

ROUTING AND TRANSMITTAL SLIP

Date

4/29/11

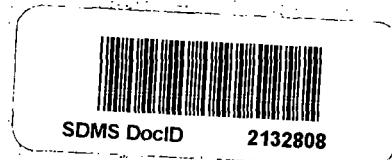
ORIGINAL

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. A Sochanski (3H511)	AS	4/29/11
2. C Howland (3RC44)	CH	5/9/11
3. B. Mykijewycz (3H511)	BM	4/29
4. H. Sokolowski (3H510)	AS	5/17/11
5.		

<input checked="" type="checkbox"/> Action	File	Note and Return
<input checked="" type="checkbox"/> Approval	For Clearance	Per Conversation
<input type="checkbox"/> As Requested	For Correction	Prepare Reply
<input type="checkbox"/> Circulate	For Your Information	See Me
<input type="checkbox"/> Comment	Investigate	<input checked="" type="checkbox"/> Signature
<input checked="" type="checkbox"/> Coordination	Justify	

REMARKS

All comments have been incorporated into the 5-YR Review for Brandywine DRMO (Revised March 2011).



DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Andy Sochanski	3H511
	Phone No. 3370

5041-102

☆ U.S.G.P.O.: 1993 342-198/80007

OPTIONAL FORM 41 (Rev. 7-76)  
Prescribed by GSA  
FPMR (41 CFR) 101-11.206



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103-2029

**DATE:**

Department of the US Air Force  
Kenneth R. Rizer, Colonel  
Commander, 11<sup>th</sup> Wing  
1535 Command Drive  
Suite A-B 203  
Joint Base Andrews, MD 20762

MAY 17 2011

RE: 2010 (Revised March 2011) Five-Year Review  
Brandywine DRMO  
Brandywine, Maryland

Dear Colonel Rizer:

Thank you for submitting the report, entitled *Final First Five-Year Review For Site SS-01 Brandywine DRMO, Joint Base Andrews Naval Air Facility Washington, NFA8903-08-D-8775, Delivery Order 52, November 2010 (Revised March 2011)* to the EPA for review and concurrence. The report was prepared to address the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 (c) five-year review requirements. EPA has reviewed this five-year review report and found it consistent with EPA's June 2001 guidance document, *Comprehensive Five Year Review Guidance* (OSWER No. 9355.7-03B-P, EPA 540-R-01-007).

EPA concurs with the US Air Force's determination that the interim remedy for groundwater at Brandywine DRMO (SS-01) is protective of human health and the environment. Furthermore, as part of this five-year review, EPA has evaluated the Government Performance and Results Act (GPRA) measures for this site and has determined their status is as follows:

**Environmental Indicators**

1. Human Health: *Current Exposure Controlled*

Groundwater Migration: *Groundwater Migration is Under Control at Brandywine DRMO (SS-01). EPA anticipates receipt of the Interim Remedial Action Completion Report (IRACR) in 2011 and the final remedy for the site to be selected in 2014 by issuance of the final record of decision (ROD).*

**Sitewide Ready for Anticipated Use**

The Site is Site-Wide Ready for Anticipated Use.

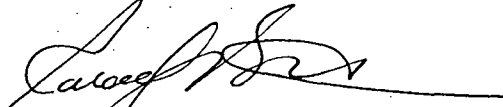


Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.  
Customer Service Hotline: 1-800-438-2474

The requirement for this five-year review at Joint Base Andrews (formerly Andrews Air Force Base) was triggered by the Remedial Action start date of December 19, 2007 at Brandywine DRMO. The next five-year review is due five years from the date of this letter.

If you have any questions, please contact Ben Mykijewycz, Chief of the NPL/BRAC Federal Facilities Branch at 215-814-3351 or S Andrew Sochanski at (215) 814-3370 or at [sochanski.andy@epa.gov](mailto:sochanski.andy@epa.gov).

Sincerely,



Ronald J. Borsellino, Director  
Hazardous Site Cleanup Division

cc: S Andrew Sochanski (3HS11)  
Rick Grills, MDE WAS/EERP  
William Burris, Chief, ER JBA



---

**FINAL  
FIRST FIVE-YEAR REVIEW FOR SITE  
SS-01 BRANDYWINE DRMO**

**JOINT BASE ANDREWS  
NAVAL AIR FACILITY WASHINGTON**



**U.S. AIR FORCE**

*Prepared for:*  
**The Air Force Center for Engineering and the Environment**

Contract No. FA8903-08-D-8775  
Delivery Order 52

*Prepared by:*  
  
MACTEC Engineering and Consulting, Inc.  
Portland, Maine

November 2010  
(Revised March 2011)

---

**FIRST FIVE-YEAR REVIEW FOR SITE  
SS-01 BRANDYWINE DRMO**

**JOINT BASE ANDREWS  
NAVAL AIR FACILITY WASHINGTON**



**United States Air Force**

*Prepared for:*

**The Air Force Center for Engineering and the Environment**

Contract No. FA8903-08-D-8775

Delivery Order 52

*Prepared by:*

 **MACTEC**

**MACTEC Engineering and Consulting, Inc.**

Portland, Maine

**November 2010  
(Revised March 2011)**


FIRST FIVE-YEAR REVIEW FOR SITE  
SS-01 BRANDYWINE DRMO

JOINT BASE ANDREWS  
NAVAL AIR FACILITY WASHINGTON

November 2010

This report documents the Five-Year Review conducted for Site SS-01, Brandywine DRMO, a site that is under the administrative control of Joint Base Andrews Naval Air Facility Washington. The site is undergoing an interim remedial action to address volatile organic compounds in groundwater, in accordance with an Interim Record of Decision issued in September 2006. This is the first five-year review completed for the site, and was conducted as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with CERCLA s121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

Approved by:

  
\_\_\_\_\_  
KENNETH R. RIZER, Colonel, USAF  
Commander, 11th Wing

28 Mar 11  
Date

\_\_\_\_\_  
RONALD J. BORSELLINO, Director  
Hazardous Site Cleanup Division  
United States Environmental Protection Agency, Region III

\_\_\_\_\_  
Date

**FIRST FIVE-YEAR REVIEW FOR SITE  
SS-01 BRANDYWINE DRMO**

**JOINT BASE ANDREWS  
NAVAL AIR FACILITY WASHINGTON**

November 2010  
(Revised March 2011)

This report documents the Five-Year Review conducted for Site SS-01, Brandywine DRMO, a site that is under the administrative control of Joint Base Andrews Naval Air Facility Washington. The site is undergoing an interim remedial action to address volatile organic compounds in groundwater, in accordance with an Interim Record of Decision issued in September 2006. This is the first five-year review completed for the site, and was conducted as required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with CERCLA s121(c), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), Part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR).

**Approved by:**

\_\_\_\_\_  
KENNETH R. RIZER, Colonel, USAF  
Commander, 11th Wing

\_\_\_\_\_  
Date

\_\_\_\_\_  
RONALD J. BORSELLINO, Director  
Hazardous Site Cleanup Division  
United States Environmental Protection Agency, Region III

\_\_\_\_\_  
Date

**FIRST FIVE-YEAR REVIEW FOR SITE  
SS-01 BRANDYWINE DRMO**

**JOINT BASE ANDREWS  
NAVAL AIR FACILITY WASHINGTON**

*Prepared for:*

**The Air Force Center for Engineering and the Environment**

Contract No. FA8903-08-D-8775

Delivery Order 52

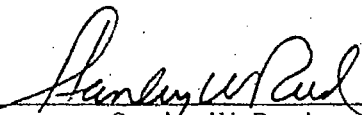
*Prepared by:*

**MACTEC Engineering and Consulting, Inc.**

Portland, Maine

**November 2010**

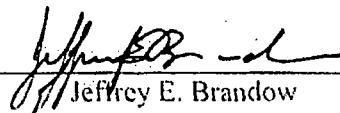
**(Revised March 2011)**



Stanley W. Reed

Principal Engineer

MACTEC Engineering & Consulting, Inc.



Jeffrey E. Brandow

Principal Engineer

MACTEC Engineering & Consulting, Inc.

## TABLE OF CONTENTS

<b>LIST OF ACRONYMS AND ABBREVIATIONS</b> .....	<b>ii</b>
<b>1.0 INTRODUCTION</b> .....	<b>1</b>
1.1 PURPOSE AND SCOPE .....	2
<b>2.0 SS-01 FIVE-YEAR REVIEW</b> .....	<b>3</b>
2.1 SS-01 DESCRIPTION AND CHRONOLOGY .....	3
2.2 SS-01 BACKGROUND.....	5
2.2.1 Physical Characteristics .....	5
2.2.2 Land and Resource Use .....	6
2.2.3 History of Groundwater Contamination .....	7
2.2.4 Initial Response.....	8
2.2.5 Basis for Taking Action.....	10
2.3 SS-01 REMEDIAL ACTIONS .....	10
2.3.1 Remedial Action Objectives .....	10
2.3.2 Selected Remedy.....	11
2.3.3 Remedy Implementation.....	17
2.3.4 System Operations/Operation and Maintenance.....	18
2.4 PROGRESS SINCE LAST FIVE-YEAR REVIEW .....	18
2.5 FIVE-YEAR REVIEW PROCESS.....	19
2.5.1 Community Involvement .....	19
2.5.2 Document Review.....	20
2.5.3 Applicable or Relevant and Appropriate Requirement Review.....	20
2.5.4 Data Review.....	20
2.5.5 Site Inspection.....	21
2.5.6 Interviews.....	21
2.6 TECHNICAL ASSESSMENT.....	22
2.6.1 Question A: Is the remedy functioning as intended by the decision documents?.....	22
2.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid? .....	27
2.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?.....	28
2.6.4 Technical Assessment Summary .....	29
2.7 ISSUES .....	29
2.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS .....	30
2.9 PROTECTIVENESS STATEMENT.....	30
2.10 NEXT REVIEW.....	30
<b>3.0 REFERENCES</b> .....	<b>31</b>

### FIGURES

- Figure 2.1 SS-01 Brandywine DRMO Yard Location Map
- Figure 2.2 SS-01 Site Map
- Figure 2.3 Contaminant Capture Map

### TABLES

- 2.1 SS-01 Summary of Toxicity Values Updates

### APPENDICES

- Appendix A Public Notices
- Appendix B SS-01 ARARs
- Appendix C Responses to Regulatory Comments

## LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
ARAR	applicable or relevant and appropriate requirement
BGP	Basewide General Plan
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CFR	Code of Federal Regulations
COC	contaminant of concern
COMAR	Code of Maryland Regulations
COPC	contaminant of potential concern
CRP	Community Relations Plan
DCE	dichloroethene
DNAPL	dense non-aqueous phase liquid
DRMO	Defense Reutilization and Marketing Office
EE/CA	Engineering Evaluation / Cost Analysis
ERP	Environmental Restoration Program
FFS	focused feasibility study
GIS	geographical information system
gpm	gallons per minute
HRC®	Hydrogen Release Compound
IC	institutional control
IRACR	Interim Removal Action Completion Report
IROD	Interim Record of Decision
LUC	land use control
LUCIP	land use control implementation plan
MCL	maximum contaminant level
MDE	Maryland Department of the Environment
mg/L	milligrams per liter
MOU	Memorandum of Understanding
NTCRA	Non-Time Critical Removal Action
NCP	National Oil and Hazardous Substances Pollution Contingency Plan (commonly referred to as the National Contingency Plan)
PBB	permeable biostimulation barrier
PCB	polychlorinated biphenyl

PCE	tetrachloroethene (also known as perchloroethene)
PGCDER	Prince George's County Department of Environmental Resources
PGCHD	Prince George's County Health Department
PLFA	phospholipid fatty acids
RAO	remedial action objective
RA-O	remedial action operation
RD/RAWP	remedial design/remedial action work plan
RfD	reference dose
RI	remedial investigation
ROD	Record of Decision
SVOC	semivolatile organic compound
TCE	trichloroethene
µg/L	micrograms per liter
USAF	U.S. Air Force
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WSSC	Washington Suburban Sanitary Commission

## 1.0 INTRODUCTION

Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR 300.430 require a review of all remedial actions where hazardous substances, pollutants, or contaminants remain at a site within five years of initiation of the remedial action and not less often than every five years thereafter until site conditions allow for unlimited use and unrestricted exposure. Reviews are performed to evaluate whether the selected remedial actions remain protective of human health and the environment. This five-year review report addresses the Brandywine Defense Reutilization and Marketing Office (DRMO) Site (SS-01 Site) located in the Town of Brandywine, Prince George's County, Maryland, and administered by Joint Base Andrews Naval Air Facility Washington (Joint Base Andrews), formerly known as Andrews Air Force Base. The Brandywine DRMO Site was listed on the National Priorities List by the U.S. Environmental Protection Agency (USEPA) on May 10, 1999 (64 Fed. Reg. 24949). The Comprehensive Environmental Response, Compensation, and Liability Act Information System (CERCLIS) ID number for the site is MD0570024803.

The former DRMO yard occupies approximately eight acres and is located approximately eight miles south-southeast of Joint Base Andrews and one quarter mile north of the intersection of Brandywine Road and Cherry Tree Crossing Road in the Town of Brandywine. The Brandywine DRMO Site includes soil and groundwater contamination extending beyond the former DRMO yard boundary, and response actions have not been limited to the DRMO yard property.

The former DRMO yard was used from 1943 to 1987 as a storage area for waste and excess government material generated by several U.S. Navy and U.S. Air Force (USAF) installations. An Interim Record of Decision (IROD) was finalized in September 2006 selecting an interim remedial action for remediation of volatile organic compounds (VOCs) in groundwater at SS-01.

This five-year review report was prepared by MACTEC Engineering and Consulting, Inc., in support of Delivery Order 052 of Contract FA8903-08-D-8775 under the direction of the U.S. Air Force Center for Engineering and the Environment (AFCEE). The review was completed between October 2009 and October 2010 in accordance with relevant USEPA guidance, including the *Comprehensive Five-Year Review Guidance* (USEPA, 2001).

## 1.1 PURPOSE AND SCOPE

The purpose of a five-year review is to determine whether the remedy implemented at a site is/remains protective of human health and the environment and to evaluate the implementation and performance of the selected remedy. The review accomplishes these tasks by addressing three questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?
- Has any other information come to light that would call into question the protectiveness of the remedy?

Five-year review reports identify deficiencies in the remedy, if any, found during the review, and make recommendations to address them.

