N60201.AR.002183
NS MAYPORT
5090.3a

REMEDIAL ACTION PLAN BUILDING 25 NS MAYPORT FL
9/1/1993
NS MAYPORT

REMEDIAL ACTION PLAN

BUILDING 25
NAVAL STATION MAYPORT
MAYPORT, FLORIDA

SEPTEMBER, 1993

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

SOUTHNAVFACENGCOM 4650/1 (Rev. 6-93)
REQUEST FOR TRAVEL ORDERS/RESERVATIONS

FILL OUT REQUEST IN DUPLICATE. SEND COPY TO PSA, CODE 50, FOR RESERVATIONS. ROUTE ORIGINAL THROUGH CHAIN OF COMMAND FOR APPROVAL. SEE REVERSE FOR INSTRUCTIONS.

FROM: SOUTHERN DIVISION NAVAL FACILITIES ENGINEERING COMMAND, CODE 1849

TO: CODE 0161T VIA: (1) CODE 184 DATE / / (2) CODE 18 DATE / /

CODE 18S DATE / /

1. NAME OF REQUESTER GABRIEL L. MAGWOOD	2. ACRN	JOB ORDER NUMBER	F/SF
OFFICE PHONE 743-0307	14	D6F621	P5
ORGANIZATIONAL ELEMENT Environmental Department	14	D1A104 (RAVENELL ONLY)	P5

3. NAME	SOCIAL SECURITY NO.	POSITION TITLE	GRADE/RANK	HOME NO.	NEED ADVANCE
GABRIEL L. MAGWOOD	250-15-3025	ENVIRONMENTAL ENGINEER	GS-12	803/559-0676	NO
DEBBIE RAVENELL	249-17-6018	CONTRACT SPECIALIST	GS-12	803/875-4299	NO

REQUIRE ACCESS TO CLASSIFIED MATERIAL
____ SECRET ____ CONFIDENTIAL ____ TOP SECRET

APPROX. DAYS TDY 2 | PROCEED DATE 21 JULY 94

4. PURPOSE OF TRAVEL
VISIT UST SITES AT NAVAL STATION MAYPORT, AND CONDUCT TECHNICAL MEETINGS WITH RAC CONTRACTOR AND RUST ENVIRONMENTAL.

5. DATE OF TRAVEL	6. ACTIVITY AND CITY		7. DEPART TIME	8. ARRIVE TIME	COMMERCIAL			GOV'T	PRIVATE AUTO	
	FROM	TO			AIR	RAIL	AUTO	VEHICLE	DRIVER	RIDER
21 JULY 94	CHARLESTON, SC	MAYPORT, FL	8:45	9:37	X					
22 JULY 94	MAYPORT, FL	CHARLESTON, SC	15:30	16:19	X					

9. RENTAL CAR
____ NO __X__ YES

SIZE ICAR
(USE APPLICABLE CLASS CODE)

NUMBER OF PASSENGERS 2

10. REGISTRATION FEE
$

11. REMARKS: AIRLINE AND RENTAL CAR RESERVATIONS MADE BY SATO ON 18 JULY 94. BOQ RESERVATIONS MADE 7/18/94. CONF# 59830 & 59831.

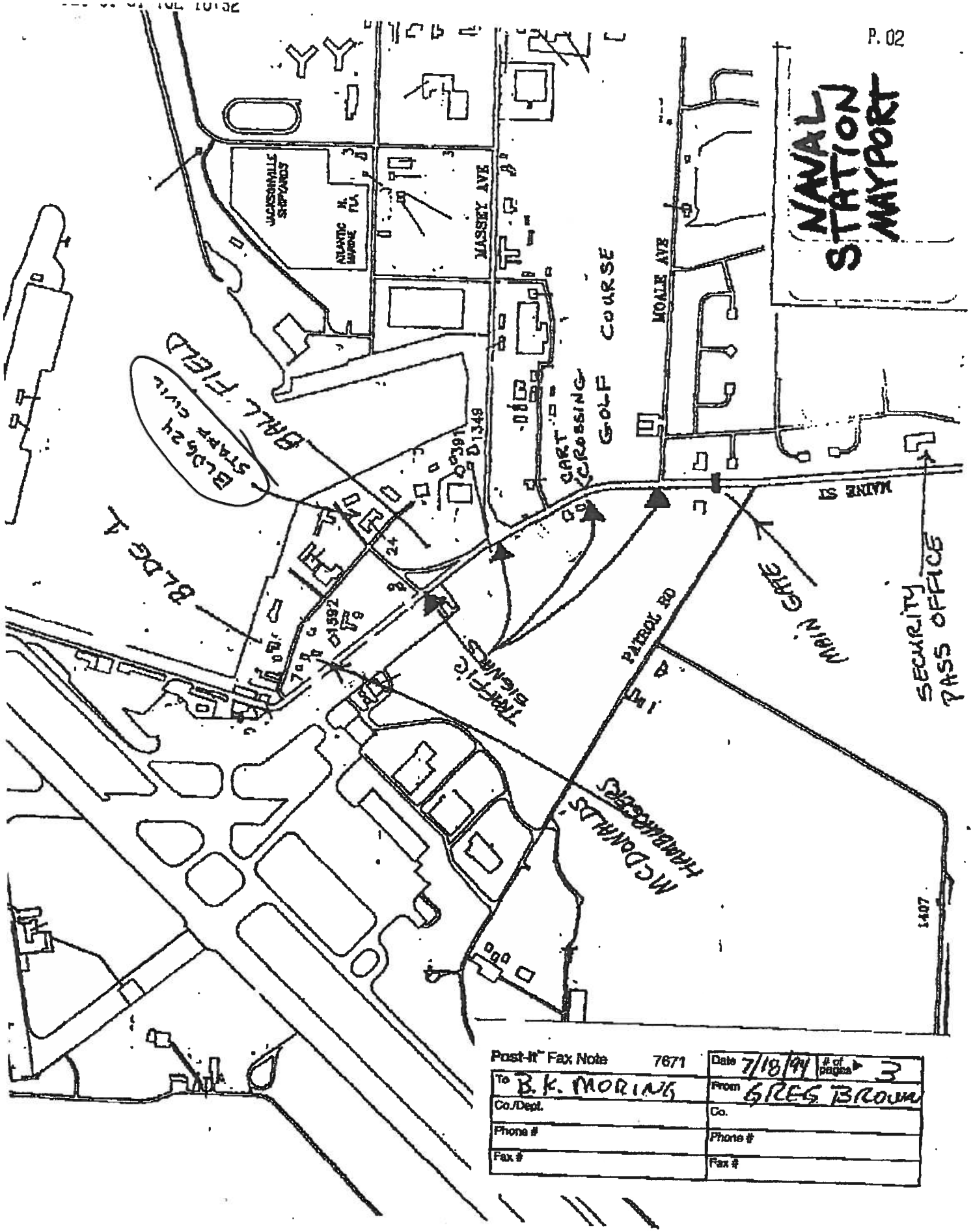
Airline Ticket Cost: $ 95 /PER PERSON

POC: BOQ DSN 960 5423

12. RETURN RESERVATION CONFIRMATION TO
SOUTHNAVFACENGCOM CODE 1849

SIGNATURE OF REQUESTER/DATE
18 July 94

13. CODE 0161T USE ONLY



Post-it™ Fax Note 7671	Date 7/18/94 # of pages ▶ 3
To B.K. MORING	From GREG BROWN
Co./Dept.	Co.
Phone #	Phone #
Fax #	Fax #

REMEDIAL ACTION PLAN (*Revision 1*)
NAVAL STATION MAYPORT
BUILDING 25 - TRANSPORTATION SHOP
MAYPORT, FLORIDA

RUST PROJECT NO. 86298.000

RUST ENVIRONMENT & INFRASTRUCTURE

RUST Environment & Infrastructure Inc.
370 S. North Lake Boulevard, Suite 1028
Altamonte Springs, FL 32701
Tel. (407) 331-5967 • FAX (407) 331-0025

April 21, 1994

Mr. Bryan Kizer
Code 184PDC
Southern Division
Naval Facilities Engineering Command
P.O. Box 10068
Charleston, SC 29411-0060

Subject: Remedial Action Plan (Revision 1)
Building 25, Naval Station Mayport
FDEP Facility No. 168626008
RUST Project No. 83680.000

Dear Mr. Kizer:

RUST Environmental and Infrastructure is pleased to submit Revision 1 of the subject Remedial Action Plan (RAP). This revision is in response to Florida Department of Environmental Protection comments on the original RAP submitted September 1993.

If you have further questions or require additional information, please contact this office.

Sincerely,

Chris M. Evans, E.I.
Staff Engineer

Marianne Sweeney, P.E.
Project Manager

CME/MS/jl/cg2433ce

EXECUTIVE SUMMARY

The Remedial Action Plan for Naval Station Mayport (Revision 1) has been revised to address comments from the Florida Department of Environmental Protection's Engineering Support Section and Naval Station Mayport. Sections of the RAP revised in response to the comments have been italicized.

Remediation of soil and groundwater contamination, as identified in the Contamination Assessment Report, *by air sparging/vapor extraction* is proposed at Building 25 according to Chapter 17-770, Florida Administrative Code.

While these remediation methodologies are proposed, design parameter values presented in this revision are estimates based on experience and industry standards. These were strictly used to determine the effectiveness and costs associated with these remediation technologies at this site. RUST, therefore, strongly recommends that a pilot study be conducted to verify soil vapor extraction and air sparging design criteria.

REMEDIAL ACTION PLAN (*Revision 1*)

NAVAL STATION MAYPORT

BUILDING 25 - TRANSPORTATION SHOP

MAYPORT, FLORIDA

RUST PROJECT NO. 86298.000

PREPARED FOR

UNITED STATES NAVY

SOUTHERN DIVISION

NAVAL FACILITIES ENGINEERING COMMAND

CHARLESTON, SOUTH CAROLINA

PREPARED BY

RUST ENVIRONMENT & INFRASTRUCTURE

370 S. North Lake Boulevard

Suite 1028

Altamonte Springs, Florida 32701

APRIL 1994

REPORT AUTHORS

The following employees of RUST Environment & Infrastructure are responsible for the technical content of the *Naval Station Mayport*, Building 25 - Transportation Shop, Remedial Action Plan (RAP) (*Revision 1*).

4/26/94

Chris M. Evans, E.I. (date)
Staff Engineer

Marianne Sweeney 4/26/94

Marianne Sweeney, P.E. (date)
Florida Reg. No. 44784

TABLE OF CONTENTS

1.0 **GENERAL**
- 1.1 Introduction
  - 1.1.1 Site Description
  - 1.1.2 Site History
- 1.2 Contamination Assessment Summary
  - 1.2.1 Site Geology and Hydrogeology
  - 1.2.2 Soil Contamination
  - 1.2.3 Groundwater Contamination

2.0 **FREE PRODUCT**

3.0 **SOIL REMEDIATION**
- 3.1 Treatment System Overview
- 3.2 Soil Vapor Extraction System
  - 3.2.1 Radius of Influence and Soil Vapor Flow Rate
  - 3.2.2 Soil Vapor Extraction/Vacuum Stress Monitor Well Specifications
  - *3.2.3 Groundwater Upwelling*
- 3.3 Soil Vapor Treatment System
  - 3.3.1 Influent and Effluent Concentrations
  - 3.3.2 Extracted Soil Vapor Treatment
  - 3.3.3 Blower Equipment and Piping

4.0 **GROUNDWATER REMEDIATION**
- *4.1 Pump and Treat versus Air Sparging*
  - *4.1.1 Feasibility of In-Situ Air Sparging*
  - *4.1.2 Cost Comparison*
- *4.2* Treatment System Overview
- *4.3 In-Situ Air Sparging System*
  - *4.3.1 Radius of Influence*
  - *4.3.2 Air Flow Rate*
  - *4.3.3 Well Pressure*
- *4.4 Sparge Vapor Capture*
- *4.5 Performance Monitoring*
- *4.6 Expected Sparge Vapor Concentration and Treatment*
- *4.7 Hydrogeologic Considerations*
- *4.8 Compressor Equipment and Piping*
- *4.9 Sparge Well Specifications*

5.0 **SYSTEM INSTALLATION**

6.0 **SYSTEM START UP**

7.0 **OPERATIONS**
- 7.1 Sampling
- 7.2 Maintenance
- 7.3 Reports

8.0 **COST ESTIMATE**

REFERENCES

Figures

Figure 1 - Site Location Map
Figure 2 - Site Vicinity Map
Figure 3 - Site Map
Figure 4 - Lithologic Cross Section
Figure 5 - Soil Contamination/Boring Location Map
Figure 6 - Groundwater Contamination Map (July 1993)
Figure 7 - Soil Vapor Extraction System Layout Map
Figure 8 - Vapor Recovery Well Construction Detail
Figure 9 - Vacuum Stress Monitor Well Detail
Figure 10 - Vapor Phase Carbon Adsorption System
Figure 11 - Air Sparging System Layout Map
Figure 12 - Treatment System Compound Detail
Figure 13 - Air Sparging Well Detail

Tables

Table 1 - Monitor Well Construction Summary
Table 2 - Summary of Soil Headspace Analyses
Table 3 - Summary of Laboratory Results (July 1993)
Table 4 - Historical Comparison of Groundwater Contaminants

Appendices

Appendix A - Historical Groundwater Elevation Data
Appendix B - Monitor Well Sampling Data Sheets
Appendix C - Report of Laboratory Analyses
Appendix D - Soil Vapor Extraction System Design Calculations and Equipment Specifications
Appendix E - Cost Comparison Between In-Situ Air Sparging and Pump and Treat
Appendix F - Pilot Study Description
Appendix G - Air Compressor Specifications
Appendix H - Cost Estimate
Appendix I - RAP Review Checklist

List of Abbreviations

AST	aboveground storage tank
bls	below land surface
COE	Corps of Engineers
cfm	cubic feet per minute
EPA	Environmental Protection Agency
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FID	*flame ionization detector*
HDPE	high-density polyethylene
MSL	mean sea level
MTBE	methyl-tert-butyl-ether
NSM	*Naval Station Mayport*
NGVD	National Geodetic Vertical Datum
NPDES	*National Pollution Discharge Elimination System*
O&M	*Operations and Maintenance*
OVA	Organic Vapor Analyzer
PID	Photoionizing Detector
ppm	parts per million
PVC	poly vinyl chloride
RAP	Remedial Action Plan
SVE	soil vapor extraction
TDH	total dynamic head
TDS	total dissolved solids
TSS	total suspended solids
TVOA	total volatile organic aromatic
ug/l	micrograms per liter
UST	underground storage tank
VSM	*vacuum stress monitor*

1.0 GENERAL

1.1 Introduction

In accordance with applicable portions of Chapter 17-770, Florida Administrative Code (FAC), a Remedial Action Plan (RAP) has been prepared for *Naval Station Mayport (NSM)*, Building 25 - Transportation Shop in Mayport, Florida. The objective of this RAP is to achieve cleanup of the contaminated groundwater to target levels set forth in Rule 17-770.730, FAC, and reduce contaminant concentrations in the unsaturated soils to acceptable levels according to Florida Department of Environmental Protection (FDEP) directives.

1.1.1 Site Description

Naval Station Mayport is located east of Jacksonville, on the south bank of the St. Johns River and on the east coast of the Atlantic Ocean (Figure 1). Topography is generally flat with elevations at approximately 10 feet NGVD.

Building 25 is a service and fueling facility for Navy vehicles and is located on the southeast corner of Maine Street and Mason Avenue (Figure 2). The ship basin is approximately 300 feet to the *east*.

Naval Station Mayport provides its own potable water via four wells located on base property (Figure 2). The closest well is approximately 650 feet south of Building 25 and is cased to over 400 feet below land surface (bls).

1.1.2 Site History

A 1,000-gallon underground storage tank (UST) was installed at Building 25 in 1952 for storage of diesel fuel. Two additional USTs, one *2,000*-gallon and one *1,000*-gallon, were installed in 1954 for gasoline storage. In 1974 a 10,000-gallon UST was installed for gasoline storage. At the present time, all four USTs are in use in their intended capacity.

In July 1990, fuel odors were detected in the soil around the 10,000-gallon UST. Hydrocarbon concentrations greater than 1,000 parts per million (ppm) were indicated by Organic Vapor Analyzer (OVA) readings in several shallow borings around the tank.

No leaks were detected during subsequent tank tightness tests performed on all four USTs. However, a small leak was discovered in the fuel delivery line from the 10,000-gallon UST to the fuel dispenser. This leak was repaired, and all tanks are currently in service.

Several fuel spills resulting from overfilling vehicle fuel tanks at the dispensing island have been reported at this facility. The quantity of spilled fuel is unknown, but apparently spilled fuel would have flowed across the paved surface toward a low grassy area in the southwest corner near monitor well MAY-25-10.

Field observations during the contamination assessment indicated petroleum contamination at the site is due to a combination of past piping leaks, spills resulting from overtopping of the USTs, and spills due to overfilling vehicle tanks at the dispensing island.

1.2 Contamination Assessment Summary

In February 1991, a contamination assessment was initiated at the site to determine the nature and extent of petroleum contamination as required by Chapter 17-770, FAC.

A series of 35 soil borings were drilled at the site to determine the extent of petroleum contamination in the soil. Boring depths ranged from 4 to 7 feet bls with the exception of 25-21 which was drilled to a depth of 30 feet bls. Boring locations are shown on Figure 3. Soil samples were visually inspected and analyzed using an OVA. Carbon filters and a photoionizing detector (PID) were used to aid in the identification of methane interferences.

Seven temporary wells were installed in selected soil borings to aid in the determination of groundwater flow direction and gradient. These wells were constructed of 2-inch PVC to depths of 4 to 6 feet bls. Temporary well locations are shown on Figure 3.

Fifteen permanent monitor wells were installed during the contamination assessment. Permanent well locations are shown on Figure 3 and well construction details are summarized in Table 1.

1.2.1 Site Geology and Hydrogeology

Soil borings indicate the near surface geology consists of light brown to gray, fine grained sand and silty sand. Clayey silt was encountered in boring 25-21 at a depth of approximately 21 to 24 feet bls, and clayey sand was encountered in the same boring at a depth of approximately 28 to 29 feet bls. A lithologic cross section is shown on Figure 4.

Groundwater at this site is approximately 2 to 4 feet bls. Although very little groundwater gradient exists at this site, the direction of flow is generally to the southeast. Only a minor tidal influence (0.03 feet between high and low tide) was indicated during monitoring of a shallow temporary well (MAY-25-3) on site. A table of groundwater elevations, and figures showing historical groundwater contours, are presented in Appendix A.

Slug tests performed during the contamination assessment indicate an average shallow horizontal hydraulic conductivity of 30 feet per day. The hydraulic gradient was determined to be 0.001, and porosity was estimated at 30 percent for a flow rate of 0.09 feet per day.

1.2.2 Soil Contamination

The results of the OVA analyses are presented in Table 2. Figure 5 shows the areal extent of excessively contaminated soils (OVA readings greater than 500 ppm) identified during the contamination assessment. This area is approximately 70 by 80 feet and includes the immediate area around the three smaller USTs and dispensing island in front of Building 25. *Figure 5 (taken from the CAR) presents excessively contaminated soils to 500 ppm OVA despite language in the CAR referring to criterion for excessively contaminated soils as > 50 ppm OVA for kerosene group contaminants (page 13). The summary of soil headspace analyses from the CAR does not contain adequate OVA headspace readings to delineate a 50 ppm isopleth.*

Some soil contamination probably exists underneath a portion of the building. Soils appear to be contaminated from just below the pavement to the water table at a depth of approximately 4 feet bls. Levels of contamination are in excess of 1000 ppm by OVA.

1.2.3 Groundwater Contamination

Seven permanent monitor wells were installed at the site in April and May 1991. Groundwater samples were obtained from these wells (MAY-25-1 through MAY-25-7) on June 17 through 19, 1991. These samples were analyzed for parameters in the Kerosene Analytical Group (Chapter 17-770, FAC). Additionally, samples from five of the wells were analyzed for total dissolved solids (TDS) and chlorides.

Monitor well MAY-25-8 was installed in December 1991 as a replacement well for MAY-25-7, which was apparently contaminated during installation. Monitor wells MAY-25-9, MAY-25-10, and MAY-25-11 were installed in October 1992. Monitor well MAY-25-12 was installed in December 1992. Subsequently, all twelve existing permanent monitor wells were sampled. Groundwater samples were analyzed according to EPA Method 602.

Three additional wells, MAY-25-13, MAY-25-14, and MAY-25-15 were installed in April and May of 1993. These three wells were sampled on May 14, 1993. Groundwater sample analysis was according to EPA Method 602.

The results of laboratory analyses indicated an area of groundwater contamination covering approximately 5000 square feet (Figure 3). Contaminant contours indicate an elongation of the plume in the direction of the sewer line. The vertical extent of contamination did not appear to exceed approximately 25 feet bls. Contaminants identified include benzene, ethylbenzene, toluene, xylenes, MTBE and naphthalenes.

1.3 Groundwater Resampling and Survey

On July 6, 1993, groundwater samples were obtained from eleven site monitor wells for analysis according to EPA Methods 602, 610, and 239.2 (lead). Both filtered and unfiltered samples were obtained for lead analysis. Samples were also obtained from monitor well MAY-25-9, located within the contaminant plume, for analysis of total dissolved solids, total suspended solids, total organic carbon, iron, hardness, calcium, and manganese. Sampling was conducted in accordance with RUST's FDEP approved Comprehensive Quality Assurance Plan. Samples were preserved, stored on ice, and shipped via Federal Express to Savannah Laboratories in Tallahassee, Florida for analysis. Monitor well sampling data sheets are included in Appendix B.

The interpreted groundwater contamination map based on the July 6, 1993 sampling event is illustrated in Figure 6. A summary of the laboratory results is presented in Table 3. The laboratory report is included as Appendix C. A historical comparison of groundwater contaminants is presented in Table 4.

Water levels were measured in all monitor wells on July 6, 1993. The results of this survey are presented in Appendix A.

2.0 FREE PRODUCT

Approximately 1/16-inch of free product was discovered during the initial contamination assessment in temporary monitor well 25-12 near the USTs.

Free product was not encountered during the July 1993 sampling event.

Any free product encountered in monitor wells during groundwater remediation should be removed using a down well hydrophobic absorbent device. Remaining free product is expected to be volatilized during air sparging/soil vapor extraction operations.

3.0 SOIL REMEDIATION

As discussed is Section 1.2.2 of this plan and illustrated in Figure 5, excessively contaminated soils exhibiting OVA readings greater than 500 ppm *(50 ppm isopleth not presented in the CAR)* were delineated in the area surrounding the fuel dispensing island, extending partially beneath the USTs and possibly under Building 25. Soil contamination extends from just below the pavement to the groundwater table (approximately 4 feet bls). RUST proposes remediation of contaminated soils to the 10 ppm line shown on Figure 5.

Two methods of soil remediation were analyzed for this site: excavation/incineration and soil vapor extraction (SVE). SVE was determined to be the best alternative for the following reasons:

- excessively contaminated soils exist beneath the active fuel dispensing island, USTs and possibly a portion of the building;

- excavation/incineration of all contaminated soils is cost prohibitive when compared to SVE;

- an SVE system can be implemented with minimal disruption to operations;

- horizontal SVE laterals can be installed which can effectively facilitate the removal of contaminants from the soil *in conjunction with groundwater air sparging operations.*

- soil vapor extraction is recognized as a "best available technology" approach for the remediation of contaminated soils that are compatible with the process. The fine sands encountered to depths of 4 feet appear to be suitable for soil vapor extraction.

3.1 Treatment System Overview

Soil vapor extraction is performed by applying a negative pressure, or vacuum, to an SVE lateral placed in the unsaturated zone. The actual removal is accomplished by lowering the relative pressure within the soil mass below the equilibrium pressure of the contaminant using a vacuum blower. Under vacuum conditions in the soil, the liquid phase petroleum hydrocarbons are converted the vapor phase. In the vapor phase, the petroleum hydrocarbons are free to migrate through the unsaturated zone and are evacuated via the SVE lateral. The extracted soil vapors are pulled through a vapor phase granular activated carbon adsorption system to achieve ambient air impact criteria.

The basic soil treatment system will consist of *one SVE lateral*, yard piping, a vacuum blower, and a vapor phase carbon adsorption system. *The SVE system layout map is shown on Figure 7.* The SVE treatment system will be located within a locked, fenced enclosure located *near the west side of Building 25*. All electrical equipment within the enclosure will be explosion proof rated.

Electrical service for the soil treatment system will be supplied from an existing power pole located on site. A metered panel will be installed by a licensed electrician.

3.2 Soil Vapor Extraction System

3.2.1 Radius of Influence and Soil Vapor Flow Rate

A 30 foot radius of influence *is expected during SVE operations and* will capture the entire area of contaminated soils. Radii of influence of up to 50 feet are achievable in fine sands as confirmed by vacuum measurements at similar sites. The radius of influence at the subject site will be verified and maintained by measuring the vacuum stresses at existing monitor wells *along*

with eleven vacuum stress monitor wells (VSM). Vapor flow rates will be monitored with the use of an in line *pitot tube* and velocity gauge.

Considering the required radius of influence of 30 feet, a target extraction well pressure of 0.85 atmospheres, an approximate soil air permeability of 1 darcy, and standard temperature and pressure, the resulting soil vapor flow rate *for the SVE lateral* is calculated at approximately *140* cubic feet per minute (cfm) (Johnson, et al, 1990).

Two additional horizontal vapor extraction wells have been added to accommodate air sparging (discussed in Section 4.3 of this revision). The expected soil vapor flow rate for these additional laterals is calculated at approximately 100 cfm each for a total system flow rate of approximately 350 cfm. Soil vapor extraction design calculations are presented in Appendix D.

The P.C. Johnson et al paper "A Practical Approach to the Design, Operation, and Monitoring of In-Situ Soil-Venting Systems" evaluates designs using vertical extraction wells. RUST has successfully implemented this model for horizontal extraction wells at the Pine Hills Auto Center (FDEP Facility No 488625311), and the Pahokee Cluster (FDEP Facility Nos 508513722, 508737092, 508942911). The lengths of horizontal wells at these sites are 75 feet and 275 feet respectively. The "H" variable, as used by RUST in horizontal applications, is equal to the length of the slotted portion of the well. For the subject site, an "H" value of 180 feet was used for the SVE lateral (130 feet each for the two additional sparge vapor capture laterals).

3.2.2 Soil Vapor Extraction/ Vacuum Stress Monitor Well Specifications

The vapor extraction laterals will be constructed of 4-inch, schedule 40 poly vinyl chloride (PVC) pipe. The laterals will be screened (0.02 slot size) in the unsaturated zone within the soil contaminant plume. The laterals will be placed approximately *1* foot bls and will be wrapped with a filter sock. The laterals will be installed in trenches approximately 2 feet wide by 2 feet deep. Coarse gravel will be placed *1/2* foot above and *1/2* foot below the laterals. Prior to *capping with concrete, a plastic liner will be placed above the gravel to prevent the migration of concrete into the excavation.* Figure 8 illustrates the soil vapor extraction lateral construction details.

Vacuum stress monitor wells VSM -1 through VSM-11 will be screened (0.02-inch slot size) from 1 to 4 feet bls and located as shown on Figure 7. A filter pack of 6/20 grade silica sand will extend from the bottom of the well to 1 foot bls. A 6-inch seal of fine silica sand (30/65 grade) will be placed above the filter pack with the remaining annular space grouted with volclay grout. The VSM wells will be completed with 8-inch, traffic rated manholes, centered in 12-inch concrete pads. The concrete pads will be crowned proximately 1-inch to shed surface runoff. Vacuum stress monitor well details are shown on Figure 9.

3.2.3 Groundwater Upwelling

Upwelling of the groundwater directly below the vacuum lateral is not expected to exceed the distance between the lateral and the groundwater table (3 feet). Although an applied vacuum at the point of extraction is anticipated at 61 inches of water, the vacuum felt at the surface of the water table three feet below is expected to be considerably less considering a typical exponential decrease in vacuum with increase in distance from the extraction point. Additionally, there is no direct connection between the lateral and the water table and therefore the groundwater is not expected to lift the distance of applied vacuum. Installing the SVE laterals at 1-foot bls should help reduce the effects of upwelling.

