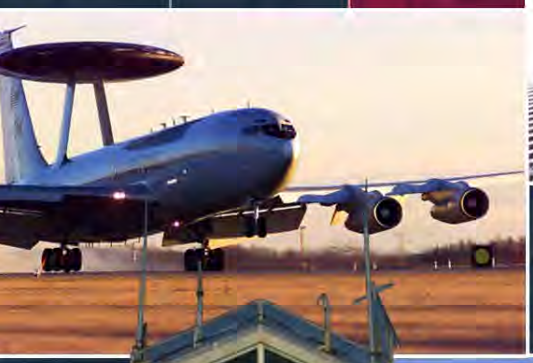


COMMUNITY RELATIONS PLAN

Installation Restoration Program and Resource Conservation and Recovery Act

TINKER AIR FORCE BASE OKLAHOMA

November 2010

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	17-November-10	Final, November 2010

4. TITLE AND SUBTITLE
Annual Scientific and Technical Report (CDRL A001C)
Community Relations Plan

5. FUNDING NUMBERS
FA8903-08-D-8778-0060

6. AUTHOR(S)
John Osweiler, Amy Phelan, Jennifer McCanne, Mark Rigby PhD, Ed Heyse PE, PhD

7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(ES)
Parsons Infrastructure and Technology Group, Inc.

8. PERFORMING ORGANIZATION REPORT NUMBER
Parsons, 747078

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Mr. Arthur Hatfield
AFCEE//EXEC, Bldg. 171
2261 Hughes Ave., Suite 155
Lackland AFB, TX 78236-9853

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. Abstract (Maximum 200 Words)

This Community Relations Plan presents the community involvement and public participation programs that have been integrated into the overall environmental restoration process at Tinker Air Force Base (AFB), Oklahoma. The Community Relations Plan is designed as a planned approach to establish and maintain two-way communication between Tinker AFB and its surrounding community. Interactive communication enables the community and those implementing the Installation Restoration Program (IRP) at Tinker AFB to convey information to each other, provide responses to questions and concerns, and formulate more responsive actions. This document supersedes the Community Relations Plan dated March 2004.

14. SUBJECT TERMS
Tinker AFB, Community Relations Plan, Installation Restoration Program

15. NUMBER OF PAGES

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
unclassified	unclassified	unclassified	none

NSN 7540-01-280-5500

Standard Form 298 (Rev 2-89)

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

This Community Relations Plan presents the community involvement and public participation programs that have been integrated into the overall environmental restoration process at Tinker Air Force Base (AFB), Oklahoma. This document reflects the Base's community relations goals and supersedes the Community Relations Plan dated March 2004. The plan consists of five sections and eleven appendices, as follows:

Section 1 - Provides an overview of the Community Relations Plan, as well as an overview of the environmental laws, regulatory requirements, and institutional processes used to guide involvement of the community in Tinker AFB's environmental restoration activities.

Section 2 - Describes the history of Tinker AFB, the origins of contamination, and the environmental programs for managing and restoring contaminant releases.

Section 3 - Provides capsule descriptions for the restoration sites at Tinker AFB that are regulated under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), and the Resource Conservation and Recovery Act (RCRA). All of these sites are managed by the Air Force, with 40 sites assigned to the Installation Restoration Program (IRP), and 13 sites assigned to the Compliance Restoration Program (CRP).

Section 4 - Briefly summarizes the Tinker AFB community, along with the communities and local governments of Oklahoma City, Midwest City, and Del City. This section also explains the relationships between the on-Base and off-Base communities as well as the public's interest and involvement in restoration activities at Tinker AFB.

Section 5 - Defines the Community Relations Program and the goals for involving various members of each community so environmental information is accurately and effectively communicated. In this section, a plan is presented that outlines the methods and techniques used to address specific public interests and/or concerns with the environmental restoration program at Tinker AFB. The plan identifies the schedule for community relations activities associated with the CERCLA process and/or RCRA corrective action activities and the interaction with various stages of the restoration process under CERCLA or RCRA guidelines. Timing charts and a table of activities are included for certain community relations tasks that must be accomplished under either RCRA or CERCLA guidelines.

Appendix A - Presents a list of federal and state agency representatives.

Appendix B - Presents a list of federal and state elected officials.

Appendix C - Presents a list of citizen groups.

Appendix D - Presents a list of media contact information.

Appendix E - Describes the Tinker AFB Restoration Advisory Board (RAB).

Appendix F - Describes the location where public meetings are held.

Appendix G - Presents a glossary of environmental terms.

Appendix H - Presents a glossary of environmental acronyms.

Appendix I - Provides factsheets for all of the IRP sites and CRP sites.

Appendix J - Describes the relative risk site evaluation (RRSE) methodology and includes RRSE worksheets for seven CRP sites.

Appendix K - Presents cross sections of the subsurface hydrogeology at the CRP sites (attached CD).

Tinker AFB will review this plan as necessary to update restoration status and technical activities, and to revise community relations activities based on the level of community interest and concern. To ensure this plan is carried out effectively, the following individuals are designated representatives concerning restoration activities at Tinker AFB:

Mr. Albert Aguilar
Chief, Environmental Restoration Branch
72nd ABW/CEPR
7701 Arnold Street, Suite 221
Tinker Air Force Base, OK 73145-9100
Phone: (405) 734-4574

Mr. Brion Ockenfels
Office of Public Affairs
Wing Headquarters Building 460
7460 Arnold Street, Ste 127
Tinker Air Force Base, OK 73145
Phone: (405) 739-2026

Mr. Robert Replogle
ODEQ/Site Assessment Unit
Oklahoma Department of Environmental Quality
707 N. Robinson, P.O. Box
Oklahoma City, OK 73101-1677
Phone: (405) 702-5118

Mr. Michael Hebert (6SF-AP)
U.S. EPA Region VI
1445 Ross Avenue, Suite 1200
1677 Dallas, TX 75202
Phone: (214) 665-8315

1.0 OVERVIEW OF THE COMMUNITY RELATIONS PLAN

1.1 Purpose of the Community Relations Plan

The purpose of this Community Relations Plan is to inform concerned citizens regarding environmental restoration activities at Tinker Air Force Base (AFB) and ways in which they can participate in this process. This Community Relations Plan is designed as a planned approach to establish and maintain two-way communication between the Base and its surrounding community during this lengthy and complex technical process. Interactive communication enables the community and those implementing the Installation Restoration Program (IRP) at Tinker AFB to convey information to each other, provide responses to questions and concerns, and formulate more responsive actions. Thus, community relations activities benefit both local citizens and the Base by providing all parties with insight and first-hand information on continuing IRP efforts.

The Community Relations Plan outlines a dynamic program integrated into all stages of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Resource Conservation and Recovery Act (RCRA). Together, CERCLA and RCRA provide the legal framework and guidance for corrective action investigations, planning, and implementation phases that are responsive to technical developments and changing concerns of the public.

CERCLA actions are responses to requirements of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Portions of Tinker AFB are on the National Priority List (NPL) of the NCP, and in accordance with CERCLA guidance, the investigation and remedial response processes require varying degrees of public involvement.

RCRA actions are performed in accordance with Tinker's Hazardous Waste Storage Facility Operations permit, which is required for the Base to store hazardous waste on site. Review of permit applications, issuance of permits and administrative orders, permit modifications, implementation of investigation and remediation programs, and approval of closure plans are all activities that require varying degrees of public involvement.

The Community Relations Plan maps out a recommended course of action that Tinker AFB environmental planning staff implement to facilitate public involvement during the IRP. The initial version of the Community Relations Plan was based on 1992 United States Environmental Protection Agency (USEPA) guidance and originated from community concerns identified during community interviews conducted in the 1980s and at public meetings held in September 1989, April 1990, December 1990, and February 1992. From these discussions, the initial plan indicated a low-to-moderate level of interest in the Base's environmental issues;

however, the Community Relations Plan is constructed with sufficient flexibility to adjust to changes either in community attitudes or in the schedule for technical activities at the site. The current version of the Community Relations Plan is based on 2005 USEPA guidance, which supersedes the 1992 guidance. The Community Relations Plan is the blueprint for public information and participation. This important document identifies the public's concerns and suggests ways that those responsible for implementing environmental restoration will respond to those concerns.

1.2 Basis and Responsibility for Environmental Cleanup at Tinker AFB

In 1980, Congress passed CERCLA to address the cleanup of hazardous waste disposal sites across the country. CERCLA gave the President authority to require responsible parties to remediate the sites or undertake response actions through the use of a fund, known as Superfund. Through executive order, the President delegated responsibility to the USEPA to investigate and remediate private party hazardous waste disposal sites that created a threat to human health and the environment. Also, the President delegated responsibility to investigate and remediate federal facility disposal sites to the various federal agency heads. In 1981, the Secretary of Defense established the IRP to investigate and remediate Department of Defense (DoD) sites. In turn, each military service established its own IRP to identify and investigate hazardous waste sites on its installations.

The Air Force IRP is designed to identify, investigate, and cleanup contamination associated with past Air Force activities at active Air Force installations as well as those formerly owned or used by the Air Force. The IRP was implemented at Tinker AFB in July 1981. The first IRP investigation at the Base was a Phase I study, similar to a preliminary assessment/site investigation (PA/SI) that is used to evaluate the potential for release of hazardous substances from a site, completed in April 1982. This study identified 14 sites that needed further investigation. A Phase II study, equivalent to a Remedial Investigation/Feasibility Study (RI/FS) phase, which is used to characterize a potential contaminant site, assess risk, and evaluate alternative remedial actions, was performed in 1983. Since that time, more sites at the Base have been identified, investigated, and remediated under the IRP.

Congress amended CERCLA in 1986 through the Superfund Amendments and Reauthorization Act (SARA). SARA waived sovereign immunity for federal facilities. It gave authority to the USEPA to oversee the cleanup of federal facilities and to have the final authority to select the remedial action at federal facilities placed on the NPL if the USEPA and relevant federal agency could not concur in the selection. Congress also codified the Defense

Environmental Response Program (DERP) (SARA Section 211), which allocates funds through the DoD budget to remediate its sites, since the Superfund is not available for the cleanup of federal facilities. The DERP specifies the type of cleanup responses that the fund can be used to address.

In response to SARA, the DoD realigned its IRP to closely follow the investigation and cleanup requirements under CERCLA. Like the CERCLA cleanup program, the IRP seeks to protect public health and minimize environmental hazards associated with contaminated sites. The IRP and CERCLA prescribe investigation and remediation activities conducted through a phased approach. In many cases, however, IRP sites at Tinker are subject to the RCRA corrective action (CA) process because the Base operates as a permitted hazardous waste storage facility. The Federal Facilities Agreement (FFA) signed by both the USEPA and the Oklahoma Department of Environmental Quality (ODEQ) allows for designated sites to be regulated under RCRA and not CERCLA. Both the CERCLA Remedial Action (RA) process and the RCRA CA process are similar in approach and objectives, as shown in Figure 1.1. CERCLA or RCRA processes are applied depending on legal authority. CERCLA regulatory processes have been led by USEPA Region 6 since inception. RCRA administrative processes however were delegated by USEPA to individual states. In Oklahoma, RCRA authority fell to the Oklahoma State Department of Health (OSDH) until the ODEQ was granted jurisdictional authority in 1993.

Table 1.1 lists all forty (40) of the original Tinker IRP sites. Seven of these sites are CERCLA regulated, because they are on the NPL. The other 33 sites are RCRA regulated, with 24 of these defined as solid waste management units (SWMUs) in the RCRA Operating Permit.

In 1984, Congress reauthorized RCRA and amended the statute to allow the USEPA to require, as a permit condition, a facility to take corrective action for any releases of hazardous waste or constituents from any SWMU at a treatment, storage, or disposal (TSD) facility. These SWMUs do not have to be active units currently being used for treatment, storage, or disposal and can also be identified as sites requiring CERCLA response actions.

