

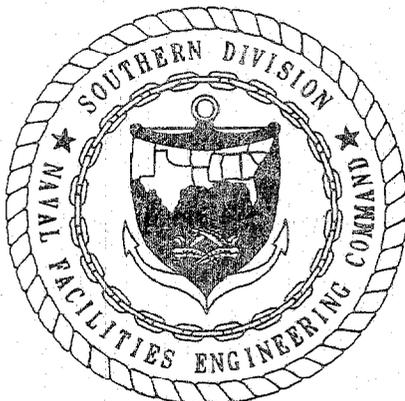
LIMITED-SCOPE REMEDIAL ACTION PLAN

SITE 119

**NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA**

**UNIT IDENTIFICATION CODE: N00207
CONTRACT NO.: N62467-89-D-0317/118**

MARCH 1997



**SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010**



March 3, 1997

Document No. 8566.100

Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418
ATTN: Mr. Bryan Kizer, Code 1842

SUBJECT: Submittal of the Site 119 Limited Scope Remedial Action Plan
Naval Air Station Jacksonville, Jacksonville, Florida.
Contract No. N62467-89-D-0317, CTO No. 118.

Dear Bryan:

Please find attached two copies of the Limited Scope Remedial Action Plan for Site 119, NAS Jacksonville. Two copies have been sent to Lt. Beth Melendez at NAS Jacksonville.

If you have any question, concerns, or comments please call either Mike Dunaway at (904)-656-1293 or myself at (904)269-7012 at your earliest convenience.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

For: Phylissa Miller
Senior Task Order Manager

Michael R. Dunaway
Michael Dunaway, P.E.
Principal Engineer

cc: Lt. Beth Melendez, NAS Jacksonville
File

Sponsor:
Special Olympics
World Games
Connecticut 1995



ABB Environmental Services Inc.

Berkeley Building
2590 Executive Center Circle East
Tallahassee, Florida 32301

Telephone (904) 656-1293
Fax (904) 877-0742



March 3, 1997

Document No. 8566.100

Lt. Melendez
NAS Jacksonville
Facility Environmental Department
Public Works Building 103
Jacksonville, Florida 32212-5000

SUBJECT: Submittal of the Site 119 Limited Scope Remedial Action Plan
Naval Air Station Jacksonville, Jacksonville, Florida.
Contract No. N62467-89-D-0317, CTO No. 118.

Dear Lt. Melendez:

Please find attached two copies of the Limited Scope Remedial Action Plan for Site 119, NAS Jacksonville. Two copies have been sent to Bryan Kizer at Southern Division Naval Facilities Engineering Command in Charleston.

If you have any question, concerns, or comments please call either Mike Dunaway at (904)-656-1293 or myself at (904)269-7012 at your earliest convenience.

Sincerely,

ABB ENVIRONMENTAL SERVICES, INC.

for: Michael J. Miller
Phylissa Miller
Senior Task Order Manager

Michael R. Dunaway
Michael Dunaway, P.E.
Principal Engineer

cc: Bryan Kizer, EIC, SouthDiv
File

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LIMITED-SCOPE REMEDIAL ACTION PLAN

SITE 119

**NAVAL AIR STATION JACKSONVILLE
JACKSONVILLE, FLORIDA**

Unit Identification Code: N00207

Contract No.: N62467-89-D-0317/118

Prepared by:

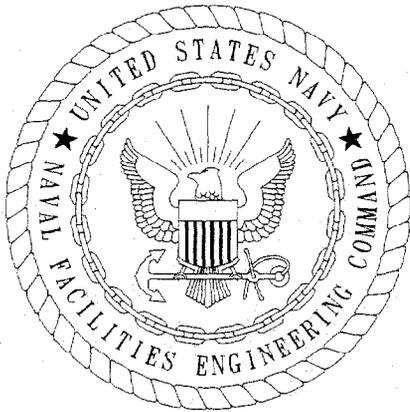
**ABB Environmental Services, Inc.
2590 Executive Center Circle, East
Tallahassee, Florida 32301**

Prepared for:

**Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418**

Bryan Kizer, Code 1842, Engineering-in-Charge

March 1997



CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

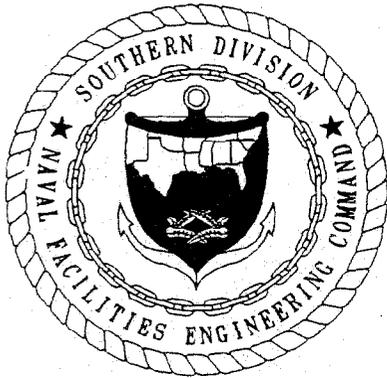
The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/118 are complete and accurate and comply with all requirements of this contract.

DATE: March 3, 1997

NAME AND TITLE OF CERTIFYING OFFICIAL: Phylissa Miller
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Michael K. Dunaway, P.E., P.G.
Project Technical Lead

(DFAR 252.227-7036)



FOREWORD

Subtitle I of the Hazardous and Solid Waste Amendments of 1984 to the Solid Waste Disposal Act of 1965 established a national regulatory program for managing underground storage tanks (USTs) containing hazardous materials, especially petroleum products. Hazardous wastes stored in USTs were already regulated under the Resource Conservation and Recovery Act of 1976. Subtitle I requires that the U.S. Environmental Protection Agency (USEPA) promulgate UST regulations. The program was designed to be administered by individual States, who were allowed to develop more stringent, but not less stringent standards. Local governments were permitted to establish regulatory programs and standards that are more stringent, but not less stringent than either State or Federal regulations. The USEPA UST regulations are found in the Code of Federal Regulations, Title 40, Part 280 (40 Code of Federal Regulations [CFR] 280) (*Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*) and 40 CFR 281 (*Approval of State Underground Storage Tank Programs*). 40 CFR 280 was revised and published on September 23, 1988, and became effective December 22, 1988.

The Navy's UST program policy is to comply with all Federal, State, and local regulations pertaining to USTs. This report was prepared to satisfy the requirements of Chapter 62-770, Florida Administrative Code (*State Underground Petroleum Environmental Response*) regulations on petroleum contamination in Florida's environment as a result of spills or leaking tanks or pipelines.

Questions regarding this report should be addressed to the Commanding Officer, Naval Air Station Jacksonville, Florida, or to Bryan Kizer at Southern Division, Naval Facilities Engineering Command, Code 1842, at 803-820-5896 (AUTOVON 563-5596).

EXECUTIVE SUMMARY

A Contamination Assessment Report (CAR) for Site 119 at Naval Air Station, Jacksonville, Florida, was submitted by ABB Environmental Services, Inc. (ABB-ES), in May 1996 to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). The following actions were recommended in the CAR:

- excavation of excessively contaminated soil in areas B and D as an initial remedial action, to be conducted during the planned expansion of Bravo Taxiway; and
- quarterly monitoring of groundwater wells was proposed for Areas A through G.

The Florida Department of Environmental Protection approved a monitoring only proposal (MOP) for seven areas of contamination within Site 119. During the first and second quarterly monitoring events, groundwater analytical results from monitoring wells in Areas D, F, and G indicated contaminant concentrations increased to levels significantly exceeding State No Further Action or Monitoring Only target levels. ABB-ES was subsequently authorized by SOUTHNAVFACENGCOM to develop a limited-scope remedial action plan (LSRAP) to address these three areas of concern, under Contract Task Order No. 118 of the Comprehensive Long-Term Environmental Action, Navy contract. This LSRAP has been developed to describe the site remediation. Components of the LSRAP are as follows:

- excavation of excessively contaminated soil at Areas D and F,
- replacement of all monitoring wells destroyed during soil excavation activities,
- short-term groundwater recovery effort from monitoring well MW-09 in Area G, and
- continued groundwater monitoring at Site 119 after soil excavation using analytical methods described in the Florida Department of Environmental Protection MOP approval order.

With the exception of continued groundwater monitoring, it is estimated that the total time to perform the activities within scope of the LSRAP will be 6 to 8 weeks. Groundwater in Areas D, F, and G will be monitored for 1 year beyond completion of remedial activities.

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Naval Air Station Jacksonville
Jacksonville, Florida

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Naval Air Station Jacksonville
Jacksonville, Florida

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GLOSSARY

ABB-ES	ABB Environmental Services, Inc.
bls	below land surface
CA	contamination assessment
CAR	contamination assessment report
cm/sec	centimeters per second
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
JP	jet propellant
LSRAP	limited-scope remedial action plan
MO	monitoring only
MOP	monitoring only plan
NAS	Naval Air Station
NFA	no further action
OVA	organic vapor analyzer
ppb	parts per billion
ppm	parts per million
RAP	remedial action plan
SOUTHNAV- FACENCOM	Southern Division, Naval Facilities Engineering Command
VOC	volatile organic compound
WWTP	wastewater treatment plant

1.0 INTRODUCTION

A Contamination Assessment Report (CAR) for Site 119 at Naval Air Station (NAS), Jacksonville, Florida, was submitted by ABB Environmental Services, Inc. (ABB-ES), in May 1996 to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). The Florida Department of Environmental Protection (FDEP) approved a Monitoring Only Proposal (MOP) recommended in the CAR for seven areas of contamination at Site 119. During the first and second quarterly monitoring events, groundwater analytical results from monitoring wells in three of the seven areas (Areas D, F, and G) indicated contaminant concentrations increased to levels exceeding State No Further Action (NFA) or Monitoring Only (MO) target levels. ABB-ES was subsequently authorized by SOUTHNAVFACENGCOM to develop a limited-scope remedial action plan (LSRAP) to address contamination in these three areas. This LSRAP is being developed as part of Contract Task Order No. 118 of the Comprehensive Long-term Environmental Action, Navy contract.

1.1 PURPOSE. The purpose of this LSRAP is to present a plan for remediating soil and groundwater exceeding FDEP NFA and MO target levels at Areas D, F, and G of Site 119. The implementation of this LSRAP is designed to bring Site 119 into compliance with the requirements of Chapters 62-770 and 62-775, Florida Administrative Code (FAC).

1.2 SCOPE. This LSRAP presents the rationale for remedial actions to be implemented at Areas D, F, and G at Site 119. Implementation of remedial actions described herein will include the following tasks:

- excavation of excessively contaminated soil at Areas D and F,
- replacement of all monitoring wells destroyed during soil excavation activities,
- short-term groundwater recovery effort from monitoring well MW-09 in Area G, and
- continued groundwater monitoring at Site 119 after soil excavation using analytical methods described in the FDEP MOP approval order.

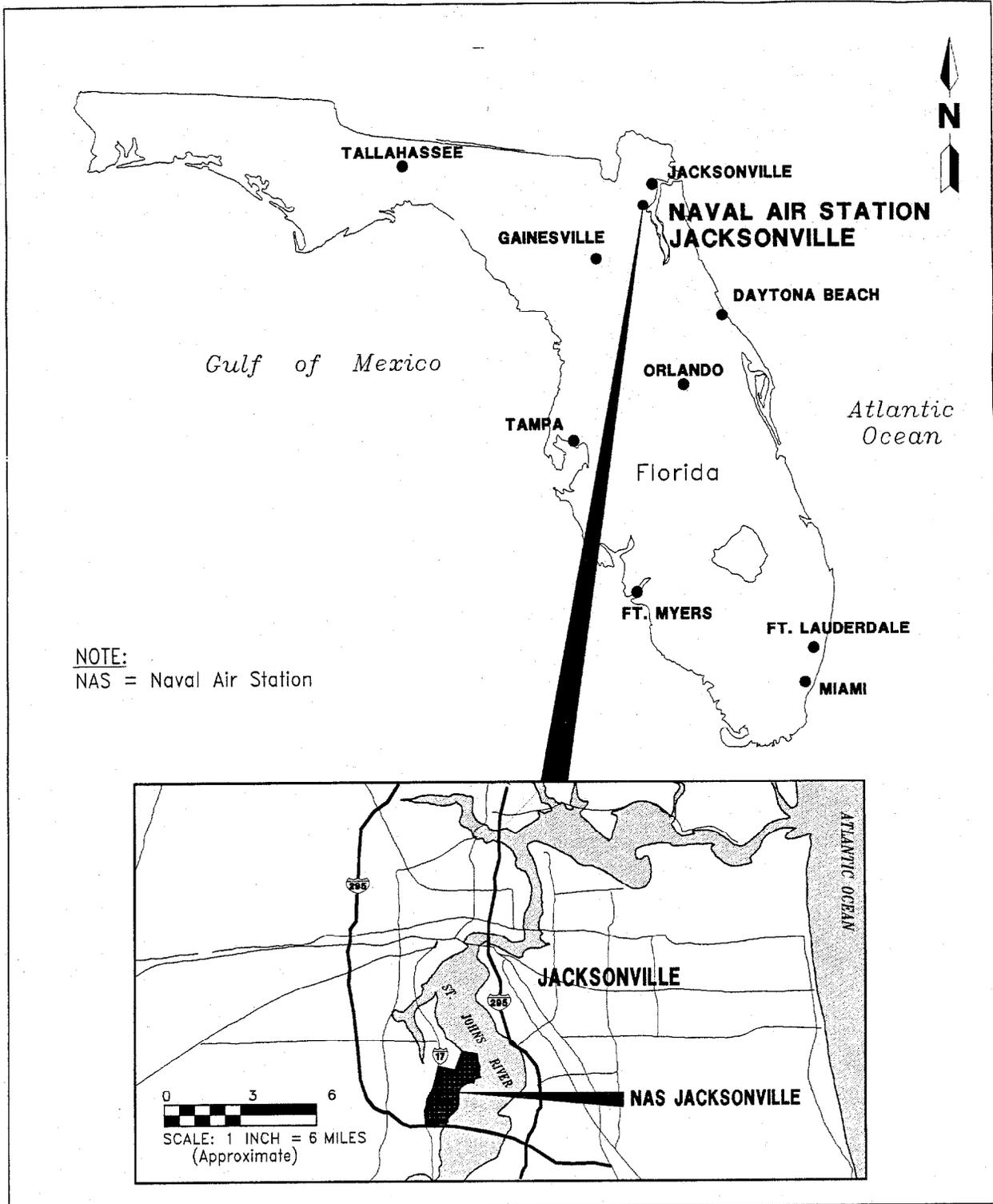
2.0 BACKGROUND

2.1 SITE DESCRIPTION. NAS Jacksonville is located in Jacksonville, Florida, along the west bank of the St. Johns River, east of Highway 17 and north of Interstate 295 (Figure 2-1). Site 119 is located in the northeast area of NAS Jacksonville, south of the 9-27 taxiway, east of Bravo taxiway, north of Albemarle Avenue, and west of Catapult Road (Figure 2-2). The northern part of Site 119 is a grass covered field extending south from the 9-27 taxiway to the fuel truck parking area and east from Bravo taxiway to Catapult Road. The southern part of the site consists of an asphalt fuel truck parking area and aircraft refueling complex, which is bordered to the west by Bravo taxiway, to the east by Catapult Road, and to the south by Albemarle Avenue. Facilities within the aircraft refueling complex include Building 24 (office, fuel testing laboratory, and fuel-truck repair shop), Facility 1963 (jet propellant [JP]-5 truck loading station), Tanks 120A and 120B (used oil), Tanks 120 and 1982 (JP-6 fuel oil), as well as several small aboveground storage tanks containing diesel fuel (emergency generator), unleaded gasoline (fuel truck supply), and used oil (fuel truck repair shop (Figure 2-3)).

Site 119 originally consisted of sixteen 27,000-gallon underground storage tanks. The tanks were used to store a variety of petroleum products, including leaded and unleaded gasoline, JP-4, aviation gasoline, No. 2 fuel oil, kerosene, lubricant, waste oil, and paint waste. Eleven of the tanks were previously abandoned in place (filled with sand or water), one was removed during a Resource Conservation and Recovery Act closure in 1987, and four were removed in January 1996. The supply pipelines, which connected the Site 119 tanks to Pier 139, Facility 159, and Facility 1963, were capped, taken out of service, and/or removed from the site in January 1996.

2.2 SUMMARY OF CAR FINDINGS AND CONCLUSIONS. ABB-ES initiated a contamination assessment (CA) at Site 119 in June 1995 to assess the horizontal and vertical extent of soil and groundwater contamination at the site. The following summarizes the findings of the Site 119 CAR (ABB-ES, 1996).

- The surficial aquifer was penetrated to a depth of 36.5 feet below land surface (bls) during the investigation. Subsurface sediments encountered at each monitoring well location were generally light-gray to brown, fine-grained sand extending from the surface to approximately 16 feet bls interspersed with greenish-gray, sandy clay, and clay lenses of variable depth and thickness. Clay lenses encountered during installation of the shallow monitoring wells were approximately 7 feet bls on the northern area of the site and approximately 12 feet bls in the southern section of the site. A confining unit of greenish-gray clay, approximately 10 feet thick, was encountered at approximately 16 feet bls in the northwest section of the site and at approximately 23 feet bls in the southeast section. Permeability tests of clay samples confirmed hydraulic conductivity values ranged from 1×10^{-8} centimeters per second (cm/sec) to 3×10^{-8} cm/sec.
- Groundwater at the site is classified as G-II.