3.3 Soil Vapor Treatment System

Extracted soil vapor must be treated for a minimum of 2 months, regardless of the vapor concentration levels. The most cost effective method of treatment depends on the vapor concentration. For vapors greater than approximately 3000 ppm, thermal oxidation is the preferred treatment method. Catalytic oxidation is more appropriate for vapor concentrations between 100 ppm and 3000 ppm. Granular activated carbon adsorption is cost effective when vapor concentrations fall below 100 ppm.

3.3.1 Influent and Effluent Concentrations

Information concerning in-situ vapor concentration is limited. *Based on soil headspace analyses performed during the contamination assessment,* and assuming minimal dilution air requirements, RUST anticipates initial influent soil vapor concentrations of at least 1000 ppm (OVA) for approximately two to three weeks after system start up. Soil vapor concentrations are expected to decrease exponentially thereafter.

3.3.2 Extracted Soil Vapor Treatment

Extracted soil vapor will be pulled through a vapor phase carbon adsorption system as shown on Figure *10*. Carbon usage rates were determined by taking the maximum OVA readings listed on Table 2, assuming the concentration was benzene, and determine the percent loading from a TVOA isotherm. At the design air flow rate of *140* cfm and an assumed benzene concentration of 1000 ppm, vapor phase carbon usage is calculated at *370* pounds per day for approximately 2 weeks, and is expected to decrease rapidly thereafter. Vapor phase carbon usage rate calculations are found in Appendix D. *Upon system start up, actual influent vapor concentrations and carbon usage rates will be determined. Vapor influent concentrations may be determined to be much higher than anticipated resulting in greater vapor phase carbon consumption. If this is shown to be the case, a 350 scfm thermal/catalytic oxidizer, if available, may be used for vapor treatment. If an oxidizer is not available, granular activated carbon can still be used. Note that initial influent concentrations are expected to decrease rapidly. Off-gas treatment will continue for a minimum of two months per Engineering Support Section document ESS-4.*

Following the two month period, the air emissions will be evaluated using an air modeling program such as SCREEN.

3.3.3 Blower Equipment and Piping

The vacuum source will be an explosion-proof regenerative blower, such as EG & G Rotron Model *EN12*. The blower selected must be capable of producing a vacuum of *70* inches of water at an air flow rate of *350* cfm *(considering sparge vapor capture)*. Vacuum requirement calculations along with vacuum blower specifications are found in Appendix D.

The SVE yard piping will consist of 4-inch schedule 40 PVC with a 0.02 slot size and will be grounded using copper wire to a dedicated grounding rod.

4.0 GROUNDWATER REMEDIATION

Based on the results of laboratory analyses of groundwater samples, a groundwater contaminant plume has been identified. We propose to perform in-situ air sparging of contaminated groundwater to reduce contaminant levels to within target levels designated in Rule 17-770.730, FAC.

4.1 Pump and Treat versus Air Sparging

Recent technical evaluations indicate that the pump and treat systems are not capable of reducing contamination to clean up levels, whereas in-situ air sparging of groundwater with SVE can, in many cases, reach cleanup levels for volatile constituents, yielding approximately 90% reduction in six months.

4.1.1 Feasibility of In-Situ Air Sparging

The application of in-situ air sparging is predicated upon the soil homogeneity, heterogeneity, and air permeability plus site specific hydrogeology, contaminant volatility, vertical and horizontal extent of the dissolved phase contaminant, and the mass of contaminant in the dissolved and adsorbed phases.

The homogeneity and heterogeneity of the soil at the site appear to be moderately suited for air sparging. Generally, the poorly graded sands, which are present between the silty sand lenses, appear to be very air permeable and therefore amenable to air sparging. As shown on Figure 4 of this plan, lenses of silty sand are present at depths to 10 feet. These lenses may facilitate a more horizontal than vertical air migration locally due to an assumed lower permeability. This may prevent the areas of contaminated groundwater above these lenses from being sparged. Additionally, lenses of silty and clayey soils at depths below approximately 21 feet may result in placement of the sparge points near the bottom of the plume instead of the recommended 5-feet

below the bottom of the plume. Placement of the sparge points five feet below the plume helps reduce the null zones between adjoining cones of air.

The volatility of the dissolved TVOA compounds appears suitable for air sparging as the vapor pressures for these compounds are individually greater than 1 mm Hg. The vapor pressures for MTBE and naphthalene are less than 1 mm Hg, therefore, those compounds are expected to volatilize slowly.

The horizontal and vertical extent of groundwater contamination has been delineated in the CAR and as a result of groundwater sampling performed by RUST personnel in July 1993.

The mass of contaminant in the dissolved and adsorbed phase is difficult to estimate. The CAR does not report OVA headspace values greater than 1000 ppm nor laboratory analyses of soils retrieved during the contamination assessment. As indicated by the laboratory analyses of groundwater samples during the July 1993 sampling event, substantial petroleum hydrocarbon contamination is present in the groundwater.

The hydraulic gradient is calculated at 0.001 feet per foot and does not appear to impact the migration of the plume.

4.1.2 Cost Comparison

A cost comparison between pump and treat and in-situ air sparging was conducted. Assumptions made for the cost comparison include a five year operating time for pump and treat, a two year operating time for air sparging, and limited air sparge emissions treatment. The treatment duration for pump and treat as used here is greater than the 18 month time frame reported in the original submittal of the RAP. The 18-month time frame is estimated as that time required to flush three pore volumes. Because contaminant levels are rarely significantly reduced after 3 pore volumes are flushed, a conservative remediation time of five years is used here.

The cost comparison, presented in Appendix E, considers capital equipment, drilling/installation, quarterly sampling, operations/maintenance (O&M), an SVE upgrade to capture sparge air, air sparge pilot study, limited sparge air emissions treatment, and NPDES sampling.

Results of the cost comparison indicate a cost advantage to in-situ air sparging. While capital equipment, installation, and O&M costs are comparable for both technologies, the apparent cost advantage to in-situ air sparging is the reduction in quarterly sampling and O & M costs, due to the shorter treatment period and the elimination of NPDES sampling.

RUST concludes that in-situ air sparging may be an appropriate technology considering the above mentioned site specific characteristics and circumstances.

4.2 Treatment System Overview

In-situ air sparging is the process of injecting air into the groundwater below the contaminant plume using a compressor and an injection well. When contaminants dissolved in the groundwater and adsorbed onto the soil come in contact with the air, they volatilize into the gas phase. The stripped contaminants are then collected by a vapor extraction system once they have risen and entered the unsaturated zone.

4.3 In-Situ Air Sparging System

Without the benefit of a pilot study, the following design parameters are estimated for purposes of preparing a cost analysis between in-situ air sparging and pump and treat. RUST strongly recommends that a pilot study be conducted prior to RAP implementation to verify air sparge and SVE design parameters. Appendix F contains air sparging pilot study criteria as set forth in Engineering Support Section document ESS-2.

4.3.1 Radius of Influence

The radius of influence is generally estimated by the horizontal to vertical permeability ratio which describes the distance horizontally that air will travel per vertical distance traveled. Horizontal to vertical air permeability ratios range from 1:1 to 5:1. An estimated ratio of 1.5:1 is used here.

As reported in Section 1.2.3 of this plan, the vertical extent of groundwater contamination does not appear to exceed 25 feet bls. Provided that the clayey silt lenses do not prevent placement of the sparge point below the bottom of the plume, the vertical distance that the sparge air is expected to travel is approximately 21 feet in the saturated zone. Assuming a 1.5:1 horizontal to vertical permeability ratio and no interference from the silty sand lenses, the horizontal distance air is expected to travel in the saturated zone is approximately 30 feet. Therefore a 30 foot radius of influence is anticipated. Using this radius of influence, four sparging points are anticipated as shown on Figure 11.

All permeable surfaces within the sparge/SVE radii of influence, such as the grass area above the USTs located southeast of the dispensing island, will require covers to render them impermeable. RUST recommends that the area be paved, or that 12 mil plastic sheeting be installed over the permeable areas at a depth of approximately 0.5 feet. The plastic sheeting, after any seams are sealed, can be covered with either decorative stone or wood chips.

4.3.2 Air Flow Rate

Typical air flow rates into a sparge well are between 2 and 20 cfm. At 20 cfm per well the total air flow into the saturated zone would equal 80 cfm.

4.3.3 Well Pressure

The pressure required to introduce air to the aquifer is equal to sum of the hydraulic head, friction losses, and diffusion pressure. The pressure requirement for a sparge point under 21 feet of hydraulic head equals approximately 11 psi.

4.4 Sparge Vapor Capture

Capture of the sparge air upon entrance to the unsaturated zone is a critical design parameter in air sparging, especially if there are nearby receptors. The nearby receptors identified at the subject site include Building 25 and the utility line backfill through which the contaminated groundwater appears to be traveling.

As shown of Figure 11, the three SVE laterals have been placed such that their expected radii of influence coincides with or exceeds that of the sparge wells. Placement of the SVE wells also considers capture of the sparge air prior to the building and on both sides of the utility line.

The expected SVE air flow rate of 350 cfm is much greater than the expected combined maximum sparge air flow rate of 80 cfm.

4.5 Performance Monitoring

The effectiveness of the air sparging will be monitored by measuring sparge vapor concentrations captured by the SVE system, pressure measurements in the unsaturated zone at the VSM wells, groundwater elevation changes, and dissolved oxygen concentrations in groundwater samples retrieved from monitor wells located within the contaminant plume. Additionally, pressure measurements will be taken at the VSM wells to verify that vacuum is the prevailing motive force in the unsaturated zone with both the SVE and sparge air systems in operation.

4.6 Expected Sparge Vapor Concentration and Treatment

The concentration of contaminant liberated into the unsaturated zone during air sparging and captured by the SVE system is difficult to predict. Considering that the process of in-situ air sparging emulates an air stripper, the concentration of contaminant entering the treatment system during in-situ air sparging is not expected to greatly exceed those experienced in an air stripper during a traditional pump and treat operation especially considering the air dilution factor greater than 4 (350 cfm SVE air to 80 cfm sparge air).

Sparge vapors will be treated until criteria presented in Engineering Support Section documents ESS-2 and ESS-4 are satisfied.

4.7 Hydrogeologic Considerations

The hydraulic gradient at the site is reported at 0.001 feet per foot and does not appear to be impacting plume migration. The necessity of groundwater recovery to prevent plume migration during in-situ air sparging is not yet defined and can be assessed during a pilot study. Plume migration is not expected to be of concern, especially if the sparge air is pulsed, which can also be useful in reducing air channeling in the soil. However, if necessary, an appropriate number of groundwater recovery wells can be used to control plume migration. Should they be required, groundwater recovery well placement will be determined using modeling.

4.8 Compressor Equipment and Piping

The pressure source will be a 25 horsepower, 460 volt, 3-phase CompAir Hydrovane Model 128 PUAS rotary vane air compressor (or equivalent). The CompAir Hydrovane 128 PUAS air compressor was selected to produce a maximum pressure of 11 PSIG at a flow rate of 80 cfm. Air compressor specifications are found in Appendix G.

Yard piping will connect the compressor to each of the sparge wells via 3/4-inch high pressure hose encased within 2-inch schedule 40 PVC pipe. A manifold, located within the treatment system compound, will contain a pressure regulator, flow rate valve, and rotameter for each well as shown on Figure 12. Additionally, each sparge well will be equipped with a pressure gauge permanently installed within each well vault.

The yard piping will be placed within the trenches excavated for SVE lateral placement as shown on Figure 8.

4.9 Sparge Well Specifications

Air sparge wells (AS-1 through AS-4) will be installed at the approximate locations shown on Figure 11. The sparge wells will consist of 2-inch schedule 40 PVC screen and riser. The air sparging wells will be constructed to a depth of 26 feet and screened (0.01 slot size) from 25 to 23 feet bls (lithology permitting). A PVC riser will extend from the top of the screened section to the bottom of the well vault. A filter pack of 6/20 grade silica sand will extend from 1-foot below to 1-foot above the screened section. A 2-foot seal of bentonite will be placed on top of the filter pack with the remaining annular space grouted with neat cement. Figure 13 illustrates air sparging well construction details.

5.0 SYSTEM INSTALLATION

System installation will include the following subtasks:

- Obtaining all required local, state and federal permits;
- *Installation of the air sparging and VSM wells;*
- Trenching from the treatment system compound to the *air sparging wells and installation of the horizontal SVE wells and yard piping;*
- Installation of the treatment system including *the compressor, SVE blower,* and the activated carbon adsorption system for soil vapor treatment;
- *Installation of security fencing around the treatment system;*
- *Electrical connection.*

6.0 SYSTEM START UP

Following installation, the *SVE and air sparging systems* will go through one week of start up and testing.

During this period, SVE and air sparge influent concentrations will be measured daily using an OVA (FID). Additionally, vacuum and pressure stresses will be measured at the VSM wells to verify radius of influence.

System modifications will be made as necessary to meet performance specifications detailed in this document. As-built drawings of the remediation systems, certified by a registered professional engineer, will be provided within six weeks after start up as required by Rule 17-770.730, FAC.

7.0 OPERATIONS

7.1 Sampling

RUST proposes that monitoring wells MAY-25-1, MAY-25-4, MAY-25-11, MAY-25-12, and MAY-25-15 be designated as verification wells to be sampled for EPA Methods 602 and 610 parameters initially and then quarterly or until results indicate that monthly sampling is needed to support an asymptotic curve determination. Quarterly sampling events will include a duplicate, an equipment blank, and a trip blank. *In addition, monitor wells MAY-25-10, MAY-25-9, and MAY-25-12 will be sampled monthly for the first year to monitor progress of*

groundwater remediation. Free product checks will be performed at monitor wells within the plume monthly.

Following approval for termination of remedial action, the designated verification wells will be sampled quarterly for a period of one year. Samples will be analyzed for EPA Method 602 and 610 constituents.

SVE sampling with an OVA (FID) will be performed daily for the first week and thereafter as necessary to support an asymptotic curve determination. If carbon is to be used, samples will be retrieved prior to, between, and immediately following the carbon canisters. If thermal/catalytic oxidation is to be used, samples will be retrieved prior to and after the treatment system. Samples will be collected in Tedlar bags and allowed to cool to ambient temperature prior to being analyzed.

In-situ air sparging sampling will be conducted daily for the first week then concurrent with groundwater sampling and will consist of analyzing influent samples collected in Tedlar bags taken from the SVE system using an OVA. Additionally, dissolved oxygen levels will be measured during monthly sampling to verify air distribution throughout the affected saturated zone.

The concentration of contaminants sparged from the groundwater will be determined by taking the difference in influent concentrations of the SVE system with and without the air sparging system in operation. As mentioned earlier, the contribution to the influent stream due to air sparging is expected to be minimal as compared to that of the SVE system, at least initially. As remediation of the unsaturated zone progresses and contaminant levels near an asymptotic curve determination, the influent stream concentrations can said to be that generated from air sparging alone.

SVE/air sparging treatment will be discontinued when:

- *samples from the compliance wells indicate cleanup of the contaminated groundwater to target levels set forth in Rule 17-770.730 (5), FAC and*

- *samples from representative areas of the contaminated zone are collected and analyzed with an OVA instrument using the soil headspace method as referenced in Rule 17-770.200(2), FAC. When soil samples give negligible readings (generally <10 ppm), corrected for background levels, verification soil samples from the area should be collected and analyzed for BTEX compounds by EPA Method 5030/8020. When BTEX levels below 100 ppb are attained, the soil will be considered adequately clean with respect to BTEX, and the vapor extraction system may be shut down.*

7.2 Maintenance

During site visits, technicians will perform necessary maintenance of the SVE and air sparging systems. Long term maintenance and monitoring of the SVE and air sparging systems will consist of routine inspection of the vacuum blower and compressor for any obvious signs of wear. The applied vacuum will gradually decrease as the soil mass dries out, requiring adjustments to maintain an appropriate level of pressure and vacuum.

7.3 Reports

As required by Rule 17-770.730(3), FAC, annual reports detailing the above information and sampling results will be prepared and submitted to the FDEP. Included in the report will be details of any corrective actions taken relative to the treatment system. When applicable conditions of FAC Rules 17-770.730(5), 17-770.730(6) or 17-770.730(7) are achieved, a monitoring plan shall be submitted. Following completion of monitoring, the Site Rehabilitation Completion Report will be prepared and submitted to the FDEP for approval.

8.0 COST ESTIMATE

Appendix H contains an estimate of the costs associated with implementation of this RAP. This estimate contains system capital costs, system installation costs, and first year operating costs.

REFERENCES

Florida Administrative Code, Chapter 17-770. Petroleum Contamination Site Cleanup Criteria.

Florida Department of Environmental Protection, January 1989, Guidelines for Assessment and Remediation of Petroleum Contaminated Soils.

Florida Department of Environmental Protection, November 1990, Guidance Manual for Review of Petroleum Remedial Action Plans, in "Getting It Right...the first time, A Compliance Manual."

Johnson, P.C., C.C. Stanley, M.W. Kemblowski, D.L. Byers and J.D. Colthart, 1990, A Practical Approach to the Design, Operation, and Monitoring of In-Situ Soil Venting Systems, Groundwater Monitoring Review, Spring 1990, p. 159-178.

Murray, L.C., R.M. Spechler, G.G. Phelps, and L.A. Brander, 1993, Potentiometric Surface Map of the Upper Floridan Aquifer in the St. Johns River Water Management District and Vicinity, Florida, September 1992.

Nyer, Evan K., 1985, Groundwater Treatment Technology: Van Nostrand Reinhold, New York.

FIGURES

Figure 1 - Site Location Map

Figure 2 - Site Vicinity Map

Figure 3 - Site Map

Figure 4 - Lithologic Cross Section

Figure 5 - Soil Contamination/Boring Location Map

Figure 6 - Groundwater Contamination Map (July 1993)

Figure 7 - Soil Vapor Extraction System Layout Map

Figure 8 - Vapor Recovery Well Construction Detail

Figure 9 - Vacuum Stress Monitor Well Detail

Figure 10 - Vapor Phase Carbon Adsorption System

Figure 11 - Air Sparging System Layout Map

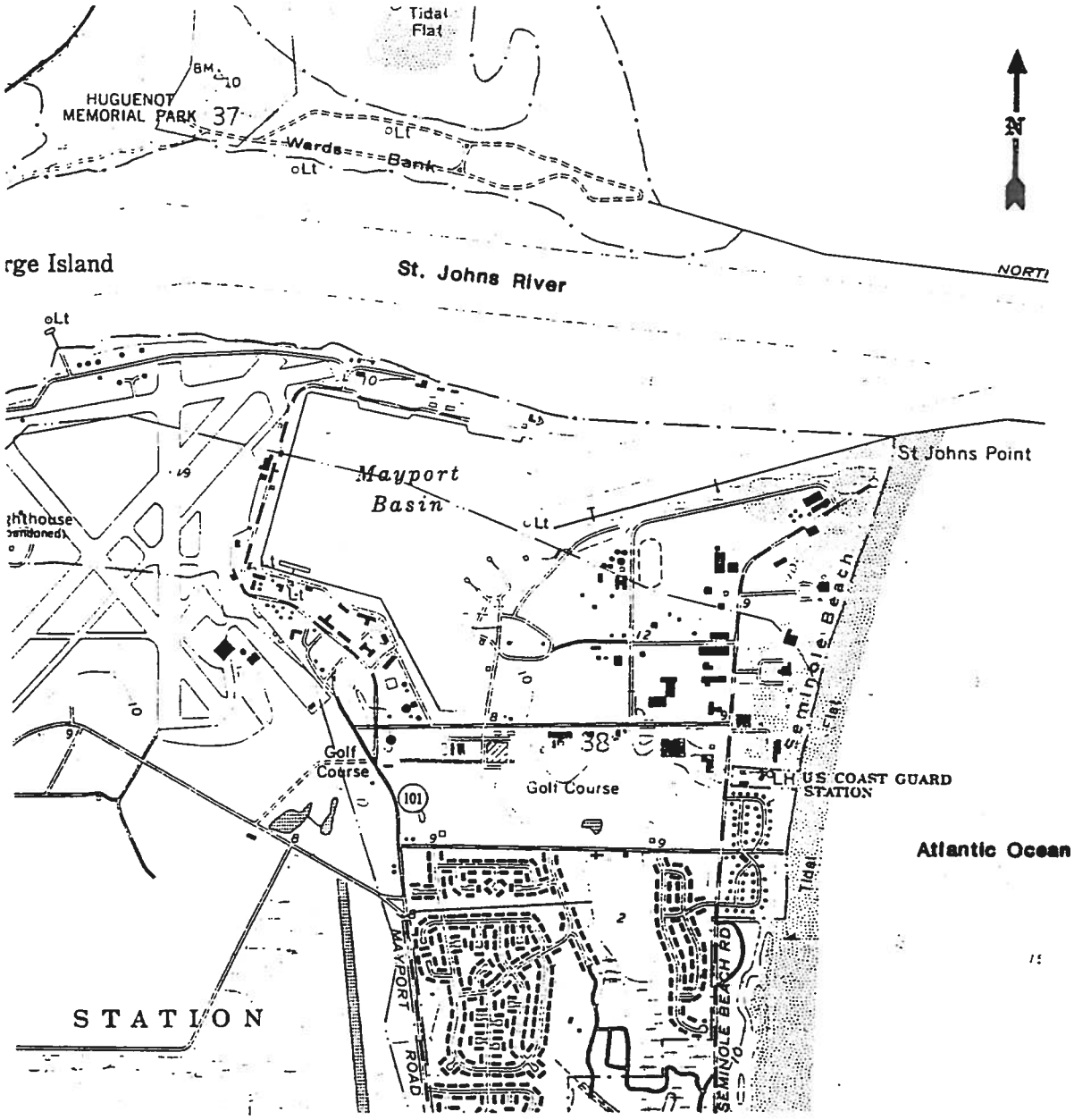
Figure 12 - Treatment System Compound Detail

Figure 13 - Air Sparging Well Detail

Marianne Sweeney 4/16/94

Marianne Sweeney, P.E. (date)

Florida Reg. No. 44784



PREPARED FROM:

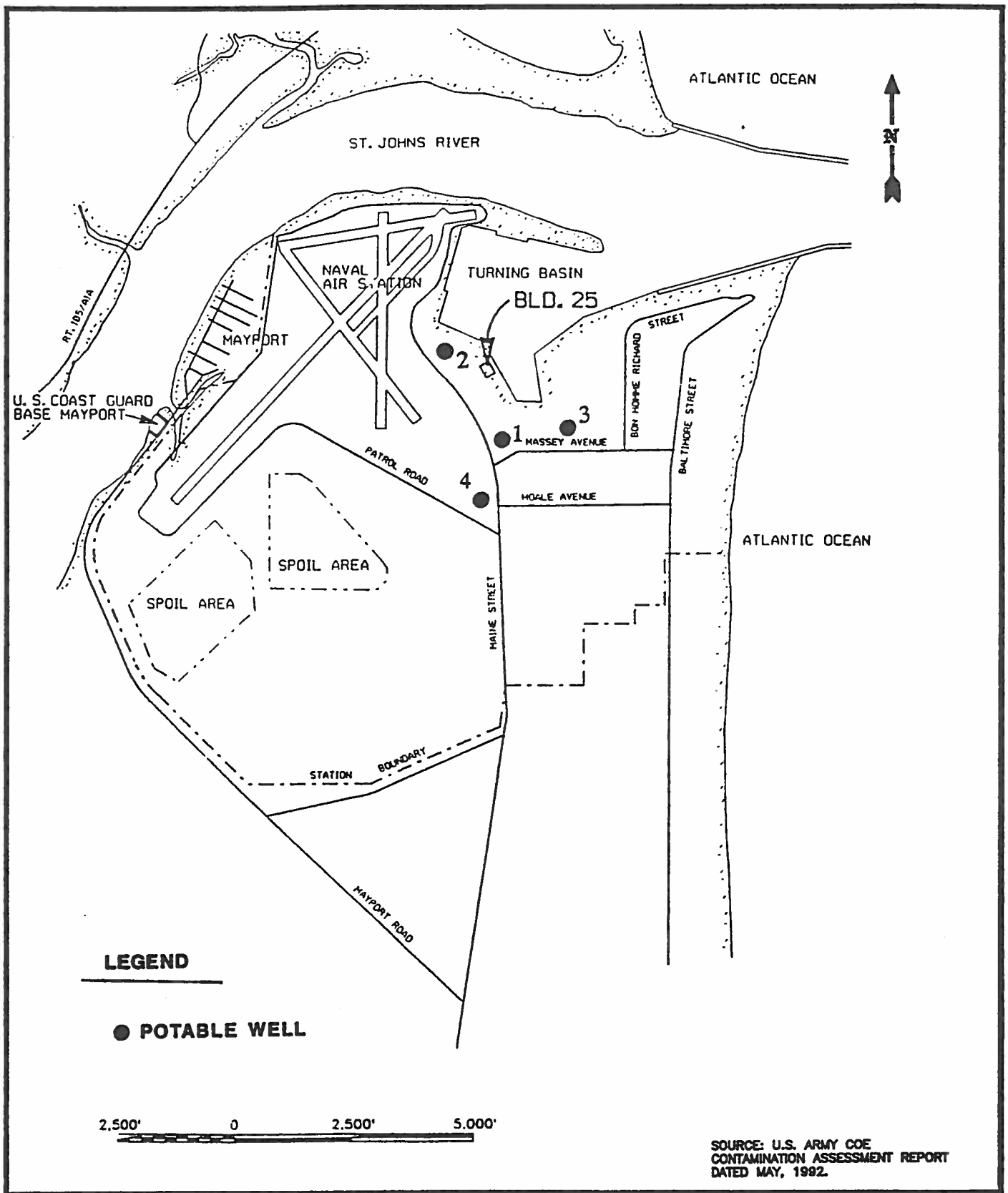
USGS MAYPORT QUAD 1964
PHOTOREVISED 1982
SECTION 38
TOWNSHIP 1 SOUTH
RANGE 29 EAST

SCALE 1" = 2000'

PROJECT NO.: 86298.000	DATE: 04-15-94	SITE LOCATION MAP
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT*
	CHECKED BY:	*BUILDING 25*
RUST ENVIRONMENT & INFRASTRUCTURE		MAYPORT, FLORIDA

1

67-FILE NAME: A:\NONE.DWG

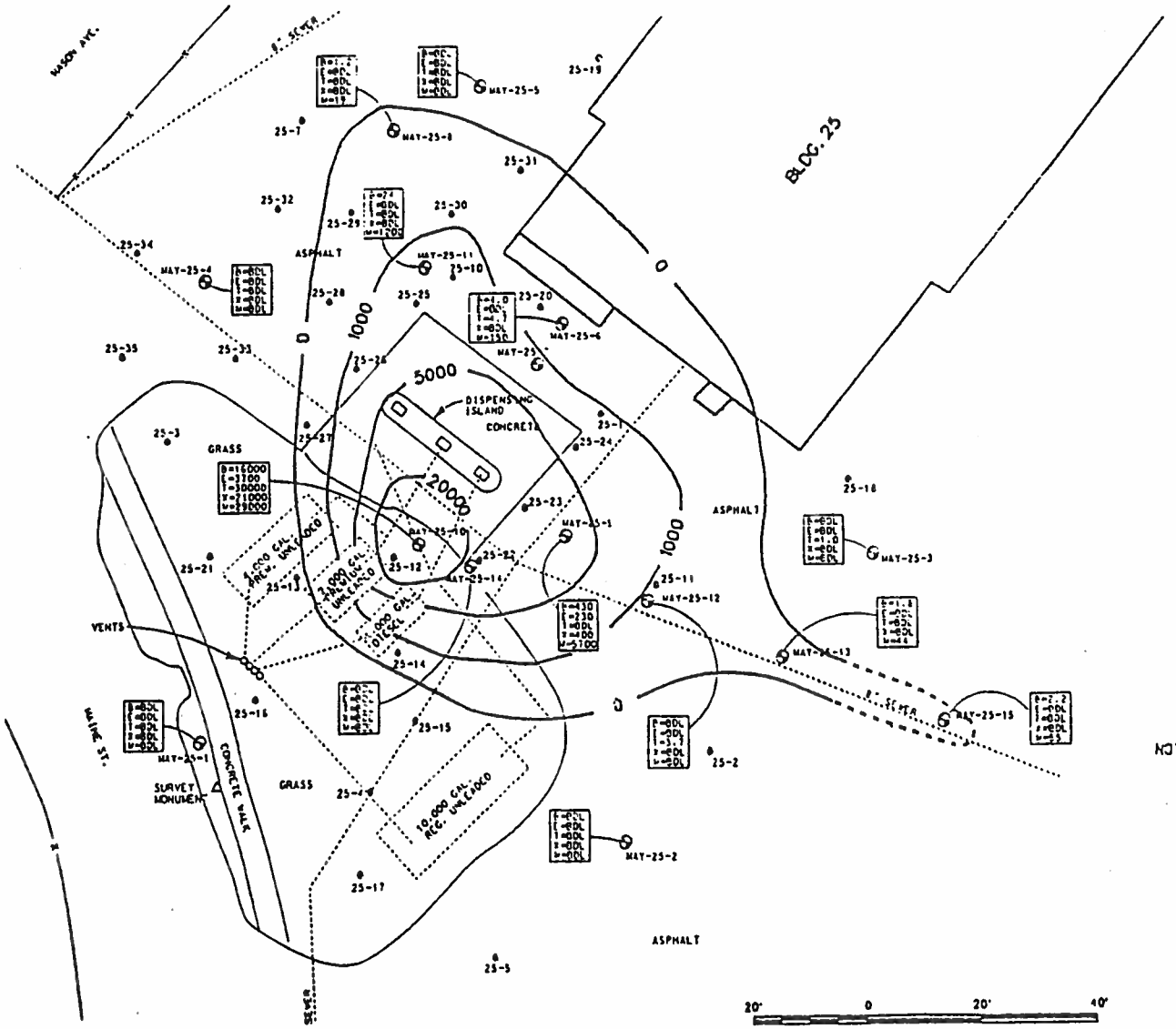


SOURCE: U.S. ARMY COE
CONTAMINATION ASSESSMENT REPORT
DATED MAY, 1992.

