DRAFT

SITE-SPECIFIC WORK PLAN FOR THE PASSIVE DIFFUSION BAG SAMPLER DEMONSTRATION AT ANDREWS AFB, MARYLAND

August 2001

Prepared for:

Air Force Center for Environmental Excellence
Technology Transfer Division
and
Air Force Environmental Directorate

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AFILEV	Air Force Environmental Directorate
AFB	Air Force Base
AFCEE/ERT	Air Force Center for Environmental Excellence, Technology Transfer Division
ANOVA	analysis of variance
bgs	below ground surface
COPCs	chemicals of potential concern
DRMO	Defense Reutilization and Marketing Office
DoD	Department of Defense
DSITMS	Direct Sampling Ion Trap Mass Spectrometry
GIS	Geographical information system
HASP	Health and Safety Plan
IRP	Installation Restoration Program
MAC	Military Airlift Command
Parsons	Parsons Engineering Science, Inc.
PCE	tetrachloroethene
PDBS	passive diffusion bag sampler
QAPP	Quality Assurance Program Plan
RI	Remedial Investigation
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SOPs	Standard Operating Procedures
SVOCs	semivolatile organic compounds
TCE	trichloroethene
TO	task order
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

1.0 INTRODUCTION

1.1 Project Description

On 27 February 2001, Parsons Engineering Science, Inc. (Parsons) was awarded a task order (TO) under Air Force Center for Environmental Excellence (AFCEE) contract F41624-00-D-8024 (TO24) to demonstrate the use of passive diffusion bag samplers (PDBSs) in existing groundwater monitoring programs at selected Air Force Environmental Directorate (AFILEV) installations. The site of the PDBS demonstration outlined in this work plan is Andrews Air Force Base (AFB), Maryland. The Technology Transfer Division of AFCEE (AFCEE/ERT) has initiated the PDBS demonstration to introduce this technology to multiple Department of Defense (DoD) installations and to improve the cost effectiveness of groundwater monitoring programs for volatile organic compounds (VOCs).

Diffusion sampling is a relatively new technology designed to utilize passive sampling techniques that eliminate the need for well purging. Specifically, a diffusive-membrane capsule is filled with deionized/distilled water, sealed, suspended in a well-installation device, and lowered to a specified depth below the water level in a monitoring well. Over time (no less than 72 hours), the VOCs in the groundwater diffuse across the membrane, and the water inside the sampler reaches equilibrium with groundwater in the surrounding formation. The sampler is subsequently removed from the well, and the water in the diffusion sampler is transferred to a sample container and submitted for laboratory analysis of VOCs. Benefits of diffusion sampling include reduced sampling costs and reduced generation of investigation-derived waste.

1.2 Objective

The PDBS demonstration at Andrews AFB has two primary objectives:

- Develop vertical profiles of VOC concentrations across the screened intervals of the sampled monitoring wells, and

- Assess the effectiveness of PDBS by statistically comparing groundwater analytical results for VOCs obtained using the current (conventional) sampling method (i.e., 3-casing-volume purge/sample) during the upcoming September 2001 sampling event with results obtained using the PDBS method.

Vertical contaminant profiles will be developed by placing PDBSs at discrete depths in each monitoring well included in the demonstration, and analyzing the resulting samples for VOCs. The statistical comparison of the conventional and diffusion sampling results will allow assessment of the appropriateness of implementing diffusion sampling for VOCs at each sampled well.

1.3 Scope

The Andrews AFB PDBS sampling demonstration will require two mobilizations to the site: one to place the diffusion samplers in the selected monitoring wells, and a second to retrieve the samplers from the wells. The PDBSs will be installed during the

second week of September 2001 (i.e., Sept. 11-12) to provide adequate equilibration time before the current environmental contractor for Andrews AFB, URS/Radian, begins the scheduled sampling event on September 27, 2001. The PDBSs will be retrieved on September 25-26, immediately prior to the conventional sampling of the same wells to ensure temporal comparability of the analytical results obtained using the two methods. The PDBSs will be in place for a minimum of 14 days, which fulfills the 14-day minimum equilibration time period specified in the AFILEV PDBS Project Work Plan (Parsons, 2001).

1.4 Document Organization

This work plan is organized into seven sections, including this introduction, and one appendix. The Andrews AFB site description is presented in Section 2. Section 3 presents the scope of the PDBS investigation at Andrews AFB. Project organization, schedule, and an overview of the PDBS site-specific results report are summarized in Sections 4, 5, and 6, respectively. References used in the preparation of this work plan are presented in Section 7. A site-specific addendum to the Project Health and Safety Plan (HASP) (Parsons, 2001) is provided in Appendix A. Appendix B presents the monitoring well logs.

2.0 SITE DESCRIPTION

2.1 Location and Description of Andrews Air Force Base, Maryland

Andrews AFB is located in Prince Georges County, Maryland, near the community of Camp Springs. Washington, DC is located approximately 5 miles northwest of the Base (Figure 2-1). The principal features of the Base occupy approximately 4,300 acres and consist of runways, airfield operations, an industrial area, and housing and recreational facilities. Remote facilities include the 1,640-acre Brandywine Receiver site and associated 5-acre housing tract, the 8-acre Brandywine Defense Reutilization and Marketing Office (DRMO), the 863-acre Davidson Transmitter site, and the 8-acre Davidsonville housing annex.

Andrews AFB was originally established as the Camp Springs Army Air Field on August 25, 1942. The name was changed to Andrews AFB in 1947 when the Air Force was established as a separate military service. The initial mission of Andrews AFB was flight operations. The Base has served as headquarters at various times for the Continental Air Command, the Strategic Air Command, the Military Air Transport Service, and the Air Force Systems Command. The major tenant command at Andrews AFB is the Andrews Naval Air Facility. The missions of the Naval Air Facility are flight operations and photographic reconnaissance. The 76th Airlift Division was established in 1976 under the Military Airlift Command (MAC), making Andrews AFB a MAC Base. In 1977, the aircraft inventory was reduced and the primary mission became support of numerous operational units and tenant commands. In 1992, Andrews AFB became an Air Mobility Command Base due to the reorganization of Air Force Command. Currently, there are 16,983 military and civilian personnel working on Base, with 7,570 people living on Base.

STARTING DATE: 4/20/98	DATE LAST REV.:	DRAFT. CHCK. BY: J. HUBBARD	INITIATOR: E. WESSNER	DWG. NO.: 761609-A-
DRAWN BY: D. HIGGS	DRAWN BY:	ENGR. CHCK BY: E. WESSNER	PROJ. MGR.: E. WESSNER	PROJ. NO.: 761609

