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# INTERIM REMEDIAL ACTION FINAL CONCEPTUAL DESIGN AND PERFORMANCE SPECIFICATION AT OPERABLE UNIT 4 (OU 4) NTC ORLANDO FL

5/27/1997

ABB ENVIRONMENTAL

ABB

May 27, 1997

8545.335

Commanding Officer
SOUTHNAVFACENGCOM
2155 Eagle Drive
N. Charleston, S.C. 29419-9010

**Attn:** **Ms. Barbara Nwokike, Code 187300**

Subject: NTC, Orlando Operable Unit 4 (OU4)
Interim Remedial Action (IRA)
Final Conceptual Design & Performance Specification
Contract; N62467-89-D-0317/CTO 107

Dear Barbara:

Enclosed for your use is the Final Conceptual Design & Performance Specification for the IRA at OU4. Comments received from the Florida Department of Environmental Protection dated March 13, 1997, have been considered and addressed within the document. Comments received from the U.S. Environmental Protection Agency dated April 15, 1997 have also been considered and addressed. These comments have not changed the intent of the original draft document.

Should you have any questions or need additional information, please call me at (407) 895-8845.

Very Truly Yours,
ABB ENVIRONMENTAL SERVICES, INC.

John P. Kaiser
Installation Manager
Enc.

JK/cp
cc: W. Hansel (SDIV)
M Maughon (SDIV)
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N. Rodriguez (EPA)
Lt. G. Whipple (NTC, ORL)
M. Salvetti (ABB-ES)
B. Cohose (Bechtel)
S. McCoy (Brown & Root)

# INTERIM REMEDIAL ACTION

# CONCEPTUAL DESIGN AND PERFORMANCE SPECIFICATION OPERABLE UNIT 4

## NAVAL TRAINING CENTER
## ORLANDO, FLORIDA

## UNIT IDENTIFICATION CODE: N65928
## CONTRACT NO.: N62467-89-D-0317/107

## MAY 1997

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORTH CHARLESTON, SOUTH CAROLINA
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# INTERIM REMEDIAL ACTION
# CONCEPTUAL DESIGN AND PERFORMANCE SPECIFICATION
# OPERABLE UNIT 4

## NAVAL TRAINING CENTER
## ORLANDO, FLORIDA

**Unit Identification Code: N65928**

**Contract No.: N62467-89-D-0317/107**

**Prepared by:**

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**Prepared for:**

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**Naval Facilities Engineering Command**
**2155 Eagle Drive**
**North Charleston, South Carolina 29418**

**Barbara Nwokike, Code 1873, Engineer-in-Charge**

**May 1997**


The engineering design and professional opinions rendered in this planning document that describes the Interim Remedial Action Conceptual Design and Performance Specification, Operable Unit 4, Naval Training Center, Orlando, Florida, were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice. These planning documents are intended to be implemented by Southern Division, Naval Facilities Engineering Command's Response Action Contract Contractor. However, this is a conceptual design document intended only to aid the Response Action Contract Contractor in their final design, it is not intended to be used for construction.

Willard A. Murray
3/13/97

Willard A. Murray, Ph.D., P.E.

Professional Engineer
Florida License PE-0039866
Expires February 28, 1999


CERTIFICATION OF TECHNICAL
DATA CONFORMITY (MAY 1987)

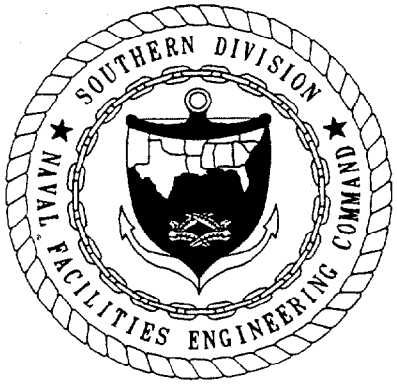
The Contractor, ABB Environmental Services, Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0317/107 are complete and accurate and comply with all requirements of this contract.

DATE: May 27, 1997

NAME AND TITLE OF CERTIFYING OFFICIAL: John P. Kaiser
Task Order Manager

NAME AND TITLE OF CERTIFYING OFFICIAL: Mark J. Salvetti, P.E.
Project Technical Lead

(DFAR 252.227-7036)




# FOREWORD

To meet its mission objectives, the U.S. Navy performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense (DOD) initiated various programs to investigate and remediate conditions related to suspected past releases of hazardous materials at their facilities.

One of these programs is the Base Realignment and Closure (BRAC) cleanup program. This program complies with the Base Closure and Realignment Act of 1988 (Public Law (P.L.) 100-526, 102 Statute 2623) and the Defense Base Closure and Realignment Act of 1990 (P.L. 101-510, 104 Statute 1808), which require the DOD to observe pertinent environmental legal provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); the 1992 Community Environmental Response Facilitation Act; Executive Order 12580; and the statutory provisions of the Defense Environmental Restoration Program, the National Environmental Policy Act (NEPA), and any other applicable statutes that protect natural and cultural resources.

CERCLA requirements, in conjunction with corrective action requirements under Subtitle C of the Resource Conservation and Recovery Act (RCRA), govern most environmental restoration activities. Requirements under Subtitles C, D, and I, of RCRA, as well as the Toxic Substances Control Act, the Clean Water Act, the Clean Air Act, the Safe Drinking Water Act, and other statutes, govern most environmental mission or operational-related and closure-related compliance activities. These compliance laws may also be applicable or relevant and appropriate requirements for selecting and implementing remedial actions under CERCLA. NEPA requirements govern the Environmental Impact Analysis and Environmental Impact Statement preparation for the disposal and reuse of BRAC installations.

The BRAC program centers on a single goal: expediting and improving environmental response actions to facilitate the disposal and reuse of a BRAC installation while protecting human health and the environment.

The Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM); the U.S. Environmental Protection Agency; and the Florida Department of Environmental Protection collectively coordinate the cleanup activities through the BRAC Cleanup team, which in Orlando is called the Orlando Partnering Team. This team approach is intended to foster partnering, accelerate the environmental cleanup process, and expedite timely, cost-effective, and environmentally responsible disposal and reuse decisions.

Questions regarding the BRAC program at the Naval Training Center (NTC) in Orlando, Florida, should be addressed to the SOUTHNAVFACENGCOM BRAC Environmental Coordinator, Mr. Wayne Hansel, Code 18B7, at (407) 646-5294 or SOUTHNAVFACENGCOM Engineer-in-Charge, Ms. Barbara Nwokike, Code 1873, at (803) 820-5566.

## EXECUTIVE SUMMARY

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command, has prepared this Interim Remedial Action (IRA) Conceptual Design and Performance Specification for Operable Unit (OU) 4, located at Area C, as part of Study Area (SA) 13, Naval Training Center, Orlando, Florida. This document was prepared under the Comprehensive Long-Term Environmental Action, Navy Contract No. N62467-89-D-0317 as Contract Task Order No. 107.

The site conceptual model, refined in the Focused Feasibility Study (ABB-ES, 1997), identifies the major contributor of volatile organic compounds (VOCs) in Lake Druid as the contaminated groundwater entering through the lake's sediment near the shoreline west of Building 1100. Groundwater containing VOCs discharging to the lake will be contained/controlled through the use of recirculating/*in situ* well stripping technology, designed to intercept and treat the VOC plume upgradient of Lake Druid. This conceptual design and performance specification addresses that technology.

VOCs partitioning directly from the sediment to the surface water may be considered a secondary source of the lake's contamination. Sediment remediation, within the scope of this IRA, will be natural attenuation with monitoring in parallel with groundwater control.

A focused assessment is planned for the area around the surge tank at the northwest corner of Building 1100. The objective of this focused assessment will be to verify the tank as a possible contaminant release point and the associated subsurface as the source of groundwater contamination. If appropriate, additional recirculating well(s) will be specified to mitigate the continued migration of contaminants from the source area.

This document presents the assumptions, parameters, performance requirements and design criteria for the recirculating/*in situ* stripping technology to be implemented as an IRA at SA 13, OU 4. The purpose of this document is to (1) conceptually identify the various components of the recirculating/*in situ* stripping technology, (2) discuss the pertinent considerations for application of the technology, and (3) provide information on design and performance requirements for the major components. The objective of the system is to intercept, both horizontally and vertically, the part of the plume defined by contaminant contour above 100 parts per billion total VOCs. The position of the *in situ* treatment zone will be located adjacent to the wetland delineation line.

Recirculation well technology creates a circulation sphere within the affected part of the aquifer. Groundwater enters through the lower part of the well, travels up through the well, and exits near the top, creating a spherical capture zone. While traveling through the recirculation well, the groundwater is aerated, volatilizing VOCs, which are subsequently transported out of the well by means of negative pressure created by a vacuum blower. If necessary, the VOCs in the offgas can be treated.

The primary elements of this document include site-specific performance requirements, site layout, and piping and instrumentation diagrams. These performance specifications will be used by the response action contract (RAC)

contractor to prepare shop submittals that will be used as the final design for construction. Shop submittals will consist of workplans and drawings submitted to the Navy. The RAC contractor will be responsible, with approval from the Orlando Partnering Team in accordance with the Responsibility Assignment Matrix, for the choice of methods and materials of construction, as well as equipment specifications necessary to achieve the performance requirements described herein.

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NTC, Orlando, Florida


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## GLOSSARY

| | |
|---|---|
| ABB-ES | ABB Environmental Services, Inc. |
| bls | below land surface |
| $CaCO_3$ | calcium carbonate |
| COCs | contaminants of concern |
| cis-DCE | cis-1,2-dichloroethene |
| FDEP | Florida Department of Environmental Protection |
| FFS | Focused Feasibility Study |
| IRA | Interim Remedial Action |
| NTC | Naval Training Center |
| O&M | operations and maintenance |
| OU | operable unit |
| lbs | pounds |
| P&ID | piping and instrumentation diagrams |
| PCE | tetrachloroethene |
| PFD | process flow diagrams |
| PM&SP | Performance Monitoring and Sampling Plan |
| ppm | parts per million |
| RAC | response action contract |
| TCE | trichloroethene |
| VOC | volatile organic compound |

# 1.0 CONCEPTUAL DESIGN AND PERFORMANCE SPECIFICATION BASIS

**1.1 BACKGROUND**. Results of previous site investigation activities at Operable Unit (OU) 4, Area C, at the Naval Training Center (NTC) in Orlando, Florida, indicate that volatile organic compounds (VOCs) are present within the surficial aquifer and the surface water and sediment of Lake Druid. Lake Druid is bordered by both residential and base properties. Due to the nature of the VOC contamination and its presence in Lake Druid, an Interim Remedial Action (IRA) is necessary. The VOCs present in the surficial aquifer include tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (cis-DCE). The same compounds are present in Lake Druid surface water and sediment with the addition of vinyl chloride.

This document is the conceptual design and performance specification for the remedial action to be implemented as an IRA at OU 4. The objective of the IRA, as it pertains to the Conceptual Design and Performance Specification, is to gain control both horizontally and vertically of the groundwater exceeding 100 parts per billion for total VOCs, migrating toward Lake Druid, adjacent to the wetland delineation line (as shown on Sheet S-1). The purpose of this design and performance specification is to conceptually identify the various components of the interim solution to meet the objective.

The site conceptual model, refined in the Focused Feasibility Study (FFS) (ABB Environmental Services, Inc. [ABB-ES], 1997), identifies the contaminant mass transfer from the probable source to the surface water as

- PCE at the probable source, near the northwest corner of Building 1100, being released to the surficial aquifer;
- PCE partitioning into groundwater and migrating away from the probable source area towards Lake Druid (over time, PCE is degrading to TCE and cis-DCE);
- VOCs being transported via groundwater through the lake's sediment bottom and into the surface water of Lake Druid.

Preliminary mass flux calculations indicate that approximately 25 pounds (lbs) per year of VOCs enter Lake Druid transported through groundwater, where an estimated 1 to 5 lbs are presently sorbed within the lake's sediment (ABB-ES, 1997). Groundwater containing VOCs discharging to the lake will be contained/controlled through the use of recirculating/*in situ* well stripping technology, designed to intercept and treat the VOC plume upgradient of Lake Druid. This conceptual design and performance specification addresses that technology.

VOCs partitioning from the sediment to the surface water may be considered a secondary source of the lake's contamination. The degradation of cis-DCE to vinyl chloride also appears to primarily occur in the sediment. Sediment remediation, within the scope of the IRA, will be natural attenuation following groundwater control. The sediment's ability to naturally attenuate VOCs will be measured as defined within the Performance Monitoring and Sampling Plan, which is included as Appendix B.

Studies to support this IRA have been focused on the contaminant migration pathway to the lake, which has since been concluded to be the surficial aquifer. The recommended technology for intercepting and treating the affected part of the aquifer will also be an effective remedy for the source; therefore, a focused contamination assessment will be implemented at the area around the surge tank on the northwest corner of Building 1100. The objective of this focused assessment will be to verify the tank as a possible contaminant release point and the associated subsurface as the source of groundwater contamination. If appropriate, an additional recirculating well will be specified to mitigate the source area. This additional action is briefly discussed throughout this document. The site layout indicates an optional recirculating/*in situ* stripping well placement at the source area.

The primary elements of this document include the proposed site layout, piping and instrumentation diagrams, and performance specifications for all major system elements as specified by ABB-ES to meet the IRA objective. Conceptual process flow diagrams (PFD) are included with the design and performance specifications in the drawings section to assist the response action contract (RAC) contractor in specifying methods and materials of construction, and in identifying specific pieces of equipment to achieve the performance requirement described in this conceptual design. The RAC contractor will describe these details in the final design and shop submittals (e.g., workplans and drawings) to the Navy.

Because of the complexities of each of the different proprietary recirculation well technologies, the final design provided by the RAC will be reviewed and approved by the Orlando Partnering Team in accordance with the Responsibility Assignment Matrix, Appendix C.

1.2 HEALTH AND SAFETY CONSIDERATIONS. Health and safety air monitoring conducted during previous investigative work at the site has not indicated the need for respiratory protection. Results of soil sampling from previous investigations suggests that VOCs will not likely be present in excavation spoils other than those generated during well installation. Therefore, Level D personal protective equipment, with modifications for dermal contact with fluids and spoils during drilling, has been adequate for all site assessment activities to date. Unanticipated site conditions discovered during routine health and safety monitoring of the remedial action activities may result in the need for an upgrade to higher levels of protection. Construction activities in the source area (if necessary) may also require higher levels of protection.

Health and safety during the implementation of the IRA will be the responsibility of the RAC contractor.

1.3 SITE CHARACTERIZATION SUMMARY. The site characterization summary is an accumulation of the data consistent with the latest investigations at the site. The summary should be used as the basis for the recirculating/*in situ* stripping technology final design to minimize and/or avoid various interpretations of the site characteristics. The data presented in this summary is not intended to be all inclusive, additional information may be found in the referenced documents.

I) Site Geology. Stratigraphic information obtained within the surficial aquifer indicates the subsurface is relatively homogeneous, composed of fine

sand interbedded with silty and/or clayey fine sand. Grain size plots can be referenced in the Interim Remedial Action Focused Field Investigation Report, Operable Unit 4 (ABB-ES, 1996b).

The soil density of the surficial aquifer typically ranges from medium dense to dense, with the exception of a hard layer (very dense) approximately 15 feet below land surface (bls), with varying thickness averaging about 5 feet. No strata has been identified that would act as a hydraulic or chemical confining layer or barrier. The depth to groundwater has seasonal fluctuation ranging between less than 1 foot to 4 feet bls.

The following geologic information was summarized from the Interim Remedial Action Focused Field Investigation Report, Operable Unit 4 (ABB-ES, 1996b):

## II) Hydrogeology

A) Unconfined Aquifer (ABB-ES, 1996b)
B) Hydraulic Conductivity = 32.7 feet per day (ABB-ES 1996a)
C) Hydraulic Gradient = 0.012 (ABB-ES, 1996b)
D) Anisotropy Ratio = 10 (assumed)
E) Saturated Thickness = 65 feet (ABB-ES, 1996b)
F) Effective Porosity = 0.25 (assumed)

## III) Groundwater Chemistry

A) Capture scenario dimensions are 200 feet wide and 45 feet bls. Recirculation well location(s) are proposed adjacent to the wetland delineation line, capture width is approximated by measuring along the wetland delineation south from the north fence line, 70 and 270 feet, as shown on Sheet S-1.

B) Applicable Inorganic Chemistry Concentrations (based on static groundwater conditions; ABB-ES, 1996b):

1) dissolved iron at 1.0 part per million (ppm)
2) dissolved calcium at 80 ppm
3) dissolved magnesium at 3.7 ppm
4) dissolved manganese at 0.025 ppm
5) alkalinity as calcium carbonate ($CaCO_3$) at 253 ppm
6) hardness as $CaCO_3$ at 276 ppm
7) pH at approximately 5.50

C) No indication of dense nonaqueous phase liquid in the area adjacent to the wetland delineation (proposed recirculation well location).

D) Contaminants of Concern and Cleanup Goals (Table 1-1) (ABB-ES, 1997)

**Table 1-1**
**Estimated Treatment Sphere Influent Concentrations and Spree Discharge Criteria for Contaminants of Potential Concern**

Interim Remedial Action
Conceptual Design and Performance Specification
Operable Unit 4
NTC, Orlando, Florida

| Contaminants of Potential Concern | Approximate Treatment Sphere Influent Concentrations ($\mu g/\ell$) | Treatment Sphere Discharge Criteria ($\mu g/\ell$) |
|---|---|---|
| Tetrachloroethene | 500 | 8 |
| Trichloroethene | 2,700 | 80 |
| total 1,2-Dichloroethene | 700 | 70 |

Notes: Discharge criteria based on Florida's Surface Water Quality Standards (FSWQS) for chemicals with a standard and Florida's maximum contaminant levels for contaminants of concern not covered in the FSWQS.

$\mu g/\ell$ = micrograms per liter.

1.4 PROCESS DESCRIPTION. Groundwater interception/treatment from a recirculating well treatment system will reduce further migration of VOCs into Lake Druid. The groundwater will be pumped into and through each recirculating well, treated within the well, and discharged back to the surficial aquifer without exposure aboveground. If an exclusion from offgas treatment is granted by the Florida Department of Environmental Protection (FDEP), offgases will be vented from the well casing to the atmosphere without treatment. However, this will not be finalized until after the RAC's final design. Initial indications from FDEP suggest no treatment will be necessary. If vapor treatment is necessary, it will likely be treated via vapor phase carbon.

The PFD provided in the drawing attachment is typical, indicating the basic process scenarios. Complete PFD and piping and instrumentation diagrams (P&ID) will be furnished by the RAC contractor in the final design.

1.5 SYSTEM REQUIREMENTS. Design and performance criteria for the proposed recirculating/*in situ* stripping well system include the requirements described below.

- The recirculating well treatment system must intercept the area defined by the 100 ppb total VOC contaminant contour line both horizontally (Site Plan, Drawing C-1) and vertically, as illustrated within the Focused Field Investigation Report (ABB-ES, 1996b). The installation(s) should be adjacent to but outside the limits of the wetland as defined on the Site Plan, Drawing S-1. The approximate capture dimensions are 200 feet wide and 45 feet deep bls.

- System design/configuration shall be such that the mounding effect associated with the treated water discharge at the top of the recirculation well(s), does not, under any conditions, breach the ground surface.

- Aboveground completion, not including air vents or offgas piping, of the recirculation well(s) shall be, if possible, limited to no more than 6 feet above ground surface.

