

INSTALLATION RESTORATION PROGRAM

**FINAL
WORK PLAN**

FOR INTERIM REMOVAL ACTION OPERATIONS

111th FIGHTER WING

WILLOW GROVE AIR RESERVE STATION

WILLOW GROVE, PENNSYLVANIA

DECEMBER 2001



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WILLOW GROVE AIR RESERVE STATION
WILLOW GROVE, PENNSYLVANIA**

DECEMBER 2001

Prepared by

PEER Consultants, P.C.
78 Mitchell Road
Oak Ridge, Tennessee 37830

Prepared for the

Air National Guard/CEVR
Under GSA Contract GS-10F-0089K, Order No. T0901BH0630

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LIST OF ACRONYMS AND ABBREVIATIONS

ANG	Air National Guard
ANG/CEVR	Air National Guard, Environmental Division, Installation Restoration Program Branch
BTEX	the sum of benzene, toluene, ethylbenzene, and total xylenes
EPA	U.S. Environmental Protection Agency
GSA	General Services Administration
HAZWRAP	Hazardous Waste Remedial Actions Program
MCL	maximum contaminant level
MTBE	methyl-tert-butyl ether
PADEP	Pennsylvania Department of Environmental Protection
PAH	polynuclear aromatic hydrocarbon
PEER	PEER Consultants, P.C.
PID	photoionization detector
PQL	Practical Quantitation Level
QA	quality assurance
QC	quality control
QAP	Quality Assurance Procedure
QAPP	Quality Assurance Program Plan
SA	Site Assessment
SOP	Standard Operating Procedure
TDS	total dissolved solids
UST	underground storage tank system

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WILLOW GROVE AIR RESERVE STATION
WILLOW GROVE, PENNSYLVANIA

1.0 INTRODUCTION

1.1 SCOPE

This Work Plan outlines interim removal action operations to be conducted at the Motor Pool Area, located at the Willow Grove Air Reserve Station for the 111th Fighter Wing, Willow Grove, Pennsylvania ([Figures 1.1 and 1.2](#)).

PEER Consultants, P.C. (PEER), under contract with the General Services Administration, (Contract No. GSA-10-F-0089K, Order No. T0901BH0630), for the Air National Guard, Environmental Division, Installation Restoration Program Branch (ANG/CEVR), is contracted to:

- Prepare an Interim Removal Action Operations Work Plan (this document);
- Conduct baseline groundwater sampling at two wells (MW-02 and MW-03) at the Motor Pool Area;
- Conduct free product removal operations using a mobile recovery at the two wells;
- Perform two quarters of follow-on (confirmatory) groundwater sampling;
- Prepare corresponding Groundwater Monitoring Reports for the two quarters of sampling; and
- Prepare a Completion Report.