EMAP5.CDR 4/20/98 SAM

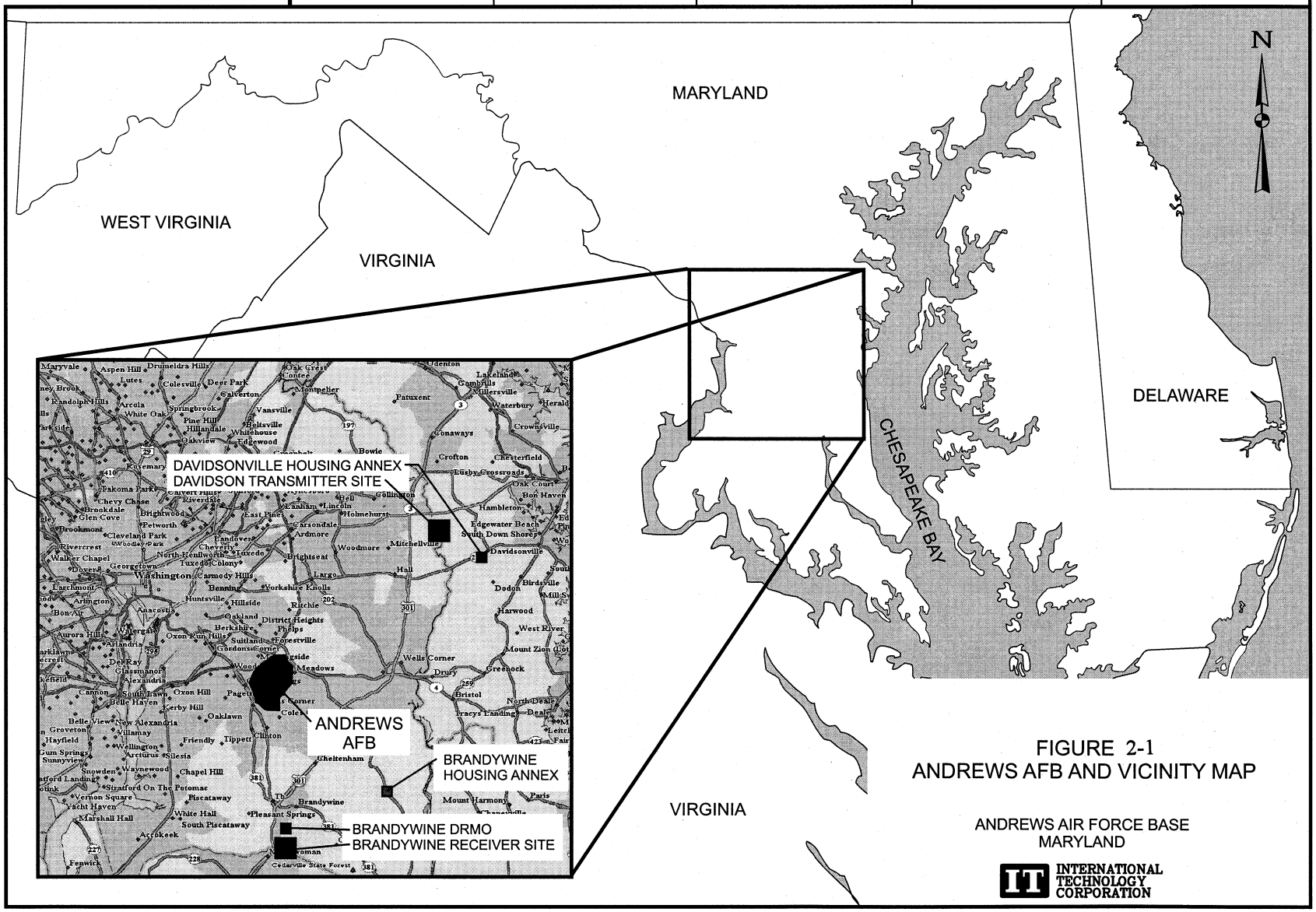


FIGURE 2-1
ANDREWS AFB AND VICINITY MAP

ANDREWS AIR FORCE BASE
MARYLAND

INTERNATIONAL TECHNOLOGY CORPORATION

2.2 PDBS Site Description

The site to be sampled using PDBS is the Brandywine DRMO, also known as the Installation Restoration Program (IRP) Site SS-01. This site is located near the intersection of Brandywine Road and Cherry Tree Crossing Road in Princes Georges County, Maryland. It is approximately eight miles south-southeast of Andrews AFB and about one-quarter mile north of the Village of Brandywine. The location of DRMO is shown on Figure 2-2.

The DRMO is an inactive facility administratively controlled by Andrews AFB. It is approximately eight acres in area and is enclosed by a chain-link fence and gate that is normally locked. The entrance to the DRMO yard is at the south end, with access from Brandywine Road. The north half of the DRMO yard is open and covered with grass. The DRMO is bounded on its west side by an active railroad track operated by Conrail and on the east and north sides by wooded areas. Residential areas are located to the southeast, south and southwest (Dames & Moore, 1996). A site map of the Brandywine DRMO is shown in Figure 2-3.

2.3 Site Specific Geology and Hydrogeology

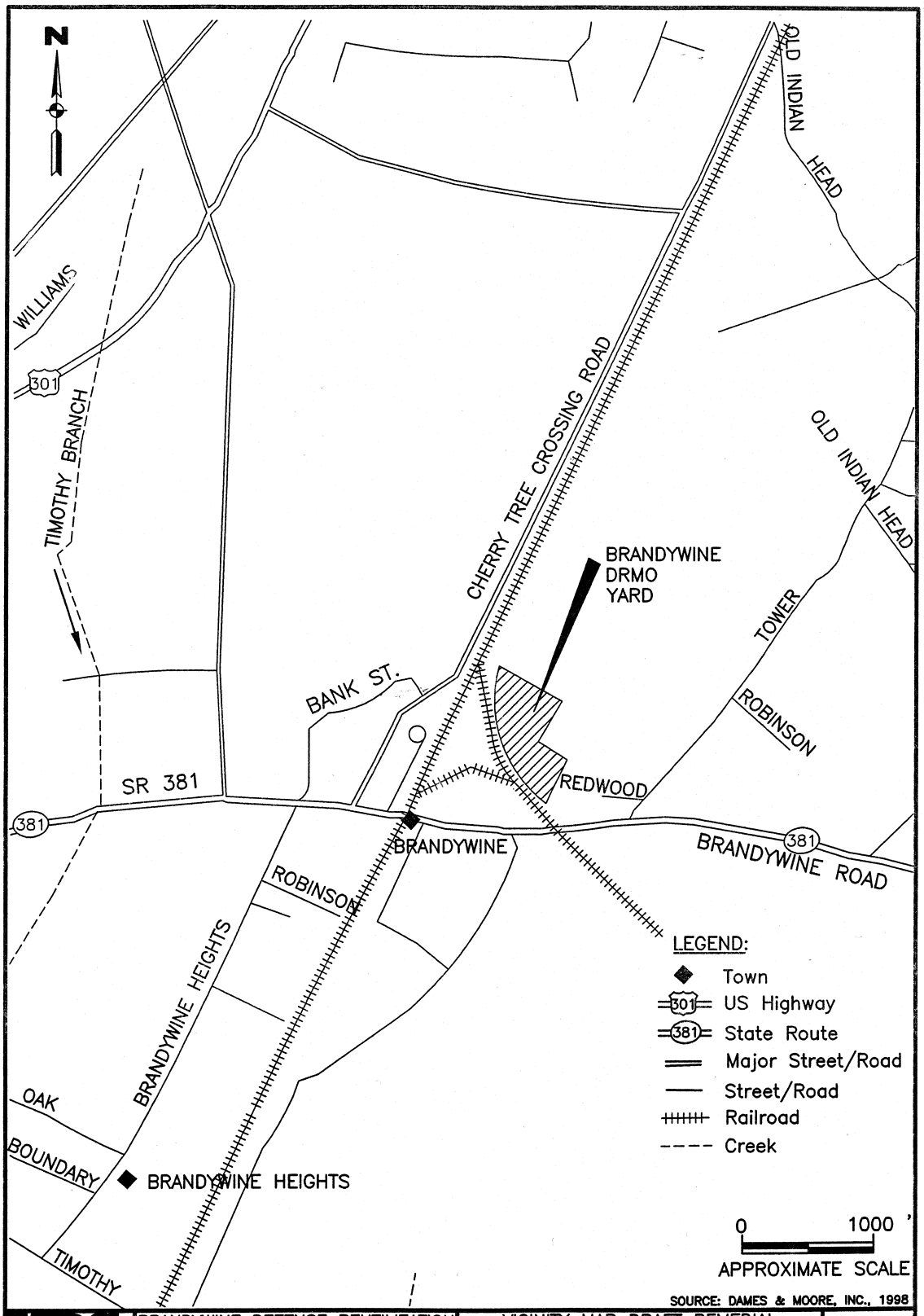
2.3.1 Geology

Coastal Plain sediments in Maryland consist of an eastward-thickening sequence of unconsolidated sands, silts, and clays that, in the vicinity of the Base, are approximately 1,300 feet thick (Tetra Tech, 1995). Surface sediments are classified as upland fluvial deposits of Pliocene Age and are characterized by gravel and sand grading upward to silt and fine sands. Beneath the 50-foot-thick surficial sediments lie two clayey silt units: the Calvert Formation and the Nanjemoy Formation. Both units range in thickness from 50 to 75 feet in the vicinity of the Base. Sediments of the coastal plain are underlain by crystalline metamorphic and consolidated sandstones and shales of unknown age that form the basement rock in the vicinity of Andrews AFB. Generally, the basement rock surface and the overlying sediments dip to the southeast. A geologic cross section for the Brandywine DRMO site is provided in Figure 2-4.

