

# **Second Five-Year Review Report Fort Riley, Kansas**

**September 2007**

**PREPARED FOR:  
Fort Riley, Kansas**



**PREPARED BY:**

**United States Army Corps of Engineers, Kansas City District  
Kansas City, Missouri**

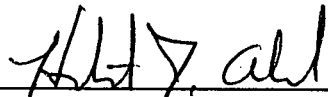


SW\_9\_6\_002

## UNITED STATES ARMY PROTECTIVENESS STATEMENT

Based on the Statutory Determinations set forth in the Records of Decision for Operable Units 001, 002, 004, and 005 and the results of this Five-Year Review, the United States Army hereby finds that the remedies for these four Fort Riley NPL Site operable units are expected to be protective of human health and the environment upon completion, and in the interim, the exposure pathways that could result in unacceptable risk are being controlled.

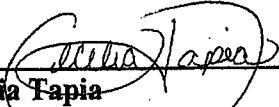
Approved by:

  
\_\_\_\_\_  
Herbert J. Abel  
Chief, Environmental Division  
Fort Riley

9 July 2007  
Date

**ENVIRONMENTAL PROTECTION AGENCY  
REGION VII  
CONCURRENCE**

**EPA Region VII concurs with the findings and protectiveness statements of the Fort Riley Second Five-Year Review.**

  
\_\_\_\_\_  
Cecilia Tapia  
Superfund Division Director, USEPA

9/20/07  
Date

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### Acronyms and Abbreviations

AOC	Area of Concern
APZ	Aircraft Accident Prevention Zone
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	Below ground surface
BLRA	Baseline Risk Assessment
BMcD	Burns & McDonnell
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	Code of Federal Regulations
<i>cis</i> -1,2-DCE	<i>cis</i> -1,2-Dichloroethene
COC	Chemical of Concern
COPC	Chemical of Potential Concern
CY	Calendar Year
DA-Fort Riley	U.S. Department of Army – Fort Riley
DCFA	Dry Cleaning Facilities Area (Operable Unit 003)
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DS/GS	Direct Support /General Support
DPW	Directorate of Public Works
DRMO	Defense Reutilization Marketing Offices
DSERTS	Defense Site Environmental Restoration Tracking System
EE/CA	Engineering Evaluation/Cost Analysis
EPA	U.S. Environmental Protection Agency (See USEPA)
EPC	Exposure Point Concentration
FFA	Federal Facility Agreement
FFTA-MAAF	Former Fire Training Area-Marshall Army Airfield, Operable Unit 004
FS	Feasibility Study
FTRI	Fort Riley designation per DSERTS site designation
ICUZ	Installation Compatibility Use Zone Study
IRIS	Integrated Risk Information System
IWSA	Installation-Wide Site Assessment
KDHE	Kansas Department of Health and Environment
LBA	Louis Berger & Associates
LTM	Long-Term Monitoring
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MNA	Monitored Natural Attenuation
MOGAS	Leaded Motor Gasoline
NCP	National Oil and Hazardous Substances Pollution Contingency Plan



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NFA	No Further Action
NPL	National Priorities List
NOAA	National Oceanic and Atmospheric Administration
OB/OD	Open Burning/Open Detonation
O&M	Operations and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
ppb	Parts per billion
PA/SI	Preliminary Assessment/Site Investigation
PCB	Polychlorinated Biphenyls
PCE	Perchloroethene or Tetrachloroethene
POL	Petroleum, Oil, Lubricant
PRG	Preliminary Remediation Goal
PS	Pilot Study
PSF	Pesticide Storage Facility, Operable Unit 002
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPMP	Real Property Master Plan
RRA	Residual Risk Assessment
RSK	Risk-Based Value for Kansas
SDWA	Safe Drinking Water Act
SEFL	Southeast Funston Landfill
SFL	Southwest Funston Landfill, Operable Unit 001
SI	Site Investigation
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound
TBD	To Be Determined
TBC	To Be Considered
TCE	Trichloroethene
UPRR	Union Pacific Railroad
USAEHA	U.S. Army Environmental Hygiene Agency
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
UST	Underground Storage Tank
UXO	Unexploded Ordnance
VC	Vinyl Chloride
VOC	Volatile Organic Compound
WWI	World War I

## Executive Summary

The Army is conducting a Five-Year Review at Fort Riley, Kansas pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c); 40 CFR 300.400,(f)(4)(ii); Executive Order 12580; and OSWER Directives 9355.7-02 (U.S. EPA, 1991), 9355.7-02A (U.S. EPA, 1994), and 9355.7-03A (U.S. EPA, 1995).

This report incorporates a statutory Five-Year Review of the Long-Term Monitoring (LTM) programs at Operable Units (OUs) 001, 004, and 005, as well as the landfill cover and bank stabilization operation and maintenance at OU 001. The LTM program at each of the three OUs addresses volatile organic compound (VOC) contaminants in groundwater and is a portion of the remedy selected in the Record of Decision (ROD) for each OU. This report also provides a review of ongoing investigations and activities at Fort Riley since EPA's concurrence with the first Five-Year Review Report on July 15, 2002.

Five OUs have been identified at Fort Riley:

**OU 001 - Southwest Funston Landfill (SFL) (FTRI-003)** has vinyl chloride contaminated groundwater below MCLs. The ROD was signed in Aug 1997 with an approved remedy that requires repair and maintenance of the landfill cover and riverbank stabilization structure and periodic groundwater monitoring.

The remedy at OU 001, restricting future site uses, stabilizing the Kansas River bank along the landfill, repairing and improving the existing native soil cover, and prohibiting the future use of site groundwater, ensures protection of human health and the environment, and will continue to be protective during operation and maintenance. Exposure pathways that could potentially result in unacceptable risks are being controlled.

**OU 002 - Pesticide Storage Facility (PSF) (FTRI-030)** has pesticide contaminated soil. The ROD was signed in 1997 with a No Further Action (NFA) determination.

The remedy at OU 002, No Further Action, is currently protective of human health and the environment, and will continue to be protective provided that land use remains consistent with the Industrial Use Scenario. Exposure pathways that could potentially result in unacceptable risks are being controlled.

**OU 003 - Dry Cleaning Facilities Area (DCFA) (FTRI-027)** has PCE, TCE, DCE, & VC contaminated groundwater. The site is undergoing a Pilot Study with a report due August 2007. The FS was completed in 2005 and the Proposed Plan (PP) is expected to be completed in 2007.

The remedy has not yet been implemented. Therefore, a statement of remedy protectiveness is not yet required.

**OU 004 - Former Fire Training Area – Marshall Army Airfield (FFTA-MAAF)** (FTRI-019) has PCE, TCE, & DCE contaminated groundwater below MCLs. The ROD was signed in 2005 with an approved remedy of monitored natural attenuation with institutional controls. The Remedial Design (RD) was completed in Jan 2006.

The remedy at OU 004, Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment, and will continue to be protective. Exposure pathways that could potentially result in unacceptable risks are being controlled.

**OU 005 - 354 Area Solvent Detections (354)** (FTRI-031) has PCE, TCE, & DCE contaminated groundwater. The ROD was signed in Jan 2006 with an approved remedy of monitored natural attenuation with institutional controls. The RD was approved by EPA on April 4, 2007.

The remedy at OU 005, Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment, and will continue to be protective. Exposure pathways that could potentially result in unacceptable risks are being controlled.

This report summarizes the status of actions taken pursuant to the RODs for OUs 001, 002, 004, and 005. Because the remedies at these sites resulted in hazardous substances remaining on site above health-based levels, Five-Year Reviews are required under CERCLA.

The purpose of the review is to determine if remedial response actions taken are protective of human health and the environment, and to make recommendations to attain or maintain protectiveness. This review is being conducted by the Army under Executive Order 12580, which delegates review responsibility to federal facilities at which the sole source of the release is under the control of the facility. This report will become a part of the Administrative Record.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
<b>Site name</b> (from CERCLIS): Fort Riley		
<b>EPA ID</b> (from CERCLIS): KS6214020756		
<b>Region:</b> 7	<b>State:</b> KS	<b>City/County:</b> Near Junction City/Geary and Riley Counties
SITE STATUS		
<b>NPL status:</b> Final		
<b>Remediation status:</b> Long-Term Operation and Maintenance		
<b>Multiple OUs?*</b> YES	<b>Construction completion date:</b> NA	
<b>Has site been put into reuse?</b> No		
REVIEW STATUS		
<b>Lead agency:</b> U.S. Army		
<b>Author name:</b> U.S. Army Corps of Engineers, Kansas City District		
<b>Author title:</b> NA	<b>Author affiliation:</b> U.S. Army	
<b>Review period:</b> August 2002 through August 2007		
<b>Date(s) of site inspection:</b> March 28, 2007		
<b>Type of review:</b> Post-SARA		
<b>Review number:</b> 2		
<b>Triggering action:</b> EPA concurrence with previous Five-Year Review on July Scheduled Completion Date		
<b>Triggering action date</b> (from WasteLAN): August 2002		
<b>Due date</b> (five years after triggering action date): August 2007		

\* ["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:**

Southwest Funston Landfill, OU 001 - Differential settlement in the landfill cover to the east of the landfill access road could result in ponding of rainwater and increased infiltration. The landfill cover to the west of the access road was repaired in the Fall of 2006.

#### **Recommendations and Follow-up Actions:**

Southwest Funston Landfill OU 001 - Fill in all settled areas to match surrounding grade and seed filled areas with native grass.

#### **Protectiveness Statement(s):**

The remedy at Southwest Funston Landfill (SFL) (FTRI-003) (OU 001), restricting future site uses, stabilizing the Kansas River bank along the landfill, repairing and improving the existing native soil cover, and prohibiting the future use of site groundwater, ensures protection of human health and the environment, and will continue to be protective during operation and maintenance. Exposure pathways that could potentially result in unacceptable risks are being controlled.

The remedy at Pesticide Storage Facility (PSF) (FTRI-030) (OU 002), No Further Action, is currently protective of human health and the environment will continue to be protective provided that land use remains consistent with the Industrial Use Scenario. Exposure pathways that could potentially result in unacceptable risks are being controlled.

The remedy at Former Fire Training Area – Marshall Army Airfield (FFTA-MAAF) (FTRI-019) (OU 004), Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment, and will continue to be protective. Exposure pathways that could potentially result in unacceptable risks are being controlled.

The remedy at 354 Area Solvent Detections (354) (FTRI-031) (OU 005), Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment, and will continue to be protective. Exposure pathways that could potentially result in unacceptable risks are being controlled.

### Five-Year Review Summary Form, cont'd.

**Long-Term Protectiveness:** The selected remedies will continue to be protective.

OU 001 - Southwest Funston Landfill (SFL) – There is vinyl chloride contaminated groundwater generally below MCLs. To insure long-term protectiveness, periodic repairs and maintenance of the landfill cover and riverbank stabilization structure will be performed and annual groundwater monitoring will be conducted.

OU 002 - Pesticide Storage Facility (PSF) - No further action is required at this site.

OU 003 - Dry Cleaning Facilities Area (DCFA) – There is PCE, TCE, DCE, & VC contaminated groundwater. The ROD has not been completed at this site so long-term protectiveness could not be evaluated under this review.

OU 004 - Former Fire Training Area – Marshall Army Airfield (FFTA-MAAF) - There is primarily DCE contaminated groundwater below MCL. One well has PCE and two wells have TCE below the MCLs. To insure future protectiveness annual groundwater monitoring will be conducted annually until all samples are below MCLs for three consecutive years.

OU 005 - 354 Area Solvent Detections (354) – There is TCE (in one well) & DCE contaminated groundwater below MCLs in the alluvial aquifer. To insure future protectiveness, annual groundwater monitoring will be conducted annually until all samples are below MCLs for three consecutive years.

# Fort Riley, Kansas

## Second Five-Year Review Report

### I. INTRODUCTION

The purpose of the 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 Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The U.S. Army Corps of Engineers (USACE) has prepared this Five-Year Review report for the U.S. Department of the Army (DA), Fort Riley (DA- Fort Riley) pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*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 often than each five years after the 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 NCP, 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 the initiation of the selected remedial action.*

The USACE on behalf of the DA – Fort Riley conducted the Five-Year Review and provides a technical assessment of the remedies and removal actions undertaken at each of the OUs since August 1997. This review was conducted for the entire installation as an NPL site.

Five OUs have been identified at Fort Riley:

**OU 001 - Southwest Funston Landfill (SFL) (FTRI-003)** has vinyl chloride contaminated groundwater below MCLs. The ROD was signed in Aug 1997 with an approved remedy that requires repair and maintenance of the landfill cover and riverbank stabilization structure and periodic groundwater monitoring.

**OU 002 - Pesticide Storage Facility (PSF) (FTRI-030)** has pesticide contaminated soil. The ROD was signed in 1997 with a No Further Action (NFA) determination.

**OU 003 - Dry Cleaning Facilities Area (DCFA) (FTRI-027)** has PCE, TCE, DCE, & VC contaminated groundwater. The site is undergoing a Pilot Study with a report due August 2007. The FS was completed in 2005 and the Proposed Plan (PP) expected to be completed in 2007.

**OU 004 - Former Fire Training Area – Marshall Army Airfield (FFTA-MAAF)** (FTRI-019) has primarily DCE contaminated groundwater below MCL. One well has PCE and two wells have TCE below the MCLs. The ROD was signed in 2005 with an approved remedy of monitored natural attenuation with institutional controls. The Remedial Design (RD) was completed in Jan 2006.

**OU 005 - 354 Area Solvent Detections (354)** (FTRI-031) has TCE ( in one well) & DCE contaminated groundwater in the alluvial aquifer below the MCLs. The ROD was signed in Jan 2006 with an approved remedy of monitored natural attenuation with institutional controls. The RD was approved by EPA on April 4, 2007.

This is the second Five-Year Review for the Fort Riley NPL site. The triggering action for the first statutory review is the signature date of the Record of Decision for the Southwest Funston Landfill, Operable Unit 001 that occurred on August 6, 1997. The triggering action for this Five-Year Review is EPA concurrence with the previous Five-Year Review which occurred on July 15, 2002. The Five-Year Review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.



## II. SITE CHRONOLOGIES

### A. Through August 2002 Five-Year Review

#### Southwest Funston Landfill, OU 001

Event	Date
Landfill Operations Began	1950s
Landfill Operations Ceased	1981
Landfill Closed, Approved by KDHE	1983
Initial Discovery of Problem/Contamination	27-Apr-84
Remedial Investigation Report/Revised	Oct 1993/April 1994
Engineering Evaluation/Cost Analysis Report for Riverbank Stabilization and Landfill Cover Repairs	Jul-93
Action Memorandum	Dec 1993
Riverbank Stabilization	Feb - Apr 1994
Landfill Cover Repair	Nov 1994 - Oct 1995
Landfill Cover Improvements	May 1996 - Mar 1997
Removal Action Report	Jun 1997
Feasibility Study Report	Apr 1994
Proposed Plan	Nov 1994
Operations and Maintenance Plan	1-Mar-96
Record of Decision Signed	6-Aug-97
Landfill Repair Project - 21,000 CY of fill placed to repair differential settlement, monitoring well access road regraded and new gravel placed	June 3 - 28, 2002

#### Pesticide Storage Facility, OU 002

Event	Date
Initial Discovery of Problem/Contamination	Prior to 1990
Remedial Investigation Report/Addendum	Dec 1993/Aug 1997
Engineering Evaluation/Cost Analsis for Soil Removal	Aug-93
Action Memorandum	Dec-93
Enforcement Documents (Unilateral Admin Order)	Fine - 1993
Feasibility Study Report	May-95
Proposed Plan	Jul-97
Record of Decision Signed	1-Sep-97

**Dry Cleaning Facilities Area, OU 003**

<b>Event</b>	<b>Date</b>
Buildings 180/181 operated as a laundry	1915 - 1983
Buildings 180/181 operated as dry cleaning facilities	1930 - 1983
Building 183 operated as a laundry	1941 - 2002
Building 183 operated as a dry cleaning facility	1983 - 2002
FFA Requires Site Investigation of former Dry Cleaners	Jun 1991
PA/SI Planning	1991-1992
PA/SI Field Work	1991-1992
PA/SI Report Approved	16-Oct-1992
RI/FS Initial Field Investigations	Feb - Apr 1993
RI/FS Workplan	Jul 1993
RI Field Work	Nov - Dec 1993
Sewer Line Repaired	May 1994
SVE and Groundwater Extraction Pilot Studies Initiated	May 1994
Soil Vapor Extraction Pilot Test	Nov - Dec 1994
RI/FS Workplan	Mar 1995
FS Report	Apr 1995
RI Addendum	Mar 1998
Revised FS Report	Mar 1998
Proposed Plan	21-Dec-98
KDHE Invoke Dispute	14-Jan-99
KDHE Dispute Resolution Proposal Letter	16-Feb-99
KDHE Dispute Resolution Letter Received	1-Apr-99
EPA Dispute Resolution Letter Received	5-Apr-99
Work Plan Addendum	14-Mar-02
Phase 1 Field Work - DCFA Geoprobe	May - Jul-2002
Groundwater Sampling	Jul 2002

**Former Fire Training Area - Marshall Army Airfield, OU 004**

<b>Event</b>	<b>Date</b>
Fire-training exercises conducted in crushed stone pit	Mod 1960s - 1984
Reportedly 55 gallons PCE released into fire pit	Aug-82
IWSA identifies FFTA-MAAF for further study	1992
SI for "High Priority Sites" including FFTA-MAAF initiated	Sept 1993
EE/CA for Exposure Control initiated -- this was for installation of replacement wells on private property. This action was suspended because a property owner filed suit against the Army.	1996
EE/CA to address hot-spot contamination initiated -- never completed because contamination larger than originally thought. FFA parties agreed to proceed with RI/FS	1997
Bioventing/SVE Pilot Study Field Work	Oct 94 - Sep 95
SVE/Bioventing Pilot Study Report	10-May-99
RI Report	26-Mar-01
Surface Water Sampling	23 - 26 Jul 01
RAO/ARAR Technical Memorandum	17-Jan-02
Technical Identification and Alternatives Analysis	20-May-02

**354, OU005**

<b>Event</b>	<b>Date</b>
Former Building 354 constructed as a gasoline service station.	1935
The 354 site is formally designated an operable unit after soil and groundwater investigation undertaken after UST removals reveals the presence of chlorinated solvents.	Jan 1997
RI/FS Workplan	1-Feb-99
RI Field Work - Summer/Fall 1999 Groundwater and Soil Geoprobe Investigation	Jun 99 - Feb 00
RI Field Work - Winter 1999 Monitoring Well Installation	Dec 99 - Jul 00
Tech Memo on Geoprobe Screening Data	30-Mar-00
Field Data Evaluation / RIWP Addendum	30-Jan-01
Additional RI Field Work - Source Definition/Geoprobe Screening	May 01 - Jul 01
Surface Water Sampling	23-Jul-01
Monitoring Well Installation	30-Jul-01
BLRA Quarterly Groundwater Sampling	Sep 01 - Sep 02
Field Work-Additional Soil Sampling	Oct 01 - Nov 01