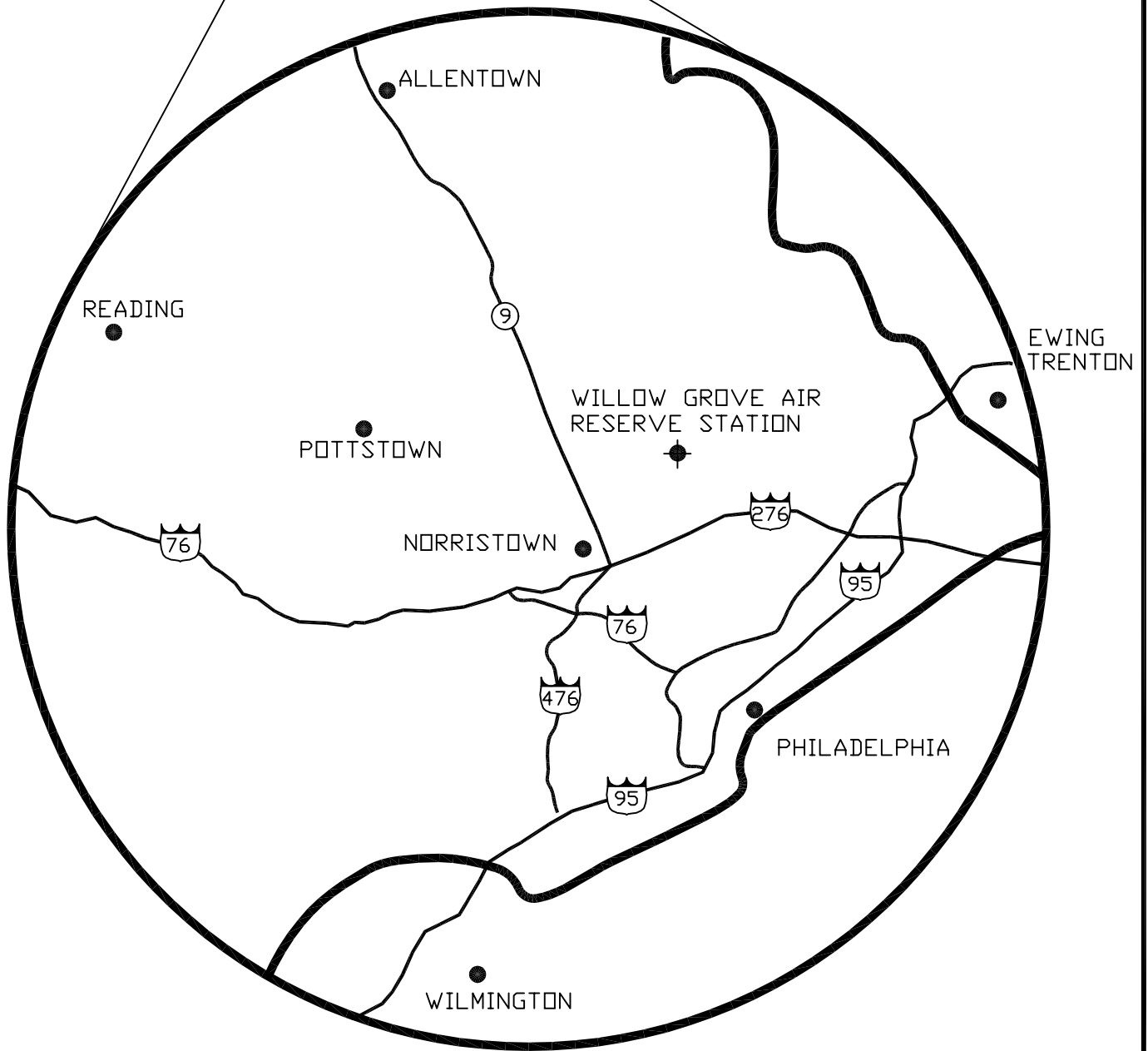
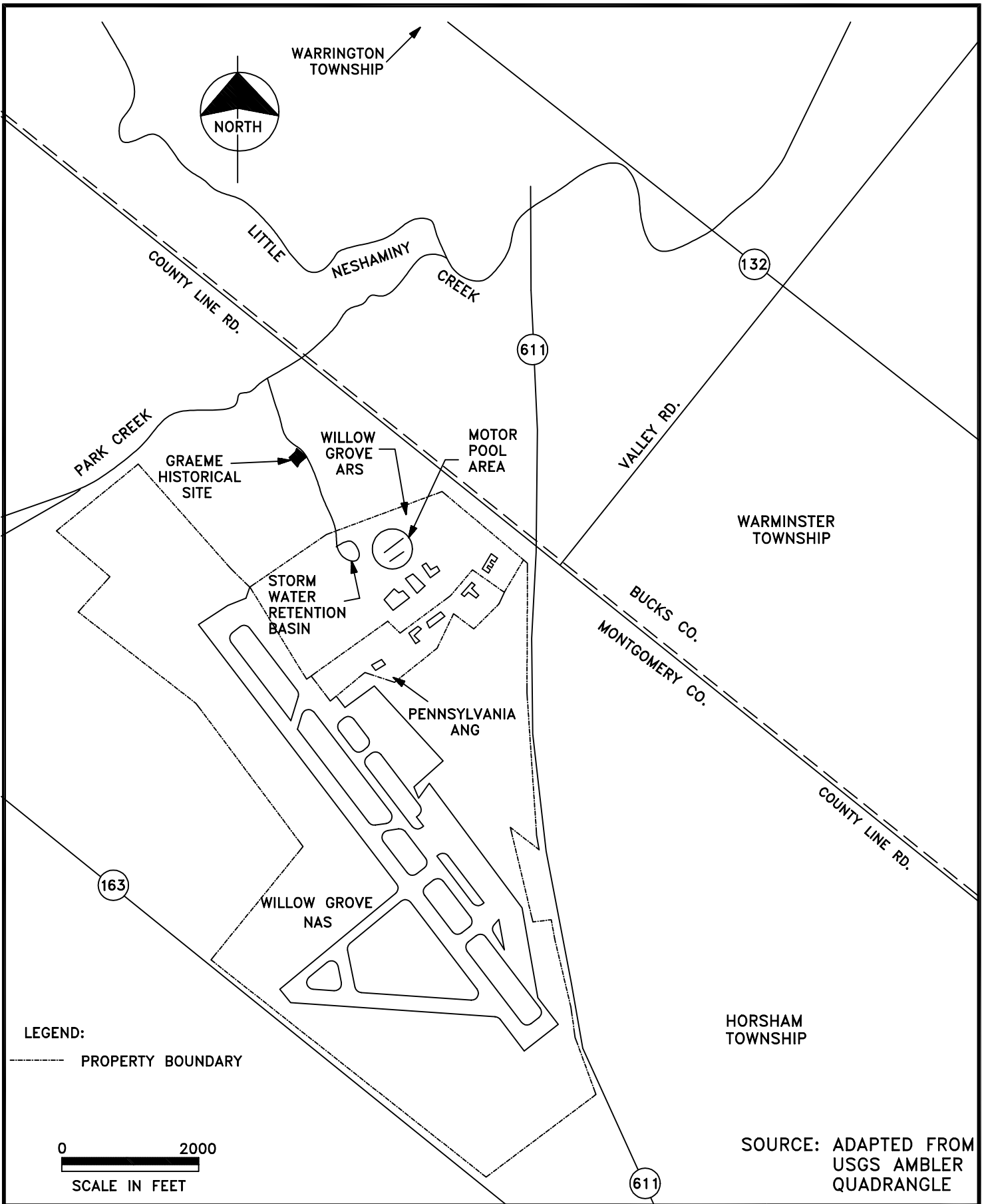


FIGURE
1.1

AREA OVERVIEW
WILLOW GROVE AIR RESERVE STATION

PEER

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FILE: WGRA-001.DWG



LEGEND:
 - - - - - PROPERTY BOUNDARY

0 2000
 SCALE IN FEET

SOURCE: ADAPTED FROM
 USGS AMBLER
 QUADRANGLE

FIGURE
 1.2

BASE MAP
 WILLOW GROVE AIR RESERVE STATION

PEER

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Optional work for this Delivery Order includes:

- Performing two additional quarters of follow-on (confirmatory) groundwater sampling;
- Preparing corresponding Groundwater Monitoring Reports for the two quarters of sampling;
- Abandoning the five monitoring wells in the Motor Pool Area; and
- Preparing a Well Abandonment Report.

No work will be performed on Optional Tasks without approval by the GSA Contracting Officer.

