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NTC ORLANDO
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REMEDIAL ACTION PLAN MCCOY ANNEX BASE EXCHANGE SERVICE STATION BUILDING 7174 NTC ORLANDO FL

4/1/1993

ABB ENVIRONMENTAL SERVICES, INC

REMEDIAL ACTION PLAN

MCCOY ANNEX BASE EXCHANGE SERVICE STATION
BUILDING 7174
NAVAL TRAINING CENTER
ORLANDO, FLORIDA

UIC: N65928

Contract No. N62467-89-D-0317

Prepared by:

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

Prepared for:

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

Carl Loop, Code 1847, Engineer-in-Charge

April 1993

DISTRIBUTION

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REMEDIAL ACTION PLAN REVIEW CHECKLIST
Bureau of Waste Cleanup
FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION

Facility Name: NTC Orlando McCoy Annex Service Station Reimbursement Site: [ ]

Location: NTC Orlando McCoy Annex Bldg 7174 State Contract Site: [ ]

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

Reviewer: _____ Date: _____ Consultant: ABB Environmental Services, Inc.

Date of QAPP Approval: _____

Date of CAR Approval: _____

Page(s) I. General

7-1 (1) RAP signed, sealed, and dated by Florida P.E. (per FS 471.025) YES

_____ (2) remediation by State cleanup program is proposed (yes/no) NO

2-3 (3) summary of CAR conclusions and results included in RAP YES

NO (4) sampling results within six months Latest sampling event: March 1992

2-1 (5) underground storage tanks and product lines have tested tight YES - in 1988

2-3 (6) method of potable water supply to area indicated City Water as supplied to station

Fig. 9 (7) underground utilities which may enhance contaminant transport shown YES

4-3 (8) estimated time of cleanup provided YES - see Appendix B

Fig. 10 (9) fencing treatment area considered YES

4-7 (10) discussion of proposed equipment maintenance provided _____

NA (11) all local, State, and Federal permits obtained and conditions stated in RAP _____

6-1 (12) cost estimate for project with breakdown of capital and O&M costs provided YES

_____ (13) feasibility of leasing equipment considered (cost cannot exceed purchase price) YES

_____ (14) cost effective analysis provided if design is innovative Design is non-innovative

NA (15) statement that signed and sealed as-built (record) drawings to be provided _____

II. Free Product Removal

4-2 (1) description of free product recovery system provided No free product removal proposed

NA (2) disposition of recovered free product discussed NA

NA (3) automated product pump shutdown for high level in product tank NA

NA (4) oil/water separator calculation provided (e.g., detention time) NA

III. Soil Remediation - General

NA (1) Hazardous soils (e.g., ignitable, corrosive, reactive, toxic, or petroleum refining waste) to be disposed of properly No Hazardous Soils Anticipated

4-4 (2) Excessively contaminated soils (per soil guidance manual) to be remediated Vapor Extraction System Proposed

NA (3) Effect of soil leachate from non-excessively contaminated soils (e.g., 10-500 ppm/OVA) upon groundwater contaminant levels evaluated Site is paved.

NA (4) Disposition of excavated, contaminated soils discussed NA - Excavation is not proposed.

3-6 (5) Volume of all contaminated soils estimated YES - 2000 cubic yards

NA (6) Rationale for 'no action' alternative for soil remediation provided NA

IV. Landfarming of Soil

NA (1) Must have total recoverable hydrocarbon concentrations in soil less than 500 mg/kg by EPA Draft Method 9073. NA

NA (2) Adequate surface area available (_____sf) to spread soil 6" to 1' thick NA

NA (3) Location of landfarming operation if different from facility location NA

NA (4) Landfarming area is flat (less than 5% slope) NA

NA (5) Impermeable base provided. Type: NA

NA (6) Surface water runoff controls provided NA

NA (7) Groundwater monitoring plan proposed NA

NA (8) Frequency of tilling provided NA

NA (9) Frequency of nutrient application provided (if proposed) NA

NA (10) Soil sampling frequency and sampling methods provided NA

NA (11) Underlying soil and groundwater monitoring procedures provided and acceptable NA

NA (12) Landfarming will be continued until the TRPH concentration is 10 ppm or less (by EPA Draft Method 9073) and the BTEX concentration is less than 100 ppb (by EPA Method 5030/8020); or TRPH concentration is 50 ppm or less, and PAH concentration is 6 ppm or less, and VOH concentration is 50 ppb or less. NA

NA (13) Impact of air emission considered NA

V. Landfilling of Soils

NA (1) Landfill lined NA

NA (2) Name and location of landfill provided along with conditions of acceptance NA

VI. Thermal Treatment

NA (1) Name and location of thermal treatment facility provided NA

NA (2) Facility is permitted for thermal treatment of contaminated soils NA

NA (3) Influent and effluent sampling frequency and analytical methods are appropriate NA

NA (4) Thermal treatment will reduce TRPH in the soil to 10 ppm by EPA draft Method 9073 or less, and the BTEX concentration to less than 100 ppb by EPA Method 5030/8020 (see IV.(12)) NA

VII. Soil Vacuum Extraction

App. A (1) Location of extraction and monitoring well(s) provided along with construction details YES

4-5 (2) On-site pilot system (field testing of system with vacuum piezometers) or modeling required unless pilot study would be similar in scale to proposed treatment system Pilot SVE test at start-up.

4-5 (3) Air phase treatment equipment description to be provided during the first two months of system operation Yes - Granular Activated Carbon (GAC) Adsorption system provided

App. E (4) Vacuum pump description, flowrate (115 cfm), and operating vacuum (6.5 in Hg) provided YES

_____ (5) Surface sealing provided for vacuum extraction (yes/no) YES - Existing pavement covers site

4-4 (6) Explosion-proof vacuum pump provided YES - see P&ID drawing

4-4 (7) Vacuum gauge provided YES - see P&ID drawing

4-4 (8) Knock out/condensation trap provided YES - see P&ID drawing

4-6 (9) system monitoring proposal provided YES

4-7 a) air emission to be sampled and analyzed monthly per Department guidance YES

_____ b) soil cleanup criteria provided 10 ppm by OVA - soil gas samples from vapor monitoring wells

VIII. Groundwater Extraction

_____ (1) Feasibility of using existing on-site wells for groundwater extraction considered YES

App. A (2) Recovery well or trench location(s) and construction details included YES

_____ (3) Screening interval appropriate YES

App. B (4) Predicted horizontal and vertical area of influence with hydraulic gradient provided YES

App. B (5) Expected drawdown in recovery well or trench (8 ft) YES

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

App. C (7) groundwater pump(s) description, pump characteristic curve, design flowrate (5.5 gpm at 81 ft TDH) provided YES

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

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

a) If used, performance specifications provided N/A

Fig. 27 (9) automated well level controls provided for shutting down groundwater pump(s) YES

Fig. 27 (10) totalizing flowmeter installed on influent line from every groundwater recovery pump YES

Fig. 27 (11) check valve provided on pump discharge piping if not integral to pump YES

Fig. 27 (12) shutoff/throttling valve provided on pump discharge piping YES

IX. Groundwater Treatment System - General

App. D (1) expected or calculated influent concentrations acceptable (based upon pumping test dynamic sample, weighted averaging procedure, or other reasonable assumptions) YES - weighted average

4-3 (2) feasibility of discharge to sewage treatment plant evaluated YES

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

App. A (3) site piping plan, and schematics of all treatment components, piping, valves, controls and appurtenances provided Site layout and P&ID drawings provided.

Fig. 27 a) influent and effluent sampling ports provided YES

App. A b) piping type and size provided YES - refer to pipe sizing calculations

_____ (4) iron level in groundwater provided (_____mg/l) from representative dynamic or static sample(s) and pretreatment for iron removal considered _____

_____ (5) pretreatment or O&M for biofouling provided YES

4-3 (6) adequate remediation proposed for other contaminants (e.g., MTBE, PAHs, EDB,1-2 dichloroethane) YES

X. Air Stripping Treatment Process

(1)Packed Tower

4-2 a) type, size, and surface area of packing provided YES - App. D

4-2 b) calculations, criteria (tower height, diameter, packing height, air flowrate, blower horsepower)/design parameters provided YES - App. D

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

Fig. 27 d) pressure gauge provided to indicate the effects of fouling over time YES - see P&ID

_____ e) mist eliminator provided YES

_____ f) observation port provided YES

(2)Diffused Aerator

NA a) calculation, criteria, (contact time, air flowrate, pressure drop, calculated efficiency) and design assumptions provided NA

(3) General

App. D a) maximum ambient air impact calculations provided YES - Air Impact Calculations Provided

NA b) equipment description provided if emissions treatment necessary NA

Fig. 27 c) automated recovery well shutdown when blower failure occurs YES

4-6 d) daily analysis screening with portable GC, or other appropriate measures, during system startup until system consistently meets discharge criteria Grab sample for lab analysis until effluent criteria is achieved

XI. Carbon Adsorption Process

NA (1) carbon specification provided

NA (2) carbon unit(s) sizing calculations (carbon usage rate*, contact time*, pressure losses)/design assumptions provided NA

NA (3) isotherm data from pilot study needed if carbon adsorption used as primary treatment and total VOA concentrations are appreciable (VOA > 100 ppb typically) in order to estimate carbon capacity required and sampling frequency NA

NA (4) TOC in groundwater determined and effect on treatment process considered YES - Air stripper removes VOC

NA *(5) sand filter or cartridge unit considered prior to carbon unit

NA *(6) pressure gauge and pressure release valve provided on carbon (and sand) filter NA

NA *(7) carbon disposal and replacement method discussed

NA *(8) two carbon units in series considered to allow for maximum carbon utilization and to prevent breakthrough of contaminant in system effluent

NA (9) automated recovery well shutdown if primary carbon unit pressure too high

NA *(10) schedule for sampling between carbon adsorption units provided

* only item required for polishing carbon units

XII. Lead Removal

App. D (1) lead concentrations; unfiltered (44 ppb), background (___ppb), and if unfiltered > 50 ppb, filtered (ppb) Weighted average of lead concentration in influent is 44 ppb.

NA (2) discussion of area of lead contamination provided NA

NA (3) if unfiltered sample greater than 50 ppb and filtered sample less than 50 ppb, lead removal filtration system proposed NA

NA (4) method of lead removal with pertinent design calculation provided NA

XIII. In Situ/Enhanced Bioreclamation

NA (1) groundwater parameters determined (pH, DO, TDS, N, P, Temp, TOC, and Alk, etc.) NA

NA (2) monitoring program discussed. TOC to be monitored NA

NA (3) additional oxygen source provided NA

NA (4) oxygen and nutrients adequately applied to contaminated area NA

NA (5) suitable soils present (non-clayey, good transport, low adsorption properties) NA

NA (6) bench scale and/or in situ pilot study proposal provided NA

XIV. Infiltration Gallery

NA (1) field percolation test (preferably with double ring infiltrometer) provided if gallery base is located in the vadose zone ____

NA (2) infiltration gallery construction details and location provided ____

NA (3) gallery calculation/assumptions provided with mounding analysis ____

NA (4) piezometer and cleanout pipe provided in gallery ____

NA (5) geotextile filter fabric to be installed around and above gallery ____

NA (6) discussion or modeling of gallery's effect on plume migration provided ____

XV. Injection Well

NA (1) injection well location and proposed construction details provided NA

NA (2) screening interval appropriate NA

(3) effluent discharge pump description, pump characteristic curve, and design flowrate(____gpm at _ _ ft TDH) provided NA

NA (4) carbon polishing unit provided NA

NA (5) air release valve provided on highest point of effluent discharge piping NA

NA (6) injection rate (well hydraulics) calculations provided NA

NA (7) UIC permit conditions met NA

NA (8) injections well's effect on potable wells and plume migration provided NA

XVI. Alternative Disposal Methods

(1)for surface water discharge

NA a) conditions of NPDES general permit no. FLG040001 met NA

NA b) after RAP approval, NPDES notice of intent to be submitted to EPA NA

NA (2) if applicable, consumptive use permit obtained from water management district NA

4-3 (3) approval from municipality for sewer discharge and alternate cleanup levels with conditions provided ____

NA (4) applicable permits obtained for stormwater discharge ____

XVII. Sampling Requirements

4-7 (1) designated monitoring wells chosen and sampling frequency adequate (recommend monthly for asymptotic curve determination and quarterly otherwise) YES - Table 4-1

4-7 (2) weekly sampling of influent from recovery well(s) and effluent at treatment system for first month, monthly sampling for first year acknowledged YES - Table 4-1

____ (3) filing of annual status reports acknowledged ____

____ (4) water table contours and depth and extent of free product to be determined at monthly or quarterly sampling event YES

4-7 (5) sampling program includes appropriate contaminants/procedures as specified in 17-70.008 YES

4-7 (6) periodic maintenance and site inspection limited to twice a month for first quarter, monthly thereafter YES

NA = NOT APPLICABLE

FOREWORD

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

Questions regarding this report should be addressed to the Commanding Officer, Naval Training Center (NTC), Orlando, Florida, or to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM), Code 18237, at AUTOVON 563-0528 or 803-743-0528.

EXECUTIVE SUMMARY

Remedial action is necessary because the Contamination Assessment (CA) of McCoy Annex Base Exchange Service Station, Building 7174, Naval Training Center, Orlando, Florida, identified contamination that exceeds the State of Florida parameters for Class G-II groundwater, this Remedial Action Plan (RAP) has been developed to describe site cleanup.

It presents a plan for cleanup of the contamination at the site. The groundwater contamination will be reduced by the installation of a "pump and treat" system that includes the installation of four groundwater recovery wells and the construction of an air stripper to remove volatile organic compounds from the contaminated water. The levels of soil contamination will be reduced by the construction of a vacuum extraction system that requires the installation of three vacuum extraction wells, a vacuum pump, and a carbon adsorption system. These systems will be operated until the petroleum related contamination in both the groundwater and the soil reaches the required target concentrations or until further remedial activities are not effective. It is estimated that the operation period will be about 2 years. The estimated costs are $328,565.

ACKNOWLEDGMENTS

In preparing this report, the Underground Storage Tank personnel at ABB Environmental Services, Inc., commends the support, assistance, and cooperation provided by the personnel at McCoy Annex, Naval Training Center (NTC), Orlando, Florida, and Southern Division, Naval Facilities Engineering Command (SOUTHNAV-FACENGCOM). In particular, we acknowledge the effort of the following people in the preparation of this report.

NAME	TITLE	POSITION	LOCATION
Carl Loop	Environmental Engineer	Engineer-in-Charge	SOUTHNAVFACENGCOM
Bill Raspet	Former Environmental Coordinator	Former Environmental Coordinator	NTC, ORLANDO

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NTC Orlando, Florida

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GLOSSARY

The following is a list of the acronyms, initialisms, and abbreviations, and units of measure used in this report.

ABB-ES	ABB Environmental Services, Inc.
AASHTO	American Association of State Highway Transportation Officials
ASTM	American Society for Testing and Materials
BDL	below detection limits
BTEX	benzene, toluene, ethylbenzene, and xylenes
bls	below land surface
CA	Contamination Assessment
CAR	Contamination Assessment Report
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CTO	Contract Task Order
1,2-DCA	1, 2-dichloroethane
DOT	Department of Transportation
EDB	ethylene dibromide
FDER	Florida Department of Environmental Regulation
FDOT	Florida Department of Transportation
ft/day	feet per day
ft/ft	feet per foot
FS	factor of safety
GAC	granular activated carbon
GC	gas chromatograph
gpd	gallons per day
gpm	gallons per minute
HMA	hot mix asphalt
HSWA	Hazardous and Solid Waste Amendments of 1984
mg/ℓ	milligrams per liter
MTBE	methyl tert-butyl ether
μg/ℓ	micrograms per liter
NCP	National Contingency Plan
NPDES	National Pollution Discharge Elimination System
NTC	Naval Training Center
O&M	operation and maintenance
OVA	organic vapor analyzer
PCA	Preliminary Contamination Assessment
PCE	tetrachloroethene
ppb	parts per billion

GLOSSARY (Continued)

ppm	parts per million
psi	pounds per square inch
PVC	polyvinyl chloride
RAC	Remedial Action Contract
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
SOUTHNAVFACENGCOM	Southern Division Naval Facilities Engineering Command
SVE	soil vapor extraction
SVOCs	semivolatile organic compounds
SWDA	Solid Waste Disposal Act of 1965
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TRPH	total recoverable petroleum hydrocarbons
TSD	temporary storage and disposal
UIC	uniform identification code
UV	ultraviolet
USEPA	United States Environmental Protection Agency
USTs	underground storage tanks
VOA	volatile organic aromatics
VOCs	volatile organic compounds
WWTP	Waste Water Treatment Plan

1.0 INTRODUCTION

ABB Environmental Services, Inc. (ABB-ES), submitted the Contamination Assessment Report (CAR) for McCoy Annex Base Exchange Service Station, Building 7174, Orlando, Florida, in September 1991 to Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). ABB-ES had performed earlier work at the site as E.C. Jordan Company, a former business name of ABB-ES. After submittal of the CAR, ABB-ES was authorized by SOUTHNAVFACENGCOM to develop a Remedial Action Plan (RAP). This work is being performed under Contract Task Order (CTO) No. 0015.

1.1 PURPOSE. The purpose of the RAP is to present a plan for remediation of petroleum contamination at the McCoy Annex Base Exchange Service Station site.

The RAP presented herein is designed for implementation at the McCoy Annex Base Exchange Service Station site. When implemented, the objectives of the remedial activities are to reduce the level of petroleum-related contamination in soils and groundwater to the following target concentrations.

Soils	10 parts per million (ppm) by organic vapor analyzer (OVA) headspace analysis	
Groundwater	Benzene	1
	Total volatile organic aromatics (VOA)	50
	Total naphthalene	100
	Methyl tert-butyl ether (MTBE)	50
	Ethylene dibromide (EDB)	0.02
	Lead (dissolved)	50

Note: Concentrations are in micrograms per liter ($\mu g/\ell$) unless specified otherwise.

1.2 SCOPE. This RAP presents the rationale for the remedial system to be implemented at the McCoy Annex Base Exchange Service Station. Implementation of this RAP will include the following specific remedial actions:

- installation of groundwater recovery wells, recovery pumps, controls, and associated pipes and trenches;
- installation of the groundwater treatment system, comprised of an air stripping tower;
- connection to the sanitary sewer to dispose of treated effluent;
- installation of three vapor recovery wells, five vapor monitoring wells, vacuum pumps, controls, and associated piping and trenches;
- installation of a vapor treatment system comprised of granular activated carbon (GAC);
- startup and testing of the system to achieve optimum efficiency; and
- maintenance, operation, and monitoring of the system for 2 years.

2.0 SITE BACKGROUND INFORMATION

2.1 SITE DESCRIPTION AND HISTORY. McCoy Annex is located about 12 miles south of the Naval Training Center (NTC) in Orlando, Orange County, Florida. It occupies 877 acres and is situated adjacent to the west side of Orlando International Airport (Figure 1, Appendix A). McCoy Annex serves mainly as a housing and community support center for the NTC complex. The area of investigation is the McCoy Annex Base Exchange Service Station, Building 7174, located at the corner of Binnacle Way and Daetwyler Drive (Figure 2, Appendix A).

In 1942, six gasoline storage tanks (7174-1 through 7174-6) were installed at the site (one 3,000-gallon tank and five 5,000-gallon tanks). The tanks were abandoned in 1986, and were filled with sand to conform with Florida Department of Environmental Regulation (FDER) abandonment procedures. In 1986, four 10,000-gallon tanks (7174-7 through 7174-10) were installed to replace the abandoned tanks. Four compliance wells were installed (OLD-7174-1 through OLD-7174-4) in association with the new tank construction to meet FDER monitoring requirements. During sampling of the compliance wells by Naval personnel on June 15, 1988, a petroleum odor was detected in wells OLD-7174-1, OLD-7174-2, and OLD-7174-3. E.C. Jordan was contacted to conduct a Preliminary Contamination Assessment (PCA) on the site as a result of this detection.

E.C. Jordan personnel completed a PCA in 1988 that included precision testing of tanks 7174-7 through 7174-10 and their associated piping. During the PCA, E.C. Jordan installed an additional six monitoring wells (OLD-7174-5 through OLD-7174-10). Results from the PCA were that the tanks and their associated piping were not leaking; however, it was observed that the annuli around the tank fill ports were not properly sealed. Groundwater testing confirmed that contamination was present and it was recommended that a Contamination Assessment (CA) be conducted at the site.

In late June 1991, ABB-ES personnel conducted a CA at the site. During the CA, eight additional 2-inch diameter shallow monitoring wells (OLD-7174-11 through OLD-7174-16, OLD-7174-18, and OLD-7174-19) and one 4-inch monitoring well (OLD-7174-17) were installed. Groundwater samples were collected by ABB-ES personnel and analyzed by Savannah Laboratories and Environmental Services, Inc. A groundwater elevation survey was completed and aquifer slug tests for hydraulic conductivity were performed.

Also, OVA readings were taken on soil samples that were collected during the CA. OVA readings confirmed that soil contamination exists at the site. The OVA results are summarized in Table 2-1.

2.2 SUMMARY OF SITE CONDITIONS. Based on the results of the field investigations and the laboratory analytical results collected during the CA, the following is a summary of conditions at the site. Additional site condition details can be found in the Contamination Assessment Report, Naval Training Center McCoy Annex Base Exchange Service Station, Building 7174, Orlando, Florida (May 1992).

- Three aquifers, the surficial, the secondary artesian, and the Floridian aquifer system, exist in Orange County.

Table 2-1
Summary of Soil Sample Organic Vapor Analyzer Results, October 10, 1991

Remedial Action Plan
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Boring Number	Depth (feet)	Unfiltered (ppm)	Filtered (ppm)	Actual (ppm)
SB1-1	2	1	1	0
SB1-2	4	10	1	9
SB2-1	2	10	0	10
SB2-2	4	20	0	20
SB3-1	2	1,000	0	1,000
SB3-2	4	150	0	150
SB4-1	2	500	0	500
SB4-2	4	21	0	21
SB4-3	6	2,600	0	2,600
SB5-1	2	1,300	0	1,300
SB5-2	4	1,500	0	1,500
SB5-3	5.5	1,700	0	1,700
SB6-1	2	200	25	175
SB6-2	4	1,000	70	930
SB6-3	6	500	16	484
SB6-4	7.5	900	35	865
SB8-1	2	150	37	113
SB8-2	4	100	10	90
SB8-3	6	60	5	55
SB9-1	2	1,000	200	800
SB10-1	2	50	0	50
SB10-2	4	100	30	70
SB10-3	7	9	0	9
SB11-1	2	0	0	0
SB11-2	5	15	10	5
SB11-3	7.4	5	0	5
SB12-1	2	2	0	2
SB12-2	5	0	0	0
SB13-1	2	10	0	10

Notes: Headspace samples were filtered with an activated carbon filter that allows only methane to pass through. The filtered reading is a measurement of methane gas in the sample and is subtracted from the unfiltered reading to obtain the actual hydrocarbon concentration.

Boring SB-7 was not reported. Met refusal at 3 feet below land surface.

ppm = parts per million.

- Generally, the sediments encountered during drilling operations onsite are comprised predominantly of light to dark brown, black, grey, or tan, fine- to medium-grained sand.

- Groundwater beneath the site was encountered at between 4 and 7 feet below land surface (bls).

- The direction of groundwater flow in the surficial aquifer is generally to the south (Figure 3, Appendix A).

- Free product was not identified in any of the monitoring wells during the PCA and CA field investigations. However, during a subsequent sampling event on March 12, 1992, approximately 0.45 foot of free product was observed in OLD-7174-11.

- Contaminants identified during the CA investigation include 1,2-dichloroethane (1,2-DCA); benzene, toluene, ethylbenzene, and xylenes (BTEX); MTBE; EDB; total recoverable petroleum hydrocarbons (TRPH); and naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene. Table 2-2 shows the results of the June 25, 1991, sampling event. The site was resampled on March 12, 1992, and those results are shown on Table 2-3. Contamination contour maps are provided as Figures 4 through 8 (Appendix A) for benzene, total VOAs, MTBE, total naphthalenes, and EDB, respectively.

- Tank testing results conducted during the PCA in 1988 indicate that the new tanks and piping are tight.

- The vertical extent of contamination, as defined by the deep well installed during the CA, does not exceed 30 feet bls.

- There are no identifiable potable wells within a 1-mile radius of the site. Potable water is provided by the City of Orlando water system.

- Hydraulic conductivity is calculated to be 2.57 feet per day (ft/day) based on slug test data.

- The hydraulic gradient is calculated to be 0.007 foot per foot (ft/ft).

2.3 CONTAMINATION ASSESSMENT REPORT (CAR) CONCLUSIONS.

- OVA analyses indicates the soil contamination is located predominantly within the boundaries of the Base Exchange Service Station and has the greatest concentrations in the area of the newer tanks and downgradient in the area south of the old tanks and the pump islands.

- Information gathered in the field during the PCA, CA, and from observations made during the tank testing indicates that the fill ports of the northern underground storage tanks (USTs) were not properly grouted from approximately 1986 until 1989. During this time, excess product contained in the tanker truck hose was allowed to drain into the fill port vault and percolate downward to the surficial groundwater. The ungrouted fill ports are believed to be the principal source of the groundwater and soil contamination at the site.

Table 2-2
Summary of Groundwater Analytical Results, June 25, 1991

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Monitoring Well	Purgeable Halocarbons (USEPA Method 601)	Purgeable Aromatics (USEPA Method 602)								Polynuclear Aromatics (USEPA Method 610/8100)				
	1,2-Dichloroethane (µg/ℓ)	Benzene (µg/ℓ)	Ethylbenzene (µg/ℓ)	Toluene (µg/ℓ)	Xylenes (µg/ℓ)	Total VOAs (µg/ℓ)	MTBE (µg/ℓ)	EDB (µg/ℓ)	Petroleum Hydrocarbons (418.1) mg/ℓ	Naphthalene (µg/ℓ)	2-Methylnaphthalene (µg/ℓ)	1-Methylnaphthalene (µg/ℓ)	Total Naphthalene (µg/ℓ)	Dissolved Lead (mg/ℓ)
Target concentrations	3	1	--	--	--	50	50	0.02	5	--	--	--	100	0.050
OLD-7174-1	BDL	490	130	6.90	110	736.90	13,000	BDL	5.70	BDL	BDL	BDL	BDL	BDL
OLD-7174-2	BDL	4,000	450	34	130	4,614	36,000	BDL	13	50	18	10	78	BDL
OLD-7174-3	BDL	BDL	BDL	BDL	BDL	BDL	33	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-4	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-5	BDL	190	40	8.10	42	280.10	8,600	BDL	1.10	BDL	BDL	BDL	BDL	BDL
OLD-7174-6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-7	BDL	9.50	1.30	3.40	8.10	22.30	13	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-8	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-11	BDL	4,300	1,100	9,800	6,400	21,600	6,100	1.40	BDL	280	75	41	396	BDL
OLD-7174-12	3.20	BDL	BDL	BDL	BDL	BDL	5,500	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-13	BDL	220	36	260	350	866	270	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-14	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-15	BDL	1.80	1.30	1.10	BDL	4.20	420	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-16	6	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-17	BDL	BDL	BDL	BDL	2.20	2.20	BDL	BDL	1.50	BDL	BDL	BDL	BDL	BDL
OLD-7174-18	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-19	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-3DUP	BDL	BDL	BDL	BDL	BDL	BDL	23	BDL	BDL	BDL	BDL	BDL	BDL	BDL
OLD-7174-13DUP	BDL	17	8.70	40	53	118.70	30	BDL	2.40	BDL	BDL	BDL	BDL	BDL

Notes: USEPA = U.S. Environmental Protection Agency.
Total VOAs = total volatile organic aromatics; the sum of benzene, ethylbenzene, toluene, and xylenes.
MTBE = methyl tert-butyl ether.
EDB = ethylene dibromide.
µg/ℓ = micrograms per liter.
mg/ℓ = milligrams per liter.
BDL = below detection limits.

Table 2-3
Summary of Groundwater Analytical Results, March 12, 1992

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Monitoring Well	Purgeable Halocarbons (601)	Purgeable Aromatics (602)										Polynuclear Aromatics (610/8100)				
	1,2-Dichloroethane (µg/ℓ)	Benzene (µg/ℓ)	Ethylbenzene (µg/ℓ)	Toluene (µg/ℓ)	Xylenes (µg/ℓ)	Tetrachloro-ethene (µg/ℓ)	Methylene Chloride	Total VOAs (µg/ℓ)	MTBE (µg/ℓ)	EDB (µg/ℓ)	Petroleum Hydrocarbons (418.1) mg/ℓ	Naphthalene (µg/ℓ)	2-Methyl-naphthalene (µg/ℓ)	1-Methyl-naphthalene (µg/ℓ)	Total Naphthalene (µg/ℓ)	Total Lead (µg/ℓ)
Target concentra-tions	3	1				5		50	50	0.02	5				100	50
OLD-7174-1	ND	12	4	ND	5	ND	ND	21	340	0.07	ND	ND	ND	ND	ND	ND
OLD-7174-2	ND	190	61	ND	16	ND	72	267	3,100	ND	2	130	56	37	223	ND
OLD-7174-3	ND	2	ND	ND	ND	ND	14	2	3	ND	ND	ND	ND	ND	ND	13
OLD-7174-4	ND	ND	ND	ND	ND	ND	1	ND	ND	ND	ND	ND	ND	ND	ND	19
OLD-7174-5	ND	8	8	ND	4	ND	ND	20	1,000	ND	ND	ND	ND	ND	ND	6
OLD-7174-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22
OLD-7174-7	ND	2	ND	ND	1	ND	ND	3	2	ND	ND	ND	ND	ND	ND	26
OLD-7174-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
OLD-7174-12	ND	5	5	ND	4	ND	ND	14	3,400	ND	ND	ND	ND	ND	ND	110
OLD-7174-13	ND	109	23	17	84	ND	ND	233	9	ND	ND	10	ND	ND	10	17
OLD-7174-14	ND	ND	ND	ND	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	ND	160
OLD-7174-15	ND	ND	ND	ND	ND	ND	4	ND	150	ND	ND	ND	ND	ND	ND	19
OLD-7174-16	ND	ND	ND	ND	ND	ND	2	ND	18	ND	ND	ND	ND	ND	ND	190
OLD-7174-17	ND	ND	ND	ND	ND	3	11B	ND	ND	ND	ND	ND	ND	ND	ND	ND
OLD-7174-19	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.06	ND	ND	ND	ND	ND	49
Duplicate	ND	3	ND	ND	1	ND	ND	4	ND	ND	ND	ND	ND	ND	ND	19

Notes: µg/ℓ = micrograms per liter.
Total VOA = total volatile organic aromatics; the sum of benzene, ethylbenzene, toluene, and xylenes.
MTBE = methyl tert-butyl ether.
EDB = ethylene dibromide.
mg/ℓ = milligram per liter.
ND = not detected.
B = Compound detected in method blank associated with this sample.
Total Naphthalene = summation of all naphthallene species.

- The contaminant isoconcentration maps (Figures 4 through 8) suggest that the source of the petroleum contamination (the fill ports at the northern tank pad) is no longer releasing product to the environment and that the contaminant plume is migrating downgradient (southward) of the source.

3.0 TECHNOLOGY IDENTIFICATION AND SCREENING

The development of remedial action alternatives consists of three primary activities:

- identifying potential treatment technologies,
- screening the technologies based on their effectiveness and implementability, and
- assembling technologies into alternatives for the media of concern at the site.

3.1 TECHNOLOGY IDENTIFICATION. Subsection 1.1 identifies the remedial action objectives for the site. Based on the remedial action objectives and general response actions, together with site information provided in the CAR (ABB Environmental Services, Inc., May 1992), general remedial action technologies were identified for each medium of concern: soil and groundwater.

Technologies were identified and evaluated based on a review of literature sources, contacts with vendors to obtain specific information and performance data, and experience in developing similar remedial actions. Technologies that were determined to be potentially applicable for helping to attain the remedial action objectives and that would be applicable for the contaminants of concern were identified. Table 3-1 (located at the end of this section) provides a brief description of these technologies. To assist in assembling the technologies in Subsection 3.5, the technologies for each medium are separated by function into response categories: no action, limited action, containment, collection, treatment, disposal, and ancillary treatment.

3.1.1 No Actions As a baseline alternative, no action alternatives are included as part of the evaluation with other remedial action alternatives for the site.

3.1.2 Limited Actions The limited action category includes technologies that restrict access to contaminated areas by physical means (e.g., fencing) or by establishing institutional controls through legal channels (e.g., deed restrictions). Technologies in this category reduce the possibility of exposure to contamination but do not reduce the volume, mobility, or toxicity of the identified hazards.

3.1.3 Containment Actions Containment actions include technologies that involve little or no treatment, but provide protection to human health and the environment by preventing the migration of contaminants. Thus, containment technologies attempt to reduce potential routes of exposure through isolation. Containment actions typically consist of covering contaminated areas or controlling groundwater movement through the use of low permeability barriers or containment walls.

3.1.4 Collection Actions Collection actions may be used for alternatives involving groundwater or soil remediation. Collection actions include technologies that may be used in conjunction with treatment, disposal, and/or recycling techniques when developing remedial action alternatives. Typical

collection technologies include subsurface trench drains and extraction wells. For soils, this would coincide with technologies for the removal of contaminated soils prior to treatment or disposal. A typical soil removal technique is excavation.

3.1.5 Treatment Actions Treatment actions include technologies that specifically act to reduce the mobility, toxicity, or volume of contaminants by biological, physical, or chemical processes. In this evaluation, in-situ treatment technologies (i.e., treatment not requiring prior removal of the medium of concern), such as soil flushing or vacuum extraction, and ex-situ treatment methods, such as thermal soil aeration or incineration, are separated into their respective categories. Treatment processes that achieve a reduction in contaminant mobility, toxicity, or volume are favored, unless site conditions limit their feasibility.

3.1.6 Disposal Actions Disposal actions are intended to prevent exposure and consolidate waste material. Disposal actions may be combined with treatment actions when developing remedial action alternatives. For example, waste material may be treated by incineration techniques (treatment action) and placed in an onsite landfill (disposal action).

3.1.7 Ancillary Actions Ancillary actions describe support technologies for containment, treatment, or disposal actions. For example, soil may require screening prior to a given treatment to assure that the treatment process does not fail.

3.2 TECHNOLOGY SCREENING. The technology screening process reduces the number of potentially applicable technology types by evaluating options with respect to their effectiveness, technical implementability, and cost in meeting remedial action objectives. Technologies were evaluated to assess whether they are applicable to the site-specific compounds and environmental media and suitable for the location and conditions of the site.

Table 3-2 (located at the end of this section) presents the technology screening for the site. Technologies that are not effective or cannot be implemented at the site have been eliminated from further consideration, as indicated in the table. The technologies remaining after screening are used to develop potential remedial action alternatives designed to meet corrective action objectives. Table 3-3 (located at the end of this section) summarizes the technology screening step for each of the two media of concern.

3.3 DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES. Technically feasible remedial action technologies identified in Subsection 3.2 are grouped into potential remedial action alternatives for each medium in Subsection 3.5. The following preferences were followed when developing and evaluating remedial alternatives.

- Remedial actions that involve treatment to permanently and significantly reduce the toxicity, mobility, or volume of the contaminants or hazardous substances are preferred over remedial actions not involving such treatment.

- Offsite transport and disposal of hazardous substances or contaminated materials without treatment is considered the least favored remedial action when practical treatment technologies are available.

- Remedial actions using permanent solutions, alternative treatment technologies, or resource recovery technologies will be considered.

Based on these preferences, emphasis was placed on developing alternatives that, as a principal element, permanently and significantly treat contaminants to reduce the toxicity, mobility, or volume of the contamination.

Treatment alternatives were considered for each medium, ranging from alternatives that would eliminate the need for long-term management at the site (e.g., excavation and offsite landfilling of source soils) to alternatives involving treatment to reduce the toxicity, mobility, or volume of the hazardous substances as their principal element (e.g., thermal soil aeration or carbon adsorption treatment of groundwater). In addition, alternatives were considered to contain contaminated media, and limited action alternatives were considered to control access to the site.

3.4 REMEDIAL ACTION ALTERNATIVE SCREENING. The remedial action alternatives developed in Subsection 3.5 were screened based on the cleanup criteria described in Subsection 1.1. The objective of this screening step is to eliminate from further consideration alternatives that have undesirable results regarding effectiveness, implementability, and costs, while still preserving a range of options. The evaluation criteria for each of the categories (effectiveness, implementability, and cost) are described in the following subsections.

3.4.1 Effectiveness Each alternative was judged for its ability to effectively protect human health and the environment by reducing the toxicity, mobility, or volume of contaminants. The ability of an alternative to meet target cleanup concentrations, as well as comply with other criteria, advisories, and guidelines, was also considered. The time required for the remedial alternative to achieve the desired result was also considered.

3.4.2 Implementability Each alternative was evaluated in terms of implementability, inclusive of technical feasibility, administrative feasibility, and availability. Factors considered for technical feasibility were the ability to construct the given technology, reliability of the technology, compliance with specific target cleanup concentrations, the ability to monitor the effectiveness of the given remedy, and the ability to perform operation and maintenance functions. Administrative feasibility for implementing a given technology addressed the ability to obtain approvals from other agencies, the need to coordinate with other agencies, and the need to comply with location-specific target cleanup concentrations.

3.4.3 Cost The final criterion for the initial screening of alternatives was the cost associated with the given remedy. Capital costs included development and construction costs. Other costs that were considered were operation and maintenance for the required duration, costs for disposal, costs for relocation of buildings and tanks, and costs for potential future remedial action, where applicable. Development of a detailed cost estimate for each alternative was outside the scope of this RAP. Therefore, gross cost estimates were used for alternative comparisons. Alternatives were screened out on the basis of cost unless another alternative is equally effective and implementable.

3.5 REMEDIAL ACTION ALTERNATIVES. Remedial technologies passing the screening have been combined into remedial action alternatives as presented below. After evaluation and comparison of the alternatives, a remedial action was selected.

3.5.1 Soil

No Action. This alternative would consist of taking no further actions to remediate the site. Because contaminant concentrations in excess of the target concentrations listed in Subsection 1.1 were identified in the CAR, this alternative must be eliminated.

Limited Action and Containment. This alternative would consist of capping the area of contaminated soils to reduce contaminant migration and implementing institutional controls to minimize future disturbance of the contamination. Periodic monitoring would also be conducted to evaluate the effectiveness of the cap. Institutional controls might include deed restrictions, the posting of signs, and site employee education.

This alternative would be easily implemented and would have a relatively low cost. It may somewhat reduce the mobility of the contamination, although the site is already capped by pavement, but would not reduce its toxicity or volume. Further, because contaminant concentrations exceed FDER regulatory limits, this alternative would not satisfy the regulatory requirement. Therefore, this alternative is eliminated.

Ex-Situ Treatment. This alternative would consist of removing the soil; treating it to reduce the mobility, toxicity, and/or volume of the contamination; and subsequently disposing of it. The only removal technology considered was excavation. This would be accomplished using standard excavation equipment, such as backhoes and front-end loaders. Treatment technologies passing screening include offsite incineration and thermal soil aeration. Because contractors are readily available to remove contaminated soils from the site and transport them to offsite commercial incinerators, and Because thermal soil aeration would occur onsite, necessitating either leaving the excavation open until treatment was complete and the soils could be returned or securing offsite disposal options, offsite incineration would be used as the treatment technology for this alternative. Therefore, this alternative would consist of excavating the contaminated soil and transporting it to a commercial incinerator, which would treat it and dispose of the residual.

This is a commonly used method of treating contaminated soil and is proven effective. Accessibility of the contaminated soil for excavation and the disruption of the service station business onsite must be considered. Excavation over a large portion of the site, as would be required for this alternative, would cause the service station to be completely closed for weeks. Because the Navy has indicated that closing the facility for that length of time would not be desirable, this alternative is eliminated.

In-Situ Treatment. This alternative would consist of treating the soil to reduce the mobility, toxicity, and/or volume of the contamination without excavation. In-situ treatment technologies passing screening include vacuum extraction and soil flushing. The presence of pavement over most of the site limits the implementability of soil flushing, but prevents short circuiting and improves the effectiveness of vapor extraction. For this reason, and because of the proven

effectiveness of vapor extraction systems, vapor extraction would be the in-situ treatment technology used in this alternative.