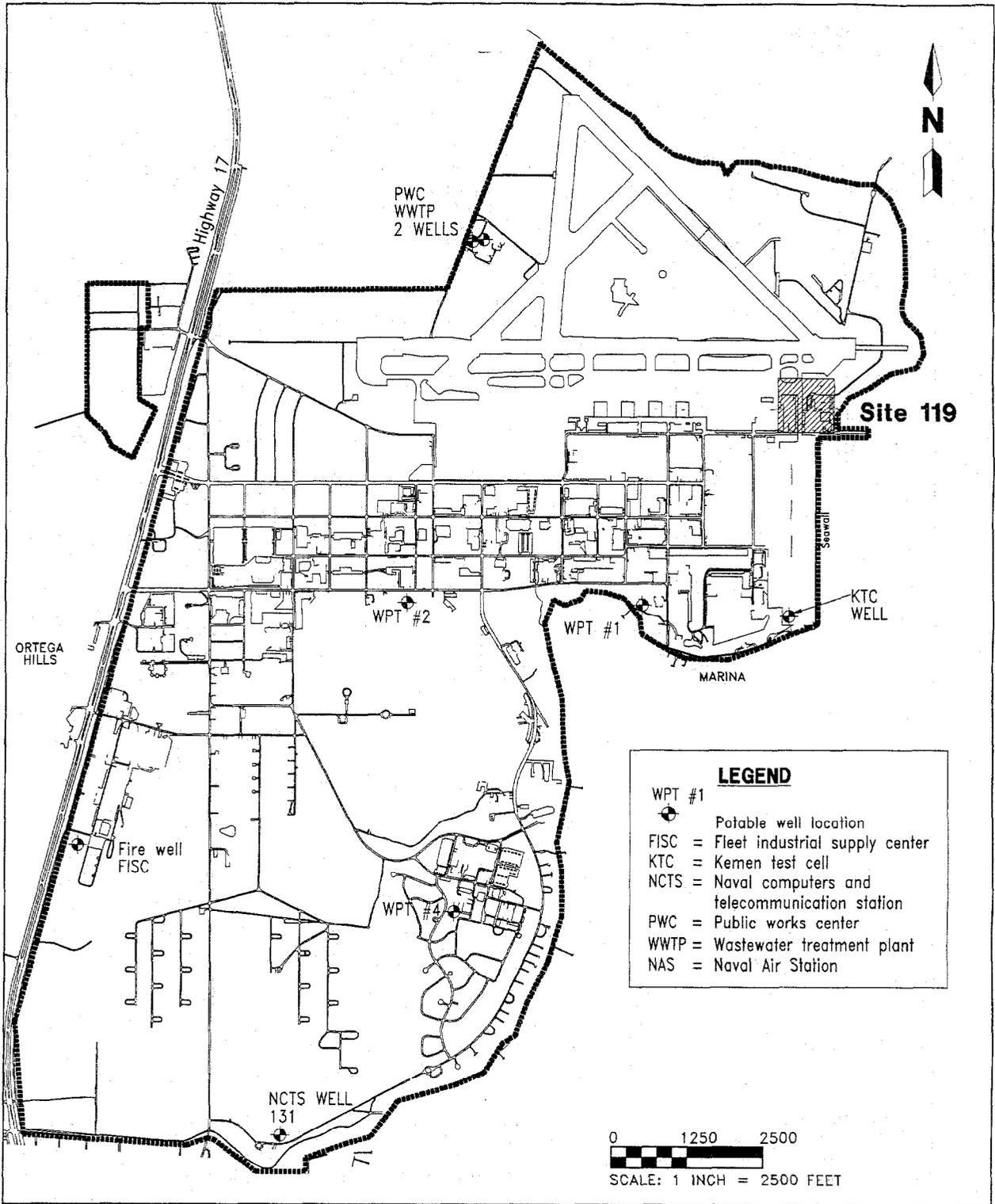
**FIGURE 2-1
 SITE VICINITY MAP**



**LIMITED SCOPE REMEDIAL
 ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
 JACKSONVILLE, FLORIDA**

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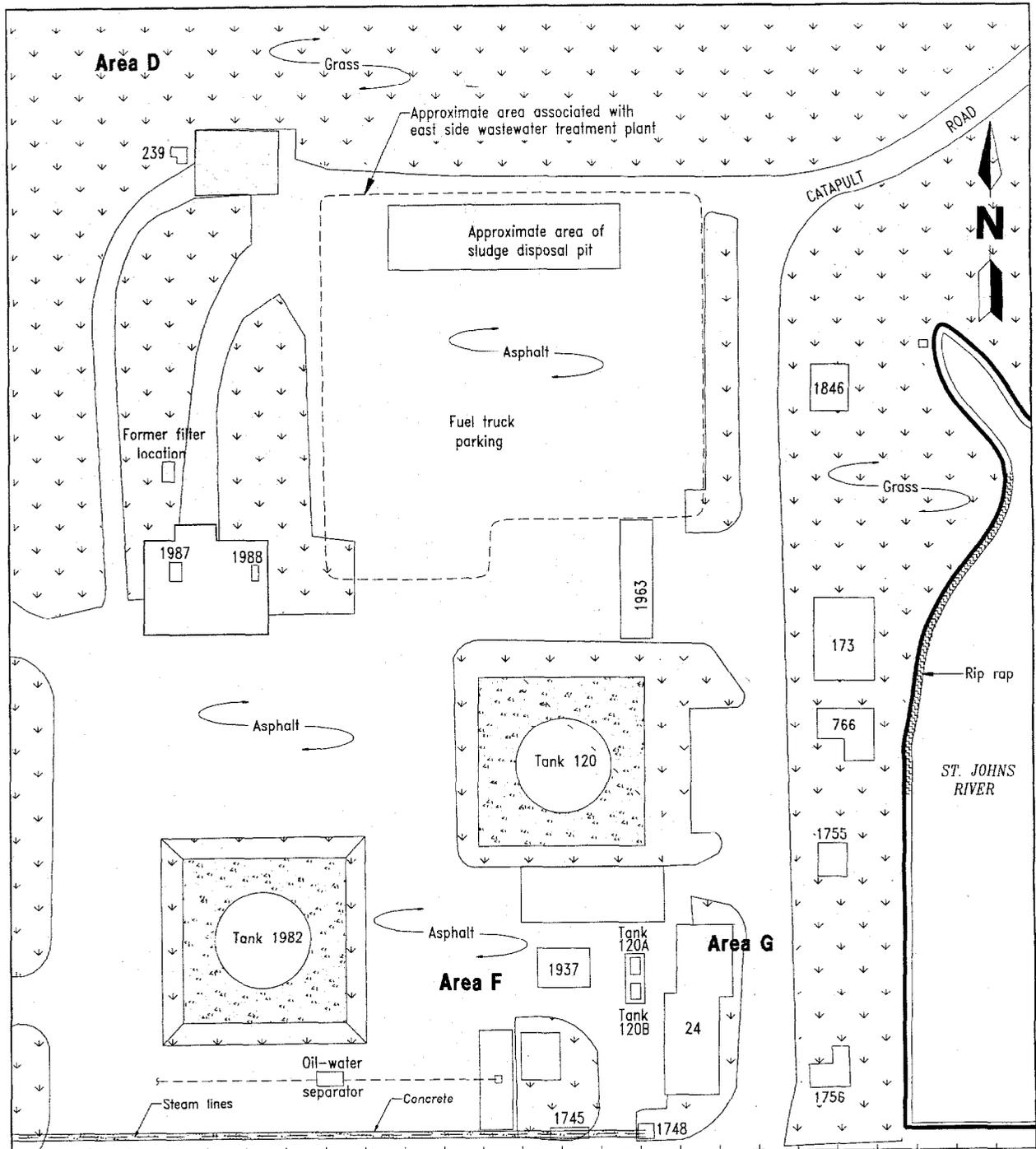
**FIGURE 2-2
SITE LOCATION MAP**

H:\JAX\JAX201\NAB-NP\02-26-97



**LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
JACKSONVILLE, FLORIDA**



0 50 100
 SCALE: 1 INCH = 100 FEET

Railroad

PIER 139

121

ST. JOHNS RIVER

NOTE:
 NAS = Naval Air Station

**FIGURE 2-3
 SITE MAP**



**LIMITED SCOPE REMEDIAL
 ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
 JACKSONVILLE, FLORIDA**

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- The depth to the water table surface at Site 119 ranged from approximately 1.65 feet bls to 5.91 feet bls during the assessment, depending on the topographic elevation of each monitoring well.
- Excessively contaminated soil was assessed at several locations, which are designated as areas A through H.
- A free-product thickness of 0.09 foot was detected in monitoring well MW-33 on October 23, 1995.
- Eight onsite wells at NAS Jacksonville are used for potable and irrigation purposes. The closest well, KTC #1, is located approximately ½-mile south of Site 119 and should not be impacted by petroleum constituents detected in the groundwater at the site.
- Groundwater contamination at Site 119 appears to be localized near the areas of excessively contaminated soil. Petroleum constituents such as benzene, toluene, ethylbenzene, xylenes, naphthalenes, and ethylene dibromide were detected in groundwater samples obtained from several monitoring wells. Most of the identified constituents were below NFA and MO criteria; however, samples from two monitoring wells (specifically MW33 and MW41) exceeded these criteria. Low concentrations of vinyl chloride were also detected in the groundwater samples obtained from monitoring wells MW06 and MW11.
- The groundwater flow direction in the shallow surficial aquifer appears to be predominantly east-southeast with a hydraulic gradient (I) of 0.0028 foot per foot.

2.3 SHORT-TERM GROUNDWATER REMOVAL EFFORT TEST. A 3-day short-term groundwater removal effort test was performed on monitoring wells MW-01, MW06, MW15, MW33, MW36, and MW41 in January 1996. The short-term groundwater removal effort tests were performed as limited-scope remedial actions to attempt to reduce groundwater contaminant concentrations in the monitoring wells below Chapter 62-770, FAC, NFA and MO criteria. Analytical results of groundwater samples collected from the overdeveloped monitoring wells 10 days later indicated contaminant concentrations in monitoring wells MW06, MW15, and MW41 dropped below NFA or MO criteria. Some constituents in samples from monitoring wells MW33 (Area B) and MW41 (Area D), however, increased or remained above State NFA or MO criteria. Subsequent groundwater sample analytical results from the first and second quarterly monitoring actions indicated contaminant concentrations in Areas D and F rebounded to the levels prior to the short-term groundwater removal effort.

2.4 CAR RECOMMENDATIONS. Based on the results of the CA, excavation of excessively contaminated soil in areas B and D was recommended as an initial remedial action. Soil removal in Areas B and D was recommended to be conducted during the planned expansion of Bravo Taxiway. In the interim, quarterly monitoring of groundwater wells was proposed for Areas A through G.

2.5 QUARTERLY MONITORING RESULTS. The first quarter of the groundwater monitoring at Site 119 was performed in September 1996. Groundwater samples were

collected from two monitoring wells in area D (MW-41 and MW-51) and three wells in Area F (MW-06, MW-11, and MW-19). Monitoring wells MW-05 and MW-30 had been either destroyed or damaged by construction activities prior to sampling. MW-51 in Area D was sampled for semivolatile organic compounds only. Concentrations of several compounds in these wells exceeded State NFA and MO target levels. Therefore, a LSRAP was recommended for Areas D and F in the first quarterly monitoring report.

Second quarterly monitoring of groundwater wells at Site 119 was performed in December 1996. Areas D and F were not sampled because remediation was recommended in the first quarterly monitoring report. The concentration of chlorobenzene in monitoring well MW-09 (Area G) was 200 parts per billion (ppb), which exceeded the State Groundwater Guidance concentration of 100 ppb. Based on the second quarter monitoring analytical results, preparation of a LSRAP was recommended to address groundwater contamination in Area G.

A summary of the first and second quarter analytical results and previous groundwater analytical data for monitoring wells in Areas D, F, and G are included in Appendix A, Summary of Groundwater Sample Analytical Results. September and October 1995 data show contaminant concentrations from monitoring wells sampled during the CA. February 1996 data are samples from the wells included in the short-term groundwater removal effort test. September 1996 and December 1996 data are from the first and second quarterly monitoring, respectively. The data are presented together to show changes in contaminant concentrations in these wells over time.

3.0 REMEDIAL ALTERNATIVES

The remedial alternatives discussed in this section reflect those chosen by the NAS Jacksonville petroleum program team as the most expeditious and cost-effective actions for site remediation. These alternatives, therefore, have been restricted to actions described in the FDEP guidance document "Remedial Action Plan Guidelines" ESS-9 (FDEP, 1993) for LSRAPs. This guidance document addresses remedial actions typically utilized as short-term cleanup strategies at sites with a limited area of soil and/or groundwater contamination. Strategies employed for LSRAPs are generally restricted to excavation of excessively contaminated soil and a limited dewatering effort (pumping or trenching) to reduce groundwater contaminants to NFA or MO target levels. The FDEP ESS-9 guidance document specifies that a LSRAP must include the same level of engineering detail as a conventional remedial action plan (RAP) to justify recovery-and-treatment system design.

3.1 CONTAMINANTS OF CONCERN AND CLEANUP STANDARDS. Contaminants of concern and maximum concentrations detected in soil and groundwater samples from Areas D, F, and G, and the applicable remedial goals are shown in Tables 3-1 and 3-2. Groundwater concentrations shown are the most recent quarterly sampling analytical results of the MO actions implemented at Site 119. Soil concentrations shown are results of samples collected February 6, 1996, which are reported in the CAR (ABB-ES, 1996). Standards and regulations that define the required remedial goals for soil and groundwater are contained in Chapters 62-770 and 62-775, FAC, and should be applied following treatment by any method.

3.2 EXTENT OF CONTAMINATION. Soil with OVA headspace readings exceeding 50 parts per million (ppm) is defined in Chapter 62-770, FAC, as "excessively contaminated" and must be remediated, except under extenuating circumstances. OVA readings in most borings increased with depth. The highest OVA readings generally occurred at the capillary fringe of the water table. Excessively contaminated soil within Areas D and F is delineated on Figures 3-1 and 3-2. The boundaries are delineated by the 50 ppm OVA headspace isoconcentration line. OVA results for each soil boring location within areas D, F, and G are included in Appendix C.

Groundwater contamination in Areas D and F is associated with overlying or nearby areas of excessively contaminated soil. Following completion of the soil remediation activities in these areas, groundwater monitoring will be resumed in accordance with the MOP approved by FDEP on July 15, 1996.

In Area G, groundwater contamination was detected in perimeter monitoring well MW-09 only (Figure 3-3).

3.3 SITE-SPECIFIC CONDITIONS RELEVANT TO ALTERNATIVES. Excessively contaminated soil in Area F lies under asphalt, which can be removed with the soil but must be replaced. Area D is unpaved. Monitoring wells located within the boundaries of soil excavation will be destroyed and must be properly abandoned prior to excavation and replaced after backfilling is complete.

Table 3-1
Summary of Groundwater Contaminants

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Parameter	Area D	Area F	Area G	Groundwater Target Concentration
Benzene	60	220	ND	1
Chlorobenzene	ND	ND	200	100
Vinyl Chloride	ND	23	ND	1
Total VOAs (BTEX)	70	252	ND	50
Total Naphthalenes	880	181	ND	100

Notes: All concentrations are in parts per billion.

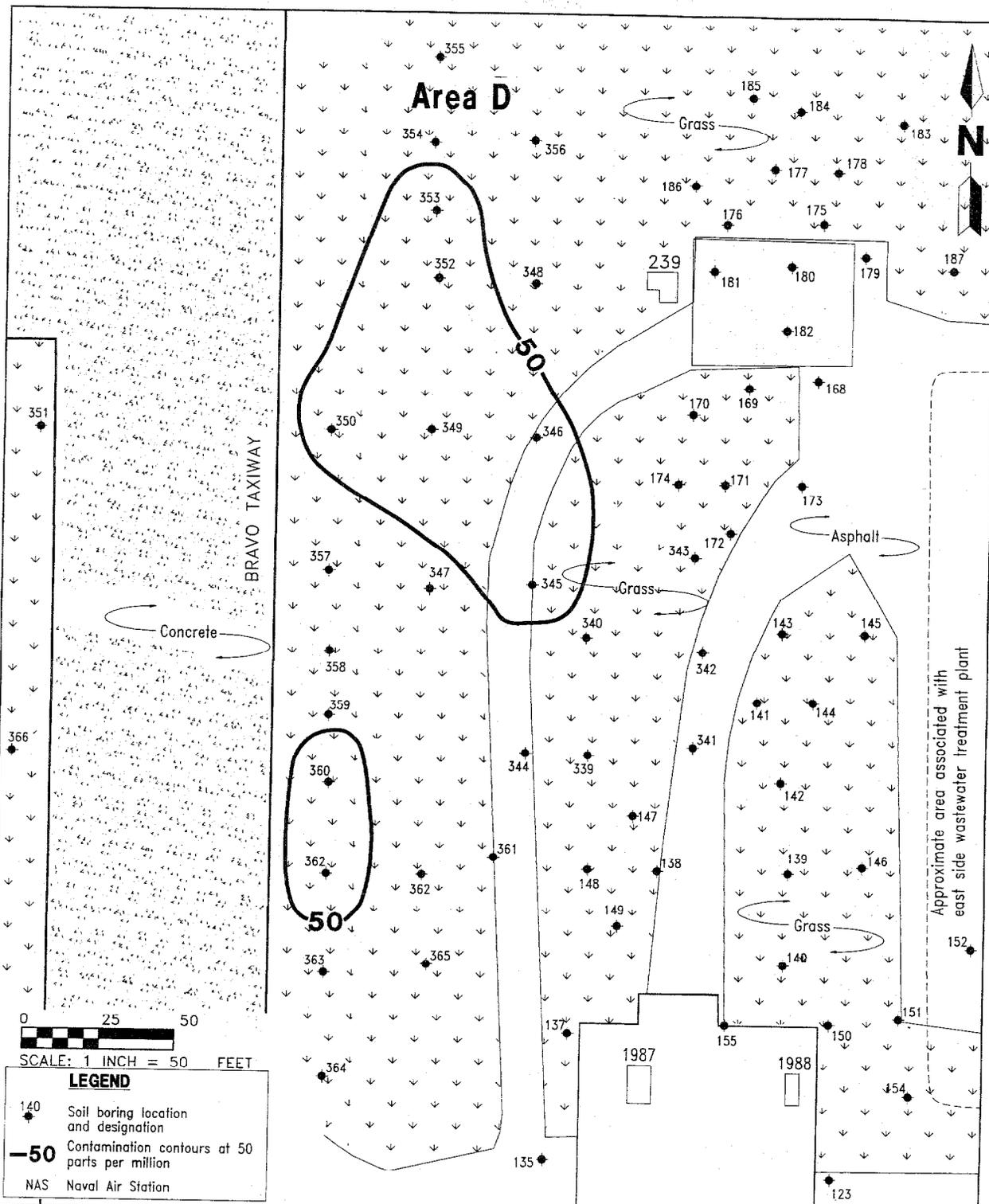
VOAs = volatile organic aromatics.
BTEX = benzene, toluene, ethylbenzene, xylenes.
ND = not detected.

Table 3-2
Summary of Soil Contaminants

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Parameter	Area D	Area F	Area G	Soil Target Concentration (TCLP)
OVA reading	>5,000 ppm	>5,000 ppm	2,400 ppm	50 ppm
Acetone	ND	110 ppb	110 ppb	1,400 ppb
Benzene	ND	66 ppb	ND	3 ppb
TRPH	4,150 ppm	<33.4 ppm	3,910 ppm	5 ppm
Total VOAs (BTEX)	ND	77 ppb	ND	100 ppm
Total Naphthalenes	194,000 ppb	99 ppb	ND	1 ppm
Total PAHs	75,260 ppb	520 ppb	ND	1 ppm

Notes: OVA = organic vapor analyzer.
> = greater than.
ND = not detected.
ppm = parts per million.
TRPH = total recoverable petroleum hydrocarbons.
VOAs = volatile aromatic hydrocarbons.
BTEX = benzene, toluene, ethylbenzene, xylenes.
ppb = parts per billion.
PAHs = petroleum aromatic hydrocarbons.
TCLP = Toxicity Characteristic Leaching Procedure.