On July 1, 1991, USEPA Region 6 and the OSDH issued RCRA Part B Permit (No. OK1571724391), whereby Tinker AFB was formally granted the right to operate as a hazardous waste storage facility for 10 years. This included the right to store controlled industrial waste in accordance with the conditions of the permit, as well as federal and state regulations, including the Oklahoma Controlled Industrial Waste Disposal Act of 1981, and the Solid Waste Disposal Act of 1976 (as amended by RCRA and the Hazardous and Solid Waste Amendments [HSWA] of 1984). In January of 2001, Tinker AFB submitted a RCRA Part B Permit renewal application

to the ODEQ, which was approved on August 15, 2002 and is effective through August 11, 2012. The current RCRA permit requires Tinker AFB to investigate any identified SWMUs and to take further action where appropriate.

RCRA Facility Investigations (RFI) have been performed at all of the SWMUs in order to meet permit requirements. It has been the intent of each RFI and any subsequent corrective measure study and/or corrective action to meet both CERCLA response action (in accordance with IRP policy and strategy) and RCRA CA requirements.

In accordance with the DERP, the DoD created another site cleanup program in 2010 entitled the Compliance Restoration Program (CRP). As shown in Table 1.2, thirteen sites have been identified under the CRP, and these sites will follow the appropriate response action process.

1.3 CERCLA/RCRA Community Involvement

CERCLA and RCRA share similar objectives in keeping the community informed about, and involved in, hazardous waste issues. Community relations activities are tailored to each individual site, taking into consideration the level of community concern, progress of cleanup and corrective actions, and RCRA permitting status. Public information and participation programs are an integral component of CERCLA restoration and RCRA hazardous waste corrective action plans, studies, and implementation processes. CERCLA and RCRA community relations programs ensure that people who live and/or work in the communities surrounding facilities where corrective actions are being conducted, as well as those who work in or for these facilities, have opportunities for public participation in the environmental restoration process. The Community Relations Plan documents how and when community relations activities, required by CERCLA and RCRA, are carried out.

1.3.1 RCRA Community Involvement Requirements

Each RCRA permitted facility is required to (1) notify the ODEQ when it discovers releases of hazardous waste or hazardous constituents from any SWMU at a facility, and (2) to develop a corrective action plan for its study and restoration. As part of the RCRA permitting process, ODEQ evaluates the status of all SWMUs at facilities located in the State of Oklahoma (see Section 3 for RCRA capsule site descriptions).

1.3.2 CERCLA Community Involvement Requirements

Community involvement requirements are set forth in the NCP, in SARA and in USEPA policy documents. For remedial actions, the plan is generally prepared before the CERCLA RI/FS begins and outlines community relations activities to be held during the RI/FS. The plan

also identifies anticipated activities required during the Record of Decision (ROD) phase and prior to Remedial Design/Remedial Action (RD/RA). Additionally, it provides guidance for both current and future actions and investigations that may affect the level of community concern in the local area (see Section 3 for CERCLA capsule site descriptions).

TABLES

Table 1.1
Installation Restoration Program (IRP)
Site Summary and Status as of November 2010

IRP Site Code	SWMU Number	Site Name	Materials Disposed Of and/or Contamination At Site	Dates Of Operation	IRP Status	Regulatory Driver
OT001		Building 3001 - Groundwater	TCE, PCE, chromium and other metals	N/A	RA-O	CERCLA
OT002		Soldier Creek - Sediment and Surface Water	contaminated spills, runoff, waste waters	N/A	SC	CERCLA
ST003		North Tank Area	fuel oil, waste solvent, gasoline	1943-1984	RA-O	CERCLA
OT004		Wells 18 & 19	TCE and PCE	1942-1986	SC	CERCLA
OT005[1]		Soldier Creek Groundwater/IWTP Groundwater	industrial waste, chemical waste	1943-Present	SC/RA-O[2]	CERCLA
ST006		Southwest Tank Area	fuel and solvents	1945-1980	SC	RCRA
ST007		290 Fuel Farm	fuel and solvents	1942-1986	RA-O	RCRA
ST008	15 - 18	Four Fuel Sites	fuel and solvents	1942-1980	RA-O[3]	RCRA
OT009		Crutcho Creek	occasional spills, landfill seeps	N/A	SC	RCRA
OT010		Kuhlman Creek	occasional spills, landfill seeps	N/A	SC	RCRA
LF011	3	Landfill 1	general household refuse	1942-1945	LTM	RCRA
LF012	4	Landfill 2	general refuse, industrial waste, radiological waste	1945-1952	LTM	RCRA
LF013	5	Landfill 3	general refuse, industrial waste	1952-1961	LTM	RCRA
LF014	6	Landfill 4	general refuse, industrial waste, radiological waste	1961-1968	LTM	RCRA
LF015	2	Landfill 5	general refuse, industrial waste	1968-1970	LTM	RCRA
LF016	1	Landfill 6	general refuse, industrial waste	1970-1979	LTM	RCRA
WP017	11	Supernatant Pond	sewage disposal, liquid waste	1954-1984	SC	RCRA
WP018	12	Industrial Waste Pit #1	oils, cyanide, chromates, phenols, solvents	1947-1958	RA-O	RCRA
WP019	13	Industrial Waste Pit #2	waste oils, solvents	1958-1965	SC	RCRA
OT020		Multiple Creeks *(Deleted as Active Site)*	N/A	N/A	SC	RCRA
FT021	7	Fire Training Area #1	fuel burned and extinguished	195l-1962	SC	RCRA
FT022	8	Fire Training Area #2	fuel burned and extinguished	1962-1966	SC	RCRA
OT023		Facility 1123	temporary storage for new hazardous materials	Pre-1985-1990	SC	RCRA
FT024	10	Fire Training Area #4	this site never existed; no contamination present	N/A	SC	RCRA
RW025	19	Radioactive Waste Disposal Site, 1030W	low-level radioactive refuse, mixed waste	1940s-1950s	SC	RCRA
RW026	20	Radioactive Waste Disposal Site, 201S	low-level radioactive radium paint solids	1950s-1960s	SC	RCRA
RW027	21	Radioactive Waste Disposal Site, 62598	radioactive “lead still” (not located)	1955	SC	RCRA
RW028		Radioactive Waste Disposal Site, 4000	engine parts containing magnesium thorium (site non-existent)	1966	SC	RCRA
RW029	22	Radioactive Waste Disposal Site, 1022E	two thorium objects, and one radium compass	Mid-1950s	SC	RCRA

IRP Site Code	SWMU Number	Site Name	Materials Disposed Of and/or Contamination At Site	Dates Of Operation	IRP Status	Regulatory Driver
WP030		Pit Q-51	industrial solvents	1940-1970	SC	CERCLA
OT031		Bonnewell *(Deleted as Active Site)*	N/A	N/A	SC	CERCLA
ST032		3700 Fuel Yard	fuel	1954-1991	SC (fuels only)	RCRA
ST033		Area "A" Service Station	fuel	1942-1990	SC (fuels only)	RCRA
OT034	23[4]	IWTP Abandoned Waste Tanks , Soils	industrial waste & chemical waste	1943 – Present	SC	RCRA
	24[5]	IWTP and associated components, Soils	treatment of industrial wastewater from processes	1963 – Present	RA-O	RCRA
	32[6]	Sanitary Waste Treatment Plant and associated components, Soils	treatment of industrial and sanitary wastes prior to 1971; limited sanitary wastes at present	1942 - Present	SC	RCRA
WP035	54	Discharge Ditch, Building 17 - soils and pad	storage drums containing unused chemical products	1950s - Late 1980s	SC	RCRA
WP036		Purge Facility/ Turnaround Soils	Jet fuel, spills due to transfer operations, possible accidental leaks, leaking tanks and transfer lines	1975 - Present	SC (fuels only)	RCRA
CG037		Northwest GWMU	Solvents, Fuels	N/A	RA-O	RCRA
CG038		Southwest GWMU	Solvents, Fuels	N/A	RA-O	RCRA
CG039		East GWMU	Solvents, Fuels	N/A	RA-O	RCRA
CG040		Gator GWMU	Solvents, Fuels	N/A	RA-O	RCRA

Notes:

(1) CERCLA is used as the primary regulatory mandate. Individual components of the IWTP may also be under RCRA compliance standards as determined by USEPA.
(2) Site OT005 consists of two operable units (OU): The Soldier Creek Groundwater (OU-3) which is SC, and the IWTP Groundwater (OU-4) which is RA-O.
(3) See capsule site description in Section 3, which addresses how the Statement of Basis for ST008 has been impacted by other RA-O activities in this area.
(4) In the 2002 RCRA Hazardous Waste Management permit, SWMU 23 was renumbered to 24.14.
(5) SWMU 24-Industrial Waste Treatment Plant has 19 associated components that are listed as individual SWMUs.
(6) SWMU 32-Sanitary Waste Treatment Plant has 8 associated components that are listed as individual SWMUs.

Definitions:

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
GWMU	Groundwater Management Unit
IRP	Installation Restoration Program
IWTP	Industrial Waste Treatment Plant
LTM	Long Term Monitoring
N/A	Not Applicable
PCE	Tetrachloroethene
RA-O	Remedial Action Operation
RCRA	Resource Conservation and Recovery Act
SC	Site Closeout is complete
SWMU	Solid waste management unit
TCE	Trichloroethane
USEPA	United States Environmental Protection Agency

IRP Site Codes:

CG	Consolidated Groundwater Management Unit
FT	Fire Training Area
LF	Landfill
OT	Other
RW	Radioactive Waste
ST	Storage tanks
WP	Waste Pit

Table 1.2
Compliance Restoration Program
Site Summary and Status as of November 2010

Site ID	Site Name	Contamination At and/or Near the Site	Dates of Operation	Relative Risk Evaluation	Regulatory Driver
CG041	AWACS Sector Groundwater Management Unit	Solvents	1942-Present	yes	RCRA
CG042	BX Service Station Groundwater Management Unit	Solvents	1950s-Present	yes	RCRA
OT058	Building 3703	Solvents	1951-Present	yes	RCRA
OT062	Building 230	Solvents	1940s-Present	yes	RCRA
OT063	Building 240	Solvents	1942-Present	yes	RCRA
OT064	Building 210	Solvents	1943-Present	yes	RCRA
OT065	Buildings 283, 284, and 296	Solvents, Fuels	1976-Present	yes	RCRA
OT066	Building 2110	Solvents	1956-Present	no	RCRA
OT067	Building 2101	Solvents	1940s-Present	no	RCRA
OT068	North Apron Fuel Hydrant System(1)	Fuels	1940s-Present	no	RCRA
OT069	Buildings 2121 and 2122	Solvents	1940s-Present	no	RCRA
VI080	Aircraft Maintenance Building 3105	Solvents	1942-Present	no	RCRA
VI081	Aircraft Maintenance Building 2210	Solvents	1975-Present	no	RCRA

Notes:

(1) Original site name was Replaced Fuel Hydrant System . Site name changed to geographically identify location of this fuel hydrant system.