A soil vapor extraction (SVE) system would consist of a series of vapor extraction wells to which suction would be applied to extract volatile organic compounds from the surrounding soil. The wells would be connected to the vacuum source and the off-gas treatment system through underground piping. The installation of the piping would temporarily disrupt site activities, but through construction phasing the service station operation would not have to be shut down for extended periods of time. Off-gas treatment for SVE systems can be effectively provided by carbon adsorption, thermal oxidation, or catalytic oxidation. Because they are proven effective technologies that can be applied to this site with limited disruption of site activities, the SVE with carbon adsorption, SVE with thermal oxidation, and SVE with catalytic oxidation in-situ treatment alternatives are retained.

3.5.2 Groundwater

No Action. This alternative would consist of taking no further actions to remediate the site. Because contaminant concentrations in excess of FDER regulatory limits were identified in the CAR, this alternative must be eliminated.

Limited Action and Monitoring. This alternative would consist of monitoring the contaminated groundwater and implementing institutional controls to minimize future use of the groundwater or disturbance of the contamination. Periodic monitoring would be conducted to evaluate any movement of the contamination. Institutional controls might include deed restrictions, the posting of signs, and site employee education.

This alternative would be relatively easy to implement and would have a relatively low cost. It would not reduce the mobility, toxicity, or volume of the contamination. Further, because contaminant concentrations exceed the target concentrations, this alternative would not meet the remedial objectives; therefore, this alternative is eliminated.

Ex-Situ Treatment. This alternative would consist of collecting the contaminated groundwater; treating it to reduce its mobility, toxicity, and volume; and disposing of the treated effluent. The groundwater would be collected through extraction wells because that was the only technology to pass the initial screening. Treatment technologies passing the initial screening include Ultraviolet (UV)/Oxidation, air stripping, and carbon adsorption. UV/Oxidation has not been as widely used in Florida for petroleum cleanups as air stripping or carbon adsorption, but is an effective technology for treating volatile organic compound (VOC)-contaminated water. Carbon adsorption is not cost effective for treating groundwater with high VOC concentrations, but will be retained for use as a polishing step if needed. Therefore, two ex-situ treatment alternatives consisting of groundwater extraction wells and each of the remaining technologies will be retained. Ancillary technologies that passed the initial screening will be included as appropriate. Disposal alternatives will be considered independent of the treatment technologies because the disposal requirements will be the same for both.

3.6 ALTERNATIVE EVALUATION AND SELECTION.

3.6.1 Soil Because the three alternatives differ only in the off-gas treatment technology used in conjunction with soil vapor extraction, alternative comparisons will be limited to those technologies. Although carbon adsorption does not destroy the contaminants directly, regeneration of the carbon by incineration will eventually destroy them. Therefore, all three alternatives will reduce the mobility, toxicity, and volume of contamination and any of the three could be implemented at this site. Selection of an alternative will, therefore, be based on costs.

Because site preparation costs, permitting costs, and costs associated with process monitoring will be similar for all three technologies, they will not be estimated for the purposes of this comparison. Capital equipment costs, system startup costs, and operation and maintenance (O&M) costs will be compared using gross cost estimates. All estimates are based on the following assumptions.

- The vapor extraction system will operate at 65 cubic feet per minute (cfm).
- The average concentration of VOCs in the off gas will be 375 ppm.
- The volume of contaminated soil is 2,000 cubic yards.
- Approximately 2,200 pounds of VOCs will be removed from the soil.

	Carbon Adsorption	Thermal Oxidizer	Catalytic Oxidizer
Capital Costs	$31,500	$40,000	$55,000
Startup Costs	$2,500	$5,000	$5,000
O&M Costs (for 6 months)	$1,500	$7,500	$5,000
Totals	$35,500	$52,500	$65,000

Although these are very rough estimates and do not include considerations such as equipment reusability or salvage value, the estimated cost differences indicate the use of carbon adsorption to be the most cost-effective alternative. Therefore, soil vapor extraction with carbon adsorption is the selected soil remediation alternative.

3.6.2 Groundwater Because the two groundwater remediation alternatives differ only in the treatment processes, this evaluation will only compare the air stripping and UV/Oxidation technologies. Both technologies are effective in removing VOCs from groundwater. Air stripping does not destroy the VOCs as does UV/Oxidation, but emits them into the atmosphere. The VOC emissions are typically released at a height sufficient to allow mixing such that air quality standards are met. UV/Oxidation typically has very low, if any, concentrations of air emissions. Maintenance of an air stripping system is relatively straight forward and can be performed with minimal training. UV/Oxidation system maintenance is more difficult and may require special training or an outside service contract for system components such as the ozone generator, the desiccant dryer, or the UV lamp assembly. Although the UV/Oxidation system may operate with minimal attention, daily monitoring of the process water is required. Costs

for the two systems are estimated below. Costs common to both technologies, such as site preparation, effluent monitoring, etc., are not included.

	Air Stripping	UV/Oxidation
Capital Costs	$23,500	$70,000
Startup Costs	$12,000	$24,000
O&M Costs (for 1 year)	$12,000	$27,500
Totals	$47,500	$121,500

Both systems are capable of meeting the site remediation goals. The air stripping system is simpler to operate and far less expensive. Therefore, air stripping is selected as the groundwater remediation alternative.

Table 3-1
General Response Actions and Potential Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

General Response Action	Soil Remedial Action Technology	Description
No action	None	No action
Limited action	Institutional controls, educational programs, site fencing	Deed restrictions on potentially contaminated areas. Educate public concerning site hazards. Erect physical barrier to site access.
Containment	Capping	Low permeability cover (e.g., clay or asphalt) is constructed over the site to provide a barrier to water infiltration and prevent direct contact exposure.
Removal	Excavation	Remove soils of concern with construction equipment such as backhoes, bulldozers, and front-end loaders.
Disposal	Onsite landfill	Secure soil in a permitted double-lined cell with a leachate collection system.
	Offsite landfill	Transport soil to an offsite permitted facility
	Base hazardous waste TSD facility	Transport treatment residuals to the NTC Orlando TSD facility.
Ex-situ treatment	Onsite incineration	Soil is excavated and treated by a mobile incinerator, which thermally destroys organics in a direct fired treatment unit.
	Offsite incineration	Soil is excavated and hauled to a licensed incinerator, which thermally destroys organics in a direct fired treatment unit.
	Thermal soil aeration	Soil is excavated and treated by a mobile unit, which volatilizes organic contaminants from soil and destroys them in a secondary combustion chamber.
	Forced aeration	Organics are volatilized by drawing air through unconfined piles using both perforated pipes installed within soil piles and vacuum pumps.
	Glass furnace vitrification	Soil is excavated and treated in a furnace equipped with a bed of molten glass. Organics are destroyed and ash/soil residue drops into molten glass to form a vitrified product after cooling.
	Solidification	Soil is excavated and mixed with a setting agent to form a monolithic product in which contaminants are entrapped by the solidified mass.
	Solvent extraction	Soil is excavated and mixed with a chemical solvent in a mobile batch mixer; soil settles out and solvent/contaminant is decanted off. The contaminant is then separated from the solvent to produce an effluent stream of concentrated contaminant.
	Supercritical extraction	Organics are extracted using gases (e.g., carbon dioxide or propane) at a certain temperature and pressure (critical point) such that their solvent properties are greatly altered. These properties make extraction of organics more rapid and efficient than processes using distillation or conventional solvent extraction methods.
	Biotreatment	Soil is excavated, deposited in a treatment area, fertilized, and aerated. Organics are degraded by microorganism either introduced or indigenous to the soil.

See notes at end of table.

Table 3-1 (Continued)
General Response Actions and Potential Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

General Response Action	Soil Remedial Action Technology	Description
Ex-situ treatment (continued)	Composting	Soil is arranged in long piles 3 to 6 feet high, add nutrients and bulking agents (e.g., wood chips), and periodically turn the piles over to facilitate aerobic and anaerobic decomposition of organic constituents.
	Hot mix asphalt	Soil is hauled offsite to a hot mix asphalt (HMA) batch plant. Contaminated soil is mixed with clean aggregate and passed through a dryer, where hydrocarbons are volatilized and incinerated. The material exiting the dryer can be used to aggregate into the HMA process.
	Land treatment	The land treatment process uses microorganisms to degrade organic contaminants in the soil. Soil is excavated, deposited in a treatment area, fertilized, and aerated. The soil environment may be adjusted to promote microbial growth and accelerate degradation.
	Soil washing	Soil is excavated and mixed with an aqueous based washing solution in a series of high energy mobile washing units. Organics and inorganics can be separated from soil with this system. Washing solution is recycled.
In-situ treatment	Vacuum extraction	A vacuum is applied to wells or french drains at the site to extract vapor from voids in the soil. The vapor is collected and either treated or released to the atmosphere.
	Biotreatment	A nutrient source and oxygen are circulated through the soil to support the growth of microorganisms that will degrade organic contaminants.
	Bioventing	Biological degradation of VOCs is achieved by low pressure air flow through the soil to provide oxygen. Low air flow minimizes volatilization and eliminates the need for off-gas treatment.
	Soil flushing	Aqueous based washing solution is applied at the ground surface. Contaminants are removed from soil particles and held in the liquid phase as the solution infiltrates the soil. Solution containing the contaminants is removed through extraction wells after reaching the water table.
	Vitrification	Metal electrodes are buried in the soil and electricity is applied to heat and melt the soil, destroying organics and encapsulating inorganics.
	Radio frequency (RF) heating	Radio frequency electrodes are used to direct electromagnetic energy into soil to produce heat that aids in the removal of VOCs and SVOCs.
	Steam stripping	Steam is forced through the soil and extracted by a vacuum collection system to remove VOCs and SVOCs.
Ancillary	Screening	Debris (e.g., boulders) is removed from excavated soils with meshed or mechanical screens.
	Dewatering	Water is removed from saturated soils by pumping to lower the groundwater table, or remove water from excavated soils by mechanical means (e.g., belt filter press).
	Carbon adsorption	Gas phase VOCs are removed with activated carbon.
	Solidification	A setting agent is mixed with contaminated residuals to form a monolithic product in which contaminants are entrapped by the solidified mass.

See notes at end of table

Table 3-1 (Continued)
General Response Actions and Potential Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

General Response Action	Groundwater Remedial Action Technology	Description
No action	None	No action
Limited action	Groundwater monitoring	Water quality analyses are performed to monitor contaminant migration and assess future environmental impacts.
	Institutional controls and educational programs	Restrictions on use of contaminated groundwater are imposed. The public is educated concerning site hazards.
Containment	Subsurface slurry wall	A low permeability barrier is emplaced to restrict groundwater migration. Should include a cover system to reduce infiltration.
Collection	Barrier drain system	A series of shallow trenches are constructed to intercept contaminated groundwater.
	Extraction wells	Several strategically located pumping wells are installed to collect contaminated groundwater for treatment.
Ex-situ treatment	UV/oxidation	Oxidize organic contaminants in extracted groundwater through simultaneous application of UV light with ozone and/or hydrogen peroxide.
	Air stripping	Reduce concentrations of volatile organics through intimate contact of extracted groundwater with air. Water descends a packed column while air is forced up the column to promote mass transfer of organics from aqueous to gaseous phase. Gaseous phase may require further treatment to meet air regulations.
	Steam stripping	Remove contaminants through intimate contact of extracted groundwater and steam. Similar to air stripping, but steam is used to elevate temperatures and enhance removal of VOCs.
	Carbon adsorption	Reduce concentrations of aqueous or gaseous phase organics through adsorption onto granular activated carbon. May be used as a polishing step for treatments such as air stripping to further reduce organic contaminant concentration.
	Wet air oxidation	Destroy organic contaminants in an aqueous solution by inducing oxidation and hydrolysis reactions at high temperature and pressure. Oxygen, at high temperatures, enhances oxidation of organic compounds to carbon dioxide and water.
	Thin film evaporation	Remove contaminants from extracted groundwater by vaporizing water from contaminants. Process produces a concentrated wastestream requiring further treatment.
	Reverse osmosis	Remove organics from extracted groundwater using membrane process. At high pressures, membrane allows water to pass while organics are retained. Process produces a concentrated wastestream requiring further treatment.
	Resin adsorption	Contaminants are transferred from the dissolved state to the surface of the resin. Can be regenerated by removing the contaminants with solvent. Process produces a concentrated wastestream requiring further treatment.

See notes at end of table.

Table 3-1 (Continued)
General Response Actions and Potential Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

General Response Action	Groundwater Remedial Action Technology	Description
Ex-situ treatment (continued)	Biological treatment	Destroy organics through biodegradation, acclimation-degradation, or chemical conversion of the organic wastes by introducing the extracted groundwater to either an aerobic or anaerobic biological treatment process. Microorganisms and nutrients (if needed) are added to induce one or more of the responses.
	Supercritical water oxidation	Destroys organic compounds in an aqueous solution at high temperature and pressure. The supercritical water oxidation process is operated at higher temperatures and pressures than wet air oxidation.
	Ion exchange	Metal ions are removed from solution by exchanging ions, electrostatically attached to a solid resin material, for dissolved ions in solution. Regeneration of the exhausted resin would produce a concentrated waste-stream requiring further treatment.
In-situ treatment	In-situ biological	Introduces microorganisms, nutrients, and oxygen into the groundwater using a matrix of extraction wells and recirculation techniques.
Discharge/disposal	Wastewater treatment facility	Disposal of groundwater treatment effluent to the local WWTP. Effluent would require transport by means of a force main, and/or gravity feed sewer or by truck to the WWTP.
	Groundwater reinjection	Reinject treated groundwater using a series of wells and pumps. Can be used to enhance plume removal and accelerate remediation.
	Surface water discharge	Discharge treated groundwater directly to nearby surface water body. Transport groundwater by means of force main. Requires NPDES permit.
	Offsite disposal facility	Dispose of extracted groundwater, organic or metals sludge/wastestream at an offsite facility. These sludge/wastestreams would be waste residuals from groundwater treatment.
	Offsite incineration	Incinerate treatment residue (e.g., spent carbon) at an offsite facility.
Ancillary	Aeration	Aerate the groundwater prior to treatment to precipitate out inorganic iron, manganese, calcium, and magnesium.
	Filtration	Remove suspended solids from the wastewater streams by forcing the water through a sand filter or cartridge-type filter.
	Oxidation-reduction	Add chemical reagents to groundwater, changing the oxidation state of the inorganics to a more treatable form.
	Precipitation, flocculation, and sedimentation	Form a solid phase, usually particulate matter suspended in a liquid phase, containing the pollutants to be removed. Process requires close control of pH. Process generates a sludge that may require further treatment prior to disposal.
	Carbon adsorption	Remove gas phase VOCs with activated carbon
	Thermal oxidation	Incinerate gas phase VOCs
	Catalytic oxidation	Combust gas phase VOCs at a lower temperature than thermal oxidation by using a catalyst.

Notes: TSD = temporary storage and disposal.
WWTP = Wastewater Treatment Plant.
UV = ultraviolet.
VOCs = volatile organic compounds.
SVOCs = semivolatile organic compounds.
NPDES = National Pollution Discharge Elimination System.

Table 3-2
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Soil Remedial Action Technology	Effectiveness	Implementability	Screening Status
No-action	None	Easily implemented.	Retained. Required for baseline comparison.
Limited Action			
Institutional controls	Would restrict future site use	Easily implemented. Could be used if the Navy were to abandon the base.	Retained. Would likely be required if contaminants were not removed or treated.
Educational programs	Would make personnel working on or near the site aware of existing contamination.	Easily implemented.	Retained. Would likely be required if contaminants were not removed or treated.
Fencing/signs	Would restrict site access	Easily implemented.	Retained. Limits access by humans and animals.
Containment			
Capping	Reduces migration of contaminants in soil by reducing infiltration.	Easily implemented. Site is capped now by existing structures and pavement.	Retained. Limits exposure to surface soil contaminants.
Removal			
Excavation	Effective for removing contaminated soils with concentrations above media protection standards. Eliminates contaminant leaching to groundwater.	Excavation is possible if pavement and structures are partially or completely removed. Would disrupt site activities.	Retained. Would be required prior to ex situ treatment or disposal.
Disposal			
Onsite landfill	Would not reduce mobility, toxicity, or volume of contaminants.	To dispose onsite, a RCRA-Subtitle C landfill would have to be constructed for disposal of treated or untreated wastes. Land disposal restrictions may require treatment of wastes prior to disposal in a RCRA landfill. Materials would have to pass TCLP testing for F001-F005 solvents (e.g., PCE and TCE) and metals.	Eliminated. Requires permitting and construction of RCRA Subtitle C Landfill.
Offsite landfill	Would not reduce mobility, toxicity, or volume of contaminants.	Would require transport to a RCRA Subtitle C facility for disposal. Land disposal restrictions would apply. Wastes may require treatment prior to disposal in a RCRA landfill. Materials would have to pass TCLP testing for F001-F005 solvents (e.g., PCE and TCE) and metals.	Eliminated. No reduction in mobility, toxicity, or volume. Offsite treatment alternatives are available.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Soil Remedial Action Technology	Effectiveness	Implementability	Screening Status
Ex-Situ Treatment			
Base Hazardous Waste TSD Facility	Effective means of disposing of treatment residuals.	Easily implemented for disposal of treatment residuals.	Retained. Can be used to dispose of small quantities of treatment residuals.
Onsite incineration	Effective for VOCs and SVOCs. Permanently destroys organics thereby reducing the mobility, toxicity, and volume.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas. Process requires operation and staging areas. Incinerator permit would be required.	Eliminated. Requires permitting and large operation and staging areas. Offsite alternatives are available.
Offsite incineration	Effective for VOCs and SVOCs. Permanently destroys organics thereby reducing the mobility, toxicity, and volume.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source area. Requires transport of material to a permitted incinerator.	Retained. Would permanently treat organic compounds in the soil.
Thermal soil aeration	Effective for VOCs and some SVOCs. Permanently destroys organics thereby reducing the mobility, toxicity, and volume.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas. Requires off gas treatment.	Retained. Would effectively remove organic contaminants from the soil.
Forced aeration	Effective for VOCs	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas. Requires off gas treatment.	Eliminated. Small volume of soil would not make this option cost effective.
Glass furnace vitrification	Effective for organics	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas. Requires off gas treatment. Generates a vitrified product requiring disposal.	Eliminated. Other technologies achieve the same results more effectively.
Solidification	Not typically used for VOC contaminants. Effective for metals.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas. Requires large land area for mixing soil and reagents.	Eliminated. Technology not typically used for VOCs.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Soil Remedial Action Technology	Effectiveness	Implementability	Screening Status
Ex-Situ Treatment (cont'd)			
Solvent extraction	Concentrations of organic chemicals in soil at the facility may be too low for effective extraction.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas.	Eliminated. Concentrations of organic chemicals in soil too low for effective treatment.
Supercritical extraction	Concentrations of organic chemicals in soil at the facility may be too low for effective supercritical extraction.	Requires excavation and screening of material prior to treatment. Currently difficult to implement with structures and underground utilities in source areas.	Eliminated. Concentrations of organic chemicals in soil too low for effective treatment.
Biotreatment	Volatilization of VOCs and SVOCs may adversely affect ambient air quality.	Requires excavation. Currently difficult to implement with structures and underground utilities in source areas. Requires large tracts of unvegetated land. Extensive site testing is required to obtain permits. May require off gas collection and treatment.	Eliminated. Requires large area of land.
Composting	Not proven for soils containing hazardous constituents. Process mostly used for treating municipal sewage sludge.	Currently difficult to implement with structures and underground utilities in source areas. Composting requires large staging area for compost piles.	Eliminated. Not proven for VOCs and SVOCs.
Hot mix asphalt	Process mostly used for treating petroleum hydrocarbons.	Requires excavation. Currently difficult to implement with structures and underground utilities in source areas.	Eliminated. Existing data indicates that soil would not likely be acceptable for asphalt incorporation processes.
Land treatment	Volatilization of VOCs and SVOCs may adversely affect ambient air quality.	Requires excavation. Currently difficult to implement with structures and underground utilities in source areas. Requires large tracts of unvegetated land. Extensive site testing is required to obtain permits. May require off gas collection and treatment.	Eliminated. Requires large tracts of unvegetated land.
Soil washing	Effective at separating organics and inorganics from soil.	Requires excavation. Currently difficult to implement with structures and underground utilities in source areas. Requires high energy mobile washing units.	Eliminated. Could accomplish the same results in situ using soil flushing.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Soil Remedial Action Technology	Effectiveness	Implementability	Screening Status
In-Situ Treatment			
Vacuum extraction	Effective for removing VOCs	Currently, may be difficult to implement due to existing structures and underground utilities. Underground utilities can act as a preferred path for air flow, short circuiting the system. Requires off-gas treatment.	Retained. Effective for removing VOCs.
Biotreatment	Technology has not yet been widely applied.	Delivery of nutrients to affected soils may be difficult due to existing structures and pavement. Biological testing would be required to determine if site is suitable.	Eliminated. Difficult to implement.
Bioventing	Appears to be a promising new technology for VOC treatment. Effectiveness is not yet proven.	Does not radically disrupt site activities. Low pressure air flow minimizes volatilization of VOCs, eliminating need for off-gas treatment.	Eliminated. Technology not proven yet.
Soil flushing	Surfactants or other additives to the water may be required to successfully remove the contaminants due to their inherent low solubility. Effectiveness may be hampered if low permeability soils are encountered.	Difficult to apply due to site pavement. Soil permeability may restrict influx of sufficient quantities of water to flush soils. May undermine foundations and utilities.	Retained. Effective in removing contaminants from the soil.
Vitrification	Destroys or immobilizes contamination in soil. Applicable for inorganics or radioactive wastes. Technology has the potential for causing migration of VOCs outside treatment area.	Currently difficult to implement due to existing structures and underground utilities in soil source areas. Energy intensive process. Moisture in soil affects operational time and increases cost. Vendors not currently available.	Eliminated. Not applicable for site contaminants. Vendors not currently available.
Radio frequency heating	Effective to a depth of 5 to 10 feet in vadose zone soils. Most effective in removing VOCs and SVOCs from homogeneous sandy soils.	Currently difficult to implement due to existing structures and underground utilities in soil source areas. Has been demonstrated on pilot scale level. Requires off gas treatment.	Eliminated. Existing structures may limit effectiveness of this technology.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Soil Remedial Action Technology	Effectiveness	Implementability	Screening Status
In-Situ Treatment (continued)			
Steam stripping	Effective for VOCs and SVOCs	Currently, may be difficult to implement due to existing structures and utilities. Underground utilities can act as a preferred path for air flow, short circuiting the system. High power requirement for steam generation. Requires vapor phase treatment.	Eliminated. Could accomplish the same results using vacuum extraction; therefore, steam is not necessary.
Ancillary			
Screening	Removes large stones and debris to facilitate treatment processes. Can lose VOCs to ambient air during screening.	Easily implemented.	Retained. May be necessary if excavation is required.
Dewatering	Lowers the groundwater table. Mechanical dewatering effectively reduces moisture content of soil and sludge.	Applicable for saturated soils and sludges.	Retained. Groundwater table may need to be lowered during excavation.
Carbon adsorption	Effective for treatment of vapors or off gases.	Easily implemented. Requires periodic changeout of carbon.	Retained. Can be used with technologies requiring off gas treatment.
Solidification	For use in conjunction with incineration to dispose of ash if it fails TCLP testing. May be required by receiving facility if soil is disposed of offsite.	Easily implemented.	Retained. May be required prior to disposal of process residuals.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Groundwater Remedial Action Technology	Effectiveness	Implementability	Screening Status
No Action	None	Easily implemented	Retained. Required for base line comparison by the NCP guidance.
Limited Action			
Groundwater monitoring	Provides current information on distribution of contaminants in groundwater, and/or treatment effectiveness.	Easily implemented. Likely to be included with any alternative.	Retained. Likely to be required with any alternative.
Institutional controls	Reduces potential human health exposure risks by preventing future use of the groundwater for drinking water.	Would require coordination between State and local agencies.	Retained. Reduces potential human health exposure.
Educational programs	Educates public concerning site hazards	Easily implemented.	Retained. Educates public concerning site hazards.
Containment			
Subsurface slurry wall with cap	Reduces horizontal, but not vertical, migration of contaminants. Does not reduce toxicity or volume.	Requires low permeability underlying stratum to key into. Existing utilities may prevent construction of hydraulic barrier. Barrier would need to be constructed of materials compatible with contaminants.	Eliminated. Location of site and depth to low permeability stratum do not make construction of a slurry wall feasible.
Collection			
Barrier drain system	Effectively collects shallow groundwater	Presence of underground utilities may create restrictions.	Eliminated. Location of site does not make construction of a drain system feasible. Other alternatives are available.
Extraction wells	Effectively collects groundwater	Easily implemented	Retained. Effective means of collecting groundwater.
Ex-Situ Treatment			
UV/oxidation	Effective for treatment of aromatics and chlorinated aliphatics.	Pretreatment for removal of naturally occurring inorganics (e.g., iron, lead, or manganese) is sometimes required to prevent fouling of oxidation system.	Retained

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Groundwater Remedial Action Technology	Effectiveness	Implementability	Screening Status
Ex-Situ Treatment (continued)			
Air stripping	Effective for removal of VOCs and SVOCs	Off-gas treatment may be required following air stripping to meet air regulations. Pretreatment for removal of naturally occurring inorganics (e.g., iron, lead, manganese) may be required to prevent fouling of air strippers.	Retained. Effective method of reducing concentrations of VOCs.
Steam stripping	Effective for removal of VOCs and SVOCs. Elevated temperatures enhance contaminant removal. Produces a concentrated wastestream requiring further treatment.	Energy source required for steam generation. Pretreatment for removal of naturally occurring inorganics or acidification of feed stream may be required to prevent fouling by production of compounds such as calcium carbonate on the packing material.	Eliminated. Produces a concentrated wastestream requiring further treatment. Air stripping would be effective in removing the volatile contaminants of concern.
Carbon adsorption	Demonstrated technology for removing VOCs and SVOCs from groundwater.	Easily implemented. Periodic changeout of spent carbon is required.	Retained. May need to be combined with another technology as a polishing step.
Wet air oxidation	This technology is not economical for dilute organic concentrations (<1 percent). Generally achieves 80 percent oxidation of organic constituents, which may not meet treatment requirements.	Mobile systems not available, therefore an onsite system would require complete building, resulting in high capital costs. Energy source required to produce heat due to low temperature of groundwater. The high temperature and pressure system would require extensive monitoring.	Eliminated. Technology has limitations and low efficiency.
Thin film evaporation	Process not proven for organics identified at the site.	Process produces a concentrated wastestream requiring further treatment.	Eliminated. Process not applicable for contaminants of concern.
Reverse osmosis	Not proven reliable for lower molecular weight organics present at the site.	Process produces a concentrated wastestream requiring further treatment. High maintenance requirements.	Eliminated. Process not applicable for contaminants of concern.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Groundwater Remedial Action Technology	Effectiveness	Implementability	Screening Status
Ex-Situ Treatment (continued)			
Resin adsorption	High TDS (>100 mg/ℓ) will limit effectiveness. Effective for removing metals and some organics.	Easily implemented	Eliminated. Process not applicable for site contaminants.
Biological treatment	Low VOC concentrations may be unable to support biological processes.	Would require additional testing. Not widely accepted by regulatory agencies for VOC treatment. May require secondary treatment to achieve target concentrations.	Eliminated. Not well suited for site influent.
Supercritical water oxidation	This technology is not economical for dilute organic concentrations (<1 percent). This high temperature and pressure system would require extensive monitoring.	Full scale systems not available. Energy source required to produce heat due to low temperature of groundwater.	Eliminated. Limitations of this technology do not make it feasible.
Ion exchange	Very effective at reducing metals concentrations.	TDS should be less than 100 μg/ℓ. Resin must be regenerated creating a waste requiring disposal.	Eliminated. Process not applicable for site contaminants.
In-Situ Treatment			
In-situ biological	Has been used successfully to reduce VOC contamination levels.	Requires injection of nutrients and oxygen. Difficult to control process in-situ. Difficult to apply nutrients due to site pavement.	Eliminated. May not sufficiently reduce the concentrations of BTEX in the groundwater. Difficult to implement.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Groundwater Remedial Action Technology	Effectiveness	Implementability	Screening Status
Discharge/Disposal			
Local wastewater treatment facility	Effective means of disposing of treated groundwater.	May require approval of facility operator. Flow capacity is available according to base Environmental Coordinator.	Retained. Effective means of disposing of treated groundwater.
Groundwater reinjection	If discharged upgradient, may assist in flushing groundwater contaminants. Recharged groundwater must be treated to meet groundwater quality standards. Groundwater recharge would prevent extraction wells from going dry.	Reinjection of treated groundwater could affect migration of chemicals toward the site boundaries.	Retained. Discharge requirements would have to be met.
Surface water discharge	Treated water discharged to surface water or sewers must meet NPDES permit limits.	Requires a NPDES permit and additional effluent monitoring.	Retained. Effective means of disposing of treated groundwater.
Offsite disposal facility	Groundwater pretreatment waste residuals are hauled offsite. Does not reduce volume or toxicity.	Requires coordination between regulators.	Eliminated. Less expensive alternatives are available.
Offsite incineration	Reduces mobility, toxicity, and volume of organic contaminants.	Process residuals (e.g., spent carbon) could be incinerated at a permitted facility.	Retained. Effective means of disposing of treatment waste residuals.
Ancillary			
Aeration	Applicable for pretreatment to remove naturally occurring inorganics (e.g., iron, lead, or manganese) to prevent fouling of main treatment system. May release VOCs into the air during the aeration process. May require air emission controls.	Easily implemented as a support treatment.	Eliminated. Other pretreatment technologies are as effective without the need for air emission controls.

See notes at end of table.

Table 3-2 (Continued)
Screening of Remedial Action Technologies

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Response Category/ Groundwater Remedial Action Technology	Effectiveness	Implementability	Screening Status
Ancillary (continued)			
Filtration	Would remove some solids from groundwater.	Easily implemented as a support treatment.	Retained. Possible use as a pretreatment or polishing step.
Oxidation-reduction	Applicable for pretreatment to remove naturally occurring inorganics (e.g., iron, lead, or manganese) to prevent fouling of main treatment system.	Easily implemented as a support treatment.	Retained. Effective means of natural inorganics removal.
Precipitation/flocculation/ sedimentation	Applicable for pretreatment to remove naturally occurring inorganics (e.g., iron, lead, or manganese) to prevent fouling of main treatment system.	Easily implemented as a support treatment.	Retained. Effective means of natural inorganics removal.
Carbon adsorption	Effective in removing VOCs from air stripper off gas and in low concentrations from effluent.	Easily implemented. Requires periodic changeout of carbon.	Retained. Can be used for off gas treatment or as a liquid polishing step.
Thermal oxidation	Thermally destroys organic compounds in air stripper off gas.	Easily implemented. Requires power source.	Retained. Can be used for off gas treatment.
Catalytic oxidation	Thermally destroys organic compounds in air stripper off gas.	Easily implemented. Requires power source.	Retained. Can be used for off gas treatment.

Notes: RCRA = Resource Conservation and Recovery Act.
TCLP = toxicity characteristic leaching procedure.
PCE = tetrachloroethene.
TCE = trichloroethene.
VOCs = volatile organic compounds.
TSD = temporary storage and disposal.
SVOCs = semivolatile organic compounds.
UV = ultraviolet.
NCP = National Contingency Plan.
BTU = British thermal unit.
TDS = total dissolved solids.
mg/ℓ = milligrams per liter.
μg/ℓ = micrograms per liter.
BTEX = benzene, toluene, ethylbenzene, and xylenes.
NPDES = National Pollution Discharge Elimination System.

Table 3-3
Technology Screening Summary

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Technology	Retained	Eliminated
Medium: Soils		
No Action		
None	X	
Limited Action		
Institutional Controls	X	
Educational Programs	X	
Fencing/Signs	X	
Containment		
Capping	X	
Removal		
Excavation	X	
Ex-Situ Treatment		
Onsite Incineration		X
Offsite Incineration	X	
Thermal Soil Aeration	X	
Forced Aeration		X
Glass Furnace Vitrification		X
Solidification		X
Solvent Extraction		X
Supercritical Extraction		X
Biotreatment		X
Composting		X
Hot Mix Asphalt		X
Land Treatment		X
Soil Washing		X
In-Situ Treatment		
Vacuum Extraction	X	
Biotreatment		X
Bioventing		X
Soil Flushing	X	
Vitrification		X
RF Heating		X
Steam Stripping		X
Ancillary		
Screening	X	
Dewatering	X	
Carbon Adsorption	X	
Solidification	X	
Disposal		
Onsite Permitted Landfill		X
Offsite Permitted Landfill		X
Base Hazardous Waste TSD Facility	X	

See notes at end of table.

Table 3-3 (Continued)
Technology Screening Summary

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Technology	Retained	Eliminated
Medium: Groundwater		
No Action	X	
Limited Action		
Groundwater Monitoring	X	
Institutional Controls	X	
Educational Programs	X	
Containment		
Subsurface Slurry Wall with Cap		X
Collection		
Barrier Drain System		X
Extraction Wells	X	
Treatment		
UV/Oxidation	X	
Air Stripping	X	
Steam Stripping		X
Carbon Adsorption	X	
Wet Air Oxidation		X
Thin Film Evaporation		X
Reverse Osmosis		X
Resin Adsorption		X
Biological Treatment		X
Supercritical Water Oxidation		X
Ion Exchange		X
In-Situ Treatment		
Enhanced Biological		X
Disposal		
Offsite WWTP	X	
Groundwater Reinjection	X	
Surface Water Discharge	X	
Offsite Disposal Facility		X
Offsite Incineration	X	
Ancillary		
Aeration		X
Filtration	X	
Oxidation-Reduction	X	
Precipitation/Flocculation/Sedimentation	X	
Carbon Adsorption	X	
Thermal Oxidation	X	
Catalytic Oxidation	X	

Notes: RF = radio frequency.
WWTP = Waste Water Treatment Plant.

4.0 RECOMMENDED REMEDIAL ACTION

Based on the evaluation of the treatment alternatives and the site conditions, a "pump and treat" system combined with a vapor extraction system is recommended. The "pump and treat" portion of the combined system will be implemented to recover and remediate contaminated groundwater. Vapor extraction will be implemented to recover residual soil contamination from the vadose zone. The combination of these technologies provides a proven and reliable means of remediating the petroleum contamination for this site. In addition, the combination of these technologies should minimize the time necessary to cleanup this site.

The "pump and treat" portion of the recommended system will consist of four groundwater recovery wells and an air stripping tower. The contaminated groundwater will be pumped from the recovery wells and discharged into an air stripping tower where the volatile contaminants will be removed. The effluent will be discharged to the sanitary sewer. The pumping rate of the recovery wells will be adjusted so that the capture zone will encompass the identified area of contamination.

The vapor extraction portion of the system will be comprised of three vapor recovery wells. The vapors will be extracted by a vacuum pump that will discharge into a GAC adsorption system. The system's effluent air will be discharged through a stack approximately 12 feet above ground surface. The pumping rate of the vapor recovery wells will be adjusted so that the created vacuum drawdown of 0.5 inch of water column vacuum will encompass the approximate area of soil contamination. At the startup of the remedial system, testing will be conducted to evaluate the effluent concentration, radius of influence, and suction at the wellheads of the proposed vapor extraction system.

Figure 9, Appendix A, is a site plan that shows the location of the groundwater recovery wells RW-1 through RW-4, the locations of the vapor recovery wells VRW-1 through VRW-3, the trenching layout, and the compound area location. The compound layout is shown in Figure 10.

4.1 GROUNDWATER RECOVERY. The contaminated groundwater will be pumped from four recovery wells (RW-1 through RW-4). The recovery wells will be constructed of 6-inch diameter polyvinyl chloride (PVC) installed to a depth of 25 feet with 20 feet of 0.020-inch slotted PVC screen. The annuli of the wells will be filled with a 6/20 silica sand pack to a depth of 4.5 feet bls, and a 6-inch-thick bentonite seal will be placed above the sand pack. The remainder of the annulus will be filled with a 1:3 by weight, water:grout mixture with bentonite to the bottom of a 3- by 3- by 2-foot, traffic bearing, locking vault. The traffic bearing cover will conform to Department of Transportation (DOT) H20 standards. Each recovery well will be completed approximately 2 inches above grade and will be sloped with the land surface to shed stormwater runoff. The recovery wells will be developed as they are constructed. The details of the proposed recovery well, the proposed recovery vault, and the influent piping are shown in Appendix A.

The average hydraulic conductivity value, calculated from the slug test data presented in the CAR, is 2.57 ft/day. By using this hydraulic conductivity value and assuming a necessary radius of influence of 35 feet, a drawdown of 8 feet was

calculated (Appendix B). Because a definite confining layer was not encountered during the CA drilling program, the aquifer thickness at the site is not known. Based on the CA and available literature, the aquifer is estimated to be between 36 and 70 feet thick. Contained in Appendix B are calculations for the flow required to achieve a 35-foot radius of influence for varying aquifer thicknesses. These calculations show that the minimum flow required is 4 gallons per minute (gpm) (assuming that the well is fully penetrating) and that the maximum flow required is 5 gpm (assuming an aquifer thickness of 40 feet). For an aquifer thickness of greater than 40 feet, the flow does not change significantly. Therefore, for preliminary design purposes the thickness of the aquifer will be assumed to equal 40 feet.

With a factor of safety (FS) of 1.10, the design flow is 5.5 gpm per well. Because there is some uncertainty in using slug test data to determine hydrogeologic properties, conservative design estimates of drawdown and also flow rate were made. After the system is installed, the flow rate of each groundwater recovery well will be adjusted so that the desired radius of influence is achieved. If the desired influence cannot be achieved, additional recovery wells may be necessary. The predicted groundwater recovery area of influence is shown in Figure 16, Appendix A.

4.2 PUMPING SYSTEM DESIGN. The engineering calculations for the sizing of the pumps are contained in Appendix C. The calculations indicate that the pump will be working against approximately 81 feet of head at the design flow rate of 5.5 gpm. Based upon a designed drawdown of 8 feet in each well, Grundfos™ Model 5E12, 1/2-horsepower electric submersible pumps or equivalent are recommended. According to the manufacturer's specifications, this pump is capable of pumping 7 gpm against a 100-foot head.

The recommended piping system will consist of 1-inch minimum diameter schedule 80 PVC piping from each well laid in 3- by 3-foot trenches backfilled with American Association of State Highway Transportation Officials (AASHTO) A-3 material in 6-inch loose lifts. Each lift will then be compacted to 98 percent of American Society for Testing Materials (ASTM) method D-698. Then the trench will be capped with 6-inch, 3,000 pounds per square inch (psi) concrete pavement with No. 5 bar, grade 40 steel reinforcement (see Figure 17, Appendix A). These trenches will also contain 3/4-inch diameter electrical conduits necessary for power supply and probe cables. After the piping stub up, each effluent line will have an instantaneous and totalizing flow meter, a shut off/throttling valve, and a check valve before the lines are manifolded together at the stripping tower.

The amount of undissolved product measured was 0.45 foot (March 1992) and isolated to MW-11. Because of the minimal amount of product and its limited extent, ABB-ES is not recommending the installation of a product recovery system; however, due to the minimal additional construction cost incurred to install the underground piping necessary for a product recovery system, this cost will be included in the construction of the system. ABB-ES recommends that the product be removed by bailing during the first month's weekly sampling and maintenance episodes. At the first quarterly operation and maintenance visit, recommendations will be given as to whether or not a product recovery system should be installed.

4.3 AIR STRIPPER DESIGN. An air stripping unit will be used to remove the volatile contaminants from the extracted groundwater. Air stripping is typically

considered to be the most cost-effective method for removal of low levels of dissolved hydrocarbons from water. The process consists of pumping water to the top of a column where it is discharged downward into the column while air is forced into the column near the bottom, counter current to the water flow. The column is filled with a media that functions to bring the water into contact with the passing air.