This five-year review addresses the protectiveness of the remedy described in the IROD for cleanup of contaminated groundwater outside of the dense nonaqueous phase liquid (DNAPL) source area at the Brandywine DRMO Site (i.e., the aqueous and sorbed-phase contamination) (USAF and USEPA, 2006).

Potential risks from contaminated soil were addressed through a removal action undertaken in 1993 and 1994 and a subsequent Non-Time Critical Removal Action (NTCRA) initiated in September 2006 and completed in October 2007. The NTCRA addressed soil contaminated with polychlorinated biphenyls (PCBs) within the former DRMO yard, in wetland and non-wetland forest areas downgradient of the DRMO yard, and to the extent practicable, in the CSX railroad right of way. The NTCRA is documented in an Interim Removal Action Completion Report (IRACR) (CAPE, 2008). The NTCRA eliminated unacceptable human health and ecological risks due to potential exposure to PCBs. No institutional controls (ICs) were required for this aspect of the site remediation (CAPE, 2008).

A Final Record of Decision (ROD) will be prepared for the site to document the overall site remedy after completion of the interim groundwater action.

## 2.0 SS-01 FIVE-YEAR REVIEW

The IROD for the SS-01 Site was signed on September 29, 2006. Remedial actions addressing the remediation of VOC-contaminated groundwater were implemented in February 2007 and are currently ongoing.

### 2.1 SS-01 DESCRIPTION AND CHRONOLOGY

The former DRMO yard is an inactive facility that is administratively controlled by Joint Base Andrews and occupies approximately eight acres. The site is located approximately eight miles south-southeast of Joint Base Andrews and one quarter mile north of the intersection of Brandywine Road and Cherry Tree Crossing Road in the Town of Brandywine (Figure 2.1).

From 1961 to 1987, the DRMO yard operated as a storage yard for waste and excess government material (IT Corporation, 1999) generated by several U.S. Navy and USAF installations. In January 1987, a fire destroyed the main warehouse building located near the south end of the former DRMO yard. Prior to 1980, drums of waste solvents were stored at the DRMO yard, and several concrete bins, located in the northeast area of the yard, were used to store capacitors and transformers, some of which contained PCBs (Dames & Moore, 1991). Detailed information on where solvent drums were stored and how wastes were handled at the former DRMO yard is not available; however, there are no records of spills, leakage, or burial of wastes or PCBs at the yard (Dames & Moore, 1996a). According to USAF records, hazardous materials and wastes were not stored at the DRMO yard after 1980.

Three 250- to 500-gallon above ground storage tanks and three 2,000-gallon underground storage tanks were also located at the former DRMO yard. These tanks were removed from the yard in 1993 and 1994 during a soil and tank removal action. During the soil and tank removal action, a potential burn pit area was identified in the northwest section of the former DRMO yard.

PCB soil contamination previously detected at the former DRMO yard may be associated with PCB-containing dielectric fluid from the capacitors and transformers stored at the yard. Groundwater at the site has been affected by releases of chemicals, most of which occurred before 1980 (URS, 2001). The releases likely included mainly surface discharges of VOCs, primarily chlorinated solvents. Petroleum hydrocarbons were also found in the groundwater. The petroleum

is believed to be mostly from a nearby property not associated with the DRMO, although some contribution from former operations at the DRMO is possible (USAF and USEPA, 2006).

The USAF finalized the purchase of two parcels of land west of Cherry Tree Crossing Road (i.e., Prince George's County Tax Map 145, Parcels 61 and 279), totaling approximately 3.6 acres, from the Gott Corporation in January 2008. The purchase facilitated the removal of PCB contaminated soil and sediment from wetland and non-wetland forested areas as part of the NTCRA performed in 2007. Purchase of the parcels also facilitated injection of carbon substrate to promote in-situ degradation of contaminants and provided a location for groundwater extraction and treatment facilities constructed in 2008 as part of the interim remedy required by the IROD. In addition, purchase of the parcels simplified implementation and enforcement of ICs. Subsection 2.2.4 provides additional description of the NTCRA. Figure 2.2 shows the location of these parcels.

The SS-01 Site is a USAF Environmental Restoration Program (ERP) site that is in the CERCLA investigation and cleanup process. A chronology of remedial studies, investigations, and reports at SS-01 is presented below.

- 1985: Phase I IRP Records Search (ES, 1985)
- 1986: Prince George's County Health Department Soil Sampling
- 1989: DRMO Soil Characterization (E.C. Jordan, 1990)
- 1988-1990: USGS Investigation (USGS, 1991)
- 1991: Final Work Plan, Trichloroethene (TCE) Plume Delineation and Source Definition (Dames & Moore, 1991)
- 1992: Pumping Test at Brandywine DRMO (Dames & Moore, 1992b)
- 1992: Draft, Conceptual Removal Action Plan (Dames & Moore, 1992c)
- 1992: Report of Findings (Dames & Moore, 1992a)
- 1993-1994: Soil and Tank Removal (Halliburton NUS Corp., 1995)
- 1996: Engineering Evaluation/Cost Analysis for the Remediation of TCE Contaminated Groundwater (Dames & Moore, 1996a)
- 1996: Decision Document for the Remediation of TCE (Dames & Moore, 1996b)
- 1996: Installation Report, Single-Pass Horizontal Well Installation, Completion, and Testing (Dames & Moore, 1996c).
- 1996: Groundwater Flow Model (P-SQUARED Technologies, Inc., 1996)
- 1997 and 1998: Groundwater Monitoring (IT, 1997a, 1997b, and 1998)

- 1999: Groundwater Treatment System Operations and Emissions Test (IT Corporation, 1999)
- 2001: Final Remedial Investigation/Feasibility Study Work Plan (URS, 2001)
- 2002-2003: Remedial Investigation (URS, 2002, 2003, 2006c)
- 2006: Final Engineering Evaluation/Cost Analysis (URS, 2006a)
- 2006: Final Focused Feasibility Study (URS, 2006b)
- 2006: Interim Record of Decision (USAF and USEPA, 2006)
- 2007: Final Site-Specific Community Relations Plan (HGL, 2007a)
- 2007: Final Action Memorandum – Soil Removal (URS, 2007b)
- 2008: Interim Removal Action Completion Report (CAPE, 2008)
- 2008: Quarterly Groundwater Monitoring - October/December 2008 (HGL, 2009a)
- 2009: Quarterly Groundwater Monitoring – January /March 2009 (HGL, 2009b)
- 2009: Quarterly Groundwater Monitoring – April/June 2009 (HGL, report in review)
- 2009: Quarterly Groundwater Monitoring – July/September 2009 (HGL, report in review)
- 2009: Quarterly Groundwater Monitoring – October/December 2009 (HGL, report in review)

## 2.2 SS-01 BACKGROUND

### 2.2.1 Physical Characteristics

The southern portion of the DRMO yard is mostly paved with asphalt, with smaller open areas covered with grass, while the northern portion of the yard is open, unpaved, and covered with grass and weeds. There is a gravel access road and remnants of former buildings. The facility is bounded to the west by an active railroad track operated by CSX and to the east and north by wooded areas (Figure 2.2).

The DRMO yard is enclosed by a chain-link fence with two locked gates. The main entrance to the site is at the south end of the property, providing vehicular access from Brandywine Road. A secondary entrance, installed during Phase I of the remedial investigation (RI), is located on the northern boundary of the yard. The north gate is used mainly to allow personnel and equipment to access sampling locations north of the yard and east of the railroad tracks.

The geological formations encountered at the Brandywine DRMO Site during the RI are (from top to bottom) the Brandywine, Calvert, and Nanjemoy Formations. Groundwater was encountered in the Brandywine Formation at a depth of approximately 2 to 15 feet below ground surface (bgs). The Calvert Formation is located at depths of approximately 25 to 35 feet bgs. The Calvert Formation consists of relatively impermeable silt and clay and acts as a barrier (or aquitard) to the downward movement of groundwater and contaminants.

High groundwater levels occur near the northwest corner of the DRMO yard, where infiltration of precipitation recharges the groundwater. Groundwater flows radially from the highest groundwater elevation, although its velocity is not uniform in all directions. The average groundwater velocity has been estimated at 35 feet per year (URS, 2006c).

Regional drainage in the vicinity of the former DRMO yard is to the west. Culverts direct surface water flow from the drainage ditch east of the railroad tracks under the railroad tracks and Cherry Tree Crossing Road to an unnamed intermittent drainage creek/wetlands located in the wooded area south of the Gott property, along the west side of Cherry Tree Crossing Road. Channeled surface water flows southwest through a well-defined ditch and meets a natural, highly braided channel system. This channel eventually joins with a southern and northern drainage system to form a tributary of Timothy Branch (Dames & Moore, 1996a).

### **2.2.2 Land and Resource Use**

The 8-acre DRMO yard is currently unoccupied and unused by Joint Base Andrews.

The facility is bounded on the west by an active CSX railroad track and on the east and north by wooded areas. Residential areas are located east, southeast, south, southwest, and west of the site, and the majority of the properties surrounding the Brandywine DRMO yard are zoned residential. The Gott property and the Lewis property to the northwest are zoned commercial. The Gott property located about 350 feet north of the site, on the west side of Cherry Tree Crossing Road (Figure 2.2), is a former commercial petroleum products distribution facility. The facility has six aboveground storage tanks within a walled retention structure and a 200-gallon aboveground storage tank immediately behind the office building at the site. Petroleum product releases have been associated with this facility, and a removal action was instituted (Dames & Moore, 1998).

Numerous groundwater monitoring wells sampled during investigations performed at the Brandywine site are located on the Gott Company property.

There is no current use of, or exposure to, groundwater at the site. Residences and businesses in the vicinity of the SS-01 Site obtain their drinking water from the local municipal distribution system, and groundwater is not expected to be used as a potable water source in the future because of ICs to prevent exposure to contaminated groundwater associated with the site. ICs implemented by the USAF include prohibiting use of groundwater beneath U.S. Government owned property at the SS-01 Site. In addition, both Prince George's County through its 10-Year Water and Sewer Plan (PGC, 2006) and the State of Maryland through Code of Maryland Regulations (COMAR) Section 26.03.01.05.A, prohibit the drilling of any new wells for potable use where a municipal water supply is available. However, several homes located beyond the plume have private wells. USEPA and the Maryland Department of the Environment (MDE) categorize the beneficial use of the groundwater at the Brandywine DRMO Site as a potential drinking water source.

Because of historical industrial operations and grading performed after completion of soil removal activities, the natural environment at the former DRMO yard has been severely altered. In its present condition, the site provides poor habitat for wildlife. Restriction of access by a chain link fence and the presence of an active railroad line along the western boundary of the yard also contribute to a reduction in habitat quality. The areas along the active railroad tracks west of the yard also constitute poor habitat for wildlife.

No areas of archaeological or historical importance have been identified at the site.

### **2.2.3 History of Groundwater Contamination**

The extent of groundwater contamination at the site is discussed in depth in the Brandywine DRMO RI report (URS, 2006c) and summarized here. Based on historical evidence and the groundwater and soil data presented and discussed in the RI, the releases of CERCLA-regulated hazardous substances at the Brandywine DRMO yard resulted in three distinct plumes of dissolved chlorinated solvents in the groundwater. The area of highest contaminant concentrations occurs west and northwest of the site. The release or releases responsible for generating this plume most likely occurred near the northwest corner of the site. A smaller, disconnected plume is located within the site. There also is a smaller plume located to the northeast of the site. The spill or spills

responsible for groundwater contamination within the site were events separate from the spills responsible for groundwater contamination northwest of the yard; the plumes are spatially disconnected. The plume within the site is smaller and has lower concentrations of contaminants as does the smaller plume to the northeast.

The most significant groundwater contaminants at the site, as defined by areal extent and concentrations above federal drinking water maximum contaminant levels (MCLs) are tetrachloroethene (PCE), trichloroethene (TCE), and cis-1,2-dichloroethene (DCE). The maximum concentrations of TCE and PCE measured at the site are 224.2 and 0.349 milligrams per liter (mg/L), respectively. The MCLs for TCE and PCE are 0.005 mg/L. The maximum cis-1,2-DCE concentration measured at the site was 13.4 mg/L. The MCL for cis-1,2-DCE is 0.070 mg/L. The results of the site investigations indicated that the VOCs in groundwater at the Brandywine DRMO Site were present both as dissolved contaminants and as droplets or pools of DNAPL that contain primarily TCE (USAF and USEPA, 2006).

#### **2.2.4 Initial Response**

During 1993 and 1994, Halliburton NUS Corporation (HNUS) excavated and removed PCB-contaminated soil from the DRMO yard. All surface soil not covered by concrete paving or warehouse floors was excavated to a depth of 6 to 24 inches, and soil and debris from a deep burn pit in the northern portion of the former DRMO yard was removed. Approximately 14,000 cubic yards of soil were removed. In addition, three underground storage tanks and three aboveground storage tanks were removed (HNUS, 1995). As part of this project, three warehouses (“A”, “B”, and remnants of the main DRMO Warehouse), concrete storage bins, and truck scales were demolished, and 21 existing drums containing solid and liquid wastes were removed. During the excavation, grid sampling at 50-foot horizontal intervals and 3- to 6-inch vertical intervals was performed to determine the extent of excavation. Soil was excavated until soil containing less than 10 milligrams per kilogram (mg/kg) of PCBs (primarily Aroclor-1260) was encountered. Following the soil removal, the yard was re-graded, backfilled, and vegetated. A more detailed description of this 1993-1994 removal action is described in the Remedial Action Report prepared by Halliburton NUS Corporation (Halliburton NUS, 1995).

The 2006 Engineering Evaluation / Cost Analysis (EE/CA) confirmed that contaminants (primarily Aroclor-1260 and lesser quantities of an insecticide [dieldrin] and metals) had spread beyond the

former DRMO yard and were deposited in wetland/drainage ways bordering the railroad and into the wetlands to the west of Cherry Tree Crossing Road through movement of contaminant-laden soil particles suspended in surface water runoff (i.e., erosion) (URS, 2006a). Between July and September, 2007, a total of 6,362.5 tons of impacted soil, sediments, and debris were excavated from the DRMO yard, drainage ways bordering the CSX railroad right of way, and wetland and non-wetland forest areas west of Cherry Tree Crossing Road for proper disposal as part of a NTCRA. Areas targeted for removal included two parcels for which the USAF negotiated purchase from Gott Corporation during 2005 through 2008. Post-excavation sampling verified the excavations achieved the project objectives. Excavations were backfilled with clean, silty soil with characteristics similar to the removed native soil. Disturbed areas were restored by spreading topsoil and seeding with specialized wetland seed mix. In addition, a total of 80 native trees and shrubs were planted in the forested wetland area to enhance site restoration. The cleanup goals of the Removal Action were a PCB concentration of 10 mg/kg (the human health risk-based cleanup goal) within the former DRMO yard, which is considered low-quality ecological habitat, and 1.0 mg/kg (the soil invertebrate lowest observable adverse effect level) in the wetland and non-wetland forest areas, and to the extent practicable in the right of way of the CSX railroad (CAPE, 2008).