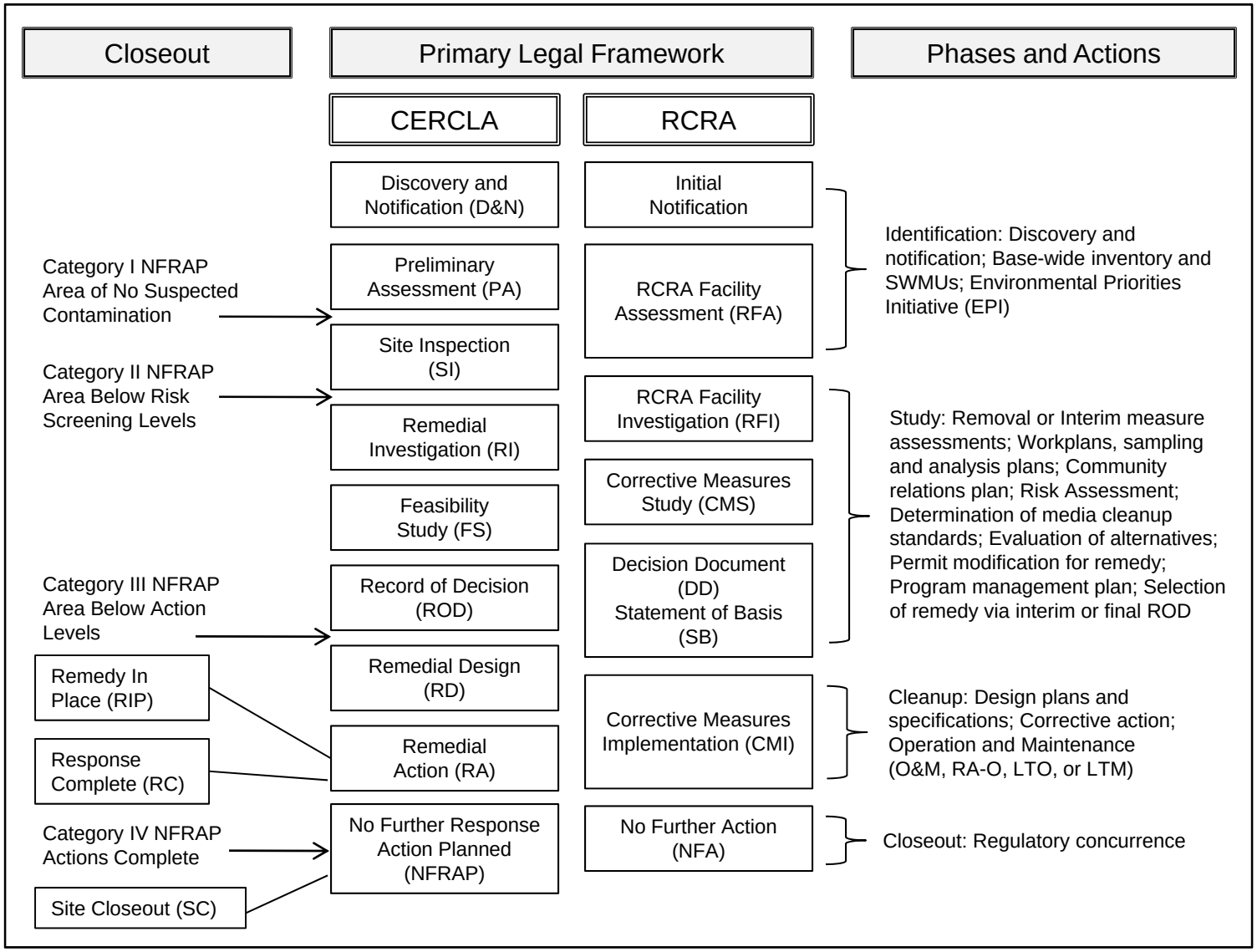
Definitions:

CG	Consolidated Groundwater Management Unit
OT	Other
RCRA	Resource Conservation and Recovery Act
VI	Vapor Intrusion

FIGURES

Figure 1.1

Technical Approach for Site Characterization and Remedial Activities



2.0 INSTALLATION BACKGROUND

2.1 History of Tinker AFB

In 1940, a group of Oklahoma business leaders learned that the War Department was considering the central United States as a location for an aircraft maintenance and supply depot. The group, known as the Local Industries Foundation, acquired 960 acres of land with an option on an additional 480 acres and offered the property to the War Department. The War Department awarded the aircraft maintenance and supply depot project to Oklahoma City in April 1941. The installation, which began operating in 1942, was later named after Major General Clarence L. Tinker of Pawhuska, Oklahoma, who lost his life during a long-range strike against Japanese forces during the early months of World War II. Tinker AFB is a worldwide repair depot for aircraft, weapons, and engines. Industrial operations in support of the Base's missions include aircraft maintenance, jet engine rebuilding and overhauling, and aircraft servicing.

Tinker AFB is located in Oklahoma County in central Oklahoma, approximately 8 miles southeast of downtown Oklahoma City. To the north and northwest of Tinker AFB are the commercial and residential districts of Midwest City and Del City, respectively. Tinker AFB is bordered by Oklahoma City to the east, south, and southwest. The location of Tinker AFB within the Oklahoma City metropolitan area is shown in Figures 2.1 and 2.2.

Tinker AFB is one of the largest major military/industrial installations in the world. The Base currently owns 4,048 acres, leases 810 acres, and has 642 acres of easements. The total number of buildings including the Tinker Aerospace Center (TAC) is 464. Over 50 percent of the property comprising Tinker AFB was donated by the community. Tinker AFB employs approximately 27,000 military and civilian personnel and is the largest single-site employer in Oklahoma. The installation has an annual statewide economic impact of $3.4 billion, creating an estimated 30,865 secondary jobs.

2.2 History of Tinker AFB's Environmental Programs

2.2.1 Community Awareness and Oversight

In response to Air Force policy directives during the early 1970s, Tinker AFB formed an Environmental Protection Committee (EPC) to track ongoing environmental concerns at the Base. Under the guidance and direction of the Oklahoma City Air Logistics Center (OC-ALC), the focus of the EPC was to oversee all environmental activities at the Base. Membership of the EPC included all major directorates of the OC-ALC, as well as all tenant organizations on-Base. In 1995, the EPC and the Air Force Occupational Safety and Health (AFOSH) Council merged

to form the Environmental Safety and Occupational Health Council. This concept integrates EPC and AFOSH aspects into a single interrelated forum providing the executive director with ESOH cradle-to-grave mission impact data.

A Technical Review Committee (TRC) was established in 1985 in accordance with Title 10 U.S. Code (USC), Section 2705(c), to provide direction for the IRP and facilitate communication between the Air Force, USEPA Region 6, the OSDH (predecessor to the ODEQ), and the general public. The TRC was chaired by the Base's Directorate of Environmental Management and met quarterly. In 1995, the TRC evolved into the Restoration Advisory Board (RAB), which allowed for more diverse community representation, procedural changes, and had a community co-chair. The RAB transformed into the Community Advisory Board (CAB) in 1999, indicating that the RAB would consider protocols other than restoration as agenda items, but the main focus would still be restoration projects. In 2006, the CAB reverted to a RAB, in accordance with the DoD RAB Rule, to restore full focus to restoration activities at Tinker AFB.

2.2.2 Implementation of the IRP at Tinker AFB

Tinker AFB initiated its IRP in 1981 with a Preliminary Assessment (PA) which identified 14 sites for further evaluation/action. The first PA report was completed in April 1982. As a result of various Base-wide surveys (e.g., underground storage tank and water quality surveys), additional PAs were conducted for suspected sites, increasing to 40 the number of IRP sites. Numerous RIs/FSs and interim removal actions have been conducted at various sites since the IRP for the Base began. Designated IRP sites include landfills, fire training pits, radioactive waste disposal sites, fuel storage areas, industrial waste pits, and the Industrial Wastewater Treatment Plant (IWTP) (see Section 1, Table 1.1 for a list of the IRP sites).

Off-Base issues affecting the implementation of the IRP emerged in September 1983, when the OSDH contacted Tinker AFB and reported that contamination had been found in an off-Base private water well, which was located immediately north of Landfill 6. This landfill is located on property the Air Force has leased since 1969 for the disposal of solid waste. In response to the contamination discovery, the OSDH initiated a major sampling effort of private and public wells in a two-square mile area around the private water well where contamination was detected. Samples were collected from 34 private and six small public wells located off the Base. Other than the well where contamination was originally discovered, the OSDH determined that there was no contamination in any of the off-Base wells tested, and concluded that Tinker AFB and the properties it managed were not the source of contamination to the off-Base private well. Shortly after the OSDH reported the contamination in the off-Base wells,

Tinker AFB collected samples from two water supply wells and 30 on-site monitoring wells located within Base boundaries. The two on-Base water supply wells, 18 and 19, were located inside Building 3001. The water samples collected from these two wells contained trichloroethene (TCE) and tetrachloroethene (PCE). Tinker AFB promptly shut down the two contaminated wells, performed additional tests and sampling, and then plugged them on September 26, 1986.

Results of the early IRP investigations and a ranking of identified contaminated sites based on the USEPA CERCLA Hazardous Ranking System (HRS) ranking criteria, facilitated the July 1987 placement of Soldier Creek/Building 3001 on the NPL. On December 9, 1988, the USEPA, Air Force, and the OSDH signed a FFA designating the Air Force as the lead agency and responsible party for cleanup at Tinker AFB. Under the FFA, all signing agencies agreed that CERCLA and RCRA response action obligations would be integrated.

2.2.3 Impact of CERCLA and the National Priorities Listing on the IRP

The 1988 FFA identifies the portions of Tinker AFB covered by NPL guidance and describes each agency's roles and responsibilities in managing, implementing, and overseeing the facility's long-term remediation. The FFA also prescribes the process for creating and managing operable units (OUs) associated with the NPL site and alludes to several sites as OUs. Designating sites as OUs of the NPL site obligated Tinker AFB to remediate in accordance with CERCLA requirements, more commonly known as Superfund law. However, a number of these sites had already undergone remedial action. Individual OUs referred to in either the FFA or listed in the ROD signed in 1990 include: Building 3001, the North Tank Area (NTA), Pit Q-51, Water Supply Wells (WSW) 18 & 19, Soldier Creek Sediment and Surface Water, Soldier Creek Groundwater, and IWTP Groundwater. Because early remedial actions led to a number of OUs being remediated before the FFA, the following operable units have been carried forward and are currently recognized by the USEPA Region 6:

- OU 1: Building 3001 (inclusive of groundwater below Building 3001 activities, Pit Q-51, and the NTA);
- OU 2: Soldier Creek Sediment and Surface Water;
- OU 3: Soldier Creek Groundwater; and
- OU 4: IWTP Groundwater.

The boundaries of these OUs are illustrated on Figure 2.3. All of the OUs have been investigated through the RI/FS process. The remedial action for OU 2 is complete and a No Action remedy was selected for OU 3. OU 1 and OU 4 each have remedies in place.

OU 1: Building 3001

There are four IRP sites within OU 1: OT001 - Building 3001 Groundwater; ST003 - NTA; WP030 - Pit Q-51, and OT004 - WSW 18 and 19. The ROD for the Building 3001 NPL Site was completed and signed in August 1990. A remedy had been already completed for WSW 18 & 19 in 1986; therefore, a remedy was not required in the ROD. The ROD described selected cleanup alternatives based on comprehensive analysis during the RI/FS, with consideration given to public comments and concerns. By 1991, Pit Q-51 had been cleaned, backfilled, and sealed. Demolition and removal of fuel tanks at the NTA began in 1992 and free product removal along with vapor recovery continues to the present. All leaking underground storage tanks (USTs) have been removed.

The groundwater extraction and treatment remedy for Building 3001 was fully operational by June 1994. In May 2003, USEPA Region 6 approved an explanation of significant difference (ESD) proposal to shut down the pump and treat system so that the effectiveness of the remedy in place could be evaluated. Following ODEQ's concurrence with the ESD, the groundwater treatment plant was shut down on March 29, 2004. A focused RI/FS within the Building 3001 OU is underway and the results will be used to optimize the current remedy in place.

OU 2: Soldier Creek Sediment and Surface Water

The Soldier Creek Sediment and Surface Water OU 2 is designated as IRP site OT002. The ROD for the Soldier Creek Sediment and Surface Water OU was completed and signed in August 1993. Continued monitoring and an ecological assessment were the selected remedies. The RA for OU 2 began in February 1994, and a Certificate for Remedial Action Complete was signed by the USEPA on January 19, 2006. Monitoring associated with this OU has been discontinued. However, the creek continues to be monitored as part of the Tinker Environmental Compliance Program due to National Pollutant Discharge Elimination System (NPDES) permit requirements.