**B. Since August 2002**

**Southwest Funston Landfill, OU 001**

<b>Event</b>	<b>Date</b>
Groundwater Sampling	3-Sep-02
2002 Annual Landfill Inspection	10-Oct-02
2002 Annual Inspection Report	13-Nov-02
Groundwater Sampling	11-Apr-03
Plant Native Grass	21-Apr-03
Groundwater Sampling	8-Sep-03
2003 Annual Inspection	30-Oct-03
2003 Annual Inspection Report	11-Dec-03
Groundwater Sampling	8-Mar-04
Groundwater Sampling	7-Sep-04
2004 Annual Landfill Inspection	6-Dec-04
2004 Annual Inspection Report	7-Jan-05
Groundwater Sampling	28-Mar-05
2005 Annual Landfill Inspection	19-Sep-05
Groundwater Sampling	26-Sep-05
2005 Annual Inspection Report	19-Oct-05
Groundwater Sampling	27-Mar-06
EPA approves request from Fort Riley to change groundwater monitoring from semi-annual to annual and to delete analysis for lead based on decreasing contaminant concentrations and all analytes below MCLs in results from March 2006 event	11-Jul-06
Groundwater Sampling	18-Sep-06
2006 Annual Landfill Inspection	20-Sep-06
2006 Annual Inspection Report	20-Oct-06
Bank Stabilization Extended 100' Upstream	Nov 2006
Cover Repair - western half of landfill	Dec 2006

**B. Pesticide Storage Facility, OU002**

<b>Event</b>	<b>Date</b>
Demolition of Building 348 structure completed - concrete foundation and floor slab left in place	2002
Former Building 348 floor slab covered with asphaltic concrete to eliminate potential for rainfall infiltration	2003
Surface Soil Samples Collected for 5 Year Review	16-Jun-06

**C. Dry Cleaning Facilities Area, OU003**

<b>Event</b>	<b>Date</b>
Phase 2 Feld Work - TA2 Geoprobe	Oct 02
Groundwater Sampling	Oct 02
Groundwater Sampling	Apr - May 03
Final RI Work Plan Addendum Bldg 183	30-Jun-03
Install TA2 Monitoring Wells	Jul 2003
Collect Bldg 183 Soil Samples	18-Jul-03
Groundwater Sampling	Jul 03
Groundwater Sampling	Oct 03
Groundwater Sampling	Apr 04
RI Report Addendum	30-Apr-04
Feasibility Study Addendum (Cancelled vice Pilot Study)	31-May-04
Groundwater Sampling	Oct 04
EPA approves Fort Riley request to abandon 29 monitoring wells, to change sampling frequency from semi-annual to annual and to limit analysis to COCs	1-Mar-05
Groundwater Sampling	Apr 05
Pilot Study Work Plan	29-Aug-05
Groundwater Sampling	Oct 05
Pilot Study Field Work	Oct 05 - Nov 06
Groundwater Sampling	Mar 06
Pilot Study Performance Evaluation I	22-Jan-07
Pilot Study Performance Evaluation II	9-Apr-07
Draft Proposed Plan	13-Mar-07

**Former Fire Training Area - Marshall Army Airfield, OU004**

<b>Event</b>	<b>Date</b>
Detailed Analysis of Alternatives	12-Nov-02
Microcosm Study Report	20-Feb-03
FS Report	15-Sep-03
Proposed Plan	13-May-04
Public Comment Period	13 Jul - 11 Aug 04
Public Availability Session	20-Jul-04
Record of Decision submitted	12-Feb-05
Fort Riley Signs ROD	21-Jul-05
EPA Region VII Signs ROD	10-Aug-05
Remedial Design/Remedial Action Plan	26-Jan-06

**354, OU005**

<b>Event</b>	<b>Date</b>
354 Air Sampling Plan	27-Dec-02
Phase 1 Air Sampling	Feb 03 - Apr 04
Phase 2 Air Sampling	Apr 03 - Jun 03
RI Report	6-Nov-03
Pilot Study Work Plan	31-Dec-03
Pilot Study Field Work	Mar 04 - Feb 05
RAO/ARAR/Tech ID/DAA	19-Apr-04
PS WP Addendum	27-Sep-04
Soil Gas Investigation Work Plan	27-Sep-04
Soil Gas Investigation Field Work	Nov 04 - Jan 05
FS Report	22-Dec-04
Proposed Plan	19-May-05
Soil Gas Investigation Report	1-Jun-05
Public Comment Period	13 Jun - 12 Jul 05
Pilot Study Report	30-Jun-05
Public Availability Session - Proposed Plan	12-Jul-05
ROD Approved	15-Jun-06
Remedial Design/Remedial Action Plan	7-Mar-07

### III. BACKGROUND

#### A. Fort Riley

Fort Riley was established as a temporary military camp in 1852 known as Camp Center. In 1853, it was re-named Fort Riley in honor of Major General Bennett Riley and became a permanent Cavalry post. The post served as the Cavalry and Light Artillery schools from the 1880s to the 1940s. It trained and deployed soldiers in every major conflict in our nation's history since the post's founding. The installation is situated along the Kansas and Republican Rivers in Riley, Clay, and Geary Counties in north-central Kansas, near the cities of Manhattan, Ogden, Junction City, Riley, and Grandview Plaza, Kansas. The installation comprises approximately 101,000 acres.

Fort Riley is located in the Flint Hills region of Kansas that lies within the Osage Plains Section of the Central Lowlands physiographic province. The general topography around Fort Riley consists of uplands incised by steep drainage features. Terrain on the installation varies from narrow alluvial bottomlands in the uplands, to wide meander floodplains and associated terraces along the Republican and Kansas Rivers, to steep slopes, and to slightly dipping uplands. This topographic expression is developed on Permian-aged limestones and shales that dip very gently to the west-northwest. The limestones form resistant ridges and the shales are easily eroded to form the stream valleys.

The Fort Riley reservation has historically functioned both as a small municipality and light industrial complex. Solid waste disposal (landfilling), wastewater treatment and discharge, facilities maintenance and construction, pesticide usage, dry cleaning operations, and electrical equipment installation, storage, and repair, are among the environmentally significant municipal activities at Fort Riley. Fort Riley's function as a military training, equipment supply, and maintenance center has required management and disposal of wastes associated with these activities. The Interim Final Report-Hazardous Waste Management Consultation No. 37-26-0190-89 Evaluation of Solid Waste Management Units Fort Riley, Kansas 9-13 May 1988 delineated potential contaminated sites and was done by the U.S. Army Environmental Hygiene Agency. An Installation-Wide Site Assessment for Fort Riley, Kansas was completed February 16, 1993 and it contained further analysis and definition of potential contaminated sites.

Pursuant to Section 105 of CERCLA, Fort Riley was proposed for inclusion on the National Priority List (NPL) on July 14, 1989 and the listing became effective October 1, 1990. Two sites were combined by the EPA and reported as one site for Hazard Ranking System scoring purposes. Those two sites were the Pesticide Storage Facility and the Southwest Funston Landfill. To ensure that environmental impacts associated with activities at the installation were thoroughly investigated and appropriate remedial action taken, Fort Riley, the EPA, and the Kansas Department of Health and Environment (KDHE) entered into a Federal Facility Agreement (FFA), dated February 28, 1991. The FFA specifically required that the Southwest Funston Landfill and Pesticide Storage Facility sites be addressed through the Remedial Investigation/Feasibility Study (RI/FS) process.

As a result of the implementation of recommendations made by the Base Realignment and Closure Commission (BRAC), the population at Fort Riley and surrounding communities, that includes active duty military and their families, the civilian work force, and military retirees, is



estimated to increase from 46,000 to 68,000 by 2011. This will result in a \$1,100,000,000 construction program at Fort Riley to provide the facilities necessary to support the increased population and expanded mission. In addition, Fort Riley's annual operating budget will increase from \$900,000,000 to \$1,300,000,000 over the next four years.

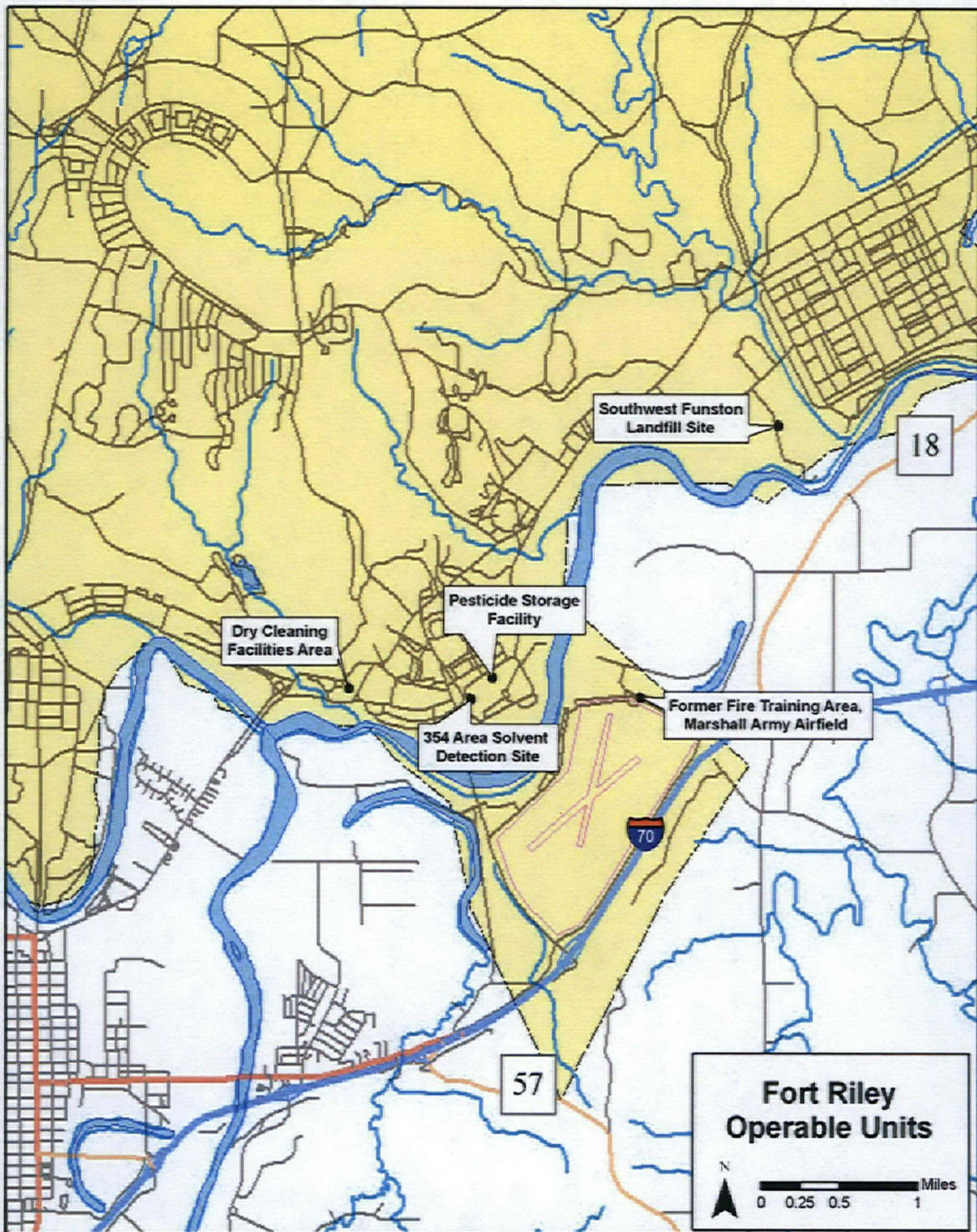


Figure 1 – Location of Operable Units

## **B. Southwest Funston Landfill, Operable Unit 001**

### **Physical Characteristics**

The Southwest Funston Landfill (SFL) site covers approximately 120 acres in the southern portion of Fort Riley, adjacent to the southwest corner of the Camp Funston cantonment area. See Figures 1 and 2. The limits of the SFL site extend from the north bank of the Kansas River north to near Well House Road, and east from the pre-1951 flood Kansas River channel to just west of Threemile Creek. The actual area that received waste is approximately 107 acres in aerial extent. The waste was placed in trenches approximately 16 feet in depth. Groundwater is at a depth of approximately 20 feet below the ground surface and bedrock is at a depth of approximately 45 feet.

The SFL Site (OU 001) lies entirely within the 50-year floodplain of the Kansas River. The nearest surface water impoundment to the SFL was Whitside Lake, an oxbow lake located about 0.5 miles northwest of the site. This oxbow lake was part of the Kansas River channel prior to the 1951 flood that changed the course of the Kansas River. During flooding in 1993, floodwater passed through the lake following the course of the former channel. Sediment was deposited by the floodwater and that eliminated this previous surface water feature.

### **Land and Resource Use**

Currently, the entire SFL Site (OU 001) is within a zone designated as "Open Space" in the Environmental Overlay of the Fort Riley Real Property Master Plan (RPMP), dated May 15, 2007. The projected land use will not change.

The SFL is located in the alluvial bottomlands adjacent to the Kansas River, with little topographic relief compared to the surrounding land surface. The landfill area was graded and a continuous soil cover was constructed as part of the KDHE approved closure activities in 1983. The area was seeded with native grasses. The SFL was bounded by agricultural land to the west (which has not been used since the 1993 flood) and the Camp Funston cantonment area to the east. The SFL Site (OU 001) slopes very gently toward the east-southeast. Steep slopes exist along the banks of the Kansas River to the south and along Threemile Creek to the east.

The ground-water aquifer underlying the SFL site is currently not a drinking water source and a future beneficial use of groundwater for drinking water is not expected and is highly unlikely since other sources of high quality and quantities of groundwater are available to Fort Riley. Further, placing a drinking water well in the landfill is restricted by the land use designation as Open Space in the RPMP. The dominant groundwater flow is to the southeast into the Kansas River.

### **History of Contamination**

The SFL operated from the mid-1950s to 1981, receiving wastes that included typical municipal waste and industrial wastes from various activities at the installation. Some of these industrial wastes were reported to have contained hazardous substances and were thus identified as potential sources of contamination. The types of wastes generated by vehicle and aircraft maintenance shops, print shops, furniture repair shops, painting facilities, oil analysis laboratory, autoclaved biological waste, pesticide/herbicide storage and preparation, laundry and dry cleaning facilities, and wastewater treatment plants that were deposited in the landfill are the potential source of

contamination at the SFL. The wastes may have included metal-laden oils, solvents, inks, paints and heavy metals, and dried wastewater treatment plant sludge. The landfill was closed in 1983.

### **Initial Response**

Under Section IX.A., paragraph 2 of the Federal Facility Agreement which was effective June 28, 1991, the SFL Site (OU 001) was specifically addressed as a potential area of contamination and a schedule for an RI/FS was established. The original RI monitoring wells were installed in April 1992 and the results of the investigation are contained in the RI Report dated October 1993 with revisions published in April 1994.

### **Basis for Taking Action**

The Baseline Risk Assessment (BLRA) found that, for a future hypothetical resident using an on-site well, the contaminants in groundwater posed a significant risk through the ingestion and inhalation pathways. Chemicals of potential concern (COPCs) were identified as the metals - antimony, arsenic, beryllium, and the volatile organic compounds (VOCs) - benzene, 1,2-dichloroethane, cis-1,3-dichloropropene, 1,1,2,2 tetrachloroethane, 1,1,2-trichloroethane, and vinyl chloride. Arsenic, antimony, and manganese were the major contributors to the total noncarcinogenic hazard index, while vinyl chloride, 1,1,2,2-tetrachloroethane, arsenic, and beryllium contributed the most to the total excess cancer risk. Of these chemical of concern (COCs), manganese was found to be consistent with background, and arsenic and beryllium were below their respective maximum contaminant levels (MCLs). The ROD identified a groundwater monitoring program that would initially include semi-annual sampling and analysis for VOCs, antimony, and lead.



Figure 2 – Southwest Funston Landfill



**Photograph 1 – Southwest Funston Landfill**

## **C. Pesticide Storage Facility, Operable Unit 002**

### **Physical Characteristics**

The Pesticide Storage Facility (PSF) Site (OU 002) is situated on a terrace on the north side of the Kansas River valley, approximately 2,000 feet north and west of the Kansas River. See Figures 1 and 3. The PSF Site (OU 002) covers approximately 2/3 of an acre around building 348 and is located in the Main Post area. The site includes a portion of the Directorate of Public Works (DPW) storage yard, which is surrounded by a fence and has secured access. The site extends south of Dickman Avenue to the south-central edge of the Main Post cantonment area and southeast across the railroad tracks. Topographic elevations at the PSF Site (OU 002) are approximately twenty-five feet higher than the Kansas River. The ground surface east of the building 348 fence slopes downward toward the east-southeast at a grade of approximately 10 percent. There is an abrupt slope change just east of the PSF fence line.

### **Land and Resource Use**

Currently the entire PSF Site (OU002) is within a land use area designated as "Industrial" in the RPMP. The projected land use will not change.

### **History of Contamination**

The Pesticide Storage Facility, Building 348, was constructed in 1941 as a general-purpose warehouse. Fort Riley records do not indicate when pesticides were first stored in building 348, however, interviews with Fort Riley personnel revealed that building 348 had been used for pesticide storage since at least 1973. Prior to the late 1970s, the maintenance/storage yard east of and adjacent to building 348 was used to wash down vehicles and spray equipment used for pesticide applications. Since at least 1976, the majority of pesticide application at Fort Riley has been performed by outside contractors who were not allowed to use the PSF Site (OU 002). During 1988, several polychlorinated biphenyl (PCB)-containing electrical transformers were stored in containers outside the southeast corner of building 348. Other items previously stored on site included paint, pesticides/herbicides, pressure-treated lumber, and various general improvement materials and equipment.

### **Initial Response**

Site contamination at the PSF Site (OU 002) was first revealed by Army pesticide-use monitoring studies conducted prior to 1990. Fort Riley initiated planning of the RI/FS in 1990 during the development of the FFA. Field activities began in early spring of 1992.

### **Basis for Taking Action**

The chemicals of potential concern identified in the initial RI included pesticides, polycyclic aromatic hydrocarbons (PAHs), and metals. The pesticides most frequently detected in soils were chlordane, dichloro-diphenyl-trichloroethane (DDT) and DDT metabolites, and dieldrin. Arsenic, chromium, and lead concentrations exceeded background levels in some samples while barium levels were consistent with background conditions. In the groundwater, metals were detected at levels consistent with background levels, no pesticides were detected, and a single detection of toluene was registered.