In September 1996, a groundwater treatment system using air stripping to remove VOCs was constructed in the northwest corner of the former DRMO yard (Dames & Moore, 1996b). This system consisted of a 14-inch wide by 25-foot deep by 120-foot long groundwater recovery trench used to direct groundwater to a recovery well. Water from the well was treated on site in an air stripper and then discharged into a drainage area on the east side of the CSX railroad. The treated water flowed from this area through a culvert under the railroad, located just south of Gott Petroleum, into the wetlands west of the tracks. Water flowing through the wetlands eventually entered Timothy Branch, approximately 3,100 feet west of the former DRMO yard. Testing of the treatment system delayed its operation until 2000. The system performed effectively after January 2000 under part-time operation, and an estimated 507 pounds of VOCs were removed by December 2005 (URS, 2006a). The capture zone for the extraction trench did not control further migration of contaminants into residential areas because it was not ideally located (URS, 2006a). This system is now inactive, having been supplanted by the system installed on the west side of Cherry Tree Crossing Road in 2008 as part of the interim remedy described in the IROD.

### **2.2.5 Basis for Taking Action**

The human-health risk assessment of the RI determined that, if groundwater at the site were to be used as a potable source, based on its beneficial use designation, PCE, TCE, cis-1,2-DCE, vinyl chloride, naphthalene, 2-methylnaphthalene, iron, and manganese are present at concentrations in groundwater at the site which could result in potential unacceptable risks to future residents and commercial workers (URS, 2006c). The PCE, TCE, cis-1,2-DCE, and vinyl chloride were present above their respective MCLs. MCLs have not been established for naphthalene, 2-methylnaphthalene, iron, or manganese. The RI and focused feasibility study (FFS) concluded that PCE, TCE, cis-1,2-DCE, vinyl chloride, naphthalene, 2-methylnaphthalene, iron, and manganese presented potential risks that require remediation to restore beneficial uses of the aquifer (URS, 2006c, 2006b). In addition, vapor intrusion of TCE from the most contaminated portion of the groundwater plume potentially could pose an unacceptable health risk to future residents and future commercial workers if an occupied building were constructed over the most contaminated portion of the plume.

Because contaminated groundwater at the site does not discharge to ground surface, contaminants in groundwater do not pose risks to ecological receptors because there is no exposure route.

Potential risks from exposure to site soil were addressed by the NTCRA performed in 2006-2007 (CAPE, 2008).

## **2.3 SS-01 REMEDIAL ACTIONS**

The IROD for the SS-01 Site was signed in September 2006 documenting the selected remedy for cleanup of groundwater associated with known releases at the site (USAF and USEPA, 2006).

### **2.3.1 Remedial Action Objectives**

Based on an evaluation of site conditions, an understanding of the contaminants, the results of the risk assessments, and an analysis of applicable or relevant and appropriate requirements (ARARs), the IROD identified the following RAOs for the site:

- Protect current and future human receptors from exposure to contaminated groundwater and to vapor emanating from the contaminated groundwater.

- Prevent further migration of the dissolved phase contaminant plume.
- Reduce contaminant concentrations in groundwater outside of the DNAPL source area.
- Constrain migration of groundwater affected by DNAPL through use of hydraulic controls.
- Further define the location of the DNAPL source area(s) by monitoring the progress of the cleanup.
- Maintain ICs to ensure that people are not exposed to contaminants in the groundwater until the final remedial action is implemented in accordance with the final ROD.

Groundwater contaminants of concern (COCs) listed in the IROD are also listed in the following table.

Contaminant of Concern	Cleanup Concentration <sup>1</sup> (mg/L)	MCL <sup>2</sup> (mg/L)
<u>VOCs</u>		
Tetrachloroethene	Not established in IROD	0.005
Trichloroethene	Not established in IROD	0.005
cis-1,2-Dichloroethene	Not established in IROD	0.070
Vinyl Chloride	Not established in IROD	0.002
<u>SVOCs</u>		
2-Methylnaphthalene	Not established in IROD	Not established
Naphthalene	Not established in IROD	Not established
<u>Metals</u>		
Iron	Not established in IROD	Not established
Manganese	Not established in IROD	Not established

**Notes:**

- 1) Consistent with OSWER Directive 9283.1-03, 10 October 1990 (OSWER, 1990), the IROD did not specify final cleanup concentrations because such goals are beyond the limited scope of the action. Final cleanup levels will be addressed by the final remedial action ROD
- 2) MCLs are presented here for comparison purposes, but have not yet been established as site cleanup concentrations for these contaminants of concern.

### 2.3.2 Selected Remedy

The interim groundwater remedy that was selected in the FFS was Alternative 6: Bioaugmentation and Carbon Substrate Addition with Gradient Control. This alternative consisted of groundwater gradient control by groundwater extraction and aboveground treatment using air stripping

combined with bioaugmentation and carbon substrate addition to decrease the time required to achieve the remediation goals and treat the DNAPL source zone. This alternative also included implementing ICs.

The major components of the selected interim remedial action and the overall cleanup strategy to address contaminated groundwater at SS-01 are as follows:

- Gradient control by groundwater extraction and aboveground treatment
- Bioaugmentation with dechlorinating bacteria and carbon substrate addition to decrease the time required to achieve the remediation goals and to treat the DNAPL source zone
- Location of permeable biostimulation barriers (PBBs) around the groundwater extraction trench
- Monitoring to evaluate the effectiveness of the interim remedial action and define the DNAPL source area for the final ROD
- Implementation of ICs to limit access and exposure to the contaminated groundwater

The following paragraphs describe of each of these components as presented in the IROD and FFS.

#### 2.3.2.1 Gradient Control by Groundwater Extraction and Aboveground Treatment

As described in the IROD, the gradient control and treatment system was to include one extraction trench located in the most contaminated region of the plume. Extracted groundwater was to be treated to remove VOCs, and filtered, if necessary, for removal of suspended solids prior to discharge to a surface drainage that connects to Timothy Branch.

System monitoring requirements consist of testing the influent and effluent to the treatment system for VOCs, semivolatile organic compounds (SVOCs), dissolved metals, and phospholipid fatty acids (PLFA). All extracted water and air discharges must be treated and monitored to meet ARARs before discharge to the environment. The extraction and treatment system will continue to operate for groundwater gradient control until the final remedial action is implemented.

### 2.3.2.2 Bioaugmentation and Carbon Substrate Addition

As described in the IROD, a grid-based application with injection points spaced approximately 20 feet apart within and between rows was required for injection of substrate to treat outlying plume areas on the DRMO yard and on the western end of the plume that would not be influenced by the extraction system. These grid injections were intended to occur only in areas of the plume with concentrations of TCE or PCE above 5 µg/L. Plume areas with concentrations less than 5 µg/L are expected to attenuate naturally. The IROD anticipated substrate injections as deep as 30 feet bgs and about two feet into the Calvert formation near the source area. Dechlorinating bacteria were also to be injected following the injection of the substrate.

### 2.3.2.3 Permeable Biostimulation Barriers Located Around the Groundwater Extraction Trench

The selected remedy included PBBs to provide treatment of groundwater contaminants in addition to that provided by grid injection of carbon substrate. However, during remedy implementation, it became apparent that substrate from the PBBs would travel to the extraction trench and cause biofouling. This was discussed among the Tier I Partners in a meeting on January 24, 2008 (URS, 2008), and the team agreed that installation of the PBBs would negatively affect the gradient control system. As a result, the PBBs were not installed. It should be noted that the IROD anticipated the potential for biofouling if carbon substrate were to reach the extraction trench and contained language allowing temporary shutdown of the gradient control system.

### 2.3.2.4 Groundwater Monitoring and Statistical Trend Evaluations

As described in the IROD and FFS, the groundwater monitoring program included in the selected remedy is to be used to determine the effects of the groundwater treatment system. The proposed performance monitoring program sampling frequency is based on a seven-year monitoring period, which assumes four years to achieve MCLs, then three years of confirmation sampling. The entire monitoring well network is to be sampled quarterly for the first two years, including a baseline sampling round prior to treatment, then semiannually for years three and four. The confirmatory sampling is to be conducted annually in years five through seven.

The results of the long-term monitoring program will be used to update the conceptual site model and the fate-and-transport model for the site. Aboveground treatment system influent and effluent

samples would be collected monthly during the operational life of the treatment system. Monthly monitoring of air emissions, if any, also would occur. During the design and implementation phase, modifications to the sampling frequency and analyte list may be required based on the substrate chosen.

The IROD indicates that all performance monitoring points are to be sampled and analyzed for VOCs, anions, methane, ethane, ethene, PLFA, iron, manganese, total organic carbon, alkalinity, sulfides, and field parameters. The FFS identifies anions as nitrate, sulfate, and chloride; field parameters as temperature, conductivity, pH, dissolved oxygen, and oxidation-reduction potential; and indicates total and dissolved iron and manganese are to be monitored. Because the biodegradation process is stimulated by injection of substrate into the saturated zone, substrate breakdown products and metals also would be monitored. Historically, naphthalene and 2-methylnaphthalene were detected with elevated concentrations only at monitoring wells DP24 and PW01, so only these two wells are also to be monitored for SVOCs. Selected monitoring wells in the grid injection areas may need to be monitored more frequently during years three and four if a secondary injection event occurs.

Subsection 2.13.1 of the IROD states that monitoring and statistical evaluation of trends in concentrations of contaminants requiring remediation will be used to ensure that the selected groundwater interim remedial action is effective and that the plume is not expanding or unexpectedly increasing in concentration. If statistical trends indicate that COC concentrations will not meet MCLs within the anticipated time for remediation (7 years), additional treatment is to be proposed for the site.

#### 2.3.2.5 Institutional Controls

The IROD includes the requirement for ICs to limit exposure to contaminated groundwater. The general areas for which ICs are to be implemented are illustrated on Figure 2.2. The IC objectives are as follows:

- Ensure no potable use of potentially impacted shallow groundwater at the site until MCLs are met in order to limit exposure of residents to groundwater contaminants;
- Ensure that activities occurring within the areas identified within Figure 2.2 do not damage the monitoring wells, interfere with the ability to undertake required environmental monitoring or testing, or cause the plume to spread;

- Ensure that land use is consistent with remedial action objectives;
- Ensure that any proposed construction activities near the site are evaluated with regard to risks posed by contaminants at the site and with regard to the potential for construction and dewatering activities to exacerbate site conditions; and
- Ensure that any impacted groundwater that exceeds relevant regulatory criteria is appropriately managed during construction activities.

The USAF is responsible for implementing, monitoring, maintaining, and enforcing the ICs at the site; however, the ICs will depend, in part, upon implementation of local regulations by Prince George's County. Any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs will be addressed by the USAF or brought to the attention of Prince George's County, if appropriate, as soon as practicable. The USAF is to notify USEPA and MDE regarding how the USAF has addressed or will address the breach within 10 days of sending USEPA and MDE notification of the breach. The ICs can be modified as new data are analyzed; however, the USAF is not to modify or terminate Land Use Controls (LUCs), modify implementation actions, or modify land use without approval by USEPA and the MDE. The USAF will seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

Because the groundwater plume protrudes beyond the DRMO yard onto private properties, implementation of state regulations and county ordinances by Prince George's County are relied upon to protect private property owners and the public from groundwater that may contain hazardous substances. By implementation of state regulations and county codes, Prince George's County has agreed to implement the following ICs at the Brandywine DRMO Site:

- Review of groundwater well permits to regulate well drilling permits within and near the plume, in accordance with COMAR Section 26.04.04.09.
- Review of plans for development, including construction of new buildings or additions to existing buildings, through the Permits and Review Division of Prince George's County Department of Environmental Resources (PGCDER), in accordance with Prince George's County Code, Subtitle 4, Sections 4-270 through 4-315.

The use of groundwater at the Brandywine DRMO Site is currently restricted, as documented in the Prince George's County Ten-Year Water and Sewer Plan. Currently, all residences and businesses located within the immediate vicinity of the groundwater plume receive potable water from the Washington Suburban Sanitary Commission (WSSC). COMAR Section 26.03.01.05.A prohibits

issuance of a permit to individual residents or businesses for private water supply wells when public water supplies are available, as in the case of the Brandywine DRMO Site.

The USAF implemented the following ICs at the Brandywine DRMO Site:

- Notify USEPA and MDE at least six (6) months prior to any transfer or sale of Brandywine so that USEPA and MDE can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective ICs. If it is not possible for the facility to notify USEPA and MDE at least six months prior to any transfer or sale, then the facility will notify USEPA and MDE as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. In addition to the land transfer notice and discussion provisions above, the USAF further agrees to provide USEPA and MDE with similar notice, within the same time frames, as to federal-to-federal transfer of property. The USAF shall provide a copy of executed deed or transfer assembly to USEPA and MDE.
- Maintain records of the groundwater contamination at the Brandywine DRMO Site in the Joint Base Andrews geographical information system/environmental database.
- Provide regular updates to Prince George's County Health Department (PGCHD), PGCDER, and MDE regarding the extent of the plume and the required distance of wells and dewatering trenches from the edge of the plume for safe groundwater usage.
- Provide annual reports on the integrity and effectiveness of the ICs to the USEPA. These reports will be used in preparation of the five-year review to evaluate the effectiveness of the interim remedial action.
- Post signs on the DRMO yard identifying the site as a CERCLA site. The signs will summarize the nature of contamination at the site and will state that no construction or excavation activities and no groundwater use or withdrawal is permitted at the site without written authorization by the USAF. Contact information for the Joint Base Andrews ERP project manager and PGCHD will also be included on the signs.

The ICs are to remain in place until the final remedial action is implemented in accordance with the final ROD (USAF and USEPA, 2006). Monitoring of environmental use restrictions and controls is to be conducted annually by Joint Base Andrews. The monitoring results are to be included in a separate report or as a section of another environmental report, if appropriate, and provided to USEPA and MDE for informational purposes only. The annual monitoring reports are to be used in preparation of the five-year review to evaluate the effectiveness of the interim remedial action. The annual monitoring report will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed. Joint Base Andrews is to notify USEPA and MDE 45 days

in advance of any proposed land use changes that are inconsistent with LUC objectives or the selected interim remedial action.

