000.0	4.71	11.40	6.58	SS
400.	290.8	6	1.0	1.0	10000.0	4.71	14.64	7.88	SS
500.	213.0	6	1.0	1.0	10000.0	4.71	17.97	9.19	SS
600.	163.3	6	1.0	1.0	10000.0	4.71	21.24	10.45	SS
700.	132.8	6	1.0	1.0	10000.0	4.71	24.46	11.32	SS
800.	109.2	6	1.0	1.0	10000.0	4.71	27.63	12.35	SS

900.	91.75	6	1.0	1.0	10000.0	4.71	30.78	13.35	SS
1000.	79.11	6	1.0	1.0	10000.0	4.71	33.88	14.16	SS
1100.	68.79	6	1.0	1.0	10000.0	4.71	36.96	15.02	SS
1200.	60.51	6	1.0	1.0	10000.0	4.71	40.01	15.85	SS
1300.	53.75	6	1.0	1.0	10000.0	4.71	43.04	16.65	SS
1400.	48.15	6	1.0	1.0	10000.0	4.71	46.05	17.44	SS
1500.	43.45	6	1.0	1.0	10000.0	4.71	49.03	18.21	SS
1600.	39.46	6	1.0	1.0	10000.0	4.71	51.99	18.95	SS
1700.	36.04	6	1.0	1.0	10000.0	4.71	54.94	19.68	SS
1800.	33.09	6	1.0	1.0	10000.0	4.71	57.87	20.40	SS
1900.	30.51	6	1.0	1.0	10000.0	4.71	60.78	21.10	SS
2000.	28.44	6	1.0	1.0	10000.0	4.71	63.68	21.63	SS
2100.	26.53	6	1.0	1.0	10000.0	4.71	66.56	22.21	SS
2200.	24.82	6	1.0	1.0	10000.0	4.71	69.42	22.78	SS
2300.	23.30	6	1.0	1.0	10000.0	4.71	72.28	23.34	SS
2400.	21.92	6	1.0	1.0	10000.0	4.71	75.12	23.89	SS
2500.	20.68	6	1.0	1.0	10000.0	4.71	77.95	24.42	SS
2600.	19.55	6	1.0	1.0	10000.0	4.71	80.76	24.95	SS
2700.	18.52	6	1.0	1.0	10000.0	4.71	83.57	25.47	SS
2800.	17.58	6	1.0	1.0	10000.0	4.71	86.36	25.98	SS
2900.	16.72	6	1.0	1.0	10000.0	4.71	89.15	26.48	SS
3000.	15.93	6	1.0	1.0	10000.0	4.71	91.92	26.98	SS
3500.	12.93	6	1.0	1.0	10000.0	4.71	105.65	28.98	SS
4000.	10.79	6	1.0	1.0	10000.0	4.71	119.17	30.84	SS
4500.	9.196	6	1.0	1.0	10000.0	4.71	132.50	32.57	SS
5000.	7.973	6	1.0	1.0	10000.0	4.71	145.67	34.21	SS
5500.	7.007	6	1.0	1.0	10000.0	4.71	158.69	35.76	SS
6000.	6.228	6	1.0	1.0	10000.0	4.71	171.58	37.23	SS
6500.	5.588	6	1.0	1.0	10000.0	4.71	184.34	38.64	SS
7000.	5.055	6	1.0	1.0	10000.0	4.71	196.99	40.00	SS
7500.	4.620	6	1.0	1.0	10000.0	4.71	209.54	41.16	SS
8000.	4.247	6	1.0	1.0	10000.0	4.71	221.98	42.28	SS
8500.	3.924	6	1.0	1.0	10000.0	4.71	234.34	43.36	SS
9000.	3.642	6	1.0	1.0	10000.0	4.71	246.61	44.40	SS
9500.	3.395	6	1.0	1.0	10000.0	4.71	258.79	45.41	SS
10000.	3.175	6	1.0	1.0	10000.0	4.71	270.90	46.38	SS
15000.	1.874	6	1.0	1.0	10000.0	4.71	388.43	54.88	SS
20000.	1.324	6	1.0	1.0	10000.0	4.71	500.95	60.29	SS
25000.	1.012	6	1.0	1.0	10000.0	4.71	609.75	64.86	SS
30000.	.8123	6	1.0	1.0	10000.0	4.71	715.59	68.84	SS
40000.	.5839	6	1.0	1.0	10000.0	4.71	920.22	74.49	SS
50000.	.4524	6	1.0	1.0	10000.0	4.71	1117.42	79.19	SS