2.3.2 Hydrogeology

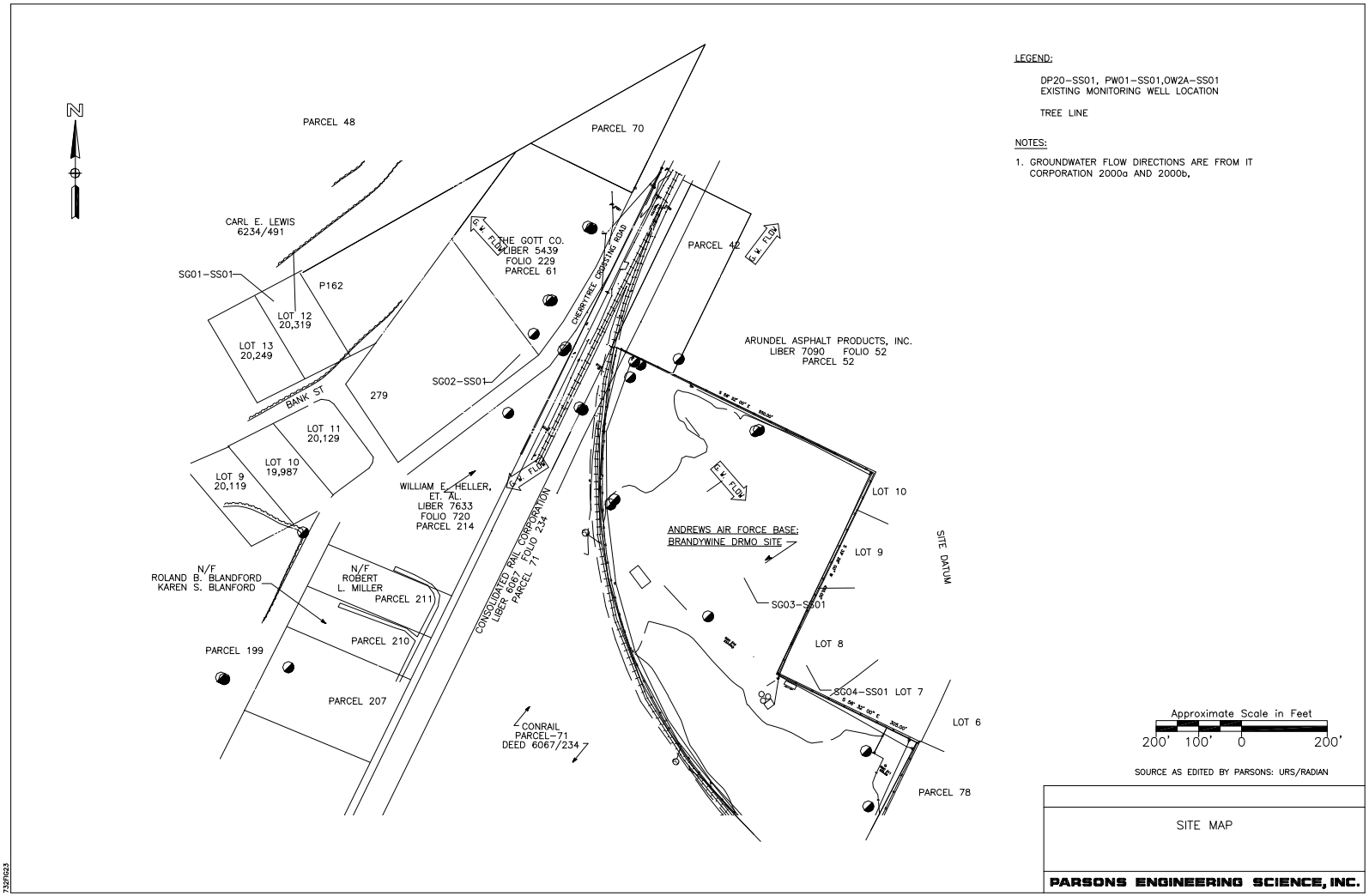
The following seven aquifer systems have been identified in the central area of Prince Georges County (Tetra Tech, 1995):

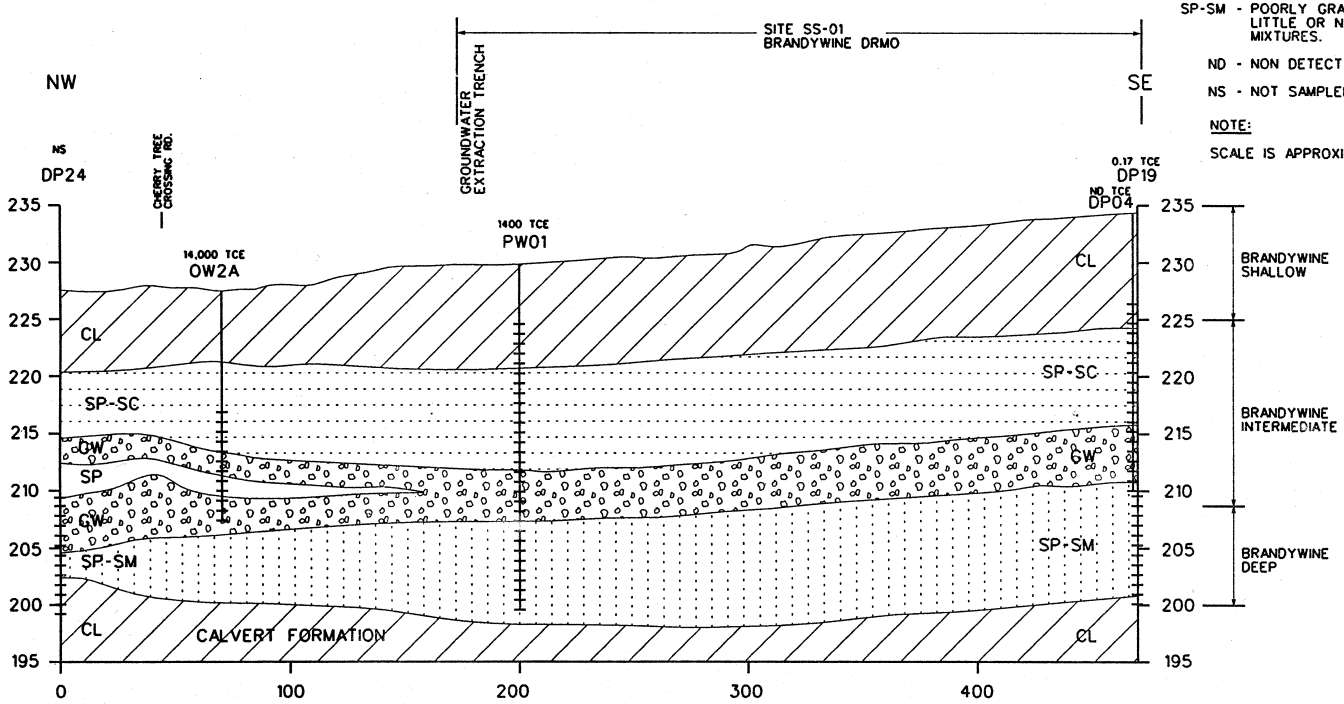
- Surficial Aquifer
- Aquia Aquifer
- Cretaceous Age Aquifers (Magothy Aquifer and Patapsco Formation Aquifers)
- St. Charles Aquifer



URS Radian	BRANDYWINE DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO) ANDREWS AFB, MARYLAND	VICINITY MAP DRAFT REMEDIAL INVESTIGATON/FEASIBILITY STUDY SEPTEMBER 2000	FIGURE 2-2

Figure 2-3
Brandywine DRMO Site Map





LEGEND:

DP04 - MONITORING WELL, PW01-PUMPING WELL, OW2A-OBSERVATION WELL

CL - INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.

SP-SC - POORLY GRADED SANDS OF GRAVELLY SANDS, LITTLE OR NO FINES. CLAYEY SANDS, SAND-CLAY MIXTURES.

GW - WELL GRADED GRAVELS OR GRAVEL SAND MIXTURES, LITTLE OR NO FINES.

SP - POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.

SP-SM - POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES, SILTY SANDS, SAND-SILT MIXTURES.

ND - NON DETECT

NS - NOT SAMPLED

NOTE:

SCALE IS APPROXIMATE.

SOURCE AS EDITED BY URS/RADIAN:

IT CORPORATION, 2000a, 2000b AND 2000c

URS Radian	BRANDYWINE DEFENSE REUTILIZATION AND MARKETING OFFICE (DRMO) ANDREWS AFB, MARYLAND	GENERALIZED GEOLOGIC CROSS-SECTION DRAFT REMEDIAL INVESTIGATION/FEASIBILITY STUDY SEPTEMBER 2000	FIGURE 2-4

- White Plains Aquifer
- La Plata Aquifer system
- Patuxent Formation Aquifer system.