### **2.3.3 Remedy Implementation**

Based on the selected groundwater remedy, a Remedial Design/Remedial Action Work Plan (RD/RAWP) was developed in 2007 and finalized in 2008 (HGL, 2008) after the completion of a baseline sampling event. The baseline sampling event was used to refine the remedial design and improve the overall efficiency of the selected remedy, as well as to evaluate performance of the selected remedy. Results of the baseline sampling event were summarized in the Remedial Design/Remedial Action Baseline Sampling Report (HGL, 2007b). To achieve gradient control, the remedial design specified a dewatering trench and treatment system for the extracted groundwater. For the enhanced reductive dechlorination portion of the interim remedy, the remedial design specified substrate injection with pH adjustment and bioaugmentation. Implementation of the RD/RAWP was initiated in late 2007. The dewatering trench was installed in fall 2007, and Anaerobic Biochem (ABC®) substrate injection with bioaugmentation was performed from February 2008 through July 2008 to promote anaerobic biodegradation and reductive dechlorination of halogenated solvents in groundwater. Over 1,100 injection points were installed. An important step in the implementation of the interim remedy was the purchase from Gott Corporation of two parcels of land totaling approximately 3.6 acres west of Cherry Tree Crossing Road. The land provided critical access for installation of the groundwater extraction and treatment system.

The Brandywine DRMO groundwater treatment system was designed and constructed to control the groundwater hydraulic gradient within the DNAPL source zone and function in concert with substrate injection/bioaugmentation completed in July 2008. Construction of the treatment system was completed in October 2008, and continuous operation of the system began on December 15, 2008. The treatment system consists of a dewatering trench [approximately 200 feet long by 2 feet wide by 27 feet deep (average)], extraction wells and pumps, and aboveground treatment using air stripping and activated carbon for VOC and SVOC removal from the process water (HGL, 2010).

The capacity of the system is 50 gallons per minute (gpm); however, the initial pumping rate was set at 11 gpm based on groundwater modeling performed during development of the remedial action work plan. Typical average monthly flow rates have ranged from 7 to 11 gpm. From

influent to effluent; the components of the treatment system include: dewatering trench, extraction wells and pumps, primary particulate filter, oil/water separator, air stripper, secondary particulate filter, and liquid- and air-phase carbon filters. Additional details regarding the design and operation of the treatment system can be found in the Final RD/RAWP (HGL, 2008).

The Brandywine DRMO treatment system was in continuous operation from December 2008 through May 2009. From May to July 2009, the system was shut down for modification and testing. During this period, an additional liquid-phase carbon unit was added, and the influent flow rate to the air stripper was reduced to improve contaminant removal efficiency. Normal operation of the treatment system resumed in July 2009, approximately 8 weeks after the system was shut down.

The first post-injection groundwater sampling event was performed in the fall of 2008 (HGL, 2009a), and the second post-injection groundwater sampling event was performed between January 26, and February 5, 2009 (HGL, 2009b). Additional quarterly sampling in 2009 was performed between April 27 and May 5, August 11 and August 19, and November 9 and November 17, but final reports had not been prepared at the time that this five-year review was drafted.

#### **2.3.4 System Operations/Operation and Maintenance**

Operation and maintenance reports are submitted monthly and include a summary of system performance during the month. Between December 31, 2008, and March 26, 2009, the groundwater extraction and treatment system was 99.6 percent operational. The average effective flow rate through the system between December 2008 and March 2009 was 8.1 gpm. As of March 26, 2009, an estimated 11.65 pounds of VOCs have been removed from the subsurface through the groundwater treatment system. Depth-to-groundwater measurements were collected during the monthly operation and maintenance visits from all site monitoring wells, as well as from the two extraction wells (RW-1 and RW-2). The groundwater elevation data are used to create groundwater elevation maps, which show the influence of the groundwater extraction system.

### **2.4 PROGRESS SINCE LAST FIVE-YEAR REVIEW**

This is the first five-year review for the SS-01 Site.

## 2.5 FIVE-YEAR REVIEW PROCESS

### 2.5.1 Community Involvement

The USAF has maintained a public involvement and information program for the ERP since 1990 and maintains an Administrative Record as required by CERCLA. The Administrative Record is maintained at the Environmental Flight, 3466 North Carolina Avenue, Joint Base Andrews. For the convenience of the public, a copy of the Administrative Record is maintained in an Information Repository located at:

Prince George's County Memorial Library-Surratts-Clinton Branch  
9400 Piscataway Road  
Clinton, MD 20735

A site-specific Community Relations Plan (CRP) was developed for the site and finalized in April 2007 (HGL, 2007a). The CRP provides information on community interests and concerns and community relation efforts, as well as background and site overview information. Community interest in the site is low, based on responses to informational questionnaires sent to local residences regarding restoration activities at the site. Community members are, however, interested in keeping informed of environmental activities and findings.

The CRP presents specific techniques and associated timing to be conducted as part of the community relations program. The following is a list of the techniques employed at the site, all of which have been initiated or are ongoing.

- Maintain and update site-specific mail list
- Maintain site-specific points of contact for information
- Maintain information repository
- Maintain a toll free community service line
- Prepare and distribute fact sheets
- Conduct public meetings
- Revise CRP – as events warrant

Community involvement activities for this five-year review consisted of publishing a notice in two local newspapers announcing the USAF's intent to perform the five-year review and providing

information regarding where and how the public could obtain additional information. The notice appeared in the Prince George's County Gazette on December 3, 2009, and in the Capital Flyer on December 18, 2009. A copy of the notice is provided in Appendix A.

### **2.5.2 Document Review**

The five-year review included review of relevant documents including RI and FFS reports, IROD, IRACR, RD/RAWP, and Quarterly Groundwater Monitoring Reports. The following is a list of documents reviewed in the five-year review:

- Final Focused Feasibility Study (URS, 2006b)
- Final Remedial Investigation Report (URS, 2006c)
- Interim Record of Decision (USAF and USEPA, 2006)
- Community Relations Plan (HGL, 2007a)
- Final Remedial Design/Remedial Action (RD/RA) Baseline Sampling Report (HGL, 2007b)
- Interim Removal Action Completion Report (CAPE, 2008)
- Final Remedial Design/Remedial Action Work Plan (HGL, 2008)
- Draft Final Quarterly Monitoring Report (HGL, 2009b)

### **2.5.3 Applicable or Relevant and Appropriate Requirement Review**

The ARARs presented in the IROD Appendix B, Table B-1 are included in Appendix B of this report. These standards and regulations were current at the signing of the IROD and, as part of the five-year site review, have been reviewed for changes that could affect protectiveness. None of the ARARs have had changes since signing of the IROD that affect the protectiveness of the implemented remedial action. In addition, no new ARARs were identified that would affect the protectiveness of the remedy.

Changes to ARARs and TBCs that pertain to risk assessment are discussed in Subsection 2.6.2.

### **2.5.4 Data Review**

Data available for review at the time of preparation of this five-year review consisted of the baseline plus two quarterly rounds of groundwater monitoring data as presented in the First Final

Quarterly Monitoring Report, October – December 2008 (HGL, 2009a) and Draft Final Quarterly Monitoring Report, January – March 2009 (HGL, 2009b). The Quarterly Groundwater Monitoring Reports present a detailed review of the quarterly monitoring data as well as a comparison to baseline conditions and an assessment of whether, based on three rounds of data, the VOC plume areas appear to be increasing or decreasing. Statistical evaluation using the Mann-Kendall test for trends was not performed because insufficient sample rounds were available; a minimum of four are recommended. This five-year review does not repeat the data review of the quarterly report, but bases its assessment, in part, on the detailed review in that report. Discussion is provided in Subsection 2.6.1 under Remedial Action Performance.

### **2.5.5 Site Inspection**

USEPA guidance for conducting five-year reviews recommends that a recent site inspection be conducted by the lead agency (in this case, the Air Force), to visually confirm and document the conditions of the remedy, the site, and the surrounding area. An inspection covering the implementation of LUCs through December 2008 was performed at SS-01 by MACTEC on behalf of the Air Force in January 2009 as part of a comprehensive LUC inspection at Joint Base Andrews CERCLA sites with IRODs/RODs (MACTEC, 2009). In addition, as part of this five-year review, MACTEC employees visited the SS-01 Site on October 21, 2009, to observe site features and conditions and better understand how remedial actions have been implemented. The visit confirmed general site conditions and land use assumptions. In January 2010 MACTEC conducted an additional site inspection, which was documented in a checklist completed on February 2, 2010 (MACTEC, 2010). Formal inspections of the site were not conducted by the USEPA or the MDE as part of the five-year review process.

Although the former DRMO yard is enclosed with a gated and locked chain link fence, it was observed during the October 2009 visit that several sections (60-80 feet) of fence adjacent to the railroad tracks at the southwest boundary were partially tipped over and in need of repair.

### **2.5.6 Interviews**

No formal interviews were conducted with community members in regard to the five-year review at SS-01. A public notice was published in two area newspapers in December 2009, indicating that the review process was underway and providing contact information for questions or comments. No inquiries from the general public were received.

There have been a number of interactions between the Air Force and the public during the course of remedial action implementation to present information to local residents and address specific issues and concerns. The Air Force has met with the Brandywine North Keys Civic Association on numerous occasions to provide updates on the project, and has prepared and distributed several fact sheets to address specific site activities or issues of potential concern to local residents. In addition, the Air Force has met directly with nearby homeowners regarding potential vapor intrusion issues, and provided air quality monitoring devices to residents with specific concerns regarding the air quality within their homes.

Additional input related to the five-year review process was obtained from representatives of the USEPA, MDE, and Prince George's County through their participation in the Tier 1 partnering team and by their review of preliminary drafts of this document.

## **2.6 TECHNICAL ASSESSMENT**

### **2.6.1 Question A: Is the remedy functioning as intended by the decision documents?**

#### 2.6.1.1 Implementation of Institutional Controls and Other Measures:

As discussed in Subsection 2.3.2, the selected remedy includes five major components:

- Gradient control by groundwater extraction and aboveground treatment
- Bioaugmentation with dechlorinating bacteria and carbon substrate addition
- Location of PBBs around the groundwater extraction trench
- Monitoring the effectiveness of the interim remedial action and define the DNAPL source area for the final ROD
- Implementation of ICs to limit access and exposure to the contaminated groundwater

**Gradient Control.** A groundwater extraction and treatment system has been installed at SS-01 and is operating. The groundwater potentiometric surface map in the January/March 2009 quarterly monitoring report indicates that the system has established groundwater gradients to reduce contaminant migration and capture contaminants for treatment.

**Bioaugmentation.** Substrate injections included bioaugmentation with dechlorinating bacteria have been completed as required by the IROD.

**Permeable Biostimulation Barriers.** PBBs were originally intended to be a component of the selected remedy; however, during the design and implementation of the remedy it became apparent that substrate from the PBBs would travel to the extraction trench and cause biofouling. Based on discussions that took place at the January 24, 2008 Tier I meeting, it was agreed that the PBBs should not be installed (URS, 2008).

**Monitoring.** A quarterly groundwater monitoring program has been implemented as required. Additional time and monitoring data are needed to assess the effectiveness of the remedy.

**Implementation of ICs.** The Joint Base Andrews Environmental Flight developed a draft LUC Implementation Plan (LUCIP) for the SS-01 Site in March 2009 (USAF, 2009). The LUCIP presents specific requirements for the establishment, implementation, and maintenance of LUCs at SS-01. The LUCIP has been implemented and incorporated into the Basewide General Plan (BGP). Under the BGP, a Waiver-to-Construct is required for all proposed construction on government property at an ERP site. An approved Waiver-to-Construct means the proposed construction has been evaluated with respect to site activity and environmental risks posed by the construction and ultimate use of the facility.

Annual LUC monitoring was completed for SS-01 for calendar year 2008 (MACTEC, 2009). The 2008 report did not identify inconsistent uses or LUC deficiencies, or activities that could interfere with the effectiveness of the land use restrictions and controls. The report for 2009 was being prepared at the time of this five-year review.

No transfer or sale of the DRMO Yard occurred during 2008 or 2009, and there are no proposed changes in land use for government owned property. At least one residential lot within the LUC boundary has gone to construction. Records of the groundwater contamination at the site were maintained in the geographic information system/environmental database throughout the period.

To help fulfill its obligation to implement LUCs at the SS-01 site, the USAF has prepared a draft Memorandum of Understanding (MOU) for signature by the Prince George's County Health Department, Prince George's County Department of Environmental Resources, and the Prince

George's County Department of Public Works by which these agencies would agree to develop standard operating procedures to meet the objectives identified within the LUCIP for the Brandywine DRMO Site. The Air Force continues to work with the County to finalize the MOU, but as of the writing of this report the County has yet to sign the agreement. In the meantime, many of the components of the LUCIP are already routinely implemented by the County in accordance with existing codes and regulations, and County officials are aware of their obligation to screen proposed development plans for properties within the IC boundary for consistency with the requirements of the ROD. In addition, the Air Force continues to perform public outreach activities to raise awareness in the affected community, and monitors activity in the vicinity of the site on a quarterly basis.

The respective roles and responsibilities for implementing and enforcing LUCs were discussed during a Land Controls Meeting held January 8, 2008, at the Largo Government Center, Largo, Maryland. Meeting participants included representatives of the USAF, Prince George's County Health Department, Prince George's County Department of Environmental Resources, the Prince George's County Department of Public Works, WSSC, and the Maryland-National Capitol Park and Planning Commission. The meeting focused on continued effective application of LUCs at SS-01.

Joint Base Andrews has posted signs at SS-01 to indicate that groundwater at the site presents a potential hazard and that construction, excavation, and groundwater use are prohibited (MACTEC, 2009). The signs summarize the nature of the contamination and state that no construction or excavation activities and no groundwater use or withdrawal is permitted at the site without the written authorization of the USAF. Contact information for the Air Force project manager and PGCHD are also included on the signs. An updated sign was posted at the treatment building enclosure in 2009.

Electronic map layers showing the locations of restricted areas associated with SS-01 have been posted on the official Joint Base Andrews Geographical Information System (GIS) (Andrews Geo-Base) to assist all organizations with project planning and design tasks after the LUCIP is finalized (MACTEC, 2009). Records of the groundwater contamination at the site were maintained in the geographic information system/environmental database throughout the period.