Figure 3 – Pesticide Storage Facility





**Photograph 2 – Pesticide Storage Facility**

## **D. Dry Cleaning Facilities Area, Operable Unit 003**

### **Physical Characteristics**

The Dry Cleaning Facilities Area (DCFA) Site (OU 003) is located in the southwest portion of the Main Post cantonment area in the southern region of Fort Riley. The site consists of five separate but related areas (Figure 4), the DCFA (where two former dry cleaners were located), the Transition Zone (a change in soil type located between DCFA and the Island), the Island (a point bar south of DCFA next to the Kansas River), the Horse Corral (east of the Island where horses are trained), and Training Area 2 (located south of the river where the Army holds field exercises).

### **History of Contamination**

Dry cleaning operations were conducted at former Buildings 180/181 and 183 (Figure 4). Former Buildings 180/181 operated as a laundry facility from 1915 to 1983 and as a dry cleaning facility from 1930 to 1983. From 1983 until 2000, former Buildings 180/181 were used for general storage. Former Building 183 was initially used as a laundry facility from construction in 1941 until 2002, and as a dry cleaning facility from 1983 to 2002.

Stoddard solvent, a petroleum distillate mixture, was used as the dry cleaning solution from 1944 until 1966. From 1966 until dry cleaning operations ceased, tetrachloroethene (PCE) was used as the cleaning solution. Buildings 180/181 and the surrounding structure, parking lots, and sidewalks were demolished in summer 2000. Building 183 and the surrounding structures were demolished in fall 2002. The locations where these buildings once stood are now empty, grassy lots.

### **Response Actions**

Several source removal actions have been conducted at the Site. The first source removal action was a soil vapor extraction pilot test study performed at the DCFA Site (OU 003) from November 1994 through April 1995. This remediation effort was successful in removing an estimated 24 pounds of contaminants, primarily PCE from the soil.

In November and December 2005, Fort Riley conducted a soil source removal pilot study (PS) at area of concern (AOC) 1 (Figure 4). Two other pilot studies were conducted at AOC 2 and AOC 3 in 2006. The preferred remedial alternatives developed for the three AOCs in the FSA were performed during the PS. Soil was treated at AOC 1 and groundwater was treated at AOC 2 and AOC 3. A brief summary of the pilot studies are presented below.

At AOC 1, in November and December of 2005, shallow soil was excavated to a depth of 8 to 12 feet and was transported to an on-post treatment cell. The soil was treated at the treatment cell during spring 2006. Soil was excavated from two areas at or near the former Building 180 footprint. Approximately 2,400 cubic yards of soil were removed for treatment. Soil samples were collected from the excavations to confirm that the soil remaining was below the Risk-Based Values for Kansas (RSK) levels. The excavations were backfilled with clean, high-clay content soil. Soil around selected abandoned-in-place sewer lines and Manholes 363 and 367 were also excavated. Soil samples were collected from the sewer line backfill and analyzed for PCE, trichloroethene (TCE), and *cis*-1,2-dichloroethene (*cis*-1,2-DCE). No soil sample concentrations

greater than the RSK levels were found within the manhole and sewer line excavations. A total of 3,692 gallons of 10% sodium permanganate solution (a chemical oxidant) was injected into the sewer lines associated with Manholes 367 and 365, at the base of Manhole 363, in the sewer line trench between Manhole 365 and 363, and in the abandoned high-pressure gas line trench. The sodium permanganate was added to destroy through oxidation any remaining chlorinated hydrocarbons. Groundwater sampling in fall 2006 of monitoring wells in the area of AOC 1 indicated a decrease in the levels of chlorinated hydrocarbons present.

In May of 2006, CAP 18™ (a non-emulsified vegetable oil product) was injected into the groundwater portion of AOC 2. This area includes a bedrock erosional channel. The vegetable oil was injected to enhance the degradation of the chlorinated hydrocarbons that is naturally occurring in this area. Approximately 8,200 pounds of vegetable oil were injected through 72 injection points. Groundwater results from monitoring wells in the erosional trench indicate that CAP18 has enhanced the natural degradation causing a decrease in the chlorinated hydrocarbons present in Monitoring Wells DCF06-40 and DCF93-13.

At AOC 3, in January and February of 2006, an aqueous solution of sodium permanganate was injected into a 375 square foot area of the vadose zone located near Monitoring Well DCF02-42. 7,400 pounds of sodium permanganate was injected at 23 locations to reduce potential contamination present in the vadose zone near Monitoring Well DCF02-42. This was a potential source area for the groundwater contamination near Monitoring Wells DCF02-42 and DCF96-25. In April and May of 2006, a pilot study involving the chemical injection of potassium permanganate into the saturated zone between Monitoring Wells DCF02-42 and DCF96-25 was conducted. Potassium permanganate destroys contaminants through oxidation. 21,755 pounds of potassium permanganate were injected into the saturated zone through 44 injection points. The potassium permanganate was emplaced throughout the saturated zone between these two wells. Monitoring of the groundwater within the area treated indicates that potassium permanganate still remains in the wells and is actively treating the chlorinated hydrocarbons present. Following completion of treatment, the concentrations for Monitoring Wells DCF06-25 and DCF02-42 are expected to decrease. Treatment performance monitoring is currently on going and the effectiveness of the treatment will be reported in a future Pilot Study or Remedial Design Report.

In September of 2006, CAP18™ was injected at three separate areas near Monitoring Wells DCF02-49c (the Island) and DCF99-37c and B354-99-11c (Horse Corral). Approximately 5,530 pounds of vegetable oil were injected through 37 injection points.

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

Soil concentrations of PCE above the RSKs were detected at two shallow soil source areas to a maximum depth of 12 feet at AOC 1. These soil sources were removed during the PS and soil (AOC 1) is no longer a media of concern. Groundwater at AOCs 2 and 3 is a medium of concern at this site, with PCE, TCE, *cis*-1,2-DCE, and vinyl chloride (VC) the contaminants of potential concern (COPCs).

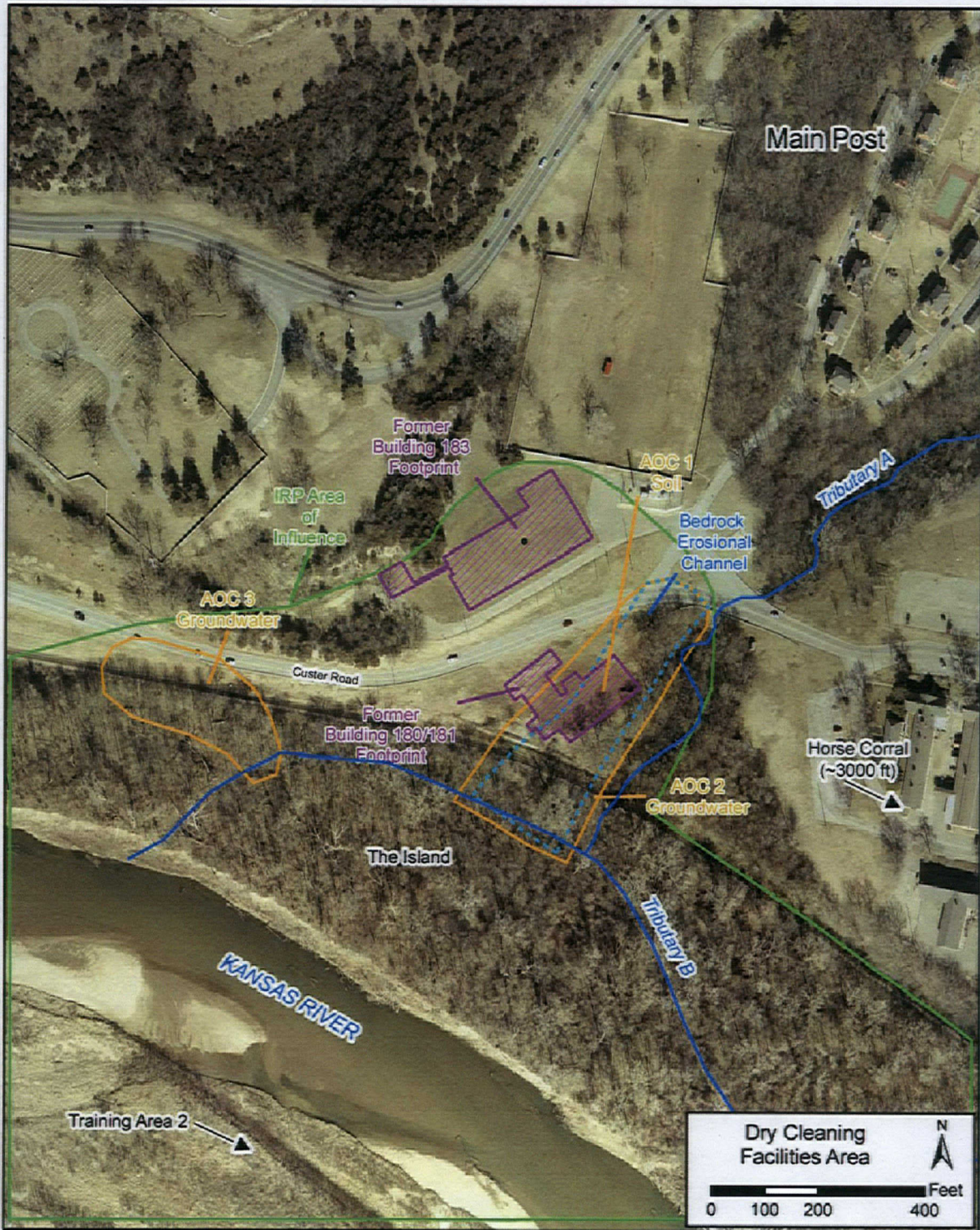
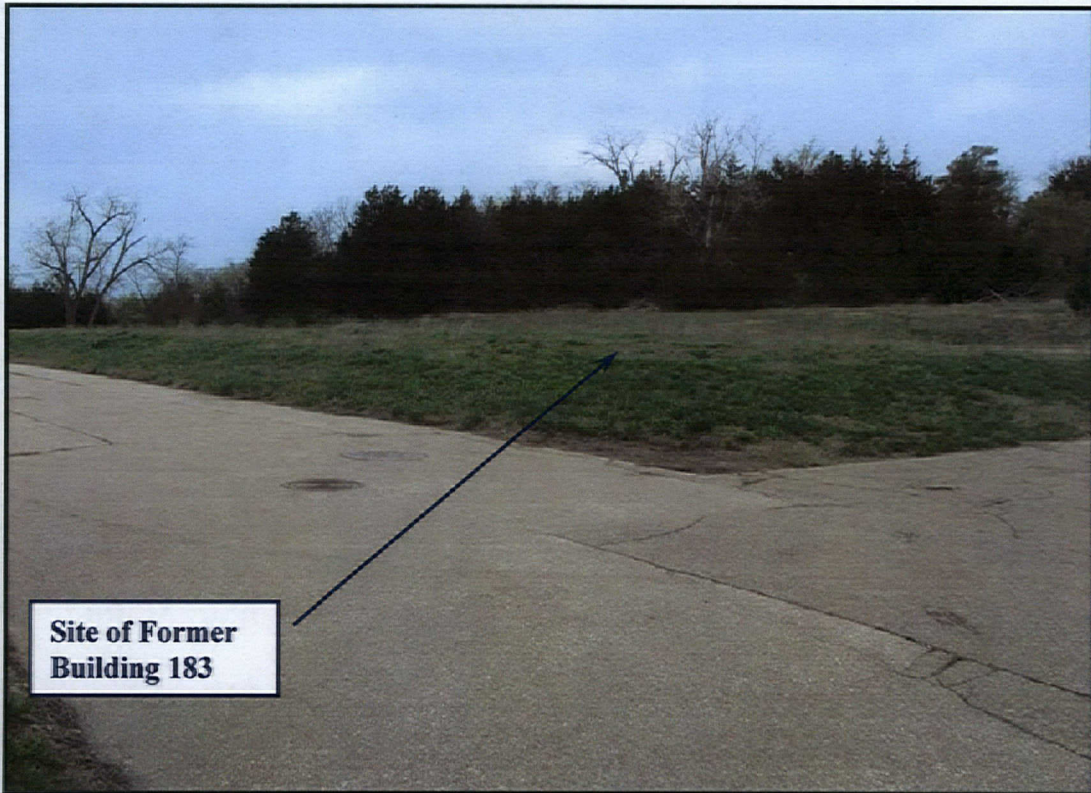


Figure 4 – Dry Cleaning Facilities Area



**Site of Former  
Buildings 180/181**



**Site of Former  
Building 183**

**Photograph 3 – Dry Cleaning Facilities Area**

## **E. Former Fire Training Area – Marshall Army Airfield, Operable Unit 004**

### **Physical Characteristics**

The Former Fire Training Area – Marshal Army Airfield (FFTA-MAAF) Site (OU 004) consists of a fire pit surface feature and the initial portion of a groundwater contaminant plume on the Fort Riley military reservation and the remaining portion of the groundwater plume which is located to the northeast of the military reservation. The FFTA is located at the east end of MAAF in the southern region of the Fort Riley military installation and extends to the Kansas River. MAAF is in the southern region of Fort Riley, south of the Kansas River and just north of Interstate 70. The FFTA-MAAF Site (OU 004) is located on the alluvial floodplain of the Kansas River. The soils immediately beneath the FFTA-MAAF Site (OU 004) consist of unconsolidated alluvial sand and gravel deposits with minor discontinuous lenses of silt and clay that tend to coarsen downward to the bedrock surface. The top of bedrock is approximately 60 to 70 feet below ground surface (bgs) and is comprised of limestone and shale units that dip gently (less than one degrees) to the west-northwest.

### **Land and Resource Use**

The FFTA-MAAF is part of the Fort Riley reservation and, as such, is not zoned by the three State of Kansas counties (Riley, Clay and Geary) within which it is located. The FFTA-MAAF pit is located within an airfield use zone as defined in the Fort Riley Master Plan. According to the Installation Compatibility Use Zone Study (ICUZ) prepared for Fort Riley by Robert and Company, the FFTA-MAAF is west of aircraft accident potential zone (APZ) APZ-I, the approach safety zone, and APZ-II, the accident potential zone. Department of Defense (DoD) guidelines prevent uses in APZs which have high residential density, large numbers of workers, concentrations of people not able to respond well to emergencies, among other restrictions and structures.

Within areas with groundwater contamination above MCLs, the KDHE Environmental Use Control (EUC) Program restricts future use to agricultural, industrial, or commercial use and prohibits the installation of drinking water wells. The implementation of the KDHE EUC Program was addressed in the Proposed Plan for FFTA-MAAF. However, because all samples were below MCLs for the March 2005 groundwater sampling event, it was determined during the Remedial Design that the EUC Program would not be utilized unless groundwater concentrations increased to levels above MCLs in the future. To date, that has not occurred.

A small triangular tract of property north of Levee Road including the road north of the levee is within the Fort Riley military reservation boundary but is leased by the Army to Plaza Speedway as a safety zone (referred to as Junction City Raceway on the property lease). The lease agreement restricts construction of any permanent structure on the property.

The racetrack located north of the FFTA-MAAF is zoned commercial by Geary County. The commercial zoning allows for the use of a mobile home for sales but not as a residence. The property north of MAAF and outside the racetrack property is zoned by Geary County for agricultural use.

Lease agreements are currently in place between Fort Riley and adjacent landowners whose land has been impacted by the contaminant plume. The agreements allow for the installation, maintenance, abandonment and access to ground water monitoring wells. The landowners have been provided with the results of monitoring events and other information on the contaminants at the FFTA-MAAF Site.

The ROD provides that Deed Notices will be filed with landowner permission for impacted adjacent properties informing people of the types of contaminants and the risks they create. Because all samples from all wells fell below and have remained below MCLs since March 2005, deed notices have not been filed nor will they be filed unless groundwater concentrations increase to levels above MCLs in the future.

The nearest public water supply well is in Building 801 at MAAF and is within one mile of the site, located south and up gradient of the FFTA-MAAF Site (OU 004). The well serves as a backup water supply for the airfield in the event an emergency affects the main Fort Riley water supply wells and /or water distribution system.

There are seven private wells north of the FFTA-MAAF Site (OU 004). Six of the wells (identified as wells F-1, F-2, N-1, M02-02, and R02-02) are located within the Kansas River valley and one well (identified as well B-1) appears to be near the margin of the valley and the upland terrace. None of these wells fall within the plume based on the available data collected through October 2006. Of the six wells located in the river valley, two presently supply water for domestic use (M02-02 and R02-02). Well M02-02 is located at a residence approximately 400 feet north of the FFTA-MAAF Site (OU 004) and well R02-02 is located at the racetrack. Wells F-1 and F-2 are located at an abandoned trailer house; one is reported to supply water for livestock. Well I-1 is an irrigation well approximately 2,400 feet north (down gradient) of the FFTA-MAAF Site (OU 004). During years 1997 and 1998, water use from this well was reported to be 25.1 million and 15.6 million gallons respectively. The seventh well (B-1) is located at a residence approximately 6,000 feet northeast of the site near the edge of the river valley. This well supplies water to a residence for domestic use.

The major river in the area is the Kansas River, which runs along the southern portion of Fort Riley. None of the surface waters are used as a direct source for drinking water, but are used for recreational purposes, such as for swimming and fishing.

### **History of Contamination**

The FFTA-MAAF Site (OU 004) was operated from the mid-1960s through 1984 to conduct fire-training exercises. During these exercises, flammable liquids were poured into the FFTA, ignited, and then extinguished. The predominant fuels used for the fire training exercises were JP-4 (jet fuel), diesel, and MOGAS (a generic term for leaded motor gasoline). In August 1982, reportedly 55 gallons of tetrachloroethene (PCE) were inadvertently poured into the fire training pit at the site. The PCE is believed to have moved downward through the soil to the groundwater. Some of these contaminants have migrated in the groundwater northward from the FFTA-MAAF Site (OU 004) under private property.

## **Initial Response**

The day after the PCE was inadvertently poured into the fire pit, it was pumped out and placed into 55-gallon drums. Fire fighting training at the site was discontinued in 1984.

## **Basis for Taking Action**

Fort Riley conducted an Installation-Wide Site Assessment (IWSA) in 1992 to identify sites having the potential to release hazardous substances to the environment. The IWSA identified the FFTA-MAAF as one of the sites where releases of hazardous substances to the environment either have occurred or were likely to have occurred. Subsequent to the IWSA, in March 1994, a site investigation (SI) was conducted at the FFTA-MAAF. The SI results indicated that concentrations of organic compounds had been released to groundwater at concentrations exceeding federal and state drinking water standards. Also, similar contaminants were found in off-site private wells at levels above drinking water standards (LBA, 1994a). These results indicated that additional investigation and study at the FFTA-MAAF Site (OU 004) were necessary. The BLRA (human health and ecological) that was completed for FFTA-MAAF Site (OU 004) found that the estimated risks to human health and the environment were within or below the EPA acceptable levels. The presence of site-related contaminants off the site in the alluvial aquifer at levels exceeding drinking water standards (MCLs, identified as an ARAR) provides the basis for remedial action.