The air stripping unit recommended is a skid mounted, 1.5-foot-diameter tower, 20 feet in height, with 15 feet of 2.3-inch polypropylene Lanpac™ random packing. According to the manufacturer's specifications, 2.3-inch Lanpac™ has a geometric surface area of 68 square feet per cubic foot, and a packing factor equal to 21 $feet^{-1}$. The blower will be a AF-8-1000 model American Fan or equivalent, 230-volt, single phase blower capable of producing the design air flow of 300 cfm. This air flow rate and water flow rate give a design air to water ratio of 100 to 1. The air stripping unit will also be equipped with influent and effluent sampling ports, a mist eliminator, an observation port, and a pressure gauge to indicate the effects of fouling with time. The unit will be equipped with controls to allow for complete system shutdown in the case of inadequate air delivery due to an unexpected increase in column operating pressure or blower failure. The sump of the column will be equipped with controls that will shut the system down in the event the water in the sump rises above a safe operating level. The details of the stripper design calculations are shown in Appendix D.

A summary of the most recent (March 12, 1992) groundwater analytical results are shown in Table 2-3. The calculated recovery well concentrations and the calculated influent concentrations are contained in Appendix D. An FS of 25 percent was applied to the influent concentrations as recommended in the *Guidance Manual for Review of Petroleum Remedial Action Plans* written by the FDER. The complete groundwater analytical laboratory report is contained in Appendix F.

Based on the design influent concentrations, which were calculated using a weighted average accounting for concentrations in monitoring well samples and the distances of the monitoring wells from the proposed recovery well, this recommended air stripper will be capable of reducing the concentrations of BTEX to less than 1 $\mu g/\ell$. MTBE will be reduced to 5 parts per billion (ppb). This stripper was designed using the AIRSTRIP™ computer program. These calculations are contained in Appendix D. The calculations for the ambient air impact are also contained in Appendix D. The ambient air impact values are not expected to exceed the acceptable ambient impact for any contaminant. It is anticipated that this system will achieve the target remediation concentrations given in Subsection 1.1 within approximately 2 years. Remediation time calculations are given in Appendix B.

Figures depicting the proposed air stripper are presented in Appendix A.

4.4 EFFLUENT DISPOSAL. The treated groundwater will be discharged to the sanitary sewer system of McCoy Annex as per approval of Mr. Bill Raspet of the base engineering office on September 18, 1991. This decision is based upon McCoy Annex's prearranged discharge of 750,000 gallons per day (gpd) and their past 12-month average discharge of 31,680 gpd. This system will add approximately 43,200 gpd to the annex's discharge rate. Prior to implementation of this plan, the availability of this means of effluent disposal should be verified.

The effluent discharge will tap into a 6-inch diameter sanitary sewer line that is located on the southeast corner of the building. The effluent trench detail is shown in Appendix A.

4.5 VACUUM EXTRACTION DESIGN. Because soil contamination was encountered at the site, ABB-ES is recommending that a vapor extraction system be installed. The vacuum extraction system will be implemented to reduce the VOA contamination concentrations in the vadose zone. This will also serve to minimize the potential for recontamination of groundwater remediated by the pump and treat process.

Three vacuum extraction wells, designated VRW-1 through VRW-3 at the locations shown in Figure 9, Appendix A, will be installed. These locations were selected because of the high OVA readings measured on soil samples taken during the soil sampling program. Table 2-1 shows the results of the soil sampling program. An estimate of vacuum drawdown and vapor flow rate was conducted by ABB-ES in order to size the extraction pump and treatment system. It was estimated that vapor wells VRW-1 through VRW-3 would require a total flow rate of 63 cfm and a total vacuum of 88 inches of water column. Also, a required radius of influence of 45 feet was assumed. Based on these requirements, the recommended vacuum pump for this site is a Rotron™ model DR-808 blower or equal. This blower has a 7.5-horsepower motor and operates on 230 volt, 3 phase, alternating current, electric power. This system is capable of either blowing or evacuating air and vapor. It is capable of a maximum vacuum of 92 inches of water column and a maximum flow rate of 350 cfm.

The blower will be skid mounted and equipped with a particulate filter, pressure and vacuum gauges, an adjustable pressure relief valve, moisture separator, a flow meter, and a thermometer. The blower will be explosion proof. It will be operated by a control panel located on the skid. The panel will actuate a shutdown of the blower if the liquid level in the separator tank is at or beyond a high level sensor. In addition, the blower will be shut down if its temperature reaches a factory set high temperature. The blower will be manually restarted after cooling off. The adjustable pressure relief valve, mounted on the skid, will allow fresh air to enter the suction line if the vacuum reaches a preset point. This should minimize the amount of shutdown caused by high motor temperature.

Vacuum recovery wells VRW-1 through VRW-3 will be installed at the locations shown on Figure 9, Appendix A. The wells will be constructed by drilling 12-inch diameter borings with a hollow-stem auger to a depth of 8 feet bls. The borings will be backfilled with a gravel in conformance to Florida Department of Transportation (FDOT) 57 rock. While backfilling the boring with this gravel, two 1-inch diameter, schedule 40 PVC pipes will be installed in the well. The pipes will be installed to depths of 3 feet and 5 feet bls. A grout seal will be placed from 3 feet to 2 feet bls in the annular space around the pipes. A 3- by 3- by 2-foot traffic bearing, locking vault will be installed above the grout seal. The traffic bearing cover will conform to DOT H20 standards. Each vapor extraction well will be completed approximately 2 inches above grade and will be sloped with the land surface to shed stormwater runoff. The vacuum ports will be manifolded together in the well head. Each port will be fitted with a ball valve and a vacuum gauge to facilitate fine tuning of the well's vacuum and flow rates. Details of the recommended vacuum recovery wells are shown in Appendix A.

Vacuum in the vadose zone will be monitored through five vacuum monitoring wells. These wells will also serve as air inlet wells for the vacuum system. The wells will be installed at the locations shown on the drawings in Appendix A. The wells will be installed to a depth of 8 feet bls. They will be constructed of 8 feet of 2-inch diameter, 0.010 inch, schedule 40 PVC well screen from 8 feet to 3 feet bls and 3 feet of 2-inch PVC casing. The wells will be installed in an 8-inch diameter boring with the annular space from 8 feet to 3 feet bls backfilled with a 20/30 filter sand pack. A 6-inch bentonite plug will be placed above the filter pack and the remainder of the annulus will be filled with a cement grout. A 1- by 1- by 1-foot vault will be installed at the surface around a 12-inch diameter manhole. The manhole and concrete pad will be constructed to shed runoff water away from the manhole. The wells will be capped with a locking cap. The cap will contain a threaded fitting that is capable of hosting a vacuum gage and a 2-inch diameter PVC ball valve will be installed to act as an air inlet port. The vapor monitoring well detail is shown in Appendix A.

GAC will be used to remove volatile contaminants from the extracted air and vapor stream. The GAC has been sized for this site based on influent concentrations, flow rate, and design data provided by the GAC manufacturer. The influent contamination stream has been split into two streams for carbon treatment to minimize the pressure losses through the carbon. In order to be prepared for an unexpectedly large carbon usage rate, ports for three, in series, carbon units for each stream will be provided. Appendix E contains calculations that were used to determine the usage rate of carbon, which is 9 pounds per day per flow stream. The actual carbon usage rate will be determined during the startup testing program.

At the request of SOUTHNAVFACENGCOM, no vapor extraction pilot study was conducted prior to the preparation of this RAP. As such, it will be necessary to conduct startup testing of the vapor system to fine tune and adjust the vacuum and flow rate and monitor VOA continuous concentrations in the GAC influent and effluent. The startup testing program will consist of an 8-hour vacuum pumping test in which vacuum pressures and flow rates will be measured. Based on the results of this testing program, the number of carbon canisters in series with each influent stream will be determined.

4.6 CONTROL SYSTEM. The control panel at this site will be equipped with surge protection and will perform the following functions. The panel design is shown in Appendix A.

- The groundwater recovery wells will contain both high water and low water level sensors that will monitor the water levels in the wells. If a low water level is reached in a well, the pump in that well will be automatically shut off until the water level recovers to the high level sensor. The low level sensor will be capable of shutting off the pump if free product is encountered.

- The air stripper will be equipped with controls to cause complete system shutdown in case of inadequate air delivery due to an unexpected increase in column operating pressure or blower failure. The sump of the air stripper will be equipped with controls that will cause the control panel to shut down the groundwater recovery pumps in the event that the water in the sump rises above a safe operating level. In

addition, a low level float will be placed in the sump to cause the air stripper influent pumps to be turned back on.

- A pressure switch will shut the entire vacuum system down if the pressure in the GAC units becomes excessive.

- Service station personnel will be instructed to contact the base environmental coordinator in the event of a system shutdown or malfunction.

4.7 SYSTEM STARTUP. Upon completion of construction and installation of the equipment and prior to the startup of each system, groundwater from the monitoring wells designated for monthly sampling and from the recovery wells will be collected for laboratory analysis.

The sensors will be manually tested and checked for the proper control system response. Upon satisfactory completion of these tests, the pumps will be mounted in the recovery wells, the sensors will be set at their appropriate levels, and the groundwater recovery system will be activated. The flow rate from each recovery well will be adjusted, and the spray distribution at the top of the tower will be inspected and adjusted if necessary. When the spray distribution is satisfactory, the system will be allowed to run for approximately 30 minutes, at which time influent and effluent samples from the air stripper will be collected.

These samples will be analyzed on a portable gas chromatograph (GC) calibrated to detect BTEX to the 1 part per billion range.

Based on the results of the GC analysis and field observations, minor adjustments (i.e., depth of pump intake, water flow rate, and air flow rate) will be made as necessary. If the GC results indicate that the water treatment system is functioning adequately, a sample from the total system effluent will be collected and laboratory analyzed on a rapid turnaround basis for the analytical parameters appropriate for the site to confirm GC results.

The air flow rate of each vapor extraction system will be adjusted to achieve the desired vacuum at the vapor recovery wells. After the vacuum reading at each vapor recovery well has stabilized, the vacuum at the vapor monitoring wells will be checked. Air samples will be collected from the vapor extraction system. These samples will be analyzed by U.S. Environmental Protection Agency (USEPA) Method T03 to determine contaminant concentrations in the air stream.

Operational parameters (i.e., totalized and instantaneous flows, temperature, and pressures) will be recorded at initial start and after equilibrium. After the drawdown in the recovery wells equilibrates, water levels will be measured in selected monitoring wells and the recovery wells.

4.8 MONITORING PROGRAM. The monitoring program is designed to evaluate the performance, progress, and effectiveness of the system installed and to identify possible methods of improving the performance. The air stripper influent and air stripper effluent will be sampled weekly for the first month, monthly for the first year, and quarterly thereafter. In addition, monitoring wells OLD-7174-1 through OLD-7174-5, OLD-7174-7, OLD-7174-8, and OLD-7174-11 through OLD-7174-18 will be sampled quarterly to provide data for tracking the progress of the

remedial program. The samples will be analyzed by USEPA Methods 602 and 610. Quality assurance samples will also be collected during each sampling event.

The influent and effluent of the vacuum extraction system will be sampled weekly the first month of operation, monthly for the first year, and quarterly thereafter. These samples will be analyzed by USEPA Method TO3 to provide data on the systems effectiveness.

The air and water flow rates, total gallons treated, and the pressure in the air stripper will be recorded together with the water levels in all wells during each sampling event. These data will be summarized in a letter report to the Navy and FDER after each visit. The minimum time of cleanup to the target levels is estimated to be approximately 18 months, based on the time for the contamination to travel to the recovery wells. Maximum time for cleanup could be as long as 10 years depending on actual contaminant recovery and migration to the recovery wells.

Presented in Table 4-1 is a summary of the recommended sampling episodes and associated tests for the first year. In addition to the sampling, the system will also be inspected during each episode and routine preventative maintenance will be performed as necessary.

Table 4-1
Sampling Schedule, First Year

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Measure water levels	XXXX	X	X	X	X	X	X	X	X	X	X	X
Sample influent and effluent airstripper and vacuum extraction system	XXXX	X	X	X	X	X	X	X	X	X	X	X
Measure air flow rate of air stripping unit.	XXXX	X	X	X	X	X	X	X	X	X	X	X
Measure pressures and air stripping unit temperature.	XXXX	X	X	X	X	X	X	X	X	X	X	X
Measure water flow through system.	XXXX	X	X	X	X	X	X	X	X	X	X	X
Sample monitoring wells[1]			X			X			X			X

[1]Includes monitoring wells OLD-7174-1 through OLD-7174-4, OLD-7174-5, OLD-7174-7, OLD-7174-8, and OLD-7174-11 through OLD-7174-18.

Notes: X indicates task to be performed.
XXXX indicates weekly sampling for the first month.

5.0 SCHEDULE

Upon the Navy's authorization, the implementing contractor will prepare any necessary construction documents and perform any additional testing, such as pumping tests or vapor extraction tests, that may be needed prior to construction. It is estimated that the remedial equipment can be delivered within 8 to 10 weeks of the notice to the suppliers. Two to 4 weeks should be allowed to obtain any necessary construction permits. Upon acquisition of permits and equipment, it is estimated that the system installation and startup will take approximately 7 weeks.

6.0 COST ESTIMATE

An engineering estimate of the costs for construction and startup of the remedial system is outlined in Table 6-1. Presented in Table 6-2 is the estimated operation and maintenance costs for the first year. The total projected cost for the remedial system including 2 years of operation and maintenance is $328,565.

This estimate is based upon ABB-ES' past experience and knowledge of the design, implementation, and operation of remedial systems.

Table 6-1
Equipment Installation and Startup Costs

Remedial Action Plan
Building 7174, McCoy Annex Base
NTC Orlando, Florida

Item	Startup Cost
Installation and startup of equipment	$ 13,000
Compound area and pipe equipment	7,000
Trenching and piping	55,000
Groundwater recovery wells	20,000
Vacuum recovery and monitoring wells	20,000
Compound pad and fence	10,000
Remedial equipment[1]	48,200
Electrical	8,500
Startup sampling	7,500
Subtotal	$189,200
25% Contingency	47,300
Total	$236,500

[1]Remedial equipment costs include costs for granular activated carbon.

Note: This estimate does not include the cost of developing construction documents.

Table 6-2
Projected Project Operation and Maintenance Costs for 1 Year

Remedial Action Plan
Building 7174, McCoy Annex
NTC Orlando, Florida

Item	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Weekly, monthly, and quarterly sampling				
Personnel	$ 5,800	$ 1,930	$ 1,930	1,930
Laboratory	13,650	9,450	9,450	9,450
Travel	960	480	480	480
Other direct costs	1,100	360	360	360
Subtotal	$21,510	$12,220	$12,220	$12,220
Utilities and Maintenance				
Personnel	1,500	1,500	1,500	1,500
Electricity	1,000	1,000	1,000	1,000
Other direct costs	800	800	800	800
Subtotal	$ 3,300	$ 3,300	$ 3,300	$ 3,300
Total $71,370	$24,810	$15,520	$15,520	$15,520

7.0 PROFESSIONAL REVIEW CERTIFICATION

This remedial action plan for the McCoy Annex Base Exchange Service Station, Naval Training Center, Orlando, Florida, has been prepared under the direction of a Registered Professional Engineer. The plan is based on information gathered by ABB Environmental Services, Inc., as well as others, from March 1991 to March 1992, with regard to the site conditions. The engineering aspects of this plan were prepared based on the certifying engineer's knowledge, information, and belief, and in accordance with commonly accepted procedures consistent with applicable standards of practice.

Celora Y. Jackson
Project Engineer

Michael K. Dunaway
P.E. No. 39451
Senior Engineer

APPENDIX A

FIGURES

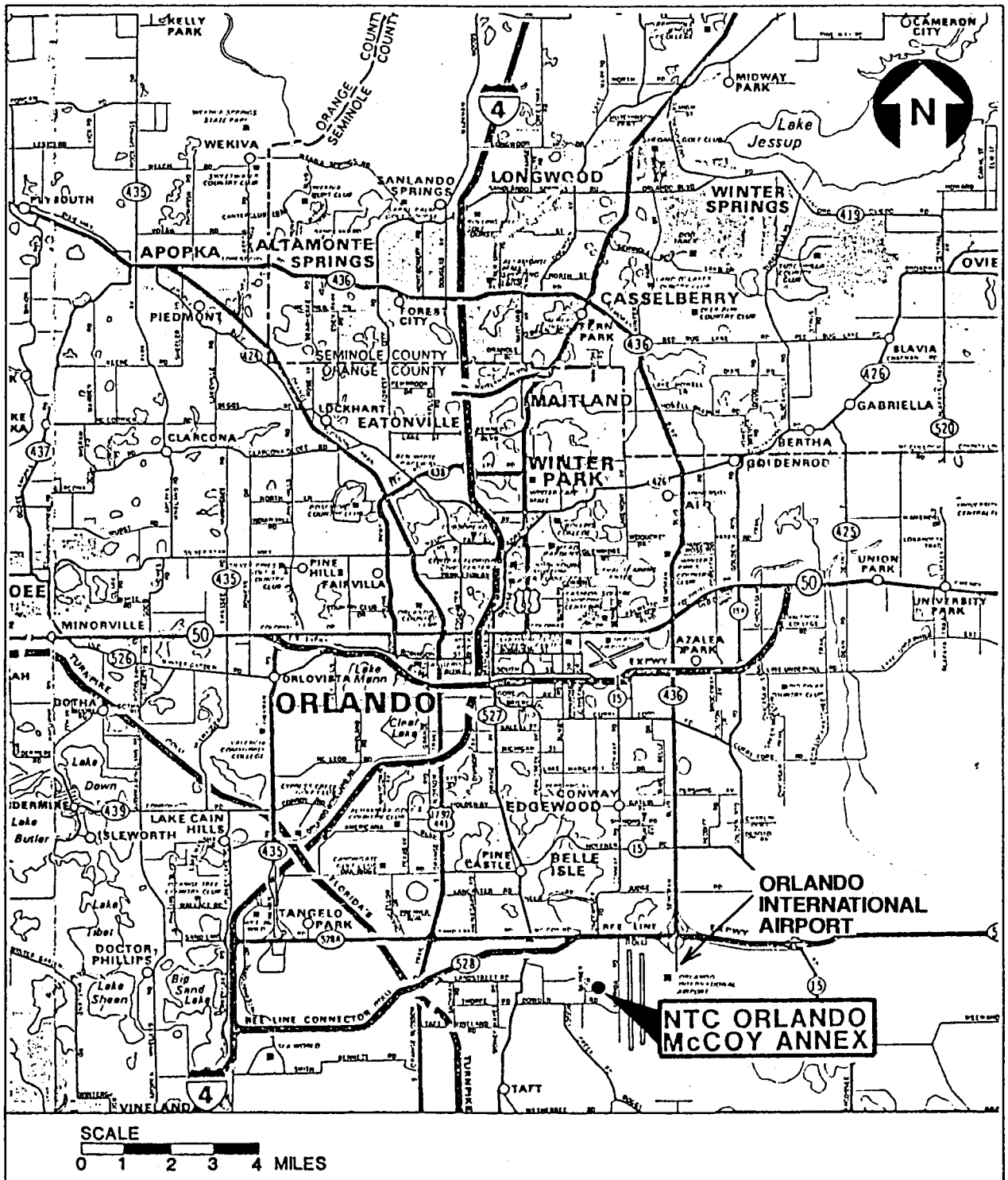


FIGURE 1

FACILITY LOCATION MAP

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

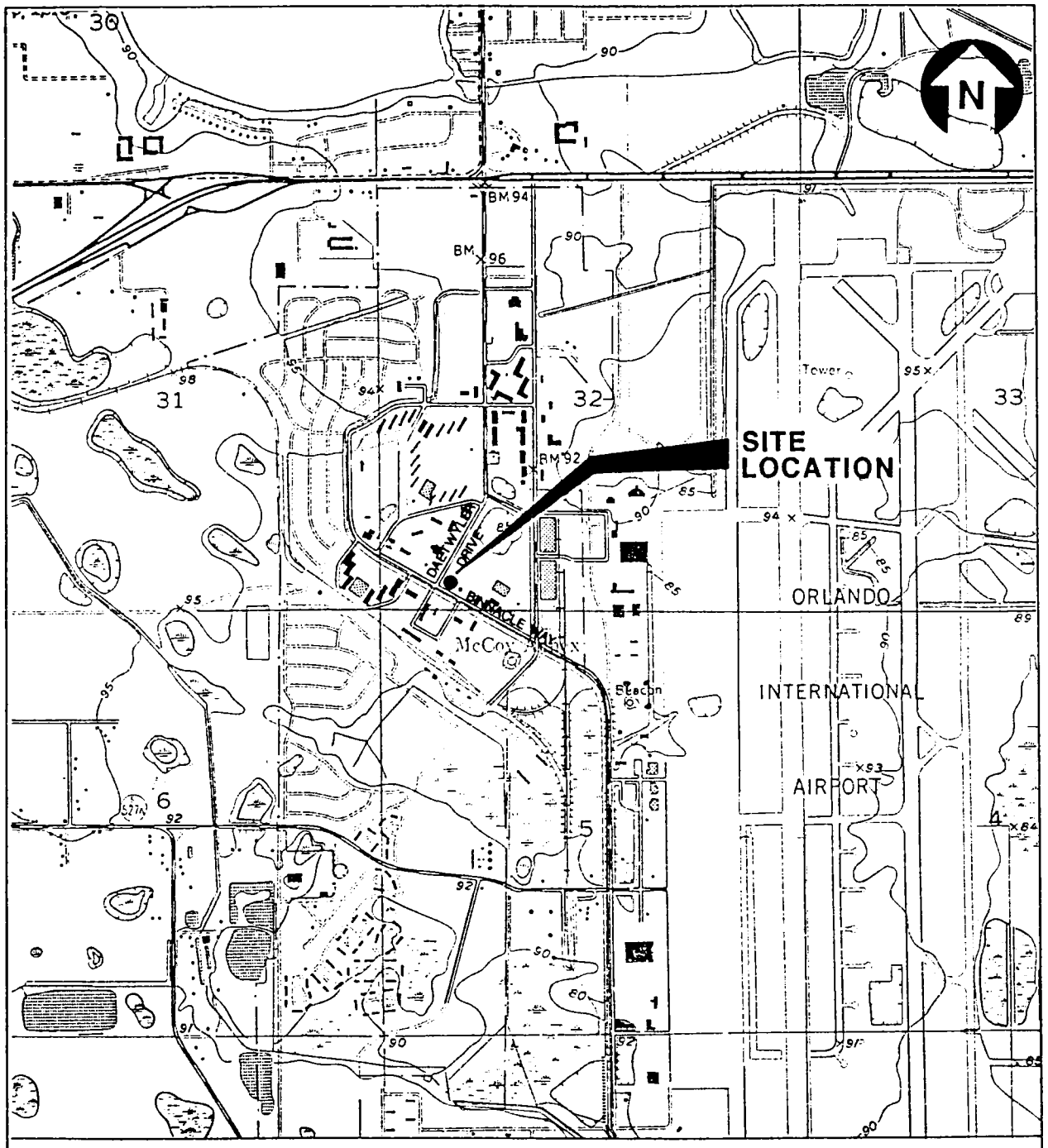


FIGURE 2

SITE LOCATION MAP

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

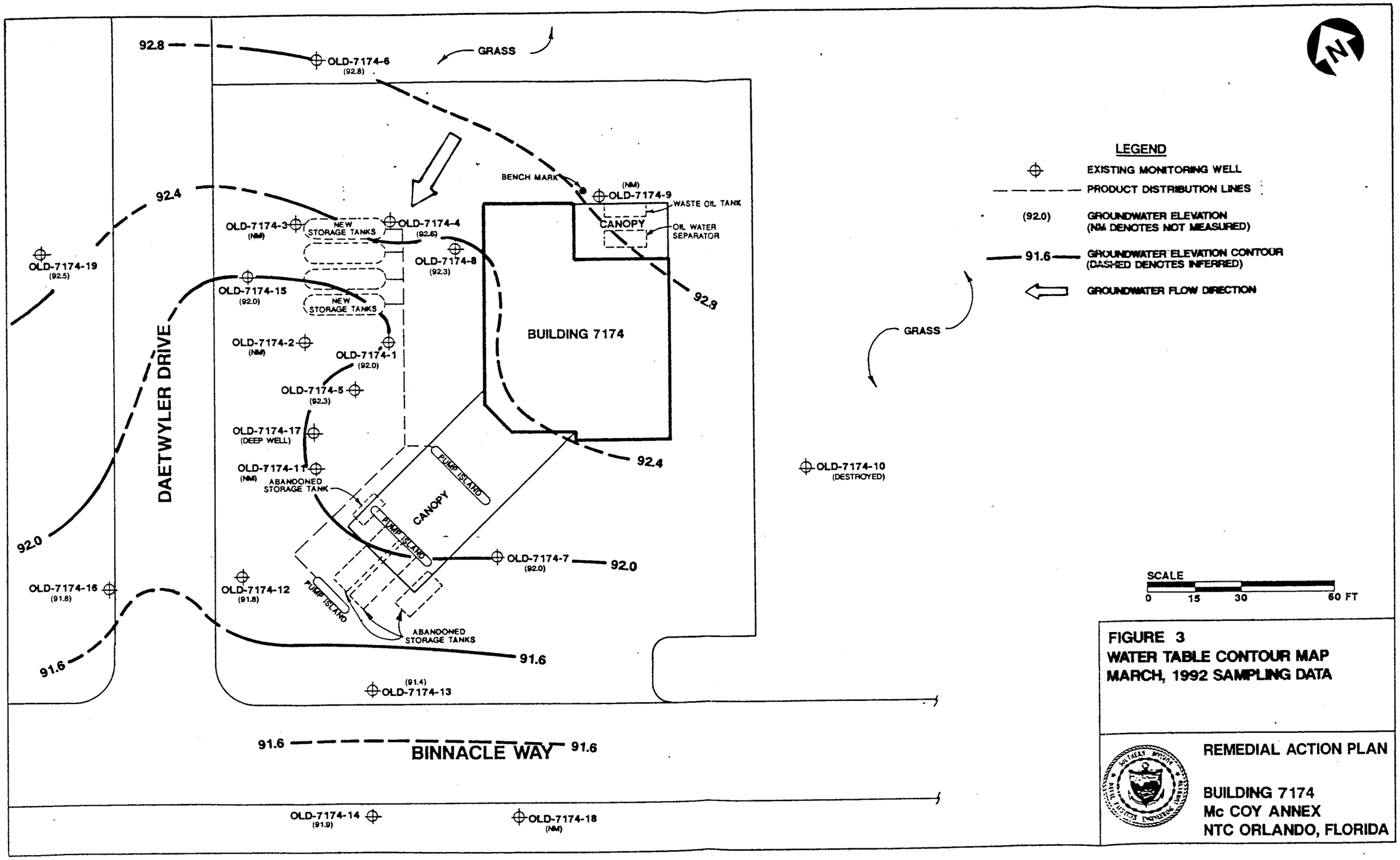


FIGURE 3
WATER TABLE CONTOUR MAP
MARCH, 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

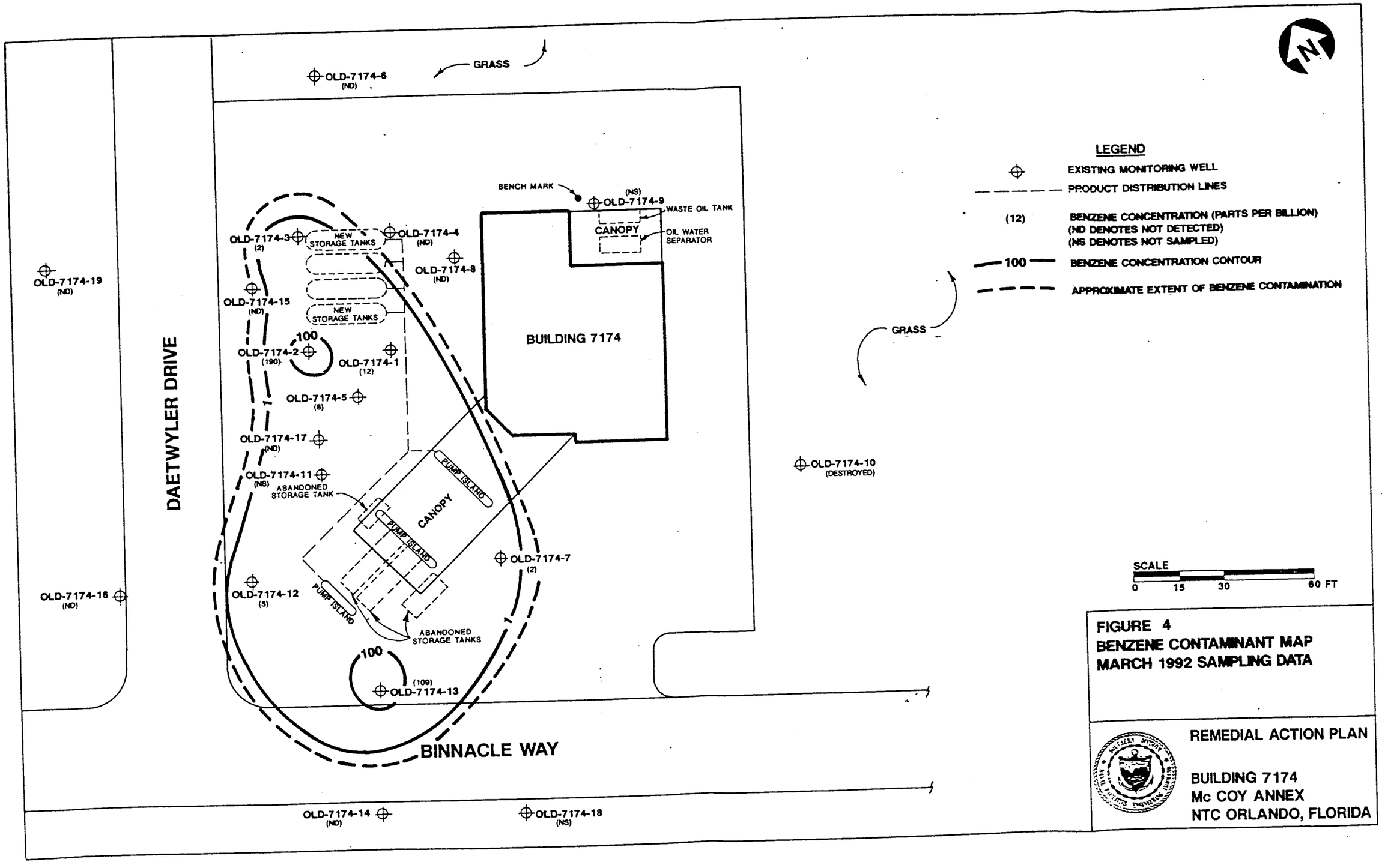


FIGURE 4
BENZENE CONTAMINANT MAP
MARCH 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

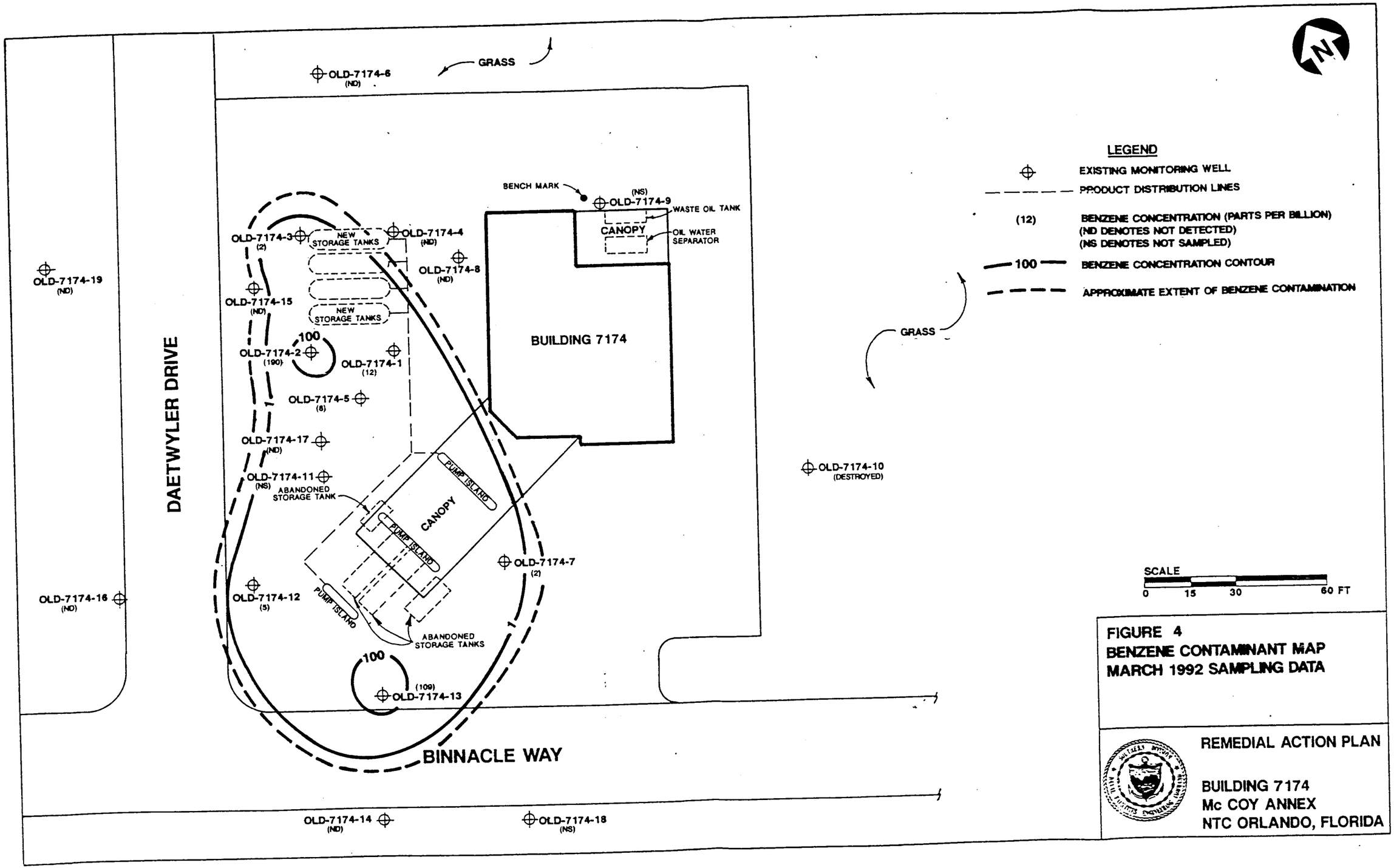


FIGURE 4
BENZENE CONTAMINANT MAP
MARCH 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

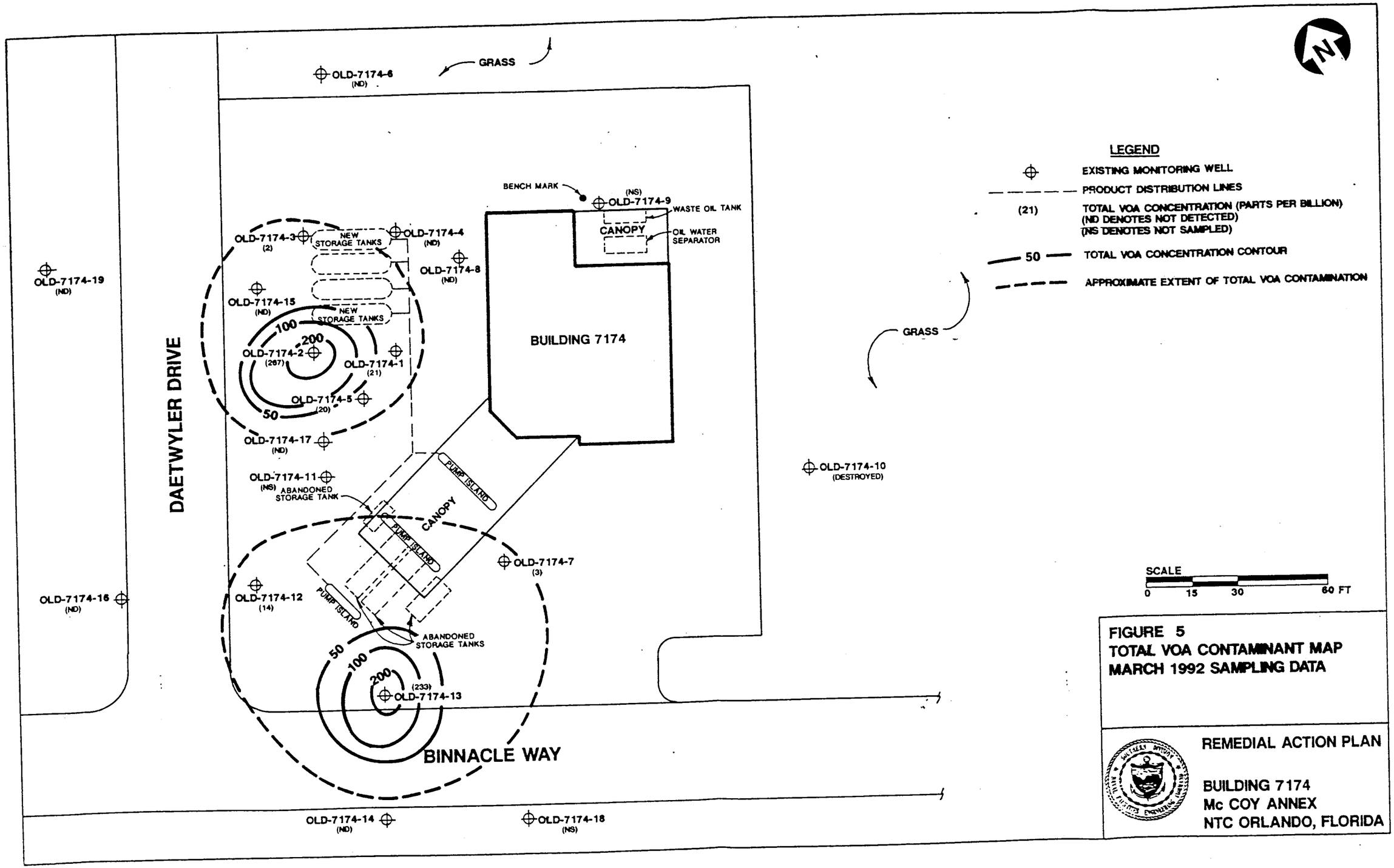


FIGURE 5
TOTAL VOA CONTAMINANT MAP
MARCH 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