The use of groundwater at the SS-01 Site is restricted, as documented in the Prince George's County Ten-Year Water and Sewer Plan. Currently, all residences and businesses located within the immediate vicinity of the groundwater plume receive potable water from the WSSC. COMAR Section 26.03.01.05.A prohibits issuance of a permit to individual residents or businesses for private water supply wells when public water supplies are available, as in the case of the SS-01 Site.

#### 2.6.1.2 Remedial Action Performance

The quarterly monitoring report for January/March 2009 (HGL, 2009b) provides a detailed review of the second round of quarterly monitoring data as well as a comparison to baseline conditions and an assessment of whether, based on three rounds of data, the VOC plume areas appear to be increasing or decreasing. More recent quarterly data were not available at the time that this five-year review was prepared. Although the three available sampling rounds were too few for statistical evaluation using the Mann-Kendall trend test, the data allow insights about treatment system performance. The monitoring report concludes that concentrations of TCE and PCE are decreasing and that the extent of the TCE/PCE groundwater plumes are decreasing, especially in downgradient areas near Bank Street. The data for cis-1,2-DCE and trans-1,2-DCE were more variable than for TCE and PCE (i.e., increasing in some areas), but overall the extent of the DCE plume was decreasing. The report concludes that the extent of the vinyl chloride plume has not changed substantially compared to baseline conditions.

Figure 2.3 overlays the outlined extent of TCE, PCE, cis-1,2-DCE, and vinyl chloride contamination exceeding cleanup criteria and groundwater elevation contours based on Figures 3.1, 3.2, 3.3, 3.5, and 3.15, respectively in the January/March 2009 quarterly monitoring report (HGL, 2009b). Review of Figure 2.3 shows 4 to 6 feet of water table drawdown at the extraction trench and establishment of well defined gradients to reduce contaminant migration and capture contaminants for treatment. Nearly all the TCE/PCE/DCE/vinyl chloride plume area exceeding MCLs is captured, with the possible exception of a limited area along the western plume boundary. The potential for migration of contaminants from that area is mitigated, however, because it falls within Injection Areas 1 and 4. Based on data through January/March 2009, which show a shrinking plume, TCE/PCE/DCE/vinyl chloride within the area outside the groundwater capture zone is expected to be treated to concentrations less than MCLs before it has a chance to migrate

further downgradient. Based on this preliminary assessment, the remedy appears to be working as designed.

Naphthalene and 2-methylnaphthalene were monitored in wells DP24 and PW01 as stipulated by the IROD. At well DP24, concentrations of these two compounds have declined significantly since the RI sampling in 2002 and are now at, or approaching, non-detectable levels. Well PW01, located in the northwest corner of the DRMO yard and within the capture zone of the extraction trench, continues to exhibit elevated levels of naphthalene and 2-methylnaphthalene. Additional time and samples are needed to fully assess the status of these compounds in the vicinity of PW01.

The monitoring report concluded that concentrations of total/dissolved iron and manganese appear to be increasing across the site because when carbon substrate has been injected, changes to the geochemical conditions of the aquifer occur and iron and manganese are released from the native soil and rock. It is anticipated that these conditions will be transitory and iron and manganese concentrations will decline as the aquifer returns to its natural conditions. The IROD anticipated a treatment timeframe of 7 years to achieve site cleanup levels within the non-source areas of the site.

Oxidation-reduction potential and dissolved oxygen both appear to be decreasing across the site, as expected following substrate injection.

#### 2.6.1.3 System Operations/Operation and Maintenance

The treatment system for extracted groundwater requires operation, maintenance, and monitoring. Operation and maintenance reports are submitted under separate cover on a monthly schedule.

#### 2.6.1.4 Cost of System Operations/Operation and Maintenance

Estimated and actual costs for remedial action operation (RA-O) are shown in the following table. As is shown, actual costs are close to estimated costs and do not suggest operational issues.

<b>SS-01 Annual System Operations, Monitoring, and Maintenance Costs</b>				
<b>Year</b>	<b>Calendar Year</b>	<b>Estimated Cost<sup>1</sup></b>	<b>Current/Actual Cost</b>	<b>Description</b>
1	2008	\$12,000	\$148,000	RA-O
2	2009	\$469,082	\$640,000	RA-O

**Notes:** The initial injections of ABC® substrate occurred from February through June 2008. Operations, monitoring and maintenance costs have been assumed to begin in 2008.

<sup>1</sup> Estimated costs from SS-01 Interim Record of Decision Table 2-9

#### 2.6.1.5 Expected Progress Towards Meeting RAOs

Additional time and monitoring data are required in order to fully assess progress toward meeting RAOs. Review of available data indicates that TCE and PCE are being remediated successfully.

#### **2.6.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?**

**Changes in Standards and To Be Considered Values.** This five-year review did not identify ARARs that have been promulgated since the IROD was signed.

**Changes in Exposure Pathways.** No changes in current or reasonably foreseeable future site conditions that affect exposure pathways were identified as part of this five-year review. The groundwater in the shallow aquifer where SS-01-related contamination was detected is not used as a potable or industrial water resource. The groundwater at SS-01 is not currently used for drinking, washing, or industrial uses, as the area is served by municipal water. Additionally, drilling of new wells in the area is prohibited, and no changes in groundwater use status are anticipated. There are reported to be some potable private wells well downgradient of the site, but they are well beyond the extent of the plume and would not be expected to be impacted by site-related contamination. Nonetheless, groundwater is considered a natural resource under the Maryland Anti-Degradation Policy (COMAR 26.08.02.04), and must be maintained as a potential source of drinking water. Consequently, the remedial action objectives stipulated in the IROD, to restore shallow groundwater to expected beneficial uses to the extent practicable, are unchanged by land uses or exposure pathways.

**Changes in Risk Assessment Methodology, Toxicity, and Other Contaminant Characteristics.** The baseline risk assessment for SS-01 identified contaminants of potential concern (COPCs) for exposures to surface soil, subsurface soil, and groundwater. The risk information was used to

develop the cleanup criteria presented in the EE/CA. The data was used to determine that cleanup was achieved by the removal action.

Twenty-four COPCs were noted for groundwater, eight of which (PCE, TCE, cis-1,2-DCE, vinyl chloride, iron, manganese, 2-methylnaphthalene, and naphthalene) were identified as COCs requiring remediation. Eleven COPCs were identified for vapors of groundwater origin, two of which (cis-1,2-DCE and TCE) were identified as COCs requiring remediation.

The COPCs that were not identified as COCs requiring remediation were established as such because they did not contribute significantly to risks.

The toxicity values for the COPCs and COCs were reviewed to determine if there had been any changes (updates) that could change the COCs identified as chemicals requiring remediation. Of the COPCs identified in SS-01 groundwater, toxicity values selected in accordance with the USEPA policy on human health toxicity values in Superfund risk assessments (USEPA, 2003) have been updated as shown in Table 2.1.

Updated toxicity values are available (or proposed) for several of the COPCs in groundwater. However, with the exception of iron, none of the updated or proposed toxicity values would increase or decrease risks so as to add or remove chemicals as COCs in groundwater. The updated reference dose (RfD) for iron would cause the hazard index for iron in groundwater to be reduced from 1.6 to 0.67. This reduction in risk would remove iron as a COC in groundwater.

**Implications for Cleanup Levels.** No groundwater cleanup levels were specified in the IROD. However, the remedial time frame considered in the FFS was based on the time required for groundwater concentrations outside of the DNAPL source area to reach the USEPA MCLs for PCE (5 µg/L), TCE (5µg/L), cis-1,2-DCE (70 µg/L), and vinyl chloride (2 µg/L). There have been no changes in toxicity values that would change the cleanup levels or call into question the protectiveness of the groundwater remedy. However, based on the updates to the toxicity value for iron, iron could be removed as a COC requiring remediation in groundwater.

### **2.6.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

No information has come to light that calls into question the protectiveness of the remedy.

## 2.6.4 Technical Assessment Summary

The following table summarizes the technical assessment of the selected remedy for SS-01.

Assessment Item	Assessment Summary
<b>Question A:</b> Is the remedy functioning as intended by the decision documents?	Yes. The major components of the remedy have been implemented. ICs have been put in place, and in-situ treatment appears to be working as envisioned in the IROD.
<b>Question B:</b> Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy still valid?	Yes. There have been no changes to exposure pathways, risk assessment methodology, or toxicity values that would change the cleanup levels or call into question the protectiveness of the groundwater remedy.
<b>Question C:</b> Has any other information come to light that could call into question the protectiveness of the remedy?	No. Information has not come to light that calls into question the protectiveness of the remedy.

## 2.7 ISSUES

The following table summarizes the issues identified for Site SS-01 during this five-year review.

The table only lists issues that affect current and/or future protectiveness.

Issues	Affects Protectiveness (Y/N)	
	Current	Future
Prince George's County has the lead role in ensuring new construction undertaken on non-government owned property within the IC boundary is in compliance with applicable ICs. Under current conditions, the actions being taken at the site are protective. Long-term protectiveness will depend, in part, on completion of a formal agreement (i.e., the MOU between Prince George's County and the Air Force. Until the MOU is in place and being fully implemented by the County, the future protectiveness of the remedy is not assured.	N	Y
Portions of the perimeter fence surrounding the former DRMO yard are in need of repair to limit potential access to the site by trespassers.	Y	Y

## 2.8 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following table summarizes recommendations and follow-up actions for the issues identified for Site SS-01 during this five-year review. The table only lists recommendations and follow-up actions for issues that affect current and/or future protectiveness.

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y/N)	
				Current	Future
Complete the MOU between the Air Force and Prince George's County to document each party's responsibilities for IC monitoring and enforcement.	USAF and Prince George's Co.	USEPA	12/31/2011	Y	Y
Repair perimeter fence around former DRMO Yard.	USAF	USEPA	12/31/2010	Y	Y

## 2.9 PROTECTIVENESS STATEMENT

The interim groundwater remedy at SS-01 currently protects human health and the environment because residents within the IC boundary at the site are on public water, preventing exposure to contaminated groundwater. However, in order for the remedy to be protective in the long-term, a MOU between Prince George's County and the USAF needs to be completed to ensure that any new construction undertaken within the IC boundary will be documented to be consistent with applicable ICs.

## 2.10 NEXT REVIEW

SS-01 is a statutory site that requires ongoing five-year reviews as long as contaminants remain on site above levels that allow for unlimited use and unrestricted exposure. The next review will be performed within five years of the completion of this five-year review report. The completion date is the date of the signature shown on the signature cover attached to the front of this report.

### 3.0 REFERENCES

- CAPE (CAPE, Inc.), 2008 Interim Removal Action Completion Report for PCB Removal at SS-01 Former Brandywine DRMO Site AAFB, Prepared for: Air Force Center for Engineering and the Environment and Andrews Air Force Base, Maryland, November.
- Dames & Moore (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. Prepared with Hazardous Waste Remedial Actions Program.
- Dames & Moore (Dames & Moore, Inc.), 1992a. Report of Findings, Trichloroethylene Plume Delineation and Source Definition at the Brandywine Defense and Reutilization Marketing Office Site, Andrews Air Force Base, Maryland. Prepared under the Hazardous Waste Remedial Action Program, March.
- Dames & Moore (Dames & Moore, Inc.), 1992b. Pumping Test at Brandywine Defense Reutilization and Marketing Office Site, Andrews Air Force Base, Maryland.
- Dames & Moore (Dames & Moore, Inc.), 1992c. Draft, Conceptual Removal Action Plan for the Remediation of Trichloroethene-Contaminated Groundwater at the Brandywine Defense Reutilization and Marketing Office Site, Andrews Air Force Base, Maryland. Prepared with Hazardous Waste Remedial Action Program.
- Dames & Moore (Dames & Moore, Inc.), 1996a. Engineering Evaluation/Cost Analysis for the Remediation of Trichloroethene-Contaminated Groundwater at the Brandywine Defense Reutilization and Marketing Office Site, Andrews Air Force Base, Maryland.
- Dames & Moore (Dames & Moore, Inc.), 1996b. Decision Document for the Remediation of Trichloroethene Contaminated Groundwater at Brandywine Defense Reutilization and Marketing Office, September.
- Dames & Moore (Dames & Moore, Inc.), 1996c. Installation Report, Single-Pass Horizontal Well Installation, Completion, and Testing, Brandywine DRMO Site, Andrews Air Force Base, Maryland. Prepared with Hazardous Waste Remedial Actions Program.
- Dames & Moore (Dames & Moore, Inc.), 1998. Decision Document for the Remediation of Trichloroethene-Contaminated Groundwater at the Brandywine Defense Reutilization and Marketing Office Site Andrews Air Force Base, Maryland. Revision 1.0. Prepared with Hazardous Waste Remedial Actions Program. Original September 1996, Revision 1998.

- E.C. Jordan Co., 1990. Summary of Site Investigations and Remedial Alternatives, Brandywine Former DRMO Site.
- ES (Engineering-Science Inc.), 1985. Installation Restoration Program, Phase I – Records Search, Andrews Air Force Base, Maryland, June.
- HNUS (Halliburton NUS Corp.), 1995. Remedial Action Report Soil and Tank Removal – Brandywine DRMO. Volume I of III. Andrews Air Force Base, Camp Springs, Maryland.
- HGL (HydroGeoLogic, Inc.), 2007a. Final Site-Specific Community Relations Plan Brandywine Defense Reutilization and marketing Office Yard Andrews Air Force Base, Maryland. April.
- HGL (HydroGeoLogic, Inc.), 2007b. Final Remedial Design/Remedial Action (RD/RA) Baseline Sampling Report Brandywine DRMO Yard: SS-01, Andrews AFB, Maryland. September.
- HGL (HydroGeoLogic, Inc.), 2008. Final Remedial Design/Remedial Action Work Plan Brandywine DRMO Yard: SS-01, Andrews AFB, Maryland, February.
- HGL (HydroGeoLogic, Inc.), 2009a. Final First Quarterly Monitoring Report, October-December 2008, Brandywine DRMO Yard: SS-01, Andrews AFB, Maryland, May.
- HGL (HydroGeoLogic, Inc.), 2009b. Draft Final Quarterly Monitoring Report, January-March 2009, Brandywine DRMO Yard: SS-01, Andrews AFB, Maryland, October.
- HGL (HydroGeoLogic, Inc.), 2010. Brandywine DRMO Yard Operations and Maintenance Report: 6 August 2009 through 28 August 2009 – 9th Monitoring Report, April.
- IT (IT Corporation), 1997a. Seventh Quarterly System Evaluation Report Long-Term Monitoring/Operation and Maintenance Program Sites FT-04, SS-13, ST-17, ST-18, SS-01, Building 1845, ST-19, ST-08, SS-22, Building 5013, and Building 3537 Andrews Air Force Base, Maryland.
- IT (IT Corporation), 1997b. Eighth Quarterly System Evaluation Report Sites FT-04, SS-13, ST-17, ST-18, SS-01, Building 1845, LF-06, LF-07, ST-08, SS-22, Building 5013, and Building 3537 Long-Term Monitoring/Operation and Maintenance Program Andrews Air Force Base, Maryland.