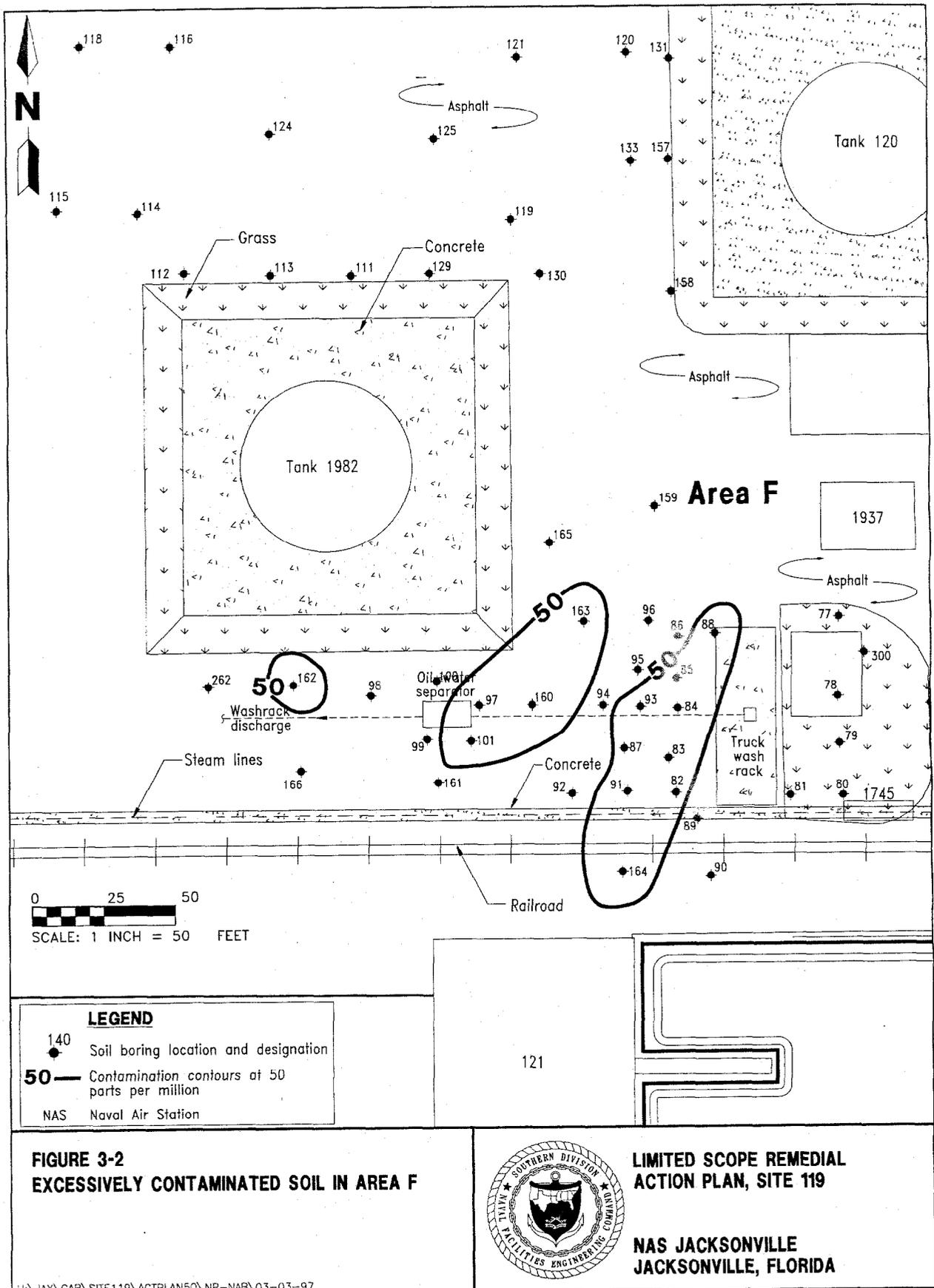


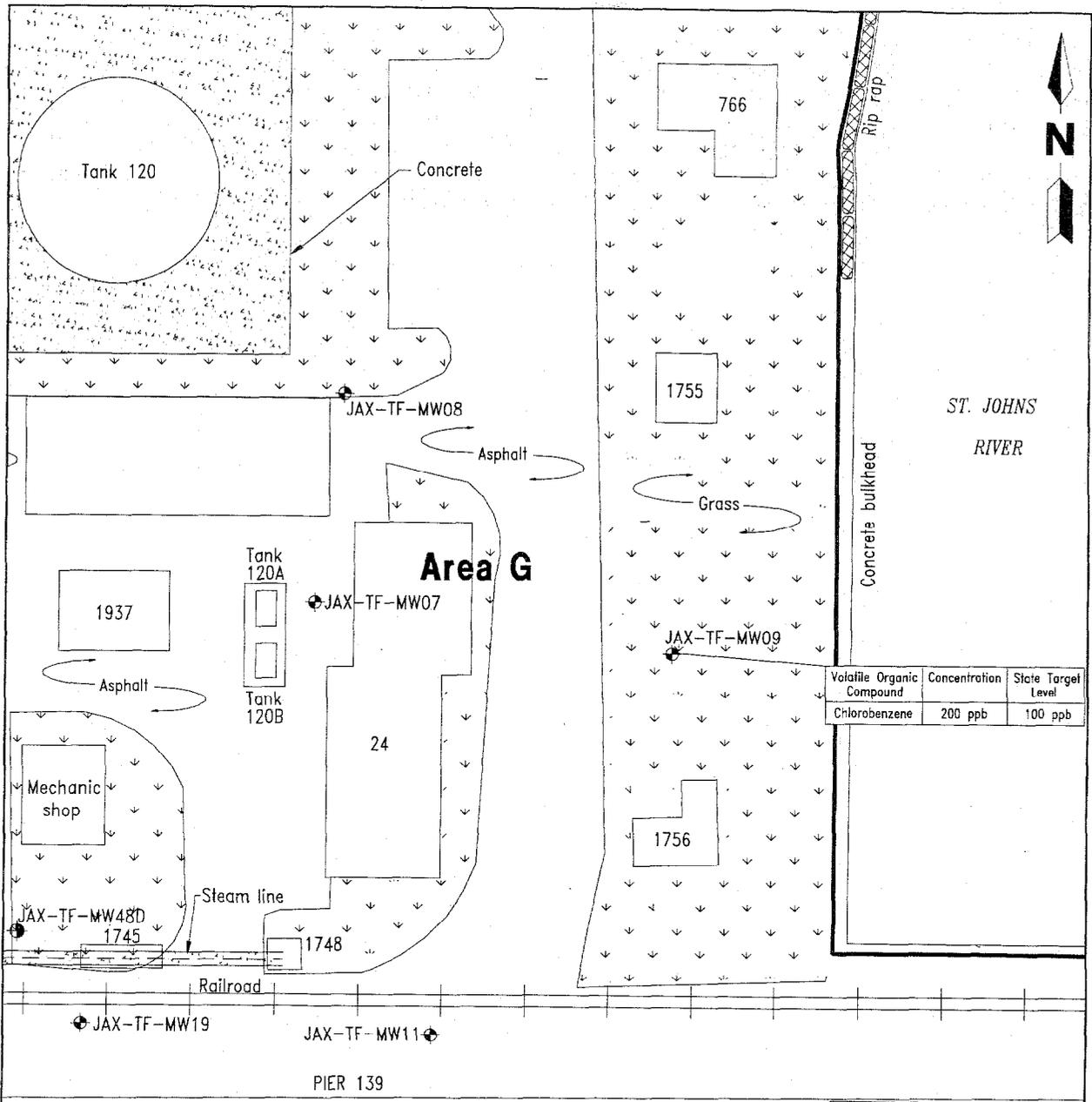
**FIGURE 3-1
EXCESSIVELY CONTAMINATED SOIL
IN AREA D**



**LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119**

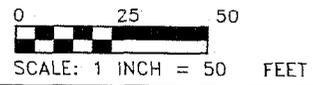
**NAS JACKSONVILLE
JACKSONVILLE, FLORIDA**





Volatfile Organic Compound	Concentration	State Target Level
Chlorobenzene	200 ppb	100 ppb

ST. JOHNS RIVER



LEGEND

NAS	Naval Air Station
ppb	parts per billion
JAX-TF-MW03	Monitoring well location and designation
JAX-TF-MW48D	Deep monitoring well location and designation

**FIGURE 3-3
AREA G GROUNDWATER CONTAMINATION MAP**

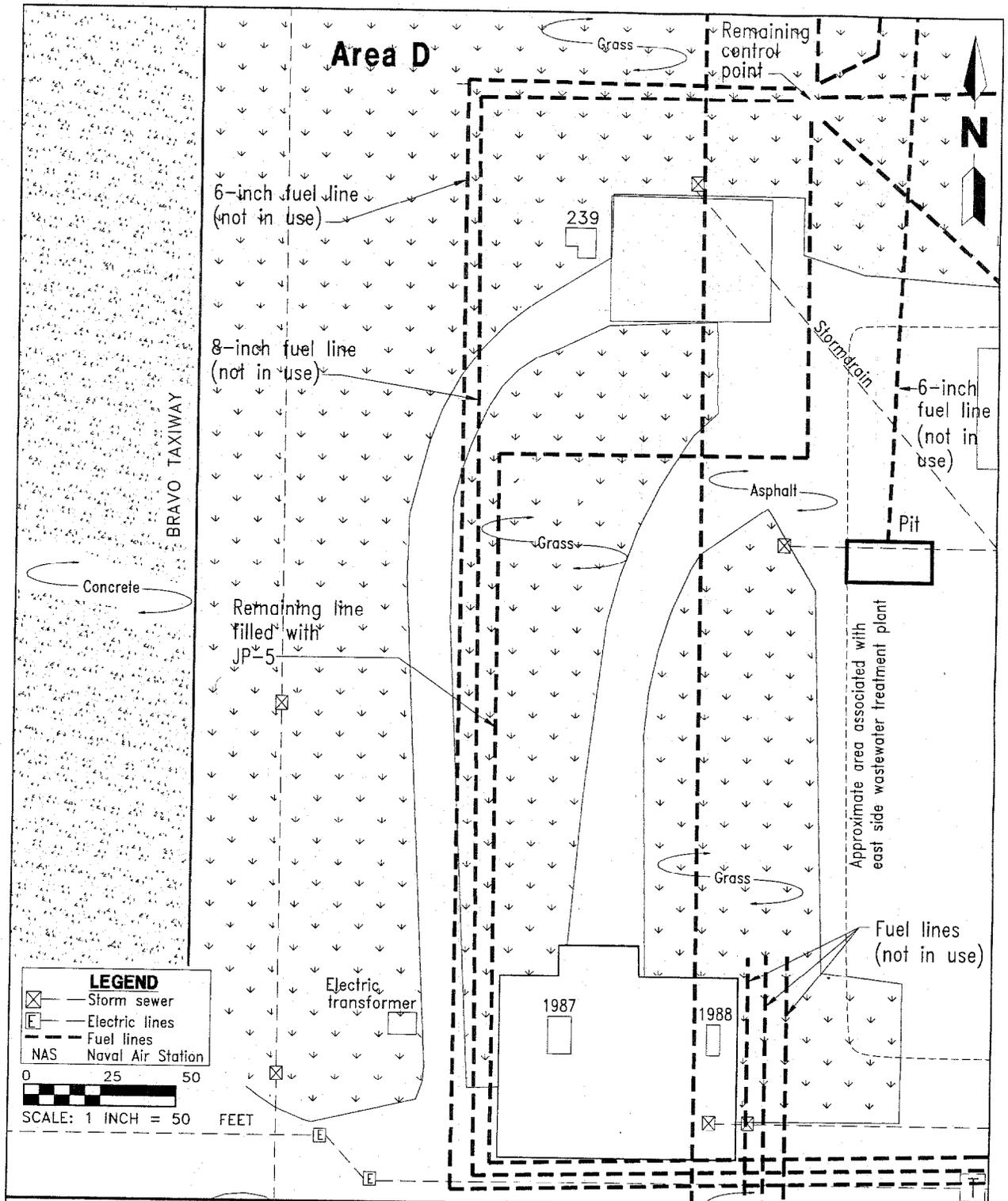


LIMITED SCOPE REMEDIAL ACTION PLAN, SITE 119

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JACKSONVILLE, FLORIDA**

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Excavation in Area F must be closely coordinated with the fuel operations manager. Access to and operation of the washrack must be maintained throughout the remedial action. This includes the operation of the oil-water separator, which serves the washrack. Existing subsurface features may impede excavation. Figures 3-4, 3-5, and 3-6 show the approximate locations of the existing utilities in Areas D, F, and G, respectively. The remediation contractor will be responsible for locating all underground utilities prior to soil excavation.



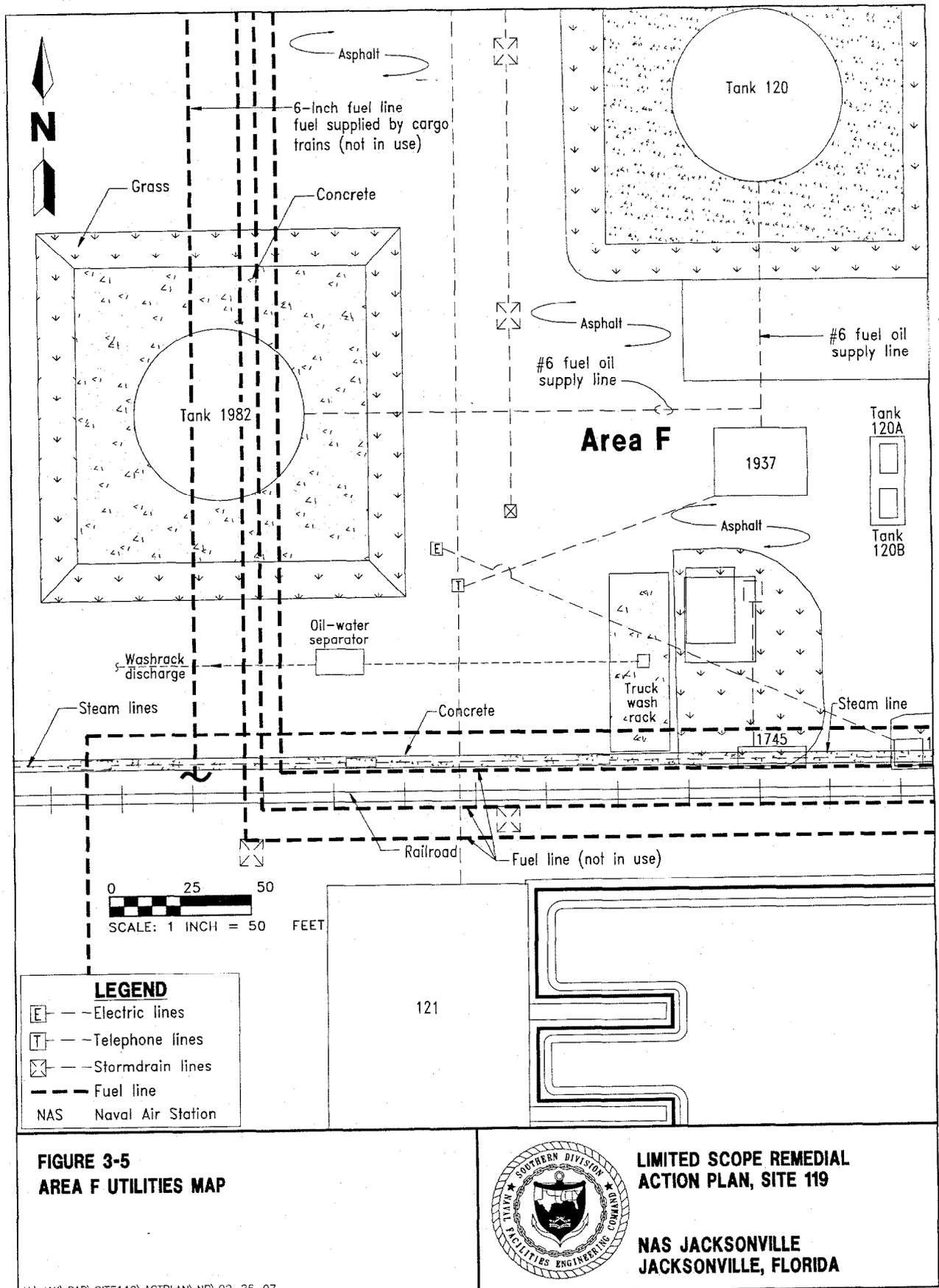
**FIGURE 3-4
AREA D UTILITIES MAP**



**LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119**

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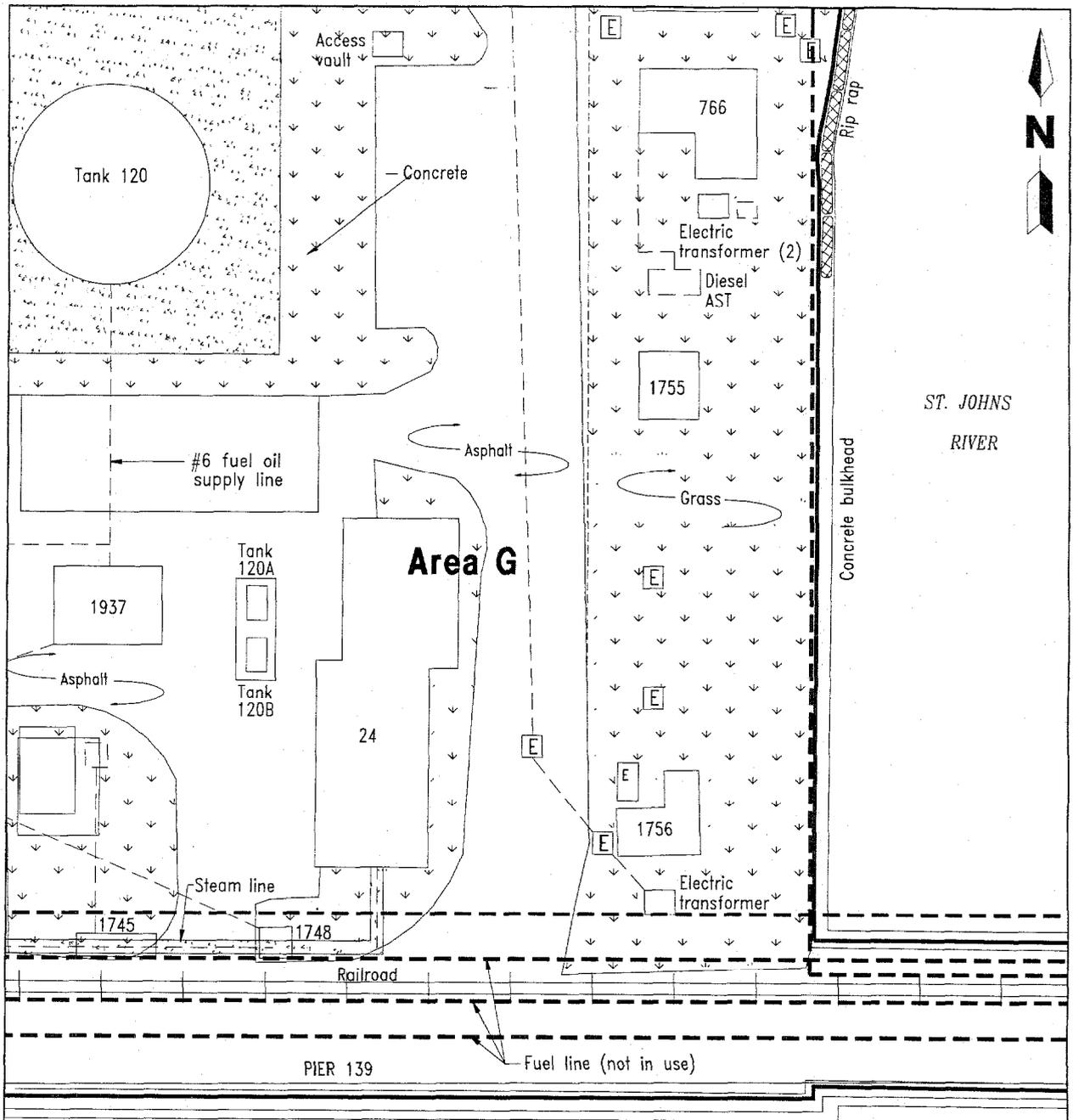


**FIGURE 3-5
AREA F UTILITIES MAP**



**LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119**

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LEGEND

- Fuel line
- Electric lines
- NAS Naval Air Station

ST. JOHNS RIVER

0 25 50

 SCALE: 1 INCH = 50 FEET

**FIGURE 3-6
 AREA G UTILITIES MAP**



**LIMITED SCOPE REMEDIAL
 ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
 JACKSONVILLE, FLORIDA**

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4.0 RECOMMENDED REMEDIAL ACTION

The recommended remedial action at Area G is a short-term groundwater recovery effort at monitoring well MW-09. The recommended remedial action for Areas D and F is source removal through the excavation and treatment of excessively contaminated soil associated with groundwater contamination.

4.1 SHORT-TERM GROUNDWATER RECOVERY EFFORT. In accordance with the ESS-9 RAP guidelines (FDEP, 1993), groundwater will be extracted from monitoring well MW-09 for a 72-hour period to attempt to lower contaminant concentrations below Chapter 62-770, FAC, NFA and MO criteria. The previous analytical results of sampling at MW-09 meet discharge criteria established by the wastewater treatment plant (WWTP); therefore, the water will be discharged directly into the sanitary sewer via a lift station connected to the facility WWTP. Proposed discharge rates and concentrations have been supplied to the WWTP and approved for discharge (see correspondence in Appendix E).