1.2 SITE HISTORY AND DESCRIPTION

The Motor Pool Area is located in the extreme northern portion of the station on Langley Street (Figure 1.2). The Motor Pool Area consists of the Auto Storage Shed (Building 351), and the Auto Maintenance Shop (Building 350). The site formerly included a Fuel Station Facility, which consisted of a refueling island (Building 352) and two 6,000-gal nominal capacity underground storage tanks (USTs) that were used to store automotive gasoline and diesel fuel. The diesel UST was emptied and taken out of service when a leak was discovered in May 1990. Both USTs were excavated and removed from the site in May 1992.

1.3 PREVIOUS INVESTIGATIONS

Under the Air National Guard's (ANG's) Installation Restoration Program, a Site Assessment (SA) was conducted at the Motor Pool Area [Hazardous Waste Remedial Actions Program (HAZWRAP) 1996]. Five bedrock monitoring wells were installed in the Motor Pool Area (MW-01, MW-02, MW-03, MW-04, and MW-05) (Figure 1.3). MW-01 is located hydraulically upgradient and south of the Motor Pool Area. MW-02 and MW-03 are located at the Motor Pool Area in the immediate vicinity of the former UST location. MW-04 and MW-05 were installed during the Site Characterization (PEER 1998) and are located hydraulically downgradient of the Motor Pool Area to the north-northwest and northwest, respectively.

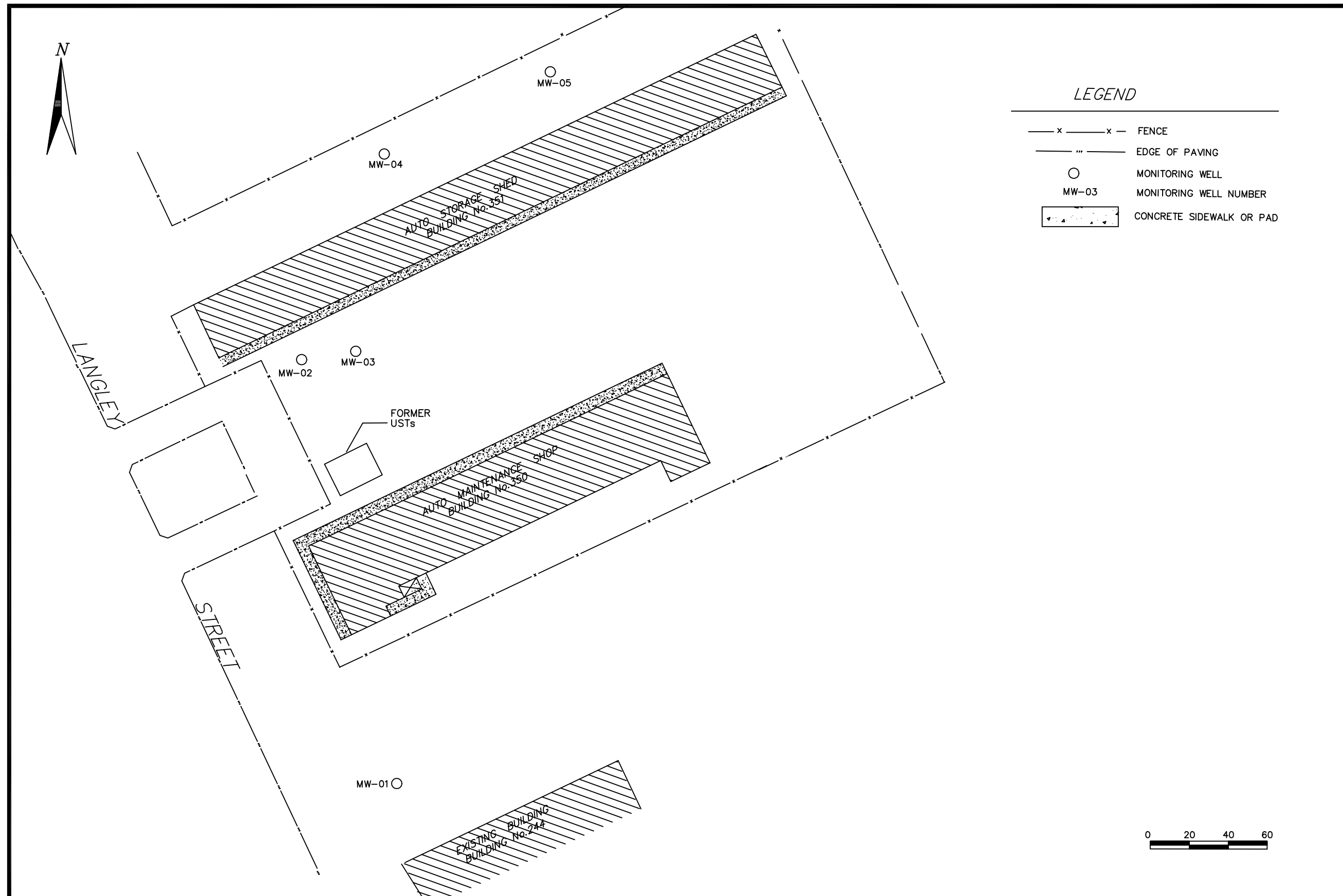


FIGURE
1.3

MONITORING WELL LOCATIONS
MOTOR POOL AREA
WILLOW GROVE AIR RESERVE STATION

PEER
 PROJ./3152-001-001
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Two rounds of groundwater samples were collected and analyzed for benzene, toluene, ethyl benzene, and xylenes, and naphthalene. The analytical results are presented in [Table 1.1](#). The SA determined that groundwater contamination was limited to the UST pit area, and that trace levels for free product were detected in two of the downgradient monitoring wells (MW-02 and MW-03).

Following the SA, passive skimmers were installed into the two wells where trace levels of product had been detected and a groundwater monitoring program was implemented. During the first two periods of monitoring, only trace amounts (i.e., no measurable quantities) of free product were collected. Following the third round of groundwater monitoring, the passive skimmers were replaced with absorbent socks.