OU 3: Soldier Creek Groundwater

The Soldier Creek Groundwater OU 3 is designated as part of IRP site OT005 (along with IWTP Groundwater OU 4). Most of the Soldier Creek Groundwater OU occurs off-Base to the north and east of Tinker AFB (Figure 2.3). Investigations and studies were conducted between 1993 and 2007. No contaminants of concern (COCs) attributable to Tinker AFB were identified in the RI, FS, Baseline Risk Assessment, or FS Addendum reports. No Further Action was the alternative selected for this OU, and on January 9, 2008 USEPA Region 6 approved this alternative in the Soldier Creek Groundwater Operable Unit ROD.

OU 4: IWTP Groundwater

The IWTP Groundwater OU 4 is designated as part of IRP site OT005 (along with Soldier Creek Groundwater OU 3). The IWTP Groundwater OU is immediately adjacent to, and south-southwest of the Soldier Creek Groundwater OU and occurs between the Building 3001 OU and the Soldier Creek Groundwater OU (Figure 2.3). The IWTP was identified as a possible source of groundwater contamination because it treated industrial wastewater generated at the Base. Soldier Creek was evaluated as a pathway of groundwater contamination because the IWTP discharged into East Soldier Creek in the past. This may have resulted in infiltration of the creek surface water into the groundwater along segments of the creek. In 1996, the Base permanently diverted discharge to the Oklahoma City wastewater collection system. In addition, contaminated sediments were removed from on-Base segments of Soldier Creek in the vicinity of the IWTP during two separate interim remedial actions. By 2007, the RI, FS, Baseline Risk Assessment and an addendum to the FS were complete. The FS Addendum recommended monitored natural attenuation (MNA) and Land Use Controls (LUCs) as the remedy for OU 4.

2.2.4 Impact of RCRA on the IRP

As discussed in Section 1.1, CERCLA actions are responses to requirements of the NCP, and RCRA actions are performed in accordance with Tinker's Hazardous Waste Storage Facility Operations permit. The RCRA permit was required in response to Section 3004(u) of RCRA, as amended by the HSWAs of 1984. To comply with the HSWAs, the USEPA completed a RCRA Facility Assessment (RFA) for Tinker AFB in June 1989, and identified 105 SWMUs and 19 Areas of Concern (AOC). Tables 2.1 and 2.2 list all of the SWMUs and AOCs that were identified in the 1989 RFA. The purpose of the RFA was to identify and assess the potential for release of hazardous wastes or hazardous constituents from SWMUs and AOCs, as well as to evaluate the need for further investigations under the authority of RCRA. Based on recommendations presented in the RFA, the USEPA developed requirements for the RFI pursuant to Title 40 of the code of federal regulations (CFR) Part 264.

USEPA Region 6 and the OSDH granted Tinker AFB a RCRA Hazardous Waste Management Permit on July 1, 1991, authorizing the Base to operate as a hazardous waste storage facility for a 10-year period. Of the original 105 possible SWMUs identified in the RFA, 43 SWMUs and two AOCs were listed in the permit as requiring further investigation. RCRA requires owners/operators of permitted facilities to implement corrective actions to identify and clean up contamination resulting from past and present practices; therefore, RFIs were required for these SWMUs.

In December 1992, the first RFI Work Plans were prepared in accordance with the RCRA permit. Phase I RFI reports were completed for all identified SWMUs in September 1994. A substantial number of RCRA CAs were completed in the 1990s, and some are still underway. ODEQ issued a renewal permit in August 2002 to continue Hazardous Waste Management Operations for another 10 years at Tinker AFB. As part of the renewed permit, a number of SWMUs and AOCs were granted "no further action" (NFA) status, decreasing the number of areas covered by the permit from 43 SWMUS and two AOCs to 27 SWMUs and no AOCs. By 2007, Tinker AFB had completed RFIs and Corrective Measures Studies (CMS) for all 27 SWMUs remaining on the Base's 2002 RCRA Operations Permit. All these SWMU sites now either have a remedy in place or have been closed. Table 2.1 identifies the SWMUs that have been addressed under the IRP.

Groundwater Management Units (GWMUs) were created to manage the numerous contaminant, potentially comingled, plumes across Tinker AFB. All contaminated groundwater at the Base that is not within the Soldier Creek/Building 3001 NPL Site is regulated by the ODEQ under RCRA. There are four non-NPL contaminated groundwater (CG) management units (GWMUs) at Tinker AFB as follows: the Northwest GWMU (CG037), the Southwest GWMU (CG038), the East GWMU (CG039), and the Gator GWMU (CG040). Three of the management areas contain multiple SWMUs or IRP sites; CG040 has a single plume.

2.2.5 Current Status of the IRP at Tinker AFB

Of the 40 sites in the IRP, 23 have reached site closeout (SC) with the regulating authority. The remaining 17 sites have a remedy in place. Of these, three are within the jurisdiction of USEPA Region 6 and managed under CERCLA, and 14 are under the jurisdiction of the ODEQ and managed under RCRA. Ten of the closed IRP sites and nine of the active IRP sites are RCRA SWMUs. Any RCRA site that is not named on the 2002 RCRA Operations permit will be added to the 2012 RCRA permit renewal. The IRP execution strategy to protect human health and the environment satisfies existing legal agreements. The goal to have all sites closed or remedies in place by the end of fiscal year (FY) 2008 was achieved (see Section 1, Table 1.1).

Although 23 of the IRP sites have reached SC, three of the RCRA sites (ST032, ST033, and WP036) have only completed case closures for fuel releases from UST releases regulated by the Oklahoma Corporation Commission (OCC) Petroleum Storage Tank Division (PSTD). ST032 and WP036 fall within the boundaries of CG039, and ST033 falls within the boundaries of CG037. Their relationship to the GWMUs is explained in the capsule site descriptions provided in Section 3.

2.2.6 The Compliance Restoration Program

The Air Force recently instituted a new policy that certain sites originally being addressed under the Environmental Compliance Program (ECP) or not yet worked on and not previously eligible for cleanup under the Defense Environmental Restoration Account (DERA) are now eligible for DERA funding and can be integrated with the IRP. This new policy has been instituted to conduct environmental cleanup activities irrespective of statutory authority or when the release occurred. As a result, the Air Force has identified sites at Tinker AFB that either have not initiated site investigations, or are in interim status and have not defined an exit strategy. In August 2009, 13 compliance sites were defined that range from "discovery and notification" in the restoration process to "interim action with a remedy in place." Each site will need to be evaluated to determine impacts of RCRA and CERCLA on-site investigation and cleanup requirements. The 13 sites were disclosed at the October 2009 RAB meeting and were officially added to the CRP in 2010 (see Section 1, Table 1.2). The sites are described in Section 3 of this Community Relations Plan.

2.2.7 The Military Munitions Response Program

The Military Munitions Response Program (MMRP) addresses the potential explosives safety, health, and environmental issues caused by past DoD munitions related activities. The MMRP is a relatively new (implemented in 2002) element of the Secretary of Defense's DERP. Under the MMRP, a modified Comprehensive Site Evaluation (CSE) Phase I was performed in 2009 to evaluate the actual or potential release(s) of contaminants from munitions response areas (MRAs) at Tinker AFB. Of eighteen potential MRAs originally identified for review under the CSE Phase I, five sites were recommended to be included in the Air Force MMRP for additional evaluation and possible remedial action. The Phase II investigation of the five sites is currently underway and slated to be completed November 2010. Capsule descriptions for the MMRP sites will be added in future community relations plans.

TABLES

Table 2.1
Summary of the Solid Waste Management Units (SWMUs)

Count	SWMU #	IRP Site Code	Site Name	Summary of SWMUs			
				1989 RFA	1991 Permit	2002 Permit	Current Conditions[1]
1	1	LF016	Landfill 6	X	X	X	X
2	2	LF015	Landfill 5	X	X	X	X
3	3	LF011	Landfill 1	X	X	X	X
4	4	LF012	Landfill 2	X	X	X	X
5	5	LF013	Landfill 3	X	X	X	X
6	6	LF014	Landfill 4	X	X	X	X
7	7	FT021	Fire Training Area #1	X	X	-	-
8	8	FT022	Fire Training Area #2	X	X	X	-
9	9		Fire Training Area # 3	X	-	-	-
10	10	FT024	Fire Training Area # 4	X	-	-	-
11	11	WP017	Supernatant Pond	X	X	X	-
12	12	WP018	Industrial Waste Pit #1	X	X	X	X
13	13	WP019	Industrial Waste Pit #2	X	X	X	-
14	14		Sludge Drying Beds (Eight)	X	-	-	-
15	15	ST008	Fuel Contaminated Site #1; Building 201, South Alcove	X	X	X	-
16	16	ST008	Fuel Contaminated Site #2; Building 201, West Alcove	X	X	-	-
17	17	ST008	Fuel Contaminated Site #3; Building 201, North Side	X	X	-	-
18	18	ST008	Fuel Contaminated Site #4; Building 201, Southwest Alcove	X	X	-	-
19	19	RW025	Radioactive Waste Disposal Site, 1030W	X	X	-	-
20	20	RW026	Radioactive Waste Disposal Site, 201S	X	X	-	-
21	21	RW027	Radioactive Waste Disposal Site, 62598	X	X	-	-
22	22	RW029	Radioactive Waste Disposal Site, 1022E	X	X	-	-
23	23 (24.14[2])	OT034	Industrial Waste Treatment Plant Abandoned Waste Tanks (11)	X	X	-	-
	24	OT034	IWTP -Industrial Waste Treatment Plant[3] Components and				
24	24.1	OT034	Lift Station #2	X	X	X	X
25	24.2	OT034	Tanks D-1 and D-2	X	X	-	-
26	24.3	OT034	Oil Separator	X	X	X	X
27	24.4	OT034	Valve Vault	X	X	X	X
28	24.5	OT034	Equalization Basins (2)	X	X	X	X
29	24.6	OT034	Main Flow Valve	X	X	X	X
30	24.7	OT034	Mixing Basin 1, 2, 3	X	X	X	X
31	24.8	OT034	Solids Contact Clarifier	X	X	X	X
32	24.9	OT034	Wet Well Lift Station	X	X	-	-
33	24.10	OT034	Softener Basins	X	X	-	-
34	24.11	OT034	Activated Sludge Unit (2)	X	X	X	X
35	24.12	OT034	Secondary Clarifiers (2)	X	X	X	X
36	24.13	OT034	Chlorine Contact Chamber	X	-	-	-
37	24.14	OT034	Pressure Filters (2)	X	-	-	-
38	24.15	OT034	Sludge Thickener	X	-	-	-
39	24.16	OT034	Sludge Holding Tank	X	-	-	-
40	24.17	OT034	Vacuum Belt	X	-	-	-
41	24.18	OT034	Sludge Hopper Area	X	-	-	-
42	(24.13[4])	OT034	Industrial Sludge Drying Beds	X	X	-	-
43	25	OT034	Hazardous Waste Storage Tank Facility	X	-	-	-
44	26	OT034	Ordnance Disposal Area	X	X	-	-
45	27	OT034	Kuhlman Creek Oil and Grease Trap	X	-	-	-
46	28	OT034	Permanent Hazardous Waste Storage, Building 3728	X	-	-	-
47	29	OT034	Permanent Hazardous Waste Storage, Building 3770	X	-	-	-
48	30	OT034	Temporary Hazardous Waste Staging Building 3726	X	-	-	-
49	31	OT034	Empty Paint/Solvent Can Trash Dumpster, DRMO Facility	X	-	-	-
	32	OT034	SWTP - Sanitary Waste Treatment Plant[5] Components and				
50	32.1	OT034	Parshall Flume	X	X	X	X
51	32.2	OT034	Flocculation Chamber	X	X	X	X
52	32.3	OT034	Primary Clarifier	X	X	X	X
53	32.4	OT034	Trickling Filters (2)	X	X	X	X
54	32.5	OT034	Final Clarifiers	X	X	X	X
55	32.6	OT034	Former Chlorine Contact Chamber	X	X	X	X
56	32.7	OT034	Anaerobic Digester	X	-	-	-
57	32.8 (32.7[6])	OT034	Drying Beds (9)	X	X	X	X