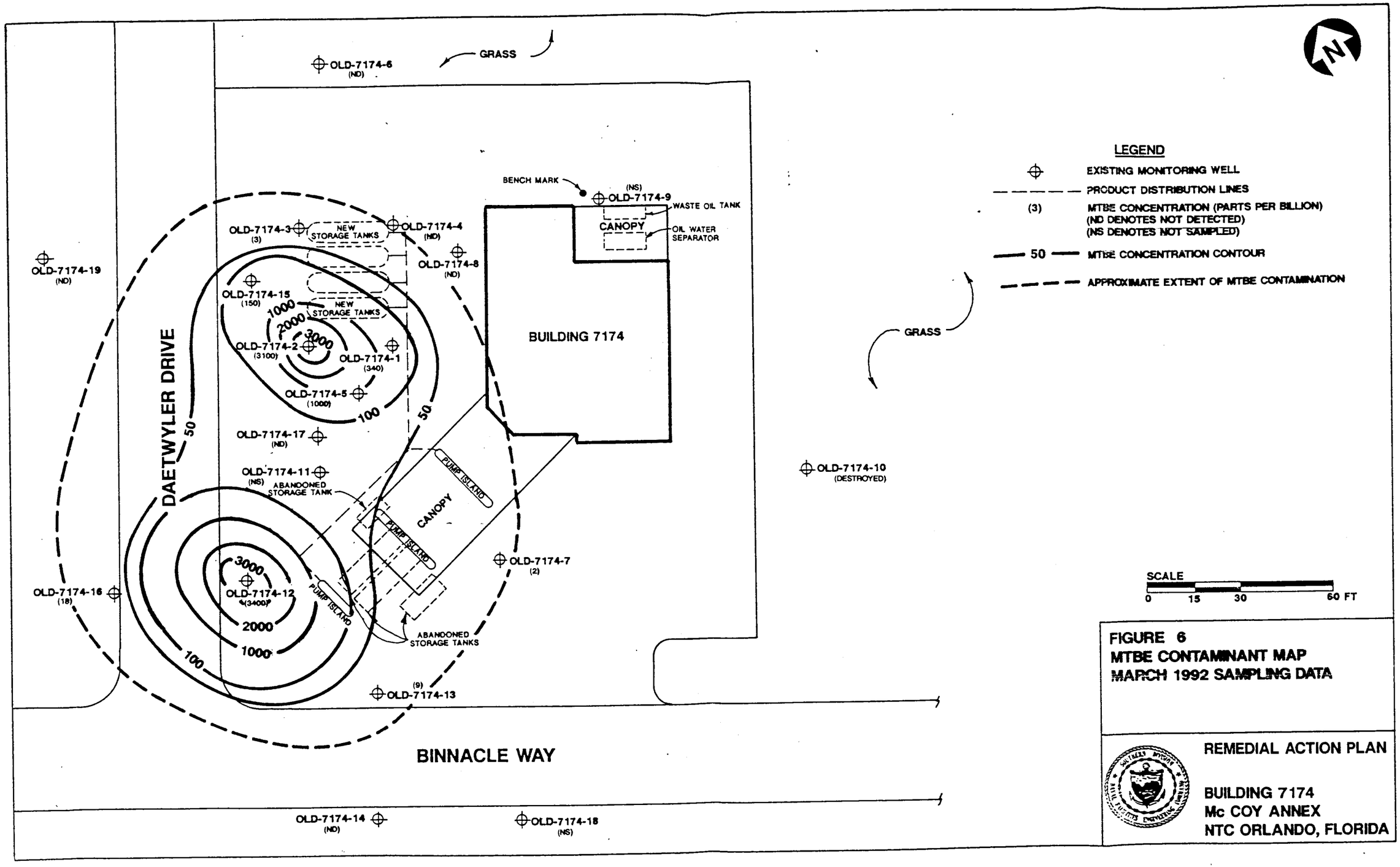


FIGURE 6
MTBE CONTAMINANT MAP
MARCH 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

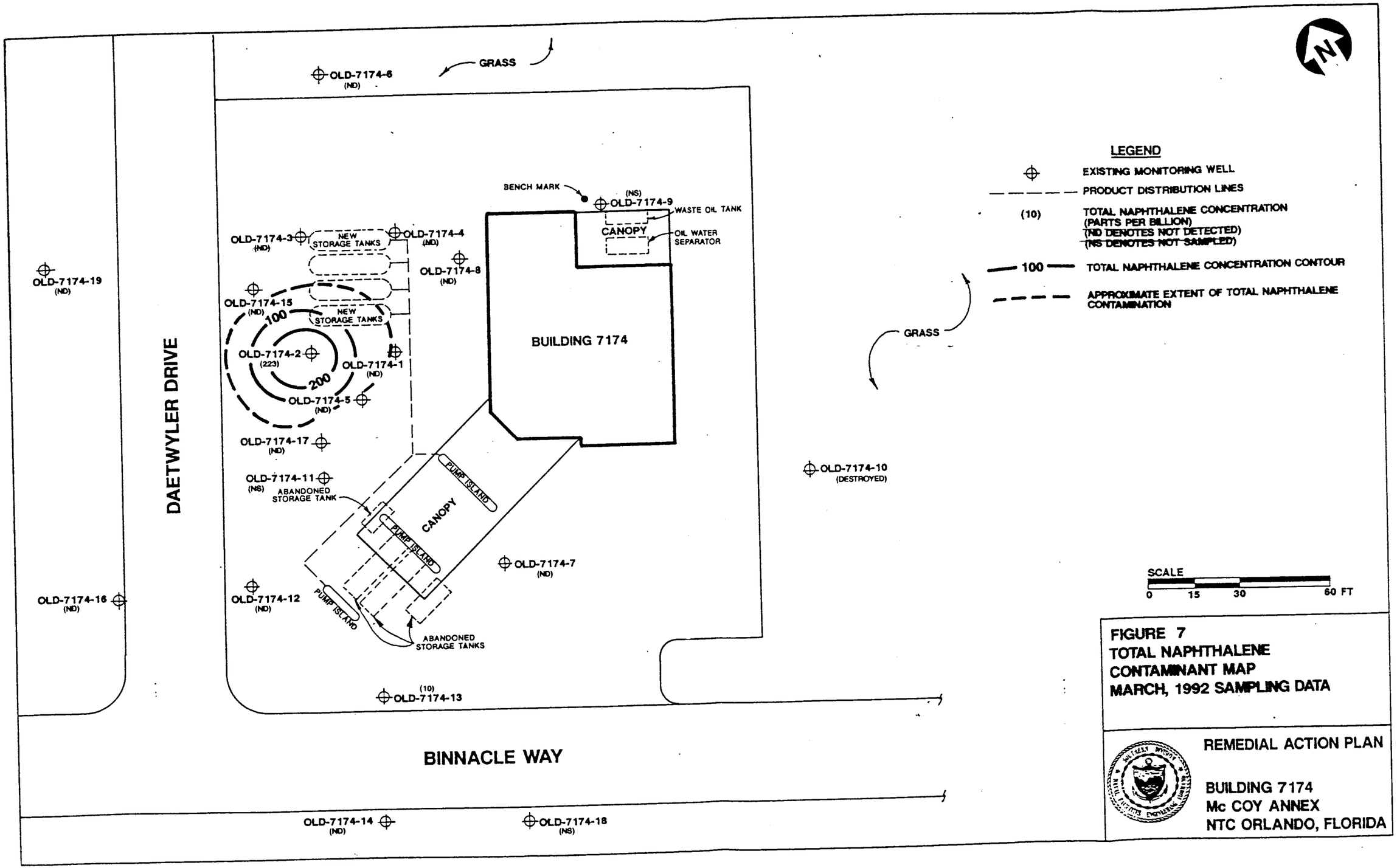


FIGURE 7
TOTAL NAPHTHALENE CONTAMINANT MAP
MARCH, 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

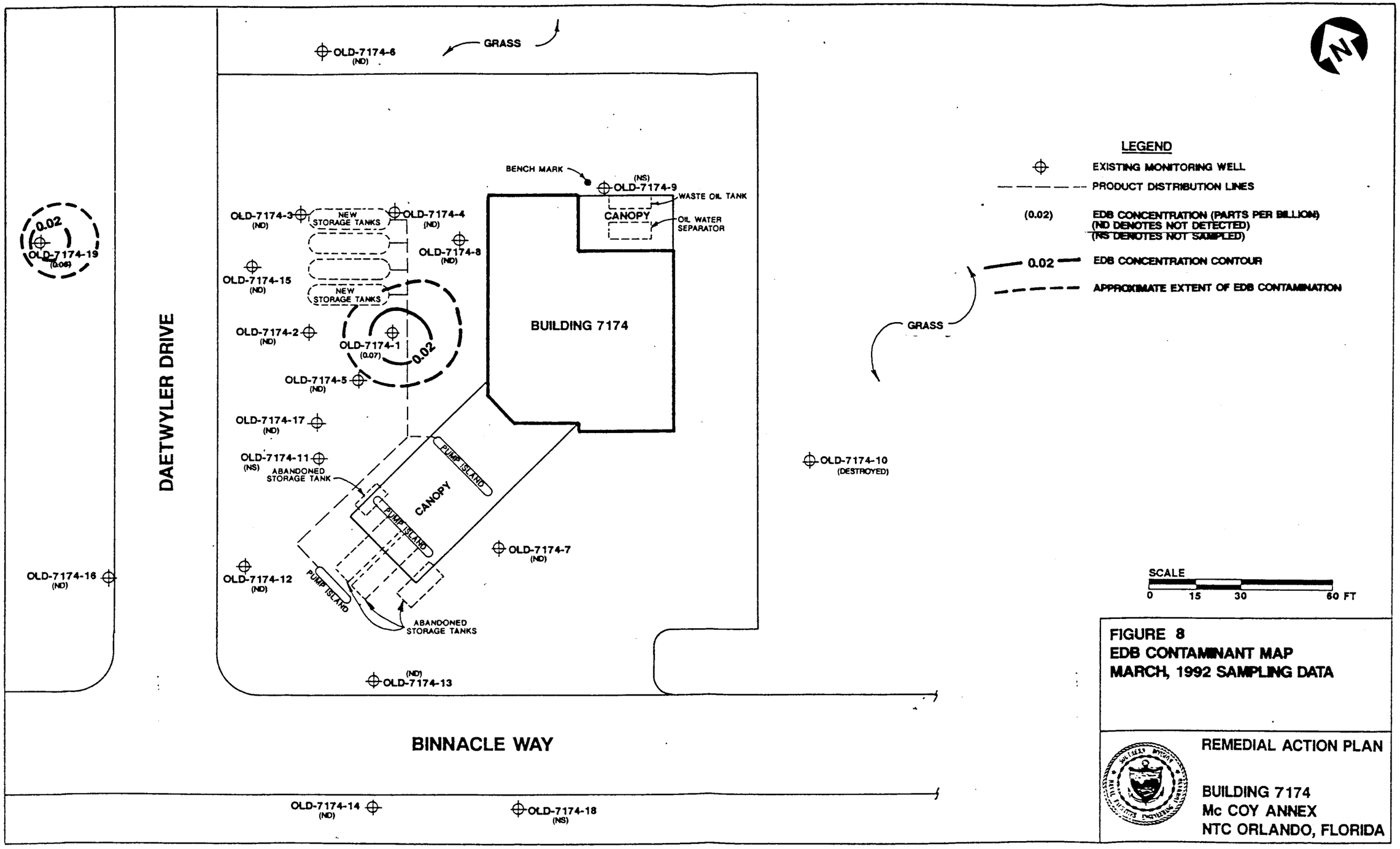


FIGURE 8
EDB CONTAMINANT MAP
MARCH, 1992 SAMPLING DATA

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

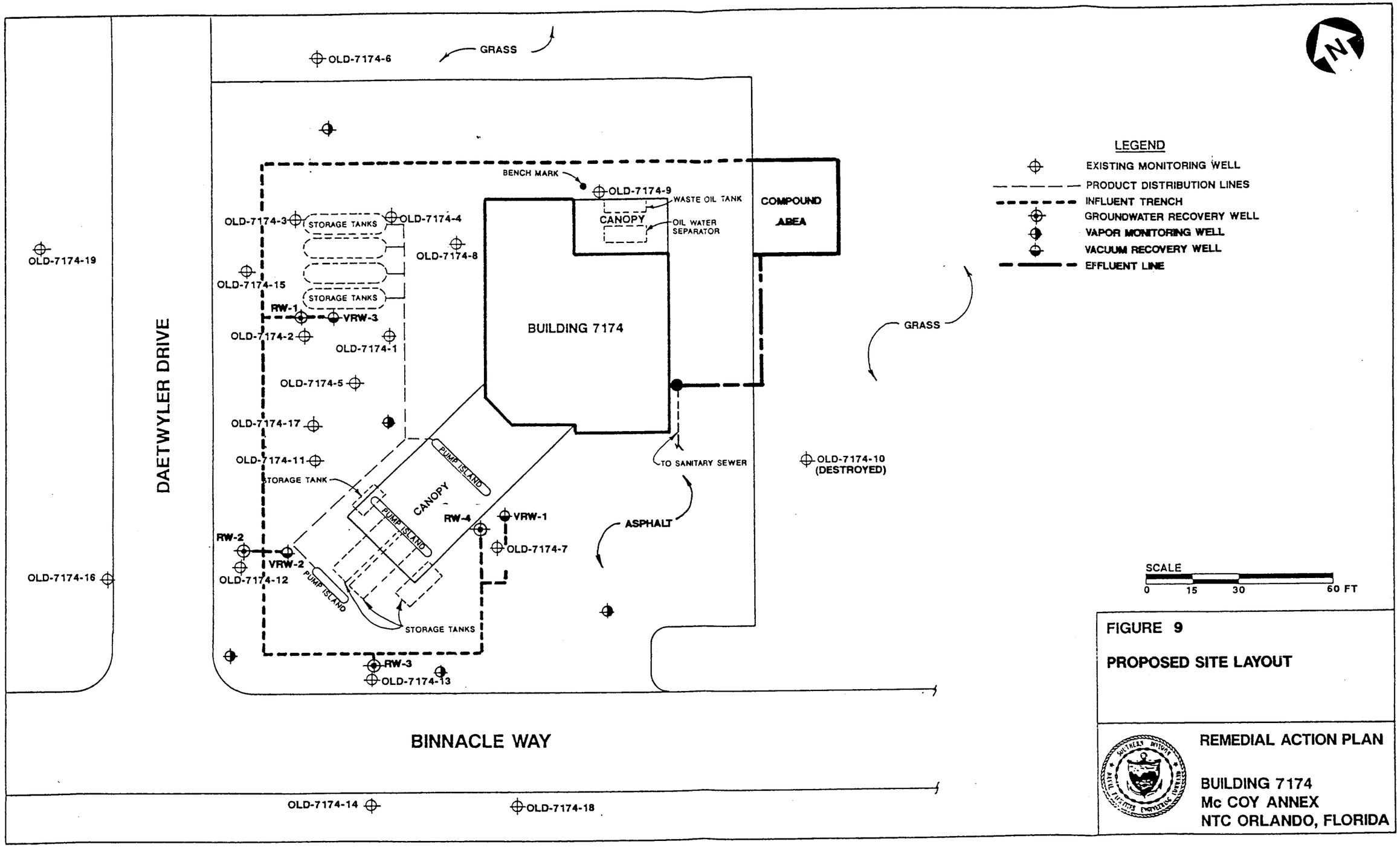
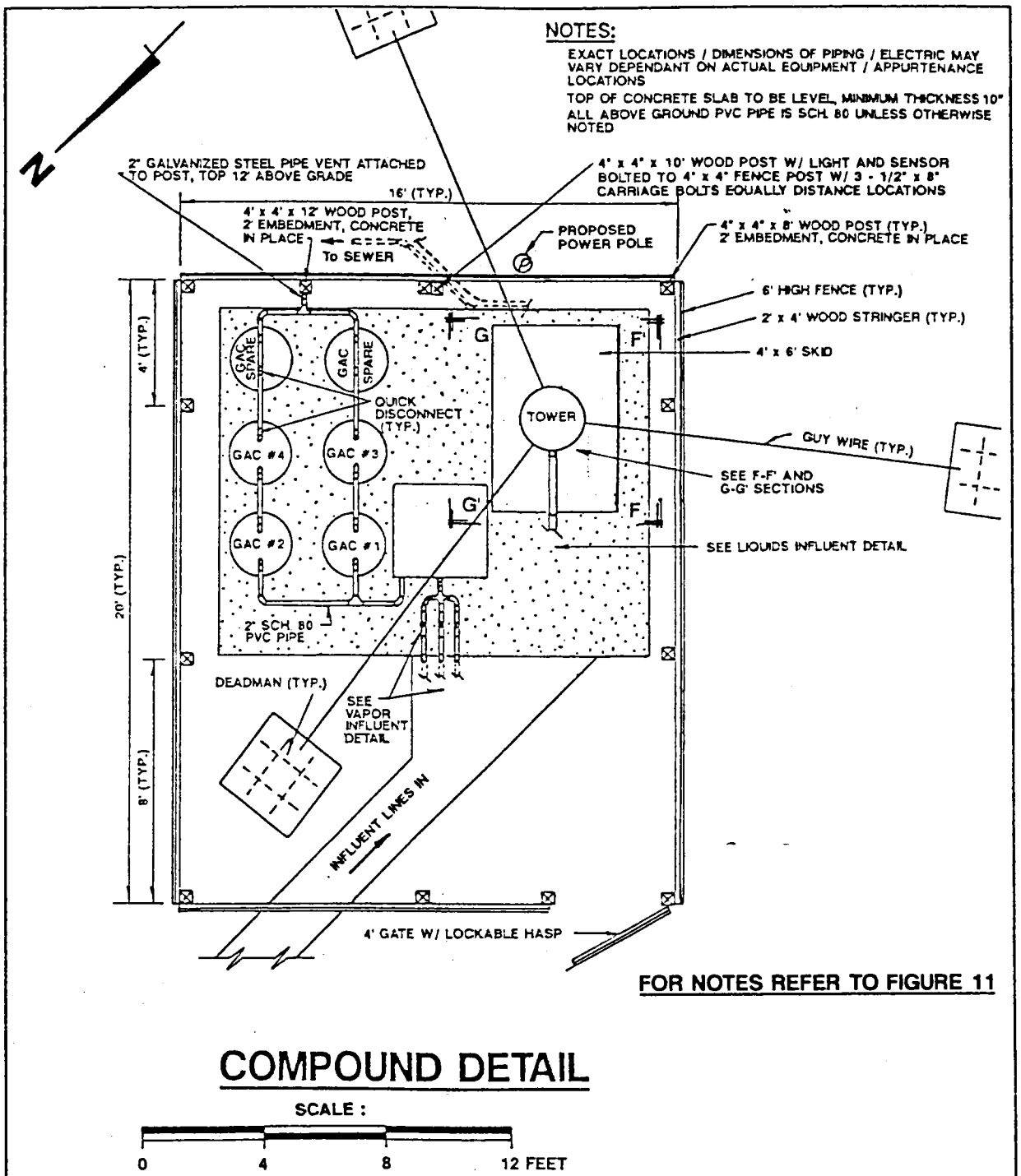


FIGURE 9

PROPOSED SITE LAYOUT

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA



COMPOUND DETAIL

SCALE :

0 4 8 12 FEET

FIGURE 10

COMPOUND AREA DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

NOTES: DETAILS

A **CONCRETE PAVEMENT:** 3000 PSI, TYPE I CEMENT, STANDARD DESIGN, 6 INCH. MINIMUM THICKNESS.

B **STEEL REINFORCEMENT:** No. 5 BAR, GRADE 40 STEEL; **24 INCH WIDE TRENCH:** 2 BARS, 12 INCHES C/C WITH CROSS BARS 24 INCHES C/C, **36 INCH TRENCH:** 3 BARS, 12 INCHES C/C WITH CROSS BARS 24 INCHES C/C.

C **A-3 MATERIAL:** COMPACT 12 INCH LOOSE LIFT ABOVE INFLUENT / VAPOR / EFFLUENT LINES, COMPACT REMAINING SOILS IN 6 INCH LOOSE LIFTS. ALL COMPACTION TO MEET 100% OF THE STANDARD PROCTOR ASTM D 698.

D 1" DIA. SCH. 80 PVC PIPE (INFLUENT) TESTED FOR 1 HOUR AT 80 PSI.

E 2" DIA. SCH. 40 PVC PIPE (VAPOR).

F **BLOWER:** 3.0 H. P., 230 VOLT SINGLE PHASE.

G 2.3 INCH LANPACS, 10 FEET OR EQUIVALENT.

H 4" DIA. SCH. 40 PVC PIPE (EFFLUENT).

I 3/4" ELECTRICAL CONDUIT FOR SENSOR, PAIRED WITH 1" DIA. ELECTRICAL CONDUIT FOR POWER TO GROUNDWATER PUMPS.

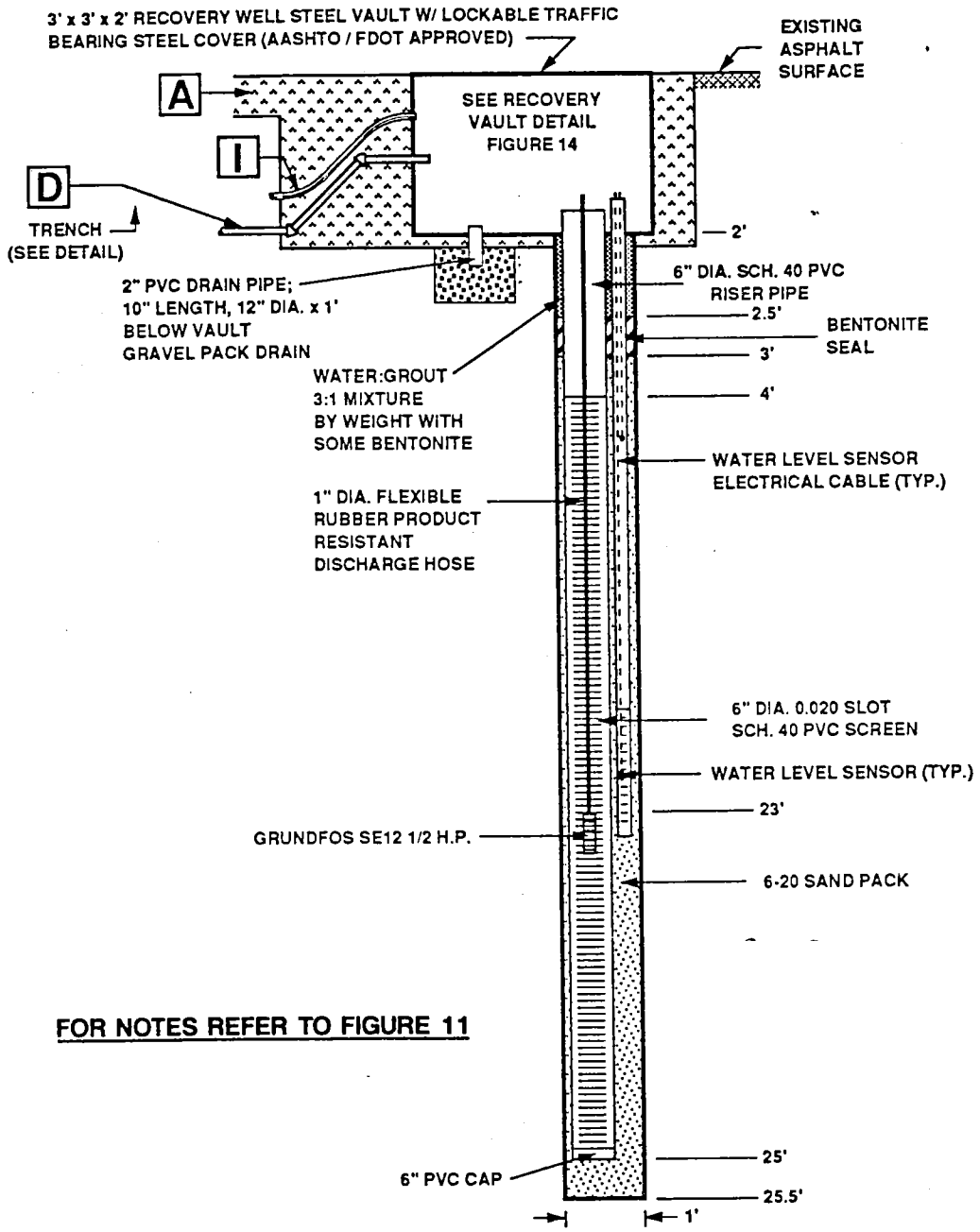
J SCH.40 PVC PIPE: HOUSES PRODUCT RECOVERY PIPING IF REQUIRED.

FIGURE 11

NOTES: DETAILS

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA



FOR NOTES REFER TO FIGURE 11

RECOVERY WELL DETAIL

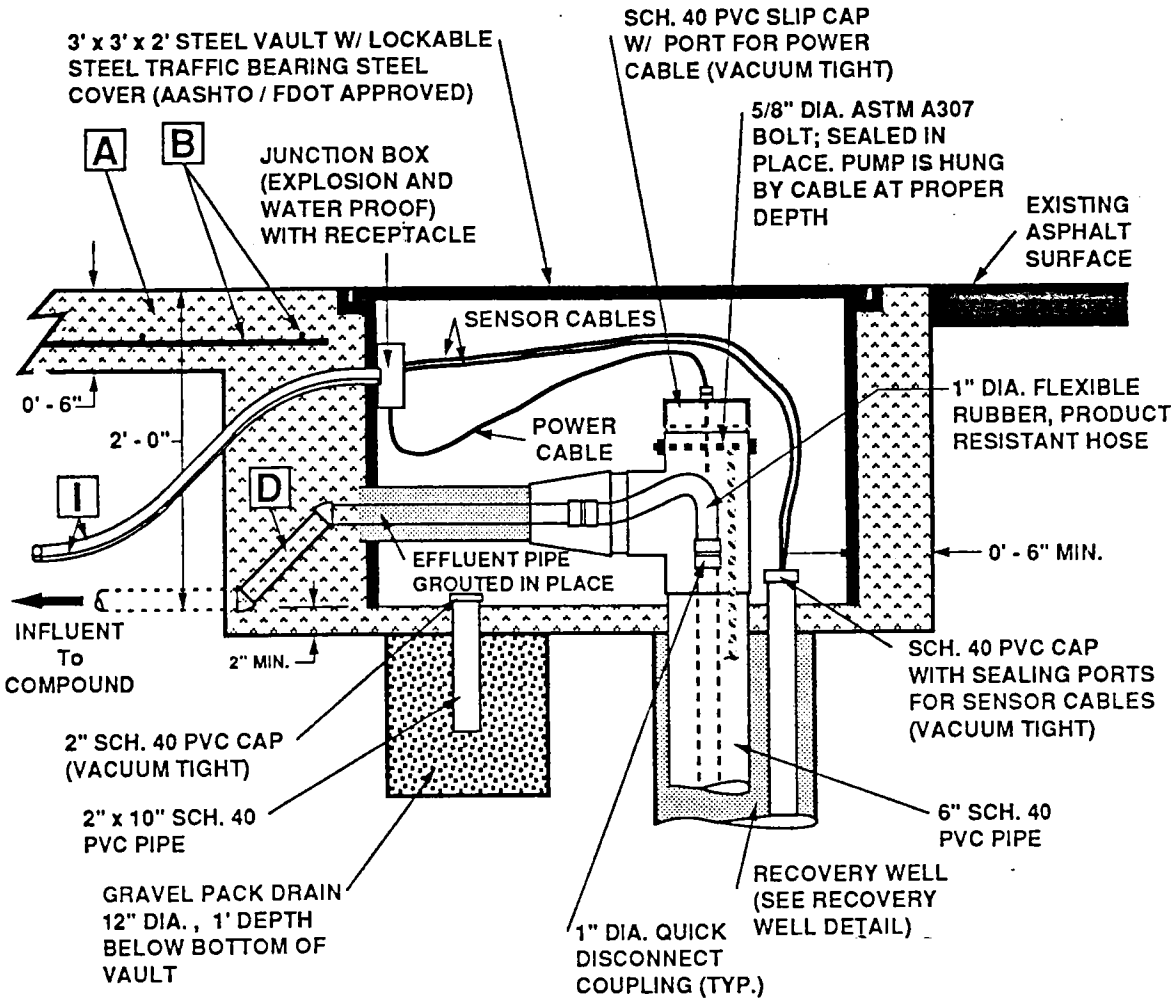
NOT TO SCALE

FIGURE 12

RECOVERY WELL DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



FOR NOTES REFER TO FIGURE 11

RECOVERY WELL VAULT DETAIL

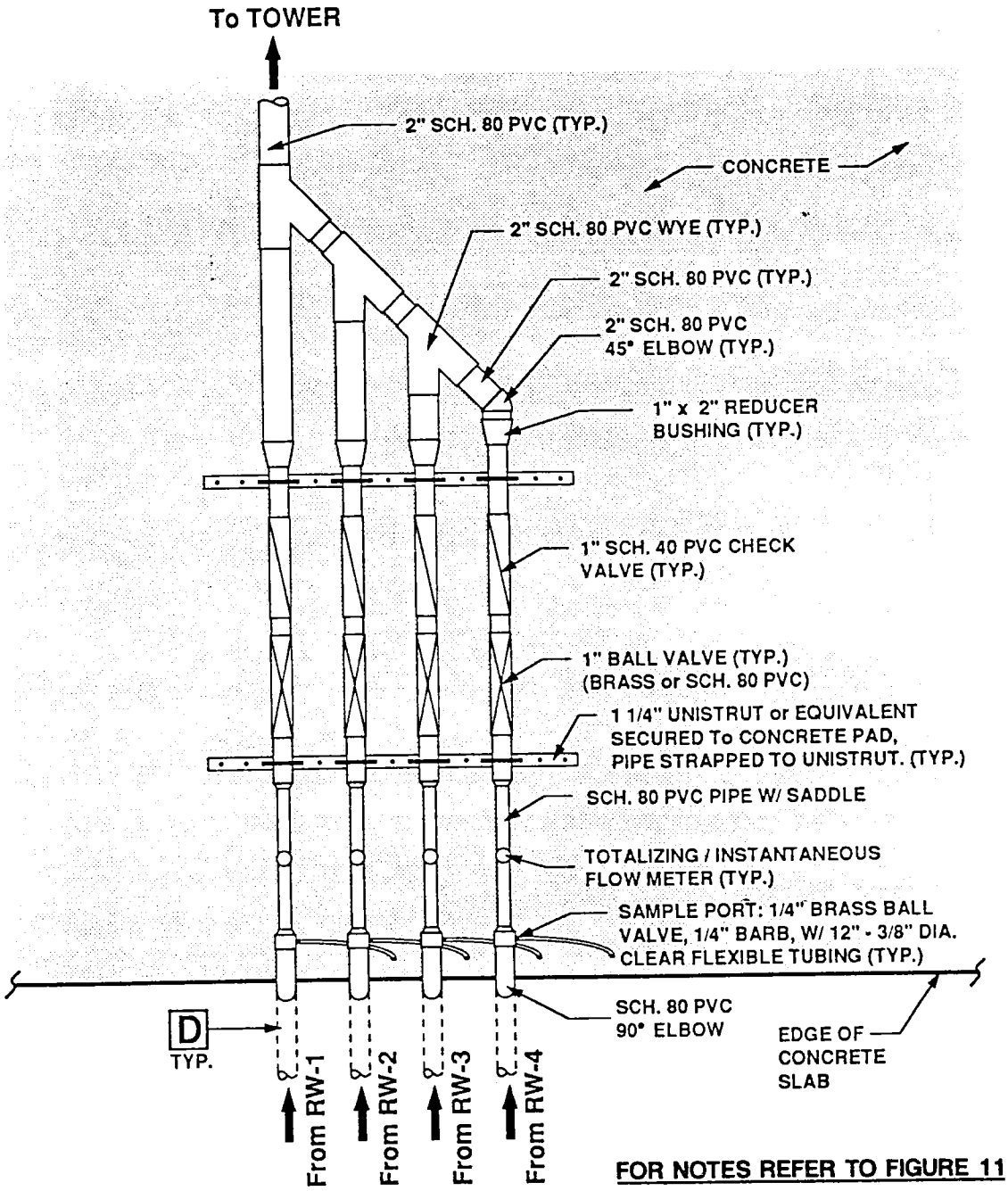
NOT TO SCALE

FIGURE 13

RECOVERY WELL VAULT DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



INFLUENT DETAIL

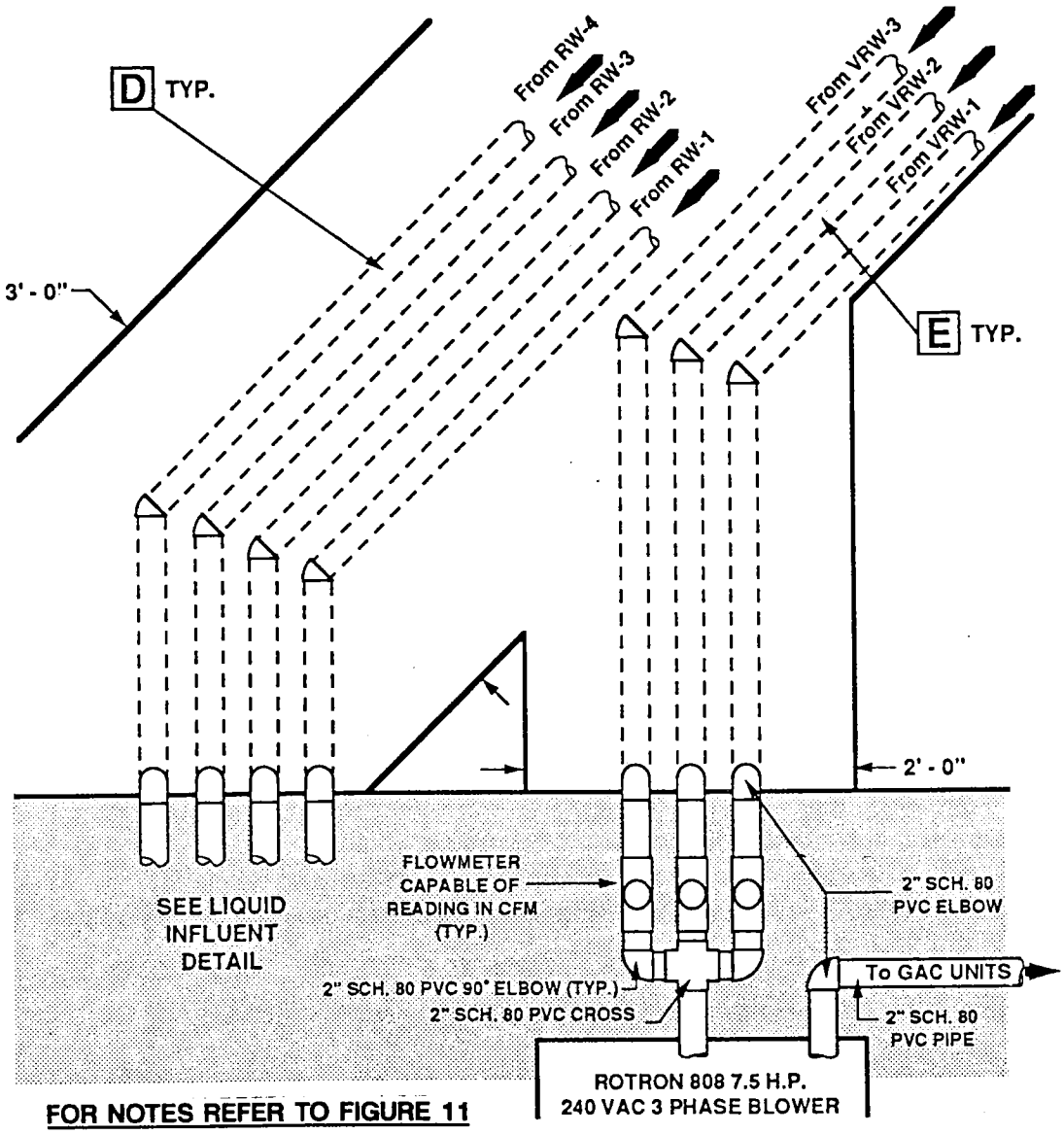
NOT TO SCALE

FIGURE 14

INFLUENT DETAIL (LIQUIDS)

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



FOR NOTES REFER TO FIGURE 11

VAPOR INFLUENT DETAIL

NOT TO SCALE

FIGURE 15

VAPOR INFLUENT DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70

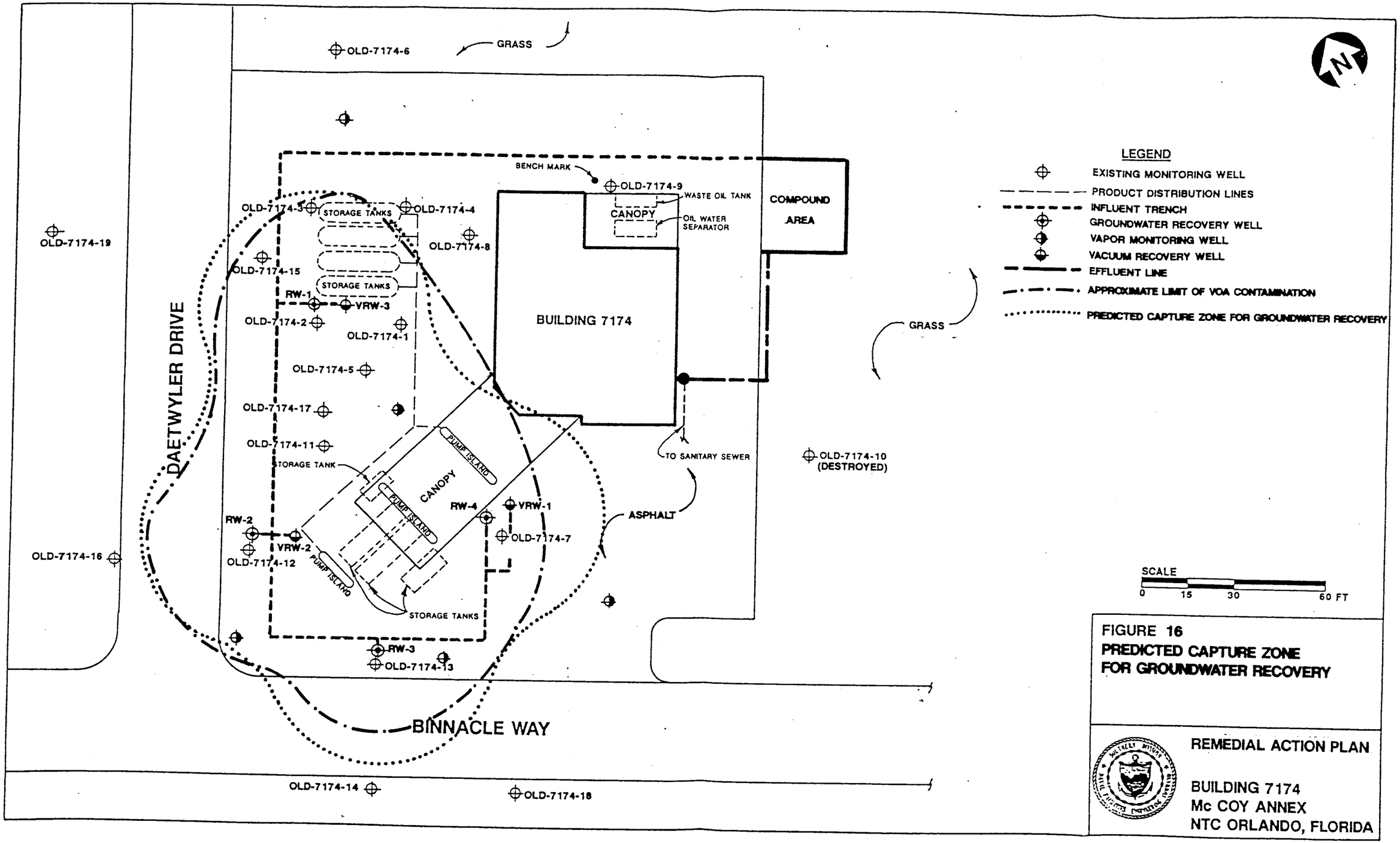


FIGURE 16
PREDICTED CAPTURE ZONE FOR GROUNDWATER RECOVERY

REMEDIAL ACTION PLAN

BUILDING 7174
Mc COY ANNEX
NTC ORLANDO, FLORIDA

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

Calculate friction losses in pipe:

Use Darcy-Weisbach formula:

$$hf = f\frac{L*v^2}{D*2*g}$$

where: f = friction factor (from Moody diagram)
L = length of pipe
(420 ft)
D = pipe diameter
(1 inch)

To determine f:

REF 5: Lindeburg, M.R., CIVIL ENGINEERING REFERENCE MANUAL, 4th Ed., Professional Publications, Belmont, CA, 1986.

for PVC use E = 5.0E-06
E/D = 0.00006

Calculate Reynolds Number:

Re = v*D/nu

Where: v = velocity in pipe
(2.2 ft/sec)
D = pipe diameter
(1 inch)
nu = kinematic viscosity, for T = 70 degrees F,
(1.06E-05 ft^2/sec)

Re = 1.77E+04

Therefore, f = 0.025
and hf = 10 ft

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

TOTAL HEAD LOSS = he + hl + hs + hf = 81 ft

Pump needs to pump 5.5 gpm at 81 ft of head.