Based on the short-term groundwater recovery efforts performed on other wells in Site 119 during the CA, the pumping rate for MW-09 is expected to be approximately 1 gallon per minute. For the 72-hour pumping test, the total volume of groundwater pumped from MW-09 should be about 4,320 gallons.

4.2 SOIL EXCAVATION. Excavation in Areas D and F should remove excessively contaminated soil in the unsaturated zone, the capillary fringe, and the water table smear zone. The effect of excavation into the water table smear zone is two-fold: (1) to eliminate exposure of groundwater to contaminated soil in the smear zone as the groundwater elevation fluctuates and (2) to allow contaminants in the groundwater to volatilize when agitated and exposed to air during excavation.

4.2.1 Excavation Boundaries

Vertical. Calculations for soil excavation are based on the average depth to groundwater in each area to be remediated, as measured on January 17, 1996. On that date, the average depth to groundwater in both Areas D and F was 4.7 feet, or approximately 5 feet bls. If groundwater is encountered above 5 feet bls in nearby monitoring wells, soil excavation shall continue to approximately 6 feet bls. If groundwater is encountered below 5 feet bls in nearby monitoring wells, soil excavation shall continue to a depth approximately 1 foot below the water table. The depth used to calculate the volume of soil to be excavated at Areas D and F is 6 feet bls.

Horizontal. Estimated horizontal boundaries of excessively contaminated soil to be excavated from Areas D and F are shown on Figures 4-1 and 4-2, respectively. Prior to initiation of remedial activities, ABB-ES personnel will meet with the remediation contractor at Areas D and F to delineate the estimated boundaries for soil excavation. The total volume of excessively contaminated soil to be removed at Site 119 is approximately 4,878 cubic yards (approximately 6,800 tons). Soil volume calculations, including a swell factor of 12 percent, are presented in Appendix D, Engineering Calculations.

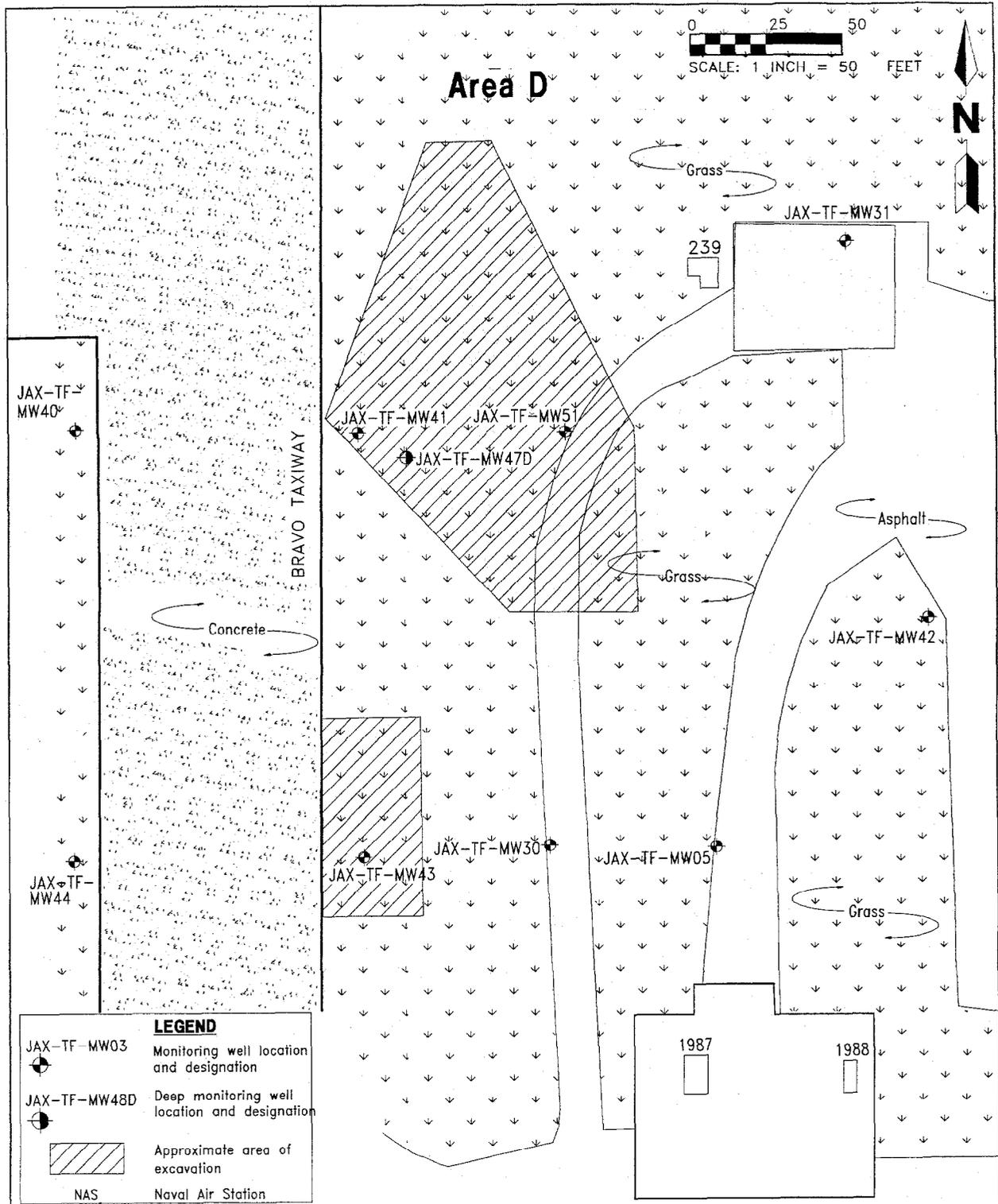


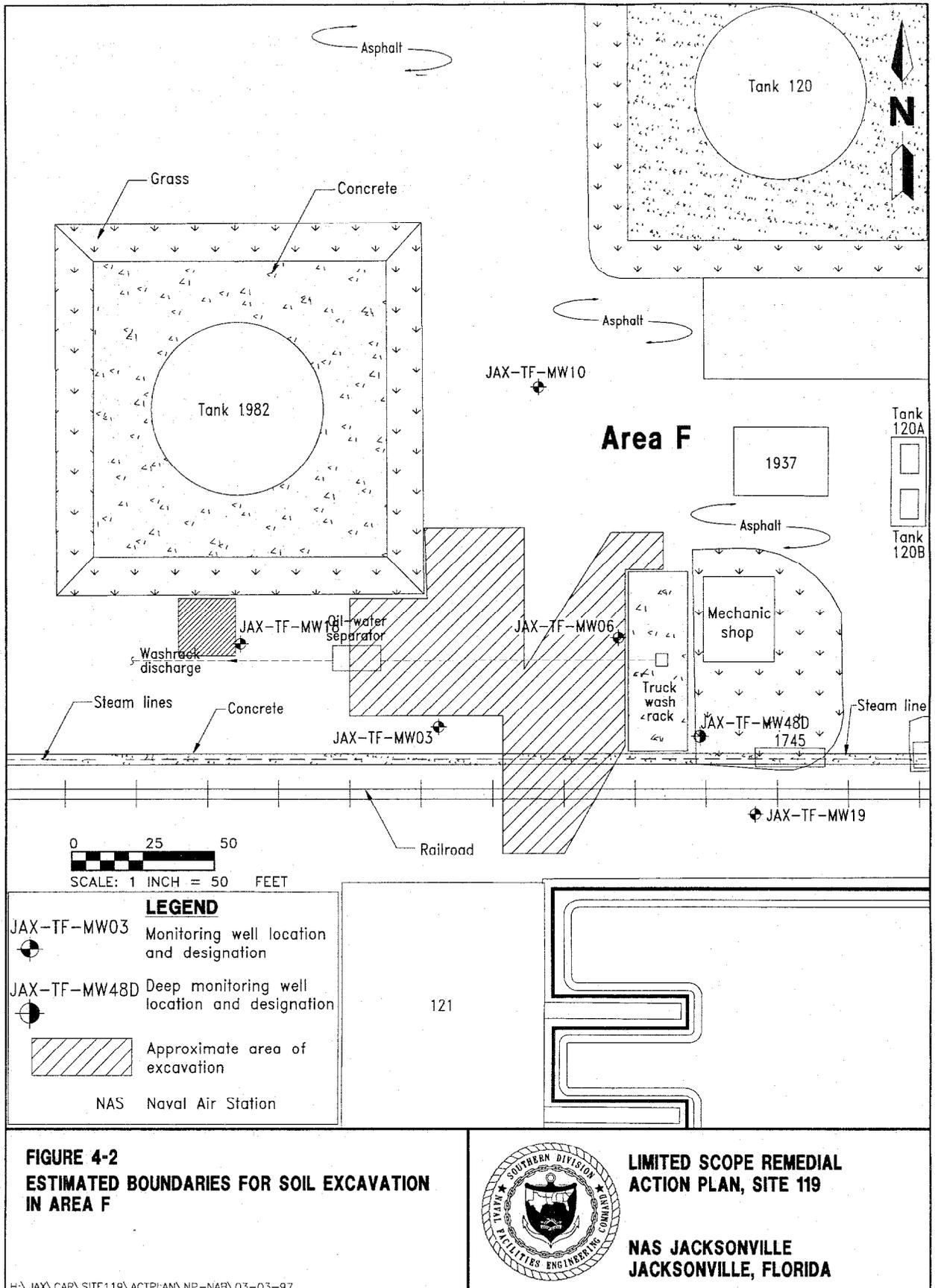
FIGURE 4-1
ESTIMATED BOUNDARIES FOR
SOIL EXCAVATION IN AREA D



LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119

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JACKSONVILLE, FLORIDA

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During remediation of Areas D and F, soil samples shall be collected from the sidewalls in the unsaturated zone of the excavation and screened with an OVA equipped with a flame ionization detector. If screening results indicate the unsaturated soil OVA readings exceed 50 ppm, the horizontal limits of excavation shall be expanded until excessively contaminated soil is no longer detected in the unsaturated zone. The actual extent of excavation will be determined in the field and will be based on field observation. The easternmost area of contaminated soil in Area F (Figure 4-2) abuts a truck washrack. The edge of the concrete wash-rack will be interpreted as a limit of excavation, regardless of OVA screening results, to avoid damaging the pad.

4.2.2 Excavation Procedures Excavation will be conducted using standard earthmoving equipment. All operators will be certified by the Occupational Safety and Health Administration. OVA headspace analyses will be performed at set intervals during the excavation to monitor soil contaminant levels and delineate the area to be removed and treated. Excavated soil should be loaded directly into trucks to facilitate immediate removal from the site and to prevent spreading of the contaminated soil at the site. Abandoned fuel distribution lines encountered during excavation will be evacuated and capped or removed.

A thermal treatment unit for petroleum-contaminated soils is currently being set up by a Navy contractor at Operable Unit 2, NAS Jacksonville. The decision was made by the NAS Jacksonville partnering team that the contaminated soil from Site 119 should be treated by the thermal treatment unit. Excavation of excessively contaminated soil from areas D and F should, therefore, not begin until either the thermal treatment unit is operational or an alternate decision has been made and approved to dispose of the soil offsite. In that event, the excavated soil would be transported to an FDEP-permitted soil thermal treatment facility by a licensed transporter.

The excavation should have sides sloped or shored in accordance with applicable standards to prevent unstable conditions during excavation, which could pose hazards to personnel or surrounding structures and pavements. Stormwater runoff and runoff controls should be implemented to prevent migration of sediment or contaminated stormwater during site activities. Dust control should also be implemented to prevent fugitive emissions during excavation and soil handling. Benchmarks, existing structures, fences, sidewalks, utilities, and other cultural features shall be protected from excavation equipment, and if temporary removal is required, replacement should be conducted during site restoration. A professional survey to verify locations of site utilities was not conducted for this report; however, active or inactive subsurface obstructions are present. Obstructions may include stormdrain lines, telephone lines, underground electric lines, and fuel lines. Locations of subsurface features should be verified by the contractor prior to excavating. During all excavation and restoration operations, utility services will be managed in coordination with base personnel.

4.2.3 Abandonment of Monitoring Wells Monitoring wells will be abandoned (grouted and sealed) in accordance with Chapter 40C-3.517, FAC, prior to excavation. Well abandonment should be performed a minimum of 12 hours prior to the excavation. Proper permits will also be required. It is anticipated that the following wells will require abandonment and replacement: MW-51, MW-47D, MW-43, MW-18, and MW-06. Each abandoned well in Areas D and F will be replaced following completion of backfilling so that groundwater in those areas can be monitored following the remedial action. Typical shallow and deep monitoring well

installation details for Site 119 are presented as Figures 4-3 and 4-4, respectively.

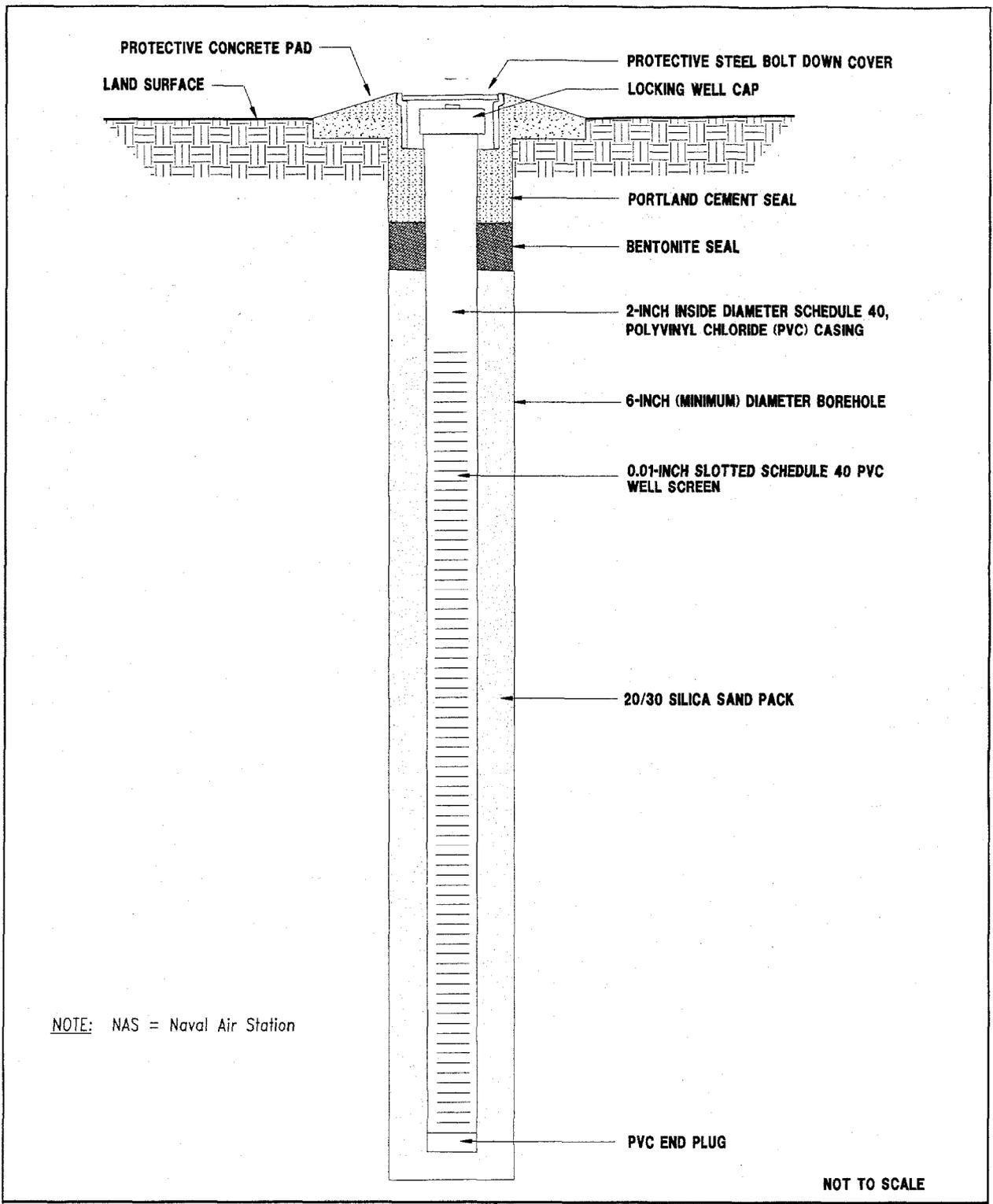
4.2.4 Site Restoration and Demobilization Backfilling activities should be completed as appropriate to minimize groundwater infiltration into the open area, hazards associated with open excavations, and disruption to facility operations. Approximately 4,878 cubic yards (6,800 tons) of backfill material will be needed. Backfill should be field compacted as determined by the remediation contractor to conform with surrounding grade and return the site to its original condition.

The final grade of the backfill will match the existing surrounding grade if it is vegetated, and the completed backfill will be reseeded. Final grade of the backfill will match the bottom grade of the pavement base course material if the excavation included asphalt or concrete. The pavement repair cross section will conform to the same materials and thicknesses as the adjoining base and surface courses. The final grading of the repaired surface course will conform to the prevalent surface drainage patterns of the surrounding area.

Excavations should be backfilled with material that is the same or a similar type as the surrounding soils. Certification that the backfill is free of petroleum hydrocarbon contamination is required from the backfill source prior to delivery. Seeding or sodding of the backfilled area should be performed to complete site restoration to minimize runoff potential.

After completion of backfilling procedures, benchmarks, monitoring wells, existing structures, fences, sidewalks, utilities, and other remaining cultural features that were damaged during remedial activities will be repaired or replaced. All lines and grades will be verified after all equipment and materials have been removed from the site and work is complete. Final review of project documentation as well as a walkover of the site will be conducted to assure satisfactory completion of the project prior to leaving the site.

4.3 MONITORING. Upon completion of the excavation, site restoration, and monitoring well replacement, groundwater monitoring will resume in accordance with the FDEP-approved Monitoring Only Plan to assess the effects of the remedial actions.



