Environmental Restoration Program
Whiteman Air Force Base

Final 2009 Five-Year Review Report

USAF Contract No.
FA8903-08-D-8769-0017
Project No. YWHG20087601
Task Order 0017

Prepared for

509 CES/CEVR, Whiteman Air Force Base
Missouri

Prepared by

CH2MHILL

March 2010

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Executive Summary

The remedies for the Environmental Restoration Program sites at Whiteman Air Force Base in Missouri include institutional controls and groundwater monitoring. A five-year review has been conducted because hazardous contaminants are onsite and unlimited use and unrestricted exposure are not allowed. This is the first five-year review conducted for Whiteman Air Force Base. The review was conducted for Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44 and found that the remedies implemented are in accordance with the requirements of the record of decision documents. The remedy at each site in the program is operating as intended, and is also protective of human health and the environment.

A study was conducted to determine if optimizing each remedy would decrease the time needed to reach remedial action objectives. It is recommended that the sampling frequency at Sites FT-02, LF-12, and SS-44 be reduced from annual monitoring to monitoring every five years. The record of decision associated with Sites FT-02, LF-12, and SS-44 selected remedies based on potable groundwater use. However, the Base groundwater is not used as a potable resource. Therefore, a record of decision amendment may be pursued to remove the groundwater monitoring program and institutional controls for Sites FT-02, LF-12, and SS-44. However, until a record of decision amendment is completed or the remedial action objectives have been achieved, the groundwater monitoring program and institutional controls will remain. No changes are recommended for the groundwater monitoring program at Site SS-30, which was established to manage construction worker exposure to groundwater containing carbon tetrachloride. Therefore, sampling at Site SS-30 will continue to occur, as planned.

Inspections of institutional controls demonstrate the remedy is effectively minimizing human contact with buried waste at the landfill sites (Sites LF-03/SS-41, LF-11, LF-13, LF-34, and LF-42) and direct contact with benzo(a)pyrene contaminated-soil at Site LF-42. The remedies at these sites are expected to remain protective of human health and the environment as long as regular maintenance of the former landfill covers occur and the contamination remains unavailable for direct exposure. The annual institutional controls inspections and the groundwater monitoring program will continue to be implemented as necessary to assure protectiveness in the future.

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Acronyms and Abbreviations

AFB	Air Force Base
AFCEE	Air Force Center for Engineering and the Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
CT	carbon tetrachloride
cis-1,2-DCE	cis-1,2-dichloroethene
ERP	Environmental Restoration Program
FS	feasibility study
GMP	groundwater monitoring program
HRC®	Hydrogen Release Compound®
IC	institutional control
LTM	long-term management
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
µg/L	micrograms per liter
QA/QC	quality assurance/quality control
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	Record of Decision
SREA	Southwest Ramp Expansion Area
TCE	trichloroethene
USEPA	United States Environmental Protection Agency

1. Introduction

The purpose of a five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in this Five-Year Review report. In addition, the Five-Year Review report identifies issues found during the review, if any, and provides recommendations to address them. Appendix A contains the five-year review summary forms.

Since 1984, Whiteman Air Force Base (AFB) has been performing environmental restoration at potential source areas under the Department of Defense Environmental Restoration Program (ERP), which closely parallels and meets the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended in 1986 by the Superfund Amendments and Reauthorization Act. Progress under the ERP is lead by the Department of Defense and coordinated with the Missouri Department of Natural Resources (MDNR) and U.S. Environmental Protection Agency (USEPA). CERCLA 121 states that:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less than each five years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The National Oil and Hazardous Substances Pollution Contingency Plan; 40 CFR 300.430(f)(4)(ii) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

Whiteman AFB identified 44 ERP sites, which are listed below. Thirty-three sites were closed with no further action or closed with additional actions that have been completed. Ten sites have been closed with long-term management activities. Those 10 sites are the subject of this five-year review. The U.S. Air Force conducted the first five-year review for the ERP sites at Whiteman AFB (Figure 1) for the period 2005 through 2009. This report documents that review. The triggering action for the review is the date of Southwest Ramp Expansion Area (SREA) Record of Decision (ROD) signature, which was obtained in 2005. The SREA ROD was the first Whiteman ROD with ERP sites that require five-year reviews. The review was conducted because hazardous contaminants are onsite, and unlimited use and unrestricted exposure are not allowed. The review addressed the following sites:

- Site FT-02 (Fire Protection Training Area) (Figure 2)
- Sites LF-03/SS-41 (Landfill No. 5/Dry Pond) (Figure 3)

- Site LF-11 (Landfill No. 2) (Figure 4)
- Site LF-12 (Landfill No. 3) (Figure 2)
- Sites LF-13 (Landfills No. 2 and No. 4) (Figure 5)
- Site SS-30 (Fourth Street Spill Site) (Figure 6)
- Site LF-34 (Old Hospital Landfill) (Figure 7)
- Site LF-42 (Defense Reutilization and Marketing Office Hardfill Area) (Figure 8)
- Site SS-44 (Trichloroethene [TCE] Spill Site) (Figure 2)

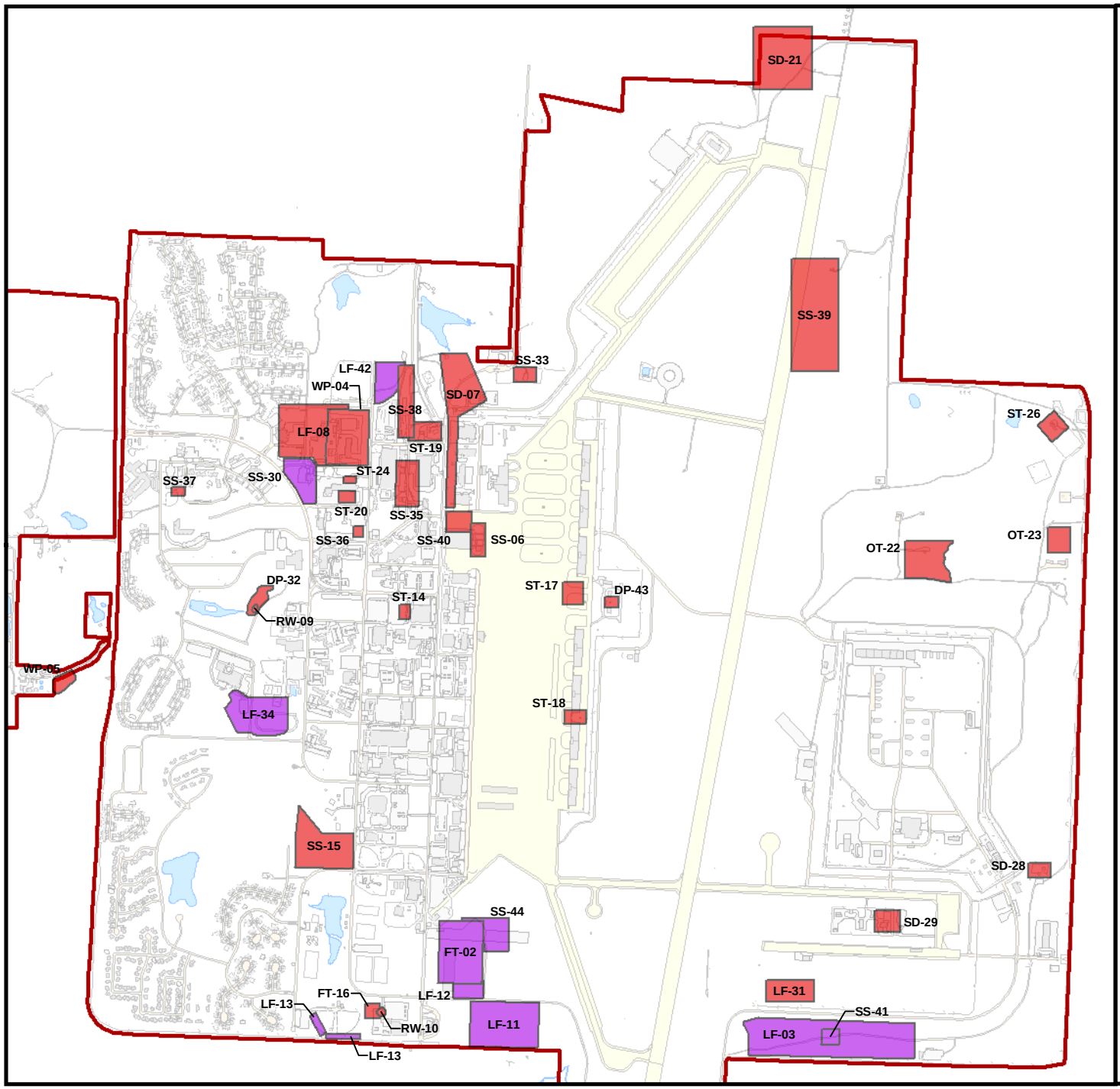
The following ERP sites are closed with no further action and are not subject to a five-year review:

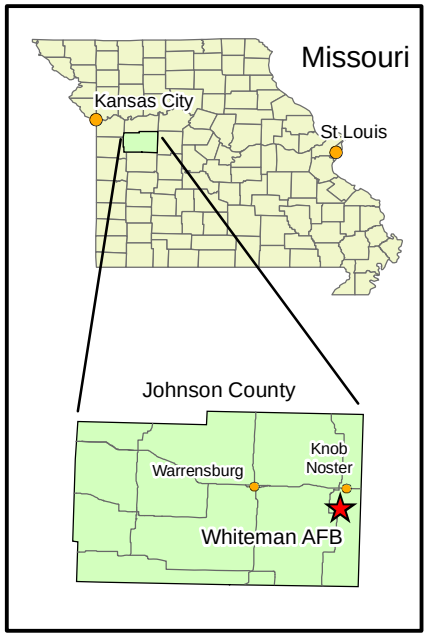
- Site WP-04 (Excess Pesticide Disposal Area)
- Site WP-05 (Chromate Treatment Area)
- Site SS-06 (Drum Storage Area)
- Sites SD-07/SS-40 (Aircraft Wash Rack Drains/Spill Site)
- Site LF-08 (Landfill 1)
- Site RW-09 (Low Level Radioactive Waste Disposal Site 1)
- Site RW-10 (Low Level Radioactive Waste Disposal Site 2)
- Site ST-14 (BX Service Station Tank)
- Site SS-15 (Drum Burial Area)
- Site FT-16 (Former Fire Protection Training Area)
- Site ST-17 (Facility 92 Underground Storage Tank Area)
- Site ST-18 (Facility 93 UST Area)
- Site ST-19 (Facility 101/102)
- Site ST-20 (Facility 158)
- Site SD-21 (S-6 Alert Area Lagoons)
- Site OT-22 (Open Burn/Open Detonation Area)
- Site OT-23 (Firing Range)
- Site ST-24 (Facility 159 Motor Oil UST)
- Site ST-25 (Sedalia Repeater Site)
- Site ST-26 (Facility 94 Communications Building)
- Site ST-27 (Minuteman II Missile Sites)
- Site SD-28 (Dog Kennel Lagoons)
- Site SD-29 (Facility 330 Lagoons)
- Site LF-31 (Old Landfill)
- Site DP-32 (Old Hospital Incinerator)
- Site SS-33 (CE Storage Facilities)
- Site SS-35 (Hobby Shop Spill Site)
- Site SS-36 (Storage Areas/Transformers)
- Site SS-37 (Old Hospital Vehicle Maintenance)
- Site SS-38 (Minuteman II Locomotive Maintenance)
- Site SS-39 (Old Aircraft Crash Site)
- Site SS-40 (Spill Site)
- Site DP-43 (JP-4 Weathering Pit)

In addition to the five-year review, this report presents the 2009 long-term management (LTM) activities that were conducted at Whiteman AFB. LTM activities were completed for

Sites FT-02, LF-11, LF-12, and SS-44, also known as the SREA, which were closed in 2005 and Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42, which were closed in spring 2007. LTM activities at Whiteman AFB consist of institutional controls (ICs) and a groundwater monitoring program (GMP) as described in the LTM and IC plans (CH2M HILL 2005a and 2007a) and the Base General Plan.

The sites are the subject of a ROD dated May 10, 2005 for the SREA (CH2M HILL 2005b) and March 23, 2007 for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42 (CH2M HILL 2007b). The ROD documents present the selected remedies for the 10 active ERP sites. Although the five-year period has not elapsed for Sites LF-03/SS-41, LF-13, SS-30, LF-34, SS-38, and LF-42, the U.S. Air Force included the sites in the five-year review so that the review schedule will be the same for the sites.





LEGEND

INSTALLATION BOUNDARY

SITE STATUS

Site Closed - No Further Action

Site Closed with Long-Term Management

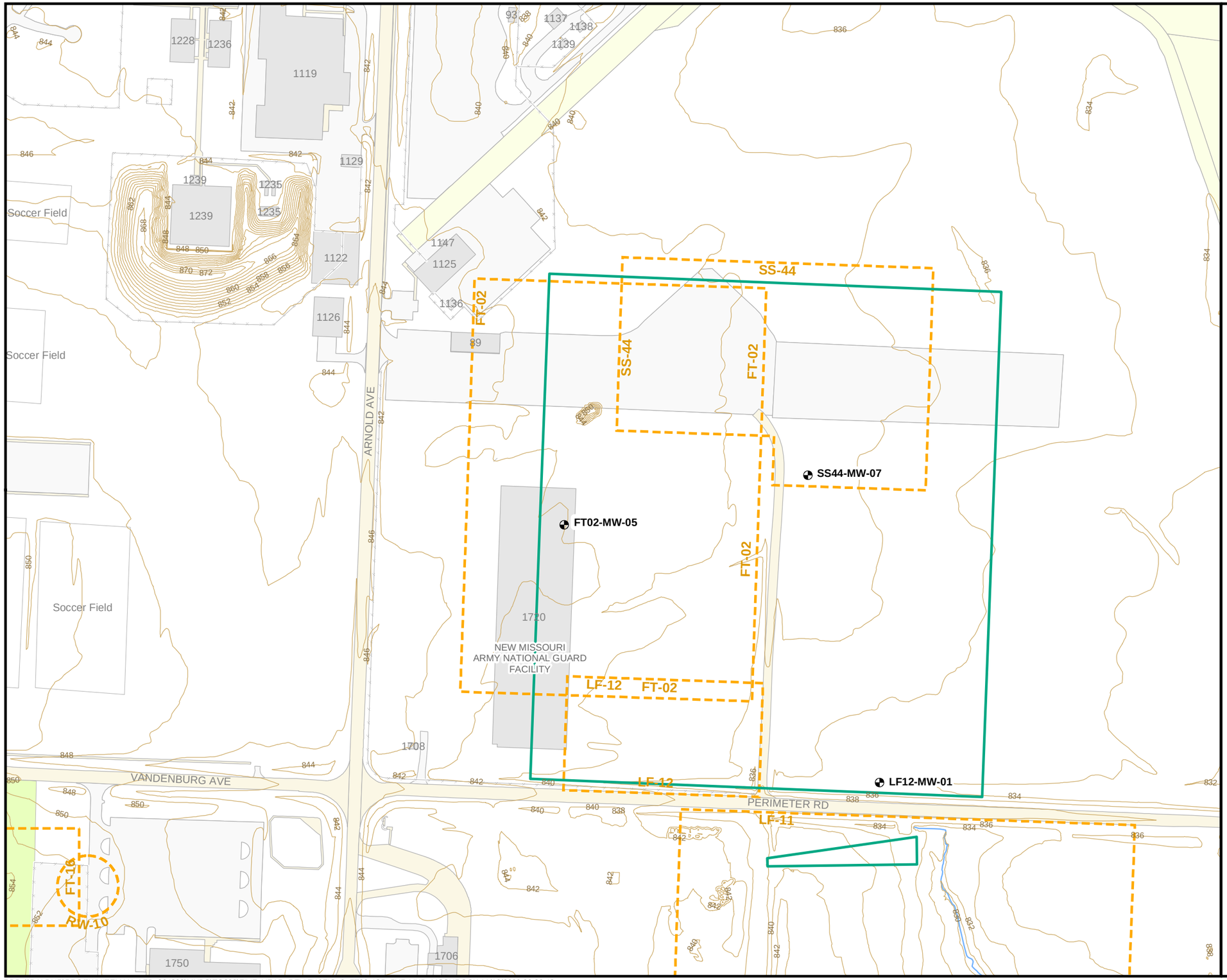
N

0 1,000 Feet

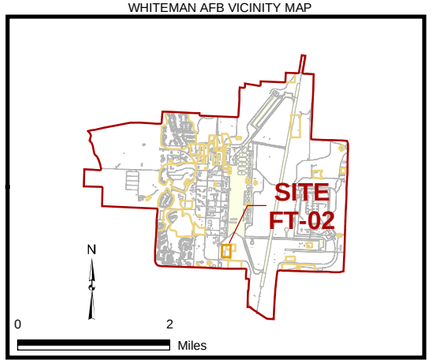
FIGURE 1
ENVIRONMENTAL RESTORATION PROGRAM SITE LOCATION AND STATUS
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_1_SITE_STATUS_5YR.MXD MSCHROCK 11/12/2009 12:47:58



WHITEMAN AFB VICINITY MAP



LEGEND

- LTM MONITORING WELL
- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- PARKS
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

0 200 Feet

N

FIGURE 2
INSTITUTIONAL CONTROL BOUNDARIES FOR SITES FT-02, LF-12, AND SS-44
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

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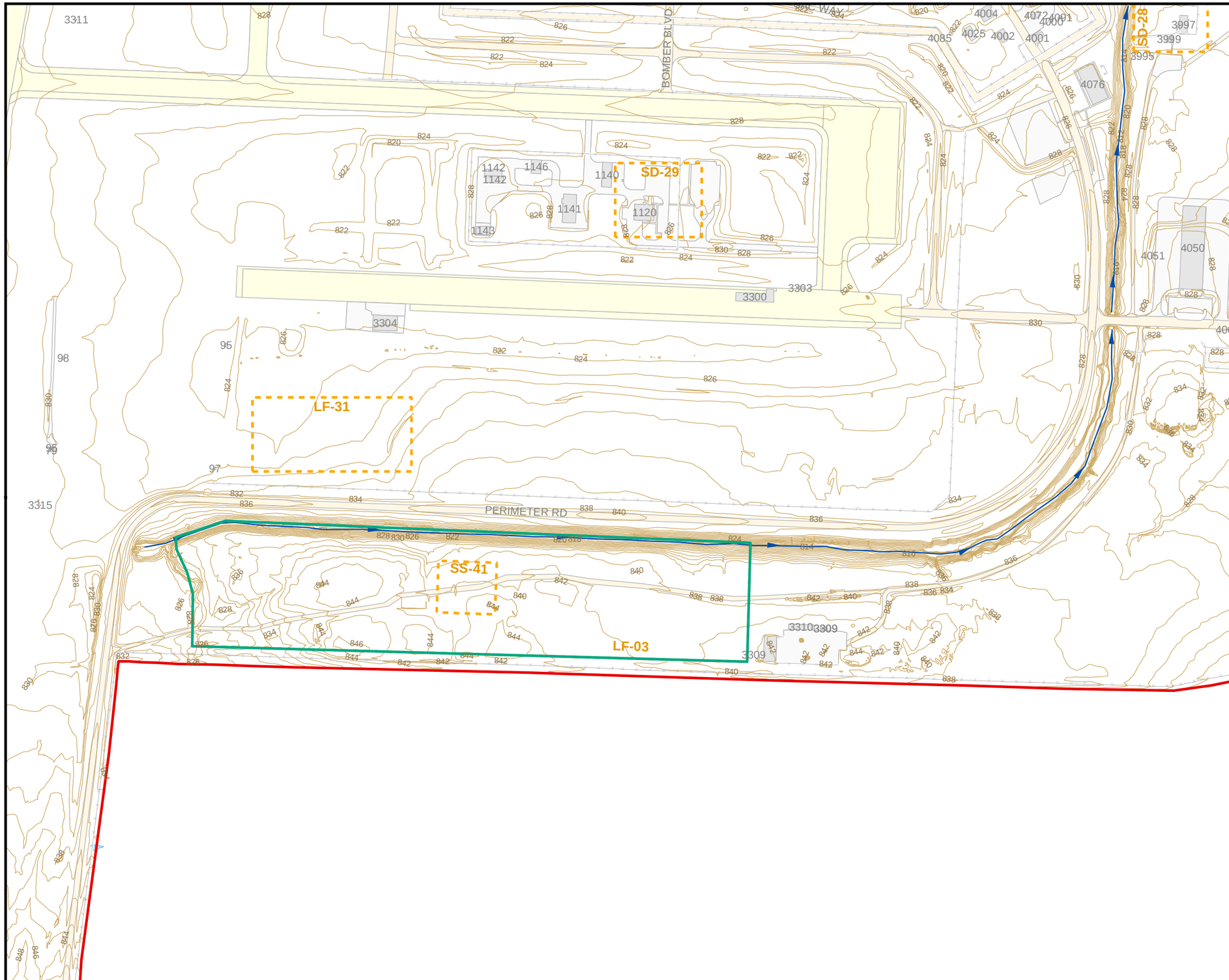
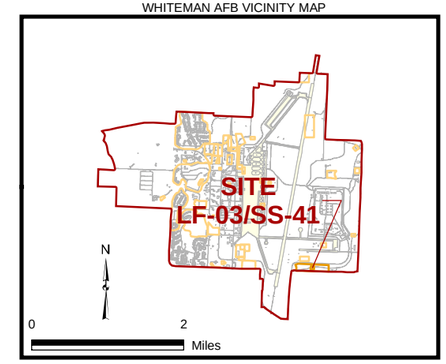


WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- INSTALLATION BOUNDARY
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

0 400 Feet

N

FIGURE 3
INSTITUTIONAL CONTROL BOUNDARY FOR SITE LF-03 / SS-41
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

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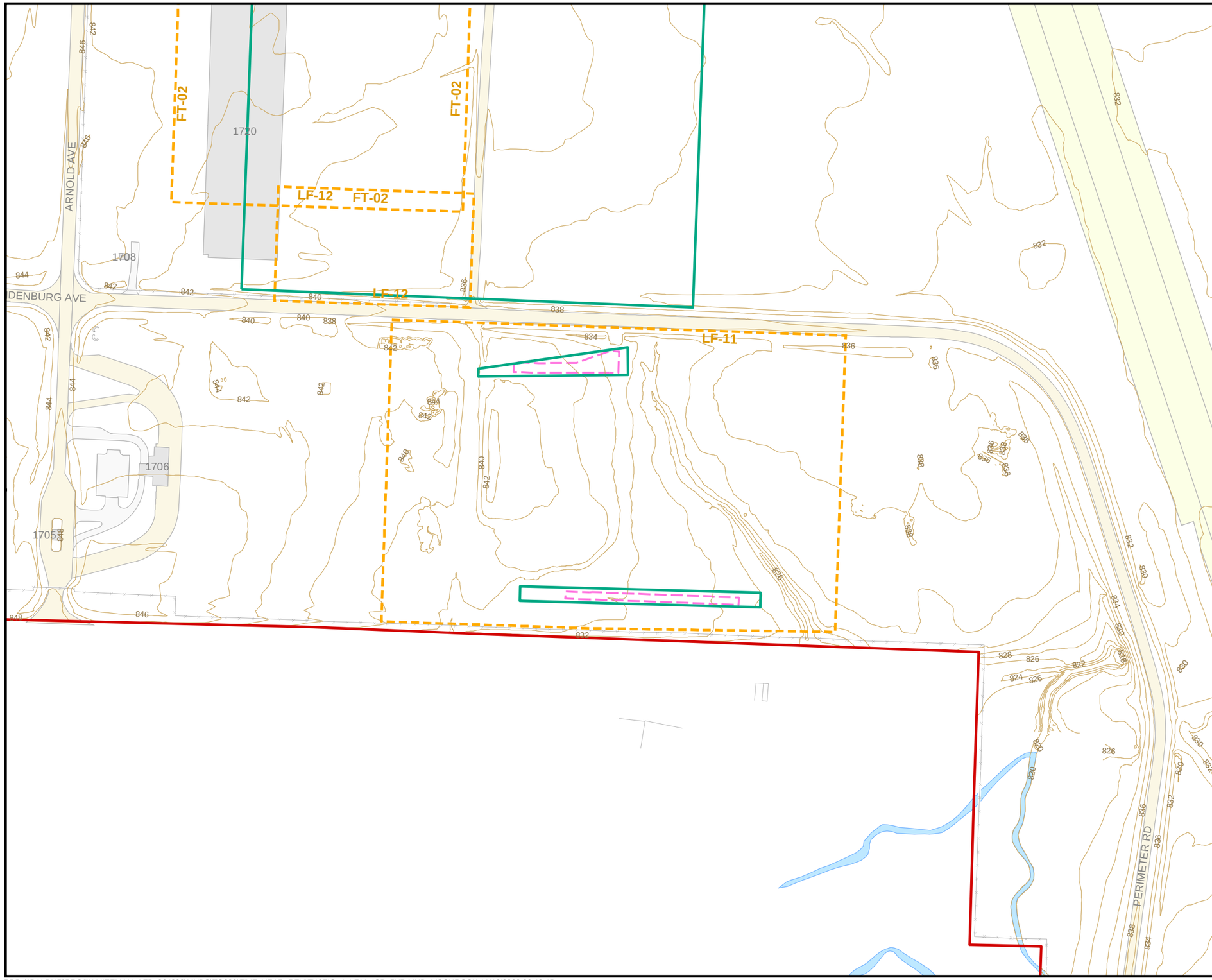
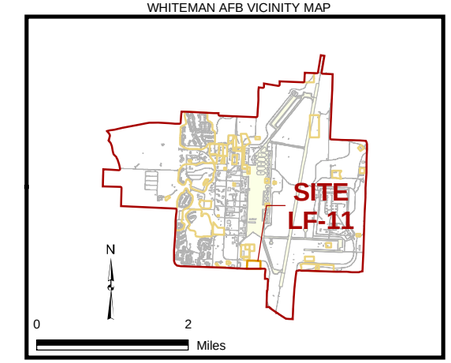


WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- INSTALLATION BOUNDARY
- WASTE TRENCH
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- SURFACE WATER
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

0 200 Feet

N

FIGURE 4
INSTITUTIONAL CONTROL BOUNDARIES FOR SITE LF-11
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

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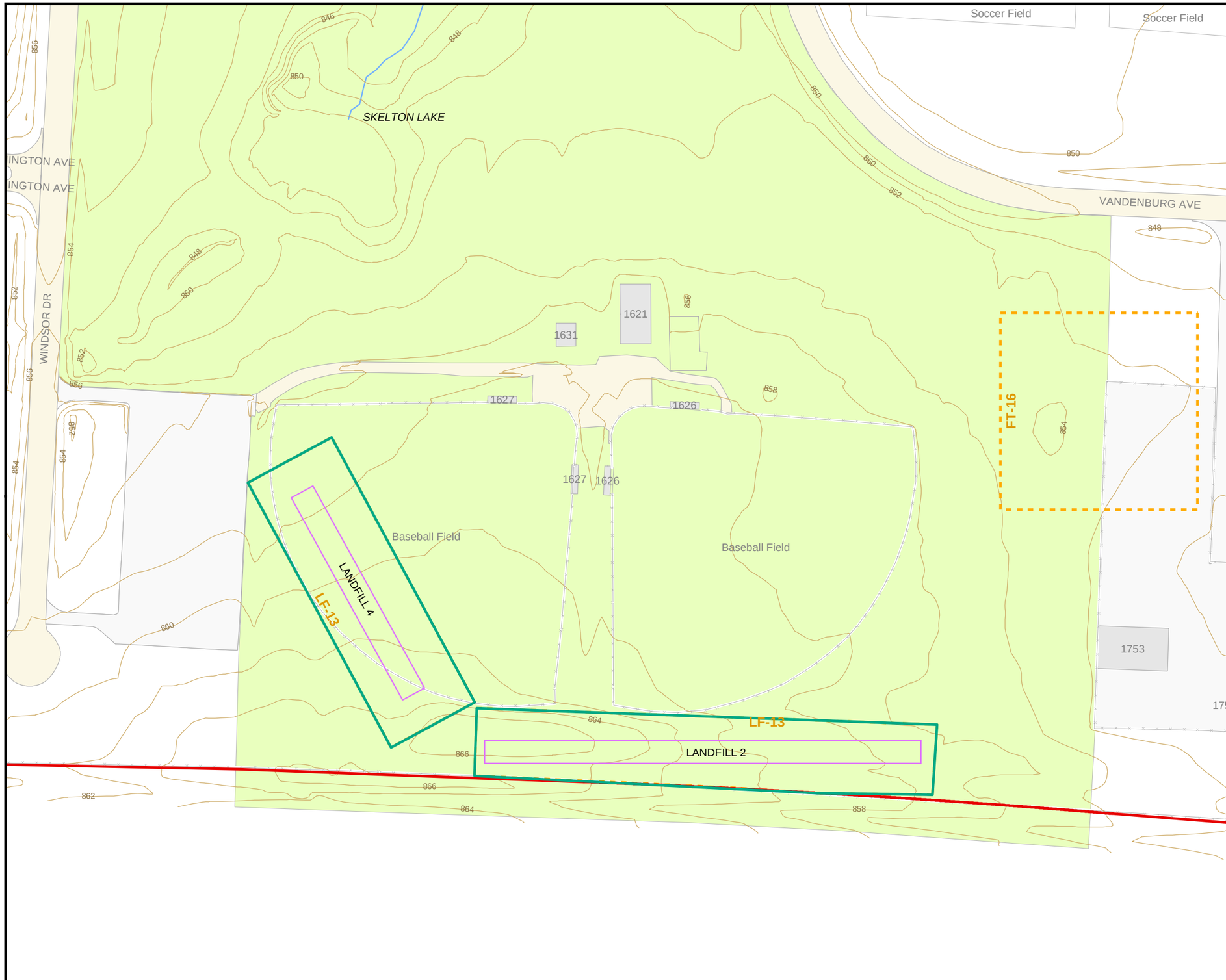

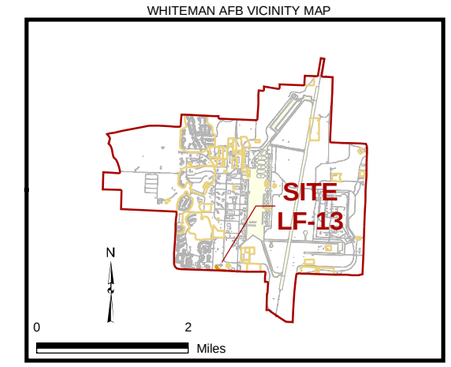

LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- INSTALLATION BOUNDARY
- LANDFILL LIMITS
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- PARKS
- SURFACE WATER
- FENCES
- TOPOGRAPHIC CONTOUR AND ELEVATION

0 100 Feet

N

FIGURE 5
INSTITUTIONAL CONTROL BOUNDARIES FOR SITE LF-13
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

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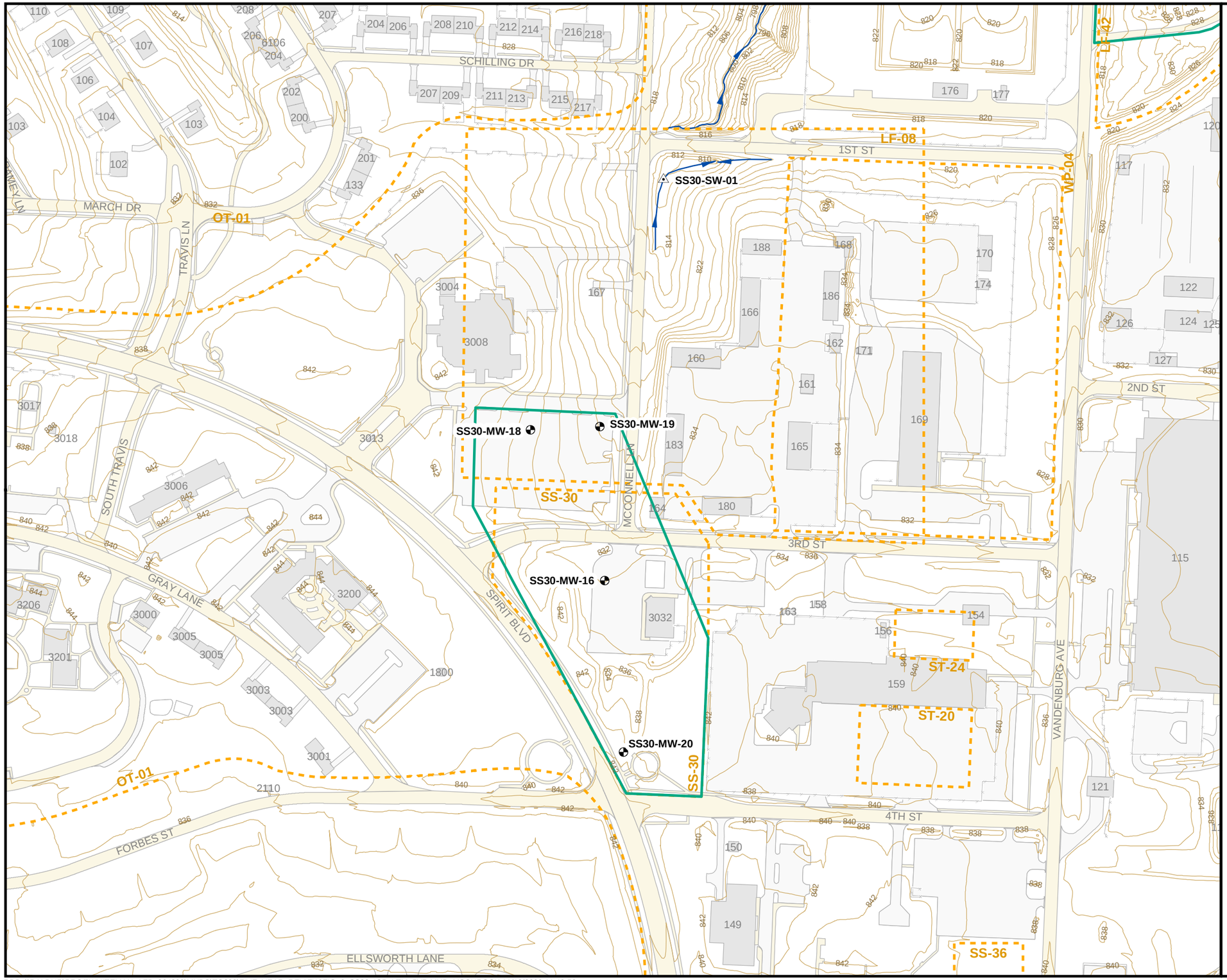
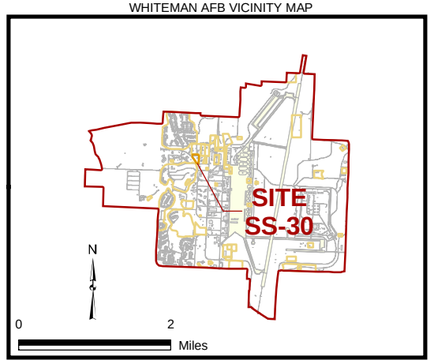


WHITEMAN AFB VICINITY MAP



LEGEND

- LTM MONITORING WELL (NOT SAMPLED IN 2008)
- SURFACE WATER SAMPLE LOCATION
- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION
- DRAINAGE DITCH

0 200 Feet

N

FIGURE 6
INSTITUTIONAL CONTROL BOUNDARY FOR SITE SS-30
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

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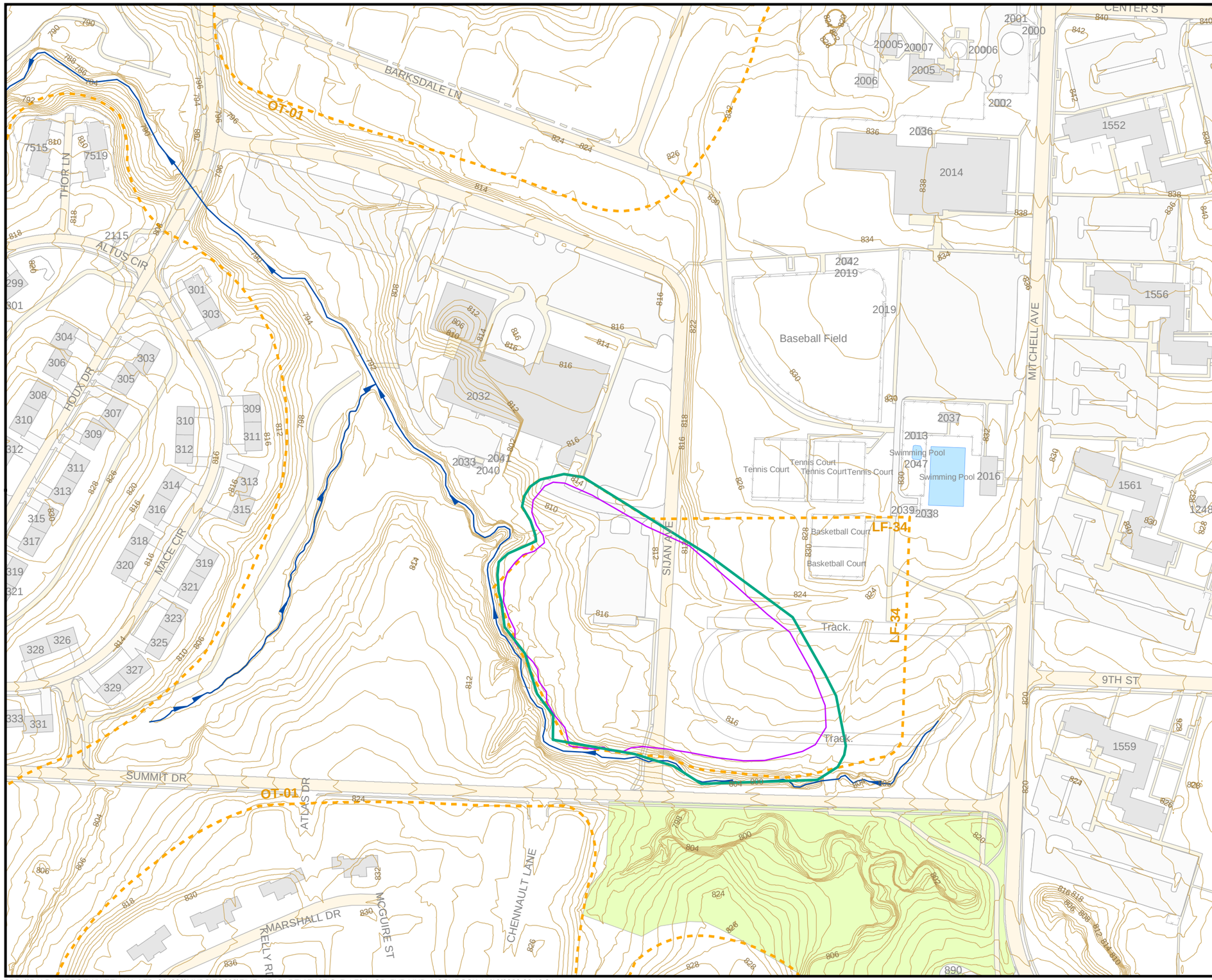
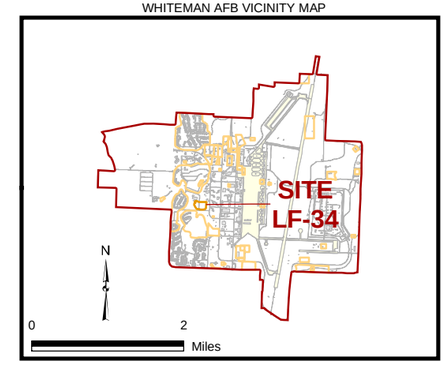


WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- LANDFILL LIMIT
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- PARKS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

NOTE:

THE SITE FEATURES MAP HAS NOT BEEN UPDATED TO REFLECT CURRENT DRAINAGEWAY FEATURES. THE INSTITUTIONAL CONTROL BOUNDARY ON THE SOUTH AND WEST SIDE EXTENDS TO THE TOE OF THE BANK OF THE CREEK ON THE LANDFILL SIDE.

0 200 Feet

N

FIGURE 7
INSTITUTIONAL CONTROL BOUNDARY FOR SITE LF-34
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

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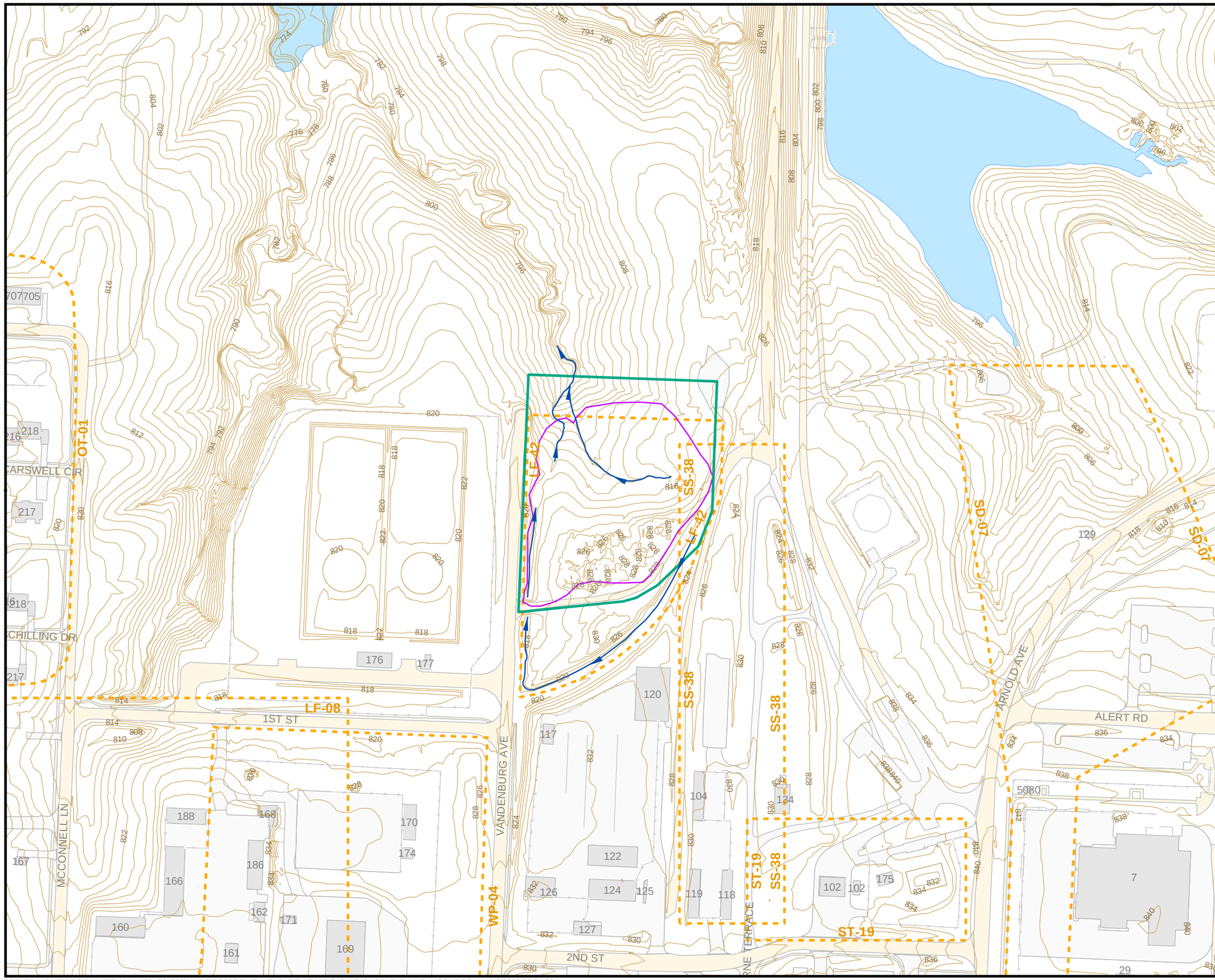
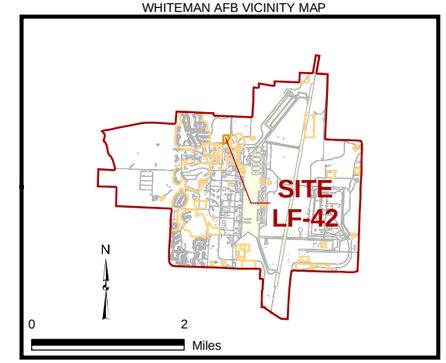


WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- LANDFILL LIMIT
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

0 200 Feet

N

FIGURE 8
INSTITUTIONAL CONTROL BOUNDARY FOR SITE LF-42
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

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2. Site Chronology

This section presents the chronology of site events through the present.

2.1 Site FT-02

Site FT-02 is a former fire protection training area that consisted of two former burn pits, two aboveground storage tanks used for fuel storage, a waste oil underground storage tank, two small unlined ponds, and an unlined pond with an associated oil/water separator used for fire training activities (Montgomery Watson 2001). Operations began at Site FT-02 with the use of Burn Pit 1 in the mid-1960s. Burn Pit 2 was constructed after 1988 and fire training exercises ceased in 1992. Burn Pit 1 was excavated in stages in 1996 through 1997. An estimated 6,000 cubic yards of soil were excavated, and the pit was filled with clean backfill. The following reports were prepared for the site.

- *Phase I, Records Search Report* (Engineering-Science 1984)
- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a)
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study* (Black and Veatch 1991)
- Draft Resource Conservation and Recovery Act (RCRA) Facilities Investigation: Volumes I, II, III (HNC 1994)
- *Decision Document for Site FT-02, Fire Training Area* (HNC 1996)
- *Remedial Investigation Report for FT-16, Former Fire Training Area* (HNC 1997)
- *Direct Push Technology Investigation* (Jacobs Engineering 1997)
- *RI/Feasibility Study (FS) for ST-20 and FS for FT-02* (Montgomery Watson 1998a)
- *Long Term Monitoring Summary for Sites FT-02, LF-03, SS-13, LF-08, OT-22, OT-23, ST-26, SS-30 and Long Term Operation and Maintenance for Site OT-01* (Montgomery Watson 1998b)
- *Groundwater Monitoring Summary Report* (Montgomery Watson 2000)
- *Feasibility Study for Site FT-02* (Montgomery Watson 2001)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)
- *Proposed Plan for Sites FT-02, LF-11, LF-12, and SS-44 Southwest Ramp* (CH2M HILL 2004a)
- *Record of Decision for Sites FT-02, LF-12, and SS-44* (CH2M HILL 2005b)
- *Final Long-Term Management Plan for Southwest Ramp Expansion Area* (CH2M HILL 2005a)
- *2005 Annual Report* (CH2M HILL 2006a)

- *2006 Annual Report* (CH2M HILL 2006b)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.1—physical characteristics
- Subsection 3.3.1—history of contamination
- Subsection 4.1.1—remedial action objectives (RAOs)
- Subsections 4.2.1 and 4.2.2—components of the remedy
- Subsections 6.4 and 6.5—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.2 Site LF-03/SS-41

Site LF-03, also known as Landfill No. 5, was active between 1972 and 1977. After the site was closed, the area was used to stockpile contaminated soil from Whiteman AFB. Site SS-41, the Dry Pond, is located within Site LF-03 and was identified as a low-lying area where water accumulated. The exact location of the pond was not determined. The pond was covered with soil during stockpiling and grading activities. In 2003, a series of vegetated berms and channels were added to the landfill surface to control stormwater flow and reduce erosion along the banks of Long Branch Creek. Existing erosion features along the creek was also repaired and vegetation was added for increased stability. The following reports were prepared for the site.

- *Phase I, Records Search Report* (Engineering-Science 1984)
- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a)
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study* (Black and Veatch 1991)
- *Final Design – Remedial Action-Operation, Site LF-03* (CH2M HILL 2003a)
- *Final Environmental Cleanup Plan – Phase II Remedial Action-Operation, Site LF-03* (CH2M HILL 2003b)
- *Final Remedial Investigation Report for Sites DP-32, SS-40, SS-41, and SS-44* (CH2M HILL 2003c)
- *Final Design for Site Landfill LF-03* (CH2M HILL 2003d)
- *Final Project Completion Report for the Phase II Remedial Action-Operation at Site LF-03* (CH2M HILL 2003e)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)

- *Proposed Plan for Nine Environmental Restoration Program Sites, Whiteman Air Force Base, Missouri* (CH2M HILL 2006c)
- *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42* (CH2M HILL 2007b)
- *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* (CH2M HILL 2007a)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.2—physical characteristics
- Subsection 3.3.2—history of contamination
- Subsection 4.2.1—components of the remedy
- Subsection 6.4—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.3 Site LF-11

Site LF-11 was operated for about 1 month during the 1950s (Engineering-Science 1984). It consisted of a hardfill area and two landfill waste trenches. Aerial photograph analysis identified a trench along the south boundary of the base in 1965 in the area that is currently Site LF-11. The hardfill area first appeared in 1984 aerial photographs. Preliminary and detailed geophysical surveys performed at the site revealed two east-west linear anomalies: one north and one south of the hardfill area (Ecology and Environment 1988). The south anomaly corresponded to the trench observed on the 1965 photograph. The following reports were prepared for the site.