- Treated groundwater discharged from the capture sphere of the recirculating and *in situ* stripping well(s) should not contain contaminants of concern (COCs) in concentrations greater than Florida's Surface Water Quality Standards for chemicals with a standard. All other effluent COCs shall meet Florida's maximum contaminant levels, where applicable (Table 1-1).

- The design parameters for the optional source recirculating well (if deemed necessary) such as depth, influent concentrations etc., will be verified following the focused contamination assessment around the surge tank.

1.6 **PERMITTING REQUIREMENTS**. The regulatory permitting requirements for the implementation of the IRA will be completed by the RAC contractor and include but may not be limited to

- NTC, Orlando base excavation permits for well construction and trenching, including utility location verification;

- following applicable guidance from FDEP regarding emissions from the planned remedial system;

- permitting and documentation required from the St. Johns Water Management District for the installation of a well greater than 6 inches in diameter, or documentation citing the exclusion of obtaining such a permit.

The defined wetland area will not be entered or disturbed during construction; therefore, wetland permitting is not anticipated.

Additional documentation associated with permitting is included in Appendix A.

1.7 **SITE PLAN DESIGN BASIS**. Design and performance criteria associated with site plan of the proposed system include the requirements described below.

- Clearing and grubbing only as absolutely necessary, and no trees with trunk diameters greater than 6 inches in diameter and measuring 3 feet above ground surface shall be removed without permission from the Navy. Clearing and grubbing shall not be conducted in areas defined as wetland. Refer to Site Plan, Drawing C-1.

- Loam and reseed areas disturbed by construction.

- Site access should be consistent with areas cleared for the previous investigations, where possible.

- Aboveground completions of treatment system(s) should be surrounded with a chainlink fence with lockable gated entrance large enough for a forklift.

- It is assumed power, as specified by the vendor, exists at Building 1100, adjacent to the treatment site.

1.8 CIVIL DESIGN BASIS. Civil design performance parameters include the requirements below.

- Treatment system(s) foundation pad(s) (concrete) should be finished to 1 foot above grade and designed to divert surface water runoff away from the recirculation well installation(s).

- Foundation (concrete) pad(s) and fencing should be sized to accommodate vapor treatment, if necessary.

- Concrete pad(s) finish shall be sloped to direct water away from well installation.

- Concrete pad(s) should be designed to withstand hydrostatic pressure caused by the recirculation recharge/mounding and large enough to prevent a breach of ground surface by mounded groundwater due to the recharge.

1.9 MECHANICAL DESIGN BASIS. Mechanical design performance parameters include the requirements below.

- Groundwater piping within the treatment well will be rigid to semirigid, resistant to contaminants found at OU 4, and properly supported and secured.

- If vapor treatment is necessary, air piping can be flexible or rigid, and should be properly supported.

- Any valves and/or appurtenances associated with groundwater conveyance shall be resistant to contaminants found at OU 4.

- Blower/compressor sizing should consider the addition of granular activated carbon canisters for offgas treatment, if required.

1.10 ELECTRICAL AND INSTRUMENTATION DESIGN BASIS. The performance/design criteria for electrical and instrumentation components include the requirements listed below.

- Electrical service for the treatment system should be metered separately onsite.

- All electrical and instrumentation should be suitable for outdoor installation.

- NEMA 3R, or better, control panel for instruments and control push-buttons/switches as shown on P&ID.

- Water-level response monitoring in monitoring wells shall consist of pressure transducers and data loggers. This will be part of the systems performance monitoring and will be part of ABB-ES's responsibility. However, the design must allow for installation and removal/replacement of monitoring equipment.

- Hour meter(s) shall be installed on any pump(s), rotating mechanical equipment, etc.

- Telemetric instrumentation is optional, but is, however, recommended.

1.11 OPERATIONS AND MAINTENANCE (O&M). An O&M plan will be developed by the RAC contractor. The O&M plan should include but not be limited to equipment manuals, startup and shutdown procedures, preventative maintenance schedules, trouble-shooting guides, and reporting format for maintenance of the system. In addition, the O&M should include the activities below.

- System startup activities will continue until the system has met the performance criteria, outlined in Section 1.5, over 7 consecutive days of operation. The activities will include setting the treatment system operating parameters through adjustment of pumping and/or air flow rates.

- A maintenance record will be completed by the responsible personnel with copies maintained with the RAC, the Comprehensive Long-Term Environmental Action, Navy contractor (ABB-ES), and NTC, Orlando.

- The recirculating and *in situ* stripping well treatment system will be visually monitored over the course of O&M and performance monitoring for fouling problems. In the event that fouling problems are adversely affecting the operation of the system, O&M schedules will be adjusted or a pretreatment system will be evaluated.

- In the event of a system operation failure or buildup of water in the blower's moisture knockout, the operation of the system will be automatically stopped and a warning light (rotating beacon) will be lit on the control panel. Base security with a visual of the beacon or through telemetry will notify NTC, Orlando's Environmental Branch and/or another specified party of the shutdown.

1.12 PERFORMANCE MONITORING AND SAMPLING (PM&SP). The intent of the PM&SP is to evaluate the performance of the recirculating well treatment system, measure the progress of remediation in Lake Druid, and identify possible system adjustments to expedite the cleanup. The PM&SP will be performed by ABB-ES. The PM&SP included in Appendix B is a minimum framework for baseline and performance monitoring of the treatment system, to be finalized following the final design, and will include but not be limited to the following:

- Prior to the operation of the system, a minimum of one baseline sampling event will occur to provide comparison data for sampling that will occur

during system operation. The baseline sampling will include groundwater, surface water, and sediment as defined in the PM&SP.

- Water-level or piezometric head response measurements, field parameters (pH, conductivity, dissolved oxygen, oxidation reduction potential, etc.), and collection and analysis of groundwater will be conducted frequently during system startup in order to make any necessary performance adjustments. The actual frequency will be decided following final design and will consider vendor recommendations.

- At the conclusion of the startup activities, performance monitoring and sampling will continue quarterly as outlined in the plan.

- Water-level or piezometric head response measurements will be collected to analyze the performance of the recirculation well by evaluating/verifying the capture area.

- Groundwater, surface water, and sediment sampling will contribute to measuring the remedial effectiveness of the system.

## REFERENCES

ABB-ES, 1996a, Letter Report/Operable Unit 4 Interim Remedial Action Treatability Study: Pumping Test implementation and Results, Naval Training Center, Orlando, Florida: prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, October.

ABB-ES, 1996b, Interim Remedial Action Focused Field Investigation Report Operable Unit 4, Naval Training Center, Orlando, Florida: prepared for SOUTHNAV-FACENGCOM, North Charleston, South Carolina, November.

ABB-ES, 1997, Focused Feasibility Study Operable Unit 4, Naval Training Center, Orlando, Florida: prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, March.

# ATTACHMENT 1

# CONCEPTUAL DESIGN AND PERFORMANCE DRAWINGS

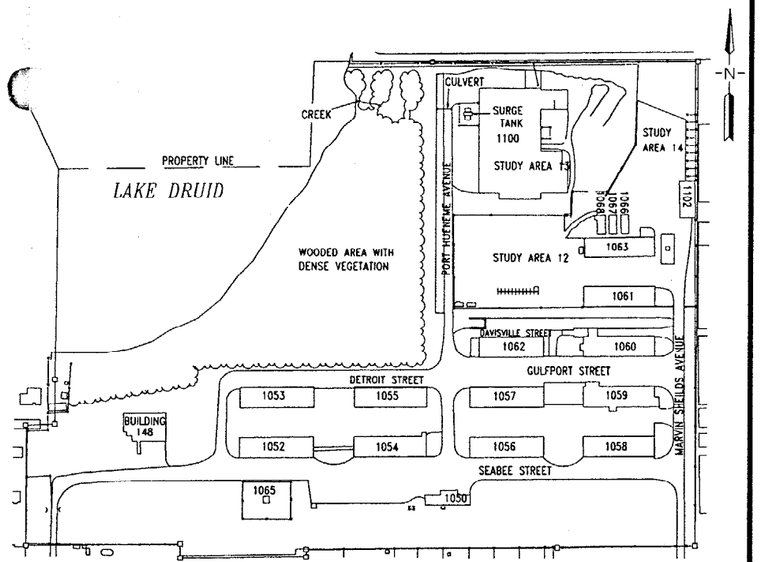
# INTERIM REMEDIAL ACTION
# CONCEPTUAL DESIGN/PERFORMANCE SPECIFICATION
# OPERABLE UNIT 4
# NAVAL TRAINING CENTER
# ORLANDO, FLORIDA

CONTRACT NO. N62467-89-D-0317/107

UNIT IDENTIFICATION CODE (UIC): N65928

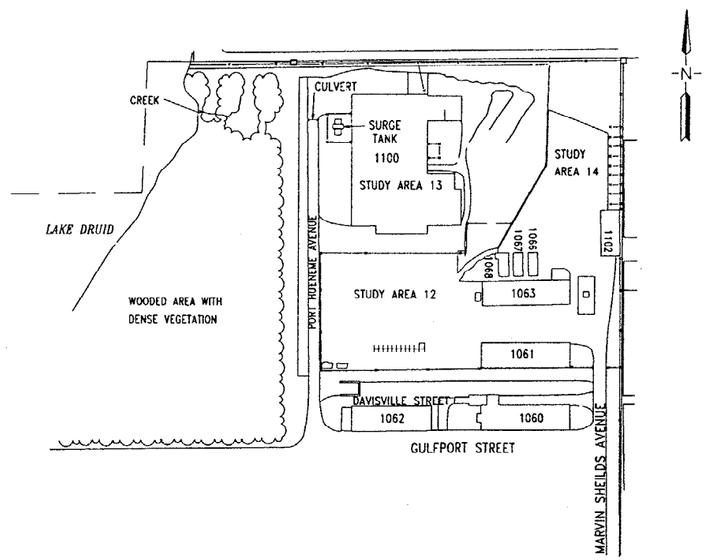
TO BE STAMPED AS CONCEPTUAL DESIGN/PERFORMANCE SPECIFICATION, PREPARED FOR RESPONSE ACTION CONTRACT, NOT FOR CONSTRUCTION

## FACILITY MAP
## AREA C




NOT TO SCALE

## LOCATION MAP
## OPERABLE UNIT 4

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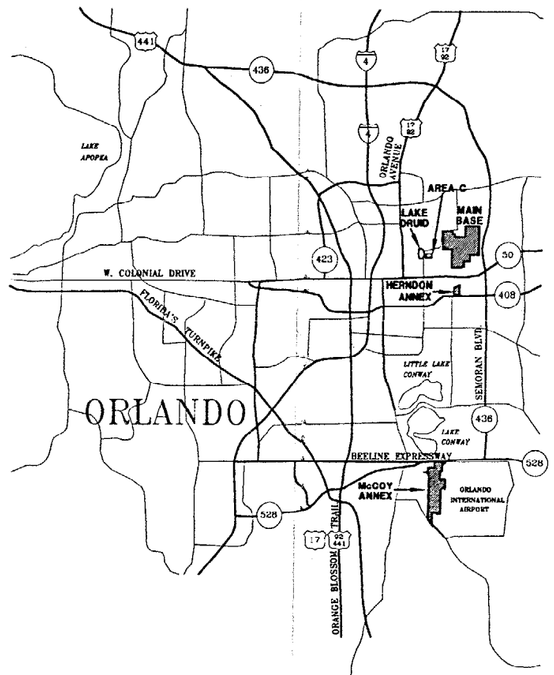
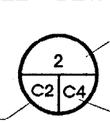



NOT TO SCALE

VICINITY MAP

EXAMPLE - DETAIL SYMBOL




IDENTIFICATION NUMBER OF DETAIL

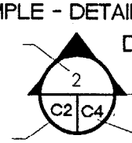
SHEET WHERE DETAIL IS TAKEN

SHEET WHERE DETAIL IS SHOWN

EXAMPLE - DETAIL SYMBOL

IDENTIFICATION NUMBER OF CUT

DIRECTION OF CUT




SHEET WHERE CUT IS TAKEN

SHEET WHERE CUT IS SHOWN

INDEX
NAVFAC

| SHEET NO. | DRAWING NO. | TITLE |
|---|---|---|
| T-1 | | INDEX SHEET |
| S-1 | | SITE PLAN |
| P-1 | | CONCEPTUAL PROCESS FLOW DIAGRAM |

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DESIGNED BY: J. NASH
DRAWN BY: J. KAPRAL
CHECKED BY: H. FAIRCLOTH
BRANCH HEAD:
F.P.E.:
PROJ. ENG.:
DIV. DIR.:

PREP. BY DATE APPRVD

REV. DESCRIPTION NO

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, S.C.

UNIT ORLANDO

INTERIM REMEDIAL ACTION OPERABLE UNIT 4
INDEX SHEET

DATE EFD FOR COMMANDER, NAVFAC
APPROVED

SEAL AREA

RECORD DRAWING DATE

| | |
|---|---|
| CODE I.D. NO. | 80091 |
| DRAWING SIZE: | D |
| SPEC. NO. 06- | |
| CONTR. NO. | N62467-89-D-0317/107 |
| NAVFAC DRAWING NO. | N65928 |
| SHEET | 1 OF 3 |

T-1

00445GBIZ

NOTES:

(1) WETLAND DELINEATION DEFINED DURING THE FOCUSED FIELD INVESTIGATION BY ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

(2) ACTUAL RECIRCULATION WELL LOCATIONS TO BE DETERMINED FOLLOWING FINAL DESIGN

THE EXISTING UTILITIES SHOWN ON THIS DRAWING ARE SHOWN DIAGRAMMATICALLY AND IT IS NOT TO BE INFERRED THAT THE LOCATIONS SHOWN ARE PRECISE.

(4) TO BE STAMPED AS CONCEPTUAL DESIGN/ PERFORMANCE SPECIFICATION, PREPARED FOR RESPONSE ACTION CONTRACT, NOT FOR CONSTRUCTION.

PLAZA TERRACE DRIVE

ASPHALT

OLD-13-OW3

OLD-13-OW2

OLD-13-11C

OLD-13-10B

OLD-13-9A

OLD-13-OW4

OLD-13-OW1

OLD-13-23B

OLD-13-RW1

OLD-13-22B

OLD-13-15A

OLD-13-21B

OLD-13-17C

OLD-13-16B

OLD-13-14C

OLD-13-13B

OLD-13-12A

OLD-13-25B

OLD-13-24A

LAKE DRUID

100 PPB

(New)

WETLANDS BOUNDARY

WOODED AREA

ACCESS ROUTE

PORT HUENEME AVENUE

OLD-13-OW5

OLD-13-02C

OLD-13-01A

OLD-13-18B

OLD-13-20B

OLD-13-21B

UNDERGROUND ELECTRICAL LINE

OLD-13-03A

OLD-13-04C

GRASS

Building 1100

OLD-13-05A

OLD-13-06C

OLD-12-01A

OLD-14-01A

ASPHALT

PAVEMENT

OLD-14-04A

OLD-14-02A

OLD-14-03A

1068

1067

1066

1102

PAVEMENT

OLD-12-02A

1063

OLD-12-03A

OLD-12-04A

1061

DAVISVILLE STREET

1062

1060

N

**LEGEND**

| | |
|---|---|
| —SW— | STORM WATER CULVERT |
| — S — | SANITARY SEWAGE |
| — G — | GAS LINE |
| — OE — | OVERHEAD ELECTRICAL |
| — · — | WETLANDS BOUNDARY |
| | MANHOLE |
| | ELECTRICAL POLE |
| | HYDRANT |
| | TREELINE |
| | RECIRCULATION WELLS (ESTIMATED LOCATION) (2) |
| OLD-13-22A | NEW MONITORING WELL LOCATION AND DESIGNATION |
| OLD-13-10B | MONITORING WELL LOCATION AND DESIGNATION |
| OLD-13-RW1 | RECOVERY WELL LOCATION AND DESIGNATION |
| OLD-13-OW1 | OBSERVATION WELL LOCATION AND DESIGNATION |
| OLD-13-22A | MICROWELL LOCATION AND DESIGNATION |
| G | GAS METER |
| — T — | TELEPHONE LINE |
| T | TELEPHONE JUNCTION BOX |
| — W — | WATER LINE |
| —100 PPB— | VOLATILE ORGANIC COMPOUND CONTOUR LINE, DASHED WHERE INFERRED, IN PARTS PER BILLION |

0 40 80

SCALE: 1 INCH = 80 FEET

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| REV. | DESCRIPTION | PREP BY | DATE | APPRVD |
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DESIGNED BY: J. NASH
DRAWN BY: J. KAPRAL
CHECKED BY: H. FAIRCLOTH
BRANCH HEAD:
F.P.E.:
PROJ. ENG.:
DIV. DIR.:

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
CHARLESTON, S.C.
ORLANDO
UNIT
INTERIM REMEDIAL ACTION OPERABLE UNIT 4
INDEX SHEET
EFD FOR COMMANDER, NAVFAC
DATE
APPROVED

SEAL AREA

RECORD DRAWING DATE

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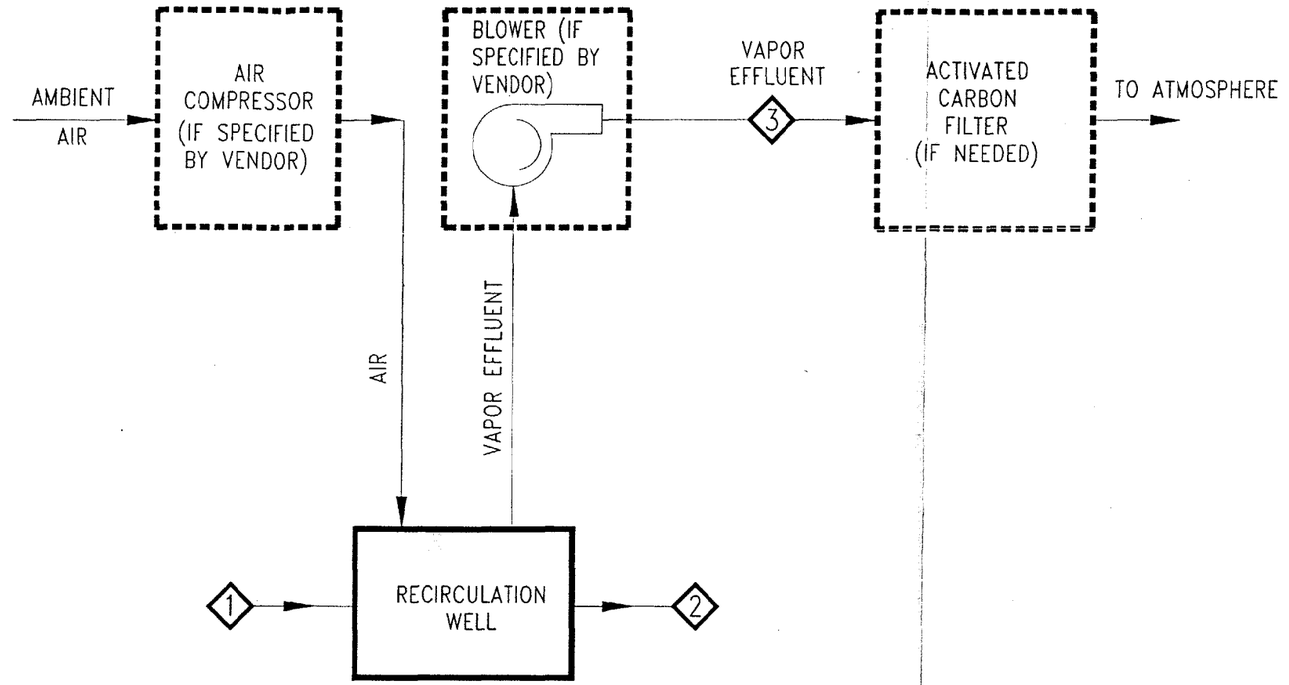
|---|---|
| CODE I.D. NO. | 80091 |
| DRAWING SIZE: | D |
| SPEC. NO. 06- | |
| CONTR NO. | N62457-89-D-0317/107 |
| NAVFAC DRAWING NO. | N65928 |
| SHEET | 1 OF 3 |