Count	SWMU #	IRP Site Code	Site Name	Summary of SWMUs			
				1989 RFA	1991 Permit	2002 Permit	Current Conditions[1]
58	33		Abrasive Hopper Storage Area	X	-	-	-
59	34		Temporary Storage Site MAT, Building 236 (North side)	X	-	-	-
60	35		Hazardous Waste Storage Tank, Building 230	X	-	-	-
61	36		Malfunctioning Air Scrubber Dry Well, Building 289	X	-	-	-
62	37		Temporary Storage Site, Building 289 (NW corner)	X	-	-	-
63	38		Temporary Storage Site, Alert Maintenance Hanger, Building	X	-	-	-
64	39		Malfunctioning Air Scrubber Dry Well, Building 976	X	-	-	-
65	40		Building 976, AFFF Fire Control Holding Pond	X	X	-	-
66	41		Building 1030 , Oil and Grease Trap	X	-	-	-
67	42		Temporary Storage Site, Building 1068 (SW corner)	X	-	-	-
68	43		Building 1071, Oil and Grease Trap	X	-	-	-
69	44		Building 1041, Oil and Grease Trap	X	-	-	-
70	45		Building 1058, Oil and Grease Trap	X	-	-	-
71	46		Temporary Storage Site, MAB 2121 (North side)	X	-	-	-
72	47		Temporary Storage Site, MAB 2121 (South side)	X	-	-	-
73	48		Temporary Storage Site, MAQ North of 2122	X	-	-	-
74	49		Temporary Storage Site, MAB 2280 (SE corner)	X	-	-	-
75	50		Waste Storage Area, Portable B-3 (in the U of Building 1)	X	-	-	-
76	51		Hazardous Waste Storage Tank, Building 16, NE corner	X	-	-	-
77	52		Temporary Storage Site , Building 17 (Enviropacs)	X	-	-	-
78	53		Waste Asbestos Storage Shed (Near Building 17)	X	-	-	-
79	54	WP035	Stained Drainage Ditch and Drums (Near Building 17)	X	X	-	-
80	55		Temporary Storage Site, MAD 210 (North side)	X	-	-	-
81	56		Waste Storage Area (North of Building 210)	X	-	-	-
82	57		Building 214: Engine Testing, Container Storage Cabinet	X	-	-	-
83	58		In-ground Storage Tank #7, Building 214	X	-	-	-
84	59		Building 229: Parachutes and Textile, Container Storage	X	-	-	-
85	60		Temporary Storage Site MAT 1055 (South side)	X	-	-	-
86	61		Building 2101: Vehicle Motor Pool, Used Oil Tank	X	-	-	-
87	62		Building 2101: Vehicle Motor Pool, Enviropac	X	-	-	-
88	63		Building 2101: Vehicle Motor Pool, Waste Paint Can Storage	X	-	-	-
89	64		Temporary Storage Site MAD 2102	X	-	-	-
90	65		Hazardous Waste Storage Tank 2217	X	-	-	-
91	66		Temporary Storage Site Building 2129 (West)	X	-	-	-
92	67		Temporary Storage Site MAT 2210 (NE corner)	X	-	-	-
93	68		Hazardous Waste Storage Tank - Building 2210	X	-	-	-
94	69		Temporary Storage Site Building 3001 (SW corner)	X	-	-	-
95	70		Hazardous Waste Storage Tank, Building 3001-A103	X	-	-	-
96	71		Hazardous Waste Storage Tank, Building 23001-M61	X	-	-	-
97	72		Temporary Storage Site MAQ 3105 (North side)	X	-	-	-
98	73		Temporary Storage Site MAD 3117 (West side)	X	-	-	-
99	74		Drum Washing at Building 3125	X	-	-	-
100	75		Hazardous Waste Central Receiving Area, South Building 3125	X	-	-	-
101	76		Temporary Storage Site, MAE 3703 (South Side)	X	-	-	-
102	77		Temporary Storage Site, MAT 209 (East Side)	X	-	-	-
103	78		Temporary Storage Site, East of Building 1005	X	-	-	-
104	79		Hazardous Waste Storage Tank, Building 3001-G51	X	-	-	-
105	80		Hazardous Waste Storage Tank, Building 3106	X	-	-	-
			TOTAL:	**105**	**43**	**27**	**23**

Notes:

[1] Since the 2002 RCRA permit, four SWMUs (i.e., SWMU 8, 11, 13, and 15) have been granted regulatory approval for no further action (NFA) by federal and state agencies; therefore, application for delisting these SWMUs from the RCRA permit will be made in 2012.

[2] In the 2002 RCRA Hazardous Waste Management permit, the SWMU number for Industrial Waste Treatment Plant Abandoned Waste Tanks changed from 23 to 24.14.

[3] SWMU 24-Industrial Waste Treatment Plant has 19 associated components that are listed as individual SWMUs.

[4] In the 2002 RCRA Hazardous Waste Management permit, the SWMU number for Industrial Sludge Drying Beds changed from 24.19 to 24.13.

[5] SWMU 32-Sanitary Waste Treatment Plant has 8 associated components that are listed as individual SWMUs.

[6] In the 2002 RCRA Hazardous Waste Management permit, the SWMU number for Drying Beds changed from 32.8 to 32.7.

Definitions:

1989 RFA	Tinker Air Force Base 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment
1991 Permit	1991 RCRA Hazardous Waste Management Permit
2002 Permit	2002 RCRA Hazardous Waste Management Permit
"-"	SWMUs that have been removed from the RCRA Hazardous Waste Management permit
"X"	Active SWMUs
IRP	Installation Restoration Program
NA	Not Applicable
SWMU	Solid Waste Management Units

Table 2.2
Summary of the Areas of Concern (AOCs)

Count	AOC #	Site Name	Summary of SWMUs			
			1989 RFA	1991 Permit	2002 Permit	Current Conditions
1	1	Fuel Farm (POL Facility)	X	-	-	-
2	2[(1)]	Spill Pond (Drainage Spillway behind Building 1030)	X	X	-	-
3	3	Kuhlman Creek	X	-	-	-
4	4	Crutcho Creek	X	-	-	-
5	5	Soldier Creek	X	-	-	-
6	6	Fuel Jettison Area	X	-	-	-
7	7	North Tank Area	X	-	-	-
8	8	Southwest Tank Area	X	-	-	-
9	9	Building 3001	X	-	-	-
10	10 (2[(1)])	Old Pesticide Storage Area, Building 1005	X	X	-	-
11	11	Diesel Fuel Area (North of Building 1005)	X	-	-	-
12	12	Temporary Storage Site MAE 3001	X	-	-	-
13	13	Cooling Tower Blowdown: Building 3306	X	-	-	-
14	14	Cooling Tower Blowdown: Building 212	X	-	-	-
15	15	Cooling Tower Blowdown: Building 3108	X	-	-	-
16	16	Outfalls 002, 003, 004, and 005	X	-	-	-
17	17	Sanitary Sewer System Lift Station, Building 1030	X	-	-	-
18	18	Underground Storage Tanks	X	-	-	-
19	19	Below-Ground Industrial Wastewater Sewer System	X	-	-	-
		TOTAL:	**19**	**2**	**0**	**0**

Notes:

[(1)] In the 2002 RCRA Hazardous Waste Management permit, the AOC number for the Spill Pond (Drainage Spillways behind Buildin 1030) was not listed.

[(2)] In the 2002 RCRA Hazardous Waste Management permit, the AOC number for the Old Pesticide Storage Area, Building 1005 changed from 10 to 2.

Definitions:

1989 RFA	Tinker Air Force Base 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment
1991 Permit	1991 RCRA Hazardous Waste Management Permit
2002 Permit	2002 RCRA Hazardous Waste Management Permit
"-"	AOCs that have been removed from the RCRA Hazardous Waste Management permit
"X"	Active AOCs
AOC	Areas of Concern