- *Phase I, Records Search Report* (Engineering-Science 1984)
- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a)
- *Technical Document to Support No Further Action Record of Decision* (Black & Veatch 1990a)
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study* (Black and Veatch 1991)
- *Decision/Closure Document for No Further Action* (Jacobs Engineering 1998)
- *Decision/Closure Document for No Further Action* (Jacobs Engineering 1999a)
- *Final Remedial Investigation Report for Site LF-11, Landfill No. 2, and Site LF-12, Landfill No. 3, Whiteman Air Force Base* (CH2M HILL 2004b)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)

- *Proposed Plan for Sites FT-02, LF-11, LF-12, and SS-44 Southwest Ramp* (CH2M HILL 2004a)
- *Record of Decision for Sites FT-02, LF-12, and SS-44* (CH2M HILL 2005b)
- *Final Long-Term Management Plan for Southwest Ramp Expansion Area* (CH2M HILL 2005a)
- *Landfill Maintenance Design* (CH2M HILL 2005d)
- *Landfill Maintenance and Completion Report for Sites LF-11 and LF-34, Whiteman Air Force Base, Missouri* (CH2M HILL 2006d)
- *2006 Annual Report* (CH2M HILL 2006b)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.3—physical characteristics
- Subsection 3.3.3—history of contamination
- Subsections 4.2.1 and 4.2.3—components of the remedy
- Subsection 6.4—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.4 Site LF-12

U.S. Air Force records indicated that Site LF-12 was operated for less than a year as a landfill (identified as Landfill 3) for disposal of routine base refuse. Its period of use is known only to be between the late 1940s and mid-1950s. Site LF-12 originally identified in a Phase I Records Search (Engineering-Science 1984). No evidence of landfill activities was documented in aerial photographs (Ecology and Environment 1988). In addition, preliminary and detailed geophysical surveys did not identify evidence of landfill activities (i.e., waste trenches). A small area of soil contaminated with lead was excavated in 2003 (CH2M HILL 2004b). The following reports were prepared for the site.

- *Phase I, Records Search Report* (Engineering-Science 1984)
- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a)
- *Draft Technical Document to Support No Further Action Record of Decision* (Ecology and Environment 1988b)
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study, Whiteman Air Force Base, Knob Noster, Missouri* (Black and Veatch 1991)
- *Decision/Closure Document for No Further Action, Landfill 3, Site LF-12* (Jacobs Engineering 1999b)

- Site LF-12 Technical Memorandum (CH2M HILL 2002a)
- *Final Remedial Investigation Report for Site LF-11, Landfill No. 2, and Site LF-12, Landfill No. 3, Whiteman Air Force Base* (CH2M HILL 2004b)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)
- *Proposed Plan for Sites FT-02, LF-11, LF-12, and SS-44 Southwest Ramp* (CH2M HILL 2004a)
- *Record of Decision for Sites FT-02, LF-12, and SS-44* (CH2M HILL 2005b)
- *Final Long-Term Management Plan for Southwest Ramp Expansion Area* (CH2M HILL 2005a)
- *2005 Annual Report* (CH2M HILL 2006a)
- *2006 Annual Report* (CH2M HILL 2006b)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.4—physical characteristics
- Subsection 3.3.4—history of contamination
- Subsection 4.1.1—RAOs
- Subsections 4.2.1 and 4.2.2—components of the remedy
- Subsections 6.4 and 6.5—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.5 Site LF-13

Site LF-13 comprises the sites formerly known as Site 11B (Landfill 2) and Site 13 (Landfill 4). The operating period of Landfill 2 is unknown. Landfill 4 operated briefly in 1957 and 1958 and accepted routine Base refuse, reportedly disposed of in a trench. A 1957 photograph indicated activity that may correlate to waste disposal operations (Black & Veatch 1991). The following reports were prepared for the site.

- *Phase I, Records Search Report* (Engineering-Science 1984)
- *Phase II, Stage 1, Final Report* (Ecology and Environment 1987)
- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a)
- *Technical Document to Support No Further Action Record of Decision* (Black & Veatch 1990a)
- *Technical Document to Support No Further Action Record of Decision* (Black & Veatch 1990b)
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study* (Black and Veatch 1991)

- *No Further Action Decision Document* (Jacobs Engineering 1996)
- *Decision/Closure for Document for No Further Action* (Jacobs Engineering 1998)
- *Decision/Closure for Document for No Further Action* (Jacobs Engineering 1999a)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)
- *Proposed Plan for Nine Environmental Restoration Program Sites, Whiteman Air Force Base, Missouri* (CH2M HILL 2006c)
- *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42* (CH2M HILL 2007b)
- *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* (CH2M HILL 2007a)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.5—physical characteristics
- Subsection 3.3.5—history of contamination
- Subsection 4.2.1—components of the remedy
- Subsection 6.4—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.6 Site SS-30

Site SS-30 initially was considered part of Site LF-08 but later was designated as a separate site after subsurface investigations revealed the presence of a distinct carbon tetrachloride (CT)/TCE groundwater plume. Despite the proximity to Site LF-08, it is thought that the contamination may have originated from a nearby vehicle maintenance facility housed in Building 159 because that facility was active at the time the spill is believed to have occurred and solvents likely were used there. The vehicle maintenance building, constructed between 1952 and 1958, is still in operation. The area around the shoppette was regraded during construction in the 1990s. The following reports were prepared for the site.

- *Installation Restoration Program Phase II: Confirmation/Quantification, Stage 1* (Ecology and Environment 1988a) [This investigation was for Site LF-08, which encompassed the area now known as Site SS-30.]
- *Installation Restoration Program, Stage 2 Remedial Investigation/Feasibility Study* (Black and Veatch 1991) [This investigation was for Site LF-08, which encompassed the area now known as Site SS-30.]

- *Remedial Investigation Report for FT-16, Former Fire Training Area* (HNC 1997) [This investigation was for LF-08, which encompassed the area now known as Site SS-30.]
- *Site Characterization Report and Treatability Study Work Plan* (CH2M HILL 2001).
- *Hydrogen Release Compound Treatability Study Report* (CH2M HILL 2003f).
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)
- *Proposed Plan for Nine Environmental Restoration Program Sites, Whiteman Air Force Base, Missouri* (CH2M HILL 2006c)
- *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42* (CH2M HILL 2007b)
- *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* (CH2M HILL 2007a)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.6—physical characteristics
- Subsection 3.3.6—history of contamination
- Subsection 4.1.2—RAOs
- Subsections 4.2.1 and 4.2.2—components of the remedy
- Subsections 6.4 and 6.5—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.7 Site LF-34

Site LF-34 was used to dump material collected from flightline shops during the 1960s and 1970s (Whiteman AFB 2002). The waste reportedly included not only material from the shops but also such items as refrigerators and electric motors. Large concrete debris from old Base foundations was placed along the creek in the 1990s to help stabilize the creek bank. The below reports were prepared for the site.

- *Preliminary Assessment/Site Inspection Report* (CH2M HILL 2002b)
- *Final Remedial Investigation Report for Site LF-11, Landfill No. 2, and Site LF-12, Landfill No. 3, Whiteman Air Force Base* (CH2M HILL 2004b)
- *Feasibility Study Report, Whiteman Air Force Base, Sites SS-40, Former Aircraft Washdown and Pump House; LF-03/SS-41, Dry Pond Site; and SS-44, Trichloroethene Spill Site* (CH2M HILL 2004c)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)

- *Landfill Maintenance Design* (CH2M HILL 2005d)
- *Landfill Maintenance Completion Report for Site LF-42* (CH2M HILL 2006d)
- *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42* (CH2M HILL 2007b)
- *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* (CH2M HILL 2007a)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.7—physical characteristics
- Subsection 3.3.7—history of contamination
- Subsections 4.2.1 and 4.2.3—components of the remedy
- Subsection 6.4—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.8 Site LF-42

Site LF-42 was used for to store and dispose of miscellaneous undocumented materials. Dumping at the site appears to have occurred as early as 1958, with activity continuing through 1983 (MDNR 1995). During a site inspection in 1991, old construction debris such as asphalt, concrete, steel and bricks, partially buried drums, and personal protection equipment were observed at the site (Metcalf & Eddy 1991). Inspections in the spring of 2006 have shown the site to be well-vegetated with grasses and areas of shrubs and trees along the north and west edges of the site and soil stockpiles along the access road that dissects the site. The following reports were prepared for the site.

- *Final RCRA Preliminary Assessment Report for Whiteman Air Force Base* (Metcalf & Eddy 1991)
- *Addendum to Final RCRA Facility Assessment Report* (MDNR 1995)
- Geophysical Survey (Bay West 1997)
- Geophysical Survey (Advanced Environmental Services 1998)
- *Preliminary Assessment/Site Inspection Report* (CH2M HILL 2002b)
- *Final Remedial Investigation Report for Site LF-11, Landfill No. 2, and Site LF-12, Landfill No. 3, Whiteman Air Force Base* (CH2M HILL 2004b)
- CH2M HILL. *Feasibility Study Report, Whiteman Air Force Base, Sites SS-40, Former Aircraft Washdown and Pump House; LF-03/SS-41, Dry Pond Site; and SS-44, Trichloroethene Spill Site* (CH2M HILL 2004c)

- *Record of Decision for Sites FT-02, LF-12, and SS-44* (CH2M HILL 2005b)
- *Landfill Maintenance Design* (CH2M HILL 2006d)
- *Landfill Maintenance Completion Report for Site LF-42* (CH2M HILL 2006e)
- *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42* (CH2M HILL 2007b)
- *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* (CH2M HILL 2007a)
- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.8—physical characteristics
- Subsection 3.3.8—history of contamination
- Subsection 4.1.3—RAOs
- Subsections 4.2.1 and 4.2.3—components of the remedy
- Subsection 6.4—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

2.9 Site SS-44

Site SS-44 was identified during the excavation of Burn Pit 1 at Site FT-02. TCE was detected in soil and groundwater samples collected near the old runway/taxiway at the northeast corner of the excavation. TCE was found to be unrelated to Site FT-02. The following reports were prepared for the site.

- *Final Remedial Investigation Report for Sites DP-32, SS-40, SS-41, and SS-44* (CH2M HILL 2003c)
- CH2M HILL. *Feasibility Study Report, Whiteman Air Force Base, Sites SS-40, Former Aircraft Washdown and Pump House; LF-03/SS-41, Dry Pond Site; and SS-44, Trichloroethene Spill Site* (CH2M HILL 2004c)
- *Final Remedial Investigation Work Plan* (CH2M HILL 2005c)
- *Proposed Plan for Sites FT-02, LF-11, LF-12, and SS-44 Southwest Ramp* (CH2M HILL 2004a)
- *Record of Decision for Sites FT-02, LF-12, and SS-44* (CH2M HILL 2005b)
- *Final Long-Term Management Plan for Southwest Ramp Expansion Area* (CH2M HILL 2005a)
- *2005 Annual Report* (CH2M HILL 2006a)
- *2006 Annual Report* (CH2M HILL 2006b)

- *2007 Annual Report* (CH2M HILL 2007c)
- *2008 Annual Report* (CH2M HILL 2008)
- *2009 Five-Year Review* (CH2M HILL 2009)

Additional detail is provided as follows:

- Subsection 3.1.9—physical characteristics
- Subsection 3.3.9—history of contamination
- Subsection 4.1.4—RAOs
- Subsections 4.2.1 and 4.2.2—components of the remedy
- Subsections 6.4 and 6.5—results of the 2009 LTM activities
- Section 7.1—remedy performance
- Section 9—recommendations and followup actions

3. Background

This section describes the physical characteristics of the site, land and resource use when the ROD documents were signed, history of contamination, remedial response, and basis for taking action.

3.1 Physical Characteristics

Whiteman AFB is located in west central Missouri, in Johnson County, about 2 miles south of Knob Noster (Figure 1). The Base is roughly 9 miles east of Warrensburg, 22 miles west of Sedalia, and 70 miles southeast of Kansas City. The physical characteristics of the sites included in the five-year review are described below and depicted in Figures 2 through 8.

3.1.1 Site FT-02

Site FT-02 is located within the new Missouri Army National Guard facility north of Perimeter Road and south of the operations end of the flight line (Figure 2). In September 2008, construction of a Missouri Army National Guard facility began; the facility encompasses Site FT-02. Groundwater flow beneath Site FT-02 is generally to the southeast.

3.1.2 Site LF-03/SS-41

Site LF-03/SS-41 is located in the southeast corner of the Base, east of the runway and south of Perimeter Road (Figure 3). Site LF-03, also known as Landfill No. 5, is about 0.5 mile long and 300 to 500 feet wide, covering about 40 acres. Site SS-41, the Dry Pond, was once a low lying area within Site LF-03 where water accumulated and is estimated to be 0.1 to 0.3 acre in size. The site is heavily vegetated and is used as an access from Perimeter Road to the Base recycling center located immediately east of the southeast corner of the site, and occasionally by the Base for storage. Most of the site is covered by native grasses, shrubbery, and trees. Berms and channels are located along the banks of Long Branch Creek to control surface water flow. Long Branch Creek flows east along the northern boundary of the landfill and separates the site from Perimeter Road. Groundwater flow across the site generally is to the north-northeast, toward Long Branch Creek.

3.1.3 Site LF-11

Site LF-11 is located about 800 feet east of the intersection of Arnold Avenue and Perimeter Road and south of Perimeter Road (Figure 4). The site is undeveloped and overgrown by vegetation. A small drainage ditch conveys water from the north central part of the site along Perimeter Road, turning southeast to a culvert under the Base perimeter fence where it discharges to a surface drainage ditch. The groundwater generally flows southeast from the waste trenches toward a drainageway paralleling the southern boundary of the site.

3.1.4 Site LF-12

Site LF-12 is about 500 feet east of the intersection of Arnold Avenue and Perimeter Road, north of Perimeter Road, south of Site FT-02, and near the new Missouri Army National

Guard facility (Figure 2). In September 2008, construction of a Missouri Army National Guard facility began. A small drainage ditch runs along the southern boundary of the site. Groundwater beneath Site LF-12 generally flows to the southeast.

3.1.5 Site LF-13

Site LF-13 is located in the southwestern corner of the Base (Figure 5). The area in and around the site contains two baseball fields and other open grassy areas. Groundwater flow beneath Site LF-13 is generally to the north/northeast.

3.1.6 Site SS-30

Site SS-30 is located east of Spirit Boulevard and south of 3rd Street (Figure 6). The Base shoppette (Building 3032) and a display plane are located within the site limits. The site is flat, except for a berm-like feature immediately south of the Base shoppette. Parts of the site outside the shoppette building and paved parking lot are covered with grassy vegetation. A drainage ditch runs east along Third Street. A gasoline fueling station is located on the north side of the shoppette. The groundwater generally flows to the north at Site SS-30.

3.1.7 Site LF-34

Site LF-34 is located in the central-southwestern part of the Base, near the Base hospital and Brewer Branch Creek (Figure 7). The site is north of Summit Drive, west of Mitchell Avenue and Sijan Avenue runs north and south through the center of the site. The landfill limits include an open field or turf area with running track, a parking lot, and a densely vegetated fringe along Brewer Branch Creek. The site generally slopes toward the west. Stormwater from a culvert between the hospital parking lots downstream of the landfill limits flows into Brewer Branch Creek. The culvert appears to drain water from the east side of Sijan Avenue. The creek bank and creek bottom along the site are covered with cellular concrete blocks and vegetation. The groundwater flows south/southwest, toward Brewer Branch Creek.

3.1.8 Site LF-42

Site LF-42 is located in the north-central part of the Base (Figure 8). The site is directly north of the active Defense Reutilization Marketing Office facility, south of an unnamed drainage feature and the archery range, east of a jet fuel storage area, and west of abandoned rail lines. Vandenberg Road is located along the western boundary of the site. The 2-acre site is vegetated with grasses, weeds, and shrubs, with some areas of dense vegetation and trees. The site area gently slopes from southeast toward northwest. North of the site lies a line of trees and brush, beyond which the grade drops more steeply. Groundwater flow at Site LF-42 is toward the north/northwest, generally parallel to the surface topography and towards a drainageway on the north side of the site.

3.1.9 Site SS-44

Site SS-44 is located within the new Missouri Army National Guard facility, north of Perimeter Road, and south of the operations end of the flight line near Site FT-02 (Figure 2). In September 2008, construction of an Army National Guard facility began. The general groundwater flow direction at Site SS-44 is to the east.

3.2 Land and Resource Use and Reuse

Whiteman AFB is an active U.S. Air Force installation encompassing 4,197 acres of government-owned, leased, or easement land. The Base is bordered by agricultural land to the south and east, Knob Noster State Park and low-density residential areas to the west, and the community of Knob Noster to the north. The Base obtains its domestic water supply from water supply wells constructed at depths of 1,000 feet or greater in bedrock and the construction of shallow wells for domestic use is not allowed by the Base or state regulations (Title 10, Division 23, Chapter 3, of the Missouri Code of State Regulations). The current and expected future land use at the sites is industrial.

The most significant land development within the ERP sites of concern is the construction of a Missouri Army National Guard facility which began in September 2008. The footprint for this new facility overlaps the limits of Sites FT-02, LF-12, and SS-44.

3.3 History of Contamination

A history of contamination at sites included in the five-year review is provided below. This history discusses activities at the site before signature of the ROD.

3.3.1 Site FT-02

Site FT-02 is a former fire protection training area that consisted of two former burn pits, two aboveground storage tanks used for fuel storage, a waste oil underground storage tank, two small unlined ponds, and an unlined pond with an oil/water separator used for fire training activities (Montgomery Watson 2001). Building 99, located northwest of the burn pits, was used for fire protection training exercises for non-aircraft situations.

From 1996 through 1997, Burn Pit 1 was excavated in stages, and confirmation samples were collected from the floor and sidewall of the excavation at each stage (Montgomery Watson 2001). An estimated 6,000 cubic yards of soil were excavated, and the pit was filled with clean backfill. Confirmation samples indicated low levels of benzene and TCE remaining in soil. During excavation, samples of water from the pit indicated high levels of benzene and chlorinated hydrocarbons.

The site was included in a groundwater long-term monitoring program from 1996 to the present. The Site FT-02 chemical of concern (COC) in groundwater is benzene. Concentrations of benzene have been as high as 11,000 micrograms per liter (µg/L) in FT02-MW-05, which is located in the west central part of the site, northwest of former Burn Pit 2.

3.3.2 Site LF-03 / SS-41

The landfill was active between 1972 and 1977. The landfill cells were constructed using the trench-and-fill method, with trenches aligned predominantly east to west and reportedly filled with Base refuse, demolition waste, rubble, drums of waste oil, and other chemicals.

After Site LF-03 was closed, the area was used to stockpile contaminated soil from Whiteman AFB. The soil included lined and covered stockpiles of 1,800 cubic yards of soil from Site OT-01 containing numerous pesticides and the polychlorinated biphenyl Aroclor 1254, 1,200 cubic yards of soil from Site WP-04 containing organochlorine pesticides and possibly

chlorinated herbicides, and 15,000 cubic yards of petroleum-contaminated soils excavated from various locations across the Base. There reportedly also was an unlined and uncovered stockpile of 25,000 cubic yards of soil from Site WP-04 containing organochlorine pesticides and herbicides. Some of the soil was removed and disposed of at an offsite landfill, some was remediated by a bioventing and composting pilot project, and the rest was graded and leveled into the landscape for surface water management (Jacobs Engineering 1999b).

Site SS-41, the Dry Pond, is located within Site LF-03 and is estimated to be 0.1 to 0.3 acre in size. The site was identified as a low-lying area within the limits of Site LF-03 where water accumulated. The exact location of the pond within site limits has not been determined. The pond was covered with soil during the stockpiling and grading activities described above.

There are no COCs for Site LF-03/SS-41. Waste material still remains at the site.

3.3.3 Site LF-11

Site LF-11 consisted of a hardfill area and two landfill waste trenches. Preliminary and detailed geophysical surveys performed at the site revealed two east-west linear anomalies: one north and one south of the hardfill area (Ecology and Environment 1988). Based on environmental investigations, no risks were identified at Site LF-11 for an unrestricted land use scenario.

3.3.4 Site LF-12

Benzene is the COC for Site LF-12. The presence of benzene, which was observed in an area east of the historic limits of Site LF-12, is attributed to a surface spill along an access road.

3.3.5 Site LF-13

Waste material reportedly was encountered in soil borings immediately northwest and southwest of Landfill 4 (Ecology and Environment 1988a). However, boring logs did not note the presence of waste. In 1996, a contractor inadvertently uncovered Landfill 4 exposing waste such as a hypodermic needle and surgical boot (Jacobs Engineering 1999a).

Waste placement occurred at Site LF-13 during the 1950s. Trenching operations at nearby Site LF-11, which also operated during the 1950s, included disposing of waste material roughly 1 to 8 feet below ground, which is consistent with a standard backhoe reach. Bedrock at Site LF-13 is reported to be present 7 to 15 feet below ground. Thus, the waste trenches are estimated to be about 8 feet deep, although they may be as deep as the bedrock (up to 15 feet in depth).

The RI of Site LF-13 concluded that the residual contamination at the sites does not pose risk. However, waste material still remains at the site.

3.3.6 Site SS-30

The area initially was considered part of Site LF-08 but later was designated as a separate site after subsurface investigations revealed the presence of a distinct CT/TCE groundwater plume in the Site SS-30 area. No connection was identified between Site SS-30 activities and the fueling station. Despite the proximity to Site LF-08, it is thought that the contamination may have originated from a nearby vehicle maintenance facility housed in Building 159,

because that facility was active at the time the spill is believed to have occurred and solvents likely were used there. No evidence of source areas has been found.

In 2002, a treatability study was performed to evaluate the effectiveness and implementability of remediating the site using Hydrogen Release Compound® (HRC®) to stimulate reductive dechlorination of chlorinated volatile organic compounds in groundwater. However, HRC distribution was limited because of low permeability soils and insufficient groundwater flow. Therefore, the remediation technique was considered unsuccessful.

In October 2004, CH2M HILL further delineated the extent of CT in groundwater. The RI Work Plan (CH2M HILL 2005c) concluded that CT is a COC at Site SS-30 because of the construction worker scenario based on direct contact during excavation work below the groundwater table.

3.3.7 Site LF-34

Site LF-34 was used to dump material collected from flightline shops (Whiteman AFB 2002). The RI Work Plan concluded there is no risk posed at Site LF-34, although waste material still remains at the site.

3.3.8 Site LF-42

Site LF-42 was used to store and dispose of miscellaneous materials as early as 1958, with activity continuing through 1983. The RI concluded that there is potential residential risk for direct contact with benzo(a)pyrene in soil. In addition, waste material still remains at the site.

3.3.9 Site SS-44

cis-1,2-Dichloroethene (cis-1,2-DCE) and TCE are the COCs for Site SS-44 and were observed in an area south-central part of the site. The COCs are attributed to a surface spill.

4. Remedial Actions

This section presents the remedies and LTM activities. LTM activities are being conducted at Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44. LTM activities at Whiteman AFB consist of ICs and a GMP as described in the LTM and IC plans (CH2M HILL 2005a; 2007a).

4.1 Remedial Action Objectives

The ROD documents for Sites FT-02, LF-11, LF-12, and SS-44 and Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42 were signed on May 10, 2005 and March 23, 2007, respectively. As a result of data collected during the RIs and the evaluation of health risks, RAOs were developed for the ERP sites to aid in the development and screening of remedial action alternatives. RAOs were identified during the remedy selection process and were stated in the ROD documents.

Sites LF-03/SS-41, LF-11, LF-13, and LF-34 do not have RAOs because no unacceptable quantitative risks were identified under the current industrial land use or the potential future unrestricted land use scenarios. However, the U.S Air Force agreed that additional precautions were necessary at the landfills to limit the potential for human exposure to landfilled material.

The RAOs developed and presented in the ROD documents for the COCs at Sites FT-02, LF-12, SS-30, LF-42, and SS-44 are summarized below.

4.1.1 Sites FT-02 and LF-12

The RAO identified for Sites FT-02 and LF-12 is to prevent human exposure to groundwater containing benzene at concentrations above the established remediation goal, which is 5 µg/L. The remediation goal for benzene of 5 µg/L is based on potable use of the groundwater. However, the groundwater is not used as a potable resource because of state regulations. Concentrations of benzene have been lower than the remedial goal since 2005 at Site LF-12.

4.1.2 Site SS-30

The RAO for Site SS-30 is to prevent construction worker exposure to groundwater containing CT at concentrations above the established remediation goal, which is 297.4 µg/L.

4.1.3 Site LF-42

The RAO for Site LF-42 was based on the residential exposure pathway estimated to pose a potentially unacceptable risk for direct contact with benzo(a)pyrene in soil.

4.1.4 Site SS-44

The RAO for Site SS-44 is to prevent human exposure to groundwater containing cis-1,2-DCE and TCE at concentrations above the established remediation goals of 70 and 5 µg/L.

4.2 Remedy Selection

To ensure the actions remain protective, the RODs detail the following requirements:

- ICs (Sites FT-02, LF-03/SS-44, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44)
- Groundwater monitoring (Sites FT-02, LF-12, SS-30, and SS-44)
- Landfill maintenance (Sites LF-34 and LF-42)

This section describes the requirements. The results and the assessment on whether the requirements have ensured protectiveness are discussed in Section 7.

4.2.1 Institutional Controls

The U.S. Air Force is responsible for monitoring and enforcing ICs at Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44.

- ICs for sites with groundwater COCs that pose a risk for potable use include Sites FT-02, LF-12, and SS-44.
- ICs for Site SS-30 were implemented because the groundwater COC poses a risk under the industrial use setting.
- ICs for Site LF-42 were implemented based on the soil COC that poses a risk to residents for direct contact.
- ICs for sites with buried waste material include Sites LF-03/SS-41, LF-11, LF-13, LF-34, and LF-42 to limit the potential for human exposure to landfilled material.

ICs will be enforced through the digging permit requirement for construction activities and annual inspections to document that the landfill cover is still in place, that landfill sites are used for industrial purposes, that groundwater is not being extracted for potable use, and that construction workers are not contacting groundwater at Site SS-30. The ICs are documented in the Base General Plan.

Authorization from one of the Natural Infrastructure Element staff members is required for construction work within an IC boundary. The chief of Natural Infrastructure Element, other appropriate Base personnel, and MDNR will re-evaluate the sites' status before change in land use. (*Note:* As of October 2008, the Environmental Flight was renamed as the Natural Infrastructure Element.)

The first formal IC inspections of Sites FT-02, LF-12, and SS-44 were conducted in 2005. The first formal IC inspection of Site LF-11 was conducted in 2006. The first formal IC inspections at Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42 were conducted in 2007. Subsequent inspections have occurred according to the schedule outlined in the ROD documents and are ongoing. Section 6.4.1 summarizes the results of the 2009 IC inspections.

4.2.2 Groundwater Monitoring

A GMP was developed for sites where contaminants in groundwater pose unacceptable risk to human health. The GMP tracks changes in groundwater COC concentrations, allowing timely response to changing site conditions. The GMP for the SREA consists of annual

monitoring of wells FT02-MW-05, LF12-MW-01, and SS44-MW-07 for benzene, TCE, and cis-1,2-DCE beginning in 2005. The GMP at Site SS-30 consists of one monitoring well within the groundwater plume (SS30-MW-16), three monitoring wells outside the plume (SS30-MW-18, SS30-MW-19, SS30-MW-20), and one surface water sample location. Sampling was performed at Site SS-30 in 2007 and 2009, per the LTM and IC Plans (CH2M HILL 2007a).

4.2.3 Landfill Maintenance

Landfill maintenance was performed at Sites LF-11, LF-34, and LF-42 in accordance with the RODs. The maintenance work is documented in the Sites LF-11 and LF-34 Landfill Maintenance Completion Report (CH2M HILL 2006d) and Site LF-42 Landfill Maintenance Completion Report (CH2M HILL 2006e).

The object of the landfill maintenance project at Site LF-11 was to contour the soil cover to promote positive surface water runoff and drainage, to prevent the ponding of water, and to revegetate the final contoured surface. Regrading was required around Trench 2 to direct surface water away from the waste trench. Vegetation and topsoil were removed from and adjacent to Trench 2 and stockpiled at Site LF-11. Roughly 240 cubic yards of backfill and topsoil was transported from the west bank of Site LF-34 and placed at Site LF-11. The material was placed in horizontal lifts, compacted, and graded. The stockpiled topsoil was spread back over the graded area. Areas disturbed by maintenance were reseeded with grass and covered with straw.

The primary focus of landfill maintenance at Site LF-34 was to correct deficiencies within the landfill limits by repairing erosion, to minimize future erosion of creek banks and the landfill, to minimize exposure of waste during repair activities, and to minimize disturbance to the natural habitat. Therefore, creek channel grading, cellular block revetment system installation, topsoil placement and hydroseeding on channel slopes, erosion control blanket installation, live stake planting, and site restoration activities were completed.

The object of landfill maintenance at Site LF-42 was to contour the soil cover to promote positive surface water runoff and drainage, to prevent the ponding of water, and to revegetate the final contoured surface. Surface cleanup was performed to grade soil stockpiles and remove debris such as pieces of concrete or asphalt, pipe, rock, or miscellaneous other materials. The soil from the stockpiles was graded around and on top of the debris to allow drainage of surface water. Cleanup was limited to the open areas of the site. Concrete placed along surface drainage ways as riprap for erosion protection was not removed. Consideration was given to maintaining the existing surface water channels. Disturbed areas on the site surface were reseeded and restored to current conditions.

4.3 Remedy Implementation

The remedies were implemented per the LTM and IC Plans (CH2M HILL 2005a; 2007a). Sections 6 and 7 discuss the implementation of the selected remedy, provide results of the 2009 implementation activities, and discuss whether the remedies are functioning as intended.

5. Progress Since the Last Review

This is the first five-year review. There is no progress from the last review to report.

6. Five-Year Review Process

6.1 Administrative Components

The five-year review team was lead by Glenn Golson of Whiteman AFB with support from Eric Barefoot of the Air Force Center for Engineering and the Environment (AFCEE). CH2M HILL, under contract to AFCEE, prepared this five-year review report. The review included the following components:

- Community Involvement (none solicited, see Section 6.2)
- Document Review
- Data Review
- IC Inspections and GMP
- Local Interviews (none conducted, see Section 6.6)
- Five-Year Report Development and Review (this report)

The review schedule will provide for approval of the first five-year review by the scheduled completion date of May 10, 2010.

6.2 Community Involvement

A notice was placed in three local publications in October 2009, the Sedalia *Democrat,* Warrensburg *Daily Star-Journal,* and Whiteman AFB *Spirit.* The notice announced the five-year review and location of the administrative record at Whiteman AFB. A notice will be submitted to the publications announcing the completion of the five-year review.

6.3 Document Review

The five-year review consisted of a review of relevant documents including the ROD documents, remedy implementation plans, construction completion reports, environmental laws and regulations, and annual reports. Section 12 is a complete listing of those documents.

6.4 Data Review

Whiteman AFB has conducted annual IC inspections and routine groundwater monitoring as part of the remedies since 2005. Results of IC inspections and groundwater monitoring are provided below.

6.4.1 IC Inspections

Annual IC inspections were conducted at Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44, which consist of a physical inspection of the sites for conditions of the ground surface and conformance to the IC requirements, inspection of the groundwater monitoring wells, if present, and a review of the Base General Plan to ensure that the required IC language is present and has not been modified. MDNR can review the pertinent sections of the Base General Plan at any time at Whiteman AFB.

ICs in place at Whiteman AFB are documented in Section 4.A.2.2, Environmental Quality, of the Base General Plan, an active document that the Base uses for planning purposes. The Base General Plan is an element of the Comprehensive Plan that is reviewed and approved annually by Major Command and the Installation Commander. The plan undergoes major revision every 3 to 5 years. No changes are made to the plan without review by Base and Major Command personnel. The document is managed in accordance with U.S. Air Force Instruction 32-7062, *Air Force Comprehensive Planning*.

A professional land surveyor registered with the State of Missouri prepared a survey of the IC boundaries (Appendix B) as part of the ROD implementation in 2005 and 2007. Inspection forms were created to document the presence of the ICs through annual inspection of the area within the IC boundaries and inspection of the Base General Plan. The site inspections are documented on one form, the Base General Plan inspection documented separately. Below is a summary of the 2009 inspection. Appendix C contains the completed 2009 Annual Inspection Forms. Appendix D contains photographs illustrating 2009 site conditions. The IC inspection summaries and forms and photographs from previous site visits were submitted in the annual reports for 2005 through 2008.

6.4.2 2009 IC Inspection Summary

Annual IC inspections were conducted at Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44 on May 20, 21, and 22, 2009. The following items were noted in the site visit:

- In September 2008, construction of a Missouri Army National Guard facility began; the facility encompasses most of Sites FT-02, LF-12, and SS-44 (Figure 9). Base authorization dig permits are contained in Appendix C.

  In November 2008, Missouri Army National Guard contractor personnel noted a "fuel" odor emanating from an excavation at the site for footing for the new hangar. The Base fire department installed absorbent mats in the excavation that day based on the odor complaint. MDNR was notified 2 days later. MDNR conducted a site visit the day after and noted inactive polyvinyl chloride pipes, discoloration, and organic odors within the excavation. Based on a letter submitted by MDNR to Whiteman AFB and the Missouri Army National Guard (dated November 12, 2008), it is uncertain if the pipes released materials or if contamination was already in place. MDNR staff collected samples of the surrounding soil and water from the excavation and requested a plan to address the area and an approach for the path forward. The Missouri Army National Guard submitted a memorandum on December 2, 2008, to the MDNR that included documentation of responsibility, characterization of the material within the excavation, handling and storage practices for contaminated soil and groundwater, collection and management of free liquids, stormwater controls, soil sampling procedures, disposition of contaminated materials, and health and safety precautions. In response to the memorandum, MDNR submitted a letter to Whiteman AFB and Missouri Army National Guard (December 12, 2008) that said MDNR was evaluating whether additional information was needed; that MDNR concurred with the approach for collection and management of contaminated water in the excavation by use of absorbent material and stormwater controls; that potential vapors entering overlying buildings would be addressed by design plans for a vapor barrier; and that concrete would serve as an impermeable cap to further

underlying contamination. MDNR stated that the measures are appropriate and should not result in any undo exposure or risk to personnel.

In May 2009, MDNR conducted a site visit and was told that water had been pumped from an excavation to a stormwater sewer. MDNR submitted an email on June 18, 2009, requesting documentation from the Missouri Army National Guard that the water was not contaminated. The Missouri Army National Guard submitted a letter to the MDNR on July 24, 2009, stating that procedures were in place and that the water was stormwater, not groundwater that was addressed in the Site FT-02 ROD. No additional correspondence was received from the MDNR regarding Site FT-02.

- Erosion on the south bank of Long Branch Creek was observed at Site LF-03/SS-41 (Photos 12 and 14), as noted in the inspection form and in Figure 10.
- At Site LF-34, a 20-foot-long, 4-foot-wide, and up to 6-foot-deep erosion feature was observed near the northwest corner of the IC boundary (Photos 40 through 44). No waste material was observed. A 1-foot by 1-foot piece of concrete debris was observed near the northwest portion of the IC boundary (Photo 45). The concrete is a relic of site activities and predates site closure. No erosion or exposed waste was observed in the area. The erosion feature and concrete debris are within the landfill limits (Figure 11).
- Concrete debris was observed at Site LF-42 (Photo 51), as noted in the inspection form and in Figure 12. The concrete is a relic of site activities and predates site closure. No erosion or exposed waste was observed in the area. Construction related to the removal and replacement of a roadway culvert was observed near the southeast corner of the IC boundary (Photos 52 and 53 and Figure 12). The area of disturbance was roughly 20 by 80 by 10 feet. The construction work was completed in accordance to the digging permit issued by Whiteman AFB.

6.5 Groundwater Monitoring

6.5.1 Sites FT-02, LF-12, and SS-44

The shallow groundwater at Sites FT-02 and LF-12 was contaminated with benzene at levels above the cleanup goal for residential use. The shallow groundwater at Site SS-44 was contaminated with TCE and cis-1,2-DCE at levels above the respective cleanup goals for potable use. Based on the RI and site-specific human health risk assessments, the volatile organic compounds do not pose unacceptable human health risks for current and anticipated future industrial land use. The GMP tracks changes in COCs concentrations, allowing timely responses to changing site conditions.

According to the ROD, groundwater monitoring for the area containing Sites FT-02, LF-12, and SS-44 consists of annual sampling and analysis for benzene, cis-1,2-DCE, and TCE from one source area monitoring well (FT02-MW-05) and two downgradient monitoring wells (LF12-MW-01 and SS44-MW-07) for the first 5 years of the GMP. Figure 9 shows the well locations. As part of the Missouri Army National Guard construction, FT02-MW-05 was modified to a flushmount well within the new hangar. The new well elevation is 842.35 feet above mean sea level, and the surface completion was replaced. During the annual inspections, the monitoring wells were found in good condition.

6.5.2 Site SS-30

The shallow groundwater at Site SS-30 historically was contaminated with CT at levels above the cleanup goal for industrial use. Based on the FS and site-specific human health risk assessments (CH2M HILL 2005e), CT exceeds the risk threshold for the construction worker scenario based on direct contact with groundwater.

According to the LTM and IC Plan (CH2M HILL 2007a), groundwater monitoring at Site SS-30 requires the sampling of one monitoring well within the CT groundwater plume (SS30-MW-16), three monitoring wells outside the plume (SS30-MW-18, SS30-MW-19, SS30-MW-20), and one surface water sample (SS30-SW-01) to be collected during the baseline and first sampling events. The first sampling event occurred in April 2007, the second in September 2009 (2.5 years from establishment of the GMP). At intervals of no more than 5 years after the baseline sampling is performed or until a downward trend is established, the U.S. Air Force will sample one monitoring well within the CT groundwater plume (SS30-MW-16) and three wells downgradient of the plume (SS30-MW-18, SS30-MW-19, and SS30-MW-20). Figure 13 presents the well locations and surface water location. During the annual inspections, the monitoring wells were found in good condition.

6.5.3 Monitoring Methodologies

Groundwater samples were collected from the three monitoring wells in the SREA for benzene, cis-1,2-DCE, and TCE analysis in October 2005, February 2007, August 2008, and May 2009. In April 2007 and September 2009, groundwater samples were collected from Site SS-30 for CT analysis from the monitoring wells specified in Section 6.5.2. Groundwater levels were measured and recorded to the nearest 0.01 foot before sampling (Table 1). The groundwater elevations from the previous sampling events were presented in the annual reports.

TABLE 1
2009 Groundwater Elevations for Sites FT-02, LF-12, SS-44, and SS-30
Five-Year Review Report, Whiteman Air Force Base, Missouri

Monitoring Well	Date Measured	Well Top of Casing (ft)	Depth to Water (ft below top of casing)	Groundwater Elevation (ft)
FT02-MW-05	05/20/2009	844.25	5.76	838.49
SS44-MW-07	05/20/2009	841.76	5.96	835.80
LF12-MW-01	05/20/2009	835.20	0.71	834.49
SS30-MW-16	09/02/2009	834.74	4.40	830.34
SS30-MW-18	09/02/2009	835.66	7.18	828.48
SS30-MW-19	09/02/2009	828.41	0.55	827.86
SS30-MW-20	09/02/2009	841.83	10.11	831.72

The wells were sampled using the low-flow purging and sampling techniques described in the LTM and IC Plans (CH2M HILL 2005a; 2007a). A peristaltic pump with disposable plastic tubing was used for low-flow purging and sampling. A flow-through water quality meter was used to observe and record water quality parameters. The wells were purged until at least one well volume was removed and water quality parameters (temperature, pH, dissolved oxygen, turbidity, and specific conductance) stabilized to within criteria for three successive readings.

Water quality stabilization criteria, purging, and sampling data are provided on field data sheets for low-flow groundwater sampling (Appendix E). Groundwater samples from the SREA were analyzed for benzene, cis-1,2-DCE, and TCE per Method SW8260B. Groundwater samples from Site SS-30 were analyzed for CT per Method SW8260B.

6.5.4 Analytical Results versus Cleanup Goals

6.5.4.1 Sites FT-02, LF-12, and SS-44

The concentrations of COCs in the groundwater at Sites FT-02, LF-12, and SS-44 were compared against the remediation goals selected in the ROD. The remediation goals were derived from published maximum contaminant levels (MCLs) promulgated under the federal Clean Water Act and the Missouri Safe Drinking Water Act. The groundwater cleanup goals for the COCs are as follows:

- Benzene 5 µg/L
- cis-1,2-DCE 70 µg/L
- TCE 5 µg/L

Appendix F contains a summary of analytical results for the sampling events. Figure 9 shows May 2009 analytical concentrations. It also shows that groundwater at the SREA generally flows to the east.

To allow for data validation and assessing the quality of analytical data, various quality assurance and quality control (QA/QC) samples were collected during field investigation activities. QA/QC samples included a field duplicate, matrix spike and matrix spike duplicate, equipment blank, and trip blank. Appendix G contains the chain-of-custody forms and laboratory data reports for analytical samples.

FT02-MW-05. Benzene was detected at Site FT-02 in source area well FT02-MW-05 at a concentration of 24 µg/L, exceeding its screening level of 5 µg/L. cis-1,2-DCE and TCE were not detected.

SS44-MW-07. Benzene, cis-1,2-DCE, and TCE were not detected in the sample collected from downgradient well SS44-MW-07.

LF12-MW-01. Benzene, cis-1,2-DCE, and TCE were not detected in the sample collected from downgradient well LF12-MW-01.

6.5.4.2 Site SS-30

A risk-based remediation goal was developed for CT in groundwater during the FS for Site SS-30 (CH2M HILL 2005e) and approved in the ROD (CH2M HILL 2007b). The remediation goal was calculated for protection of dermal contact exposures to groundwater by construction workers since the calculated noncarcinogenic risk hazard quotient associated with this exposure scenario exceeded the acceptable risk threshold. The groundwater remediation goal for CT is 297.4 µg/L.

Appendix F contains a summary of analytical results for the sampling events. Figure 13 shows September 2009 analytical concentrations. It also shows that groundwater at Site SS-30 generally flows to the north.

To allow for data validation and assessing the quality of analytical data, various QA/QC samples were collected during field investigation activities. Appendix G contains the chain-of-custody forms and laboratory data reports for analytical samples.

SS30-MW-16. CT was detected in well SS30-MW-16 at an estimated concentration of 1.5 µg/L, source area well below the remediation goal of 297.4 µg/L.

SS30-MW-18. CT was detected in downgradient monitoring well SS30-MW-18 at a concentration of 160 µg/L, but below the remediation goal of 297.4 µg/L.

SS30-MW-19. CT was not detected in downgradient monitoring well SS30-MW-19.

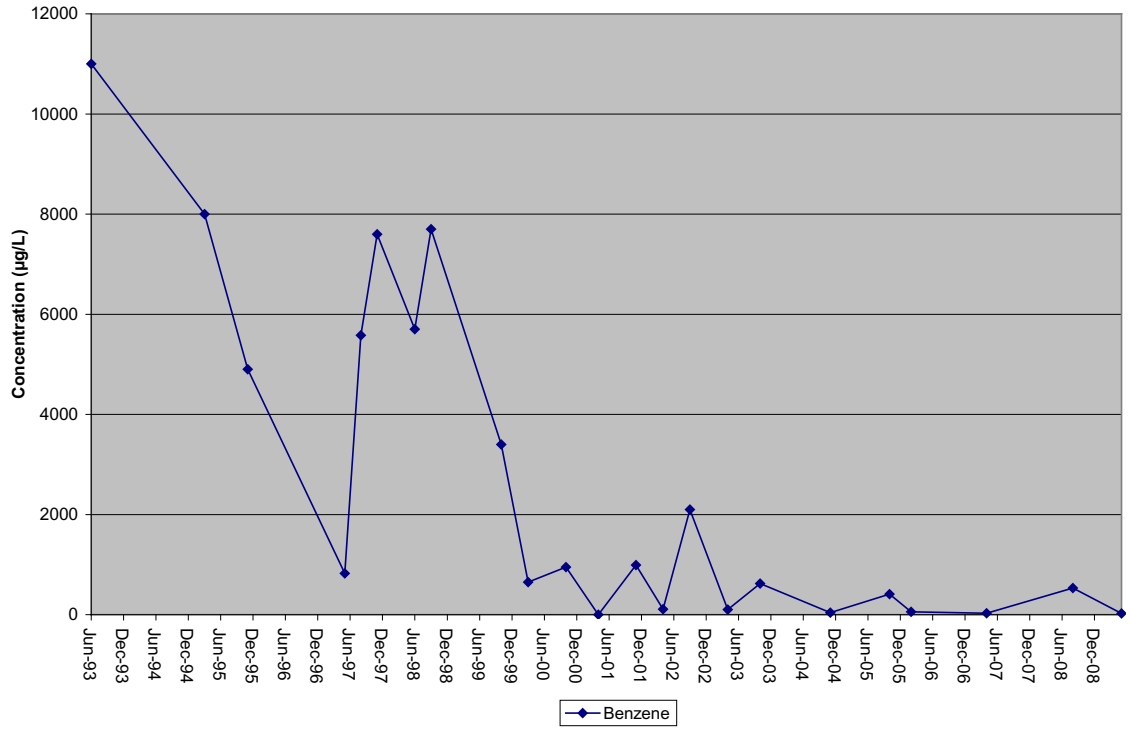
SS30-MW-20. CT was detected in downgradient monitoring well SS30- MW-20 at a concentration of 75 µg/L, but below the remediation goal of 297.4 µg/L.

SS30-SW-01. CT was not detected in downgradient surface water location SS30-SW-01.

6.5.5 Chemicals of Concern Concentration Trends

Historical analytical sampling results are available for monitoring well FT02-MW-05 from June 1993 to the present (Appendix F, Table F1). Benzene concentrations have ranged from a maximum recorded concentration of 11,000 µg/L (June 1993) to the lowest recorded concentration of 1.7 µg/L (April 2001). The benzene concentration measured during the May 2009 sampling event is 24 µg/L, which is lower than results from 2008 (Graph 1). The likely cause of the decreased benzene concentration is natural attenuation due to physical processes such as volatilization, dilution, and dispersion. The average concentration for the last 6-year

GRAPH 1
Benzene Concentrations at Well FT02-MW-05
Five-Year Review Report, Whiteman Air Force Base, Missouri



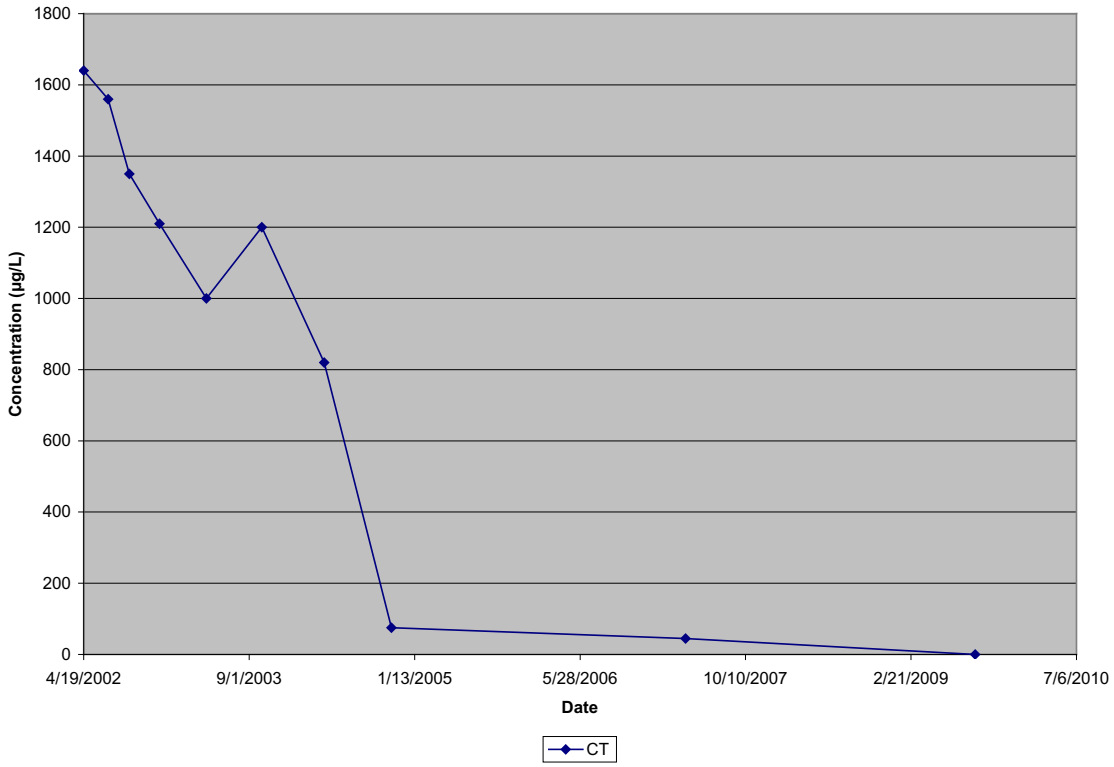
period (April 2003 to May 2009) is 200 µg/L. The graph shows a continuing downward trend of the benzene concentrations over time at well FT02-MW-05.