S-1

| ASSUMPTIONS:<br>WATER FLOW: 8 $M^3$/HR PER SYSTEM<br>AIR/WATER RATIO: 50:1 | ① | ② | ③ |
|---|---|---|---|
| | **GROUNDWATER INFLUENT** | **GROUNDWATER EFFLUENT** | **VAPOR[3] EFFLUENT** |
| **ORGANICS** | **(ug/l)** | | **(lb/yr/system)** |
| cis - 1,2 - DICHLOROETHYLENE | 700 | < = 70 ug/l [1] | 108 |
| TETRACHLOROETHYLENE | 500 | < = 8.85 ug/l [2] | 77 |
| TRICHLOROETHYLENE | 2700 | < = 80.7 ug/l [2] | 416 |
| **INORGANICS** | **(ug/l)** | | |
| ALUMINUM | 160 | | |
| IRON | 1000 | | |
| LEAD | 6 | | |
| MAGNESIUM | 3700 | | |
| SODIUM | 12000 | | |
| ZINC | 42 | | |
| **GENERAL CHEMISTRY** | **(mg/l)** | | |
| ALKALINITY AS $CaCO_3$ | 253 | | |
| CHLORIDE | 22 | | |
| HARDNESS AS $CaCO_3$ | 276 | | |
| RESIDUE, FILTERABLE (TDS) | 14 | | |
| RESIDUE, NON FILTERABLE (TSS) | ND | | |
| SULFATE | 16 | | |
| SULFIDE | 0.2 | | |
| TOTAL ORGANIC CARBON | 110 | | |
| TOTAL SOLIDS | ND | | |

NOTES:
1. DERIVED FROM FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, GROUNDWATER GUIDANCE CONCENTRATIONS
2. DERIVED FROM FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION, SURFACE WATER QUALITY STANDARDS
   COMPLETE ANALYTICAL RESULTS FOUND IN APPENDIX A, FFS
   ND NOT DETECTED
   ug/l MICROGRAMS PER LITER
   mg/l MILLIGRAMS PER LITER
   TDS TOTAL DISSOLVED SOLIDS
   TSS TOTAL SUSPENDED SOLIDS
   $CaCO_3$ CALCIUM CARBONATE
   $M^3$/HR CUBIC METERS PER HOUR
3. MAXIMUM ESTIMATED VAPOR EMISSIONS BASED ON 100 PERCENT REMOVAL EFFICIENCY AT A WATER FLOW RATE OF 8 $M^3$/HR AND MAXIMUM GROUNDWATER CONCENTRATIONS SHOWN IN COLUMN ①. (SEE APPENDIX A).
4. TO BE STAMPED AS CONCEPTUAL DESIGN/PERFORMANCE SPECIFICATION, PREPARED FOR RESPONSE ACTION CONTRACT, NOT FOR CONSTRUCTION.




# CONCEPTUAL PROCESS FLOW DIAGRAM

DESIGNED BY: M. HAWES
DRAWN BY: J. KAPRAL
CHECKED BY: H. FAIRCLOTH
BRANCH HEAD:
P.P.E.:
PROJ. ENG.:
DIV. DIR.:

REV. | DESCRIPTION | PREP BY | DATE | APPRVD

NAVAL FACILITIES ENGINEERING COMMAND
SOUTHERN DIVISION
CHARLESTON, S.C.
DEPARTMENT OF THE NAVY
UNIT ORLANDO 4
INTERIM REMEDIAL ACTION OPERABLE UNIT 4
CONCEPTUAL PROCESS DIAGRAM
APPROVED DATE
EFD FOR COMMANDER, NAVFAC

SEAL AREA

RECORD DRAWING DATE

CODE I.D. NO. 80091
DRAWING SIZE: D
SPEC. NO. 06-
CONTR. NO. N62467-89-D-0317/107
NAVFAC DRAWING NO. N65928
SHEET 3 OF 3
P-1

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# ATTACHMENT 2

# CONSTRUCTION PERFORMANCE SPECIFICATIONS

# PROJECT TABLE OF CONTENTS

INTRODUCTION

DIVISION 1 -- GENERAL REQUIREMENTS

SECTION 01010 SUMMARY OF WORK
SECTION 01680 TREATMENT FACILITY STARTUP

DIVISION 2 -- SITE WORK

SECTION 02015 SUBSURFACE INFORMATION
SECTION 02016 EXISTING UTILITIES AND UNDERGROUND STRUCTURES
SECTION 02670 RECIRCULATING/*IN SITU* STRIPPING WELL

## INTRODUCTION

This performance specification attachment is intended to be utilized by the RAC contractor as a basis for their prescriptive specification package. This attachment is designed to provide performance specifications in the standard construction specification format; therefore, developing a smooth transition into the prescriptive construction specifications to be submitted as part of the final design by the RAC. Within the scope of the IRA, this document pertains to the performance criteria for general requirements and site work, Divisions 1 and 2, respectively.

Divisions 1 and 2 included in this document are provided only in part and should be completed in the workplan submitted by the RAC. The Divisions include the sections specific to the site and the system's performance such as

- Summary of Work,
- Treatment System Startup,
- Subsurface Information,
- Existing Utilities and Underground Structures, and
- Recirculating/*In Situ* Stripping Well.

Divisions 3, 11, 15, and 16 will be specific to the chosen proprietary recirculating well technology and are, therefore, considered final in nature and are to be submitted by the RAC.

# DIVISION 1

# GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

1.1.1 Project Description

Southern Division, Naval Facilities Engineering Command, and Naval Training Center (NTC), Orlando proposes to install a treatment system at Operable Unit (OU) 4 to intercept and treat groundwater containing volatile organic compounds (VOCs) prior to the contaminants entering Lake Druid. This project involves the implementation of an interim remedial action (IRA). The IRA is designed to reduce further migration of the contaminants into Lake Druid. The groundwater will be treated *in situ* via recirculating well/*in situ* stripping well technology. If an air permit exclusion is granted by Florida Department of Environmental Protection (FDEP) offgases will be allowed to escape to the atmosphere.

An option of providing additional recirculating well(s) may be exercised. A focused contamination assessment around Building 1100's surge tank will be initiated, and if it is defined as a source of groundwater VOC contamination, one or more optional well(s) will be installed to aggressively mitigate the source area.

1.1.2 Location

OU 4 is located at Area C, NTC, Orlando. The area was formerly the location (Building 1100) of the drycleaning and laundry operations for NTC, Orlando and is currently vacant. Contaminants at the site are assumed to be the product of the drycleaning operations.

1.2 WORK NOT COVERED BY CONTRACT DOCUMENTS

a. The demolition and closure of the IRA treatment system(s) shall be covered under a separate contract and, therefore, is not addressed in these specifications.

b. Installation of additional recirculation well(s) and associated prep work not included herein.

c. The following specifications may be supplied wholly, or in part, in a workplan prepared by the Response Action Contract (RAC) contractor. This technical specification document was prepared with the understanding that the workplan submitted by the RAC will be provided for approval by Southern Division, Naval Facilities Engineering Command as the document to be implemented into construction and, therefore, the following specifications will be included in their workplan and not in this attachment.

1. 01025 - MEASUREMENT AND PAYMENT
2. 01041 - PROJECT COORDINATION
3. 01300 - SUBMITTALS
4. 01310 - PROGRESS SCHEDULES
5. 01400 - QUALITY CONTROL
6. 01500 - CONSTRUCTION FACILITIES
7. 01560 - ENVIRONMENTAL PROTECTION
8. 01700 - PROJECT CLOSEOUT
9. 01730 - OPERATION AND MAINTENANCE DATA
10. 02220 - GENERAL EXCAVATION, FILLING, AND BACKFILLING
11. 02229 - VEHICLE AND EQUIPMENT DECONTAMINATION
12. 02720 - STORM DRAINAGE SYSTEM
13. 02831 - FENCE, CHAINLINK

DIVISION 03 - CONCRETE
DIVISION 11 - EQUIPMENT
DIVISION 15 - MECHANICAL
DIVISION 16 - ELECTRICAL

1.3 SUBMITTALS

Submit in accordance with Section 01300, "Submittals."

1.4 MINIMUM INSURANCE REQUIREMENTS

Not used.

1.5 CONTRACTOR PERSONNEL REQUIREMENTS

Not used.

1.6 CONTRACTOR ACCESS AND USE OF PREMISES

1.6.1 NTC, Orlando Regulations

Ensure that Contractor personnel employed on base become familiar with and obey NTC regulations. Keep within the limits of the work and avenues of ingress and egress. Do not enter restricted areas unless required to do so and until cleared for such entry. Permission to interrupt any base roads, railroads, or utility services shall be requested in writing a minimum of 15 calendar days prior to the desired date of interruption. The Contractor's equipment shall be conspicuously marked for identification.

1.6.2 Working Hours

Regular NTC working hours shall consist of a period between 7 a.m. and 5 p.m., Monday through Friday, excluding Government holidays.

1.6.3 Work Outside Regular Hours

Work outside regular working hours shall be coordinated through the Navy Technical Representative (NTR). During periods of darkness, work areas shall be lighted in a manner approved by the NTR. Also, NTC, Orlando's Base Security must be notified for work after hours and on weekends.

1.6.4 Utility Cutovers and Interruptions

a. Coordinate utility cutovers and interruptions through the NTR.

b. Ensure that new utility lines are complete, except for the connection, before interrupting existing service.

c. Interruption to Water, Sanitary Sewer, Electric Service, shall be considered utility cutovers pursuant to the paragraph entitled "Work Outside Regular Hours." This time limit includes time for deactivation and reactivation.

1.7 LOCATION OF UNDERGROUND FACILITIES

Survey the construction site with appropriate pipe and cable locating equipment, and mark the surface of the ground where existing underground utilities are discovered. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated (or discovered during scanning) in locations to be traversed by piping, ducts, and other work to be installed. Verify elevations before installing new work closer than nearest manhole or other structure at which an adjustment in grade can be made.

1.7.1 Notification Prior to Excavation

Notify the NTR 48 hours prior to starting excavation work in order to schedule arrangements with public works personnel to scan the area for unmarked utilities.

1.8 PRECONSTRUCTION CONFERENCE

Prior to commencement of any work at the site, meet with the NTR to discuss and develop a mutual understanding relative to the administration of the value engineering and safety program, preparation and submission of the schedule of prices, shop drawings and other submittals, scheduling, programming and execution of work. Conceptual design and performance specifier (ABB Environmental Services, Inc. [ABB-ES]) and any other major subcontractors who will be engaged in the work may also attend as deemed appropriate by the NTR.

1.8.1 Recommended Agenda:

1. Distribute and discuss:
   a. List of major subcontractors.
   b. Tentative construction schedules.
2. Critical work sequencing.
3. Relation and coordination of subcontractors.
4. Designation of responsible personnel.
5. Processing of field decisions and change orders.
6. Use of premises:
   a. Office and storage areas.
   b. Owner's requirements.
7. Safety and first-aid procedures.
8. Environmental protection.

## 1.9 RECOMMENDED CONSTRUCTION SEQUENCE

The recommended construction sequence for this project is listed below.

a. Baseline sampling and monitoring event (ABB-ES).

b. Limited clearing, grubbing and other access improvements within designated limits of construction.

c. Construction of recirculation *in situ* stripping treatment wells.

d. Construction of concrete pad and any other aboveground completion appurtenances.

e. Construction of additional monitoring wells for performance monitoring.

f. Construction of treatment systems enclosure (fencing).

### 1.9.1 Clearing, Grubbing and Access Improvements

The contractor shall clear and improve access to the site only to the extent that is deemed absolutely necessary for system installation. No clearing or grubbing will be permitted in the area defined as wetland.

Clearing and grubbing shall be performed in accordance with the Technical Specification for Clearing and Grubbing included in the workplan prepared by the RAC.

### 1.9.2 Construction of Recirculation/*In Situ* Stripping Well(s)

The recirculating well treatment system shall be designed to capture/contain the area defined by the 100 parts per billion (ppb) VOC contaminant contour line both horizontally and vertically, as illustrated within the Focused Field Investigation (FFI) Report (ABB-ES, 1996). The installation(s) should be adjacent to but outside the limits of the wetland as defined on the Site Plan, Drawing C-1. Refer to Section 02670; Recirculation/*In Situ* Stripping Well(s).

### 1.9.3 Construction of Concrete Pad

Concrete pad shall be completed to a minimum of 1 foot above grade to divert storm water from entering the recirculation well. The pad should be designed to handle hydrostatic loads and sized to prevent ground surface breaching of discharged groundwater. The concrete pad should also be sized large enough to handle the blower, recirculating well vault, and hold two vapor carbon units if necessary. Further detail will be provided by the RAC in Section 03302 Cast-in-Place Concrete (Minor Construction).

### 1.9.4 Construction of Additional Monitoring Wells

Additional monitoring wells (as required) will be installed to assist in evaluating and validating the recirculation system performance. Refer to the Performance Monitoring and Sampling Plan in Appendix B.

1.9.5 Baseline Monitoring and Sampling (ABB-ES)

Sampling and monitoring of the groundwater, surface water, and sediment prior to the startup operation of the system will be done in order to provide a baseline of physical and chemical data. The data will be used to help measure the system's effectiveness. Refer to the Performance Monitoring and Sampling Plan in Appendix B.

1.9.6 Construction of Treatment System Enclosure

Enclosure (fencing) shall be constructed in accordance with the Technical Specification for Fence, Chainlink included in the workplan to be prepared by the RAC.

1.10 STARTUP, PERFORMANCE MONITORING, AND OPERATIONS AND MAINTENANCE

1.10.1 Startup Operations

During the initial stages of the system's operation, monitoring, including piezometric head response and sampling, will be executed in order to verify the system is meeting the design performance criteria. Refer to Section 01680 Treatment System Startup.

1.10.2 Performance Monitoring and Sampling (ABB-ES)

The performance monitoring and sampling plan is designed to evaluate and validate the performance, progress, and effectiveness of the recirculating/*in situ* stripping well treatment system(s). Refer to the Performance Monitoring and Sampling Plan in Appendix B.

1.10.3 Operation and Maintenance

An operation and maintenance (O&M) plan will be developed by the RAC. The O&M plan should address specific O&M needs, actions, and reporting format for maintenance of the system.

-- End of Section --

SECTION 01680

TREATMENT FACILITY STARTUP

PART 1 GENERAL

1.1 REFERENCES

Not Used.

1.2 DESCRIPTION OF WORK

1.2.1 Work included

a. Startup of the recirculating/*in situ* stripping well treatment facility(s) shown on the Drawings and described in these specifications, in accordance with the system treatment objectives as in the Conceptual Design and Performance Specification Basis:

1. The recirculating well treatment system must intercept the area defined by the 100 parts per billion (ppb) total volatile organic compound (VOC) contaminant contour line both horizontally (Site Plan, Drawing C-1) and vertically, as illustrated within the Focused Field Investigation Report (ABB Environmental Services, Inc. [ABB-ES], 1996). The installation(s) should be adjacent to but outside the limits of the wetland as defined on the Site Plan, Drawing S-1. The approximate capture dimensions are 200 feet wide and 45 feet deep below land surface (bls).

2. System design/configuration shall be such that the mounding effect associated with the treated water discharge at the top of the recirculation well(s), does not, under any conditions, breach the ground surface.

3. Aboveground completion, not including air vents or offgas piping, of the recirculation well(s) shall be, if possible, limited to no more than 6 feet above ground surface.

4. Treated groundwater discharged from the capture sphere of the recirculating and *in situ* stripping well(s) should not contain contaminants of concern (COCs) in concentrations greater than Florida's Surface Water Quality Standards for chemicals with a standard. All other effluent COCs shall meet Florida's maximum contaminant levels, where applicable.

5. The design parameters for the optional source recirculating well (if deemed necessary) such as depth, influent concentrations etc., will be verified following the focused contamination assessment around the surge tank.

b. Startup activities shall be considered complete following 7 calendar days of continuous successful operation of the treatment system. Successful operation is defined as meeting the design criteria objective: "gaining control, both horizontally

(200 feet wide within the 100 ppb contour) and vertically (45 feet bls), of the groundwater exceeding 100 parts per billion (ppb) for total VOCs, migrating toward Lake Druid, adjacent to the wetland delineation line, as shown on Sheet S-1". Capture area will be measured by water-level or piezometric head response.

c. Successful operation means that process operations and equipment functions are in accordance with the original design intent. Minor process interruptions caused by performance changes, electrical outage or physical breakdowns will be tolerated if such occurrences are infrequent.

1.2.2 Description of Operation:

a. Contaminants and Treatment Objective

1. Groundwater Treatment

**Estimated Treatment Sphere Influent Concentrations and Spree Discharge Criteria for Contaminants of Potential Concern**

| Contaminants of Potential Concern | Approximate Treatment Sphere Influent Concentrations ($\mu g/\ell$) | Treatment Sphere Discharge Criteria ($\mu g/\ell$) |
|---|---|---|
| Tetrachloroethene | 500 | 8 |
| Trichloroethene | 2,700 | 80 |
| total 1,2-Dichloroethene | 700 | 70 |

Notes: Discharge criteria based on Florida's Surface Water Quality Standards (FSWQS) for chemicals with a standard and Florida's maximum contaminant levels for contaminants of concern not covered in the FSWQS.

$\mu g/\ell$ = micrograms per liter.

2. Offgas Treatment: No air emission treatment device is anticipated as indicated by the FDEP. However, that decision will be finalized following the final design.

b. Operation

1. Initially recirculation well(s) will pump at a rate defined by the vendor to meet the remedial objective, as stated above. System flow rate should be able to be controlled manually by throttling valves in order to adjust flow rate to meet the performance objectives.

2. Groundwater will enter through the bottom of the recirculation well system, and is conveyed upward. In-well aeration is used to remove the dissolved VOCs. Groundwater is then discharged from the top of the recirculation well back to the surficial aquifer.

3. If the offgas treatment exclusion (see Appendix A) is granted for the recirculation/*in situ* stripping well, offgases will be allowed to escape directly to the atmosphere. If the exclusion is not granted, the offgas from the well will

likely be treated by granular activated carbon (GAC) to remove vapor phase contaminants down to levels to be specified by Florida Department of Environmental Protection.

4. The vapor GAC, if used, is to be regenerated offbase, as will be specified by the RAC.

1.3 SUBMITTALS

Submittals in accordance with Section 01300, "Submittals" to be provided by the RAC.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 STARTUP REQUIREMENTS

3.1.1 Perform system startup to ensure that system components are functioning according to specifications within prescribed operating parameters. System startup shall be documented in a written report and approved by a registered Professional Engineer. Startup performance shall include but not be limited to the following:

a. Pumps are functioning correctly and meet flow requirements at stated head condition.

b. Any tanks or canisters are sound and functional.

c. Piping is sound and not leaking.

d. The stripping function of well performs properly and meets required output.

e. Instrumentation and control components operate properly. Test alarm conditions and change flow rates and air flow to simulate various operating conditions.

f. Proper functioning of plant utilities, e.g., water, sewer, heating, power, lighting, etc.

g. The treatment facility(s) meet the treatment objectives through piezometric head response and groundwater chemical analysis. Monitoring will be daily during startup.

h. Record data in logbooks and/or data sheets and provide to Southern Division, Naval Facilities Engineering Command per contract requirements.