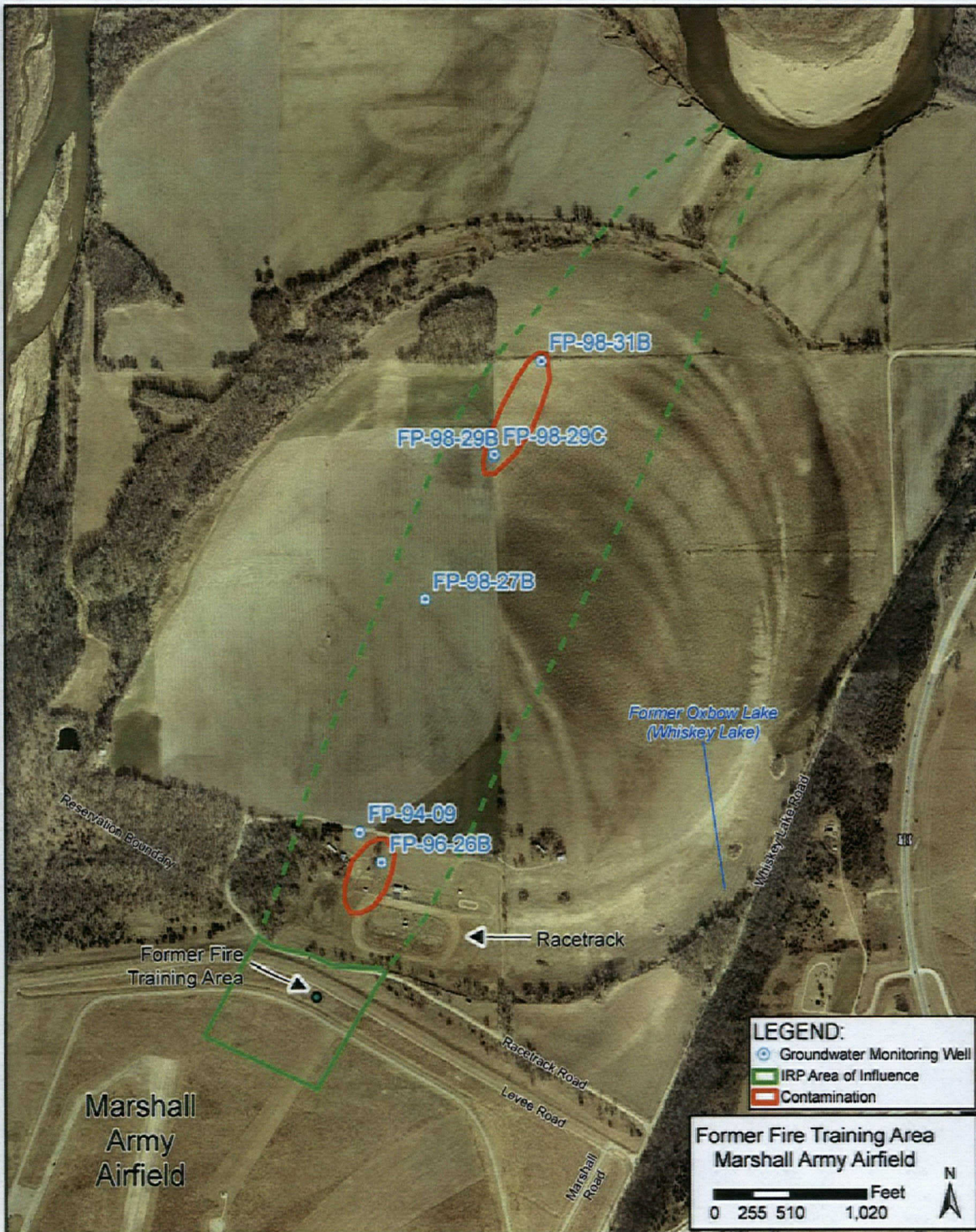
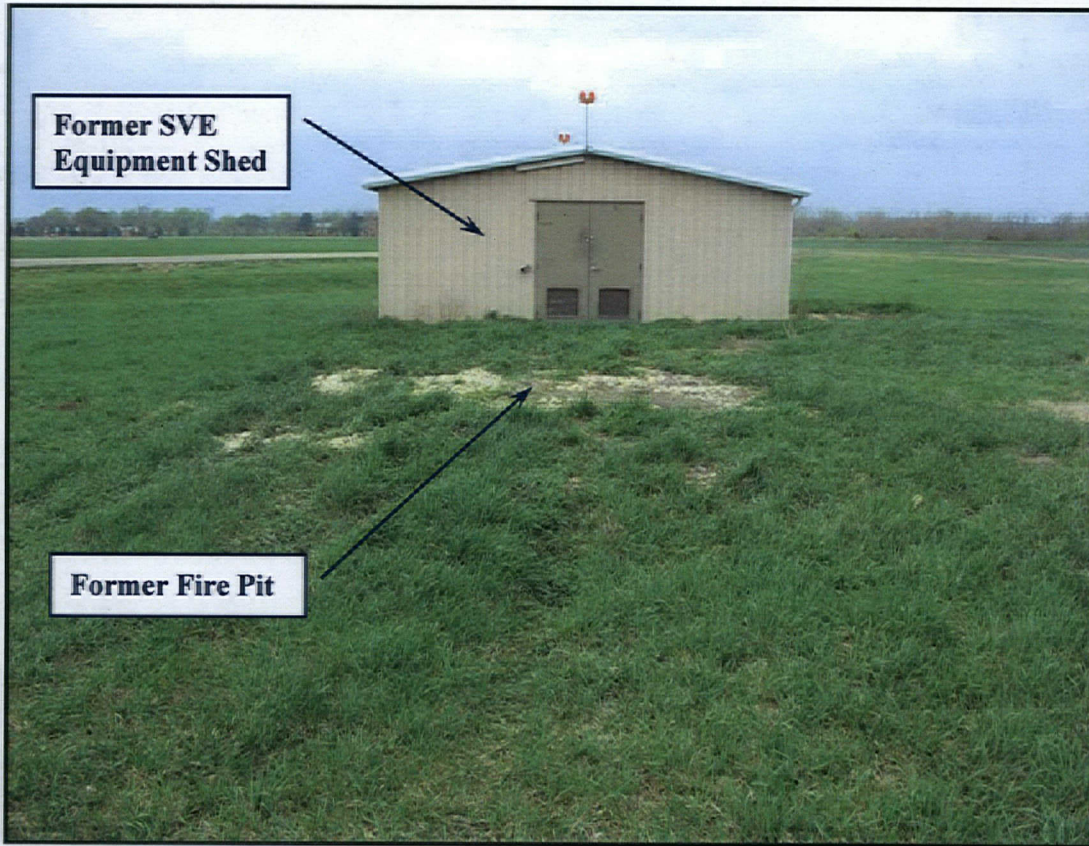


Figure 5 – Former Fire Training Area – Marshall Army Airfield



**Photograph 4 – Former Fire Training Area – Marshall Army Airfield**

## **F. 354 Area Solvent Detections, Operable Unit 005**

### **Physical Characteristics**

The Fort Riley, Kansas, 354 Area Solvent Detections (354 Site) (OU 005), is located at the Main Post cantonment area of the Fort Riley military installation, which is located in Geary County and Riley County, near Junction City. Main Post is in the southern region of Fort Riley, north of the Kansas River (Figure 1).

The 354 Site (OU 005) currently encompasses portions of the Main Post as far north as Godfrey Avenue, and virtually the entire point bar south of the Union Pacific Railroad (UPRR) grade and east of the Henry Drive Bridge. This point bar and an ancient alluvial terrace dominate the topography across this area. The point bar is part of the active floodplain and consists of approximately 60 feet (ft) of alluvial sediments overlying shale or limestone bedrock. The terrace, located to the north of the railroad grade, also consists of alluvial sediments deposited on shale and limestone bedrock; however, this area is topographically higher than the floodplain and the unconsolidated terrace deposits vary in thickness from nine to 64 ft.

### **Land and Resource Use**

The 354 Site (OU 005) is part of the Fort Riley reservation and is not zoned by Geary County. North and west of the UPRR grade is a built-up area (Main Post), with building and road development. Buildings include offices, barracks, family housing units, warehouses, and maintenance facilities. South and east of the UPRR grade is the point bar of the Kansas River. This area is mainly covered with forest and vegetation; although, there is one built-up area between the UPRR grade and Marshall Avenue. The built-up area consists of warehouses, several of which have been converted to office buildings.

Land use at the 354 Site (OU 005) is classified under the RPMP. It is anticipated that land use activities will remain unchanged into the foreseeable future. The Main Post area to the north of the UPRR grade is classified as a National Register Historic District. The area to the north of the UPRR has multiple land use designations under the RPMP including open space, industrial, maintenance, supply/storage, and administration. Portions of the area north of the UPRR may lie within the 500 year flood plain. The area to the south of the UPRR grade is classified as open space under the RPMP and should not see change from current land classification because it is within the active flood plain of the Kansas River where land uses must be in compliance with Executive Order 11988 – Floodplain Management. This Order restricts and places requirements on actions that occur within a flood plain. Additionally, the area within 100 meters of the current Kansas River bank is critical wildlife habitat for bald eagles that winter over at Fort Riley.

Groundwater is the primary source of drinking water for Fort Riley and many of the surrounding communities. Alluvial sand and gravel deposits in the Kansas and Republican River valleys are excellent aquifers. Potential users of the Kansas River are identified in this section. Fort Riley, Morris County Rural Water District, and the communities of Junction City and Ogden rely on groundwater withdrawn from alluvial materials for their drinking water supplies. Fort Riley has eight active wells in the Republican River alluvial aquifer, Junction City has nine active wells, Ogden has three active wells (United States Army Environmental Hygiene Agency [USAEHA], 1992), and Morris County Rural Water District has three active wells. The Fort Riley well field is not currently operating at full capacity. Ogden also provides water to a rural water district in

Riley County. The wells for Ogden and Junction City are more than four miles from the site and the Morris County Rural Water District wells withdraw water from the Clarks Creek alluvium, which is hydraulically separated from the Kansas River alluvium.

The Fort Riley water supply wells are located approximately four miles up gradient (west) of the 354 Site (OU 005) near Camp Forsyth. The nearest water supply well (used as a backup well) is located at MAAF, one mile south of the 354 Site (OU 005). The purpose for this well is to service the airfield in the event of an emergency affecting the Fort Riley water distribution system.

At the 354 Site (OU 005), there are no known water supply wells completed in the terrace aquifer. The transmissivity of the terrace aquifer is quite low. This is due to the limited saturated thickness, which is generally no greater than ten ft, and usually less than this depth. Because of the prolific supply available from the Kansas River alluvial aquifer, there is no reason for water supply wells to be completed in the terrace aquifer. There are no reasonably anticipated changes in water use at the 354 Site (OU 005) currently or in the near future. Implementation of ICs will ensure water supply wells are not completed in the terrace aquifer until remediation is complete.

#### **History of Contamination**

The former Building 354 was constructed in 1935 as a gasoline service station. In addition to gasoline and diesel fuel, it may have been subsequently used as a storage site for solvents and road oil. Two 10,000-gallon steel underground storage tanks (USTs), one 12,800-gallon steel UST, and one 8,500-gallon steel UST were installed at the site circa 1935 (United States Army Corps of Engineers [USACE], 1995), and were used for gasoline and diesel storage. Two 10,000-gallon steel USTs were installed at the site in 1980 and were used for diesel storage (Dames & Moore, 1995). The USACE indicated that the USTs were also used to store road oil, and may have been used to store solvents (USACE, 1996). The former USTs (including the solvent tank) were 20 ft south and approximately 60 ft northwest of the former Building 354. A drawing dated June 1982, obtained from the Fort Riley Directorate of Public Works (DPW), indicated plans to replace the pump on a solvent tank located approximately 15 ft southeast of former Building 354. The drawing does not indicate if the tank was an UST or an above-ground tank.

Fort Riley conducted an Installation-Wide Site Assessment (IWSA) in 1992 to identify sites having the potential to release hazardous substances to the environment. The IWSA did not specifically identify the 354 Site (OU 005) as a potential area of concern requiring further evaluation. It did address petroleum, oil, and lubricant (POL) facilities, including the 354 Site (OU 005), as sites which might be evaluated under the UST programs. These sites would normally be excluded from CERCLA, since CERCLA was not intended to cover sites impacted exclusively by petroleum contamination. However, following the removal of the USTs at the 354 Site (OU 005), investigation of soil and groundwater revealed the presence of chlorinated solvent contamination. As a result, during January 1997, the 354 Area Solvent Detections was formally designated an OU.

**Initial Response**

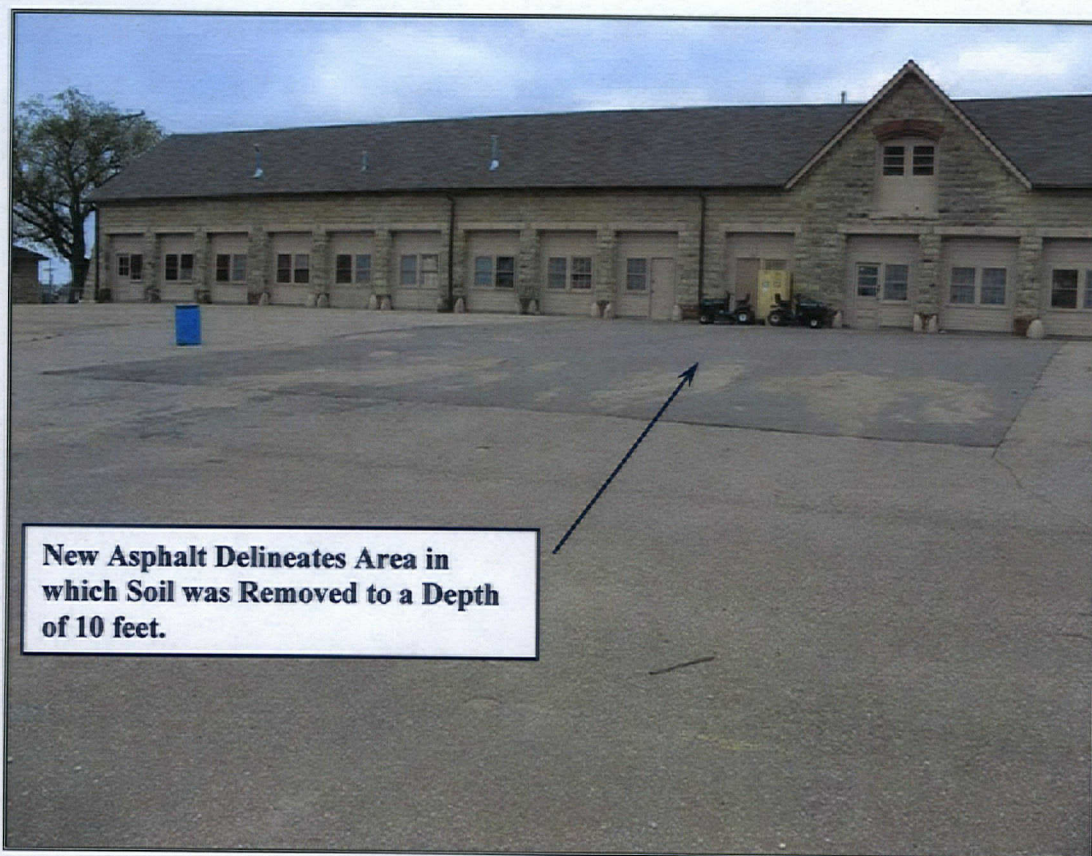
In 1998, the Army began a RI/FS to identify the types, quantities, and locations of the contaminants at the 354 Site (OU 005) and to develop a plan to address the contamination problem.

**Basis for Taking Action**

The baseline risk assessment (human health and ecological) that was completed for the 354 Site (OU 005) found that the estimated risks to human health and the environment were within or below the EPA acceptable levels. The presence of site-related contaminants in the Kansas River alluvial aquifer at levels exceeding drinking water standards (MCLs, identified as an ARAR) provides the basis for remedial action.



Figure 6 – 354 Area Solvent Detections



**Photograph 5 – 354 Area Solvent Detections**

## **G. Sites Not Identified as Operable Units**

In addition to the five Operable Units, 64 other sites have been identified at Fort Riley which might require remediation under CERCLA or RCRA.

### **Expanded Site Investigations**

Forty-nine sites have been included in an Expanded Site Investigation (ESI). This investigation was initiated in October 2005 when Fort Riley determined, after a review of the public record, that these sites did not have a formal decision on their regulatory status that was signed by the parties to the Federal Facility Agreement (FFA). The ESI includes the following sites listed by their Defense Site Environmental Restoration Tracking System (DSERTS) designation and grouped based on similar site conditions/contaminants:

- Twelve Pesticide/PCB sites
  - DRMO Storage Area 1 (FTRI-006)
  - PCB Storage Building 343 (FTRI-007)
  - PCB Storage Conex 348 (FTRI-008)
  - Pesticide UST at Camp Funston (FTRI-010)
  - DRMO Storage Area 3 (FTRI-012)
  - DRMO Storage Area 2 (FTRI-015)
  - Former Livestock Dipping Facility (FTRI-047)
  - Former Pesticide Facilities (FTRI-048)
  - Mercury Contamination Areas (FTRI-049)
  - PCB Transformer Sites (FTRI-050)
  - Milford Campground/Marina (FTRI-055)
  - DRMO Area 3 (No DSERTS Number)
  
- Six Wastewater Sites
  - Industrial Wastewater System Custer Hill (FTRI-020)
  - Camp Funston Wastewater Treatment Plant (WWTP) Sludge Drying Beds (FTRI-022)
  - Custer Hill WWTP Sludge Drying Beds (FTRI-023)
  - Camp Forsyth WWTP Sludge Drying Beds ( FTRI-024)
  - Main Post WWTP Sludge Drying Beds (FTRI-025)
  - Range Complex Wastewater Lagoons (FTRI-026)
  
- Ten Petroleum/Volatile Organic Compound (VOC) Sites
  - Abandoned VOC Tanks – Irwin Army Community Hospital (FTRI-013)
  - Waste Oil Above Ground Storage Tank (AST), 3<sup>rd</sup> Battery (FTRI-016)
  - Waste Oil AST, 4<sup>th</sup> Battery (FTRI-017)
  - Fire Training Area Facility 892 (FTRI-018)
  - Fire Training Area, Camp Funston (FTRI-028)
  - Consolidated Maintenance Facility Building 8100 (FTRI-039)
  - Former Oil Testing Laboratory Building 1022 (FTRI-040)
  - Furniture Repair Shops (FTRI-041)
  - Print and Publications Shop Building 263 (FTRI-045)



- Building 727 Waste Pit (FTRI-051)
- Nine Former Landfill/Incinerator Sites
  - Whitside Construction Debris Landfill (FTRI-002)
  - Main Post Landfill (FTRI-004)
  - Custer Hill Rubble Dump (FTRI-005)
  - Camp Funston Ground Water (FTRI-011)
  - Hospital Incinerator Irwin Army Community Hospital (FTRI-014)
  - Southeast Funston Landfill Incinerator (FTRI-029)
  - Southeast Funston Landfill (FTRI-036)
  - Old Whitside Incinerator (FTRI-037)
  - Inactive Landfills-Camp Whitside (FTRI-052)
- Twelve Petroleum, Oil and Lubricant Sites
  - Camp Funston Groundwater (FTRI-011) The investigation of this site was transferred to other sites - see separate discussion below.
  - Tactical Vehicle Maintenance Shops (FTRI-042)
  - Former Gas Stations/Garages (FTRI-043)
  - 6200 Area Fuel Oil Line (FTRI-057)
  - Remove USTs (7903 and 7923) (FTRI-059)
  - Main Post PX Gas Station 218 (FTRI-060)
  - Former Building 1090 Dispensing Station (FTRI-064)
  - Former Building 1190 Dispensing Station (FTRI-065)
  - Former Building 1539 Dispensing Station (FTRI-069)
  - Former Building 1890 Dispensing Station (FTRI-071)
  - Building 8340 Fuel Oil UST (FTRI-072)
  - Building 8360 Fuel Oil UST (FTRI-073)

The ESI included a review of all available data on each of the 49 sites and, where appropriate, collection of additional soil and/or groundwater samples. Each of the 49 sites is recommended for closure in the ESI Reports. The final status of these sites will be determined when the recommendations included in the reports are approved by all parties to the FFA which is currently scheduled for June 25, 2007.