FIGURES

Figure 2.1
Greater Oklahoma City Metropolitan Area

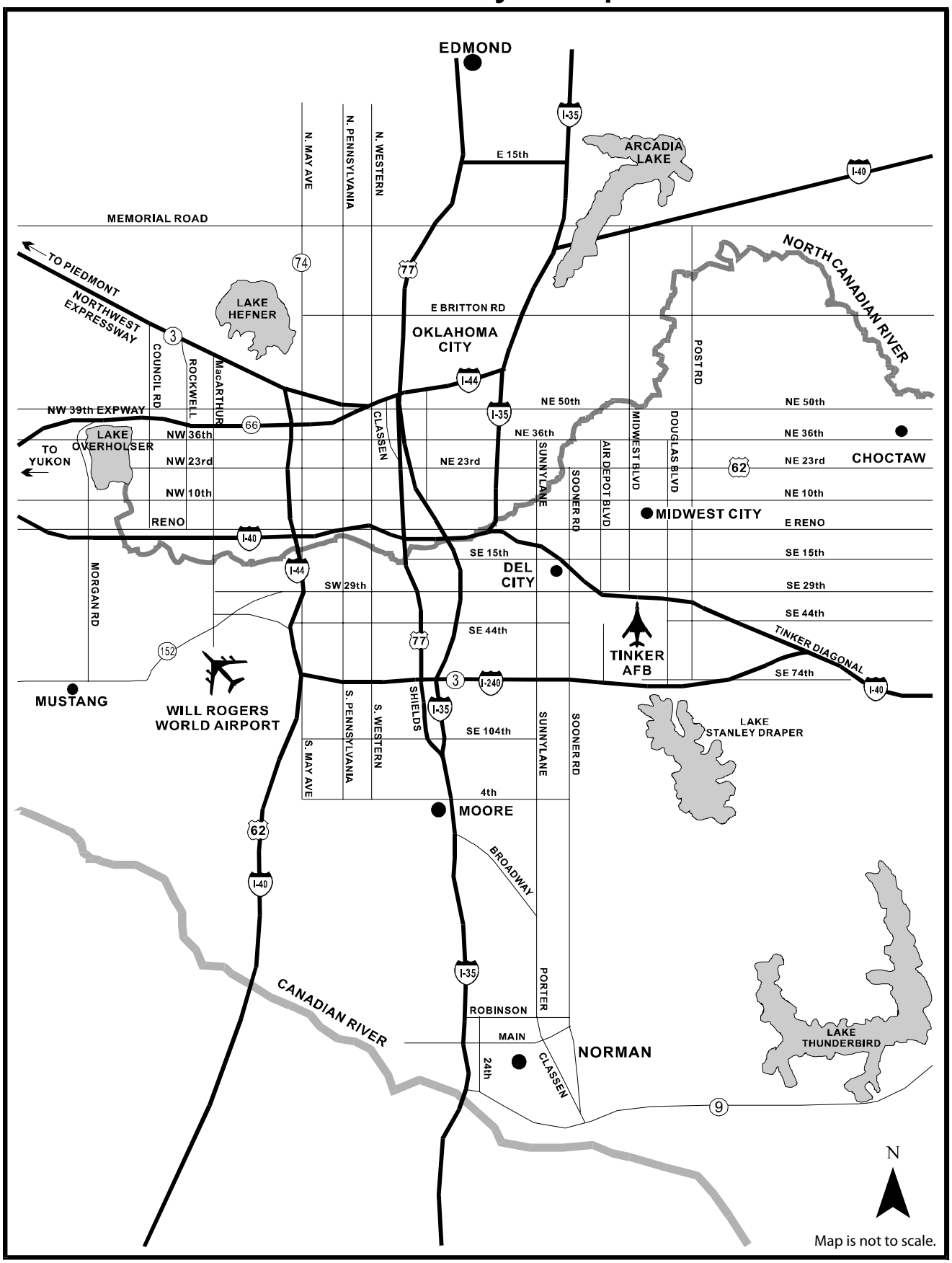


Figure 2.2
Tinker AFB and Surrounding Area

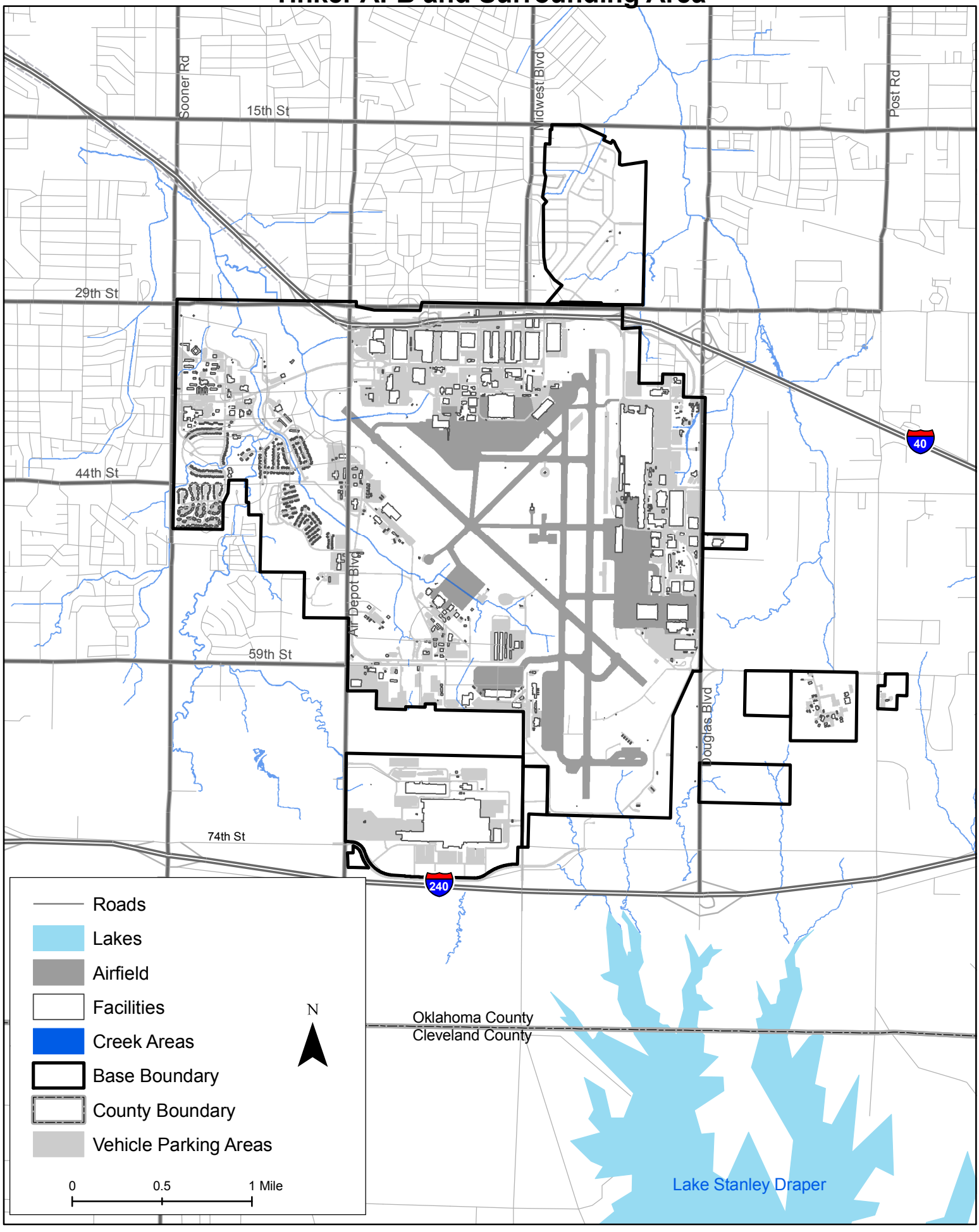
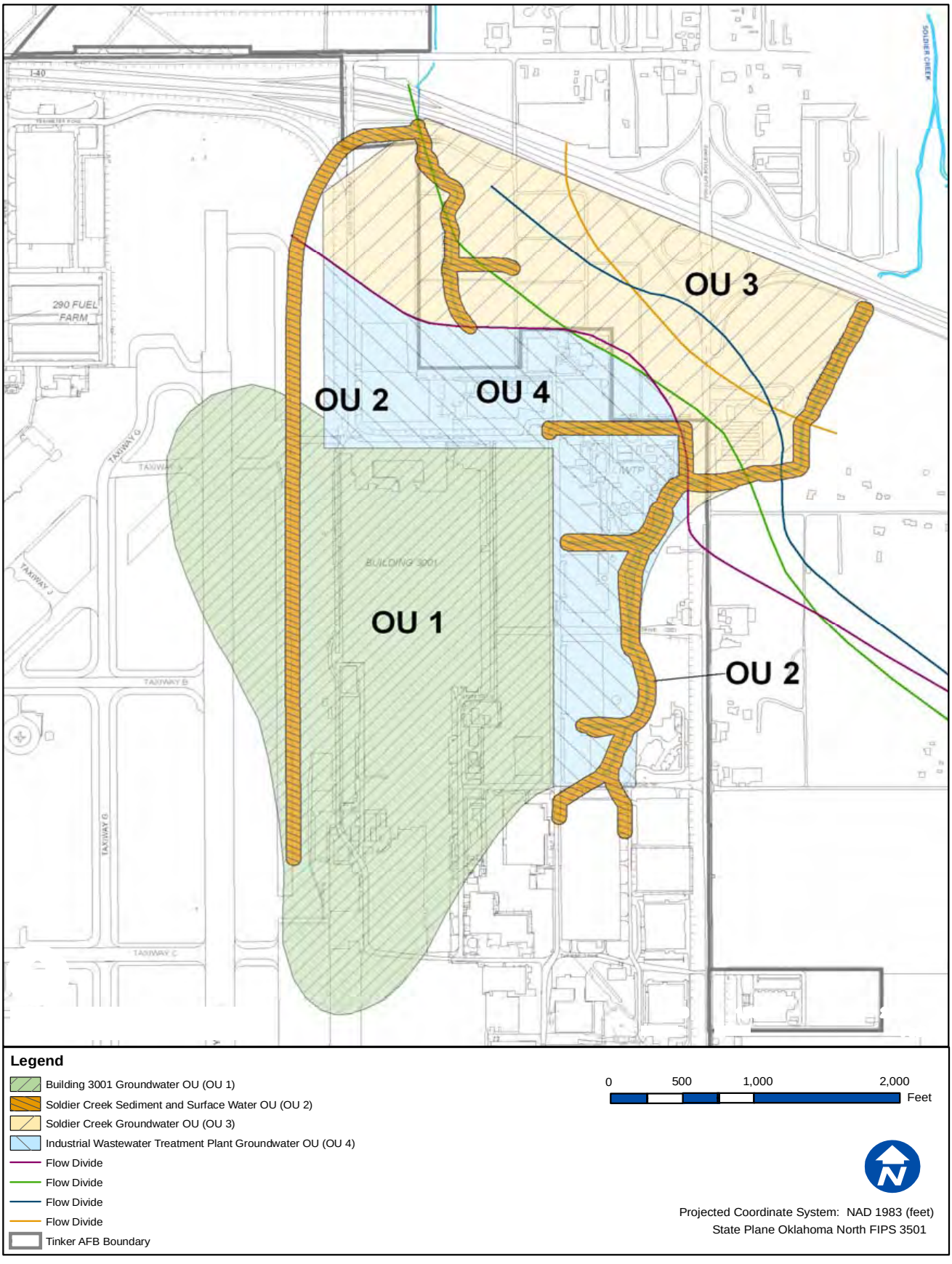


Figure 2.3
The Four Operable Units at Tinker AFB



3.0 CAPSULE SITE DESCRIPTIONS

There are 53 sites presented in the following capsule descriptions as shown on Figure 3.1. Forty of these are the original IRP sites that were initiated in the 1980s when Tinker AFB implemented the IRP (see Section 2.2.2 for further details). Thirteen sites were identified in 2009 and added to the CRP in 2010. Figures 3.2 - 3.14 are focused maps showing the 13 CRP sites in more detail; note that the boundaries (red outline) shown on the figures are used as a site locator and do not necessarily define the entire area to be evaluated. The maps also document groundwater flow patterns and TCE groundwater patterns located at or near each site. The original forty IRP sites have all been investigated and each has either a remedy in place (RIP), or a response complete (RC) determination under the IRP. The majority of RC sites have attained SC status as well. The CRP sites will require additional site investigations and studies before remedial responses can be proposed and implemented.

Under the DERP, a Relative Risk Site Evaluation (RRSE) is conducted to program remedial response for any site that has not yet been fully studied. RRSEs were previously performed at all forty IRP sites at Tinker AFB. Because each of these sites either has a RIP or a RC determination, RRSEs are not required. Seven of the CRP sites currently have sufficient characterization information to complete a RRSE and the evaluations are included in this report (see Appendix J). The other six sites have only been identified and more data needs to be collected before RRSEs can be performed for these sites. Therefore, the capsule site descriptions in this section are more developed for the seven CRP sites with RRSE rankings.

3.1 Installation Restoration Program Sites

In the following site descriptions, it is important to note that several of the listed sites have shown both chlorinated solvent and fuel contamination (see Section 1, Table 1.1). In some cases only the major contaminant type is discussed, because it is the principle risk driver. However, each contaminant type found at every site is investigated. In addition, each site description typically discusses contaminant sources, although a number of sites have undergone changes in use over time.

Prior to 2005, most monitoring wells on the Base were sampled annually, but in 2005 Tinker AFB initiated a RCRA Class 2 Permit Modification to reduce monitoring requirements and allow for an optimized sampling schedule. As a result, many wells have been dropped from a strict quarterly or semi-annual sampling protocol, and are sampled on a schedule specifically designed for each given site. The data are continually evaluated and used in the decision making process.

Site #OT001 Building 3001 (OU 1)

The Building 3001 IRP Site (OT001), comprising a mile-long industrial complex and its surrounding areas, is listed as an OU of the Soldier Creek/Building 3001 NPL site. From the 1940s through the 1970s, subsurface concrete lined pits and trenches were used to remove solvents and wastewater byproducts of industrial processes from the building interior. These pits and trenches leaked, allowing the solvents to percolate into the soil. The migrating contaminants have reached the upper and lower saturated zones of the Garber-Wellington Aquifer. Results of the 1987 RI for Building 3001 indicated that underground contaminant plumes extend to a maximum depth of 175 feet and laterally across an area of about 220 acres. The RI indicated that the primary groundwater contaminants at the site were TCE and hexavalent chromium. Following the 1989 FS, the 1990 Proposed Plan identified groundwater extraction with treatment and on-site reuse as the preferred alternative. The Proposed Plan was accepted, and incorporated into the ROD, which was signed on August 15, 1990.

Following startup activities, the groundwater extraction and treatment system began full time operation on June 1, 1994. The system used extraction wells to remove contaminated groundwater from beneath the site, and directed the recovered water to a treatment plant constructed specifically for this cleanup action. The extraction system includes 28 vertical extraction wells located to the east and west of Building 3001, and 5 horizontal extraction wells that extend under the building. The plant was designed to process 216,000 gallons of water per day and used an air stripper to separate the volatile organic compounds (VOCs) from the water. A secondary treatment process removed chromium through a precipitation/filtration procedure. Water leaving the plant was purified to drinking water standards, and was recirculated to Building 3001 for reuse in industrial processes.