-- End of Section --

# DIVISION 2

# SITE WORK

SECTION 02015

PART 1 GENERAL

1.1 RELATED REQUIREMENTS:

General Excavation, Filling and Backfilling: Section 02220

1.2 DESCRIPTION:

a. Various subsurface explorations have been conducted at the locations shown on the Drawings for the purpose of assisting the Comprehensive Long-Term Environmental Action, Navy Contractor in the preliminary design activities associated with this Interim Remedial Action. Logs of these explorations are included in the Interim Remedial Action Focused Field Investigation Report (ABB Environmental Services, Inc., 1996).

b. Explorations are not intended to indicate subsurface conditions except at the locations of the borings and are based on the information available and the Geologist's interpretations at the time borings were made.

c. Explorations were not made for, nor intended to be used by, the response action contract contractor for purposes of determining or facilitating the constructability of the project or the cost thereof. Therefore, they may not be suitable or adequate for any purpose other than for use in designing the wells for the project.

-- End of Section --

SECTION 02016

# EXISTING UTILITIES AND UNDERGROUND STRUCTURES

## PART 1 GENERAL

### 1.1 RELATED REQUIREMENTS:

General Excavation, Filling, and Backfilling: Section 02220, to be provided by the response action contract.

### 1.2 DESCRIPTION

a. The existing utilities shown on the Site Plan drawing (S-1) are shown diagrammatically, and it is not to be inferred that the locations shown are precise.

b. Coordinate with all applicable utility owners prior to excavation in areas where it is reasonable to expect the presence of existing utilities, whether shown on the Drawings or not.

c. Contact the Navy Technical Representative and the affected utility as soon as any damage is discovered.

d. The utility shall make the determination as to who makes the necessary repairs.

e. In areas where existing underground structures are shown or suspected, carefully uncover such structures to determine what adjustments if any need to be made to accommodate the presence or removal or such structures.

-- End of Section --

SECTION 02670

# RECIRCULATING/*IN SITU* STRIPPING WELL(S)

## PART 1 GENERAL

### 1.1 REFERENCES

1.1.1 The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

| | |
|---|---|
| ANSI/ASME B1.20.1 | 1983 Pipe Threads, General Purpose (Inch) |

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

| | |
|---|---|
| ASTM A 53 | 1990 (Rev. B) Pipe, Steel, Black and Hot--Dipped, Zinc-Coated Welded and Seamless |
| ASTM C 150 | 1989 Portland Cement |
| ASTM A 312/A312M | Specification for Seamless and Welded Austenitic Stainless-Steel Pipe |
| ASTM A 403/A403M | Specification for Wrought Austenitic Stainless-Steel Piping Fittings |
| ASTM C 494 | 1990 Chemical Admixtures for Concrete |
| ASTM A774/A774M | Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures |
| ASTM A778-88 | Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products |
| ASTM D 1785 | Specifications for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 |

AMERICAN WATER WORKS ASSOCIATION (AWWA)

| | |
|---|---|
| AWWA C206 | 1988 Field Welding of Steel Water Pipe |

ENVIRONMENTAL PROTECTION AGENCY (EPA)

| | |
|---|---|
| EPA 570/9-75-001 | Water Well Construction Practices |

### 1.2 SUBMITTALS

Submit the following in accordance with Section 01300, "Submittals", as provided by the response action contract contractor.

1.2.1 Drawings

1. Site Plan.
2. Recirculating/*In Situ* Stripping Well Detail.
3. Recirculating/*In Situ* Stripping Well Components Detail.
4. Process and Instrumentation Diagram

1.2.2 Statements

1. Development water disposal methods
2. Drill cuttings disposal methods

1.2.3 Field Test Reports

1. Pressure Test

1.2.4 Certificates

1. Casings
2. Bentonite seal
3. Bentonite/Cement grout
4. Well screens
5. Sand pack

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact. Replace defective or damaged materials with new materials.

1.4 GENERAL REQUIREMENTS

All monitoring well materials, installation, development, protection and designation will be conducted in accordance with the Southern Division, Naval Facilities Engineering Command *Monitoring Well Design, Installation, Construction, and Development Guidelines* (May, 1997); U.S. Environmental Protection Agency (USEPA) *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* (May, 1996); and the Naval Training Center, Orlando, Florida *Project Operations Plan* (March, 1994).

PART 2 PRODUCTS

2.1 EQUIPMENT, MATERIALS, TOOLS, CONTAINERS, ETC.

Equipment, materials and tools shall conform to the respective specifications and other requirements as specified herein.

2.1.1 Drill Rigs and Tools:

Drill rigs shall be specifically designed and manufactured for production well drilling. Drill rigs and tools that are not adequate, in the opinion of the Contracting Officer, will not be permitted.

2.1.2 Well Casing

1. Recirculating/*In Situ* Stripping Well and Piezometers (Monitoring Wells)

The casing material shall be specified by vendor; however, it must be resistant to contaminants found at OU4.

Recommended casing for the adjacent piezometers (monitoring wells) should be 2-inch-diameter, Schedule 40 PVC, flush threaded.

2.1.3 Well Screen

1. The recirculating/*in situ* stripping well screen(s) material and slot size shall be specified by vendor. Aquifer characterization analysis recommended 0.020-inch continuous wire-wrap screen size for optimal well efficiencies.

   Piezometers not placed in the annulus of the recirculating/*in situ* stripping well should be flush threaded 2-inch-diameter, Schedule 40 PVC, 0.010-inch continuous wrap.

2. Length of the recirculating/*in situ* stripping well screen(s) and the piezometer screens within the treatment well's annulus should be specified by vendor.

2.1.4 Cement Grout

Provide neat cement grout, Type I or II portland cement conforming to ASTM C 150, and water. The mixed grout shall contain no more than 7 gallons of water per bag (1.0 cubic foot or 94 pounds) of cement with a 4 percent bentonite mixture.

2.1.5 Auxiliary Equipment

Provide pump, discharge piping and storage to collect purge water during development.

2.1.6 Sediment Trap

A sediment trap will be installed in the recirculating/*in situ* stripping well(s) if specified by vendor.

2.1.7 Well Caps

Provide locking expansion well caps for piezometers. Protective casings should conform to Southern Division, Naval Facilities Engineering Command, Guidelines for Groundwater Monitoring Well Installation.

2.1.8 Backfill Materials

Backfill for the recirculating/*in situ* stripping well(s), including annular seal(s) shall be specified by vendor; however, aquifer characterization analysis recommended backfill material (filter pack) consisting of 6/20 silica sand for optimal well efficiencies.

Backfill for all piezometers outside the annulus of the recirculating/*in situ* stripping well should consist of 20/30 silica sand tremied to 2 feet above the well screen (s). Bentonite slurry seal should be installed to 2 feet above filter sand. Grout mixture to be installed to ground surface.

2.2 QUALITY CONTROL

Well materials shall be new and undamaged and, where possible, factory cleaned and wrapped. Materials that are damaged or determined to be not in accordance with desired specifications will be rejected. Equipment and materials will be decontaminated and stored in a fashion that will adequately protect them from contamination or degradation.

PART 3 EXECUTION

3.1 WELL LOGS

3.1.1 During the progress of each boring, the Contractor shall keep a continuous and accurate log of the materials encountered and a complete record of the operation of installing casing. Soil cuttings shall be described on a boring log in accordance with the Unified Soil Classification System.

3.1.2 Records shall include at least the following data:

1. Names of driller and inspector.
2. Dates and times of beginning and completion of work.
3. Identifying number and location of test boring.
4. Diameter of bore hole.
5. Diameter and description of casing.
6. Total length of each size of casing.
7. Diameter and description of screen(s).
8. Total length of screen(s) used.
9. Depth to the top of screen(s).
10. Length of casing extending below ground surface at the completion of the boring.
11. Depth to top of each different material penetrated.
12. Depth to water surface in borehole at completion and at end of each major work stoppage.

13. Loss or gain of drilling water.
14. Sudden dropping of drill rods or other abnormal behavior.
15. Total amount of filter pack sand used and depth interval.
16. Total amount of bentonite used and depth interval.
17. Total amount of grout used and depth interval.

## 3.2 WELL CONSTRUCTION

### 3.2.1 General Procedures

Well development of both the recirculating/*in situ* stripping well(s) and the adjacent piezometers shall be conducted after well installations, but prior to final hookup of the treatment system.

### 3.2.2 Recirculating/*In Situ* Stripping Well(s) Installation

Recirculating/*in situ* stripping well(s) will be installed in the surficial aquifer at OU 4. The depth and configuration will be specified in the final design, in conjunction with the proprietary technology vendor, with the objective of containing the 100 part per billion (ppb) contamination part of the affected aquifer both horizontally and vertically as defined by contaminant contouring in the Interim Remedial Action Focused Field Investigation Report (ABB-ES, 1996). The recirculation well(s) may not be installed within the limits of the wetland as defined on the Site Plan drawing S-1. The method for installing the well(s) will be one that does not introduce mud or other drilling additives that will affect the aquifer hydraulic properties; preferably a casing driven method. All recirculation well(s) will be sealed, with locking well caps, until installation of down-hole equipment and aboveground completions.

### 3.2.3 Well Development

Following recirculating/*in situ* stripping well(s) installation, the well(s) will be developed as specified by the vendor to increase yield and to remove fluids that may have been introduced during drilling operations. Development will be initiated no sooner than 24 hours and no later than 72 hours following the completion of grouting.

Recommended development of piezometers shall be accomplished by using a swab/surge block assembly and a submersible pump. No air or water will be injected into the wells during development. Each well will be developed and surged by removing a minimum of 5 well volumes, until the water is clear and free of apparent turbidity and/or until field measurements of specific capacity, pH, conductivity, and temperature have stabilized. At well locations with very slow recharge or little water, wells will be developed to dryness three times.

3.2.4 Down Hole Equipment and Aboveground Completion

Recirculation/*in situ* stripping well(s) down hole and aboveground components will be installed upon completion and acceptance of well development by the Contracting Officer.

3.3 PERMITS AND REGULATIONS

Permits and licenses of a temporary nature necessary for the execution of the RAC contractor's work shall be secured and paid for by the RAC. The RAC contractor shall give all notice and comply with laws, ordinances, rules, and regulations bearing on the conduct of the work as described in the scope of work specified.

3.4 PROTECTION OF WORK, PUBLIC AND PROPERTY

3.4.1 The means, methods, procedures, and techniques to be used by the Contractor are the responsibility of the Contractor and shall be designed to meet the intent of the specifications.

3.4.2 The Contractor shall continuously protect work from damage and protect adjacent property as provided by law. The Contractor shall maintain lights and other safety devices as required. The Contractor shall promptly repair damages caused by its operations. When using internal combustion equipment, the Contractor shall have available at the work site emergency fire extinguishers or other approved fire-fighting apparatus.

3.4.3 During operations, the Contractor may occupy only those portions of the site for which the required permits have been obtained by the Contractor.

3.4.4 Fill drill holes with grout, regrade areas of surface soil disturbance, and reseed areas where the grass is damaged.

3.4.5 Drilling casings shall be withdrawn from the drill holes unless directed to be left in place by the Navy Technical Representative.

3.5 DISPOSAL OF CUTTINGS AND WELL DEVELOPMENT WATER

3.5.1 Stored cuttings and decontamination fluids should be kept in Federal Department of Transportation-approved containers for soils and fluids, which shall be supplied by the Contractor and disposed of in a manner approved by the Contracting Officer. Characterization and drum disposal will be the responsibility of the Contractor. Any drums stored at the site must be labeled and stored together in a secure location. Contractor shall ensure transportation and disposal means and methods comply with State and Federal regulatory authorities. Contractor shall furnish the Contracting Officer with written documentation and records verifying receipt and the quantity received of each load at the disposal facility and verification of proper disposal.

3.5.2 Development water should be collected and sampled prior to removal or discharge from the site. Store the collected water onsite at a secure location for subsequent treatment or removal. The Contractor shall ensure that transportation and/or treatment disposal means and/or methods comply with local, State, and Federal regulation authorities. The Contractor shall provide storage of water onsite and in a secure location. The Contractor shall be responsible for any spills from storage containers.

3.6 FIELD SAMPLING AND TESTING

3.6.1 Material Samples

To identify possible deviations from design and/or contaminants in materials used for drilling activities and comply with USEPA Region IV guidelines, the Contractor will collect samples from each of the following materials and/or other materials used in the drilling activities:

a. monitoring well filter pack sand,
b. bentonite,
c. grout slurry, and
d. municipal water used for drilling fluid.

These samples will be archived by the RAC.

3.6.2 Pressure Test of Down Hole Equipment

Recirculation/*in situ* stripping well down hole components will be pressure tested as specified by the vendor.

3.7 ABANDONMENT AND COMPLETION OF BORINGS

3.7.1 Borings shall not be abandoned before reaching the final depth authorized by the Contracting Officer except with the approval of the Contracting Officer.

3.7.2 Borings abandoned before reaching required depth, because of an obstruction or other reasonable cause not permitting completion of the boring by standard procedures, shall be replaced by a supplementary boring adjacent to the original and carried to the required depth.

3.7.3 Abandoned well borings will be backfilled with cement slurry.

3.8 CLEANUP

Upon completion of the work, the Contractor shall remove rigs and surplus and unused material and leave the site in a clean condition to the satisfaction of the NTR.

3.9 DECONTAMINATION

Drill rigs, pumps, and tools (casing and rods) shall be steam cleaned, with potable water prior to setting up at the drilling location, between drilling locations and prior to departure. More

frequent decontamination of rigs may be required depending on actual exposure to contaminated conditions. Containerize decontamination water as described in the article entitled Disposal of Cuttings and Well Development Water in this Section. Alternative decontamination procedures and methods shall be approved by the Contracting Officer prior to their use. Perform decontamination at a specially designated decontamination area as directed by the Contracting Officer.

3.10 INSPECTION OF WORK

The NTR shall have access to the work, and the Contractor shall provide proper facilities for such access and for inspection. Drilling and well installation shall be in accordance with the requirements of these specifications and authorizations of the NTR.

-- End of Section --

# REFERENCES

ABB-ES, 1994, Project Operations Plan for Site Investigations and Remedial Investigations, Naval Training Center, Orlando, Florida: prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina, March.

ABB-ES, 1996, Interim Remedial Action Focused Field Investigation Report Operable Unit 4, Naval Training Center, Orlando, Florida: prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, November.

SOUTHNAVFACENGCOM, 1997, Monitoring Well Design, Installation, Construction, and Development Guidelines, March.

U.S. Environmental Protection Agency, 1996, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May.

# APPENDIX A

# PERMITTING

# APPENDIX A

## PERMITS TO BE FILED

### 1.0 AIR PERMITTING

Florida Department of Environmental Protection (FDEP) has indicated that air emission requirements for the system will be covered under the FDEP Memorandum dated May 17, 1996, regarding revised guidance on air emissions. The guidance indicates 1) the emission source must be temporary in nature (operated less than 5 years) and 2) air emissions must not exceed 15 pounds per day of total volatile organic compounds (VOCs) for treatment of offgasses to be avoided. Therefore, because of the duration of the Interim Remedial Action (IRA) and the results of the preliminary offgas emission calculations, offgas treatment along with a formal air permit is not expected. Greg Brown of FDEP has indicated that his seal on the final design will serve as the air permit certification.

Preliminary emissions calculations and a copy of the FDEP memorandum are included in this appendix.

### 2.0 WELL PERMITTING

The recirculation/*in situ* stripping treatment system wells have a potential outside diameter of 16 inches. According to *St Johns River Water Management District, Consumptive Uses Of Water, Chapter 40C-2*, a consumptive use permit is required for wells where the water bearing casing is 6 inches or larger. However, in this case, an exemption applies. Section 3.4.1.c.1 states that withdrawals of groundwater to remove pollutants from contaminated water in which the extracted groundwater is recharged onsite to the aquifer from which it was withdrawn do not require a consumptive use permit. Recirculation wells do not physically withdraw water, and all treated water is recharged. The pertinent pages of Chapter 20C-2 are enclosed for review and reference.

The contact at St. Johns River Water Management District is Shannon Joyth in the well permitting department. She can be reached at (407) 897-4320.

### 3.0 EXCAVATION PERMITTING

An excavation permit must be completed and filed with the Public Works Department, Naval Training Center, Orlando, Florida. This must be done no less than 5 working days before any excavation. A copy of the excavation permit application is enclosed for future use at Area C.

In addition, FDEP requires a permit for any wells installed within the wetland. The permit is the "Joint Environmental Resource Permit Application," form # 62-343.900(1). A copy is enclosed for future use at Area C.

# 1.0 AIR PERMITTING

## *IN SITU* GROUNDWATER TREATMENT SYSTEM - ESTIMATED VAPOR EMISSIONS

Maximum contaminant concentration estimates are based on the Focused Field Investigation groundwater sampling results and groundwater sampling results from the August 1996 pumping test:

| | | |
|---|---|---|
| 1) | Trichloroethylene: | 2,700 $\mu g/\ell$ |
| 2) | Tetrachloroethylene: | 500 $\mu g/\ell$ |
| 3) | cis- 1,2 Dichloroethylene: | 700 $\mu g/\ell$ |

*In Situ* Groundwater Treatment System (UVB-400)

| | |
|---|---|
| Water Flow Rate: | 8 $m^3$/hr (per well basis) |
| Number of Treatment System Wells: | To be decided by vendor, calculations are for one treatment well. |
| Air/Water Ratio: | 50:1 |
| Removal Efficiency: | Assume: 100%<br>Actual: 90% to 95% |

Formula for anticipated maximum vapor (off gases) emissions:

$$(Water\ Flow) \times (Contaminant\ Conc.) \times (removal\ efficiency) = off\ gas\ emissions \quad (1)$$

1) Trichloroethylene

$$(8\ m^3/hr) \times (24\ hr/day) \times (2.70\ mg/\ell) \times (.001\ g/mg) \times (.0022\ lb/g) \times (1{,}000\ \ell/m^3) \times (1.00) = 1.14\ lb/day/per\ well\ or\ 416\ lb/year/per\ well \quad (2)$$

2) Tetrachloroethylene

$$(8\ m^3/hr) \times (24\ hr/day) \times (0.50\ mg/\ell) \times (.001\ g/mg) \times (.0022\ lb/g) \times (1{,}000\ \ell/m^3) \times (1.00) = 0.21\ lb/day/per\ well\ or\ 77\ lb/year/per\ well \quad (3)$$

3) cis- 1,2 Dichloroethylene

$$(8\ m^3/hr) \times (24\ hr/day) \times (0.70\ mg/\ell) \times (.001\ g/mg) \times (.0022\ lb/g) \times (1{,}000\ \ell/m^3) \times (1.00) = 0.30\ lb/day/per\ well\ or\ 108\ lb/year/per\ well \quad (4)$$

Total vapor emissions per day and per year for each well would therefore be approximately **1.65 and 601 pounds** total volatile organic compounds (VOCs), respectively. This estimate is based on the following assumptions: the groundwater treatment system is 100 percent efficient in stripping the VOCs from

the groundwater and that the VOC concentrations will remain at the estimated maximum concentrations for the entire year.