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 305. M:

305.	413.7	6	1.0	1.0	10000.0	4.71	11.40	6.58	SS

DIST = DISTANCE FROM CENTER OF THE AREA SOURCE
CONC = MAXIMUM GROUND LEVEL CONCENTRATION
STAB = ATMOSPHERIC STABILITY CLASS (1=A, 2=B, 3=C, 4=D, 5=E, 6=F)
U10M = WIND SPEED AT THE 10-M LEVEL
USTK = WIND SPEED AT STACK HEIGHT
MIX HT = MIXING HEIGHT
PLUME HT= PLUME CENTERLINE HEIGHT
SIGMA Y = LATERAL DISPERSION PARAMETER
SIGMA Z = VERTICAL DISPERSION PARAMETER
DWASH = BUILDING DOWNWASH:
DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED

DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

*** CAVITY CALCULATION - 1 ***			*** CAVITY CALCULATION - 2 ***		
CONC (UG/M**3)	=	9406.	CONC (UG/M**3)	=	9406.
CRIT WS @10M (M/S)	=	1.27	CRIT WS @10M (M/S)	=	1.27
CRIT WS @ HS (M/S)	=	1.27	CRIT WS @ HS (M/S)	=	1.27
DILUTION WS (M/S)	=	1.00	DILUTION WS (M/S)	=	1.00
CAVITY HT (M)	=	6.12	CAVITY HT (M)	=	6.12
CAVITY LENGTH (M)	=	4.82	CAVITY LENGTH (M)	=	4.82
ALONGWIND DIM (M)	=	2.44	ALONGWIND DIM (M)	=	2.44

****
*** USER SPECIFIED AVERAGING TIMES ***
****

ESTIMATED MAXIMUM CONCENTRATION FOR 8 HR AVERAGING TIME:
289.59 (+/- 82.74) UG/M**3

ESTIMATED MAXIMUM CONCENTRATION FOR 24 HR AVERAGING TIME:
165.48 (+/- 82.74) UG/M**3

ESTIMATED MAXIMUM CONCENTRATION FOR ANNUAL AVERAGING TIME:
33.096 (+/- 8.274) UG/M**3

****
*** END OF SCREEN MODEL OUTPUT ***
****

RUST ENVIRONMENT & INFRASTRUCTURE

CALCULATION SHEET

PAGE 1 OF 1

PROJECT NO. _____

CLIENT NAS Pensacola SUBJECT TSREEN Modelling Prepared By Nicole Shoop Date 5/11/95

PROJECT Air Stripper Emission Calculation Reviewed By RMB Date 5/25/95

Approved By PHB Date 5/25/95

Assumptions / Input Variables

① Concentration of VOC obtained from composite stream data = $2849.7 \frac{ug}{L}$ = $\boxed{2.85\ mg/L}$

② Incoming H_2O flow = 40.00 gpm (maximum equipment rating)

$$= \left(40.00 \frac{gallons}{min}\right)\left(3.785 \frac{L}{gallons}\right) = 151.40 \frac{L}{min}$$

③ Exit Velocity = $\frac{4V}{\pi d^2}$ where V = Volumetric flow rate, d = stack diameter

$$d = 8\ inches \left(\frac{2.54 \times 10^{-2} m}{inch}\right) = \boxed{0.203\ m}$$

(Air flow rate) $V = 400 \frac{ft^3}{min}\left(\frac{0.02832\ m^3}{ft^3}\right)\left(\frac{min}{60 s}\right) = 0.189 \frac{m^3}{s}$

$$\text{Stack Velocity} = \frac{4\left(0.189 \frac{m^3}{s}\right)}{\pi\,(0.203\ m)^2} = \boxed{5.84 \frac{m}{s}}$$

④ Release height assumed to be 12 ft $\left(\frac{0.3048 m}{ft}\right) = \boxed{3.658\ m}$

⑤ Exit temperature = 68 °F = 20 °C = $\boxed{293\ °K}$

⑥ Any buildings falling within a 60 ft radius (radius = stack height x 5) must be included in analysis.