PROJECT NO.: 86298.000	DATE: 03-28-94	SITE VICINITY MAP
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT*
	CHECKED BY:	*BUILDING 25*
RUST ENVIRONMENT & INFRASTRUCTURE		MAYPORT, FLORIDA

2

67-FILE NAME: A:\NONE.DWG



LEGEND

MAY-25-1 — PERMANENT MONITOR WELL

25-2 — OVA HEADSPACE BORING

25-18 — TEMPORARY MONITOR WELL IN HEADSPACE BORING

— 5000 — MTBE EQUIPOTENTIAL LINES

PARAMETER (PPB)	REGULATORY LIMIT (PPB)
B=BENZENE	1
E=ETHYLBENZENE	—
T=TOLUENE	—
X=XYLENE	—
M=MTBE	50

NOTE: BDL=BELOW DETECTION LIMIT

NOTE: GROUND-WATER DATA FOR WELLS MAY-25-1 THROUGH MAY-25-12 ARE FROM SAMPLING EVENT ON 18 DEC. 1992. DATA FROM WELLS MAY-25-13 THROUGH MAY-25-15 ARE FROM SAMPLING EVENT ON 14 MAY 1993.

SOURCE: U.S. ARMY COE ADDENDUM 2 TO CONTAMINATION ASSESSMENT REPORT DATED JUNE, 1993.

RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000

FDEP FACILITY NO.: 168626008

DATE: 03-28-94

DRAWN BY: R.R.L.

CHECKED BY:

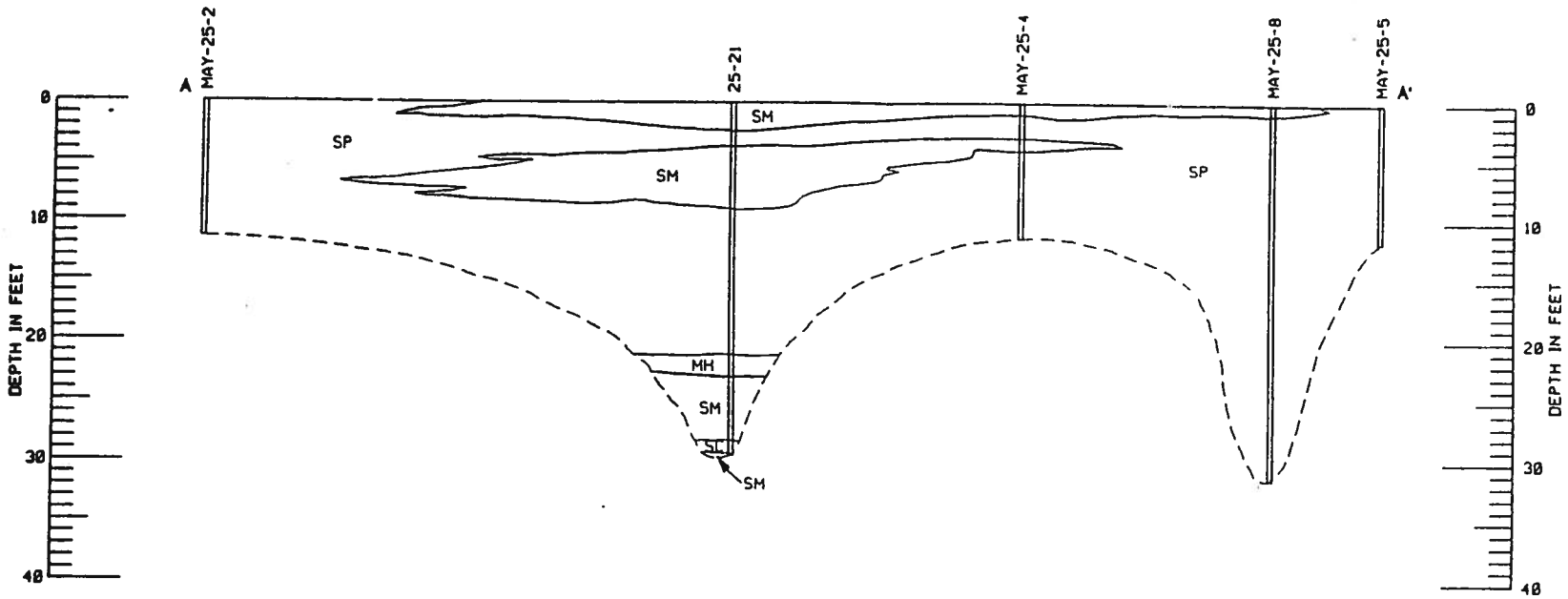
SITE MAP

NAVAL STATION MAYPORT
BUILDING 25

MAYPORT, FLORIDA

3

67-FILE NAME: A:\NONE1.DWG



LEGEND

MH	CLAYEY SILT
SC	CLAYEY SAND
SM	SILTY SAND
SP	POORLY GRADED SAND

SOURCE: U.S. ARMY COE
CONTAMINATION ASSESSMENT REPORT
DATED MAY, 1992.

RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000
FDEP FACILITY NO.: 168626008

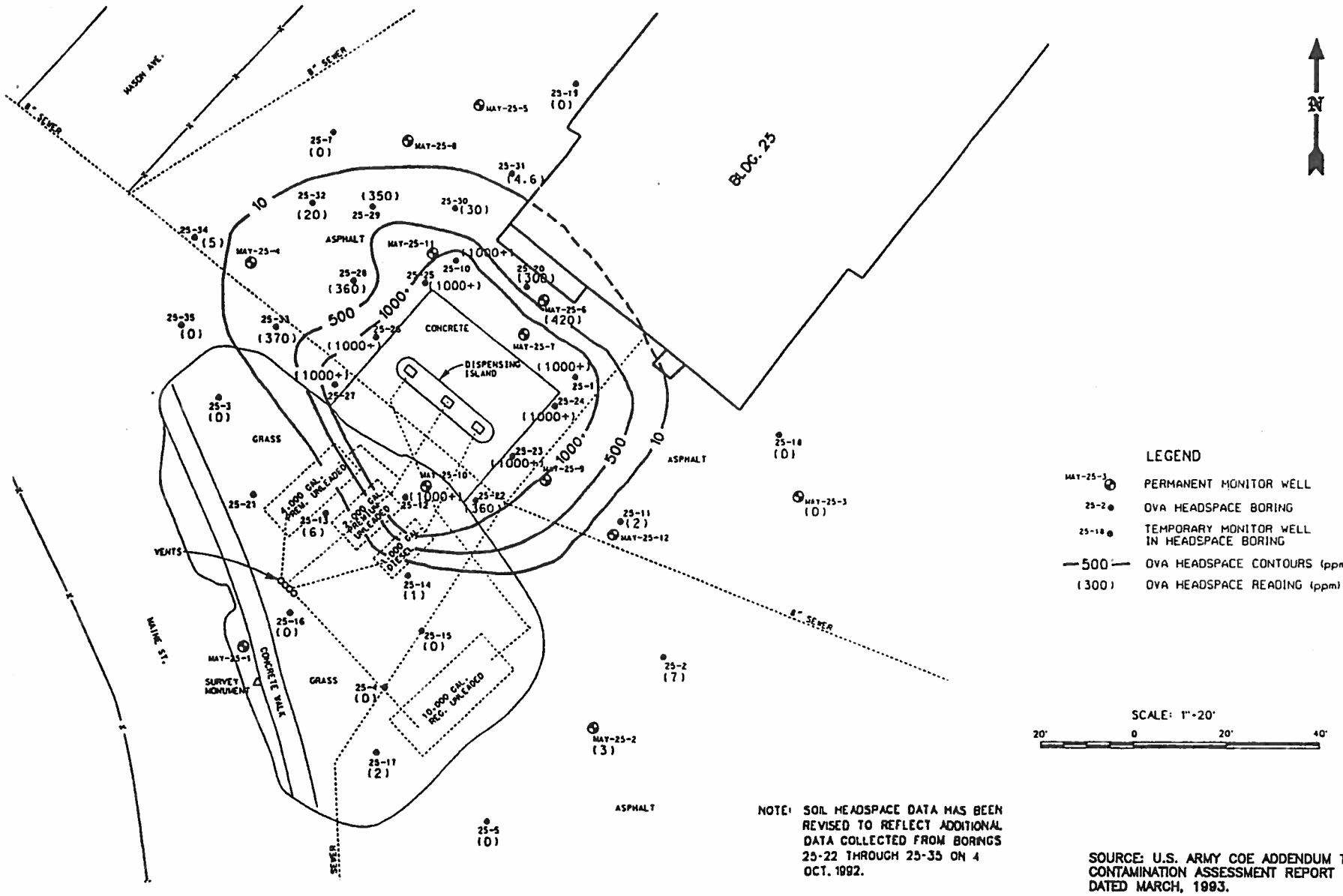
DATE: 03-28-94
DRAWN BY: R.R.L.
CHECKED BY:

LITHOLOGIC CROSS SECTION

NAVAL STATION MAYPORT
BUILDING 25
MAYPORT, FLORIDA

4

67-FILE NAME: A:\NONE1.DWG



NOTE: SOIL HEADSPACE DATA HAS BEEN REVISED TO REFLECT ADDITIONAL DATA COLLECTED FROM BORINGS 25-22 THROUGH 25-35 ON 4 OCT. 1992.

SOURCE: U.S. ARMY COE ADDENDUM TO CONTAMINATION ASSESSMENT REPORT DATED MARCH, 1993.

RUST ENVIRONMENT & INFRASTRUCTURE

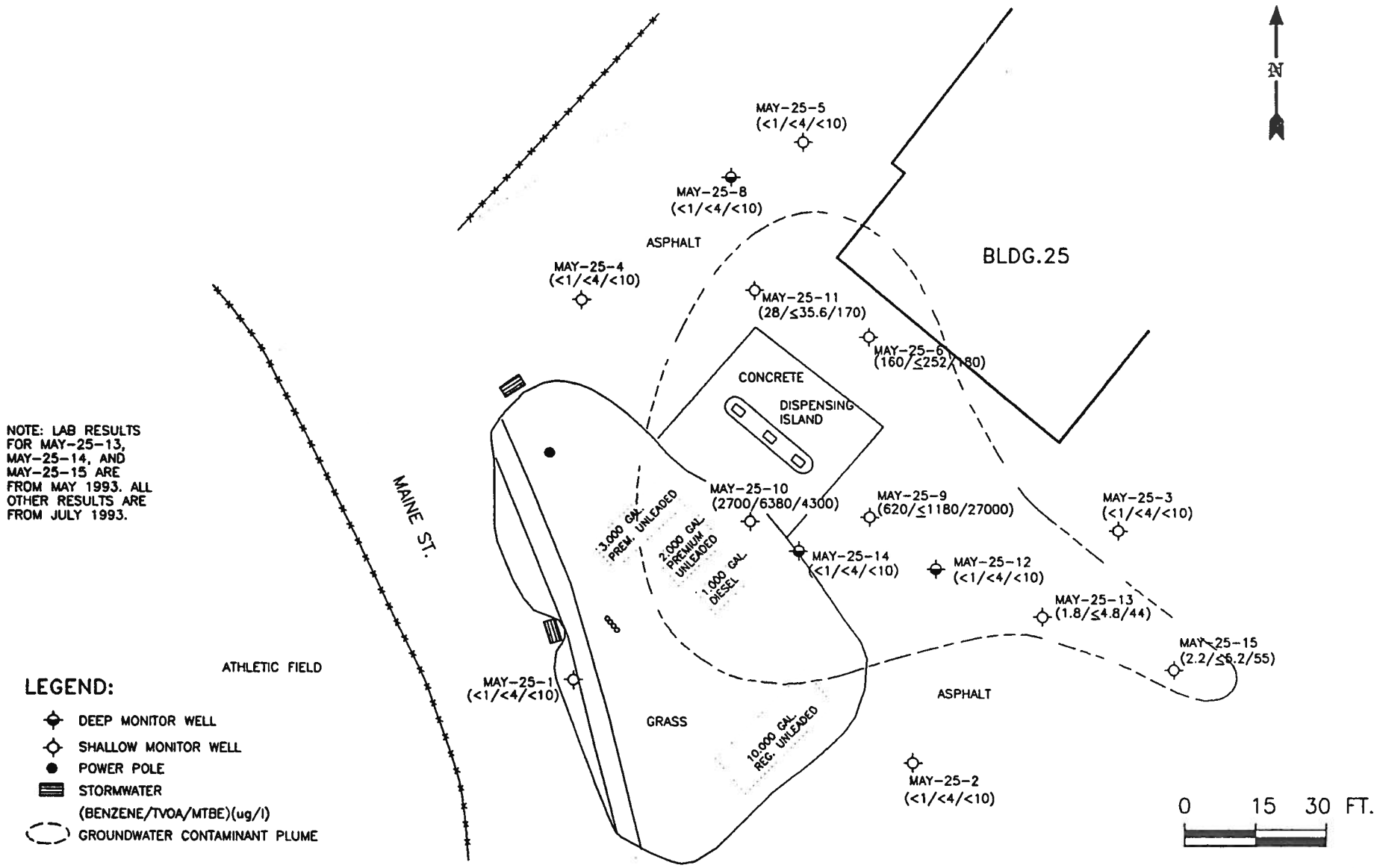
PROJECT NO.: 86298.000
FDEP FACILITY NO.: 168626008
DATE: 03-28-94
DRAWN BY: R.R.L.
CHECKED BY:

SOIL CONTAMINATION/BORING LOCATION MAP

NAVAL STATION MAYPORT
BUILDING 25
MAYPORT, FLORIDA

5

67-FILE NAME: A:\NONE1.DWG



RUST ENVIRONMENT & INFRASTRUCTURE

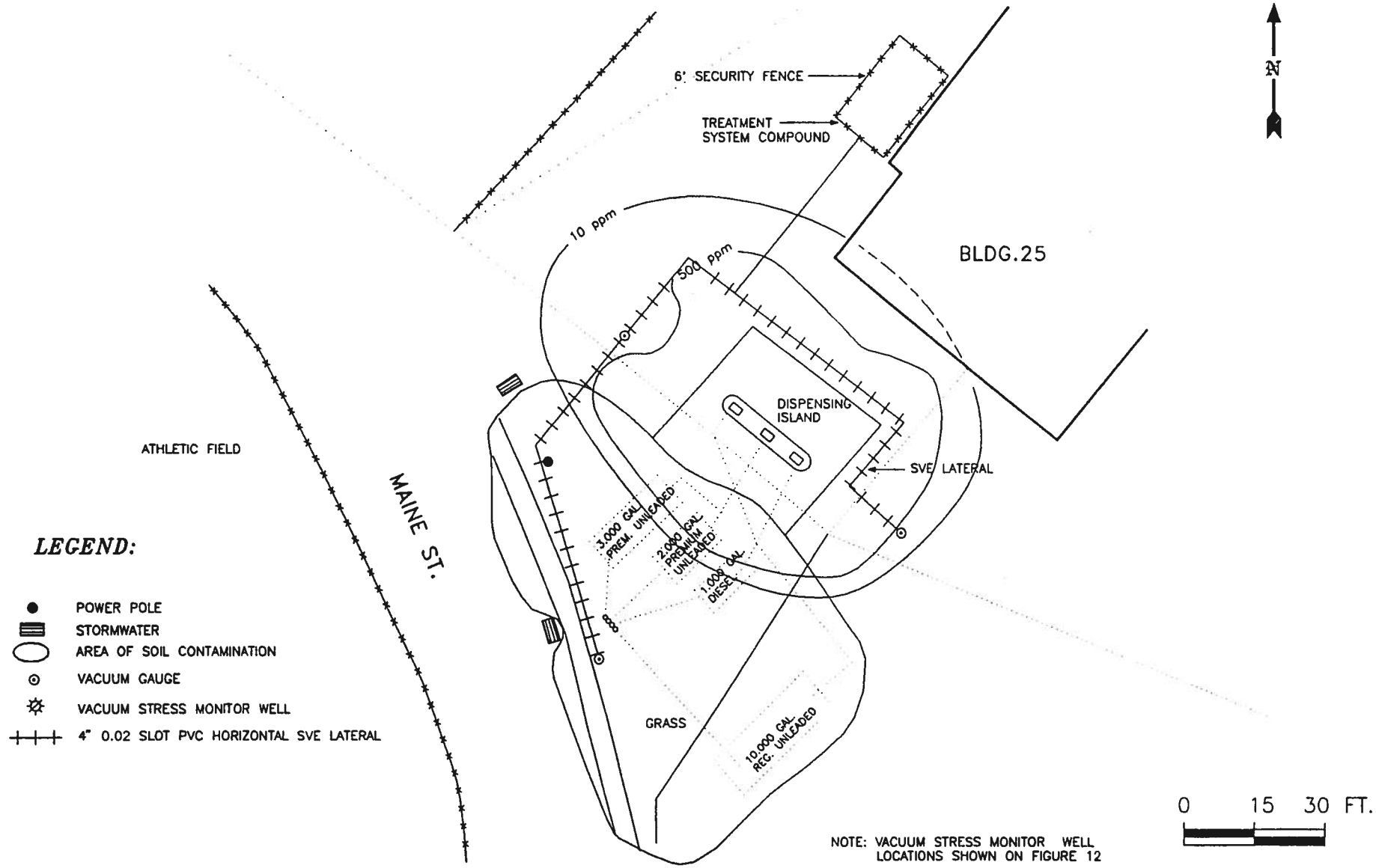
PROJECT NO.: 86298.000
FDEP FACILITY NO.:168626008

DATE: 03-28-94
DRAWN BY: R.R.J.
CHECKED BY:

GROUNDWATER CONTAMINATION MAP
(JULY 1993)
NAVAL STATION MAYPORT
BULDING 25
MAYPORT, FLORIDA

6

67-FILE NAME: A:\86298-GC.DWG

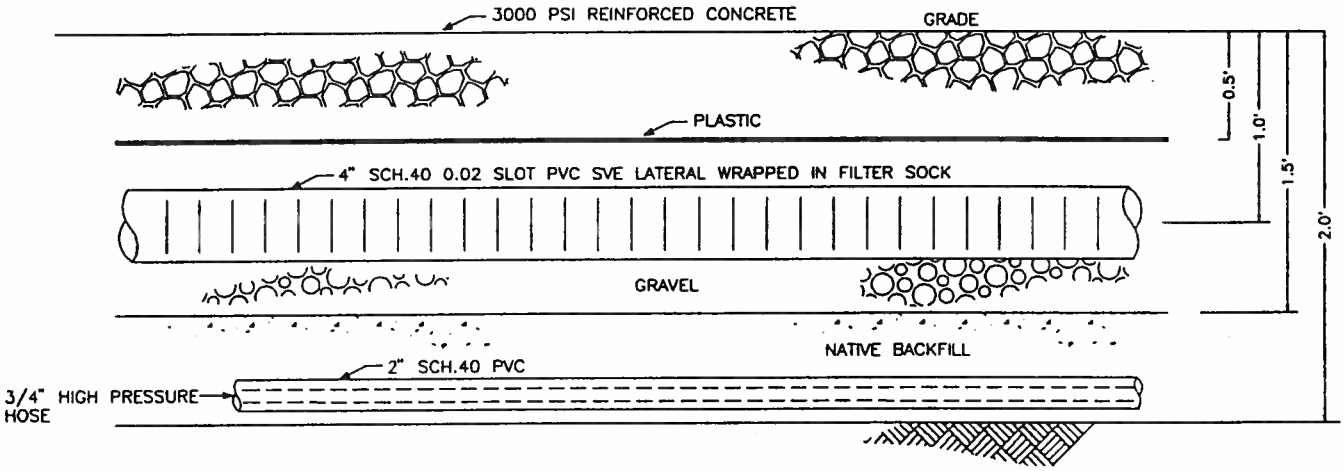


NOTE: VACUUM STRESS MONITOR WELL LOCATIONS SHOWN ON FIGURE 12

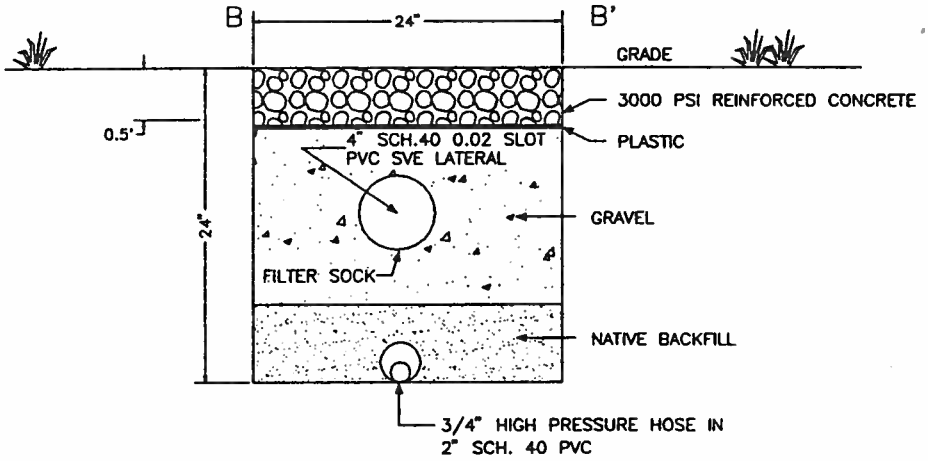
RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000	SOIL VAPOR EXTRACTION SYSTEM LAYOUT MAP
FDEP FACILITY NO.:168626008	*NAVAL STATION MAYPORT BULDING 25*
DATE: 04-15-94	MAYPORT, FLORIDA
DRAWN BY: R.R.L.	7
CHECKED BY:	

67-FILE NAME: A:\86298-SV.DWG



SIDE VIEW SECTION B–B'
(NOT TO SCALE)



END VIEW SECTION B–B'
(NOT TO SCALE)

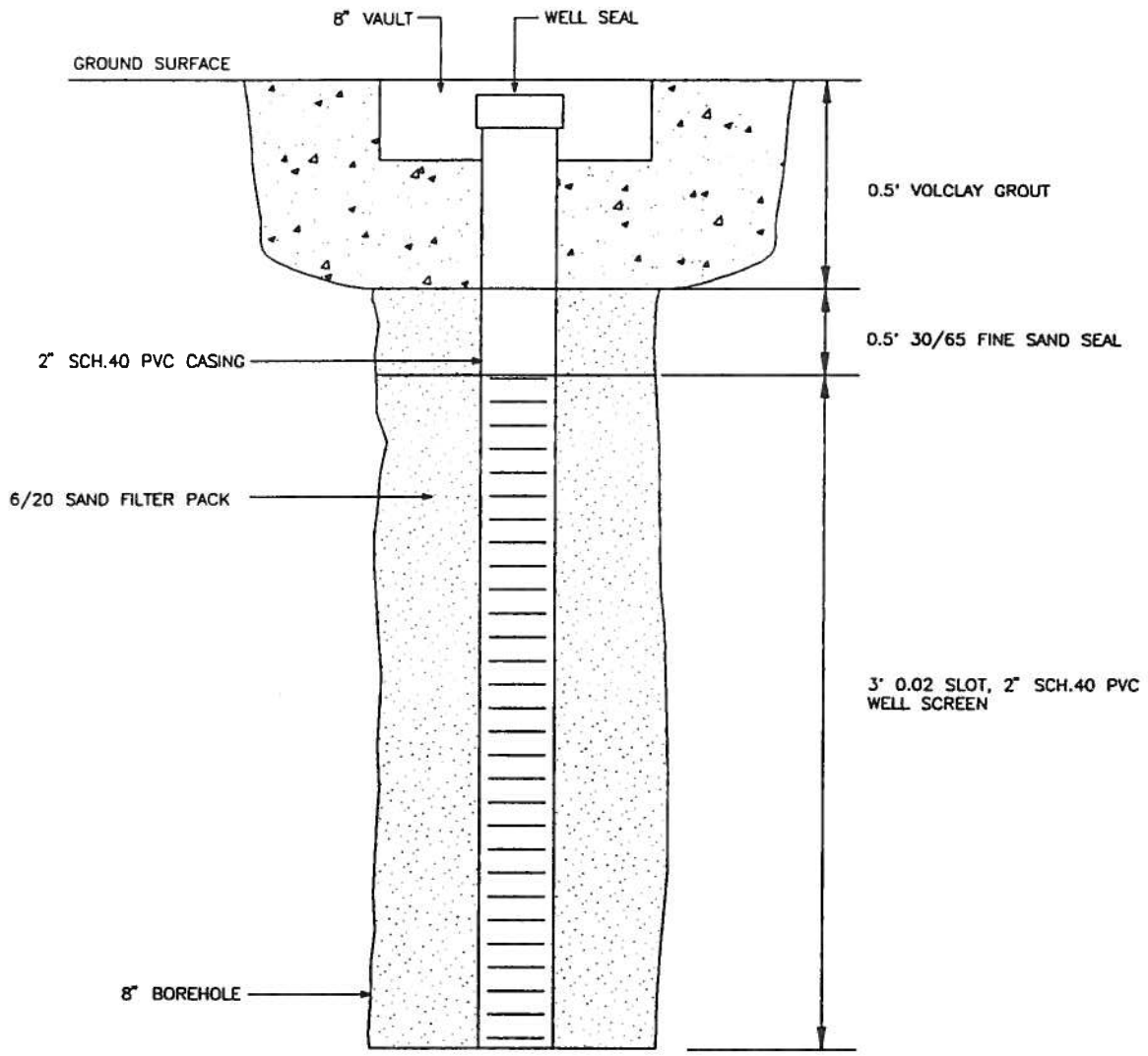
NOTE: SECTION LINE B—B' SHOWN ON FIGURE 11

PROJECT NO.: 86298.000	DATE: 04–15–94	VAPOR RECOVERY WELL CONSTRUCTION DETAIL
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT BUILDING 25*
	CHECKED BY: CH	MAYPORT, FLORIDA