**Open Burning/Open Detonation Ground, Range 16 (OB/OD)**

Range 16 (FTRI-009) was used to destroy defective ammunition rounds. Historical practices included the use of solvents in an open burning area. This practice of solvent use was discontinued in the early 1980s. Periodic groundwater monitoring has detected the presence of perchlorate and TCE. Currently, there is no defined risk to human health or environmental impacts. The site will remain active for training and emergency disposal of unexploded ordnance (UXO) for the foreseeable future. Groundwater and surface-water monitoring will continue on an annual basis until FY11. In FY 11, a decision will be made on site activities in relation to perchlorate, metals and chlorinated solvent contaminants after evaluation of the data collected over the previous 7 years.

### **Camp Funston Groundwater Detections**

The Camp Funston Groundwater Detections Area (FTRI-011) was initially implemented as a comprehensive groundwater study of the Camp Funston area. Groundwater screening and monitoring well sampling data analysis have indicated the presence of very few sporadic hits of organic compounds and metals below risk-based levels of concern. No specific source has been identified. This site was inactivated and the investigation with its associated wells was transitioned to the SFL and POL/UST Sites 1245, 1044, and 1637 in Camp Funston. Please refer to discussions of those sites for plans to address contamination/sources of contamination.

### **Weapons Impact Areas**

There are four sites that will remain active as long as Fort Riley serves as an active military installation. FTRI-032 is the Impact Zone for artillery, FTRI-033 is the Douthit Range, FTRI-034 is the Impact Area Small Arms Ranges, and FTRI-035 is the Non-Impact Area Small Arms Ranges.

### **Forsyth Landfill**

The landfill (FTRI-038) is located south and west of Camp Forsyth and contains five separate areas that have been used for waste disposal. Regional flooding in the summer of 1993 caused significant erosion of the banks of the Republican River along one of the five landfill areas designated as Area 2. During the spring of 1994, a sand bar in the Republican River approximately 700 feet downstream from Area 2 was found to contain significant quantities of unexploded ordnance (UXO). The ordnance was detonated in place. In August 2000, a non-time critical removal action was implemented to construct a 1200-foot length of rock revetment with baffles to protect the riverbank along Area 2. This removal action was intended to be the final remedy for Area 2. The action met the removal objectives of preventing exposure to and release of potential landfill contaminants and contents, stabilizing the Republican River bank to minimize future erosion, and attainment of ARARs including no impact on the bald eagle habitat. There is an ongoing requirement for maintenance of the riverbank stabilization structure and inspection of the river bed for UXO that was washed out of the former landfills before the bank stabilization was in place.

### **Former Direct Support/General Support (DS/GS) Area**

Two pits which contain very high levels of metals and POL contamination are located in the former DS/GS area (FTRI-046). The pits were capped with concrete to prevent infiltration of rainfall and direct contact with the contents. The contaminants are located in alluvial materials of the Kansas River just above the groundwater level and pose a potential contamination source for down-gradient well fields. Further assessment is planned to determine the extent and to verify concentrations of metals contamination in the soil in the North Pit Area measured during the 1994 Site Investigation.

### **Abandoned Gasoline Line**

The Abandoned Gasoline Line Site (AGL Site) (FTRI-056) consists of an abandoned 1.1-mile pipeline and three former underground storage tanks at a terminus at Marshall Army Airfield. A preliminary assessment showed no releases along the pipeline but there was evidence of a release at the terminus. AGL Site investigations at the terminus area identified these chemicals present: benzene, toluene, ethylbenzene and xylenes (BTEX), 1,1,2-dichloroethane, naphthalene, fluorene,

phenanthrene, cumene, 1,2-dichloromethane and lead. In November 2006, a non-time critical removal action for soil and groundwater remediation was implemented. An Oxygen Release Compound (ORC) was injected into the soil to treat the aromatic hydrocarbon contamination. A chemical oxidizer (RegenOx) was also injected into the soil with the highest levels of contaminants. Quarterly groundwater sampling is being conducted to determine the effectiveness of the treatment. That evaluation will be completed in November 2007.

#### **POL/UST Sites without Free Product**

Three POL/UST Sites, FTRI-054, -057, and -062 should be closed out when funding for additional sampling permits. FTRI-057 and FTRI-62 are not believed to contain free product and FTRI-054 had small amounts of POL released into a fractured bedrock zone that will preclude any possible recovery. Additional investigation is required to verify that no free product is present at these sites. Additional monitoring wells were installed at these sites in 2006. Sampling to verify no measurable free product is planned for FY08-FY09.

#### **POL/UST Sites with Free Product**

Three POL/UST Sites, FTRI-063, -066, and 068, were found to contain free product during investigations conducted in the summer of 2006. Additional field work is planned for the summer of 2007 to fully delineate the extent of the soil and groundwater contamination at these sites. It is anticipated that dual-phase extraction systems will be installed at each site in 2009.

#### **WWI Incinerator, NW Camp Funston**

This former Incinerator Site (FTRI-074) is located in the northwest corner of Camp Funston. In December 2006, 100 soil samples were collected at the site and analyzed for the RCRA priority pollutant metals. Of those, one sample collected at a depth of 0 to 6" exceeded the industrial RSKs for lead (1300 mg/kg versus 1000 mg/kg), two collected at a depth of 0 to 6" exceeded the industrial RSK for arsenic (64.4 and 47.4 mg/kg versus 38 mg/kg) and one sample collected at a depth of 6" to 12" exceed the industrial RSK for arsenic (52.4 mg/kg). Based on these results and the fact that this site is designated as open space in the RPMP, Fort Riley will recommend this site for closure.

## **IV. REMEDIAL ACTIONS**

### **A. Southwest Funston Landfill, Operable Unit 001**

#### **Remedy Selection**

The principal threat described in the RI and ROD at the SFL, pertains to a hypothetical future use of site-impacted groundwater. The remedial action objectives established for the SFL are:

1. Minimize human and ecological direct contact with landfill contents.
2. Reduce the potential for leachate generation by reducing storm-water (rainfall) ponding and infiltration as practical.
3. Stabilize the Kansas River bank slope adjacent to the SFL to prevent movement of the channel into the landfill and to prevent exposure and erosion of the landfill contents.
4. Prevent ingestion, inhalation, and dermal contact with groundwater having organic contaminant concentrations exceeding the remediation goals.

The remedy includes engineering controls such as long-term groundwater monitoring, riverbank stabilization, repairs and improvements to the existing native soil cover, and a contingency for future remediation of groundwater. Restriction on land use was included as an institutional control.

#### **Remedy Implementation**

The riverbank stabilization and native soil cover repairs were implemented through the non-time critical removal action process as defined in CERCLA. Concurrent with the performance of the RI/FS, an Engineering Evaluation/Cost Analysis (EE/CA) was performed to assess the appropriateness of taking a non-time-critical removal action at the SFL Site (OU 001). The intention of the removal activities was to reduce the risk of exposing landfill contents by riverbank erosion and to limit the effects of subsidence in the landfill. The actions were designed to stabilize the Kansas River bank immediately adjacent to the landfill and repair the existing landfill cover. The results of that evaluation and analysis are contained in an EE/CA report dated July 1993. A public comment period on the EE/CA report was provided from August 17 to September 16, 1993, although no public comments were received. A Removal Action Memorandum with a Responsiveness Summary were submitted to the EPA and the KDHE in December 1993, and signed by Fort Riley and the KDHE on December 20, 1993. The Removal Action Remedy was implemented in three phases. A riverbank stabilization project was initiated in January 1994 and completed in the spring of 1994. A landfill cover repair project began in the fall of 1994 and construction activities were completed in 1995. In the final phase, the landfill cover improvement project was implemented to ensure that sufficient cover thickness was placed across the landfill. This project began in May 1996 and was completed in March 1997.

Institutional controls have been implemented at Southwest Funston Landfill through an Institutional Controls Plan and the RPMP. The RPMP identifies an IRP Area of Influence around the landfill (see Figure 2) and specifies activities that are restricted within that Area of Influence that include drilling drinking water wells, digging/trenching, the use of track vehicles, and building construction/demolition.

### Operation and Maintenance

Three plans were prepared for the implementation of the SFL remedy. These plans are:

1. Operations and Maintenance Plan, September 30, 1996
2. Institutional Controls Plan, November 1997
3. Long-Term Groundwater Monitoring Plan, January 1997

The Operations and Maintenance Plan is implemented through annual inspections of the landfill cover, riverbank stabilization structure, and monitoring wells and periodic repair of these structures when identified in the inspection report as being required. Fort Riley completed landfill cover repairs which involved filling differentially settled areas in the cover in June 2002 on the entire landfill and in November 2006 on the western half of the landfill. The riverbank stabilization structure was extended 100 feet upstream in November 2006 to reduce the risk that the river could erode behind the structure.

The institutional controls component of the remedy is implemented through the Fort Riley .

The long-term, groundwater monitoring program focuses on the perimeter of the landfill and originally included groundwater sampling and analysis for VOCs, antimony, and lead. With the approval of the EPA and the KDHE, analysis for antimony was discontinued in December 1999 and analysis for lead was discontinued in January 2007. The objectives of the monitoring program are to detect potential increases in contaminant concentrations in the vicinity of the SFL that might warrant additional actions at the SFL and to determine if constituents from the SFL are migrating under Threemile Creek.

Operations and maintenance costs include groundwater sample collection, sample analysis and reporting, repair and maintenance of the landfill cover and riverbank stabilization structure, and maintenance of the monitoring wells.

**Table 1 – Annual O&M Costs  
Southwest Funston Landfill**

Fiscal Year	Total Cost (rounded to nearest \$1000)
2002	\$286,000
2003	\$141,000
2004	\$130,000
2005	\$16,000
2006	\$133,000
2007	\$170,000
2008	\$315,000
2009	\$275,000
2010	\$275,000
2011	\$350,000

## **B. Pesticide Storage Facility, OU002**

### **Remedy Selection**

The selected remedy for the PSF was No Further Action (NFA). A non-time-critical removal action was performed in 1994 during the RI/FS phase to reduce the potential risks posed to a hypothetical worker from exposure to COCs in soil. COCs in soil were arsenic, barium, benzo(a)anthracene, benzo(a)pyrene, chlordane, chromium, DDT, DDE, DDD, dieldrin, and heptachlor. The Residual Risk Assessment (RRA) was a post-Removal Action evaluation that confirmed potential cumulative risks were reduced to acceptable levels for the current and projected industrial land use. However, the ROD clarified that if there was a major change in land use at the site, a re-evaluation of the NFA may be required.

The Removal Action Goals for arsenic in groundwater were revised based on results of a background study in the RI Report Addendum: Comparison of Ground-Water Inorganic Concentrations in On-Site and Background Monitoring Wells, Pesticide Storage Facility, Fort Riley, Kansas dated June 14, 1996. This study determined that the data used in the statistical tests were sufficient to tell if all the wells were or were not at background concentrations. The analysis demonstrated that the arsenic distribution in the wells was equivalent to background concentrations. The conclusion was that removal actions to address groundwater at the site were not necessary.

### **Remedy Implementation**

The selected remedy for the PSF was No Further Action. Institutional controls have been implemented at Pesticide Storage Facility site through the RPMP. The RPMP identifies an IRP Area of Influence around the former building site (see Figure 3) and specifies activities that are restricted within that IRP Area of Influence that include construction/demolition and digging/trenching.

### **Operation and Maintenance**

The Record of Decision for the PSF Site (OU 002) concluded that no further action was required.

## **C. Dry Cleaning Facilities Area, OU003**

The Record of Decision for the Dry Cleaning Facilities Area has not been completed. The remedy for this OU will be reported in the next Five-Year Review.

## **D. Former Fire Training Area – Marshall Army Airfield, Operable Unit 004**

### **Remedy Selection**

Two actions undertaken by Fort Riley contributed to the factors that led to the selection of the remedy for the FFTA-MAAF. In 1995, a source removal pilot study was conducted that effectively reduced the levels of chlorinated solvents and petroleum hydrocarbons in the soil at the FFTA-MAAF Site (OU 004). In 2002, an interim removal action was implemented that replaced five existing wells with two private water supply wells located outside the contaminated groundwater plume.

The RAOs for the FFTA-MAAF Site (OU 004) are to:

- Prevent use of groundwater with contaminant levels exceeding the MCLs as a drinking water source, and
- Reduce contaminant levels, to the extent practicable and appropriate, through natural attenuation processes.

The ultimate goal is for the groundwater to meet unrestricted use requirements. The Preliminary Remediation Goals (PRGs) for groundwater at the FFTA-MAAF Site (OU 004) are levels determined safe for drinking water (MCLs). The MCLs for COCs that drive the risk at the FFTA-MAAF Site (OU 004) are as follows:

- TCE: 5 parts per billion (ppb)
- cis-1,2-DCE: 70 ppb (BMcD, 2004c)

The selected remedy for remediation of the groundwater contamination at the FFTA-MAAF Site (OU 004) is MNA with Institutional Controls. This alternative relies on natural degradation processes already occurring at the FFTA-MAAF Site (OU 004) to further reduce contaminant concentrations to levels below the MCLs. With this alternative, the FFTA-MAAF Site (OU 004) will undergo groundwater sampling to monitor progress, and institutional controls will be put in place to prevent exposure to potential receptors.

### **Remedy Implementation**

The key elements of the selected remedy are:

- Monitoring the aquifer periodically in the zone of MNA
- Restricting the installation and use of groundwater wells at and down gradient of the FFTA-MAAF Site (OU 004)
- Providing sampling results to the affected off-site landowners until groundwater quality has been restored.

At the time the ROD was signed (10 Aug 2005), there was no human exposure to the contaminated groundwater and concentrations of contaminants in groundwater were below MCLs. The selected remedy will be considered complete when the following COCs are below their respective MCLs for three consecutive years (all other VOCs were below MCLs prior to the initiation of the ROD):

- TCE (MCL is 5 µg/L)
- cis-1,2-DCE (MCL is 70 µg/L)

If the groundwater MCLs are not exceeded for three consecutive years, the FFTA-MAAF Site (OU 004) will be recommended for the discontinuance of sampling and for site closeout during the next periodic review.

Institutional controls have been implemented at the FFTA-MAAF site through the RPMP. The RPMP identifies an IRP Area of Influence around the FFTA-MAAF site (see Figure 5) and restricts the drilling of drinking water wells within that Area of Influence.

**Operation and Maintenance**

Post-ROD monitoring of groundwater is scheduled for October 2006, April 2007 and then annually in the winter/spring of each year until the goal of three consecutive years below MCLs is achieved.

Operations and maintenance costs include groundwater sample collection, sample analysis, and maintenance of the monitoring wells.

**Table 2 – Annual O&M Costs  
Former Fire Training Area – Marshall Army Airfield**

Fiscal Year	Total Cost (rounded to nearest \$1000)
2006	\$138,000
2007	\$82,000
2008	\$82,000
2009	\$82,000
2010	\$108,000

**E. 354 Area Solvent Detections, Operable Unit 005**

**Remedy Selection**

A pilot study for soil remediation was performed at the Building 367 location during 2004. This remediation effort was successful in treating and removing approximately 1,000 cubic yards (yd<sup>3</sup>) of soil that were contaminated with chlorinated solvents. This effectively eliminated the source of groundwater contamination, which should result in continuing decreases in future groundwater concentrations. Pilot study results are reported in the Pilot Study Report, Pilot Study for Soil Remediation, 354 Area Solvent Detections (Operable Unit 005) at Main Post, Fort Riley, Kansas (BMcD, 2005c).

Based on the human health and ecological risk assessments, the preliminary ARARs, the media of interest, the COPCs in groundwater at the site, and the anticipated land and beneficial groundwater use, the RAOs for the 354 Site (OU 005) are to:

- Prevent the potential of degradation of the surface waters of the Kansas River by reducing levels or eliminating contaminants from the margin of the Kansas River alluvial aquifer.
- Reduce contamination levels to below MCLs within the Kansas River alluvial aquifer through the use of natural and/or active remedial processes.
- Reduce contaminant levels, to the extent practicable and appropriate, within the terrace aquifer, through natural and/or active remedial processes.



The selected remedy for remediation of the groundwater contamination at the 354 Site (OU 005) is MNA with Institutional Controls. This alternative relies on natural degradation processes already occurring at the 354 Site (OU 005) to further reduce contaminant concentrations to levels below the MCLs. With this alternative, the site will undergo groundwater sampling to monitor progress, and institutional controls will be put in place to prevent exposure to potential receptors.

**Remedy Implementation**

Currently, there is no human exposure to the contaminated groundwater and concentrations of contaminants in groundwater in the point bar are below MCLs based on the most recent groundwater sampling results (September 2006). The selected remedy will be considered complete when the following COCs are below their respective MCLs for three consecutive years post-ROD (CY 2006) in the Kansas River alluvial aquifer. The MCLs have not been exceeded in the Kansas River alluvial aquifer since April 2004:

- PCE (MCL is 5 µg/L)
- TCE (MCL is 5 µg/L)
- cis-1,2-DCE (MCL is 70 µg/L)
- Benzene (MCL is 5 µg/L)

If the groundwater MCLs are not exceeded for three consecutive years post-ROD (CY 2006) in the Kansas River alluvial aquifer, the 354 Site (OU 005) will be recommended for the discontinuance of sampling and for site close out during the next periodic review. CERCLA requires administrative re-assessments every five years if the Site is not open for unrestricted use whenever contaminants are left in place. Upon completion of the selected remedy, the land use at the 354 Site (OU 005) will be changed to unrestricted.