Groundwater in the surficial/water table aquifer is under unconfined conditions across the Base, with depths to groundwater ranging from less than 10 feet to 20 feet below ground surface (bgs). Groundwater elevations within the surficial aquifer generally mirror topography. Below the surficial aquifer are the Calvert, Nanjemoy, and Marlboro Formations, which form the confining units above the Aquia Aquifer.

In the area of the DRMO site, the groundwater flow within the surficial aquifer apprears to be dominantly to the west from the DRMO site. However, the flow pattern shows some variability, which appears to be the result of infiltration of precipitation and recharge to certain areas of the aquifer. Figure 2-3 illustrates this outward groundwater flow pattern due to increased recharge, which occurs in the area around the northwest corner of the site following a rainfall or recharge event. An estimated horizontal hydraulic gradient during fair weather conditions is approximately 0.001, increasing to 0.004 following a recharge event (Dames & Moore, 1991)

Data collected during well slug tests performed in 1991, indicate that variability exists in the hydraulic conductivity (K) values for the surficial aquifer. K-values from wells screened between depths of 10 to 20 feet range from 5.1×10^{-3} cm/s to 5.1×10^{-4} (DP-2 and DP-3, respectively) with an average of 2.6×10^{-3} cm/s. K-values from wells screened between depths of 20 to 30 feet range from 1.6×10^{-4} to 3.5×10^{-5} cm/s (DP-22 and DP-24, respectively) with an average of 7.9×10^{-5} cm/s. These values indicate an order of magnitude difference between the middle and lower sediments of the surficial aquifer. This trend is consistent with the increase in clay and silt content found at the lower depths of the aquifer. Using the average K-values, a horizontal gradient of 0.001, and an estimated porosity of 30 percent, groundwater flow velocities are 9 feet per year and 0.30 feet per year for the middle and lower portions, respectively. Changing the horizontal gradient to 0.004 increases the groundwater flow velocity to 36 feet per year and 1.0 feet per year for the middle and lower portions, respectively. The increased gradient, representing conditions during a recharge event, indicates that the linear groundwater velocity fluctuates with each precipitation event (Dames & Moore, 1991)

2.4 Chemicals of Concern

Historically, contaminants that have exceeded regulatory limits at Andrews AFB have consisted primarily of chlorinated solvents, their associated breakdown products, and fuel hydrocarbons. Contaminants detected in groundwater at concentrations exceeding regulatory limits during the most recent sampling events at Site SS-01 are summarized in Table 2.1. The primary chemicals of potential concern (COPCs) in groundwater at SS-01 include 1,4-dichlorobenzene, tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene, naphthalene, fuel compounds, semivolatile organic compounds (SVOCs) and metals. Twenty-nine wells at SS-01 are scheduled to be sampled during the September 2001 groundwater sampling event by URS/Radian for VOCs using US Environmental Protection Agency (USEPA) Method SW8260B.

Table 2.1
Historical Groundwater Analytical Summary
Brandywine DRMO-Passive Diffusion Bag Sampler Demostration
Andrews AFB, Maryland

	Location Code:		DP01-SS01						DP02-SS01									DP03-SS01								
	Screen Interval:		8 - 25						7 - 24									6 - 23								
	Sample No:		1419			1102			1421			1006			AN-0842			1422			1007			AN-0837		
Parameter	Sample Date:		23-Mar-00			17-Mar-99			24-Mar-00			11-Mar-99			11-Jun-97			28-Mar-00			11-Mar-99			9-Jun-97		
VOLATILES	**Units**	**Reg. Std.**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**
Benzene	ug/L	5	-			-			-			0.36	F	F	-			0.6			-			-		
Bromomethane	ug/L	10	-			-			-			-			-			-			-			-		
Butyl benzene, sec-	ug/L	243.3	-			-			-			-			-			-			-			-		
Chlorobenzene	ug/L	100	-			-			-			-			-			2.1			-			-		
Chloroform	ug/L	80	-			-			-			-			-			-			-			-		
Chloromethane	ug/L	3	1.1	F	J	0.66	F	F	-			-			-			-			-			-		
Cymene	ug/L		-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,2-	ug/L	75	-			-			-			0.46	F	F	-			-			-			-		
Dichlorobenzene, 1,4-	ug/L	600	-			-			-			-			-			64			260			240		J
Dichlorodifluoromethane	ug/L	1000	-			-			-			-			-			-			-			-		
Dichloroethene, 1,1-	ug/L	7	-			-			-			0.72	F	F	-			2.1			-			-		
Dichloroethene, cis-1,2-	ug/L	70	-			-			0.74	F	J	28			-			**1200**			**17000**			**7900**	D	J
Dichloroethene, trans-1,2-	ug/L	100	-			-			-			-			-			8.3			**120**	F	F	-		
Ethylbenzene	ug/L	700	-			-			-			-			-			1.5			-			-		
Isopropylbenzene	ug/L	658.2	-			-			-			-			-			0.41	F	J	-			-		
Methylene chloride	ug/L	5	-			-			-			-			7.4		J	-			-			-		
Naphthalene	ug/L	20	-			-			-			-			-			3.1			-			-		
Propylbenzene, 2-	ug/L	243.3	-			-			-			-			-			0.31	F	J	-			-		
Tetrachloroethene	ug/L	5	-			-			-			-			-			-			-			-		
Toluene	ug/L	1000	-			0.36	F	F	-			-			-			-			-			-		
Trichlorobenzene, 1,2,4-	ug/L	70	-			-			0.86	F	J	0.58	F	F	-			-			-			-		
Trichloroethene	ug/L	5	-			0.2	F	M	1.1			**69**			-			**69**			**1900**			**280**		J
Trimethylbenzene, 1,2,4-	ug/L	12.33	-			-			-			-			-			1.3			-			-		
Trimethylbenzene, 1,3,5-	ug/L	12.33	-			-			-			-			-			-			-			-		
Vinyl chloride	ug/L	2	-			-			-			-			-			**28**			-			-		
Xylene, m,p-	ug/L		-			0.34	F	F	-			-			-			0.52	F	J	-			-		
Xylene, o-	ug/L	12167	-			0.17	F	F	-			-			-			0.86	F	J	-			-		

Note: Shaded value exceeds the regulatory limit (for comparison use only).

LQ - Laboratory's qualifier.

VQ - Validator's qualifier.

F - Estimated result detected above the method detection limit but below the reporting limit.

J - Estimated.

M - Matrix interference present.

D - Diluted sample.

R - Rejected.

Table 2.1
Historical Groundwater Analytical Summary
Brandywine DRMO-Passive Diffusion Bag Sampler Demostration
Andrews AFB, Maryland

	Location Code:		DP04-SS01									DP17-SS01									DP18-SS01								
	Screen Interval:		7 - 24									33 - 43									29 - 39								
	Sample No:		1423			1008			AN-0844			1424			1104			AN-0843			1425			1010			AN-0840		
Parameter	Sample Date:		5-Apr-00			15-Mar-99			11-Jun-97			24-Mar-00			17-Mar-99			11-Jun-97			27-Mar-00			11-Mar-99			11-Jun-97		
VOLATILES	**Units**	**Reg. Std.**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**
Benzene	ug/L	5	-			0.12	F	F	-			0.34	F	J	-			-			-			-			-		
Bromomethane	ug/L	10	-			-			-			-			-			-			-			-			-		
Butyl benzene, sec-	ug/L	243.3	-			0.8	F	F	-			-			-			-			-			-			-		
Chlorobenzene	ug/L	100	-			-			-			-			-			-			-			-			-		
Chloroform	ug/L	80	-			-			-			-			-			-			-			-			-		
Chloromethane	ug/L	3	-			-			-			-			-			-			-			-			-		
Cymene	ug/L		-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,2-	ug/L	75	-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,4-	ug/L	600	-			0.5			-			-			-			-			-			-			-		
Dichlorodifluoromethane	ug/L	1000	-			-			-			-			-			-			-			-			-		
Dichloroethene, 1,1-	ug/L	7	-			-			-			-			-			-			-			-			-		
Dichloroethene, cis-1,2-	ug/L	70	-			0.23	F	F	-			**120**			**170**		M	64			1.4			0.27	F	F	-		
Dichloroethene, trans-1,2-	ug/L	100	-			-			-			0.55	F	J	-			-			-			-			-		
Ethylbenzene	ug/L	700	-			-			-			-			-			-			-			0.19	F	F	-		
Isopropylbenzene	ug/L	658.2	-			0.35	F	F	-			-			-			-			-			-			-		
Methylene chloride	ug/L	5	-			-			-			-			-			-			-			-			-		
Naphthalene	ug/L	20	-			2.7			-			-			-			-			-			0.6		B	-		
Propylbenzene, 2-	ug/L	243.3	-			0.28	F	F	-			-			-			-			-			-			-		
Tetrachloroethene	ug/L	5	-			-			-			**87**			**140**			**43**			1.1	F	J	1.3	F	F	-		
Toluene	ug/L	1000	-			-			-			-			-			-			-			0.33	F	F	-		
Trichlorobenzene, 1,2,4-	ug/L	70	-			-			-			-			-			-			-			0.4	U	F	-		
Trichloroethene	ug/L	5	-			-			-			**51**			**93**		M	**30**			3.1			0.6	F	F	-		
Trimethylbenzene, 1,2,4-	ug/L	12.33	-			2.5			2.5	J	J	**-**			-			-			-			0.23	F	F	-		
Trimethylbenzene, 1,3,5-	ug/L	12.33	-			-			-			-			-			-			-			-			-		
Vinyl chloride	ug/L	2	-			-			-			-			-			-			-			-			-		
Xylene, m,p-	ug/L		-			-			-			-			-			-			-			0.36	F	F	-		
Xylene, o-	ug/L	12167	-			-			-			-			-			-			-			0.17	F	F	-		