RUST ENVIRONMENT & INFRASTRUCTURE

8

67-FILE NAME: A:\86298-VR.DWG



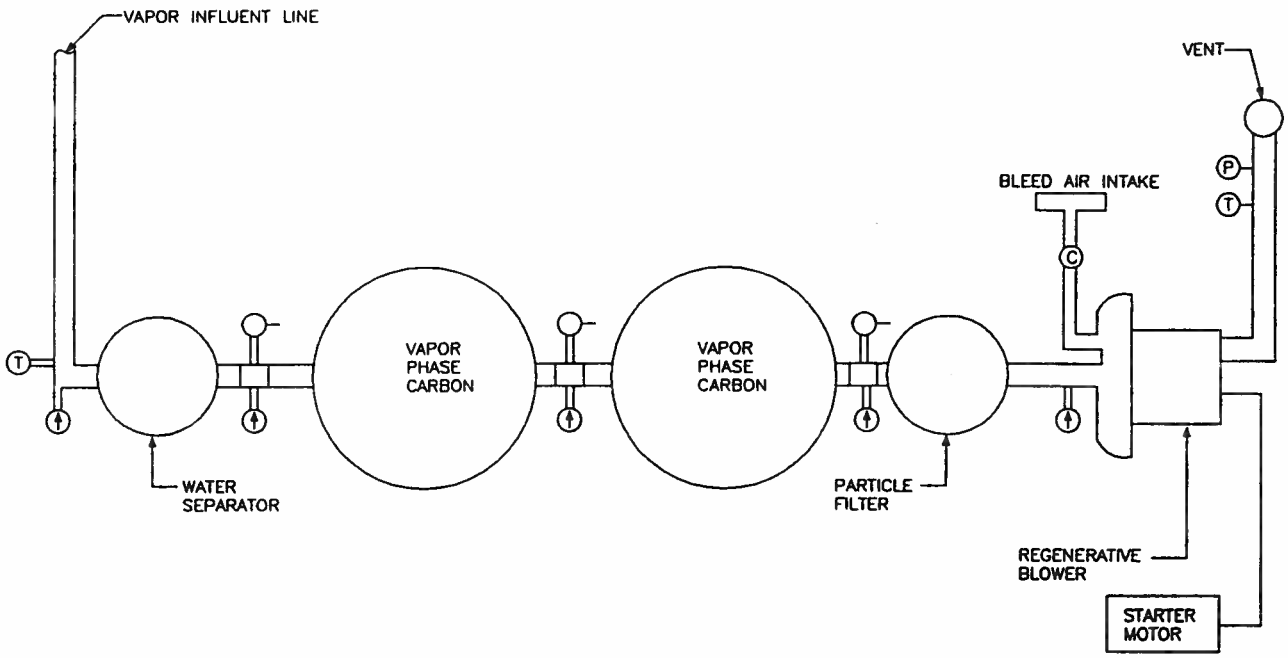
NOTE: DRAWING NOT TO SCALE

PROJECT NO.: 86298.000	DATE: 04-15-94	VACUUM STRESS MONITOR WELL DETAIL
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT BUILDING 25*
	CHECKED BY:	

RUST ENVIRONMENT & INFRASTRUCTURE

MAYPORT, FLORIDA

67-FILE NAME: A:\86298-VS.DWG



LEGEND:

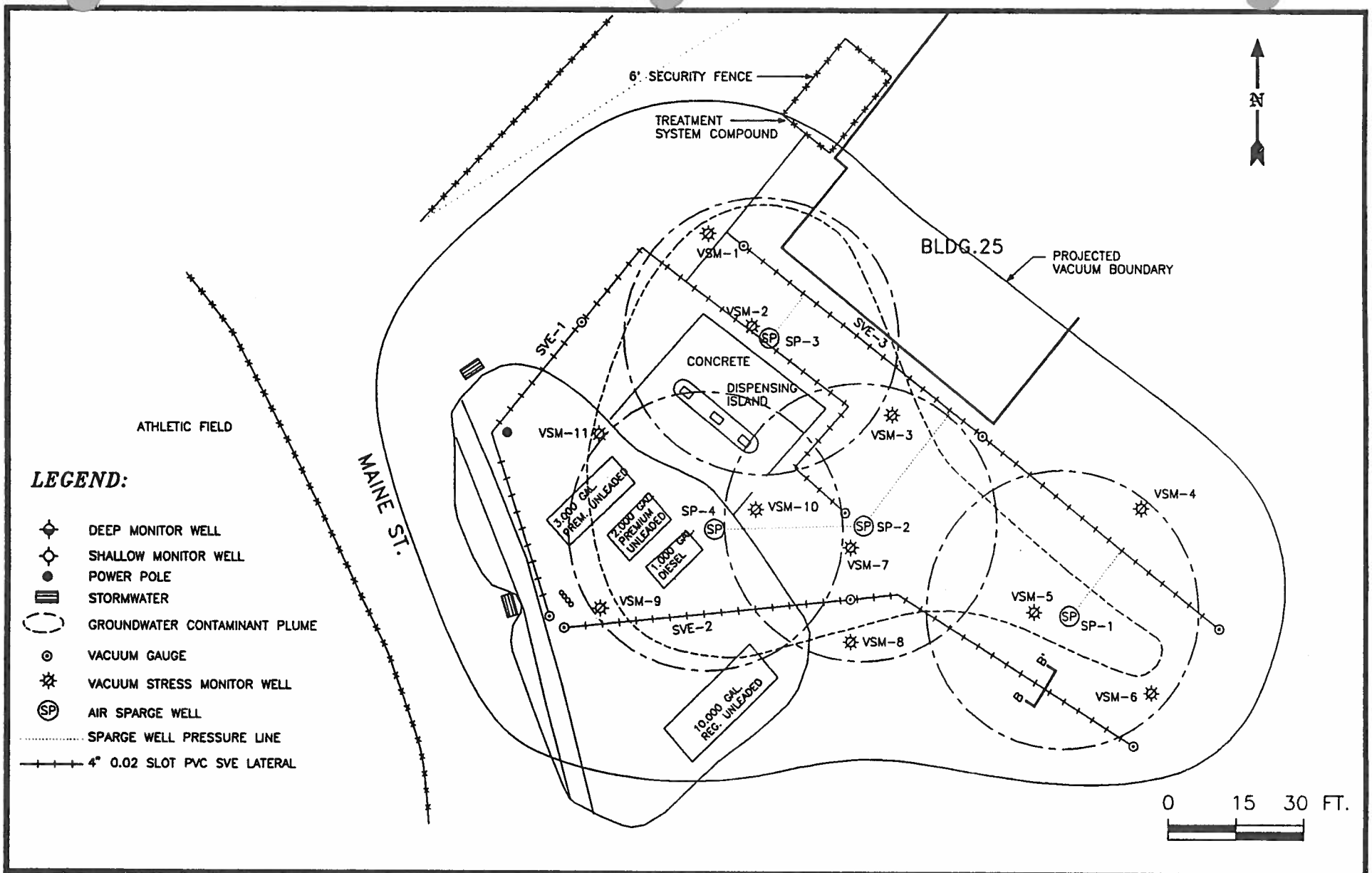
- VACUUM GAUGE
- SAMPLE PORT
- MANUAL BLEED AIR VALVE
- TEMPERATURE GAUGE
- PRESSURE GAUGE

PROJECT NO.: 86298.000	DATE: 04-15-94	VAPOR PHASE CARBON ADSORPTION SYSTEM
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT BUILDING 25*
	CHECKED BY:	MAYPORT, FLORIDA

RUST ENVIRONMENT & INFRASTRUCTURE

10

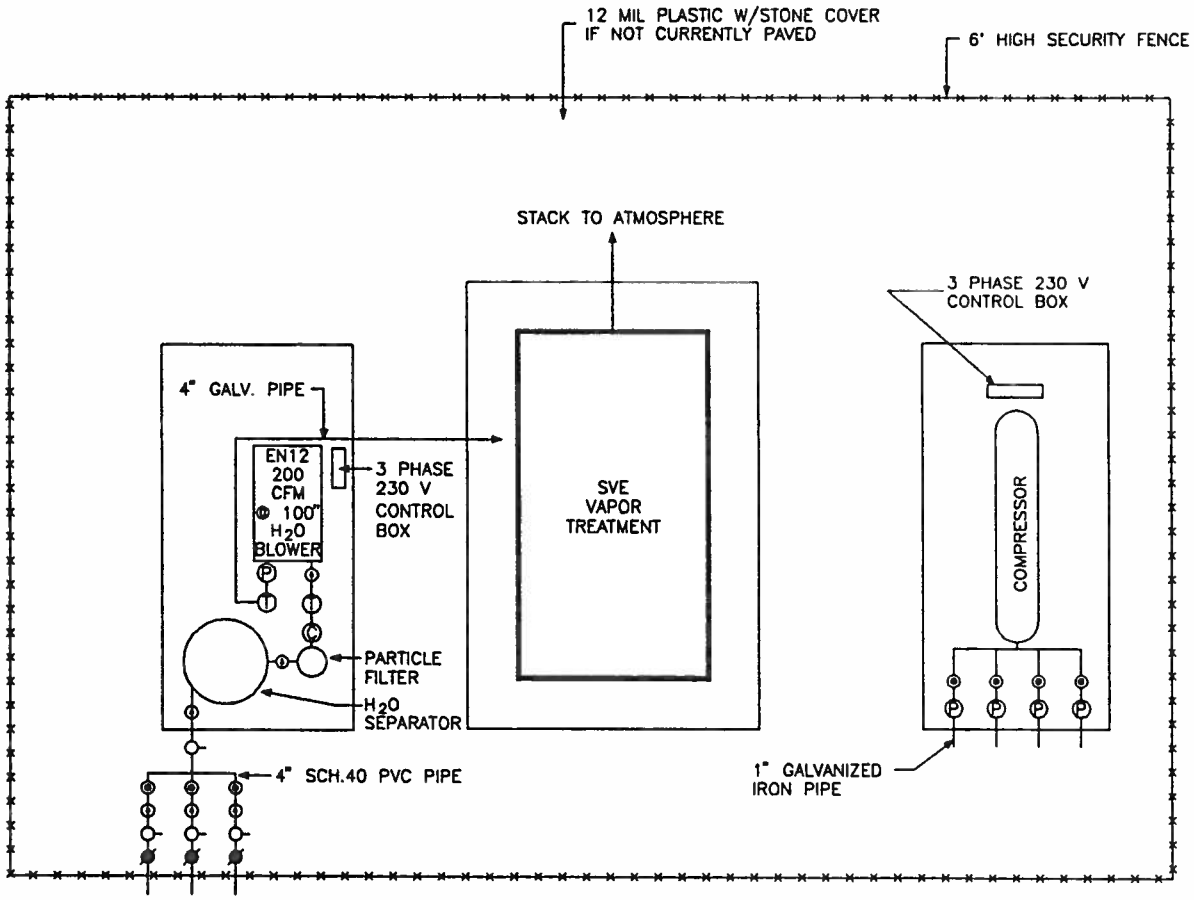
67-FILE NAME: A:\B6298-VP.DWG



RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000	AIR SPARGING SYSTEM LAYOUT MAP
FDEP FACILITY NO.: 168626008	*NAVAL STATION MAYPORT*
	BULDING 25
DATE: 04-15-94	MAYPORT, FLORIDA
DRAWN BY: R.R.L.	11
CHECKED BY:	

67-FILE NAME: A:\86298-G2.DWG



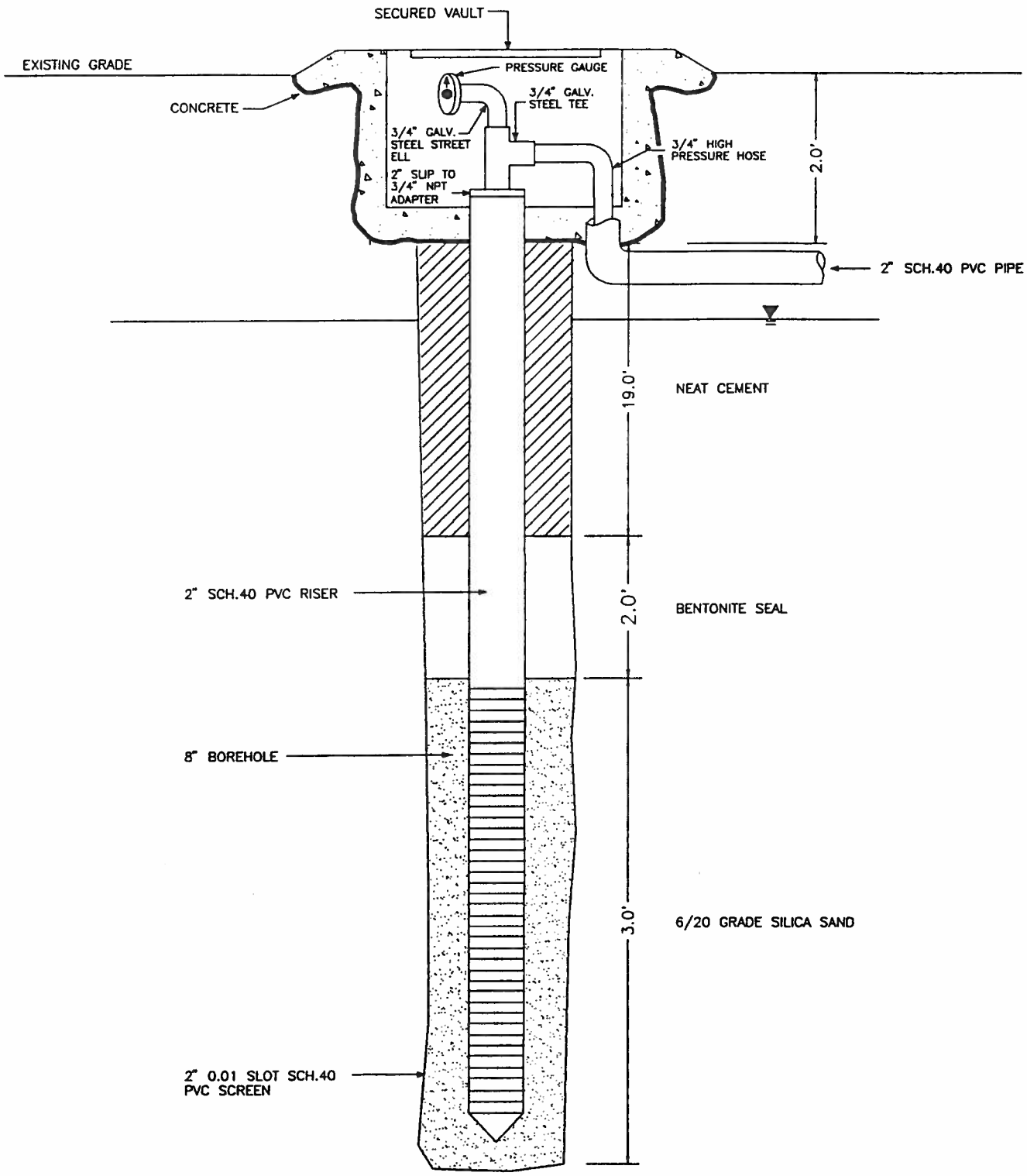
LEGEND:

- 4" PVC BALL VALVE
- SAMPLE PORT
- VACUUM GAUGE
- INLINE FLOW METER
- TEMPERATURE GAUGE
- PRESSURE GAUGE
- MANUAL BLEED AIR VALVE

RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000	TREATMENT SYSTEM COMPOUND DETAIL
FDEP FACILITY NO.: 168626008	
	NAVAL STATION MAYPORT
DATE: 04-15-94	*BULDING 25*
DRAWN BY: R.R.L.	MAYPORT, FLORIDA
CHECKED BY:	12

67-FILE NAME: A:\86298-TS.DWG



PROJECT NO.: 86298.000	DATE: 04-15-94	AIR SPARGING WELL DETAIL
FDEP FACILITY NO.: 168626008	DRAWN BY: R.R.L.	*NAVAL STATION MAYPORT BUILDING 25*
	CHECKED BY:	
RUST ENVIRONMENT & INFRASTRUCTURE		MAYPORT, FLORIDA

13

67-FILE NAME: A:\86298-A1.DWG

TABLES

Table 1

Monitor Well Construction Summary

Naval Station Mayport
Building 25 - Transportation Shop
Mayport, Florida

Well Designation	Total Depth (feet)	Well Diameter (inches)	Screened Interval (feet)	Date Installed
MAY-25-1	12.0	2	1.9 - 10.9	4/29/91
MAY-25-2	12.1	2	2.0 - 11.0	4/29/91
MAY-25-3	12.1	2	2.0 - 11.0	4/29/91
MAY-25-4	12.1	2	2.0 - 11.0	4/29/91
MAY-25-5	12.1	2	2.0 - 11.0	4/30/91
MAY-25-6	12.1	2	2.0 - 11.0	4/30/91
MAY-25-7	Abandoned	-	-	5/19/91
MAY-25-8	31.5	2	26.5 - 30.5	12/3/91
MAY-25-9	12.0	2	1.5 - 11.5	10/1/92
MAY-25-10	12.0	2	1.5 - 11.5	10/2/92
MAY-25-11	12.0	2	1.5 - 11.5	10/2/92
MAY-25-12	25.0	2	19.5 - 24.5	12/17/92
MAY-25-13	11.5	2	3.3 - 12.3	4/30/93
MAY-25-14	32.1	2	25.0 - 29.5	5/6/93
MAY-25-15	11.9	2	2.5 - 11.5	5/6/93

TABLE 2*

SUMMARY OF SOIL HEADSPACE ANALYSES

BUILDING 25 - TRANSPORTATION SHOP
MAYPORT NAVAL STATION
MAYPORT, FLORIDA

Sample No.	Date	Depth (feet)	OVA Headspace Reading	OVA Headspace Reading With Carbon Filter	Corrected OVA Headspace Reading (*)	PID Reading
25-1	2-12-91	1.0-1.5	1000+	NR	--	160
		2.0-2.5	600	NR	--	130
25-2	2-12-91	1.0-1.5	0	NR	--	NR
		3.0-3.5	6.6	NR	--	NR
25-3	2-12-91	1.0-1.5	0	NR	--	NR
25-4	2-12-91	1.0-1.5	0	NR	--	NR
25-5	2-12-91	1.0-1.5	0	NR	--	NR
25-6	2-12-91	1.0-1.5	0	NR	--	160
		2.5-3.0	0	NR	--	103
25-7	2-12-91	1.0-1.5	0.5	NR	--	NR
		2.0-2.5	0	NR	--	NR
25-8	2-12-91	1.0-1.5	10	NR	--	NR
25-9	2-12-91	1.0-1.5	0	NR	--	NR
		2.0-2.5	0	NR	--	NR
25-10	2-12-91	1.0-1.5	1000+	NR	--	224
		2.8-3.0	1000+	NR	--	268
25-11	2-12-91	1.0-1.5	0	NR	--	NR
		2.5-3.0	2	NR	--	1.8
25-12	2-12-91	1.0-1.5	1000+	NR	--	279
25-13	2-12-91	1.0-1.5	1.0	NR	--	NR
		2.2-2.5	6.0	NR	--	NR
25-14	2-12-91	1.0-1.5	1.0	NR	--	NR
25-15	2-12-91	1.0-1.5	0	NR	--	NR
25-16	2-12-91	1.0-1.5	0.5	NR	--	NR
		2.5-3.0	0	NR	--	NR
25-17	2-12-91	1.0-1.5	2.0	NR	--	NR
		3.2-3.5	0.5	NR	--	NR
25-18	2-13-91	1.0-1.5	0	NR	--	NR
		2.5-3.0	0	NR	--	NR
25-19	2-13-91	1.0-1.5	0	NR	--	NR
		2.5-3.0	0	NR	--	NR
25-20	2-13-91	1.0-1.5	50	NR	--	29.5
		2.5-3.0	300	NR	--	54.3

* SOURCE: U.S. ARMY COE ADDENDUM TO CONTAMINATION REPORT DATED MARCH 1993

TABLE 2 (CONT'D)

SUMMARY OF SOIL HEADSPACE ANALYSES

BUILDING 25 - TRANSPORTATION SHOP
MAYPORT NAVAL STATION
MAYPORT, FLORIDA

Sample No.	Date	Depth (feet)	OVA Headspace Reading	OVA Headspace Reading With Carbon Filter	Corrected OVA Headspace Reading (*)	PID Reading
25-21	2-13-91	--	NR	NR	--	NR
MAY 25-1	4-29-91	1.0-1.5	0.3	NR	--	0
MAY 25-2	4-29-91	1.0-1.5	3.0	0.4	2.6	0
MAY 25-3	4-29-91	1.0-1.5	0	NR	--	0
MAY 25-4	4-29-91	--	NR	NR	--	NR
MAY 25-5	4-30-91	1.0-1.5	0	NR	--	0
MAY 25-6	4-30-91	1.0-1.5	420	120	300	74.1
MAY 25-7	5-17-91	--	NR	NR	--	NR
MAY 25-8	12-3-91	--	NR	NR	--	NR
25-22	10-4-92	1.0-1.5	360	NR	--	NR
		2.5-3.0	290	NR	--	NR
25-23	"	1.0-1.5	130	NR	--	NR
		3.0-3.5	1000+	NR	--	NR
25-24	"	1.0-1.5	680	NR	--	NR
		3.0-3.5	1000+	NR	--	NR
25-25	"	1.0-1.5	1000+	NR	--	NR
		3.0-3.5	1000+	NR	--	NR
25-26	"	1.0-1.5	1000+	NR	--	NR
		3.0-3.5	1000+	NR	--	NR
25-27	"	1.0-1.5	310	NR	--	NR
		3.0-3.5	1000+	NR	--	NR
25-28	"	1.0-1.5	315	NR	--	NR
		3.0-3.5	360	NR	--	NR
25-29	"	1.0-1.5	200	NR	--	NR
		3.0-3.5	350	NR	--	NR
25-30	"	1.0-1.5	0	NR	--	NR
		3.0-3.5	30	NR	--	NR
25-31	"	1.0-1.5	4.6	NR	--	NR
		3.0-3.5	0	NR	--	NR
25-32	"	1.0-1.5	4.0	NR	--	NR
		2.0-2.5	20	NR	--	NR
25-33	"	1.0-1.5	320	75	245	NR
		2.5-3.0	1000+	630	370+	NR

TABLE 2 (CONT'D)

SUMMARY OF SOIL HEADSPACE ANALYSES

BUILDING 25 - TRANSPORTATION SHOP
MAYPORT NAVAL STATION
MAYPORT, FLORIDA

Sample No.	Date	Depth (feet)	OVA Headspace Reading	OVA Headspace Reading With Carbon Filter	Corrected OVA Headspace Reading (*)	PID Reading
25-34	"	1.0-1.5	0.2	NR	--	NR
		2.5-3.0	520	515	5	NR
25-35	"	1.0-1.5	0	NR	--	NR
		2.0-2.5	130	130	0	NR

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

Table 3

Summary of Laboratory Results
July 1993
Naval Station Mayport
Building 25

Source	Benzene (ug/l)	E. Benzene (ug/l)	Toluene (ug/l)	Xylenes (ug/l)	MTBE (ug/l)	TVO A (ug/l)	Total Napthalenes (ug/l)	Dissolved Lead (mg/l)
MAY-25-1	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005
MAY-25-2	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005
MAY-25-3	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005
MAY-25-4	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005
MAY-25-5	<1.0	<1.0	<1.0	<1.0	<10	4	<30	<0.005
MAY-25-6	160	43	<5.0	44	180	≤252	<30	<0.005
MAY-25-8	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005
MAY-25-9	620	230	<50	280	27000	≤118	106	<0.005
MAY-25-10	2700	780	900	2000	4300	6380	84	<0.005
MAY-25-11	28	5.5	<1.0	1.1	170	≤35.6	<30	<0.005
MAY-25-12	<1.0	<1.0	<1.0	<1.0	<10	<4	<30	<0.005

TABLE 4
COMPARISON OF GROUNDWATER CONTAMINANT DATA

Well #	Location relative to plume:		SIDEGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/18/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-1	Benzene	1.0	<1.0	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Toluene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Total Xylenes	N/R	<1.0	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	<4	N/T	<4	N/T	<4
	MTBE	50.0	<10	N/T	<10	N/T	<10
	Total Lead	50.0	7.2	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<1.0	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:	TDS = 480 MG/l (6/18/91)						

Well #	Location relative to plume:		DOWNGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/18/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-2	Benzene	1.0	<1.0	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Toluene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Total Xylenes	N/R	<1.0	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	<4	N/T	<4	N/T	<4
	MTBE	50.0	22	N/T	<10	N/T	<10
	Total Lead	50.0	<5.0	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<1.0	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:							

Well #	Location relative to plume:		DOWNGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/18/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-3	Benzene	1.0	<5.0	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	<5.0	N/T	<1.0	N/T	<1.0
	Toluene	N/R	<5.0	N/T	1.0	N/T	<1.0
	Total Xylenes	N/R	<5.0	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	<20	N/T	4*	N/T	<4
	MTBE	50.0	130	N/T	<10	N/T	<10
	Total Lead	50.0	<7.2	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<5.0	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:	TDS = 480 MG/l (6/18/91)						

N/T GROUNDWATER SAMPLES WERE NOT TAKEN ON THIS DATE
N/A GROUNDWATER SAMPLES WERE NOT ANALYZED FOR THIS PARAMETER
N/R NON-REGULATED COMPOUND

UG/L MICROGRAM PER LITRE
MG/L MILLIGRAM PER LITRE
MPL MAXIMUM PERMISSIBLE LEVEL
* THIS TVOA VALUE REPRESENTS THE SUM OF ALL POSITIVE (ABOVE DETECTION LIMIT) BTEX VALUES PLUS DETECTION LIMIT VALUES FOR THOSE BTEX COMPOUNDS THAT WERE REPORTED AS BELOW DETECTION LIMITS

CG2433CE

TABLE 4 (CONT'D)

Well #	Location relative to plume:		UPGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/18/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-4	Benzene	1.0	<1.0	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Toluene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Total Xylenes	N/R	<1.0	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	<4	N/T	<4	N/T	<4
	MTBE	50.0	22	N/T	<10	N/T	<10
	Total Lead	50.0	<5.0	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<1.0	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:	TDS = 480 MG/l (6/18/91)						

Well #	Location relative to plume:		UPGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/19/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-5	Benzene	1.0	<1.0	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	<1.0	N/T	<1.0	N/T	<1.0
	Toluene	N/R	<1.0	N/T	1.0	N/T	<1.0
	Total Xylenes	N/R	<1.0	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	<4	N/T	<4	N/T	<4
	MTBE	50.0	<10	N/T	<10	N/T	<10
	Total Lead	50.0	<5.0	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<1.0	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:	TDS = 490 MG/L (6/13/91)						

Well #	Location relative to plume:		WITHIN				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/19/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-6	Benzene	1.0	56	N/T	4.0	N/T	160
	Ethylbenzene	N/R	<50	N/T	<1.0	N/T	43
	Toluene	N/R	<50	N/T	4.7	N/T	<5.0
	Total Xylenes	N/R	<50	N/T	<1.0	N/T	44
	TVOAs	50.0	206*	N/T	10.7*	N/T	252*
	MTBE	50.0	1400	N/T	150	N/T	180
	Total Lead	50.0	<5.0	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/A	N/T	N/A	N/T	<5.0
	EDB	0.02	<0.020	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	<50	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	<30	N/T	N/A	N/T	<30
REMARKS:							

N/T GROUNDWATER SAMPLES WERE NOT TAKEN ON THIS DATE
N/A GROUNDWATER SAMPLES WERE NOT ANALYZED FOR THIS PARAMETER
N/R NON-REGULATED COMPOUND

UG/L MICROGRAM PER LITRE
MG/L MILLIGRAM PER LITRE
MPL MAXIMUM PERMISSIBLE LEVEL
* THIS TVOA VALUE REPRESENTS THE SUM OF ALL POSITIVE (ABOVE DETECTION LIMIT) BTEX VALUES PLUS DETECTION LIMIT VALUES FOR THOSE BTEX COMPOUNDS THAT WERE REPORTED AS BELOW DETECTION LIMITS

CD2433CE

TABLE 4 (CONT'D)

Well #	Location relative to plume:		DEEP/UPGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-8	Benzene	1.0	N/T	<1.0	1.2	N/T	<1.0
	Ethylbenzene	N/R	N/T	<1.0	<1.0	N/T	<1.0
	Toluene	N/R	N/T	<1.0	<1.0	N/T	<1.0
	Total Xylenes	N/R	N/T	<1.0	<1.0	N/T	<1.0
	TVOAs	50.0	N/T	<4	4.2*	N/T	<4
	MTBE	50.0	N/T	<10	19	N/T	<10
	Total Lead	50.0	N/T	<5.0	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/T	N/A	N/A	N/T	<5.0
	EDB	0.02	N/T	<0.020	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	N/T	<1.0	N/A	N/T	N/A
	Total Naphthalenes	100	N/T	<30	N/A	N/T	<30
REMARKS:	TDS = 640 MG/L (6/14/91)						