Initially, four rounds of groundwater samples were collected (approximately semiannually). However, this was later expanded to allow a total of six rounds of sampling. Samples were analyzed for polynuclear aromatic hydrocarbons (PAHs) (fluorene and phenanthrene) and volatile organics (benzene, toluene, ethyl benzene, xylenes, isopropyl benzene, and naphthalene). Results are presented in [Table 1.1](#).

Through the Site Assessment and Groundwater Monitoring Program, the results from wells MW-01, MW-04, and MW-05 were non-detect for all rounds of sampling. Samples were collected from wells MW-02 and MW-03 during the third through sixth rounds of the Groundwater Monitoring Program. Two parameters were detected above the applicable standards. In well MW-02, naphthalene was detected above the applicable standard of 20 µg/L during the third and sixth rounds of the Groundwater Monitoring Program, at concentrations of 65 µg/L and 580 µg/L, respectively. Naphthalene (110 µg/L) was also detected above the standard in the sixth round of sampling from well MW-03). Isopropyl benzene was detected in the sample collected during the sixth round of sampling at a concentration of 37 µg/L which exceeds the applicable standard of 25 µg/L.

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Table 1.1
Summary of Groundwater Results from Previous Investigations
At the Motor Pool Area
111th Fighter Wing
Willow Grove Air Reserve Station
Willow Grove, Pennsylvania

Parameter		Applicable Standard (µg/L)	Concentration (µg/L)																			
			Site Assessment ^(a) - Round 1 (10/97)					Site Assessment ^(a) - Round 2 (11/97) ^(a)					Monitoring Program ^(b) - Round 1 (2/99)					Monitoring Program ^(b) - Round 2 (6/99)				
			MW-01	MW-02 ^(c)	MW-03 ^(c)	M2-04	MW-05	MW-01	MW-02 ^(c)	MW-03 ^(c)	M2-04	MW-05	MW-01	MW-02 ^(c)	MW-03 ^(c)	M2-04	MW-05	MW-01	MW-02 ^(c)	MW-03 ^(c)	M2-04	MW-05
PAH	Fluorene	190	NA	NS	NS	NA	NA	NA	NS	NS	NA	NA	U	NS	NS	U	U	U	NS	NS	U	U
	Phenanthrene	1,200	NA	NS	NS	NA	NA	NA	NS	NS	NA	NA	U	NS	NS	U	U	U	NS	NS	U	U
Volatile Organics	Benzene	5	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U
	Toluene	1,000	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U
	Ethylbenzene	700	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U
	m&p Xylenes	10,000	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U
	o Xylene	total	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U
	Isopropylbenzene (Cumene)	25	NA	NS	NS	NA	NA	NA	NS	NS	NA	NA	U	NS	NS	U	U	U	NS	NS	U	U
	Naphthalene	20	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U	U	NS	NS	U	U

Parameter		Applicable Standard (µg/L)	Concentration (µg/L)																				
			Site Assessment ^(b) - Round 3 (9/99)					Site Assessment ^(b) - Round 4 (3/00)					Monitoring Program ^(b) - Round 5 (8/00)					Monitoring Program ^(b) - Round 6 (01/01 and 04/01)					
			MW-01	MW-02 ^(d)	MW-03 ^(d)	M2-04	MW-05	MW-01	MW-02 ^(d)	MW-03 ^(d)	M2-04	MW-05	MW-01	MW-02 ^(d)	MW-03 ^(d)	M2-04	MW-05	MW-01	MW-02 ^(d)	MW-03 ^(d)	M2-04	MW-05	
PAH	Fluorene	190	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	
	Phenanthrene	1,200	U	32	41	U	U	U	U	U	U	U	U	1.2 J	2 J	U	U	U	8.6 J	21	U	U	
Volatile Organics	Benzene	5	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	
	Toluene	1,000	U	U	19	U	U	U	U	U	U	U	U	U	U	U	U	U	20	U	U	U	
	Ethylbenzene	700	U	U	99	U	U	U	U	U	U	U	U	U	U	U	U	U	320	47	U	U	
	m&p Xylenes	10,000	U	U	24	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	
	o Xylene	total	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	U	400	100	U	U	
	Isopropylbenzene (Cumene)	25	U	U	18	U	U	U	3.5	7.1	U	U	U	U	U	U	U	U	U	37	23	U	U
	Naphthalene	20	U	U	65	U	U	U	U	U	U	U	U	U	U	U	U	U	U	580	110	U	U

Notes:

- J Estimated concentration below the method detection limit.
- NA Not analyzed
- NS Not sampled due to trace levels of free product.
- PAH Polynuclear aromatic hydrocarbons.
- U Not detected above method detection limit.

Bolded and shaded concentrations exceed the applicable standard.

- (a) Final Site Characterization Report (PEER 1998).
- (b) Groundwater Monitoring Reports [Round 1 - May 1999; Round 2 - September 1999; Round 3 - December 1999; Round 4 - July 2000; Round 5 - December 2000; Round 6 - May 2001 (Draft)].
- (c) Well not sampled due to presence of free product.
- (d) Trace sheen removed with absorbent socks prior to purging and sampling.

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2.0 CLEANUP CRITERIA

2.1 GROUNDWATER CLEANUP CRITERIA

In accordance with the Pennsylvania Land Recycling Program Technical Guidance Manual, action levels for assessing site contamination can be established based on: Background Standards, Statewide Health Standards, and Site-Specific Standards [Pennsylvania Department of Environmental Protection (PADEP) 1997].

2.1.1 Background Standards

Background Standards are used to document naturally-occurring levels of contaminants of concern. Background Standards are determined through site investigation or through the use of default Background Standards or Practical Quantitation Level (PQL) as set by the state.