This remedy prescribed in the ROD was anticipated to reach cleanup goals by September 30, 2023, but the groundwater extraction and treatment system was not achieving anticipated contaminant reduction rates. Therefore, the Air Force submitted an ESD application to USEPA Region 6 and the ODEQ in March 2003, and the agencies approved system shut-down for aquifer rebound analysis. System shut-down was initiated on March 29, 2004. Since then, performance monitoring data has been collected to evaluate the Building 3001 remedial action, as well as to monitor the plume stability. In the meantime, yearly approval for the system to remain inactive has been obtained since the initial shut-down approval, and has been extended through February 2011. A Focused RI/FS was initiated in 2008 and is still ongoing. The focused FS will provide an evaluation of revised remedial alternatives for the site and will make

recommendations as to the optimal technology(ies) for future remediation. The RRSE is not required.

Site #OT002 Soldier Creek Sediment and Surface Water (OU 2)

Soldier Creek flows northward from its headwaters near Southeast 59th Street approximately 6 miles downstream to its confluence with Crutcho Creek. Two tributaries of Soldier Creek originate on the northeast quadrant of Tinker AFB. West Soldier Creek originates on the west side of Building 3001 and flows northward to its confluence with main Soldier Creek approximately 2 miles downstream. East Soldier Creek flows northward from its origin north of Building 3705 and east of Building 3001, and then passes the IWTP before reaching its confluence with main Soldier Creek approximately 1 mile downstream. IRP Site #OT002 includes 1) all sediment and surface water of East Soldier Creek that originate on Tinker AFB to the intersection of East Soldier Creek and Interstate 40 north of Tinker AFB, and 2) all sediment and surface water of West Soldier Creek that originate on Tinker AFB to the intersection of West Soldier Creek and Interstate 40 north of Tinker AFB. IRP Site #OT002 is designated as an OU of the Soldier Creek/Building 3001 NPL site.

Sampling was initiated at East and West Soldier Creeks in 1984, and results indicated the presence of chromium and solvent contamination in the sediment and surface water. In 1986, excavation activities were conducted along East and West Soldier Creek to identify and eliminate potential sources of contamination to the creek. Approximately 7,500 cubic yards of sediment were removed. Extensive field investigations were conducted in 1990 and 1991, and a RI report was finalized in February 1993. Following a public meeting and a 60-day public comment period, a ROD was prepared for the site. The ROD identified long-term monitoring (LTM) and an ecological assessment as the preferred alternative action for the creek. The ROD also answered questions voiced by the community at the public meeting and received during the public comment period. The ROD was signed by the Air Force on August 24, 1993, and by the USEPA on September 14, 1993.

The prescribed ecological risk assessment was conducted in 1994 and 1995. LTM was initiated on a quarterly basis in November 1994. Further sediment excavation was done to remove contaminants from the west branch of the creek in 1998 and from the east branch in 1999, thus reducing the necessity for costly LTM. The remedial action phase reached RC)in December 1999. After reviewing the March 2003 five-year review report for OU 2, USEPA and ODEQ determined that the site no longer presents a potential threat to human health or the environment and the sediment and surface water monitoring could be discontinued. Results documented in the 2003 five-year review report found that there has been no exceedence of

health-based screening levels in samples taken during the five-year monitoring program. Additionally, recent facility improvements, including modifying West Soldier Creek to become a concrete channel, has minimized the potential for sediments to move off-base and pose a human health or ecological threat to downstream receptors. ODEQ approved closure of this site on September 14, 2004. The Remedial Action Report was approved by ODEQ on January 4, 2005, and by USEPA on January 12, 2006. USEPA issued a Certificate of Completion for the Soldier Creek Sediment and Surface Water Operable Unit on January 19, 2006. The Air Force discontinued surface water monitoring program that was associated with the OU 2 August 1993 ROD. However, the Base still samples the creek on a regular basis under the NPDES program at Tinker AFB. The RRSE is not required.

Site #ST003 North Tank Area (OU 1)

The NTA, situated at the northwest corner of Building 3001, is included as part of the Building 3001 OU and falls under the 1990 ROD for the Soldier Creek/Building 3001 NPL site. The site originally housed five USTs constructed or installed between 1943 and 1958. All tanks have either been removed or cleaned and abandoned in place. Primary contamination appears to be located adjacent to Tank 3404, a 235,000 gallon #2 heating oil tank. The ROD specified installation of a floating fuel product removal system to recover fuel product floating above the groundwater table, installation of a vapor extraction system to remove fuel vapors from the subsurface soils, removal and disposal of a 750 gallon waste tank, and proper closure of Tank 3404.

Several free product removal techniques were implemented at the NTA beginning May 1, 1991. A dual phase free product and groundwater recovery system consisting of electric hydrocarbon recovery pumps and groundwater pumps was employed. Removal of Tank 3404 was completed in 1992. A remedial investigation was completed in 1994 to fully characterize the hydrogeologic conditions at the NTA. It was determined that the dual phase removal system was not properly designed to efficiently recover free product. The electric pumps were replaced with pneumatic pumps in 1995, while a focused FS was completed at the site. Subsequently, a vacuum enhanced pumping (VEP) system consisting of nine extraction wells for free product recovery was installed in 1999. The treatment system removes vapor, water, and free product from all of the extraction wells. The VEP system is still in use for free product recovery at the North Tank Area. A Five-Year Review was completed in September 2007. The Five Year Review Report found that the treatment system at NTA is functioning as intended by the ROD. The containment and recovery of free-floating fuel product remains the response action. The RRSE is not required.

Site #OT004 Wells 18 and 19

WSW 18 and 19, both located inside Building 3001, were removed from service in 1984 after TCE and PCE were detected in water samples drawn at the wellhead. Investigation of these wells in 1984 concluded that contaminants were probably migrating downward from the shallow saturated zones in the annular space between well casing and the formation, and were entering wells through corrosion holes in casing at depths around 100 and 150 feet. Both wells were plugged in September 1986. Because the plugging of wells 18 and 19 was completed as an interim action prior to the FFA, wells 18 and 19 did not require a remedy under the Building 3001 ROD. The site was closed on June 1, 1991. The RRSE is not required.

Site #OT005 Soldier Creek Groundwater (OU 3) and IWTP Groundwater (OU 4)

IRP Site #OT005 consists of two OUs: Soldier Creek Groundwater (OU 3) and IWTP Groundwater (OU 4). Both are listed as operable units of the Soldier Creek/Building 3001 NPL site. The Soldier Creek Groundwater OU addresses groundwater north of a groundwater flow divide that exists, depending on depth, from just north of the northeast boundary of Tinker AFB to Interstate 40. The IWTP Groundwater OU addresses groundwater south of that groundwater flow divide, but north and east of the Building 3001 groundwater (see Figure 2.1). The groundwater divide determines the migration pathway for contaminants in the groundwater system in the northeast quadrant of the Base. Groundwater north of the divide generally flows to the north; groundwater south of the divide flows to the south-southwest toward the Base. The groundwater divide prevents, or greatly hinders, groundwater and any associated contaminants from moving across the divide. IRP Site #OT005 encompasses roughly 320 acres of land with surface drainage into Soldier Creek and its tributaries. The RRSE is not required.

Soldier Creek Groundwater (OU 3)

The baseline risk assessment for the Soldier Creek Groundwater OU and IWTP Groundwater OU was finalized in 2000 following remedial investigations completed in the 1990s. The risk assessment identified three constituents (arsenic, thallium and pentachlorophenol) exceeding risk-based criteria in the Soldier Creek Groundwater OU. Only thallium was carried forward into the FS for further evaluation. In 2000, the FS concluded that none of the three constituents are attributable to Tinker AFB. During 2007, a supplement to the baseline risk assessment was completed for the Soldier Creek Groundwater OU which recommended a NFA remedy. This recommendation was presented in the Proposed Plan on August 14, 2007. No verbal or written comments were received during the public review and comment period. The Air Force, ODEQ, and USEPA Region 6 signed the ROD on January 9, 2008. The response is complete for this portion of IRP Site #OT005.

IWTP Groundwater (OU 4)

The IWTP was identified as a potential source of groundwater contamination because it treated industrial wastewater generated at the Base, including electroplating, chemical cleaning and paint-stripping operations. These operations generated wastewater containing oil, grease, metals and organic solvents. Initially, industrial wastewater used at the Base was treated at the IWTP and then was discharged to East Soldier Creek under a NPDES permit. However, in April 1996 the Base permanently diverted the pre-treated discharge to the Oklahoma City wastewater collection system under a City of Oklahoma City Industrial User Permit.

The primary contaminants associated with OU 4 are TCE and degradation products such as vinyl chloride. The pathways of concern are exposure to contaminants in the groundwater underlying the site and exposure to contaminants from the groundwater that may have infiltrated into Soldier Creek. Potential receptors, albeit reduced from 10 years ago, include human exposure to contaminants in the groundwater and possible human and ecological exposure to the contaminants in Soldier Creek. The risk assessment for the Soldier Creek Groundwater OU and IWTP Groundwater OU was finalized in 2000. Results of the human health risk assessment for IWTP Groundwater OU indicated that further evaluation of vinyl chloride and its parent compounds was warranted.

Source removal for VOC contaminants in the IWTP Soils (Site #OT034) was initiated in 2000 at the former Industrial Sludge Drying Beds and expanded in 2003 at the former Tanks D-1 and D-2. Removal and treatment of contaminants has been accomplished with a VEP system, which removes vapor and liquids via seven extraction wells. In October 2007, the addendum to the FS concerning the IWTP Groundwater OU recommended MNA and LUC as the preferred remedial actions for groundwater. The RRSE is not required for Site #OT005.

Site # ST006 Southwest Tank Area

The Southwest Tank Area, encompasses about 2.5 acres, and is located in the northeast quadrant of Tinker AFB, approximately 500 feet west of the south end of Building 3001. The site was in operation from 1945 to 1980 and consisted primarily of 17 USTs. The tanks reportedly stored petroleum products such as gasoline, lubricating oil and jet propulsion fuel (JP)-1, as well as solvents including toluene, naphtha, and Stoddard solvents.

Early investigations conducted in the 1980s found that the soil surrounding the tanks was contaminated with total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene and xylene (BTEX) compounds, as well as petroleum based solvents. Site characterization and field demonstrations of various remedial technologies were completed between 1992 and 1996.

Investigations were conducted in 1993 to determine the condition of the USTs and to characterize the soil contamination pathway. A RFI for the soils was completed in 1994, while bioslurping (vacuum extraction) technology was demonstrated at the site. In March 1997, an Air Force Decision Document (DD) described the existing pump & treat and vacuum technologies as adequate technologies for remediating the site. The DD also stated that sufficient institutional controls (IC) were in place for a NFA remedy to be protective of human health and the environment. A VEP system was used to continue removing free phase fuel and solvent from the soil matrix and from the top of the groundwater, and to enhance biodegradation of fuel components in the soil. Operation of the VEP system began in September 1997 and continued until September 2003, when free product was no longer observed on the groundwater. The VEP system was shut down in conjunction with the Building 3001 OU (Site #OT001) ESD rebound test on March 29, 2004. Fuel product was no longer observed on the groundwater or in the soil after the rebound study began in 2004. In November 2007, the extraction and monitoring wells were abandoned and equipment was removed from the site. Contaminated groundwater underlying the Southwest Tank Area lies entirely within the Building 3001 OU and is subject to the remediation requirements of the Building 3001 ROD. Solvents dissolved in the groundwater at the Southwest Tank Area were being recovered by the Building 3001 extraction wells and treatment system; any remaining contamination will be remediated in accordance with the OU 1 ROD. For additional groundwater information refer to the Capsule Site Description for Site #OT001. The RRSE is not required.