Well #	Location relative to plume:		WITHIN				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/92	7/6/93
MAY-25-9	Benzene	1.0	N/T	N/T	430	N/T	620
	Ethylbenzene	N/R	N/T	N/T	230	N/T	230
	Toluene	N/R	N/T	N/T	BDL	N/T	<50
	Total Xylenes	N/R	N/T	N/T	400	N/T	280
	TVOAs	50.0	N/T	N/T	1060*	N/T	1180*
	MTBE	50.0	N/T	N/T	5700	N/T	27000
	Total Lead	50.0	N/T	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/T	N/T	N/A	N/T	<5.0
	EDB	0.02	N/T	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	N/T	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	N/T	N/T	N/A	N/T	106
REMARKS:	WELL INSTALLED SEPTEMBER 1992						

Well #	Location relative to plume:		SOURCE				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/92	7/6/93
MAY-25-10	Benzene	1.0	N/T	N/T	16000	N/T	2700
	Ethylbenzene	N/R	N/T	N/T	3700	N/T	780
	Toluene	N/R	N/T	N/T	30000	N/T	900
	Total Xylenes	N/R	N/T	N/T	21000	N/T	2000
	TVOAs	50.0	N/T	N/T	70700	N/T	6380
	MTBE	50.0	N/T	N/T	29000	N/T	4300
	Total Lead	50.0	N/T	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/T	N/T	N/A	N/T	<5.0
	EDB	0.02	N/T	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	N/T	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	N/T	N/T	N/A	N/T	84
REMARKS:	WELL INSTALLED SEPTEMBER 1992						

N/T GROUNDWATER SAMPLES WERE NOT TAKEN ON THIS DATE
N/A GROUNDWATER SAMPLES WERE NOT ANALYZED FOR THIS PARAMETER
N/R NON-REGULATED COMPOUND

UG/L MICROGRAM PER LITRE
MG/L MILLIGRAM PER LITRE
MPL MAXIMUM PERMISSIBLE LEVEL
* THIS TVOA VALUE REPRESENTS THE SUM OF ALL POSITIVE (ABOVE DETECTION LIMIT) BTEX VALUES PLUS DETECTION LIMIT VALUES FOR THOSE BTEX COMPOUNDS THAT WERE REPORTED AS BELOW DETECTION LIMITS

CD2433CE

TABLE 4 (CONT'D)

Well #	Location relative to plume:		UPGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/16/93
MAY-25-11	Benzene	1.0	N/T	N/T	24	N/T	28
	Ethylbenzene	N/R	N/T	N/T	BDL	N/T	5.5
	Toluene	N/R	N/T	N/T	BDL	N/T	<1.0
	Total Xylenes	N/R	N/T	N/T	BDL	N/T	1.1
	TVOAs	50.0	N/T	N/T	>24	N/T	35.6*
	MTBE	50.0	N/T	N/T	1200	N/T	170
	Total Lead	50.0	N/T	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/T	N/T	N/A	N/T	<5.0
	EDB	0.02	N/T	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	N/T	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	N/T	N/T	N/A	N/T	<30
REMARKS:	* NAPHTHALENE ONLY/** 10 UG/L NAPHTHALENE						

Well #	Location relative to plume:		DEEP				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-12	Benzene	1.0	N/T	N/T	<1.0	N/T	<1.0
	Ethylbenzene	N/R	N/T	N/T	<1.0	N/T	<1.0
	Toluene	N/R	N/T	N/T	3.7	N/T	<1.0
	Total Xylenes	N/R	N/T	N/T	<1.0	N/T	<1.0
	TVOAs	50.0	N/T	N/T	6.7*	N/T	<4
	MTBE	50.0	N/T	N/T	<1.0	N/T	<10
	Total Lead	50.0	N/T	N/T	N/A	N/T	<5.0
	Dissolved Lead	N/R	N/T	N/T	N/A	N/T	<5.0
	EDB	0.02	N/T	N/T	N/A	N/T	N/A
	1,2 Dichloroethane	3.0	N/T	N/T	N/A	N/T	N/A
	Total Naphthalenes	100	N/T	N/T	N/A	N/T	<30
REMARKS:	MANGANESE = 0.21 MG/L, HARDNESS AS CaCO3 = 510 MG/L, Fe++ = <0.10 MG/L, TOC = 19 MG/L, TDS = 620 MG/L, TSS = 36 MG/L, (5/14/93)						

Well #	Location relative to plume:		DOWNGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-13	Benzene	1.0	N/T	N/T	N/T	1.8	N/T
	Ethylbenzene	N/R	N/T	N/T	N/T	<1.0	N/T
	Toluene	N/R	N/T	N/T	N/T	<1.0	N/T
	Total Xylenes	N/R	N/T	N/T	N/T	<1.0	N/T
	TVOAs	50.0	N/T	N/T	N/T	4.8*	N/T
	MTBE	50.0	N/T	N/T	N/T	44	N/T
	Total Lead	50.0	N/T	N/T	N/T	N/A	N/T
	Dissolved Lead	N/R	N/T	N/T	N/T	N/A	N/T
	EDB	0.02	N/T	N/T	N/T	N/A	N/T
	1,2 Dichloroethane	3.0	N/T	N/T	N/T	N/A	N/T
	Total Naphthalenes	100	N/T	N/T	N/T	N/A	N/T
REMARKS:							

N/T GROUNDWATER SAMPLES WERE NOT TAKEN ON THIS DATE
N/A GROUNDWATER SAMPLES WERE NOT ANALYZED FOR THIS PARAMETER
N/R NON-REGULATED COMPOUND

UG/L MICROGRAM PER LITRE
MG/L MILLIGRAM PER LITRE
MPL MAXIMUM PERMISSIBLE LEVEL
* THIS TVOA VALUE REPRESENTS THE SUM OF ALL POSITIVE (ABOVE DETECTION LIMIT) BTEX VALUES PLUS DETECTION LIMIT VALUES FOR THOSE BTEX COMPOUNDS THAT WERE REPORTED AS BELOW DETECTION LIMITS

CD2433CE

TABLE 4 (CONT'D)

Well #	Location relative to plume:		DEEP				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-14	Benzene	1.0	N/T	N/T	N/T	<1.0	N/T
	Ethylbenzene	N/R	N/T	N/T	N/T	<1.0	N/T
	Toluene	N/R	N/T	N/T	N/T	<1.0	N/T
	Total Xylenes	N/R	N/T	N/T	N/T	<1.0	N/T
	TVOAs	50.0	N/T	N/T	N/T	<4	N/T
	MTBE	50.0	N/T	N/T	N/T	<10	N/T
	Total Lead	50.0	N/T	N/T	N/T	N/A	N/T
	Dissolved Lead	N/R	N/T	N/T	N/T	N/A	N/T
	EDB	0.02	N/T	N/T	N/T	N/A	N/T
	1,2 Dichloroethane	3.0	N/T	N/T	N/T	N/A	N/T
	Total Naphthalenes	100	N/T	N/T	N/T	N/A	N/T
REMARKS:							

Well #	Location relative to plume:		DOWNGRADIENT				
	Dissolved Contaminant	MPL PER CHAPTER 17-770 (ug/l)	Sample Date / CONCENTRATIONS (ug/l)				
			6/91	1/10/92	12/18/92	5/14/93	7/6/93
MAY-25-15	Benzene	1.0	N/T	N/T	N/T	2.2	N/T
	Ethylbenzene	N/R	N/T	N/T	N/T	<1.0	N/T
	Toluene	N/R	N/T	N/T	N/T	<1.0	N/T
	Total Xylenes	N/R	N/T	N/T	N/T	<1.0	N/T
	TVOAs	50.0	N/T	N/T	N/T	5.2*	N/T
	MTBE	50.0	N/T	N/T	N/T	55	N/T
	Total Lead	50.0	N/T	N/T	N/T	N/A	N/T
	Dissolved Lead	N/R	N/T	N/T	N/T	N/A	N/T
	EDB	0.02	N/T	N/T	N/T	N/A	N/T
	1,2 Dichloroethane	3.0	N/T	N/T	N/T	N/A	N/T
	Total Naphthalenes	100	N/T	N/T	N/T	N/A	N/T
REMARKS:							

N/T GROUNDWATER SAMPLES WERE NOT TAKEN ON THIS DATE
N/A GROUNDWATER SAMPLES WERE NOT ANALYZED FOR THIS PARAMETER
N/R NON-REGULATED COMPOUND

CD2433CE

UG/L MICROGRAM PER LITRE
MG/L MILLIGRAM PER LITRE
MPL MAXIMUM PERMISSIBLE LEVEL
* THIS TVOA VALUE REPRESENTS THE SUM OF ALL POSITIVE (ABOVE DETECTION LIMIT) BTEX VALUES PLUS DETECTION LIMIT VALUES FOR THOSE BTEX COMPOUNDS THAT WERE REPORTED AS BELOW DETECTION LIMITS

APPENDICES

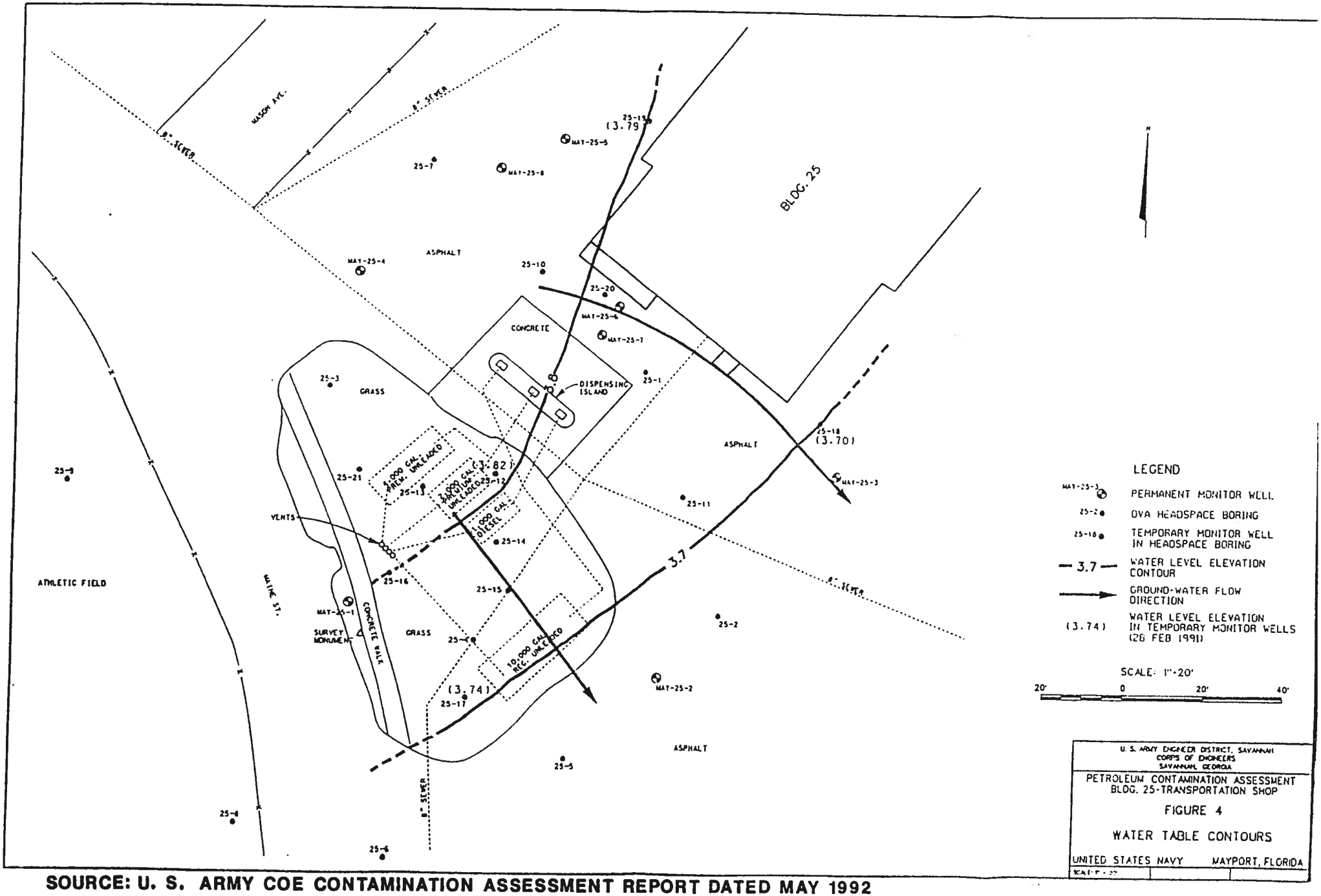
APPENDIX A

HISTORICAL GROUNDWATER ELEVATION DATA

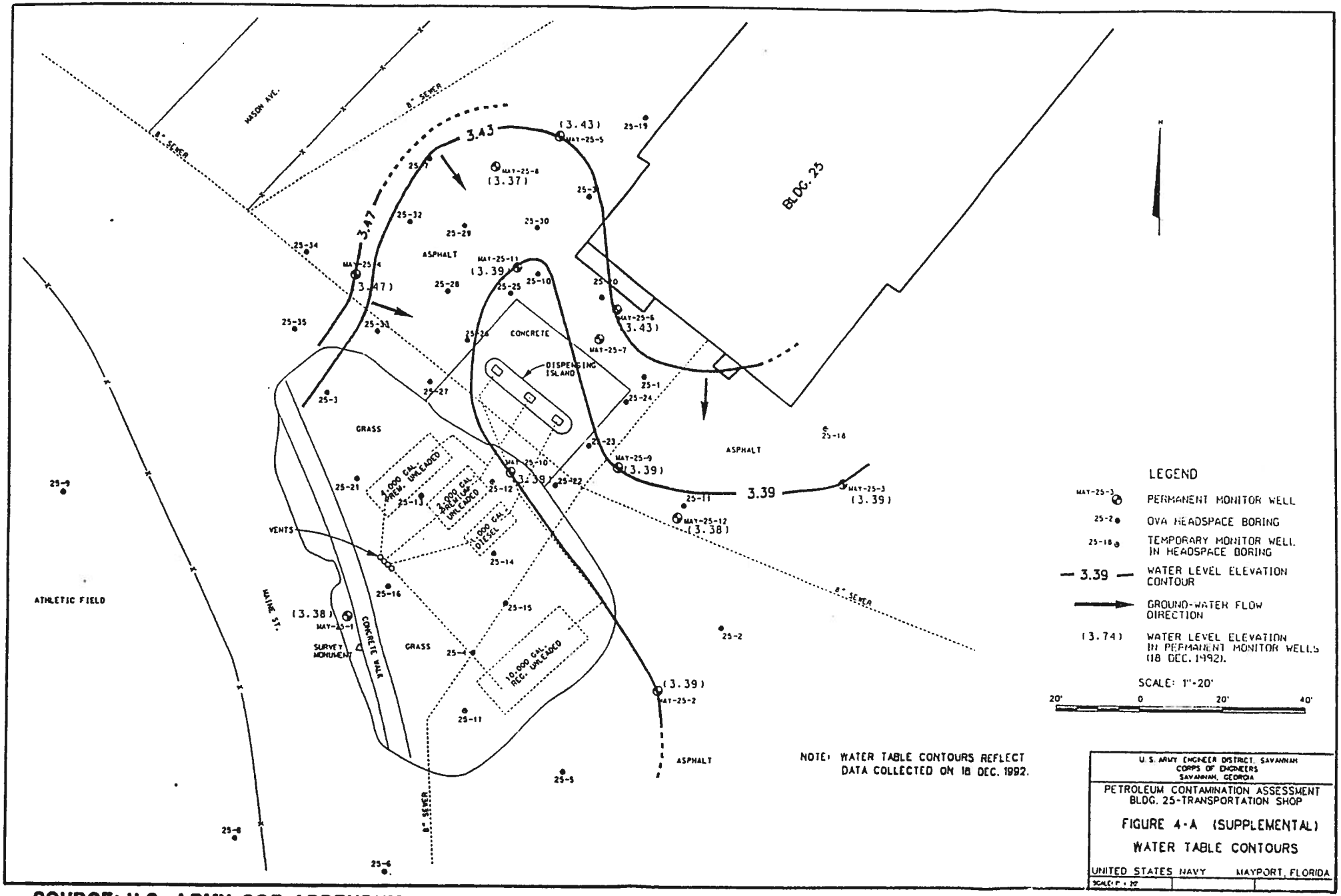
GROUNDWATER ELEVATIONS *

Well Designation	Survey Elevation	Date			
		6/19/91	12/18/92	6/23/93	7/6/93
MAY-25-1	6.48	4.20	3.38	2.78	2.96
MAY-25-2	6.79	4.21	3.39	2.68	2.89
MAY-25-3	7.12	4.22	3.39	2.67	2.90
MAY-25-4	6.37	4.19	3.47	2.88	3.13
MAY-25-5	6.73	4.17	3.43	2.80	3.01
MAY-25-6	7.08	4.23	3.43	2.76	3.00
MAY-27-7	6.97	4.27	-	-	-
MAY-25-8	6.67	3.31**	3.37	2.70	2.93
MAY-25-9	6.89	-	3.39	2.72	2.93
MAY-25-10	7.14	-	3.39	2.74	2.95
MAY-25-11	6.89	-	3.39	2.80	3.01
MAY-25-12	6.88	-	3.38	2.70	2.93
MAY-25-13	6.93	-	-	2.65	2.88
MAY-25-14	6.48	-	-	2.66	2.90
MAY-25-15	6.82	-	-	2.64	2.87

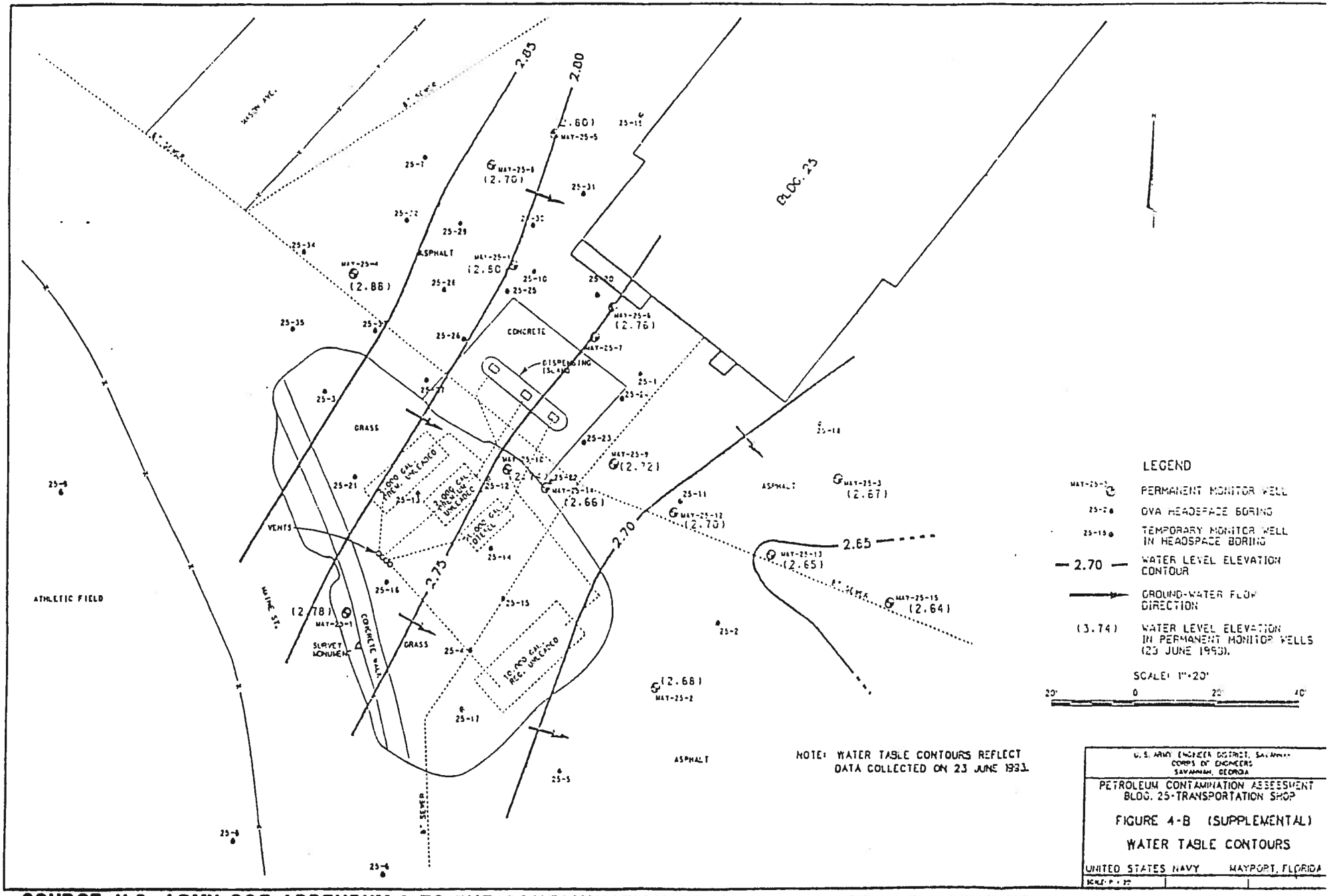
* Referenced to MSL
** Water Elevation on Jan. 10, 1992
\- No reading available



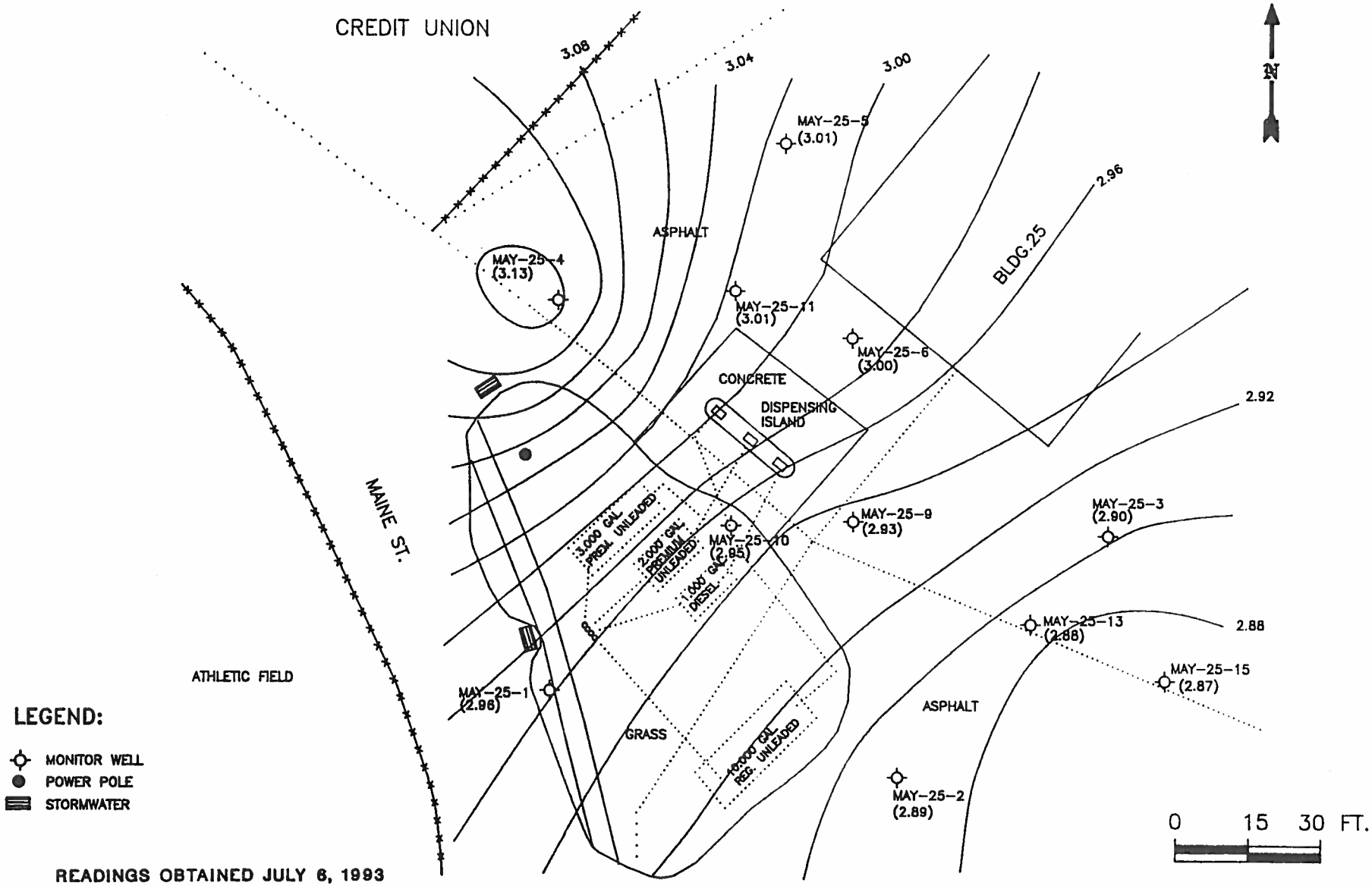
SOURCE: U. S. ARMY COE CONTAMINATION ASSESSMENT REPORT DATED MAY 1992



SOURCE: U.S. ARMY COE ADDENDUM TO CONTAMINATION ASSESSMENT DATED MARCH 1993



SOURCE: U.S. ARMY COE ADDENDUM 2 TO THE CONTAMINATION ASSESSMENT REPORT DATED JUNE 1993



RUST ENVIRONMENT & INFRASTRUCTURE

PROJECT NO.: 86298.000
FDER FACILITY NO.:168626008

DATE: 08-16-93
DRAWN BY: R.R.L.
CHECKED BY: MB

GROUNDWATER CONTOUR

MAYPORT NAS
BULDING 25
MAYPORT, FLORIDA

67-FILE NAME: A:\86298-G1.DWG

APPENDIX B

MONITOR WELL SAMPLING DATA SHEETS

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-1
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.52 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.0 FT.

1 WELL VOLUME = 12.0 (TOTAL WELL DEPTH (FT.)) − 3.52 (DEPTH TO WATER (FT.)) × 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.4 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 7.5 GALS. | PURGING INITIATED AT: 1135 HRS.

PURGE RATE: 0.6 GPM. | PURGING ENDED AT: 1148 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	2	7.09	89.1	526	Brown	very turbid	none	
2								
3	5	7.13	85.4	520	tan	clear	none	
4								
5	7.5	7.13	84.7	505	tan	clear	none	

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 12:05 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-2
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.90 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.1 FT.

1 WELL VOLUME = 12.1 (TOTAL WELL DEPTH (FT.)) − 3.90 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.4 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 4.5 GALS. | PURGING INITIATED AT: 1409 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 1414 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	1.5	7.00	88.4	676	Lt yellow	Clear	sl. sulfer	
2	3.0	7.04	87.2	648	Lt yellow	clear	sl. sulfer	
3	4.5	7.07	86.2	638	Lt yellow	clear	sl. sulfer	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1430 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-3
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 4.22 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.1 FT.

1 WELL VOLUME = 12.1 (TOTAL WELL DEPTH (FT.)) − 4.22 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.3 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 6 GALS. | PURGING INITIATED AT: 1307 HRS.

PURGE RATE: 0.7 GPM. | PURGING ENDED AT: 1316 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (C) F	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	2	7.04	88.4	813	Brown	very turbid	none	
2	4	7.03	87.5	795	tan	clear	none	
3	6	7.05	86.5	795	tan	clear	none	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1330 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-4
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.24 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.1 FT.

1 WELL VOLUME = 12.1 (TOTAL WELL DEPTH (FT.)) − 3.24 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.5 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 4.5 GALS. | PURGING INITIATED AT: 11:21 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 11:25 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (C) F	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	1.5	6.92	90.9	738	Lt. yellow	clear	None	
2	3.0	6.99	89.2	750	Lt. yellow	clear	None	
3	4.5	7.03	88.3	752	Lt. yellow	clear	None	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 11:40 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67-FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-5
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.72 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.1 FT.