2.1.2 Statewide Health Standards

The interim Statewide Health Standards were developed by compiling and augmenting existing state and federal standards by making them medium-specific.

For groundwater, the appropriate value is selected based upon the natural level of total dissolved solids (TDS). A TDS level of < 2,500 mg/L requires use of the maximum contaminant levels (MCLs) under the Safe Drinking Water Act as the standard, if available. Where no MCL exists, the standard used is the existing lifetime health advisory level, if available, unless a more stringent health advisory level exists. The standards used for benzene, toluene, ethylbenzene, and xylenes are the MCLs. If the TDS level is > 2500 mg/L, the standard used is 100 times the standard used for < 2500 mg/L ([Table 2.1](#)).

**Table 2.1
State of Pennsylvania Groundwater Cleanup Standards**

Constituent	Groundwater Cleanup Standards (µg/L)		
	Groundwater TDS		PQL
	< 2500 mg/L	> 2500 mg/L	
Benzene	5	500	5
Toluene	1,000	100,000	1,000
Ethylbenzene	700	70,000	700
Xylenes	10,000	180,000	5
Cumene	25	2,500	5
Naphthalene	100	2,000	10
Fluorene	190	190	10
Phenanthrene	1,200	1,200	10
Methyl-tert-butyl ether (MTBE)	20	2,000	10

2.1.3 Site-Specific Standards

The Site-Specific Standard is developed through obtaining detailed site information, developing a risk-based assessment using the site conditions and human exposure, and using rigorous scientific evaluation of a remedy to produce standards unique to the site. Although this approach offers more flexibility it requires more time, effort, and the continual review by the PADEP and is generally not used unless significant cleanup is required and significant associated cost savings can be attained.

2.1.4 Summary

As part of the previous site characterization investigation, groundwater samples were collected from two wells (MW-01 and MW-05) and analyzed for TDS. Results were 210 mg/L and 190 mg/L, respectively. Thus, the applicable PADEP standards for the site characterization for groundwater would be the < 2,500 mg/L TDS standards, as shown in [Table 2.1](#). These cleanup standards for groundwater constituents will be used as the applicable action levels for the purpose of the groundwater monitoring program.

2.2 FREE PRODUCT REMEDIATION STANDARD

In accordance with the Pennsylvania Land Recycling Program Technical Guidance Manual, the groundwater shall be remediated until there is no visible (or other evidence) of free product (and until the cleanup standards are achieved).

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3.0 REMEDIAL ACTION WORK PLAN

Specific field work tasks that will be conducted for the Removal Action include:

- Collecting a round of baseline groundwater samples from the two wells (MW-02 and MW-03) at the Motor Pool Area;
- Conducting free product removal operations using mobile recovery at the two wells; and
- Performing two quarters of follow-on (confirmatory) groundwater sampling.

Optional field work tasks for this Delivery Order include:

- Performing two additional quarters of follow-on (confirmatory) groundwater sampling; and
- Abandoning the five monitoring wells in the Motor Pool Area.

The results from the baseline groundwater sampling will be provided in a letter report, consisting of a summary data table and corresponding analytical reports.

3.1 BASELINE GROUNDWATER SAMPLING

Prior to the initiation of the removal operations at the Motor Pool Area, a round of baseline groundwater samples will be collected. The baseline groundwater sampling activities will include:

- obtaining water level measurements from the two monitoring wells;
- purging the two monitoring wells prior to sampling;
- field measurement of groundwater samples for pH, conductivity, and temperature;
- collecting groundwater samples and appropriate quality assurance/quality control (QA/QC) samples from the two wells;

- submitting the samples to a laboratory approved by the PADEP for analysis for benzene, toluene, ethylbenzene, and xylenes; cumene; naphthalene; fluorene; phenanthrene, and methyl-tert-butyl ether (MTBE); and
- preparing a semiannual Groundwater Monitoring Report summarizing the findings of the investigation.

3.1.1 Water Level Measurements

Water level measurements will be collected from the two existing bedrock wells (MW-02 and MW-03). Water level measurements will be referenced from casing elevations obtained during the SA (HAZWRAP 1996) and Site Characterization (PEER 1998). Groundwater elevations will be measured to the nearest 0.01 ft. Static water levels will be measured in accordance with PEER Standard Operating Procedure (SOP) F-26, “Water Level and Free Product Measurement,” using an electronic water level indicator and will be taken prior to each sampling event.

3.1.2 Purging

After determining the static water level at the well, but prior to collecting a sample, the total volume of water standing in the well will be calculated and recorded in the logbook. A minimum of three casing volumes will then be purged from the well. In accordance with PEER SOP F-16, “Guidelines for Well Purging,” field parameters (pH, temperature, and conductivity) will be measured after each casing volume is removed. Purging will continue until field parameters have stabilized (pH to ± 0.5 units, temperature to $\pm 1^{\circ}\text{C}$, and conductivity to $\pm 10\%$) after two consecutive recording intervals.

3.1.3 Groundwater Sampling

Groundwater samples will be collected from the five monitoring wells in accordance with PEER SOP F-17, “Groundwater Sampling Using a Bailer.” After purging, when the well has recovered a sufficient volume of water, the sample for benzene, toluene, ethylbenzene, and xylenes; cumene; and naphthalene will be collected with a new disposable bailer. The bailer will be

slowly lowered into the water column to minimize agitation of the groundwater. Once submersed, the bailer will be allowed to fill and will then be slowly removed from the well. The sample for fluorene and phenanthrene (semivolatile organics) will be collected next.