Note: Shaded value exceeds the regulatory limit (for comp

LQ - Laboratory's qualifier.

VQ - Validator's qualifier.

F - Estimated result detected above the method detection l

J - Estimated.

M - Matrix interference present.

D - Diluted sample.

R - Rejected.

Table 2.1
Historical Groundwater Analytical Summary
Brandywine DRMO-Passive Diffusion Bag Sampler Demostration
Andrews AFB, Maryland

	Location Code:		DP19-SS01												DP20-SS01								
	Screen Interval:		24 - 34												19 - 29								
	Sample No:		1426			1391			1105			AN-0841			1427			1012			AN-0839		
Parameter	Sample Date:		27-Mar-00			16-Nov-99			17-Mar-99			11-Jun-97			27-Mar-00			11-Mar-99			11-Jun-97		
VOLATILES	**Units**	**Reg. Std.**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**
Benzene	ug/L	5	-			-			-			-			**18**			-			**18**	JD	R
Bromomethane	ug/L	10	-			-			-			-			-			-			-		
Butyl benzene, sec-	ug/L	243.3	-			-			-			-			0.42	F	J	-			-		
Chlorobenzene	ug/L	100	-			-			-			-			8.5			-			-		
Chloroform	ug/L	80	-			-			-			-			1.9			-			-		
Chloromethane	ug/L	3	-			1	J	J	-			-			-			-			-		
Cymene	ug/L		-			-			-			-			0.14	F	J	-			-		
Dichlorobenzene, 1,2-	ug/L	75	-			-			-			-			-			-			-		
Dichlorobenzene, 1,4-	ug/L	600	-			-			-			-			79	J	J	-			-		
Dichlorodifluoromethane	ug/L	1000	-			-			-			-			-			-			-		
Dichloroethene, 1,1-	ug/L	7	-			-			-			-			**29**			-			-		
Dichloroethene, cis-1,2-	ug/L	70	-			-			-			-			**14000**			**25000**			**12000**	ED	R
Dichloroethene, trans-1,2-	ug/L	100	-			-			-			-			67	J	J	-			17	JD	R
Ethylbenzene	ug/L	700	-			-			-			-			3.5			-			-		
Isopropylbenzene	ug/L	658.2	-			-			-			-			1.8			-			-		
Methylene chloride	ug/L	5	-			-			-			-			-			-			-		
Naphthalene	ug/L	20	-			-			-			-			10			-			-		
Propylbenzene, 2-	ug/L	243.3	-			-			-			-			1.1			-			-		
Tetrachloroethene	ug/L	5	-			-			-			-			-			-			-		
Toluene	ug/L	1000	-			-			-			-			2.2			-			-		
Trichlorobenzene, 1,2,4-	ug/L	70	-			-			-			-			-			-			-		
Trichloroethene	ug/L	5	-			-			0.17	F	M	-			**23000**			**6200**			**5700**	ED	R
Trimethylbenzene, 1,2,4-	ug/L	12.33	-			-			-			-			4.4			-			-		
Trimethylbenzene, 1,3,5-	ug/L	12.33	-			-			-			-			0.41	F	J	-			-		
Vinyl chloride	ug/L	2	-			-			-			-			**41**	J	J	-			-		
Xylene, m,p-	ug/L		-			-			-			-			6.2			-			-		
Xylene, o-	ug/L	12167	-			-			-			-			9.5			-			-		

Note: Shaded value exceeds the regulatory limit (for comp

LQ - Laboratory's qualifier.

VQ - Validator's qualifier.

F - Estimated result detected above the method detection

J - Estimated.

M - Matrix interference present.

D - Diluted sample.

R - Rejected.

Table 2.1
Historical Groundwater Analytical Summary
Brandywine DRMO-Passive Diffusion Bag Sampler Demostration
Andrews AFB, Maryland

	Location Code:		DP21-SS01												DP25-SS01						DP27-SS01								
	Screen Interval:		3 - 13												19 - 29						19 - 29								
	Sample No:		1429			1392			1014			AN-0832			1430			1106			1431			1107			AN-0831		
Parameter	Sample Date:		6-Apr-00			18-Nov-99			11-Mar-99			9-Jun-97			24-Mar-00			17-Mar-99			5-Apr-00			17-Mar-99			9-Jun-97		
VOLATILES	**Units**	**Reg. Std.**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**
Benzene	ug/L	5	-			0.28	J	J	-			-			-			-			0.37	F	J	0.28	F	F	-		
Bromomethane	ug/L	10	-			-			-			-			-			-			-			-			-		
Butyl benzene, sec-	ug/L	243.3	-			-			-			-			-			-			-			-			-		
Chlorobenzene	ug/L	100	0.49			0.92			1.2	F	F	-			-			-			-			-			-		
Chloroform	ug/L	80	-			-			-			-			-			0.19	F	F	-			-			-		
Chloromethane	ug/L	3	-			-			-			-			-			0.3	F	F	-			-			-		
Cymene	ug/L		-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,2-	ug/L	75	-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,4-	ug/L	600	20			35			38			26		J	-			-			0.45	F	J	1.5			-		
Dichlorodifluoromethane	ug/L	1000	-			-			-			-			-			-			-			-			-		
Dichloroethene, 1,1-	ug/L	7	0.43	F	J	0.49	J	J	-			-			-			-			-			-			-		
Dichloroethene, cis-1,2-	ug/L	70	**100**			**250**			**290**			**120**		J	-			-			24			51		M	22		J
Dichloroethene, trans-1,2-	ug/L	100	0.44	F	J	0.98			-			-			-			-			-			-			-		
Ethylbenzene	ug/L	700	-			-			-			-			-			-			-			-			-		
Isopropylbenzene	ug/L	658.2	-			-			-			-			-			-			-			-			-		
Methylene chloride	ug/L	5	-			-			-			-			-			-			-			-			-		
Naphthalene	ug/L	20	0.52	F	J	18			**25**			11		J	-			-			-			-			-		
Propylbenzene, 2-	ug/L	243.3	-			-			-			-			-			-			-			-			-		
Tetrachloroethene	ug/L	5	-			-			-			-			-			-			**64**			**40**			**49**		J
Toluene	ug/L	1000	-			0.23	J	J	-			-			-			0.44	F	F	-			-			-		
Trichlorobenzene, 1,2,4-	ug/L	70	-			-			-			-			-			-			0.35	F	J	-			-		
Trichloroethene	ug/L	5	**32**			**27**			**70**			**31**		J	-			0.89	F	M	**23**			**68**		M	**18**		J
Trimethylbenzene, 1,2,4-	ug/L	12.33	-			-			-			-			-			-			-			-			-		
Trimethylbenzene, 1,3,5-	ug/L	12.33	-			-			-			-			-			-			-			-			-		
Vinyl chloride	ug/L	2	1.5			**3.6**			-			**2.2**	J	J	-			-			-			0.56	F	F	-		
Xylene, m,p-	ug/L		-			-			-			-			-			0.34	F	F	-			-			-		
Xylene, o-	ug/L	12167	-			-			-			-			-			-			-			-			-		

Note: Shaded value exceeds the regulatory limit (for comp

LQ - Laboratory's qualifier.