1 WELL VOLUME = 12.1 (TOTAL WELL DEPTH (FT.)) − 3.72 (DEPTH TO WATER (FT.)) × 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.4 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 7.5 GALS. | PURGING INITIATED AT: 1012 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 1020 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°C) F	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	2	6.79	87.1	740	DK BROWN	VERY TURBID	NONE	
2								
3	5	6.96	84.5	700	TAN	CLEAR	NONE	
4								
5	7.5	6.97	84.4	698	TAN	CLEAR	NONE	

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 10:30 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-6
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 4.08 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.1 FT.

1 WELL VOLUME = 12.1 (TOTAL WELL DEPTH (FT.)) − 4.08 (DEPTH TO WATER (FT.)) × 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.3 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 6 GALS. | PURGING INITIATED AT: 1519 HRS.

PURGE RATE: 0.5 GPM. | PURGING ENDED AT: 1530 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	2	6.82	86.5	822	Brown	turbid	none	
2								
3	4	6.89	84.6	801	tan	clear	none	
4	6	6.86	83.9	794	tan	clear	none	
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1540 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM—1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-5
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.74 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 31.5 FT.

1 WELL VOLUME = 31.5 (TOTAL WELL DEPTH (FT.)) − 3.74 (DEPTH TO WATER (FT.)) × 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 4.6 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 13.5 GALS. | PURGING INITIATED AT: 1020 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 1031 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	4.5	7.	81.3	683	LT Yellow	Sly cloudy	None	
2	9.0	7.34	81.2	692	LT yellow		none	
3	13.5	7.32	80.2	687	Lt yellow	clear	none	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 10:50 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-9
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.96 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.0 FT.

1 WELL VOLUME = 12.0 (TOTAL WELL DEPTH (FT.)) − 3.96 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.2 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 4.5 GALS. | PURGING INITIATED AT: 1607 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 1612 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (C°/F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	1.5	6.78	87.1	925	Lt yellow	clear	Fuel	
2	3.0	6.81	86.3	900	Lt yellow	clear	Fuel	
3	4.5	6.81	85.3	904	Lt yellow	clear	Fuel	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1630 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total), manganese, hardness
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)
1	HDP	500ml	HNO_3	Ø	<2	Iron
1	HDP	500ml	4°C	Ø	N/A	TDS
1	HDP	500ml	4°C	Ø	N/A	TSS
1	AG	125ml	H_2SO_4	Ø	<2	TOC

REMARKS: DUPLICATE (MW-19) SAMPLED @ 1700

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-10
COMPANY SAMPLED BY: RUST E&I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 4.19 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.0 FT.

1 WELL VOLUME = 12.0 (TOTAL WELL DEPTH (FT.)) − 4.19 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.3 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 11 GALS. | PURGING INITIATED AT: 1605 HRS.

PURGE RATE: 0.5 GPM. | PURGING ENDED AT: 1630 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1								
2								
3								
4								
5	7	6.67	82.7	930	Brown	very turbid	Fuel	
7	9	6.75	82.5	909	tan	clear	Fuel	
9	11	6.66	83.1	920	tan	clear	Fuel	

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 16:40 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	∅	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	∅	N/A	EPA 610
1	HDP	500ml	HNO_3	∅	<2	Pb (total)
1	HDP	500ml	HNO_3	∅	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM—1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-11
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.88 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 12.0 FT.

1 WELL VOLUME = 12.0 (TOTAL WELL DEPTH (FT.)) − 3.88 (DEPTH TO WATER (FT.)) × 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 1.3 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 12 GALS. | PURGING INITIATED AT: 1408 HRS.

PURGE RATE: 0.6 GPM. | PURGING ENDED AT: 1428 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°C)/F	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1								
2								
3								
4	6	6.87	87.5	787	Brown	very turbid	slight fuel	
5								
7	10	6.98	85.5	698	tan	clear	sl. fuel	
9	12	6.95	84.9	707	tan	clear	none	

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1435 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

MONITOR WELL SAMPLING DATA SHEET

PROJECT: MAYPORT NAS / BLDG 25	PROJECT NO.: 86298.000	WELL NO.: MW-12
COMPANY SAMPLED BY: RUST E & I	DATE SAMPLED: 7/6/93	DEPTH TO WATER: 3.95 FT.

PURGE DATA

WELL DIAMETER: 2 IN. | TOTAL WELL DEPTH: 25.0 FT.

1 WELL VOLUME = 25.0 (TOTAL WELL DEPTH (FT.)) − 3.95 (DEPTH TO WATER (FT.)) x 0.16 (WELL CAPACITY (GAL/FT.) (REF. KEY BELOW)) = 3.5 GALS.

PURGE METHOD: 110 V PERISTALTIC PUMP

TOTAL VOLUME PURGED: 10.5 GALS. | PURGING INITIATED AT: 1311 HRS.

PURGE RATE: 1 GPM. | PURGING ENDED AT: 1321 HRS.

WELL VOLUMES PURGED	CUMULATIVE VOLUME PURGED (GALLONS)	pH	TEMPERATURE (°F)	CONDUCTIVITY (µmhos)	COLOR (VISUAL)	TURBIDITY (VISUAL)	ODOR	REMARKS
1	3.5	7.10	83.3	847	Lt yellow	cloudy	none	
2	7.0	7.16	83.9	832	Lt yellow	clear	none	
3	10.5	7.24	83.0	820	Lt yellow	clear	none	
4								
5								

SAMPLING DATA

FIELD ID NO:

DISSOLVED OXYGEN CONTENT: (mg/L) | SAMPLING METHOD: TEFLON BAILERS

LABORATORY USED: SAVANNAH | LABORATORY LOCATION: TALLAHASSEE

SAMPLED BY: MV / MB | SAMPLING INITIATED AT: 1340 HRS. | SAMPLING ENDED AT: HRS.

SAMPLE CONTAINER SPECIFICATIONS			SAMPLE PRESERVATION			ANALYSIS PERFORMED AND/OR METHOD
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (ml)	FINAL pH	
3	V	40ml	HCl	Ø	<2	EPA 602 INCL. MTBE
2	AG	1 l	N/A	Ø	N/A	EPA 610
1	HDP	500ml	HNO_3	Ø	<2	Pb (total)
1	HDP	500ml	HNO_3	Ø	<2	Pb (dissolved)

REMARKS:

WELL CAPACITIES	
1¼"	0.06 GAL/FT.
2"	0.16 GAL/FT.
4"	0.65 GAL/FT.

MATERIAL CODES	
G	CLEAR GLASS
AG	AMBER GLASS
V	EPA GLASS VIALS W/TEFLON SEPTA
HDP	HIGH DENSITY POLYETHYLENE
LDP	LOW DENSITY POLYETHYLENE
SBB	STERILE BACTERIOLOGICAL BAGS
OP	OPAQUE POLYETHYLENE

RUST ENVIRONMENT & INFRASTRUCTURE

67—FILE NAME A:\FORM-1.DWG

APPENDIX C

REPORT OF LABORATORY ANALYSES

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-1	MAY25-1	07-06-93/1205
01954-2	MAY25-2	07-06-93/1430
01954-3	MAY25-3	07-06-93/1330
01954-4	MAY25-4	07-06-93/1140
01954-5	MAY25-5	07-06-93/1030

PARAMETER	01954-1	01954-2	01954-3	01954-4	01954-5
Purgeable Aromatics (602/8020)					
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Total Volatile Organic Aromatics, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10	<10	<10	<10
Surrogate - a,a,a-Trifluorotoluene , ug/l	18.6	19.9	19.1	18.7	19.0
Surrogate - Expected Value, ug/l	20	20	20	20	20
Surrogate - % Recovery	93 %	100 %	96 %	94 %	95 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	07.12.93	07.14.93	07.13.93	07.12.93	07.13.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES. INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-1	MAY25-1	07-06-93/1205
01954-2	MAY25-2	07-06-93/1430
01954-3	MAY25-3	07-06-93/1330
01954-4	MAY25-4	07-06-93/1140
01954-5	MAY25-5	07-06-93/1030

PARAMETER	01954-1	01954-2	01954-3	01954-4	01954-5
Polynuclear Aromatics (610/8100)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibe nzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
1-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
2-Methylnaphthalene, ug/l	<10	<10	<10	<10	<10
Surrogate - 2-Fluorobiphenyl	58.8	29.8	33.5	49.4	32.0
Surrogate - Expected Value, ug/l	100	100	100	100	100
Surrogate - % Recovery	59 %	30 %	34 %	49 %	32 %
Surrogate - Control Limit	27-123 %	27-123 %	27-123 %	27-123 %	27-123 %
Date Extracted	07.14.93*	07.12.93	07.12.93	07.12.93	07.12.93
Date Analyzed	07.16.93	07.13.93	07.13.93	07.14.93	07.14.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-1	MAY25-1	07-06-93/1205
01954-2	MAY25-2	07-06-93/1430
01954-3	MAY25-3	07-06-93/1330
01954-4	MAY25-4	07-06-93/1140
01954-5	MAY25-5	07-06-93/1030

PARAMETER	01954-1	01954-2	01954-3	01954-4	01954-5
Lead (7421)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93	07.14.93	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93	07.16.93	07.16.93	07.16.93
Lead (Dissolved)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93	07.14.93	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93	07.16.93	07.16.93	07.16.93

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-6	MAY25-6	07-06-93/1540
01954-7	MAY25-8	07-06-93/1050
01954-8	MAY25-9	07-06-93/1630
01954-9	MAY25-10	07-06-93/1640
01954-10	MAY25-11	07-06-93/1435

PARAMETER	01954-6	01954-7	01954-8	01954-9	01954-10
Purgeable Aromatics (602/8020)					
Benzene, ug/l	160	<1.0	620	2700	28
Chlorobenzene, ug/l	<5.0	<1.0	<50	<100	<1.0
1,2-Dichlorobenzene, ug/l	<5.0	<1.0	<50	<100	<1.0
1,3-Dichlorobenzene, ug/l	<5.0	<1.0	<50	<100	<1.0
1,4-Dichlorobenzene, ug/l	<5.0	<1.0	<50	<100	<1.0
Ethylbenzene, ug/l	43	<1.0	230	780	5.5
Toluene, ug/l	<5.0	<1.0	<50	900	<1.0
Xylenes, ug/l	44	<1.0	280	2000	1.1
Total Volatile Organic Aromatics, ug/l	247	<1.0	1130	6380	34.6
Methyl-tert-butyl ether (MTBE), ug/l	180	<10	27000	4300	170
Surrogate - a,a,a-Trifluorotoluene , ug/l	20.2	18.7	19.4	19.4	20.8
Surrogate - Expected Value, ug/l	20	20	20	20	20
Surrogate - % Recovery	101 %	94 %	97 %	97 %	104 %
Surrogate - Control Limit	77-140 %	77-140 %	77-140 %	77-140 %	77-140 %
Date Analyzed	07.14.93	07.12.93	07.13.93	07.13.93	07.12.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-6	MAY25-6	07-06-93/1540
01954-7	MAY25-8	07-06-93/1050
01954-8	MAY25-9	07-06-93/1630
01954-9	MAY25-10	07-06-93/1640
01954-10	MAY25-11	07-06-93/1435

PARAMETER	01954-6	01954-7	01954-8	01954-9	01954-10
Polynuclear Aromatics (610/8100)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10	<10	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	74	58	<10
Phenanthrene + Anthracene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
1-Methylnaphthalene, ug/l	<10	<10	15	11	<10
2-Methylnaphthalene, ug/l	<10	<10	17	15	<10
Surrogate - 2-Fluorobiphenyl	32.0	36.6	56.2	31.6	32.0
Surrogate - Expected Value, ug/l	100	100	100	100	100
Surrogate - % Recovery	32 %	37 %	56 %	32 %	32 %
Surrogate - Control Limit	27-123 %	27-123 %	27-123 %	27-123 %	27-123 %
Date Extracted	07.12.93	07.12.93	07.15.93*	07.12.93	07.12.93
Date Analyzed	07.14.93	07.14.93	07.19.93	07.14.93	07.14.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-6	MAY25-6	07-06-93/1540
01954-7	MAY25-8	07-06-93/1050
01954-8	MAY25-9	07-06-93/1630
01954-9	MAY25-10	07-06-93/1640
01954-10	MAY25-11	07-06-93/1435

PARAMETER	01954-6	01954-7	01954-8	01954-9	01954-10
Lead (7421)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93	07.14.93	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93	07.16.93	07.16.93	07.16.93
Lead (Dissolved)					
Lead, mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93	07.14.93	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93	07.16.93	07.16.93	07.16.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-11	MAY25-12	07-06-93/1340
01954-12	MAY25-Equipment Blank	07-06-93/1530

PARAMETER	01954-11	01954-12
Purgeable Aromatics (602/8020)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0
Total Volatile Organic Aromatics, ug/l	<1.0	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10	<10
Surrogate - a,a,a-Trifluorotoluene , ug/l	18.6	19.4
Surrogate - Expected Value, ug/l	20	20
Surrogate - % Recovery	93 %	97 %
Surrogate - Control Limit	77-140 %	77-140 %
Date Analyzed	07.12.93	07.13.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-11	MAY25-12	07-06-93/1340
01954-12	MAY25-Equipment Blank	07-06-93/1530

PARAMETER	01954-11	01954-12
Polynuclear Aromatics (610/8100)		
Acenaphthene, ug/l	<10	<10
Acenaphthylene, ug/l	<10	<10
Benzo(a)pyrene, ug/l	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10
Benzo(b,k)fluoranthene, ug/l	<10	<10
Chrysene + Benzo(a)anthracene, ug/l	<10	<10
Fluoranthene, ug/l	<10	<10
Fluorene, ug/l	<10	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	<10
Naphthalene, ug/l	<10	<10
Phenanthrene + Anthracene, ug/l	<10	<10
Pyrene, ug/l	<10	<10
1-Methylnaphthalene, ug/l	<10	<10
2-Methylnaphthalene, ug/l	<10	<10
Surrogate - 2-Fluorobiphenyl	35.6	77.2
Surrogate - Expected Value, ug/l	100	100
Surrogate - % Recovery	36 %	77 %
Surrogate - Control Limit	27-123 %	27-123 %
Date Extracted	07.12.93	07.12.93
Date Analyzed	07.14.93	07.13.93
Lead (7421)		
Lead, mg/l	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-11	MAY25-12	07-06-93/1340
01954-12	MAY25-Equipment Blank	07-06-93/1530

PARAMETER	01954-11	01954-12
Lead (Dissolved)		
Lead, mg/l	<0.0050	<0.0050
Prep or Extraction Date	07.14.93	07.14.93
Date Analyzed	07.16.93	07.16.93

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-13	MAY25-19 (DUPLICATE OF MAY-25-9)	07-06-93/1700

PARAMETER	01954-13
Purgeable Aromatics (602/8020)	
Benzene, ug/l	480
Chlorobenzene, ug/l	<50
1,2-Dichlorobenzene, ug/l	<50
1,3-Dichlorobenzene, ug/l	<50
1,4-Dichlorobenzene, ug/l	<50
Ethylbenzene, ug/l	120
Toluene, ug/l	<50
Xylenes, ug/l	160
Total Volatile Organic Aromatics, ug/l	760
Methyl-tert-butyl ether (MTBE), ug/l	29000
Surrogate - a,a,a-Trifluorotoluene , ug/l	19.7
Surrogate - Expected Value, ug/l	20
Surrogate - % Recovery	98 %
Surrogate - Control Limit	77-140 %
Date Analyzed	07.13.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-13	MAY25-19 (MAY 25-9)	07-06-93/1700

PARAMETER	01954-13
Polynuclear Aromatics (610/8100)	
Acenaphthene, ug/l	<10
Acenaphthylene, ug/l	<10
Benzo(a)pyrene, ug/l	<10
Benzo(g,h,i)perylene, ug/l	<10
Benzo(b,k)fluoranthene, ug/l	<10
Chrysene + Benzo(a)anthracene, ug/l	<10
Fluoranthene, ug/l	<10
Fluorene, ug/l	<10
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10
Naphthalene, ug/l	49
Phenanthrene + Anthracene, ug/l	<10
Pyrene, ug/l	<10
1-Methylnaphthalene, ug/l	<10
2-Methylnaphthalene, ug/l	<10
Surrogate - 2-Fluorobiphenyl	39.2
Surrogate - Expected Value, ug/l	100
Surrogate - % Recovery	39 %
Surrogate - Control Limit	27-123 %
Date Extracted	07.12.93
Date Analyzed	07.14.93
Lead (7421)	
Lead, mg/l	<0.0050
Prep or Extraction Date	07.14.93
Date Analyzed	07.16.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE/ TIME SAMPLED
01954-13	MAY25-19 (MA425-9)	07-06-93/1700

PARAMETER	01954-13
Lead (Dissolved)	
Lead, mg/l	<0.0050
Prep or Extraction Date	07.14.93
Date Analyzed	07.16.93
Carbon, Total Organic	
Carbon, Total Organic, mg/l	55
Date Analyzed	07.14.93
Total Dissolved Solids (160.1)	
Total Dissolved Solids, mg/l	550
Date Analyzed	07.12.93
Suspended Solids (160.2)	
Suspended Solids, mg/l	66
Date Analyzed	07.12.93
Ferrous (2+) Iron	
Ferrous (2+) iron, mg/l	<0.10
Date Analyzed	07.15.93
Manganese (6010)	
Manganese, mg/l	0.079
Prep or Extraction Date	07.14.93
Date Analyzed	07.15.93
Hardness as CaCO3 (130.2)	
Hardness as CaCO3, mg/l	410
Prep or Extraction Date	07.14.93
Date Analyzed	07.15.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES
01954-14	MAY25-Trip Blank

PARAMETER	01954-14
Purgeable Aromatics (602/8020)	
Benzene, ug/l	<1.0
Chlorobenzene, ug/l	<1.0
1,2-Dichlorobenzene, ug/l	<1.0
1,3-Dichlorobenzene, ug/l	<1.0
1,4-Dichlorobenzene, ug/l	<1.0
Ethylbenzene, ug/l	<1.0
Toluene, ug/l	<1.0
Xylenes, ug/l	<1.0
Total Volatile Organic Aromatics, ug/l	<1.0
Methyl-tert-butyl ether (MTBE), ug/l	<10
Surrogate - a,a,a-Trifluorotoluene , ug/l	18.5
Surrogate - Expected Value, ug/l	20
Surrogate - % Recovery	92 %
Surrogate - Control Limit	77-140 %
Date Analyzed	07.12.93

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
01954-15	Method Blank
01954-16	Accuracy (% Recovery)
01954-17	Precision (% RPD)

PARAMETER	01954-15	01954-16	01954-17
Purgeable Aromatics (602/8020)			
Benzene, ug/l	<1.0	92 %	15 %
Chlorobenzene, ug/l	<1.0	94 %	16 %
1,2-Dichlorobenzene, ug/l	<1.0	---	---
1,3-Dichlorobenzene, ug/l	<1.0	---	---
1,4-Dichlorobenzene, ug/l	<1.0	---	---
Ethylbenzene, ug/l	<1.0	---	---
Toluene, ug/l	<1.0	94 %	13 %
Xylenes, ug/l	<1.0	---	---
Total Volatile Organic Aromatics, ug/l	<1.0	---	---
Methyl-tert-butyl ether (MTBE), ug/l	<10	---	---
Surrogate - a,a,a-Trifluorotoluene , ug/l	20.2	19.5	---
Surrogate - Expected Value, ug/l	20	20	---
Surrogate - % Recovery	101 %	97 %	---
Surrogate - Control Limit	77-140 %	77-140 %	---
Date Analyzed	07.12.93	07.12.93	---

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
01954-15	Method Blank
01954-16	Accuracy (% Recovery)
01954-17	Precision (% RPD)

PARAMETER	01954-15	01954-16	01954-17
Polynuclear Aromatics (610/8100)			
Acenaphthene, ug/l	<10	86 %	1.2 %
Acenaphthylene, ug/l	<10	---	---
Benzo(a)pyrene, ug/l	<10	59 %	6.8 %
Benzo(g,h,i)perylene, ug/l	<10	---	---
Benzo(b,k)fluoranthene, ug/l	<10	---	---
Chrysene + Benzo(a)anthracene, ug/l	<10	---	---
Fluoranthene, ug/l	<10	---	---
Fluorene, ug/l	<10	88 %	1.1 %
Indeno(1,2,3-cd)pyrene+Dibenzo(a,h)anthracene, ug/l	<10	---	---
Naphthalene, ug/l	<10	79 %	0 %
Phenanthrene + Anthracene, ug/l	<10	---	---
Pyrene, ug/l	<10	93 %	2.2 %
1-Methylnaphthalene, ug/l	<10	---	---
2-Methylnaphthalene, ug/l	<10	---	---
Surrogate - 2-Fluorobiphenyl	79.4	80.7	---
Surrogate - Expected Value, ug/l	100	100	---
Surrogate - % Recovery	79 %	81 %	---
Surrogate - Control Limit	27-123 %	27-123 %	---
Date Extracted	07.12.93	07.12.93	---
Date Analyzed	07.13.93	07.13.93	---
Lead (7421)			
Lead, mg/l	<0.0050	89 %	2.2 %
Prep or Extraction Date	07.14.93	07.14.93	---
Date Analyzed	07.16.93	07.16.93	---

SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
01954-15	Method Blank
01954-16	Accuracy (% Recovery)
01954-17	Precision (% RPD)

PARAMETER	01954-15	01954-16	01954-17
Lead (Dissolved)			
Lead, mg/l	<0.0050	91 %	2.2 %
Prep or Extraction Date	07.14.93	<0.0050	---
Date Analyzed	07.16.93	07.14.93	---
Carbon, Total Organic			
Carbon, Total Organic, mg/l	<1.0	80 %	1.3 %
Date Analyzed	07.14.93	07.14.93	---
Total Dissolved Solids (160.1)			
Total Dissolved Solids, mg/l	<5.0	100 %	3.6 %
Date Analyzed	07.12.93	07.12.93	---
Suspended Solids (160.2)			
Suspended Solids, mg/l	<5.0	---	0 %
Date Analyzed	07.12.93	---	---
Ferrous (2+) Iron			
Ferrous (2+) iron, mg/l	<0.10	113 %	7.1 %
Date Analyzed	07.15.93	07.15.93	---
Manganese (6010)			
Manganese, mg/l	<0.010	97 %	0 %
Prep or Extraction Date	07.14.93	07.14.93	---
Date Analyzed	07.15.93	07.15.93	---
Hardness as CaCO3 (130.2)			
Hardness as CaCO3, mg/l	<3.4	98 %	1.0 %
Prep or Extraction Date	07.14.93	07.14.93	---
Date Analyzed	07.15.93	07.15.93	---

SL SAVANNAH LABORATORIES
& ENVIRONMENTAL SERVICES, INC.

2846 Industrial Plaza Drive (32301) • P.O. Box 13056 • Tallahassee, FL 32317-3056 • (904) 878-3994 • Fax (904) 878-9504

LOG NO: T3-01954

Received: 08 JUL 93

Ms. Marianne Sweeney
RUST Environment & Infrastructure, Inc.
370 South North Lake Blvd., Suite 1028
Altamonte Springs FL 32701

Project: 86298.000/Mayport NAS - BLDG 25
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES
01954-15	Method Blank
01954-16	Accuracy (% Recovery)
01954-17	Precision (% RPD)

PARAMETER	01954-15	01954-16	01954-17

Method: EPA 40 CFR Part 136
HRS Certification #'s:81291,87279,E81005,E87052
FDER CompQAP No. 890142G
* Sample was extracted 07.12.93 and analyzed 07.13-14.93; re-extraction and re-analysis were required to meet QA objectives.

Janet B. Pruitt

Janet B. Pruitt

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 33442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

NALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

O. NUMBER:
PROJECT NUMBER: 86298.000
PROJECT NAME: MAYPORT NAS - BLDG 25
PAGE: OF

LIENT NAME: USTENVIROMENT & I
TELEPHONE/FAX NO.: (407) 331 5967
LIENT ADDRESS: 10 S. Northlake Blvd #1028
CITY, STATE, ZIP CODE: Alt. Springs, FL 32701
AMPLER(S) NAME(S): Valenzuela, M. Barron
CLIENT PROJECT MANAGER: M. Sweeney

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

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

REQUIRED ANALYSES — NUMBER OF CONTAINERS SUBMITTED

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	EPA 602	EPA 610	Pb (TOTAL)	Pb (DISSOLVED)	TOC	TDS/TSS	Fe+2, MN, HARDNESS						
/93	1205	~~[illegible]~~ MAY25-1	✓				3	2	1	1									
/93	1430	MAY25-2	✓				3	2	1	1									
/93	1330	MAY25-3	✓				3	2	1	1									
6/93	1140	MAY25-4	✓				3	2	1	1									
6/93	1030	MAY25-5	✓				3	2	1	1									
6/93	1540	MAY25-6	✓				3	2	1	1									
/93	1050	MAY25-8	✓				3	2	1	1									
/93	1630	MAY25-9	✓				3	2	1	1	1	1	1						
6/93	1640	MAY25-10	✓				3	2	1	1									
/93	1435	MAY25-11	✓				3	2	1	1									
/93	1700	MAY25-~~12~~19	✓				3	2	1	1									
6/93	1530	MAY25-EQUIP BK	✓				3	2	1	1									

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
[illegible]	7/1/93	1600	[illegible]	7/6/93	500	[illegible]	7/7/93	1600
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME

NO BOTTLES

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
[illegible]	7/8/93	1545	☐ YES ☐ NO		T3-01954

LABORATORY REMARKS: Did not receive (TDS, TSS) or (Fe+2, M, N, Hard.) sample for ID # MAY 25-9. Received these parameters for ID # MAY 25-19

* Received (1) 130ml amber container w/o label

ORIGINAL

SL SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

☐ 5102 LaRoche Avenue, Savannah, GA 31404 — Phone: (912) 354-7858 — (912) 352-0165
☐ 2846 Industrial Plaza Drive, Tallahassee, FL 32301 — Phone: (904) 878-3994 — Fax (904) 878-9504
☐ 414 Southwest 12th Avenue, Deerfield Beach, FL 32442 — Phone: (305) 421-7400 — Fax (305) 421-2584
☐ 900 Lakeside Drive, Mobile, AL 36693 — Phone: (205) 666-6633 — Fax (205) 666-6696
☐ 6712 Benjamin Road, Suite 100, Tampa, FL 33634 — Phone: (813) 885-7427 — Fax (813) 885-7049

NALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

O. NUMBER:
PROJECT NUMBER: 86298.000
PROJECT NAME: MAYPORT NAS BLDG 25
PAGE:
OF:

LIENT NAME: UST ENVIROMENT & INFRA.
TELEPHONE/FAX NO.: (407) 331 5967
LIENT ADDRESS: 70 S. Northlake Blvd #102B
CITY, STATE, ZIP CODE: Alt. Spgs, FL 32701
MPLER(S) NAME(S): J. VELAZQUEZ, M. BARRON
CLIENT PROJECT MANAGER: M. Sweeney

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

SAMPLING DATE	SAMPLING TIME	SAMPLE IDENTIFICATION	AQUEOUS MATRIX	NONAQUEOUS MATRIX	OIL MATRIX	AIR MATRIX	EPA 602	EPA 610	Pb (TOTAL)	Pb (DISSOLVED)						
6/93	1340	MAY25-12	✓				3	2	1	1						
		MAY 25- TRIP BLANK	✓				3									

MATRIX TYPE / REQUIRED ANALYSES / NUMBER OF CONTAINERS SUBMITTED

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME
Dale Bybelles	7/1/93	1600	Mary Mottles	7/6/93	500	M. Barron	7/7/93	1600
RECEIVED BY: (SIGNATURE)	DATE	TIME	RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	DATE	TIME
Marianne Sweeney	7/8/93	1000	Marianne Sweeney	7/8/93	1100			

FOR SAVANNAH LABORATORY USE ONLY

RECEIVED FOR LABORATORY BY: (SIGNATURE)	DATE	TIME	CUSTODY INTACT	CUSTODY SEAL NO.	S.L. LOG NO.
[signature]	7/8/93	1525	☐ YES ☑ NO		T3-01954

LABORATORY REMARKS: Did not receive pb samples for ID# MAY 25-12. Received (2) 250 ml plastic container for ID MAY 265-12 not listed on C.O.C.