IT (IT Corporation), 1998. Ninth Quarterly System Evaluation Report Long-Term Monitoring/Operation and Maintenance Program Multiple Sites Andrews Air Force Base, Maryland.

IT (IT Corporation), 1999. Groundwater Treatment System Operations and Emissions Test, Brandywine DRMO Site (SS-01) Andrews AFB, Maryland.

OSWER Directive 9283. 1-03 Suggested ROD Language for Various Ground Water Remediation Options, October 10, 1990.

MACTEC (MACTEC, Inc.), 2009. Report of Annual Land Use Control Monitoring, Andrews Air Force Base, Maryland, October 2007 – December 2008. February 2009.

MACTEC (MACTEC, Inc.), 2010. Land Use Control (LUC) Checklist, SS-01., February 2, 2010.

PBS&J (Post, Buckley, Schuh, & Jernigan), 2009. General Plan Update - Joint Base Andrews–Naval Air Facility, Washington, Maryland, December.

PGC (Prince George's County), 2006. Prince George's County 10-Year Water and Sewer Plan. CR-55-2006.

P-SQUARED Technologies, Inc., 1996. Development of a Calibrated Groundwater Flow Model and Evaluation of Remedial Alternatives and Brandywine Defense Reutilization and Marketing Office Site, Andrews Air Force Base, Maryland. With the Hazardous Water Remedial Actions Program.

URS (URS Corporation), 2001. Final Remedial Investigation/Feasibility Study Work Plan for the Brandywine DRMO (IRP Site SS-01). Prepared for the Air Force Center for Environmental Excellence, August.

URS (URS Corporation), 2002. Phase I Technical Memorandum for the Remedial Investigation at the Brandywine DRMO (IRP Site SS-01).

URS (URS Corporation), 2003. Phase IIa Technical Memorandum for the Remedial Investigation at the Brandywine DRMO (IRP Site SS-01).

URS (URS Corporation), 2006a. Final Engineering Evaluation/Cost Analysis, Site SS-01 – Former Brandywine DRMO, Andrews Air Force Base, Maryland, June.

URS (URS Corporation), 2006b. Final Focused Feasibility Study, Site SS-01, Former Brandywine DRMO, Andrews Air Force Base, Maryland, June.

URS (URS Corporation), 2006c. Final Remedial Investigation Report, Site SS-01 – Brandywine DRMO, Andrews Air Force Base, Maryland, August.

URS (URS Corporation), 2007. Final Action Memorandum – Soil Removal, SS-01 – Former Brandywine DRMO, March.

URS (URS Corporation), 2008. Andrews AFB Environmental Partnering Tier I Meeting, 23-24 January 2008, Prince George's County Health Department, Largo, MD – Final Meeting Minutes.

USAF (U.S. Air Force), 2009. Andrews Air Force Base General Plan, Land Use Control Implementation Plan Site SS-01, Brandywine DRMO, Andrews Air Force Base, Maryland, March.

USAF and USEPA (U.S. Air Force and U.S. Environmental Protection Agency), 2006. Interim Record of Decision, SS-01 Brandywine DRMO, Andrews Air Force Base, Maryland, September.

USEPA (U.S. Environmental Protection Agency), 2001. Comprehensive Five-Year Review Guidance; EPA 540R-01-007; June.

USEPA (U.S. Environmental Protection Agency), 2003. Human Health Toxicity Values in Superfund Risk Assessments, OSWER No. 9285.7-53, December.

USGS (U.S. Geological Survey), 1991. Installation Restoration Program Remedial Investigation/Feasibility Study, Stage 1, Addendum 1, Draft Report, January.



## **FIGURES**

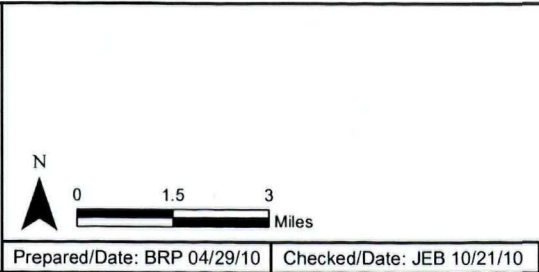
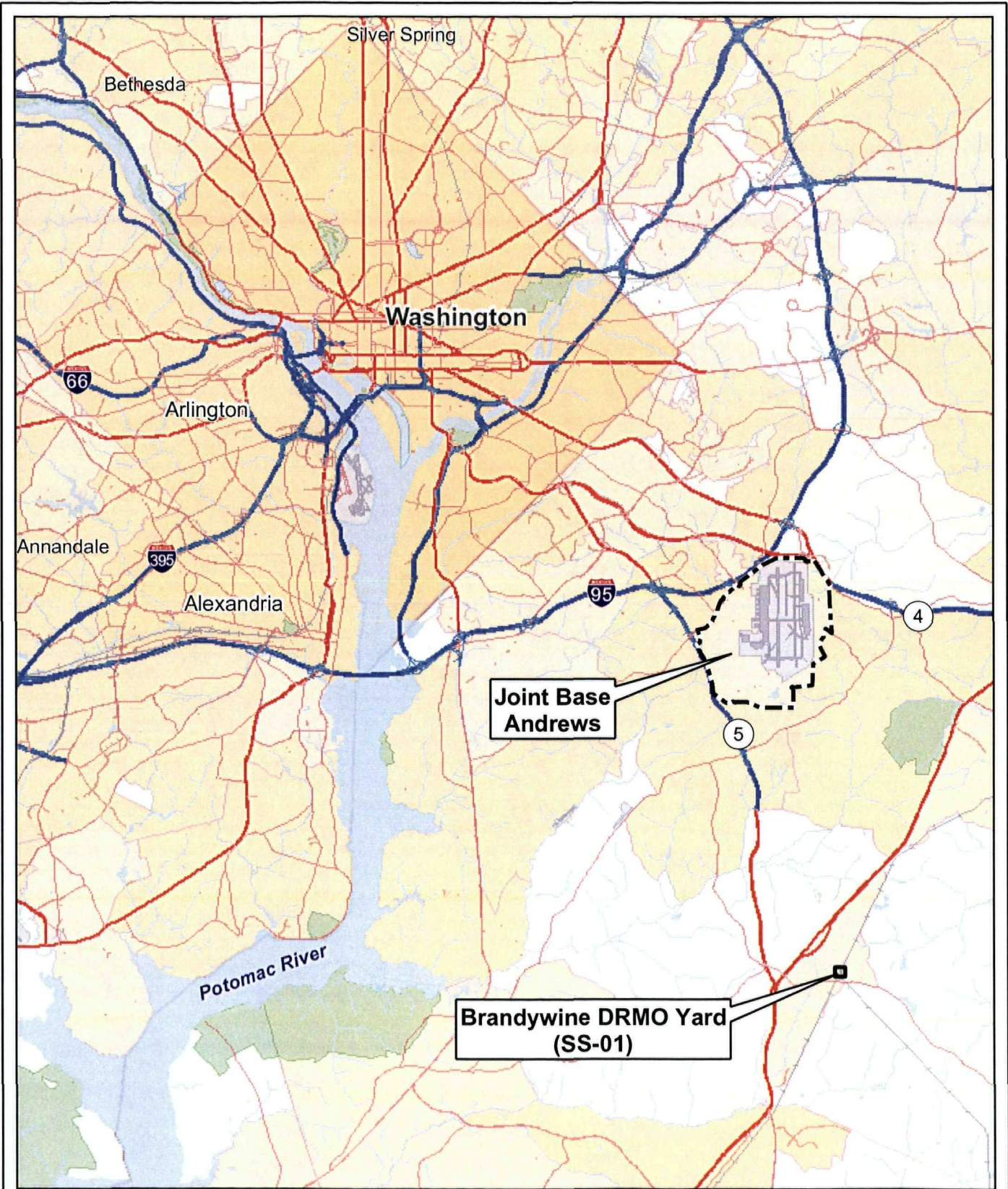
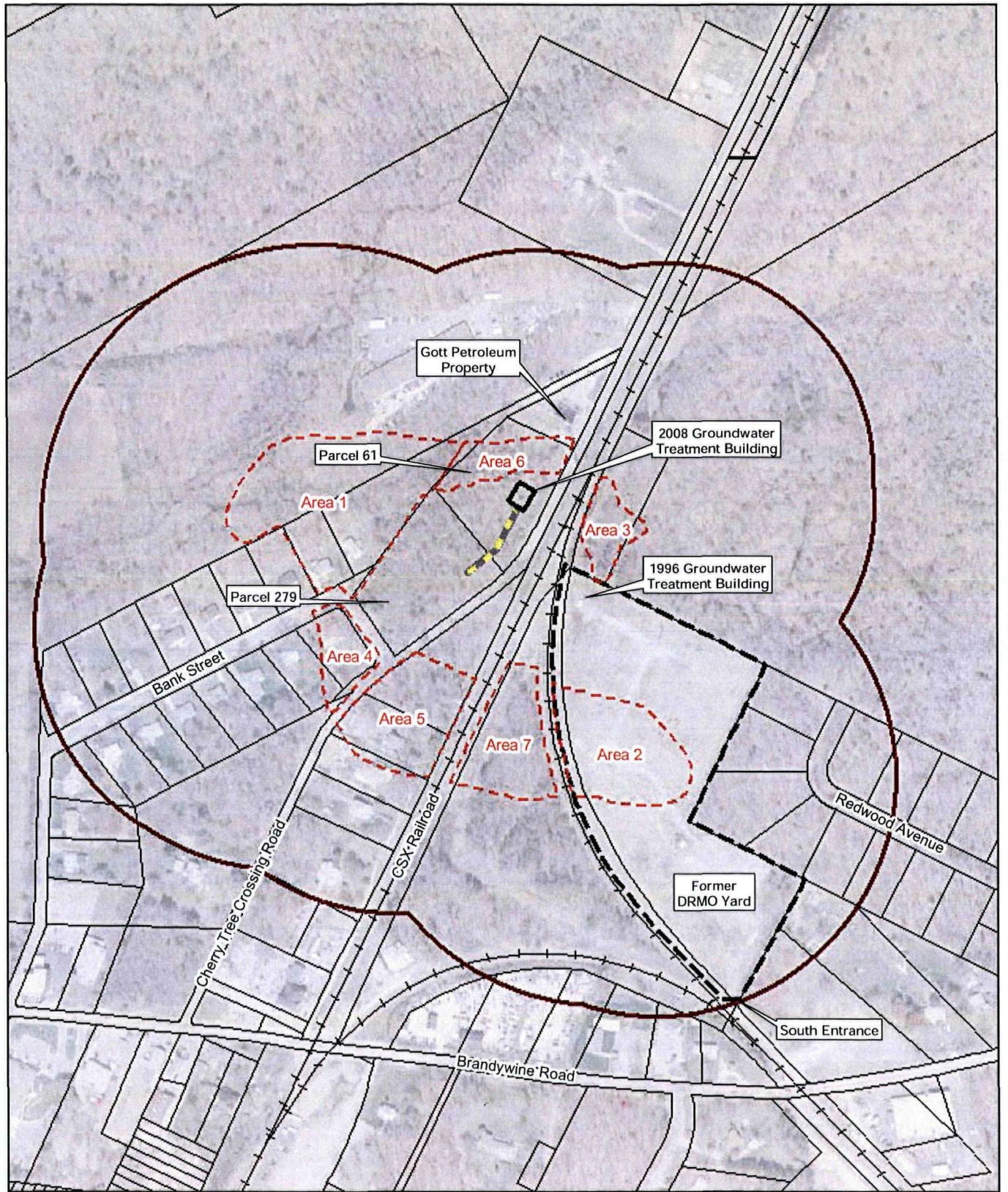


Figure 2.1  
SS-01 Brandywine DRMO Yard  
Location Map

SS-01 2010 Five-Year Review  
Joint Base Andrews, Maryland



Legend

- Substrate Injection Areas
- Area Requiring Institutional Controls
- Groundwater Extraction Trench
- Approximate Site Boundary
- Railroad
- Property Line