Sampling was conducted at SS44-MW-07 in August 2002, October 2005, February 2006, April 2007, August 2008, and May 2009. Benzene, cis-1,2-DCE, and TCE were not detected at concentrations exceeding the remediation goals during these or previous sampling events. SS44-MW-07 is about 150 downgradient of the historical location with elevated concentrations of TCE and cis-1,2-DCE.

Sampling was conducted at LF12-MW-01 in October 2005, February 2006, April 2007, August 2008, and May 2009. Benzene, cis-1,2-DCE, and TCE were not found at concentrations exceeding the remediation goals during the sampling events. LF12-MW-01 is about 200 feet downgradient of the single sample location where elevated concentrations of benzene were observed (19 µg/L) in an earlier (pre-2005) field effort. A trace concentration (0.33 F µg/L) of benzene was observed at that location in October 2005; it was not detected at this location in February 2006, April 2007, August 2008, or May 2009.

Table F2 in Appendix F contains analytical results for groundwater sampling performed at Site SS-30. Wells SS30-MW-16, SS30-MW-18, SS30-MW-19, and SS30-MW-20 at Site SS-30 were sampled during the September 2009 sampling event. SS30-MW-16 is the only well with more than two data points (see Graph 2). The concentration observed in September 2009 confirms data from November 2004, which indicate the concentration at this location is below the remediation goal of 297.4 µg/L.

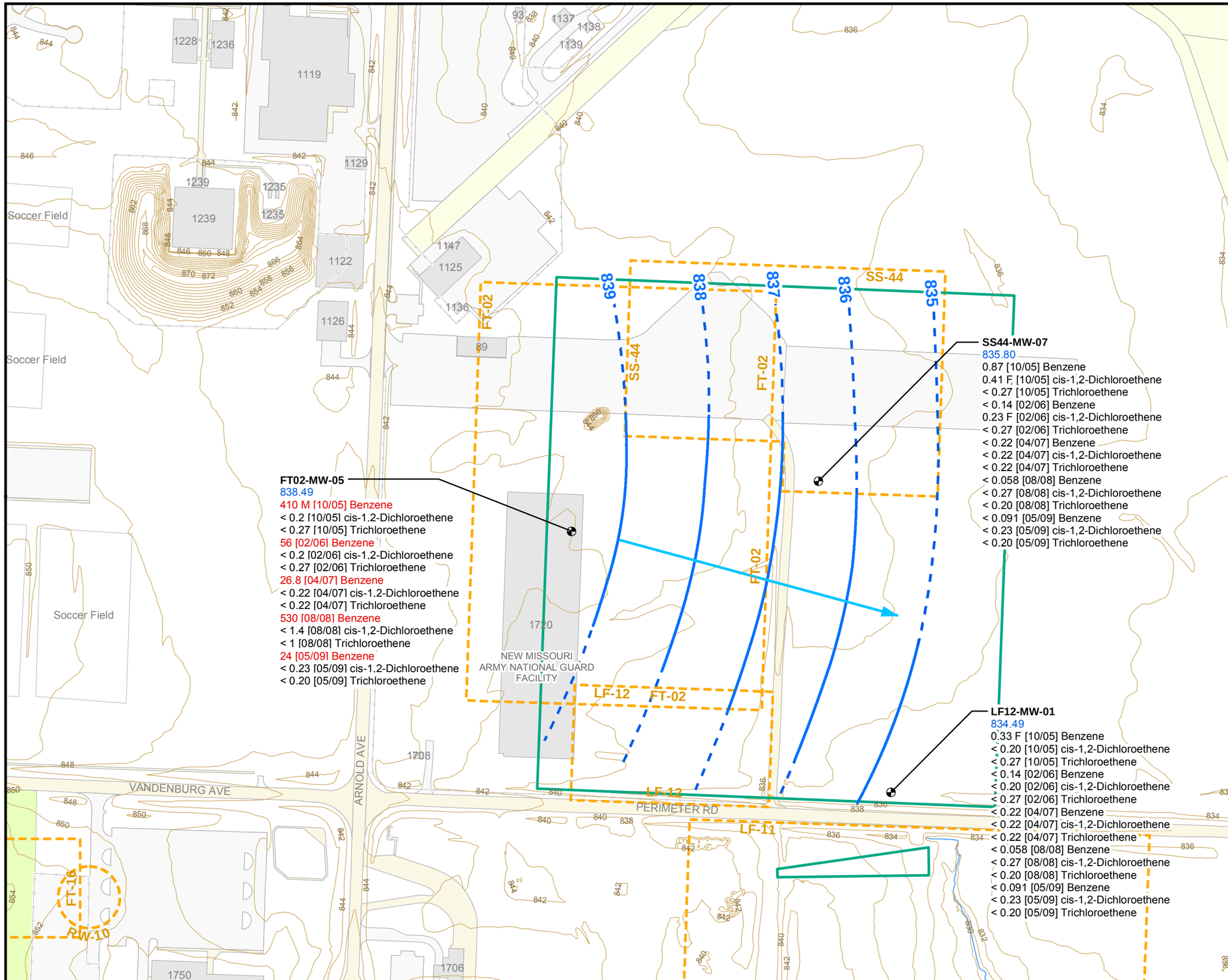
GRAPH 2
CT Concentrations at Well SS30-MW-16
Five-Year Review Report, Whiteman Air Force Base, Missouri



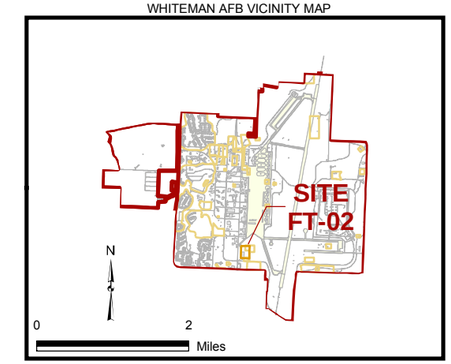
The reduction in CT concentration at this location is attributed in part to the injection of HRC in the spring of 2002 as part of a treatability study. CT concentrations showed a decline during monitoring of the treatability study, however, results suggesting that the concentrations could be reduced to levels below the remediation goals were not observed until November 2004. The HRC material degrades fairly quickly, and it is unlikely that the substance remains in the subsurface. However, the material created anaerobic conditions favorable to degradation of CT, and those conditions may still be present. The HRC was injected in a 10-foot grid spacing in the area around SS30-MW16.

6.6 Interviews

No interviews were conducted because of limited interest shown in previous public meetings, including one held in 2009. Glenn Golson of Whiteman AFB was not contacted to discuss the ERP by members of the community as suggested by the notices placed in local publications.



WHITEMAN AFB VICINITY MAP



LEGEND

- LTM MONITORING WELL
- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- 830 POTENTIOMETRIC SURFACE CONTOUR
- 830 INFERRED - POTENTIOMETRIC SURFACE CONTOUR
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- PARKS
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION
- GROUNDWATER FLOW DIRECTION

SAMPLE LOCATION — LF13-MW-06
GROUNDWATER ELEVATION — 834.90
GROUNDWATER CONCENTRATION (µg/L) — 360 [04/05] TCE
SAMPLE COLLECTION (MONTH/YEAR)
ANALYTE OR ANALYTE ABBREVIATION

NOTES:

1: TEXT IN RED INDICATES A CONCENTRATION ABOVE 5 µg/L, the CALM GTARC MCL.
2: < = BELOW THE METHOD DETECTION LIMIT.
3. M = A MATRIX EFFECT WAS PRESENT.
4. F = THE ANALYTE WAS POSITIVELY IDENTIFIED BUT THE VALUE WAS BELOW THE REPORTING LIMIT.
5: ALL RESULTS REPORTED IN µg/L.
6: ANALYTICAL SAMPLES AND GROUNDWATER ELEVATION MEASUREMENTS COLLECTED ON 5/20/2009.
7. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

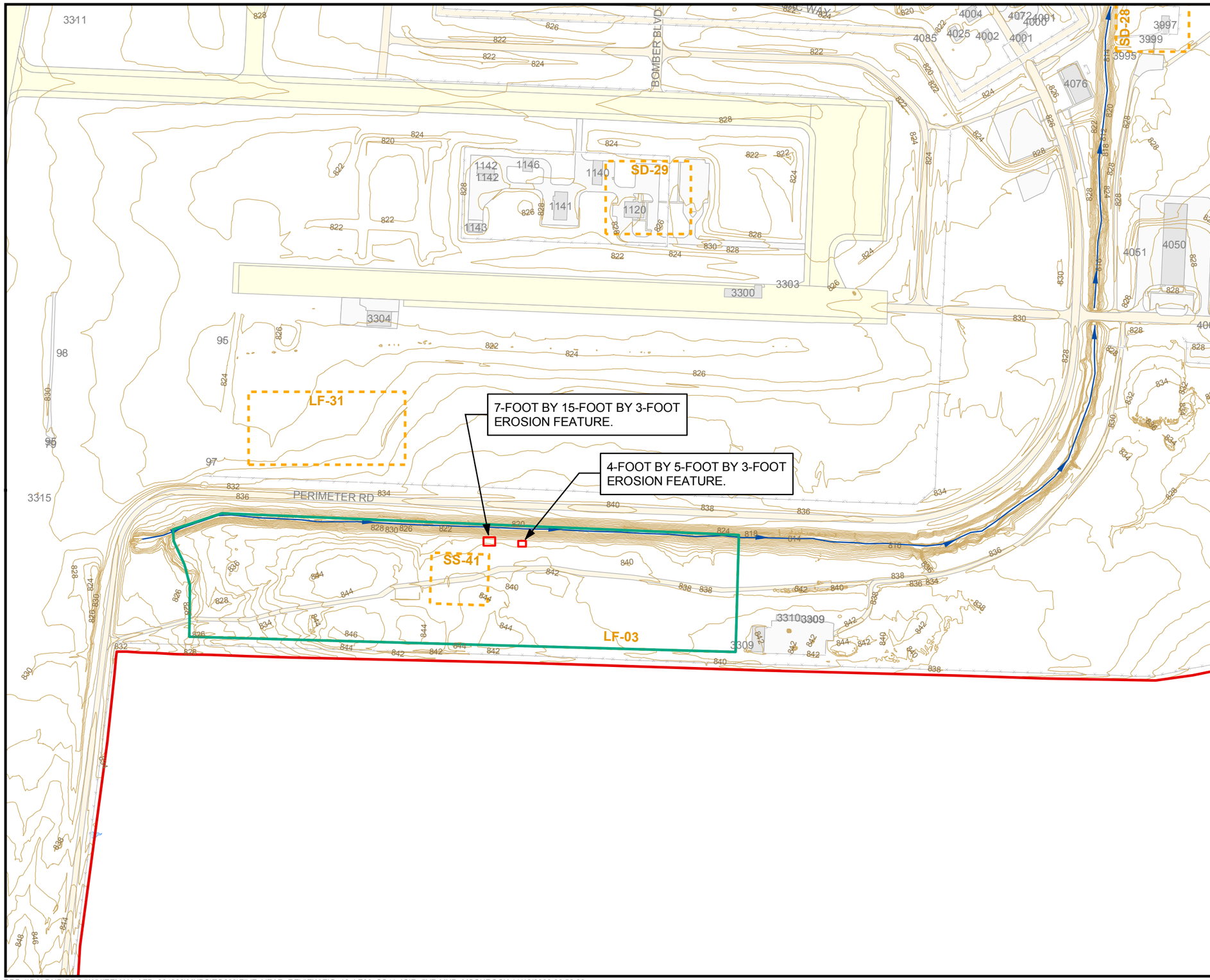
0 200 Feet

N

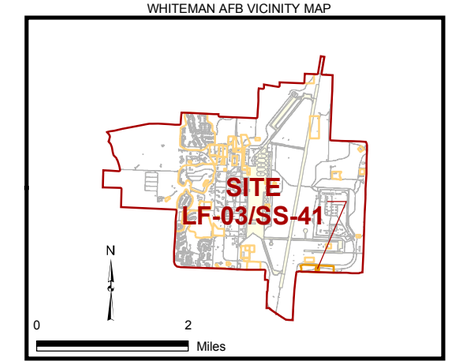
FIGURE 9
GROUNDWATER MONITORING DATA RESULTS FOR SITES FT-02, LF-12, AND SS-44
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_9_FT02_GW_RESULTS_5YR.MXD MSCHROCK 11/12/2009 00:37:33



WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- INSTALLATION BOUNDARY
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

0 400 Feet

N

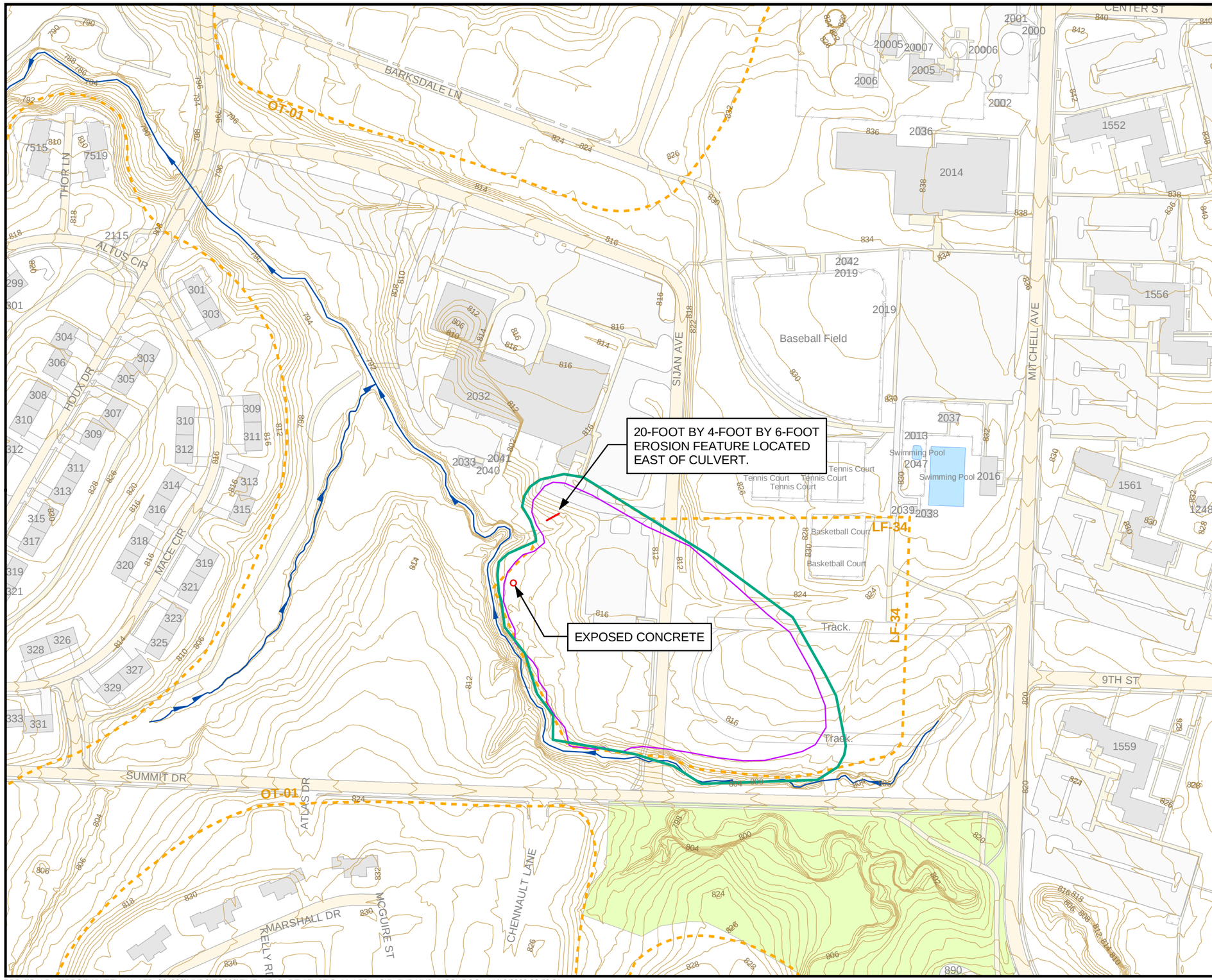
FIGURE 10

INSTITUTIONAL CONTROL INSPECTION RESULTS FOR SITE LF-03 / SS-41

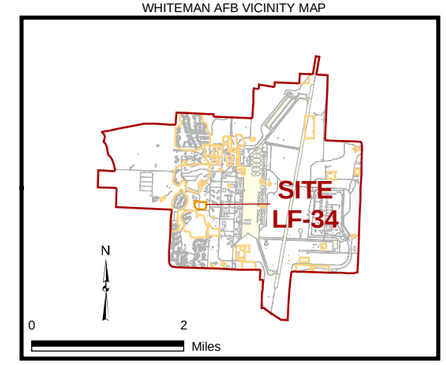
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_10_LF03_SS41_ICIR_5YR.MXD MSCHROCK 11/12/2009 00:52:20



WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- LANDFILL LIMIT
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- PARKS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

NOTE:

THE SITE FEATURES MAP HAS NOT BEEN UPDATED TO REFLECT CURRENT DRAINAGEWAY FEATURES. THE INSTITUTIONAL CONTROL BOUNDARY ON THE SOUTH AND WEST SIDE EXTENDS TO THE TOE OF THE BANK OF THE CREEK ON THE LANDFILL SIDE.

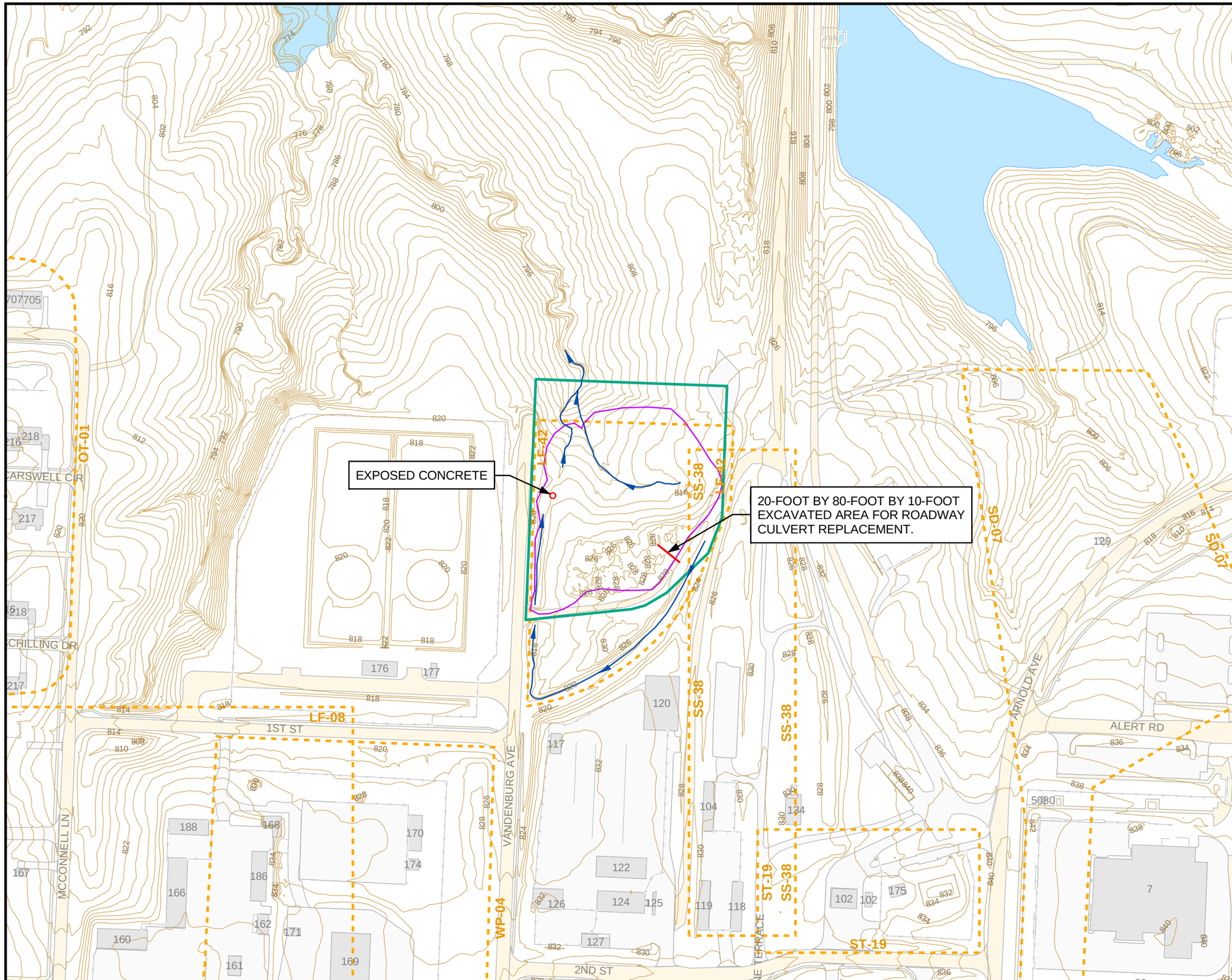
0 200 Feet

N

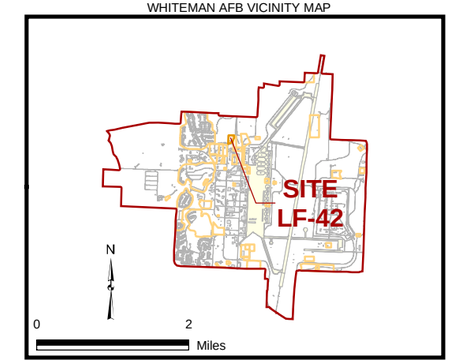
FIGURE 11
INSTITUTIONAL CONTROL INSPECTION RESULTS FOR SITE LF-34
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_11_LF34_ICIR_5YR.MXD MSCHROCK 11/12/2009 00:53:31



WHITEMAN AFB VICINITY MAP



LEGEND

- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- LANDFILL LIMIT
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- SURFACE WATER
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION

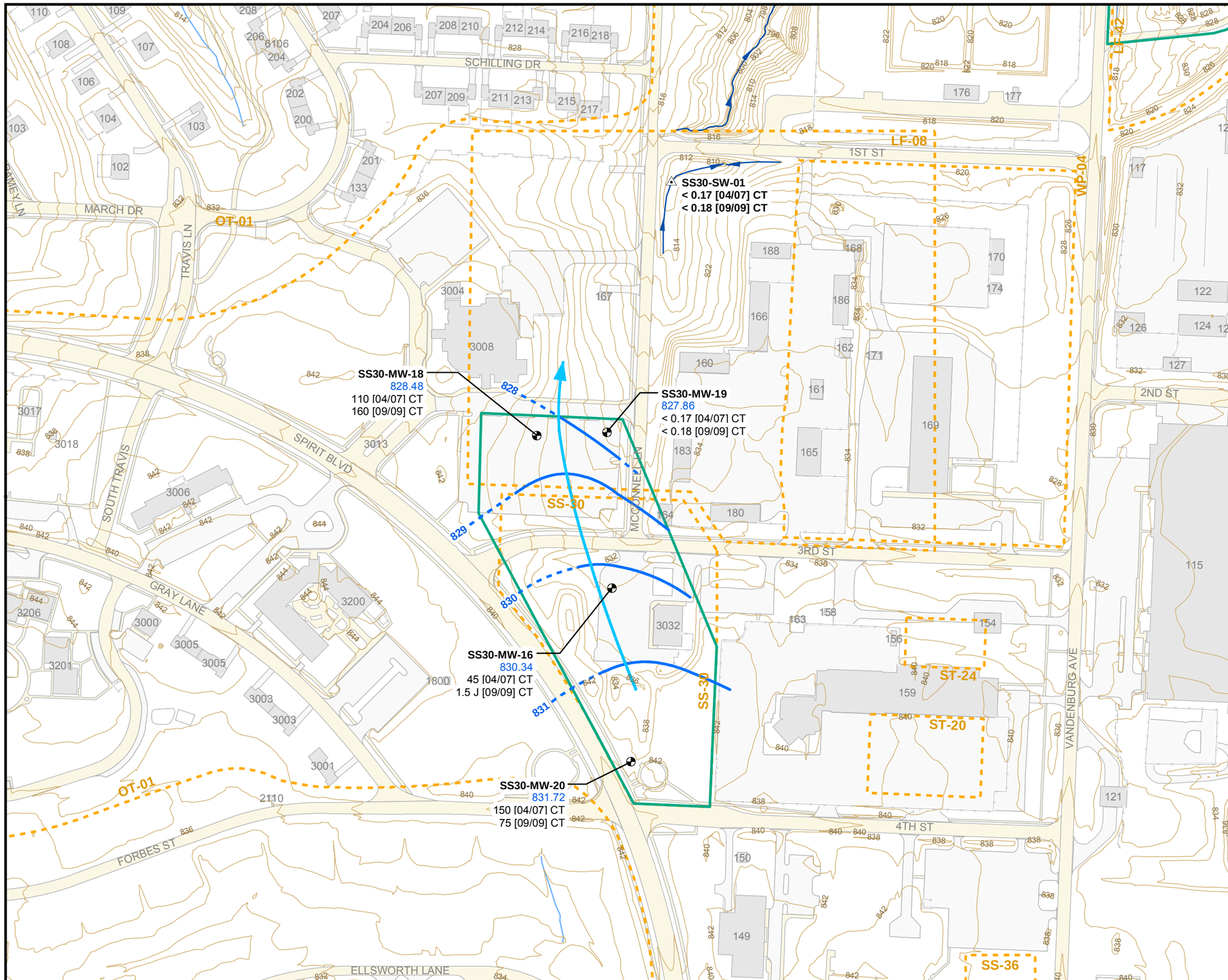
0 200 Feet

N

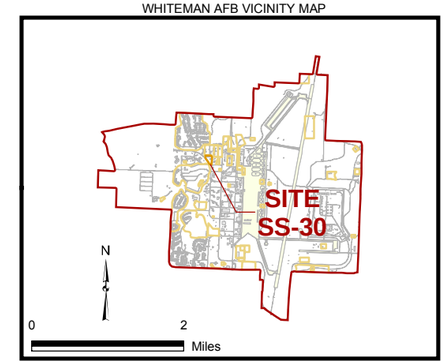
FIGURE 12
INSTITUTIONAL CONTROL INSPECTION RESULTS FOR SITE LF-42
FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_12_LF42_ICIR_5YR.MXD MSCHROCK 11/12/2009 00:55:07



WHITEMAN AFB VICINITY MAP



LEGEND

- LTM MONITORING WELL (NOT SAMPLED IN 2008)
- SURFACE WATER SAMPLE LOCATION
- INSTITUTIONAL CONTROL BOUNDARY
- SITE LIMITS
- 830 POTENTIOMETRIC SURFACE CONTOUR
- 830 INFERRED - POTENTIOMETRIC SURFACE CONTOUR
- MISCELLANEOUS SURFACE FEATURE
- MISCELLANEOUS ROAD FEATURE
- PAVEMENT
- BUILDINGS
- STREAMS
- DRAINAGE DITCH
- FENCES
- 830 TOPOGRAPHIC CONTOUR AND ELEVATION
- GROUNDWATER FLOW DIRECTION

SAMPLE LOCATION — SS30-MW-16
GROUNDWATER ELEVATION — 830.34
GROUNDWATER CONCENTRATION (µg/L) — 1.53 [09/09] CT
SAMPLE COLLECTION (MONTH/YEAR)
ANALYTE OR ANALYTE ABBREVIATION

NOTES:

1: CT = CARBON TETRACHLORIDE
2: < = BELOW THE METHOD DETECTION LIMIT.
3. J = ESTIMATED CONCENTRATION
4: ALL RESULTS REPORTED IN µg/L.
5: ANALYTICAL SAMPLES AND GROUNDWATER ELEVATION MEASUREMENTS COLLECTED ON 9/2/2009 AND 9/3/2009.
6. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

0 200 Feet

N

FIGURE 13
GROUNDWATER MONITORING DATA RESULTS FOR SITE SS-30

FIVE-YEAR REVIEW REPORT
WHITEMAN AIR FORCE BASE, MISSOURI

CH2MHILL

RDD \\BALDUR\PROJ\WHITEMAN_AFB_364309\MXDS\TO220\FIVE_YEAR_REVIEW\FIG_13_SS30_GW_RESULTS_5YR.MXD MSCHROCK 11/12/2009 11:55:51

7. Technical Assessment

7.1 Is the Remedy Functioning as Intended?

The remedy at each ERP site is functioning as intended and meeting the RAOs. Annual inspections and periodic groundwater sampling activities are being implemented to ensure that the remedies remain protective.

7.1.1 Remedial Action Performance

Observations made during IC inspections indicate no serious deficiencies. Concrete debris was observed at Sites LF-34 and LF-42, as noted in the inspection forms. However, the presence of the concrete is unrelated to erosion or surface disturbance and is not indicative of damage to the land surface. The remedy presented in the ROD (CH2M HILL 2007b) stated that landfill maintenance includes the repair of the existing surface resulting from damage caused by land surface activity, subsurface activity, or normal erosion. Therefore, maintenance associated with the concrete is not required. Data from groundwater and surface water monitoring indicates a continuation of the downward trend of the site-related COC contamination in source area monitoring wells at Sites FT-02, LF-12, SS-30, and SS-44. Downgradient wells have COC concentrations less than the remediation goals.

7.1.2 Opportunities for Optimization

An evaluation of remediation process optimization was conducted to determine if there are opportunities for optimizing the LTM program. The *Final Long-Term Monitoring Optimization Guide* (AFCEE 2006; version 1.2) was used to support this evaluation.

7.1.2.1 Monitoring Network Evaluation

The U.S. Air Force developed the monitoring well network with MDNR's concurrence. The benzene plume monitored through well FT02-MW-05 still has COC concentrations that exceed the remediation goal. The concentrations generally are decreasing, but additional monitoring is currently required until the concentrations decrease below cleanup goals or the cleanup goals are updated based on current exposure pathways.

Concentrations of the COCs at the SREA (benzene, cis-1,2-DCE, and TCE) for SS44-MW-07 were below remediation goals between September 2002 and September 2009 (6 sampling events) and below method detection limits for the past 3 years. Concentrations of benzene, cis-1,2-DCE, and TCE were below the method detection limit in LF12-MW-01.

Termination of the GMP can be considered once COCs in the source area monitoring well have decreased below cleanup goals for two successive monitoring events following the initial sampling event in which COC concentrations decrease below cleanup goals.

Concentrations of TCE and daughter product cis-1,2-DCE have been below the remediation goals for last 5 years within downgradient well SS44-MW-07. No concentrations above the remediation goal have been observed at downgradient well LF12-MW-01. Monitoring will

continue at these locations until results indicate monitoring is no longer required at FT02-MW-05. LF12-MW-01 and SS44-MW-07 serve as a sentinel wells for the SREA.

The concentration of CT at Site SS-30 did not exceed the remediation goal of 297.4 µg/L in the three downgradient monitoring wells or the surface water location during the baseline April 2007 event or the September 2009 event. The concentration of CT also was below the remediation goal in the groundwater sample collected from within the plume. The observed concentrations do not trigger additional action at Site SS-30, and no changes to the groundwater monitoring network are recommended at this time.

7.1.2.2 Monitoring Frequency Evaluation

The May 2009 groundwater sampling event was the 5th annual event for the SREA since the ROD was signed. The September 2009 groundwater sampling event was the 2nd event for Site SS-30 since the ROD was signed.

Sites FT-02, LF-12, and SS-44. The GMP states that the monitoring wells will be sampled at least annually. Per the GMP decision rules presented in the LTM and IC Plan (CH2M HILL 2005a), the monitoring frequency can be negotiated downward after the 5th year of monitoring if COC concentration trends remain generally stable or show a decrease over 2 successive years of annual monitoring. Benzene, cis-1,2-DCE, and TCE concentrations generally have decreased or remained below the remediation goals for the last 5 years. The following changes to the program are recommended:

- Reduce sampling frequency from annual monitoring to monitoring every 5 years for FT02-MW-05, SS44-MW-07, and LF12-MW-01.

Site SS-30. The *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* states the U.S. Air Force will sample one monitoring well within the CT groundwater plume (SS30-MW-16) and three wells downgradient of the plume (SS30-MW-18, SS30-MW-19, and SS30-MW-20) at intervals of no more than 5 years after the baseline sampling will be performed or until a downward trend is established. According to the *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42*, the groundwater monitoring program can be terminated if COC concentrations are below the remediation goal for three consecutive events.

CT was not detected in the monitoring well within the CT plume, the downgradient wells, or the surface water location at a concentration above the remediation goal during the April 2007 and September 2009 sampling events. The concentration of CT observed at the downgradient wells was less than 250 µg/L, which is the concentration in the *Final Long-Term Management and Institutional Control Plan for Sites LF-03/SS-41, LF-13, SS-30, LF-34, and LF-42* that suggests that another monitoring well downgradient should be considered. A slight increase was observed at SS30-MW-18 in September 2009, but the concentration was within the same order of magnitude as the 2007 sampling event. It is recommended that the groundwater monitoring sampling frequency of every 5 years not be changed.

7.1.2.3 Monitoring Duration Evaluation

In accordance with the ROD, site closure requires that COCs in FT02-MW-05 be present at concentrations below remediation goals for two consecutive monitoring events following

the first event in which COC concentrations decreased below remediation goals. Benzene was detected at a concentration exceeding the remediation goal in FT02-MW-05. Thus, the condition required for GMP termination does not yet exist.

According to the ROD for Site SS-30, the ICs can be removed, with MDNR approval, if the concentrations of CT in groundwater are below the remediation goal for three consecutive sampling events occurring at least 3 months apart. CT was detected at a concentration below the remediation goal in the monitoring wells at Site SS-30. A third consecutive sampling event is necessary at SS30-MW-18, SS30-MW-19, and SS30-MW-20 to satisfy the conditions for site closure. Therefore, the condition required for GMP termination does not yet exist.

7.1.2.4 Institutional Controls

The land and groundwater uses have not changed and, as stated in the RODs, the remedies will remain protective if the uses are unchanged. The ROD documents require restrictions on land use and prohibits the use of groundwater. It is recommended that the ICs remain, as planned.

7.2 Are Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Still Valid?

Site conditions and use are as expected in the *Final Record of Decision for Sites LF-03/SS-41, LF-13, FT-16, SS-30, LF-34, SS-37, SS-38, and LF-42.* However, groundwater use conditions are not as those included in the *Record of Decision for Sites FT-02, LF-12, and SS-44.* The *Record of Decision for Sites FT-02, LF-12, and SS-44* included remedies protective for potable use of groundwater. The groundwater is not a potable resource and was not evaluated as such in subsequent ROD documents for the Base. Therefore, the RAOs for the *Record of Decision for Sites FT-02, LF-12, and SS-44* are not valid. The U.S. Air Force may pursue a ROD Amendment to document this change.

The ERP sites continue to be used for industrial purposes, which is as expected. In the years since the ROD documents were signed, toxicity data and cleanup levels have not changed.

7.3 Has Information Come to Light That Would Call into Question the Protectiveness of the Remedy?

No information has come to light that would call into question the protectiveness of the remedy at each ERP site. No new human health and ecological risks were found, and no land use changes are being considered.

8. Issues

No major issues regarding the protectiveness of the remedy were discovered during the five-year review, but landfill cover areas may require future maintenance. Section 6.4.1 summarizes observations of the IC inspections.

9. Recommendations and Followup Actions

Table 2 lists recommendations and followup actions for the issues the U.S. Air Force needs to address to ensure future protectiveness. This report provides the basis for those changes and the mechanism for review and approval of the changes by MDNR. MDNR's acceptance of this report is considered endorsement of the path forward.

TABLE 2
Recommendations and Followup Actions
Five-Year Review Report, Whiteman Air Force Base, Missouri

LTM Results	Recommendations and Followup Actions
Groundwater COC concentrations detected above the remediation goal for benzene at FT02-MW-05 in the SREA, which includes Sites FT-02, LF-12, and SS-44.	Reduce monitoring of wells FT02-MW-05, SS44-MW-07, and LF12-MW-01 to every 5 years to collect groundwater data and conduct annual IC inspections as described in the ROD. The IC components are included in Appendix B. If COC concentrations are below the remediation goal in a future sampling event, sampling frequency may increase to achieve site closure, which can be achieved with three consecutive events (occurring at least 3 months apart but no longer than 2 years apart) with COC concentrations below the remediation goal. In the future, the U.S. Air Force may prepare a ROD amendment based on updated exposure pathways (i.e., RAOs) at the SREA to evaluate the remedy. However, sampling will continue as described above until a ROD Amendment has been finalized.
Landfill cover erosion at Sites LF-03/SS-41 and LF-34.	Fix the erosion or monitor areas of erosion to ensure that waste is not available for contact.
Groundwater COC concentrations detected at Site SS-30 are below the remedial goal	Continue to monitor Site SS-30 groundwater, as planned.
Buried waste is present at the landfill sites, which are Sites LF-03/SS-41, LF-11, LF-13, LF-34, and LF-42	Continue annual ICs inspections as described in the ROD, as planned. The IC components are included in Appendix B.

10. Protectiveness Statement

The remedy selected for each active ERP site at Whiteman AFB is protective of human health and the environment. No immediate threats at the ERP sites were identified. The remedy continues to result in reductions in COC concentrations. IC inspections and digging permits continue to prevent exposure to buried waste. The remedies are expected to remain protective of human health and the environment upon attainment of the RAOs or as long as the former landfills are regularly maintained and COC contamination remains unavailable for direct exposure. IC inspections and the GMP will continue to be implemented to assure continued protectiveness.

11. Next Five-Year Review

The next five-year review for Sites FT-02, LF-03/SS-41, LF-11, LF-12, LF-13, SS-30, LF-34, LF-42, and SS-44 is required in 2014, 5 years from the date of this review.

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Appendix A
Five-Year Review Summary Forms

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site FT-02		
EPA ID *(from WasteLAN)*: Not applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non-NPL Site		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 09 / 21 / 05	
Has site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 05 / 11 / 05 to 05 / 20 / 09		
Date(s) of site inspection: 10/14/05; 02/28/06; 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 05/10/05		
Due date *(five years after triggering action date)*: 05/10/10		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

The Groundwater Monitoring Plan (GMP) states that the monitoring wells will be sampled at least annually. Per the GMP decision rules presented in the Long-Term Monitoring and Institutional Control (IC) Plan, the monitoring frequency can be renegotiated downward after the 5th year of monitoring if contaminant concentration trends remain generally stable or show a decrease over 2 successive years of annual monitoring. Benzene, cis-1,2-dichloroethene, and trichloroethene concentrations have generally decreased or remained below the remediation goals for the last 5 years. Therefore, it is recommended that the sampling frequency be reduced from annual monitoring to monitoring every five years. In addition, the U.S, Air Force will prepare a Record of Decision (ROD) amendment to update the remedial action objectives (RAOs) (i.e., remove the GMP since the groundwater is not a potable resource).

Protectiveness Statement(s):

The remedy at Site FT-02 at Whiteman AFB is protective of human health and the environment. Immediate threats at each Environmental Restoration Program (ERP) site have been addressed. IC inspections continue to effectively prevent exposure to contaminated groundwater. In addition, the groundwater at the Base is not used as a potable resource. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the RAOs or as long as contaminant of concern contamination remains unavailable for direct exposure. IC inspections and the GMP will continue to be implemented to assure protectiveness in the future. However, a ROD amendment may be prepared by the U.S. Air Force.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Sites LF-03/SS-41		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**

SITE STATUS	
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non NPL-Site	
Remediation status (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete	
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 06 / 06 / 07
Has site been put into reuse? ☐ YES ☒ NO	

REVIEW STATUS	
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force	
Author name: Mr. Glenn Golson	
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**
Review period:** 03 / 23 / 07 to 05 / 20 / 09	
Date(s) of site inspection: 04/19/07; 08/04/08; 05/20/09	
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion	
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____	
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date	
Triggering action date *(from WasteLAN)*: 03/23/07	
Due date *(five years after triggering action date)*: 03/23/12***	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]
*** This Five-Year Review was completed ahead of schedule to align Whiteman AFB Environmental Restoration Sites on the same Five-Year Review schedule.

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy. However, erosion on the south bank of Long Branch Creek was observed at the site. If erosion continues, buried waste could be exposed.

Recommendations and Follow-up Actions:

Continued annual Institutional Control (IC) inspections are recommended to ensure the remedy remains protective of human health and the environment by limiting human contact with buried waste.

Protectiveness Statement(s):

The remedy for Site LF-03/SS-41 at Whiteman AFB is protective of human health and the environment. Iimmediate threats at the site has been addressed. IC inspections continue to effectively prevent exposure to buried waste. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives or as long as regular maintenance of the former landfills occurs. IC inspections will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site LF-11		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 09 / 21 / 05	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 05 / 11 / 05 to 05/ 20 / 09		
Date(s) of site inspection: 02/28/06; 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 05/10/05		
Due date *(five years after triggering action date)*: 05/10/10		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

Continued annual intuitional control (IC) inspections are recommended to ensure the remedy remains protective of human health and the environment to limit human contact with buried waste.

Protectiveness Statement(s):

The remedy for Site LF-11 at Whiteman AFB is protective of human health and the environment. Immediate threats at the site have been addressed. IC inspections continue to effectively prevent exposure to buried waste. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives or as long as regular maintenance of the former landfill occurs. IC inspections will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site LF-12		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non-NPL Site		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 09 / 21 / 05	
Has site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 05 / 11 / 05 to 05 / 20 / 09		
Date(s) of site inspection: 10/14/05; 02/28/06; 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 05/10/05		
Due date *(five years after triggering action date)*: 05/10/10		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

The Groundwater Monitoring Plan (GMP) states that the monitoring wells will be sampled at least annually. Per the GMP decision rules presented in the Long-Term Monitoring and Institutional Control (IC) Plan, the monitoring frequency can be renegotiated downward after the 5th year of monitoring if contaminant concentration trends remain generally stable or show a decrease over 2 successive years of annual monitoring. Benzene, cis-1,2-dichloroethene, and trichloroethene concentrations have generally decreased or remained below the remediation goals for the last 5 years. Therefore, it is recommended that the sampling frequency be reduced from annual monitoring to monitoring every five years. In addition, the U.S, Air Force will prepare a Record of Decision (ROD) amendment to update the remedial action objectives (RAOs) (i.e., remove the GMP since the groundwater is not a potable resource).

Protectiveness Statement(s):

The remedy at Site LF-12 at Whiteman AFB is protective of human health and the environment. Immediate threats at each Environmental Restoration Program (ERP) site have been addressed. IC inspections continue to effectively prevent exposure to contaminated groundwater. In addition, the groundwater at the Base is not used as a potable resource. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the RAOs or as long as contaminant of concern contamination remains unavailable for direct exposure. IC inspections and the GMP will continue to be implemented to assure protectiveness in the future. However, a ROD amendment may be prepared by the U.S. Air Force.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site LF-13		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non-NPL Site		
Remediation status (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 06 / 06 / 07	
Has site been put into reuse? ☒ YES ☐ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 03 / 24 / 07 to 05 / 20 / 09		
Date(s) of site inspection: 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 03/23/07		
Due date *(five years after triggering action date)*: 05/10/10***		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]
*** This Five-Year Review was completed ahead of schedule to align Whiteman AFB Environmental Restoration Sites on the same Five-Year Review schedule.

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

Continued annual institutional control (IC) inspections are recommended to ensure the remedy remains protective of human health and the environment by limiting human contact with buried waste.

Protectiveness Statement(s):

The remedy for Site LF-13 at Whiteman AFB is protective of human health and the environment. Immediate threats at the site have been addressed. IC inspections continue to effectively prevent exposure to buried waste. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives or as long as regular maintenance of the former landfill occurs. IC inspections will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site SS-30		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non-NPL Site		
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☐ NO	**Construction completion date:** 06 / 06 / 07	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 03 / 24 / 07 to 09 / 03 / 09		
Date(s) of site inspection: 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 03/23/07		
Due date *(five years after triggering action date)*: 05/10/10***		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]
*** This Five-Year Review was completed ahead of schedule to align Whiteman AFB Environmental Restoration Sites on the same Five-Year Review schedule.

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

The Groundwater Monitoring Plan (GMP) states that the April 2007 groundwater and surface water sampling event was the baseline sampling event and the same locations be sampled in September 2009 (2.5 years after development of the monitoring program). The U.S. Air Force will sample one monitoring well within the carbon tetrachloride (CT) groundwater plume (SS30-MW-16) and three wells downgradient of the plume (SS30-MW-18, SS30-MW-19, and SS30-MW-20) at intervals of no more than 5 years after the baseline sampling will be performed or until a downward trend is established.

CT was not detected above the remediation goal during the April 2007 and September 2009 sampling events in the monitoring well within the CT plume, the downgradient wells, or the surface water location, and the concentration of CT observed at the downgradient wells was less than 250 µg/L. Per the decision logic, the CT concentrations need to be below the remediation goal for three consecutive events. Therefore, another groundwater monitoring sampling event is recommended.

Protectiveness Statement(s):

The remedy at Site SS-30 at Whiteman AFB is protective of human health and the environment. Immediate threats at the site have been addressed. Institutional control (IC) inspections continue to effectively prevent exposure to contaminated groundwater. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives and the CT contamination remains unavailable for direct exposure. IC inspections and the GMP will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site LF-34		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 06 / 06 / 07	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 03 / 24 / 07 to 05 / 20 / 09		
Date(s) of site inspection: 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 03/23/07		
Due date *(five years after triggering action date)*: 05/10/10***		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]
*** This Five-Year Review was completed ahead of schedule to align Whiteman AFB Environmental Restoration Sites on the same Five-Year Review schedule.

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy. However, erosion near the northwest corner of the site was observed. If erosion continues, buried waste could be exposed. In addition, a piece of concrete debris was observed, which may or may not be associated with the landfill. Also, if the concrete is from the landfill, there may or may not be a risk to human health as a result.

Recommendations and Follow-up Actions:

Continued annual institutional control (IC) inspections are recommended to ensure the remedy remains protective of human health and the environment.

Protectiveness Statement(s):

The remedy for Site LF-34 at Whiteman AFB is protective of human health and the environment. Immediate threats at the site have been addressed. IC inspections continue to effectively prevent exposure to buried waste. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives or as long as regular maintenance of the former landfill occurs. IC inspections will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site LF-42		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**
SITE STATUS		
NPL status: ☐ Final ☐ Deleted ☒ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete		
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 06 / 06 / 07	
Has site been put into reuse? ☐ YES ☒ NO		
REVIEW STATUS		
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force		
Author name: Mr. Glenn Golson		
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**	
Review period:** 03 / 24 / 07 to 05 / 20 / 09		
Date(s) of site inspection: 04/19/07; 08/04/08; 05/20/09		
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date		
Triggering action date *(from WasteLAN)*: 03/23/07		
Due date *(five years after triggering action date)*: 05/10/10***		

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]
*** This Five-Year Review was completed ahead of schedule to align Whiteman AFB Environmental Restoration Sites on the same Five-Year Review schedule.

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy. However, a piece of concrete debris was observed, which may or may not be associated with the landfill. Also, if the concrete is from the landfill, there may or may not be a risk to human health as a result.

Recommendations and Follow-up Actions:

Continued annual Institutional Control (IC) inspections are recommended to ensure the remedy remains protective of human health and the environment.

Protectiveness Statement(s):

The remedy for Site LF-42 at Whiteman AFB is protective of human health and the environment. All immediate threats at the site have been addressed. IC inspections continue to effectively prevent exposure to buried waste. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the remedial action objectives or as long as regular maintenance of the former landfill occurs. IC inspections will continue to be implemented to assure protectiveness in the future.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Whiteman Air Force Base Site SS-44		
EPA ID *(from WasteLAN)*: Not Applicable		
Region: 7	**State: MO**	**City/County: Knob Noster/Johnson**

SITE STATUS	
NPL status: ☐ Final ☐ Deleted ☒ Other (specify) Non-NPL Site	
Remediation status (choose all that apply): ☐ Under Construction ☒ Operating ☒ Complete	
Multiple OUs?* ☐ YES ☒ NO	**Construction completion date:** 09 / 21 / 05
Has site been put into reuse? ☒ YES ☐ NO	

REVIEW STATUS	
Lead agency: ☐ EPA ☐ State ☐ Tribe ☒ Other Federal Agency U.S. Air Force	
Author name: Mr. Glenn Golson	
Author title: Natural Resources Manager	**Author affiliation: Whiteman Air Force Base**
Review period:** 05 / 11 / 05 to 05 / 20 / 09	
Date(s) of site inspection: 10/14/05; 02/28/06; 04/19/07; 08/04/08; 05/20/09	
Type of review: ☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☒ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion	
Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____	
Triggering action: ☐ Actual RA Onsite Construction at OU #____ ☐ Actual RA Start at OU#__ ☐ Construction Completion ☐ Previous Five-Year Review Report ☒ Other (specify) – Record of Decision Signature Date	
Triggering action date *(from WasteLAN)*: 05/10/05	
Due date *(five years after triggering action date)*: 05/10/10	

* ["OU" refers to operable unit.]
** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

Five-Year Review Summary Form, cont'd.