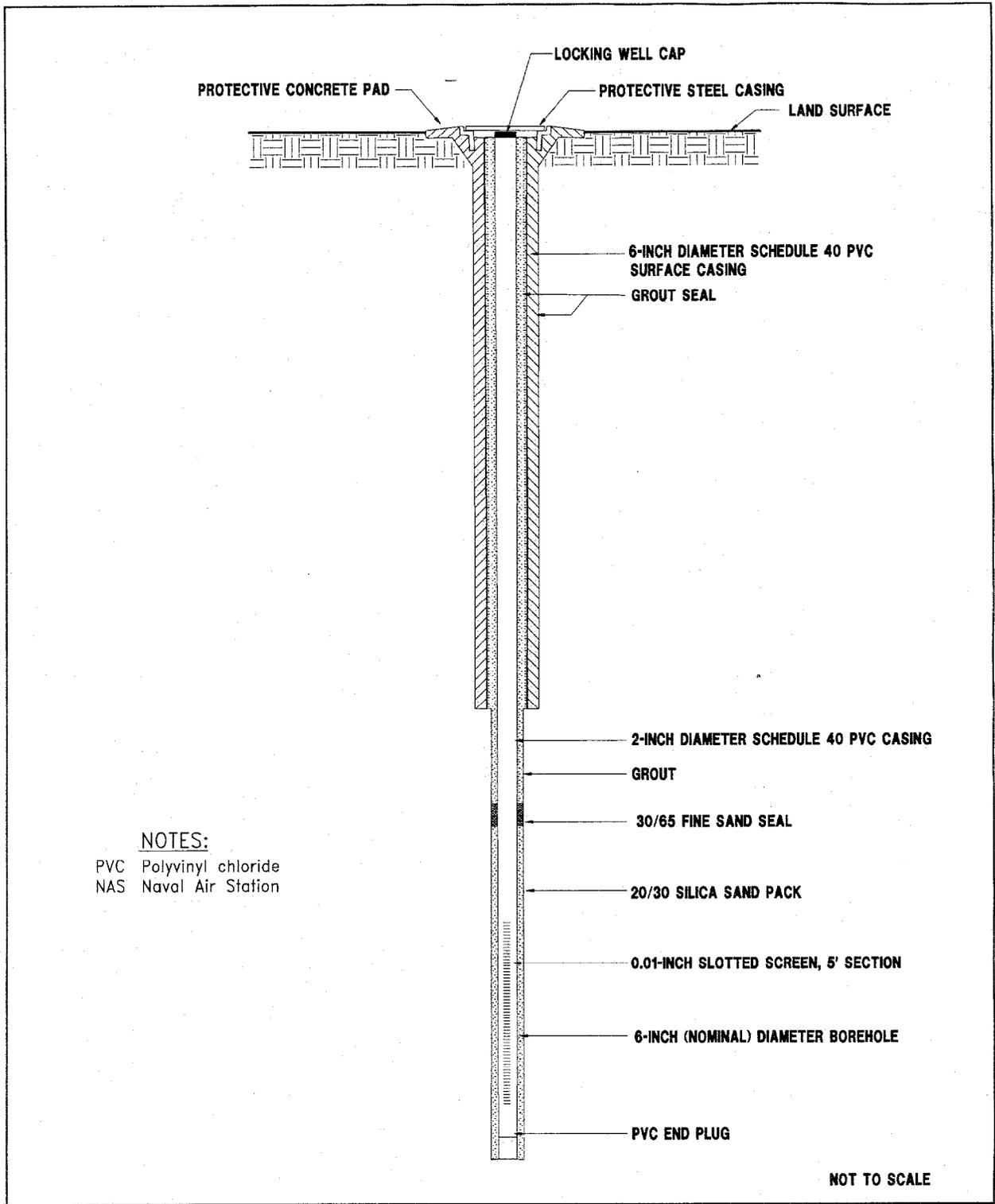
**FIGURE 4-3
TYPICAL SHALLOW MONITORING WELL
CONSTRUCTION DETAIL**



**LIMITED SCOPE REMEDIAL
ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
JACKSONVILLE, FLORIDA**

HA\JAX\WELL-DET\OLD-NP\02-26-97



NOTES:
 PVC Polyvinyl chloride
 NAS Naval Air Station

**FIGURE 4-4
 TYPICAL DEEP MONITORING WELL
 INSTALLATION DETAIL**



**LIMITED SCOPE REMEDIAL
 ACTION PLAN, SITE 119**

**NAS JACKSONVILLE
 JACKSONVILLE, FLORIDA**

HA SYMBOLS WELL-DPI-NAS-03-03-97

5.0 COST ESTIMATE

A cost estimate for the recommended remedial actions for Site 119 has been prepared. To facilitate the Navy's procurement procedures, the cost estimate is being submitted under separate cover. The cost estimate is attached following the appendices in copies of this plan submitted for regulatory review.

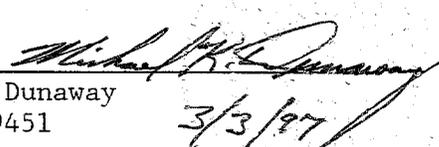
6.0 SCHEDULE

It is estimated that excavation activities will begin approximately 2 weeks after Notice to Proceed from the Navy. Excavation and backfilling will take approximately 2 weeks. Abandoned monitoring wells will be reinstalled, and excavated asphalt will be replaced. The short-term groundwater recovery from MW-09 in Area G will be completed prior to completion of the excavation. With the exception of monitoring, it is estimated that the total time to perform the activities included in this LSRAP will be 6 to 8 weeks.

7.0 PROFESSIONAL REVIEW CERTIFICATION

This LSRAP was prepared using standard engineering practices and designs. The plan for remediating this site is based on the information collected between June 1995 and November 1996 and engineering detailed in the text and appended to this report. If conditions are determined to exist differently than those described, the undersigned professional engineer should be notified to evaluate the effects of any additional information on the design described in this report.

This LSRAP was developed for Site 119 at NAS Jacksonville, Jacksonville, Florida, and should not be construed to apply to any other site.



Michael K. Dunaway
P.E. No. 39451

3/3/97

REFERENCES

ABB Environmental Services, Inc., 1996, Contamination Assessment Report, Site 119, Naval Air Station Jacksonville, Florida: prepared for, Southern Division, Naval Facilities Engineering Command, North Charleston, South Carolina, May.

Florida Department of Environmental Protection, 1993, Remedial Action Plan Guidelines: Soils Only or Short Term Groundwater Recovery RAPs - Cleanup Requirements (Limited-Scope RAPs): Identification No. ESS-9.

APPENDIX A

GROUNDWATER SAMPLE ANALYTICAL RESULTS

Table A-1
Summary of Groundwater Sample Analytical Results

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Compound Detected	Area D									State Target Level
	MW-5 19G00500		MW-30 19G0300		1MW-41 19G04100			1MW-51 19G05100		
	10/2/95	² 9/27/96	9/26/95	² 9/27/96	10/3/95	2/1/96	9/27/96	4/9/96	² 9/27/96	
<u>Volatile Organic Compounds (USEPA Methods 601/602 or 624), ppb</u>										
1,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	ND	NS	5
1,2-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	ND	NS	600
1,4-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	8.6	NS	75
Chlorobenzene	ND	NS	ND	NS	ND	NS	ND	ND	NS	100
Methylene chloride	ND	NS	ND	NS	³ 6.5	NS	ND	ND	NS	5
Vinyl chloride	ND	NS	ND	NS	ND	NS	ND	ND	NS	1
Benzene	ND	NS	ND	NS	³ 60	³ 8.2	^{3,4} 60	ND	NS	1
Toluene	ND	NS	ND	NS	ND	ND	ND	ND	NS	NA
Ethylbenzene	ND	NS	ND	NS	5.3	ND	^{4,5} 10	3.6	NS	NA
Xylenes, total	4.2	NS	ND	NS	ND	⁴ 1.6	ND	ND	NS	NA
Total BTEX	4.2	NS	ND	NS	³ 65.3	9.8	^{3,4,5} 70	3.6	NS	50
<u>Polynuclear Aromatic Hydrocarbons (PAHs) (USEPA Methods 610 or 625), ppb</u>										
Total Naphthalenes	ND	NS	ND	NS	³ 810	69	^{3,4,5} 880	10.5	^{3,4} 198	100
Total PAHs (excluding naphthalenes)	ND	NS	ND	NS	ND	^{3,4} 244	ND	³ 36.1	3.1	10 or DL
See notes at end of table.										

Table A-1 (Continued)
Summary of Groundwater Sample Analytical Results

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Compound Detected	Area F							State Target Level
	¹ MW-06 19G00600			MW-11 19G01100		MW-19 19G01900		
	10/3/95	2/1/96	9/26/96	10/2/95	9/26/96	10/3/95	9/26/96	
<u>Volatile Organic Compounds (USEPA Methods 601/602 or 624), ppb</u>								
1,2-Dichloropropane	ND	NS	ND	ND	ND	ND	ND	5
1,2-Dichlorobenzene	ND	NS	ND	ND	ND	ND	ND	600
1,4-Dichlorobenzene	ND	NS	ND	ND	ND	ND	ND	75
Chlorobenzene	ND	NS	ND	ND	ND	ND	ND	100
Methylene chloride	³ 8.6	NS	ND	ND	ND	2.5	ND	5
Vinyl chloride	³ 12	NS	^{3,4,5} 23	5.3	^{3,4} 6.4	ND	^{3,4} 3.2	1
Benzene	³ 250	³ 52	^{3,4,5} 220	ND	ND	ND	ND	1
Toluene	ND	16	ND	ND	ND	ND	ND	NA
Ethylbenzene	39	1.0	⁴ 21	ND	ND	ND	ND	NA
Xylenes, total	ND	3.7	⁴ 11	1.3	ND	ND	ND	NA
Total BTEX	³ 289	72.7	^{3,4,5} 252	1.3	ND	ND	ND	50
<u>PAHs (USEPA Methods 610 or 625), ppb</u>								
Total Naphthalenes	100	98	^{3,4,5} 181	ND	NS	ND	NS	100
Total PAHs (excluding naphthalenes)	ND	7.5	ND	ND	NS	ND	NS	10 or DL
See notes at end of table.								

Table A-1 (Continued)
Summary of Groundwater Sample Analytical Results

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Compound Detected	Area G						State Target Level
	1MW-07 19G00700			MW-09 19G00900			
	10/3/95	9/26/96	12/11/96	9/27/95	9/26/96	12/11/96	
<u>Volatile Organic Compounds (USEPA Methods 601/602 or 624), ppb</u>							
1,2-Dichloropropane	2.4	ND	ND	ND	ND	ND	5
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	600
1,4-Dichlorobenzene	ND	ND	ND	2.5	2.0	ND	75
Chlorobenzene	ND	ND	ND	³ 160	35	^{3,4} 200	100
Methylene chloride	ND	ND	ND	ND	ND	ND	5
Vinyl chloride	ND	ND	ND	ND	ND	ND	1
Benzene	ND	ND	ND	ND	ND	ND	1
Toluene	ND	ND	ND	ND	ND	ND	NA
Ethylbenzene	ND	ND	ND	ND	ND	ND	NA
Total xylenes	ND	ND	ND	ND	ND	ND	NA
Total BTEX	ND	ND	ND	ND	ND	ND	50
<u>PAHs (USEPA Methods 610 or 625), ppb</u>							
Total Naphthalenes	ND	NS	NS	ND	NS	NS	100
Total PAHs (excluding naphthalenes)	ND	NS	NS	ND	NS	NS	10 or DL
<p>¹ Source area monitoring well. ² Well damaged or destroyed. ³ Concentration exceeds State target level. ⁴ Concentration greater than when sampled previously. ⁵ Concentration of duplicate sample.</p> <p>Notes: USEPA = U.S. Environmental Protection Agency. NA = not applicable. ppb = parts per billion. BTEX = benzene, toluene, ethylbenzene, and xylenes. ND = not detected. DL = detection limit. NS = not sampled. PAH = polynuclear aromatic hydrocarbons.</p>							

APPENDIX B

WATER TABLE ELEVATION DATA

Table B-1
Water Table Elevation Data, 1995-1996

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Monitoring Well Number (Area)	Total Well Depth (feet bls)	Screened Interval (feet bls)	TOC Elevation (feet msl)	October 23, 1995		January 17, 1996	
				Depth to Water (feet BTOC)	Water Level Elevation (feet msl)	Depth to Water (feet BTOC)	Water-Level Elevation (feet msl)
MW03 (F)	12.5	2.5 to 12.5	8.70	4.17	4.52	5.12	3.58
MW06 (F)	11.0	2.0 to 11.0	8.33	3.23	5.10	4.15	4.18
MW18 (F)	10.5	2.0 to 10.5	8.67	3.80	4.87	4.91	3.76
MW30 (D)	11.0	2.0 to 11.0	10.83	3.67	7.16	4.90	5.93
MW41 (D)	12.0	2.0 to 12.0	10.29	3.81	6.48	4.88	5.41
MW43 (D)	9.0	2.0 to 9.0	10.14	3.35	6.79	4.10	6.04
MW47 (D)	25.0	20.0 to 25.0	10.17	NA	NA	4.82	5.35
MW51 (D)	11.0	2.0 to 11.0	NA	NA	NA	NA	NA

Notes: TOC = top of casing.
bls = below land surface.
msl = mean sea level.
BTOC = below top of casing.
(F) = Area F.
(D) = Area D.
NA = not applicable, well installed after October 23, 1995, or January 17, 1996.

APPENDIX C

SUMMARY OF SOIL SAMPLE OVA RESULTS, 1995

**Table C-1
Summary of Soil Sample OVA Results, 1995**

Limited-Scope Remedial Action Plan, Site 119
Naval Air Station Jacksonville
Jacksonville, Florida

Boring Number	Depth (feet bls)	Unfiltered Concentration	Filtered Concentration	Actual Concentration	Comments
Area D					
SB-148	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	0	NA	0	wet
SB-339	2.0 to 2.5	1	0	1	
	4.0 to 4.5	1	0	1	
	5.0 to 5.5	1,000	0	1,000	wet
SB-340	2.0 to 2.5	0	NA	0	
	4.0 to 4.5	0	NA	0	
	5.5 to 6.0	15	0	15	wet
SB-344	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	wet
	4.0 to 4.5	0	NA	0	wet
	5.0 to 5.5	0	NA	0	wet
SB-345	1.0 to 1.5	120	0	120	
	2.0 to 2.5	340	0	340	
	3.0 to 3.5	>5,000	0	>5,000	
	4.0 to 4.5	4,500	0	4,500	
SB-346	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	230	0	230	
	3.0 to 3.5	210	0	210	
	4.0 to 4.5	2,500	0	2,500	damp
	5.0 to 5.5	2,600	0	2,600	wet
SB-347	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	damp
	4.0 to 4.5	0	NA	0	wet
SB-348	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	damp
	4.0 to 4.5	0	NA	0	wet
SB-349	2.0 to 2.5	3	0	3	
	3.0 to 3.5	5	0	5	
	3.5 to 4.0	1,300	0	1,300	
	4.0 to 4.5	>5,000	0	>5,000	
SB-350	2.0 to 2.5	4,500	0	4,500	
	3.0 to 3.5	>5,000	0	>5,000	
	4.0 to 4.5	>5,000	0	>5,000	wet
SB-352	2.0 to 2.5	130	0	130	
	3.0 to 3.5	105	0	105	
	4.0 to 4.5	440	0	440	wet
SB-353	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	1	0	1	
	3.0 to 3.5	3,700	0	3,700	
	4.0 to 4.5	>5,000	0	>5,000	damp

See notes at end of table.

Table C-1 (Continued)
Summary of Soil Sample OVA Results, 1995

Limited-Scope Remedial Action Plan, Site 119
 Naval Air Station Jacksonville
 Jacksonville, Florida

Boring Number	Depth (feet bls)	Unfiltered Concentration	Filtered Concentration	Actual Concentration	Comments
Area D (Continued)					
SB-354	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	damp
	4.0 to 4.5	1,500	0	1,500	wet
SB-356	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	damp
	4.0 to 4.5	0	NA	0	wet
SB-357	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	8	0	0	damp
	4.0 to 4.5	>5,000	0	0	wet
SB-358	1.0 to 1.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	39	0	39	damp
	4.0 to 4.5	290	0	290	wet
SB-359	1.0 to 1.5	1	0	1	
	2.0 to 2.5	480	0	480	
	3.0 to 3.5	2,500	0	2,500	
	4.0 to 4.5	>5,000	0	>5,000	damp
SB-360	1.0 to 1.5	5	0	5	
	2.0 to 2.5	>5,000	0	>5,000	
	3.0 to 3.5	>5,000	0	>5,000	
	4.0 to 4.5	>5,000	0	>5,000	damp
SB-361	1.0 to 2.0	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	
	4.0 to 4.5	0	NA	0	wet
SB-362	1.0 to 1.5	2	0	2	
	2.0 to 2.5	4,600	0	4,600	
	3.0 to 3.5	>5,000	0	>5,000	
	4.0 to 4.5	>5,000	0	>5,000	wet
Area F					
SB-82	0.0 to 2.0	>5,000	0	>5,000	
	2.0 to 4.0	>5,000	0	>5,000	strong hydrocarbon odor
SB-83	0.0 to 2.0	>5,000	0	>5,000	
	2.0 to 4.0	>5,000	0	>5,000	strong hydrocarbon odor
SB-84	0.0 to 2.0	>5,000	0	>5,000	
	2.0 to 4.0	>5,000	0	>5,000	strong hydrocarbon odor
SB-85	0.0 to 2.0	>5,000	0	>5,000	
	2.0 to 4.0	>5,000	0	>5,000	strong hydrocarbon odor
SB-86	0.0 to 2.0	2	0	2	
	2.0 to 4.0	3,200	0	3,200	wet
SB-87	0.0 to 2.0	14	0	14	
	2.0 to 4.0	430	0	430	wet
See notes at end of table.					

Table C-1 (Continued)
Summary of Soil Sample OVA Results, 1995

Limited-Scope Remedial Action Plan, Site 119
 Naval Air Station Jacksonville
 Jacksonville, Florida

Boring Number	Depth (feet bls)	Unfiltered Concentration	Filtered Concentration	Actual Concentration	Comments
Area F (Continued)					
SB-88	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	1,800	0	1,800	wet @ 3'
SB-89	0.0 to 2.0	0	NA	0	
	2.0 to 4.0	>5,000	0	>5,000	damp, strong hydrocarbon odor
SB-90	0.0 to 2.0	0	NA	0	
	2.0 to 3.5	0	NA	0	wet @ 3.5'
SB-91	0.0 to 2.0	8	0	8	
	2.0 to 4.0	>5,000	0	>5,000	wet from 3' to 4'
SB-92	0.0 to 2.0	0	NA	0	
	2.0 to 4.0	0	NA	0	damp from 3' to 4'
SB-93	0.0 to 2.0	220	0	220	
	2.0 to 4.0	2,500	0	2,500	damp from 3' to 4', hydrocarbon odor
SB-94	0.0 to 2.0	5	0	5	
	2.0 to 3.0	7	0	7	
	3.0 to 4.0	3,100	0	3,100	damp, hydrocarbon odor
SB-95	0.0 to 2.0	20	0	20	
	2.0 to 3.0	19	0	19	
	3.0 to 4.0	2,400	0	2,400	damp, hydrocarbon odor
SB-96	0.0 to 2.0	1	0	1	
	2.0 to 3.0	2	0	2	
	3.0 to 4.0	2,300	0	2,300	damp
SB-97	0.0 to 2.0	75	0	75	
	2.0 to 3.0	2,800	0	2,800	
	3.0 to 4.0	>5,000	0	>5,000	damp
SB-98	0.0 to 2.0	3	0	3	
	2.0 to 3.0	4	0	4	
	3.0 to 4.0	390	0	390	damp
SB-99	0.0 to 2.0	8	0	8	
	2.0 to 3.0	2	0	2	
	3.0 to 4.0	1,450	0	1,450	damp
SB-100	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	140	0	140	damp
SB-101	0.0 to 2.0	2	0	2	
	2.0 to 3.0	230	0	230	
	3.0 to 4.0	2,000	0	2,000	
SB-160	0.0 to 2.0	12	0	12	
	2.0 to 3.0	450	0	450	
	3.0 to 4.0	3,900	0	3,900	
SB-161	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	0	NA	0	

See notes at end of table.

Table C-1 (Continued)
Summary of Soil Sample OVA Results, 1995

Limited-Scope Remedial Action Plan, Site 119
 Naval Air Station Jacksonville
 Jacksonville, Florida

Boring Number	Depth (feet bls)	Unfiltered Concentration	Filtered Concentration	Actual Concentration	Comments
Area F (Continued)					
SB-162	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	115	0	115	
SB-163	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	11	0	11	
	3.0 to 4.0	260	0	260	
SB-164	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	60	0	60	
SB-166	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
	3.0 to 4.0	0	NA	0	
Area G					
SB-263	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	300	0	300	
	3.0 to 4.0	4,700	0	4,700	wet
SB-298	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	damp
	3.0 to 4.0	0	NA	0	wet
SB-299	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	damp
	3.0 to 4.0	310	0	310	wet
SB-301	0.0 to 2.0	0	NA	0	
	2.0 to 4.0	0	NA	0	wet
SB-306	0.0 to 2.0	0	NA	0	
	2.0 to 4.0	160	0	160	damp
SB-307	0.0 to 2.0	6	0	6	
	2.0 to 3.0	2,400	0	2,400	
	3.0 to 4.0	36	0	36	
SB-323	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	8	0	8	
	3.0 to 4.0	1,000	0	1,000	wet
SB-324	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	1	0	1	damp
	3.0 to 4.0	6	0	6	wet
SB-333	0.0 to 2.0	0	NA	0	
	2.0 to 3.0	0	NA	0	
SB-355	1.0 to 2.5	0	NA	0	
	2.0 to 2.5	0	NA	0	
	3.0 to 3.5	0	NA	0	damp
	4.0 to 4.5	0	NA	0	wet

Notes: Concentrations are reported in parts per million.