Institutional controls have been implemented at the 354 site through the RPMP. The RPMP identifies an IRP Area of Influence around the 354 site (see Figure 6) and restricts the drilling of drinking water wells within that Area of Influence.

**Operation and Maintenance**

The second post-ROD groundwater monitoring was completed in March 2007. In the future, groundwater monitoring will be accomplished annually in the winter/spring of each year until three consecutive years below MCLs is achieved.

Operations and maintenance costs include groundwater sample collection, sample analysis, and maintenance of the monitoring wells.

**Table 3 – Annual O&M Costs  
354 Area Solvent Detections**

Fiscal Year	Total Cost (rounded to nearest \$1000)
2007	\$83,000
2008	\$83,000
2009	\$83,000
2010	\$83,000
2011	\$60,000

## **V. PROGRESS SINCE THE LAST FIVE-YEAR REVIEW**

The First Five-Year Review, completed August 2002, concluded that the remedies at the SFL Site (OU 001) and the PSF (OU 002) are protective of human health and the environment and exposure pathways that could potentially result in unacceptable risks are being controlled.

During the previous Five-Year Review process, the technical assessment, or other aspects of those activities, no issues were identified that would affect the affect the protectiveness of the remedies.

There was no input generated or issues raised by the general public during the previous review process.

## **VI. FIVE-YEAR REVIEW PROCESS**

### **A. Administrative Components**

Members of the Restoration Advisory Board (RAB) were notified of the ongoing Five-Year Review process on March 28, 2007. A public notice was printed in the Junction City Daily Union and the Manhattan Mercury newspapers for community notification on April 1, 2007. The Fort Riley Five-Year Review team included Fort Riley, the USACE, the EPA, and the KDHE. The review was led by the USACE Project Manager and included technical team members with expertise in chemistry, engineering, and risk assessment.

Executive Order 12580 delegates remedial responsibilities at Fort Riley to the Army. The Army is responsible for conducting the five year review at Fort Riley. The EPA Region VII may either concur with the protectiveness determinations presented in this report or provide independent findings.

### **B. Community Involvement**

A public notice was printed in the Junction City Daily Union and the Manhattan Mercury newspapers for community notification on April 1, 2007 (see Appendix A). The notice included the following:

- The site name and location;
- The lead agency conducting the review;
- A brief description of the selected remedies and contamination addressed;
- Example questions and topics for community input;
- A contact name and telephone number by which the public may contribute additional information; and
- The scheduled completion date for the Five-Year Review.

Upon finalization of this Five-Year Review, a notice will be printed in the Junction City Daily Union and the Manhattan Mercury newspapers announcing its completion. The notice will provide information similar to the initial notice and will add information on the location of the Five-Year Review for public viewing (i.e. the Information Repository) on the location of the Information Repository where a copy of the Five-Year Review will be available for public review.

### **C. Document Review**

Relevant documents reviewed during this Five-Year Review are listed in Appendix B.

### **D. Data Review**

#### **Southwest Funston Landfill, Operable Unit 001**

Groundwater monitoring has been conducted at the SFL Site (OU 001) since 1992. During each sampling event analysis was conducted for all COCs, however, only the positive analytical

results for all sampling events conducted since the last Five-Year Review are provided in Tables 4 and 5. The shallow wells are screened across the water table while the bottom of the screen is at bedrock in the deep wells. The analytes presented in the tables are those that were identified in the Record of Decision for Long-Term Monitoring and include VOCs and lead. All analyte concentrations were below established MCLs in the last two sampling events – March and September 2006.

**Table 4 – Positive Detections in Shallow Wells  
Southwest Funston Landfill**

Well/Analyte	MCL	Sep-02	Apr-03	Sep-03	Mar-04	Sep-04	Mar-05	Sep-05	Mar-06	Sep-06
<b>SFL92-101</b>										
Lead	15(AL)	0.6J	.001U	.5U	1U	1U	.5U	NS	NS	NS
<b>SFL92-301</b>										
Benzene	5	2U	2U	2U	2U	.5U	.139U	.139U	.139U	.139U
<i>cis</i> -1,2-Dichloroethene	70	2U	2U	.27J	2U	0.32J	0.33 J	0.22 J	0.22 J	.151U
Trichloroethene	5	2U	2U	2U	2U	.5U	.151U	.151U	.151U	0.24 J
Vinyl chloride	2	2U	2U	0.32J	2U	.5U	.239U	.239U	.239U	.239U
<b>SFL92-401</b>										
<i>cis</i> -1,2-Dichloroethene	70	1.22	0.56J	0.72J	0.62J	0.58	0.62 J	0.64 J	0.44 J	0.26 J
Trichloroethene	5	2U	2U	2U	2U	.5U	.151U	.151U	.151U	0.84 J
Vinyl chloride	2	<b>8.54</b>	<b>5.11</b>	<b>4.6</b>	<b>3.57</b>	<b>3.30</b>	<b>3.49</b>	<b>3.19</b>	1.68 J	1.21 J
Lead	15(AL)	1U	0.001U	3.58	0.234J	1U	.5U	.5U	.5U	.5U
<b>SFL92-601</b>										
Benzene	5	3.29	4.01	4.94	4.72	4.68	4.38	3.78	2.84	2.82
<i>cis</i> -1,2-Dichloroethene	70	2U	.95J	0.32J	.23J	.5U	.151U	.151U	.151U	.151U
Trichloroethene	5	2U	2U	2U	2U	.5U	.151U	.151U	.151U	1.24 J
Vinyl chloride	2	<b>5.81</b>	<b>4.78</b>	<b>5.01</b>	<b>2.57</b>	1.24	.239U	0.82 J	.239U	.239U
<b>SFL94-02A</b>										
<i>cis</i> -1,2-Dichloroethene	70	2U	2U	2U	2U	.5U	.151U	.151U	.151U	.151U
Vinyl chloride	2	2U	2U	2U	2U	.5U	.239U	.239U	.239U	.239U
<b>SFL94-06A</b>										
Lead	15(AL)	2.14	1.29	0.703	1.04	2.27	1.28	2.77	0.552 J	0.917 J

U - Not Detected at reporting limit

J - Qualified as Estimated

all units in ug/L

Bold values exceed MCL

AL - Action Level

**Table 5 – Positive Detections in Deep Wells  
Southwest Funston Landfill**

Well/Analyte	MCL	Sep-02	Apr-03	Sep-03	Mar-04	Sep-04	Mar-05	Sep-05	Mar-06	Sep-06
<b>SFL97-903</b>										
Vinyl chloride	2	2U	2U	2U	2U	.5U	.239U	.239U	.239U	.239U
<b>SFL94-04B</b>										
Lead	15(AL)	1U	0.6395J	7.39	0.708J	1.13	2.64	3.4	2.52	2.37
<b>SFL94-03B</b>										
Vinyl chloride	2	2U	.34J	2U	2U	.5U	.239U	NS	NS	NS
<b>SFL94-02B</b>										
<i>cis</i> -1,2-Dichloroethene	70	2U	2U	2U	2U	.5U	.151U	NS	NS	NS
Vinyl chloride	2	2U	2U	2U	2U	.5U	.239U	NS	NS	NS
<b>SFL92-603</b>										
<i>cis</i> -1,2-Dichloroethene	70	2U	2U	2U	2U	.5U	.151U	.151U	0.36 J	0.36 J
Trichloroethene	5	2U	2U	2U	2U	.5U	.151U	.151U	.151U	0.30 J
Vinyl chloride	2	2U	0.78J	0.41J	2U	0.56	.239U	0.74 J	1.63 J	1.58 J
<b>SFL92-403</b>										
<i>cis</i> -1,2-Dichloroethene	70	2U	0.74	0.95J	0.76J	0.73	0.85 J	0.74 J	0.42 J	0.20 J
Trichloroethene	5	2U	2U	2U	2U	.5U	.151U	.151U	.151U	0.23 J
Vinyl chloride	2	2U	4.84	4.6	4.48	4.02	3.89	3.55	1.11 J	0.77 J

U - Not Detected at reporting limit

J - Qualified as Estimated

all units in ug/L

Bold values exceed MCL

AL - Action Level

**Pesticide Storage Facility, Operable Unit 002**

On June 16, 2006 soil samples were collected to determine if contamination in the PSF Site (OU 002) had migrated to adjacent soil or into sediment in the drainage course of this area. Pursuant to this end, five surface samples (0-6") and two sediment samples were collected at the locations shown in Figure 7. Three surface soil samples were taken along the route of the first set of railroad tracks to the south of the former pesticide storage building (348) and down slope from the southern-most point that exceeded the removal action remedial goals and other unremediated surface soil at the site. The fourth and fifth samples were collected down slope from the southern-most remediation sites along the course of the southern-most set of tracks. Two sediment samples in the watercourses that drain the Pesticide Storage Facility were collected to ensure that contamination is not being carried off the site down these routes. The samples were analyzed for Pesticides, PCBs, and lead. The positive detections resulting from the analysis are presented in Table 6.

**Table 6 – Positive Detections  
Pesticide Storage Facility**

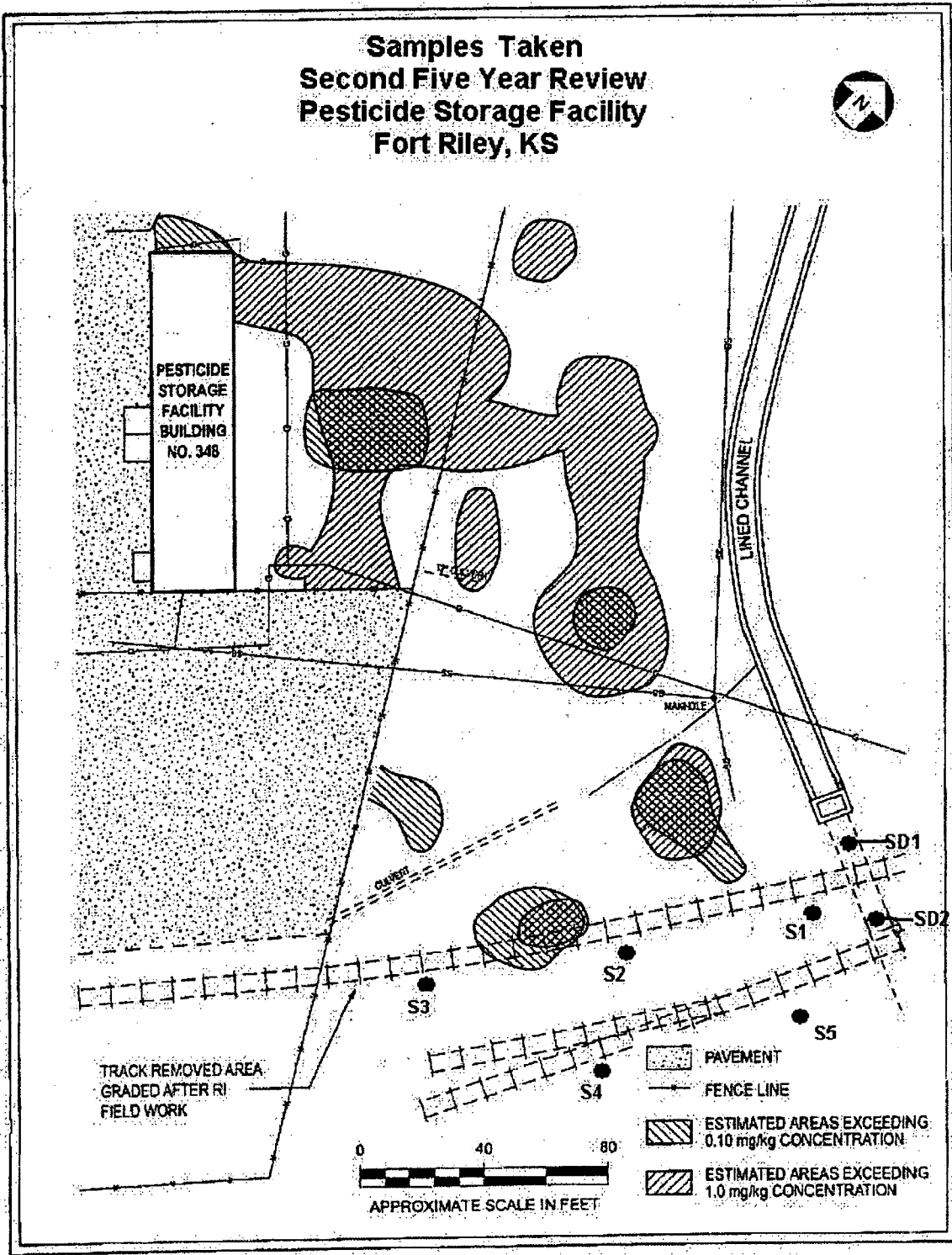
Parameter	RAG (mg/kg)	Riley-Pest-06-S1	Riley-Pest-06-S2	Riley-Pest-06-S3	Riley-Pest-06-S4
Lead	NA	51.9 mg/kg	31.2 mg/kg	41.1 mg/kg	16.6 mg/kg
4,4'-DDD	1.73	33 ug/kg J	84.8 ug/kg U	14 ug/kg J	7.43 ug/kg U
4,4'-DDE	1.73	49.4 ug/kg J	40.1 ug/kg J	56.7 ug/kg J	7.43 ug/kg U
4,4'-DDT	1.73	67.1 ug/kg J	38.9 ug/kg J	71.6 ug/kg J	7.43 ug/kg U
alpha-Chlordane	1.58	98.7 ug/kg	8.51 ug/kg U	8.56 ug/kg U	3.73 ug/kg U
gamma-Chlordane	1.58	48 ug/kg	8.51 ug/kg U	8.56 ug/kg U	3.73 ug/kg U
Aroclor-1260	NA	77.3 ug/kg	25.4 ug/kg J	47 ug/kg	37.1 ug/kg U

Parameter	RAG (mg/kg)	Riley-Pest-06-S5	Riley-Pest-06-S6	Riley-Pest-06-SD-1	Riley-Pest-06-SD-2
Lead	NA	14.7 mg/kg	37.4 mg/kg	74 mg/kg	67.7 mg/kg
4,4'-DDD	1.73	7.44 ug/kg U	32.7 ug/kg J	208 ug/kg U	5.83 ug/kg J
4,4'-DDE	1.73	7.44 ug/kg U	76.2 ug/kg J	208 ug/kg U	19.2 ug/kg J
4,4'-DDT	1.73	7.44 ug/kg U	73.7 ug/kg J	208 ug/kg U	19.4 ug/kg J
Aroclor-1260	NA	37.2 ug/kg U	36.6 ug/kg	41.5 ug/kg U	41.6 ug/kg U

U - Not Detected at detection limit

J - Qualified as Estimated

RAG - Removal Action Goal



**Figure 7 – Surface Soil (S) and Sediment (SD) Sample Locations at PSF Site (OU 002).**

**Former Fire Training Area – Marshall Army Airfield, Operable Unit 004**

Seven groundwater sampling events have been completed since the last Five-Year Review was completed in August 2002. The concentration of PCE (Table 7) has remained below its MCL (5 ug/l) in all wells since the last Five-Year Review. The concentration of cis-1,2-DCE (Table 8) fell and has remained below its MCL (70 ug/L) in all wells beginning with the March 2005 sampling event. The concentration of TCE (Table 9) fell and remains below its MCL (5 ug/L) in all wells beginning with the August 2003 sampling event.

**Table 7 – PCE Historical Detections  
Former Fire Training Area – Marshall Army Airfield**

FP-98-27B		FP-98-29B		FP-98-29C		FP-98-31B		FP-99-32B		FP-99-32C	
Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L
8-Aug-02	1.1U	6-Aug-02	1.9	6-Aug-02	1.1U	7-Aug-02	2.7	9-Aug-02	1.5	9-Aug-02	1.3
5-Mar-03	1.1U	5-Mar-03	1.1U	5-Mar-03	1.1U	5-Mar-03	1.1U	4-Mar-03	1.1U	4-Mar-03	1.1U
20-Aug-03	1.1U	19-Aug-03	1.1U	20-Aug-03	1.1U	20-Aug-03	1.1U	21-Aug-03	1.1U	21-Aug-03	1.1U
18-Feb-04	1.1U	--	--	23-Feb-04	1.1U	23-Feb-04	1.1U	18-Feb-04	1.1U	--	--
13-Oct-04	1.1U	8-Oct-04	1.1U	8-Oct-04	1.1U	8-Oct-04	1.1U	11-Oct-04	1.1U	11-Oct-04	1.1U
--	--	1-Mar-05	1.1U	--	--	2-Mar-05	1.1U	--	--	--	--
24-Oct-06	1.1U	24-Oct-06	1.1U	24-Oct-06	1.1U	24-Oct-06	1.1U	25-Oct-06	1.1U	25-Oct-06	1.1U

U - Not Detected at reporting limit -- No data

Bold values exceed MCL - 5 µg/L

**Table 8 – cis-1,2-DCE Historical Detections  
Former Fire Training Area – Marshall Army Airfield**

FP-94-09		FP-96-26B		FP-98-27B		FP-98-29B		FP-98-29C		FP-98-31B	
Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L
9-Aug-02	102	6-Aug-02	33.8	8-Aug-02	87	6-Aug-02	120	6-Aug-02	122	7-Aug-02	98.9
3-Mar-03	64.9	6-Mar-03	142	5-Mar-03	17.1	5-Mar-03	141	5-Mar-03	90.9	5-Mar-03	59.4
22-Aug-03	52.5	19-Aug-03	56.2	20-Aug-03	28.9	19-Aug-03	125	20-Aug-03	54.9	20-Aug-03	67.8
--	--	20-Feb-04	90.5	18-Feb-04	10.9	23-Feb-04	91.8	23-Feb-04	34.2	23-Feb-04	69.9
14-Oct-04	17.7	7-Oct-04	70.9	13-Oct-04	8.1	8-Oct-04	45.2	8-Oct-04	6.3	8-Oct-04	54.4
2-Mar-05	8	1-Mar-05	23.1	--	--	1-Mar-05	29.7	--	--	2-Mar-05	34.3
26-Oct-06	11	26-Oct-06	12.3	24-Oct-06	1.3	24-Oct-06	6	24-Oct-06	1.2	24-Oct-06	15

U - Not Detected at reporting limit -- No data

Bold values exceed MCL - 70 µg/L



**Table 9 – TCE Historical Detections  
Former Fire Training Area – Marshall Army Airfield**

FP-94-09		FP-96-26B		FP-98-27B		FP-98-29B	
Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$
9-Aug-02	0.6U	6-Aug-02	0.6U	8-Aug-02	1	6-Aug-02	7.6
3-Mar-03	0.6U	6-Mar-03	0.6U	5-Mar-03	0.6U	5-Mar-03	<b>6.4</b>
22-Aug-03	0.6U	19-Aug-03	0.6U	20-Aug-03	0.6U	19-Aug-03	3.9
--	--	20-Feb-04	0.6U	18-Feb-04	0.6U	--	--
14-Oct-04	0.6U	7-Oct-04	0.6U	13-Oct-04	0.6U	8-Oct-04	0.7
2-Mar-05	0.6U	1-Mar-05	0.6U	--	--	1-Mar-05	0.6U
26-Oct-06	0.6U	26-Oct-06	0.6U	24-Oct-06	0.6U	24-Oct-06	0.6U

FP-98-29C		FP-98-31B		FP-99-32B		FP-99-32C	
Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$	Date Sampled	Result $\mu\text{g/L}$
6-Aug-02	2.9	7-Aug-02	<b>10.7</b>	9-Aug-02	4.7	9-Aug-02	2.6
5-Mar-03	2	5-Mar-03	7	4-Mar-03	2.8	4-Mar-03	1.5
20-Aug-03	1	20-Aug-03	4.8	21-Aug-03	1.2	21-Aug-03	0.7
23-Feb-04	0.6	23-Feb-04	3.4	18-Feb-04	0.6U	--	--
8-Oct-04	0.6U	8-Oct-04	1.3	11-Oct-04	0.6U	11-Oct-04	0.6U
--	--	2-Mar-05	0.8	--	--	--	--
24-Oct-06	0.6U	24-Oct-06	0.6U	25-Oct-06	0.6U	25-Oct-06	0.6U

U - Not Detected at reporting limit -- No data  
**Bold values exceed MCL - 5  $\mu\text{g/L}$**

### 354 Area Solvent Detections, Operable Unit 005

Groundwater sampling results, up to and including the September 2006 sampling round, indicate that preliminary chemical-specific ARARs (i.e., MCLs) were exceeded for two of the COPCs at the 354 Site (PCE and benzene). Beginning with the October 2004 sampling event, ARARs are being met within the Kansas River alluvial aquifer. Concentrations of PCE and benzene that exceed the ARARs were primarily within the plume in the terrace aquifer and, therefore, localized with little potential effect on the Kansas River alluvial aquifer.