ORIGINAL

RUST ENVIRONMENT & INFRASTRUCTURE

LABORATORY DATA QUALITY CONTROL REVIEW

PROJECT INFORMATION

Project Name: Mayport NAS - Bldg 25	Project No.: 56298.000
Prepared By: Gw Vandenstar	Date of Review: 8/9/93
Lab Name: Savannah	Lab Location: Tallahassee
Data Package Log No. T3-01954	time charged: 0.5

DATA REVIEW

Item	Page No.	Comments (Continue at bottom of Page 2, if needed)
Blank		Needed 2 equipment blanks with 11 samples (not including duplicate) Equipment blank (B) should have been for all parameters including TDS, TSS, TOC, Mn, Fe + hardness
Matrix Spike		N/A
Duplicate		May 25-9 + May 25-19 RPD: benzene = 75%, ethylbenz = 63% Xylenes = 55%, naphthalene = 41%, 1 methylnaph > 40%, 2 methylnaph > 52% 1602's - not good, 1610's - OK
Holding Time	2+5	OK if 1602 samples were preserved yes no Original extraction of 1610 samples of May 25-1+8 within hold limits, but reextraction was not. Ferrous iron needed
Detection Limits		OK
Control Limits		OK Control limits for % rec + % RPD not stated

LABORATORY DATA QUALITY CONTROL REVIEW

Item	Page No.	Comments (Continue at bottom of page, if needed)
Sample Notes		OK
Methods		OK
Unusual Data Points		None noted
Additional Comments	4	Total VOA for samples not started correctly

MW #	1	2	3	4	5	6	8	9	10	11	12	EB	19	FB
TVOA	<4	<4	<4	<4	<4	252*	<4	110*	63*	35.6*	<4	<4	810*	<4

	5	Total Naph for May 25-9 = 106, May 25-10 = 84
		May 25-19 (-9) = 69*, rest were < 30
(hold time cont)		to be done in the field (NO ACCEPTABLE HOLD TIME)
	C-O-C	OK

APPENDIX D

SOIL VAPOR EXTRACTION SYSTEM DESIGN CALCULATIONS AND EQUIPMENT SPECIFICATIONS

SOIL VAPOR EXTRACTION DESIGN CALCULATIONS

SITE: MAYPORT NAVAL STATION
RUST PROJECT NUMBER: 86298.000

CONTAMINANT: GASOLINE

FROM THE P.C. JOHNSON et.al. PAPER "A PRACTICAL APPROACH TO THE DESIGN, OPERATION, AND MONITORING OF IN SITU SOIL-VENTING SYSTEMS",
RADIUS OF INFLUENCE (Ri) = (As/Nw) ^ .5
EXTRACTION WELL FLOW RATE (Q) = ((H(pi)(K)(Pw))/u)*((1-(Patm/Pw) ^ 2)/(ln(Rw/Ri)))
TOTAL FLOW RATE (Qt) = Q*Nw

APPROXIMATE AIR PERMEABILITY OF SOIL (k):	1	darcy	=	9.9E-09	cm ^ 2
VISCOSITY OF AIR (u):	0.00018	g/cm sec			
ATMOSPHERIC PRESSURE (Patm):	1	atm	=	1,010,000	g/cm sec ^ 2
EXTRACTION WELL PRESSURE (Pw):	0.85	atm	=	858,500	g/cm sec ^ 2
RADIUS OF VAPOR EXTRACTION WELL (Rw):	2	inch	=	5.08	cm
SPILL AREA (As):	10000	ft ^ 2	=	9,290,000	cm ^ 2
ESTIMATED NUMBER OF WELLS (Nw):	1				
REQUIRED RADIUS OF INFLUENCE (Ri):	20	ft	=	610	cm
WELL SCREEN THICKNESS (H):	180.0	ft	=	5486.4	cm
pi:	3.1416				
SOIL VAPOR FLOW RATE PER WELL (Q):	137.1	ft ^ 3/min	=	65,291.8	cm ^ 3/sec
TOTAL SOIL VAPOR FLOW RATE (Qt):	137.1	ft ^ 3/min	=	5,573,769.1	L/day
AIR FLOW VELOCITY:	26.19	ft/sec			
QUANTITY OF 90 DEGREE ELBOWS IN NETWORK :	6		=	60	equiv ft
QUANTITY OF 45 DEGREE ELBOWS IN NETWORK :	2		=	10	equiv ft
TOTAL LENGTH OF PIPE:	50	ft			
FRICTION LOSS THROUGH PIPE AND FITTINGS:	5.5	in H20			
QUANTITY OF CARBON CANNISTERS IN SERIES:	0				
FRICTION LOSS THROUGH CARBON CANNISTERS:	0	in H20			
FRICTION LOSS THROUGH WATER TRAP:	4	in H2O			
FRICTION LOSS THROUGH PARTICLE FILTER:	4	in H2O			
VACUUM REQUIRED AT VAPOR RECOVERY WELL:	61.05	in H20			
TOTAL VACUUM REQUIRED:	66.55	in H20			

SOIL VAPOR EXTRACTION DESIGN CALCULATIONS

SITE: MAYPORT NAVAL STATION
RUST PROJECT NUMBER: 86298.000

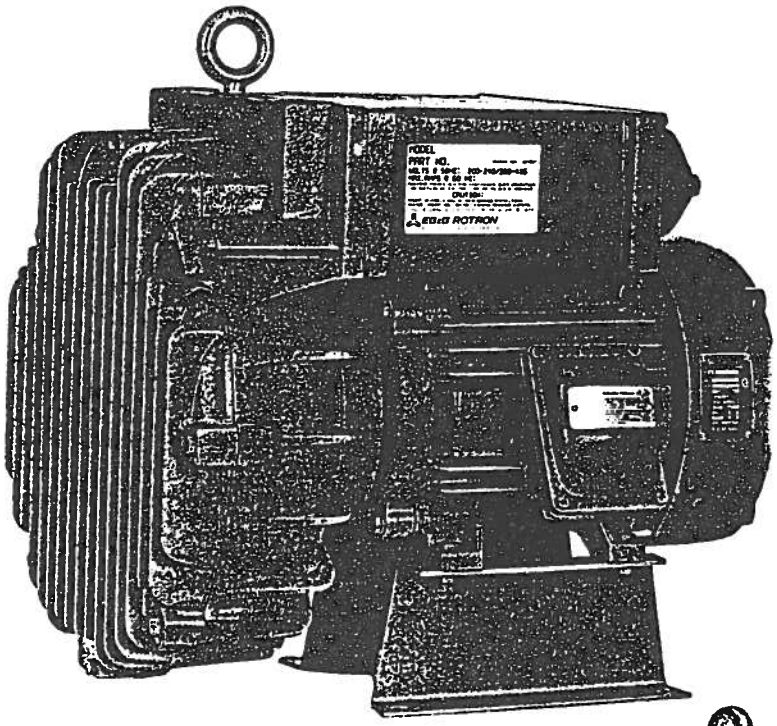
CONTAMINANT: GASOLINE

FROM THE P.C. JOHNSON et.al. PAPER "A PRACTICAL APPROACH TO THE DESIGN, OPERATION, AND MONITORING OF IN SITU SOIL-VENTING SYSTEMS",
RADIUS OF INFLUENCE (Ri) = (As/Nw) ^ .5
EXTRACTION WELL FLOW RATE (Q) = ((H(pi)(K)(Pw))/u)*((1-(Patm/Pw) ^ 2)/(ln(Rw/Ri)))
TOTAL FLOW RATE (Qt) = Q*Nw

APPROXIMATE AIR PERMEABILITY OF SOIL (k):	1	darcy	=	9.9E-09	cm ^ 2
VISCOSITY OF AIR (u):	0.00018	g/cm sec			
ATMOSPHERIC PRESSURE (Patm):	1	atm	=	1,010,000	g/cm sec ^ 2
EXTRACTION WELL PRESSURE (Pw):	0.85	atm	=	858,500	g/cm sec ^ 2
RADIUS OF VAPOR EXTRACTION WELL (Rw):	2	inch	=	5.08	cm
SPILL AREA (As):	10000	ft ^ 2	=	9,290,000	cm ^ 2
ESTIMATED NUMBER OF WELLS (Nw):	1				
REQUIRED RADIUS OF INFLUENCE (Ri):	20	ft	=	610	cm
WELL SCREEN THICKNESS (H):	130.0	ft	=	3962.4	cm
pi:	3.1416				
SOIL VAPOR FLOW RATE PER WELL (Q):	99.0	ft ^ 3/min	=	47,155.2	cm ^ 3/sec
TOTAL SOIL VAPOR FLOW RATE (Qt):	99.0	ft ^ 3/min	=	4,025,499.9	L/day
AIR FLOW VELOCITY:	18.91	ft/sec			
QUANTITY OF 90 DEGREE ELBOWS IN NETWORK :	6		=	60	equiv ft
QUANTITY OF 45 DEGREE ELBOWS IN NETWORK :	2		=	10	equiv ft
TOTAL LENGTH OF PIPE:	200	ft			
FRICTION LOSS THROUGH PIPE AND FITTINGS:	13	in H20			
QUANTITY OF CARBON CANNISTERS IN SERIES:	0				
FRICTION LOSS THROUGH CARBON CANNISTERS:	0	in H20			
FRICTION LOSS THROUGH WATER TRAP:	4	in H2O			
FRICTION LOSS THROUGH PARTICLE FILTER:	4	in H2O			
VACUUM REQUIRED AT VAPOR RECOVERY WELL:	61.05	in H20			
TOTAL VACUUM REQUIRED:	74.05	in H20			

EN 12
Explosion-Proof Regenerative Blower

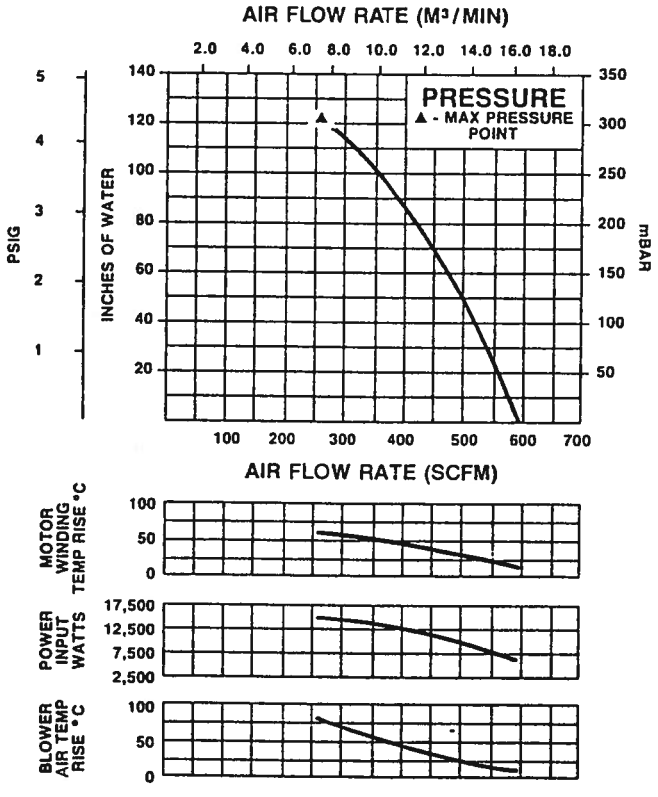
FEATURES
- Manufactured in the USA
- Maximum flow: 600 SCFM
- Maximum pressure: 120″ WG
- Maximum vacuum: 100″ WG
- Standard motor: 15 HP
- Blower construction — cast aluminum housing, cover, impeller & manifold; cast iron flanges
- UL & CSA approved motors for Class I, Group D atmospheres
- Sealed blower assembly
- Quiet operation within OSHA standards

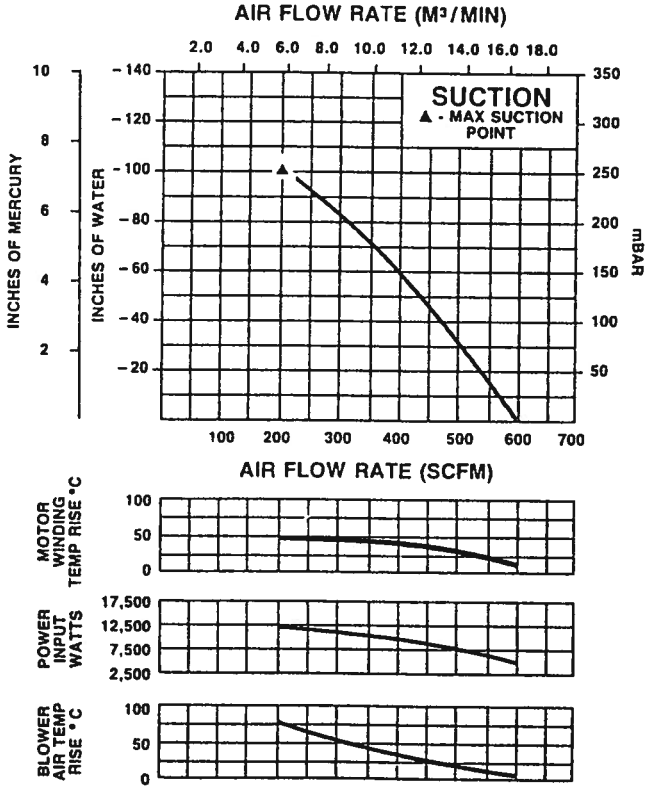


OPTIONS
- TEFC motors
- 50 Hz motors
- International voltages
- Other HP motors
- Corrosion resistant surface treatments
- Remote drive (motorless) models

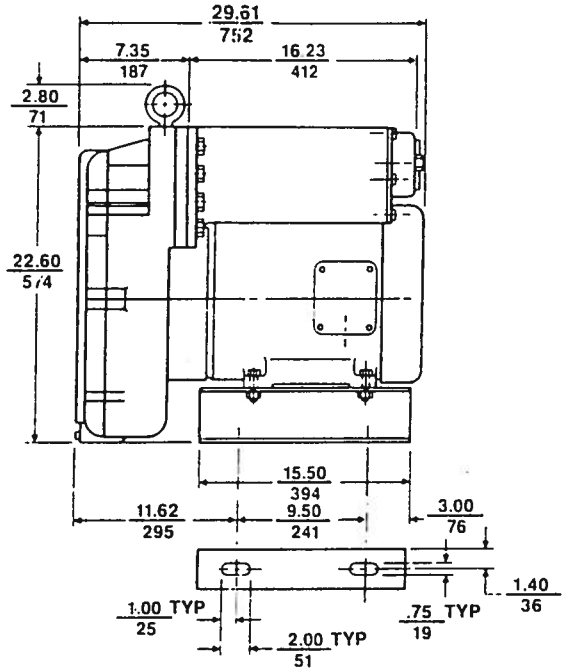
ACCESSORIES
- Moisture separators
- Explosion-proof motor starters
- Inline & inlet filters
- Vacuum & pressure gauges
- Relief valves
- External mufflers

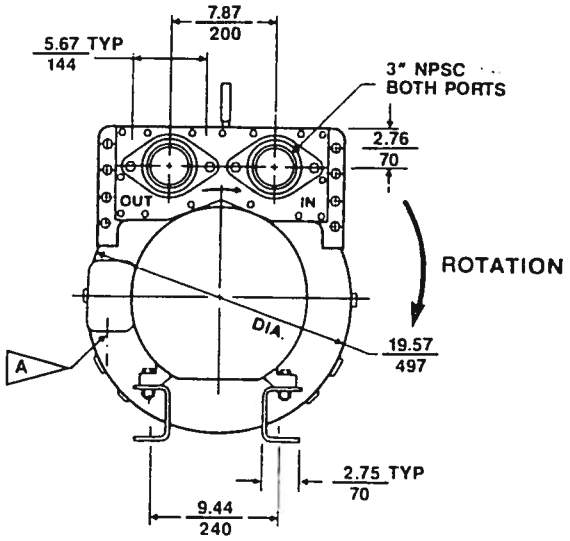
BLOWER PERFORMANCE AT STANDARD CONDITIONS





EN 12
Explosion-Proof Regenerative Blower





DIMENSIONS: IN / MM
TOLERANCES: .XX ± .1 / 2.5
(UNLESS OTHERWISE NOTED)

A 1.25" NPT CONDUIT CONNECTION AT 6 O'CLOCK POSITION

SPECIFICATIONS

MODEL	EN12BG72WL	
Part No.	038186	
Motor Enclosure Type	Explosion-proof	
Horsepower	15	
Phase — Frequency	Three - 60 Hz	
Voltage	230	460
Motor Nameplate Amps	36	18
Maximum Blower Amps[1]	44	22
Inrush Amps	318	159
Starter Size	2	2
Service Factor	1.0	
Thermal Protection	Pilot Duty	
Bearing Type	Sealed, Ball	
Shipping Weight	584 lb (265 kg)	

BLOWER LIMITATIONS

Min. Flow @ Max. Suction	200 SCFM @ –100" WG
Min. Flow @ Max. Pressure	260 SCFM @ 120" WG

[1]Corresponds to the performance point at which the blower and/or motor temperature rise reaches the limit of the thermal protection in the motor.

Specifications subject to change without notice. Please contact factory for specification updates.

VAPOR PHASE CARBON USAGE RATES

SITE:	NAVAL STATION MAYPORT	
RUST PROJECT NUMBER:	86298.000	
*CONTAMINANT:	BENZENE	
MOLECULAR WEIGHT:	78.1	(lb/lb mole)
ATMOSPHERIC PRESSURE:	14.7	psi
TEMPERATURE:	140	degrees F
AIR FLOW RATE:	140	ft^3/min
AIR FLOW RATE:	201,600	ft^3/day
OVA SOIL VAPOR CONCENTRATION:	1000	(ppm)
MOLE FRACTION:	1.00E-03	decimal
POUNDS BENZENE PER ft^3 OF AIR:	0.000218	lb C6H6/ft^3 air
PARTIAL PRESSURE:	1.47E-02	psi
% LOADING FROM BENZENE ISOTHERM:	0.15	decimal
POUNDS CARBON PER ft^3 OF AIR:	1.45E-03	lb C/ft^3 air
**POUNDS CARBON PER DAY:	365.48	lb C/day

* BECAUSE OVAs DETECT TVOA AND NOT SPECIFIC PETROLEUM HYDROCARBON CONSTITUENTS, THE OVA CONCENTRATION IS ASSSUMED TO BE BENZENE BECAUSE, OF THE BTEX COMPOUNDS, BENZENE DEMONSTRATES THE LEAST TENDENCY TO ADSORB.

** SAFETY FACTOR OF 1.25 INCLUDED

APPENDIX E

COST COMPARISON
BETWEEN IN-SITU AIR SPARGING
AND PUMP AND TREAT

A cost comparison of air sparging versus pump and treat for groundwater remediation has been completed as requested. Components of cost include capital equipment, installation, sampling, operations, and maintenance. A SVE upgrade is also considered for the air sparging system. Conservatively, estimated operating times for pump and treat and air sparging are 5 years and 2 years respectively. The cost estimates for each over the estimated operating times are as follows:

COST COMPONENT	*PUMP AND TREAT*	*AIR SPARGING*
Capital Equipment	*$ 24,400*	*$ 16,000*
Drilling/Installation	*$ 40,000*	*$ 55,000*
Sampling	*$135,000*	*$ 65,000*
Operations/Maintenance	*$ 11,000*	*$ 13,500*
SVE Upgrade	*$ 0*	*$ 7,500*
NPDES Sampling	*$ 35,000*	*$ 0*
Pilot Study		*$ 7,000*
Air Emission Treatment		*$ 5,000*
TOTALS:	***$245,400***	***$169,000***

As the above costs indicate, there is a significant cost benefit associated with air sparging.

APPENDIX F

PILOT STUDY DESCRIPTION

PILOT STUDY DESCRIPTION

1. *The contamination assessment for the subject site has been approved.*

2. *Groundwater sampling was conducted in July of 1993 as reported in this plan and occurred within six months of the RAP having initially been submitted.*

3. *A narrative discussion of the site lithology, hydrogeology, contaminant type, and vertical and horizontal extent of the groundwater contaminant plume with estimates of the amount (mass) of contaminant in each phase is provided in Section 4.0 of this plan.*

4. *A hydrogeologic evaluation, including groundwater gradient, current downgradient extent of the contaminant plume, and potential groundwater recovery are addressed in subsection 4.7 of this plan.*

5. *A preliminary cost evaluation is provided in Appendix E that demonstrated that in-situ air sparging is a cost effective alternative to conventional pump and treat technology.*

6. *Vacuum extraction (SVE) will be used concurrently during the air sparging pilot study. SVE design information will be collected during the pilot study and will include vacuum stress measurements at selected groundwater monitor wells and vacuum stress monitor wells VSM-1 through VSM-3 under varying applied vacuum conditions. Air flow rates will also be measured under these varying applied vacuums to determine the point of diminishing returns on flow rates versus measured vacuum stress.*

7. *RUST recommends that air sparging well SP-3 be installed at the approximate location shown on Figure 12. Additionally, vacuum stress monitor wells VSM-1 through VSM-3 will be used to monitor the change in VOC concentrations versus various applied pressures and flow rates. Information to be gathered during the air sparging pilot study include air flow rate, applied pressure, unsaturated zone pressure, dominant motive force (pressure or vacuum), groundwater elevation, dissolved oxygen, and VOC concentration changes. These data will be used to define the radius of influence for both air sparging and SVE and air permeability of the soil. Samples and measurements will be taken before, during, and after the test. A base line of off-gas concentration with only the SVE system operating will be defined to support the effectiveness of air sparging. Vacuum stress monitor well VSM-2 will be used as the vacuum extraction point. VSM-2 and VSM-3, along with groundwater monitor wells within the expected radius of influence, will be used to measure vacuum stresses to verify SVE radius of influence.*

8. *Figure 7 and Figure 11 are provided to illustrate the location and construction of the proposed pilot study sparge, extraction, and dedicated observation wells.*

9. *The pilot study will be conducted as needed to define equilibrium soil and groundwater conditions. Air emissions treatment must be provided for the duration of the pilot testing.*

10. *The estimated cost for conducting the pilot study is included in the cost comparison presented in Appendix E.*

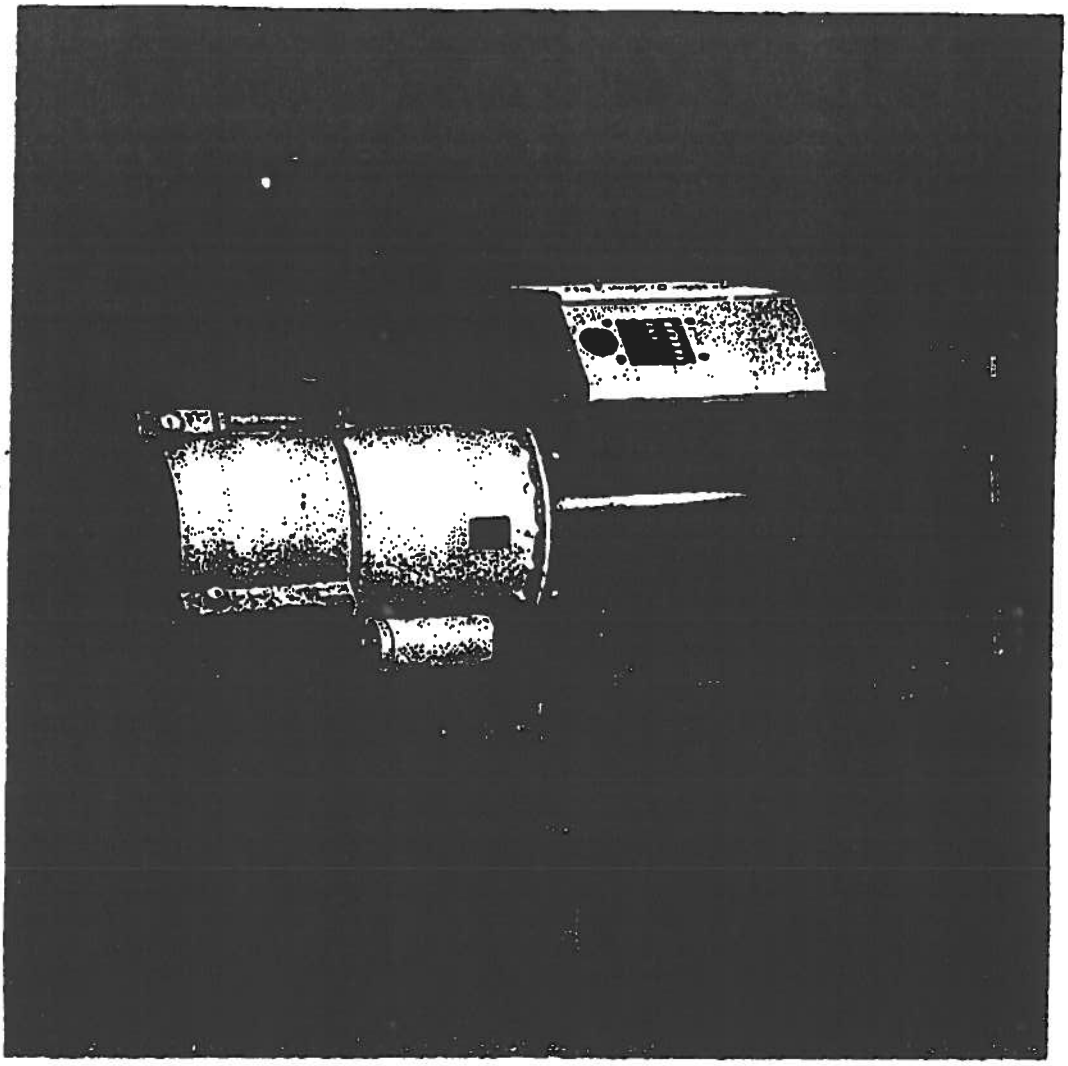
11. *No plate count or other bioanalysis is required. RUST recommends that oxygen and carbon dioxide concentrations in the unsaturated zone be measured to determine if gratuitous bioremediation is occurring.*

The results of the pilot study will be assimilated and used to design a full scale SVE and air sparging system.

APPENDIX G

AIR COMPRESSOR SPECIFICATIONS

CompAir Hydrovane



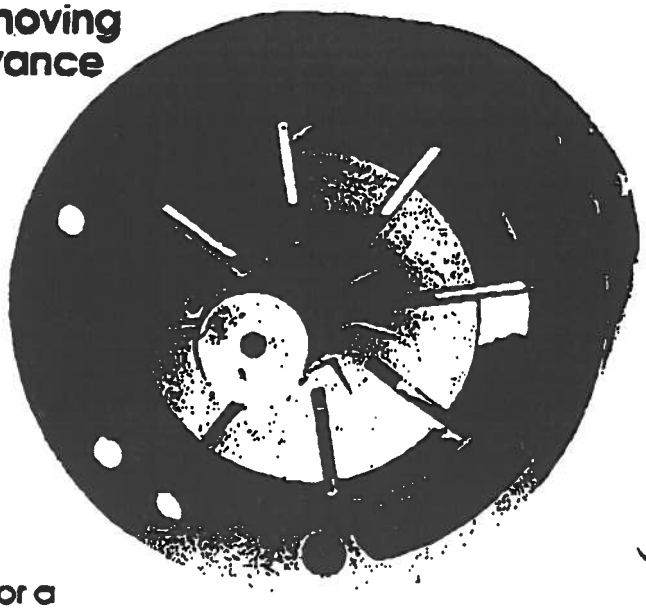
The best designed, most reliable rotary air compressor package ever built. Period.

Hydrovane. One design simply advances performance, reliability, and economy well beyond any other rotary air compressor in the world.

No matter how you look at it, no other compressor is nearly as advanced as the CompAir Hydrovane. Dollar for dollar, feature for feature, year after year, Hydrovane Rotary Air Compressors will out-perform any and all equivalent reciprocating or screw compressors. **Anywhere.**

That's quite a strong statement. Hydrovane's features and benefits offer some very strong proof. If you need an air compressor from 2 to 50 HP, 6.3 to 200 scfm, consider the advantages of the CompAir Hydrovane. If you can find a better all-around value — buy it!

Only one major moving part: A major advance in reliability



The fewer moving parts in any machine, the fewer the things that can go wrong. That's why the Hydrovane is kept simple. The oil-sealed design is nothing less than the last word in mechanical simplicity, for the ultimate in mechanical reliability and long life.