OVA = organic vapor analyzer.
 bls = below land surface.
 NA = not applicable.

> = greater than.
 @ = at.
 ' = feet.

APPENDIX D
ENGINEERING CALCULATIONS

VOLUME OF CONTAMINATED SOIL TO BE EXCAVATED

The approximate extent of excessively contaminated soil to be excavated is shown on Figures 4-1 and 4-2. The vertical extent of excessively contaminated soil varies slightly due to sample depth, groundwater fluctuations in the capillary zone, depth to water at the time of sample acquisition, and topographic elevation differences between sample locations.

Depth to groundwater measurements for each monitoring well at Site 119 were obtained during the contamination assessment on October 23, 1995, and January 17, 1996. Water table elevations were lower on January 17, 1996, and, therefore, represent a more conservative depth for excavation calculations.

Calculations for soil excavation are based on the average depth to groundwater in each area to be remediated, as measured on January 17, 1996. On that date, the average depth to groundwater in both Areas D and F was 4.7 feet, or approximately 5 feet bls. If groundwater is encountered above 5 feet bls, soil excavation shall continue to approximately 6 feet bls. If groundwater is encountered below 5 feet bls, soil excavation shall continue to a depth approximately 1 foot below the water table. The depth used to calculate the volume of soil to be excavated is 6 feet bls.

The volume of excessively contaminated soil was estimated as shown in the table below.

	AREA D		AREA F		TOTAL
	North	South	East	Around MW-18	
Area (ft ²)	10,150	2,050	7,000	400	19,600
Volume (ft ³)	60,900	12,300	42,000	2,400	117,600
Volume (yd ³)	2,256	456	1,556	89	4,356
Corrected Volume (yd ³) (12% swell factor)	2,526	510	1,742	100	4,878
Mass (tons) (1.4 tons per yd ³)	3,537	714	2,439	140	6,829

Notes: ft² = feet squared.
 ft³ = feet cubed.
 yd³ = yards cubed.
 % = percent.

Rounding to the nearest hundred, approximately 6,800 tons of soil are to be excavated from areas D and F.

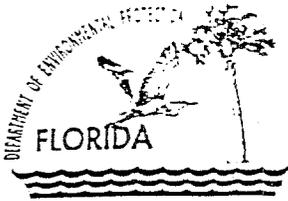
Percentage Swell and Load Factors of Materials

Material	Swell, %	Load Factor
Cinders	45	0.69
Clay, dry	40	0.72
Clay, wet	40	0.72
Clay and gravel, dry	40	0.72
Clay and gravel, wet	40	0.72
Coal, anthracite	35	0.74
Coal, bituminous	35	0.74
Earth, dry loam	25	0.80
Earth, wet loam	25	0.80
Gravel, wet	12	0.89
Gravel, dry	12	0.89
Gypsum	74	0.57
Hardpan	50	0.67
Limestone	67	0.60
Rock, well blasted	65	0.60
Sand, dry	12	0.89
Sand, wet	12	0.89
Sandstone	54	0.65
Shale and soft rock	65	0.60
Slag, bank	23	0.81
Slate	65	0.60
Traprock	65	0.61

References: Florida Department of Environmental Protection, *Guidelines for Assessment and Remediation of Petroleum Contaminated Soil*, May, 1992.

Merritt, Frederick S., Ed., 1983, *Standard Handbook for Civil Engineers, Third Edition*: McGraw-Hill Book Co., New York, Ch. 13 p. 17.

APPENDIX E
CORRESPONDENCE



Department of Environmental Protection

Lawton Chiles
Governor

Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Virginia B. Wetherell
Secretary

July 15, 1996

Mr. Brian Kizer
SOUTH DIV
PO Box 190010
2155 Eagle Drive.
Charleston, South Carolina 29411

RE: Naval Air Station Jacksonville Site 119
Jacksonville, Florida

Dear Mr. Kizer:

The Bureau of Waste Cleanup has reviewed the Contamination Assessment Report (CAR) and Monitoring Only Plan (MOP) proposal dated May 1996 (received May 21, 1996), submitted for this site. Due to the nature of this site, the Department designates of "source wells" as the wells located adjacent to present and/or former Underground Storage Tanks or to identified sources of soil and/or groundwater contamination. Likewise, the Department designates "perimeter wells" as all those wells located near the limits of previously chosen areas A to H. This order is based on monitoring well locations shown in Figure No. 5-2 of the above referenced report. Pursuant to Rule 62-770.600(6), Florida Administrative Code (F.A.C.), the Department approves the "monitoring only" proposal. Pursuant to Rules 62-770.660 and 62-770.700(3), F.A.C., you are required to complete the monitoring program outlined below, and to submit the analytical results to the Department within sixty (60) days of sample collection:

<u>Monitoring Wells</u>	<u>Parameters</u>	<u>Frequency</u>	<u>Duration</u>
See attachment	EPA Methods 601, 602 (including MTBE), and 610.	Quarterly	One Year

If contaminant concentrations in the designated wells increase above the concentrations listed below, then the resampling/supplemental assessment described in Rule 62-770.660(6) should be performed. If the contaminant

Mr. Brian Kizer
July 15, 1996
Page Two

concentrations do not decrease below Rule 62-770.730(5) target cleanup levels (unless higher alternative site rehabilitation levels have been established) after the duration of the monitoring period; then additional monitoring, supplemental contamination assessment and/or remediation may be required:

Source Wells: 500 ug/l Benzene; 1000 ug/l
Total VOAs; 2000 ug/l Total
Naphthalenes; and 500 ug/l MTBE.

Perimeter Wells: 50 ug/l Benzene; 50 ug/l
Total VOAs; 100 ug/l Total Naphthalenes;
and 50 ug/l MTBE.

Persons whose substantial interests are affected by this Approval Order have the right to challenge the Department's decision. Such a challenge may include filing a petition for an administrative determination (hearing) as described in the following paragraphs. However, pursuant to Chapter 17-103, F.A.C., you may request an extension of time to file the Petition. All requests for extensions of time or petitions for administrative determinations must be filed directly with the Department's Office of General Counsel at the address given below within twenty-one (21) days of receipt of this notice (do not send them to the Bureau of Waste Cleanup).

Notwithstanding the above, a person whose substantial interests are affected by this Approval Order may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes (F.S.). The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within twenty-one (21) days of receipt of this notice. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, F.S.

The Petition shall contain the following information:

- (a) The name, address, and telephone number of each petitioner, the Department file number (DER facility number), and the name and address of the facility;

Mr. Brian Kizer
July 15, 1996
Page Three

- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by each petitioner, if any;
- (e) A statement of facts which each petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes each petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by each petitioner, stating precisely the action each petitioner wants the Department to take with respect to the Department's action or proposed action.

This Approval Order is final and effective on the date of receipt of this Order unless a petition (or time extension) is filed in accordance with the preceding paragraphs. Upon the timely filing of a petition, this Order will not be effective until further order of the Department.

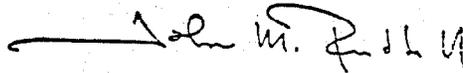
When the Order is final, any party to the Order has the right to seek judicial review of the Order pursuant to Section 120.68, F.S., by filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy the Notice of Appeal, accompanied by the applicable filing fees, with the appropriate District Court of Appeal. The Notice of Appeal must be filed within thirty (30) days from the date the Final Order is filed with the Clerk of the Department.

Please note, any changes in the ownership status of this site and/or property use must be notified to the Department.

Mr. Brian Kizer
July 15, 1996
Page Four

Any questions you may have on the technical aspects of this Approval Order should be directed to Jorge R. Caspary, P.G. at (904) 488-3935. Contact with the above named person does not constitute a petition for administrative determination.

Sincerely,



John M. Ruddell, Director
Division of Waste Management

JMR/jrc

cc: Martha Berry, EPA-Atlanta
Diane Lancaster, NAS Jacksonville

ATTACHMENT
SITE 119
NAS Jacksonville

AREA A

MW 20 and MW-23
EPA Methods 602 and 610

AREA B

MW-33: source well
MW 32, 34, and 35: perimeter wells
EPA Methods 601, 602, and 610

AREA C

MW-38: source well
MW-25, 36, and 37: perimeter wells
EPA Methods 602 and 610

AREA D

MW 41 and 51: source wells
MW 5 and 30: perimeter wells
EPA Methods 601, 602, and 610

AREA E

MW-1: source well
MW-17: perimeter well
EPA Method 602

AREA F

MW 6: source well
EPA Methods 601, 602, and 610
MW-11 and 19: perimeter wells
EPA Methods 601 and 602

AREA G

MW-7: source well
MW-9: perimeter well
EPA Methods 601 and 602

NAVY PUBLIC WORKS CENTER
JACKSONVILLE
ENVIRONMENTAL DEPARTMENT
MEMORANDUM

28 February 1997

From: Jay Caddy, Navy Public Works Center Jacksonville
To: Lt. Beth Melendez, NAS JAX FED

Subj: PURGE WATER FROM MONITORING WELL JAX-TF-MM09

After review of the analytical data and proposed pumping rate, we have concluded that the purge water from subject well will have minimal if any adverse effect to the NAS JAX Wastewater Treatment Plant. The purge water may be discharged at a maximum rate of 1 gal/min for 3 days to the sanitary sewer. Please notify me prior to the date that the work will be performed. If you have any questions or concerns, please feel free to contact me at 772-4548, ext. 8313.

Sincerely,



JAY CADDY

APPENDIX F
RAP CHECKLIST

REMEDIAL ACTION PLAN CHECKLIST

Bureau of Waste Cleanup Florida Department of Environmental Protection

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
FAC ID No.: _____	
Reviewer: _____	Date: _____
Consultant: <u>ABB Environmental Services</u>	
Date of CAR Approval: <u>July 15, 1996</u>	

This checklist should not be applied in blanket fashion. Technical judgement may be necessary in determining the applicability of some items. However, all information listed that is relevant to the remedial design should be provided.

PAGE(S) I. GENERAL

- 7-1 (1) RAP signed, sealed, and dated by Florida P.E. (per FS 471.025)
- NA (2) Indication whether proposed plan is for reimbursement program or State-contracted cleanup
- 2-1 (3) Recap of CAR information and conclusions pertinent to RAP preparation
- 2-1 (a) horizontal and vertical extent of contamination in soil and groundwater
- 4-2 (b) volumes of affected soil and groundwater
- NA (c) estimated mass of contaminants in soil and groundwater
- 2-5 (d) depth to water table
- 2-6 (e) groundwater flow direction and gradient
- 2-5 (f) hydraulic conductivity of aquifer and method of determination
- NA (g) transmissivity of aquifer and method of determination
- 2-5 (h) confining layer location
- 2-5 (i) lithology of site
- 3-2 (4) Current sampling results (within 6 months) used for remediation system design
- NA (5) Latest date underground storage tanks and product lines have tested tight
- 3-8 (6) Potable water considerations
- 3-8 (a) method of potable water supply to area
- 3-8 (b) location of private wells in 1/4-mile and public wells in 1/2-mile radius of site
- NA (c) indication whether or not FDEP district office drinking water program was notified if contaminant groundwater could be expected to reach any public or private water well. Method of notification, person notified, and date.
- 3-8 (7) Underground utilities that may enhance contaminant transport shown

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
FAC ID No.: _____	
Reviewer: _____	Date: _____
Consultant: <u>ABB-ES</u>	
Date of CAR Approval: <u>July 15, 1996</u> Page <u>2 of 15</u>	

- NA (8) Cleanup time
- NA (a) estimated time of cleanup: groundwater, soil
- NA (b) method used to determine cleanup time
- NA (9) Fencing treatment area required, unless public access is restricted by institutional controls
- NA (10) Discussion of required maintenance for proposed equipment, including site visit frequency and special O&M considerations
- NA (11) All local, State, and Federal permits obtained and conditions stated
- 5-1 (12) Itemized cost estimate for project: capital, operation, maintenance, sampling, and closure
- NA (13) Feasibility of leasing equipment considered (cost cannot exceed purchase price)
- 3-1 (14) Alternative analysis or discussion of other alternatives considered
- NA (15) Cost-effective analysis provided if design is innovative
- NA (16) Statement that signed and sealed as-built drawings are to be provided
- NA (17) Nuisance noise and odor to neighbors avoided by careful location of equipment items and exhaust stacks or other mitigating measures

II. REMOVAL AND/OR REPLACEMENT (R/R) OF PETROLEUM STORAGE SYSTEMS: Technical and Reimbursement Considerations

- (1) General
 - NA (a) indication whether R/R will be claimed as reimbursable expense
 - NA (b) acknowledgement that R/R reimbursement is exclusive of hardware
 - NA (c) acknowledgement that any relocation and facility renovation activities during R/R are not reimbursable
 - NA (d) if dewatering involved during R/R, then documentation provided regarding proper disposal, or verification that water not contaminated
 - 4-2 (e) indication of quantity and location of soil removed, or to be removed, from below the static water table
- (2) PRIOR TO JULY 1, 1992: R/R reimbursement justification based on association of contamination with the tank (or tank pit)
 - NA (a) verification of petroleum storage system as potential contamination source by either verified leak, apparent leak, or overlapping when soil and/or groundwater contamination plumes superimposed on a site map showing tank bed
 - NA (b) indication of whether R/R has already been done or is to be done after RAP approval
 - 4-5 (c) proper disposal of water, soil, and sludge from the R/R
 - 4-2 (d) scaled site map including
 - (1) identification and location of all storage system components to be R/R
 - (2) boundaries and dimensions of excavation

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
FAC ID No.: _____	
Reviewer: _____	Date: _____ Consultant: <u>ABB-ES</u>
Date of CAR Approval: <u>July 15, 1996</u>	Page <u>3 of 15</u>

- Yes or No (e) FDEP reviewing engineer: Agree that tanks which were subject of R/R were associated with the contamination? If disagree, then include statement in RAP Approval Order, even if tanks already removed
- (3) ON OR AFTER JULY 1, 1992: R/R reimbursement is based on pertinence of tank removal to the achievement of cleanup criteria set for in 62-770, FAC
- NA (a) R/R justified as meaningful and necessary for achievement of 62-770, FAC, cleanup criteria
- NA (b) if R/R is part of a RAP Modification, then show cost-effectiveness in comparison to other alternatives and no action
- NA (c) if R/R was done during IRA, then discussion of necessity of R/R in order to remove contaminated soil and/or free product
- NA (d) if R/R is associated with MO or NFA, then show that the removal of soil, product, and groundwater contributes or contributed to achieving MO or NFA criteria
- Yes or No (e) FDEP reviewing engineer: Agree that R/R contributed (or will contribute) in a meaningful way to site cleanup? If disagree, then include statement in RAP Approval Order, even if tanks already removed

III. FREE PRODUCT REMOVAL

- NA (1) Free product plume identification
- NA (2) Description of free product recovery system
- NA (3) Oil-water separator sizing calculations and detention time
- NA (4) Free product storage tank of adequate size for reasonable maintenance
- NA (5) Automated product pump shutdown for high level in product tank
- NA (6) Disposition of free product after its recovery

IV. SOIL REMEDIATION - GENERAL

- 4-2 (1) Volumes of all contaminated and excessively contaminated soil
- 2-6 (2) Recap of IRA activities and soil volume already excavated
- 2-6 (3) Effect of soil leachate from nonexcessively contaminated soil on groundwater contaminant levels evaluated
- 4-1 (4) Indication that excessively contaminated soil (per soil guidance manual) will be remediated, or rationale for "no action" alternative for soil remediation provided
- 4-5 (5) Disposition of excavated, contaminated soil
- 4-5 (6) Indication that hazardous soil (e.g., ignitable, corrosive, reactive, toxic, or petroleum refining waste) will be disposed of properly

V. LAND FARMING OF SOIL

- NA (1) Adequate surface area available (_____ square feet [sq ft]) to spread soil 6 to 12 inches thick
- NA (2) Location of landfarming operation
- NA (3) Landfarming area is flat (less than 5 percent slope)
- NA (4) Impermeable base provided. Type:
- NA (5) Surface water runoff controls provided
- NA (6) Groundwater monitoring plan proposed if landfarm is outside immediate contamination area
- NA (7) Frequency of tilling provided
- NA (8) Frequency and details of nutrient application or other enhancements provided (if proposed)
- NA (9) Soil sampling frequency and sampling methods provided
- NA (10) Potential for land farm causing nuisance conditions evaluated
- NA (11) Underlying soil and groundwater monitoring procedures provided and acceptable
- NA (12) Landfarming will be continued until the TRPH concentration is 10 parts per million (ppm) or less (by USEPA Method 9073) and the BTEX concentration is less than 100 parts per billion (ppb) (by USEPA Method 5030/8020); or TRPH concentration is 50 ppm or less, and PAH concentration is 1 ppm or less, and VOH concentration is 50 ppb or less. Alternate TRPH standard may be considered if appropriate and acceptable means of soil disposal is identified.
- NA (13) Cost-effectiveness evaluated
- NA (14) Ultimate disposition of soil discussed
- NA (15) Need to fence landfarm area considered

Vi. LANDFILLING OF SOIL

- NA (1) Landfill lining permitted by FDEP
- NA (2) Name and location of landfill provided along with conditions of acceptance
- NA (3) Cost-effectiveness considerations

VII. SOIL THERMAL TREATMENT

- 4-5 (1) Name and location of thermal treatment facility provided
- 4-5 (2) Facility is permitted for thermal treatment of petroleum-contaminated soil
- 4-5 (3) Indication of whether pretreatment soil samples will be collected at site or at thermal treatment facility
- 4-5 (4) Cost-effectiveness evaluation

Facility Name: NAS Jacksonville Reimbursement Site: []
Location: Jacksonville, FL State Contract Site: []
FAC ID No.: _____
Reviewer: _____ Date: _____ Consultant: ABB-ES
Date of CAR Approval: July 15, 1996 Page 5 of 15

VIII. COMMERCIAL BIOREMEDIATION OF SOIL

- NA (1) Name and location of bioremediation facility provided
- NA (2) Facility is permitted for bioremediation of petroleum-contaminated soil
- NA (3) Indication of whether pretreatment soil samples will be collected at site or at bioremediation facility
- NA (4) Cost-effectiveness evaluation

IX. IN SITU BIOVENTING OF SOIL

- NA (1) Soil cleanup criteria identification
- NA (2) Estimated mass of contaminants in the vadose
- NA (3) Pilot test determination of the following:
- NA (a) soil temperature, permeability, pH, moisture
- NA (b) nutrient requirements
- NA (c) presence of suitable indigenous microbes
- NA (d) oxygen requirement (usually as pounds of air to pound of hydrocarbon degraded)
- NA (4) Layout:
- NA (a) location of air injection and air extraction and wells with respect to contaminated soil plume location and depth
- NA (b) location and depth of soil gas monitoring probes with respect to contaminated soil plume and the air injection and extraction wells
- NA (5) Mechanical details, equipment sizing calculations, and operating parameters:
- NA (a) well type - vertical or horizontal
- NA (b) well construction details
- NA (c) indication whether soil vacuum pump will be used alone (with induced influx of air from unsealed surface acting as oxygen source) or accompanied by air injection pump as oxygen source
- NA (d) vacuum pump and blower specifications and horsepower (hp)
- NA (e) method and design details of moisture addition if site soil is dry
- NA (f) method and design details of nutrient delivery system, if necessary
- NA (6) Estimated cleanup time
- NA (7) Instruments, controls, gauges, and valves:
- NA (a) subsurface soil gas monitoring probes
- NA (b) pressure gauges
- NA (c) shutoff and throttling valves
- NA (d) nutrient and moisture addition control devices and meters