Worst case building height = 12 ft = $\boxed{3.658\ m}$

building diameter = 8 ft = $\boxed{2.438\ m}$

⑦ distance to plant fence line = 1000 ft = $\boxed{304.80\ m}$

⑧ Emission rate = $\left(0.0072 \frac{g}{s}\right)\left(\frac{60 s}{min}\right)\left(\frac{60 min}{hr}\right)\left(\frac{24 hr}{day}\right)\left(\frac{lbs}{454 grams}\right) = \boxed{1.37 \frac{lbs}{day}}$

APPENDIX F

JAR TEST PROCEDURES FOR CHEMICAL PRECIPITATION

JAR TEST TREATABILITY STUDY

NAS PENSACOLA
PENSACOLA, FLORDIA

Composite Recovery Well Sample

Sample Volume:

1050 mls (21%) - RW 1,2 & 3
1350 mls (27%) - RW 4 & 6
2200 mls (44%) - RW 5A
400 mls (8%) - RW 7
Total: 5,000 mls

Date: 4/26/95
Testing Person: Robert Borowski - Project Engineer Rust Environment & Infrastructure

Initial Volume: 5,000 ml
pH: 6.75 s.u.

Chemical Addition:

5 mls	1 percent solution of potassium permanganate
45 mls	0.2 N solution of sodium hydroxide
10 mls	2 mg/l solution of cationic polymer

Mixing: Solution was mixed with a stir rod for approximately 1 minute.

Filtering: Solution was filtered through a 0.45 micron filter.

Final pH: 8.33 s.u.

Comments: Well water was dark from the well composite. After the chemicals were added, the water was still a dark color and small particals appeared in the water. The particals did not settle immediately. The water appeared clear after filtration and was analyzed for metals and radionuclides.

JAR TEST TREATABILITY STUDY

NAS PENSACOLA
PENSACOLA, FLORDIA

Recovery Well No. 4 & 6

Date: 4/26/95
Testing Person: Robert Borowski - Project Engineer Rust Environment & Infrastructure

Initial Volume: 5,000 ml
pH: 6.99 s.u.

Chemical Addition:

5 mls	1 percent solution of potassium permanganate
40 mls	0.2 N solution of sodium hydroxide
10 mls	2 mg/l solution of cationic polymer

Mixing: Solution was mixed with a stir rod for approximately 1 minute.

Filtering: Solution was filtered through a 0.45 micron filter.

Final pH: 7.98 s.u.

Comments: Well water was light yellow from the well. After the chemicals were added, the water was still a yellow color and no small particals appeared in the water. The water was still slightly yellow after filtration and was analyzed for metals and radionuclides.

JAR TEST TREATABILITY STUDY

NAS PENSACOLA
PENSACOLA, FLORDIA

Recovery Well No. 5A

Date: 4/26/95
Testing Person: Robert Borowski - Project Engineer Rust Environment & Infrastructure

Initial Volume: 5,000 ml
pH: 6.40 s.u.

Chemical Addition:

5 mls	1 percent solution of potassium permanganate
50 mls	0.2 N solution of sodium hydroxide
10 mls	2 mg/l solution of cationic polymer

Mixing: Solution was mixed with a stir rod for approximately 1 minute.

Filtering: Solution was filtered through a 0.45 micron filter.

Final pH: 8.2 s.u.

Comments: Well water was very dark (black) from the well. After the chemicals were added, the water was still a dark color and small particals appeared in the water. The solids did not settle immediately. The water appeared clear after filtration and was analyzed for metals and radionuclides.