In reality, VOC concentrations in the treated water are expected to decrease. At system startup, VOCs will likely be emitted at the rates calculated above. However, VOC concentrations within the treatment cell around each well should be quickly reduced. When the treatment cells are fully established, the total VOC emissions from the treatment system should approximate the current rate of VOC emissions to Lake Druid, or 25 pounds/year.

These calculations assume the treatment system will be intercepting the plume in the vicinity of the existing recovery well (RW-1). Air emissions will increase if an additional system is installed in the source area.

| Completed By: | Date: | Checked By: | Date: | Checked By: | Date: |
|---|---|---|---|---|---|
| Marc Hawes | May 9, 1997 | Harlan Faircloth | May 9, 1997 | | |

Florida Department of

# Memorandum Jim Cave Environmental Protection

DARM-OGG-03
Revised

TO: Bureau of Waste Cleanup
Bureau of Air Regulation
District Waste Program Administrators
District Air Program Administrators
District Waste Cleanup Supervisors
District Tanks Supervisors
Local Program Tank Supervisors
Local Air Program Administrators

BUREAU OF WASTE CLEANUP
MAY 23 1996
TECHNICAL REVIEW SECTION

FROM: John M. Ruddell, Director JMR
Division of Waste Management

Howard L. Rhodes, Director
Division of Air Resources Management

DATE: May 17, 1996

SUBJECT: Revised Guidance on Air Emissions from Petroleum Cleanup Sites

This guidance replaces the February 27, 1996 Guidance, DARM-OGG-03.

This memorandum provides guidance for evaluation of air emissions that will result from the cleanup of petroleum contaminated sites. This guidance replaces all previous guidance memoranda related to air emissions evaluation and control for groundwater treatment air strippers and vacuum extraction systems at petroleum contaminated sites.

The Bureau of Waste Cleanup is responsible for the cleanup of many petroleum contaminated sites throughout the state. The cleanup systems on these sites will not be identical but will have similarities as far as considerations for air emissions control and evaluation. It is the intent to avoid duplicate efforts by Air and Waste Cleanup program staff in the evaluation of these cleanup systems. Therefore, the staff of the Bureau of Waste Cleanup and contracted local program offices will evaluate air emissions sources from existing and proposed petroleum contaminated site cleanup systems in accordance with the provisions of this memorandum. Provided that systems are designed and operated in accordance with the terms of this memorandum, the Remedial Action Plan Approval Order will serve as evidence that air emissions concerns have been adequately addressed. No separate air permit will be required for the operation of the cleanup system, as long as the procedures outlined in this memo for air emissions evaluation, treatment, and monitoring are followed unless the soil remediation unit is located at a facility that is a Title V source. If the unit is at a Title V source, it should be reported as an emissions unit and should be included in the Title V permit pursuant to Rules 62-213.420 and 440, F.A.C.

It is assumed that air emissions sources associated with petroleum cleanup sites will be temporary in nature, that is, will be operated less than 5 years. The Remedial Action Plan must include an estimate of the site cleanup duration. If the cleanup is projected to last greater than 5 years, the District Air Program Administrator must be contacted to obtain an air permit or an exemption under the provisions of Chapter 62-4, F.A.C.

The maximum air emissions from a cleanup site may not exceed 15 pounds per day of volatile organic compounds (VOCs), as determined by EPA Method 18 or other methods with prior approval of the Division of Air Resources Management and the Division of Waste Management. When several technologies are used together on a cleanup site, the air emissions from the multiple sources must be considered together in determining the combined air impacts from the site cleanup activities and the need for air emissions control. The emissions may be determined by direct measurement of the air stream for vapor extraction systems or on the basis of mass transfer of hydrocarbons from water phase to air phase in an air stripper system.

Recent years have seen the development of several new approaches to site cleanup. These processes each have different air emissions potentials and concerns due to the nature of the site cleanup process. A brief description of each process and the air emissions evaluation and control procedures for the process are described individually below.

Vapor extraction

Soil vapor extraction (SVE) or vacuum extraction is an accepted and proven technique for removing volatile organic compounds from the unsaturated zone of soils. The process typically involves several screened vacuum extraction lines, installed either vertically or horizontally, that are manifolded together to a single mechanical equipment system. In this technology, a vacuum is applied to the soil matrix to create a negative pressure gradient that causes movement of vapors toward the extraction wells. Vacuum extraction systems, as distinguished from bioventing systems, typically have relatively high vacuums and air flow rates. These systems primarily remediate soil by causing the volatilization of hydrocarbons adsorbed to soil through the induced vacuum and air flow through the soil. These systems are more effective on lighter petroleum products that are composed predominantly of compounds with higher vapor pressures. The remediation typically removes the greatest mass of VOCs and results in highest concentrations of recovered vapors in the first few days or weeks of operation.

The equipment system typically consists of a blower to create a vacuum, a knock out tank to reduce moisture, an air emissions treatment device, and valves, pressure gauges and air flow meters. Several variations of air emissions devices may be used, including activated carbon, catalytic oxidation, thermal oxidation or a biofilter. The type of air emissions treatment equipment selected will depend on anticipated air flow rates and VOC concentrations.

Vacuum extraction systems will generally be proposed where sites have soils excessively contaminated with VOCs. At such sites, due to the relatively high rates of hydrocarbon recovery in the early stages of vacuum extraction system operation, air emissions control at startup is generally mandatory. The Bureau of Waste Cleanup will consider site specific considerations if there are no excessively contaminated soils present or it is determined the petroleum hydrocarbons present will not be readily volatilized. The air emissions treatment device shall continue operation for the first 30 days of the vacuum extraction system operation. At the end of 30 days, air samples of recovered vapors shall be collected from the recovered vapor air stream without the air emissions treatment device. The air emissions, after controls, must be less than 15 pounds per day. Samples shall be collected in a tedlar bag and analyzed by EPA Method 18 or other methods, with prior approval of the Division of Air Resources Management and the Division of Waste Management, to determine total VOC concentrations. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the measured air flow rate. If the recovered VOCs (including any other emission sources from the site remediation) are less than 15 pounds per day without controls, air emissions

treatment may be discontinued. If the recovered VOCs are 15 pounds per day or greater, the air emissions control shall continue until subsequent samples demonstrate the VOC air emissions are less than 15 pounds per day.

Bioventing

Bioventing is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents adsorbed to soils in the vadose zone. The activity of the indigenous bacteria is enhanced by inducing flow of air (to supply oxygen for microorganism metabolism) through the unsaturated zone. The system design is similar to a vacuum extraction system in that there will be extraction (or injection) wells manifolded to an equipment system which includes a blower. The system design is different from soil vacuum extraction, however, in that air flow rates are generally much lower and air may be either injected to the unsaturated zone or withdrawn by applying a vacuum. Bioventing is most often used at sites with mid-weight petroleum products such as diesel fuels and jet fuel because lighter fuels such as gasoline tend to volatilize readily and can be removed more rapidly with soil vapor extraction.

Because this process relies on degradation of petroleum hydrocarbons by microorganisms rather than volatilization, air emissions control is not required. To qualify as bioventing and operation without air emissions control, the Remedial Action Plan must demonstrate that the remediation mechanism will be primarily biodegradation and must show that the uncontrolled air emissions are less than 15 pounds per day. This will generally necessitate the performance of a pilot study and subsequent system design (air flow rates) based on respiration rates established from the pilot study. Additionally, if the site is gasoline contaminated, startup air samples shall be obtained to verify no significant recovery of vapors by the system operation.

In-situ Sparging

In-situ air sparging is an in-situ remedial technology that reduces concentrations of volatile constituents in petroleum products that are adsorbed to soils in the saturated zone and dissolved in the groundwater. This technology involves the injection of contaminant-free air into the subsurface saturated zone, enabling a phase transfer of hydrocarbons from dissolved state to a vapor phase. The air is then vented through the unsaturated zone. Soil vapor extraction is used in conjunction with in-situ sparging to recover the volatilized hydrocarbons. Air sparging is generally more applicable to the lighter petroleum constituents and therefore most effective on gasoline contaminated sites. There is evidence to show that in-situ bioremediation may also be induced during in-situ sparging, however, for the purpose of this discussion it is assumed that the remediation mechanism is predominantly volatilization of petroleum hydrocarbons. A separate section below describes "biosparging" as a distinct process with different air emissions control considerations.

In-situ sparging systems are required to be operated in conjunction with a soil vapor extraction system and the soil vapor extraction system is required to have an air emissions treatment system at system startup due to the relatively high rates of hydrocarbon recovery in the early stages of in-situ sparging and vacuum extraction system operation. The air emissions treatment device shall continue operation for the first 30 days of the in-situ sparging and vacuum extraction system operation. At the end of 30 days, air samples of recovered vapors shall be collected from the recovered vapor air stream without the air emissions treatment device. The air emissions, after controls, must be less than 15 pounds per day. Samples shall be collected in a tedlar bag and analyzed by EPA Method 18 or other methods with prior approval of the Division of Air Resources Management and the Division of Waste

Management to determine total VOC concentrations. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the measured air flow rate. If the recovered VOCs (including any other emissions sources from the site remediation) are less than 15 pounds per day without controls, air emissions treatment may be discontinued. If the recovered VOCs are 15 pounds per day or greater, the air emissions control shall continue until subsequent air samples demonstrate the recovered vapors are less than 15 pounds per day uncontrolled.

Biosparging

Biosparging is an in-situ remediation technology that uses indigenous microorganisms to biodegrade organic constituents in the saturated zone. In biosparging, air and nutrients (if needed) are injected into the saturated zone to increase the biological activity of the indigenous microorganisms. The biosparging process is similar to in-situ air sparging. However, while in-situ air sparging removes constituents primarily through volatilization, biosparging promotes biodegradation of constituents rather than volatilization. Biosparging systems will typically have lower air flow rates designed on the basis of providing adequate oxygen supply to optimize biological activity without causing significant volatilization of hydrocarbons.

A biosparging system may be operated along with a bioventing system, a soil vapor extraction system, or with no soil venting system at all. This will depend to a large degree on the extent and nature of contamination of the unsaturated zone. If the extent of contamination to the unsaturated zone is not great enough to warrant any soil remediation system, no soil venting system is required to be operated with biosparging. If the extent of soil contamination warrants a soil remediation system, either vapor extraction or bioventing may be operated in conjunction with biosparging. If a vapor extraction system is proposed, the air emissions control and evaluation procedures described above under "soil vapor extraction" are applicable. If a bioventing system is proposed and the RAP demonstrates that both the biosparging system and bioventing systems will be predominantly bioremediation mechanisms and are designed on the basis of respiration rates of microorganisms, no air emissions control is required if it can be shown that the uncontrolled air emissions are less than 15 pounds per day.

Air Stripping of Recovered Groundwater

Air stripping in the context of this memo refers to any process in which dissolved hydrocarbons in recovered groundwater are transferred from dissolved phase to air phase through mechanical processes. The most common types are packed tower air strippers, aeration tanks, or tray-type aerators. Typically the recovery rate of hydrocarbons dissolved in groundwater results in a relatively low air emissions impact compared with the vacuum extraction and in-situ sparging technologies discussed above. The Department's experience is that air stripping of recovered groundwater generally results in relatively low air emissions that do not require treatment. The evaluation is to be based on the concentration of total volatile organic aromatics (VOAs) in recovered groundwater as determined by EPA Method 602. It shall be assumed that the results of the 602 analysis (BETX) represents 10 percent of the total VOCs. Considering the relatively low effluent standards for most treated groundwater disposal options, it should be assumed that all VOCs measured in groundwater are converted to the air phase. The VOC analytical result shall be used to calculate the daily pounds of VOCs recovered based on the design groundwater recovery rate. If the recovered VOCs (including any other emissions sources from the site remediation) are less than 15 pounds per day, air emissions treatment is not necessary. If the recovered VOCs are 15 pounds per day or greater, air emissions treatment shall be required.

If both soil vapor extraction and air stripping of recovered groundwater are operated on a site, it is generally appropriate to use the air emissions control device on the soil vapor extraction system first. Treating the vacuum extraction air emissions alone will generally reduce total air emissions to less than 15 pounds per day of VOCs. The air emission control shall continue until subsequent samples demonstrate the vapor emissions are less than 15 pounds per day.

Nuisance considerations

Notwithstanding the evaluation process described above, the RAP shall consider the location of the air emissions sources relative to receptors in the vicinity which could result in odor nuisance, or health concerns due to the direct proximity to the emissions source. If necessary, the RAP shall include recommendations for equipment location, additional exhaust stack height or air emissions treatment to address such concerns.

Alternate Air Emissions Evaluation Methods

The pounds/day of VOCs method to determine the need for air emissions treatment is the preferred method. If this evaluation results in a determination that air emissions control equipment is necessary, a supplemental evaluation of ambient air impacts based on plume dispersion modeling may be performed for verification prior to a final decision to provide an air emissions control device. The procedures in Attachment A shall be followed to make this demonstration.

Listed below are the ambient reference concentrations (ARCs) developed by the Division of Air Resources Management (DARM) for some of the petroleum constituents. This table includes both a column for 24 hour ARCs and a column for annual ARCs.

The 24 hour ARC is derived from occupational exposure levels such as the PELs set by OSHA or Threshold Limit Values that are based on the American Conference of Governmental Industrial Hygienists (ACGIH). The DARM has derived an equation to determine the 24 hour ARC values for different petroleum constituents. The equation is: TLV/420 = 24 hr ARC. Please note that these values are only utilized for short term exposures. Any type of air emissions which occur over a longer period of time should be evaluated based on the estimated annual average ambient concentration and compared against the reference values in EPA's Integrated Risk Information System (IRIS) database. Since five years will be the determining factor on whether an air permit is required, the Department will utilize the five year period as a cutoff between the use of a 24 hour ARC or an annual ARC. Any remedial action plan which estimates air emissions over a five year period should use the annual ARC values.

The TSCREEN Model will provide a 1 hour concentration as the default output. This model can also convert to a 24 hour concentration. Therefore, when a Remedial Action Plan proposes an air emission of less than five years, the model output for a 24 hour emission can be compared directly to the table shown below. However, if the Remedial Action Plan estimates air emissions over five years, the TSCREEN model does not convert from a 1 hour average to an annual average. Therefore one must use a conversion factor from a 1 hour average to an annual average and hand calculate these numbers. This conversion factor is 0.08.

This table does not include a 24 hour ARC for MTBE or an annual ARC for naphthalene. One should substitute the value provided and compare this value to that calculated from the TSCREEN

model. For example, the 24 hour ARC for MTBE should be 3000 ug/m3 and the annual ARC for naphthalene should be 119 ug/m3.

With the exception of naphthalene, the polynuclear aromatic hydrocarbons (PAHs) were not included on this table because: (1) There are only two ARC values available; (2) All of the PAHs are semi-volatile organics with a relatively low Henry's Constant. Therefore, the PAHs emitted to the air should be of a low magnitude; (3) The concentrations of PAHs discovered in the soil or the groundwater are typically less than 1 ppm (1000 ppb).

| CHEMICALS | 24hr ARC ug/m3 | annual ARC ug/m3 |
|---|---|---|
| benzene | 7 | 0.12 |
| 1,2-Dicholroethane | 95 | 0.038 |
| 1,2-Dibromoethane (EDB) | 71 | 0.0045 |
| MTBE | — | 3000 |
| ethylbenzene | 1033 | 1000 |
| naphthalene | 119 | — |
| toluene | 448 | 400 |
| xylene | 1033 | 80 |

JMR/HLR/h

Attachment

ATTACHMENT "A"

MODELING OF AIR EMISSIONS

The Department recommends the use of TSCREEN when determining the appropriate stack height of an air emission and whether air emission controls can be removed from a source of air emissions

Purpose of TSCREEN

TSCREEN is an easy-to-use, interactive, menu-driven, point-source screen model. The purpose of TSCREEN is to quickly and easily screen a point source emission to determine the maximum downwind concentration and the location of this maximum concentration. TSCREEN applies to a continuous point source and includes in the model a built-in worst case meteorology. Worst case meteorology is that combination of wind speeds and stability classes that can physically occur and runs all these cases for the "X" direction. It also uses the standard Gaussian equation, the Briggs plume rise and can consider nearby buildings for downwash, and/or account for fencelines.

Averaging Times

The default averaging time in the TSCREEN model is 1 hour. The maximum concentration can be calculated for additional averaging times selected from the menu. These times include: 15 minutes, 30 minutes, 3 hours, 8 hours, and 24 hours. To associate the ambient reference concentrations (ARC) developed by the Division of Air Resources Management with the results from TSCREEN, one should use the 24 hour averaging time and compare this to the 24 hour ARC.

Model Input

1. Always use 293° K for the ambient air temperature. An estimate should be made of the expected stack exit gas temperature.

2. The flat terrain should be used for sites in Florida.

3. Always use the rural terrain, except if the site is in the center of a large metropolitan area.

4. If a building is within the distance of five times the largest dimension of the building (height, width or length), then the building should be included in the model.

5. If a receptor is within close proximity of the stack (e.g., intake to ventilation system), flagging of this receptor should be included.

6. The receptor height for people standing on the ground should be 0.0.

7. In most cases use a small value (1.0 meter) for the distance to the outside of the site property unless institutional control of site access is possible.

8. The TSCREEN model can only calculate from one source. If there is more than one source one should combine the concentrations and input this data for the more conservative stack (e.g., lower exit temperature, lower velocity, shorter stack), or use the Industrial Source Complex Model.

9. The program will calculate the 1 hour maximum concentration in ug/m3. Use the 24 hour averaging time and compare this result to the ambient reference concentrations provided below. If the results show that the emissions are below ARC at the area of greatest impact, then either the stack

height is appropriate or the air emission control may be discontinued after concurrence from the Department (or local program).

Model Output

The SCREEN model output begins with the times and date that the model was run. Next, there is the model name and version number. Following the model name is the run's title and the user input. Next, the output contains a summary of results showing the maximum concentration and the distance to the maximum. Next, there is a list of concentrations for TSCREEN's automated distances. Finally, there is a listing of the cavity concentrations. Note: cavity concentrations are only listed if the effects of building downwash are being considered. The 24 hour averaging time result is at the end of the model output.

How can TSCREEN be obtained?

TSCREEN can be obtained from the EPA's Support Center for Regulatory Air Models (SCRAM) Bulletin Board System (BBS). The telephone number for access by modem is 919/541-5742.

# 2.0 WELL PERMITTING

# 3.0 Activities Requiring a Permit

## 3.1 Implementation Date of the Consumptive Use Permitting Program

3.1.1 The effective dates of implementation are found in Section 40C-2.031, F.A.C., (see Appendix B). There are three geographic regions in the District which are used in determining the effective date of implementation of the consumptive use permitting program (Figure 3.1-1).

These are:

(a) The Upper St. Johns River Basin (Area A of Figure 3.1-1) -- effective date December 31, 1976.

(b) The Green Swamp Subbasin (Area B of Figure 3.1-1) -- effective date December 1, 1980.

(c) The remaining portions of the District (Area C of Figure 3.1-1) -- January 1, 1983.

3.1.2 The effective date of implementation for the District's general water use permitting program (Chapter 40C-20, F.A.C.) is July 23, 1991. (See paragraph 40C-2.031(1)(d), F.A.C.). This program was implemented for the entire District on this date.

3.1.3 The effective date for the program implemented within the Delineated Area regulating the use of water from wells with casing diameters between three point five and six inches and regulating freeze protection uses not previously permitted, is 12-6-93.

3.1.4 The effective date of implementation of the District's secondary use permit (those uses requiring a permit pursuant to paragraph 40C-2.041(1)(g), F.A.C., and section 3.2.3) is 2-15-95.