**Table 10 – PCE Historical Detections  
354 Area Solvent Detections Site**

354-01-27		354-99-09		MW95-04		TSO292-01	
Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L	Date Sampled	Result µg/L
12-Jul-02	<b>179</b>	9-Jul-02	27.5	10-Jul-02	3.3	9-Jul-02	<b>39</b>
21-Mar-03	<b>180</b>	13-Mar-03	31.7	25-Mar-03	1.8	14-Mar-03	<b>32.6</b>
1-Oct-03	<b>121</b>	25-Sep-03	27.7	25-Sep-03	<b>5.2</b>	23-Sep-03	<b>21.6</b>
23-Apr-04	<b>95.9</b>	22-Apr-04	<b>60</b>	22-Apr-04	1.8	22-Apr-04	<b>32.1</b>
6-Oct-04	<b>71.7</b>	5-Oct-04	<b>37.8</b>	6-Oct-04	1.7	4-Oct-04	<b>24.8</b>
20-Apr-05	<b>98.5</b>	20-Apr-05	27.3	20-Apr-05	1.7	19-Apr-05	<b>55.8</b>
20-Sep-06	<b>96.6</b>	22-Sep-06	75.9	--	--	20-Sep-06	<b>23.3</b>

U - Compound not detected at reporting limit

-- No data

**Bold values exceed MCL - 5 µg/L**

**Table 11 – Benzene Historical Detections  
354 Area Solvent Detections Site**

TSO292-01		TSO292-02	
Date Sampled	Result µg/L	Date Sampled	Result µg/L
9-Jul-02	0.4U	10-Jul-02	<b>40.3</b>
14-Mar-03	0.4U	18-Mar-03	<b>42.6</b>
23-Sep-03	0.7	24-Sep-03	<b>18.8</b>
22-Apr-04	0.4U	22-Apr-04	7.5
4-Oct-04	0.4U	5-Oct-04	<b>25</b>
19-Apr-05	0.4U	19-Apr-05	<b>24</b>
20-Sep-06	9.5	20-Sep-06	<b>12.3</b>

U - Compound not detected at reporting li

-- No data

**Bold values exceed MCL - 5 µg/L**

### **E. Site Inspection**

A qualitative inspection of the five Operable Units was conducted on March 28, 2007. During the inspection representatives from Fort Riley, the EPA Region VII, the KDHE and the U.S. Army Corps of Engineers visited each site to confirm that current land uses were in agreement with the Records of Decision for these sites. No activities were observed that violate institutional controls for SFL, FFTA-MAAF or the 354 sites. No new uses of ground water were identified. In general, the inspection team concluded that the remedies remain protective. However, it was noted that cover repairs are required on the eastern half of Southwest Funston Landfill.

### **F. Interviews**

It was determined that interviews were not required for this Five-Year Review. All sites are on an active military installation. Fort Riley's project coordinators visit the sites on a frequent basis to ensure that there are no changes in land use and that the remedies remain protective.

## VII. TECHNICAL ASSESSMENT

### A. Southwest Funston Landfill, Operable Unit 001

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

Yes.

The original repairs and improvements made to the landfill cover and the construction of the riverbank stabilization structure were effective in achieving the remedial objectives of the ROD which are to: minimize human and ecological direct contact with the landfill contents; reduce the potential for leachate generation by reducing storm-water ponding and infiltration; stabilize the Kansas River bank slope adjacent to the SFL to prevent exposure and erosion of the landfill contents; and prevent ingestion, inhalation, and dermal contact with the groundwater having organic contaminant concentrations exceeding remediation goals. The site inspection conducted for this Five-Year Review confirmed that land use at SFL remains the same. The inspection confirmed a need for repairs to differentially settled areas on the eastern portion of the landfill to eliminate ponding.

Institutional controls have been implemented at Southwest Funston Landfill through an Institutional Controls Plan and through the RPMP. The RPMP identifies an IRP Area of Influence around the landfill. The RPMP requires physical controls including fencing and signs at the landfill. It also prohibits drilling drinking water wells, digging/trenching, the use of track vehicles and building construction/demolition within the IRP Area of Influence. No activities have been observed that violate the institutional controls. The cover and surrounding areas are undisturbed, there are no uses of groundwater within the IRP Area of Influence, signage is in place and the gate protecting access to the landfill is in good repair.

The results of the groundwater monitoring program as presented in Tables 4 and 5 indicate that the native grass evapotranspirative cover has assisted in maintaining the levels of the potential chemicals of concern in the groundwater at low and mainly below MCL concentrations over time. There were no concentrations of the potential chemicals of concern identified in the ROD exceeding MCLs during both the March and September 2006 groundwater sampling events.

There were no opportunities for optimization identified during this review for the SFL site. In 2006, the number of wells in the groundwater monitoring network was decreased and the sampling frequency was changed from semi-annual to annual because all contaminants were below MCLs based upon analytical results from both of the 2006 sampling events.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Yes.

RAO's for SFL are summarized in Section IV.A. As part of their on-going maintenance program, Fort Riley repaired the differential settlement to the west of the access road in

November 2006. Differential settlement to the east of the access road is programmed to be repaired in FY08. These repairs will reduce storm water ponding which is one element of the RAOs. There are no other changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered (TBC) Criteria

The ROD identified the principal ARARs which are relevant and appropriate for SFL as MCLs and RCRA Subtitle D, Criteria for Municipal Solid Waste Landfills (40 CFR 258.60 and 258.61). The original MCLs for the monitored COCs at SFL have not changed. The remediation goals listed in the ROD are presented in Table 12 along with current MCLs for the COCs. Of the six COCs, an original or current MCL has only been exceeded for vinyl chloride since the previous five-year review. If there are no detections above the MCLs for three consecutive years, a Remedial Action Completion Report and a de minimus Long Term Management Plan will be prepared.

Analyte	Remediation Goal	Basis	Current MCL
Benzene	5	MCL	5
1,2-Dichloroethane	5	MCL	5
cis-1,3-Dichloropropene	0.28, 2.8, 28	Cancer Risk 1E-06, 1E-05, 1E-04	-
1,1,2,2-Tetrachloroethane	0.042, 0.42, 4.2	Cancer Risk 1E-06, 1E-05, 1E-04	-
1,1,2-Trichloroethane	3	MCLG	5
Vinyl Chloride	2	MCLG	2

MCL = Maximum Contaminant Level  
MCLG = Maximum Contaminant Level Goal

Changes in Exposure Pathways, Toxicity, and Other Characteristics

Changes in toxicity criteria for some COPCs were noted in the first Five-Year Review, namely increased toxicity for vinyl chloride and decreased toxicity for beryllium. However, the overall potential risk to a hypothetical resident has not increased because exposure pathways remain incomplete. The RPMP serves as an institutional control to prevent changes in land use and preclude exposure pathways to groundwater from becoming complete in the future.

Vapor intrusion from impacted soil or groundwater is an exposure pathway that was not evaluated as part of the BLRA. Since land use is restricted by the RPMP, there are no receptors and this potential exposure pathway, as those evaluated in the BLRA, remains incomplete.

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

No.

Cover repairs currently programmed for FY08 will reduce ponding on the eastern half of the landfill. No other information about environmental risks, site conditions, natural disaster impacts, or other data has been determined to affect the protectiveness of the remedy. While the EPA has issued new guidance for conducting ecological risk assessments since the BLRA was

written, the initial step of the process remains the same. Under problem formulation, the likelihood of exposure pathways is evaluated. The BLRA concluded that exposure opportunity and the potential for ecological risk at the site were minimal. Continuation of industrial land use in the area renders the site a less attractive habitat than surrounding undeveloped areas. Therefore, the ecological evaluation in the BLRA is still adequately protective.

The LTM Report for 2006 states that there were no exceedances of MCLs and vinyl chloride for the first time fell below its MCL in two consecutive sampling events. While trichloroethene (TCE) was detected in five wells for the first time since the one historical detection in 1993, this is likely an artifact of lower detection limits (all but one were qualified as estimated concentrations). The LTM Report recommends continued monitoring for vinyl chloride and TCE; therefore, RAOs set forth in the ROD continue to be protective.

## **B. Pesticide Storage Facility, OU002**

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

Yes.

NFA was the selected alternative for PSF, conditional on a re-evaluation of the effectiveness of this remedy should a major change in land use occur. Institutional controls have been implemented at the Pesticide Storage Facility site through the RPMP. The RPMP identifies an IRP Area of Influence around the former building site. The RPMP prohibits construction/demolition and digging/trenching within the IRP Area of Influence. No activities have been observed that violate the institutional controls.

There were no opportunities for optimization identified during this review for the PSF site.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Yes.

There are no changes in the physical conditions of the site that would affect the protectiveness of the ROD.

### Changes in Standards and To Be Considered (TBC) Criteria

TBCs presented in the ROD were risk-based removal action goals for pesticides in soil and were conservatively calculated. These goals are comparable to current EPA Region 9 Preliminary Remediation Goals for residential soil (USEPA, 2004), as shown in the following table.

**Table 13. PSF Removal Action Goals compared to EPA Residential PRGs (2004).**

Analyte	Removal Action Goals (mg/kg)	EPA Residential PRGs (mg/kg)
Chlordane	1.58	1.6
DDD	1.73	2.4
DDE	1.73	1.7
DDT	1.73	1.7
Dieldrin	0.127	0.03
Heptachlor	0.05	0.11
PRG = Preliminary Remediation Goal		

Changes in Exposure Pathways, Toxicity, and Other Characteristics

The post-removal action risk assessment compared concentrations in residual soil with conservatively calculated removal action goals which were intended to protect a full-time worker through ingestion, dermal contact, and inhalation of fugitive dust pathways. One sample result for chlordane exceeded its respective goal, but the exposure point concentration (EPC) based on 95% upper confidence limit did not. Additionally, pesticide detections from the June 2006 soil sampling event (see Table 6) were below the ROD removal goals and the current EPA Region 9 residential PRGs.

There are now toxicity values which were not available at the time the removal action goals were calculated; however, the removal goals compare well to current EPA Region 9 residential PRGs, indicating that any change in toxicity criteria is inconsequential to the protectiveness of the remedy.

Since the time the PSF risk assessments were conducted, there has been increased attention on the vapor intrusion pathway. While several pesticides are identified in the EPA draft vapor intrusion guidance (USEPA, 2004) as being of concern for this pathway, only chlordane and heptachlor have vapor pressures indicating low to medium volatility (Lyman, 1982). However, based on other chemico-physical properties, they are more apt to remain adsorbed to soil than to volatilize (Ney, 1995). Given this, and the low concentrations detected in July 2006, exposure and subsequent risk through this pathway would be minimal to nonexistent.

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

No.

No information about environmental risks, site conditions, natural disaster impacts, or other data has been determined to affect the protectiveness of the remedy. While the EPA has issued new guidance for conducting ecological risk assessments since the BLRA was written, the initial step of the process remains the same. Under problem formulation, the likelihood of exposure pathways is evaluated. The BLRA concluded that exposure opportunity and the potential for ecological risk at the site were minimal. Continuation of industrial land use in the area renders the site a less attractive habitat than surrounding undeveloped areas. Therefore, the ecological evaluation in the BLRA is still adequately protective.

**C. Former Fire Training Area – Marshall Army Airfield, Operable Unit 004**

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

Yes.

MNA with institutional controls was the selected remedy for FFTA-MAAF Site (OU 004). The ROD for FFTA-MAAF was signed in 2005 and was preceded by three actions: a source removal pilot study in 1995, the off-site alternate water supply in 2001, and an interim soil removal action in 2002. As a result, there were no current risks from on-site soil or from on- and off-site groundwater at the time of the ROD, thus justifying a MNA with institutional controls remedy.

Institutional controls are implemented for the FFTA-MAAF site through the RPMP which prohibits the drilling of drinking water wells. Since the Record of Decision was signed, no new uses of groundwater have been established. Increased airfield activity diminishes the likelihood of land use changes now and in the foreseeable future. The site location in a flood plain and near a levee further diminishes the likelihood of future use. Annual groundwater monitoring and notification to off-site landowners continues to meet the stipulations of the ROD. Therefore, the remedy is functioning as intended.

There were no opportunities for optimization identified during this review for the FFTA-MAAF site. The Remedial Design, which was completed in January 2006, identified 41 wells or piezometers in the monitoring well network to be decommissioned. The wells which remain in the monitoring program and the chemical analysis being performed are currently required to meet the requirements of the ROD.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Yes.

RAOs for FFTA-MAAF are presented in Section IV.D. There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered Criteria

Chemical-specific standards identified in the ROD included state surface water quality standards, state anti-degradation policy, and federal and state MCLs. No criteria were set for soil in the ROD, since the source removal pilot study had effectively reduced contaminants to acceptable levels.

The following MCLs have not changed since the time the ROD was signed.



Analyte	Remediation Goal (ug/L)	Basis
Trichloroethene	5	MCL
cis-1,2-Dichloroethene	70	MCL
MCL = Maximum Contaminant Level		

The ROD also identified action- and location-specific standards, such as endangered and/or threatened species, floodplain, historical, and RCRA requirements, which have not changed.

Changes in Exposure Pathways, Toxicity, and Other Characteristics

The BLRA for human health evaluated current and reasonably expected exposures to COPCs (petroleum constituents and chlorinated solvents) in soil and groundwater. Potential risk from soil was insignificant, while TCE and cis-1,2-DCE were considered the COCs for a future resident exposed to the maximum modeled chemical concentrations found in a hypothetical floating well (termed “floating” to explain that maximum concentrations occurring at different locations in the plume were pooled for the exposure point estimates). Following the interim soil removal action for the protection of groundwater, and installation of alternate water supplies off site, potential exposure pathways were no longer complete. This remains the case today.

The EPA published draft toxicity criteria (USEPA, 2004) for TCE are under review by the National Academy of Science and may become more conservative in the future. However, exposure pathways remain incomplete, and TCE was not detected in any of the wells in 2006. Therefore, potential for risk would not be affected by increased toxicity of TCE.

Vapor intrusion from groundwater into a future residential building was not considered to be a significant pathway in the BLRA due to the depth of groundwater (20 to 25 ft bgs). To demonstrate in the Five-Year Review that this assumption was adequately protective, screening criteria from the draft EPA vapor intrusion guidance were reviewed for cis-1,2-DCE, the only COC detected in 2006. The maximum concentration of 15 ug/L is more than an order of magnitude less than the screening criteria of 210 ug/L, which was set for noncancer protection. Therefore, the vapor intrusion pathway would not pose risk, even in the unlikely event that a home was built above groundwater off the site.

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

No.

No information about environmental risks, site conditions, natural disaster impacts, or other data has been determined to affect the protectiveness of the remedy. While the EPA has finalized guidance for conducting ecological risk assessments since the time the BLRA was written, the ecological portion of the BLRA did follow the draft version of that guidance. Chemical concentrations, measured in soil and modeled in groundwater to the river, were compared to media-specific benchmarks; no adverse impacts were indicated. In addition, continued use as an airfield renders the site as a less attractive habitat than surrounding undeveloped areas, thus reducing exposure opportunity to chemicals in soil. Groundwater chemical concentrations have

continued to decrease and the likelihood of impact at the river is more remote. Therefore, the ecological evaluation in the BLRA remains adequately protective.

#### **D. 354 Area Solvent Detections, Operable Unit 005**

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

Yes.

The selected remedy for 354 Site (OU 005) is monitored natural attenuation and institutional controls. MNA is part of the performance monitoring of the source in-situ treatment and soil removal action completed at the site in December 2004.

Institutional controls are implemented for the 354 site through the RPMP which prohibits the drilling of drinking water wells. Since the Record of Decision was signed, no new uses of groundwater have been established.

There were no opportunities for optimization identified during this review for the 354 site. During the summer of 2005, twenty wells or piezometers in the monitoring well network were decommissioned. The wells which remain in the monitoring program are required to either meet the requirements of the ROD or to provide water level data.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?

Yes.

RAOs for the 354 Site (OU 005) are presented above. There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy. The land uses at the site are limited to open space, industrial, maintenance, supply/storage, and administration in the RPMP.

#### Changes in Standards and To Be Considered (TBC) Criteria

Chemical-specific standards identified in the ROD included state surface water quality standards and anti-degradation policy, and federal and state MCLs. No criteria were set for soil in the ROD, since the source removal pilot study had effectively reduced contaminants to acceptable levels.

The MCLs listed in Table 15 have not changed since the time the ROD was signed.

The ROD also identified action- and location-specific standards such as endangered and/or threatened species, floodplain, historical, and RCRA requirements. None of these standards have changed; however, there is current consideration by the Fish and Wildlife Service to remove the

bald eagle from the threatened species list. The bald eagle has made practice nests along the Kansas River near the site.