3.1.4 Sampling Handling and Analysis

The samples for benzene, toluene, ethylbenzene, and xylenes; cumene; and naphthalene will be collected in 40-mL vials pre-preserved with hydrochloric acid. The vials will be filled until a meniscus is formed over the top of each vial rim. The cap will then be placed on the vial, and the vial will be inverted and checked for the presence of air bubbles by tapping. If air bubbles are present, the sample vial will be reopened and additional sample will be added. The samples for fluorene and phenanthrene will be collected in 1-L amber glass bottles. The outside of the sample containers will be wiped clean with a paper towel, the container packed in a cooler with bagged ice or blue ice, and cooled to 4°C.

The samples will be submitted to a laboratory approved by the PADEP. The samples will be analyzed for benzene, toluene, ethylbenzene, and xylenes; cumene; and naphthalene using the Environmental Protection Agency (EPA) SW-846 Method 8021B; and fluorene and phenanthrene using EPA SW-846 Method 8270C.

Chain-of-custody will be maintained on all samples from the time of collection through laboratory analysis as described in Section 4.7, and in accordance with PEER SOP Q-2, “Chain-of-Custody.”

3.2 GROUNDWATER REMOVAL OPERATIONS

Upon completion of the baseline groundwater sampling round, the removal action for the residual free product will be initiated. The removal action will consist of total fluids removal (i.e., groundwater and residual free product) from wells MW-02 and MW-03.

Total fluids (i.e., groundwater and residual free product) will be extracted using a vacuum truck with a drop tube. The drop tube shall be placed no more than 6 in. below the water surface. A

maximum of up to 2,500 gal of groundwater/free product will be extracted per well. If the wells pump dry prior to removal of the desired volume, the wells will be allowed to recover, and the process repeated (for up to 2 days of vacuum truck extraction). The collected fluids will be containerized within the suction truck, and manifested for treatment and disposal.

3.3 CONFIRMATION GROUNDWATER SAMPLING

Upon completion of the groundwater removal operations, two additional rounds (and up to two optional rounds) of groundwater samples will be collected (quarterly). Each round of confirmatory groundwater sampling will be conducted as described under Baseline Groundwater Sampling, Section 3.1. Optional work will not be conducted without prior approval by the Contracting Officer.

3.4 MONITORING WELL ABANDONMENT

Upon the successful completion of the confirmation groundwater sampling and ANG and PADEP approval, the five monitoring wells located at the Motor Pool Area will be abandoned. The wells will be abandoned in accordance with all applicable PADEP requirements, including Chapter 7 of the “Groundwater Monitoring Guidance Manual” (PADEP 1996).

Prior to abandoning the wells, the existing manhole will be removed using a pry bar or other appropriate tools. The wells will be abandoned by filling from the bottom to the top with grout using a tremie pipe. The grout shall consist of either:

- Portland Cement (Type I or III) (at a ratio of no more than 6 gal of water per 94 lb bag of cement) or,
- A Portland Cement/bentonite grout mixture (consisting of 4 to 6% granular or powdered bentonite with a grout density of 13.5 to 14.1 lbs/gal).

Sufficient grout will be used to fill the entire borehole volume. The grout will be allowed to cure a minimum of 24 hours. After 24 hours, any remaining well space and the surface manhole will be filled with cement level to the existing concrete pad surface.

A marker will be provided on the concrete cap to mark the location of the abandoned well.

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4.0 QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC requirements for this Delivery Order are in accordance with the Quality Assurance Program Plan (QAPP) prepared by PEER for the ANG, dated February 1995.

4.1 SAMPLE NUMBERING SYSTEM

All samples collected will be assigned a unique sample number as described below:

- a 2-character code representing the project (e.g., WG = Willow Grove, Pennsylvania, Motor Pool Area);
- for groundwater samples, a 3-character code representing the collection location of the sample (e.g., MW2 = MW-02; MWD = Duplicate; DRM = Drum; and TRP = Trip Blank); and
- a 1-digit number representing the sampling round (e.g., 7 = Baseline; 8 = First Round Confirmatory; and 9 = Second Round Confirmatory).

For example, the sample number WG-MW2-7 would be used to designate a sample from Willow Grove, Pennsylvania, Motor Pool Area, monitoring well MW-01, collected during the baseline sampling. In order to submit a “blind duplicate” to the laboratory, the sample shall be numbered WG-MWD-7.

4.2 INSTRUMENT CALIBRATION

A photoionization detector (PID) will be used to conduct well headspace and breathing zone measurements. The portable PID used for screening for the presence of photoionizable organic and some organic gases and vapors will be calibrated daily in accordance with PEER SOP-F-5, “Field Measurement Using HNu.” The calibration will be accomplished using isobutylene gas

and will be documented in the field logbook. The instrument will be zeroed using ambient air in an area away from the work zone which is representative of background.

Equipment used for pH determination will be calibrated daily according to the manufacturer's instructions and in accordance with PEER SOP F-8, "Measurement Using the pH Meter." The calibration will be documented in the field logbook.

4.3 SAMPLE CONTAINERS AND LABELS

Sample containers will be purchased new and precleaned from the designated analytical laboratory. Sample volume requirements, preservation techniques, and container material requirements, are summarized in [Table 4.1](#). Field personnel will collect and ship a sufficient volume of each sample in appropriate containers, properly preserved, to allow for all the analyses that are scheduled to be performed.

The sample labels will be supplied along with the bottles. All samples will be labeled in accordance with PEER SOP F-2, "Sample Identification." The labels will be placed upon the containers prior to sample collection, and immediately upon collection, a unique sample number will be assigned to each sample in waterproof ink as described in Section 4.1.