VQ - Validator's qualifier.

F - Estimated result detected above the method detection l

J - Estimated.

M - Matrix interference present.

D - Diluted sample.

R - Rejected.

Table 2.1
Historical Groundwater Analytical Summary
Brandywine DRMO-Passive Diffusion Bag Sampler Demostration
Andrews AFB, Maryland

	Location Code:		OW2A-SS01									OW2B-SS01									PW01-SS01								
	Screen Interval:		10 - 20									5 - 10									5 - 30								
	Sample No:		1415			1100			AN-0827			1416			1101			AN-0828			1434			1019			AN-0835		
Parameter	Sample Date:		6-Apr-00			17-Mar-99			9-Jun-97			6-Apr-00			17-Mar-99			9-Jun-97			29-Mar-00			15-Mar-99			9-Jun-97		
VOLATILES	**Units**	**Reg. Std.**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**	**Result**	**LQ**	**VQ**
Benzene	ug/L	5	-			-			-			-			-			-			-			-			-		
Bromomethane	ug/L	10	-			-			-			-			-			-			-			-			-		
Butyl benzene, sec-	ug/L	243.3	-			-			-			-			-			-			-			-			-		
Chlorobenzene	ug/L	100	-			-			-			-			-			-			12	F	J	45	F	F	-		
Chloroform	ug/L	80	0.83	F	J	-			-			-			-			-			-			-			-		
Chloromethane	ug/L	3	-			-			-			-			-			-			-			-			-		
Cymene	ug/L		-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,2-	ug/L	75	-			-			-			-			-			-			-			-			-		
Dichlorobenzene, 1,4-	ug/L	600	100			300			220		J	2			6			4.7	J	J	**740**			**2400**			**3300**	D	R
Dichlorodifluoromethane	ug/L	1000	-			-			-			-			-			-			-			-			-		
Dichloroethene, 1,1-	ug/L	7	4			-			-			-			0.38	F	F	-			-			-			-		
Dichloroethene, cis-1,2-	ug/L	70	**1900**			**4700**	M	M	**8000**	D	R	5.8			26		M	30		J	**1200**			**8500**			**5000**	D	R
Dichloroethene, trans-1,2-	ug/L	100	6.3			-			-			-			0.78	F	F	-			-			-			-		
Ethylbenzene	ug/L	700	-			-			-			-			-			-			-			-			-		
Isopropylbenzene	ug/L	658.2	-			-			-			-			-			-			-			-			-		
Methylene chloride	ug/L	5	-			-			**81**	J	J	-			-			-			-			-			-		
Naphthalene	ug/L	20	**25**			**280**			-			-			-			-			**560**			**2100**			**2700**	BD	U
Propylbenzene, 2-	ug/L	243.3	-			-			-			-			-			-			-			-			-		
Tetrachloroethene	ug/L	5	-			-			-			-			-			-			-			-			-		
Toluene	ug/L	1000	-			-			-			-			-			-			-			-			-		
Trichlorobenzene, 1,2,4-	ug/L	70	-			-			-			-			-			-			-			-			-		
Trichloroethene	ug/L	5	**6400**			**14000**	M	M	**17000**	D	J	2.6			**34**		M	**5.7**		J	**200**			**1400**			**4000**	D	R
Trimethylbenzene, 1,2,4-	ug/L	12.33	-			-			-			-			-			-			-			-			-		
Trimethylbenzene, 1,3,5-	ug/L	12.33	-			-			-			-			-			-			-			-			-		
Vinyl chloride	ug/L	2	0.41	F	J	-			-			-			-			-			**16**	F	J	88	F	F	-		
Xylene, m,p-	ug/L		-			-			-			-			-			-			-			-			-		
Xylene, o-	ug/L	12167	0.21	F	J	-			-			-			-			-			-			-			-		

Note: Shaded value exceeds the regulatory limit (for comp

LQ - Laboratory's qualifier.

VQ - Validator's qualifier.

F - Estimated result detected above the method detection l

J - Estimated.

M - Matrix interference present.

D - Diluted sample.

R - Rejected.

3.0 SCOPE OF PDBS DEMONSTRATION

An estimated total of 67 passive diffusion samplers will be installed in 29 monitoring wells at Andrews AFB as part of this project. The monitoring wells that will be sampled during this PDBS demonstration are summarized in Table 3.1, and their locations are shown on Figures 3.1.

3.1 Diffusion Sampling

3.1.1 Field Activities

Monitoring wells selected for VOC sampling using the PDBS technique (Table 3.1) were chosen from the list of monitoring wells targeted for sampling by URS/Radian during the groundwater sampling event scheduled to begin in late September 2001. Monitoring wells were selected based primarily on VOC concentrations detected during previous sampling events. Selected wells include 24 wells with historical concentrations of chlorinated solvents and daughter products and five new monitoring wells (Figures 3.1).

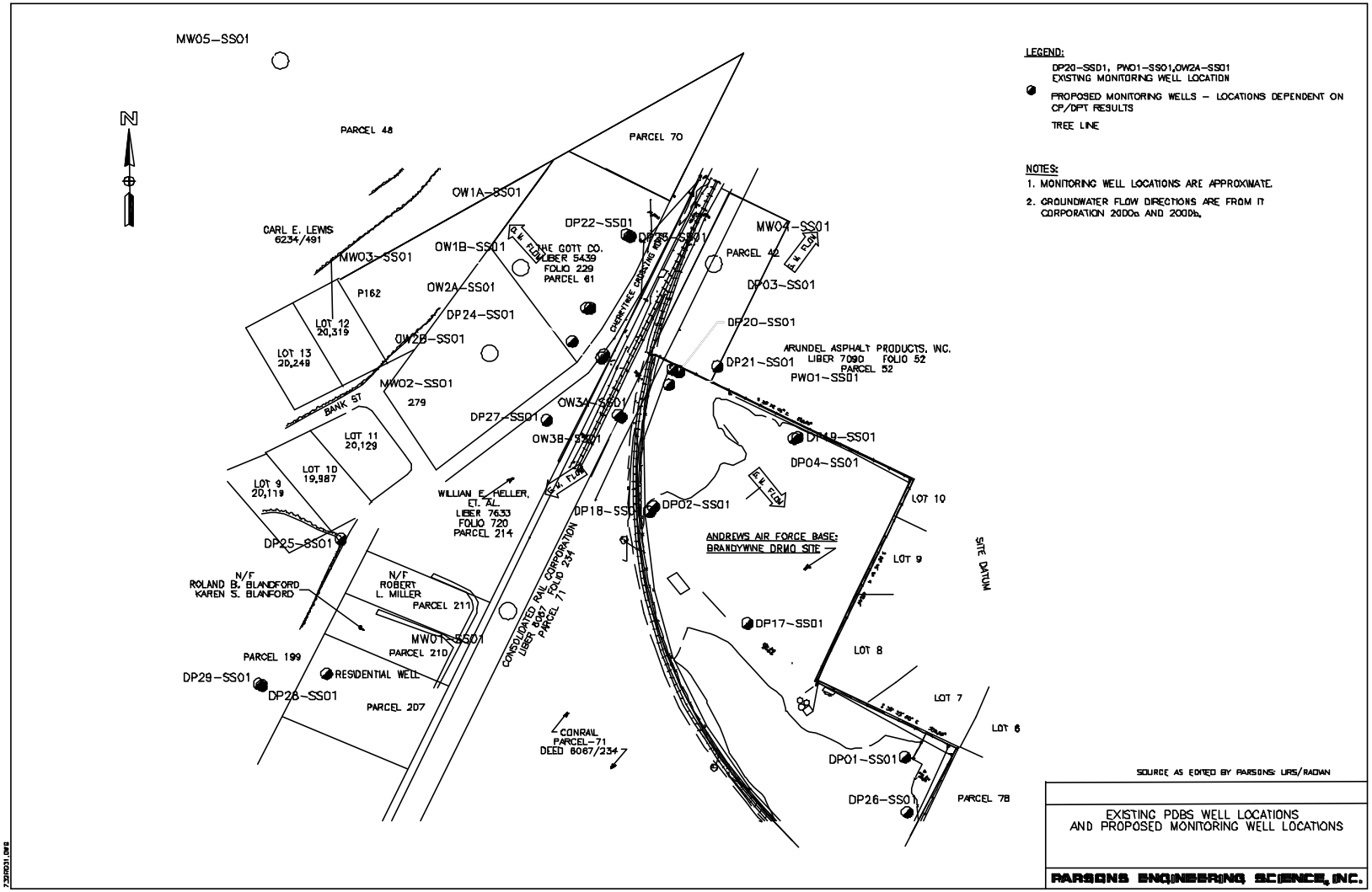
PDBSs deployed during this investigation will be installed and retrieved in accordance with the diffusion sampler installation and recovery standard operating procedures (SOPs) presented in Appendix B of the AFILEV PDBS Project Work Plan (Parsons, 2001). PDBSs will be installed throughout the screened interval of each well (i.e., 1 PDBS per 3 feet of saturated screen) to obtain a vertical profile of contaminant concentrations. The PDBS samples will be collected prior to conventional sampling of the wells. Analysis of the vertical profiling samples is discussed in Section 3.1.2.