**Table 15. Remediation Goals for Groundwater at 354.**

Analyte	Remediation Goal (ug/L)	Basis
Tetrachloroethene	5	MCL
Trichloroethene	5	MCL
cis-1,2-Dichloroethene	70	MCL
Benzene	5	MCL

MCL = Maximum Contaminant Level

Changes in Exposure Pathways, Toxicity, and Other Characteristics

The BLRA for 354 evaluated potential risks from soil and groundwater for three areas at the site; COPCs in common were VOCs, SVOCs, and metals. Indoor worker, groundskeeper, excavation worker, and child resident scenarios were evaluated using reasonable maximum exposure assumptions. Pathways included soil ingestion, dust inhalation, and soil dermal contact, and indoor/outdoor inhalation of vapors from either soil or groundwater. Groundwater at the site is not used. All reasonably expected populations and pathways were evaluated with reasonable maximum exposure assumptions in the BLRA.

Conducted in 2003, the BLRA used the conservative EPA published draft TCE toxicity criteria; there were no changes in other toxicity criteria that would impact the protectiveness of the remedy. Assumptions about dermal absorption are consistent with, or more protective than, default values provided in EPA 2004 dermal guidance. Restrictions remain in place in the RPMP regarding land and water use; therefore, no changes were noted that impact the protectiveness of the selected remedy.

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

No.

No information about environmental risks, site conditions, natural disaster impacts, or other data has been determined to affect the protectiveness of the remedy. The most recent EPA ecological risk assessment guidance was followed at the time the BLRA was conducted. Conservatively modeled concentrations of contaminants at the Kansas River were screened against benthic benchmarks and found to not pose significant risk.

Technical Assessment Summary

According to the data review and the site inspections, the remedies at the four operable units are functioning as intended by their respective RODs. There have been no changes in the physical conditions of the sites that would affect the protectiveness of the remedies. Most ARARs for soil contamination and/or groundwater contamination have been met. While EPA drafted more conservative TCE toxicity factors in 2003, some BLRA were conducted prior. However, future

finalization of these new numbers will not impact protectiveness since TCE concentrations have been below MCLS. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. There is no other information that calls into question the protectiveness of the remedies.

## VIII. ISSUES

<b>Issue</b>	<b>Currently Affects Protectiveness (Y/N)</b>	<b>Affects Future Protectiveness (Y/N)</b>
<b>Southwest Funston Landfill, OU 001</b>  Differential settlement in the landfill cover to the east of the landfill access road could result in ponding of rainwater and increased infiltration. The landfill cover to the west of the access road was repaired in the Fall of 2006.	N	N

**IX. RECOMMENDATIONS AND FOLLOW-UP ACTIONS**

Issue	Recommendations/ Follow-Up Actions	Responsible Party	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
<p><b>Southwest Funston Landfill, OU 001</b></p> <p>Differential settlement in the landfill cover to the east of the landfill access road could result in ponding of rainwater and increased infiltration.</p>	<p>Fill in all settled areas to match surrounding grade and seed filled areas with native grass.</p>	<p>Fort Riley</p>	<p>USEPA, KDHE</p>	<p>30 Sep 08</p>	<p>N</p>	<p>N</p>

## **X. PROTECTIVENESS STATEMENTS**

### **A. Southwest Funston Landfill, Operable Unit 001**

The remedy at SFL Site (OU 001), restricting future site uses, stabilizing the Kansas River bank along the landfill, repairing and improving the existing native soil cover, and prohibiting the future use of site groundwater, ensures protection of human health and the environment will continue to be protective during operation and maintenance. Exposure pathways that could potentially result in unacceptable risks are being controlled.

### **B. Pesticide Storage Facility, Operable Unit 002**

The remedy at PSF Site (OU 002), No Further Action, is currently protective of human health and the environment will continue to be protective provided that land use remains consistent with the Industrial Use Scenario. Exposure pathways that could potentially result in unacceptable risks are being controlled.

### **C. Former Fire Training Area – Marshall Army Airfield, Operable Unit 004**

The remedy at FFTA-MAAF Site (OU 004), Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment will continue to be protective. Exposure pathways that could potentially result in unacceptable risks are being controlled.

### **D. 354 Area Solvent Detections, Operable Unit 005**

The remedy at 354 Site (OU 005), Monitored Natural Attenuation (MNA) with Institutional Controls, is currently protective of human health and the environment will continue to be protective as the remedy is operated and maintained. Exposure pathways that could potentially result in unacceptable risks are being controlled.

## **XI. NEXT REVIEW**

The next review will be due on August 6, 2012.



**APPENDIX A – PUBLIC NOTICE**

**PUBLIC NOTICE  
FORT RILEY, KANSAS  
ANNOUNCES  
FIVE-YEAR REVIEW**

On behalf of Fort Riley, the U.S. Army Corps of Engineers will be conducting a Five-Year Review of the implemented clean up actions associated with the Records of Decision (ROD) for four Operable Units (OUs) at Fort Riley, Kansas.

OU 001 - Southwest Funston Landfill (SFL) (FTRI-003) has vinyl chloride contaminated groundwater below MCLs. The implemented remedy includes repair and maintenance of the landfill cover and riverbank stabilization structure, annual groundwater monitoring and institutional controls. The ROD was signed in 1995.

OU 002 - Pesticide Storage Facility (PSF) (FTRI-030) has pesticide contaminated soil. This operable unit was designated as requiring No Further Action (NFA). The ROD was signed in 1997.

OU 004 - Former Fire Training Area – Marshall Army Airfield (FFTA-MAAF) (FTRI-019) has PCE, TCE, & DCE contaminated groundwater below MCLs. The remedy includes annual groundwater monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2005.

OU 005 - 354 Area Solvent Detections (354) (FTRI-031) has PCE, TCE, & DCE contaminated groundwater. The remedy includes annual groundwater monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2006.

The Five-Year Review will cover the Remedial Action Objectives for each of the four operable units to determine if they remain protective of human health and the environment.

Interested members of the public are invited to provide input for the Five-Year Review. Example questions/topics which you might consider include:

- Your overall impression of these projects (general sentiment)?
- Have site operations had an impact on the surrounding community?
- Are there any community concerns regarding the four sites or their operation and administration?
- Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local or installation authorities?
- Do you feel well informed about the site's activities and programs?
- Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

For more information on past and ongoing environmental clean up at Fort Riley, the Administrative Record can be viewed at:

Directorate of Public Works  
Environmental Division  
IMNW-RLY-PWE  
407 Pershing Court  
Fort Riley, Kansas 66442-6016  
785-239-8619  
Mon – Fri 9AM to 4 PM

Comments/questions related to this Five-Year Review should be submitted to Dr. Richard Shields no later than May 31, 2007 at the address provided above. Dr. Shields may also be contacted directly at 785-239-3194. The final version of the Five-Year Review Report will be submitted to EPA Region VII no later than July 6, 2007. A notice will be provided to the public upon completion of the Five-Year Review on or about August 7, 2007.

**AFFIDAVIT OF PUBLICATION**

STATE OF KANSAS  
GEARY COUNTY

SS

vs.

Notice

Patrick Keeze, being first duly sworn,  
deposes and says: That he is Adm mgr. of

**THE JUNCTION CITY DAILY UNION**

a daily newspaper printed in the State of Kansas, and published in and of general circulation in Geary County, Kansas, with a general paid circulation of more than 6,000 on a daily basis in Geary County, Kansas, and that said newspaper is not a trade, religious or fraternal publication.

Said newspaper is a daily published at least 305 times a year; has been so published continuously and uninterruptedly in said county and state for a period of more than five years prior to the first publication of said notice; and has been admitted at the post office of Junction City in said County as second class matter.

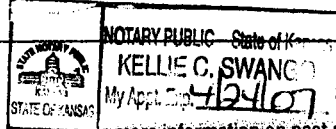
That the attached notice is a true copy thereof and was published in the regular and entire issue of said newspaper for 1 consecutive days (weeks, days), the first publication thereof being made as aforesaid on the 1st day of April, 2007, with subsequent publications being made on the following dates:

- \_\_\_\_\_, 20\_\_\_\_, \_\_\_\_\_, 20\_\_\_\_
- \_\_\_\_\_, 20\_\_\_\_, \_\_\_\_\_, 20\_\_\_\_
- \_\_\_\_\_, 20\_\_\_\_, \_\_\_\_\_, 20\_\_\_\_

Subscribed and sworn to before me this 2 day of April, 2007

Patrick M. Keeze  
Kellie C. Swanson  
Notary Public

My Commission expires: \_\_\_\_\_  
Printer's Fee \$ 111.65 Ad.  
Additional copies \$ \_\_\_\_\_



For more information on past and ongoing environmental clean up at Fort Riley, the Administrative Record can be viewed at:

Directorate of Public Works  
Environmental Division  
IMNW-RLY-PWE  
407 Pershing Court  
Fort Riley, Kansas 66442-6016  
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**PUBLIC NOTICE  
FORT RILEY, KANSAS  
ANNOUNCES  
FIVE-YEAR REVIEW**

On behalf of Fort Riley, the U.S. Army Corps of Engineers will be conducting a Five-Year Review of the implemented clean up actions associated with the Records of Decision (ROD) for four Operable Units (OU) at Fort Riley, Kansas.

OU 001 - Southwest Funston Landfill (SFL) (FTRI-003) has vinyl chloride contaminated ground water below MCLs. The implemented remedy includes repair and maintenance of the landfill cover and river bank stabilization structure, annual ground-water monitoring and institutional controls. The ROD was signed in 1997.

OU 002-Pesticide Storage Facility (PSF) (FTRI-030) has pesticide contaminated soil. This operable unit was designated as requiring No Further Action (NFA). The ROD was signed in 1997.

OU 004-Former Fire Training Area-Marshall Army Airfield (FFTA\_MAAF) (FTRI-019) has PCE, TCE, & DCE contaminated ground water below MCLs. The remedy includes annual ground-water monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2005.

OU 005-354 Area Solvent Detections (354) (FTRI-031) has PCE, TCE, & DCE contaminated ground water. The remedy includes annual groundwater monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2006.

The Five-Year Review will cover the Remedial Action Objectives for each of the four operable units to determine if they remain protective of human health and the environment.

Interested members of the public are invited to provide input for the Five-Year Review. Example questions/topics which you might consider include:

- Your overall impression of these projects (general sentiment)?
- Have site operations had an impact on the surrounding community?
- Are there any community concerns regarding the four sites or their operation and administration?
- Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local or installation authorities?
- Do you feel well informed about the site's activities and programs?
- Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

In The Matter of Public Notice

STATE OF KANSAS, RILEY COUNTY, ss

Printer's Fee \$ 76.48

Payment Date 3-31-07

PUBLIC NOTICE
FORT RILEY, KANSAS
ANNOUNCES
FIVE-YEAR REVIEW

Published in The Manhattan Mercury on April 1, 2007.
On behalf of Fort Riley, the U.S. Army Corps of Engineers will be conducting a Five-Year Review of the implemented clean up actions associated with the Records of Decision (ROD) for four Operable Units (OU) at Fort Riley, Kansas:

- OU 001 - Southwest Junction Landfill (SFL) (FTRI-009) has vinyl chloride contaminated ground water below MCLs. The implemented remedy includes repair and maintenance of the landfill cover and fiber bank stabilization structure, annual ground water monitoring and institutional controls. The ROD was signed in 1997.
OU 002 - Pesticide Storage Facility (PSF) (FTRI-030) has pesticide contaminated soil. This operable unit was designated as requiring No Further Action (NFA). The ROD was signed in 1997.
OU 004 - Former Fire Training Area - Marshall Army Airfield (FFTA-MAAF) (FTRI-019) has PCE, TCE, & DCE contaminated ground water below MCLs. The remedy includes annual ground water monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2005.
OU 005 - 354 Area Solvent Detections (354) (FTRI-031) has PCE, TOE, & DCE contaminated ground water. The remedy includes annual groundwater monitoring for natural attenuation effectiveness and institutional controls. The ROD was signed in July 2006.

The Five-Year Review will cover the Remedial Action Objectives for each of the four operable units to determine if they remain protective of human health and the environment.

Interested members of the public are invited to provide input for the Five-Year Review. Example questions/topics which you might consider include:

- > Your overall impression of these projects (general sentiment)?
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> Are there any community concerns regarding the four sites or their operation and administration?
> Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local or installation authorities?
> Do you feel well informed about the site's activities and programs?
> Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

For more information on past and ongoing environmental clean up at Fort Riley, the Administrative Record can be viewed at:

Directorate of Public Works
Environmental Division
IMNW-RLY-PWS
407 Pershing Court
Fort Riley, Kansas 66442-6018
785-239-6619
Mon - Fri 9AM to 4 PM

Comments/questions related to this Five-Year Review should be submitted to Dr. Richard Shields no later than May 15, 2007 at the address provided above. Dr. Shields may also be contacted directly at 785-239-3194. The final version of the Five-Year Review Report will be submitted to EPA Region VII no later than July 6, 2007. A notice will be provided to the public upon completion of the Five-Year Review on or about August 7, 2007.

I, Stephen Stallwitz being first duly sworn, depose and say: That I am Advertising Director of The Manhattan Mercury, a daily newspaper printed in the State of Kansas, and published in and of general circulation in Riley County, Kansas, with a general paid circulation on a daily basis in Riley County, Kansas and that said newspaper is not a trade, religious or fraternal publication. Said newspaper is a daily published at least weekly 50 times a year; has been so published continuously and uninterruptedly in said county and state for a period of more than five years prior to the first publication of said notice; and has been admitted at the post office of Manhattan in said County as second class matter. That the attached notice is a true copy thereof and was published in the regular and entire issue of said newspaper for one consecutive insertion the first publication thereof being made as aforesaid on the 1st day of April, 2007 with subsequent publications being made on the following dates:

On the \_\_\_ day of \_\_\_, 2007

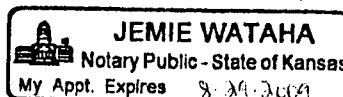
On the \_\_\_ day of \_\_\_, 2007

[Handwritten signature]

Subscribed and sworn to before me this 2nd day of April, 2007.

[Signature] Notary Public

Notary Seal



## **Appendix B – Reference List and Relevant Documents Reviewed**

## **General References and Relevant Documents Reviewed**

Bucher, Willis, & Ratliff, 1986. Geary County Kansas Zoning Regulations.

Lyman WJ, Reehl WJ, Rosenblatt DH (Lyman), 1982. Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds. McGraw-Hill, New York, New York.

Ney RE, 1995. Fate and Transport of Organic Chemicals in the Environment, A Practical Guide. Government Institutes, Inc., Rockville Maryland.

Robert and Company, 1993. Installation Compatible Use Zone (ICUZ) Study, Fort Riley, Kansas.

Long Range Component, Real Property Master Plan for Fort Riley, Kansas, September 2000.

U.S. Environmental Protection Agency (USEPA), 1991. Office of Solid Waste and Environmental Restoration (OSWER) Directive 9355.7-02.

U.S. Environmental Protection Agency (USEPA), 1994. Office of Solid Waste and Environmental Restoration (OSWER Directive 9355.7-02A.

U.S. Environmental Protection Agency (USEPA), 1995. Office of Solid Waste and Environmental Restoration (OSWER Directive 9355.7-03A.

U.S. Environmental Protection Agency Region 9 (USEPA), 2004. Preliminary Remediation Goals.

U.S. Environmental Protection Agency (USEPA), 2004. Draft Guidance for Evaluating the Vapor Intrusion Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance).

Interim Final Report-Hazardous Waste Management Consultation No. 37-26-0190-89 Evaluation of Solid Waste Management Units Fort Riley, Kansas. 1988.

Installation-Wide Site Assessment for the Fort Riley, Kansas. 1992.

Site Investigation Report for High Priority Sites at Fort Riley, Kansas. 1994.

### **SFL Site (OU 001) Specific References**

Remedial Investigation Report, Southwest Funston Landfill (Operable Unit 001), Fort Riley, Kansas. 1993.

Engineering Evaluation/Cost Analysis (EE/CA) Report, Southwest Funston Landfill (Operable Unit 001), Fort Riley, Kansas. 1993.

Feasibility Study for Southwest Funston Landfill (Operable Unit 001). 1994

Draft Final Proposed Plan, Southwest Funston Landfill (Operable Unit 001), 1994.

Record of Decision, Southwest Funston Landfill (Operable Unit 001), 1995.

Long-Term Monitoring Reports, Southwest Funston Landfill (Operable Unit 001), Fort Riley, Kansas, through 2006.

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### **PSF Site (OU 002) Specific References**

Remedial Investigation Report, Pesticide Storage Area (Operable Unit 002), 1993.

Removal Action Engineering Evaluation/Cost Analysis Report (EE/CA), Storage Area (Operable Unit 002), 1993.

Removal Action Memorandum, Pesticide Storage Area (Operable Unit 002), 1993.

RI Report Addendum: Comparison of Ground-Water Inorganic Concentrations in On-Site Background Monitoring Wells, Pesticide Storage Facility (Operable Unit 002), Fort Riley, Kansas. 1996.

Remedial Investigation Addendum, Pesticide Storage Area (Operable Unit 002), 1997.

Proposed Plan, Pesticide Storage Area (Operable Unit 002), 1997.

Record of Decision, Pesticide Storage Area (Operable Unit 002), 1997.

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### **MAAF-FFTA Site (OU 004) Specific References**

Engineering Evaluation/Cost Analysis for the Former Fire Training Area (Operable Unit 004) at Marshall Army Airfield, Fort Riley, Kansas. 19xx.

Pilot Test Study Results Report, Soil Vapor Extraction and Bioventing Systems for the Former Fire Training Area, Marshall Army Airfield (Operable Unit 004), Fort Riley, Kansas, 1999.



Remedial Investigation Report, Fire Training Area, Marshall Army Airfield (Operable Unit 004) at Fort Riley, Kansas. 200x.

Feasibility Study, Former Fire Training Area, Marshall Army Airfield (Operable Unit 004) at Fort Riley, Kansas. 2003.

Proposed Plan, Fire Training Area Marshall Army Airfield (Operable Unit 004) at Fort Riley, Kansas. 2004.

Record of Decision, Fire Training Area Marshall Army Airfield (Operable Unit 004) at Fort Riley, Kansas. 2005.

Data Summary Reports for Fire Training Area Marshall Army Airfield (Operable Unit 004) at Fort Riley, Kansas, through 2006.

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### **354 Site (OU 005) Specific References**

Site Investigation: POL UST Investigations/Remedial Action Plans, 354 Area Solvent Detections (Operable Unit 005), Fort Riley, Kansas. 1995.

Draft Final Remedial Investigation Report, 354 Area Solvent Detections (Operable Unit 005) at Main Post, Fort Riley, Kansas. 2004.

Draft Final Proposed Plan, 354 Area Solvent Detections (Operable Unit 005) at Main Post, Fort Riley, Kansas. 2005.

Pilot Study Report, Pilot Study for Soil Remediation, 354 Area Solvent Detections (Operable Unit 005) at Main Post, Fort Riley, Kansas. 2005.

Record of Decision, 354 Area Solvent Detections (Operable Unit 005). 2006.

Draft Final Remedial Design/Remedial Action Plan, 354 Area Solvent Detections (Operable Unit 005) at Main Post Fort Riley, Kansas. 2007.

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