Issues:

No deficiencies were noted that currently impact the protectiveness of the remedy.

Recommendations and Follow-up Actions:

The Groundwater Monitoring Plan (GMP) states that the monitoring wells will be sampled at least annually. Per the GMP decision rules presented in the Long-Term Monitoring and Institutional Control (IC) Plan, the monitoring frequency can be renegotiated downward after the 5th year of monitoring if contaminant concentration trends remain generally stable or show a decrease over 2 successive years of annual monitoring. Benzene, cis-1,2-dichloroethene, and trichloroethene concentrations have generally decreased or remained below the remediation goals for the last 5 years. Therefore, it is recommended that the sampling frequency be reduced from annual monitoring to monitoring every five years. In addition, the U.S, Air Force will prepare a Record of Decision (ROD) amendment to update the remedial action objectives (RAOs) (i.e., remove the GMP since the groundwater is not a potable resource).

Protectiveness Statement(s):

The remedy at Site SS-44 at Whiteman AFB is protective of human health and the environment. Immediate threats at each Environmental Restoration Program (ERP) site have been addressed. IC inspections continue to effectively prevent exposure to contaminated groundwater. In addition, the groundwater at the Base is not used as a potable resource. The remedy at the site is expected to remain protective of human health and the environment upon attainment of the RAOs or as long as contaminant of concern contamination remains unavailable for direct exposure. IC inspections and the GMP will continue to be implemented to assure protectiveness in the future. However, a ROD amendment may be prepared by the U.S. Air Force.

Appendix B
IC Language Boundary Surveys and Components

APPENDIX B

Institutional Control Language

Base General Plan Language for Sites FT-02, LF-12, and SS-44

Sites FT-02, LF-12, and SS-44 are located northeast of the intersection of Arnold Avenue and Perimeter Road.

An IC has been established for Sites FT-02, LF-12, and SS-44 to prevent extraction and use of underlying groundwater and to restrict unauthorized soil disturbance associated with installation of utilities or construction of any kind.

The established IC boundary fully encompasses the three sites and the associated contaminant plumes where groundwater contaminants pose risk under the unrestricted use scenario. A survey of the IC boundaries, prepared by a professional land surveyor registered with the State of Missouri.

The IC use restrictions are as follows:

- Groundwater shall not be extracted from within the IC boundary for use except for the incidental removal of groundwater during construction or routine base activities. Groundwater removed will be handled and disposed of in accordance with appropriate regulations.
- The area within the IC boundary shall not be used for residential purposes.
- Prior to performing construction activities at the sites, a waiver shall be obtained through the ERP Manager from Headquarters Air Combat Command, Environmental Restoration Office (HQ ACC/CEVR).
- Prior to installing utilities or other soil disturbance of any kind, the activity proponent must obtain an AF Form 103, *Digging Permit*, from Civil Engineering or other appropriate office.
- Prior to a land use change from restricted (industrial) to unrestricted (residential), approval must be obtained from the ERP Manager, other appropriate base personnel, and the Missouri Department of Natural Resources (MDNR).

In the unlikely event that the United States sells or transfers the property, these restrictions must be incorporated into any real property documents necessary for transferring ownership from the United States to another party.

Institutional Controls and Base General Plan Language for Site LF-03/SS-41

Site LF-03, also known as Landfill No. 5, is about 0.5 mile long and 300 to 500 feet wide, covering about 40 acres. Site SS-41, the Dry Pond, is located within Site LF-03 and is estimated to be 0.1 to 0.3 acre in size. The current Site LF-03/SS-41 land use is industrial and includes a Base recycling center located in the southwestern part of the site. Most of the site is covered by unmaintained native grasses, shrubbery, and trees. Long Branch Creek flows east along the northern boundary of the landfill and separates the site from Perimeter Road.

An IC has been established for Site LF-03/SS-41 to restrict unauthorized disturbance of the subsurface associated with construction of any kind and to maintain and repair of the existing surface. The established IC boundary encompasses the site. A survey of the IC boundaries was prepared by a professional land surveyor registered with the State of Missouri.

The IC requirements are as follows:

- Before performing construction at the site, a digging permit must be approved by the ERP Manager, Environmental Flight Chief, or equivalent at Whiteman AFB. Civil Engineering or other appropriate office issuing the dig permit will maintain an active file showing the location of the IC boundary and shall notify the activity proponent of the presence of waste, the need for proper health and safety equipment and procedures and the procedures for disposal of waste removed from the site in accordance with appropriate regulations.
- Inspection and maintenance of the current landfill surfaces will be conducted annually. Maintenance includes repair of the existing surface resulting from damage caused by land surface activity, subsurface activity, or normal erosion. Waste removed, if any, will be handled and disposed of in accordance with appropriate regulations.
- Activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs will be addressed by the USAF within 30 days after the USAF becomes aware of the breach. The USAF will notify the MDNR within 30 days after discovery of activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs. The USAF will notify MDNR regarding how the USAF has addressed or will address the breach within 30 days of sending MDNR notification of the breach.
- The USAF shall notify the MDNR 45 days in advance of proposed land use changes that are inconsistent with the land use control objective or the selected remedy. The USAF will provide notice to the MDNR at least 6 months before transfer or sale of the site, so that MDNR 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 USAF to notify MDNR at least 6 months before transfer or sale, then the USAF will notify MDNR as soon as possible but no later than 60 days before the transfer or sale of site. In addition, the USAF will provide the MDNR with similar notice as to federal-to-federal transfer of property. The USAF shall provide a copy of executed deed or transfer assembly to MDNR.

- The duration of ICs for Site LF-03/SS-41, pertinent to potential exposure to wastes, will be unlimited as long as waste is present at the site. Five-year reviews of each site will be conducted in accordance with Section 121c of CERCLA as long as ICs are in place (that is, as long as buried waste is present at the site). If the waste inhibits future Base construction activities, the USAF can remove the waste in consultation with MDNR and in accordance with appropriate regulations.

Base General Plan Language for Site LF-11

Site LF-11 is located at the southern end of the base, just east of the current LeMay Gate.

An IC has been established for Site LF-11 to limit human contact with landfill waste material by prohibiting activities that may damage or breach the existing protective soil cover and by implementing actions to minimize erosion of the protective soil cover from surface water runoff.

An IC boundary encompassing each waste trench individually has been surveyed by a professional land surveyor registered with the State of Missouri.

The IC use restrictions are as follows:

- Prior to performing construction activities at the site, a waiver shall be obtained through the ERP Manager from Headquarters Air Combat Command, Environmental Restoration Office (HQ ACC/CEVR).
- Prior to installing utilities or other soil disturbance of any kind, the activity proponent shall obtain an AF Form 103, Digging Permit, from Civil Engineering or other appropriate office.
- Damage to the protective soil cover resulting from land surface or subsurface activity will be repaired within 30 days following completion of the activities. Waste removed will be handled and disposed of in accordance with appropriate regulations.
- The IC boundaries will remain as long as waste is present at the site. In the unlikely event that the United States sells or transfers the property, these restrictions must be incorporated into any real property documents necessary for transferring ownership from the United States to another party.

Institutional Controls and Base General Plan Language for Site LF-13

Site LF-13 comprises the sites formerly known as Site 11B (Landfill 2) and Site 13 (Landfill 4). Currently, Site LF-13 consists of two softball fields and other open grass areas. Workers regularly maintain and mow the site.

An IC has been established for Site LF-13 to restrict unauthorized disturbance of the subsurface associated with construction of any kind and to maintain and repair of the existing surface. The established IC boundary fully encompasses the site. A survey of the IC boundaries was prepared by a professional land surveyor registered with the State of Missouri.

The IC requirements are as follows:

- Before construction is performed at the site, a digging permit must be approved by the ERP Manager, Environmental Flight Chief, or equivalent at Whiteman AFB. Civil Engineering or other appropriate office issuing the dig permit will maintain an active file showing the location of the IC boundary and shall notify the activity proponent of the presence of waste, the need for proper health and safety equipment and procedures and the procedures for disposal of waste removed from the site in accordance with appropriate regulations.
- Inspection and maintenance of the current landfill surfaces will be conducted annually. Maintenance includes repair of the existing surface resulting from damage caused by land surface activity, subsurface activity, or normal erosion. Waste removed, if any, will be handled and disposed of in accordance with appropriate regulations.
- Activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs will be addressed by the USAF within 30 days after the USAF becomes aware of the breach. The USAF will notify the MDNR within 30 days after discovery of activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs. The USAF will notify MDNR regarding how the USAF has or will address the breach within 30 days of sending MDNR notification of the breach.
- The USAF will notify the MDNR 45 days in advance of proposed land use changes that are inconsistent with the land use control objective or the selected remedy. The USAF will provide notice to the MDNR at least six months prior to transfer or sale of the site so that MDNR 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 USAF to notify MDNR at least 6 months before transfer or sale, then the USAF will notify MDNR as soon as possible but no later than 60 days before the transfer or sale of site. The USAF will provide the MDNR with similar notice as to federal-to-federal transfer of property. The USAF shall provide a copy of executed deed or transfer assembly to MDNR.
- The duration of ICs for Site LF-13, pertinent to potential exposure to wastes, will be unlimited as long as waste is present at the site. Five-year reviews of each site will be

conducted in accordance with Section 121c of CERCLA as long as ICs are in place (that is, as long as buried waste is present at the site). If the waste inhibits future Base construction activities, the USAF can remove the waste in consultation with MDNR and in accordance with appropriate regulations.

Institutional Controls and Base General Plan Language for Site SS-30

Site SS-30 is located east of Spirit Boulevard, south of 3rd Street. The Base shoppette (Building 3032) and a display plane are located at the site. The site is flat, except for a berm-like feature immediately south of the Base shoppette. Parts of the site outside the shoppette building and paved parking lot are covered with grassy vegetation. A drainage ditch runs east along Third Street. An active gasoline fueling station is located on the north side of the shoppette.

An IC has been established for Site SS-30 to restrict access or protect humans exposed to potential pathways. ICs would control construction activities, including excavation and drilling at the site, to protect humans from direct contact exposure to groundwater, or if contacted, to be managed in accordance with current laws and regulations. The established IC boundary encompasses the CT groundwater plume and a 15-year buffer zone. A survey of the IC boundaries and conditions of the use restrictions was prepared by a professional land surveyor registered with the State of Missouri.

The IC requirements are as follows:

- Groundwater may not be extracted from within the IC boundary unless the appropriate personal protective equipment is used. Groundwater removed will be handled and disposed of in accordance with appropriate regulations.
- The area within the IC boundary may not be used for residential purposes.
- Before construction is performed at the site, a digging permit must be approved by the ERP Manager, Environmental Flight Chief, or equivalent at Whiteman AFB. Civil Engineering or other appropriate office issuing the dig permit will maintain an active file showing the location of the IC boundary and shall notify the activity proponent of the presence of groundwater containing CT at concentrations above the remediation goal of 297.4 µg/L, the need for proper health and safety equipment and procedures, and procedures for disposal of waste removed from the site in accordance with appropriate regulations.
- ICs may not be modified, deleted, or terminated. Land use inconsistent with the IC objectives, including land use that would change the underlying risk assessment exposure assumptions, will not be approved without obtaining written MDNR approval.
- Activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs, will be addressed by the USAF within 30 days after the USAF becomes aware of the breach. The USAF will notify the MDNR within 30 days after discovery of activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs. The USAF will notify MDNR regarding how the USAF has addressed or will address the breach within 30 days of sending MDNR notification of the breach.
- These restrictions will be incorporated into real property documents necessary for transferring ownership from the U.S., in the unlikely event that the U.S. sells or transfers

the property. The real property document would include a discussion of the groundwater contamination. The USAF shall notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives or the selected remedy. The USAF will provide notice to MDNR at least 6 months before transfer or sale of the sites affected by the ICs so that MDNR 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 USAF to notify MDNR at least six months prior to transfer or sale then the USAF will notify MDNR as soon as possible but no later than 60 days before the transfer or sale of property subject to ICs. In addition to the land transfer notice and discussion provisions above, the USAF will provide MDNR with similar notice, within the same time periods, as to federal-to-federal transfer of property. The USAF shall provide a copy of executed deed or transfer assembly to MDNR.

- A single IC boundary will encompass areas where chemical concentrations in groundwater exceeded a risk-based remedial goal protective of construction workers. The IC boundary will be located at least 50 feet from locations where chemical concentrations exceeded remediation goals. This will minimize the potential for hypothetical future construction dewatering to draw the plume from the area exceeding the remediation goal. The downgradient IC boundary position will provide a physical buffer for a minimum of 15 years (Table 2-1) before contaminated groundwater could potentially reach the IC boundary based on contaminant velocity. These distances are based upon fate and transport calculation presented in the RI Work Plan. The IC boundary will be reviewed during the 5-year review, as described below.

- The USAF will implement a groundwater and surface water monitoring program, to be documented in a long-term monitoring plan that will be developed in consultation with the MDNR, in order to support the ICs and allow systematic, periodic evaluation of site groundwater and groundwater CT plume discharge point (that is, surface water) quality to help ensure that the established IC boundaries fully encompass the contaminant plumes and remain protective of human health and the environment. The monitoring program will be used to evaluate trends in plume concentrations and the need for continued monitoring and ICs.

- The USAF will conduct an annual inspection of the site and submit a copy of the report generated annually to MDNR. Annual reporting requirements will be the responsibility of the ERP Manager, Environmental Flight Chief, or equivalent from HQ ACC/CEVR. The USAF will monitor the IC elements to ensure necessary compliance and continued protection of human health and the environment.

- In addition to monitoring, 5-year reviews of the site will be conducted in accordance with Section 121c of CERCLA. As part of the review, a 5-year summary report will be produced that will compile the information contained in the annual inspection reports and monitoring reports or other reports generated for the site, as appropriate. The ICs will be removed, with written MDNR approval, if the concentrations of contaminants in groundwater are below the remediation goals for three consecutive sampling events occurring at least 3 months apart but no longer than 2.5 years apart.

Institutional Controls and Base General Plan Language for Site LF-34

Site LF-34 is located in the central-southwestern part of Whiteman AFB, near the Base hospital and Brewer Branch Creek. The site is north of Summit Drive; Sijan Avenue passes through it. The landfill limits include an open field or turf area, a parking lot, and a densely vegetated fringe along Brewer Branch Creek. The site area generally slopes toward the west. Stormwater from a culvert between the hospital parking lots downstream of the landfill limits flows into Brewer Branch Creek. The culvert appears to drain water from the east side of Sijan Avenue.

An IC has been established for Site LF-34 to restrict unauthorized disturbance of the subsurface associated with construction of any kind and to maintain and repair of the existing surface. The established IC boundary fully encompasses the site. A survey of the IC boundaries was prepared by a professional land surveyor registered with the State of Missouri.

The IC requirements are as follows:

- Before construction is performed at the site, a digging permit must be approved by the ERP Manager, Environmental Flight Chief, or equivalent at Whiteman AFB. Civil Engineering or other appropriate office issuing the dig permit will maintain an active file showing the location of the IC boundary and shall notify the activity proponent of the presence of waste, the need for proper health and safety equipment and procedures and the procedures for disposal of waste removed from the site in accordance with appropriate regulations.
- Inspection and maintenance of the current landfill surfaces will be conducted annually. Maintenance includes repair of the existing surface resulting from damage caused by land surface activity, subsurface activity, or normal erosion. Waste removed, if any, will be handled and disposed of in accordance with appropriate regulations.
- Activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs will be addressed by the USAF within 30 days after the USAF becomes aware of the breach. The USAF will notify the MDNR within 30 days after discovery of activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs. The USAF will notify MDNR regarding how the USAF has or will address the breach within 30 days of sending MDNR notification of the breach.
- The USAF shall notify the MDNR 45 days in advance of proposed land use changes that are inconsistent with the land use control objective or the selected remedy. The USAF will provide notice to the MDNR at least six months prior to transfer or sale of the site so that MDNR 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 USAF to notify MDNR at least six months prior to transfer or sale then the USAF will notify MDNR as soon as possible but no later than 60 days prior to the transfer or sale of site. In addition, the USAF will provide the MDNR with similar

notice as to federal-to-federal transfer of property. The USAF shall provide a copy of executed deed or transfer assembly to MDNR.

- The duration of ICs for Site LF-34, pertinent to potential exposure to wastes, will be unlimited as long as waste is present at the site. Five-year reviews of the site will be conducted in accordance with Section 121c of CERCLA as long as ICs are in place (that is, as long as buried waste is present at the site). If the waste inhibits future Base construction activities, the USAF may remove the waste in consultation with MDNR and in accordance with appropriate regulations.

Institutional Controls and Base General Plan Language for Site LF-42

Site LF-42 is located in the north-central part of Whiteman AFB. The site is directly north of the active Defense Reutilization Marketing Office facility, south of an unnamed drainage feature and the archery range, east of a jet-fuel storage area, and west of abandoned rail lines. Vandenberg Road is located along the western boundary of the site. The 2-acre site is vegetated with grasses, weeds, and shrubs, with some areas of dense vegetation and trees. The site area gently slopes from the southeast toward the northwest. North of the site lies a line of trees and brush, beyond which the grade drops more steeply.

An IC has been established for Site LF-42 to restrict unauthorized disturbance of the subsurface associated with construction of any kind and to maintain and repair of the existing surface. The established IC boundary fully encompasses the site. A survey of the IC boundaries was prepared by a professional land surveyor registered with the State of Missouri.

The IC requirements are as follows:

- Before construction is performed at the site, a digging permit must be approved by the ERP Manager, Environmental Flight Chief, or equivalent at Whiteman AFB. Civil Engineering or other appropriate office issuing the dig permit will maintain an active file showing the location of the IC boundary and shall notify the activity proponent of the presence of waste, the need for proper health and safety equipment and procedures and the procedures for disposal of waste removed from the site in accordance with appropriate regulations.
- Inspection and maintenance of the current landfill surfaces will be conducted annually. Maintenance includes repair of the existing surface resulting from damage caused by land surface activity, subsurface activity, or normal erosion. Soil or waste removed, if any, will be handled and disposed of in accordance with appropriate regulations.
- The area within the IC boundary may not be used for residential purposes.
- Activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs will be addressed by the USAF within 30 days after the USAF becomes aware of the breach. The USAF will notify the MDNR within 30 days after discovery of activity that is inconsistent with the IC objectives or use restrictions, or other action that may interfere with the effectiveness of the ICs. The USAF will notify MDNR regarding how the USAF has addressed or will address the breach within 30 days of sending MDNR notification of the breach.
- In the unlikely event that the U.S. sells or transfers the property, these restrictions must be incorporated into real property documents necessary for transferring ownership from the U.S. to another party. The USAF shall notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives or the selected remedy. The USAF will provide notice to MDNR at least six months prior to transfer or sale of the sites affected by the ICs so that MDNR 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 USAF to notify MDNR at least six months prior to transfer or sale then the USAF will notify MDNR as soon as possible but no later than 60 days prior to the transfer or sale of property subject to ICs. In addition to the land transfer notice and discussion provisions above, the USAF will provide MDNR 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 MDNR.

- The duration of ICs, pertinent to potential exposure to wastes, will be unlimited as long as waste is present at the Site. The NCP requires 5-year site reviews as long as hazardous substances remain at the site at concentrations that do not allow unlimited use and unrestricted exposure. Five-year reviews will be conducted in accordance with Section 121c of CERCLA as long as ICs are in place. In the event that the waste inhibits future Base construction activities, the USAF may remove the waste in consultation with MDNR and in accordance with appropriate regulations.

3,4–45–24
05–06–40245–1
40245dw1.dwg

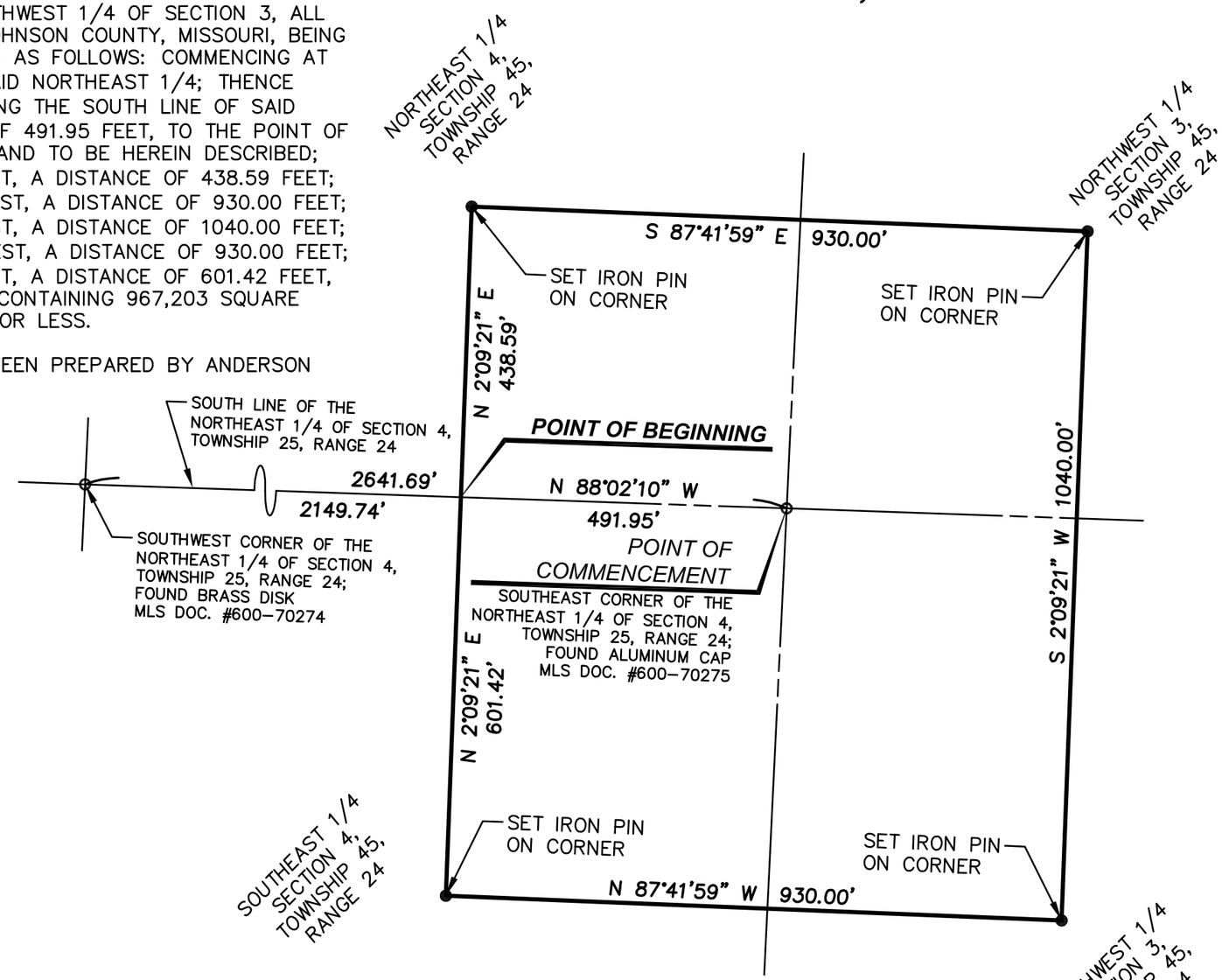
INSTITUTIONAL CONTROL
SITES FT-02 , LF-12 & SS-44

DESCRIPTION, SITES FT-02 , LF-12 & SS-44:

ALL THAT PART OF THE SOUTHEAST 1/4 AND THE NORTHEAST 1/4 OF SECTION 4 TOGETHER WITH ALL THAT PART OF THE SOUTHWEST 1/4 AND THE NORTHWEST 1/4 OF SECTION 3, ALL IN TOWNSHIP 45, RANGE 24, JOHNSON COUNTY, MISSOURI, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID NORTHEAST 1/4; THENCE NORTH 88°–02'–10" WEST, ALONG THE SOUTH LINE OF SAID NORTHEAST 1/4, A DISTANCE OF 491.95 FEET, TO THE POINT OF BEGINNING OF THE TRACT OF LAND TO BE HEREIN DESCRIBED; THENCE NORTH 2°–09'–21" EAST, A DISTANCE OF 438.59 FEET; THENCE SOUTH 87°–41'–59" EAST, A DISTANCE OF 930.00 FEET; THENCE SOUTH 2°–09'–21" WEST, A DISTANCE OF 1040.00 FEET; THENCE NORTH 87°–41'–59" WEST, A DISTANCE OF 930.00 FEET; THENCE NORTH 2°–09'–21" EAST, A DISTANCE OF 601.42 FEET, TO THE POINT OF BEGINNING. CONTAINING 967,203 SQUARE FEET OR 22.204 ACRES, MORE OR LESS.

THE ABOVE DESCRIPTION HAS BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.



THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

SCALE 1 INCH = 200 FEET

200 100 0 200 400 600

SCALE IN FEET

DRN. JPW	P.C.	CK. PJH	APP.

3,4–45–24
05–06–40245–1
40245dw1.dwg

DATE	REVISION	BY
7–18–2005	MISC CORRECTIONS	PJH

ANDERSON
SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEES SUMMIT, MISSOURI 64063
(816) 246-5050

PLAT OF DESCRIPTION

DATE: JUNE 10, 2005
FOR: *CH2M HILL, INC.*
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

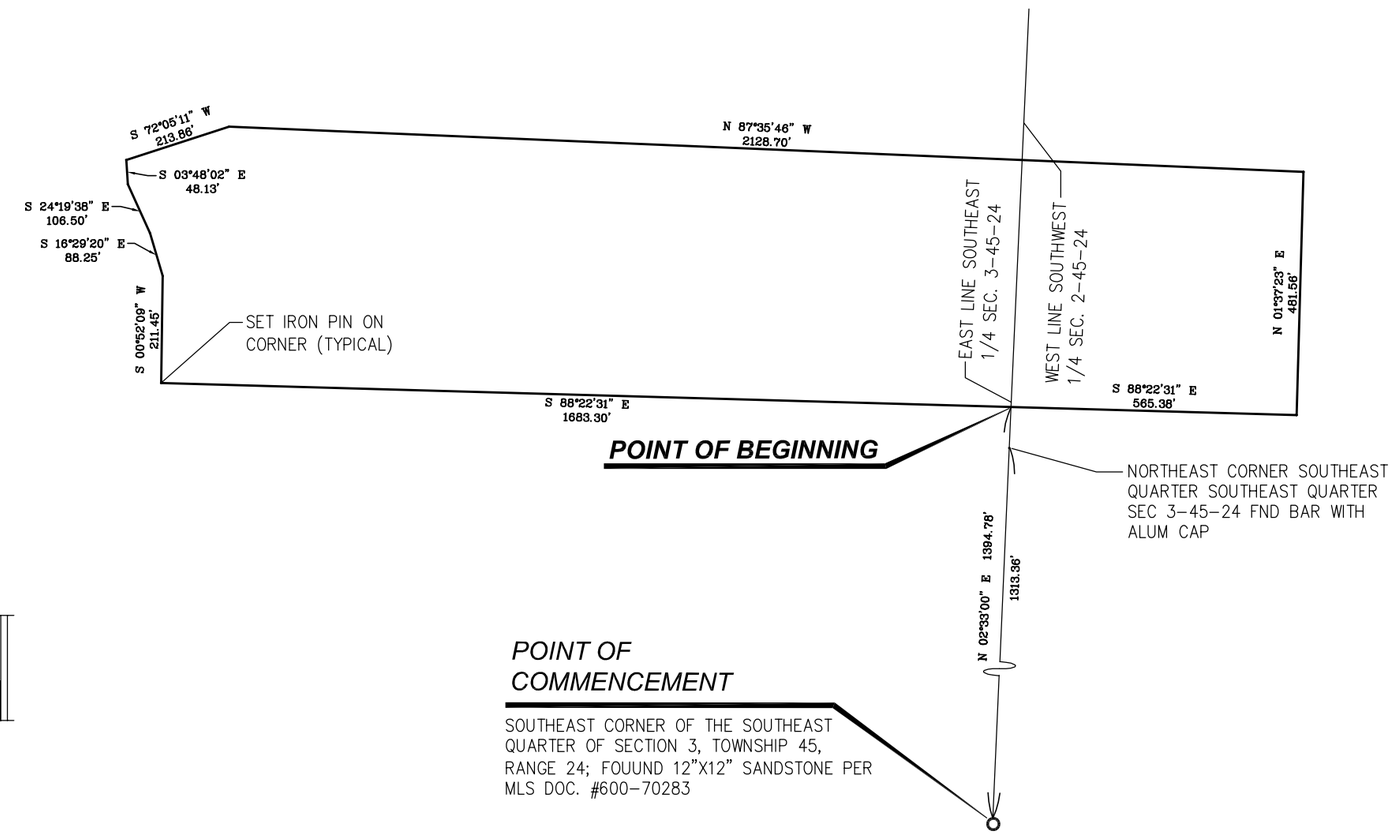
RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

INSTITUTIONAL CONTROL SITE LF-03/SS-41

DESCRIPTION, SITE LF-03/SS-41: THAT PART OF THE SOUTHEAST QUARTER OF SECTION 3 AND THE SOUTHWEST QUARTER OF SECTION 2, TOWNSHIP 45, RANGE 24, JOHNSON COUNTY, MISSOURI BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 3; THENCE NORTH 2°–33'–00" EAST ALONG THE EAST LINE OF SAID SOUTHEAST QUARTER A DISTANCE OF 1394.78 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE SOUTH 88°–22'–31" EAST A DISTANCE OF 565.38 FEET; THENCE NORTH 01°–37'–23" EAST A DISTANCE OF 481.56 FEET; THENCE NORTH 87°–35'–46" WEST A DISTANCE OF 2128.70 FEET; THENCE SOUTH 72°–05'–11" WEST A DISTANCE OF 213.86 FEET; THENCE SOUTH 03°–48'–02" EAST A DISTANCE OF 48.13 FEET; THENCE SOUTH 24°–19'–38" EAST A DISTANCE OF 106.50 FEET; THENCE SOUTH 16°–29'–20" EAST A DISTANCE OF 88.25 FEET; THENCE SOUTH 00°–52'–09" WEST A DISTANCE OF 211.45 FEET; THENCE SOUTH 88°–22'–31" EAST A DISTANCE OF 1683.30 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 1126363 SQUARE FEET OR 25.858 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION HAS BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ANY ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.



SCALE 1 INCH = 300 FEET

300 150 0 300 600 900

SCALE IN FEET

THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

DRN. PJH	P.C.	CK.	APP.

5–7–2007	EDITED TITLE	PJH
	REVISION	BY

PHILIP J. HENEHAN, PLS 2079

ANDERSON
SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEE'S SUMMIT, MISSOURI 64063
(816) 246-5050

PLAT OF DESCRIPTION

DATE: APRIL 17, 2007
FOR: **CH2M HILL, INC.**
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

3,4–45–24
05–06–40245–1
40245dw2.dwg

INSTITUTIONAL CONTROL SITE LF-11
TRENCHES 1 & 2

DESCRIPTION, SITE LF-11 TRENCH 1:

THAT PART OF THE SOUTHWEST 1/4 OF SECTION 3, TOWNSHIP 45, RANGE 24, JOHNSON COUNTY, MISSOURI BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTHWEST CORNER OF SAID SOUTHWEST 1/4 (THE NORTHWEST CORNER OF THE SOUTHEAST 1/4 OF SECTION 4, TOWNSHIP 45 RANGE 24, SAID COUNTY AND STATE, BEARS NORTH 88°–02'–10" WEST, A DISTANCE OF 2641.69 FEET, FROM SAID NORTHWEST CORNER OF SAID SOUTHWEST 1/4); THENCE SOUTH 2°–44'–46" WEST, ALONG THE WEST LINE OF SAID SOUTHWEST 1/4, A DISTANCE OF 749.19 FEET; THENCE NORTH 81°–51'–31" EAST, A DISTANCE OF 9.19 FEET, TO THE POINT OF BEGINNING OF THE TRACT OF LAND TO BE HEREIN DESCRIBED; THENCE CONTINUING NORTH 81°–51'–31" EAST, A DISTANCE OF 310.58 FEET; THENCE SOUTH 0°–38'–44" EAST, A DISTANCE OF 57.06 FEET; THENCE SOUTH 89°–21'–16" WEST, A DISTANCE OF 307.92 FEET; THENCE NORTH 0°–38'–44" WEST, A DISTANCE OF 16.55 FEET, TO THE POINT OF BEGINNING. CONTAINING 11,333 SQUARE FEET OR 0.260 ACRE, MORE OR LESS.

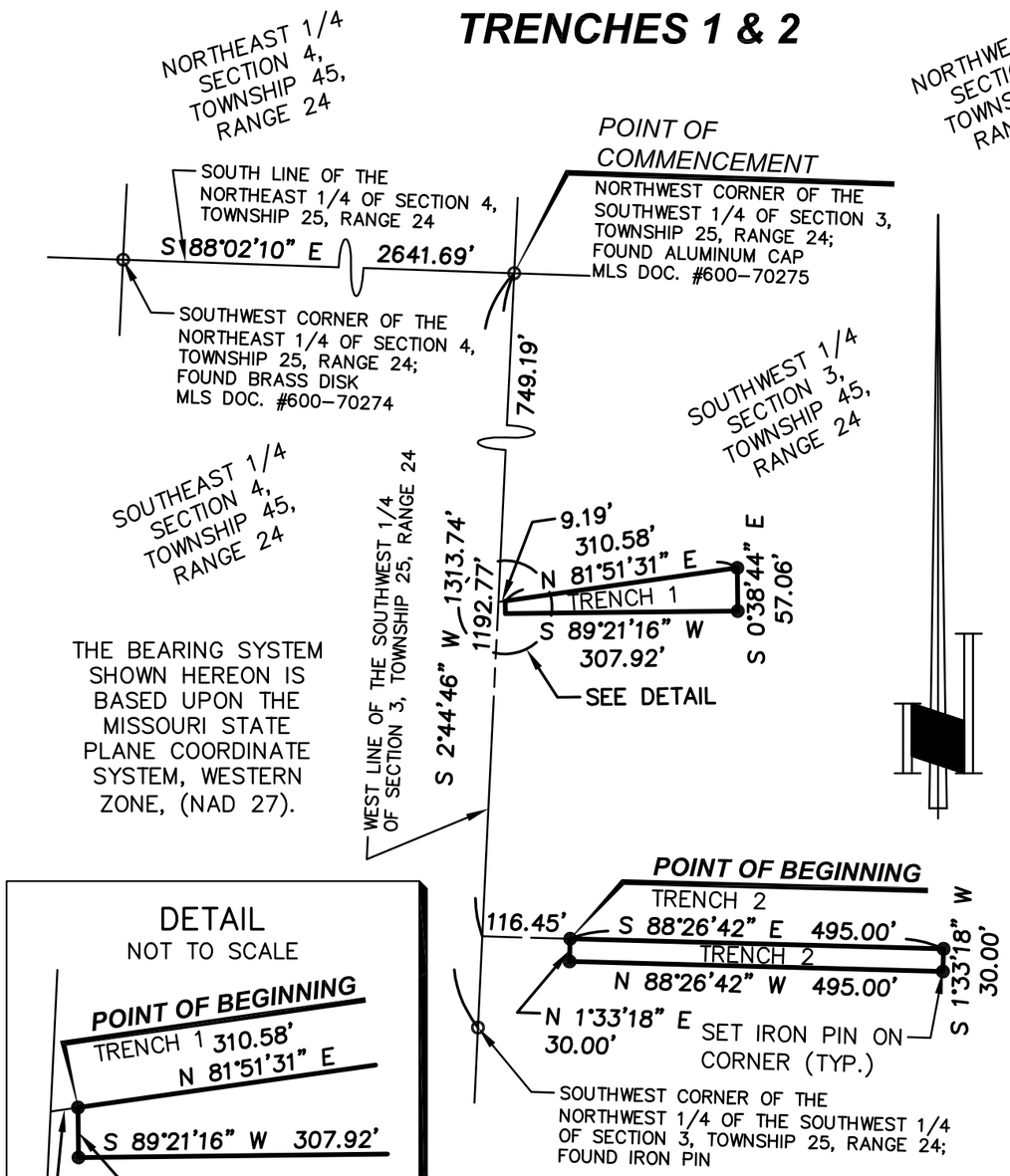
DESCRIPTION, SITE LF-11 TRENCH 2:

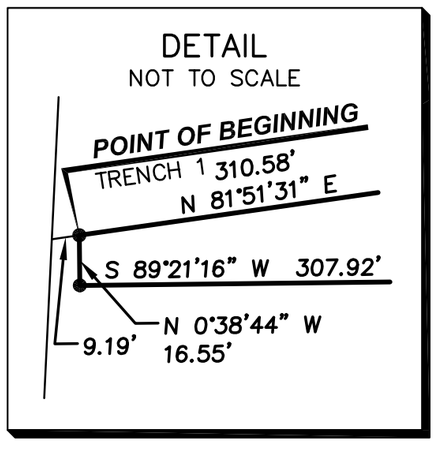
THAT PART OF THE SOUTHWEST 1/4 OF SECTION 3, TOWNSHIP 45, RANGE 24, JOHNSON COUNTY, MISSOURI BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTHWEST CORNER OF SAID SOUTHWEST 1/4 (THE NORTHWEST CORNER OF THE SOUTHEAST 1/4 OF SECTION 4, TOWNSHIP 45 RANGE 24, SAID COUNTY AND STATE, BEARS NORTH 88°–02'–10" WEST, A DISTANCE OF 2641.69 FEET, FROM SAID NORTHWEST CORNER OF SAID SOUTHWEST 1/4); THENCE SOUTH 2°–44'–46" WEST, ALONG THE WEST LINE OF SAID SOUTHWEST 1/4, A DISTANCE OF 1192.77 FEET; THENCE SOUTH 88°–26'–42" EAST, A DISTANCE OF 116.45 FEET, TO THE POINT OF BEGINNING OF THE TRACT OF LAND TO BE HEREIN DESCRIBED; THENCE CONTINUING SOUTH 88°–26'–42" EAST, A DISTANCE OF 495.00 FEET; THENCE SOUTH 1°–33'–18" WEST, A DISTANCE OF 30.00 FEET; THENCE NORTH 88°–26'–42" WEST, A DISTANCE OF 495.00 FEET; THENCE NORTH 1°–33'–18" EAST, A DISTANCE OF 30.00 FEET, TO THE POINT OF BEGINNING. CONTAINING 14,850 SQUARE FEET OR 0.341 ACRE, MORE OR LESS.

THE ABOVE DESCRIPTIONS HAVE BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.

DRN. JPW	P.C.	CK. PJH	APP.





3,4–45–24
05–06–40245–1
40245dw2.dwg

DATE	REVISION	BY

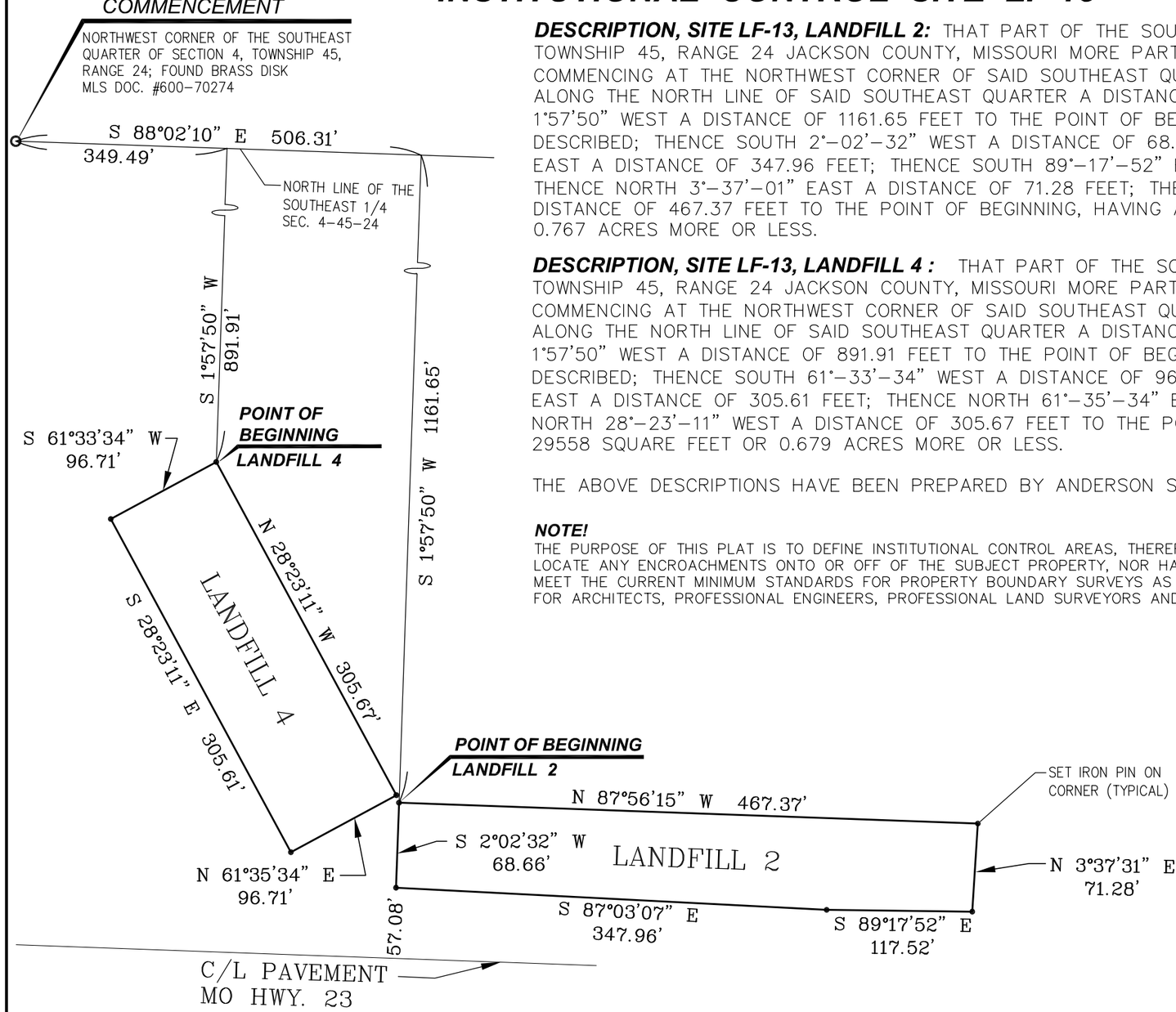
ANDERSON
SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEES SUMMIT, MISSOURI 64063
(816) 246-5050

PLAT OF DESCRIPTION

DATE: JUNE 10, 2005
FOR: *CH2M HILL, INC.*
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

INSTITUTIONAL CONTROL SITE LF-13



THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

DESCRIPTION, SITE LF-13, LANDFILL 2: THAT PART OF THE SOUTHEAST QUARTER OF SECTION 4, TOWNSHIP 45, RANGE 24 JACKSON COUNTY, MISSOURI MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTHWEST CORNER OF SAID SOUTHEAST QUARTER; THENCE SOUTH 88°02'10" EAST ALONG THE NORTH LINE OF SAID SOUTHEAST QUARTER A DISTANCE OF 506.31 FEET; THENCE SOUTH 1°57'50" WEST A DISTANCE OF 1161.65 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE SOUTH 2°-02'-32" WEST A DISTANCE OF 68.66 FEET; THENCE SOUTH 87°-03'-07" EAST A DISTANCE OF 347.96 FEET; THENCE SOUTH 89°-17'-52" EAST A DISTANCE OF 117.52 FEET; THENCE NORTH 3°-37'-01" EAST A DISTANCE OF 71.28 FEET; THENCE NORTH 87°-56'-15" WEST A DISTANCE OF 467.37 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 33430 SQUARE FEET OR 0.767 ACRES MORE OR LESS.

DESCRIPTION, SITE LF-13, LANDFILL 4 : THAT PART OF THE SOUTHEAST QUARTER OF SECTION 4, TOWNSHIP 45, RANGE 24 JACKSON COUNTY, MISSOURI MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE NORTHWEST CORNER OF SAID SOUTHEAST QUARTER; THENCE SOUTH 88°02'10" EAST ALONG THE NORTH LINE OF SAID SOUTHEAST QUARTER A DISTANCE OF 349.49 FEET; THENCE SOUTH 1°57'50" WEST A DISTANCE OF 891.91 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE SOUTH 61°-33'-34" WEST A DISTANCE OF 96.71 FEET; THENCE SOUTH 28°-23'-11" EAST A DISTANCE OF 305.61 FEET; THENCE NORTH 61°-35'-34" EAST A DISTANCE OF 96.71 FEET; THENCE NORTH 28°-23'-11" WEST A DISTANCE OF 305.67 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 29558 SQUARE FEET OR 0.679 ACRES MORE OR LESS.

THE ABOVE DESCRIPTIONS HAVE BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ANY ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.

SCALE 1 INCH = 100 FEET

100 50 0 100 200 300

SCALE IN FEET

DRN. PJH	P.C.	CK.	APP.

REVISION | BY

PHILIP J. HENEHAN, PLS 2079

ANDERSON SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEE'S SUMMIT, MISSOURI 64063
(816) 246-5050

PLAT OF DESCRIPTION

DATE: APRIL 17, 2007
FOR: **CH2M HILL, INC.**
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

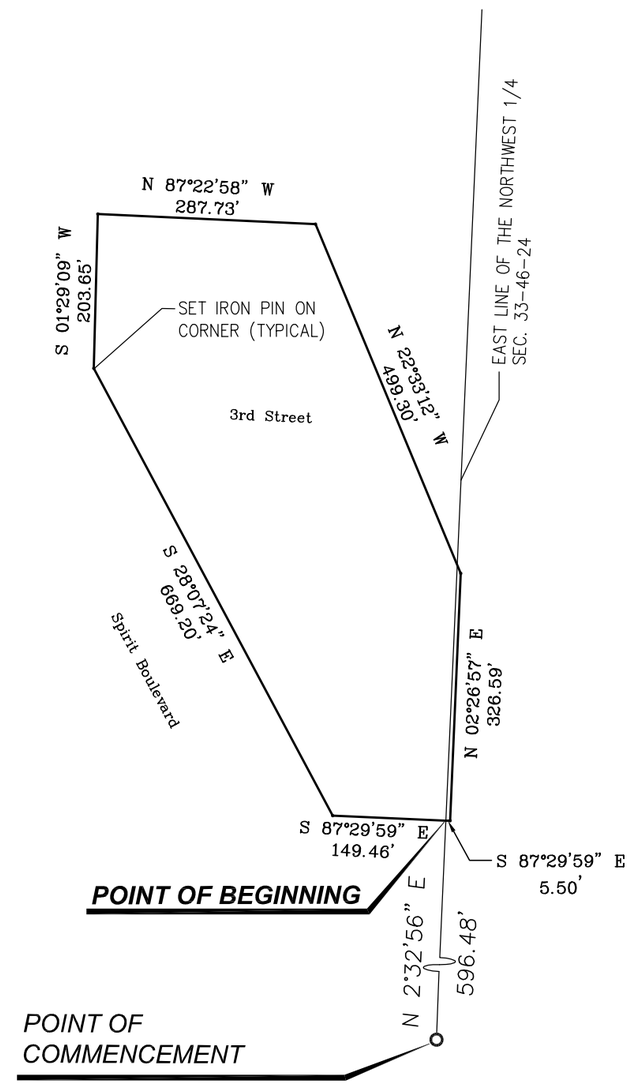
RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

INSTITUTIONAL CONTROL SITE SS-30

DESCRIPTION, SITE SS-30: THAT PART OF THE NORTH ONE HALF OF SECTION 33, TOWNSHIP 46, RANGE 24, JOHNSON COUNTY, MISSOURI BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF THE NORTHWEST QUARTER OF SAID SECTION 33; THENCE NORTH 02°–32'–56" EAST ALONG THE EAST LINE OF SAID NORTHWEST QUARTER A DISTANCE OF 596.48 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE SOUTH 87°–29'–59" EAST A DISTANCE OF 5.50 FEET; THENCE NORTH 02°–26'–57" EAST A DISTANCE OF 326.59 FEET; THENCE NORTH 22°–33'–12" WEST A DISTANCE OF 499.30 FEET; THENCE NORTH 87°–22'–58" WEST A DISTANCE OF 287.73 FEET; THENCE SOUTH 01°–29'–09" WEST A DISTANCE OF 203.65 FEET; THENCE SOUTH 28°–07'–24" EAST A DISTANCE OF 669.20 FEET; THENCE SOUTH 87°–29'–59" EAST A DISTANCE OF 149.46 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 240517 SQUARE FEET OR 5.522 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION HAS BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ANY ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.