3.1.5 The significance of the designated effective date is that it and the date of application are used to determine which criteria are to be used in evaluation of an initial permit application. Those uses existing on the effective date of implementation are to be evaluated using the criteria described in Section 8.0 of this Handbook, provided a substantially completed application is received by the District within two years of the date of implementation (See

subsection 40C-2.301(1), F.A.C.). Those uses which are to commence after the effective date of implementation for each area or for which a substantially completed application was not filed in the two year time period are to be evaluated using the criteria described in Section 9.0 of this Handbook (see subsection 40C-2.301(2), F.A.C.).

3.1.6 Those users who were not required to obtain a consumptive use permit under the provisions of previous District consumptive use rules but who are required to obtain a permit after January 1, 1983, are required to obtain a permit, even if the use is in an area which has an earlier implementation date.

## 3.2 Thresholds

3.2.1 A consumptive use permit is required for every consumptive use of ground or surface water which:

(a) exceeds 100,000 gallons per day (estimated on an average annual basis); or

(b) is from a facility (wells, pumps, etc.) or facilities which are capable of withdrawing one million gallons of water per day or more; or

(c) is from a well in which the outside diameter of the largest permanent water bearing casing is six inches or greater. For purposes of this section, the diameter of the well at ground surface will be considered to be the diameter of the well for its entire length unless the well owner or well contractor can demonstrate that the well has a smaller diameter water bearing pipe below ground surface.

3.2.2 Unless expressly exempted in 3.4, a consumptive use permit is required for all withdrawals from a well with a casing diameter of between five and six inches, and uses of water for freeze protection of agricultural and nursery property greater than five acres in size, within the Delineated Area as set forth in 6.7.1.6.

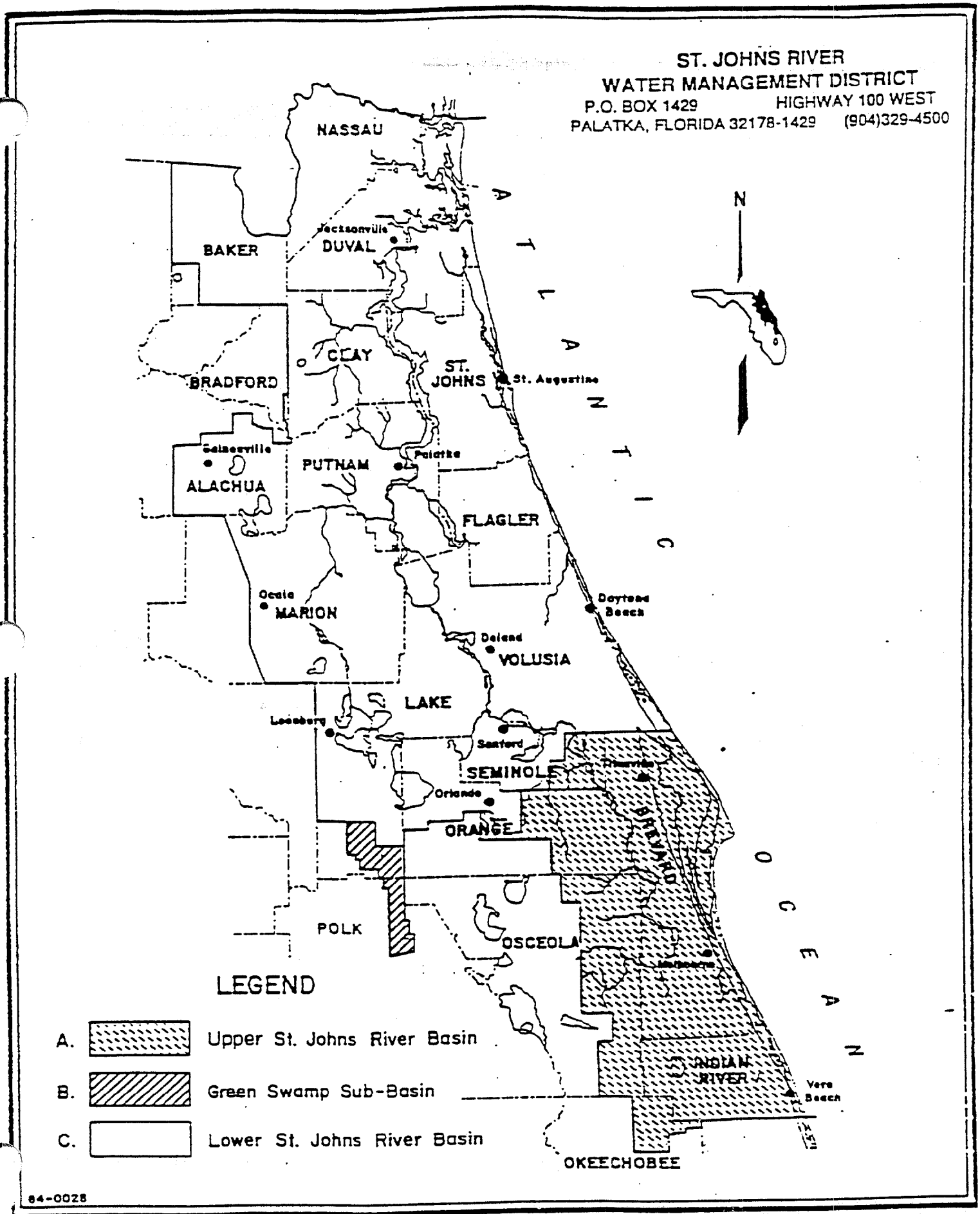


Figure 3.1-1 Areas within the District having differing effective dates for implementation of Consumptive Use Rules

3.2.3 Any secondary use of water which exceeds 100,000 gallons per day (estimated on an average annual basis), and was not reviewed for consistency with the criterion in section 9.3 and the applicable requirements contained in paragraphs 10.3(a), (b), (d), (e), (f), (g), (i), and (k) as part of the consumptive use permit application for the water supplier, must obtain a consumptive use permit. In determining whether the 100,000 gallons per day threshold is met, total withdrawals for all uses on contiguous properties that are owned, operated, or controlled by an individual, corporation, governmental agency, or other person shall be considered. Such secondary use need only satisfy the criterion in section 9.3 and the applicable requirements contained in paragraphs 10.3(a), (b), (d) (e), (f), (g), (i) and (k). The requirement to obtain a permit under this paragraph will provide greater water savings and assurances that all uses of water are consistent with the public interest and are reasonable beneficial. This will be achieved through the creation of a direct permitting relationship between the District and persons with secondary uses, alleviating the water supplier from the burden to satisfy all of the District's consumptive use permitting criteria for each of the secondary uses.

3.2.4 Except for secondary uses, the requirement for obtaining a permit is associated with the initial consumptive use.

3.2.5 The thresholds specified in subsection 3.2.1 above refer to total water withdrawal for all uses on contiguous properties that are owned, operated or controlled by an individual, corporation, governmental agency, or other person.

3.2.6 Consumptive uses of water which are non-exempt, which do not qualify for a general permit by rule under section 40C-2.042, F.A.C., or a noticed general permit under chapter 40C-22, F.A.C., and involve a withdrawal of less than 500,000 gallons per day on an average annual basis, are processed as a standard general permit under chapter 40C-20, F.A.C.

3.2.7 A water user should obtain one permit for all withdrawals which are intended to serve contiguous property; thus, a farm on contiguous property which has four wells should apply for one permit; the application will include information about each of the wells, the intended use for the water from each well, or pump, and a general indication of when the water will be withdrawn.

3.2.8 Water users who will conduct withdrawals from points which are not intended to serve one contiguous property may submit a single permit application for all withdrawal points collectively.

3.2.9 If the permittee seeks to change the requirements and circumstances under which the existing permit was issued, the permittee must submit an application to modify the permit, except as provided in subsection 3.3.2(b) below.

## 3.3 Permits Required

3.3.1 A permit is required for the following activities:

(a) After two years from the date of implementation, to continue a use which was existing on the date of implementation, if that use meets or exceeds the thresholds established in Section 40C-2.041, F.A.C. (see also subsection 3.2.1 above).

(b) After the date of implementation to commence a new use, if such use exceeds the thresholds established in Section 40C-2.041, F.A.C. (see also subsection 3.2.1 above).

(c) To continue a use after the expiration date specified on a permit granted by the District.

See Section 4.0 for application information or Part II for information regarding criteria for evaluation.

### 3.3.2 Transfers and Modifications

(a) The District must be notified, in writing,within 30 days of any sale, conveyance, or other transfer of a well or facility from which the permitted consumptive use is made or within 30 days of any transfer of ownership or control of the real property at which the permitted consumptive use is located. All transfers of ownership or transfers of a permit are subject to the requirements of chapter 40C-1.

(b) A permit holder must apply to the District for a modification if he intends to increase the amount of withdrawal beyond that specified on the permit, put the water to a use other than that specified on the permit, or otherwise modify the conditions of the permit. However, a modification involving one or more of the following changes

may be applied for by submitting a letter to the District provided that the water use is not increased:

1. Moving the location of a proposed well within 200 feet of the permitted location.

2. The addition of a domestic use with irrigation of landscape less than one acre.

3. Change in crop type.

4. Adding a surface water pump to the same source.

5. Reduction in allocation or a reduction in the number of wells, or a reduction in the project acreage.

6. Changing to a reclaimed or stormwater water source.

7. Changing the method of monitoring water use.

8. Replacement of an existig well with a well producing from the same aquifer horizon.

See Section 4.2 for information regarding application procedure and Section 11.1 and 11.2 for information regarding evaluation criteria which will be applied to an application to modify a permit.

3.3.3 A temporary consumptive use permit may be issued while the application for a consumptive use permit is pending. See Section 4.2 for application information and Section 11.3 for information regarding criteria for evaluation.

## 3.4 Exemptions

3.4.1 The following types of use are exempt from the requirements to obtain a consumptive use permit:

(a) Domestic uses – the use of self-supplied or individually-supplied water for the individual personal household purposes of drinking, bathing, cooking, or sanitation.

(b) Electrical power plants which have received certification under the provisions of Part II, Chapter 403, F.S., and industrial sites which have been certified with the provisions of the Florida Industrial Siting Act, Chapter 288, F.S.

(c) Withdrawals of ground or surface water to facilitate construction on or below ground surface or to remove pollutants from contaminated water, in the following circumstances:

1. Ground water may be withdrawn in any quantity for any duration if it is recharged on site to the aquifer from which it was withdrawn by either infiltration or direct injection;

2. Surface water may be withdrawn in any quantity for any duration only from wholly-owned impoundments or works which are no deeper than the lowest extent of the uppermost water bearing stratum and which have no surface hydrologic connection off site, and the surface water must be recharged on site to the uppermost water bearing stratum by either infiltration or direct injection.

3. Infiltration under this subsection may be accomplished by the use of land application or by discharge to wholly-owned impoundments or works, so long as there is no surface discharge off site. The withdrawal and recharge under this subsection must be done in a manner that does not contravene Sections 40C-2.301(2)(b), (4)(f)(g)(h)(i) and (5).

4. Ground water may be withdrawn from wells which withdraw from the surficial aquifer provided the cumulative withdrawals at any one time do not exceed 100,000 gallons per day.

(d) Withdrawals of groundwater for aquifer performance tests requested by District staff as information needed to review a consumptive use permit application, provided that the withdrawal of water for the pump test shall be for a period of not more than 30 days, shall not interfere with existing uses of water and shall be performed in accordance with an aquifer performance test plan approved by District staff.

(e) Withdrawals of surface water solely for flood control when:

1. the withdrawal is accomplished by and was approved as part of a surface water management system which has received a management and storage of surface waters permit pursuant to chapter 40C-4, F.A.C., or

2. the withdrawal is conducted by a municipality, county, agency of the executive branch of the state or the federal government and is accomplished by a surface water management system which meets the terms and conditions of the exemption contained in subsection 40C-4.051(2), F.A.C., and the withdrawal is consistent with the system's plans, specifications, and performance criteria existing on the relevant exemption date.

(f) Withdrawals of ground water to irrigate residential landscape areas less than one acre in size, which withdrawals would otherwise require an individual consumptive use permit under 3.2.2 only.

(g) Secondary uses which fit into one of the following categories:

1. Uses supplied solely by reclaimed water obtained from a water supplier.

2. Permitted consumptive uses, such as public water supply systems, augmented with water obtained via an interconnection with a water supplier, provided use of the combined water supply was reviewed and approved by the District as part of the application for the consumptive use being augmented.

(h) Withdrawals of ground or surface water to facilitate construction (not including borrow or mining excavations) on or below ground surface (dewatering) subject to the following conditions:

# EXCAVATION PERMIT

PUBLIC WORKS DEPARTMENT
NAVAL TRAINING STATION, ORLANDO

| REQUESTOR | ACTIVITY AND PHONE NO. |
|---|---|
| REASON FOR EXCAVATION | LOCATION |
| | DIMENSIONS OF EXCAVATION |
| PROPOSED EXCAVATION DATE | METHOD OF EXCAVATION |

SKETCH OF EXCAVATION SITE

| DEPARTMENT | SIGNATURE | YES | N |
|---|---|---|---|
| PWD ENGINEERING DIVISION | | ☐ | ☐ |
| PWD ELECTRICAL TRADES BRANCH | | ☐ | ☐ |
| PWD METAL TRADES BRANCH | | ☐ | ☐ |
| PWD TELEPHONE BRANCH | | ☐ | ☐ |
| PWD IRRIGATION CONTRACTOR | | ☐ | ☐ |

APPROVING OFFICIALS' COMMENTS:

| DIRECTOR, MAINTENANCE / UTILITIES DIVISION | | DATE |
|---|---|---|
| | APPROVED ☐ DISSAPPROVED ☐ | |

# 3.0 EXCAVATION PERMITTING

FORM #: 62-343.900 (1)
FORM TITLE: JOINT ENVIRONMENTAL RESOURCE PERMIT APPLICATION
EFFECTIVE DATE:


# JOINT APPLICATION FOR

# ENVIRONMENTAL RESOURCE PERMIT/

# AUTHORIZATION TO USE STATE OWNED SUBMERGED LANDS/

# FEDERAL DREDGE AND FILL PERMIT

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION/
WATER MANAGEMENT DISTRICTS/
U.S. ARMY CORPS OF ENGINEERS

FORM #: 62-343.900 (1)
FORM TITLE: JOINT ENVIRONMENTAL RESOURCE PERMIT APPLICATION
EFFECTIVE DATE:

# INSTRUCTIONS FOR JOINT APPLICATION FOR ENVIRONMENTAL RESOURCE PERMIT/ AUTHORIZATION TO USE STATE OWNED SUBMERGED LANDS/FEDERAL DREDGE AND FILL PERMIT

## INTRODUCTION

Attached is a joint application for:

1) activities regulated under Part IV of Chapter 373, F.S.;
2) activities which require authorization to use state owned submerged lands; and
3) activities which require a federal dredge and fill permit.

Certain activities may qualify for an exemption. If an activity qualifies for an exemption, an application is not required, although the use of this application form is the most expeditious way for the agencies to make the determination that the activity qualifies for an exemption. Attachment 2 lists various regulated activities and the type of permit required for each activity. If you have any questions, please contact the staff of the nearest office of either the Florida Department of Environmental Protection (DEP) or a Water Management District (WMD).

## PROCESSING AGENCY/DISTRICT SERVICE CENTERS

The Department of Environmental Protection ("Department" or "DEP") regulates some types of activities, and the Water Management Districts ("WMDs") regulate others. Attachment 1, DEP/WMD Permitting Responsibilities, specifies which activities are regulated by each agency. Environmental Resource Permit Applications shall be made to the appropriate District/ Department office serving the area in which the activity is proposed. Attachment 4 designates the appropriate agency office for each geographic area.

## COPIES/APPLICATION FEES

Submit an original signed application form plus **four** copies of the form, and **five** complete sets of all the requested drawings and other information to the appropriate DEP or WMD office. Submit the appropriate fee with your application. Application fees are listed in Attachment 3.

## DISTRIBUTION TO THE U.S. ARMY CORPS OF ENGINEERS

When activities are proposed in, on or over wetlands or other surface waters, a portion of the application (Section A and Section C, with the associated drawings) will be forwarded to the Army Corps of Engineers (ACOE) by the reviewing agency. The ACOE will advise you of any additional information that may be required to complete your federal dredge and fill permit application. It is not necessary for the applicant to submit a separate application to the ACOE. The information requested in this application form may be more than required to make a complete application to the ACOE. However, it is useful and may be essential for subsequent evaluation. Reducing unnecessary paperwork and delays is a continuing goal of the ACOE.

## DISTRIBUTION TO THE DEP FOR STATE LAND APPROVAL

If the applicant checks the box to request authorization to use sovereign submerged lands, the Department will begin processing the request for sovereign submerged lands approval. Additionally, if at any time during the processing of the application, it appears that the proposed activities may take place on sovereign submerged lands, the Department will initiate a review for the authorization to use such lands. For an explanation of sovereign submerged lands approval see Attachment 5.

**NOTE**: The information listed in Sections B, D, E, and F of this application package is not intended to be all-inclusive. Additional information may be requested by the reviewing agency in order to complete your application.

ORG CODE: 3740-2010-0000
EO: G1
OBJ: 002256

FORM #: 62-343.900 (1)
FORM TITLE: JOINT ENVIRONMENTAL RESOURCE PERMIT APPLICATION
DATE: October 3, 1995

# SECTION A

FOR AGENCY USE ONLY

ACOE Application # _____
Date Application Received _____
Proposed Project Lat. ____° ____' ____"
Proposed Project Long. ____° ____' ____"

DEP/WMD Application # _____
Date Application Received _____
Fee Received $_____
Fee Receipt #_____

**PART 1:**

Are any of the activities described in this application proposed to occur in, on, or over wetlands or other surface waters? ☐ Yes ☐ No

Is this application being filed by or on behalf of a government entity or drainage district? ☐ Yes ☐ No

**PART 2:**

A. Type of Environmental Resource Permit Requested (check at least one). See Attachment 2 for thresholds and descriptions.

☐ Noticed General - include information requested in Section B.
☐ Standard General (Single Family Dwelling) - include information requested in Sections C and D.
☐ Standard General (all other Standard General projects) - include information requested in Sections C and E.
☐ Individual (Single Family Dwelling) - include information requested in Sections C and D.
☐ Individual (all other Individual projects) - include information requested in Sections C and E.
☐ Conceptual - include information requested in Sections C and E.
☐ Mitigation Bank Permit (construction) - include information requested in Section C and F.
( If the proposed mitigation bank involves the construction of a surface water management system requiring another permit defined above, check the appropriate box and submit the information requested by the applicable section.)
☐ Mitigation Bank (conceptual) - include information requested in Section C and F.

B. Type of activity for which you are applying (check at least one)

☐ Construction or operation of a new system, other than a solid waste facility, including dredging or filling in, on or over wetlands and other surface waters.
☐ Construction, expansion or modification of a solid waste facility.
☐ Alteration or operation of an existing system which was not previously permitted by a WMD or DEP.
☐ Modification of a system previously permitted by a WMD or DEP. Provide previous permit numbers. _____
☐ Alteration of a system ☐ Extension of permit duration ☐ Abandonment of a system
☐ Construction of additional phases of a system ☐ Removal of a system

C. Are you requesting authorization to use Sovereign Submerged Lands. ☐Yes ☐No
(See Section G and Attachment 5 for more information before answering this question.)