- NA (8) Monitoring plan: CO₂; pertinent bioremediation parameters; contaminants of concern
- (9) Air emissions:
- NA (a) generally, no air emissions treatment necessary because vapor flow rates are so low and biodegradation of petroleum results in production of CO₂ and water
- NA (b) evaluation of need for offgas treatment if pilot test indicated that a significant amount of coincidental hydrocarbon volatilization occurs

X. SOIL VACUUM EXTRACTION

- (1) Prerequisites
- NA (a) relatively permeable soil
- NA (b) depth to groundwater greater than 3 feet
- NA (c) relatively volatile contaminants
- (2) Pilot study (results of onsite testing, unless pilot study approaches size of full-scale system)
- NA (a) pilot test components designed and located for cost-effective subsequent integration into full-scale design
- NA (b) diagram of pilot layout indicating location of vapor extraction well, and radial distance of monitoring wells from the vapor extraction well
- NA (c) air flow, cubic feet per meter (cfm)
- NA (d) radius of influence, feet; vacuum (inches of water) at limit of radius of influence
- NA (e) water elevations at monitoring wells to assess groundwater mounding; observed mound, inches
- NA (f) vacuum readings at monitoring wells and at various radial distances from extraction well to aid in full-scale design
- NA (g) measurement of offgas contaminant concentrations for the purpose of selecting and sizing cost-effective offgas treatment for full-scale system
- NA (h) determination of soil's permeability (rule of thumb: permeability should be greater than 10⁻⁹ square centimeters [sq cm])
- (3) Full-scale design
- NA (a) location(s) and radius of influence, feet; overlapping radii for adequate coverage of excessively contaminated soil plume
- NA (b) vapor extraction well(s) construction details:
- NA (1) number of wells; cfm each well; total cfm; well type (vertical or horizontal); well diameter; well depth; water table, feet below land surface (ft bls); screen slot size; screened interval (ft bls); well sealed w/bentonite or nonshrinking grout at screen design depth to prevent short-circuiting.
- NA (2) screen location close to water table to optimize collection of vapors across vadose depth but not so close as to collect excessive water
- NA (c) operating vacuum at wellhead(s), inches water

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
FAC ID No.: _____	Reviewer: _____ Date: _____ Consultant: <u>ABB-ES</u>
Date of CAR Approval: <u>July 15, 1996</u>	Page <u>7</u> of <u>15</u>

- NA (1) calculation of piping system friction losses
- NA (2) calculation of vacuum pump motor hp based on system losses plus required vacuum at wellhead
- NA (d) vacuum source type; regenerative blower; positive displacement vacuum pump; other
 - NA (1) design: cfm at inches water; operating cfm at inches water
 - NA (2) mfg; model; motor hp; rpm; performance curves; hp calculations or curves
 - NA (3) nonferrous materials of construction and/or assembly to minimize potential for sparking and friction
 - NA (4) explosion-proof motor specified
- NA (e) moisture separator and condensation trap ("knock out pot") prior to inlet of vacuum pump
- NA (f) surface sealing provided for vacuum extraction, or existing concrete or asphalt adequate
- NA (g) safety:
 - NA (1) system operation at approximately 25 percent of Lower Explosive Limit (LEL)
 - NA (2) bleed valve to control flammable vapor concentrations
- NA (h) instrumentation, gauges, and appurtenances:
 - NA (1) vacuum gauges at each well; temperature gauges (at vacuum pump and/or exhaust gas stack)
 - NA (2) sample ports for influent from each well, and for the offgas from the treatment unit
 - NA (3) air flow control: shutoff and throttling valve at each well; other air flow control device or method
 - NA (4) high-level switch in knock out pot to either shut down vacuum pump or drain the pot (w/proper disposal of the contaminated water)
- NA (i) air emissions (general):
 - NA (1) expected concentrations and quantities of any contaminants discharged to air
 - NA (2) method of cost-effective offgas treatment to be provided during first 2 months of system operation (Provide details in Section XI or XII for carbon adsorption or thermal oxidation of offgas, or details of any alternate method proposed)
- NA (j) system monitoring proposal provided:
 - NA (1) air emissions to be sampled and analyzed monthly per Department guidance
 - NA (2) soil cleanup criteria provided
 - NA (3) provision for monitoring wells to serve as vacuum measurement locations (at various radial distances from extraction wells), or other provisions for verification of proper operation

XI. VAPOR-PHASE CARBON ADSORPTION (for control of air emissions)

- NA (1) Cost-effectiveness evaluation in comparison to other alternatives
- NA (2) Mechanical details, sizing calculations, and operating parameters:
 - NA (a) gas flow rate
 - NA (b) gas temperature
 - NA (c) effect of moisture level on adsorption
 - NA (d) identification of contaminants
 - NA (e) contaminant concentrations
 - NA (f) retention (expressed as a percent or pounds of contaminant adsorbed per pound of carbon)
 - NA (g) carbon usage rate
 - NA (h) configuration of carbon vessels in series
 - NA (i) pressure drop
 - NA (j) pressure relief valve for carbon vessels
 - NA (k) proper disposal or regeneration and replacement of spent carbon
- NA (3) Instrumentation, controls, gauges, and valves:
 - NA (a) high pressure shutdown switch and pressure relief valve
 - NA (b) pressure gauges
 - NA (c) temperature gauges
 - NA (d) sampling ports
- NA (4) Safety:
 - NA (a) evaluation of need to isolate carbon units from other equipment items in the process train by an in-line flame arrestor
 - NA (b) identification of the LEL for contaminants
 - NA (c) observance of appropriate requirements in Series 500 articles of the National Electrical Code - equipment shall meet either Class I, Group D, Division 1 or Class I, Group D, Division 2 hazardous area requirements, whichever is applicable when an equipment item is located in a hazardous area as defined by the code

XII. THERMAL/CATALYTIC OXIDATION (for control of air emissions)

- NA (1) Cost-effectiveness evaluation in comparison to other alternatives
- NA (2) Mechanical details, equipment sizing calculations, and operating parameters
 - NA (a) type - thermal or catalytic
 - NA (b) combustion air flow rate

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
FAC ID No.: _____	
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- NA (c) supplemental fuel type - propane or natural gas
- NA (d) temperature and retention time
- NA (e) stack height
- NA (f) stack diameter
- NA (3) Instrumentation, controls, gauges, and valves: Schematic or mobile unit manufacturer's drawings indicating instrumentation, controls, gauges, and valves for all process streams (contaminant-laden influent, fuel gas, and combustion air)
- NA (4) Safety considerations include but are not limited to the following
- NA (a) bleed valve or dilution control valve to maintain influent flammable vapor concentration at 25 percent of the LEL
- NA (b) evaluation of whether or not a flame arrestor should be installed in the pipeline between thermal oxidation unit and a soil vapor vacuum extraction pump, which feeds the oxidizer
- NA (c) air purge prior to reignition
- NA (d) observance of appropriate requirements in Series 500 articles of the National Electrical Code - equipment shall meet either Class I, Group D, Division 1 or Class I, Group D, Division 2 hazardous area requirements, whichever is applicable when an equipment item is located in a hazardous area as defined by the code
- NA (e) use of thermal or catalytic oxidizers that meet appropriate fire codes for handling natural or propane gas and prevention of furnace explosions - National Fire Protection Association, Industrial Risk Insurer's, Factory Mutual, etc. Some of the most important safety shutdowns for gas-fired burners occur upon high gas pressure, low gas pressure, loss of combustion supply air, loss of failure to establish flame, loss of control system actuating energy, and power failure.

XIII. GROUNDWATER EXTRACTION

- 4-1 (1) Feasibility of using existing onsite wells for groundwater extraction considered
- NA (2) (a) recovery well or trench location(s) and construction details included
- NA (b) recovery well depth appropriate for depth of contamination reported in CAR; the recovery well depth should optimize petroleum mass recovery relative to groundwater recovery
- NA (c) well diameter
- NA (d) screening interval appropriate
- NA (3) Predicted horizontal and vertical area of influence with hydraulic gradient provided
- NA (4) Expected drawdown in recovery well or trench (____ ft)
- NA (5) Consideration of multiple well configurations to minimize drawdown
- NA (6) Groundwater pump(s) description, pump characteristic curve, design flowrate (____ gallons per minute [gpm] at ____ ft TDH provided) mfg; model; motor hp
- NA (a) hydraulic design (including friction losses and suction lift considerations acceptable)
- NA (7) Automated well-level controls provided for stopping and starting groundwater pump(s)

- NA (8) Totalizing flowmeter installed on influent line from each groundwater recovery pump
- NA (9) Check valve provided on pump discharge piping if not integral to pump
- NA (10) Shutoff and throttling valve provided on pump discharge piping

XIV. GROUNDWATER TREATMENT SYSTEM - GENERAL

- 3-2 (1) Expected or calculated influent concentrations acceptable (based upon pumping test dynamic sample, weighted averaging procedure, or other reasonable assumptions)

- 3-2 (a) summary of the expected influent concentrations:

- _____ benzene
- _____ toluene
- _____ ethylbenzene
- _____ xylene
- _____ MTBE
- _____ total naphthalenes
- _____ PAHs
- _____ EDB
- _____ 1,2-dichloroethane
- 200 ppb chlorobenzene

- 4-1 (2) Feasibility of discharge to sewage treatment plant evaluated

- 4-1 (a) consideration given to less time and/or level of treatment required to meet sewage system pretreatment standards

- (3) Site piping plan, and schematics of all treatment components, piping valves, controls, and appurtenances provided

- NA (a) influent and effluent sampling ports provided

- NA (b) piping type and size provided

- (4) Iron fouling:

- NA (a) groundwater analyses: total _____ ppm; dissolved _____ ppm

- NA (b) consideration whether iron fouling should be controlled by filtration of influent to remove particulate bound iron, and/or by removal or sequestering of dissolved iron to prevent precipitation in process equipment items

(Generally, "normal" concentration of dissolved iron in water is approx. 0.1 to 0.3 ppm, and unless the pH of the water falls below 5, it rarely exceeds 1 ppm.)

- NA (5) Calcium carbonate: consideration whether pretreatment or other measures necessary to prevent fouling by calcium carbonate (Langelier Index calculation based on groundwater samples may aid in this consideration)

- NA (6) Need for pretreatment or O&M for biofouling considered

XV. AIR STRIPPING TREATMENT PROCESS

- (1) Packed tower:

- NA (a) type, size, and surface area of packing

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
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- NA (b) calculations, criteria, design parameters: tower height; tower diameter; packing height; water flow rate; air flow rate; blower hp; air/water ratio; pressure drop across packing
- NA (c) pressure gauge to indicate effects of fouling over time
- NA (d) mist eliminator
- NA (e) observation port
- NA (f) O&M considerations (fouling potential)
- (2) Diffused aerator (tank type):
- NA (a) calculations, parameters (tank volume; contact time, air flow rate, pressure drop, contaminant removal efficiency) and design assumptions
- (3) Low profile air stripper
- NA (a) Number of trays; water flow rate; air flow rate; air/water ratio; pressure drop; blower hp; mist eliminator
- (4) General
- NA (a) maximum ambient air impact calculations; emissions stack height
- NA (b) equipment description if emissions treatment necessary
- NA (c) automated recovery well shutdown when blower failure occurs
- NA (d) daily analysis screening with portable GC, or other appropriate measures, during system startup until system consistently meets discharge criteria

XVI. LIQUID-PHASED CARBON ADSORPTION

- NA (1) Indication whether adsorption is for primary treatment of groundwater or polishing of effluent
- NA (2) Carbon specifications
- NA (3) Carbon unit(s) sizing calculations (carbon usage rate, contact time, pressure losses) and design assumptions
- NA (4) Isotherm data from pilot study needed if carbon adsorption used as primary treatment and total VOA concentrations are appreciable (VOA > 100 ppb typically) in order to estimate carbon capacity required and sampling frequency
- NA (5) TOC in groundwater determined and effect on carbon usage considerations
- NA (6) Need for sand filter or cartridge unit considered prior to carbon unit
- NA (7) Pressure gauge and pressure relief valve provided on carbon (and sand) filter
- NA (8) Carbon disposal and replacement method
- NA (9) Series configuration of carbon units considered to allow for maximum carbon utilization and prevention of contaminant breakthrough to system effluent
- NA (10) Automated recovery well shutdown if primary carbon unit pressure too high
- NA (11) Schedule for sampling between and after carbon adsorption units

XVII. IN SITU AIR SPARGING OF GROUNDWATER

- NA (1) Prerequisites
- (a) No or little free product which could spread via sparge turbulence, or prolong sparging
- NA (b) Volatile (C3-C10) petroleum fractions with Henry's law constant $> = .00001 \text{ atm.m}^3/\text{mole}$ (approx. rule of thumb, unless biosparging is proposed)
- NA (c) no high concentrations of metals (iron, magnesium) to form oxides which plug aquifer or well screens, or high concentrations of dissolved calcium, which could react with CO_2 in air to clog aquifer w/calcium carbonate
- (Notes: Langelier Index calculation regarding equilibrium between calcium carbonate and dissolved CO_2 may be helpful. Generally, precipitation of dissolved iron is less likely when water is acidic, approx. of pH less than 6.)
- NA (2) Pilot study results
- NA (3) Stage pilot study recommended prior to RAP design: vapor extraction only; sparging only; combined extraction and sparging
- (A pilot study is generally necessary, unless plume size is relatively small and aquifer characteristics favorable.)
- NA (a) pilot test components designed and located for cost-effective subsequent integration into full-scale design
- NA (b) diagram of pilot layout indicating locations of air injection well, vapor extraction well, and radial distance of monitoring wells from the air injection well
- NA (c) air flow rates for each stage: vapor extract, cfm; sparging, cfm; combined cfm
- NA (d) radius of influence for each stage: vapor extract, feet; sparging, feet; combined feet
- NA (e) groundwater mounding observed during each stage: vapor extraction, inches; sparging, inches; combined, inches
- NA (f) measurement of parameters that are pertinent to full-scale design at various radial distances from the air injection well (for example: vacuum readings, pressure readings, water elevations, dissolved oxygen, pH, and conductivity)
- NA (g) measurement of vapor extraction system offgas contaminant concentrations for the purpose of selecting and sizing cost-effective offgas treatment for full-scale system
- NA (h) determination of soil's permeability (should be greater than 10^{-9} sq cm for sparging to be feasible)
- NA (i) need for groundwater recovery for plume control evaluated
- (4) Full-scale design
- NA (a) groundwater contamination plume coverage:
- (1) location(s) and radius of influence for full-scale air injection well(s); adequate coverage by overlapping radii of influence if multiple well system
- NA (b) air injection well(s): number of wells; well design; operating air pressure at wellheads; cfm each well; total cfm
- NA (c) avoidance of long screen allowing air to diffuse at top portion only, where air flow resistance is least (type of screen is 1 to 3 feet long)

- NA (d) well depth and screened interval (or depth of sparge tip) appropriate w/ respect to depth of contamination
- NA (e) vapor extraction well(s) in conjunction w/sparging situated properly to recover volatiles and prevent their release to atmosphere:
- NA (1) injection cfm of air typically 20 to 80 percent of vapor extraction cfm. (0.2 to 0.8)
- NA (2) automatic shutdown of air injection upon loss or low vapor extraction system vacuum, or failure of vacuum pump motor, in order to prevent air emissions
- NA (3) adequate and cost-effective treatment of vapor extraction system offgas proposed to prevent air emissions
- NA (f) compressor:
- design: cfm at pounds per inch gauge (psig); operating cfm at psig
compressor: type; mfg; model; motor hp; rpm; performance curves;
air filter at compressor inlet; oil trap or oil-free compressor to avoid introducing more contamination to aquifer
- NA (g) safety: pressure relief valve at discharge of compressor and/or high pressure switch for automatic shutdown
- NA (h) instrumentation and gauges: pressure indicating gauges at each sparging well
- NA (i) air flow control: shutoff and throttling valve at each well; other flow control device or method
- NA (j) cost-effectiveness evaluation of proposed full-scale design includes cost of pilot study

XVIII. IN SITU/ENHANCED BIORECLAMATION

- NA (1) Groundwater parameters evaluation (pH, DO, TDS, N, P, Temp, TOC, and Alk, etc.)
- NA (2) Monitoring program discussion; TOC to be monitored
- NA (3) Additional oxygen source provision
- NA (4) Oxygen and nutrients method of application and application rate to contaminated area evaluated
- NA (5) Suitable soil present (non-clayey, good transport, low adsorption properties)
- NA (6) Bench scale and/or *in situ* pilot study proposal

XIX. LEAD REMOVAL

- NA (1) Discussion of area(s) where groundwater lead concentrations exceed 15 ppb
- NA (2) Lead concentrations: unfiltered (__ppb); filtered (__ppb); background (__ppb);
- NA (3) Proposal for lead removal by filtration if unfiltered sample is greater than 15 ppb and filtered sample is less than 15 ppb
- NA (4) Method of lead removal, including pertinent design calculations

XX. INFILTRATION GALLERY

- NA (1) Field percolation test (preferably with double ring infiltrometer) provided if gallery base is located in the vadose zone
- NA (2) Infiltration gallery construction details and location (upgradient location if site layout allows)
- NA (3) Gallery calculations and/or assumptions with mounding analysis
- NA (4) Piezometer and cleanout pipe in gallery
- NA (5) Geotextile filter fabric to be installed around the above gallery
- NA (6) Discussion or modeling of gallery's effect on plume migration

XXI. INJECTION WELL

- NA (1) Discussion of injection zone and relevant lithology information
- NA (2) Injection well location and proposed construction details
- NA (3) Screening interval appropriate
- NA (4) Effluent discharge pump description, pump characteristic curve, and design flow rate (____gpm at ____ft TDH)
- NA (5) Carbon polishing unit (or equivalent)
- NA (6) Air release valve at highest point of effluent discharge piping
- NA (7) Injection rate (well hydraulics) calculations
- NA (8) Underground Injection Control (UIC) permit conditions met
- NA (9) Evaluation of injection well's effect on potable wells and plume migration

XXII. ALTERNATE DISPOSAL METHODS

- NA (1) Cost-effectiveness comparison of alternatives (including general permit fee of \$2,500 per year in the cost estimate for NPDES disposal, if it is one of the alternatives being compared)
- (2) For surface water discharge:
 - NA (a) conditions for NPDES general permit met
 - NA (b) indication that notice of intent for NPDES permit will be submitted after RAP approval
- NA (3) If applicable, consumptive use permit obtained from water management district
- App. E (4) Approval from municipality for sewer discharge, and conditions and effluent standards to be met
- NA (5) Applicable permits for stormwater discharge

Facility Name: <u>NAS Jacksonville</u>	Reimbursement Site: []
Location: <u>Jacksonville, FL</u>	State Contract Site: []
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XXIII. SAMPLING REQUIREMENTS

- MOP* (1) Designated monitoring wells and their sampling frequency:
upgradient _____; downgradient _____; highest concentration _____
- NA (2) Weekly sampling of influent from recovery well(s) and effluent at treatment system for first month, monthly sampling for first year
- MOP* (3) Filing of annual status reports acknowledgement
- MOP* (4) Water table contours and depth and extent of free product to be determined at monthly or quarterly sampling event
- MOP* (5) Sampling program includes appropriate contaminants and procedures as specified in 62-770.600, FAC
- NA (6) Periodic maintenance and site inspection limited to twice a month for first quarter, monthly thereafter, or justification for alternative frequency provided

Note: * MOP = NAS Jacksonville, Site 119 Monitoring Only Plan proposal dated May 1996, received May 21, 1996, and approved July 15, 1996.