SCALE 1 INCH = 200 FEET

200 100 0 200 400 600

SCALE IN FEET

THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

DRN. PJH	P.C.	CK.	APP.

RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

REVISION	BY

PHILIP J. HENEHAN, PLS 2079

ANDERSON
SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEE'S SUMMIT, MISSOURI 64063
(816) 246-5050

PLAT OF DESCRIPTION

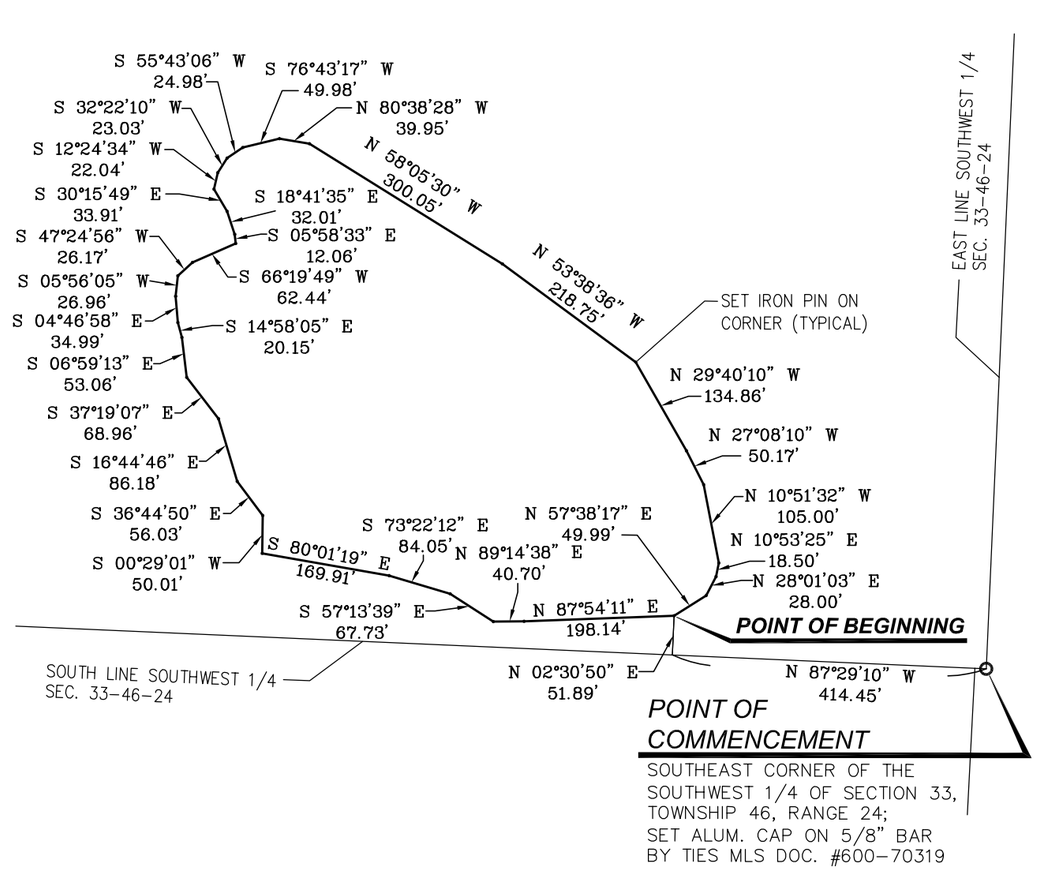
DATE: APRIL 17, 2007
FOR: ***CH2M HILL, INC.***
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

INSTITUTIONAL CONTROL SITE LF-34

DESCRIPTION, SITE LF-34: THAT PART OF THE SOUTHWEST QUARTER OF SECTION 33, TOWNSHIP 46, RANGE 24, JOHNSON COUNTY, MISSOURI BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHWEST QUARTER OF SAID SECTION 33; THENCE NORTH 87°–29'–10" WEST ALONG THE SOUTH LINE OF SAID SOUTHWEST QUARTER A DISTANCE OF 414.45 FEET; THENCE NORTH 2°–30'–50" EAST A DISTANCE OF 51.89 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE NORTH 57°–38'–17" EAST A DISTANCE OF 49.99 FEET; THENCE NORTH 28°–01'–03" EAST A DISTANCE OF 28.00 FEET; THENCE NORTH 10°–53'–25" EAST A DISTANCE OF 18.50 FEET; THENCE NORTH 10°–51'–32" WEST A DISTANCE OF 105.00 FEET; THENCE NORTH 27°–08'–10" WEST A DISTANCE OF 50.17 FEET; THENCE NORTH 29°–40'–10" WEST A DISTANCE OF 134.86 FEET; THENCE NORTH 53°–38'–36" WEST A DISTANCE OF 218.75 FEET; THENCE NORTH 58°–05'–30" WEST A DISTANCE OF 300.05 FEET; THENCE NORTH 80°–38'–28" WEST A DISTANCE OF 39.95 FEET; THENCE SOUTH 76°–43'–17" WEST A DISTANCE OF 49.98 FEET; THENCE SOUTH 55°–43'–06" WEST A DISTANCE OF 24.98 FEET; THENCE SOUTH 32°–22'–10" WEST A DISTANCE OF 23.03 FEET; THENCE SOUTH 12°–24'–34" WEST A DISTANCE OF 22.04 FEET; THENCE SOUTH 30°–15'–49" EAST A DISTANCE OF 33.91 FEET; THENCE SOUTH 18°–41'–35" EAST A DISTANCE OF 32.01 FEET; THENCE SOUTH 05°–58'–33" EAST A DISTANCE OF 12.06 FEET; THENCE SOUTH 66°–19'–49" WEST A DISTANCE OF 62.44 FEET; THENCE SOUTH 47°–24'–56" WEST A DISTANCE OF 26.17 FEET; THENCE SOUTH 05°–56'–05" WEST A DISTANCE OF 26.96 FEET; THENCE SOUTH 04°–46'–58" EAST A DISTANCE OF 34.99 FEET; THENCE SOUTH 14°–58'–05" EAST A DISTANCE OF 20.15 FEET; THENCE SOUTH 06°–59'–13" EAST A DISTANCE OF 53.06 FEET; THENCE SOUTH 37°–19'–07" EAST A DISTANCE OF 68.96 FEET; THENCE SOUTH 16°–44'–46" EAST A DISTANCE OF 86.18 FEET; THENCE SOUTH 36°–44'–50" EAST A DISTANCE OF 56.03 FEET; THENCE SOUTH 00°–29'–01" WEST A DISTANCE OF 50.01 FEET; THENCE SOUTH 80°–01'–19" EAST A DISTANCE OF 169.91 FEET; THENCE SOUTH 73°–22'–12" EAST A DISTANCE OF 84.05 FEET; THENCE SOUTH 57°–13'–39" EAST A DISTANCE OF 67.73 FEET; THENCE NORTH 89°–14'–38" EAST A DISTANCE OF 40.70 FEET; THENCE NORTH 87°–54'–11" EAST A DISTANCE OF 198.14 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 290466 SQUARE FEET OR 6.668 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION HAS BEEN PREPARED BY ANDERSON SURVEY COMPANY.

NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ANY ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.



SCALE 1 INCH = 200 FEET

200 100 0 200 400 600

SCALE IN FEET

THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

DRN. PJH	P.C.	CK.	APP.

PHILIP J. HENEHAN, PLS 2079

ANDERSON SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEES SUMMIT, MISSOURI 64063
(816) 246-5050

REVISION	BY

PLAT OF DESCRIPTION

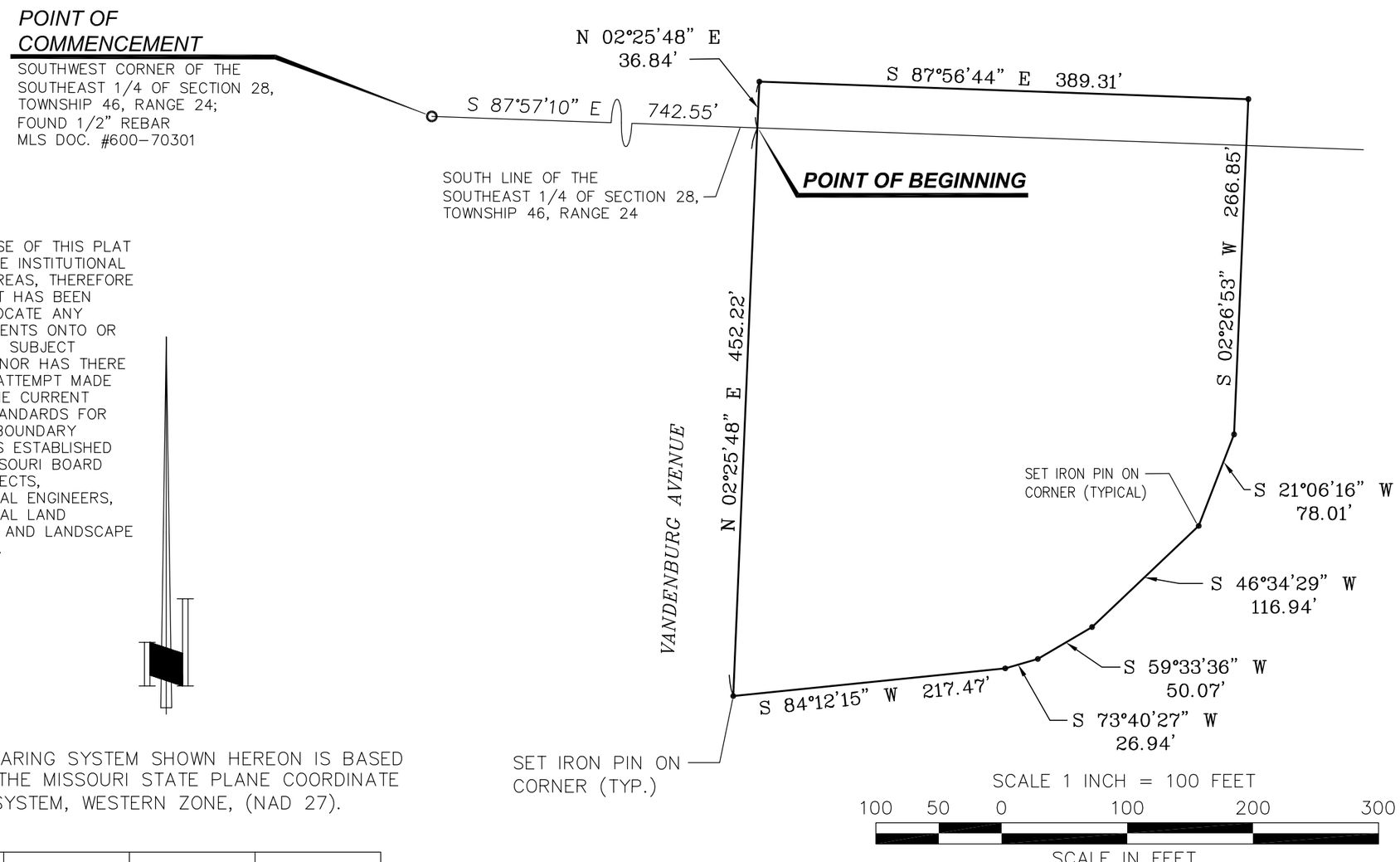
DATE: APRIL 17, 2007
FOR: **CH2M HILL, INC.**
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

INSTITUTIONAL CONTROL SITE LF-42

DESCRIPTION, SITE LF-42: THAT PART OF THE SOUTHEAST QUARTER OF SECTION 28 AND THE NORTHEAST QUARTER OF SECTION 33, TOWNSHIP 46 NORTH, RANGE 24 EAST BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHWEST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 28; THENCE SOUTH 87°–57'–10" EAST ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER A DISTANCE OF 742.55 FEET TO THE TRUE POINT OF BEGINNING OF THE TRACT TO BE HEREIN DESCRIBED; THENCE NORTH 02°–25'–48" EAST A DISTANCE OF 36.84 FEET; THENCE SOUTH 87°–56'–44" EAST A DISTANCE OF 389.31 FEET; THENCE SOUTH 02°–26'–53" WEST A DISTANCE OF 266.85 FEET; THENCE SOUTH 21°–06'–16" WEST A DISTANCE OF 78.01 FEET; THENCE SOUTH 46°–34'–29" WEST A DISTANCE OF 116.94 FEET; THENCE SOUTH 59°–33'–36" WEST A DISTANCE OF 50.07 FEET; THENCE SOUTH 73°–40'–27" WEST A DISTANCE OF 26.94 FEET; THENCE SOUTH 84°–12'–15" WEST A DISTANCE OF 217.47 FEET; THENCE NORTH 02°–25'–48" EAST A DISTANCE OF 452.22 FEET TO THE POINT OF BEGINNING, HAVING AN AREA OF 170804 SQUARE FEET OR 3.921 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION HAS BEEN PREPARED BY ANDERSON SURVEY COMPANY.



NOTE!
THE PURPOSE OF THIS PLAT IS TO DEFINE INSTITUTIONAL CONTROL AREAS, THEREFORE NO ATTEMPT HAS BEEN MADE TO LOCATE ANY ENCROACHMENTS ONTO OR OFF OF THE SUBJECT PROPERTY, NOR HAS THERE BEEN ANY ATTEMPT MADE TO MEET THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS AND LANDSCAPE ARCHITECTS.

THE BEARING SYSTEM SHOWN HEREON IS BASED UPON THE MISSOURI STATE PLANE COORDINATE SYSTEM, WESTERN ZONE, (NAD 27).

DRN. PJH	P.C.	CK.	APP.

RESTRICTIONS ASSOCIATED WITH THIS INSTITUTIONAL CONTROL AREA ARE DESCRIBED IN SECTION 4.A.2.2 ENVIRONMENTAL QUALITY

PHILIP J. HENEHAN, PLS 2079

ANDERSON
SURVEY COMPANY
203 N. W. EXECUTIVE WAY
LEE'S SUMMIT, MISSOURI 64063
(816) 246-5050

REVISION	BY

PLAT OF DESCRIPTION

DATE: APRIL 17, 2007
FOR: ***CH2M HILL, INC.***
9191 SOUTH JAMAICA STREET
ENGLEWOOD, COLORADO 80112
ATTN: TIFFANY SWOVELAND CHAPMAN, PM

Appendix C

Annual Inspection Forms and Dig Permits

APPENDIX C

Whiteman Air Force Base Southwest Ramp Expansion Area Annual Inspection Form

Institutional controls (ICs) apply to one area containing Sites FT-02, LF-12, and SS-44 and two areas associated with Site LF-11. This checklist is designed to document the maintenance of the ICs through annual inspection of the physical condition of the area within the ICs and inspection of the Base General Plan that documents control of the ICs.

Site Inspection

Coordinate site access with the point of contact listed below:

Environmental Restoration Program Manager
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: (660) 687-6263
Fax: 660-687-5164

1) Describe current land use:

   Sites FT-02, LF-12, and SS-44 are located on the north side of Perimeter Road. Site LF-11 is located on the south side of Perimeter Road. The fenced area in the northwestern part of IC Sites FT-02, LF-12, and SS-44 is currently being used as a parking area for construction personnel. A new helicopter maintenance facility for the Missouri Army National Guard is under construction with a new concrete parking lot, apron and taxiways. The facility encompasses the majority of Sites FT-02, LF-12, and SS-44. The area at Site LF-11 is vegetated with no existing buildings or structures.

   a) Any building demolition Yes__ No X

      i) If yes, identify site and building number

      _____
      _____
      _____
      _____

   b) Any building construction Yes X No__

      i) If yes, identify site and building type (residential, commercial, industrial) A new helicopter maintenance facility, concrete parking lot, and taxiways are under construction on Sites FT-02, LF-12, and SS-44.

   c) Other changes in land use (agricultural, recreational, etc.)

      _____

2) Note any land disturbances.

a) Any sign of excavation activity Yes X No__

i) If yes, identify site, measure the dimensions and depict the approximate location on site map Trench excavations were completed for installation of utilities at Sites FT-02, LF-12, and SS-44.

b) Any sign of grading activity or elevation change Yes X No__

i) If yes, identify site and type of activity (cut or fill) Extensive grading at Sites FT-02, LF-12, and SS-44 completed during construction of facility, parking lot, and taxiways.

ii) Estimate depth of cut or height of fill Depth of cut and fill at Sites FT-02, LF-12, and SS-44 is unknown.

c) Any sign of drilling activity Yes__ No X

i) If yes, identify site and type of activity (soil boring or well)

ii) If well, identify type (water supply well, monitoring well)

iii) If wells are identified, a request for information regarding the well will be submitted to the Geological Survey and Resource Assessment Division.

Review of the Base General Plan

Review the Base General Plan with the Whiteman Air Force Base Planning Group, Contact:

Planning Chief
509 CES/CECP
660 Tenth Street
Whiteman Air Force Base, Missouri 65305
Office Phone: 660-687-6306

1) Is the language presented in Exhibits 3-1 and 3-2 present? Yes X No__

   a) If no, describe language included (if any) and obtain copy

   _____
   _____
   _____
   _____
   _____
   _____

2) Any changes recorded to the IC boundaries Yes__ No X

   a) If yes, identify the parcel, site, and type of change

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

   b) Obtain a copy of the new IC boundary map

Site Inspection Form

Coordinate site access with the Base Contact listed below:

Environmental Restoration Program Manager, Environmental Flight Chief, or equivalent
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: 660-687-6263
Fax: 660-687-5164

Site Name and Location: Sites LF-03/SS-41, southeast corner of base, east of runway, south of Perimeter Rd.

Date: 05/21/09

1) Obtain dig permits obtained since last inspection. Provide dig permit number(s) below and attach copies to inspection form.

_____
_____
_____

2) Review inspection form from previous site inspection.
   a) Was need for maintenance identified? Yes X No__

      If yes, describe current condition of areas where maintenance was to be performed

      Unable to verify location of erosion due to thick vegetation and ground cover.

      _____
      _____

Notify Base Contact if required maintenance activities were not performed.

3) Describe current land use and current cover conditions (vegetation, pavement, etc):

   Current land use is industrial. The majority of the sites are heavily vegetated. Site is used to access base recycling center from Perimeter Rd., located east of the southeast corner of the site. Majority of the site covered in native grasses, shrubs, and trees.

   _____
   _____

   a) Any building demolition Yes__ No X
      i) If yes, identify building number(s)

      _____
      _____
      _____
      _____

   b) Any building construction Yes__ No X

If yes, identify building type (residential, commercial, industrial)

_____
_____
_____
_____
_____

c) Any excavation associated with construction Yes__ No X

i) If yes, was a digging permit obtained? Yes__ No __

_____
_____

Notify Base Contact if excavation activities were performed without a digging permit.

Base is required to take corrective action and notify MDNR within 30 days.

ii) Any sign of waste exposed? Yes__ No X

If yes, describe how wasted was handled and if waste was removed from the site. Document disposal facility if appropriate.

_____
_____
_____
_____

d) Other changes in land use (agricultural, recreational, etc.)

_____
_____
_____
_____
_____

Notify Base Contact if land use change may be inconsistent with land use control objectives. For Sites LF-03/SS-41, LF-13, LF-34, and LF-42 the objective is minimizing the potential of human exposure to landfill material. Site LF-42 has an additional objective to prevent residential exposure to contaminated soil (i.e. benzo(a)pyrene in soil). For Site SS-30 the objective is to prevent construction worker exposure to groundwater.

Base is required to take corrective action and notify MDNR within 30 days if land use change is inconsistent with land use control objectives.

4) Note any land disturbances

a) Any sign of erosion Yes X No__

i) If yes, depict the approximate location on site map and take photograph(s)

Two areas of erosion along the southern portion of the Lower Branch Creek bank. Erosion features are approximately 4 by 13 by 3 feet and 7 by 15 by 3 feet. Refer to photos and Figure 10.

b) Any sign of exposed waste Yes__ No X

i) If yes, describe exposed waste dimensions and type of material

c) Any sign of excavation activity Yes _ No X

i) If yes, measure the dimensions, depict the approximate location on site map

d) Any sign of grading activity or elevation change Yes__ No X

i) If yes, identify type of activity (cut or fill)

ii) Estimate depth of cut or height of fill

e) Any sign of drilling activity Yes__ No X

i) If yes, identify type of activity (soil boring, well, or other)

ii) If well, identify type (water supply well, monitoring well)

iii) If wells are identified, submit a request for information regarding the well to the Geological Survey and Resource Assessment Division. Include response in Annual Report.

Notify Base Contact if land disturbance warrants maintenance. Maintenance should be performed if waste material is exposed or if surface disturbance may lead to exposure of waste material over the next year. For example, erosion gullies greater than 6-inches in depth and width and multiple feet long should be repaired.

5) Activity discovered that appear inconsistent with the IC objective or use restrictions, or other action that may interfere with the effectiveness of the ICs Yes__ No X

i) If yes, identify activity or activities below and notify the Base Contact. *USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.*

_____
_____
_____
_____

6) Notification Requirements: Document Notification of items requiring action highlighted above.

i) Excavation activities performed without digging permit

Person Notified: _____

Date Notified: _____

ii) Change in land use inconsistent with IC objectives

Person Notified: _____

Date Notified: _____

iii) Previously identified Maintenance not performed

Person Notified: _____

Date Notified: _____

iv) Maintenance Required

Person Notified: Mr. Glenn Golson of Whiteman AFB

Date Notified: 10/22/08

USAF must notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives. USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.

Wayne Conway — CH2M HILL

Signature — Affiliation

Site Inspection Form

Coordinate site access with the Base Contact listed below:

Environmental Restoration Program Manager, Environmental Flight Chief, or equivalent
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: 660-687-6263
Fax: 660-687-5164

Site Name and Location: Site LF-13, Southwest corner of the base used as softball fields.

Date: 05/21/09

1) Obtain dig permits obtained since last inspection. Provide dig permit number(s) below and attach copies to inspection form.

_____
_____
_____

2) Review inspection form from previous site inspection.
   a) Was need for maintenance identified? Yes__ No X
      If yes, describe current condition of areas where maintenance was to be performed

      _____
      _____
      _____
      _____

Notify Base Contact if required maintenance activities were not performed.

3) Describe current land use and current cover conditions (vegetation, pavement, etc):
   Area is currently two softball fields and grassy area.
   a) Any building demolition Yes__ No X
      i) If yes, identify building number(s)

      _____
      _____
      _____
      _____

   b) Any building construction Yes__ No X
      If yes, identify building type (residential, commercial, industrial)

      _____
      _____
      _____

_____

_____

c) Any excavation associated with construction Yes__ No X

i) If yes, was a digging permit obtained? Yes__ No __

_____

_____

Notify Base Contact if excavation activities were performed without a digging permit.

Base is required to take corrective action and notify MDNR within 30 days.

ii) Any sign of waste exposed? Yes__ No X

If yes, describe how wasted was handled and if waste was removed from the site. Document disposal facility if appropriate.

_____

_____

_____

_____

d) Other changes in land use (agricultural, recreational, etc.)

_____

_____

_____

_____

Notify Base Contact if land use change may be inconsistent with land use control objectives. For Sites LF-03/SS-41, LF-13, LF-34, and LF-42 the objective is minimizing the potential of human exposure to landfill material. Site LF-42 has an additional objective to prevent residential exposure to contaminated soil (i.e. benzo(a)pyrene in soil). For Site SS-30 the objective is to prevent construction worker exposure to groundwater.

Base is required to take corrective action and notify MDNR within 30 days if land use change is inconsistent with land use control objectives.

4) Note any land disturbances

a) Any sign of erosion Yes__ No X

i) If yes, depict the approximate location on site map and take photograph(s)

_____

_____

_____

_____

_____
_____

b) Any sign of exposed waste Yes__ No X

i) If yes, describe exposed waste dimensions and type of material

_____
_____
_____
_____
_____
_____

c) Any sign of excavation activity Yes__ No X

i) If yes, measure the dimensions, depict the approximate location on site map

_____
_____
_____
_____
_____
_____

d) Any sign of grading activity or elevation change Yes__ No X

i) If yes, identify type of activity (cut or fill)

_____
_____
_____
_____
_____

ii) Estimate depth of cut or height of fill

_____
_____
_____
_____
_____

e) Any sign of drilling activity Yes__ No X

i) If yes, identify type of activity (soil boring, well, or other)

_____
_____
_____
_____

ii) If well, identify type (water supply well, monitoring well)

_____
_____
_____
_____

iii) If wells are identified, submit a request for information regarding the well to the Geological Survey and Resource Assessment Division. Include response in Annual Report.

Notify Base Contact if land disturbance warrants maintenance. Maintenance should be performed if waste material is exposed or if surface disturbance may lead to exposure of waste material over the next year. For example, erosion gullies greater than 6-inches in depth and width and multiple feet long should be repaired.

5) Activity discovered that appear inconsistent with the IC objective or use restrictions, or other action that may interfere with the effectiveness of the ICs Yes__ No X

i) If yes, identify activity or activities below and notify the Base Contact. *USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.*

_____
_____
_____
_____

6) Notification Requirements: Document Notification of items requiring action highlighted above.

i) Excavation activities performed without digging permit

Person Notified: _____

Date Notified: _____

ii) Change in land use inconsistent with IC objectives

Person Notified: _____

Date Notified: _____

iii) Previously identified Maintenance not performed

Person Notified: _____

Date Notified: _____

iv) Maintenance Required

Person Notified: _____

Date Notified: _____

USAF must notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives. USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.

Wayne Conway — CH2M HILL

Signature — Affiliation

Site Inspection Form

Coordinate site access with the Base Contact listed below:

Environmental Restoration Program Manager, Environmental Flight Chief, or equivalent
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: 660-687-6263
Fax: 660-687-5164

Site Name and Location: SS-30, East of Spirit Blvd., S of 3rd St.

Date: 05/21/09

1) Obtain dig permits obtained since last inspection. Provide dig permit number(s) below and attach copies to inspection form.

_____

_____

2) Review inspection form from previous site inspection.
   a) Was need for maintenance identified? Yes X No _

      If yes, describe current condition of areas where maintenance was to be performed

      An 8-foot diameter bare spot and 20 by 8-foot bare spot associated with installation of a telephone was observed during the previous IC inspection. Grass has since grown in at these locations.

Notify Base Contact if required maintenance activities were not performed.

3) Describe current land use and current cover conditions (vegetation, pavement, etc):

   North portion of site is a parking lot for the Officer's Club. The Base shopette is located south of 3rd street.

   a) Any building demolition Yes__ No X
      i) If yes, identify building number(s)

      _____

      _____

      _____

      _____

   b) Any building construction Yes__ No X

      If yes, identify building type (residential, commercial, industrial)

      _____

      _____

      _____

_____

_____

c) Any excavation associated with construction Yes _ No X

i) If yes, was a digging permit obtained? Yes _ No __

_____

Notify Base Contact if excavation activities were performed without a digging permit.

Base is required to take corrective action and notify MDNR within 30 days.

ii) Any sign of waste exposed? Yes__ No X

If yes, describe how wasted was handled and if waste was removed from the site. Document disposal facility if appropriate.

_____

_____

_____

_____

d) Other changes in land use (agricultural, recreational, etc.)

_____

_____

_____

_____

_____

Notify Base Contact if land use change may be inconsistent with land use control objectives. For Sites LF-03/SS-41, LF-13, LF-34, and LF-42 the objective is minimizing the potential of human exposure to landfill material. Site LF-42 has an additional objective to prevent residential exposure to contaminated soil (i.e. benzo(a)pyrene in soil). For Site SS-30 the objective is to prevent construction worker exposure to groundwater.

Base is required to take corrective action and notify MDNR within 30 days if land use change is inconsistent with land use control objectives.

4) Note any land disturbances

a) Any sign of erosion Yes __ No X

i) If yes, depict the approximate location on site map and take photograph(s)

_____

_____

_____

b) Any sign of exposed waste Yes__ No X

i) If yes, describe exposed waste dimensions and type of material

_____
_____
_____
_____
_____
_____

c) Any sign of excavation activity Yes _ No X

i) If yes, measure the dimensions, depict the approximate location on site map

_____

d) Any sign of grading activity or elevation change Yes__ No X

i) If yes, identify type of activity (cut or fill)

_____
_____
_____
_____
_____

ii) Estimate depth of cut or height of fill

_____
_____
_____
_____
_____

e) Any sign of drilling activity Yes__ No X

i) If yes, identify type of activity (soil boring, well, or other)

_____
_____
_____
_____

ii) If well, identify type (water supply well, monitoring well)

_____
_____
_____
_____

iii) If wells are identified, submit a request for information regarding the well to the Geological Survey and Resource Assessment Division. Include response in Annual Report.

Notify Base Contact if land disturbance warrants maintenance. Maintenance should be performed if waste material is exposed or if surface disturbance may lead to exposure of waste material over the next year. For example, erosion gullies greater than 6-inches in depth and width and multiple feet long should be repaired.

5) Activity discovered that appear inconsistent with the IC objective or use restrictions, or other action that may interfere with the effectiveness of the ICs Yes__ No X

   i) If yes, identify activity or activities below and notify the Base Contact. *USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.*

   _____
   _____
   _____
   _____

6) Notification Requirements: Document Notification of items requiring action highlighted above.

   i) Excavation activities performed without digging permit

      Person Notified: _____

      Date Notified: _____

   ii) Change in land use inconsistent with IC objectives

      Person Notified: _____

      Date Notified: _____

   iii) Previously identified Maintenance not performed

      Person Notified: _____

      Date Notified: _____

   iv) Maintenance Required

      Person Notified: _____

      Date Notified: _____

USAF must notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives. USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.

Wayne Conway	CH2M HILL
Signature	Affiliation

Site Inspection Form

Coordinate site access with the Base Contact listed below:

Environmental Restoration Program Manager, Environmental Flight Chief, or equivalent
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: 660-687-6263
Fax: 660-687-5164

Site Name and Location: Sites LF-34, Central Southwest part of the base, near base Hospital and Brower Branch Creek.

Date: 05/22/09

1) Obtain dig permits obtained since last inspection. Provide dig permit number(s) below and attach copies to inspection form.

_____
_____
_____

2) Review inspection form from previous site inspection.
   a) Was need for maintenance identified? Yes__ No X

   _____
   _____
   _____

   If yes, describe current condition of areas where maintenance was to be performed

Notify Base Contact if required maintenance activities were not performed.

3) Describe current land use and current cover conditions (vegetation, pavement, etc):

   Eastern portion of the site bisected by Sijan Ave., is grassy area and running track. West side of Sijan Ave., site used as parking lot for base clinic and Western edge of IC boundary is bounded by a heavily vegetated creek.

   a) Any building demolition Yes__ No X
      i) If yes, identify building number(s)

      _____
      _____
      _____
      _____

   b) Any building construction Yes__ No X

      If yes, identify building type (residential, commercial, industrial)

      _____

c) Any excavation associated with construction Yes__ No X

i) If yes, was a digging permit obtained? Yes__ No __

Notify Base Contact if excavation activities were performed without a digging permit.

Base is required to take corrective action and notify MDNR within 30 days.

ii) Any sign of waste exposed? Yes X No __

If yes, describe how wasted was handled and if waste was removed from the site. Document disposal facility if appropriate. A 1 by 1-foot piece of concrete was observed. Refer to photographs and Figure 11. No erosion was observed and no waste material was exposed.

d) Other changes in land use (agricultural, recreational, etc.)

Notify Base Contact if land use change may be inconsistent with land use control objectives. For Sites LF-03/SS-41, LF-13, LF-34, and LF-42 the objective is minimizing the potential of human exposure to landfill material. Site LF-42 has an additional objective to prevent residential exposure to contaminated soil (i.e. benzo(a)pyrene in soil). For Site SS-30 the objective is to prevent construction worker exposure to groundwater.

Base is required to take corrective action and notify MDNR within 30 days if land use change is inconsistent with land use control objectives.

4) Note any land disturbances

a) Any sign of erosion Yes X No_

If yes, depict the approximate location on site map and take photograph(s)

Approximately 20 by 4 by 6 feet erosion feature (incision) located near the northwestern portion of the IC boundary. The incision trends southwest-northeast, near the east side of a large drainage culvert. No waste was observed. Refer to photos and Figure 11.

b) Any sign of exposed waste Yes__ No X

i) If yes, describe exposed waste dimensions and type of material

_____

_____

c) Any sign of excavation activity Yes__ No X

i) If yes, measure the dimensions, depict the approximate location on site map

_____

_____

_____

_____

_____

_____

d) Any sign of grading activity or elevation change Yes__ No X

i) If yes, identify type of activity (cut or fill)

_____

_____

_____

_____

_____

ii) Estimate depth of cut or height of fill

_____

_____

_____

_____

_____

e) Any sign of drilling activity Yes__ No X

i) If yes, identify type of activity (soil boring, well, or other)

_____

_____

_____

_____

ii) If well, identify type (water supply well, monitoring well)

_____

_____

_____

_____

iii) If wells are identified, submit a request for information regarding the well to the Geological Survey and Resource Assessment Division. Include response in Annual Report.

Notify Base Contact if land disturbance warrants maintenance. Maintenance should be performed if waste material is exposed or if surface disturbance may lead to exposure of waste material over the next year. For example, erosion gullies greater than 6-inches in depth and width and multiple feet long should be repaired.

5) Activity discovered that appear inconsistent with the IC objective or use restrictions, or other action that may interfere with the effectiveness of the ICs Yes__ No X

   i) If yes, identify activity or activities below and notify the Base Contact. *USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.*

   _____
   _____
   _____
   _____

6) Notification Requirements: Document Notification of items requiring action highlighted above.

   i) Excavation activities performed without digging permit

      Person Notified: _____

      Date Notified: _____

   ii) Change in land use inconsistent with IC objectives

      Person Notified: _____

      Date Notified: _____

   iii) Previously identified Maintenance not performed

      Person Notified: _____

      Date Notified: _____

   iv) Maintenance Required

      Person Notified: Mr. Glenn Golson of Whiteman AFB

      Date Notified: 06/03/09

USAF must notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives. USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.

Wayne Conway	CH2M HILL
Signature	Affiliation

Site Inspection Form

Coordinate site access with the Base Contact listed below:

Environmental Restoration Program Manager, Environmental Flight Chief, or equivalent
660 Tenth Street
Whiteman Air Force Base, Missouri 65305-5074
Office Phone: 660-687-6263
Fax: 660-687-5164

Site Name and Location: Site LF-42, North-Central part of base, North of Defense Revitalization Mark Facility.

Date: 05/22/09

1) Obtain dig permits obtained since last inspection. Provide dig permit number(s) below and attach copies to inspection form.

   Dig permits for roadway culvert replacement were reviewed.

2) Review inspection form from previous site inspection.
   a) Was need for maintenance identified? Yes__ No X

      If yes, describe current condition of areas where maintenance was to be performed

      _____
      _____
      _____
      _____

Notify Base Contact if required maintenance activities were not performed.

3) Describe current land use and current cover conditions (vegetation, pavement, etc):

   The southern portion of the site is grassy and is dissected near the center by a heavily vegetated drainageway. The northern portion of the site is covered with native grasses, shrubs, and trees. An archery range is located north of the drainageway.

   Any building demolition Yes__ No X

   i) If yes, identify building number(s)

      _____
      _____
      _____
      _____

   b) Any building construction Yes__ No X

If yes, identify building type (residential, commercial, industrial)

_____
_____
_____
_____
_____

c) Any excavation associated with construction Yes X No _

i) If yes, was a digging permit obtained? Yes X No __

A dig permit for replacement of a road culvert pipe was completed.

Notify Base Contact if excavation activities were performed without a digging permit.

Base is required to take corrective action and notify MDNR within 30 days.

ii) Any sign of waste exposed? Yes X No _

If yes, describe how wasted was handled and if waste was removed from the site. Document disposal facility if appropriate.

Concrete debris observed as noted on Figure 12. The debris may or may not be from the landfill. No erosion was observed and no waste was exposed.

d) Other changes in land use (agricultural, recreational, etc.)

_____
_____
_____
_____
_____

Notify Base Contact if land use change may be inconsistent with land use control objectives. For Sites LF-03/SS-41, LF-13, LF-34, and LF-42 the objective is minimizing the potential of human exposure to landfill material. Site LF-42 has an additional objective to prevent residential exposure to contaminated soil (i.e. benzo(a)pyrene in soil). For Site SS-30 the objective is to prevent construction worker exposure to groundwater.

Base is required to take corrective action and notify MDNR within 30 days if land use change is inconsistent with land use control objectives.

4) Note any land disturbances

a) Any sign of erosion Yes__ No X

i) If yes, depict the approximate location on site map and take photograph(s)

_____
_____

b) Any sign of exposed waste Yes X No _

i) If yes, describe exposed waste dimensions and type of material

Refer to response to question 3(c)(ii).

c) Any sign of excavation activity Yes X No _

i) If yes, measure the dimensions, depict the approximate location on site map

A new roadway culvert is replacing the former culvert near the southeast portion of Site LF-42. The excavation is approximately 20 by 80 by 10 feet in the area of the existing culvert. Refer to the photos and Figure 12.

d) Any sign of grading activity or elevation change Yes__ No X

i) If yes, identify type of activity (cut or fill)

ii) Estimate depth of cut or height of fill

e) Any sign of drilling activity Yes__ No X

i) If yes, identify type of activity (soil boring, well, or other)

ii) If well, identify type (water supply well, monitoring well)

iii) If wells are identified, submit a request for information regarding the well to the Geological Survey and Resource Assessment Division. Include response in Annual Report.

Notify Base Contact if land disturbance warrants maintenance. Maintenance should be performed if waste material is exposed or if surface disturbance may lead to exposure of waste material over the next year. For example, erosion gullies greater than 6-inches in depth and width and multiple feet long should be repaired.

5) Activity discovered that appear inconsistent with the IC objective or use restrictions, or other action that may interfere with the effectiveness of the ICs Yes__ No X

   i) If yes, identify activity or activities below and notify the Base Contact. *USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.*

   _____
   _____
   _____
   _____

6) Notification Requirements: Document Notification of items requiring action highlighted above.

   i) Excavation activities performed without digging permit

      Person Notified: _____

      Date Notified: _____

   ii) Change in land use inconsistent with IC objectives

      Person Notified: _____

      Date Notified: _____

   iii) Previously identified Maintenance not performed

      Person Notified: _____

      Date Notified: _____

   iv) Maintenance Required

      Person Notified: _____

      Date Notified: _____

USAF must notify MDNR 45 days in advance of proposed land use changes that are inconsistent with land use control objectives. USAF must notify MDNR within 30 days if the activity identified is determined to be a breach.

Wayne Conway	CH2M HILL
Signature	Affiliation

Base General Plan Review Form

Review the Base General Plan with the Whiteman Air Force Base Planning Group, Contact:

Planning Chief
509 CES/CECP
660 Tenth Street
Whiteman Air Force Base, Missouri 65305
Office Phone: 660-687-6306

Date(s) of Review:

1) Is the language presented in Exhibits 3-1 (LF-03/SS-41), 3-2 (LF-13), 3-3 (SS-30), 3-4 (LF-34), and 3-5 (LF-42) present? Yes X No__

   a) If no, describe language included (if any) and obtain copy

   _____
   _____
   _____
   _____
   _____
   _____

2) Place a check mark next to the sites identified in the Base General Plan with ICs and survey in the form of a map

   a) LF-03/SS-41 X
   b) LF-13 X
   c) SS-30 X
   d) LF-34 X
   e) LF-42 X

3) Any changes recorded to the IC boundaries Yes__ No X

   a) If yes, identify the parcel, site, and type of change

   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____
   _____

   b) Obtain a copy of the new IC boundary map

Wayne Conway CH2M HILL

Signature Affiliation

Appendix D
Site Photographs

APPENDIX D

Site Photographs

Photo 1: West-southwest view of Missouri Army National Guard facility under construction at Sites FT-02, LF-12, and SS-44.

Photo 2: Southwest view of parking area and apron under construction at Sites FT-02, LF-12, and SS-44.

Photo 3: Northwest view of construction parking area and construction storage area at Sites FT-02, LF-12, and SS-44.

Photo 4: West view of construction activities at Sites FT-02, LF-12, and SS-44.

Photo 5: West view of parking area, apron, and facility under construction at Sites FT-02, LF-12, and SS-44.

Photo 6: At southeast corner of Site LF-12 and looking northwest at Sites FT-02, LF-12, and SS-44.

Photo 7: North view of west IC boundary of Site FT-02.

Photo 8: South view of Sites LF-03/SS-41.

Photo 9: East view of Sites LF-03/SS-41.

Photo 10: East view of north IC boundary at Sites LF-03/SS-41.

Photo 11: Standing at southeast corner of LF-03, looking down east IC boundary.

Photo 12: Close-up of 7 by 15 by 3-foot erosion feature along southern bank of Lower Branch Creek at Sites LF-03/SS-41.

Photo 13: East view of north IC boundary at Sites LF-03/SS-41.

Photo 14: Closeup of 4 by 5 by 3-foot erosion feature along southern bank of Lower Branch Creek at Sites LF-03/SS-41.

Photo 15: Northwest view of northern trench area at Site LF-11.

Photo 16: East view of Site LF-11.

Photo 17: West view of Site LF-13 while standing at northeast corner of IC boundary.

Photo 18: Southwest view of Site LF-13.

Photo 19: South view of Site LF-13.

Photo 20: East view of southern IC boundary at Site LF-13.

Photo 21: West view of southern IC boundary at Site LF-13.

Photo 22: Northwest view of Site SS-30. Standing at intersection of McConnell Ln. and 3rd St.

Photo 23: West view of central portion of Site SS-30.

Photo 24: Southeast view of Site SS-30. Standing at intersection of McConnell Ln. and 3rd St.

Photo 25: South view of east IC boundary at Site SS-30.

Photo 26: North view of east IC boundary at Site SS-30.

Photo 27: North view of west IC boundary at Site SS-30. Monitoring well SS30-MW-20 in right-center of photo.

Photo 28: East view of Base Shopette at Site SS-30.

Photo 29: Close-up of partially submerged well protector at SS30-MW-19.

Photo 30: Closeup of partially submerged well protector at SS30-MW-18.

Photo 31: Close-up of submerged well protector at monitoring well SS30-MW-16 at Site SS-30.

Photo 32: Close-up of monitoring well SS30-MW-20 at Site SS-30.

Photo 33: Close-up of low-flow sampling equipment at monitoring well SS30-MW-19 at Site SS-30.

Photo 34: Close-up of low-flow sampling equipment at monitoring well SS30-MW-18 at Site SS-30.

Photo 35: Close-up of low-flow sampling equipment at monitoring well SS30-MW-20 at Site SS-30.

Photo 36: Close-up of low-flow sampling equipment at monitoring well SS30-MW-16 at Site SS-30.

Photo 37: East view of surface water sample SS30-SW-01 location.

Photo 38: Southeast view of Site LF-34 while standing near north IC boundary.

Photo 39: Close-up of 20 by 4-foot erosion feature near north IC boundary at Site LF-34.

Photo 40: Close-up of 20 by 4-foot erosion feature near north IC boundary at Site LF-34.

Photo 41: Close-up of 20 by 4-foot erosion feature near north IC boundary at Site LF-34.

Photo 42: Close-up of 20 by 4-foot erosion feature near north IC boundary at Site LF-34.

Photo 43: Close-up of 20 by 4-foot erosion feature near north IC boundary at Site LF-34.

Photo 44: Northwest view of exposed concrete near west-northwest portion of Site LF-34.

Photo 45: North view of creek near west IC boundary at Site LF-34.

Photo 46: West view of roadway culvert at intersection of Sijan Ave. and Summit Dr. at Site LF-34.

Photo 47: East view of Site LF-42 while standing at southwest corner of IC boundary.

Photo 48: North of of west IC boundary at Site LF-42.

Photo 49: Northeast view of Site LF-42 while standing near south IC boundary.

Photo 50: West view of exposed concrete near west central part of west IC boundary at Site LF-42.

Photo 51: North view of roadway culvert replacement at Site LF-42.

Photo 52: Northwest view of 20 by 80 by 10-foot disturbed area during culvert replacement at Site LF-42.

Photo 53: South view of Site LF-42 from center of the site.

Photo 54: North view of Site LF-42 from center of the site.

Photo 55: North view of east IC boundary at Site LF-42.

Photo 56: West view of small creek near northwest corner of IC boundary at Site LF-42.

Appendix E
Low Flow Sample Sheets

CH2MHILL

PROJECT NUMBER	WELL NUMBER
375430	SHEET 1 OF 2

LOW FLOW SAMPLING LOG

Well Number: MW-07
Site: SS44
Field Crew: **WConway**
Date: 5-20-09

Well Depth (ft): 35.53
DTW (ft): 5.96
Water Column (ft): 29.57
Well Diameter (in): 2"
Gal. Per ft: .0.163
Well volume (gal): 4.7
Depth of Screen (ft): 25.53

Purge Methodology:

Diameter	Gal. Per Foot	Diameter	Gal. Per Foot
2"	0.163	5"	1.02
3"	0.367	6"	1.469
4"	0.653	8"	2.611

Field Parameters

	Time	DTW (toc)	Flow Rate (ml/min)	Total Volume (gal)	pH (Std. Units)	Temp (C)	Cond. (mS/cm)	ORP (mV)	D.O. [Surface] (mg/L)	Turbidity (NTU)	Color/Odor
Start		<0.3'	300-500								
INT.	1530	5.91	200	0	5.75	24.52	0.651	82.7	4.95	4.54	Clear
1 VOL.	1535	6.22	200	0.2	6.62	16.77	0.844	90.0	4.40	4.73	"
2 VOL.	1540	6.24	200	0.4	6.58	16.49	0.826	98.5	6.22	4.28	
3 VOL.	1545	6.27	200	0.6	6.59	16.30	0.821	102.8	6.15	3.97	
4 VOL.	1550	6.30	200	0.8	6.59	16.42	0.817	106.3	5.68	3.77	
5 VOL.	1555	6.31	200	1.0	6.60	16.43	0.817	108.5	5.15	4.17	
6 VOL.	1600	6.32	200	1.6	6.60	16.46	0.817	110.5	4.32	4.09	
7 VOL.	1605	6.33	200	1.8	6.59	16.43	0.813	112.6	4.17	3.98	
8 VOL.	1610	6.33	200	2.0	6.59	16.38	0.809	115.0	3.65	3.52	
9 VOL.	1615	6.34	200	2.20	6.60	16.43	0.808	116.5	3.23	3.48	
10 VOL.	1620	6.34	200	2.40	6.60	16.40	0.808	118.5	2.99	3.76	
11 VOL.	1625	6.34	200	2.60	6.60	16.17	0.800	120.4	2.88	3.15	
12 VOL.	1630	6.34	200	2.80	6.61	16.08	0.796	122.1	2.54	3.75	
13 VOL.	1635	6.34	200	3.00	6.66	16.21	0.798	111.3	2.22	4.28	
14 VOL.	1640	6.34	200	3.20	6.61	15.92	0.792	117.5	1.96	3.55	
15 VOL.	1645	6.35	200	3.40	6.61	15.89	0.788	120.3	1.94	3.07	
16 VOL.	1650	6.35	200	3.60	6.62	15.67	0.784	124.6	1.86	2.88	
17 VOL.	1655	6.35	200	3.80	6.63	15.66	0.782	126.6	1.70	2.73	
18 VOL.	1700	6.35	200	4.0	6.62	15.73	0.782	127.8	1.64	2.55	
19 VOL.	1705	6.35	200	4.5	6.62	15.72	0.784	129.3	1.59	2.37	
20 VOL.	1710	6.34	200	4.7	6.63	15.88	0.784	131.1	1.61	2.42	

Remarks:
44MW07W00 -1720
44MW07W00MS MSD -1720

5 3
29.57
0.163
1770
2950
4.720

Sampling

Depth to Water Before Sampling: 11.01
Depth sample was acquired: 30.5' BGS
Sample Methodology: Peristaltic
Sample Date/Time: 5-20-09 1770
Signed Sampler: W Conway
Filtered Metals Collected: Y / N
Filter Size:
Sample Observations:
Parameters: Benzene, TCE, CIS 1,2

CH2MHILL

PROJECT NUMBER	WELL NUMBER
375430	SHEET OF

LOW FLOW SAMPLING LOG

Well Number: MW01 | Site: 12

Field Crew: **WConway** | Date: 5-20-09

Well Depth (ft): 26.50
DTW (ft): 0.71
Water Column (ft): 25.79
Well Diameter (in): 2"
Gal. Per ft: .0.163
Well volume (gal): 4.1
Depth of Screen (ft):

Purge Methodology:
3 4
25.8
1.16
1548
2580
4.128

Diameter	Gal. Per Foot	Diameter	Gal. Per Foot
2"	0.163	5"	1.02
3"	0.367	6"	1.469
4"	0.653	8"	2.611

Field Parameters

	Time	DTW (toc)	Flow Rate (ml/min)	Total Volume (gal)	pH (Std. Units)	Temp (C)	Cond. (mS/cm)	ORP (mV)	D.O. [Surface] (mg/L)	Turbidity (NTU)	Color/Odor
Start		<0.3'	300-500								
INT.	1808	0.71									
1 VOL.	1813	1.15	250	0.10	6.44	13.77	0.639	127.6	9.20	7.12	
2 VOL.	1818	1.79	250	0.30	6.38	13.62	0.623	132.4	2.85	12.53	
3 VOL.	1823	1.89	250	0.60	6.38	13.50	0.606	129.7	2.74	8.35	
4 VOL.	1828	1.93	250	0.80	6.39	13.55	0.594	120.8	2.63	7.84	
5 VOL.	1833	2.03	250	1.10	6.42	13.41	0.587	109.5	2.03	7.54	
6 VOL.	1838	2.07	250	1.30	6.43	13.36	0.580	103.9	1.75	7.13	
7 VOL.	1843	2.08	250	1.50	6.44	13.33	0.573	98.5	1.52	6.63	
8 VOL.	1848	2.10	250	1.80	6.43	13.36	0.565	94.0	1.37	6.13	
9 VOL.	1853	2.11	250	2.10	6.44	13.37	0.556	90.1	1.17	5.98	
10 VOL.	1858	2.11	250	2.40	6.44	13.27	0.551	86.8	1.19	5.87	
11 VOL.	1903	2.12	250	2.70	6.45	13.29	0.548	84.3	1.18	5.81	
12 VOL.	1908	2.12	250	3.00	6.45	13.29	0.544	82.9	1.17	5.32	
13 VOL.	1913	2.13	250	3.30	6.48	13.24	0.540	80.5	1.13	5.11	
14 VOL.	1918	2.14	250	3.60	6.47	13.25	0.539	81.0	1.09	4.73	
15 VOL.	1923	2.14	250	3.90	6.47	13.26	0.539	81.6	1.09	4.13	
16 VOL.	1928	2.15	250	4.20	6.47	13.26	0.535	81.7	1.01	4.28	
17 VOL.											
18 VOL.											
19 VOL.											
20 VOL.											