D. For activities in, on or over wetlands or other surface waters, check type of federal dredge and fill permit requested:
☐ Individual ☐ Programmatic General ☐ General ☐ Nationwide ☐ Not Applicable

E. Are you claiming to qualify for an exemption? ☐ Yes ☐ No
If yes, provide rule number if known._____

| PART 3: | |
|---|---|
| A. OWNER(S) OF LAND | B. ENTITY TO RECEIVE PERMIT (IF OTHER THAN OWNER) |
| NAME | NAME |
| TITLE AND COMPANY | TITLE AND COMPANY |
| ADDRESS | ADDRESS |
| CITY, STATE, ZIP | CITY, STATE, ZIP |
| TELEPHONE AND FAX | TELEPHONE AND FAX |
| C. AGENT AUTHORIZED TO SECURE PERMIT | D. CONSULTANT (IF DIFFERENT FROM AGENT) |
| NAME | NAME |
| TITLE AND COMPANY | TITLE AND COMPANY |
| ADDRESS | ADDRESS |
| CITY, STATE, ZIP | CITY, STATE, ZIP |
| TELEPHONE AND FAX | TELEPHONE AND FAX |

**PART 4** (Please provide metric equivalent for federally funded projects):

A. Name of project, including phase if applicable:_____

B. Is this application for part of a multi-phase project? ☐ Yes ☐ No

C. Total applicant-owned area contiguous to the project: _____ ac.; _____ ha.

D. Total area served by the system: _____ ac.; _____ ha.

E. Impervious area for which a permit is sought: _____ ac.; _____ ha.

F. Volume of water that the system is capable of impounding: _____ ac. ft.; _____ $m^3$

G. What is the total area of work in, on, or over wetlands or other surface waters?

_____ ac.; _____ ha. _____ sq. ft.; _____ sq. m.

H. Total volume of material to be dredged: _____ $yd^3$; _____ $m^3$

I. Number of new boat slips proposed:_____wet slips;_____dry slips

**PART 5:**

Project location (use additional sheets, if needed):

County(ies) _____

Section(s) _____ Township _____ Range _____

Section(s) _____ Township _____ Range _____

Section(s) _____ Township _____ Range _____

Land Grant name, if applicable _____

Tax Parcel Identification Number _____

Street address, road, or other location _____

City, Zip Code if applicable _____

**PART 6:** Describe in general terms the proposed project, system, or activity.

PART 7:

A. If there have been any pre-application meetings, including on-site meetings, with regulatory staff, please list the date(s), location(s), and names of key staff and project representatives.

_____

_____

_____

B. Please identify by number any MSSW/Wetland resource/ERP/ACOE Permits pending, issued or denied for projects at the location, and any related enforcement actions.

| Agency | Date | No.\Type of Application | Action Taken |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

C. Note: The following information is required for projects proposed to occur in, on or over wetlands that need a federal dredge and fill permit or an authorization to use state owned submerged lands. Please provide the names, addresses and zip codes of property owners whose property directly adjoins the project (excluding applicant) and/or (for proprietary authorizations) is located within a 500 ft. radius of the applicant's land. Please attach a plan view showing the owner's names and adjoining property lines. Attach additional sheets if necessary.

1. _____

_____

_____

2. _____

_____

_____

3. _____

_____

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4. _____

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5. _____

_____

_____

6. _____

_____

_____

7. _____

_____

_____

8. _____

_____

_____

PART 8:

A. By signing this application form, I am applying, or I am applying on behalf of the applicant, for the permit and any proprietary authorizations identified above, according to the supporting data and other incidental information filed with this application. I am familiar with the information contained in this application and represent that such information is true, complete and accurate. I understand this is an application and not a permit, and that work prior to approval is a violation. I understand that this application and any permit issued or proprietary authorization issued pursuant thereto, does not relieve me of any obligation for obtaining any other required federal, state, water management district or local permit prior to commencement of construction. I agree, or I agree on behalf of the applicant, to operate and maintain the permitted system unless the permitting agency authorizes transfer of the permit to a responsible operation entity. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Typed/Printed Name of Applicant (If no Agent is used) or Agent (If one is so authorized below)

Signature of Applicant/Agent Date

(Corporate Title if applicable)

**AN AGENT MAY SIGN ABOVE ONLY IF THE APPLICANT COMPLETES THE FOLLOWING:**

B. I hereby designate and authorize the agent listed above to act on my behalf, or on behalf of my corporation, as the agent in the processing of this application for the permit and/or proprietary authorization indicated above; and to furnish, on request, supplemental information in support of the application. In addition, I authorize the above-listed agent to bind me, or my corporation, to perform any requirement which may be necessary to procure the permit or authorization indicated above. I understand that knowingly making any false statement or representation in this application is a violation of Section 373.430, F.S. and 18 U.S.C. Section 1001.

Typed/Printed Name of Applicant Signature of Applicant Date

(Corporate Title if applicable)

***Please note: The applicant's original signature (not a copy) is required above.***

**PERSON AUTHORIZING ACCESS TO THE PROPERTY MUST COMPLETE THE FOLLOWING:**

C. I either own the property described in this application or I have legal authority to allow access to the property, and I consent, after receiving prior notification, to any site visit on the property by agents or personnel from the Department of Environmental Protection, the Water Management District and the U.S. Army Corps of Engineers necessary for the review and inspection of the proposed project specified in this application. I authorize these agents or personnel to enter the property as many times as may be necessary to make such review and inspection. Further, I agree to provide entry to the project site for such agents or personnel to monitor permitted work if a permit is granted.

Typed/Printed Name Signature Date

(Corporate Title if applicable)

FORM #: 62-343.900 (1)
FORM TITLE: JOINT ENVIRONMENTAL RESOURCE PERMIT APPLICATION
DATE: October 3, 1995

# SECTION B
# INFORMATION FOR NOTICED GENERAL ENVIRONMENTAL RESOURCE PERMITS

**INSTRUCTIONS:** To qualify for a Noticed General Permit (NGP) for specific activities, the project must strictly comply with all of the terms, conditions, requirements, limitations and restrictions applicable to the desired NGP. A summary of the types of NGP's available is contained in Attachment 2. Carefully review the rule section of the NGP for which you are applying to ensure that your project meets the requirements of that NGP. Please complete Section A and submit it along with the information required in this Section (on $8^1/_2$" x 11" paper).

1. Indicate the project boundaries on a USGS quad map, reduced or enlarged as necessary to legibly show the entire project. If not apparent from the quad map, provide a location map (in sufficient detail to allow a person unfamiliar with the site to find it), containing a north arrow and a graphic scale and showing the boundary of the proposed activity and Section(s), Township(s), and Range(s).

2. A legible site plan showing the following features:
   a) property boundaries and dimensions
   b) name and location of any adjoining public streets or roads
   c) location and dimensions of all existing structures
   d) label all impervious and pervious area and indicate their size (area)
   e) the direction of drainage relative to the proposed improvements (using arrows)
   f) locations of all proposed works
   g) permanent and temporary erosion, sedimentation and turbidity controls
   h) boundaries of wetlands and other surface waters, identifying open water areas
   i) boundary area and volume of all temporary and permanent earthwork, including pre and post construction grades

3. Description of wetland or aquatic habitat .

4. Construction methods and schedule.

5. Additional information that would show that you qualify for the general permit, addressing all the parameters, thresholds and conditions required in the general permit. Errors and omissions will be identified within 30 days by the processing agency.

6. Provide the rule section number of the NGP for which you are applying.

7. The construction plans and supporting calculations must be signed, sealed, and dated by an appropriate registered professional as required by the relevant statutory provisions when the design of the system requires the services of an appropriate registered professional.

# APPENDIX B

# PERFORMANCE MONITORING AND SAMPLING PLAN

# PERFORMANCE MONITORING AND SAMPLING PLAN (PM&SP)

## 1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), under contract to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), has prepared this PM&SP for the Interim Remedial Action (IRA) at Operable Unit (OU) 4, Former Drycleaning and Laundry Facility, at the Naval Training Center (NTC), Area C, in Orlando, Florida. The PM&SP is being conducted under contract number N62467-89-D-0317-90. This plan presents the framework for the baseline monitoring, operational (performance) monitoring and reporting to support the effectiveness of the proposed IRA remedial system. All monitoring well installations and sampling efforts described herein shall be in accordance with the U.S. Environmental Protection Agency (USEPA) Region IV Environmental Investigations Standard Operations Procedures and Quality Assurance Manual (EISOPQAM), May 1996 and/or the FDEP and EPA approved NTC, Orlando POP.

1.1 **Site Conditions** Results of previous site investigation activities at OU 4, Area C, at NTC, Orlando indicate that volatile organic compounds (VOCs) are present within the surficial aquifer and the surface water and sediment of Lake Druid. Due to the nature of the VOC contamination and its presence in Lake Druid, adjacent to a residential community, an IRA is necessary, as required by the Orlando Partnering Team (OPT).

1.2 **Technical Overview** Groundwater containing VOCs discharging to the lake will be contained/controlled through the use of recirculating/*in situ* well stripping technology, designed to intercept and treat the VOC plume upgradient of Lake Druid. The technology creates a circulation sphere within the affected part of the aquifer. While groundwater travels through the recirculation sphere, it is aerated, volatilizing the VOCs, which are subsequently transported out of the well by means of negative pressure created by a vacuum blower. If necessary, the VOCs in the offgas can be treated.

1.3 **Objective of Performance Monitoring and Sampling Plan** The performance monitoring and sampling plan is designed to evaluate and validate the performance, progress, and effectiveness of the recirculating/*in situ* well stripping groundwater treatment system. This evaluation will include monitoring of (1) treatment of associated groundwater; (2) the hydraulic effect of the recirculating/*in situ* stripping well on the surficial aquifer; and (3) the system's effects on contaminant concentrations of the sediment and surface water of Lake Druid. In addition, possible needs and methods of improving the treatment system's performance will be identified. This monitoring plan will define performance and analytical evaluations for

- overall system performance,
- operating parameters and efficiencies for the treatment system,
- vapor emissions from the treatment system, and
- performance adjustments.

The PM&SP may be revised depending on the requirements of the selected vendor. An operation and maintenance (O&M) plan will be developed by the Response Action Contract (RAC) contractor, as represented in the Responsibility Assignment Matrix

(RAM). The O&M plan will address specific O&M needs, actions, and reporting format for maintenance of the recirculating/*in situ* well stripping system.

1.4 Overview The remainder of the PM&SP presents the plans for monitoring and sampling (data baseline and system operations), data management, evaluation and reporting.

## 2.0 MONITORING AND SAMPLING PLAN

This section presents the rational of the monitoring and sampling plan as it relates to data quality objectives (DQOs), baseline activities, and performance to support the effectiveness of the recirculation/*in situ* stripping technology while in operation.

2.1 DQOs Soil, sediment, surface water, and groundwater samples will be analyzed in accordance with USEPA Level IV DQOs. DQOs will remain consistent with the Focused Field Investigation (FFI), OU4, November 1996, and as discussed in the Project Operations Plan (POP), Section 3.2, Data Quality Objectives (ABB-ES, 1994a).

2.2 Baseline Activities Groundwater, surface water, and sediment samples will be collected and analyzed to establish baseline contaminant concentrations and media-specific characteristics prior to the activation of the treatment system. All baseline sampling efforts will begin within 1 month prior to the treatment system activation/startup operations. The baseline results will be the foundation for tracking treatment system effectiveness.

A baseline will also be established for water-level and/or piezometric heads. The piezometric baseline will be obtained by monitoring precipitation trends while measuring water levels in monitoring wells, piezometers, drive-point wells and staff gauges. All baseline piezometric monitoring efforts will begin within 1 month of the treatment system activation/startup operations and continue weekly until system installation and startup. The baseline results will be the foundation for tracking treatment system effectiveness regarding the sphere of influence.

2.2.1 Additional Groundwater Monitoring Locations To evaluate the *in situ* groundwater treatment system's effects on the surficial aquifer, one additional drive point well and five additional groundwater monitoring wells will be installed. Of the five additional groundwater monitoring wells, OLD-13-21B, OLD-13-22B, and OLD-13-23B are proposed for the vicinity of the existing monitoring well clusters, as illustrated on Figure B-1. The three monitoring wells will be screened from 27-32 feet below land surface (bls). The other two additional wells are proposed for the area located along the shoreline approximately 125 feet south from OLD-13-09A (Figure B-1). These two proposed monitoring wells, OLD-13-24A and OLD-13-25B, will be screened from 1-11 feet bls, and 16-21 feet bls, respectively.

The additional monitoring wells will be constructed similar to the existing monitoring wells installed during the OU4 IRA FFI. Refer to Figure B-2 for a typical monitoring well construction detail. The monitoring wells will be installed by a licensed well driller. Each well will be developed upon installation to ensure proper connection of the filter pack with the surrounding

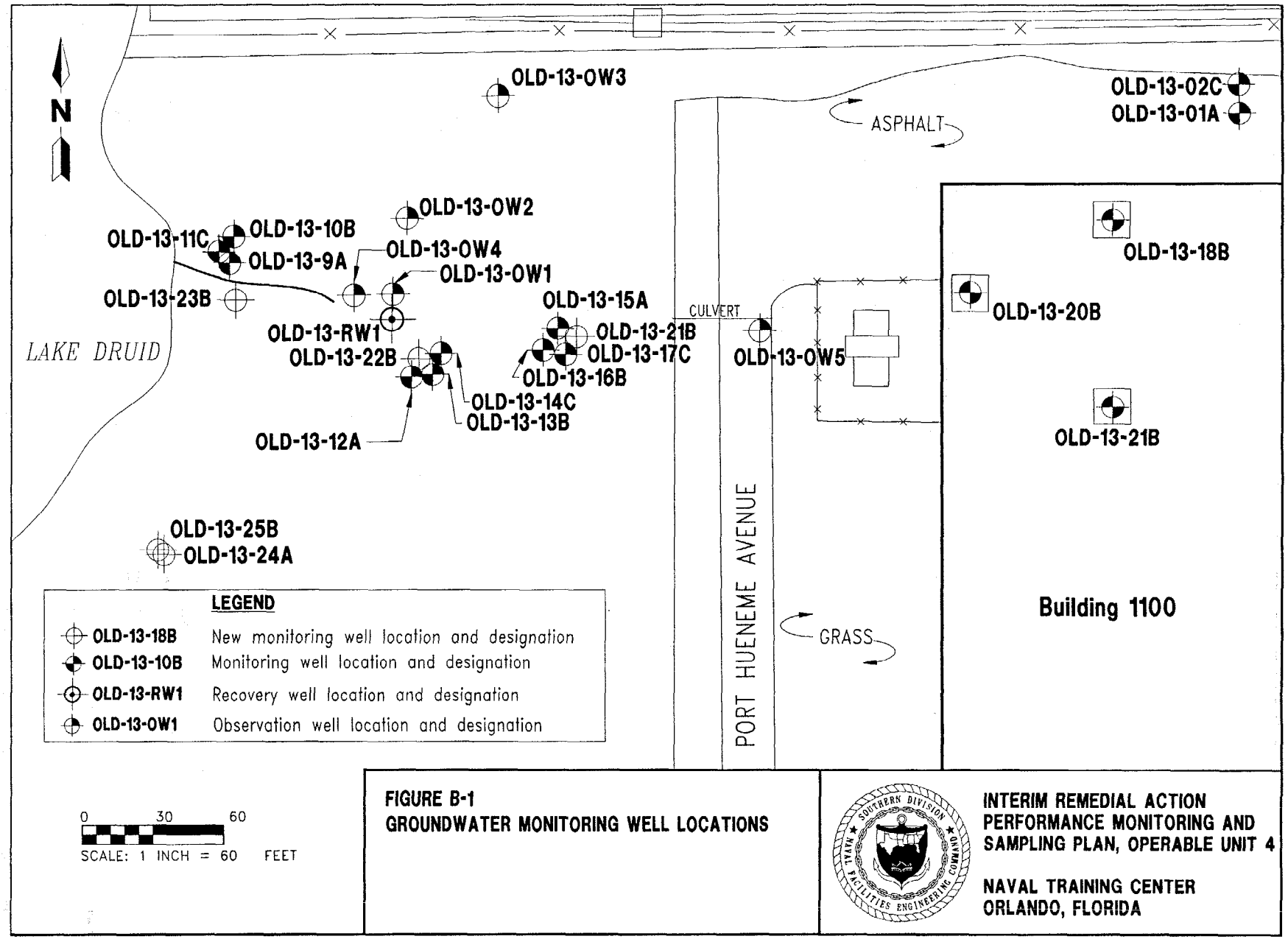


**FIGURE B-1**
**GROUNDWATER MONITORING WELL LOCATIONS**

**INTERIM REMEDIAL ACTION PERFORMANCE MONITORING AND SAMPLING PLAN, OPERABLE UNIT 4**

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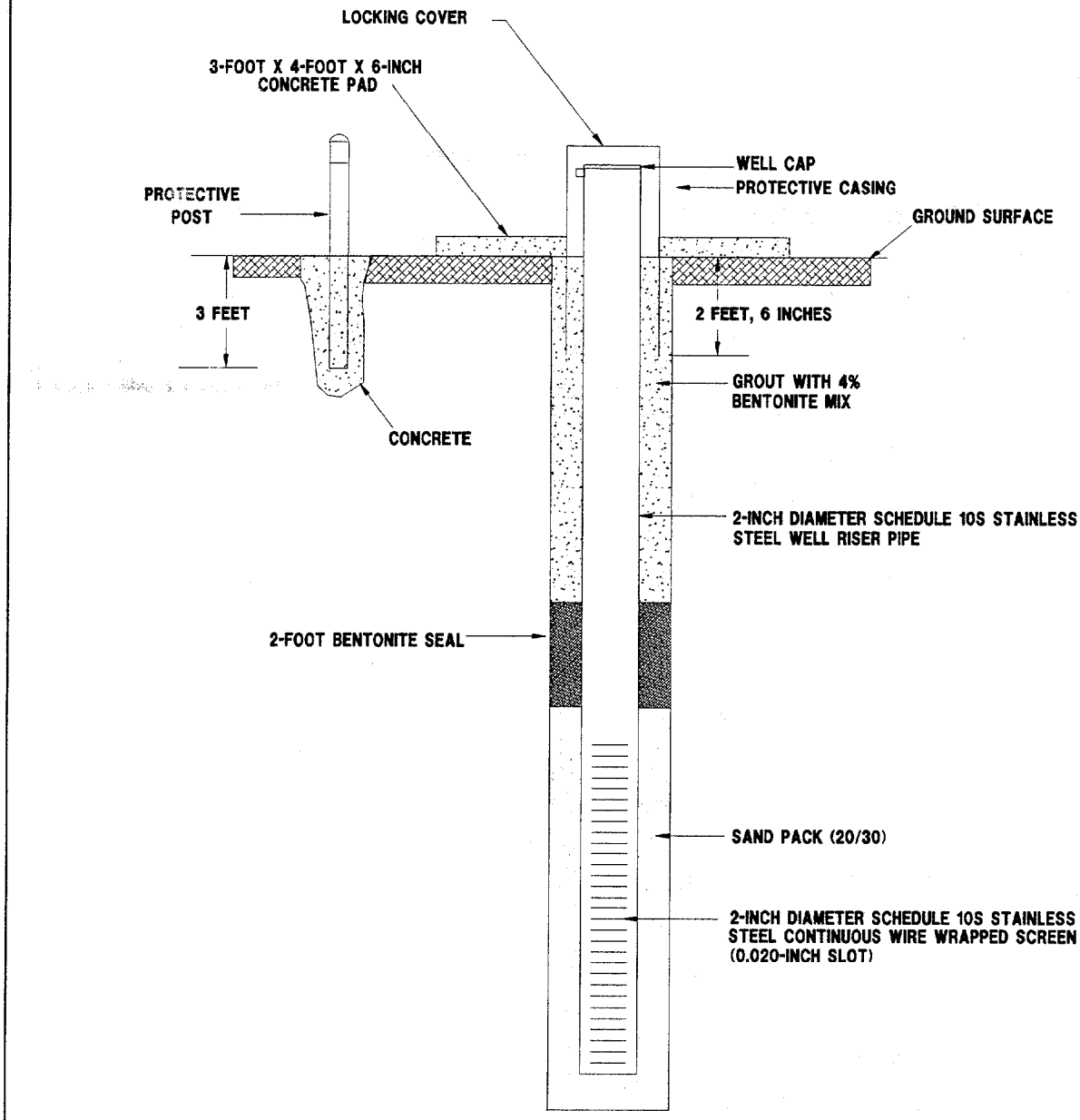


**FIGURE B-2**
**MONITORING WELL DIAGRAM, SINGLE CASED, ABOVEGROUND COMPLETION**

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**INTERIM REMEDIAL ACTION PERFORMANCE MONITORING AND SAMPLING PLAN, OPERABLE UNIT 4**

**NAVAL TRAINING CENTER ORLANDO, FLORIDA**

formation. All well installation and development activities will be done in a manner consistent with the guidelines prescribed in Section 4.4 of the POP.