Sample aliquots from PDBSs installed in all the wells targeted for sampling will be shipped to O'Brien & Gere in Syracuse, New York for VOC analysis using USEPA Method 8260B. This is the same laboratory that will be used by URS/Radian for analysis of the samples collected via conventional techniques during the sampling event starting in late September 2001. Field quality control samples will be collected at the following frequencies:

- 10 percent field duplicates;
- 5 percent matrix spikes and matrix spike duplicates;
- 1 pre-installation equipment rinseate blank;
- 1 pre-installation source water blank; and
- 1 trip blank per cooler of samples.

The Quality Assurance Program Plan (QAPP) for the groundwater sampling event by URS/Radian at Andrews AFB will be adopted as the site-specific addendum to the PDBS QAPP as appropriate.

Figure 3-1



LEGEND:
DP20-SS01, PW01-SS01,OW2A-SS01
EXISTING MONITORING WELL LOCATION
PROPOSED MONITORING WELLS – LOCATIONS DEPENDENT ON CP/DPT RESULTS
TREE LINE
NOTES:
1. MONITORING WELL LOCATIONS ARE APPROXIMATE.
2. GROUNDWATER FLOW DIRECTIONS ARE FROM IT CORPORATION 2000a AND 2000b.
MW05-SS01
PARCEL 48
PARCEL 70
OW1A-SS01
CARL E. LEWIS
6234/491
MW03-SS01
OW1B-SS01
DP22-SS01
THE GOTT CO.
LIBER 5439
FOLIO 229
PARCEL 61
MW04-SS01
PARCEL 42
DP03-SS01
P162
OW2A-SS01
DP24-SS01
LOT 12
20,319
LOT 13
20,249
OW2B-SS01
DP20-SS01
ARUNDEL ASPHALT PRODUCTS, INC.
LIBER 7090 FOLIO 52
PARCEL 52
DP21-SS01
PW01-SS01
MW02-SS01
279
BANK ST
OW3A-SS01
DP27-SS01
OW3B-SS01
DP19-SS01
DP04-SS01
LOT 11
20,129
LOT 10
19,987
LOT 9
20,119
WILLIAM E. HELLER, ET. AL.
LIBER 7633
FOLIO 720
PARCEL 214
DP18-SS01
DP02-SS01
LOT 10
ANDREWS AIR FORCE BASE:
BRANDYWINE DRMO SITE
LOT 9
SITE DATUM
DP25-SS01
N/F
ROLAND B. BLANDFORD
KAREN S. BLANFORD
N/F
ROBERT
L. MILLER
PARCEL 211
CONSOLIDATED RAIL CORPORATION
LIBER 6067 FOLIO 234
PARCEL 71
DP17-SS01
MW01-SS01
PARCEL 210
PARCEL 199
LOT 8
DP29-SS01
RESIDENTIAL WELL
DP28-SS01
PARCEL 207
LOT 7
LOT 6
CONRAIL
PARCEL-71
DEED 6067/234
DP01-SS01
DP26-SS01
PARCEL 78
SOURCE AS EDITED BY PARSONS: URS/RADIAN
EXISTING PDBS WELL LOCATIONS
AND PROPOSED MONITORING WELL LOCATIONS
PARSONS ENGINEERING SCIENCE, INC.

TABLE 3.1
SAMPLING LOCATION SUMMARY
PASSIVE DIFFUSION BAG SAMPLER DEMONSTRATION
ANDREWS AFB, MARYLAND

Well Number	Total Depth bgs (ft)[a/]	Well Diameter (in)[a/]	Screened Interval (ft Below TOC)[b/]	Dominant Lithology of Screened Interval	Approximate Water Level Range (ft below TOC) in 1999	Formation Monitored[/c]	Estimated Number of PDBSs	Main COCs and March 2000 Contaminant Concentration (mg/L)[b/]	Comments/Sampling Rationale
Brandywine DRMO									
DP01	25.00	2	8-25	NA[/d]	11.08 - 15.77	Shallow/Interm	3	TCE:0.2 (3/99)	
DP02	24.00	2	7-24	NA	6.74 - 8.94	Shallow/Interm	3	TCE: 1.1	
DP03	23.40	2	6.4-23.4	Coarse Sand	4.55 - 7.45	Shallow/Interm	4	VC: 28, TCE: 69, cis-1,2-DCE:1200	March 2000, TCE exceeds regulatory limit
DP04	24.10	2	7.1-24.1	Sand	6.49 - 9.53	Shallow/Interm	3	NA	
DP17	43.00	2	33-43	Sand, Gravel, & Clay	8.93 - 12.06	Deep	3	TCE: 51, cis-1,2-DCE: 120, PCE:87	March 2000, TCE exceeds regulatory limit
DP18	39.50	2	29.5-39.5	NA	6.77 - 8.87	Deep	3	TCE: 3.1	
DP19	34.00	2	24-34	NA	6.30 - 9.41	Deep	3	TCE:0.17 (3/99)	
DP20	29.00	2	19-29	NA	3.90 - 6.58	Interm/Deep	3	TCE: 23000, cis-1,2-DCE:14000,VC:41, 1,1-DCE:29, Benzene:18	March 2000, TCE exceeds regulatory limit
DP21	13.50	2	3.5-13.5	Coarse Sand	3.50 - 4.24	Shallow	3	TCE:32, cis-1,2-DCE:100, Naph: 25	March 2000, TCE exceeds regulatory limit
DP22	27.30	2	17.3-27.3	NA		Interm/Deep	3	TCE: 41 (6/91)	June 1991, TCE exceeds regulatory limit
DP23	79.00	2	69-79	Coarse Sand		Calvert Formation	3	TCE: 4J (6/91)	
DP24	24.00	2	18-28	Clay		Deep	1	TCE:9800 (6/91)	June 1991, TCE exceeds regulatory limit
DP25	29.00	2	19-29	C. Sand & Gravel	7.32 - 7.65	Deep	3	TCE:0.89 (3/99)	
DP26	118.00	2	108-118	C. Sand & Gravel	-	Calvert Formation	3	NA	
DP27	29.00	2	19-29	NA	3.63 - 4.35	Deep	3	TCE:23, cis-1,2-DCE:24, PCE:64	March 2000, TCE exceeds regulatory limit
DP28	128.00	2	118-128	Sand	14.53 - 16.87	Calvert Formation	3	NA	
DP29	28.00	2	18-28	Silty Sand	9.57 - 11.32	Deep	3	NA	
OW1A	20.00	2	10-20	Sand & Gravel	-	Shallow	3	NA	
OW1B	10.00	2	5-10	Sand & Gravel	-	Shallow	1	NA	
OW2A	20.00	2	10-20	Sand & Gravel	2.12 - 2.62	Shallow	3	TCE:6400, cis-1,2-DCE:1800, Naph:25	March 2000, TCE exceeds regulatory limit
OW2B	10.00	2	5-10	Sand & Gravel	2.29 - 2.50	Shallow	1	TCE:2.6	
OW3A	20.00	2	10-20	Sand & Gravel	3.49 - 3.91	Shallow	3	TCE: 0.5 (3/99)	
OW3B	10.00	2	5-10	Sand & Gravel	3.99 - 6.42	Shallow	1	TCE: 9 (3/99)	March 1999, TCE exceeds regulatory limit
PW01	30.00	2	5-30	Sand & Gravel	4.48 - 8.36	Intermediate	5	TCE:200, cis-1,2-DCE:1200, Naph:560, 1,4-DCB:740	March 2000, TCE exceeds regulatory limit
New Monitoring Wells									
MW01	TBD	2	TBD	TBD	TBD	TBD	TBD	TBD	
MW02	TBD	2	TBD	TBD	TBD	TBD	TBD	TBD	
MW03	TBD	2	TBD	TBD	TBD	TBD	TBD	TBD	
MW04	TBD	2	TBD	TBD	TBD	TBD	TBD	TBD	
MW05	TBD	2	TBD	TBD	TBD	TBD	TBD	TBD	
29 Wells						**Totals:**	**67**	(not including new wells)	

Notes:

VC= Vinyl Chloride; TCE = Trichloroethene; cis-1,2-DCE = cis-1,2-Dichloroethene; PCE = Tetrachloroethene; Naph = Naphthalene

1,1-DCA = 1,1-Dichloroethane; 1,1-DCE = 1,1-Dichloroethene; 1,2,4-TMB = 1,2,4-Trimethylbenzene; 1,1,1-TCA = 1,1,1-Trichloroethane.