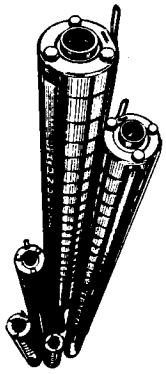
Select Grundfos 5E12 (1/2 HP) or equivalent

GRUNDFOS®

Redi-Flo4 Environmental Submersible Pumps

5E

Submittal Data 3450 RPM 60 Hertz



JOB or CUSTOMER:

ENGINEER:

CONTRACTOR:

SUBMITTED BY: DATE:

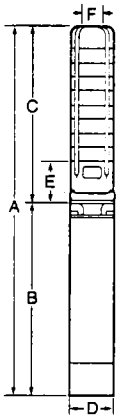
APPROVED BY: DATE:

ORDER NO.: DATE:

SPECIFICATION REF.:

QUANTITY	TAG NO.	MODEL NO.	GPM	FEET	VOLT	PHASE	COMMENT

Dimensions



Technical Data

FLOW RANGE: 1.2 to 7 US GPM

MOTORS: Grundfos MS402E Environmental Submersible Motor (Standard)
Maximum Operating Temperature: 104°F (40°C)
Maximum Operating Pressure: 220 PSI
Maximum Number of Starts Per Hour: 100
Minimum Recommended Flow Past Motor: 0.25 ft/sec
(NOTE: Franklin Pollution Recovery motor is optional.)

DISCHARGE SIZE: 1" NPT

PUMP END CONSTRUCTION MATERIALS: Stainless Steel and Teflon®

INSTALLATION: Unit to be installed vertically for submerged operation.

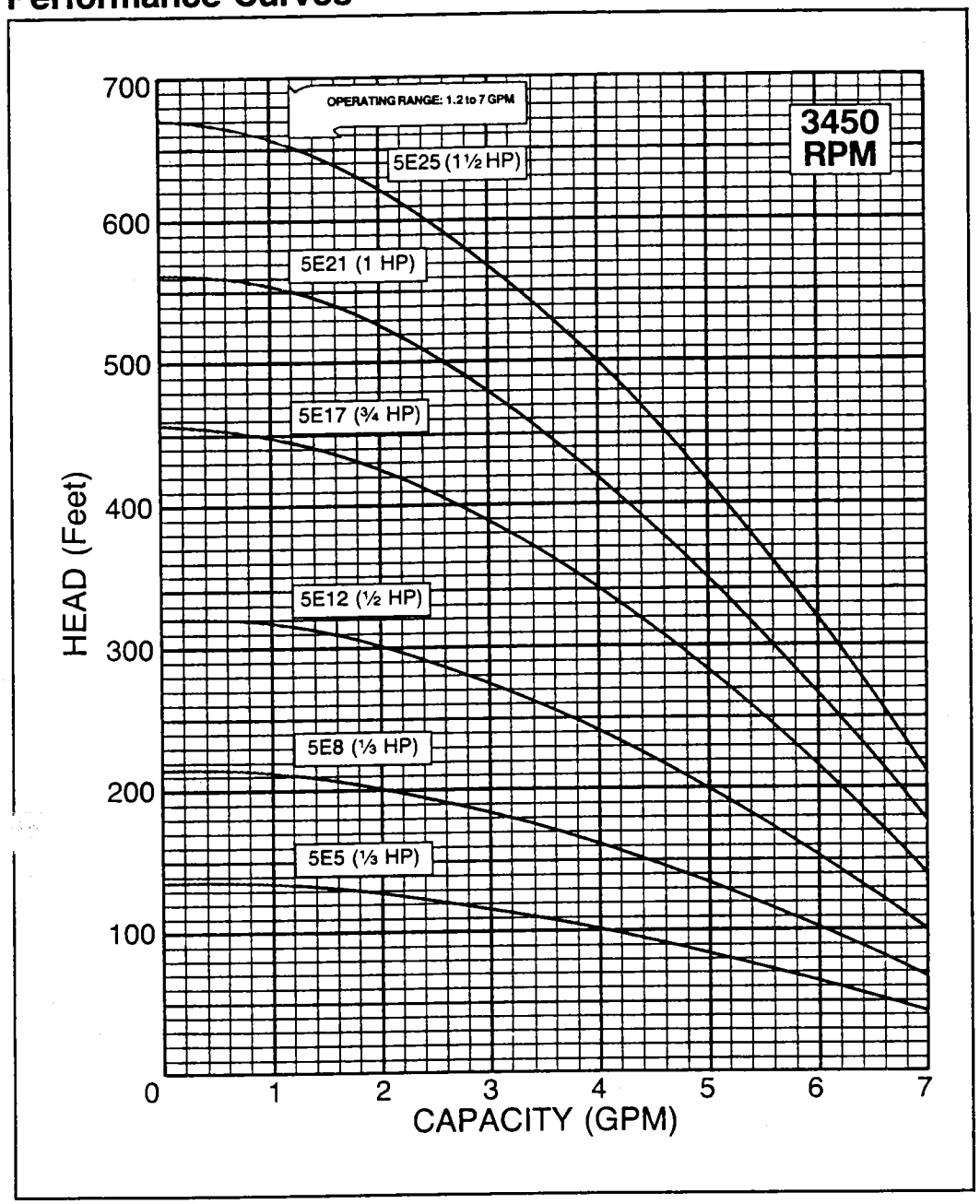
Electrical Data, Dimensions, and Weights ①

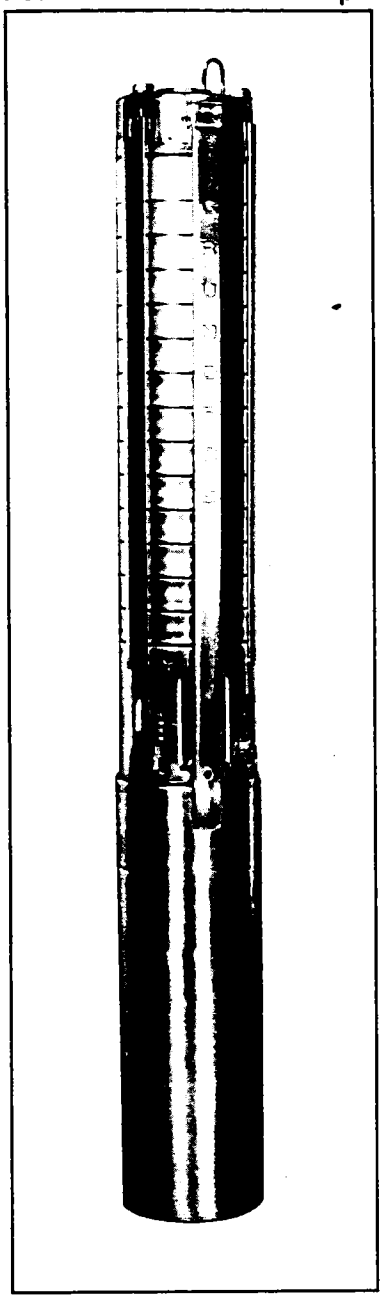
PUMP TYPE	MOTOR HP	MOTOR SF	MOTOR PH	MOTOR VOLTS	DIMENSIONS (In Inches) OVERALL LENGTH A	MOTOR LENGTH B①	PUMP END LENGTH C	MAX. DIA. D	INLET E	DISCH. PIPE SIZE (NPT) F	NET WEIGHT (LBS.)②	SHIP. WEIGHT (LBS.)②
5E5	⅓	1.75	1	230	20 5/16	10	10 5/16	3 31/32	3 1/4	1	24	26
5E8	⅓	1.75	1	230	22 3/4	10	12 3/4	3 31/32	3 1/4	1	26	28
5E12	½	1.60	1	230	26 13/16	10 13/16	16	3 31/32	3 1/4	1	28	29
5E17	¾	1.50	1	230	31 7/16	11 3/8	20 3/16	3 31/32	3 1/4	1	31	32
5E21	1	1.40	1	230	35 7/16	12	23 7/16	3 31/32	3 1/4	1	33	35
5E25	1 ½	1.30	1	230	40 5/16	13 9/16	26 3/4	3 31/32	3 1/4	1	35	37

① Data for Grundfos MS402E motors. ② Does not include motor leads.

Performance Curves

Redi-Flo4 Environmental Pump





Materials of Construction

REDI-FLO4 PUMP END	
Check Valve Housing	304 Stainless Steel
Check Valve	304 Stainless Steel
Check Valve Seat	304 Stainless Steel & Teflon®
Diffuser Chamber	304 Stainless Steel
Impeller Seal Ring	Teflon®
Impeller	304 Stainless Steel
Suction Interconnector	304 Stainless Steel
Inlet Screen	304 Stainless Steel
Pump Shaft	304 Stainless Steel
Coupling	329/420/431 Stainless Steel
Straps	304 Stainless Steel
ble Guard	304 Stainless Steel
riming Inducer	304 Stainless Steel
Intermediate Bearings	Teflon®

NOTE: Specifications are subject to change without notice.

GRUNDFOS ENVIRONMENTAL MOTOR	
Nema Top	304 Stainless Steel
Studs & Fasteners	304 Stainless Steel
Nuts	316 Stainless Steel
Sand Slinger	Viton®
Shaft Extension	431 Stainless Steel
Diaphragm	Viton®
Stator Housing	304 Stainless Steel
Fill Plug Screw	304 Stainless Steel
Fill Plug Washer	Teflon®

GRUNDFOS ENVIRONMENTAL MOTOR LEADS	
Connector Sleeve	304 Stainless Steel
Connector Potting	Scotch Cast #4® Epoxy w/Viton® Cap
Connector Plug	Viton®
Lead Insulation	Teflon®

APPENDIX D

AIR STRIPPER DESIGN CALCULATIONS

McCOY ANNEX
BLDG. 7174

INFLUENT CONCENTRATION CALCULATIONS

JOB NO. 7514-70

COMPLETED BY: cyd
CHECKED BY :
DATE : 12/29/92

RECOVERY WELL #1

WELL #	DISTANCE (FEET)	1/DIST	BENZENE (ppb)	TOLUENE (ppb)	XYLENE (ppb)	ETHYL BENZENE (ppb)	NAPHTH-ALENE (ppb)	MTBE (ppb)	EDB (ppb)	LEAD (ppb)
OLD-7174-3	32.00	0.03	2.00	0.00	0.00	0.00	0.00	3.00	0.00	13.00
OLD-7174-15	23.00	0.04	0.00	0.00	0.00	0.00	0.00	150.00	0.00	19.00
OLD-7174-1	30.00	0.03	12.00	0.00	5.00	4.00	0.00	340.00	0.07	0.00
OLD-7174-2	7.00	0.14	190.00	0.00	16.00	61.00	223.00	3100.00	0.00	0.00
OLD-7174-5	28.00	0.04	8.00	0.00	4.00	8.00	0.00	1000.00	0.00	6.00
	SUM :	0.29	212.00	0.00	25.00	73.00	223.00	4593.00	0.07	38.00
CONC. (ppb) :			97.31	0.00	9.05	31.86	111.14	1732.25	0.01	5.05

RECOVERY WELL #2

WELL #	DISTANCE (FEET)	1/DIST	BENZENE (ppb)	TOLUENE (ppb)	XYLENE (ppb)	ETHYL BENZENE (ppb)	NAPHTH-ALENE (ppb)	MTBE (ppb)	EDB (ppb)	LEAD (ppb)
OLD-7174-11	35.00	0.03	5600.00	29000.00	19000.00	2900.00	396.00	6100.00	1.40	0.00
OLD-7174-12	6.00	0.17	5.00	0.00	4.00	5.00	0.00	3400.00	0.00	110.00
	SUM :	0.20	5605.00	29000.00	19004.00	2905.00	396.00	9500.00	1.40	110.00
CONC. (ppb) :			823.78	4243.90	2783.90	428.66	57.95	3795.12	0.20	93.90

RECOVERY WELL #3

WELL #	DISTANCE (FEET)	1/DIST	BENZENE (ppb)	TOLUENE (ppb)	XYLENE (ppb)	ETHYL BENZENE (ppb)	NAPHTH-ALENE (ppb)	MTBE (ppb)	EDB (ppb)	LEAD (ppb)
OLD-7174-13	5.00	0.20	109.00	17.00	84.00	23.00	10.00	9.00	0.00	17.00
	SUM :	0.20	109.00	17.00	84.00	23.00	10.00	9.00	0.00	17.00
CONC. (ppb) :			109.00	17.00	84.00	23.00	10.00	9.00	0.00	17.00

RECOVERY WELL #4

WELL #	DISTANCE (FEET)	1/DIST	BENZENE (ppb)	TOLUENE (ppb)	XYLENE (ppb)	ETHYL BENZENE (ppb)	NAPHTH-ALENE (ppb)	MTBE (ppb)	EDB (ppb)	LEAD (ppb)
OLD-7174-7	8.00	0.13	2.00	0.00	1.00	0.00	0.00	2.00	0.00	26.00
	SUM :	0.13	2.00	0.00	1.00	0.00	0.00	2.00	0.00	26.00
CONC. (ppb) :			2.00	0.00	1.00	0.00	0.00	2.00	0.00	26.00

DESIGN CONCS. (ppb)

		BENZENE	TOLUENE	XYLENE	ETHYL BENZENE	NAPHTH-ALENE	MTBE	EDB	LEAD
CONC. TO STRIPPER:		258	1065	719	121	45	1385	0.05	35
S. FACTOR	1.25	323	1332	899	151	56	1731	0.07	44
RECOM. EFF. CONC.		1	10	10	10	100	50	0.02	50

NOTES:
MTBE- Methyl-tert-butyl ether
EDB- 1,2-Dibromoethane
Lead sample from 7174-11 data taken from 6-91 data

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Benzene
Molecular weight	:	78.1 g/mol
Boiling point	:	176 degrees F.
Molal volume at boiling point	:	0.0960 L/mol
Henry's Constant	:	0.23000
Enthalpy upon dissolution in water	:	3680 cal/mol
Molecular diffusivity in air	:	1.02E-04 ft^2/s
Molecular diffusivity in water	:	9.88E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7	lb/ft^2.s	*
Air mass loading rate	:	0.207	lb/ft^2.s	*
Water volumetric loading rate	:	12.39	gpm/ft^2	*
Air volumetric loading rate	:	1239	gpm/ft^2	*
Air pressure gradient	:	0.077	" H2O/ft	#
Volumetric air/water ratio	:	100.0		
Stripping factor	:	24.3		

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6	%	
Wetted packing area	:	28.3	ft^2/ft^3	*
Transfer rate constant in water	:	0.000622	ft/s	
Transfer rate constant in air	:	0.015868	ft/s	
Overall transfer rate constant	:	0.000536	ft/s	
Overall mass transfer coefficient	:	0.0152	1/s	
NTU	:	7.8742		
HTU	:	1.9049	ft	

CONTAMINANT REMOVAL

Influent concentration	:	323.0	ug/L	
Effluent concentration	:	0.2	ug/L	
Fraction removed	:	99.9	%	
Mass of contaminant removed	:	0.04804	lb/ft^2.day	*
Concentration in airstream	:	0.00849	mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Toluene
Molecular weight	:	92.2 g/mol
Boiling point	:	232 degrees F.
Molal volume at boiling point	:	0.1182 L/mol
Henry's Constant	:	0.19000
Enthalpy upon dissolution in water	:	16100 cal/mol
Molecular diffusivity in air	:	9.01E-05 ft^2/s
Molecular diffusivity in water	:	8.72E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7	lb/ft^2.s	*
Air mass loading rate	:	0.207	lb/ft^2.s	*
Water volumetric loading rate	:	12.39	gpm/ft^2	*
Air volumetric loading rate	:	1239	gpm/ft^2	*
Air pressure gradient	:	0.077	" H2O/ft	#
Volumetric air/water ratio	:	100.0		
Stripping factor	:	24.2		

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6	%	
Wetted packing area	:	28.3	ft^2/ft^3	*
Transfer rate constant in water	:	0.000585	ft/s	
Transfer rate constant in air	:	0.014648	ft/s	
Overall transfer rate constant	:	0.000502	ft/s	
Overall mass transfer coefficient	:	0.0142	1/s	
NTU	:	7.3667		
HTU	:	2.0362	ft	

CONTAMINANT REMOVAL

Influent concentration	:	1.3	mg/L	
Effluent concentration	:	1.1	ug/L	
Fraction removed	:	99.9	%	
Mass of contaminant removed	:	0.19804	lb/ft^2.day	*
Concentration in airstream	:	0.03500	mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	o-Xylene
Molecular weight	:	106.2 g/mol
Boiling point	:	291 degrees F.
Molal volume at boiling point	:	0.1404 L/mol
Henry's Constant	:	0.33000
Enthalpy upon dissolution in water	:	3800 cal/mol
Molecular diffusivity in air	:	8.13E-05 ft^2/s
Molecular diffusivity in water	:	7.87E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7 lb/ft^2.s	*
Air mass loading rate	:	0.207 lb/ft^2.s	*
Water volumetric loading rate	:	12.39 gpm/ft^2	*
Air volumetric loading rate	:	1239 gpm/ft^2	*
Air pressure gradient	:	0.077 " H2O/ft	#
Volumetric air/water ratio	:	100.0	
Stripping factor	:	34.9	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6 %	
Wetted packing area	:	28.3 ft^2/ft^3	*
Transfer rate constant in water	:	0.000555 ft/s	
Transfer rate constant in air	:	0.013680 ft/s	
Overall transfer rate constant	:	0.000497 ft/s	
Overall mass transfer coefficient	:	0.0141 1/s	
NTU	:	7.3910	
HTU	:	2.0295 ft	

CONTAMINANT REMOVAL

Influent concentration	:	899.0 ug/L	
Effluent concentration	:	0.7 ug/L	
Fraction removed	:	99.9 %	
Mass of contaminant removed	:	0.13367 lb/ft^2.day	*
Concentration in airstream	:	0.02363 mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Ethylbenzene
Molecular weight	:	106.2 g/mol
Boiling point	:	277 degrees F.
Molal volume at boiling point	:	0.1404 L/mol
Henry's Constant	:	0.27000
Enthalpy upon dissolution in water	:	3800 cal/mol
Molecular diffusivity in air	:	8.16E-05 ft^2/s
Molecular diffusivity in water	:	7.87E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7 lb/ft^2.s	*
Air mass loading rate	:	0.207 lb/ft^2.s	*
Water volumetric loading rate	:	12.39 gpm/ft^2	*
Air volumetric loading rate	:	1239 gpm/ft^2	*
Air pressure gradient	:	0.077 " H2O/ft	#
Volumetric air/water ratio	:	100.0	
Stripping factor	:	28.6	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6 %	
Wetted packing area	:	28.3 ft^2/ft^3	*
Transfer rate constant in water	:	0.000555 ft/s	
Transfer rate constant in air	:	0.013716 ft/s	
Overall transfer rate constant	:	0.000486 ft/s	
Overall mass transfer coefficient	:	0.0138 1/s	
NTU	:	7.1804	
HTU	:	2.0890 ft	

CONTAMINANT REMOVAL

Influent concentration	:	151.0 ug/L	
Effluent concentration	:	0.1 ug/L	
Fraction removed	:	99.9 %	
Mass of contaminant removed	:	0.02245 lb/ft^2.day	*
Concentration in airstream	:	0.00397 mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Napthalene
Molecular weight	:	128.2 g/mol
Boiling point	:	424 degrees F.
Molal volume at boiling point	:	0.1476 L/mol
Henry's Constant	:	0.04900
Enthalpy upon dissolution in water	:	3800 cal/mol
Molecular diffusivity in air	:	7.56E-05 ft^2/s
Molecular diffusivity in water	:	7.63E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7	lb/ft^2.s	*
Air mass loading rate	:	0.207	lb/ft^2.s	*
Water volumetric loading rate	:	12.39	gpm/ft^2	*
Air volumetric loading rate	:	1239	gpm/ft^2	*
Air pressure gradient	:	0.077	" H2O/ft	#
Volumetric air/water ratio	:	100.0		
Stripping factor	:	5.2		

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6	%	
Wetted packing area	:	28.3	ft^2/ft^3	*
Transfer rate constant in water	:	0.000547	ft/s	
Transfer rate constant in air	:	0.013033	ft/s	
Overall transfer rate constant	:	0.000302	ft/s	
Overall mass transfer coefficient	:	0.0086	1/s	
NTU	:	4.0488		
HTU	:	3.7048	ft	

CONTAMINANT REMOVAL

Influent concentration	:	56.0	ug/L	
Effluent concentration	:	1.7	ug/L	
Fraction removed	:	96.9	%	
Mass of contaminant removed	:	0.00808	lb/ft^2.day	*
Concentration in airstream	:	0.00143	mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	MTBE III
Molecular weight	:	81.1 g/mol
Boiling point	:	131 degrees F.
Molal volume at boiling point	:	0.1160 L/mol
Henry's Constant	:	0.19600
Enthalpy upon dissolution in water	:	7000 cal/mol
Molecular diffusivity in air	:	9.51E-05 ft^2/s
Molecular diffusivity in water	:	8.82E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7 lb/ft^2.s	*
Air mass loading rate	:	0.207 lb/ft^2.s	*
Water volumetric loading rate	:	12.39 gpm/ft^2	*
Air volumetric loading rate	:	1239 gpm/ft^2	*
Air pressure gradient	:	0.077 " H2O/ft	#
Volumetric air/water ratio	:	100.0	
Stripping factor	:	21.8	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6 %	
Wetted packing area	:	28.3 ft^2/ft^3	*
Transfer rate constant in water	:	0.000588 ft/s	
Transfer rate constant in air	:	0.015182 ft/s	
Overall transfer rate constant	:	0.000499 ft/s	
Overall mass transfer coefficient	:	0.0141 1/s	
NTU	:	7.3064	
HTU	:	2.0530 ft	

CONTAMINANT REMOVAL

Influent concentration	:	1.7 mg/L	
Effluent concentration	:	1.5 ug/L	
Fraction removed	:	99.9 %	
Mass of contaminant removed	:	0.25734 lb/ft^2.day	*
Concentration in airstream	:	0.04548 mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 1/2

PHYSICAL CONSTANTS

Design temperature	:	70.0 degrees F.
Density of water	:	62.3 lb/ft^3
Density of air	:	0.0749 lb/ft^3
Viscosity of water	:	6.57E-04 lb/ft.s
Viscosity of air	:	1.19E-05 lb/ft.s
Surface tension of water	:	73 dyne/cm
Atmospheric pressure	:	1.00 atm

CONTAMINANT PROPERTIES

Name	:	Ethylenedibromide
Molecular weight	:	187.9 g/mol
Boiling point	:	270 degrees F.
Molal volume at boiling point	:	0.0984 L/mol
Henry's Constant	:	0.02800
Enthalpy upon dissolution in water	:	3800 cal/mol
Molecular diffusivity in air	:	9.02E-05 ft^2/s
Molecular diffusivity in water	:	9.74E-09 ft^2/s

PACKING PROPERTIES

Name	:	lanpac
Packing Material	:	Plastic
Nominal Size	:	2.30 inch
Specific Area	:	68.0 ft^2/ft^3
Critical surface tension	:	33 dyne/cm
Packing depth	:	15.0 ft
Air friction factor	:	21

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

PROJECT : McCOY ANNEX BLDG. 7174 DATE : 1/8/1993

ENGINEER : MKD PAGE : 2/2

LOADING RATES

Water mass loading rate	:	1.7 lb/ft^2.s	*
Air mass loading rate	:	0.207 lb/ft^2.s	*
Water volumetric loading rate	:	12.39 gpm/ft^2	*
Air volumetric loading rate	:	1239 gpm/ft^2	*
Air pressure gradient	:	0.077 " H2O/ft	#
Volumetric air/water ratio	:	100.0	
Stripping factor	:	3.0	

MASS TRANSFER PARAMETERS

Percentage of packing area wetted	:	41.6 %	
Wetted packing area	:	28.3 ft^2/ft^3	*
Transfer rate constant in water	:	0.000618 ft/s	
Transfer rate constant in air	:	0.014660 ft/s	
Overall transfer rate constant	:	0.000255 ft/s	
Overall mass transfer coefficient	:	0.0072 1/s	
NTU	:	3.2739	
HTU	:	4.5817 ft	

CONTAMINANT REMOVAL

Influent concentration	:	0.1 ug/L	
Effluent concentration	:	0.0 ug/L	
Fraction removed	:	92.2 %	
Mass of contaminant removed	:	0.00001 lb/ft^2.day	*
Concentration in airstream	:	0.00000 mg/ft^2.ft^3	

* Expressed per unit of stripping tower cross-sectional area
Expressed per unit of tower length

AIR STRIPPING EVALUATION WORKSHEET

Source Identification 7514-70	Max. Influent Flow Rate (GPM)	:	22
Source Location McCoy Annex	Max. Air Flow Rate (CFM)	:	295
Manufacturer_____	Emission Pt. Height (St. Height){ft}	:	20
Model Number_____	Max. Hrs. of Operation (hrs/wk)	:	168

#	Contaminant Name	Max Con (ppb)	Max. Emission Rate (lb/hr)	Max. Ambient Impact (mg/M3)	TLV	Category (A or B)	AAC
1	Benzene	323	0.00356	0.00132	3	A	0.007
2	Toluene	1332	0.01467	0.00545	375	B	1.785
3	Ethylbenzene	151	0.00166	0.00062	435	A	1.035
4	Total Xylenes	899	0.00990	0.00368	435	A	1.035
5	Met. Tert. Butyl Ether	1731	0.01907	0.00709	n/a	n/a	
6	Naphthalenes	56	0.00062	0.00023	50	A	0.119
7							
8							

If maximum ambient impact is greater than acceptable ambient impact (AAC), this implies that the design is not adequate.

PROJECT	COMP. BY	JOB NO.
[illegible]	[illegible]	[illegible]
	CHK. BY	DATE
	[illegible]	[illegible]

[illegible] BLOWER

CFM REQUIRED

AIR TO WATER RATIO FROM THE AIRSTRIPPER™ PROGRAM IS 100:1.

DESIGN FLOW RATE IS 22 GPM

$$22 \text{ GPM} \times \frac{1 \text{ CFM}}{[illegible]} \times \frac{100 \text{ AIR}}{1 \text{ WATER}} = 294.1$$

$$\cong 300 \text{ CFM}$$

PRESSURE DROP IN PACKING

0.078 IN/FT FROM AIRSTRIPPER™

PACKING HEIGHT IS 10 FEET

$$10 \text{ FT} \times \frac{0.078 \text{ IN}}{\text{FT}} = 0.78 \text{ INCHES}$$

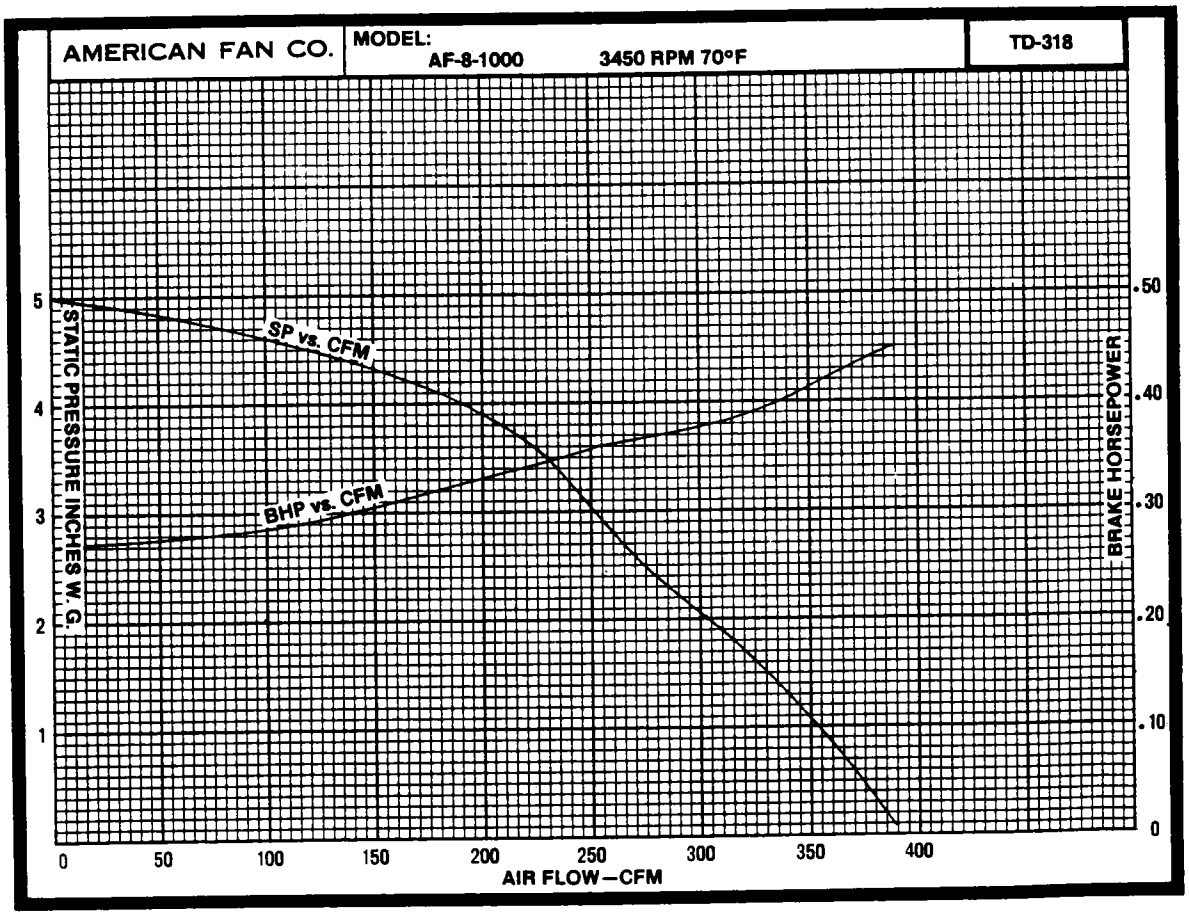
THE SELECTION PARAMETERS ARE

300 CFM @ 0.78 INCHES OF H_2O

∴ FROM THE CHART SELECT AF-B-1000 AMERICAN FAN MODEL BLOWER OR EQUIVALENT

		0.50 SP		1.00 SP		1.50 SP		2.00 SP		2.50 SP		3.00 SP		3.50 SP		4.00 SP		4.50 SP		5.00 SP		6.00 SP		7.00 SP		8.00 SP		9.00 SP	
CFM	OV	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
87	1000	1304	0.02	1702	0.04	2032	0.06	2316	0.09	2567	0.12	2796	0.15	3007	0.19	3203	0.23	3389	0.27	3566	0.31	3894	0.40	4196	0.50	4477	0.61	4741	0.72
105	1200	1419	0.02	1762	0.04	2078	0.07	2355	0.10	2605	0.13	2832	0.16	3040	0.20	3237	0.24	3421	0.28	3595	0.32	3919	0.42	4221	0.52	4502	0.62	4766	0.74
122	1400	1522	0.03	1838	0.05	2134	0.08	2403	0.11	2645	0.14	2871	0.18	3079	0.21	3273	0.25	3455	0.29	3628	0.34	3952	0.43	4251	0.53	4528	0.64	4791	0.76
140	1600	1640	0.04	1952	0.06	2205	0.09	2459	0.12	2696	0.15	2914	0.19	3118	0.23	3312	0.27	3494	0.31	3666	0.36	3986	0.45	4284	0.55	4561	0.66	4822	0.78
157	1800	1764	0.05	2059	0.08	2297	0.11	2527	0.13	2753	0.17	2965	0.20	3166	0.24	3352	0.29	3533	0.33	3705	0.38	4025	0.47	4319	0.58	4594	0.69	4855	0.81
175	2000	1888	0.06	2163	0.09	2415	0.12	2608	0.16	2820	0.18	3025	0.22	3218	0.26	3404	0.31	3579	0.35	3745	0.40	4064	0.50	4358	0.61	4632	0.72	4890	0.84
192	2200	2015	0.08	2281	0.11	2520	0.14	2724	0.17	2901	0.21	3093	0.24	3281	0.29	3457	0.33	3631	0.38	3796	0.42	4105	0.52	4397	0.63	4671	0.75	4929	0.87
209	2400	2141	0.09	2405	0.13	2623	0.16	2838	0.20	3010	0.24	3173	0.28	3350	0.31	3523	0.36	3689	0.40	3848	0.45	4156	0.55	4440	0.66	4711	0.78	4968	0.91
227	2600	2270	0.11	2528	0.15	2736	0.19	2940	0.22	3128	0.26	3280	0.31	3431	0.35	3595	0.39	3755	0.43	3911	0.48	4208	0.59	4491	0.70	4755	0.82	5007	0.94
244	2800	2400	0.13	2653	0.18	2859	0.22	3044	0.25	3232	0.29	3398	0.34	3538	0.38	3676	0.43	3830	0.47	3978	0.52	4269	0.63	4543	0.74	4806	0.86	5054	0.99
262	3000	2536	0.16	2779	0.20	2983	0.25	3158	0.29	3335	0.33	3507	0.37	3656	0.42	3787	0.47	3911	0.52	4057	0.57	4335	0.67	4603	0.78	4858	0.90	5106	1.03
279	3200	2676	0.19	2905	0.23	3106	0.28	3281	0.33	3440	0.37	3609	0.41	3767	0.46	3904	0.51	4027	0.57	4144	0.62	4409	0.72	4669	0.83	4919	0.95	5158	1.08
297	3400	2816	0.23	3032	0.26	3230	0.32	3405	0.37	3559	0.41	3713	0.46	3869	0.51	4017	0.56	4144	0.61	4260	0.67	4490	0.79	4740	0.89	4984	1.01	5219	1.14
314	3600	2958	0.27	3160	0.30	3356	0.36	3528	0.42	3682	0.46	3823	0.51	3972	0.56	4118	0.61	4257	0.66	4378	0.72	4595	0.84	4821	0.96	5053	1.07	5285	1.20
332	3800	3101	0.31	3290	0.34	3483	0.40	3652	0.46	3806	0.52	3945	0.57	4077	0.61	4221	0.67	4359	0.72	4490	0.78	4711	0.90	4912	1.04	5134	1.15	5352	1.27
349	4000	3244	0.36	3420	0.38	3609	0.45	3777	0.51	3929	0.58	4068	0.63	4197	0.68	4326	0.73	4462	0.78	4592	0.84	4829	0.96	5027	1.10	5215	1.24	5433	1.36
367	4200	3388	0.42	3557	0.43	3736	0.50	3903	0.56	4053	0.63	4193	0.70	4319	0.75	4441	0.80	4566	0.85	4694	0.91	4938	1.03	5145	1.17	5330	1.32		
384	4400	3534	0.47	3696	0.50	3864	0.55	4030	0.62	4177	0.69	4316	0.76	4443	0.82	4562	0.88	4677	0.93	4798	0.99	5039	1.11	5263	1.24	5447	1.39		
401	4600	3682	0.54	3836	0.56	3994	0.60	4155	0.68	4303	0.76	4439	0.83	4568	0.91	4686	0.96	4798	1.01	4907	1.07	5142	1.20	5365	1.33				
419	4800	3830	0.60	3977	0.64	4124	0.67	4282	0.75	4430	0.83	4563	0.90	4690	0.98	4810	1.05	4921	1.11	5028	1.16	5246	1.29	5467	1.43				
436	5000	3978	0.68	4118	0.71	4257	0.74	4410	0.81	4556	0.90	4689	0.98	4814	1.06	4934	1.14	5045	1.21										
454	5200	4127	0.76	4261	0.80	4395	0.82	4539	0.89	4682	0.97	4816	1.06	4939	1.14	5057	1.23	5170	1.31										
471	5400	4276	0.85	4403	0.89	4535	0.92	4669	0.97	4809	1.06	4942	1.15	5064	1.23	5180	1.32	5292	1.41										
489	5600	4425	0.94	4547	0.99	4675	1.02	4800	1.05	4937	1.14	5068	1.24	5191	1.33	5305	1.42	5416	1.51										
50[illegible]	[illegible]00	4575	1.04	4691	1.10	4815	1.12	4934	1.15	5066	1.23	5194	1.33	5318	1.43	5431	1.52												

		10.00 SP		11.00 SP	
CFM	OV	RPM	BHP	RPM	BHP
87	1000	4991	0.84	5228	0.97
105	1200	5016	0.86	5253	0.99
122	1400	5041	0.88	5278	1.01
140	1600	5068	0.90	5304	1.03
157	1800	5101	0.93	5336	1.06
175	2000	5135	0.96	5369	1.09
192	2200	5172	1.00	5404	1.13
209	2400	5211	1.04	5442	1.17
227	2600	5250	1.08	5482	1.21
244	2800	5290	1.12		
262	3000	5340	1.17		
279	3200	5392	1.22		
297	3400	5444	1.28		



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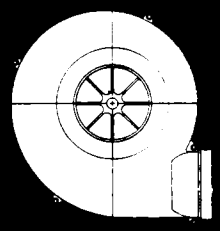
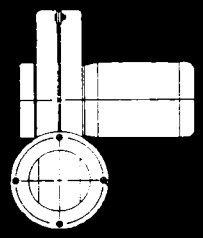
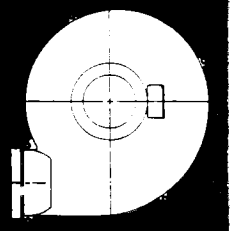
9	3 9/16	5	6	7 1/4	6 17/32	7 3/4	1 7/16	3 3/4	1 3/16	3 1/16	5 5/8	7 7/16	13 5/8	16 11/16	7 3/4	6 1/8	1 1/4
10	4 9/16	6	6 11/16	8 5/16	7 15/32	9	1 3/8	3 3/4	1 1/2	3 3/8	6 3/8	8 1/16	13 5/8	17	7 7/8	6 3/4	1 1/4
12	5 1/2	7	7 3/4	9 1/4	8 1/2	10 7/16	1 7/16	4 1/4	1 1/2	3 5/8	7 5/16	9 3/16	14 7/8	18 1/2	9	8	1 5/8
15	7 1/2	*	9 3/8	11	10	12	2 1/16	5 7/8	1 1/2	4 7/16	7 7/8	11 7/16	18 11/16	23 1/8	13 1/2	11 3/4	1 1/2

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AF SIZE	A	B	C	D	E	F	G	H	I	J	K	L*	M	N	O	P	Q	R	S	T*	T*	T*	S	T*	T*	S	T*	T*	S
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9	4	5	6	7 1/4	6 17/32	7 3/4	1 3/16	15	3 3/4	1 3/16	3 1/16	3 1/8	5 5/8	7 3/16	5	6	7	7/16	13 3/4	34 11/16	34 13/16	35 13/16	14 3/4	35 1/16	36 1/16	—	—	—	—
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12	6	7	7 3/4	9 1/4	8 1/2	10 7/16	1 1/8	15	4 1/4	1 1/2	3 5/8	3 3/8	7 5/16	8 7/8	5	6	7	7/16	13 3/4	35 1/2	35 5/8	36 5/8	14 3/4	35 15/16	36 15/16	—	—	—	—
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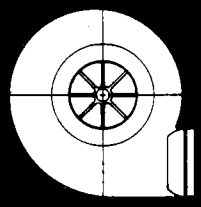
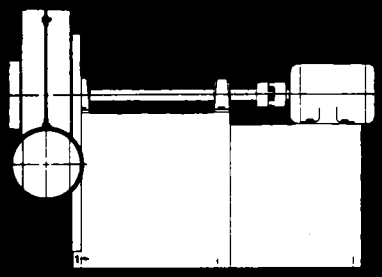
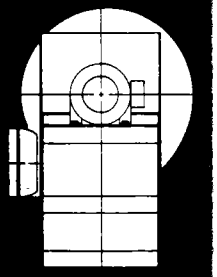
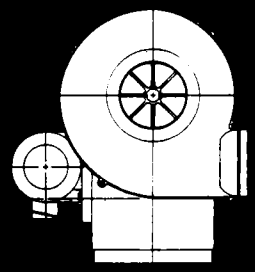
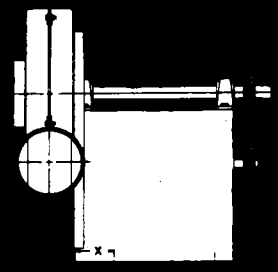
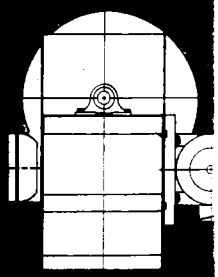




AF SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S*	T	U	V	W*	X	Y	Z	AA	SHAFT DIA.	KEYWAY	MAXIM MOTO FRAME
8	4	4	4 15/16	5 13/16	5 3/32	6 11/16	15	1 3/8	1	5	6	7	1 1/8	3 1/2	2 7/8	3	12	1	3	21 7/8	1	4 9/16	6 5/16	7/16	3/4	3/16 x 3/32	184-
9	4	5	6	7 1/4	6 17/32	7 3/4	15	1 3/16	1	5	6	7	1 3/16	3 3/4	3 1/16	3 1/8	12	1	3	22 3/16	1	5 5/8	7 3/16	7/16	3/4	3/16 x 3/32	184-
10	5	6	6 11/16	8 5/16	7 15/32	9	15	1 1/8	1	5	6	7	1 1/2	3 3/4	3 3/8	3 1/8	12	1	3	22 1/2	1	6 3/8	7 13/16	7/16	1	1/4 x 1/8	184-
12	6	7	7 3/4	9 1/4	8 1/2	10 7/16	15	1 1/8	1	5	6	7	1 1/2	4 1/4	3 5/8	3 3/8	12	1	3	23	1	7 5/16	8 7/8	7/16	1	1/4 x 1/8	184-
15	8	*	9 3/8	11	10	12	19 11/16	1 9/16	1	7	8	9	1 1/2	5 7/8	4 7/16	7 3/8	12	2 3/16	4 3/4	31	4 7/16	7 7/8	10 15/16	9/16	1 7/16	3/8 x 3/16	256-

REPRESENTED BY

AMERICAN FAN COMPANY

2933 Symmes Road, Fairfield, Ohio 45014
Phone: (513) 874-2400 Telefax: (513) 874-4096

APPENDIX E

VACUUM EXTRACTION CALCULATIONS

SOIL VAPOR EXTRACTION WELL DESIGN METHOD

Soil vapor extraction (SVE) wells are designed based on a methodology presented in the article "A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil-Venting Systems" (P. C. Johnson, et al). The predicted flow to a well is calculated using the following equation.

$$\frac{Q}{H} = \pi \times \frac{k}{\mu} \times P_w \times \frac{\left[1 - \left(\frac{P_{Atm}}{P_w}\right)^2\right]}{\ln\left(\frac{R_w}{R_I}\right)}$$

where:

	Q	= air flow rate in cubic centimeters per second
	H	= length of well screen in centimeters
	k	= soil permeability to air flow in cm^2 or darcy
	μ	= viscosity of air = 1.8×10^{-4} g/cm-s or 0.018 cp
	P_w	= absolute pressure at extraction well in g/cm-s^2 (PA)
	P_{Atm}	= absolute ambient pressure $\approx 1.01 \times 10^6$ g/cm-s^2 (PA)
	R_w	= radius of vapor extraction well in centimeters
	R_I	= radius of influence of vapor extraction well in centimeters.