Prepared/Date: BRP 04/29/10    Checked/Date: JEB 10/21/10

Figure 2.2  
SS-01 Site Map

SS-01 2010 Five-Year Review  
Joint Base Andrews, Maryland



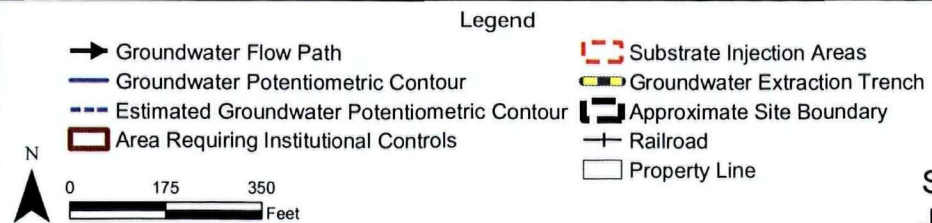
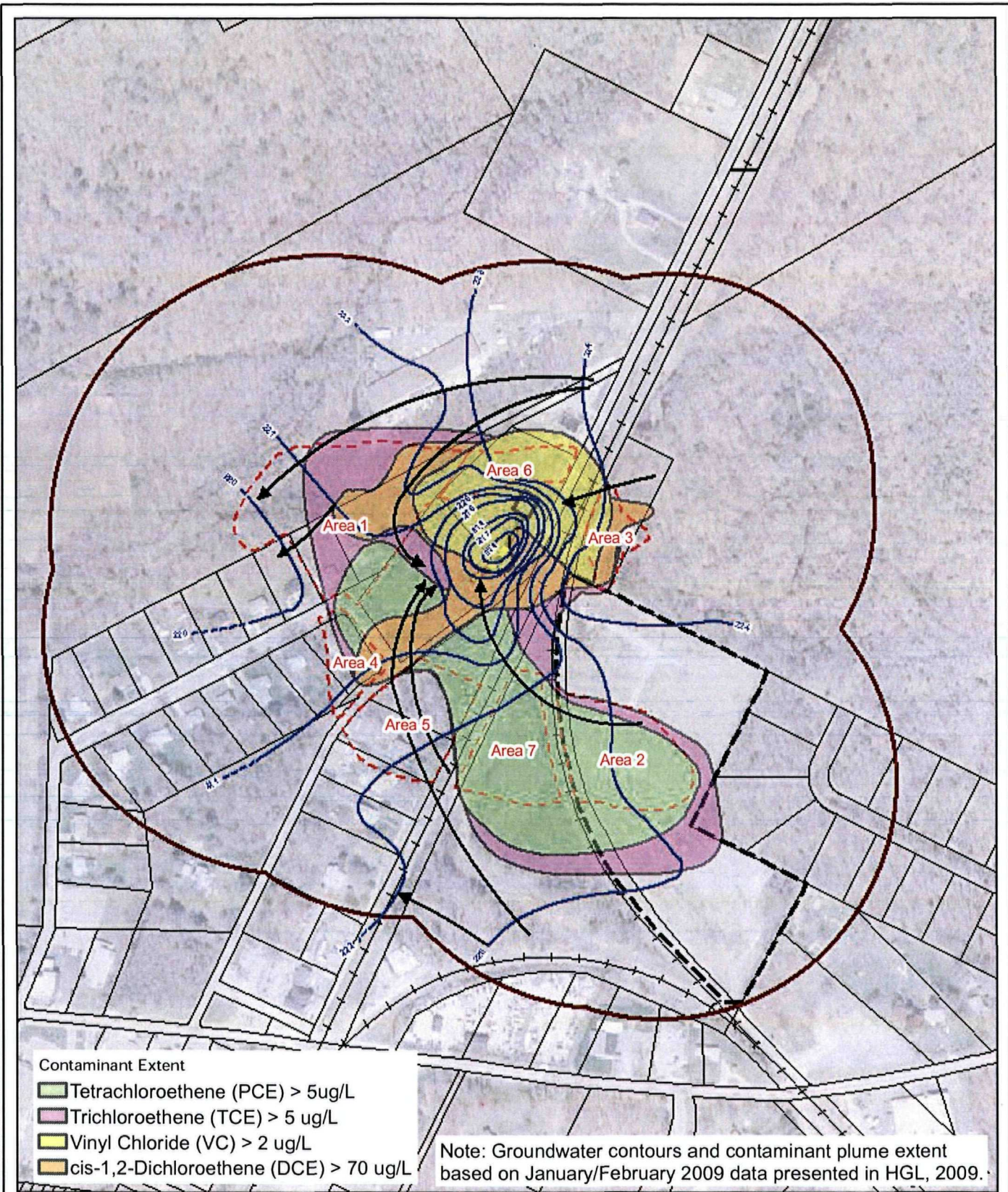
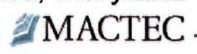


Figure 2.3  
Contaminant Capture Map

SS-01 2010 Five-Year Review  
Joint Base Andrews, Maryland





## **TABLES**

**Table 2.1**  
**SS-01 Summary of Toxicity Values Updates**

Chemical of Potential Concern (COPC)	Oral Reference Dose (RfD) [mg/kg/day]				Inhalation Reference Dose (RfD) [mg/kg/day]				Oral Cancer Slope Factor (CSF) [mg/kg/day] <sup>1</sup>				Inhalation Cancer Slope Factor (CSF) [mg/kg/day] <sup>1</sup>			
	Final RI		Updated		Final RI		Updated		Final RI		Updated		Final RI		Updated	
	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source	Value	Source
Arsenic					NA	NA	4.30E-06	REL								
Barium	0.07	IRIS	0.2	IRIS												
bis(2-ethylhexyl)phthalate (chronic)	0.02	Heast	0.1	CALEPA									0.014	NCEA, IRIS	0.0085	CALEPA
bis(2-ethylhexyl)phthalate (subchronic)	0.02	Heast	0.1	CALEPA												
Chloroform (chronic)					NA	NCEA	0.086	REL								
Chloroform (subchronic)	0.01	Heast	0.1	CALEPA												
Chromium III (subchronic)	1	Heast; NCEA	1.5	IRIS (chronic)												
4,4'-DDD	NA	NA	0.0005	surrogate									NA	NA	2.4E-01	CALEPA
1,4-Dichlorobenzene	0.03	NCEA	0.07	ATSDR					2.4E-02	IRIS	5.4E-03	CALEPA	2.2E-02	HEAST (NCEA)	3.9E-02	CALEPA
1,4-Dichlorobenzene (subchronic)	2.5	Heast	0.8	chronic												
cis(1,2-dichloroethene) (chronic)	0.01	Heast	0.006	IRIS proposed												
cis(1,2-dichloroethene) (subchronic)	0.1	Heast	0.3	CALEPA												
trans(1,2-dichloroethene)	0.02	IRIS	0.02	IRIS proposed	NA	NA	NA/017	IRIS/PPRTV								
Iron	0.3	NCEA	0.7	PPRTV												
PCE	0.01	IRIS	0.004	IRIS proposed	0.6	IRIS	.077/0.005	ATSDR/IRIS proposed	5.40E-01	NA	1.00E-01	IRIS proposed	2.0E-02	NA	7.0E-02	IRIS proposed
Thallium (chronic)	0.00007	other	0.00008	IRIS												
Thallium (subchronic)	0.0007	Heast	0.0008	Heast97												
TCE	6.00E-03	EPA	NA/0.0004	NA/IRIS proposed	NA	NA	0.0014	IRIS proposed	1.1E-02	NCEA	1.3E-02 / 2.0E-02	CALEPA/IRIS proposed	1.5E-02	NCEA	7.0E-3/1.4E-2	CALEPA/IRIS proposed

**Notes:**  
 IRIS - Integrated Risk Information System (December 2009)  
 IRIS Proposed - Integrated Risk Information System (December 2009) - a Draft IRIS Assessment has been published for external peer review.  
 ATSDR - Agency for Toxic Substances and Disease Registry Minimum Risk Level (MRL) (December 2008)  
 CALEPA - California Environmental Protection Agency; slope factors (July 2009) and Reference Exposure Levels (RELs) (December 2008)  
 NCEA - National Center for Environmental Assessment (NCEA) provisional dose-response value  
 PPRTV - Provisional Peer Reviewed Reference Toxicity Value  
 HEAST - Health Effects Assessment Summary Tables 2008 (obtained from Oak Ridge National Library Regional Screening Levels for Chemical Contaminants at Superfund Sites)  
 HEAST97 - Health Effects Assessment Summary Tables FY 1997



**APPENDIX A  
PUBLIC NOTICES**

# The Gazette

9030 Comprint Court, Gaithersburg, MD 20877 301-846-2100

This is to certify that the annexed advertisement of PUBLIC NOTICE AFB was published in the Clinton/Ft Washington Gazette newspapers, a weekly newspaper published in Prince Georges' County, Maryland. The ad appeared once a week for 1 week (s), before 12/4/09.

Copy of Ad Attached  
Ad Order Number G538747

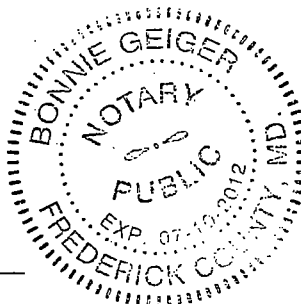
Publication Dates

12/3/09

Gazette Legal Advertising Department

Bonnie Geiger

Notary  
My Commission Expires \_\_\_\_\_



### PUBLIC NOTICE

The Air Force is currently performing the first basewide five-year review at Andrews Air Force Base (AFB), Prince George's County, Maryland, in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 (c). The purpose of the five-year review is to evaluate the performance of previously implemented cleanup remedies to ensure these remedies remain protective of human health and the environment; the purpose is not to reconsider these remedies. Should any remedy be found performing below design expectations, the Air Force will recommend improvements as part of the five-year review. The review will also provide a summary of the current status of on base CERCLA sites that do not yet have remedies in place.

Twelve on base environmental sites will be included in the five year review: FT-02, Fire Training Area 1; FT-03, Fire Training Area 2; FT-04, Fire Training Area 4; LF-05, Landfill 5; LF-06, Landfill 6; LF-07, Landfill 7; SD-23, Sludge Disposal Area; SS-26, Hanger 15; SS-27, Former Dry Cleaner; SS-28, Building 1206; ST-10, PD-680 Spill Site; and ST-14, East Side Gas Station. A separate five-year review will be performed concurrently for SS-01 Brandywine DRMO, located approximately eight miles south of Andrews AFB.

The Air Force plans to issue reports detailing the five-year reviews in August 2010. Following release of the reports, the Air Force will also issue a public notice and fact sheet. Questions or comments on the preparation of the five-year reviews or other environmental activities at Andrews AFB may be directed to:

316th Airlift Wing Public Affairs Office (316 WG/PA)  
1535 Command Drive  
Andrews AFB, MD 20762-7002  
Telephone: 301-981-7888  
Fax: 301-981-4588  
Email: 316PA.comrel@andrews.af.mil

#### **MORE INFORMATION**

Additional information about sites included in the five-year review report and other Andrews AFB sites is available in the Administrative Record which is kept at the Environmental Flight, 3466 North Carolina Avenue, Andrews AFB. For the convenience of the public, a copy of the Administrative Record is maintained in an Information Repository located at:

Prince George's County Memorial Library-Surratts-Clinton Branch  
9400 Piscataway Road  
Clinton, MD 20735  
Phone (301) 868-9200  
Hours: Monday-Wednesday 10 am-9 pm  
Thursday-Friday 10 am-6 pm  
Saturday 10 am-5 pm



**APPENDIX B  
SS-01 ARARs**

**Table B-1  
ARARs and TBCs  
for Brandywine Groundwater Alternatives<sup>†</sup>**

Federal or State Statute, Regulation or Guidance	Summary of Requirement	Type of ARAR	ARAR Category
Maryland's Wetland Restoration Initiative	Commits to increasing the total area of wetlands in the state by 60,000 acres and strengthens the "no net loss" rules.	TBC	Location
Fish and Wildlife Coordination Act, Public Law 89-72	Requires that actions that will impact fish or wildlife must include efforts to protect these affected resources.	RA	Action
<b>Miscellaneous (cont.)</b>			
Executive Order 13148 Greening the Government through Leadership in Environmental Management, Part 6—Landscaping Management Practices, Section 601(a)	Requires incorporation of federal guidance on landscaping federal grounds into landscaping procedures for all federal agencies.	RA	Action
Maryland Forest Conservation Act, Natural Resources Article 5-164-1612	Provides for the replacement of trees when actions result in harvesting that is extensive enough to meet specified criteria.	RA	Action
Maryland Occupational, Industrial, and Residential Hazards Regulations, COMAR 26.02.03	Provides limits on the maximum allowable levels of noise at the site boundaries during site remediation work to protect the health, general welfare, and property of the people of the state.	A	Action
Maryland Water Supply, Sewage Disposal, and Solid Waste Regulations, COMAR 26.04.04 and .07	Provides specifications for well construction and abandonment. Provides for proper closure and post closure monitoring and maintenance of landfills.	RA	Action
Maryland Board of Well Drillers Regulations, COMAR 26.05.01	Provides licensing requirements for persons drilling and installing wells in the state. Assures that monitoring wells are installed by qualified well drillers.	A	Action
Maryland Waterworks and Waste Systems Operator Regulations, COMAR 26.06.01	Provides certification requirements for persons operating facilities used to collect, store, pump, treat, or discharge any liquid or waterborne waste.	RA	Action

<sup>†</sup> ARARs and TBCs listed in this table apply only to the interim remedial action. A new list of ARARs and TBCs will be formulated for the final ROD for the Brandywine site.

Action-specific ARARs are determined according to the specific technologies or activities taking place under an alternative.

Chemical-specific ARARs are not appropriate for interim ROD (OSWER Directive 9283.1-03, 10 October 1990).

Location-specific ARARs are determined according to site-related characteristics such as geology, floodplains, wetlands, sensitive ecosystems and habitats, and historic places.

A = Applicable Requirement

RBC = risk-based concentration

ARAR = applicable or relevant and appropriate requirements

TBC = To Be Considered

AWQC = Ambient Water Quality Criteria

USEPA = United States Environmental Protection Agency

CFR = Code of Federal Regulations

COC = chemicals of concern

COMAR 26 = Code of Maryland Regulations Title 26, Department of the Environment

(January 7, 2005)

NPDES = National Pollutant Discharge Elimination System

RA = Relevant and Appropriate Requirement



**APPENDIX C  
RESPONSES TO REGULATORY COMMENTS**

**RESPONSE TO COMMENTS  
FIRST FIVE-YEAR REVIEW**

**BRANDYWINE DRMO SITE  
BRANDYWINE, MARYLAND**



**United States Air Force**

*Prepared for:*

**The Air Force Center for Engineering and the Environment**

Contract No. FA8903-08-D-8775  
Delivery Order 52

*Prepared by:*



**MACTEC Engineering and Consulting, Inc.**  
Portland, Maine

**October 2010  
(Updated March 2011)**

**Comments contained in USEPA Region 3 markup of Brandywine DRMO Five-year Review text, September 1, 2010**

The following comments are excerpted from USEPA Region III's markup of the draft report text. Most of EPA's markup comments were editorial in nature and have been addressed/incorporated in the revised text and are not enumerated here.

1. *Section 1.0, 2<sup>nd</sup> paragraph. Case law supports EPA's determination that a NPL site extends to wherever contamination lies. EPA insists upon these changes in this paragraph.*

**Response:** The required changes will be incorporated.

2. *Section 2.1, 3<sup>rd</sup> paragraph. Move text or fix the non sequitur (burn pit area is unrelated to the warehouse fire)*

**Response:** The requested change will be made.

3. *Section 2.2.1, 2<sup>nd</sup> paragraph. It is much better to say "are locked unless ..." and then explain when the gates are not locked. As written, it implies that the USAF may not have control over gate/fence/locks. If this is true, then the site is not secure.*

**Response:** The text will be modified.

4. *Section 2.2.4, 1<sup>st</sup> paragraph. The close-out report on the 1993-1994 removal is a better reference here to support the discussion above than the EE/CA. Please add the Close-out report for the 1993-94 Removal action as a reference.*

**Response:** The requested changes will be made.

5. *Section 2.2.5 3<sup>rd</sup> paragraph. The EE/CA is only the report and does not address any potential risks. The NTCRA addressed the risks by removing the contamination.*

**Response:** The reference to the EE/CA will be deleted.

6. *Section 2.3.2.3. This decision and discussion MUST be documented in the Administrative Record! (refers to Tier I decision to not install PBBs).*

**Response:** The discussions and decision by the Tier I occurred on January 24, 2008, and were documented in meeting minutes prepared by URS. A reference to this meeting and the associated minutes will be inserted into the report.