1,4-DCB = 1,4-Dichlorobenzene

[a/] ft = feet; in = inches.

[b/] TOC = top of casing; µg/L = micrograms per liter.

[/c] See Figure 2.3

[/d] NA = Not Available

[e/] TBD = to be determined.

3.1.2 Contaminant Profiling

Per the AFILEV project work plan (Parsons, 2001), contaminant profiling within the screened intervals of the monitoring wells is intended to be conducted using field-screening methods, with only the sample exhibiting the greatest VOC concentrations, based on the field analysis method, being submitted for laboratory analysis.

Field-screening will be performed using direct sampling ion trap mass spectrometry (DSITMS) technology via USEPA SW846 Method 8265. DSITMS is an innovative technology for determining the presence or absence and measuring the concentration of VOC's and SVOC's in air, water and soil. DSITMS introduces sample materials directly into an ion trap mass spectrometer by means of a very simple interface such as a capillary restriction or a polymer membrane. There is very little, if any, sample preparation and no chromatographic separation of the sample constituents meaning that the response to the analytes or contaminants in a sample is instantaneous.

All samples will be analyzed in the field using a field ready DSITMS by Tri-Corders Environmental, Inc. (McLean, VA). Field screening quality control will include a duplicate for every 1 in 20 samples (5%) and two blanks. For each well, the sample resulting in the highest concentration of total VOCs, based on field screening, will be shipped to O'Brien & Gere Laboratories for VOC analysis using EPA Method 8260B. If the field screening results for all samples within one monitoring well screened interval are less than the method detection limit, the sample collected from the PDBS positioned closest to the saturated screen midpoint will be sent to the laboratory for analysis.

3.1.3 Analytical Results Comparison/Evaluation

Analytical results for groundwater samples collected using the PDBSs and using conventional techniques will be compared, and the results will be evaluated. Typically, if maximum concentrations from the PDBS are higher than concentrations in samples collected using the conventional method, it is probable that the concentrations from the PDBS are more representative of ambient groundwater chemistry conditions than are the conventional-sampling data (Vroblesky, 2001). If, however, the conventional method produces VOC results that are higher by a predetermined amount than the concentrations reported for the PDBS, then the PDBS may not adequately represent local ambient groundwater conditions. In this case, the difference may be due to a variety of factors, including hydraulic and chemical heterogeneity within the saturated screened interval of the well, vertical flow of groundwater within the well, and/or the relative permeability of the well screen with respect to the surrounding aquifer matrix (Vroblesky, 2001).

Considering the above guidance, if the maximum analytical result obtained using the PDBS is greater than or equal to the conventional sampling result, it will indicate that the PDBS method is appropriate for use in that particular well and no further comparison of results will be performed. However, if the maximum PDBS result is less than the conventional sampling result, further comparison of the two sets of results will be undertaken. In this instance, analytical results for samples collected using the diffusion samplers will be compared to results from the conventional sampling using relative-percent-difference (RPD), as defined by the following equation:

$$RPD = 100*[abs(D-C)]/[(D+C)/2]$$

Where:

abs = absolute value

D = diffusion sampler result

C = conventional sample result.

For this investigation, an RPD of less than 15 (McClellan AFB, 2000) will be considered to demonstrate good correlation between sample results. Calculated RPDs in excess of 15 will be reviewed individually in an attempt to determine the reason for the variance.

3.2 Monitoring Network Optimization Evaluation

A portion of the groundwater monitoring network at this installation will be evaluated using both qualitative assessments and a geographical information system (GIS)-based algorithm that performs statistically based temporal and spatial analyses of monitoring-well information. Locations and completion intervals of individual monitoring wells and sampling points will be examined, and the informational contribution of each well or sampling point to the network will be weighed against the cost of monitoring at that point. Monitoring protocols and analytical methods also will be evaluated. Where warranted, recommendations will be developed for optimization of the portion of the monitoring network that is evaluated. Methods to be used in the evaluation will include, but are not limited to, qualitative hydrogeologic and hydrochemical analyses, application of statistical optimization techniques, and application of decision-logic structures.

A maximum of 30 monitoring wells at this installation will be evaluated as part of this task. Parsons will coordinate with Andrews AFB to determine which wells to include in the evaluation. The results of the evaluation will be included in the Site-Specific Diffusion Sampler Demonstration Report for Andrews AFB.

4.0 PROJECT ORGANIZATION

Addresses and telephone numbers of the Andrews AFB PDBS management and support team are as follows:

Name	Title	Address	Phone/Email	Fax
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5.0 SCHEDULE

Work performed as part of this demonstration at Andrews AFB will be completed according to the schedule summarized below.

- Submittal of the Draft Andrews AFB PDBS Work Plan to commenting parties: August 31, 2001
- Receipt of Draft Andrews AFB PDBS Work Plan Comments: September 10, 2001
- Submittal of the Final Andrews AFB PDBS Work Plan: September 11, 2001
- Install PDBS samplers in monitoring wells at Andrews AFB: September 11-12, 2001
- Retrieve PDBS samplers from monitoring wells at Andrews AFB: September 25-26, 2001
- Preparation of the Draft Andrews AFB PDBS Report: October 29 - December 21, 2001

6.0 REPORTING

The site-specific results report will provide a map and accompanying table identifying the location and depth for each PDBS sample collected. Analytical results obtained as part of this study will be compared to conventional-sampling analytical results collected by URS-Radian in a scientifically defensible manner using statistical analyses. The results of the statistical comparisons will be presented in a clear and logical manner in the results report. Statistical methods will include calculation of RPDs between PDBS and conventional sampling results, and possibly parametric or non-parametric analysis of variance (ANOVA) tests. The draft version of this report will be distributed according to the schedule presented in Section 5.

7.0 REFERENCES

Dames & Moore, Inc., 1991 *Final Work Plan Trichloroethylene Plume Delineation and Source Definition at the Brandywine Defense Reutilization and Marketing Office Site,* Andrews Air Force Base, Maryland, October.

IT Corporation (IT), 2000 *Quarterly System Evaluation Report (January through June 2000), Long-term Monitoring/Operation and Maintenance Program, Multiple Sites, Andrews Air Force Base, Maryland,* prepared for the Air Force Center for Environmental Excellence HSC/PKCB Headquarters, Human Services Center (AFMC), Brooks Air Force Base, Texas. November.

IT Corporation (IT), 1998 *Final Site-Specific Plans, Andrews Air Force Base, Maryland: Attachment 2A in Volume 2 of Installation-Wide Plans,* Andrews Air Force Base, Maryland, July.

McClellan AFB. 2000. *Final Passive Diffusion Membrane Samplers Technology Application Analysis Report.* National Environmental Technology Test Sites (NETTS). August.

Parsons. 2001. *Draft Work Plan for the Air Force Environmental Directorate Passive Diffusion Sampler Demonstration*. April.

Tetra Tech, Inc. 1995, *Installation Restoration Program (IRP) RCRA Facility Investigation/Corrective Measures Study Technical Report, Andrews Air Force Base, Mayland, Final*, prepared for AFCEE, Brooks Air Force Base, April.

Vroblesky, D. A. 2001. *User's Guide for Polyethylene-Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells*. US Geological Survey Water-Resources Investigations Report 01-4060. Columbia, South Carolina.

APPENDIX A

HEALTH AND SAFETY PLAN ADDENDUM

(HASP ADDENDUM POSTED AS A SEPARATE DOCUMENT ON THIS WEBSITE)

APPENDIX B

MONITORING WELL LOGS

(BORING LOGS AVAILABLE UPON REQUEST FROM JOHN LEDBETTER)