The additional drive point well (DP-11) will be installed in the lake approximately 100 feet south of DP-5, as shown on Figure B-3. DP-11 will be installed in accordance with the procedures defined in the FFI (ABB-ES, 1996c).

Additional monitoring points (monitoring wells/piezometers) may also be required by the proprietary vendor for monitoring the performance of the recirculation/*in situ* stripping system.

2.2.2 **Sampling and Analysis** Soil samples for total organic carbon (TOC) will be collected with a split-spoon sampler during the drilling of the proposed groundwater monitoring wells. Results of these analyses will be used to support fate and transportation evaluation. TOC samples will be collected at intervals shown in Table B-1.

**Table B-1**
**TOC Soil Sampling Plan**

Interim Remedial Action
Conceptual Design and Performance Specification
Operable Unit 4
NTC, Orlando, Florida

| | 8 to 10 feet bls | 18 to 20 feet bls | 30 to 32 feet bls | 48 to 50 feet bls |
|---|---|---|---|---|
| OLD-13-21B | | x | x | |
| OLD-13-22B | | x | x | |
| OLD-13-23B | | x | x | |
| OLD-13-24A | x | | | |
| OLD-13-25B | | x | x | |
| Additional wells as required by the vendor | | x | x | x |

Notes: TOC = top of casing.
bls = below land surface.

To evaluate the *in situ* groundwater treatment system's effects on the surficial aquifer, groundwater samples will be collected from an array of existing groundwater monitoring wells and drive point wells, including the five proposed groundwater monitoring wells and drive point well. The monitoring wells include OLD-13-09A, OLD-13-10B, OLD-13-11C, OLD-13-12A, OLD-13-13B, OLD-13-14C, OLD-13-15A, OLD 13-16B, OLD-13-17C, OLD-13-21B, OLD-13-22B, OLD-13-23B, OLD-13-24A, and OLD-13-25B (Drawing, B-1). The letter identifier at the end of the monitoring well number signifies shallow, intermediate, and deep well depths with an A, B, or C, respectively.

The drive point wells include DP-1, DP-2, DP-3, DP-4, DP5, and DP-11. Samples from the conventional wells will be used to support evaluation of VOC concentrations in the groundwater migrating toward Lake Druid. Samples from the drive point wells will be utilized to determine the VOC concentrations in groundwater entering Lake Druid from below the lake bottom.

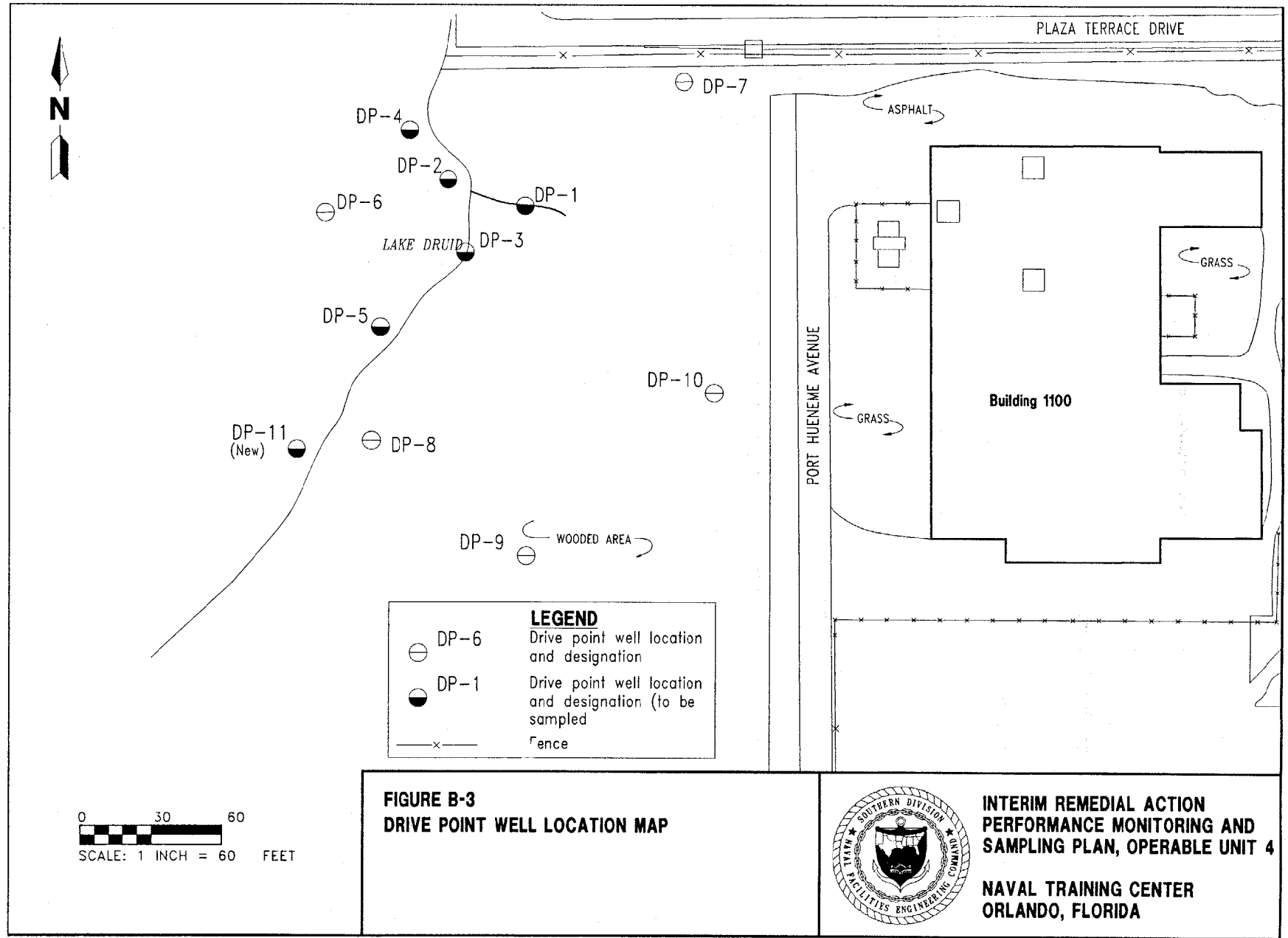


**FIGURE B-3**
**DRIVE POINT WELL LOCATION MAP**

**INTERIM REMEDIAL ACTION PERFORMANCE MONITORING AND SAMPLING PLAN, OPERABLE UNIT 4**

**NAVAL TRAINING CENTER ORLANDO, FLORIDA**

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The drive point wells include DP-1, DP-2, DP-3, DP-4, DP5, and DP-11. Samples from the conventional wells will be used to support evaluation of VOC concentrations in the groundwater migrating toward Lake Druid. Samples from the drive point wells will be utilized to determine the VOC concentrations in groundwater entering Lake Druid from below the lake bottom.

The monitoring well network will be used to monitor the size of the treatment cell and to provide locations to monitor changes in VOC concentrations within the plume. Final well locations and screened intervals will also consider the system monitoring requirements of the chosen vendor. In the event that a third recirculating/*in situ* stripping well is installed to aggressively target the source of contamination, additional monitoring wells may be needed.

To further evaluate the effects on Lake Druid due to the *in situ* groundwater treatment system's operation, surface water and sediment samples will be collected for analysis and to support treatment system evaluation. These samples will be collected from locations adjacent to selected drive point wells along the shoreline (DP-1 through DP-5, DP-11), as shown on Figure B-3. Sediment samples and surface water samples will be collected using the same procedures defined in the FFI.

The following parameters will be collected in the field from groundwater and surface water samples: dissolved oxygen (DO), redox potential (Eh), pH, temperature, specific conductivity, and turbidity. Groundwater, surface water, and sediment samples will be submitted to a certified laboratory for analysis of halogenated volatile organics using USEPA Method 8010, filtered and unfiltered manganese and iron, nitrate/nitrite, ammonia, phosphate, sulfate/sulfide, DCE epoxide, acetic acid, $CO_2$, and TOC. Samples for analysis of methane/ethane/ethylene will be submitted to the treatability laboratory. Soil samples will be submitted to a certified laboratory for TOC analysis only.

2.3 **Performance Monitoring and Sampling** This section presents the approach for performance monitoring and sampling, which will be compared to the baseline data in order to measure the effectiveness of the recirculation/*in situ* stripping technology.

2.3.1 **Startup Monitoring** During the first three days of startup, head response measuring the influence of the recirculation well(s) will be monitored continuously. After the third day, head response monitoring will scale back to hourly; however, the monitoring schedule may change depending on the observed system performance.

Daily samples of the recirculation system(s) influent and effluent will be collected during the first three days of startup. The frequency of influent and effluent sampling will be adjusted based on these results though the end of startup.

2.3.2 **Hydraulic Monitoring** The head response study will utilize a data logging system. The data logger will take hourly head readings and will continue for 1 year to provide system hydraulic performance data on a seasonal basis. Continued monitoring may be scaled back if data demonstrates the sphere of influence has encompassed the remedial design goal during all seasonal or daily influences.

Precipitation and barometric effects will be monitored on a daily basis in the vicinity of OU4. During the execution of the pumping test at OU4, barometric fluctuations proved to be insignificant; however, precipitation had a direct effect on the aquifer.

Up to three staff gauges will be manually monitored continuously during baseline activities and during the operation of the recirculation/*in situ* stripping well system to monitor surface water changes. Two staff gauges are already in place, and a third may be added if greater coverage of the shoreline is required.

2.3.3 Sampling and Analysis During the initial phase of operation, the following monitoring wells will be sampled: OLD-13-09A, OLD-13-12A, OLD-13-15A, OLD-13-18B, OLD-13-19B, OLD-13-20B, OLD-13-21A, and OLD-13-22B. Table B-2 summarizes the initial operational performance monitoring and sampling schedule that will follow the baseline monitoring and sampling activities. Performance sampling activities will begin 3 days (week 1 on Table B-2) following treatment system startup. As shown in Table B-2, groundwater sampling of the selected monitoring wells and drive points, DP-1, DP-2, and DP-3 will be performed biweekly during the first 2 months of performance monitoring. The sampling frequency will taper off as the program progresses to quarterly monitoring, as shown in Table B-2.

**Table B-2**
**Performance Monitoring and Sampling Frequency**

Interim Remedial Action
Conceptual Design and Performance Specification
Operable Unit 4
NTC, Orlando, Florida

| Week | Head Response Monitoring | Influent/ Effluent Sampling | Groundwater Monitoring Well Sampling | Groundwater Sampling DP-1, DP-2, DP-3 | Groundwater Sampling DP-4, DP-5, DP-11 | Vapor Emissions Sampling | Sediment and Surface Water Sampling |
|---|---|---|---|---|---|---|---|
| Startup | x | x | | | | | |
| 1 | x | x | x | x | | x | |
| 2 | x | x | x | x | | | |
| 4 | x | x | x | x | | x | |
| 7 | x | x | x | x | | | |
| 11 | x | x | x | x | x | | x |
| 16 | x | x | x | x | x | x | x |
| 28 | x | x | x | x | x | x | x |
| 40 | x | x | x | x | x | x | x |
| 52 | x | x | x | x | x | x | x |

Sample collection from surface water/sediment locations and groundwater drive point locations DP-4, DP-5, DP-11 will not occur until evidence is gathered demonstrating the effectiveness of the treatment system by noting a decrease in VOCs in groundwater obtained from drive point wells within the lake (DP-1, DP-2 and DP-3). When the system's influence or effect is suspected to have spread to the outer sample collection localities, manifested by a decrease in VOCs in groundwater, then samples from surface water/sediment locations and groundwater drive point locations DP-4, DP-5, DP-11 will be collected. If a notable decrease

has not occurred within 10 weeks (5 rounds), samples from these areas will be collected and analyzed to evaluate possible effects from the groundwater treatment system.

Following the 16th week, all performance sampling should be done on a quarterly basis. All sampling should be performed consistently from one event to another and should be consistent with previous sampling events and procedures outlined in the POP (ABB-ES, 1994a). Groundwater and surface water samples will have the following parameters measured in the field: DO, Eh, pH, temperature, specific conductivity, and turbidity. Groundwater, surface water, and sediment samples will be submitted to a certified laboratory for analysis of halogenated volatile organics using USEPA Method 8010, and for filtered and unfiltered manganese and iron, nitrate/nitrite, ammonia, phosphate, sulfate/sulfide, DCE epoxide, acetic acid, $CO_2$, and TOC. Samples for analysis of methane/ethane/ethylene will be submitted to the treatability laboratory for analysis.

Vapor emissions produced by the treatment system are anticipated to be low enough to qualify for an exemption from an air permit by the Florida Department of Environmental Protection (FDEP). In the event that an air permit is required, vapor emissions will be sampled and analyzed as instructed by FDEP. Otherwise, vapor emissions will be collected and sampled for volatile organic emissions during week 1, week 4, week 16 and then quarterly for 1 year. Vapor analysis will confirm that the system is generating low-level emissions and assist in evaluating the stripping efficiency of the system. The sampling frequency may be modified based on vendor requirements.

Sample locations and frequency are dependent on the location of the treatment system and vendor performance estimates. The proposed monitoring plan may change depending on the specifics of the treatment system. The continuous evaluation of performance data may also affect sample locations and frequency. For example, surface water and sediment sampling may occur sooner if VOC concentrations in the drive points decrease faster than predicted.

3.0 **DATA MANAGEMENT PLAN** Sample handling/tracking and data management will be consistent with the FFI Workplan and POP. QA/QC samples will be collected per the guidelines set forth in the POP.

4.0 **EVALUATION PLAN** This section presents the approach used to evaluate the effectiveness of the recirculation/*in situ* stripping technology based on performance monitoring and sampling data.

4.1 **Hydraulic Performance** The head response study will be used to evaluate and verify the sphere of influence the recirculating/*in situ* stripping well has on the surficial aquifer. The data collection of precipitation, atmospheric conditions, barometric effects, and surface water changes at OU 4 will assist in interpreting trends spikes and other fluctuations in aquifer conditions during system operation. These measurements along with the chemical data will provide operation/performance data in order to fine tune the system by adjusting each recirculation/*in situ* stripping well's air flow rate, water flow rate, or both to improve performance.

4.2 Chemical and Biological Performance Data gathered during the *in situ* groundwater treatment system's operation will assist in evaluating the effectiveness and performance of the treatment system by comparing it to the baseline data. Groundwater chemistry and its influence on VOC contaminants and plume characteristics will be evaluated, as well as other trends in the data. Degradation of VOC concentrations due to biological activity will be evaluated to support system performance, conclusions, and recommendations.

5.0 REPORTING System performance reporting will be provided to the OPT on a periodic basis as letter reports and an annual report. These documents will serve to communicate the system's effect on the aquifer and sediment and surface water of Lake Druid. A better understanding through diagnosis of hydraulic and chemical changes provides a basis to improve the systems efficiency. These Performance Monitoring Reports are not meant to replace or supply information on the system's operation, functional characteristics, preventative maintenance, or repair/-replacement activities. The RAC contractor is responsible for reporting these O&M concerns.

A letter report summarizing the baseline sampling event will be submitted to the OPT. The letter will include groundwater, surface water, and sediment contaminant concentrations and media-specific characteristics. It will also include TOC analytical results of the subsurface soil samples.

Letter reports summarizing the sampling events and performance monitoring of the system will be submitted to the OPT monthly for the first quarter, then will be reported on a quarterly basis. The letter will include groundwater, surface water, and sediment contaminant concentrations and media-specific characteristics, as well as, comparative analysis with the baseline sampling.

An annual report summarizing all sampling events will be submitted to the OPT. The report will include comparative analysis of baseline sampling data to performance monitoring and sampling data for each medium and a cleanup trend analysis. In addition, the report will include conclusions and recommendations for consideration to enhance system operations.

## REFERENCES

ABB-ES, 1994, Project Operations Plan for Site Investigations and Remedial Investigations, Naval Training Center, Orlando, Florida: prepared for Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), North Charleston, South Carolina, March.

ABB-ES, 1996, Interim Remedial Action Focused Field Investigation Report Operable Unit 4, Naval Training Center, Orlando, Florida: prepared for SOUTHNAVFACENGCOM, North Charleston, South Carolina, November.

SOUTHNAVFACENGCOM, 1997, Monitoring Well Design, Installation, Construction, and Development Guidelines, March.

U.S. Environmental Protection Agency, 1996, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, May.

# APPENDIX C

# RESPONSIBILITY ACTION MATRIX

## Responsibility Assignment Matrix

Interim Remedial Action
Conceptual Design and Performance Specification
Operable Unit 4
NTC, Orlando, Florida

| Task | CLEAN | RAC | SOUTHNAV-FACENGCOM | Activity | FDEP | USEPA | ROICC |
|---|---|---|---|---|---|---|---|
| Focused Field Investigation | L | S | A | A | A | A | NA |
| Focused Feasibility Study | L | S | A | A | A | A | NA |
| Remedial Investigation | L | S | A | A | A | A | NA |
| Technology Review | L | S | A | A | A | A | NA |
| Determination of PSC Characteristics | L | S | R | R | R | R | NA |
| Performance Design | L | S/R | A | A | A | A | R |
| Design Specifications & Shop Drawings | R/A | L | A | A | R | R | R |
| Permitting | S | L | R | R | A | NA | R |
| Utility Clearance and Access Requirements | S | L | R | A | NA | NA | R |
| Construction | S | L | S/A | S | NA | NA | A |
| Operations and Maintenance | S | L | R | R | R | R | R |
| Performance Monitoring, Sampling and Reporting | L | S | R | R | R | R | NA |
| As-Builts | S | L | A | R | R | R | A |
| Remedial Action/Closure Reports | L | S | R/A | A | A | A | R |

Notes: NTC = Naval Training Center.
CLEAN = Comprehensive Long-Term Environmental Action, Navy.
RAC = remedial action contract.
SOUTHNAVFACENGCOM = Southern Division, Naval Facilities Engineering Command.
FDEP = Florida Department of Environmental Protection.
USEPA = U.S. Environmental Protection Agency.
ROICC = resident officer in charge of construction.
PSC = Potential Source of Contamination
L = lead responsibility.
S = support responsibility.
R = review responsibility.
A = approval.
NA = not applicable.