Remarks:
12MW01W00 - 1930
Well Box was Flooded, well cap was not well installed.

Sampling

Depth to Water Before Sampling: 2.15 | Depth sample was acquired: 21.5

Sample Methodology: Peristaltic pump

Sample Date/Time: 5-20-09 1930

Signed Sampler: W Conway

Filtered Metals Collected: Y / N | Filter Size:

Sample Observations:

Parameters: Benzene, TCE, 0.5 1,2,3

2222 222

CH2MHILL

PROJECT NUMBER	WELL NUMBER
375430.06.90.01.01	SHEET 1 OF 2

LOW FLOW SAMPLING LOG

Well Number: MW05	Site: FT02-MW05
Field Crew: **WConway**	Date: 5/20/09
Well Depth (ft): 17.34	Purge Methodology: Peristaltic
DTW (ft): 5.76	
Water Column (ft): 11.58	
Well Diameter (in): 4"	
Gal. Per ft: ~~0.163~~ 0.653	
Well volume (gal): 7.6 94110-3	
Depth of Screen (ft):	

Diameter	Gal. Per Foot	Diameter	Gal. Per Foot
2"	0.163	5"	1.02
3"	0.367	6"	1.469
4"	0.653	8"	2.611

Field Parameters

	Time	DTW (toc)	Flow Rate (ml/min)	Total Volume (gal)	pH (Std. Units)	Temp (C)	Cond. (mS/cm)	ORP (mV)	D.O. [Surface] (mg/L)	Turbidity (NTU)	Color/Odor
Start		<0.3'	300-500								
INT.	1105	6.06	200	0.20	6.73	13.83	1.609	-27.8	2.69	28.9	Clear
1 VOL.	1110	6.18	200	0.40	6.73	14.47	1.623	-35.6	2.43	17.0	Clear
2 VOL.	1115	6.31	200	0.60	6.74	14.73	1.629	-50.9	2.75	17.7	Clear
3 VOL.	1120	6.53	200	0.80	6.75	14.45	1.562	-80.2	2.43	20.7	Clear
4 VOL.	1125	6.67	200	1.00	6.74	14.33	1.454	-101.1	1.80	22.1	Clear
5 VOL.	1130	6.83	200	1.20	6.73	13.88	1.279	-112.8	0.84	17.9	Clear
6 VOL.	1135	6.97	200	1.40	6.73	14.18	1.179	-114.4	0.17	20.2	Clear
7 VOL.	1140	7.13	200	1.60	6.74	14.17	1.119	-116.0	-0.88	16.9	
8 VOL.	1145	7.28	200	1.80	6.74	14.20	1.046	-112.9	-1.67	19.3	
9 VOL.	1150	7.44	200	2.00	6.75	14.23	0.977	-108.0	-2.38	18.3	
10 VOL.	1155	7.62	[illegible]	2.20	6.75	14.29	0.918	-104.2	-3.31	17.8	
11 VOL.	1200	7.65	200	2.40	6.75	14.27	0.894	-99.0	-3.91	18.7	
12 VOL.	1205	7.80	200	2.60	6.75	14.17	0.876	-91.2	-3.96	15.6	Pump Stopped
13 VOL.	1210	8.00	200	2.80	6.74	13.84	0.872	-79.9	-3.31	18.2	
14 VOL.	1215	8.24	200	3.00	6.72	13.83	0.870	-75.0	-2.41	13.9	
15 VOL.	1220	8.36	200	3.20	6.73	14.07	0.887	-72.3	-3.30	7.04	
16 VOL.	1225	8.48	200	3.40	6.72	14.38	0.890	-65.1	-1.82	9.54	
17 VOL.	1230	8.58	200	3.60	6.70	14.68	0.901	-72.5	-1.07	7.52	
18 VOL.	1235	8.77	200	3.80	6.71	14.52	0.927	-103.9	-.64	7.83	
19 VOL.	1240	8.90	200	4.00	6.72	14.86	0.945	-123.1	-0.24	7.22	
20 VOL.	1245	8.97	200	4.20	6.71	15.13	0.956	-118.3	0.20	6.95	

Remarks:

02MW05 WOO - 1410

02MW05 WOO FD - 1415

3.4
11.58
0.653
1.5474
5.7900
6.9200
7.5574

Sampling

Depth to Water Before Sampling: 8.97	Depth sample was acquired:
Sample Methodology: Peristaltic	
Sample Date/Time: 1410 1415 5-20-09	
Signed Sampler: W Conway	
Filtered Metals Collected: Y / N	Filter Size:
Sample Observations:	
Parameters: Benzene, TCE, Cis 1,2	

C:\Documents and Settings\fconway\Desktop\Blank documents\Low_flow_sampling_log_FWC.xls

Glenn 660-563-1123 687-6347

CH2MHILL

PROJECT NUMBER	WELL NUMBER
375430	SHEET 2 OF 2

LOW FLOW SAMPLING LOG

Well Number:	Site:
Field Crew: **WConway**	Date:

Well Depth (ft):	Purge		
DTW (ft):	Methodology:		
Water Column (ft):			
Well Diameter (in):			
Gal. Per ft: .0.163	7.6		
Well volume (gal):			
Depth of Screen (ft):			

Diameter	Gal. Per Foot	Diameter	Gal. Per Foot
2"	0.163	5"	1.02
3"	0.367	6"	1.469
4"	0.653	8"	2.611

Field Parameters

	Time	DTW (toc)	Flow Rate (ml/min)	Total Volume (gal)	pH (Std. Units)	Temp (C)	Cond. (mS/cm)	ORP (mV)	D.O. [Surface] (mg/L)	Turbidity (NTU)	Color/Odor
Start		<0.3'	300-500								
INT.	1250	9.13	200	4.40	6.71	14.88	0.960	-118.0	-0.02	6.87	Clear
1 VOL.	1255	9.28	200	4.60	6.72	14.33	0.963	-137.9	0.02	7.3	↓
2 VOL.	~~1260~~ 1300	9.37	200	4.80	6.74	14.36	0.972	-155.7	-0.03	6.58	↓
3 VOL.	1305	9.49	200	5.00	6.75	14.37	0.989	-163.4	0.03	6.92	
4 VOL.	1310	9.59	200	5.20	6.75	14.46	1.002	-171.6	0.03	5.41	
5 VOL.	1315	9.74	200	5.40	6.76	14.34	1.035	-181.4	-0.05	5.13	
6 VOL.	1320	9.86	200	5.60	6.77	14.52	1.050	-188.0	-1.34	4.92	
7 VOL.	1325	9.97	200	5.80	6.77	14.77	1.075	-192.0	-0.05	4.30	
8 VOL.	1330	10.10	200	6.00	6.78	14.61	1.098	-200.7	-0.12	4.15	
9 VOL.	1335	10.21	200	6.20	6.79	14.43	1.119	-206.1	-0.13	4.25	
10 VOL.	1340	10.30	200	6.40	6.75	13.76	1.506	-204.2	-0.23	13.78	Lowered inlet to 14'
11 VOL.	1345	10.43	200	6.60	6.76	14.01	1.562	-192.1	-0.18	11.1	
12 VOL.	1350	10.49	200	6.80	6.76	14.14	1.579	-184.0	-0.15	9.3	
13 VOL.	1355	10.58	200	7.00	6.76	14.13	1.589	-180.3	-0.16	9.1	
14 VOL.	1400	10.71	200	7.20	6.76	14.32	1.598	-176.8	-0.14	9.8	
15 VOL.	1405	10.84	200	7.40	6.76	14.09	1.599	-172.7	-0.11	10.0	
16 VOL.	1410	11.01	200	7.60	6.76	14.02	1.592	-167.6	-0.14	9.1	
17 VOL.											
18 VOL.											
19 VOL.											
20 VOL.											

Remarks:
1511 Waterloo Drive
50
N.O.S 65
L on Eagleview
R on ADAMS
L on 1
L onto Ewing
R Waterloo

Sampling

Depth to Water Before Sampling:	Depth sample was acquired:
Sample Methodology:	
Sample Date/Time:	
Signed Sampler:	
Filtered Metals Collected: Y / N	Filter Size:
Sample Observations:	
Parameters:	

Low Flow Groundwater Sampling Form

Project Name: WAFB 5530 LTM
Project Number:
Sample Source (Well No./Location) 5530-MW-16
Date: 09 / 03 / 09
Weather Conditions 57° & clear
PID 0.0 (ppm) Well Condition Concrete pad cracked, well protector loose
Sample Team T. Swinscoe

Well Stabilization Data

Well Depth 27.73 (FT.) Datum BTOC
Static Water Level 4.35 (FT.) Diameter: 2" SCH. 40 PVC
Water Column 23.38 (FT.) Time Purging begins (T_0): 0829 Tubing depth: 23' bgs
Well Volume 3.75 gal. = 14.2 Liters
Purge Method Peristaltic Pump
Time Purging ends (T_1) 0940
Water Level at time T_0 4.82
Water Level at time T_1 _____

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
0829	ϕ	6.62	0.704	18.88	-54.4	4.82	15.37	629	0.20	Cloudy
0834	1.0	6.73	0.711	18.67	-79.2	4.91	7.95	581	0.20	Cloudy
0839	2.0	6.76	0.770	18.65	-84.8	4.94	5.80	471	0.20	Cloudy
0844	3.0	6.77	0.793	18.57	-84.6	4.98	4.74	461	0.20	Cloudy
0849	4.0	6.77	0.804	18.73	-80.6	4.96	4.02	412	0.20	Cloudy
0854	5.0	6.77	0.854	18.74	-80.0	4.96	3.52	281	0.20	Cloudy
0859	6.0	6.76	0.889	18.79	-77.4	4.96	3.11	190	0.20	Clearing up
0904	7.0	6.75	0.926	18.70	-75.9	4.98	2.94	138	0.20	Clearing up
0909	8.0	6.75	0.947	18.78	-74.3	4.98	2.99	102	0.20	Clear
0914	9.0	6.74	0.960	18.93	-71.9	4.95	3.08	73.4	0.20	Clear

Sample Information

Sample ID: 30MW16WQD & 30MW16FD
Analysis: GT by 8260
Date: 09 / 03 / 09
Time: 0944 & 0950 (FD)
Field Filtering NO
Laboratory PEL Method of Shipment FedEx
Remarks :

Low Flow Groundwater Sampling Form

Project Name: WAFB 5530 LTM
Project Number:
Sample Source (Well No./Location) 5530-MW-16
Date: 09 / 03 / 09
Weather Conditions 57° & clear
PID 0.0 (ppm) Well Condition Concrete pad cracked, well protector loose
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 27.73 (FT.) Datum BTOC
Static Water Level 4.35 (FT.) Diameter: 2" Sch.40 PVC
Water Column 23.38 (FT.) Time Purging begins (T_0): 0829
Well Volume 14.2 Liters
Purge Method: Peristaltic Pump

Time Purging ends (T_1) 0940
Water Level at time T_0 4.82
Water Level at time T_1 4.99

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
0914	10.0	6.74	0.980	18.97	-69.7	4.94	3.26	58.0	0.20	Clear
0924	11.0	6.73	0.997	18.80	-66.1	4.98	3.48	39.9	0.20	Clear
0929	12.0	6.73	1.005	18.83	-64.7	4.98	3.47	29.0	0.20	Clear
0934	13.0	6.73	1.016	18.87	-63.5	4.98	3.51	27.3	0.20	Clear
0939	14.0	6.73	1.020	18.77	-61.8	4.99	3.56	26.7	0.20	Clear
0940	14.2	6.73	1.020	18.78	-61.7	4.99	3.55	25.1	0.20	Clear

Sample Information

Sample ID: 30MW16W00 & 30MW16FD
Analysis: CT by 8260
Date: 09 / 03 / 09
Time: 0944 & 0950 (FD)
Field Filtering ND
Laboratory PEL Method of Shipment FedEx
Remarks :

Low Flow Groundwater Sampling Form

Project Name: WPF3 SS30 LTM
Project Number:
Sample Source (Well No./Location) SS30-MW-18
Date: 09 / 02 / 09
Weather Conditions 72° & partly cloudy
PID 0.0 (ppm) Well Condition Screen submerged
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 29.27 (FT.) Datum BTOC
Static Water Level 7.18 (FT.) Diameter: 2" Sch.40 PVC
Water Column 22.09 (FT.) Time Purging begins (T_o): 1303 Tubing depth: 24' bgs
Well Volume 3.53 gal. = 13.40 Liters Purge Method: Peristaltic Pump

Time Purging ends (T_1) 1410
Water Level at time T_o 7.37
Water Level at time T_1 7.40

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1303	ϕ	6.99	0.569	20.31	178.5	7.37	4.30	12.5	0.20	Clear
1308	1.0	6.87	0.553	19.49	185.7	7.40	3.94	9.97	0.20	Clear
1313	2.0	6.85	0.551	19.61	188.0	7.39	3.66	7.57	0.20	Clear
1318	3.0	6.85	0.549	19.55	188.9	7.40	3.34	6.33	0.20	Clear
1323	4.0	6.85	0.548	19.74	189.0	7.40	3.20	5.27	0.20	Clear
1328	5.0	6.85	0.545	19.54	189.6	7.40	3.23	3.72	0.20	Clear
1333 ~~1335~~	6.0	6.84	0.544	19.45	190.3	7.40	3.14	3.68	0.20	Clear
1338	7.0	6.85	0.542	19.59	191.2	7.40	3.20	3.04	0.20	Clear
1343	8.0	6.84	0.542	19.42	191.8	7.40	3.15	2.78	0.20	Clear
1348	9.0	6.84	0.537	19.56	192.6	7.40	3.15	2.79	0.20	Clear

Sample Information

Sample ID: ~~SS3~~ 30MW18W00
Analysis: CT by 8260
Date: 09/ 02 /09
Time: 1414
Field Filtering NO
Laboratory PSL Method of Shipment FedEx
Remarks :

Low Flow Groundwater Sampling Form

Project Name: WAFB SS30 LTM
Project Number:
Sample Source (Well No./Location) SS30-MW-18
Date: 09 / 02 / 09
Weather Conditions 72° & partly cloudy
PID 0.0 (ppm) Well Condition Protector submerged
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 29.27 (FT.) Datum BTOC
Static Water Level 7.18 (FT.) Diameter: 2" Sch. 40 PVC
Water Column 22.09 (FT.) Time Purging begins (T_0): 1303 Tubing depth: 24' btoc
Well Volume 13.40 Liters
Purge Method: Peristaltic Pump

Time Purging ends (T_1) 1410
Water Level at time T_0 7.37
Water Level at time T_1 7.40

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1353	10.0	6.84	0.536	19.52	193.4	7.40	3.31	2.42	0.20	Clear
1358	11.0	6.84	0.536	19.54	194.6	7.40	3.20	1.94	0.20	Clear
1403	12.0	6.85	0.535	19.59	188.9	7.40	3.20	2.04	0.20	Clear
1408	13.0	6.84	0.534	19.60	192.4	7.40	3.14	1.83	0.20	Clear
1410	13.4	6.84	0.535	19.54	193.4	7.40	3.13	1.64	0.20	Clear

Sample Information

Sample ID: 30MW18W00
Analysis: VOC by 8260
Date: 09 / 02 / 09
Time: 1414
Field Filtering ND
Laboratory
Method of Shipment FedEx
Remarks :

Low Flow Groundwater Sampling Form

Project Name: WAFB 5330 LTM
Project Number:
Sample Source (Well No./Location) 5330-MW-19
Date: 09 / 02 / 09
Weather Conditions 61° & partly cloudy
PID 0.0 (ppm) Well Condition Plug not on; protector submerged
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 24.18 (FT.) Datum BTOC
Static Water Level 0.55 (FT.) Diameter: 2" SCH 40 PVC
Water Column 23.63 (FT.) Time Purging begins (T_0): 1119 Tubing depth: 19' BTOC
Well Volume 3.78 gal. = 14.30 Liters
Purge Method: Peristaltic Pump

Time Purging ends (T_1) 1231
Water Level at time T_0 0.68
Water Level at time T_1 0.68

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1119	ϕ	6.75	1.011	20.67	172.7	0.68	3.88	6.03	0.20	Clear
1124	1.0	6.69	0.993	21.61	174.1	0.69	3.16	4.66	0.20	Clear
1129	2.0	6.67	1.016	21.23	171.0	0.69	2.74	3.26	0.20	Clear
1134	3.0	6.65	1.039	21.06	171.7	0.69	3.08	3.61	0.20	Clear
1139	4.0	6.64	1.058	21.05	171.2	0.69	1.38	2.03	0.20	Clear
1144	5.0	6.64	1.057	21.19	171.1	0.68	1.56	2.18	0.20	Clear
1149	6.0	6.64	1.050	21.10	171.0	0.68	3.31	1.93	0.20	Clear
1154	7.0	6.64	1.051	20.96	170.5	0.68	3.21	2.78	0.20	Clear
1159	8.0	6.64	1.056	21.10	163.1	0.68	3.16	1.76	0.20	Clear
1204	9.0	6.65	1.056	20.96	164.5	0.68	3.17	1.65	0.20	Clear

Sample Information

Sample ID: 30MW19W00, 30MW19MS, 30MW19MSD
Analysis: CT by 8260
Date: 09 / 02 / 09
Time:
Field Filtering No
Laboratory
Method of Shipment FedEx
Remarks :

114 687-6266
STEAM PLANT 180-DAY POINT
HAZ-MAT
2 OF 2

Low Flow Groundwater Sampling Form

Project Name: WAFB SS30 LTM Project Number:
Sample Source (Well No./Location) SS30-MW-19 Date: 09 / 02 / 09
Weather Conditions 61° & partly cloudy
PID 0.0 (ppm) Well Condition Pkg. off riser, protector submerged
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 24.18 (FT.) Datum BTOC Time Purging ends (T_1) 1231
Static Water Level 0.55 (FT.) Diameter: 2" Sch. 40 PVC Water Level at time T_0 0.68
Water Column 23.63 (FT.) Time Purging begins (T_0): 1119 Tubing depth: 19' btoc Water Level at time T_1 0.68
Well Volume 14.30 Liters Purge Method: Peristaltic Pump

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1209	10.0	6.64	1.052	20.96	166.6	0.68	2.10	2.04	0.20	Clear
1214	11.0	6.64	1.049	20.97	167.7	0.68	2.19	1.67	0.20	Clear
1219	12.0	6.64	1.050	20.85	168.0	0.68	2.28	1.59	0.20	Clear
1224	13.0	6.64	1.051	20.72	168.7	0.68	2.41	1.40	0.20	Clear
1229	14.0	6.64	1.056	20.61	169.5	0.68	2.59	1.88	0.20	Clear
1231	14.4	6.64	1.057	20.61	169.6	0.68	2.63	1.71	0.20	Clear

Sample Information

Sample ID: 30MW19WQD, 30MW19MS, 30MW19MSD
Analysis: CT by 8260
Date: 09 / 02 / 09
Time: 1234
Field Filtering No
Laboratory _____ Method of Shipment FedEx
Remarks : _____

Low Flow Groundwater Sampling Form

Project Name: WAFB 5330 LTM
Project Number:
Sample Source (Well No./Location) 5330-MW-20
Date: 09 / 02 / 09
Weather Conditions 74° & partly cloudy
PID 0.0 (ppm) Well Condition GOOD
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 34.41 (FT.) Datum BTOC
Static Water Level 10.11 (FT.) Diameter: 2" SCH.40 PVC
Water Column 24.30 (FT.) Time Purging begins (T_o): 1441 Tubing depth: 29.5' BOOC
Well Volume 3.90 gal. = 14.75 Liters
Purge Method: Peristaltic Pump

Time Purging ends (T_1) ~~10.52~~ 1556
Water Level at time T_o 10.52
Water Level at time T_1 10.78

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1441	Ø	6.36	0.595	17.34	204.0	10.52	3.17	15.7	0.20	Clear
1446	1.0	6.25	0.592	17.12	210.1	10.70	3.15	16.5	0.20	Clear
1451	2.0	6.23	0.594	16.80	212.5	10.71	2.89	15.4	0.20	Clear
1456	3.0	6.23	0.593	16.86	211.9	10.76	2.98	11.0	0.20	Clear
1501	4.0	6.23	0.592	17.12	210.6	10.79	2.89	9.09	0.20	Clear
1506	5.0	6.22	0.592	17.06	209.3	10.79	2.83	6.72	0.20	Clear
1511	6.0	6.21	0.592	16.99	208.7	10.79	2.82	6.65	0.20	Clear
1516	7.0	6.20	0.591	17.14	207.7	10.77	2.68	5.39	0.20	Clear
1521	8.0	6.20	0.588	17.27	207.1	10.76	2.67	5.11	0.20	Clear
1526	9.0	6.19	0.589	17.09	206.3	10.76	2.72	4.83	0.20	Clear

Sample Information

Sample ID: 30MW20W00
Analysis: GT by 8260
Date: 09/ 02 / 09
Time: 1600
Field Filtering NO
Laboratory PEL Method of Shipment FedEx
Remarks :

Low Flow Groundwater Sampling Form

Project Name: WAFB 5530 LTM
Project Number:
Sample Source (Well No./Location) 5530-MW-20
Date: 09/ 02 / 09
Weather Conditions 74° & partly cloudy
PID 0.0 (ppm) Well Condition Good
Sample Team T. Swierczek

Well Stabilization Data

Well Depth 34.41 (FT.) Datum BTOC
Static Water Level 10.11 (FT.) Diameter: 2" SCH.40 PVC
Water Column 24.30 (FT.) Time Purging begins (T_0): 1441 Tubing Depth: 29.5' bmp
Well Volume 14.75 Liters
Purge Method: Peristaltic Pump

Time Purging ends (T_1) 1556
Water Level at time T_0 10.52
Water Level at time T_1 10.78

Time	Volume Removed Liters	pH + / - 0.1	SPCOND.(mS/cm) + / - 3%	TEMP.(C) + / - 0.2	Redox (mV) + / - 10 mV	Water level (Ft) < 0.3 ft	D.O. (mg/L) + / - 10%	Turbidity (NTU)	Purge rate (Lpm) <0.5LPM	Appearance
1531	10.0	6.20	0.587	17.16	205.8	10.77	2.58	4.66	0.20	Clear
1536	11.0	6.21	0.586	16.98	205.6	10.78	2.45	4.05	0.20	Clear
1541	12.0	6.23	0.587	17.05	205.9	10.78	2.31	3.74	0.20	Clear
1546	13.0	6.21	0.586	17.12	204.8	10.78	2.41	3.53	0.20	Clear
1551	14.0	6.21	0.586	17.04	204.9	10.78	2.38	3.09	0.20	Clear
1556	15.0	6.20	0.586	17.06	205.2	10.78	2.35		0.20	Clear

Sample Information

Sample ID: 30MW20W00
Analysis: CT by 8260
Date: 09/ 02 / 09
Time: 1600
Field Filtering No
Laboratory PEL Method of Shipment FedEx
Remarks :

Appendix F
Summary of Chemicals Detected in Groundwater

APPENDIX F1
Summary of Chemicals Detected in Groundwater
Sites FT-02, LF-12, and SS-44
Five-Year Review Report, Whiteman Air Force Base, Missouri

			Location>>	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05
			Sample ID>>	NA	NA	NA	WG-FT02-MW05-02	WG-FT02-MW05-03	NA	NA	NA	WM-GW-FT02-MW05-01	MW-GW-FT02-MW05-02
			Sample Date>>	6/3/1993	3/28/1995	11/13/1995	5/5/1997	8/7/1997	11/5/1997	6/12/1998	9/23/1998	10/3/1999	3/30/2000
Analyte	Units	Screening Level Source	Screening Level										
Benzene	µg/L	CALM GTARC/MCL	5	**11000**	**8000**	**4900**	**825**	**5580**	**7600**	**5700**	**7700**	**3400**	**650**
cis-1,2-Dichloroethene	µg/L	CALM GTARC/MCL	70	NA	< 5	NA	< 1.2	< 1.2	< 16.4	< 600	< 240	< 0.23	< 0.16
Trichloroethene	µg/L	CALM GTARC/MCL	5	**100 J**	< 5	NA	< 1	< 1	< 20.4	< 500	< 200	< 0.17	< 0.15

			Location>>	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05	FT02-MW-05
			Sample ID>>	GW-FT02-MW05-03	GW-FT02-MW05-04	WG-FT02-MW05-0-1	WG-FT02-MW05-0-2 (7015)	WG-FT02-MW05-0-3	WG-FT02-MW05-0-4	WG-FT02-MW05-0-5	WG-FT02-MW05-0-7	02MW005W00	02MW005W00
			Sample Date>>	10/30/2000	4/3/2001	11/16/2001	4/23/2002	9/27/2002	4/21/2003	10/9/2003	11/5/2004	10/14/2005	2/28/2006
Analyte	Units	Screening Level Source	Screening Level										
Benzene	µg/L	CALM GTARC/MCL	5	**952**	**1.7**	**990**	**110**	**2100**	**100**	**620**	**41**	**410 M**	**56**
cis-1,2-Dichloroethene	µg/L	CALM GTARC/MCL	70	< 3.8	< 0.024	< 9.3	< 0.9	< 3.6	< 0.36	< 1.2	< 0.2	< 0.2	< 0.2
Trichloroethene	µg/L	CALM GTARC/MCL	5	< 3.3	< 0.017	< 5	< 0.5	< 1.2	< 0.12	< 1.2	< 0.16	< 0.27	< 0.27

			Location>>	FT02-MW-05	FT02-MW-05	FT02-MW-05
			Sample ID>>	02MW005W00	02MW05W00	02MW05W00
			Sample Date>>	4/13/2007	8/5/2008	5/20/2009
Analyte	Units	Screening Level Source	Screening Level			
Benzene	µg/L	CALM GTARC/MCL	5	**26.8**	**530**	**24**
cis-1,2-Dichloroethene	µg/L	CALM GTARC/MCL	70	< 0.22	<1.4	< 0.23
Trichloroethene	µg/L	CALM GTARC/MCL	5	< 0.22	< 1	< 0.2

			Location>>	LF12-MW-01	LF12-MW-01	LF12-MW-01	LF12-MW-01	LF12-MW-01
			Sample ID>>	12MW001W00	12MW001W00	12MW001W00	12MW01W00	12MW01W00
			Sample Date>>	10/14/2005	2/28/2006	4/13/2007	8/5/2008	5/20/2009
Analyte	Units	Screening Level Source	Screening Level					
Benzene	µg/L	CALM GTARC/MCL	5	**0.33 F**	<0.14	< 0.22	< 0.058	< 0.091
cis-1,2-Dichloroethene	µg/L	CALM GTARC/MCL	70	< 0.2	< 0.2	< 0.22	< 0.27	< 0.23
Trichloroethene	µg/L	CALM GTARC/MCL	5	< 0.27	< 0.27	< 0.22	< 0.2	< 0.2

			Location>>	SS44-MW-07	SS44-MW-07	SS44-MW-07	SS44-MW-07	SS44-MW-07	SS44-MW-07
			Sample ID>>	44MW007W000902	44MW007W00	44MW007W00	44MW007W00	44MW07W00	44MW07W00
			Sample Date>>	9/19/2002	10/14/2005	2/28/2006	4/13/2007	8/5/2008	5/20/2009
Analyte	Units	Screening Level Source	Screening Level						
Benzene	µg/L	CALM GTARC/MCL	5	< 0.035	**0.87**	<0.14	< 0.22	< 0.058	< 0.091
cis-1,2-Dichloroethene	µg/L	CALM GTARC/MCL	70	**0.46 F**	**0.41 F**	**0.23 F**	< 0.22	< 0.27	< 0.23
Trichloroethene	µg/L	CALM GTARC/MCL	5	**0.37 F**	< 0.27	< 0.27	< 0.22	< 0.2	< 0.2

Note:
Results that indicate a detection are shown in **bold.**
Results that indicate detections above the screening value are shaded.
NA = The sample was not analyzed at that time
CALM GTARC/MCL=Cleanup Levels for Missouri Groundwater Target Concentrations /Maximum Contaminant Limit, from MDNR, 2001.

Qualifier Descriptions:
J = The analyte was present between the method detection limit and reporting limit
F = The analyte was positively identified but the value was below the reporting limit
M = A matrix effect was present
< = Below the specified quantitation limit

APPENDIX F2
Summary of Chemicals Detected in Groundwater and Surface Water
Site SS-30
Five-Year Review Report, Whiteman Air Force Base, Missouri

		Location>>	SS30-MW-16	SS30-MW-16	SS30-MW-16	SS30-MW-16	SS30-MW-16	SS30-MW-16
		Sample ID>>	30MW016W000402	30MW016W000702	30MW016W000902	SS30MW16W1204D	WG-SS30-MW16-0-4	WG-SS30-MW16-0-5
		Sample Date>>	4/19/2002	7/2/2002	9/4/2002	12/4/2002	4/25/2003	10/9/2003
Analyte	Units	Remediation Goal						
Carbon tetrachloride	µg/L	297.4	**1640**	**1560**	**1350**	**1210**	**1000**	**1200**

		Location>>	SS30-MW-16	SS30-MW-16	SS30-MW-16	SS30-MW-16	SS30-MW-18	SS30-MW-18
		Sample ID>>	WG-SS30-MW16-0-6	WG-SS30-MW16-0-7	30MW16W00	30MW16W00	30MW18W00	30MW18W00
		Sample Date>>	4/15/2004	11/4/2004	4/12/2007	9/3/2009	4/16/2007	9/2/2009
		Remediation Goal						
Carbon tetrachloride	µg/L	297.4	**820**	**75**	**45**	**1.5 J**	**110**	**160**

		Location>>	SS30-MW-19	SS30-MW-19	SS30-MW-20	SS30-MW-20	SS30-SW-01	SS30-SW-01
		Sample ID>>	30MW19W00	30MW19W00	30MW20W00	30MW20W00	30SW01W00	30SW01W00
		Sample Date>>	4/16/2007	9/2/2009	4/16/2007	9/2/2009	4/16/2007	9/3/2009
Analyte	Units	Remediation Goal						
Carbon tetrachloride	µg/L	297.4	< 0.17	< 0.18	**150**	**75**	< 0.17	< 0.18

Note:
Results that indicate a detection are shown in **bold.**
Results that indicate detections above the remediation goal are shaded.

Qualifier Descriptions:
J = The analyte was present between the method detection limit and reporting limit
< = Below the specified quantitation limit

Appendix G
Laboratory Analytical Report

PEL a division of Spectrum Analytical, Inc.

featuring HANIBAL TECHNOLOGY

Customer Name:	CH2M Hill
Date and Time Received:	5/22/2009 8:30:00 AM
Date Reported:	6/2/2009
Laboratory Submission Number/SDG:	2512648
Project:	Whiteman AFB

Samples: The submission consisted of 8 samples with sample identification shown in the attached data tables.

Tests: The samples were analyzed for the methods listed on the attached table of contents.

Results: See the attached data tables for results.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Respectfully Submitted,

Brian Spann
Laboratory Director
PEL a division of Spectrum Analytical, Inc.
featuring Hanibal Technology

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are fo the exclusive use of the client to whom they are addressed. Our Letters and reports apply to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar materials

8405 Benjamin Road, Suite A• Tampa, Florida 33634
813-888-9507• FAX: 800-480-6435
Website: www.pelab.com

EXECUTIVE SUMMARY - Detection Highlights

2512648

SAMPLE ID: 02MW05W00

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Benzene	24	0.50	UG/L	SW8260B

SAMPLE ID: 02MW05W00FD

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Benzene	21	0.50	UG/L	SW8260B

020609 1615

Afcee Data Qualifiers

J The analyte was positively identified, the quantitation is an estimation

U The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

F The analyte was positively identified but the associated numerical value is below the RL.

R The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

B The analyte was found in an associated blank, as well as in the sample.

M A matrix effect was present.

S To be applied to all field screening data.

T Tentatively identified compound (using GC/MS).

020609 1615

Organics

020609 1615

Organic Sample ID Qualifiers

The qualifiers that may be appended to the lab sample ID and/or the client sample ID for organic analysis are defined below:

DL Diluted reanalysis. Indicates that the results of the original analysis of the sample contained compounds that exceeded the calibration range. The sample was diluted and reanalyzed. May be followed by a digit to indicate multiple dilutions of the sample. The results of more than one diluted reanalysis may be reported.

R Reanalysis. The extract was reanalyzed without re-extraction. The "R" is not used if the sample was also re-extracted. May be followed by a digit to indicate multiple reanalysis of the sample at the same dilution.

RE Re-extracted. The extract was reanalyzed with re-extraction. May be followed by a digit to indicate multiple re-extraction of the same sample at the same dilution.

MS Matrix spike (may be followed by a digit to indicate multiple matrix within a sample set).

SD Matrix spike duplicate (may be followed by a digit to indicate multiple matrix spike duplicate within a sample set).

020609 1615

GC/MS VOLATILE ORGANICS

METHOD 8260

020609 1615

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2512648

Client: CH2M Hill

I. RECEIPT

Exceptions encountered upon receipt are addressed in the Sample Receipt Confirmation Report, included with the Chain-of-Custody documentation, or communication included in the addendum with this package.

II. HOLDING TIMES

A. Sample Preparation: All holding times were met.

B. Sample Analysis: All holding times were met.

III. METHODS

EPA 8260B/SW846

IV. PREPARATION

Water samples were prepared by SW846/5030 for EPA8260B volatiles analysis. All aspects of sample preparation proceeded without exception.

V. ANALYSIS

A. Calibration:

All acceptance criteria were met. It should be noted that Chloromethane did not meet the AFCEE %D criteria in the CCV. SPCC criteria was met for this analyte. This was not a target analyte, so no further action was taken.

B. Blanks:

All acceptance criteria were met.

C. Surrogates:

All acceptance criteria were met.

D. Spikes:

1. Laboratory Control Spikes (LCS)

All acceptance criteria were met.

2. Matrix Spike/Matrix Spike Duplicate Samples (MS/SD)

A client requested MS/SD set was analyzed. All percent recovery and relative percent difference (RPD) criteria were met.

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2512648

Client: CH2M Hill

E. Internal Standards:

All acceptance criteria were met.

F. Samples:

Sample analysis proceeded normally. Client specified reporting limits were used.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and PEL, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as, verified by the following signature.

SIGNED: **DATE: 06/01/2009**

W:\Narratives\Vols\2512\2512648_8260AFC.doc

CASE NARRATIVE

PEL Lab Reference No./SDG: 2512648

Client: CH2M Hill

MANUAL INTEGRATION SUMMARY

The following analytes were manually integrated by the chemist.

No manual integrations detected.

These manual integrations have been reviewed and meet all criteria in accordance with PEL's SOP regarding manual integration.

CHEMIST: **DATE: 06/01/2009**

SECTION LEADER: **DATE: 06/01/2009**

W:\Narratives\Vols\2512\2512648_8260AFCMI.doc

AFCEE
ORGANIC ANALYSES DATA PACKAGE

Analytical Method: SW8260B **SDG #:** 2512648

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Base/Command: Whiteman AFB **Prime Contractor:** CH2M Hill

Field Sample ID	Lab Sample ID
02MW05W00	251264801
02MW05W00FD	251264802
44MW07W00	251264803
44MW07W00MS	251264804
44MW07W00SD	251264805
12MW01W00	251264806
EB-052009	251264807
Trip Blank	251264808

Comments:

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager's designee, as verified by the following signature.

Signature: Name: Brian Spann

Date: 6-2-09 Title: Laboratory Director

AFCEE FORM O-1

020609 1615

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 02MW05W00 **Lab Sample ID:** 251264801 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	**24**	1		
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	102.0	85 - 115	
Toluene d8	101.0	81 - 120	
4-Bromofluorobenzene	103.0	76 - 119	
1,2-Dichloroethane-d4	103.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 02MW05W00FD **Lab Sample ID:** 251264802 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	**21**	1		
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	103.0	85 - 115	
Toluene d8	104.0	81 - 120	
4-Bromofluorobenzene	105.0	76 - 119	
1,2-Dichloroethane-d4	107.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 44MW07W00 **Lab Sample ID:** 251264803 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	0.091	1		**U**
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	103.0	85 - 115	
Toluene d8	101.0	81 - 120	
4-Bromofluorobenzene	102.0	76 - 119	
1,2-Dichloroethane-d4	104.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 44MW07W00MS **Lab Sample ID:** 251264804 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	**21**	1		
Benzene	0.091	0.5	**20**	1		
Trichloroethene	0.2	1	**20**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	102.0	85 - 115	
Toluene d8	102.0	81 - 120	
4-Bromofluorobenzene	104.0	76 - 119	
1,2-Dichloroethane-d4	102.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 44MW07W00SD **Lab Sample ID:** 251264805 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	**20**	1		
Benzene	0.091	0.5	**20**	1		
Trichloroethene	0.2	1	**20**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	106.0	85 - 115	
Toluene d8	105.0	81 - 120	
4-Bromofluorobenzene	105.0	76 - 119	
1,2-Dichloroethane-d4	106.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 12MW01W00 **Lab Sample ID:** 251264806 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	0.091	1		**U**
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	104.0	85 - 115	
Toluene d8	104.0	81 - 120	
4-Bromofluorobenzene	105.0	76 - 119	
1,2-Dichloroethane-d4	104.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: EB-052009 **Lab Sample ID:** 251264807 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	0.091	1		**U**
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	105.0	85 - 115	
Toluene d8	103.0	81 - 120	
4-Bromofluorobenzene	104.0	76 - 119	
1,2-Dichloroethane-d4	101.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: Trip Blank **Lab Sample ID:** 251264808 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Date Received: 22-May-09 **Date Prepared:** **Date Analyzed:** 26-May-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
cis-1,2-Dichloroethene	0.23	1	0.23	1		**U**
Benzene	0.091	0.5	0.091	1		**U**
Trichloroethene	0.2	1	0.2	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	105.0	85 - 115	
Toluene d8	104.0	81 - 120	
4-Bromofluorobenzene	104.0	76 - 119	
1,2-Dichloroethane-d4	102.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

2A

WATER VOLATILE ORGANIC SURROGATE RECOVERY

Lab Name: PEL, Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : PEL Case No.: SAS No: SDG NO.: 2512648

Column(1): DB-624 ID: 0.18 (mm)

EPA Sample NO.	S1 #	S2 #	S3 #	S4 #	S5 #	S6 #	TOT OUT
02MW05W00	102.0	101.0	103.0	103.0			0
02MW05W00FD	103.0	104.0	105.0	107.0			0
050609BLKA34	110.0	109.0	106.0	108.0			0
052609LCSA34	110.0	108.0	104.0	107.0			0
12MW01W00	104.0	104.0	105.0	104.0			0
44MW07W00	103.0	101.0	102.0	104.0			0
44MW07W00MS	102.0	102.0	104.0	102.0			0
44MW07W00SD	106.0	105.0	105.0	106.0			0
EB-052009	105.0	103.0	104.0	101.0			0
Trip Blank	105.0	104.0	104.0	102.0			0

Control Limits

S1	=	Dibromofluoromethane	85 -	115
S2	=	Toluene d8	81 -	120
S3	=	4-Bromofluorobenzene	76 -	119
S4	=	1,2-Dichloroethane-d4	72 -	119

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out
Control limit source: (lab/method) AFCEE

Form II

020609 1615

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Date of Initial calibration:** 26-May-09

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT **Concentration Units:** UG/L

Column ID: DB-624

Analyte		200PPTt.D		500PPTt.D		1PPBt.D		2PPBt.D		5PPBt.D	
		Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5
Chloromethane	*					1	0.372	2	0.359	5	0.351
Vinyl chloride	#			0.5	0.386	1	0.339	2	0.365	5	0.338
1,1-Dichloroethene	#			0.5	0.577	1	0.565	2	0.547	5	0.553
1,1-Dichloroethane	*					1	0.560	2	0.645	5	0.609
cis-1,2-Dichloroethene				0.5	0.268	1	0.287	2	0.277	5	0.269
Chloroform	#	0.2	0.619	0.5	0.571	1	0.542	2	0.564	5	0.542
Carbon tetrachloride				0.5	0.318	1	0.253	2	0.325	5	0.323
Benzene		0.2	1.200	0.5	1.059	1	1.016	2	1.003	5	1.001
Trichloroethene				0.5	0.234	1	0.204	2	0.223	5	0.223
1,2-Dichloropropane	#			0.5	0.303	1	0.310	2	0.315	5	0.317
Toluene	#			0.5	0.636	1	0.630	2	0.594	5	0.610
Chlorobenzene	*			0.5	0.971	1	0.885	2	0.952	5	0.908
Ethylbenzene	#			0.5	0.556	1	0.480	2	0.495	5	0.488
Bromoform	*					1	0.149	2	0.174	5	0.168
1,1,2,2-Tetrachloroethane	*	0.2	1.662	0.5	0.738	1	0.746	2	0.736	5	0.701
==========*											
Dibromofluoromethane(SURR										5	0.181
Toluene d8(SURR)										5	0.697
4-Bromofluorobenzene(SURR										5	0.766
1,2-Dichloroethane-d4(SURR										5	0.039

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

020609 1615

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Date of Initial calibration:** 26-May-09

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT **Concentration Units:** UG/L

Column ID: DB-624

Analyte		10PPBt.D		20PPBt.D		50PPBt.D		60PPBt.D		80PPBt.D	
		Std 6	RF 6	Std 7	RF 7	Std 8	RF 8	Std 9	RF 9	Std 10	RF 10
Chloromethane	*	10	0.333	20	0.306	50	0.285	60	0.300	80	0.279
Vinyl chloride	#	10	0.313	20	0.298	50	0.281	60	0.304	80	0.282
1,1-Dichloroethene	#	10	0.503	20	0.493	50	0.483	60	0.509	80	0.500
1,1-Dichloroethane	*	10	0.594	20	0.550	50	0.572	60	0.586	80	0.589
cis-1,2-Dichloroethene		10	0.269	20	0.254	50	0.256	60	0.266	80	0.264
Chloroform	#	10	0.508	20	0.488	50	0.485	60	0.508	80	0.493
Carbon tetrachloride		10	0.298	20	0.311	50	0.322	60	0.337	80	0.349
Benzene		10	0.989	20	0.946	50	0.961	60	0.974	80	0.980
Trichloroethene		10	0.205	20	0.196	50	0.197	60	0.211	80	0.207
1,2-Dichloropropane	#	10	0.311	20	0.301	50	0.308	60	0.317	80	0.317
Toluene	#	10	0.586	20	0.565	50	0.569	60	0.591	80	0.582
Chlorobenzene	*	10	0.930	20	0.869	50	0.863	60	0.890	80	0.876
Ethylbenzene	#	10	0.473	20	0.467	50	0.462	60	0.480	80	0.480
Bromoform	*	10	0.180	20	0.182	50	0.193	60	0.201	80	0.209
1,1,2,2-Tetrachloroethane	*	10	0.718	20	0.716	50	0.681	60	0.696	80	0.689
==========*											
Dibromofluoromethane(SURR		10	0.222	20	0.220	50	0.220	60	0.206	80	0.227
Toluene d8(SURR)		10	0.791	20	0.803	50	0.769	60	0.727		
4-Bromofluorobenzene(SURR		10	0.875	20	0.901	50	0.864	60	0.827	80	0.890
1,2-Dichloroethane-d4(SURR		10	0.049	20	0.049	50	0.046	60	0.044	80	0.047

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

020609 1615

2512648

AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS03
Date of Initial calibration: 26-May-09
Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT
Concentration Units: UG/L
Column ID: DB-624

Analyte		Curve Type	Average RF	% RSD	mean %RSD	r	COD	Q
Chloromethane	*	AVRG	0.32	10.96	6.53			
Vinyl chloride	#	AVRG	0.32	11.39	6.53			
1,1-Dichloroethene	#	AVRG	0.53	6.67	6.53			
1,1-Dichloroethane	*	AVRG	0.59	5.09	6.53			
cis-1,2-Dichloroethene		AVRG	0.27	3.76	6.53			
Chloroform	#	AVRG	0.53	8.18	6.53			
Carbon tetrachloride		AVRG	0.32	8.68	6.53			
Benzene		AVRG	1.01	7.19	6.53			
Trichloroethene		AVRG	0.21	6.16	6.53			
1,2-Dichloropropane	#	AVRG	0.31	2.02	6.53			
Toluene	#	AVRG	0.60	4.19	6.53			
Chlorobenzene	*	AVRG	0.90	4.24	6.53			
Ethylbenzene	#	AVRG	0.49	5.67	6.53			
Bromoform	*	AVRG	0.18	10.49	6.53			
1,1,2,2-Tetrachloroethane	*	2ORDR	0.81			0.9999		
==========	*	==========	==========	==========	==========	==========	==========	==========
Dibromofluoromethane(SURR		AVRG	0.21	7.97	6.53			
Toluene d8(SURR)		AVRG	0.76	5.88	6.53			
4-Bromofluorobenzene(SURR		AVRG	0.85	5.88	6.53			
1,2-Dichloroethane-d4(SURR		AVRG	0.05	8.27	6.53			

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

2nd Source ID: SSC724650 **Concentration Units:** UG/L

File ID: SEC32t.D **Column ID:** DB-624

Analyte	Expected	Found	%D	Q
Chloromethane	50	49.23	1.5	
Vinyl chloride	50	44.37	11.3	
1,1-Dichloroethene	50	46.44	7.1	
1,1-Dichloroethane	50	48.96	2.1	
cis-1,2-Dichloroethene	50	48.58	2.8	
Chloroform	50	45.47	9.1	
Carbon tetrachloride	50	55.15	10.3	
Benzene	50	46.32	7.4	
Trichloroethene	50	48.02	4	
1,2-Dichloropropane	50	50.20	0.4	
Toluene	50	47.20	5.6	
Chlorobenzene	50	47.76	4.5	
Ethylbenzene	50	48.18	3.6	
Bromoform	50	56.48	13	
1,1,2,2-Tetrachloroethane	50	50.85	1.7	
==========				
Dibromofluoromethane(SURR)	50	52.51	5	
Toluene d8(SURR)	50	50.69	1.4	
4-Bromofluorobenzene(SURR)	50	51.47	2.9	
1,2-Dichloroethane-d4(SURR)	50	51.18	2.4	

Comments:

AFCEE FORM O-4

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ORGANIC ANALYSES DATA SHEET 5A
CALIBRATION VERIFICATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Column: DB-624

ICV ID: **CCV #1 ID:** CCV724614 **CCV #2 ID:**

File ID: **File ID:** 50CCV33.D **File ID:**

Analyte		ICV		CCV #1		CCV #2		
		RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	Q
Chloromethane	*			0.2059	36.30			*
Vinyl chloride	#			0.2634	18.42			
1,1-Dichloroethene	#			0.5513	4.92			
1,1-Dichloroethane	*			0.6106	3.82			
cis-1,2-Dichloroethene				0.2776	3.64			
Chloroform	#			0.5231	1.69			
Carbon tetrachloride				0.3573	13.35			
Benzene				1.0172	0.43			
Trichloroethene				0.2199	4.12			
1,2-Dichloropropane	#			0.3206	3.10			
Toluene	#			0.6106	2.48			
Chlorobenzene	*			0.8908	1.57			
Ethylbenzene	#			0.4933	1.33			
Bromoform	*			0.1992	9.44			
1,1,2,2-Tetrachloroethane †	*			50.27	0.54			
==========	*	==========	==========	==========	==========	==========	==========	==========
Dibromofluoromethane(SURR)				0.2257	6.20			
Toluene d8(SURR)				0.7934	4.77			
4-Bromofluorobenzene(SURR)				0.8602	0.74			
1,2-Dichloroethane-d4(SURR)				0.0475	3.73			

* SPCCs # CCCs

Comments: Analytes marked with an † are reported from a linear or 2nd order calibration and are using concentration and % drift.
All other analytes are using RF and %D.