4.4 FIELD CHANGES

All field activities will be conducted in accordance with this Work Plan, with the exception of changes which may occur in response to unanticipated site conditions encountered during actual field work. Any changes made in the field will be approved and documented in accordance with PEER Quality Assurance Procedure (QAP)-001G, "Control of Field Changes," and will require approval of the PEER Program Manager, the Air National Guard Project Manager, and the PEER Project Manager prior to their initiation. All changes will be documented in the field logbook and on PEER Field Change Request Forms ([Figure 4.1](#)). Any changes possibly affecting the cost or performance of this contract must also be approved by the ANG/CEVR Project Manager and

Table 4.1
Summary of Analytical Methods, Sample Containers, and Preservation Requirements
Removal Action Groundwater Monitoring at the Motor Pool Area
Willow Grove Air Reserve Station
Willow Grove, Pennsylvania
Methodology Summary

Sample Type	Total No. of Samples ^(a)	Parameters	Analytical Method	Sample Containers	Preservation
Groundwater	2	BTEX, cumene, naphthalene, MTBE	8021B	3, 40-mL vials	HCl to pH < 2
		Fluorene, phenanthrene	8270C	2, 1-L amber glass	Cool 4°C
Groundwater (Duplicate)	1	BTEX, cumene, naphthalene, MTBE	8021B	3, 40-mL vials	HCl to pH < 2
		Fluorene, phenanthrene	8270C	2, 1-L amber glass	Cool 4°C
Trip Blank	1	BTEX, cumene, naphthalene, MTBE	8021B	3, 40-mL vials	HCl to pH < 2
Investigation-Derived Waste	1	TCLP	1311	2, 1-L amber glass	Cool 4°C

(a) Number of samples per monitoring event.

BTEX The sum of benzene, toluene, ethylbenzene, and total xylenes.

MTBE Methyl-tert-butyl ether.

FORM 001G-1 FIELD CHANGE REQUEST		FIELD CHANGE NO. _____ PAGE _____ OF _____
PROJECT: _____		
PROJECT NO.: _____		
APPLICABLE DOCUMENT: _____		
REQUESTED CHANGE: _____ _____		
<input type="checkbox"/> MAJOR CHANGE <input type="checkbox"/> MINOR CHANGE		
REASON FOR CHANGE: _____ _____		
RECOMMENDED DISPOSITION: _____ _____		
IMPACT ON PRESENT AND COMPLETED WORK: _____ _____		
FINAL DISPOSITION: _____ _____		
REQUESTED BY: _____		
NAME AND TITLE		SIGNATURE AND DATE
APPROVALS:		
ACCEPT	REJECT	
<input type="checkbox"/>	<input type="checkbox"/>	PROJECT/SITE MANAGER: _____ DATE: _____
<input type="checkbox"/>	<input type="checkbox"/>	DELIVERY ORDER MANAGER: _____ DATE: _____
<input type="checkbox"/>	<input type="checkbox"/>	PROGRAM MANAGER: _____ DATE: _____
<input type="checkbox"/>	<input type="checkbox"/>	CLIENT PROJECT MANAGER: _____ DATE: _____
CC: QAS QA/QC MANAGER		

Figure 4.1. Field Change Request Form

GSA Contracting Officer prior to initiation. Such changes that would be affected may include elimination or addition of analytical samples, or non-negotiated additional equipment cost.

4.5 FIELD LOGBOOK

A field logbook will be maintained to record field data and observations of PEER activities. The logbook will be maintained in accordance with PEER SOP F-1, "Field Logbook."

The field logbook will be bound and contain sequentially numbered pages, and all entries will be written in waterproof black ink. The following daily information will be included in the field logbook:

1. date and time task started; weather conditions; names, titles of PEER personnel performing the task;
2. a description of site activities as they occur in specific detail including date, time, name of any visitors, phone calls to PEER, decontamination, waste management, water level data, well purging, and sampling activities;
3. a description of field screening activities in detail, including instrument reading and calibration;
4. a description in specific detail of samples collected and containerized, including color, odor, and date and time collected, sample identification numbers, Chain-of-Custody Form numbers, and airbill numbers or other shipping identification numbers for samples shipped;
5. a list of the equipment type and sampling and decontamination procedures used;
6. documentation of equipment failures or breakdowns, reasons, time resolved, and description of repairs;

7. any field changes made to the Work Plan; and
8. a list of investigation-derived wastes, (each container I.D. number, contents, volume, recommended disposition, location stored, etc.).

Each page will be dated and signed by the person making the entry. Incorrect entries will be corrected by drawing a single line through the error, and dating and initialing the correction.

4.6 SAMPLE PACKAGING AND SHIPMENT

Samples will be packed and shipped, as necessary, in accordance with PEER SOP F-3, "Packaging and Shipment of Environmental Samples," within 24 hours of collection.

Immediately upon collection, samples will be placed in a shipping container at the point of collection and surrounded with double-bagged water ice (or blue ice) so that the temperature of the samples is maintained at or below 4°C. Packing material will be used to secure the samples in the shipping container to help prevent breakage of glass containers. Enough packing material shall be placed in the cooler so that the samples do not rattle or shake inside the shipping container. When the samples are deemed secure from breakage and properly iced, the Chain-of-Custody Form will be placed in a plastic cover and taped inside the lid of the shipping container. The lid of the container will then be closed, secured using clear or nylon strapping tape, and custody sealed to ensure that samples will not be disturbed during shipment.

Coolers or other shipping containers will be either shipped by a next-day delivery service to the laboratory or hand-delivered to the laboratory by PEER personnel. Notification of shipment, including airbill number, will be telephoned to the laboratory the day of sample collection. Receipt of the previous day's shipment will be confirmed daily. All sample containers, preservatives, and shipping crates/coolers will be supplied by the designated analytical laboratory.