DETAILED COST ESTIMATE

LIMITED SCOPE REMEDIAL ACTION PLAN
NAS JACKSONVILLE
SITE 119

Prepared by:

ABB Environmental Services
2590 Executive Center Circle, East
Tallahassee, Florida 32301

Prepared for:

Department of the Navy, Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29418

March 1997

PROJECT SUMMARY REPORT

N F RAP
Limited Scope Remedial Action Plan, Site 119
Jacksonville NAS FL
Gopi. K
C /09/97

Category	Amount
PA/SI	\$ 0
Site Assessment Studies	\$ 0
Remedial Design	0
RA Capital	451,854
Site Work	2,436
Sampling and Analysis	0
RA Professional Labor	0
Subcontractor Overhead & Profit	0
General Conditions	0
Studies/Professional Labor Overhead	0
Prime Contractor Home Office	0
Subtotal	\$ 454,290
Prime Contractor Profit - (Fee) (0.00%)	0
RA Operations and Maintenance	13,448
O&M Service Contract Overhead, Tax & Profit	0
Subtotal	\$ 467,738
Escalation	0
Total Contract Costs	\$ 467,738
Contingencies (0.00%)	0
Project Management (0.00%)	0
Total Project Costs	\$ 467,738

***** END OF REPORT *****

* * * * This System Intended For Government Use Only * * * *

PROJECT COST REPORT

NFF RAP
 Limited Scope Remedial Action Plan, Site 119
 Jacksonville NAS FL
 Gopi. K
 01/09/97

	<u>Start</u>	<u>Duration</u>	<u>Escalation Date</u>
RA Construction:	Jan 1999	4 weeks	Jan 1999
O&M:	Feb 1999	12 months	Aug 1999

* Escalation from Jan 1995

Project Comments:

	<u>Studies</u>	<u>RD/RA Construction</u>	<u>O&M</u>
119 JAX	\$ 0	\$ 454,290	\$ 13,448
Total Direct Cost for Project:	\$ 0	\$ 454,290	\$ 13,448

PROJECT COST REPORT

FF RAP
 Limited Scope Remedial Action Plan, Site 119
 Jacksonville NAS FL
 Gopi. K
 1/09/97

	Studies/RD/ RA Construction		O&M
	-----		-----
Total Direct Cost	\$ 454,290	\$	13,448
Sales Tax:	0		0
General Conditions:	0		
Subcontractor Overhead:	0		
Subcontractor Profit:	0		
Bonds & Insurance:	0		0
Prime Contractor			
Professional Labor Overhead:	0		
Home Office Expense:	0		0
Prime Contractor Profit:	0		0
Subtotal	\$ <u>454,290</u>	\$	<u>13,448</u>
Escalation:	0		0
Total Contract Cost	\$ <u>454,290</u>	\$	<u>13,448</u>
Contingency (0.0%):	0		0
Project Management (0.0%):	0		0
Total Project Amount	\$ <u>454,290</u>	\$	<u>13,448</u>
	=====		=====

***** END OF REPORT *****

* * * * This System Intended For Government Use Only * * * *

Time 16:00

DETAIL COST REPORT

		Labor	Equip	Material
3	REMEDIAL ACTION			
33.02	Monitoring, Sampling, Testing, Analysis			
33.02.98	Monitoring			
33.02.98.99	Monitoring - O&M Costs			
	Total Petroleum Hydrocarbons (EPA 418.1)			
	40.00 EA	0.00	0.00	3,686.00
	BTEX/MTBE (Mod. 8020)			
	40.00 EA	0.00	0.00	3,298.00
	Total O&M Costs	2,072.71	1,233.28	10,142.83
	Total Monitoring	2,072.71	1,233.28	10,142.83
33.03	Site Work			
33.03.72	Demolition, Catch Basins/Manholes			
33.03.72.01	Demolition, Catch Basins/Mnhls-Cptl Cost			
	Abandon Catch Basin/Manhole			
	10.00 CY	88.01	30.67	0.00
	Total Capital Costs	88.01	30.67	0.00
	Total Demolition, Catch Basins/Manholes	88.01	30.67	0.00
33.03.75	Demolition, Pavements			
	Demolish Bituminous Pavement W/Air Equipment			
	88.00 CY	1,346.21	380.16	0.00
	910, 1.25 CY, Wheel Loader			
	3.00 HR	59.01	48.72	0.00
	8 CY, Dump Truck			
	10.00 HR	142.39	342.10	0.00
	Total Capital Costs	1,547.61	770.98	0.00
	Total Demolition, Pavements	1,547.61	770.98	0.00
33.08	Solids Collection and Containment			
33.08.01	Excavation			
33.08.01.01	Excavation - Capital Costs			
	Crawler Mounted, 2 CY, 235 Hyd Excavator			
	23.00 HR	663.19	1,862.31	0.00

Time 16:00

DETAIL COST REPORT

	Labor	Equip	Material
33	REMEDIAL ACTION		
33.08	Solids Collection and Containment		
33.08.01	Excavation		
33.08.01.01	Excavation - Capital Costs		
	Standby, Crawler Mounted, 2 CY, 235 Hyd Excavator		
	58.00 HR 0.00	1,378.64	0.00
	Unclass Fill, 6" Lifts, Off-Site		
	5,891.00 CY 3,395.80	8,589.08	22,628.51
	Sprayed Water Dust Suppressant		
	38,042.00 SY 112.46	148.36	0.00
	Plastic Laminate Waste Pile Cover		
	24,456.00 SF 265.08	2.45	2,609.46
	Decon Heavy Equipment		
	1.00 EA 143.21	21.78	0.00
	OVA Rental, Per Month		
	1.00 MO 0.00	0.00	1,010.74
	Total Capital Costs	4,579.74	12,002.62
			26,248.71
	Total Excavation	4,579.74	12,002.62
			26,248.71
33.14	Thermal Treatment		
33.14.02	Low Temperature Thermal Desorption		
33.14.02.01	Low Temp Thermal Desorption - Captl Cost		
	926, 2.0 CY, Wheel Loader		
	27.00 HR 531.10	624.51	0.00
	Direct Firing, Low Temp Thermal Desorp, Processing		
	7,317.00 TN 8,190.47	4,500.69	390,361.95
	Total Capital Costs	8,721.57	5,125.20
			390,361.95
	Total Low Temperature Thermal Desorption	8,721.57	5,125.20
			390,361.95
33.23	Wells		
33.23.11	Drilling & Installation		
33.23.11.01	Drilling & Installation - Capital Costs		
	Furnish 55 Gal Drum For Drilling Cuttings & Devel Water		
	1.00 EA 0.00	0.00	41.56
	Well Development Equipment Rental		
	1.00 WK 28.48	0.37	369.15

Time 16:00

DETAIL COST REPORT

	Labor	Equip	Material
33			
	REMEDIAL ACTION		
33.23			
	Wells		
33.23.11			
	Drilling & Installation		
33.23.11.01			
	Drilling & Installation - Capital Costs		
	Mob/Demob Drilling Rig & Crew		
	1.00 LS	408.63	704.32
	Decontaminate Rig, Augers, Screen (Rental Equipment)		0.00
	2.00 DAY	0.00	263.84
	Move Rig/Equipment Around Site		
	4.00 EA	51.08	88.04
	H Stem, 8" OD Borehole For 2" Well		0.00
	75.00 LF	557.29	960.47
	2" Well, Bentonite Seal		0.00
	5.00 EA	22.99	39.62
	2" Well, Portland Cement Grout		70.28
	45.00 LF	0.00	39.29
	2" Screen, Filter Pack		
	60.00 LF	69.48	119.74
	2" PVC, Sch 40, Well Casing		341.31
	38.00 LF	51.77	89.22
	2" PVC, Sch 40, Well Screen		31.17
	45.00 LF	79.08	136.29
	2" PVC, Well Plug		190.44
	5.00 EA	10.22	17.61
			33.92
	Total Capital Costs	1,279.02	2,155.68
			1,380.96
	Total Drilling & Installation		
		1,279.02	2,155.68
			1,380.96
	TOTAL DIRECT COSTS REMEDIAL ACTION		
		18,288.66	21,318.43
			428,134.45

* * * * This System Intended For Government Use Only * * * *

Date 02/28/97
Time 16:00

COMMON PARAMETERS
for 119 JAX Site

Project ID: NFF RAP

Startup Period:	0	weeks
O&M Period:	0	months
Total Flow Rate:	0	gallons per minute (gpm)
Depth to Groundwater:	0	feet
Safety Level:	D	

Date 02/28/97
Time 16:00

Page 2

EXCAVATION, BURIED WASTE PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
Time 16:00

EXCAVATION, BURIED WASTE PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Required:

Excavation Length: 150 ft
Width: 130 ft
Depth: 6 ft

Number of Buried Drums: 0
Side Wall Protection: Side Slope 1:1.0 (RISE:RUN)

Excavation Method: Continuous

Primary Equipment Type: Excavator

Project Duration: 2 weeks

Safety Level: D

General:

	Model Default -----	User Value -----
Backfill:	Yes	Yes
Percent of Borrow Matl Available On-Site:	0 %	0 %
Depth of Clean Cover:	0 ft	0 ft
Dust Suppressant Spraying Frequency:	1 days	1 days

Drums:

Hand Excavated Soil Surrounding Drums:
Depth of Layer Above Drums: 3 ft
Width of Layer Around Drums: 3 ft

EXCAVATION, BURIED WASTE PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Equipment:

	Model Default -----	User Value -----
Dozer Quantity:	0 bcy	0 bcy
Scraper Quantity:	0 bcy	0 bcy
Excavator Quantity:	4,722 bcy	4,722 bcy
Track Loader Quantity:	0 bcy	0 bcy
Wheel Loader Quantity:	0 bcy	0 bcy
	-----	-----
Total Volume Material Handled:	4,722 bcy	4,722 bcy

Dozer:

Model Default: 65 HP (D3) w/A Blade
User Value: 65 HP (D3) w/A Blade

Dozer Qty: 0 bcy

	Model Default -----	User Value -----
Maximum Production Rate:	100 lcy/hr	100 lcy/hr
Loose Material Weight:	2,550.00 lb/cy	2,550.00 lb/cy
Work Minutes/Hour: (Efficiency)	50.00 min	50.00 min

Equipment Factors:

Load: 0.800 0.800
Blade: 0.70 0.70
Grade: 1.00 1.00
Visibility: 0.80 0.80
Transmission: 0.80 0.80
Operator Efficiency: 0.75 0.75
Material Correction: 0.80 0.80

Date 02/28/97
Time 16:00

EXCAVATION, BURIED WASTE PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Scraper:

Model Default: Standard, 15 CY (621)
User Value: Standard, 15 CY (621)

Scraper Qty: 0 bcy

	Model Default -----	User Value -----
Maximum Production Rate:	300 bcy/hr	300 bcy/hr
Work Minutes/Hour: (Efficiency)	50.00 min	50.00 min

Excavator:

Model Default: Hydraulic, 2 CY (235)
User Value: Hydraulic, 2 CY (235)

Excavator Qty: 4,722 bcy

	Model Default -----	User Value -----
Bucket Fill Factor:	1.10	1.10
Load Factor:	0.790	0.790
Cycle Time:	25.00 sec	25.00 sec
Work Minutes/Hour: (Efficiency)	48.00 min	48.00 min

EXCAVATION, BURIED WASTE PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Track Loader:

Model Default: 65 HP, 1 CY (931), Track
User Value: 65 HP, 1 CY (931), Track

Track Loader Qty: 0 bcy

	Model Default	User Value
Load Factor:	0.800	0.800
Bucket Fill Factor:	0.90	0.90
Load Time (Per Cycle):	0.15 min	0.15 min
Dump Time (Per Cycle):	0.05 min	0.05 min
Travel Time (One Way):	0.60 min	0.60 min
Maneuver Time (Per Cycle):	0.22 min	0.22 min
Work Minutes/Hour (Efficiency):	48.00 min	48.00 min

Wheel Loader:

Model Default: 65 HP, 1.25 CY (910), Wheel
User Value: 65 HP, 1.25 CY (910), Wheel

Wheel Loader Qty: 0 bcy

	Model Default	User Value
Load Factor:	0.800	0.800
Bucket Fill Factor:	0.80	0.80
Travel Time Empty (Per Cycle):	0.28 min	0.28 min
Travel Time Loaded (Per Cycle):	0.28 min	0.28 min
Load/Dump/Maneuver (Per Cycle):	0.45 min	0.45 min
Work Minutes/Hour (Efficiency):	48.00 min	48.00 min

Date 02/28/97
Time 16:00

MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
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MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

required:

Site Type: Fuel Storage Facility

Mobilization Distance: 10 miles

Media

	Depth to Groundwater	Sampling Rounds	Samples Per Round	Contaminant Severity
groundwater	5	4	10	

Safety Level: D

Cost Source: UNIT PRICE BOOK

Date 02/28/97
Time 16:00

MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Groundwater:

Groundwater Sampling Crew:
Model Default: 2 Field Techs
User Value: 2 Field Techs

	Model Default	User Value
	-----	-----
Number of Wells Sampled per Day:	7	7
Number of Drums for Purge Water:	0	0

MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Mobilization:

Number of Mobilizations

Crew Size	Suggested Range		Default	User
	Min	Max		
One-Person Crew:	0	0	0	0
Two-Person Crew:	4	4	4	4
Three-Person Crew:	0	0	0	0
Total:	4	4	4	4

Cost Adjustments:

Turnaround Time Factor	Default	User
Standard	1.00	1.00
14 Day	1.20	1.20
4-7 Day	1.50	1.50
24-72 Hr	2.00	2.00
Default	Standard	Standard
Quality Control Factor	Default	User
Level 1	1.00	1.00
Level 2	1.10	1.10
Level 3	1.25	1.25
Level 4	1.40	1.40
Default	Level 1	Level 1

Date 02/28/97
Time 16:00

MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Analyses - Groundwater:

	Model Default	User Value U/M
Total Dissolved Solids (EPA 160.1)	40.00	40.00 EA
Total Petroleum Hydrocarbons (EPA 418.1)	40.00	40.00 EA
BTEX/MTBE (Mod. 8020)	40.00	40.00 EA

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MONITORING PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Sampling:

	Model Default	User Value	U/M
Field Technician	88.00	88.00	HR
Mobilize Crew, Local, Per Person	8.00	8.00	EA
Load Supplies/Equipment	4.00	4.00	LS
Security Pass/Protocol	4.00	4.00	LS
Water Quality Parameter Testing Device	4.00	4.00	WK
Well Development Equipment Rental	2.00	2.00	WK
Van Or Pickup Rental	8.00	8.00	DAY
Disposable Materials Per Sample	40.00	40.00	EA
Decontamination Materials Per Sample	40.00	40.00	EA
50 Quart Ice Chest	4.00	4.00	EA

Date 02/28/97
Time 16:00

LOW TEMPERATURE THERMAL DESORPTION
PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
Time 16:00

LOW TEMPERATURE THERMAL DESORPTION
PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Required:

Nature of Waste: Non-Hazardous
Volume of Bulk Waste: 4,878 cubic yards
Moisture Level in Waste: 30%
Is Average Particle Size
Greater than 2-inches?: No (Y/N)
Number of Drums: 0
Firing System: Direct
Distance from Vendor: 0 miles
Safety Level: D

Accessory Equipment:

	Model Default	User Value
Hopper:	No	No
Primary Screens:	No	No
Secondary Screens:	No	No
Conveyors:	No	No
Electric Shredder:	No	No
Concrete Slab:	0	0 sf

Date 02/28/97
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WELL DRILLING AND INSTALLATION PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
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WELL DRILLING AND INSTALLATION PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Required:

Type of Well: Vertical Well
Formation Type: Consolidated
Completion Type: Single Cased Well
Number of Wells/Boring: 5
Depth to Top of Screen: 5 feet
Screen Length: 9 feet
Safety Level: D

Date 02/28/97
Time 16:00

WELL DRILLING AND INSTALLATION PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Secondary:

Well Construction:	Model	User	
	Default	Value	
	-----	-----	
Well Diameter:	4 inches	2 inches	*
Drilling Method:	Water/Mud Rotary	Hollow Stem Auger	*
Drum Drill Cutting:	Yes	No	*
Sample During Drilling:	Yes	No	*
Well Development:	Yes	Yes	

* User Value Different from Model Default

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DEMOLITION-CATCH BASINS/MANHOLES PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
Time 16:00

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DEMOLITION-CATCH BASINS/MANHOLES PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Required:

Catch Basins/Manholes: 1 ea
Demolition Action: Abandon
Abandon Backfill Factor: 2.00 cy/unit
Safety Level: E

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DEMOLITION - PAVEMENTS PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Comments:

Date 02/28/97
Time 16:00

DEMOLITION - PAVEMENTS PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Required:

Area: 790 sy

Type of Pavement: Bituminous Small Areas

Pavement Thickness: 4 in

Safety Level: D

Demolition:

	Model Default -----	User Value -----
Demolition Factor:	1.5 cy	1.5 cy
Equipment:	Air	Air

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DEMOLITION - PAVEMENTS PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Load & Haul Parameters:

Required:

Calc. Amount of Material: 132 lcy
Amount of Material to Haul: 132 lcy

Type of Truck: Highway Dump Truck

Haul Distance (One-Way): 5 miles

Dump Charges: 0.00 \$/cy

Safety Level: D

Secondary:

Truck	% of Material to Haul	Type of Loader
8 CY Rear Dump	100%	65 HP, 1.25 CY (910), Wheel
12 CY Rear Dump	0%	Not Applicable
20 CY Semi Dump	0%	Not Applicable
26 CY Semi Dump	0%	Not Applicable
32 CY Semi Dump	0%	Not Applicable
18 CY Bottom Dump	0%	Not Applicable
20 CY Bottom Dump	0%	Not Applicable
30 CY Bottom Dump	0%	Not Applicable

DEMOLITION - PAVEMENTS PARAMETER REPORT

Project ID: NFF RAP
Site ID: 119 JAX
Sequence Number: 1
Location: Jacksonville NAS
Florida

Truck Parameters:

Truck: 8 CY Rear Dump

Type of Loader

Model Default: 65 HP, 1.25 CY (910), Wheel
User Value: 65 HP, 1.25 CY (910), Wheel

	Model Default	User Value
Number of Trucks:	3	3
% of Material to Haul:	100%	100%
Number of Loaders:	1	1

Truck Productivity Factors:

Truck: 8 CY Rear Dump

Highway Truck Productivity Factors

	Model Default	User Value
Work Minutes/Hour:	48.00 min	48.00 min
Average Speed of Truck:	40 mph	40 mph
Dump Time:	0.15 min/cy	0.15 min/cy
Delay Time:	3 min	3 min

Loader Productivity Factors:

Truck: 8 CY Rear Dump

Wheel Loader Productivity Factors

65 HP, 1.25 CY (910), Wheel

	Model Default	User Value
Work Minutes/Hour:	48.00 min	48.00 min
Travel Time (Loaded):	0.28 min	0.28 min
Travel Time (Empty):	0.28 min	0.28 min
Load/Maneuver/Dump Time:	0.45 min	0.45 min
Bucket Fill Factor:	0.90	0.90
Truck Loading Time:	8.97 min	8.97 min

* * * * This System Intended For Government Use Only * * * *