AFCEE FORM O-5

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AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANKS

Analytical Method: SW8260B **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Units: UG/L **Method Blank ID:** 050609BLKA34

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT

Analyte	Method Blank	RL	Q
cis-1,2-Dichloroethene	0.23	1	**U**
Benzene	0.091	0.5	**U**
Trichloroethene	0.2	1	**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	110.0	85 - 115	
Toluene d8	109.0	81 - 120	
4-Bromofluorobenzene	106.0	76 - 119	
1,2-Dichloroethane-d4	108.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: SW8260B **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

LCS ID: 052609LCSA34 **Units:** UG/L **Initial Calibration ID:** VMS0305/26/09-1533~M3052609PCT

Analyte	Expected	Found	%R	Control Limits	Q
cis-1,2-Dichloroethene	20	22	110.0	72 - 126	
Benzene	20	21	105.0	81 - 122	
Trichloroethene	20	22	110.0	70 - 127	

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	110.0	85 - 115	
Toluene d8	108.0	81 - 120	
4-Bromofluorobenzene	104.0	76 - 119	
1,2-Dichloroethane-d4	107.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE FORM O-7

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ORGANIC ANALYSES DATA SHEET 8
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Analytical Method: SW8260B **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Parent Field Sample ID: 44MW07W00 **Units:** UG/L **% Solids:** 0

MS ID: 44MW07W00MS **MSD ID:** 44MW07W00SD

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT

Analyte	Parent Sample Result	Spike Added	Spiked Sample Result	%R	Duplicate Spike Added	Duplicate Spiked Sample Result	%R	%RPD	Control Limits %R	Control Limits %RPD	Q
cis-1,2-Dichloroethene		20	21	105.0	20	20	100.0	4.9	72-126	20	
Benzene		20	20	100.0	20	20	100.0	0.0	81-122	20	
Trichloroethene		20	20	100.0	20	20	100.0	0.0	70-127	20	

Comments:

AFCEE FORM O-8

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8A

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : SA Case No.: SAS No: SDG No.: 2512648

Lab File ID (Standard): 50PPBt.D Date Analyzed: 5/26/2009

Instrument ID: VMS03 Time Analyzed: 14:43

GC Column: DB-624 ID: 0.18 (mm)

Matrix: (soil/water) W Heated Purge: (Y/N) No

		IS1 AREA	#	RT	IS2 AREA	#	RT	IS3 AREA	#	RT
	MID CAL STD	1400137		10.55	836383		12.97	2104325		7.24
	UPPER LIMIT	2800274		11.05	1672766		13.47	4208650		7.74
	LOWER LIMIT	700068.5		10.05	418191.5		12.47	1052162.5		6.74
	EPA SAMPLE NO.									
1	052609LCSA34	1373013		10.55	806435		12.96	1983846		7.24
2	44MW07W00MS	1384785		10.55	812477		12.96	2091024		7.24
3	44MW07W00SD	1388877		10.55	805851		12.96	2057287		7.24
4	050609BLKA34	1362328		10.55	771906		12.96	1927872		7.24
5	44MW07W00	1376745		10.55	773942		12.96	2028265		7.24
6	02MW05W00	1352102		10.55	774856		12.96	2022339		7.24
7	02MW05W00FD	1350776		10.55	771268		12.96	2006654		7.24
8	12MW01W00	1358259		10.55	763287		12.96	1982979		7.24
9	EB-052009	1328923		10.55	756338		12.96	1983764		7.24
10	Trip Blank	1331946		10.55	751722		12.96	1963466		7.24

IS1 = Chlorobenzene d5

IS2 = 1,4-Dichlorobenzene-d4

IS3 = Fluorobenzene

UPPER LIMIT = +100%
of internal standard area.
LOWER LIMIT = -50%
of internal standard area

Column used to flag internal standard area values with an asterisk

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FORM VIII

AFCEE
ORGANIC ANALYSES DATA SHEET 9
HOLDING TIMES

Analytical Method: SW8260B **AAB #:** M305260P

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	Q
02MW05W00	20-May-09	22-May-09				26-May-09	14	6	
02MW05W00FD	20-May-09	22-May-09				26-May-09	14	6	
12MW01W00	20-May-09	22-May-09				26-May-09	14	6	
44MW07W00	20-May-09	22-May-09				26-May-09	14	6	
44MW07W00MS	20-May-09	22-May-09				26-May-09	14	6	
44MW07W00SD	20-May-09	22-May-09				26-May-09	14	6	
EB-052009	20-May-09	22-May-09				26-May-09	14	6	
Trip Blank	20-May-09	22-May-09				26-May-09	14	6	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 10
INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Instrument ID#: VMS03 **Column:** DB-624

Field Sample ID/Std ID/ Blank ID/QC Sample ID	File ID	Date Analysis Started	Time Analysis Started	Date Analysis Completed	Time Analysis Completed
BFB724613	BFB31t.D	26-May-09	1126	26-May-09	1144
STD724620	200PPTt.	26-May-09	1149	26-May-09	1207
STD724643	500PPTt.	26-May-09	1215	26-May-09	1233
STD724619	1PPBt.D	26-May-09	1240	26-May-09	1258
STD724642	2PPBt.D	26-May-09	1304	26-May-09	1322
STD724645	5PPBt.D	26-May-09	1329	26-May-09	1347
STD724618	10PPBt.D	26-May-09	1353	26-May-09	1411
STD724621	20PPBt.D	26-May-09	1418	26-May-09	1436
STD724644	50PPBt.D	26-May-09	1443	26-May-09	1501
STD724646	60PPBt.D	26-May-09	1508	26-May-09	1526
STD724647	80PPBt.D	26-May-09	1533	26-May-09	1551
SSC724650	SEC32t.D	26-May-09	1622	26-May-09	1640
BFB724694	BFB32.D	26-May-09	1645	26-May-09	1703
CCV724614	50CCV33.	26-May-09	1708	26-May-09	1726
052609LCSA34	LCS34R.D	26-May-09	1823	26-May-09	1841
44MW07W00MS	64804MS.	26-May-09	1936	26-May-09	1954
44MW07W00SD	64805SD.	26-May-09	2001	26-May-09	2019
050609BLKA34	BLK34.D	26-May-09	2050	26-May-09	2108
44MW07W00	64803.D	26-May-09	2139	26-May-09	2157
02MW05W00	64801.D	26-May-09	2203	26-May-09	2221
02MW05W00FD	64802.D	26-May-09	2227	26-May-09	2245
12MW01W00	64806.D	26-May-09	2251	26-May-09	2309
EB-052009	64807.D	26-May-09	2315	26-May-09	2333
Trip Blank	64808.D	26-May-09	2339	26-May-09	2357

Comments:

AFCEE FORM O-10

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AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Compound:** BFB **Injection Date/Time:** 26-May-09 1126

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE		Q
50	15.0 - 40.0% of mass 95	23.9		
75	30.0 - 60.0% of mass 95	56.2		
95	Base Peak, 100% relative abundance	100		
96	5.0 - 9.0% of mass 95	6.5		
173	Less than 2.0% of mass 174	0	(0)1	
174	50.0 - 100.0% of mass 95	64.6		
175	5.0 - 9.0% of mass 174	4.7	(7.3)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	62.5	(96.8)1	
177	5.0 - 9.0% of mass 176	4.1	(6.6)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

STD724620
STD724643
STD724619
STD724642
STD724645
STD724618
STD724621
STD724644
STD724646
STD724647
SSC724650

AFCEE FORM O-11

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AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS03 **Compound:** BFB **Injection Date/Time:** 26-May-09 1645

Initial Calibration ID: VMS0305/26/09-1533~M3052609PCT

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE		Q
50	15.0 - 40.0% of mass 95	23.3		
75	30.0 - 60.0% of mass 95	56.8		
95	Base Peak, 100% relative abundance	100		
96	5.0 - 9.0% of mass 95	6.9		
173	Less than 2.0% of mass 174	0	(0)1	
174	50.0 - 100.0% of mass 95	68		
175	5.0 - 9.0% of mass 174	4.7	(6.9)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	66.1	(97.3)1	
177	5.0 - 9.0% of mass 176	4.3	(6.5)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

CCV724614
052609LCSA34
44MW07W00MS
44MW07W00SD
050609BLKA34
44MW07W00
02MW05W00
02MW05W00FD
12MW01W00
EB-052009
Trip Blank

AFCEE FORM O-11

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PEL MDLs

020609 1615

MDL STUDY REPORT FORM

PEL Laboratories, Inc.

Method: 8260AFC **Units:** ug/l **Matrix:** W

CAS #	Analyte	Amt Spked	Replicate 1	2	3	4	5	6	7	8	9	STD DEV	MDL	Verification Date
71-43-2	Benzene	0.5	0.55	0.54	0.49	0.55	0.48	0.52	0.58	0.51	0.53	0.0315	0.091	5/16/2008
156-59-2	cis-1,2-Dichloroethene	1	1.2	1.1	1.1	1.2	1.1	1	1	1	1.1	0.0782	0.23	5/16/2008
79-01-6	Trichloroethene	1	1.2	1.1	1.2	1.1	1	1.1	1.1	1.1	1	0.0707	0.2	5/16/2008

020609 1615

Chain of Custody Documentation

020609 1615

2512648 [illegible]

PEL

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page _____ of

Special Handling:

TAT- Indicate Date Needed:

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: CH2M Hill
@ 1027 S Brentwood
St Louis, MO 63117
Ph- 314-335-3043 Fax 314-421-3927

Project Mgr.: _____

Invoice To: per Contract

P.O. No.: _____ RQN: _____

Project No.: _____
Site Name: Whiteman AFB
Location: ~~Missouri~~ State: MO
Sampler(s): W Conway

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9=_____ 10=_____ 11= _____

List preservative code below: 2 2 2

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1=_____ X2=_____ X3=_____

G=Grab C=Composite

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other _____

State specific reporting standards: _____

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Benzene 8260B	TCE 8260B	Cis 1,2 - DCE 8260B							
	02MW05W00	5-20-09	1410	G	GW	3				X	X	X							-01
	02MW05W00FD	5-20-09	1415	G	GW	3				X	X	X							-02
	41MW07W00	5-20-09	1720	G	GW	3				X	X	X							-03
	44MW07W00MS	5-20-09	1720	G	GW	3				X	X	X							-04
	44MW07W00SD	5-20-09	1720	G	GW	3				X	X	X							-05
	12MW01W00	5-20-09	1430	G	GW	3				X	X	X							-06
	EB-052009	5-20-09	2000	G	GW	3				X	X	X							-07
	Trip Blank	5-20-09	—	G	GW	1				X	X	X							-08

5/22/09 [illegible]

☐ E-mail to _____

EDD Format PK2 8260; 2 Trip Blanks rec'd but not listed on COC; TBs added to COC

Relinquished by:	Received by:	Date:	Time:
[illegible] 5-8-09	W Conway	5-18-09	
W Conway 5-20-09	[illegible]	5/22/09	0830

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 2.0

2512648

35

PEL, a Division of Spectrum Analytical, Inc.

pH LOG SHEET

Work Order # 2512648 By JK

Client / Project Name CH2MHILL / Whiteman AFB Date 5/22/09

PEL Sample Number	H_2SO_4 (pH<2)		HNO_3 (pH<2)		NaOH (pH>12)		ZnAC/NaOH (pH>9)		HCl (pH<2) 8260		Other _____ pH _____	
	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH
01									3	<2		
02									↓	↓		
03												
04												
05												
06												
07												
08									2	—		
09												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

W:\Login\pH LOG SHEET REV 4.doc

2512648

2512648

fedex.com 1.800.GoFedEx 1.800.463.3339

FedEx Express US Airbill

FedEx Tracking Number 8697 5102 6027

Form ID No. 0200 — Recipient's Copy

1 From

Date 5-24-09

Sender's Name Wayne Cosmo Phone 414 331-7507

Company CH2M Hill

Address [illegible]

Dept./Floor/Suite/Room

City [illegible] State WI ZIP 63117

2 Your Internal Billing Reference [illegible]

3 To

Recipient's Name Phone 813 899-4207

Company HEL Labs

Recipient's Address 9405 [illegible] Rd

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Dept./Floor/Suite/Room

Address

To request a package be held at a specific FedEx location, print FedEx address here.

City Tampa State FL ZIP 33624

8697 5102 6027

4a Express Package Service — *Packages up to 150 lbs.*

- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate.

* To most locations.

4b Express Freight Service — *Packages over 150 lbs.*

- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation:

** To most locations.

5 Packaging

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

* Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.

- [ ] **SATURDAY Delivery** — Not available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] **HOLD Weekday** at FedEx Location — Not available for FedEx First Overnight.
- [ ] **HOLD Saturday** at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.

- [ ] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging.

- [ ] Cargo Aircraft Only

7 Payment *Bill to:* — Enter FedEx Acct. No. or Credit Card No. below.

- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

Obtain Recip. Acct. No. [ ]

Total Packages	Total Weight	Total Declared Value†	Credit Card Auth.
1	12	$ .00	

†Our liability is limited to $100 unless you declare a higher value. See back for details.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.

- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. *Fee applies.*
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. *Fee applies.*

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fedex.com 1.800.GoFedEx 1.800.463.3339

SAMPLE RECEIPT CONFIRMATION SHEET

Client Information

SDG:	2512648	**Req:**	81110
Client:	CH2M Hill	**Project:**	TO 220
Level:	5	**Date Rec'd:**	5/22/2009 8:30:00 AM
Rec'd via:	Fed-Ex	**Due Date:**	06/05/09

Sample Verification

Samples/Cooler Secure?	Yes	**All Samples on COC accounted For?**	Yes
Temperature of Samples(Celsius)	2.0C	**All Samples Rec'd Intact?**	Yes
pH Verified?	Yes	**Sample Vol. Stuff. For Analysis?**	Yes
pH WNL?	Yes	**Samples Rec'd W/I Hold Time?**	Yes
Soil Origin (Domestic/Foreign):		**Are All Samples to be Analyzed?**	Yes
Site Location/Project on COC?	Yes	**Correct Sample Containers?**	Yes
Client Project # on COC?	Yes	**COC Comments written on COC?**	Yes
Project Mgr. Indicated on COC?	Yes	**Samplers Initials on COC?**	Yes
COC relinquished/Dated by Client?	Yes	**Sample Date/Time Indicated?**	Yes
COC Received/Dated by PEL?	Yes	**TAT Requested:**	STD
Specific Subcontract Indicated?	No	**Client Requests Verbal Results?**	No
Samples Received By	Fed-Ex	**Client Requests Faxed Results?**	No
PEL to Conduct ALL Analyses?	Yes		

PEER REVIEW

Client: CH2M Hill

WONo: 2512648 Profile Name: Whiteman Profile #: 81110

MATRIX W

Sample #	Bottle	Parameter		Check	Received	Date
01	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:13:16 AM
01	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:14:55 AM
01	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:01 AM
01	002	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:12:51 PM
01	002	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:15:00 PM
02	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:05 AM
02	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:07 AM
02	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:10 AM
02	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:12:57 PM
02	001	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:15:05 PM
03	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:12 AM
03	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:13 AM
03	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:15 AM
03	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:03 PM
03	001	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:14:54 PM
04	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:17 AM
04	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:19 AM
04	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:21 AM
04	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:42 PM
04	003	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:48 PM
04	001	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:16:26 PM
04	003	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:16:31 PM
05	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:23 AM
05	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:25 AM

05	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:29 AM
05	003	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:54 PM
05	002	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:14:00 PM
05	003	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:16:39 PM
05	002	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:16:45 PM
06	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:31 AM
06	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:33 AM
06	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:34 AM
06	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:10 PM
06	001	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:15:11 PM
07	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:36 AM
07	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:38 AM
07	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:40 AM
07	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:16 PM
07	001	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:15:17 PM
08	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:43 AM
08	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	5/22/2009 11:15:44 AM
08	002	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	5/26/2009 2:13:27 PM
08	002	8260AFC	Volatile Organic Compounds	In	Marcell Stephens	5/27/2009 1:15:22 PM

Addendum

020609 1615

Letter of Acceptance

Customer Name: CH2M Hill

Date and Time Received: 5/22/2009 8:30:00 AM

Date to be Reported: 6/12/2009

Laboratory Submission Number/SDG: 2512648

Get Detailed Analyte List here: www.pelab.com/webdms/Default.asp?LoaSDG=2512648

Project: Whiteman AFB

Samples: The submission consisted of 8 samples, including QC, with sample identification shown in the attached data tables.

Tests: The Samples will be analyzed for EPA methods: 8260AFC.

Sample Custody/COC discrepancies:

None.

Notes:

None.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are for the exclusive use of the client to whom they are addressed. Our letters and reports apply to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar materials

Log-in Report

Level: AFCEE

Total of: 8 analyses on 8 samples (including QC) *26-May-09*

Report/SDG #: 2512648

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
02MW05W00	251264801		GW	5/20/2009 2:10:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
02MW05W00FD	251264802		GW	5/20/2009 2:15:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
44MW07W00	251264803		GW	5/20/2009 5:20:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
44MW07W00MS	251264804		WQ	5/20/2009 5:20:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
44MW07W00SD	251264805		WQ	5/20/2009 5:20:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
12MW01W00	251264806		GW	5/20/2009 2:30:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

Report/SDG #: 2512648

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
EB-052009	251264807		WQ	5/20/2009 8:00:00 PM	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
Trip Blank	251264808		WQ	5/20/2009	5/22/2009 8:30:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

PEL a division of Spectrum Analytical, Inc.

featuring HANIBAL TECHNOLOGY

Customer Name:	CH2M Hill
Date and Time Received:	9/3/2009 11:35:40 AM
Date Reported:	9/17/2009
Laboratory Submission Number/SDG:	2513459
Project:	WAFB SS30 LTM

Samples: The submission consisted of 6 samples with sample identification shown in the attached data tables.

Tests: The samples were analyzed for the methods listed on the attached table of contents.

Results: See the attached data tables for results.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Respectfully Submitted,

Brian Spann
Laboratory Director
PEL a division of Spectrum Analytical, Inc.
featuring Hanibal Technology

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are f the exclusive use of the client to whom they are addressed. Our Letters and reports apply to the sample tested and are not necessarily indicative o the qualities of apparently identical or similar materials

8405 Benjamin Road, Suite A• Tampa, Florida 33634
813-888-9507• FAX: 813-889-7128
Website: www.pelab.com

Organics **3**
METHOD 8260 GC/ MS VOLATILE ORGANICS 5
PEL MDLs 31

Chain of Custody Documentation **33**

Addendum **40**

EXECUTIVE SUMMARY - Detection Highlights

2513459

SAMPLE ID: 30MW18W00DL1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Carbon tetrachloride	160	5.0	UG/L	SW8260B

SAMPLE ID: 30MW20W00

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Carbon tetrachloride	75	1.0	UG/L	SW8260B

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Afcee Data Qualifiers

J The analyte was positively identified, the quantitation is an estimation

U The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

F The analyte was positively identified but the associated numerical value is below the RL.

R The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

B The analyte was found in an associated blank, as well as in the sample.

M A matrix effect was present.

S To be applied to all field screening data.

T Tentatively identified compound (using GC/MS).

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Organics

170909 1715

Organic Sample ID Qualifiers

The qualifiers that may be appended to the lab sample ID and/or the client sample ID for organic analysis are defined below:

DL Diluted reanalysis. Indicates that the results of the original analysis of the sample contained compounds that exceeded the calibration range. The sample was diluted and reanalyzed. May be followed by a digit to indicate multiple dilutions of the sample. The results of more than one diluted reanalysis may be reported.

R Reanalysis. The extract was reanalyzed without re-extraction. The "R" is not used if the sample was also re-extracted. May be followed by a digit to indicate multiple reanalysis of the sample at the same dilution.

RE Re-extracted. The extract was reanalyzed with re-extraction. May be followed by a digit to indicate multiple re-extraction of the same sample at the same dilution.

MS Matrix spike (may be followed by a digit to indicate multiple matrix within a sample set).

SD Matrix spike duplicate (may be followed by a digit to indicate multiple matrix spike duplicate within a sample set).

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GC/MS VOLATILE ORGANICS

METHOD 8260

170909 1715

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2513459

Client: CH2M Hill

I. RECEIPT

Exceptions encountered upon receipt are addressed in the Sample Receipt Confirmation Report, included with the Chain-of-Custody documentation, or communication included in the addendum with this package.

II. HOLDING TIMES

A. Sample Preparation: All holding times were met.

B. Sample Analysis: All holding times were met.

III. METHODS

EPA 8260B/SW846

IV. PREPARATION

Water samples were prepared by SW846/5030 for EPA8260B volatiles analysis. All aspects of sample preparation proceeded without exception.

V. ANALYSIS

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Surrogates:

All acceptance criteria were met.

D. Spikes:

1. Laboratory Control Spikes (LCS)

An LCS/LCSD set was analyzed. All percent recovery and relative percent difference (RPD) criteria were met.

2. Matrix Spike/Matrix Spike Duplicate Samples (MS/SD)

A client requested MS/SD set was analyzed. All percent recovery and relative percent difference (RPD) criteria were met.

E. Internal Standards:

All acceptance criteria were met.

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2513459

Client: CH2M Hill

F. Samples:

Sample analysis proceeded normally. Client specified reporting limits were used.

Sample 30MW18W00 required a 5X dilution due to a high concentration of the following analyte: Carbon tetrachloride. Both full and diluted runs are reported.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and PEL, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as, verified by the following signature.

SIGNED: **DATE: 09/15/2009**

W:\Narratives\Vols\2513\2513459_8260AFC.doc

AFCEE
ORGANIC ANALYSES DATA PACKAGE

Analytical Method: SW8260B **SDG #:** 2513459

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Base/Command: WAFB SS30 LTM **Prime Contractor:** CH2M Hill

Field Sample ID	Lab Sample ID
30MW19W00	251345901
30MW19WMS	251345902
30MW19WMSD	251345903
30MW18W00	251345904
30MW18W00DL1	251345904DL1
30MW20W00	251345905
TB-090209	251345906

Comments:

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager's designee, as verified by the following signature.

Signature: Mark Cortman for Name: Brian Spann

Date: 9/17/09 Title: Laboratory Director

AFCEE FORM O-1

170909 1715

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW19W00 **Lab Sample ID:** 251345901 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	0.18	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	94.4	85 - 115	
Toluene d8	95.2	81 - 120	
4-Bromofluorobenzene	91.4	76 - 119	
1,2-Dichloroethane-d4	93.6	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW19WMS **Lab Sample ID:** 251345902 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**20**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	114.0	85 - 115	
Toluene d8	110.0	81 - 120	
4-Bromofluorobenzene	109.0	76 - 119	
1,2-Dichloroethane-d4	109.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW19WMSD **Lab Sample ID:** 251345903 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**19**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	111.0	85 - 115	
Toluene d8	109.0	81 - 120	
4-Bromofluorobenzene	107.0	76 - 119	
1,2-Dichloroethane-d4	111.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW18W00 **Lab Sample ID:** 251345904 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**170**	1		**J**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	112.0	85 - 115	
Toluene d8	107.0	81 - 120	
4-Bromofluorobenzene	105.0	76 - 119	
1,2-Dichloroethane-d4	112.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW18W00DL1 **Lab Sample ID:** 251345904DL1 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.9	5	**160**	5		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	110.0	85 - 115	
Toluene d8	104.0	81 - 120	
4-Bromofluorobenzene	102.0	76 - 119	
1,2-Dichloroethane-d4	110.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW20W00 **Lab Sample ID:** 251345905 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**75**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	113.0	85 - 115	
Toluene d8	107.0	81 - 120	
4-Bromofluorobenzene	105.0	76 - 119	
1,2-Dichloroethane-d4	111.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: TB-090209 **Lab Sample ID:** 251345906 **Matrix:** W

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 03-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	0.18	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	113.0	85 - 115	
Toluene d8	111.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	113.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

2A

WATER VOLATILE ORGANIC SURROGATE RECOVERY

Lab Name: PEL, Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : PEL Case No. SAS No: SDG NO.: 2513459

Column(1): DB-624 ID: 0.18 (mm)

EPA Sample NO.	S1 #	S2 #	S3 #	S4 #	S5 #	S6 #	TOT OUT
0912BLK52	113.0	108.0	108.0	112.0			0
0912LCS51	106.0	105.0	101.0	103.0			0
0912LCS51D	114.0	110.0	108.0	112.0			0
30MW18W00	112.0	107.0	105.0	112.0			0
30MW18W00DL1	110.0	104.0	102.0	110.0			0
30MW19W00	94.4	95.2	91.4	93.6			0
30MW19WMS	114.0	110.0	109.0	109.0			0
30MW19WMSD	111.0	109.0	107.0	111.0			0
30MW20W00	113.0	107.0	105.0	111.0			0
TB-090209	113.0	111.0	108.0	113.0			0

Control Limits

S1	=	Dibromofluoromethane	85 - 115
S2	=	Toluene d8	81 - 120
S3	=	4-Bromofluorobenzene	76 - 119
S4	=	1,2-Dichloroethane-d4	72 - 119

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out
Control limit source: (lab/method) AFCEE

Form II

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ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Date of Initial calibration:** 11-Sep-09

Initial Calibration ID: VMS0509/11/09-1303~M5091109C **Concentration Units:** UG/L

Column ID: DB-624

Analyte		1ppbD.D		2ppb.D		5ppb.D		10ppbD.D		20ppb.D	
		Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5
Chloromethane	*	1	0.314	2	0.204	5	0.292	10	0.277	20	0.301
Vinyl chloride	#	1	0.279	2	0.251	5	0.229	10	0.235	20	0.231
1,1-Dichloroethene	#	1	0.347	2	0.383	5	0.313	10	0.309	20	0.347
1,1-Dichloroethane	*	1	0.562	2	0.680	5	0.558	10	0.575	20	0.621
Chloroform	#	1	0.553	2	0.593	5	0.527	10	0.544	20	0.605
Carbon tetrachloride		1	0.342	2	0.395	5	0.351	10	0.350	20	0.422
1,2-Dichloropropane	#	1	0.307	2	0.354	5	0.309	10	0.321	20	0.355
Toluene	#	1	0.733	2	0.807	5	0.717	10	0.767	20	0.863
Chlorobenzene	*	1	1.158	2	1.307	5	1.150	10	1.215	20	1.327
Ethylbenzene	#	1	0.631	2	0.707	5	0.625	10	0.675	20	0.739
Bromoform	*	1	0.132	2	0.185	5	0.168	10	0.152	20	0.207
1,1,2,2-Tetrachloroethane	*	1	0.861	2	1.022	5	0.872	10	0.841	20	1.013
==========*											
Dibromofluoromethane(SUR						5	0.235	10	0.273	20	0.263
Toluene d8(SURR)						5	0.861	10	1.050	20	1.019
4-Bromofluorobenzene(SUR						5	0.903	10	1.066	20	1.003
1,2-Dichloroethane-d4(SUR						5	0.056	10	0.065	20	0.064

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS05
Date of Initial calibration: 11-Sep-09
Initial Calibration ID: VMS0509/11/09-1303~M5091109C
Concentration Units: UG/L
Column ID: DB-624

Analyte		50ppb.D		60ppb.D		80ppb.D		500pptD.D		200pptD.D	
		Std 6	RF 6	Std 7	RF 7	Std 8	RF 8	Std 9	RF 9	Std 10	RF 10
Chloromethane	*	50	0.294	60	0.287	80	0.299				
Vinyl chloride	#	50	0.234	60	0.248	80	0.256	0.5	0.213		
1,1-Dichloroethene	#	50	0.309	60	0.320	80	0.304	0.5	0.343		
1,1-Dichloroethane	*	50	0.544	60	0.564	80	0.543				
Chloroform	#	50	0.528	60	0.543	80	0.524	0.5	0.596	0.2	0.697
Carbon tetrachloride		50	0.376	60	0.398	80	0.389	0.5	0.364		
1,2-Dichloropropane	#	50	0.313	60	0.324	80	0.318	0.5	0.316		
Toluene	#	50	0.761	60	0.794	80	0.777	0.5	0.821		
Chlorobenzene	*	50	1.164	60	1.179	80	1.124	0.5	1.248		
Ethylbenzene	#	50	0.655	60	0.675	80	0.661	0.5	0.669		
Bromoform	*	50	0.207	60	0.216	80	0.218				
1,1,2,2-Tetrachloroethane	*	50	0.896	60	0.913	80	0.885	0.5	1.025	0.2	1.180
==========*											
Dibromofluoromethane(SUR		50	0.253	60	0.267	80	0.266				
Toluene d8(SURR)		50	0.983	60	1.046	80	1.052				
4-Bromofluorobenzene(SUR		50	0.972	60	1.049	80	1.069				
1,2-Dichloroethane-d4(SUR		50	0.061	60	0.066	80	0.066				

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS05
Date of Initial calibration: 11-Sep-09
Initial Calibration ID: VMS0509/11/09-1303~M5091109C
Concentration Units: UG/L
Column ID: DB-624

Analyte		Curve Type	Average RF	% RSD	mean %RSD	r	COD	Q
Chloromethane	*	AVRG	0.28	11.88	7.05			
Vinyl chloride	#	AVRG	0.24	7.98	7.05			
1,1-Dichloroethene	#	AVRG	0.33	7.93	7.05			
1,1-Dichloroethane	*	AVRG	0.58	8.06	7.05			
Chloroform	#	AVRG	0.57	9.40	7.05			
Carbon tetrachloride		AVRG	0.38	7.12	7.05			
1,2-Dichloropropane	#	AVRG	0.32	5.63	7.05			
Toluene	#	AVRG	0.78	5.76	7.05			
Chlorobenzene	*	AVRG	1.21	5.96	7.05			
Ethylbenzene	#	AVRG	0.67	5.28	7.05			
Bromoform	*	LINR	0.19			0.999		
1,1,2,2-Tetrachloroethane	*	AVRG	0.95	11.19	7.05			
==========*								
Dibromofluoromethane(SUR		AVRG	0.26	5.27	7.05			
Toluene d8(SURR)		AVRG	1.00	7.38	7.05			
4-Bromofluorobenzene(SUR		AVRG	1.01	6.46	7.05			
1,2-Dichloroethane-d4(SUR		AVRG	0.06	6.30	7.05			

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

2nd Source ID: SSC757895 **Concentration Units:** UG/L

File ID: SEC52.D **Column ID:** DB-624

Analyte	Expected	Found	%D	Q
Chloromethane	50	53.72	7.4	
Vinyl chloride	50	50.66	1.3	
1,1-Dichloroethene	50	47.63	4.7	
1,1-Dichloroethane	50	47.93	4.1	
Chloroform	50	47.07	5.9	
Carbon tetrachloride	50	51.80	3.6	
1,2-Dichloropropane	50	49.47	1.1	
Toluene	50	50.92	1.8	
Chlorobenzene	50	49.06	1.9	
Ethylbenzene	50	50.32	0.6	
Bromoform	50	45.72	8.6	
1,1,2,2-Tetrachloroethane	50	45.40	9.2	
==========				
Dibromofluoromethane(SURR)	50	50.73	1.5	
Toluene d8(SURR)	50	51.64	3.3	
4-Bromofluorobenzene(SURR)	50	50.07	0.1	
1,2-Dichloroethane-d4(SURR)	50	50.82	1.6	

Comments:

AFCEE FORM O-4

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ORGANIC ANALYSES DATA SHEET 5A
CALIBRATION VERIFICATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Column: DB-624

ICV ID: **CCV #1 ID:** CCV757890 **CCV #2 ID:**

File ID: **File ID:** 50CCV52.D **File ID:**

Analyte		ICV		CCV #1		CCV #2		
		RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	Q
Chloromethane	*			0.325	14.65			
Vinyl chloride	#			0.2584	6.83			
1,1-Dichloroethene	#			0.3217	2.72			
1,1-Dichloroethane	*			0.5716	1.61			
Chloroform	#			0.557	2.44			
Carbon tetrachloride				0.3879	3.01			
1,2-Dichloropropane	#			0.3298	1.75			
Toluene	#			0.8122	3.81			
Chlorobenzene	*			1.2253	1.45			
Ethylbenzene	#			0.6885	2.64			
Bromoform †	*			46.4	7.20			
1,1,2,2-Tetrachloroethane	*			0.9111	4.16			
==========*								
Dibromofluoromethane(SURR)				0.279	7.60			
Toluene d8(SURR)				1.0944	9.25			
4-Bromofluorobenzene(SURR)				1.0629	5.20			
1,2-Dichloroethane-d4(SURR)				0.0672	6.36			

* SPCCs # CCCs

Comments: Analytes marked with an † are reported from a linear or 2nd order calibration and are using concentration and % drift. All other analytes are using RF and %D.

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AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANKS

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Units: UG/L **Method Blank ID:** 0912BLK52

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Analyte	Method Blank	RL	Q
Carbon tetrachloride	0.18	1	**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	113.0	85 - 115	
Toluene d8	108.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	112.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

LCS ID: 0912LCS51 **Units:** UG/L **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Analyte	Expected	Found	%R	Control Limits	Q
Carbon tetrachloride	20	24	120.0	66 - 138	

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	106.0	85 - 115	
Toluene d8	105.0	81 - 120	
4-Bromofluorobenzene	101.0	76 - 119	
1,2-Dichloroethane-d4	103.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE FORM O-7

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ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

LCS ID: 0912LCS51D **Units:** UG/L **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Analyte	Expected	Found	%R	Control Limits	Q	RPD	Max RPD	Q
Carbon tetrachloride	20	22	110.0	66 - 138		8.7	20	

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	114.0	85 - 115	
Toluene d8	110.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	112.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE FORM O-7

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AFCEE
ORGANIC ANALYSES DATA SHEET 8
MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Parent Field Sample ID: 30MW19W00 **Units:** UG/L **% Solids:** 0

MS ID: 30MW19WMS **MSD ID:** 30MW19WMSD

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Analyte	Parent Sample Result	Spike Added	Spiked Sample Result	%R	Duplicate Spike Added	Duplicate Spiked Sample Result	%R	%RPD	Control Limits %R	Control Limits %RPD	Q
Carbon tetrachloride		20	20	100.0	20	19	95.0	5.1	66-138	20	

Comments:

AFCEE FORM O-8

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8A

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : SA Case No.: SAS No: SDG No.: 2513459

Lab File ID (Standard): 50ppb.D Date Analyzed: 9/11/2009

Instrument ID: VMS05 Time Analyzed: 9:27

GC Column: DB-624 ID: 0.18 (mm)

Matrix: (soil/water) W Heated Purge: (Y/N) No

		IS1 AREA	#	RT	IS2 AREA	#	RT	IS3 AREA	#	RT
	MID CAL STD	606612		9.29	338925		11.61	875335		6.10
	UPPER LIMIT	1213224		9.79	677850		12.11	1750670		6.60
	LOWER LIMIT	303306		8.79	169462.5		11.11	437667.5		5.60
	EPA SAMPLE NO.									
1	0912LCS51	538607		9.29	298420		11.61	770381		6.09
2	0912LCS51D	527315		9.29	292876		11.61	754220		6.09
3	0912BLK52	510665		9.29	279697		11.61	738305		6.09
4	30MW19W00	544890		9.29	291132		11.61	775386		6.10
5	TB-090209	528826		9.29	289602		11.61	762961		6.10
6	30MW20W00	503862		9.29	278350		11.61	737447		6.09
7	30MW18W00DL1	509819		9.29	281478		11.61	748695		6.09
8	30MW18W00	516529		9.29	281717		11.61	750558		6.10
9	30MW19WMS	524386		9.29	286429		11.61	743022		6.10
10	30MW19WMSD	514741		9.29	281497		11.61	731612		6.10

IS1 = Chlorobenzene d5

IS2 = 1,4-Dichlorobenzene-d4

IS3 = Fluorobenzene

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = -50% of internal standard area

Column used to flag internal standard area values with an asterisk

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FORM VIII

AFCEE
ORGANIC ANALYSES DATA SHEET 9
HOLDING TIMES

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	Q
30MW18W00	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
30MW18W00DL1	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
30MW19W00	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
30MW19WMS	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
30MW19WMSD	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
30MW20W00	02-Sep-09	03-Sep-09				12-Sep-09	14	10	
TB-090209	02-Sep-09	03-Sep-09				12-Sep-09	14	10	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 10
INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Instrument ID#: VMS05 **Column:** DB-624

Field Sample ID/Std ID/ Blank ID/QC Sample ID	File ID	Date Analysis Started	Time Analysis Started	Date Analysis Completed	Time Analysis Completed
BFB757872	BFB51.D	11-Sep-09	0606	11-Sep-09	0624
STD757888	2ppb.D	11-Sep-09	0751	11-Sep-09	0809
STD757892	5ppb.D	11-Sep-09	0815	11-Sep-09	0833
STD757880	20ppb.D	11-Sep-09	0903	11-Sep-09	0921
STD757891	50ppb.D	11-Sep-09	0927	11-Sep-09	0945
STD757893	60ppb.D	11-Sep-09	0951	11-Sep-09	1009
STD757894	80ppb.D	11-Sep-09	1015	11-Sep-09	1033
STD757879	200pptD.	11-Sep-09	1151	11-Sep-09	1209
STD757889	500pptD.	11-Sep-09	1215	11-Sep-09	1233
STD757878	1ppbD.D	11-Sep-09	1239	11-Sep-09	1257
STD757877	10ppbD.D	11-Sep-09	1303	11-Sep-09	1321
SSC757895	SEC52.D	11-Sep-09	1417	11-Sep-09	1435
BFB757873	BFB51.D	12-Sep-09	0736	12-Sep-09	0754
CCV757890	50CCV52.	12-Sep-09	0824	12-Sep-09	0842
0912LCS51	LCS51.D	12-Sep-09	0849	12-Sep-09	0907
0912LCS51D	LCS51D.	12-Sep-09	0913	12-Sep-09	0931
0912BLK52	BLK52.D	12-Sep-09	1001	12-Sep-09	1019
30MW19W00	45901.D	12-Sep-09	1027	12-Sep-09	1045
TB-090209	45906.D	12-Sep-09	1050	12-Sep-09	1108
30MW20W00	45905.D	12-Sep-09	1114	12-Sep-09	1132
30MW18W00DL1	45904D.D	12-Sep-09	1138	12-Sep-09	1156
30MW18W00	45904.D	12-Sep-09	1202	12-Sep-09	1220
30MW19WMS	45902MS.	12-Sep-09	1825	12-Sep-09	1843
30MW19WMSD	45903MS	12-Sep-09	1849	12-Sep-09	1907

Comments:

AFCEE FORM O-10

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2513459

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Compound:** BFB **Injection Date/Time:** 11-Sep-09 0606

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	Q
50	15.0 - 40.0% of mass 95	17.1	
75	30.0 - 60.0% of mass 95	46.6	
95	Base Peak, 100% relative abundance	100	
96	5.0 - 9.0% of mass 95	7	
173	Less than 2.0% of mass 174	0 (0)1	
174	50.0 - 100.0% of mass 95	69.5	
175	5.0 - 9.0% of mass 174	5.4 (7.8)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	66.9 (96.3)1	
177	5.0 - 9.0% of mass 176	4.5 (6.7)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

STD757888
STD757892
STD757880
STD757891
STD757893
STD757894
STD757879
STD757889
STD757878
STD757877
SSC757895

AFCEE FORM O-11

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AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Compound:** BFB **Injection Date/Time:** 12-Sep-09 0736

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE		Q
50	15.0 - 40.0% of mass 95	16.5		
75	30.0 - 60.0% of mass 95	45.6		
95	Base Peak, 100% relative abundance	100		
96	5.0 - 9.0% of mass 95	6.7		
173	Less than 2.0% of mass 174	0	(0)1	
174	50.0 - 100.0% of mass 95	76.7		
175	5.0 - 9.0% of mass 174	5.8	(7.5)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	74.5	(97)1	
177	5.0 - 9.0% of mass 176	5	(6.7)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

CCV757890
0912LCS51
0912LCS51D
0912BLK52
30MW19W00
TB-090209
30MW20W00
30MW18W00DL1
30MW18W00
30MW19WMS
30MW19WMSD

AFCEE FORM O-11

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2513459

PEL MDLs

170909 1715

MDL STUDY REPORT FORM

PEL Laboratories, Inc.

Method: 8260AFC **Units:** ug/l **Matrix:** W

CAS #	Analyte	Amt Spked	Replicate 1	2	3	4	5	6	7	8	9	STD DEV	MDL	Verification Date
56-23-5	Carbon tetrachloride	1	0.99	1	1	0.87	1	0.88	1	0.88	1	0.061	0.18	6/5/2009

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Chain of Custody Documentation

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PEL

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1 2513459 KC

Special Handling:

TAT- Indicate Date Needed:

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Mark Fesler
CH2M HILL, Inc.
2525 Airpark Dr.
Redding, CA 96001
530-229-3273
Project Mgr.: Tiffany Swoveland Chapman

Invoice To: Contract Rate

P.O. No.: RQN:

Project No.: 375430.06.90.01.02
Site Name: WAFB 5530 LTM
Location: WAFB State: MO
Sampler(s): T. Swierczek

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= 10= 11=

List preservative code below: 2

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
~~X1~~ TB= Trip Blank X2= X3=

G=Grab C=Composite

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other

State specific reporting standards:

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Carbon Tetrachloride
01	30MW19W00	09/02/09	1234	G	GW	3				X
02	30MW19MS		1234	G	GW	3				X
03	30MW19MSD		1234	G	GW	3				X
04	30MW18W00		1414	G	GW	3				X
05	30MW20W00		1600	G	GW	3				X
06	TB-090209		1615		TB	1				X

☒ E-mail to mark.fesler@ch2m.com

EDD Format

pH <2

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 4.2

Relinquished by:	Received by:	Date:	Time:
8-20-09			
		09/02/09	1700
		9/3/09	1015

2513459

34

PEL, a Division of Spectrum Analytical, Inc.

pH LOG SHEET

Work Order # 2513459 By KC

Client / Project Name Whiteman Date 9/3/09

PEL Sample Number	H_2SO_4 (pH<2)		HNO_3 (pH<2)		NaOH (pH>12)		ZnAC/NaOH (pH>9)		HCl (pH<2)		Other _____ pH _____	
	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH
01									3	<2		
02									↓	↓		
03												
04												
05												
06									1			
07												
08												
09												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

W:\Login\pH LOG SHEET REV 4.doc

2513459

FedEx Express *US Airbill*

8704 6755 0052

0200 Form ID No.

FedEx Retrieval Copy

1 From

Date 09/02/09 Sender's FedEx Account Number 1001778620

Sender's Name T. Swierczek Phone 618 550-1241

Company CHEM HALL

Address 1034 S. Brentwood Blvd. 2300 Dept./Floor/Suite/Room

City Richmond Heights State MO ZIP 63117

2 Your Internal Billing Reference 375430.06.90.01.02 / 42719

3 To

Recipient's Name Sample Receiving Phone 813 888-9507

Company PEL

1 ☐ HOLD Weekday Print FedEx location address below. NOT available for FedEx First Overnight.

31 ☐ HOLD Saturday Print FedEx location address below. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Address 8405 Benjamin Rd.

We cannot deliver to P.O. boxes or P.O. ZIP codes. Dept./Floor/Suite/Room

Address

Print FedEx location address here if a HOLD option is selected.

City Tampa State FL ZIP 33634

8704 6755 0052

4a Express Package Service • To most locations. *Packages up to 150 lbs.*

1 ☒ FedEx Priority Overnight Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

5 ☐ FedEx Standard Overnight Next business afternoon.* Saturday Delivery NOT available.

6 ☐ FedEx First Overnight Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.

3 ☐ FedEx 2Day Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

20 ☐ FedEx Express Saver Third business day.* Saturday Delivery NOT available.

4b Express Freight Service •• To most locations. *Packages over 150 lbs.*

7 ☐ FedEx 1Day Freight Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

FedEx 1Day Freight Booking No.

8 ☐ FedEx 2Day Freight Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

83 ☐ FedEx 3Day Freight Third business day.** Saturday Delivery NOT available.

5 Packaging • Declared value limit $500.

6 ☐ FedEx Envelope* 2 ☐ FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak. 3 ☐ FedEx Box 4 ☐ FedEx Tube 1 ☒ Other

6 Special Handling and Delivery Signature Options

3 ☐ **SATURDAY DELIVERY**

☐ No Signature Required Package may be left without obtaining a signature for delivery.

10 ☐ Direct Signature Someone at recipient's address may sign for delivery. *Fee applies.*

34 ☐ Indirect Signature If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?

One box must be checked.

☒ No 4 ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. 6 ☐ Dry Ice Dry ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below. Obtain Recip. Acct. No. ☐

1 ☒ Sender Acct. No. in Section 1 will be billed. 2 ☐ Recipient 3 ☐ Third Party 4 ☐ Credit Card 5 ☐ Cash/Check

Total Packages 1 Total Weight 15 lbs. Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

554

Rev. Date 2/09•Part #158281•©1994–2009 FedEx•PRINTED IN U.S.A. SRY

fedex.com 1.800.GoFedEx 1.800.463.3339

fedex.com 1.800.GoFedEx 1.800.463.3339

2513459

SAMPLE RECEIPT CONFIRMATION SHEET

Client Information

SDG:	2513459	**Req:**	81110
Client:	CH2M Hill	**Project:**	TO 220
Level:	5	**Date Rec'd:**	9/3/2009 11:35:40 AM
Rec'd via:	Fed-Ex	**Due Date:**	09/17/09

Sample Verification

Samples/Cooler Secure?	Yes	**All Samples on COC accounted For?**	Yes
Temperature of Samples(Celsius)	4.2C	**All Samples Rec'd Intact?**	Yes
pH Verified?	Yes	**Sample Vol. Stuff. For Analysis?**	Yes
pH WNL?	Yes	**Samples Rec'd W/I Hold Time?**	Yes
Soil Origin (Domestic/Foreign):		**Are All Samples to be Analyzed?**	Yes
Site Location/Project on COC?	Yes	**Correct Sample Containers?**	Yes
Client Project # on COC?	Yes	**COC Comments written on COC?**	Yes
Project Mgr. Indicated on COC?	Yes	**Samplers Initials on COC?**	Yes
COC relinquished/Dated by Client?	Yes	**Sample Date/Time Indicated?**	Yes
COC Received/Dated by PEL?	Yes	**TAT Requested:**	STD
Specific Subcontract Indicated?	No	**Client Requests Verbal Results?**	No
Samples Received By	Fed-Ex	**Client Requests Faxed Results?**	No
PEL to Conduct ALL Analyses?	Yes		

PEER REVIEW:

Client: CH2M Hill

WONo: 2513459 Profile Name: Whiteman Profile #: 81110

MATRIX W

Sample #	Bottle	Parameter		Check	Received	Date
01	002	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:55:50 AM
01	003	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:55:53 AM
01	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:55:57 AM
01	002	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/4/2009 9:06:13 AM
01	002	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/4/2009 10:05:21 AM
01	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	9/12/2009 10:09:40 AM
01	001	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:07:53 PM
02	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:00 AM
02	002	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:04 AM
02	003	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:07 AM
02	001	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/4/2009 9:06:17 AM
02	001	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/4/2009 9:06:30 AM
02	003	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:28 AM
02	003	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:09:12 PM
03	003	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:11 AM
03	002	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:14 AM
03	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:18 AM
03	001	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:33 AM
03	001	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 3:05:36 PM
04	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:22 AM
04	002	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:25 AM
04	003	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:29 AM
04	001	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/4/2009 9:06:22 AM
04	001	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/4/2009 10:05:48 AM

04	003	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:36 AM
04	003	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:04 PM
05	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:32 AM
05	002	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:36 AM
05	003	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:39 AM
05	001	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/4/2009 9:06:25 AM
05	001	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/4/2009 10:05:51 AM
05	002	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	9/12/2009 10:10:21 AM
05	002	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:00 PM
06	001	8260AFC	Volatile Organic Compounds	In	Kevin Crandall	9/3/2009 11:56:43 AM
06	001	8260AFC	Volatile Organic Compounds	Out	Marcell Stephens	9/12/2009 10:09:46 AM
06	001	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:07:56 PM

Addendum

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Letter of Acceptance

Customer Name: CH2M Hill

Date and Time Received: 9/3/2009 11:35:40 AM

Date to be Reported: 9/24/2009

Laboratory Submission Number/SDG: 2513459

Get Detailed Analyte List here: www.pelab.com/webdms/Default.asp?LoaSDG=2513459

Project: WAFB SS30 LTM

Samples: The submission consisted of 6 samples, including QC, with sample identification shown in the attached data tables.