It's not uncommon for a Hydrovane to run for **100,000 hours (20 years)** and longer — with the original meehanite cast iron parts still in good working order.

The most advanced design is simple and self-contained

Hydrovane integrates total air compression into one compact package. Everything is built right in, including drive, automatic unloader, safety valve, and no-pump lube system. You eliminate a bulky air receiver, separate lube and oil separator system, or other auxiliary equipment where problems can occur.

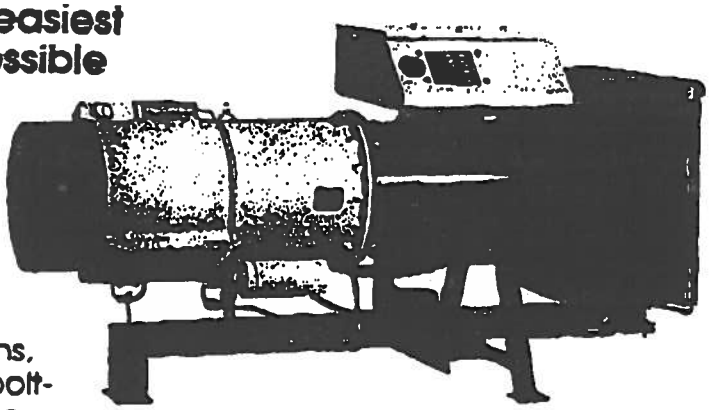
High efficiency that actually improves over the years

Hydrovane compressors typically deliver more than 4 cfm per BHP. Output is efficient from the outset, and literally gets **better**, over years of operation. Your economy improves accordingly. Compare Hydrovane efficiency with others.

Cooler than recips, slower than screws

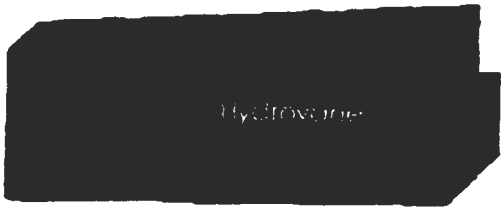
Hydrovanes operate at much lower temperatures than reciprocating machines, thus eliminating oil carbonization and maintenance problems. The running speed is a constant 1750 rpm, or about **half** that of rotary screws, saving wear on bearings and key drive parts, increasing service life.

The simplest, easiest installation possible



Just put your Hydrovane right where you want it, hook it up, and start it up. You'll never need to pay for special foundations, floor grouting, or bolting down, because the Hydrovane stands alone on its own three feet. And whenever your needs change, you can move your Hydrovane to wherever you need it. Siting is simplified further because the Hydrovane takes up only about **half** the space of comparable recip or screw compressors.

The quietest, smoothest compressors of their size

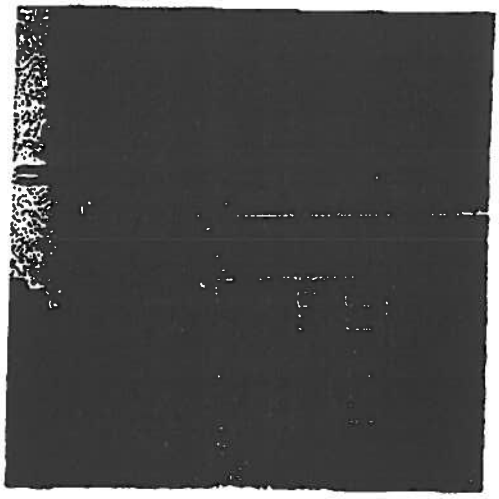


Many Hydrovanes have the lowest noise levels available for any comparable compressors. In fact, with levels as low as 65 dBA at 1 meter, they meet OSHA standards **without** enclosures. That means you can site your Hydrovane close to the workplace, saving the cost of acoustic enclosures, employee ear protection, or separate compressor houses. The Hydrovane runs vibrationfree, with the rotor turning smoothly inside the oil chamber. Check other compressors to see if they'll give your plant bad vibrations!

Consistently cool, clean, dry air at constant pressure

Hydrovane air is high quality air. Outlet temperature is a mere 15°F over ambient. Moisture is minimal. Oil carryover is only 1 ppm by weight. The Hydrovane delivers pulsefree air at constant pressure.

Energy efficient



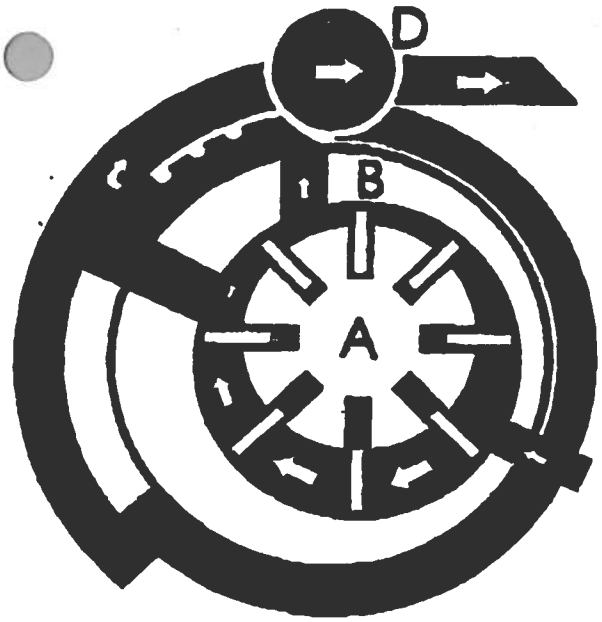
Depend on ultrasimple, ultrareliable controls — at the flick of a switch. Hydrovane offers a comprehensive selection of control options, including constant run and automatic start/stop. Microprocessor controls are designed and built to be extremely reliable and functionally very easy to use.

Off-load power consumption on some models is an extremely efficient 28 percent. Compare this efficiency with any other manufacturer.

The inside story: Simply compact, simply efficient, simply reliable, simply accessible, simply economical.

How Hydrovane works

The rotary sliding vane principle simply keeps Hydrovane efficient—now and in the long run. One major moving part, the rotor (a) turns within the stator (b). Air is cooled by oil (c) injected during compression, then removed from the air by high-efficiency oil separators (d). The Hydrovane provides volumetric efficiencies of up to 93% across the range . . . with low delivered air temperatures . . and oil carryover as low as 1 ppm.

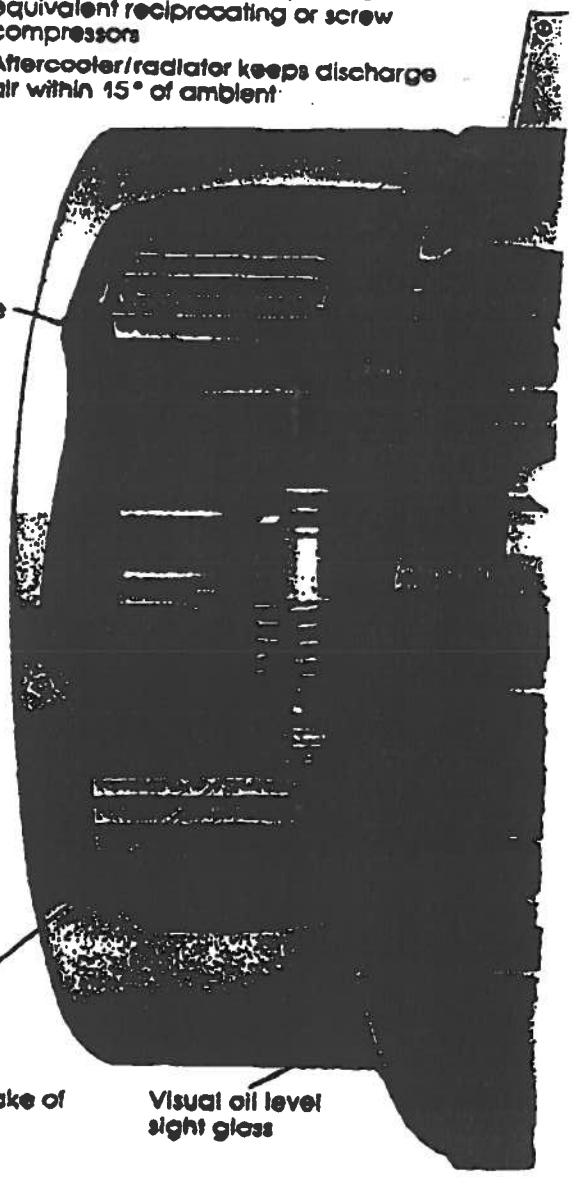


Air outlet—cool, clean, dry, pulse-free air at constant pressure

Space-saving integrated design takes up about half the space of equivalent reciprocating or screw compressors

Aftercooler/radiator keeps discharge air within 15° of ambient

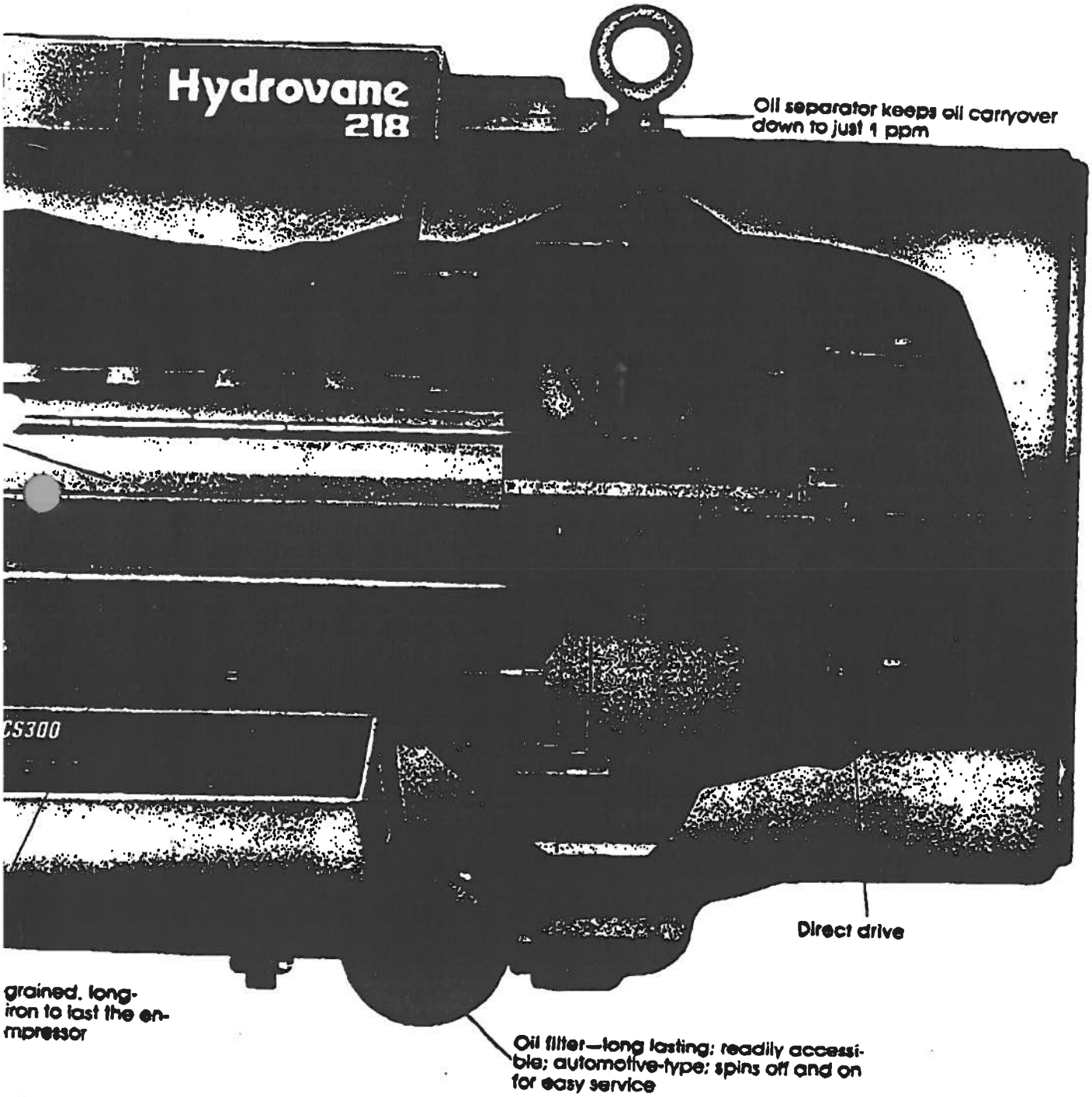
Rotor/stator unit provides volumetric efficiency up to 93%, so you get more air for your money



Air control valve regulates intake of air according to demand

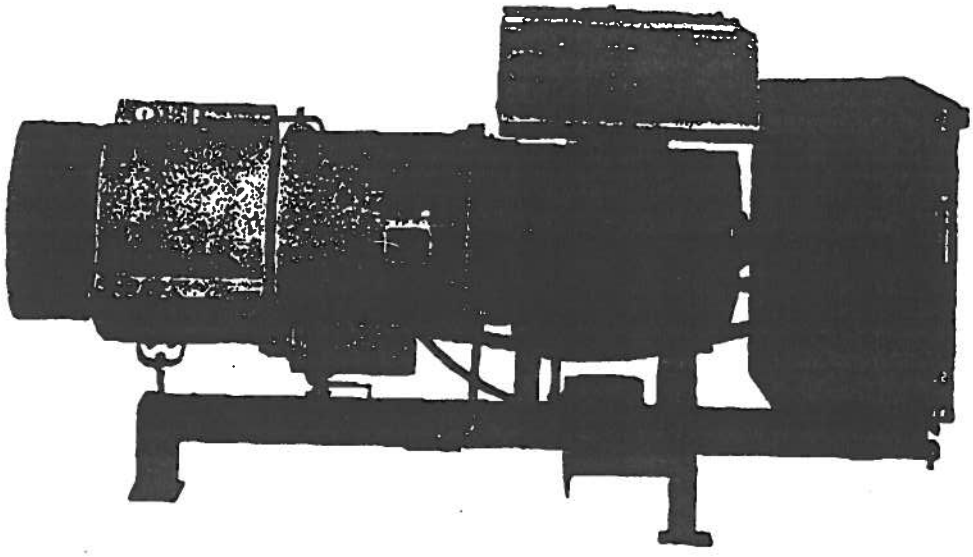
Visual oil level sight glass

Van
wea
tire


Hydrovane
218
Oil separator keeps oil carryover down to just 1 ppm
CS300
Direct drive
grained, long-
iron to last the en-
mpressor
Oil filter—long lasting; readily accessible; automotive-type; spins off and on for easy service

The only compressor that actually improves your environment.

A Hydrovane could be the best thing to happen not just to your plant air—but to your entire plant environment. That's because Hydrovane eliminates all the environmental problems most people have with ordinary compressors. Get a Hydrovane and you also get



- **Less noise**—much less than that of equivalent competitive machines. And no vibration at all.
- **More working space**—because Hydrovane's compact design takes up only about half the space of comparable recips or rotary screws.
- **Less maintenance**—by compressor design, simplicity means reliability—and Hydrovane is as simple as you can get.
- **Easier maintenance**—because everything's readily accessible and CompAir parts kits make service ultrasimple.
- **Affordable utility bills**—because Hydrovane is just about as energy efficient as you can get—and efficiency actually gets better over the years. Automatic energy-efficient control reduces off-load power consumption to 28 percent.
- **Easy, economical installation.** Set it down, hook it up, choose mode of operation and start it up. It's that simple. You won't need special floor foundations, grouting, bolting, or extra time and money in installing your Hydrovane.
- **A safer working environment.** Simplicity means safety. Hydrovane simply has fewer parts, so there's less chance of anything going wrong. Hydrovane also has no pressure vessel, so you don't have to worry about pressure vessel codes or hazards. All Hydrovane's controls and safety features are state-of-the-art.
- **A better-looking environment.** Hydrovane's clean lines and contemporary styling can improve the appearance of any installation. No matter where you put it, a Hydrovane is easy to look at—and easy to live with.
- **Cool, clean, pulse-free plant air.** Hydrovane air means high quality, dependable air . . . ideal for instrumentation or other sensitive applications. You simply can't find another compressor that does this much for your plant environment—and your plant's economy.

Hydrovane General Specifications

Series	Model	Motor HP	Free Air Delivered (CFM)		Noise Level dBA at 1 meter	Oil Capacity (US pints)	Air Discharge Temp. (°F above ambient)	Operating Controls
			100 psig	150 psig				
5	10 PUTS	2	6.3	5.0	65	1.4	90 °F	Continuous Run
	10 PUR	2	6.3	5.0	65	1.4	72 °F	Auto Start/Stop
	25 PUAS	5	20.0	16.0	72	3.8	15 °F	Continuous Run
7	707 PUAS	10.0	41.5	32.0	74	9.1	15 °F	Dual Control
8	68 PUAS	15.0	60	—	80	12.0	15 °F	Dual Control
	88 PUAS	20.0	77	—	80	12.0	15 °F	Dual Control
	128 PUAS	25.0	100	—	85	29.0	11 °F	Dual Control
	148 PUAS	30.0	120	—	85	29.0	15 °F	Dual Control
	178 PUAS	40.0	155	—	90	29.0	11 °F	Dual Control
	218 PUAS	50.0	200	—	90	29.0	15 °F	Dual Control

Series	Model	Length (inches)	Width (inches)	Height (inches)	Weight (lbs)	Air Outlet NPT	Rotating Speed (rpm) Motor and Attend.	Starter
5	10 PUTS	25.0	11.0	18.0	130	3/8	1760	Direct on line
	10 PUR	43.0	19.5	30.5	300	3/8	1760	Press Switch
	25 PUAS	41.25	23.38	23.5	315	1/2	1760	Direct on line
7	707 PUAS	43.0	22.0	28.0	400	3/4	1760	Direct on line
8	68 PUAS	60.0	25.0	35.0	700	1"	1760	Direct on line
	88 PUAS	61.0	25.0	35.0	750	1"	1760	Direct on line
	128 PUAS	65.0	29.25	40.0	1125	1"	1760	Direct on line
	148 PUAS	66.0	29.25	40.0	1175	1"	1760	Direct on line
	178 PUAS	70.5	30.5	39.0	1250	1"	1760	Direct on line
	218 PUAS	71.5	29.5	42.0	1485	1"	1760	Direct on line

APPENDIX H

COST ESTIMATE

Air Sparging/SVE Cost Estimate

Trenching/Well Installation		*$ 55,000*
Air Sparging System		
1.	*100 cfm, 100 psig compressor and receiver tank*	*$ 9,000*
2.	*Pressure regulators, rotometers, valves*	*$ 1,000*
3.	*Skid mounting*	*$ 3,000*
4.	*Control Panel*	*$ 2,000*
5.	*Shipping*	*$ 1,000*
6.	*Air Emission Treatment*	*$ 5,000*
	Sparging system subtotal	*$ 21,000*
SVE Treatment System		
1.	*Skid Mounted blower/moisture separating drum*	*$ 16,000*
2.	Vapor Carbon Lease (20 estimated for duration of SVE activity)	$ 17,000
	SVE system subtotal	$33,000
System Start-up		$ 2,500
1st year Operation/Maintenance/Sampling		*$ 35,000*
Reports (As-Built, Annual)		$ 3,000
Project Management		$ 5,000
	TOTAL	***$154,500***

APPENDIX I

RAP REVIEW CHECKLIST

REMEDIAL ACTION PLAN REVIEW CHECKLIST
Bureau of Waste Cleanup, FDER

Facility Name : BUILDING 25 - TRANSPORTATION SHOP — Reimbursement Site: []

Location : NAVAL STATION MAYPORT — State Contract Site: []

EDI # : _____ FAC ID# : _____ — Enforcement Case: []

Reviewer : _____ Date : _____ — Consultant: _____

Date of QAPP Approval: _____

Date of CAR Approval: _____

S = Submitted/Acknowledged A = Adequate

Page(s)	S	A		
			I.	**General**
	[]	[]	(1)	RAP signed, sealed, and dated by Florida P.E. (per FS 471.025) author page
	[]		(2)	remediation by State cleanup program is proposed (yes/no) yes
3	[]	[]	(3)	summary of CAR conclusions and results included in RAP soil/gw contamination
	[]	[]	(4)	sampling results current July 1992
1	[]	[]	(5)	underground storage tanks and product lines have tested tight
1	[]		(6)	method of potable water supply to area indicated
Fig 3	[]	[]	(7)	underground utilities which may enhance contaminant transport shown
8	[]	[]	(8)	estimated time of cleanup provided in months
12		[]	(9)	fencing treatment area considered yes Fig 7
14	[]	[]	(10)	discussion of proposed equipment maintenance provided
12	[]	[]	(11)	all local, State, and Federal permits obtained and conditions stated in RAP
14	[]	[]	(12)	cost estimate for project with breakdown of capital and O&M costs provided App. G
NA	[]	[]	(13)	feasibility of leasing equipment considered (cost cannot exceed purchase price)
9	[]	[]	(14)	cost effective analysis provided if design is innovative App. E
13	[]		(15)	statement that signed and sealed as-built (record) drawings to be provided
			II.	**Free Product Removal**
4	[]	[]	(1)	description of free product recovery system provided N/A
NA	[]	[]	(2)	disposition of recovered free product discussed N/A
↓	[]	[]	(3)	automated product pump shutdown for high level in product tank N/A
↓	[]	[]	(4)	oil/water separator calculations provided (e.g., detention time) N/A
			III.	**Soil Remediation - General**
4	[]	[]	(1)	hazardous soils (e.g., ignitable, corrosive, reactive, toxic, or petroleum refining waste) to be disposed of properly N/A
4	[]	[]	(2)	excessively contaminated soils (per soil guidance manual) to be remediated
NA	[]	[]		a) proper calibration procedure followed if PID used to assess soil contamination
NA	[]	[]	(3)	effect of soil leachate from non-excessively contaminated soils (e.g., 10 - 500 ppm/OVA) upon groundwater contaminant levels evaluated
NA	[]	[]	(4)	disposition of excavated, contaminated soils discussed N/A
3	[]	[]	(5)	volume of all contaminated soils estimated

N/A [] [] (6) rationale for 'no action' alternative for soil remediation provided _____

IV. Landfarming of Soil

N/A [] [] (1) must have total recoverable hydrocarbon concentrations in soil less than 500 mg/kg by EPA Method 418.1 _____

[] [] (2) adequate surface area available (_____ sf) to spread soils 6" to 1' thick _____

[] [] (3) location of landfarming operation if different from facility location _____

[] [] (4) landfarming area is flat (less than 5% slope) _____

[] [] (5) impermeable base provided. Type: _____

[] [] (6) surface water runoff controls provided _____

[] [] (7) groundwater monitoring plan proposed _____

[] [] (8) frequency of tilling provided _____

[] [] (9) frequency of nutrient application provided (if proposed) _____

[] [] (10) soil sampling frequency and sampling methods provided _____

[] [] (11) underlying soil and groundwater monitoring procedures provided and acceptable _____

[] [] (12) landfarming will be continued until the total recoverable hydrocarbon concentration is 5 ppm or less (by EPA method 418.1) and the BTEX concentration is less than 100 ppb (by EPA method 5030/8020) unless an alternate use as a road bed base or asphalt mix is proposed

[] [] (13) impact of air emissions considered _____

V. Landfilling of Soils

[] [] (1) landfill lined _____

[] [] (2) name and location of landfill provided along with conditions of acceptance _____

VI. Incineration

[] [] (1) name and location of thermal treatment facility provided _____

[] [] (2) facility is permitted for thermal treatment of contaminated soils _____

[] [] (3) influent and effluent sampling frequency and analytical methods are appropriate _____

✓ [] [] (4) incineration will reduce total recoverable hydrocarbons in the soil to 5 ppm or less by EPA Method 418.1, and the BTEX concentration to less than 100 ppb by EPA Method 5030/8020 unless an alternate use such as a road bed base or asphalt mix is proposed _____

VII. Soil Vacuum Extraction

6, FIG 8 [] [] (1) location of extraction and monitoring well(s) provided along with construction details ___

APP F [] [] (2) on site pilot system (field testing of system with vacuum piezometers) or modeling required unless pilot study would be similar in scale to proposed treatment system _____

7 [] [] (3) air phase treatment equipment description to be provided during the first two months of system operation _____

8 [] [] (4) vacuum pump description, flowrate (____ cfm), and operating vacuum (____in Hg) provided __

10 [] [] (5) surface sealing provided for vacuum extraction (yes/no) _____

7 [] [] (6) explosion proof vacuum pump provided _____

11 [] [] (7) vacuum gauge provided _____

7 [] [] (8) knock out/condensation trap provided _____

13 [] [] (9) system monitoring proposal provided _____

[] [] a) air emissions to be sampled and analyzed monthly per Department guidance _____

✓ [] [] b) soil cleanup criteria provided _____

VIII. Groundwater Extraction

N/A [] [] (1) feasibility of using existing on-site wells for groundwater extraction considered _____

[] [] (2) recovery well or trench location(s) and construction details included _____

[] [] (3) screening interval appropriate _____

[] [] (4) predicted horizontal and vertical area of influence with hydraulic gradient provided _____

[] [] (5) expected drawdown in recovery well or trench (____ft) _____

[] [] (6) has multiple well configuration been considered to minimize drawdown and product adsorption onto the soils in the cone of depression _____

[] [] (7) groundwater pump(s) description, pump characteristic curve, design flowrate (_____ gpm at _____ ft TDH) provided _____

[] [] a) hydraulic design (including friction losses and suction lift requirements) acceptable

[] [] (8) pneumatic or peristaltic pump considered if design flow is less than 5 gpm _____

[] [] a) If used, performance specifications provided _____

[] [] (9) automated well level controls provided for shutting down groundwater pump(s) _____

[] [] (10) totalizing flowmeter installed on influent line from every groundwater recovery pump _____

[] [] (11) check valve provided on pump discharge piping if not integral to pump _____

✓ [] [] (12) shutoff/throttling valve provided on pump discharge piping _____

IX. Groundwater Treatment System - General

NA [] [] (1) expected or calculated influent concentrations acceptable (based upon pumping test dynamic sample, weighted averaging procedure, or other reasonable assumptions) _____

N/A [] [] (2) feasibility of discharge to sewage treatment plant evaluated _____

N/A [] [] a) consideration given to less time and/or level of treatment required to meet sewage system's pretreatment standards _____

NA [] [] (3) site piping plan, and schematics of <u>all</u> treatment components, piping, valves, controls and appurtenances provided _____

NA [] [] a) influent and effluent sampling ports provided _____

NA [] [] b) piping type and size provided _____

N/A [] [] (4) iron level in groundwater provided (____ ppm) from representative dynamic or static sample(s) and pretreatment for iron removal considered _____

N/A [] [] (5) pretreatment or O&M for biofouling provided _____

NA [] [] (6) adequate remediation proposed for other contaminants (e.g., MTBE, PAHs, EDB, 1-2 dichloroethane) _____

X. Air Stripping Treatment Process

(1) Packed Tower:

N/A [] [] a) type, size, and surface area of packing provided _____

[] [] b) calculations, criteria (tower height, diameter, packing height, air flowrate, blower horsepower)/design parameters provided _____

[] [] c) method/procedure for determining K_la or HTU given _____

[] [] d) pressure gauge provided to indicate the effects of fouling over time _____

[] [] e) mist eliminator provided _____

[] [] f) observation port provided _____

APPENDIX H

COST ESTIMATE

Air Sparging/SVE Cost Estimate

Trenching/Well Installation		*$ 55,000*
Air Sparging System		
1.	*100 cfm, 100 psig compressor and receiver tank*	*$ 9,000*
2.	*Pressure regulators, rotometers, valves*	*$ 1,000*
3.	*Skid mounting*	*$ 3,000*
4.	*Control Panel*	*$ 2,000*
5.	*Shipping*	*$ 1,000*
6.	*Air Emission Treatment*	*$ 5,000*
	Sparging system subtotal	*$ 21,000*
SVE Treatment System		
1.	*Skid Mounted blower/moisture separating drum*	*$ 16,000*
2.	Vapor Carbon Lease (20 estimated for duration of SVE activity)	$ 17,000
	SVE system subtotal	$33,000
System Start-up		$ 2,500
1st year Operation/Maintenance/Sampling		*$ 35,000*
Reports (As-Built, Annual)		$ 3,000
Project Management		$ 5,000
	TOTAL	***$154,500***