The viscosity of air and the approximate ambient pressure are given as constants. The soil permeability to air flow is calculated from the hydraulic conductivity (K_w), the unit weight of water (γ_w), and the viscosity of water (μ_w) by the following equation.

$$k = K_w \times \frac{\mu_w}{\gamma_w}$$

The resulting value of k is considered to be within an order of magnitude of the actual soil permeability to air. Because of this uncertainty and to be conservative, the calculated value of k is increased by an order of magnitude. The variables H and R_w are from the well geometry. The absolute pressure at the extraction well is the ambient pressure minus the design vacuum, which is chosen based on experience. The desired radius of influence can be chosen to meet the design requirements since this method is not sensitive to large changes in its value (typical values are between 30 and 100 feet).

Reference: Johnson, P. C., C. C. Stanley, M. W. Kemblowski, D. L. Byers, and J. D. Colthart. 1990. A Practical Approach to the Design, Operation, and Monitoring of In Situ Soil-Venting Systems. In *Ground Water Monitoring Review*, Spring 1990.

SOIL VAPOR RECOVERY WELL FLOW RATE CALCULATION

PROJECT: NTC Orlando, McCoy Annex Service Station, Building 7174

DATE: 30 March 93 ENGINEER: MKD

Symbol	Value	Units	Description	Source
Kw	2.57	ft/day	hydraulic conductivity	measured
Kw	0.000907	cm/s		
Rw	0.5	feet	radius of recovery well	selected
Rw	15.24	cm		
Ri	45	feet	radius of influence	selected
Ri	1371.6	cm		
H	5.5	feet	length of well screen	selected
H	167.64	cm		
P design	60	in. H2O	design vacuum at the well	selected
P design	14.7	%	design vacuum at the well	selected
gamma-w	9800	N/m^3	unit weight of water	constant
u w	0.001	N-s/m^2	viscosity of water	constant
u a	2E-05	N-s/m^2	viscosity of air	constant
k	9.25E-13	m^2	intrinsic permeability	calculated
k	9.25E-12	m^2	intrinsic permeability w/ S.F. (x10)	calculated
k	9.25E-08	cm^2		
Patm	101000	PA	absolute ambient pressure (1 atmosphere)	constant
Pw	86103	PA	absolute pressure at extraction well	calculated
Q	0.001753	m^3/s	flow rate from measured Kw	calculated
Q	3.7	cfm	flow rate from measured Kw	calculated
Q	0.017525	m^3/s	design flow rate with safety factor	calculated
Q	37.1	cfm	design flow rate with safety factor	calculated

NOTE: Unit conversions are included in the calculations.

PRESSURE LOSS CALCULATIONS

PROJECT: NTC Orlando McCoy Annex Service Station		
DATE: 30 March 1993	ENGINEER: MKD	
Pipe Diameter	2	inches
Flow in Each Pipe	37.1	cfm
Length of Longest Piping Run	440	LF
Number of 90 deg Elbows	8	
Number of 45 deg Elbows	1	
Friction Loss / 90 deg Elbow	5	feet (from attached chart)
Friction Loss / 45 deg Elbow	2.5	feet (from attached chart)
Equivalent Length of Elbows	42.5	
Friction Loss per Foot	0.024	feet (from attached chart)
Total Friction Losses	11.6	inches of water

Assume well entrance losses to be 4 inches of water.
Assume blower intake losses to be 4 inches of water.

Total Entrance Losses	8	inches of water

Assume 3 carbon canisters in series with losses of 2.5 inches of water each.

Total Treatment System Losses	7.5	inches of water
Total System Head Loss	27.1	inches of water
Design Vacuum at the Well	60	inches of water
TOTAL REQUIRED VACUUM	87.1	inches of water

BLOWER PERFORMANCE REQUIREMENTS

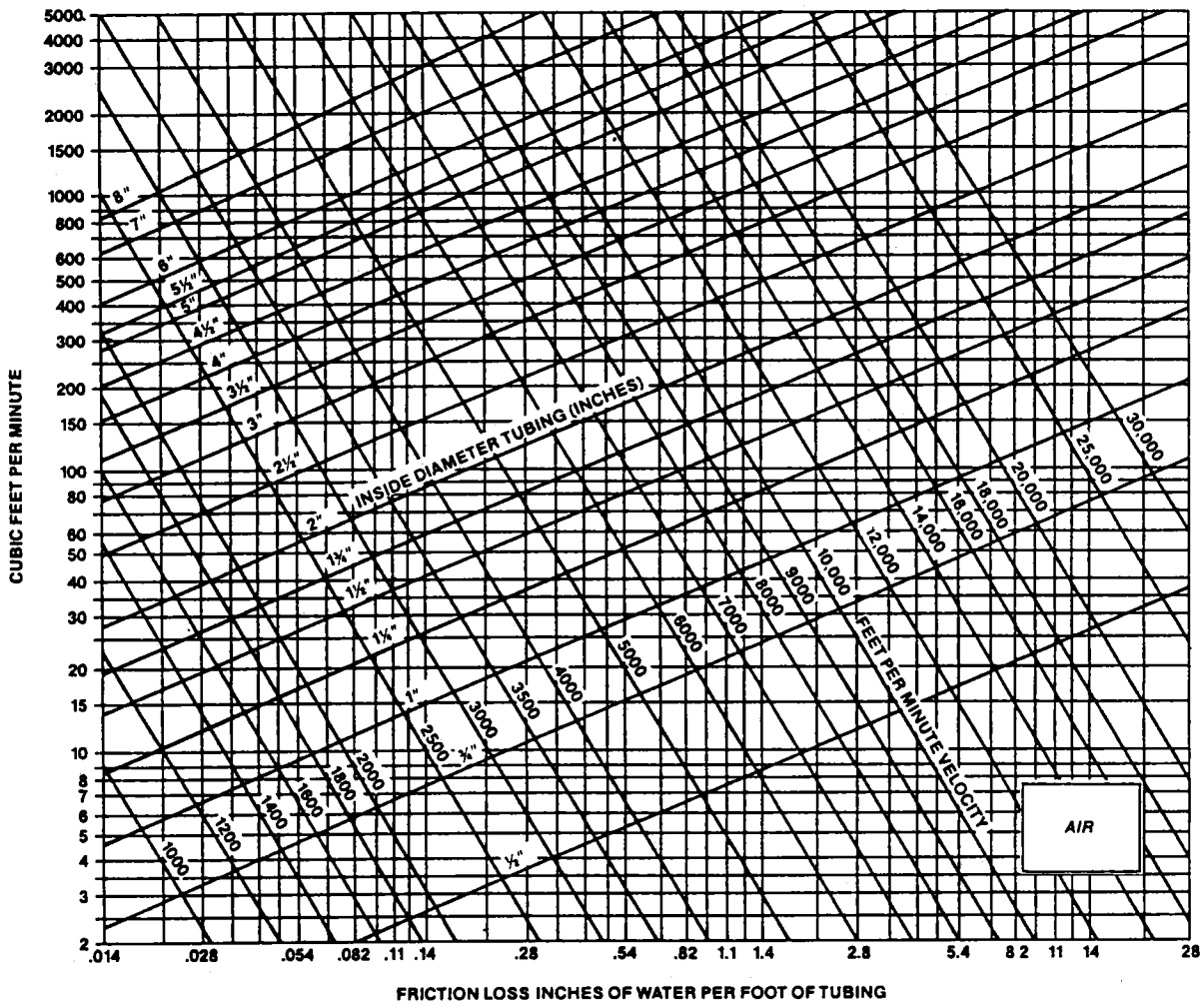
Number of Wells	3	
Flow per Well	37.1	cfm
Total Flow	111.3	cfm

USE: 115 cfm at 90 inches of water

Recommended blower: EG&G Rotron DR 808 Regenerative Blower - 7.5 HP (or equivalent).

Application/Engineering

Friction Loss Per Foot of Tubing

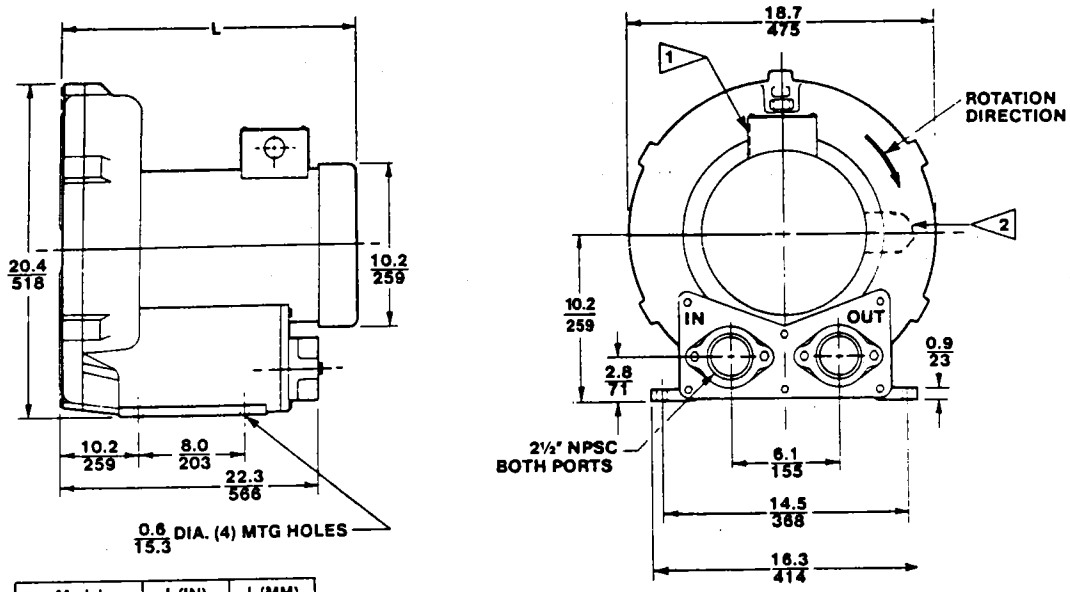


Friction Loss in Fittings

To calculate friction loss in fittings use chart below. This chart will yield equivalent lengths (in feet) of tubing. Use this length with graph above to find friction loss in inches of water column.

NOMINAL PIPE SIZE (INCHES)	EQUIVALENT TUBING LENGTH (FEET)	
	90° EL	45° EL
1¼	3	1.5
1½	4	2
2	5	2.5
2½	6	3
3	7	4
4	10	5
5	12	6
6	15	7.5
8	20	10

DR 808
Regenerative Blower



Model	L (IN)	L (MM)
DR808AY72X	22.6	574
DR808BA72X	24.0	610
DR808AY86X	22.6	574
DR808D89X	19.3	490
DR808F72X	21.0	533

1 T'BOX CONNECTION 1.06" DIA. ON TEFC MOTORS, ¾" NPT ON XP MOTORS

2 LOCATION OF CAPACITOR ON SINGLE PHASE MOTORS

DIMENSIONS: IN / MM

TOLERANCE: .XX ±.1 / 2.5

Specifications Subject To Change Without Notice.

SPECIFICATIONS

MODEL	DR808AY72X	DR808BA72X	DR808AY86X	DR808D89X	DR808F72X
Part No.	037186	037189	037190	037187	037277
Motor Enclosure Type	TEFC	XP	TEFC	TEFC	XP
Motor Horsepower	7.5	7.5	7.5	5.0	5.0
Voltage[1]	230/460	230/460	575	230/460	230/460
Phase	3	3	3	3	3
Frequency[1] (Hz)	60	60	60	60	60
Insulation Class[2]	F	B	F	F	F
NEMA Rated Motor Amps	18.8/9.4	18.8/9.4	7.5	14/7	14/7
Service Factor	1.15	1.0	1.15	1.15	1.0
Locked Rotor Amps	140/70	140/70	56	96/48	96/48
Max. Blower Amps	27.0/13.5	26.0/13.0	10.8	17.0/8.5	15.2/7.6
Recommended NEMA Starter Size	1/1	1/1	1	1/0	1/0
Weight (lbs/Kg)	201/91	201/91	201/91	180/82	180/82
Blower Limitations for Continuous Duty (60 Hz/50 Hz)					
Max. Pressure-In. of water	116/96	100/90	116 (60 Hz)	50/64	35/30
Max. Suction-In. of water	100/80	92/80	100 (60 Hz)	60/70	32/35
Min. Flow-Pressure-SCFM	110/55	200/70	110 (60 Hz)	280/170	300/240
Min. Flow-Suction-SCFM	70/35	100/65	70 (60 Hz)	210/110	275/200

[1]All 3-phase motors are factory tested and certified to operate on 200-230/460 VAC-3 ph-60 Hz and 220-240/380-415 VAC-3 ph-50 Hz.

[2]Maximum operating temperatures: Motor winding temperature (winding rise plus ambient) should not exceed 140°C for Class F insulation or 110°C for Class B insulation. Blower outlet air temperature should not exceed 140°C (air temperature rise plus ambient).

DR 808
Regenerative Blower

FEATURES

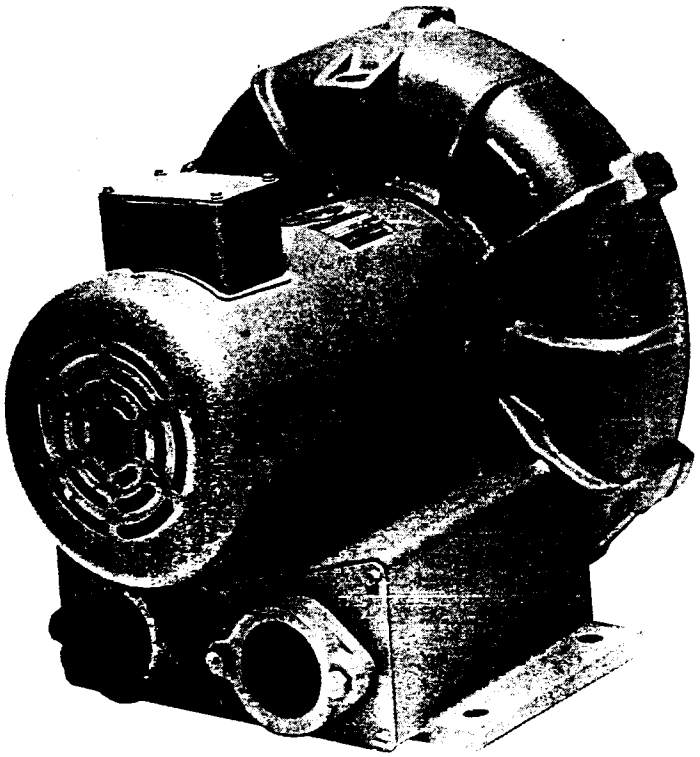
- Manufactured in the USA
- Maximum flow 345 SCFM
- Maximum pressure 116" WG
- Maximum vacuum 7.4" Hg
- 7.5 HP standard
- Blower construction—cast aluminum housing, impeller and cover
- Inlet and outlet internal muffling
- Noise level within OSHA standards
- Weight: 201 lbs. (91.0 Kg)

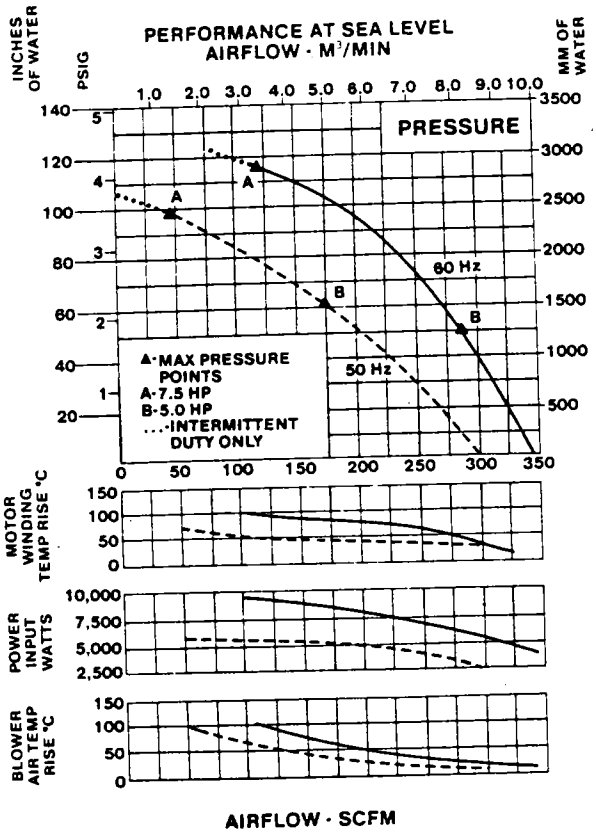
ACCESSORIES

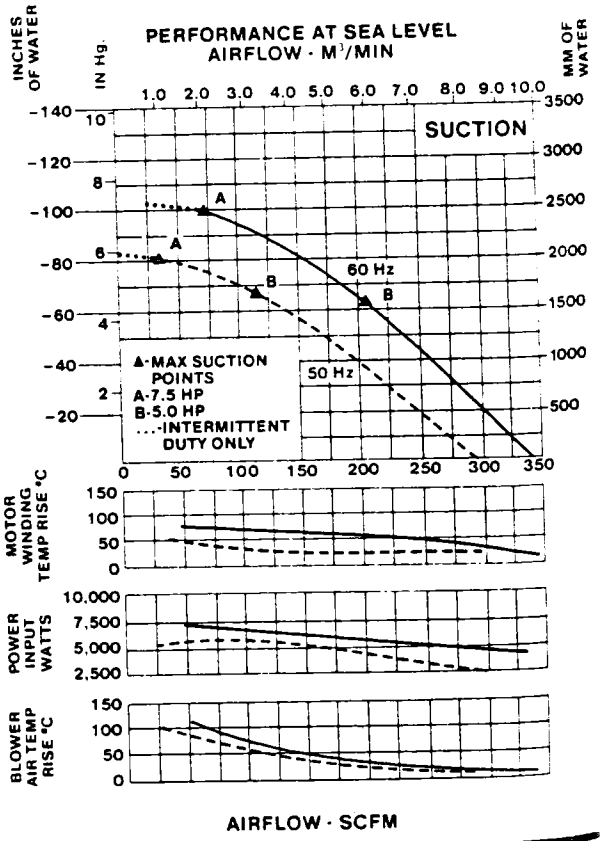
- External mufflers
- Slip-on flanges
- Inlet and/or Inline filters
- For details see Accessories Section

OPTIONS

- Smaller HP motors
- 575-volt and XP motors
- Surface treatment or plating
- Single or three phase motors
- Gas tight sealing
- Belt drive (motorless) model; for details see Remote Drive Section







EG&G ROTRON, SAUGERTIES, N.Y. 12477 • 914/246-340

SIZE CARBON ADSORPTION SYSTEM

PROJECT:	NTC Orlando, McCoy Annex Service Station, Building 7174			
DATE:	March 31, 1993	ENGINEER: MKD		
OVA DATA (in ppm)		Number of data points	12	
4.5	86	Average Head Space Reading	376	ppm
15	800			
575	43	Design Flow Rate	115	cfm
866	3			
1500	1	Est. Mass of Air and Vapor	0.08	LB/ft ^ 3
614	10			
		Mass Flow Rate of Air and Vapor		
		115 cfm X 0.08 LB/FT ^ 3 =	9.29	LB/min

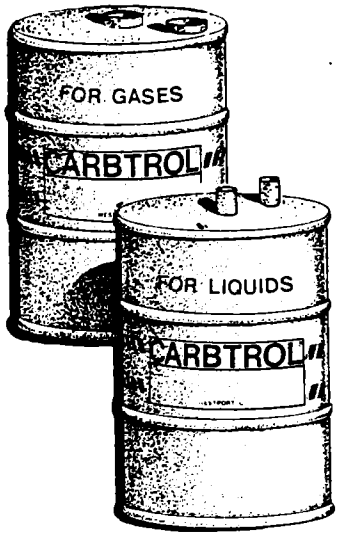
Assume Carbon Adsorptivity is 20 percent.

Weight of Contamination in Influent (mass flow X avg. concentration / 1,000,000).	0.0035	LB/min
Estimated Carbon Usage Rate (influent X 1440 min per day / 0.20)	25.2	LB/day

NOTE: ACTUAL CARBON USAGE RATE TO BE DETERMINED AT START-UP.

CARBTROL®

Activated Carbon Adsorption Canisters



CARBTROL®: A modular system designed for removal of contaminants from liquids and gases.

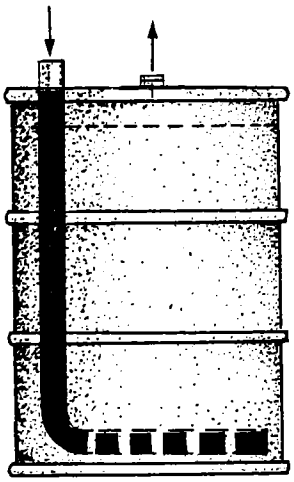
Typical Carbtrol® Applications:

Gas Phase:	Liquid Phase:
■ SEWAGE PLANT ODOR CONTROL	■ GROUNDWATER TREATMENT
■ TANK VENTS	■ PRODUCT PURIFICATION
■ AIR STRIPPER EXHAUSTS	■ WASTEWATER TREATMENT
■ EXHAUST HOODS	■ PCB REMOVAL
■ WORK AREA AIR PURIFICATION	■ LEACHATE TREATMENT

CARBTROL®
CORPORATION

39 Riverside Avenue, Westport, CT 06880 • 1-800-242-1150
(203) 226-5642
Fax No: (203) 226-5322

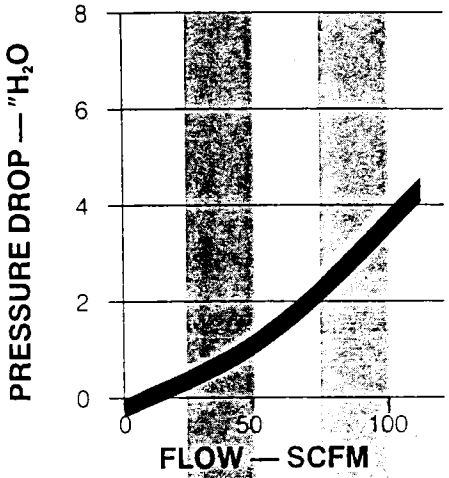
CARBTROL® for gases

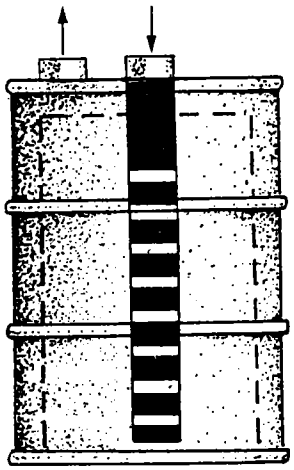


Model G-1

SPECIFICATIONS

Diameter/Height	24/36"
Carbon	200 lbs.
Shipping Weight	250 lbs.
Inlet	2" NPT
Outlet	2" Bung
Max. Flow	100 CFM

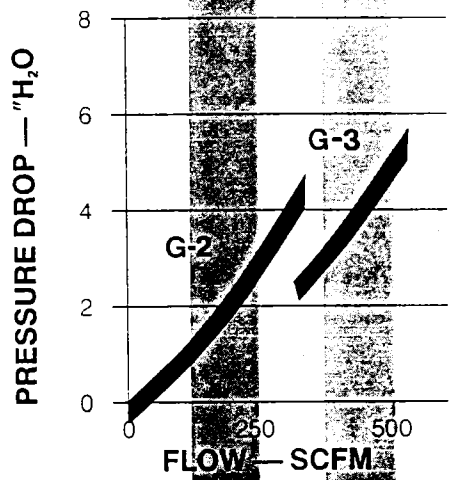




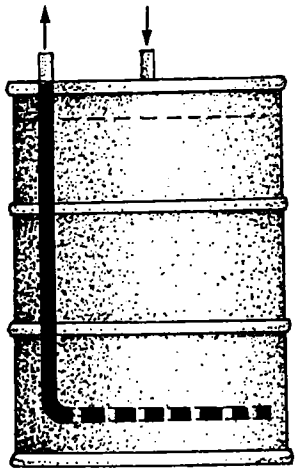
Models G-2, G-3

SPECIFICATIONS

Diameter/Height	24/36"
Carbon (G-2)	170 lbs.
Carbon (G-3)	140 lbs.
Shipping Weight	250 lbs.
Inlet	4" NPT
Outlet	4" NPT
Max. Flow: G-2	300 CFM
Max. Flow: G-3	500 CFM



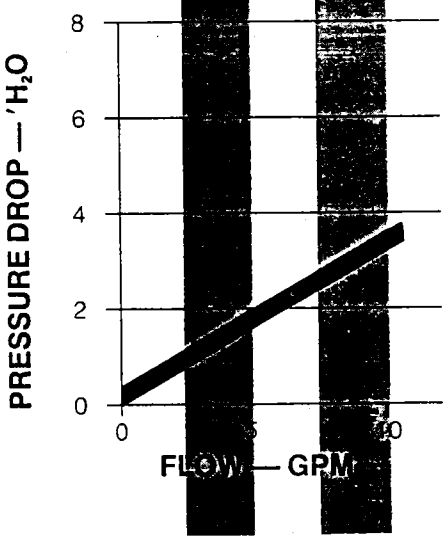
CARBTROL® for liquids

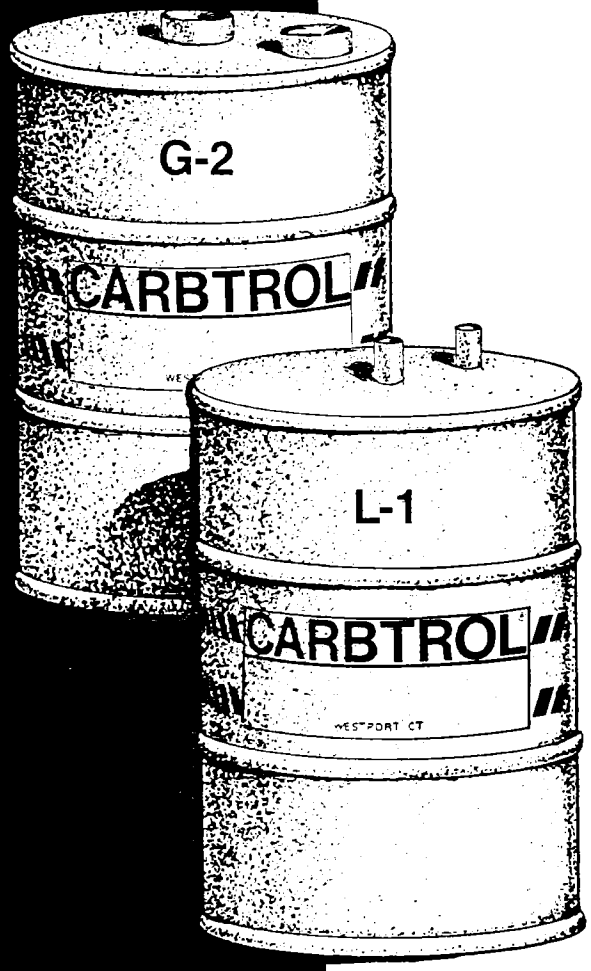


Model L-1

SPECIFICATIONS

Diameter/Height	24/36"
Carbon	200 lbs.
Shipping Weight	250 lbs.
Inlet	1¼" NPT
Outlet	1¼" NPT
Max Flow	10 gpm

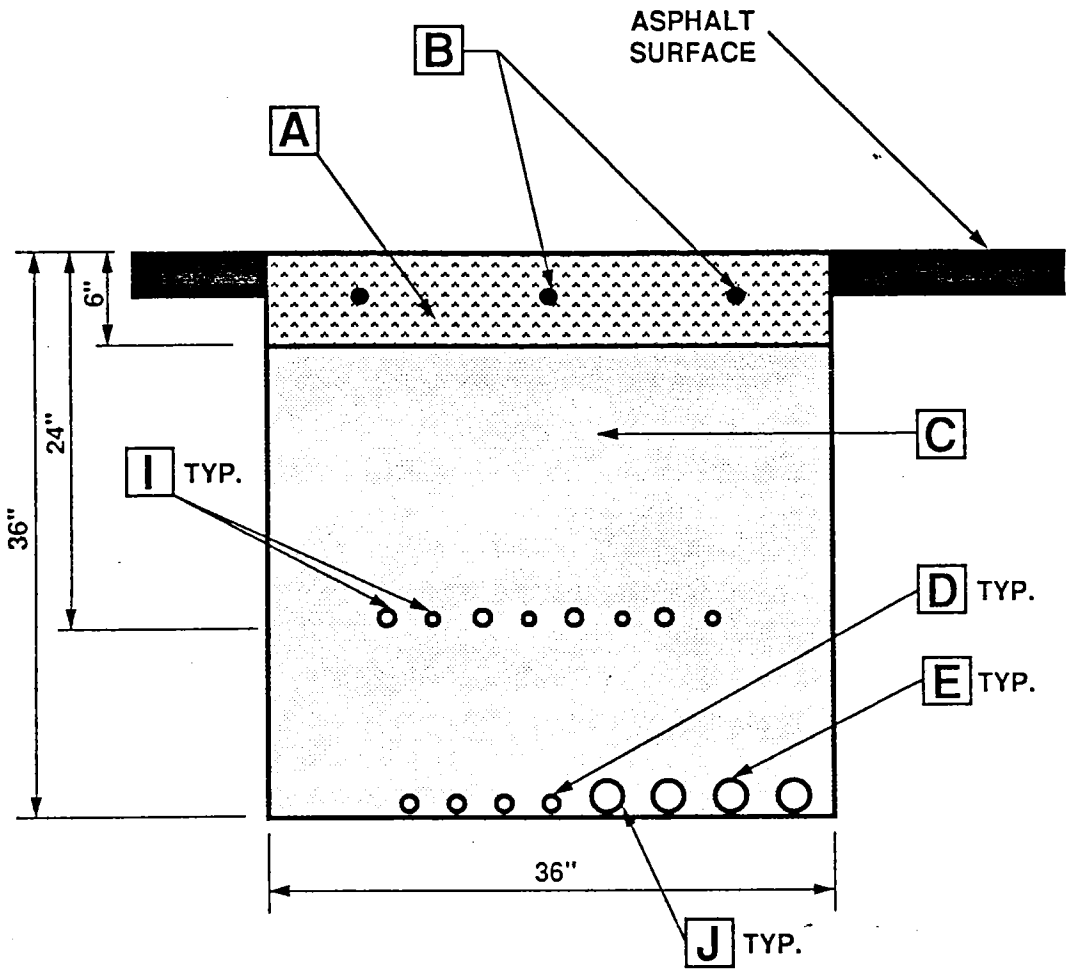




- **CARBTROL®** canisters utilize the proven effectiveness of granular activated carbon to provide economical and effective removal of organic contaminants from air and water.
- The canisters are designed for treatment of gas streams to 500 CFM and liquid systems to 10 gpm.
- **CARBTROL®** adsorption units consist of heavy-duty steel canisters, double epoxy-lined, fitted with chemically inert internal distribution and collection systems.
- The canisters contain between 140 and 200 lbs. of custom-selected activated carbon media (depending on model and application) and can be operated at temperatures to 140°F and pressures to 8 PSIG.
- The **CARBTROL®** adsorption canister system is shipped to your facility ready for easy installation. Normally, all that is required is connection of inlet and outlet piping or ducting.
- When exhausted, the **CARBTROL®** canister can be shipped to an appropriate landfill or regeneration facility, since the canister is a D.O.T. approved container for handling hazardous waste.
- The service life of the **CARBTROL®** canister will vary according to application and concentration of contaminant to be removed. **CARBTROL® Corporation** can provide an estimate of expected service life upon review of proposed operating conditions. (Listing of typical compounds removed by **CARBTROL®** on back page.)

CARBTROL® options:

- Custom activated carbon and synthetic adsorption media can be provided, including:
  - Potassium Hydroxide Impregnated Carbon
  - Phosphoric Acid Impregnated Carbon
  - Molecular Sieve
  - Silica Gel
  - And others depending on the contaminants to be removed.



INFLUENT TRENCH DETAIL

NOT TO SCALE

FOR NOTES REFER TO FIGURE 11

FIGURE 17

INFLUENT TRENCH DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

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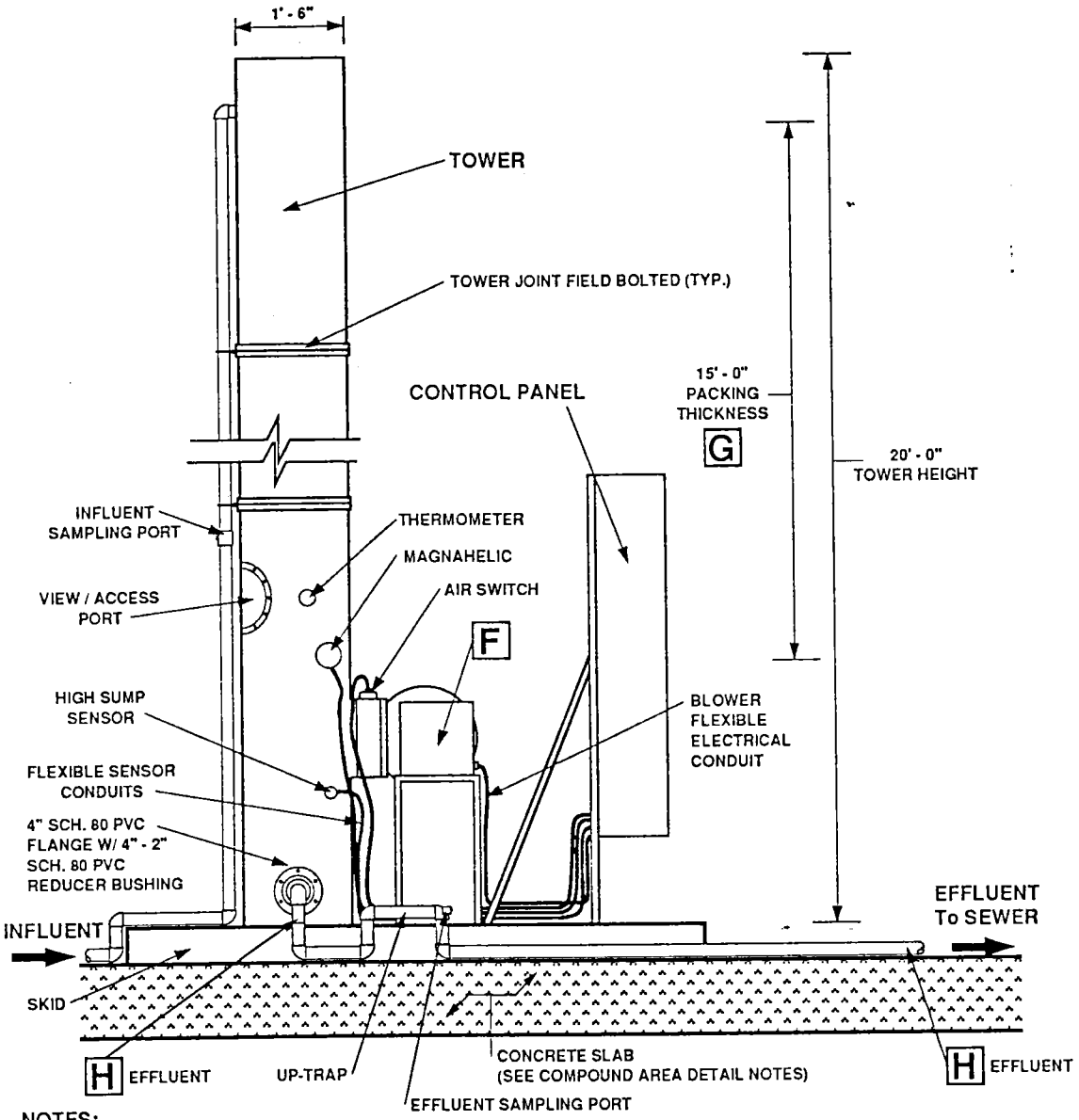


NOTES:

- SECTION F - F' IS GENERIC ONLY; LOCATION / SIZE OF TOWER APPURTENANCES, SKID, BLOWER AND CONTROL PANEL MAY BE DIFFERENT THAN SHOWN.
- ALL OFF-SKID ELECTRICAL TO CONTROL PANEL NOT SHOWN FOR CLARITY. SEE COMPOUND AREA (ELECTRICAL) DETAIL.