Tests: The Samples will be analyzed for EPA methods: 8260AFC.

Sample Custody/COC discrepancies:

None.

Notes:

None.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are for the exclusive use of the client to whom they are addressed. Our letters and reports apply to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar materials

Log-in Report

Level: AFCEE

Total of: 6 analyses on 6 samples (including QC) *04-Sep-09*

Report/SDG #: 2513459

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW19W00	251345901		W	9/2/2009 12:34:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW19WMS	251345902		W	9/2/2009 12:34:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW19WMSD	251345903		W	9/2/2009 12:34:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW18W00	251345904		W	9/2/2009 2:14:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW20W00	251345905		W	9/2/2009 4:00:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
TB-090209	251345906		W	9/2/2009 4:15:00 PM	9/3/2009 11:35:40 AM

Method		
8260AFC	Volatile Organic Compounds	8260

John Heyman

From: John Heyman
Sent: Tuesday, September 15, 2009 6:32 PM
To: 'Mark.Fesler@CH2M.com'
Subject: FW: 2513459 ch2m hill whiteman 8260

Good afternoon.

From: Kevin Siuda
Sent: Tuesday, September 15, 2009 9:18 AM
To: Project Managers
Cc: Lisa Pelo
Subject: 2513459 ch2m hill whiteman 8260

Please notify the PC of the following:

Sample 30MW18W00 required a 5X dilution due to high concentration of the following analyte: Carbon tetrachloride. Both full and diluted runs are reported

Kevin Siuda
Volatiles Analytical Chemist, Tampa Division
Spectrum Analytical Featuring Hanibal Technology
813-888-9507 x254 Office

PEL a division of Spectrum Analytical, Inc.

featuring HANIBAL TECHNOLOGY

Customer Name:	CH2M Hill
Date and Time Received:	9/4/2009 10:05:00 AM
Date Reported:	9/17/2009
Laboratory Submission Number/SDG:	2513473
Project:	WAFB SS30 LTM

Samples: The submission consisted of 5 samples with sample identification shown in the attached data tables.

Tests: The samples were analyzed for the methods listed on the attached table of contents.

Results: See the attached data tables for results.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Respectfully Submitted,

Brian Spann
Laboratory Director
PEL a division of Spectrum Analytical, Inc.
featuring Hanibal Technology

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are f the exclusive use of the client to whom they are addressed. Our Letters and reports apply to the sample tested and are not necessarily indicative o the qualities of apparently identical or similar materials

8405 Benjamin Road, Suite A• Tampa, Florida 33634
813-888-9507• FAX: 813-889-7128
Website: www.pelab.com

Organics **3**
METHOD 8260 GC/ MS VOLATILE ORGANICS 5
PEL MDLs 28

Chain of Custody Documentation **30**

Addendum **37**

EXECUTIVE SUMMARY - Detection Highlights

2513473

SAMPLE ID: 30MW16FD

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Carbon tetrachloride	4.6	1.0	UG/L	SW8260B

SAMPLE ID: 30MW16W00

PARAMETER	RESULT	REPORTING LIMIT	UNITS	ANALYTICAL METHOD
Carbon tetrachloride	1.5	1.0	UG/L	SW8260B

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Afcee Data Qualifiers

J The analyte was positively identified, the quantitation is an estimation

U The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

F The analyte was positively identified but the associated numerical value is below the RL.

R The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.

B The analyte was found in an associated blank, as well as in the sample.

M A matrix effect was present.

S To be applied to all field screening data.

T Tentatively identified compound (using GC/MS).

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Organics

170909 1730

Organic Sample ID Qualifiers

The qualifiers that may be appended to the lab sample ID and/or the client sample ID for organic analysis are defined below:

DL Diluted reanalysis. Indicates that the results of the original analysis of the sample contained compounds that exceeded the calibration range. The sample was diluted and reanalyzed. May be followed by a digit to indicate multiple dilutions of the sample. The results of more than one diluted reanalysis may be reported.

R Reanalysis. The extract was reanalyzed without re-extraction. The "R" is not used if the sample was also re-extracted. May be followed by a digit to indicate multiple reanalysis of the sample at the same dilution.

RE Re-extracted. The extract was reanalyzed with re-extraction. May be followed by a digit to indicate multiple re-extraction of the same sample at the same dilution.

MS Matrix spike (may be followed by a digit to indicate multiple matrix within a sample set).

SD Matrix spike duplicate (may be followed by a digit to indicate multiple matrix spike duplicate within a sample set).

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GC/MS VOLATILE ORGANICS

METHOD 8260

170909 1730

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2513473

Client: CH2M Hill

I. RECEIPT

Exceptions encountered upon receipt are addressed in the Sample Receipt Confirmation Report, included with the Chain-of-Custody documentation, or communication included in the addendum with this package.

II. HOLDING TIMES

A. Sample Preparation: All holding times were met.

B. Sample Analysis: All holding times were met.

III. METHODS

EPA 8260B/SW846

IV. PREPARATION

Water samples were prepared by SW846/5030 for EPA8260B volatiles analysis. All aspects of sample preparation proceeded without exception.

V. ANALYSIS

A. Calibration:

All acceptance criteria were met.

B. Blanks:

All acceptance criteria were met.

C. Surrogates:

All acceptance criteria were met with the exception of:

Sample EB-090309 was recovered above criteria for the following surrogate(s): Dibromofluoromethane at 116 % with criteria of (85-115).

Sample TB-090309 was recovered above criteria for the following surrogate(s): Dibromofluoromethane at 118 % with criteria of (85-115).

No further action was taken, since the high range was exceeded and the other surrogates met recovery criteria. Samples coded accordingly.

D. Spikes:

1. Laboratory Control Spikes (LCS)

An LCS/LCSD set was analyzed. All percent recovery and relative percent difference (RPD) criteria were met.

CASE NARRATIVE
GC/MS VOLATILE ORGANICS

PEL Lab Reference No./SDG: 2513473

Client: CH2M Hill

2. Matrix Spike/Matrix Spike Duplicate Samples (MS/SD)

No spikes requested by client.

E. Internal Standards:

All acceptance criteria were met.

F. Samples:

Sample analysis proceeded normally. Client specified reporting limits were used.

I certify that this data package is in compliance with the terms and conditions agreed to by the client and PEL, both technically and for completeness, except for the conditions noted above. Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or designated person, as, verified by the following signature.

SIGNED: **DATE: 09/15/2009**

W:\Narratives\Vols\2513\2513473_8260AFC.doc

AFCEE
ORGANIC ANALYSES DATA PACKAGE

Analytical Method: SW8260B **SDG #:** 2513473

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Base/Command: WAFB SS30 LTM **Prime Contractor:** CH2M Hill

Field Sample ID	Lab Sample ID
TB-090309	251347301
30MW16W00	251347302
30MW16FD	251347303
30SW01W00	251347304
EB-090309	251347305

Comments:

I certify this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager's designee, as verified by the following signature.

Signature: Mark Christman for Name: Brian Spann

Date: 9/17/09 Title: Laboratory Director

AFCEE FORM O-1

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AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: TB-090309 **Lab Sample ID:** 251347301 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 04-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	0.18	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	118.0	85 - 115	*
Toluene d8	112.0	81 - 120	
4-Bromofluorobenzene	109.0	76 - 119	
1,2-Dichloroethane-d4	118.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW16W00 **Lab Sample ID:** 251347302 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 04-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**1.5**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	115.0	85 - 115	
Toluene d8	110.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	114.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30MW16FD **Lab Sample ID:** 251347303 **Matrix:** GW

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 04-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	**4.6**	1		

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	113.0	85 - 115	
Toluene d8	105.0	81 - 120	
4-Bromofluorobenzene	104.0	76 - 119	
1,2-Dichloroethane-d4	111.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: 30SW01W00 **Lab Sample ID:** 251347304 **Matrix:** SW

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 04-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	0.18	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	115.0	85 - 115	
Toluene d8	110.0	81 - 120	
4-Bromofluorobenzene	106.0	76 - 119	
1,2-Dichloroethane-d4	115.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 2
RESULTS

Analytical Method: SW8260B **Preparatory Method:** SW5030 **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID: EB-090309 **Lab Sample ID:** 251347305 **Matrix:** WQ

% Solids: 0 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Date Received: 04-Sep-09 **Date Prepared:** **Date Analyzed:** 12-Sep-09

Initial Wgt/Vol: 5 mL **Final Wgt/Vol:** 5 mL

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	MDL	RL	Concentration	Dilution	Confirm	Qualifier
Carbon tetrachloride	0.18	1	0.18	1		**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	116.0	85 - 115	*
Toluene d8	113.0	81 - 120	
4-Bromofluorobenzene	111.0	76 - 119	
1,2-Dichloroethane-d4	115.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

2A

WATER VOLATILE ORGANIC SURROGATE RECOVERY

Lab Name: PEL, Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : PEL Case No. SAS No: SDG NO.: 2513473

Column(1): DB-624 ID: 0.18 (mm)

EPA Sample NO.	S1 #	S2 #	S3 #	S4 #	S5 #	S6 #	TOT OUT
0912BLK52	113.0	108.0	108.0	112.0			0
0912LCS51	106.0	105.0	101.0	103.0			0
0912LCS51D	114.0	110.0	108.0	112.0			0
30MW16FD	113.0	105.0	104.0	111.0			0
30MW16W00	115.0	110.0	108.0	114.0			0
30SW01W00	115.0	110.0	106.0	115.0			0
EB-090309	116.0 *	113.0	111.0	115.0			1
TB-090309	118.0 *	112.0	109.0	118.0			1

Control Limits

S1	=	Dibromofluoromethane	85 - 115
S2	=	Toluene d8	81 - 120
S3	=	4-Bromofluorobenzene	76 - 119
S4	=	1,2-Dichloroethane-d4	72 - 119

Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out
Control limit source: (lab/method) AFCEE

Form II

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS05
Date of Initial calibration: 11-Sep-09
Initial Calibration ID: VMS0509/11/09-1303~M5091109C
Concentration Units: UG/L
Column ID: DB-624

Analyte		1ppbD.D		2ppb.D		5ppb.D		10ppbD.D		20ppb.D	
		Std 1	RF 1	Std 2	RF 2	Std 3	RF 3	Std 4	RF 4	Std 5	RF 5
Chloromethane	*	1	0.314	2	0.204	5	0.292	10	0.277	20	0.301
Vinyl chloride	#	1	0.279	2	0.251	5	0.229	10	0.235	20	0.231
1,1-Dichloroethene	#	1	0.347	2	0.383	5	0.313	10	0.309	20	0.347
1,1-Dichloroethane	*	1	0.562	2	0.680	5	0.558	10	0.575	20	0.621
Chloroform	#	1	0.553	2	0.593	5	0.527	10	0.544	20	0.605
Carbon tetrachloride		1	0.342	2	0.395	5	0.351	10	0.350	20	0.422
1,2-Dichloropropane	#	1	0.307	2	0.354	5	0.309	10	0.321	20	0.355
Toluene	#	1	0.733	2	0.807	5	0.717	10	0.767	20	0.863
Chlorobenzene	*	1	1.158	2	1.307	5	1.150	10	1.215	20	1.327
Ethylbenzene	#	1	0.631	2	0.707	5	0.625	10	0.675	20	0.739
Bromoform	*	1	0.132	2	0.185	5	0.168	10	0.152	20	0.207
1,1,2,2-Tetrachloroethane	*	1	0.861	2	1.022	5	0.872	10	0.841	20	1.013
==========*											
Dibromofluoromethane(SUR						5	0.235	10	0.273	20	0.263
Toluene d8(SURR)						5	0.861	10	1.050	20	1.019
4-Bromofluorobenzene(SUR						5	0.903	10	1.066	20	1.003
1,2-Dichloroethane-d4(SUR						5	0.056	10	0.065	20	0.064

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS05
Date of Initial calibration: 11-Sep-09
Initial Calibration ID: VMS0509/11/09-1303~M5091109C
Concentration Units: UG/L
Column ID: DB-624

Analyte		50ppb.D		60ppb.D		80ppb.D		500pptD.D		200pptD.D	
		Std 6	RF 6	Std 7	RF 7	Std 8	RF 8	Std 9	RF 9	Std 10	RF 10
Chloromethane	*	50	0.294	60	0.287	80	0.299				
Vinyl chloride	#	50	0.234	60	0.248	80	0.256	0.5	0.213		
1,1-Dichloroethene	#	50	0.309	60	0.320	80	0.304	0.5	0.343		
1,1-Dichloroethane	*	50	0.544	60	0.564	80	0.543				
Chloroform	#	50	0.528	60	0.543	80	0.524	0.5	0.596	0.2	0.697
Carbon tetrachloride		50	0.376	60	0.398	80	0.389	0.5	0.364		
1,2-Dichloropropane	#	50	0.313	60	0.324	80	0.318	0.5	0.316		
Toluene	#	50	0.761	60	0.794	80	0.777	0.5	0.821		
Chlorobenzene	*	50	1.164	60	1.179	80	1.124	0.5	1.248		
Ethylbenzene	#	50	0.655	60	0.675	80	0.661	0.5	0.669		
Bromoform	*	50	0.207	60	0.216	80	0.218				
1,1,2,2-Tetrachloroethane	*	50	0.896	60	0.913	80	0.885	0.5	1.025	0.2	1.180
==========*											
Dibromofluoromethane(SUR		50	0.253	60	0.267	80	0.266				
Toluene d8(SURR)		50	0.983	60	1.046	80	1.052				
4-Bromofluorobenzene(SUR		50	0.972	60	1.049	80	1.069				
1,2-Dichloroethane-d4(SUR		50	0.061	60	0.066	80	0.066				

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 3A
INITIAL MULTIPOINT CALIBRATION-GC/MS ANALYSIS

Analytical Method: SW8260B
AAB #: N/A
Lab Name: PEL, Spectrum Analytical, Inc.
Contract Number: F41624-03-D-8595
Instrument ID: VMS05
Date of Initial calibration: 11-Sep-09
Initial Calibration ID: VMS0509/11/09-1303~M5091109C
Concentration Units: UG/L
Column ID: DB-624

Analyte		Curve Type	Average RF	% RSD	mean %RSD	r	COD	Q
Chloromethane	*	AVRG	0.28	11.88	7.05			
Vinyl chloride	#	AVRG	0.24	7.98	7.05			
1,1-Dichloroethene	#	AVRG	0.33	7.93	7.05			
1,1-Dichloroethane	*	AVRG	0.58	8.06	7.05			
Chloroform	#	AVRG	0.57	9.40	7.05			
Carbon tetrachloride		AVRG	0.38	7.12	7.05			
1,2-Dichloropropane	#	AVRG	0.32	5.63	7.05			
Toluene	#	AVRG	0.78	5.76	7.05			
Chlorobenzene	*	AVRG	1.21	5.96	7.05			
Ethylbenzene	#	AVRG	0.67	5.28	7.05			
Bromoform	*	LINR	0.19			0.999		
1,1,2,2-Tetrachloroethane	*	AVRG	0.95	11.19	7.05			
==========*								
Dibromofluoromethane(SUR		AVRG	0.26	5.27	7.05			
Toluene d8(SURR)		AVRG	1.00	7.38	7.05			
4-Bromofluorobenzene(SUR		AVRG	1.01	6.46	7.05			
1,2-Dichloroethane-d4(SUR		AVRG	0.06	6.30	7.05			

* SPCCs # CCCs

Comments:

AFCEE FORM O-3

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AFCEE
ORGANIC ANALYSES DATA SHEET 4
SECOND SOURCE CALIBRATION VERIFICATION

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

2nd Source ID: SSC757895 **Concentration Units:** UG/L

File ID: SEC52.D **Column ID:** DB-624

Analyte	Expected	Found	%D	Q
Chloromethane	50	53.72	7.4	
Vinyl chloride	50	50.66	1.3	
1,1-Dichloroethene	50	47.63	4.7	
1,1-Dichloroethane	50	47.93	4.1	
Chloroform	50	47.07	5.9	
Carbon tetrachloride	50	51.80	3.6	
1,2-Dichloropropane	50	49.47	1.1	
Toluene	50	50.92	1.8	
Chlorobenzene	50	49.06	1.9	
Ethylbenzene	50	50.32	0.6	
Bromoform	50	45.72	8.6	
1,1,2,2-Tetrachloroethane	50	45.40	9.2	
==========				
Dibromofluoromethane(SURR)	50	50.73	1.5	
Toluene d8(SURR)	50	51.64	3.3	
4-Bromofluorobenzene(SURR)	50	50.07	0.1	
1,2-Dichloroethane-d4(SURR)	50	50.82	1.6	

Comments:

AFCEE FORM O-4

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AFCEE
ORGANIC ANALYSES DATA SHEET 5A
CALIBRATION VERIFICATION-GC/MS ANALYSIS

Analytical Method: SW8260B **AAB #:** N/A

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Column: DB-624

ICV ID: **CCV #1 ID:** CCV757890 **CCV #2 ID:**

File ID: **File ID:** 50CCV52.D **File ID:**

Analyte		ICV		CCV #1		CCV #2		
		RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	RF or CONC(†)	%D or % DRIFT(†)	Q
Chloromethane	*			0.325	14.65			
Vinyl chloride	#			0.2584	6.83			
1,1-Dichloroethene	#			0.3217	2.72			
1,1-Dichloroethane	*			0.5716	1.61			
Chloroform	#			0.557	2.44			
Carbon tetrachloride				0.3879	3.01			
1,2-Dichloropropane	#			0.3298	1.75			
Toluene	#			0.8122	3.81			
Chlorobenzene	*			1.2253	1.45			
Ethylbenzene	#			0.6885	2.64			
Bromoform †	*			46.4	7.20			
1,1,2,2-Tetrachloroethane	*			0.9111	4.16			
==========*								
Dibromofluoromethane(SURR)				0.279	7.60			
Toluene d8(SURR)				1.0944	9.25			
4-Bromofluorobenzene(SURR)				1.0629	5.20			
1,2-Dichloroethane-d4(SURR)				0.0672	6.36			

* SPCCs # CCCs

Comments: Analytes marked with an † are reported from a linear or 2nd order calibration and are using concentration and % drift. All other analytes are using RF and %D.

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AFCEE
ORGANIC ANALYSES DATA SHEET 6
BLANKS

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Units: UG/L **Method Blank ID:** 0912BLK52

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Analyte	Method Blank	RL	Q
Carbon tetrachloride	0.18	1	**U**

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	113.0	85 - 115	
Toluene d8	108.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	112.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE FORM O-6

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AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

LCS ID: 0912LCS51 **Units:** UG/L **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Analyte	Expected	Found	%R	Control Limits	Q
Carbon tetrachloride	20	24	120.0	66 - 138	

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	106.0	85 - 115	
Toluene d8	105.0	81 - 120	
4-Bromofluorobenzene	101.0	76 - 119	
1,2-Dichloroethane-d4	103.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

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AFCEE
ORGANIC ANALYSES DATA SHEET 7
LABORATORY CONTROL SAMPLE

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

LCS ID: 0912LCS51D **Units:** UG/L **Initial Calibration ID:** VMS0509/11/09-1303~M5091109C

Analyte	Expected	Found	%R	Control Limits	Q	RPD	Max RPD	Q
Carbon tetrachloride	20	22	110.0	66 - 138		8.7	20	

Surrogate	Recovery	Control Limits	Qualifier
Dibromofluoromethane	114.0	85 - 115	
Toluene d8	110.0	81 - 120	
4-Bromofluorobenzene	108.0	76 - 119	
1,2-Dichloroethane-d4	112.0	72 - 119	

Internal Std	Qualifier
Chlorobenzene d5	
1,4-Dichlorobenzene-d4	
Fluorobenzene	

Comments:

AFCEE FORM O-7

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2513473

8A

VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: Spectrum Analytical, Inc. Contract: F41624-03-D-8595

Lab Code : SA Case No.: SAS No: SDG No.: 2513473

Lab File ID (Standard): 50ppb.D Date Analyzed: 9/11/2009

Instrument ID: VMS05 Time Analyzed: 9:27

GC Column: DB-624 ID: 0.18 (mm)

Matrix: (soil/water) W Heated Purge: (Y/N) No

		IS1 AREA	#	RT	IS2 AREA	#	RT	IS3 AREA	#	RT
	MID CAL STD	606612		9.29	338925		11.61	875335		6.10
	UPPER LIMIT	1213224		9.79	677850		12.11	1750670		6.60
	LOWER LIMIT	303306		8.79	169462.5		11.11	437667.5		5.60
	EPA SAMPLE NO.									
1	0912LCS51	538607		9.29	298420		11.61	770381		6.09
2	0912LCS51D	527315		9.29	292876		11.61	754220		6.09
3	0912BLK52	510665		9.29	279697		11.61	738305		6.09
4	TB-090309	506886		9.29	282251		11.61	734936		6.09
5	30MW16W00	515005		9.29	280790		11.61	743275		6.09
6	30MW16FD	517928		9.29	286657		11.60	754302		6.09
7	30SW01W00	505754		9.29	278155		11.61	728036		6.10
8	EB-090309	515932		9.29	272369		11.61	725631		6.09

IS1 = Chlorobenzene d5

IS2 = 1,4-Dichlorobenzene-d4

IS3 = Fluorobenzene

UPPER LIMIT = +100% of internal standard area.
LOWER LIMIT = -50% of internal standard area

Column used to flag internal standard area values with an asterisk

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FORM VIII

AFCEE
ORGANIC ANALYSES DATA SHEET 9
HOLDING TIMES

Analytical Method: SW8260B **AAB #:** M5091209

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Field Sample ID	Date Collected	Date Received	Date Extracted	Max. Holding Time E	Time Held Ext.	Date Analyzed	Max. Holding Time A	Time Held Anal.	Q
30MW16FD	03-Sep-09	04-Sep-09				12-Sep-09	14	9	
30MW16W00	03-Sep-09	04-Sep-09				12-Sep-09	14	9	
30SW01W00	03-Sep-09	04-Sep-09				12-Sep-09	14	9	
EB-090309	03-Sep-09	04-Sep-09				12-Sep-09	14	9	
TB-090309	03-Sep-09	04-Sep-09				12-Sep-09	14	9	

Comments:

AFCEE
ORGANIC ANALYSES DATA SHEET 10
INSTRUMENT ANALYSIS SEQUENCE LOG

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract #:** F41624-03-D-8595

Instrument ID#: VMS05 **Column:** DB-624

Field Sample ID/Std ID/ Blank ID/QC Sample ID	File ID	Date Analysis Started	Time Analysis Started	Date Analysis Completed	Time Analysis Completed
BFB757872	BFB51.D	11-Sep-09	0606	11-Sep-09	0624
STD757888	2ppb.D	11-Sep-09	0751	11-Sep-09	0809
STD757892	5ppb.D	11-Sep-09	0815	11-Sep-09	0833
STD757880	20ppb.D	11-Sep-09	0903	11-Sep-09	0921
STD757891	50ppb.D	11-Sep-09	0927	11-Sep-09	0945
STD757893	60ppb.D	11-Sep-09	0951	11-Sep-09	1009
STD757894	80ppb.D	11-Sep-09	1015	11-Sep-09	1033
STD757879	200pptD.	11-Sep-09	1151	11-Sep-09	1209
STD757889	500pptD.	11-Sep-09	1215	11-Sep-09	1233
STD757878	1ppbD.D	11-Sep-09	1239	11-Sep-09	1257
STD757877	10ppbD.D	11-Sep-09	1303	11-Sep-09	1321
SSC757895	SEC52.D	11-Sep-09	1417	11-Sep-09	1435
BFB757873	BFB51.D	12-Sep-09	0736	12-Sep-09	0754
CCV757890	50CCV52.	12-Sep-09	0824	12-Sep-09	0842
0912LCS51	LCS51.D	12-Sep-09	0849	12-Sep-09	0907
0912LCS51D	LCS51D.	12-Sep-09	0913	12-Sep-09	0931
0912BLK52	BLK52.D	12-Sep-09	1001	12-Sep-09	1019
TB-090309	47301.D	12-Sep-09	1226	12-Sep-09	1244
30MW16W00	47302.D	12-Sep-09	1250	12-Sep-09	1308
30MW16FD	47303.D	12-Sep-09	1314	12-Sep-09	1332
30SW01W00	47304.D	12-Sep-09	1338	12-Sep-09	1356
EB-090309	47305.D	12-Sep-09	1402	12-Sep-09	1420

Comments:

AFCEE FORM O-10

170909 1730

2513473

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Compound:** BFB **Injection Date/Time:** 11-Sep-09 0606

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	Q
50	15.0 - 40.0% of mass 95	17.1	
75	30.0 - 60.0% of mass 95	46.6	
95	Base Peak, 100% relative abundance	100	
96	5.0 - 9.0% of mass 95	7	
173	Less than 2.0% of mass 174	0 (0)1	
174	50.0 - 100.0% of mass 95	69.5	
175	5.0 - 9.0% of mass 174	5.4 (7.8)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	66.9 (96.3)1	
177	5.0 - 9.0% of mass 176	4.5 (6.7)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

STD757888
STD757892
STD757880
STD757891
STD757893
STD757894
STD757879
STD757889
STD757878
STD757877
SSC757895

AFCEE FORM O-11

170909 1730

2513473

AFCEE
ORGANIC ANALYSES DATA SHEET 11
INSTRUMENT PERFORMANCE CHECK

BFB

Analytical Method: SW8260B

Lab Name: PEL, Spectrum Analytical, Inc. **Contract Number:** F41624-03-D-8595

Instrument ID: VMS05 **Compound:** BFB **Injection Date/Time:** 12-Sep-09 0736

Initial Calibration ID: VMS0509/11/09-1303~M5091109C

Mass	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	Q
50	15.0 - 40.0% of mass 95	16.5	
75	30.0 - 60.0% of mass 95	45.6	
95	Base Peak, 100% relative abundance	100	
96	5.0 - 9.0% of mass 95	6.7	
173	Less than 2.0% of mass 174	0 (0)1	
174	50.0 - 100.0% of mass 95	76.7	
175	5.0 - 9.0% of mass 174	5.8 (7.5)1	
176	Greater than 95.0%, but less than 101.0% of mass 174	74.5 (97)1	
177	5.0 - 9.0% of mass 176	5 (6.7)2	

1-Value is % of mass 174
2-Value is % of mass 176

Comments:

CCV757890
0912LCS51
0912LCS51D
0912BLK52
TB-090309
30MW16W00
30MW16FD
30SW01W00
EB-090309

AFCEE FORM O-11

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2513473

PEL MDLs

170909 1730

MDL STUDY REPORT FORM

PEL Laboratories, Inc.

Method: 8260AFC **Units:** ug/l **Matrix:** W

CAS #	Analyte	Amt Spked	Replicate 1	2	3	4	5	6	7	8	9	STD DEV	MDL	Verification Date
56-23-5	Carbon tetrachloride	1	0.99	1	1	0.87	1	0.88	1	0.88	1	0.061	0.18	6/5/2009

170909 1730

Chain of Custody Documentation

170909 1730

PEL

A DIVISION OF SPECTRUM ANALYTICAL, INC. Featuring HANIBAL TECHNOLOGY

CHAIN OF CUSTODY RECORD

Page 1 of 1 2513473 KC

Special Handling:

TAT- Indicate Date Needed:

- All TATs subject to laboratory approval. Min. 24-hour notification needed for rushes.
- Samples disposed of after 60 days unless otherwise instructed.

Report To: Mark Fesler
CH2M HILL
2525 Airpark Dr.
Redding, CA 96001
530-229-3273
Project Mgr.: Tiffany Swoveland Chapman

Invoice To: Contract
Ref
P.O. No.: RQN:

Project No.: 375430.06.90.01.02
Site Name: WAFB 5530 LTM
Location: WAFB State: MD
Sampler(s): T. Swierczek

1=$Na_2S_2O_3$ 2=HCl 3=H_2SO_4 4=HNO_3 5=NaOH 6=Ascorbic Acid 7=CH_3OH
8= $NaHSO_4$ 9= 10= 11=

List preservative code below: 2

Notes:

DW=Drinking Water GW=Groundwater WW=Wastewater
O=Oil SW= Surface Water SO=Soil SL=Sludge A=Air
X1= TB Trip Blank X2= X3=

G=Grab C=Composite

Containers: # of VOA Vials, # of Amber Glass, # of Clear Glass, # of Plastic

Analyses: Carbon Tetrachloride

QA/QC Reporting Level
☐ Level I ☐ Level II
☐ Level III ☐ Level IV
☐ Other

State specific reporting standards:

Lab Id:	Sample Id:	Date:	Time:	Type	Matrix	# of VOA Vials	# of Amber Glass	# of Clear Glass	# of Plastic	Carbon Tetrachloride
01	TB-090309	09/03/09	0852	—	TB	1				X
02	30MW16W00	↓	0944	G	GW	3				X
03	30MW16FD		0950	G	GW	3				X
04	30SW01W00		1030	G	SW	3				X
05	EB-090309		1050	G	DW	3				X

☒ E-mail to mark.fesler@ch2m.com
EDD Format
pH<2

Condition upon receipt: ☒ Iced ☐ Ambient ☒ °C 6.0

Relinquished by:	Received by:	Date:	Time:
8-20-09			
		09/03/09	1430
		9/4/09	1005

2513473

PEL, a Division of Spectrum Analytical, Inc.

pH LOG SHEET

Work Order # 2513473 By KC

Client / Project Name Whiteman AFB Date 9/4/09

PEL Sample Number	H_2SO_4 (pH<2)		HNO_3 (pH<2)		NaOH (pH>12)		ZnAC/NaOH (pH>9)		HCl (pH<2)		Other _____ pH _____	
	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH	No. of Containers	pH
01									i			
02									3	<2		
03									↓	↓		
04												
05												
06												
07												
08												
09												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

W:\Login\pH LOG SHEET REV 4.doc

2513473

FedEx Express US Airbill 8704 6755 0085 0200 Form ID No. **FedEx Retrieval Copy**

1 From

Date 09/03/09 Sender's FedEx Account Number 1001778 20

Sender's Name T. Swierczek Phone 618 550.1244

Company CH2M HILL

Address 1034 S. Brentwood Blvd. 2300

Dept./Floor/Suite/Room

City Richmond Heights State MO ZIP 63117

2 Your Internal Billing Reference 375430.06.90.01.02/42719

3 To

Recipient's Name Sample Receiving Phone 813 888-9507

Company PEL

1 ☐ HOLD Weekday Print FedEx location address below. NOT available for FedEx First Overnight.

31 ☐ HOLD Saturday Print FedEx location address below. Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Address 8405 Benjamin Rd.

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Dept./Floor/Suite/Room

Address

Print FedEx location address here if a HOLD option is selected.

City Tampa State FL ZIP 33634

8704 6755 0085

4a Express Package Service * To most locations. *Packages up to 150 lbs.*

1 ☒ FedEx Priority Overnight Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

5 ☐ FedEx Standard Overnight Next business afternoon.* Saturday Delivery NOT available.

6 ☐ FedEx First Overnight Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.

3 ☐ FedEx 2Day Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

20 ☐ FedEx Express Saver Third business day.* Saturday Delivery NOT available.

4b Express Freight Service ** To most locations. *Packages over 150 lbs.*

7 ☐ FedEx 1Day Freight Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

FedEx 1Day Freight Booking No.

8 ☐ FedEx 2Day Freight Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.

83 ☐ FedEx 3Day Freight Third business day.** Saturday Delivery NOT available.

5 Packaging * Declared value limit $500.

6 ☐ FedEx Envelope* 2 ☐ FedEx Pak* Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak. 3 ☐ FedEx Box 4 ☐ FedEx Tube 1 ☒ Other

6 Special Handling and Delivery Signature Options

3 ☐ **SATURDAY DELIVERY**

☒ No Signature Required Package may be left without obtaining a signature for delivery.

10 ☐ Direct Signature Someone at recipient's address may sign for delivery. *Fee applies.*

34 ☐ Indirect Signature If no one is available at recipient's address, someone at a neighboring address may sign for delivery. For residential deliveries only. *Fee applies.*

Does this shipment contain dangerous goods?

One box must be checked.

☒ No 4 ☐ Yes As per attached Shipper's Declaration. ☐ Yes Shipper's Declaration not required. 6 ☐ Dry Ice Dry Ice, 9, UN 1845 ____ x ____ kg

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging or placed in a FedEx Express Drop Box.

☐ Cargo Aircraft Only

7 Payment *Bill to:*

Enter FedEx Acct. No. or Credit Card No. below.

Obtain Recip. Acct. No. ☐

1 ☒ Sender Acct. No. in Section 1 will be billed. 2 ☐ Recipient 3 ☐ Third Party 4 ☐ Credit Card 5 ☐ Cash/Check

Total Packages ____ Total Weight ____ lbs. Credit Card Auth.

†Our liability is limited to $100 unless you declare a higher value. See the current FedEx Service Guide for details.

554

Rev. Date 2/08•Part #150281•©1994–2008 FedEx•PRINTED IN U.S.A. SRY

fedex.com 1.800.GoFedEx 1.800.463.3339

fedex.com 1.800.GoFedEx 1.800.463.3339

2513473

SAMPLE RECEIPT CONFIRMATION SHEET

Client Information

SDG:	2513473	**Req:**	81110
Client:	CH2M Hill	**Project:**	TO 220
Level:	5	**Date Rec'd:**	9/4/2009 10:05:00 AM
Rec'd via:	Fed-Ex	**Due Date:**	09/18/09

Sample Verification

Samples/Cooler Secure?	Yes	**All Samples on COC accounted For?**	Yes
Temperature of Samples(Celsius)	6.0C	**All Samples Rec'd Intact?**	Yes
pH Verified?	Yes	**Sample Vol. Stuff. For Analysis?**	Yes
pH WNL?	Yes	**Samples Rec'd W/I Hold Time?**	Yes
Soil Origin (Domestic/Foreign):		**Are All Samples to be Analyzed?**	Yes
Site Location/Project on COC?	Yes	**Correct Sample Containers?**	Yes
Client Project # on COC?	Yes	**COC Comments written on COC?**	Yes
Project Mgr. Indicated on COC?	Yes	**Samplers Initials on COC?**	Yes
COC relinquished/Dated by Client?	Yes	**Sample Date/Time Indicated?**	Yes
COC Received/Dated by PEL?	Yes	**TAT Requested:**	STD
Specific Subcontract Indicated?	No	**Client Requests Verbal Results?**	No
Samples Received By	Fed-Ex	**Client Requests Faxed Results?**	No
PEL to Conduct ALL Analyses?	Yes		

PEER REVIEW:

Client: CH2M Hill

WONo: 2513473 Profile Name: Whiteman Profile #: 81110

MATRIX W

Sample #	Bottle	Parameter		Check	Received	Date
01	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:18 AM
01	001	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:39 AM
01	001	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:10 PM
02	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:23 AM
02	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:27 AM
02	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:30 AM
02	003	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/8/2009 11:08:36 AM
02	003	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/8/2009 1:15:48 PM
02	002	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:41 AM
02	002	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:14 PM
03	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:34 AM
03	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:37 AM
03	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:40 AM
03	003	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/8/2009 11:08:50 AM
03	003	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/8/2009 1:15:52 PM
03	002	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:43 AM
03	002	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:17 PM
04	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:43 AM
04	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:47 AM
04	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:50 AM
04	003	8260AFC	Volatile Organic Compounds	Out	Mark Jacobs	9/8/2009 11:08:53 AM
04	003	8260AFC	Volatile Organic Compounds	In	Mark Jacobs	9/8/2009 1:15:55 PM
04	002	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:47 AM
04	002	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:22 PM

05	003	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:53 AM
05	002	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:57 AM
05	001	8260AFC	Volatile Organic Compounds	In	Ja Kim	9/4/2009 11:25:59 AM
05	002	8260AFC	Volatile Organic Compounds	Out	Kevin Siuda	9/12/2009 10:47:49 AM
05	002	8260AFC	Volatile Organic Compounds	In	Kevin Siuda	9/14/2009 4:08:27 PM

Addendum

170909 1730

Letter of Acceptance

Customer Name: CH2M Hill

Date and Time Received: 9/4/2009 10:05:00 AM

Date to be Reported: 9/25/2009

Laboratory Submission Number/SDG: 2513473

Get Detailed Analyte List here: www.pelab.com/webdms/Default.asp?LoaSDG=2513473

Project: WAFB SS30 LTM

Samples: The submission consisted of 5 samples, including QC, with sample identification shown in the attached data tables.

Tests: The Samples will be analyzed for EPA methods: 8260AFC.

Sample Custody/COC discrepancies:

None.

Notes:

None.

Distribution of Report to:

CH2M Hill
Attn: Mark Fesler
Phone: 530-229-3273

Note: Submitted material will be retained for 30 days unless otherwise requested by client or consumed in analysis. PEL letters and reports are for the exclusive use of the client to whom they are addressed. Our letters and reports apply to the sample tested and are not necessarily indicative of the qualities of apparently identical or similar materials

Log-in Report

Level: AFCEE

Total of: 5 analyses on 5 samples (including QC) *08-Sep-09*

Report/SDG #: 2513473

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
TB-090309	251347301		WQ	9/3/2009 8:52:00 AM	9/4/2009 10:05:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW16W00	251347302		GW	9/3/2009 9:44:00 AM	9/4/2009 10:05:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30MW16FD	251347303		GW	9/3/2009 9:50:00 AM	9/4/2009 10:05:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
30SW01W00	251347304		SW	9/3/2009 10:30:00 AM	9/4/2009 10:05:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

SampleID	LAB ID	StationID	Matrix	SampleDate	ReceiveDate
EB-090309	251347305		WQ	9/3/2009 10:50:00 AM	9/4/2009 10:05:00 AM

Method		
8260AFC	Volatile Organic Compounds	8260

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

September 10, 2009

Kirk Kraus
Kingston Environmental Services
15450 Hanger Road
Kansas City, MO 64147
TEL: (816) 524-8811
FAX:

NELAP Accredited #100226

RE: Whiteman

WorkOrder: 09090227

Dear Kirk Kraus:

TEKLAB, INC received 1 sample on 9/5/2009 11:25:00 AM for the analysis presented in the following report.

Samples are analyzed on an as received basis unless otherwise requested and documented. The sample results contained in this report relate only to the requested analytes of interest as directed on the chain of custody. IL ELAP and NELAP accredited fields of testing are indicated by the letters NELAP under the Certification column.

All quality control criteria applicable to the test methods employed for this project have been satisfactorily met and are in accordance with NELAP except where noted. The following report shall not be reproduced, except in full, without the written approval of Teklab, Inc.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Shelly A Hennessy

Shelly A. Hennessy
Project Manager
(618)344-1004 ex 36

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

Client: Kingston Environmental Services
Project: Whiteman
LabOrder: 09090227
Report Date: 10-Sep-09

CASE NARRATIVE

Cooler Receipt Temp: 4.4 °C

State accreditations:

KS: NELAP #E-10347 | KY: UST #0073 | MO: DNR #00930 | AR: ADEQ #70-028-0

Qualifiers

DF - Dilution Factor	**B** - Analyte detected in the associated Method Blank	**C** - Client requested RL below PQL
RL - Reporting Limit	**J** - Analyte detected below reporting limits	**D** - Diluted out of sample
ND - Not Detected at the Reporting Limit	**R** - RPD outside accepted recovery limits	**E** - Value above quantitation range
Surr - Surrogate Standard added by lab	**S** - Spike Recovery outside accepted recovery limits	**H** - Holding time exceeded
TNTC - Too numerous to count (> 200 CFU)	X - Value exceeds Maximum Contaminant Level	**MI** - Matrix interference
Q - QC criteria failed or noncompliant CCV	# - Unknown hydrocarbon	**DNI** - Did not ignite
NELAP - IL ELAP and NELAP Accredited Field of Testing	**IDPH** - IL Dept. of Public Health	

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

LABORATORY RESULTS

Client: Kingston Environmental Services
WorkOrder: 09090227
Lab ID: 09090227-001
Report Date: 10-Sep-09

Client Project: Whiteman
Client Sample ID: Drum 1
Collection Date: 9/3/2009 1:30:00 PM
Matrix: AQUEOUS

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
1,1,1,2-Tetrachloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1,1-Trichloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1,2,2-Tetrachloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1,2-Trichloro-1,2,2-trifluoroethane		20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1,2-Trichloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1-Dichloro-2-propanone		50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1-Dichloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1-Dichloroethene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,1-Dichloropropene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2,3-Trichlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2,3-Trichloropropane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2,3-Trimethylbenzene		5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2,4-Trichlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2,4-Trimethylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2-Dibromo-3-chloropropane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2-Dibromoethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2-Dichlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2-Dichloroethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,2-Dichloropropane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,3,5-Trimethylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,3-Dichlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,3-Dichloropropane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1,4-Dichlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
1-Chlorobutane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2,2-Dichloropropane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2-Butanone	NELAP	25.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2-Chloroethyl vinyl ether	NELAP	20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2-Chlorotoluene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2-Hexanone	NELAP	25.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
2-Nitropropane	NELAP	50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
4-Chlorotoluene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
4-Methyl-2-pentanone	NELAP	25.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Acetone	NELAP	25.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Acetonitrile	NELAP	50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Acrolein	NELAP	100		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Acrylonitrile	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Allyl chloride	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Benzene	NELAP	2.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

LABORATORY RESULTS

Client: Kingston Environmental Services
WorkOrder: 09090227
Lab ID: 09090227-001
Report Date: 10-Sep-09

Client Project: Whiteman
Client Sample ID: Drum 1
Collection Date: 9/3/2009 1:30:00 PM
Matrix: AQUEOUS

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Bromobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Bromochloromethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Bromodichloromethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Bromoform	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Bromomethane	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Butyl acetate		25.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Carbon disulfide	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Carbon tetrachloride	NELAP	5.0		**8.8**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Chlorobenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Chloroethane	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Chloroform	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Chloromethane	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Chloroprene	NELAP	20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
cis-1,2-Dichloroethene	NELAP	5.0	J	**4.4**	µg/L	1	9/9/2009 1:50:00 PM	CCF
cis-1,3-Dichloropropene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
cis-1,4-Dichloro-2-butene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Cyclohexanone		50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Dibromochloromethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Dibromomethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Dichlorodifluoromethane	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Ethyl acetate	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Ethyl ether	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Ethyl methacrylate	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Ethylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Heptane		20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Hexachlorobutadiene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Hexachloroethane	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Iodomethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Isopropylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
m,p-Xylenes	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Methacrylonitrile	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Methyl Methacrylate	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Methyl tert-butyl ether	NELAP	2.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Methylacrylate		10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Methylene chloride	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Naphthalene	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
n-Butylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
n-Hexane		20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF

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ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

LABORATORY RESULTS

Client: Kingston Environmental Services
WorkOrder: 09090227
Lab ID: 09090227-001
Report Date: 10-Sep-09

Client Project: Whiteman
Client Sample ID: Drum 1
Collection Date: 9/3/2009 1:30:00 PM
Matrix: AQUEOUS

Analyses	Certification	RL	Qual	Result	Units	DF	Date Analyzed	Analyst
SW-846 5030, 8260B, VOLATILE ORGANIC COMPOUNDS BY GC/MS								
Nitrobenzene	NELAP	50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
n-Propylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
o-Xylene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Pentachloroethane	NELAP	20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
p-Isopropyltoluene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Propionitrile	NELAP	50.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
sec-Butylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Styrene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
tert-Butylbenzene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Tetrachloroethene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Tetrahydrofuran	NELAP	20.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Toluene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
trans-1,2-Dichloroethene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
trans-1,3-Dichloropropene	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
trans-1,4-Dichloro-2-butene	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Trichloroethene	NELAP	5.0	J	**3.1**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Trichlorofluoromethane	NELAP	5.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Vinyl acetate	NELAP	10		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Vinyl chloride	NELAP	2.0		**ND**	µg/L	1	9/9/2009 1:50:00 PM	CCF
Surr: 1,2-Dichloroethane-d4		74.7-129		**98.3**	%REC	1	9/9/2009 1:50:00 PM	CCF
Surr: 4-Bromofluorobenzene		86-119		**97.3**	%REC	1	9/9/2009 1:50:00 PM	CCF
Surr: Dibromofluoromethane		81.7-123		**101.6**	%REC	1	9/9/2009 1:50:00 PM	CCF
Surr: Toluene-d8		84.3-114		**99.0**	%REC	1	9/9/2009 1:50:00 PM	CCF

Sample Narrative

TEKLAB, INC.

5445 HORSESHOE LAKE ROAD
COLLINSVILLE, ILLINOIS 62234

ENVIRONMENTAL TESTING LABORATORY

TEL: 618-344-1004
FAX: 618-344-1005

RECEIVING CHECK LIST

Client: Kingston Environmental Services
Project: Whiteman
Lab Order: 09090227
Report Date: 10-Sep-09

Carrier: FedEx

Received By: KNL

Completed by: Elizabeth A. Hurley
On: 08-Sep-09

Reviewed by: Shelly A. Hennessy
On: 08-Sep-09

Pages to follow: Chain of custody 1 Extra pages included 0

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐	Temp °C 4.4
Type of thermal preservation?	None ☐	Ice ☑	Blue Ice ☐	Dry Ice ☐
Chain of custody present?	Yes ☑	No ☐		
Chain of custody signed when relinquished and received?	Yes ☑	No ☐		
Chain of custody agrees with sample labels?	Yes ☑	No ☐		
Samples in proper container/bottle?	Yes ☑	No ☐		
Sample containers intact?	Yes ☑	No ☐		
Sufficient sample volume for indicated test?	Yes ☑	No ☐		
All samples received within holding time?	Yes ☑	No ☐		
Reported field parameters measured:	Field ☐	Lab ☐	NA ☑	
Container/Temp Blank temperature in compliance?	Yes ☑	No ☐		

When thermal preservation is required, samples are compliant with a temperature between 0.1°C - 6.0°C, or when samples are received on ice the same day as collected.

Water - VOA vials have zero headspace?	Yes ☑	No ☐	No VOA vials	☐
Water - TOX containers have zero headspace?	Yes ☐	No ☐	No TOX containers	☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐		

Any No responses must be detailed below or on the COC.

CHAIN OF CUSTODY

pg. 1 of 1 Work Order # 09090227

TEKLAB, INC. 5445 Horseshoe Lake Road ~ Collinsville, IL 62234 ~ Phone: (618) 344-1004 ~ Fax: (618) 344-1005

Client: Kingston Environmental Services
Address: 15450 Hangar Road
City / State / Zip: Kansas City, MO 64147
Contact: Kirk Kraus **Phone:** 816-524-8811
E-Mail: kirk.kraus@kingstonenv.com **Fax:** 816-331-4806

Samples on: ☒ Ice ☐ Blue Ice ☐ No Ice 4.4 °C
Preserved in: ☐ Lab ☐ Field
Lab Notes: ⌀ headspace - EAH 9/8/09
Comments:

- Are these samples known to be involved in litigation? If yes, a surcharge will apply. ☐ Yes ☐ No
- Are these samples known to be hazardous? ☐ Yes ☐ No
- Are there any required reporting limits to be met on the requested analysis? If yes, please provide limits in comment section. ☐ Yes ☐ No

Project Name / Number: Whitemarsh
Sample Collector's Name: Richard Cox
Results Requested: ☒ Standard ☐ 1-2 Day (100% Surcharge) ☐ Other_____ ☐ 3 Day (50% Surcharge)
Billing Instructions:

Lab Use Only	Sample Identification	Date/Time Sampled	# and Type of Containers: UNPRES	HNO_3	NaOH	H_2SO_4	HCL	MeOH	$NaHSO_4$	Other	MATRIX: Water	Drinking Water	Soil	Sludge	Sp. Waste	INDICATE ANALYSIS REQUESTED: VOC's
09090227-001	Drum 1	9/3 13:30	3								X					X

Relinquished By	Date / Time	Received By	Date / Time
Mike Bengel	9-4-09 922	[illegible]	9/4/09 922
[illegible]	9/4/09 1600	Kelly Sener (FedEx) EAH 9/8/09	9/5/09 11:25

The individual signing this agreement on behalf of client acknowledges that he/she has read and understands the terms and conditions of this agreement, on the reverse side, and that he/she has the authority to sign on behalf of client.

WHITE & YELLOW – LAB PINK – SAMPLER'S COPY