7. *Section 2.5.5, 1<sup>st</sup> paragraph. Was another site inspection performer in January 2010? In accordance with 2.33 Remedy Implementation, pages 15-16 paragraph four stated that annual reports on the integrity and the effectiveness of the ICs will be provided to EPA and used for the Five-Year Review. If an inspection was not conducted in January 2010, the annual reporting requirements were not met.*

**Response:** The text will be revised to indicate that an updated IC checklist for the site was completed in February 2010.

8. *Section 2.6.1.1 (Permeable Biostimulation Barriers). Inconsistent with the information on page 13. Are the PBBs installed or not? Please reconcile!*

**Response:** The text will be revised to indicate that the PBBs were not installed, based on the decisions reached at the January 24, 2008 Tier I meeting.

9. *Section 2.6.1.1 (Implementation of ICs). [BGP] Not defined. Please define and add to the acronyms listing.*

**Response:** The requested changes will be made.

10. *Section 2.6.1.1 (Implementation of ICs). Is the LUCIP finalized/implemented? If not, what's the hold up? Why the delay? So, the ICs are incomplete? How does this affect the protectiveness of the remedy?*

**Response:** The text will be revised to indicate that the LUCIP has been finalized and implemented.

11. *Section 2.6.1.1 (Implementation of ICs). What is this [AFI 32-1021]? What does this mean? Please spell out in detail.*

**Response:** The reference will be spelled out in the text.

12. *Section 2.6.1.1 (Implementation of ICs). The AF must follow up with the County. What is the AF's plan and schedule to complete this [MOU]?*

**Response:** The text will be revised to indicate the Air Force and County have a goal of completing the MOU by the end of 2010.

13. *Section 2.6.1.1 (Implementation of ICs). Was? Hasn't this been done yet? Why? What's the schedule to complete this? Please elaborate and explain.*

**Response:** The update of the Andrews AFB GIS drawings has been completed. The text will be revised to indicate this.

14. *Section 2.6.1.2, 3<sup>rd</sup> paragraph. On what facts is this conclusion based? Please elaborate and explain. It would be more useful to present the data if the conclusion is uncertain.*

**Response:** The text will be revised and clarified.

15. *Section 2.6.1.2, 4<sup>th</sup> paragraph. Is this correct? How long will these conditions last?!*

**Response:** The text will be revised to indicate the projected timeframe to achieve site cleanup levels discussed in the IROD (7 years).

16. *Section 2.6.1.3. When? Was this done? This is critical in evaluating the performance and effectiveness of the remedy. Why has this not been done?*

**Response:** The reference to groundwater modeling will be removed from the text.

17. *Section 2.7, 1<sup>st</sup> paragraph. Is such documentation required by PGC Code § 40270 through 4-315?*

**Response:** Section 2.7 will be revised to focus on the need to complete the Memorandum of Understanding (MOU) between the County and the Air Force.

18. Section 2.7, 1<sup>st</sup> paragraph. *Your supposition that the construction was allowed without following applicable ICs must be substantiated or determined to be invalid. Vague conclusions without supporting information make the document incomplete and deficient when implementing ICs.*

**Response:** Section 2.7 will be revised to focus on the need to complete the Memorandum of Understanding (MOU) between the County and the Air Force.

19. Section 2.7, 1<sup>st</sup> paragraph. *Does the Interim ROD require restricted access? If so, the fence must be repaired. Procedures and a schedule to complete this repair must be documented.*

**Response:** The text will be revised to indicate the fence will be repaired by the end of 2010.

20. REFERENCES. *The date here is 2009. However, following there appears to be two reports one Oct 2007 – Dec 2008 and one February 2009. Inconsistent format e.g. Excellence. August or Excellence, August. Note the change consistent with Excellence, August.*

**Response:** The requested corrections and format revisions will be made.

**USEPA Comments dated September 23, 2010 (Federal Facilities Restoration and Reuse Office)**

1. *Overall the report was written well and it followed the format based on the 2001 Five-Year Review Guidance.*

**Response:** Comment noted, no response required.

2. *Trigger date for the review is Sept 29, 2006 therefore the first five-year review should be due by September 26, 2011. Hopefully, CERCLIS reflects the date. I would encourage us to get the document signed on that date and not so far in advance.*

**Response:** The Air Force, in consultation with EPA, State of Maryland, and Prince George's County representatives, made the decision to complete the Brandywine DRMO five-year review on the same schedule as the Andrews AFB five-year review (i.e., completion in November 2010).

3. *For the issues and recommendations, a table needs to be generated similar to Exhibit 4-3 and Exhibit 4-4. As a reminder, we should only report those issues that affect current and future protectiveness.*

**Response:** A table summarizing issues, recommendations and milestones will be inserted into the document.

4. *The protectiveness statement for OU SS-01 is not clear. I would refer to the 2001 Guidance for language regarding protectiveness statement. Also, because the ICs are not in place, I would argue that the protectiveness determination should be short term until the ICs are in place.*

**Response:** The protectiveness statement will be edited to follow the suggested language in the 2001 Guidance for a remedy that is protective in the short term.

5. *On page 3 the sentence that begins with petroleum hydrocarbon is an awkward sentence.*

**Response:** The sentence has been revised.

6. *Because the MOU with the LUCs has not been signed, there may be a need to add this as an issue and a date on when the MOU will be signed.*

**Response:** Completion of the MOU will be included as an issue, with a target date of 12/31/2010.

7. *Under Section 2.7, this is an issue that could affect future protectiveness so therefore should be added to the list of issues.*

**Response:** Section 2.7 will be revised to focus on the need to complete the Memorandum of Understanding (MOU) between the County and the Air Force. Completion of the MOU will be included in the list of issues.

8. *Need a table that lists the issues, recommendations, and milestones. Refer to page 4-13 in the 2001 Comprehensive Guidance.*

**Response:** A tabular format will be used in the document to present issues, recommendations and milestones.

9. *On page 29, the protectiveness statement does not follow the language in the guidance. Please refer to pages 4-15 through 4-22 in the Comprehensive Guidance.*

**Response:** The protectiveness statement will be modified to more closely conform with the language in the Comprehensive Guidance.

**Prince George's County Comments from email dated October 4, 2010**

1. *Section 1.1, Page 2, 3<sup>rd</sup> paragraph: The NTCRA addressed soil contaminated with polychlorinated biphenyls (PCBs) contaminated soil within the former DRMO yard, in wetland and non-wetland forest areas downgradient of the DRMO yard, and to the extent practicable, in the CSX railroad right of way. This needs to be reworded. Either: "NTCRA addressed soil contaminated with PCBs within the Former DRMO Yard," or "NTCRA addressed PCB contaminated soil within the former DRMO Yard."*

**Response:** The text will be revised as requested.

2. *Section 2.2.2, Page 7, 1st paragraph: State of Maryland through Code of Maryland Regulations (COMAR) Section 26.03.01.05.A prohibit the drilling of any new wells for potable use where municipal water supply is available. Place a comma after "A," and insert "a" after where.*

**Response:** The text will be revised as requested.

3. *Section 2.2.2, Page 7, 1st paragraph: Several homes located beyond the plume have private wells, however. USEPA and the Maryland Department of the Environment (MDE) categorize the beneficial use of the groundwater at the Brandywine DRMO Site as a potential drinking water source. Move "however" to the front of the sentence: "However, several homes located beyond the plume have private wells. USEPA and MDE ...."*

**Response:** The text will be revised as requested.

4. *Section 2.2.3, Page 8, 2nd paragraph: Spell out trichloroethyne (TCE).*

**Response:** The text will be revised as requested.

5. *Section 2.3.1: RAOs-Table Notes (1): Change "cleanup levels" to "clean up concentrations" to match the table heading. Please explain why MCLs are presented in the table for "informational purposes." I think MCLs should be listed for comparison.*

**Response:** Cleanup levels has been changed to cleanup concentrations. The note regarding MCLs has been revised to read "MCLs are presented here for comparison purposes, but have not yet been established as site cleanup concentrations for these contaminants of concern."

6. *Section 2.3.2: The selected interim groundwater remedy for the SS-01 Site was FFS Alternative 6: Bioaugmentation and Carbon Substrate Addition with Gradient Control. Change to: The interim groundwater remedy that was selected in the FFS was Alternative 6: Bioaugmentation and Carbon Substrate Addition with Gradient Control.*

**Response:** The text will be revised as requested.

7. *Section 2.3.2.4: Page 13, 1st paragraph: As described in the IROD and FFS, the groundwater monitoring program included in the alternative is to be used to determine the effects of the groundwater treatment system. The proposed performance monitoring program sampling frequency is based on a seven-year monitoring period, which assumes four years to achieve MCLs, then three years of confirmation sampling. The entire monitoring well network was to be sampled quarterly for the first two years, including a baseline sampling round prior to treatment, then semiannually for years three and four. The confirmatory sampling was to be conducted annually in years five through seven. In the 1st sentence, change alternative to "selected remedy." Change "was" in the third and fourth sentences to "is."*

**Response:** The text will be revised as requested.

8. *Section 2.3.2.5: page 15: ICs 4th sentence after bullets: The ICs can be modified as new data are analyzed; however, the USAF is not to not modify or terminate Land Use Controls (LUCs), modify implementation actions, or modify land use without approval by USEPA and the MDE. Delete the second "not."*

**Response:** The text will be revised as requested.

9. *Section 2.5.4: Page 21: 1st paragraph 3rd Sentence: Statistical evaluation using the Mann-Kendall test for trend was not performed because insufficient sample rounds were available; a minimum of four are recommended. Insert "s" after trend.*

**Response:** This text will be revised as requested.

10. *Section 2.6.1 Page 23, 4th paragraph: This MOU was first provided to Prince George's County in March 2009, but has not yet been signed. Construction began at a residential lot*

*within the LUC boundary in 2009, and it is unclear that proactive measures were taken by county agencies to ensure protection of human health. Change to: ... and permit review was carried out in accordance with standard operating procedures in the process, and the instituted Land Use Controls by the AF, to ensure protection of human health and the environment.*

**Response:** This paragraph will be revised in response to this comment and comments from EPA, to clarify the role the County plays in the implementation of ICs.

11. *Section 2.6.1: Page 23, 5th paragraph, 2nd sentence: Meeting participants included the USAF, Prince George's County Health Department, Prince George's County Department of Environmental Resources, the Prince George's County Department of Public Works, WSSC, and the Maryland-National Capitol Park and Planning Commission. Insert "representatives of" after "included."*

**Response:** The text will be revised as requested.

12. *Section 2.6.1.2: Page 24, 1st paragraph, 3rd sentence: Although the three available sampling rounds were too few for statistical evaluation using the Mann-Kendall test for trend, the data allow insights about treatment system performance. All references that I have seen for the Mann-Kendall Test refer to it as the Mann-Kendall Test, or the Mann-Kendall Trend Test, or Mann-Kendall Analysis.*

**Response:** The text will be revised to read "Mann-Kendall trend test".

13. *Section 2.6.1.2: Page 25, 1st paragraph, last sentence: Based on this preliminary assessment, the remedy appears to be working as envisioned. Change "envisioned" to "designed."*

**Response:** The text will be revised as requested.

14. *Section 2.6.2, Page 26: **Changes in Standards and To Be Considered Values.** This five-year review did not identify ARARs that have been promulgated since the ROD was signed. Change ROD to IROD.*

**Response:** The text will be revised as requested.

15. *Section 2.6.2, page 26, **Changes in Exposure Pathways,** 5th sentence: There are reported to be some potable private wells well downgradient of the site, but they are and well beyond the*

*extent of the plume and would not be expected to be impacted by site-related contamination. Delete "and well," or delete "and."*

**Response:** The text will be revised by deleting "and".

16. *Section 2.6.2, Page 27, 1st paragraph: Consequently, the remedial action objectives stipulated in the ROD, to restore shallow groundwater to expected beneficial uses to the extent practicable, are unchanged by land uses or exposure pathways. Change ROD to IROD.*

**Response:** The text will be revised as requested.

17. *Section 2.8, Page 29, 1st paragraph, 2nd sentence: The IC boundary pursuant to the IROD is the location where site conditions allow for unlimited and unrestricted exposure. Insert "use" after "unlimited."*

**Response:** The text will be revised as requested.

#### **USEPA Comments dated January 19, 2011 (from Division Director Ronald J. Borsellino)**

1. *Page 2.5.5 Inspections: This section should reference inspections conducted by the AF representatives as well as EPA and Maryland Department of the Environment in preparation for this Five-Year Review.*

**Response:** The text will be revised to indicate that inspections were conducted by MACTEC on behalf of the Air Force. No formal inspections were conducted by EPA or MDE.

2. *Page 21, 2.5.6 Interviews: Interviews should consist of interviewing the public and documenting said activities; i.e., Andrews AFB representatives conducted community outreach with members of the Prince George's County Health Department during and after the removal and in-situ groundwater remedy. This section should not identify that the contractor interviewed the AF.*

**Response:** The text will be revised to summarize the extensive community outreach efforts conducted by the Air Force.

3. *Page 2, Paragraph 4, line 7: The sentence references that the MOA will be signed by "the end of 2010." It is now 2011 and the date has passed. Therefore, since the MOU is still not signed as of this date, the planned completion date should be changed to "by the end of 2011".*

**Response:** The text will be revised to remove the reference to a specific target date, and will instead indicate that the MOU has not been signed as of the writing of the Five-Year Review report.

4. *Page 27. Changes in Risk Methodology. Please change to something similar to "The baseline risk assessment for SS-01 identified contaminants of potential concern (CPOCs) for exposures to surface soil, subsurface soil, and groundwater. The risk information was used to develop the cleanup criteria presented in the engineering evaluation / cost analysis (EE/CA). The data was used to determine the cleanup was achieved for the removal action.*

**Response:** The text will be revised as requested.

5. *Page 29 Issues Table: Please correct. Not protective in the future without the completed MOU. It is protective in the short-term.*

**Response:** The Issues Table will be revised as requested.

6. *Page 29 Protectiveness Statement, paragraph 1, last sentence: Again, the document references the "goal of completing the MOU by December 31, 2010 and should be changed to 2011.*

**Response:** The reference to a specific target date for signing the MOU will be removed.