4.7 CHAIN-OF-CUSTODY

Chain-of-custody shall be maintained from the time of sample collection through analysis in accordance with PEER SOP Q-2, “Chain-of-Custody.” All samples collected for laboratory analyses will be documented on a Chain-of-Custody Record (Figure 4.2). The original Chain-of-Custody Record will accompany all samples from the time of collection through laboratory receipt. Copies of the Chain-of-Custody Records will be maintained by the PEER Project/Site Manager. Each custody transfer by hand delivery shall be documented by signature of the relinquishing and receiving individuals and the date and time of transfer. For samples to be shipped via an overnight carrier, the airbill number (or other shipment identification number) will be written on the Chain-of-Custody Record to allow tracking of the samples during shipment.

The Chain-of-Custody Record will document the following information: project name, signature of sampler, sampling station, sample number, date and time of sample collection, grab or composite designation, matrix, preservatives, analyses requested, and signatures of individuals involved in sample transfer.

This procedure will be used throughout the sampling event to guide the transmittal of information regarding collected samples to the analytical laboratory, and other necessary parties. Samples are considered to be under custody if:

- they are in the sampler's possession, or
- they are in the sampler's line of sight after being in possession, or
- they are in a designated controlled secure area, or
- they are in a cooler sealed with custody seals.

The Project/Site Manager will have overall responsibility for ensuring that the care and custody of the samples collected is maintained until they are transferred or properly dispatched to the

CHAIN-OF-CUSTODY RECORD

PEER CONSULTANTS, P.C.						COC # _____
PROJECT NO.	PROJECT NAME					
SAMPLERS (SIGNATURE)			NUMBER, TYPE, AND VOLUME OF CONTAINERS		ANALYSES	PRESERVATIVES
TIER NO.	DATE (MM/DD/YY)	TIME (MILITARY)	COMP GRAB	SAMPLE NUMBER	MATRIX (1)	

Relinquished By: (Signature)	Date/Time	Received By: (Signature)	Analytical Laboratory:
Relinquished By: (Signature)		Received By: (Signature)	
Relinquished By: (Signature)		Received By: (Signature)	Contact: _____ Phone No: _____

Send results to:
 PEER CONSULTANTS, P.C.
 575 Oak Ridge Turnpike
 Oak Ridge, IN 47830
 Attn: _____ (615) 483-3191
 Distribution:
 White Copy Accompanies Shipment
 Yellow Copy to Project Manager
 Pink Copy for Field Files

- (1) S - Soil SD - Sediment SL - Sludge SQ - Solid Waste
- GH - Ground Water SW - Surface Water LH - Liquid Waste

laboratory. Each individual who collects a sample is responsible for sample custody until transferred to someone else via the Chain-of-Custody Record.

4.8 PREVENTION OF CROSS-CONTAMINATION

Cross-contamination will be prevented by decontaminating all sampling and measurement equipment before each use in accordance with PEER SOP Q-3, "Decontamination-Field Equipment." Additionally, during sampling events, personnel will wear new disposable latex gloves which will be changed between sampling points. Sampling equipment will not be placed directly on the ground, but will be placed on clean plastic sheeting.

All sampling equipment which is not pre-cleaned and disposable and all monitoring equipment shall be properly decontaminated before each use by the following procedure:

- washed with a laboratory grade detergent (e.g., Alconox) using potable water;
- rinsed with ASTM Type II water;
- rinsed with HPLC-grade methanol; and
- allowed to air dry.

4.9 FIELD QUALITY CONTROL SAMPLES

Field QC samples for each groundwater monitoring event will include:

Trip Blanks. Trip blanks, consisting of analyte-free laboratory reagent-grade water, will be supplied by the analytical laboratory with each cooler. One trip blank sample (per event) will be analyzed for benzene, toluene, ethylbenzene, and xylenes; cumene; and naphthalene and will be used to detect potential sample contamination during shipment and handling.

Duplicate Samples. One duplicate groundwater sample will be collected from monitoring well MW-02 and analyzed for the same parameters as the sample ([Table 4.1](#)).

5.0 ADDITIONAL REQUIREMENTS

5.1 HEALTH AND SAFETY

All removal action activities will be conducted in strict conformance with the Site-Specific Health and Safety Plan developed for and presented in the Site Characterization Work Plan Addendum (PEER 1997), and the programmatic Health and Safety Plan prepared by PEER for the ANG/CEVR, dated February 1995.

5.2 INVESTIGATION DERIVED WASTE

All water generated during decontamination and purging will be placed in 55-gal drums and labeled as to generation date, contents, and volume. Drums will be properly closed and marked daily.

All drums will be moved from the site by the base. The drums will be stored at a designated drum storage area that is approved by the station Environmental Manager until wastes are properly characterized.

The results will be submitted to the station Environmental Manager following completion of field activities. PEER will assist the base with waste characterization and disposition, manifesting, or other paperwork. All waste disposal/treatment costs will be the responsibility of the base.

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6.0 PROJECT ORGANIZATION

The project line management consists of:

ANG Project Manager	Winston Crow	(301) 836-8155
Facility ANG Representative	Captain Jacqueline Siciliano	(215) 443-1433
PEER Program Manager/QA	C.W. Stanley, P.G.	(865) 483-3191
PEER Project/Site Manager	Debby Hines	(865) 483-3191
PEER Site Health and Safety Officer	Debby Hines	(865) 483-3191

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7.0 PROJECT DELIVERABLES AND SCHEDULE

The deliverables for this project include:

- The Remedial Action Work Plan (Draft and Final);
- Two (2) Periodic Groundwater Monitoring Reports (Draft and Final);
- Two (2) (optional) - Periodic Groundwater Monitoring Reports (Draft and Final);
- A Well Abandonment Report (optional) (Draft and Final);
- A Removal Action Completion Report (Draft and Final); and
- Two (2) Quarterly Progress Reports.

The proposed schedule for the project is provided in [Figure 7.1](#).

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