FOR NOTES REFER TO FIGURE 6

SECTION F - F'

NOT TO SCALE

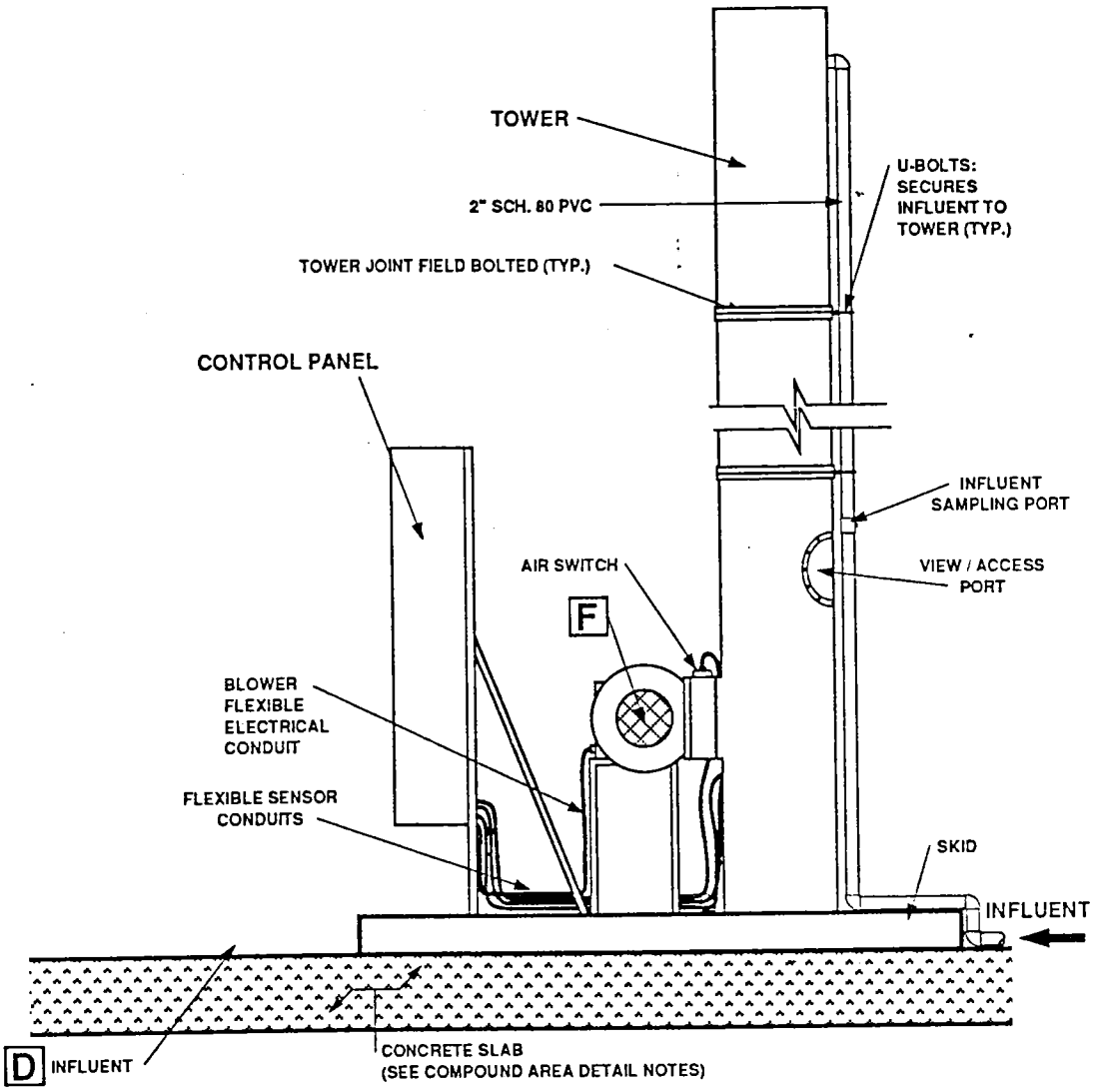
FIGURE 18

SECTION F-F'

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



NOTES:
- SECTION G - G' IS GENERIC ONLY; LOCATION / SIZE OF TOWER APPURTENANCES, SKID, BLOWER AND CONTROL PANEL MAY BE DIFFERENT THAN SHOWN.
- FOR CLARITY, SEE COMPOUND AREA (ELECTRICAL) DETAIL.

FOR NOTES REFER TO FIGURE 11

SECTION G - G'

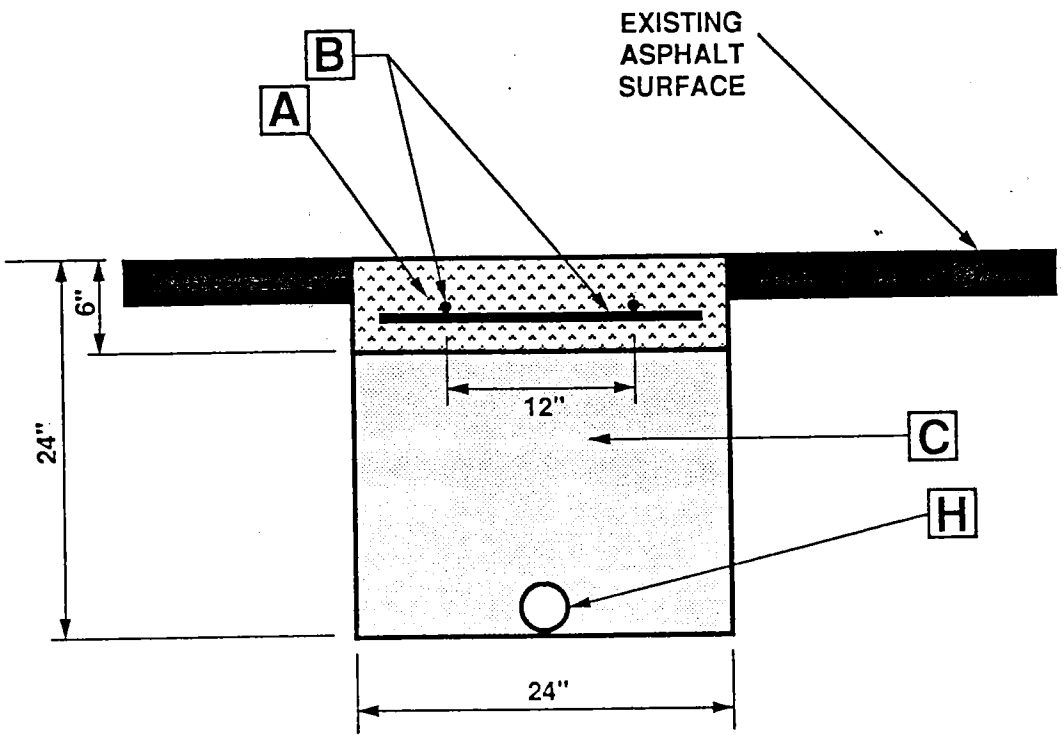
NOT TO SCALE

FIGURE 19

SECTION G - G'

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70



EFFLUENT TRENCH DETAIL

NOT TO SCALE

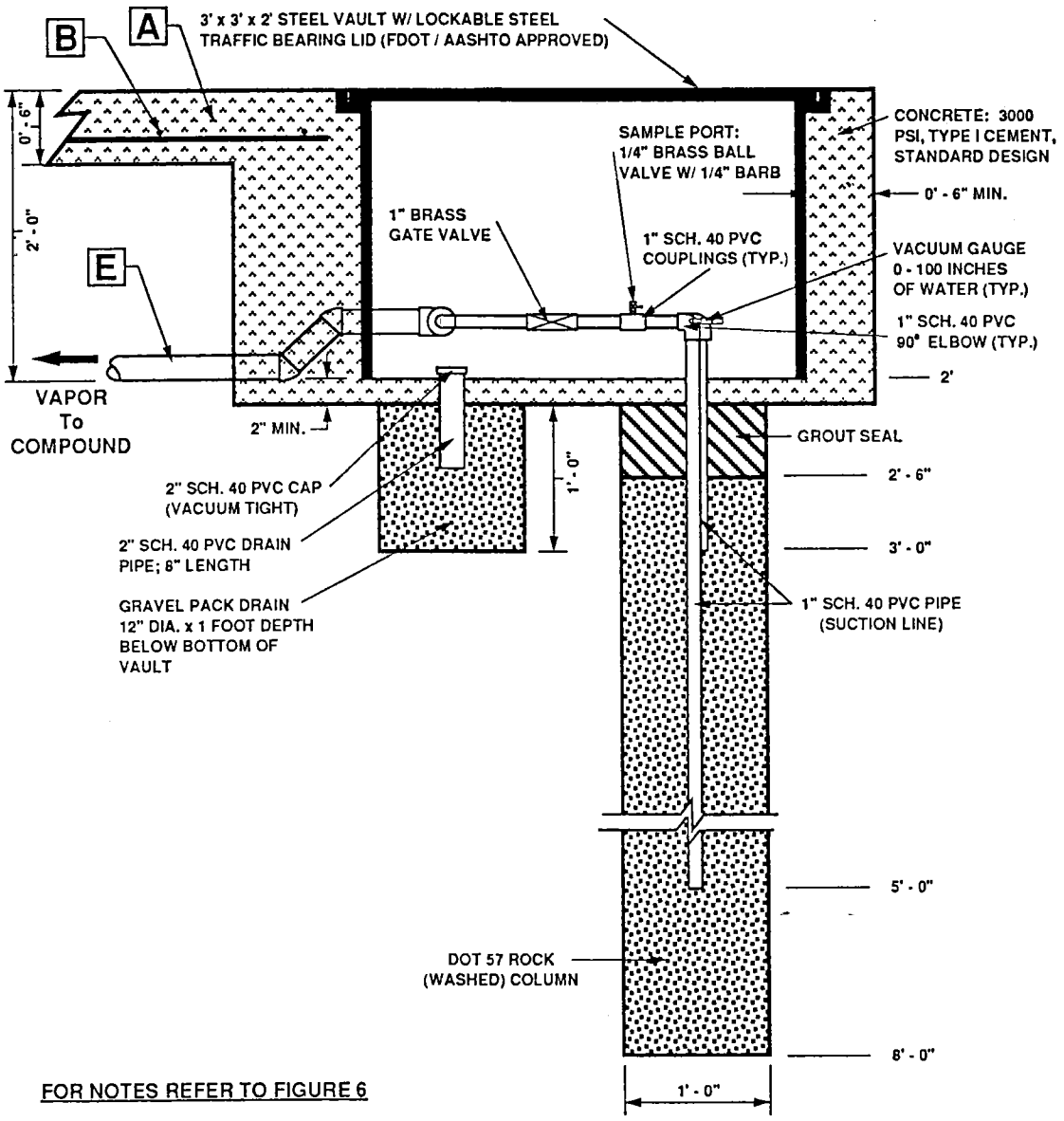
FOR NOTES REFER TO FIGURE 11

FIGURE 20

EFFLUENT TRENCH DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA



FOR NOTES REFER TO FIGURE 6

VACUUM EXTRACTION WELL DETAIL

NOT TO SCALE

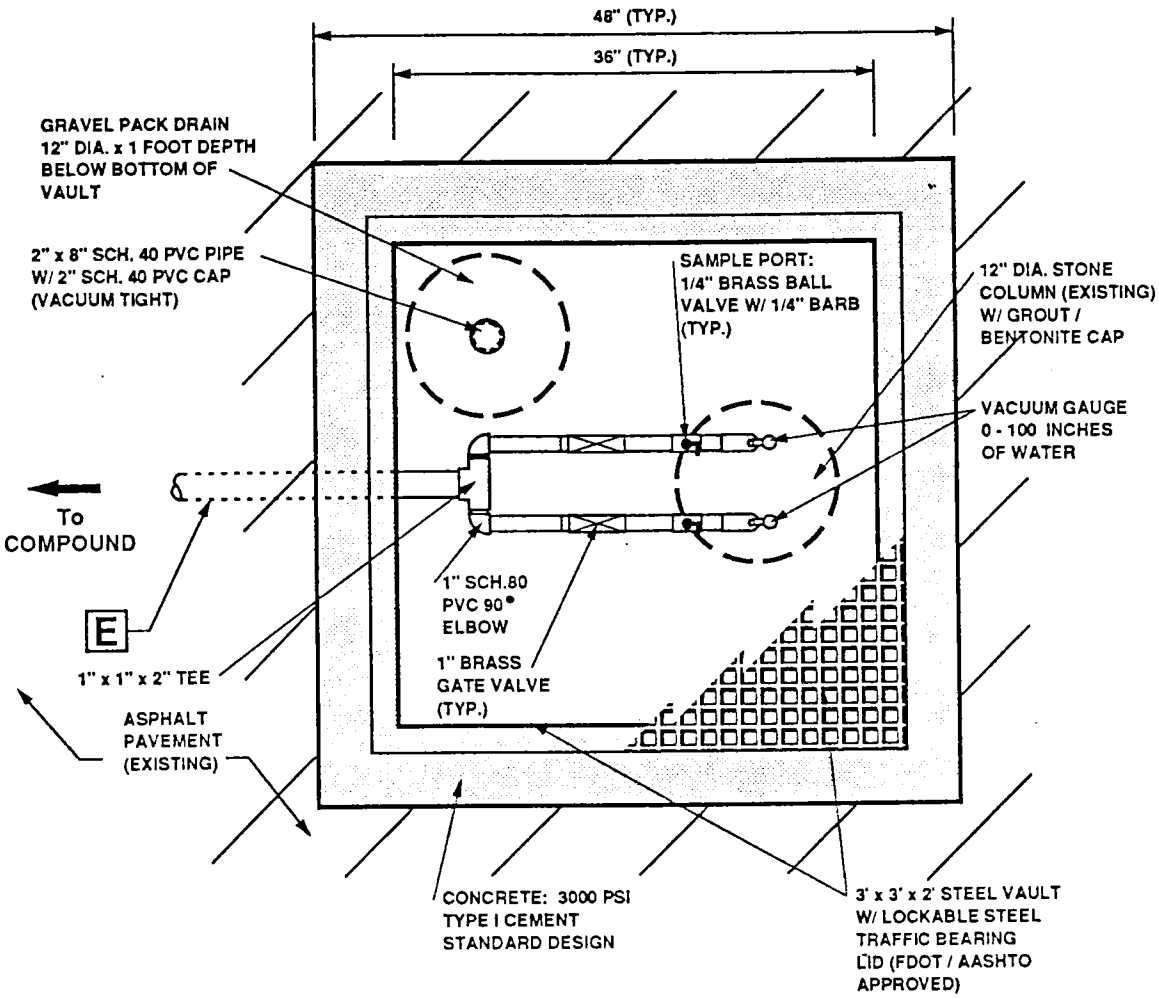
FIGURE 21

VACUUM EXTRACTION WELL DETAIL

7514-70

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA



VACUUM RECOVERY WELL VAULT DETAIL

NOT TO SCALE

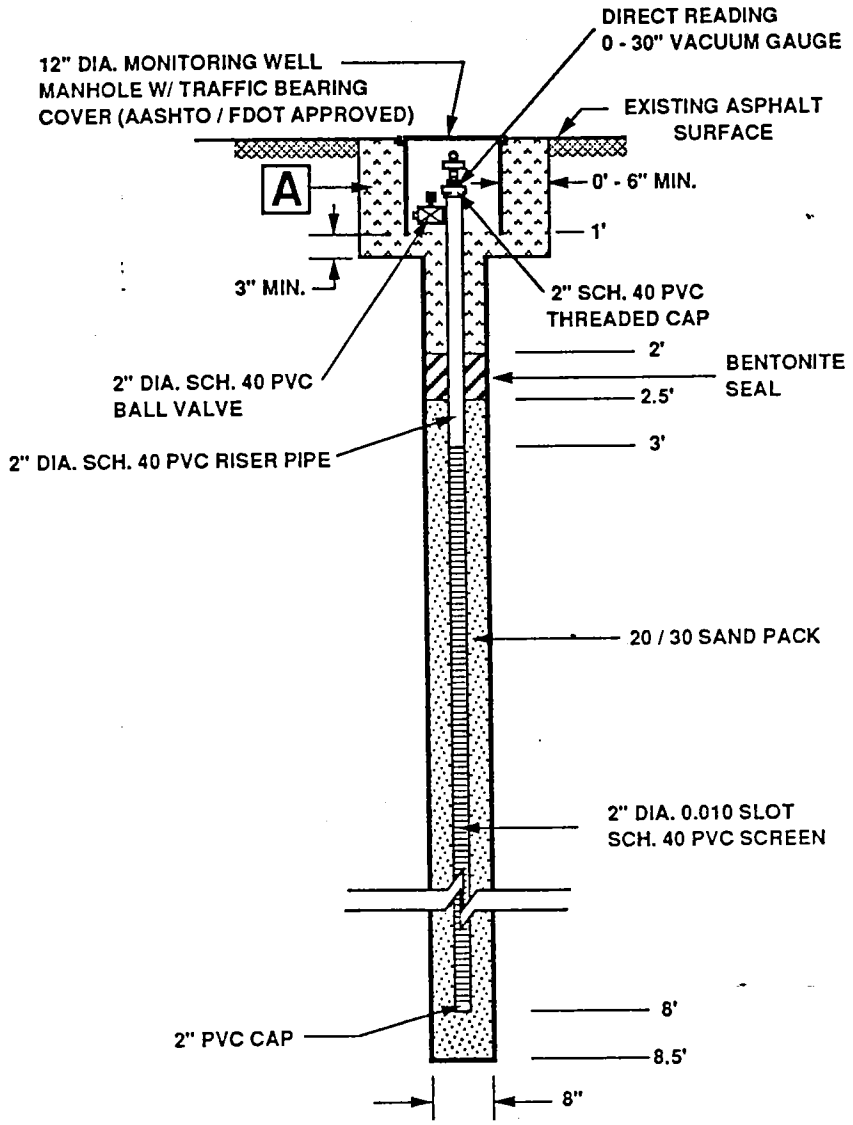
FOR NOTES REFER TO FIGURE 11

FIGURE 22

VACUUM RECOVERY VAULT WELL DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA



FOR NOTES REFER TO FIGURE 11

VAPOR MONITORING WELL DETAIL

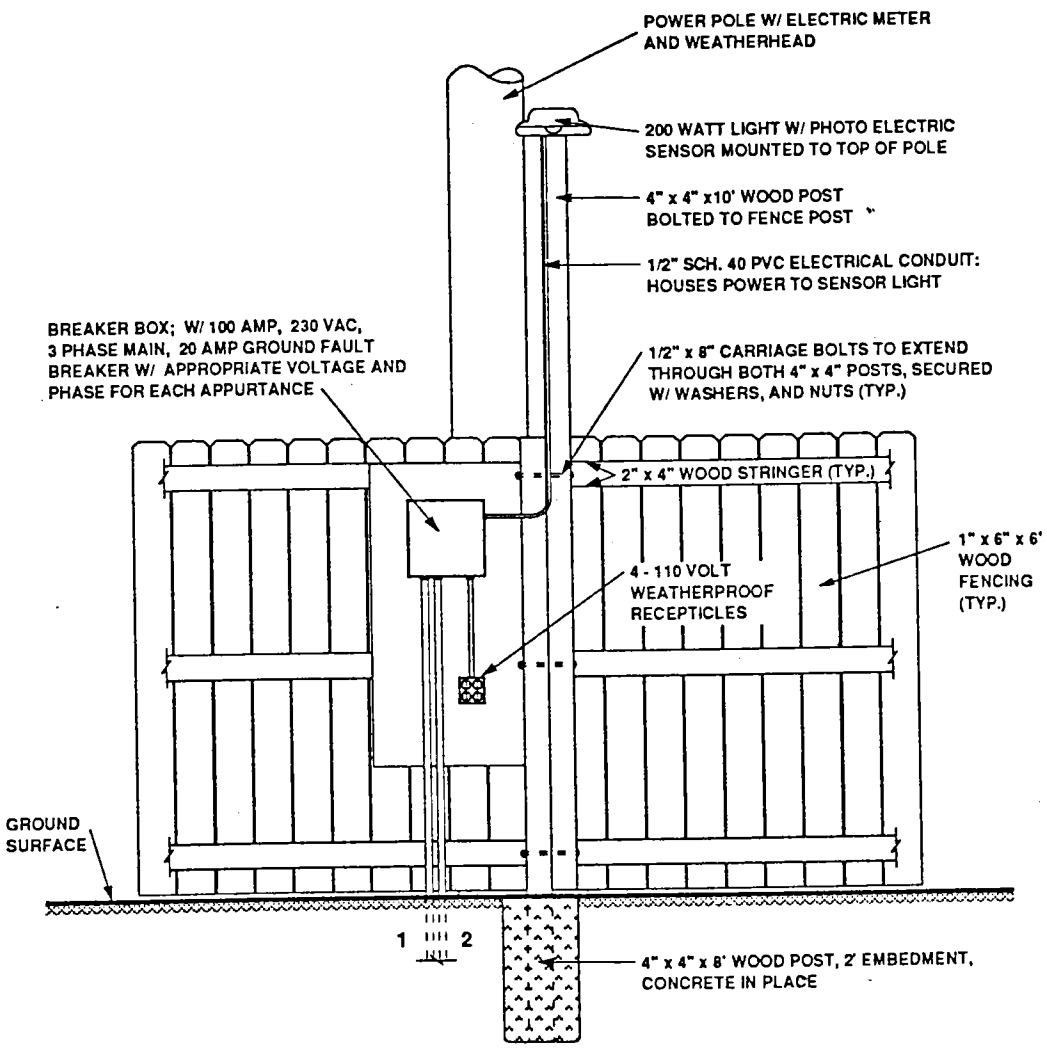
NOT TO SCALE

FIGURE 23

VAPOR MONITORING
WELL DETAIL

7514-70

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA



NOTES:
ALL ELECTRICAL CONDUIT, LOCATION, MOUNTING, BURIAL DEPTHS TO BE IN ACCORDANCE WITH ALL LOCAL, STATE, AND NEC ELECTRICAL CODES AT TIME OF CONSTRUCTION. LOCATIONS MAY BE DIFFERENT THAN SHOWN.

ALL WOOD INCORPORATED IN PROJECT TO BE WEATHER RESISTANT FOR FENCING; CDX, EXPOSURE I GRADE FOR PLYWOOD.

1) ELECTRICAL CONDUIT : HOUSES 230 VAC, 3 PHASE, TO VACUUM BLOWER.

2) ELECTRICAL CONDUIT : HOUSES 230 VAC, SINGLE PHASE TO AIR STRIPPER CONTROL PANEL.

ELECTRICAL DETAIL

NOT TO SCALE

FIGURE 24

ELECTRICAL DETAIL

REMEDIAL ACTION PLAN
BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

7514-70

INSTRUMENT ID LEGEND

LETTER	FIRST LETTER PROCESS VARIABLE OR ACTIVATION	2nd LETTER TYPE OR FUNCTION	THIRD LETTER ADDITIONAL FUNCTION
A	ANALYSIS	ALARM	ALARM
C	CONDUCTIVITY	CONTROL	CONTROL
D	DENSITY (Sq)	DIFFERENTIAL	–
E	VOLTAGE	ELEMENT	–
F	FLOW	RATIO	–
G	GAGING	GLASS	–
H	HAND	–	HIGH
I	CURRENT	INDICATOR	INDICATOR
K	TIME	–	CNTRL STA
L	LEVEL	LIGHT	LOW
M	MOISTURE	METER	MIDDLE
O	–	ORIFICE	–
P	PRESSURE	PRESSURE	POINT
R	RADIATION	REGULATOR	RECORDER
S	SPEED	SWITCH	SENSOR
T	TEMPERATURE	TRANSMITTER	TRANSMITTER
V	VACUUM	–	VALVE
X	–	TEST	–
Y	–	RELAY	–
Z	POSITION	–	DRIVE

VALVES & ACTUATORS

- HV- GATE VALVE
- HV- GLOBE VALVE
- CV- CHECK VALVE
- HV- BALL VALVE
- BUTTERFLY VALVE
- NORMALLY CLOSED VALVE
- RV- THROTTLING VALVE
- SAFETY RELIEF VALVE
- NEEDLE VALVE
- ANGLE VALVE
- DIAPHRAGM ACTUATOR
- ELECTRIC MOTOR ACTUATOR
- PNEUMATIC ACTUATOR (PISTON)
- SOLENOID ACTUATOR
- FLEXIBLE CONNECTOR
- HOSE
- SAMPLING PORT
- THERMOMETER
- PRESSURE GUAGE

EQUIPMENT

- P- CENTRIFUGAL PUMP
- P- POSITIVE DISPLACEMENT PUMP
- BL- BLOWER OR FAN
- F- FILTER
- HE- HEAT EXCHANGER
- ED- EDUCTOR OR EJECTOR
- ST- Y PATTERN STRAINER
- ST- BASKET STRAINER
- ST- DUPLEX BASKET STRAINER

FIGURE 25
PIPING AND INSTRUMENTATION LEGEND

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

SCHM

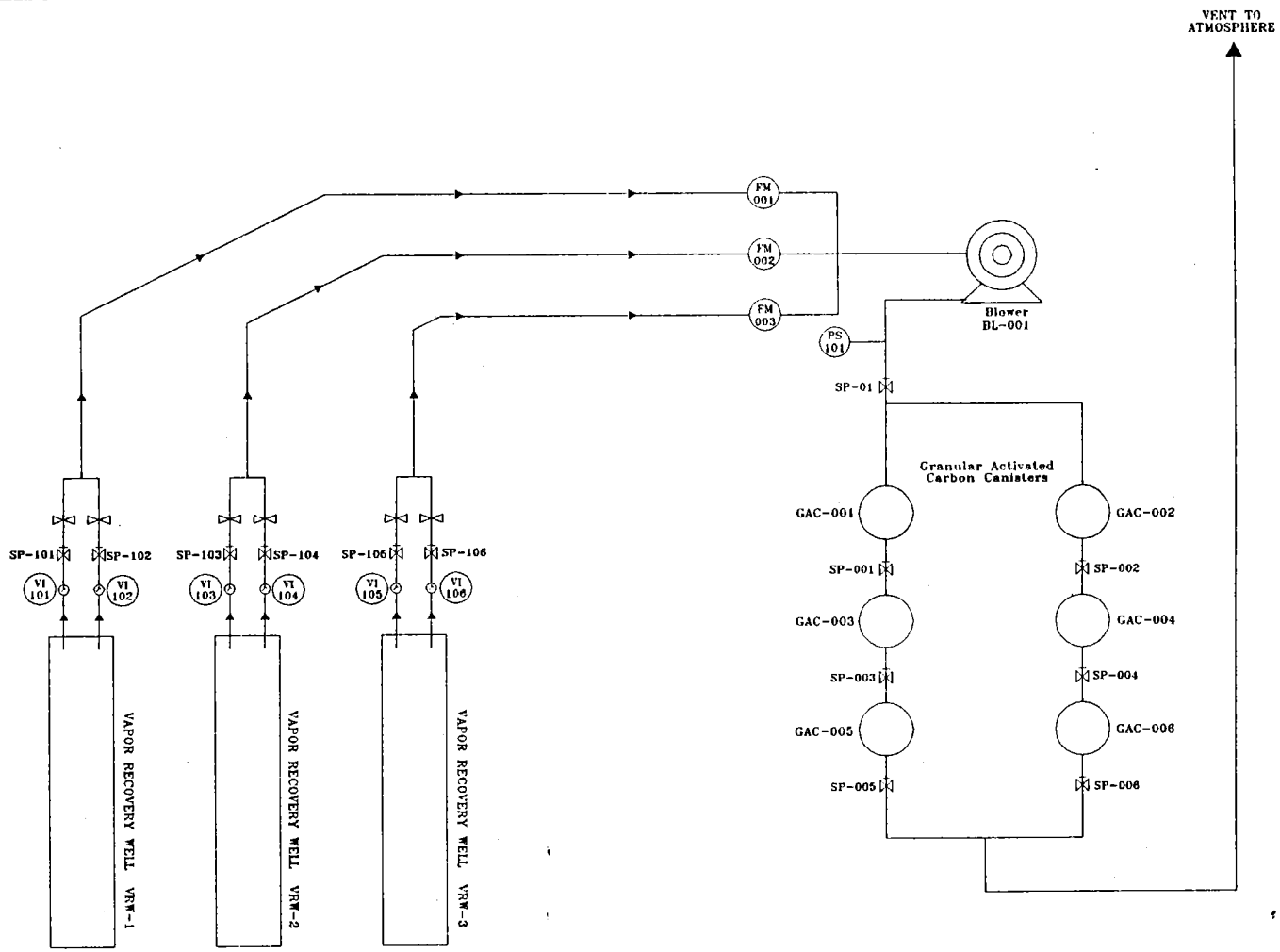


FIGURE 26
SOIL VAPOR EXTRACTION SYSTEM
PIPING AND INSTRUMENTATION
DIAGRAM

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

Soil Vapor Extraction System Process Controls
(refers to Figure 26)

Sensor ID No.	Description	Location	Interlocks	Local Indicators
VI-101	Vacuum gauge	VRW-001		Indicates vacuum at well VRW-001 (shallow)
VI-102	Vacuum gauge	VRW-001		Indicates vacuum at well VRW-001 (deep)
VI-103	Vacuum gauge	VRW-002		Indicates vacuum at well VRW-002 (shallow)
VI-104	Vacuum gauge	VRW-002		Indicates vacuum at well VRW-002 (deep)
VI-105	Vacuum gauge	VRW-003		Indicates vacuum at well VRW-003 (shallow)
VI-106	Vacuum gauge	VRW-003		Indicates vacuum at well VRW-003 (deep)
SP-101	Sampling port	VRW-001		Sampling device at well VRW-001 (shallow)
SP-102	Sampling port	VRW-001		Sampling device at well VRW-001 (deep)
SP-103	Sampling port	VRW-002		Sampling device at well VRW-002 (shallow)
SP-104	Sampling port	VRW-002		Sampling device at well VRW-002 (deep)
SP-105	Sampling port	VRW-003		Sampling device at well VRW-003 (shallow)
SP-106	Sampling port	VRW-003		Sampling device at well VRW-003 (deep)
FM-001	Flow meter	Before Header		Indicates flow from VRW-001
FM-002	Flow meter	Before Header		Indicates flow from VRW-002
FM-003	Flow meter	Before Header		Indicates flow from VRW-003
PS-101	Pressure switch	BL-001	Shuts down BL-001 on high pressure	
SP-01	Sampling port	After BL-001		Sampling device after the blower
SP-001	Sampling port	After GAC-001		Sampling for breakthrough in GAC-001
SP-002	Sampling port	After GAC-002		Sampling for breakthrough in GAC-002
SP-003	Sampling port	After GAC-003		Sampling for breakthrough in GAC-003
SP-004	Sampling port	After GAC-004		Sampling for breakthrough in GAC-004
SP-005	Sampling port	After GAC-005		Sampling for breakthrough in GAC-005
SP-006	Sampling port	After GAC-006		Sampling for breakthrough in GAC-006

Notes:
- VI = vacuum indicator.
- BL = blower.
- SP = sampling port.
- FM = flow meter.
- GAC = vapor phase granular activated carbon.
- PS = pressure switch.
- VRW = vapor recovery well.

SCHM

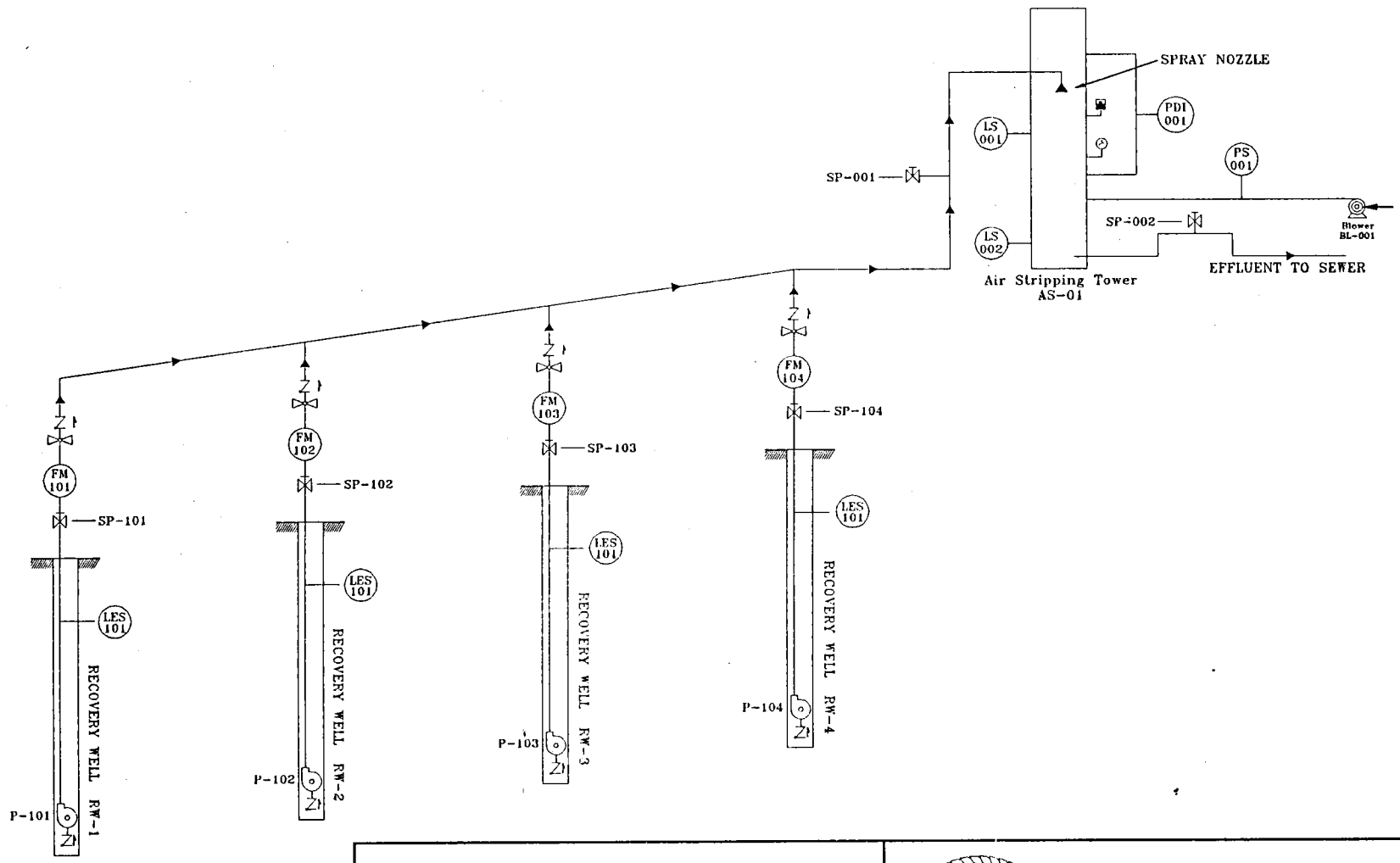


FIGURE 27
GROUNDWATER TREATMENT SYSTEM PIPING AND INSTRUMENTATION DIAGRAM

REMEDIAL ACTION PLAN

BUILDING 7174
McCOY ANNEX
NTC ORLANDO, FLORIDA

Groundwater Treatment Process Controls
(refers to Figure 27)

Sensor ID No.	Description	Location	Interlocks	Local Indicators
P-101	Pump	RW-01		
P-102	Pump	RW-02		
P-103	Pump	RW-03		
P-104	Pump	RW-04		
FM-101	Flow meter	Before Header		Indicates instantaneous and total flow from RW-01
FM-102	Flow meter	Before Header		Indicates instantaneous and total flow from RW-02
FM-103	Flow meter	Before Header		Indicates instantaneous and total flow from RW-03
FM-104	Flow meter	Before Header		Indicates instantaneous and total flow from RW-04
LES-101	Level element sensor	RW-01	1. Low level shuts down P-101 2. High level starts P-101	
LES-102	Level element sensor	RW-02	1. Low level shuts down P-102 2. High level starts P-102	
LES-103	Level element sensor	RW-03	1. Low level shuts down P-103 2. High level starts P-103	
LES-104	Level element sensor	RW-04	1. Low level shuts down P-104 2. High level starts P-104	
SP-101	Sampling port	RW-01		
SP-102	Sampling port	RW-02		
SP-103	Sampling port	RW-03		
SP-104	Sampling port	RW-04		
SP-001	Sampling port	After Header		Sampling device after flows combined
LS-001	Level switch in the tower	AS-01		High level shuts down BL-001
LS-002	Level switch in the tower	AS-01		Low level shuts down BL-001
PDI-001	Pressure differential indicator	AS-01		Indicates fouling of packing media
SP-002	Sampling port	After AS-01		Sampling device before being discharged to sewer
PS-001	Pressure switch	BL-001	Low pressure shuts down BL-001	

Notes:
AS = air stripping tower.
FM = flow meter.
SP = sampling port.
LS = level switch.
BL = blower.
PS = pressure switch.
P = pump.
RW = recovery well.
LES = level element sensor.
PDI = pressure differential indicator.

APPENDIX B

FLOW CALCULATIONS

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

Necessary radius of influence = 35 ft

(1) delh = R/(1.5*SQRT(K))

Where: delh = drawdown (ft)
R = radius of influence
K = hydraulic conductivity (cm/s * 10**4)

REF 1: "Dewatering and Groundwater Control", Army TM 5-818-5, Navy NAVFAC P-418, Air Force AFM 88-5, Chap 6, November 1983

K = 0.000907 cm/s

From Eq. 1:
delh = 7.7 ft; will round to 8 ft.

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

Calculate flow required to produce a drawdown of 8 ft:

From REF 1:

$$(2) \quad Q = \frac{PI*K((b-s)**2 - t**2)}{\ln(R/Rw)}\left(1+\left(0.3+\frac{10*Rw}{b}\right)*\sin\left(\frac{1.8*s}{b}\right)*\frac{7.48gal}{cu.ft}\right)$$

Where:
Q = flow (gpm)
K = hydraulic conductivity(2.57 ft/day = 0.00178 ft/min)
b = saturated aquifer thickness (unknown)
s = distance from bottom of screen to confining layer (unknown)
t = saturated screen length minus drawdown (10 ft)
R = radius of influence (35 ft)
Rw = radius of well including annulus (0.5 ft)

Assumptions:
- steady state, gravity flow with a circular source
- well may be partially or fully penetrating
- hydraulic conductivity calculated from slug test data is comparable to that which would have been calculated from pump test data
- effects of well efficiency are negligible
- homogeneous, istropic aquifer

Since aquifer thickness is unknown, calculate Q for several values of b to determine sensivity to b:

b(ft)	s(ft)	Q(gpm)
22	0	3.79
25	3	4.20
30	8	4.61
35	13	4.83
40	18	4.96
45	23	5.03
50	28	5.07
55	33	5.10
60	38	5.11
65	43	5.12
70	48	5.12

The flow rate does not change significantly for an auqifer thickness greater than 40 ft.; therefore for preliminary design purposes the thickness of the aquifer will be assumed to equal 40 ft, The corresponding flowrate will be 5 gpm.

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

Design recovery well:

Proposed design: 6 inch nominal diameter PVC well
25 feet deep
0.020-inch slot PVC screen from 5 ft bls
to 25 ft bls

Design flow rate = 5 gpm X FS, FS = 1.1
5.5 gpm

Design standard: entrance velocity of water into well
must not exceed 0.1 ft/sec.

REF 2: Driscoll, F.G., GROUNDWATER AND WELLS, 2nd Ed, Johnson Division,
St. Paul MN, 1987, pg. 449.

Calculate surface area per unit length of screen:

a = PI*d*12in/ft

Where
d = screen diameter (6 in)

a = 226.19 sq in/ft

Calculate total area for 10 ft of saturated screen
(based on 8 ft of drawdown)

A = a*t

A = 2262 sq. in.

Assume 11% of screen area is open (equivalent to continuous slot
wire wound with 0.156 inch wire)

0.11*A = 249 sq. in. open area
v = Q/(0.11*A); v = 0.007 ft/sec

Therefore, design is adequate.

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

ESTIMATE minimum time to clean-up:

Assume retardation factor for BETX, Rb = 50
Actual retardation factors cannot be determined without organic content in soils.

Neglecting dispersion and decay , and assuming cleanup to BDL, Fick's law becomes:

delt = Rb*delx/v

where: delt = time to clean-up
delx = distance of edge of plume from recovery well
(35 ft)
v = average pore water velocity

v = Ki/n

where: K = horiz. hydraulic conductivity
(2.57 ft/day)
i = induced hydraulic gradient, delh/R
(0.22 ft/ft neglecting natural gradient)
n = porosity (assume = 20 %)

v = 2.84 ft/day

Therefore,
delt = 615 days

NOTE: This equation does not consider the recontamination of the groundwater due to flucuations in the water table height which may contact residual contaminants stored in the soil.

APPENDIX C

PUMP SIZING CALCULATIONS

REMEDIAL ACTION PLAN
McCOY ANNEX BLDG. 7174

FLOW CALCULATIONS

COMP. BY cyd
CHK. BY
JOB NO. 7514-70
DATE 12/29/92

SIZE PUMP

Calculate total head loss.

Assume:	tower height =	20 ft
	drawdown =	8 ft
	depth to static water =	7 ft
	head loss, he =	35 ft

Calculate minor losses:

Pipe diameter = 1 inch

hl = Kv^2/(2*g)

where: v = velocity through pipe = Q/A
(2.2 ft/sec, assuming difference between nominal diameter and I.D. is negligible)
K= minor loss coefficent

ITEM	NO.	K
90 ELBOWS	5	0.9
45 ELBOWS	0	0.7
BALL CHECK VALVE	1	70
FLOW METER	1	10

Note: K values from FDER RAP guidance document

total minor hl = 6.6 ft

assume head loss due to spray nozzle, hs = 30 ft

APPENDIX F

LABORATORY RESULTS

WADSWORTH/ALERT
LABORATORIES 5910 Breckenridge Pkwy., Suite H, Tampa, FL 33610

Sampling, testing, mobile labs

Since 1938

ANALYTICAL REPORT

SUBCONTRACT NUMBER: 1-08-134

TASK ORDER NUMBER: 0018

NTC ORLANDO - McCOY ANNEX

Presented to:

PETER REDFERN

ABB ENVIRONMENTAL SERVICES, INC.

WADSWORTH/ALERT LABORATORIES

5910 BRECKENRIDGE PARKWAY, SUITE H

TAMPA, FL 33610

(813) 621-0784

Dan Henson
Project Manager

Randall C. Grubbs
Laboratory Director - Florida

April 6, 1992

WADSWORTH/ALERT
LABORATORIES

INVOLVEMENT

This report summarizes the analytical results of the NTC Orlando McCoy Annex site submitted by ABB Environmental Services, Inc. to Wadsworth/ALERT Laboratories who provided independent, analytical services for this project under the direction of Peter Redfern. The samples were accepted into Wadsworth's Florida facility on 12-13 March 1992 & 24 March 1992, in accordance with documented sample acceptance procedures. The associated analytical methods and sample results are outlined sequentially in this report.

Analytical results included in this report have been reviewed for compliance with the Laboratory QA/QC Plan as summarized in the Quality Control Section at the rear of the report. Sample custody documentation describing the number of samples and sample matrices is also included. Any qualifications and/or non-compliant items have been noted below.

WADSWORTH/ALERT
LABORATORIES

ANALYTICAL METHODS

Wadsworth/ALERT Laboratories utilizes only USEPA approved analytical methods and instrumentation. The analytical methods utilized for the analysis of these samples are listed below.

PARAMETER	METHOD
ORGANICS	
Volatile Organics	** EPA Method 601/2, 624
Ethylene Dibromide	** EPA Method 601 Mod.
Polynuclear Aromatic Hydrocarbons	** EPA Method 625
METALS	
Lead	** EPA Method 239.2
MISCELLANEOUS	
Tot. Rec. Petroleum Hydrocarbons	** EPA Method 418.1

NOTE: ** Indicates usage of this method to obtain results for this report.

EPA Methods -Methods for Chemical Analysis of Water and Wastes, USEPA, 600/4-79-020, March, 1983. July, 1982
Drinking Waters USEPA, 600/4-88/039, December, 1988.

Std. Methods -Standard Methods for the Examination of Water and Wastewater, APHA, 16th edition, 1985.

USEPA Methods -From 40CFR Part 136, published in Federal Register on October 26, 1984.

SW846 Methods -Test Methods for Evaluating Solid Waste Physical/Chemical Methods, 3rd Edition, USEPA, 1986.

ASTM Methods -American Society for Testing and Materials.

NIOSH Method -NIOSH Manual of Analytical Methods, National Institute for Occupational Safety and Health, 2nd Edition, April 1977.

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-1
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	12	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	4
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	5
		Methyl-tert-butylether	260 J

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	86	(78-122)
Trifluorotoluene (PID)	106	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-1
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	340

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	102	(78-122)
Trifluorotoluene (PID)	100	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-1
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	0.07	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		80

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-1
MATRIX : WATER

SAMPLE ID : OLD-7174-1 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-1
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-1
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	190	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	61
Carbon tetrachloride	ND	Methylene chloride	72
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	16
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 100 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	89	(75-123)	(85-126)	(85-138)
Toluene-d8	103	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	92	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-1
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	3,100	100

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	92
Toluene-d8	(92-107)	(89-124)	105
Bromofluorobenzene	(86-115)	(84-124)	92

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-1
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/27/92

SAMPLE ID: MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		98

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-1
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/25/92
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	37
2-Methylnaphthalene	56
Naphthalene	130
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	41	(22-135)	(10-155)
Fluorobiphenyl	69	(34-140)	(12-153)
Terphenyl-d14	28	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/24/92
LAB #: 2C2406-1
MATRIX : WATER

SAMPLE ID : MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/27/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C2406-1
MATRIX : WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/30/92
DATE ANALYZED: 3/30/92

SAMPLE ID: MW#2 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	2	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-1
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/13/92

SAMPLE ID: OLD-7174-3

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	2	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	14
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	3

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	94	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-1
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-3

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-1
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-3

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	62	(22-135)	(10-155)
Fluorobiphenyl	71	(34-140)	(12-153)
Terphenyl-d14	59	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-1
MATRIX : WATER

SAMPLE ID : OLD-7174-3 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	13	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-1
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-3 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-2
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/13/92

SAMPLE ID: OLD-7174-4

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	1
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	99	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-2
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-4

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-2
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-4 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	63	(22-135)	(10-155)
Fluorobiphenyl	81	(34-140)	(12-153)
Terphenyl-d14	65	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-2
MATRIX : WATER

SAMPLE ID : OLD-7174-4 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	19	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-2
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-4 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-2
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-5 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	8	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	8
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	4
		Methyl-tert-butylether	920 J

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	89	(78-122)
Trifluorotoluene (PID)	108	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-2
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-5 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	1000

NOTE: ND (None Detected, lower detectable limit = 50 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	99	(78-122)
Trifluorotoluene (PID)	99	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-2
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-5 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		92

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-2
MATRIX : WATER

SAMPLE ID : OLD-7174-5 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	6	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-2
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-5 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-3
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: OLD-7174-6

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	94	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-3
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-6

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-3
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-6 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	71	(22-135)	(10-155)
Fluorobiphenyl	87	(34-140)	(12-153)
Terphenyl-d14	81	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-3
MATRIX : WATER

SAMPLE ID : OLD-7174-6 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	33	10	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-3
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-6 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-3
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-7 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	2	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	1
		Methyl-tert-butylether	2

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	90	(78-122)
Trifluorotoluene (PID)	100	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-3
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-7 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		99

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-3
MATRIX : WATER

SAMPLE ID : OLD-7174-7 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	26	10	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-3
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-7 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-4
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-8 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	95	(78-122)
Trifluorotoluene (PID)	99	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-4
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-8 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		65

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-4
MATRIX : WATER

SAMPLE ID : OLD-7174-8 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-4
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-8 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-5
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: OLD-7174-12 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	5	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	5
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	4
		Methyl-tert-butylether	3400 J

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	91	(78-122)
Trifluorotoluene (PID)	86	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-5
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-12 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	3400

NOTE: ND (None Detected, lower detectable limit = 50 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	107	(78-122)
Trifluorotoluene (PID)	98	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-5
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-12 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		91

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-5
MATRIX : WATER

SAMPLE ID : OLD-7174-12 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	110	20	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-5
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-12 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-6
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-13 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	109	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	23
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	17
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	84
		Methyl-tert-butylether	9

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	103	(78-122)
Trifluorotoluene (PID)	99	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-6
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: OLD-7174-13 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		75

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-6
MATRIX : WATER

SAMPLE ID : OLD-7174-13 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	17	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-6
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: OLD-7174-13 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-4
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: OLD-7174-14

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	4
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	96	(78-122)
Trifluorotoluene (PID)	103	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-4
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: OLD-7174-14

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-4
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-14 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	57	(22-135)	(10-155)
Fluorobiphenyl	75	(34-140)	(12-153)
Terphenyl-d14	64	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-4
MATRIX : WATER

SAMPLE ID : OLD-7174-14 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	160	40	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-4
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-14 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-5
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: OLD-7174-15

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	4
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	160 J

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	94	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-5
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/17/92

SAMPLE ID: OLD-7174-15

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	150

NOTE: ND (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	95	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-5
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: OLD-7174-15

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-5
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-15 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	63	(22-135)	(10-155)
Fluorobiphenyl	78	(34-140)	(12-153)
Terphenyl-d14	77	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-5
MATRIX : WATER

SAMPLE ID : OLD-7174-15 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	19	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-5
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-15 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-6
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/17/92

SAMPLE ID: OLD-7174-16

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	2
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	18

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	93	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-6
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: OLD-7174-16

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-6
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-16 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	60	(22-135)	(10-155)
Fluorobiphenyl	71	(34-140)	(12-153)
Terphenyl-d14	66	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-6
MATRIX : WATER

SAMPLE ID : OLD-7174-16 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	190	40	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-6
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-16 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-2
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	11 B
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	3
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	90	(75-123)	(85-126)	(85-138)
Toluene-d8	103	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	93	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-2
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	90
Toluene-d8	(92-107)	(89-124)	103
Bromofluorobenzene	(86-115)	(84-124)	93

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-2
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/27/92

SAMPLE ID: MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		106

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-2
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/25/92
DATE ANALYZED: 3/31/92

SAMPLE ID: MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	47	(22-135)	(10-155)
Fluorobiphenyl	68	(34-140)	(12-153)
Terphenyl-d14	39	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/24/92
LAB #: 2C2406-2
MATRIX : WATER

SAMPLE ID : MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/27/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C2406-2
MATRIX : WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/30/92
DATE ANALYZED: 3/30/92

SAMPLE ID: MW#17 PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-7
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: OLD-7174-19

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	94	(78-122)
Trifluorotoluene (PID)	102	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-7
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: OLD-7174-19

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	0.06	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-7
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: OLD-7174-19 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	64	(22-135)	(10-155)
Fluorobiphenyl	83	(34-140)	(12-153)
Terphenyl-d14	65	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-7
MATRIX : WATER

SAMPLE ID : OLD-7174-19 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	49	10	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-7
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: OLD-7174-19 PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-7
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: DUPLICATE #1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	3	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	1
		Methyl-tert-butylether	2

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	93	(78-122)
Trifluorotoluene (PID)	98	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-7
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: DUPLICATE #1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(71-152)		83

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-7
MATRIX : WATER

SAMPLE ID : DUPLICATE #1 NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	19	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-7
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: DUPLICATE #1 NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-3
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	14 B
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	90	(75-123)	(85-126)	(85-138)
Toluene-d8	104	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	92	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-3
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	90
Toluene-d8	(92-107)	(89-124)	104
Bromofluorobenzene	(86-115)	(84-124)	92

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-3
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/27/92

SAMPLE ID: DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		91

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-3
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/25/92
DATE ANALYZED: 3/31/92

SAMPLE ID: DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	56	(22-135)	(10-155)
Fluorobiphenyl	79	(34-140)	(12-153)
Terphenyl-d14	37	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/24/92
LAB #: 2C2406-3
MATRIX : WATER

SAMPLE ID : DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/27/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C2406-3
MATRIX : WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/30/92
DATE ANALYZED: 3/30/92

SAMPLE ID: DUPLICATE PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-8
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: EQUIPMENT BLANK

PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	94	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-8
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: EQUIPMENT BLANK NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	98	(78-122)
Trifluorotoluene (PID)	99	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-4
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	15 B
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	90	(75-123)	(85-126)	(85-138)
Toluene-d8	105	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	92	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-4
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	90
Toluene-d8	(92-107)	(89-124)	105
Bromofluorobenzene	(86-115)	(84-124)	92

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-8
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/20/92

SAMPLE ID: EQUIPMENT BLANK PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-8
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: EQUIPMENT BLANK NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		107

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-4
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/27/92

SAMPLE ID: EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		84

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-8
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: EQUIPMENT BLANK PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	76	(22-135)	(10-155)
Fluorobiphenyl	94	(34-140)	(12-153)
Terphenyl-d14	107	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-4
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/25/92
DATE ANALYZED: 3/31/92

SAMPLE ID: EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	55	(22-135)	(10-155)
Fluorobiphenyl	82	(34-140)	(12-153)
Terphenyl-d14	76	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-8
MATRIX : WATER

SAMPLE ID : EQUIPMENT BLANK PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-8
MATRIX : WATER

SAMPLE ID : EQUIPMENT BLANK NTC ORLANDO MCCOY ANNEX BLDG 7174
CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/26/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/24/92
LAB #: 2C2406-4
MATRIX : WATER

SAMPLE ID : EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/27/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-8
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: EQUIPMENT BLANK PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-8
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: EQUIPMENT BLANK NTC ORLANDO MCCOY ANNEX BLDG 7174

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C2406-4
MATRIX : WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/30/92
DATE ANALYZED: 3/30/92

SAMPLE ID: EQUIPMENT BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-9
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/14/92

SAMPLE ID: TRIP BLANK PROJ: MCCOY ANNEX, BLDG 7174/NTC ORLANDO

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	96	(78-122)
Trifluorotoluene (PID)	103	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-5
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: TRIP BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	15 B
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	88	(75-123)	(85-126)	(85-138)
Toluene-d8	104	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	91	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-5
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: TRIP BLANK PROJ# 7514.70

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	88
Toluene-d8	(92-107)	(89-124)	104
Bromofluorobenzene	(86-115)	(84-124)	91

WADSWORTH/ALERT
LABORATORIES

QUALITY CONTROL SECTION

- Quality Control Summary
- Laboratory Blanks
- Laboratory Control Sample
- Matrix Spike/Matrix Spike Duplicate Results
- Sample Custody Documentation

WADSWORTH/ALERT
LABORATORIES

QUALITY ASSURANCE / QUALITY CONTROL PROGRAM SUMMARY

Wadsworth/ALERT Laboratories considers continuous analytical method performance evaluations to be an integral portion of the data package, and routinely includes the pertinent QA/QC data associated with various analytical result reports. Brief discussions of the various QA/QC procedures utilized to measure acceptable method and matrix performance follow.

Surrogate Spike Recovery Evaluations

Known concentrations of designated surrogate spikes, consisting of a number of similar, non-method compounds or method compound analogues, are added, as appropriate, to routine GC and GC/MS sample fractions prior to extraction and analysis. The percent recovery determinations calculated from the subsequent analysis is an indication of the overall method efficiency for the individual sample. This surrogate spike recovery data is displayed alongside acceptable analytical method performance limits at the bottom of each applicable analytical result report sheet.

NOTE: Acceptable method performance for Base/Neutral Acid extractables is indicated by two (2) of three (3) surrogates for each fraction with a minimum recovery of ten (10) percent each. For Pesticides one (1) of two (2) surrogates meeting performance criteria is acceptable.

Laboratory Analytical Method Blank Evaluations

Laboratory analytical method blanks are systematically prepared and analyzed in order to continuously evaluate the system interferences and background contamination levels associated with each analytical method. These method blanks include all aspects of actual laboratory method analysis (chemical reagents, glassware, etc.), substituting laboratory reagent water or solid for actual sample. The method blank must not contain any analytes above the reported detection limit. The following common laboratory contaminants are exceptions to this rule provided they are not present at greater than five times the detection limit.

Volatiles	Semi-volatiles	Metals
Methylene chloride	Dimethyl phthalate	Calcium
Toluene	Diethly phthalate	Magnesium
2-Butanone	Di-n-butyl phthalate	Sodium
Acetone	Butyl benzyl phthalate	
	Bis (2-ethylhexyl) phthalate	

A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method blanks.

Laboratory Analytical Method Check Sample Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to a laboratory reagent blank prior to extraction and analysis. Percent recovery determinations demonstrate the performance of the analytical method. Failure of a check sample to meet established laboratory recovery criteria is cause to stop the analysis until the problem is resolved.

WADSWORTH/ALERT
LABORATORIES

QUALITY ASSURANCE / QUALITY CONTROL
PROGRAM SUMMARY
(cont'd)

At that time all associated samples must be re-analyzed. A minimum of five percent (5%) of all laboratory analyses are laboratory analytical method check samples.

Matrix Spike (MS)/Matrix Spike Duplicate (MSD) Recovery Evaluations

Known concentrations of designated matrix spikes (actual analytical method compounds) are added to two of three separate aliquots of a sequentially predetermined sample prior to extraction and analysis. Percent recovery determinations are calculated from both of the spiked samples by comparison to the actual values generated from the unspiked sample. These percent recovery determinations indicate the accuracy of the analysis at recovering actual analytical method compounds from the matrix. Relative percent difference determinations calculated from a comparison of the MS/MSD recoveries demonstrate the precision of the analytical method. Actual percent recovery and relative percent difference data is displayed alongside their respective acceptable analytical method performance limits in the QA/QC section of the report. The MS/MSD are considered in control when the precision is within established control limits and the associated check sample has been found to be acceptable. A minimum of ten percent (10%) of all analyses are MS/MSD quality control samples.

**********EXAMPLE**********

COMPOUND	SAMPLE CONC.	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
4,4'-DDT	0	95	112	16	22	66-119
Benzene	10	86	93	8	20	39-150
(cmpd. name)	sample result	1st% recov.	2nd% recov.	Rel.% diff.	accep. method perform range	

Analytical Result Qualifiers

The following qualifiers, as defined below, may be appended to analytical results in order to allow proper interpretation of the results presented:

J - indicates an estimated concentration (typically used when a dilution, matrix interference or instrumental limitation prevents accurate quantitation of a particular analyte).

B - indicates the presence of a particular analyte in the laboratory blank analyzed concurrently with the samples. Results must be interpreted accordingly.

DIL - indicates that because of matrix interferences and/or high analyte concentrations, it was necessary to dilute the sample to a point where the surrogate or spike concentrations fell below a quantifiable amount and could not be reported.

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/13/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	92	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

LAB #: 2C1210-5
MATRIX: WATER

DATE RECEIVED: 03/12/92
DATE EXTRACTED: 03/24/92
DATE ANALYZED: 03/24/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Tot. Rec. Petroleum Hydrocarbons	98	100	2	24	75-124

WADSWORTH/ALERT
LABORATORIES

LAB #: 2C1302-5
MATRIX: WATER

DATE RECEIVED: 03/13/92
DATE EXTRACTED: 03/26/92
DATE ANALYZED: 03/26/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Tot. Rec. Petroleum Hydrocarbons	98	100	2	24	75-124

WADSWORTH/ALERT LABORATORIES
SAMPLE SHIPPER EVALUATION AND RECEIPT FORM

McCoy Annex Bldg 7174

Client: ABB Project Name/Number: N.T.C. ORLANDO / Bldg. 2080

Samples Received By: R. Thomas (Signature) Date Received: 4075/2C1210-1+012

Sample Evaluation Form By: R. Thomas (Signature) LAB No: 3-12-92

Type of shipping container samples received in? WAL Cooler ✓

Client Cooler ____ WAL Shipper ____ Box ____ Other ____

Any "NO" responses or discrepancies should be explained in comments section.

		YES	NO
1.	Were custody seals on shipping container(s) intact? No seals.		✓
2.	Were custody papers properly included with samples?	✓	
3.	Were custody papers properly filled out (ink, signed, match labels)?	✓	
4.	Did all bottles arrive in good condition (unbroken)?	✓	
5.	Were all bottle labels complete (Sample No., date, signed, analysis preservatives)?	✓	
6.	Were correct bottles used for the tests indicated?	✓	
7.	Were proper sample preservation techniques indicated?	✓	
8.	Were samples received within adequate holding time?	✓	
9.	Were all VOA bottles checked for the presence of air bubbles? (If air bubbles were found indicate in comment section)	✓	
10.	Were samples in direct contact with wet ice? (NOTE TEMPERATURE BELOW)	✓	
11.	Were samples accepted into the laboratory? (If no see comments)	✓	

Cooler # 48-189 Temp 11 °C Cooler # N/A Temp 11 °C

Cooler # 48-105 Temp 9 °C Cooler # 48-109 Temp 9 °C
48-105 Temp 9

Comments: OLD 2080-1 BUBBLES (60/602), OLD 2080-4 BUBBLES (60/602 & EDB) OLD 2080 (EQ. BLANK BUBBLE)
Trip Blank received but not stated on COC

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/17/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromochloromethane (HECD)	99	(78-122)
Trifluorotoluene (PID)	104	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-BK
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	97	(78-122)
Trifluorotoluene (PID)	113	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB # 2C1302-BK
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/26/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
METHOD 601/602 - GC

Benzene	ND	1,2-Dichloroethane	ND
Bromodichloromethane	ND	1,1-Dichloroethene	ND
Bromoform	ND	1,2-Dichloroethene (Total)	ND
Bromomethane	ND	1,2-Dichloropropane	ND
Carbon tetrachloride	ND	cis-1,3-Dichloropropene	ND
Chlorobenzene	ND	trans-1,3-Dichloropropene	ND
Chloroethane	ND	Ethylbenzene	ND
2-Chloroethylvinyl ether	ND	Methylene chloride	ND
Chloroform	ND	1,1,2,2-Tetrachloroethane	ND
Chloromethane	ND	Tetrachloroethene	ND
Dibromochloromethane	ND	Toluene	ND
1,2-Dichlorobenzene	ND	1,1,1-Trichloroethane	ND
1,3-Dichlorobenzene	ND	1,1,2-Trichloroethane	ND
1,4-Dichlorobenzene	ND	Trichloroethene	ND
Dichlorodifluoromethane	ND	Trichlorofluoromethane	ND
1,1-Dichloroethane	ND	Vinyl chloride	ND
		Xylenes	ND
		Methyl-tert-butylether	ND

NOTE: ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS**
Bromchloromethane (HECD)	97	(78-122)
Trifluorotoluene (PID)	99	(73-131)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/30/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	5
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	%	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	95	(75-123)	(85-126)	(85-138)
Toluene-d8	104	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	94	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	ND
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	110	(75-123)	(85-126)	(85-138)
Toluene-d8	104	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	94	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 4/ 1/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

VOLATILE ORGANICS
USEPA METHOD 624 - GC/MS

Acrolein	ND*	1,1-Dichloroethene	ND
Acrylonitrile	ND*	1,2-Dichloroethene(Total)	ND
Benzene	ND	1,2-Dichloropropane	ND
Bromodichloromethane	ND	cis-1,3-Dichloropropene	ND
Bromoform	ND	trans-1,3-Dichloropropene	ND
Bromomethane	ND	Ethylbenzene	ND
Carbon tetrachloride	ND	Methylene chloride	5
Chlorobenzene	ND	1,1,2,2-Tetrachloroethane	ND
Chloroethane	ND	Tetrachloroethene	ND
2-Chloroethylvinyl ether	ND	Toluene	ND
Chloroform	ND	1,1,1-Trichloroethane	ND
Chloromethane	ND	1,1,2-Trichloroethane	ND
Dibromochloromethane	ND	Trichloroethene	ND
1,2-Dichlorobenzene	ND	Trichlorofluoromethane	ND
1,3-Dichlorobenzene	ND	Vinyl chloride	ND
1,4-Dichlorobenzene	ND	Xylene(Total)	ND
1,1-Dichloroethane	ND		
1,2-Dichloroethane	ND		

NOTE:
ND (None Detected, lower detectable limit = 1 ug/L) as rec'd
ND* (None Detected, lower detectable limit = 10 ug/L) as rec'd
ND** (None Detected, lower detectable limit = ug/L) as rec'd
J (Detected, but below quantitation limit; estimated value)
B (Compound detected in method blank associated with this sample)
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID	LOW LEVEL
1,2-Dichloroethane	92	(75-123)	(85-126)	(85-138)
Toluene-d8	98	(75-123)	(89-124)	(89-128)
Bromofluorobenzene	89	(86-115)	(84-124)	(83-128)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/30/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	95
Toluene-d8	(92-107)	(89-124)	104
Bromofluorobenzene	(86-115)	(84-124)	94

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/31/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Methyl tert-butyl-ether	ND	1

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
1,2-Dichloroethane-d4	(75-123)	(85-126)	110
Toluene-d8	(92-107)	(89-124)	104
Bromofluorobenzene	(86-115)	(84-124)	94

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/18/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/19/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/20/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1302-BK
MATRIX: WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/23/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		78

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 3/27/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

SELECTED ORGANIC COMPOUNDS ANALYTICAL REPORT

PARAMETER	RESULT (ug/L)	DETECTION LIMIT
Ethylene dibromide	ND	0.02

NOTE: ND (None Detected) as rec'd
J (Detected, but below quantitation limit; estimated value)

SURROGATE RECOVERY:	ACCEPTABLE LIMITS WATER	SOLID	%
Bromoform	(41-152)		80

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C1210-BK
MATRIX: WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/13/92
DATE ANALYZED: 3/25/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	76	(22-135)	(10-155)
Fluorobiphenyl	99	(34-140)	(12-153)
Terphenyl-d14	113	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB #: 2C2406-BK
MATRIX: WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/25/92
DATE ANALYZED: 3/31/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

POLYNUCLEAR AROMATIC HYDROCARBONS
METHOD 625 HSL/TCL LIST - GC/MS

Acenaphthene	ND
Acenaphthylene	ND
Anthracene	ND
Benzo(a)anthracene	ND
Benzo(a)pyrene	ND
Benzo(b)fluoranthene	ND
Benzo(ghi)perylene	ND
Benzo(k)fluoranthene	ND
Chrysene	ND
Dibenz(a,h)anthracene	ND
Fluoranthene	ND
Fluorene	ND
Indeno(1,2,3-cd)pyrene	ND
1-Methylnaphthalene	ND
2-Methylnaphthalene	ND
Naphthalene	ND
Phenanthrene	ND
Pyrene	ND

NOTE: ND (None Detected, lower detectable limit = 5 ug/L) as rec'd
ND* (None Detected, lower detectable limit = ug/L) as rec'd
-- (Not Analyzed)

SURROGATE RECOVERY:	**%**	**ACCEPTABLE LIMITS** WATER	SOLID
Nitrobenzene-d5	54	(22-135)	(10-155)
Fluorobiphenyl	78	(34-140)	(12-153)
Terphenyl-d14	76	(10-132)	(13-140)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/12/92
LAB #: 2C1210-BK
MATRIX : WATER

SAMPLE ID : LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/13/92
LAB #: 2C1302-BK
MATRIX : WATER

SAMPLE ID : LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/24- 3/25/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY : ABB ENVIRONMENTAL SERVICES, INC. **DATE RECEIVED:** 3/24/92
LAB #: 2C2406-BK
MATRIX : WATER

SAMPLE ID : LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

METALS ANALYTICAL REPORT
SELECTED LIST

Total metals analysis results - as received

ELEMENT	PREPARATION - ANALYSIS DATE	RESULT	DETECTION LIMIT	
Lead	3/27/92	ND	5	ug/L

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1210-BK
MATRIX : WATER

DATE RECEIVED: 3/12/92
DATE EXTRACTED: 3/24/92
DATE ANALYZED: 3/24/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C1302-BK
MATRIX : WATER

DATE RECEIVED: 3/13/92
DATE EXTRACTED: 3/26/92
DATE ANALYZED: 3/26/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

COMPANY: ABB ENVIRONMENTAL SERVICES, INC.
LAB ID: 2C2406-BK
MATRIX : WATER

DATE RECEIVED: 3/24/92
DATE EXTRACTED: 3/30/92
DATE ANALYZED: 3/30/92

SAMPLE ID: LABORATORY BLANK

CERTIFICATION #: E84059
HRS84297

TOTAL RECOVERABLE PETROLEUM HYDROCARBONS REPORT

	RESULT	UNITS	LOWER DETECTION LIMIT
Total Recoverable Petroleum Hydrocarbons	ND	mg/L	1

NOTE: ND (None Detected)

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601/2
RUN ID : SA/SB00729

DATE EXTRACTED: N/A
DATE ANALYZED : 03/13/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Benzene	SA/SB00729	93	15	70-117
Toluene		105	16	70-117
Chlorobenzene		110	24	58-133
1,1-Dichloroethene		48	28	43-131
Trichloroethene		96	13	75-123
Dichlorobromomethane		83	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601/2
RUN ID : SA/SB00769

DATE EXTRACTED: N/A
DATE ANALYZED : 03/17/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Benzene	SA/SB00769	101	15	70-117
Toluene		99	16	70-117
Chlorobenzene		115	24	58-133
1,1-Dichloroethene		83	28	43-131
Trichloroethene		103	13	75-123
Dichlorobromomethane		108	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601/2
RUN ID : 2A253/2B253

DATE EXTRACTED: N/A
DATE ANALYZED : 03/18/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Benzene	2A253/2B253	98	15	70-117
Toluene		104	16	70-117
Chlorobenzene		93	24	58-133
1,1-Dichloroethene		80	28	43-131
Trichloroethene		104	13	75-123
Dichlorobromomethane		130	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601/2
RUN ID : 2A375/2B375

DATE EXTRACTED: N/A
DATE ANALYZED : 03/26/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Benzene	2A375/2B375	79	15	70-117
Toluene		89	16	70-117
Chlorobenzene		79	24	58-133
1,1-Dichloroethene		45	28	43-131
Trichloroethene		85	13	75-123
Dichlorobromomethane		91	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 624
RUN ID : W2377

DATE EXTRACTED: N/A
DATE ANALYZED : 03/30/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
1,1-Dichloroethene	W2377	114	40	56-133
Trichloroethene		106	20	67-106
Chlorobenzene		98	21	78-122
Toluene		118	30	64-128
Benzene		120	21	83-123
Dichlorobromomethane		112	25	71-123

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 624
RUN ID : W2411

DATE EXTRACTED: N/A
DATE ANALYZED : 03/31/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
1,1-Dichloroethene	W2411	86	40	56-133
Trichloroethene		92	20	67-106
Chlorobenzene		93	21	78-122
Toluene		101	30	64-128
Benzene		94	21	83-123
Dichlorobromomethane		85	25	71-123

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 624
RUN ID : W2427

DATE EXTRACTED: N/A
DATE ANALYZED : 04/01/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
1,1-Dichloroethene	W2427	85	40	56-133
Trichloroethene		88	20	67-106
Chlorobenzene		92	21	78-122
Toluene		96	30	64-128
Benzene		99	21	83-123
Dichlorobromomethane		85	25	71-123

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601 Mod.
RUN ID : 173

DATE EXTRACTED: N/A
DATE ANALYZED : 03/18/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Ethylene Dibromide	173	117	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601 Mod.
RUN ID : 197

DATE EXTRACTED: N/A
DATE ANALYZED : 03/19/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Ethylene Dibromide	197	100	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601 Mod.
RUN ID : 217

DATE EXTRACTED: N/A
DATE ANALYZED : 03/20/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Ethylene Dibromide	217	120	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601 Mod.
RUN ID : 238

DATE EXTRACTED: N/A
DATE ANALYZED : 03/23/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Ethylene Dibromide	238	117	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB ID : LCS
MATRIX : WATER
METHOD : 601 Mod.
RUN ID : 303

DATE EXTRACTED: N/A
DATE ANALYZED : 03/27/92

LABORATORY CONTROL SAMPLE RESULTS

COMPOUND	ANALYTICAL RUN ID #	LCS %REC	QC LIMITS RPD	QC LIMITS %REC
Ethylene Dibromide	303	105	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C1210-LCS	**DATE RECEIVED:**	03/12/92
MATRIX:	WATER	**DATE EXTRACTED:**	03/13/92
METHOD:	625	**DATE ANALYZED:**	03/24/92

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Acenaphthene	97	31-105
Pyrene	103	12-108

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C2406-LCS	**DATE RECEIVED:**	03/24/92
MATRIX:	WATER	**DATE EXTRACTED:**	03/25/92
METHOD:	625	**DATE ANALYZED:**	03/31/92

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Acenaphthene	82	31-105
Pyrene	72	12-108

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C1210-LCS	**DATE RECEIVED:**	03/12/92
MATRIX:	WATER	**DATE PREP'D:**	03/24/92
		DATE ANALYZED:	03/24/92

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lead, furnace	101	64-131

WADSWORTH/ALERT
LABORATORIES

LAB #: 2C1302-LCS
MATRIX: WATER

DATE RECEIVED: 03/13/92
DATE PREP'D: 03/24/92
DATE ANALYZED: 03/25/92

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lead, furnace	96	64-131

WADSWORTH/ALERT
LABORATORIES

LAB #: 2C2406-LCS
MATRIX: WATER

DATE RECEIVED: 03/24/92
DATE PREP'D: 03/27/92
DATE ANALYZED: 03/27/92

LABORATORY CHECK SAMPLE RECOVERY

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Lead, furnace	87	64-131

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C1210-LCS	**DATE RECEIVED:**	03/12/92
MATRIX:	WATER	**DATE EXTRACTED:**	03/24/92
		DATE ANALYZED:	03/24/92

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Tot. Rec. Pet. Hydrocarbons	99	75-124

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C1302-LCS	**DATE RECEIVED:**	03/13/92
MATRIX:	WATER	**DATE EXTRACTED:**	03/26/92
		DATE ANALYZED:	03/26/92

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Tot. Rec. Pet. Hydrocarbons	104	75-124

WADSWORTH/ALERT
LABORATORIES

LAB #:	2C2406-LCS	**DATE RECEIVED:**	03/24/92
MATRIX:	WATER	**DATE EXTRACTED:**	03/30/92
		DATE ANALYZED:	03/30/92

LABORATORY CHECK SAMPLE

COMPOUND	LCS %REC	QC LIMITS RECOVERY
Tot. Rec. Pet. Hydrocarbons	104	75-124

WADSWORTH/ALERT
LABORATORIES

LAB#:	2C1210-5	**DATE RECEIVED:**	03/12/92
MATRIX:	WATER	**DATE EXTRACTED:**	NA
METHOD:	601/2	**DATE ANALYZED:**	03/17/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,1-Dichloroethene	77	77	0	28	43-131
Trichloroethene	100	96	4	13	75-123
Chlorobenzene	119	120	1	24	58-133
Toluene	114	116	2	16	70-117
Benzene	113	115	1	15	70-117
Dichlorobromomethane	107	105	2	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB#:	2C1302-6	**DATE RECEIVED:**	03/13/92
MATRIX:	WATER	**DATE EXTRACTED:**	NA
METHOD:	601/2	**DATE ANALYZED:**	03/26/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,1-Dichloroethene	54	55	1	28	43-131
Trichloroethene	95	97	2	13	75-123
Chlorobenzene	87	93	7	24	58-133
Toluene	98	103	5	16	70-117
Benzene	90	84	7	15	70-117
Dichlorobromomethane	109	113	4	22	61-133

WADSWORTH/ALERT
LABORATORIES

LAB#:	2C2406-1	**DATE RECEIVED:**	03/24/92
MATRIX:	WATER	**DATE EXTRACTED:**	NA
METHOD:	624	**DATE ANALYZED:**	04/01/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
1,1-Dichloroethene	90	94	4	19	63-123
Trichloroethene	90	93	3	10	75-115
Chlorobenzene	93	91	2	13	74-113
Toluene	106	108	2	23	75-122
Benzene	164	153	7	16	76-126
Dichlorobromomethane	87	85	2	15	67-114

WADSWORTH/ALERT
LABORATORIES

LAB ID: 2C1210-3
MATRIX: WATER
METHOD: 601 Mod.

DATE RECEIVED: 03/12/92
DATE EXTRACTED: NA
DATE ANALYZED: 03/19/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Ethylene Dibromide	82	100	20	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB ID: 2C2406-1
MATRIX: WATER
METHOD: 601 Mod.

DATE RECEIVED: 03/24/92
DATE EXTRACTED: NA
DATE ANALYZED: 03/27/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Ethylene Dibromide	99	108	9	25	81-135

WADSWORTH/ALERT
LABORATORIES

LAB#: 2C1210-5
MATRIX: WATER
METHOD: 625

DATE RECEIVED: 03/12/92
DATE EXTRACTED: 03/13/92
DATE ANALYZED: 03/25/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Acenaphthene	88	96	9	24	57-104
Pyrene	93	93	0	30	58-148

WADSWORTH/ALERT
LABORATORIES

LAB#:	2C1210-5	**DATE RECEIVED:**	03/12/92
MATRIX:	WATER	**DATE PREP'D:**	03/24/92
		DATE ANALYZED:	03/25/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
INORGANIC PARAMETERS - METALS

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Lead, furnace	95	97	2	24	76-124

WADSWORTH/ALERT
LABORATORIES

LAB#:	2C2406-2	**DATE RECEIVED:**	03/24/92
MATRIX:	WATER	**DATE PREP'D:**	03/27/92
		DATE ANALYZED:	03/27/92

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY
INORGANIC PARAMETERS - METALS

COMPOUND	MS %REC	MSD %REC	RPD	QC LIMITS RPD	QC LIMITS RECOVERY
Lead, furnace	95	96	1	24	76-124

2C1210-1to12/4075

WADSWORTH/ALERT LABORATORIES – FLORIDA

5910-H BRECKENRIDGE PARKWAY/TAMPA, FL 33610
(813) 621-0784

Chain-of Custody Record

№ 5582

PROJ. NO.

PROJECT NAME/LOCATION: McCoy Annex, Bldg 7174/NTC Orlando

SAMPLERS: (Signature) Aaron Cohen

STA. NO.	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	PAH	TRPH	Pb	EDB	601/602		REMARKS
	3/11/92	1343		X	OLD-7174-6	8	2	1	1	2	2		Kerosene Group
		548		X	OLD-7174-3	8	2	1	1	2	2		" "
		1550		X	OLD-7174-4	8	2	1	1	2	2		" "
		1430		X	OLD-7174-14	8	2	1	1	2	2		" "
		1630		X	OLD-7174-15	10	2	3	1	2	2		Kerosene Group/do MS+MSD
		1436		X	OLD-7174-16	8	2	1	1	2	2		Kerosene Group
		400		X	OLD-7174-19	8	2	1	1	2	2		" "
		1322			Equipment Blank	8	2	1	1	2	2		" "

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Carol McNulty	3/12/92 1600	Fed ex			
Aaron Cohen	3/11/92 1700	Fed Ex	FED EX	3/12/92 1600	R. Thompson
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution Original Accompanies Shipment. Copy returned with Report.

WADSWORTH/ALERT L BORATORIES – FLORIDA

5910-H BRECKENRIDGE PARKWAY/TAMPA, FL 33610
(813) 621-0784

Chain-of Custody Record

№ 5586

PROJ. NO.

PROJECT NAME/LOCATION: NTC Orlando McCoy Annex Bldg 7174

SAMPLERS: (Signature) Aaron Cohen

STA. NO.	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	PAH	TRPH	Pb	EDB	601/602		REMARKS
	3/12/92	0750		X	OLD-7174-1	8	2	1	1	2	2		kerosene Group
		1048		X	OLD-7174-5	8	2	1	1	2	2		
		0940		X	OLD-7174-7	8	2	1	1	2	2		
		0813		X	OLD-7174-8	8	2	1	1	2	2		
		0825		X	OLD-7174-12	10	2	3	1	2	2		MS+MSD
		1006		X	OLD-7174-13	8	2	1	1	2	2		
		0950		X	Duplicate #1	8	2	1	1	2	2		
		0716			Equipment Blank	8	2	1	1	2	2		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Carol McMulty	3/6/92 1600	Fedex			
Aaron Cohen	3/12/92 1330	Fed Ex	Fed. Ex	3/13/92 0940	D. Thompson
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution Original Accompanies Shipment. Copy returned with Report.

5910-H Brackenridge Pkwy. Tampa, FL 33610

CLIENT CODE _____

QUOTE / SAR NUMBER _____

Chain-of Custody Record

WADSWORTH/ALERT LABORATORIES

~~4101 SHUFFEL DRIVE N.W./NORTH CANTON, OHIO 44720~~

(813) 621-0784 ~~(216) 497-0396~~

№ 19702

PROJ. NO.	PROJECT NAME/LOCATION
754470	McCOY ANNEX BLDG 7174

SAMPLERS: (Signature) Alle L Stamp K.W

STA. NO.	DATE	TIME	COMP.	GRAB.	STATION LOCATION	NO. OF CONTAINERS	601/602	EDB/601	PAH 625	TRPH 418.1	Pb 239.2	HCL	HNO3	REMARKS
	3/21/92	1015		x	MW # 17	8	2	2	2	1	1			
	3/21/92	1215		x	MW # 2	8	2	2	2	1	1			HOT !!
	3/21/92	11		x	DUPLICATE	8	2	2	2	1	1			
	3/21/92	11:30		x	EQ BLK	8	2	2	2	1	1			
					TRIP BLANK	2								
					TEMP BLANK	1		1						

COULD NOT COMPLETE MS/MSD BECAUSE BOTTLES BROKE

Alle L Stamp

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Alle L Stamp	3/23/92 915	FEDEX			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
	3/24/92 1700	[illegible]/WAD			
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

Distribution Original Accompanies Shipment. Copy returned with report.