Site #ST007 290 Fuel Farm

The 290 Fuel Farm site is located in the north-central area of the Base. The site is bounded by First and Arnold Streets on the north and south and by "A" and "B" streets on the east and west, respectively. The original Fuel Farm consisted of five 18,000-gallon USTs and 20 25,000-gallon USTs. The tanks were used to store motor fuel, aviation gasoline and JP-4. Two major spills of 6,000 and 10,000 gallons, respectively, occurred in 1979 and 1980. The USTs were removed and replaced with above-ground storage tanks (ASTs). Investigations conducted in 1985, 1987, and 1988 found fuel-related contaminants in the soil and groundwater. An intensive RI was conducted at the site in 1994 to determine the amount of fuel remaining in the soil and the full extent of groundwater contamination. TCE and other chlorinated solvents were also identified in the RI. Two VEP systems were installed at the site between 1998 and 2000. Collectively, the two systems extract groundwater and soil vapor from 34 recovery wells around Building 214, the former Building 210, near Tank 349, and near Building 117. Operation of this system, along with LTM is the RIP. The cleanup is scheduled to be completed in 2013 with the closeout targeted for 2018. The RRSE is not required.

Site #ST008 (SWMUs 15, 16, 17, and 18) Four Fuel Sites

This site originally consisted of four underground storage tanks located near Buildings 201 and 214 on the north side of the Base. An investigation was conducted in 1985 to determine if contamination was originating from the site. In 1991, investigations were conducted to pinpoint the exact location of the USTs. A Phase II RFI was completed in September 1994 that determined the nature and extent of the contamination in the surrounding soil. In 1995 and 1996, two USTs were removed from the site. On August 15, 2002, the ODEQ renewed and issued the Tinker AFB RCRA Permit. ODEQ concurred with the Base's request for NFA at SWMUs 16 and 17 near Building 201, and SWMU 18 near Building 214. Subsequently, SWMU 15 (also near Building 201) was granted regulatory approval for NFA, and will be delisted from the RCRA permit in 2012. The Statement of Basis document for MNA was completed in January 2005. ODEQ concurred and accepted the document in February 2005. The RRSE is not required.

Site #OT009 Crutcho Creek and Site #OT010 Kuhlman Creek

There are three creeks that are monitored and evaluated under the Crutcho Creek and Kuhlman Creek IRP Sites: Crutcho Creek, Kuhlman Creek, and a tributary of Elm Creek. The main branch of Crutcho Creek originates south of Tinker AFB and flows northward through the Base toward the North Canadian River. The east tributary of the creek begins on Base just southeast of the Base Control Tower and joins the main branch near Base housing. The creek receives drainage from the western and southern sections of the Base, including the main instrument runway. Kuhlman Creek, a tributary of Crutcho Creek, originates in the northern portion of the Base and is fed by storm sewer outfalls that drain the northern portion of the Base. A small tributary of Elm Creek originates near the southern boundary of Tinker AFB and discharges southward to Elm Creek off-Base. Elm Creek terminates at Lake Stanley Draper, south of the Base.

Crutcho and Kuhlman Creeks were identified as potential contaminated sites in 1984. Contamination from landfill seeps (Landfills 1, 3 & 5), occasional spills originating from limited industrial operations located on the western portion of Tinker AFB, and water from the outfalls were suspected to have contributed to contamination of these creeks. The tributary of Elm Creek was also identified as potentially affected by past contaminant releases. Extensive sampling of the sediment and surface water of the creek systems was conducted during the RI completed in September 1992. Sampling data from the RI was used to conduct a risk assessment based on USEPA guidelines. The risk assessment determined that the sediment and surface water from Crutcho and Kuhlman Creeks, as well as the tributary of Elm Creek, did not pose an

unacceptable risk. No definite source or contaminant level trends were found in the subsequent ten year period of sampling. A letter dated December 9, 2005 to the ODEQ recommended that sampling of these areas be discontinued. A response letter from the ODEQ dated January 12, 2006 concurred with this recommendation. These sites are contained within the boundary of the groundwater contamination study areas known as CG037, CG038 and CG039. The RRSE is not required.

Site #LF011 (SWMU 3) Landfill 1

Landfill 1 is located east of Patrol Road and south of Crutcho Creek and covers an area of 1.5 acres. During its operation from 1942 through 1945, the landfill received general refuse and industrial waste generated at Tinker AFB. Trench water sampling and soil borings revealed low concentrations of VOCs and semi-volatile organic compounds (SVOCs) along with low levels of metals. The RI performed for Crutcho Creek did not reveal any indication that contamination had migrated into the creek. Land use near the site does not include any ecologically sensitive areas, housing or military quarters. A 2-acre RCRA cap was installed over the landfill in 1991 as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater, and prevent any direct contact with the site. A DD was submitted to ODEQ on July 25, 2001; however, site closure has not yet been attained with the agency. The site lies within the boundary of the Southwest Contaminated Groundwater Management Unit, Site #CG038. The 2002 RFI for CG038 concluded that Landfill 1 does not appear to be a source of contamination to CG038. Long term care of the RCRA cap will continue for Landfill 1, and monitoring of groundwater around the site will continue as part of the CG038 RIP. For additional groundwater information refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #LF012 (SWMU 4) Landfill 2

Landfill 2 covers 27.5 acres and is located south of Vanaman Road and adjacent to Landfill 4 on the southwest side of the Base. Dates of operation for Landfill 2 have been reported as being from 1945 through 1952; however, aerial photos suggest that the range of use of the site might be closer to 1951 through 1963. This landfill primarily received general refuse from the Base, including sanitary and industrial waste. Soil and groundwater investigations were performed between 1985 and 1990 to determine if environmental contamination in the area occurred as a result of disposal and management practices. Trench water sampling showed low concentrations of VOCs (including TCE and vinyl chloride) and SVOCs. Low levels of metals such as barium, cadmium, chromium, lead and nickel were also detected. The possibility of leachate migrating into Crutcho Creek from the landfill was thought to exist; however, samples

collected in the creek do not indicate that this occurred. In addition, a radiological waste disposal site was located within Landfill 2, and soil removal actions were performed in 1992 and 1997. For additional information on the radiological site refer to the Capsule Site Description for Site #RW025.

A 28-acre RCRA cap was installed over the Landfill 2 in 1998 as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater or to the creek, and prevent any direct contact with the site. A DD was submitted to ODEQ on July 25, 2001; however, site closure has not yet been attained with the agency. Landfill 2 lies within the boundary of the Southwest Contaminated Groundwater Management Unit, Site #CG038. A RFI/CMS was conducted between 2002 and 2004 for CG038, and concluded that the burial trenches and other waste management activities within Landfill 2 are the likely sources of chlorinated hydrocarbon contamination to CG038. Between 2004 and 2008 additional studies have identified and delineated hexavalent chromium contamination in the groundwater beneath Landfill 2. Long term care of the RCRA cap will continue for Landfill 2, and monitoring of groundwater around the site will continue as part of the CG038 RIP. For additional groundwater information refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #LF013 (SWMU 5) Landfill 3

Landfill 3 covers approximately eight acres and is located north of Vanaman Road and south of Crutcho Creek in the southwestern portion of the Base. It is reported to have been in operation from 1952 through 1961, although aerial photo evidence suggests trenching may have started around 1951. The landfill was used primarily for disposal of general refuse, but included some industrial waste as well. The waste burial trenches were closed in 1961, but a sludge dump was described in the south-central area of the landfill and used until 1968. Soil and groundwater investigations were performed between 1986 and 1990 to determine if environmental contamination in the area occurred as a result of disposal and management practices. Trench water sampling revealed low concentrations of VOCs including TCE, methyl ethyl ketone (MEK) and toluene as well as SVOCs. Metals in the trench water samples included barium, chromium, cadmium, lead, mercury and zinc. In addition, laboratory results for soil samples recovered from 3 to 18 foot deep borings around the sludge pit were indicative of high concentrations of both solvent and fuel compounds.

An 8-acre RCRA cap was installed over the landfill in 1991 as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater, and prevent any direct contact with the site. A summary remedial investigation

report was completed in 1993. After the landfill was capped, additional groundwater investigations were conducted to delineate the contaminant plumes beneath the landfill. A DD was submitted to ODEQ on July 11, 2001; however, site closure has not yet been attained with the agency. The site lies within the boundary of the Southwest Contaminated Groundwater Management Unit, Site #CG038. A RFI/CMS was conducted between 2002 and 2004 for CG038, and concluded that the former Sludge Dump Area in Landfill 3 appears to be a source of the chlorinated hydrocarbon contamination to CG038. Near the southern boundary of Landfill 3, high concentrations of several VOCs, including vinyl chloride and cis-1,2-dichloroethene (DCE) have been detected in groundwater. Long term care of the RCRA cap will continue for Landfill 3, and monitoring of groundwater around the site will continue as part of the CG038 RIP. For additional groundwater information refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #LF014 (SWMU 6) Landfill 4

Located immediately west of Landfill 2 and south of Vanaman Road, Landfill 4 covers 12.4 acres and mainly operated from 1961 through 1968. Aerial photo evidence, however, suggests that trenching occurred as early as 1948 in the northwest corner of the landfill, and again in 1953. Waste placed in the landfill consisted mostly of general refuse with some drums containing solidified solvent and metal shavings. Soil and groundwater investigations were performed between 1985 and 1990 to determine if environmental contamination in the area occurred as a result of disposal and management practices. Trench water sampling showed low concentrations of VOCs including TCE, MEK, and toluene as well as SVOCs. Metals in the trench water contained chromium and manganese. Soil samples obtained from 5 to 18 foot below surface revealed acetone, MEK and chromium. The possibility of leachate migrating into Crutcho Creek was thought to exist. However, the RI performed for Crutcho Creek did not show any indication that this has ever occurred. A 13-acre RCRA cap was installed over the landfill in 1998 as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater or to the creek, and prevent any direct contact with the site. A DD was submitted to ODEQ on October 29, 2001; however, site closure has not yet been attained with the agency. Landfill 4 lies within the boundary of the Southwest Contaminated Groundwater Management Unit, Site #CG038. A RFI/CMS was conducted between 2002 and 2004 for CG038, and concluded that the burial trenches within Landfill 4 are potentially sources of chlorinated hydrocarbon and hexavalent chromium contamination to CG038. Long term care of the RCRA cap will continue for Landfill 4, and monitoring of groundwater around the site will continue as part of the CG038 RIP. For additional groundwater information refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #LF015 (SWMU 2) Landfill 5

Landfill 5, encompassing about 6.0 acres, is located in the south central portion of Tinker AFB. The landfill is bordered by Tower Road on the west, the TACAMO (Navy) ramp to the south and Crutcho Creek to the north and east. While it was in operation from 1968 to 1970, the landfill accepted approximately 75,000 cubic yards of general refuse with small quantities of industrial waste. Preliminary sampling indicated the presence of both metals and organic compounds including TCE. An interim 12-inch compacted clay cap was installed in August 1990 to minimize infiltration of surface water into the landfill. In 1998, a 6-acre RCRA cap was installed over the landfill as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater, and prevent any direct contact with the site. A DD was submitted on October 21, 2001; however, site closure has not yet been attained with the agency. Landfill 5 lies within the boundary of the East Contaminated Groundwater Management Unit, Site #CG039. Long term care of the RCRA cap will continue for Landfill 5, and monitoring of groundwater around the site will continue as part of the CG039 RIP. For additional groundwater information refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #LF016 (SWMU 1) Landfill 6

Landfill 6 is situated east of the main Base south of Southeast 59th Street and ½ mile east of Douglas Boulevard on land leased from Oklahoma City. It occupies about 25 acres of a 40 acre site that Tinker AFB has leased from Oklahoma County from 1969 to the present. The landfill was operated from 1970 through 1979. The landfill was used to dispose of approximately 500,000 cubic yards of general refuse. There are reports that some paints, insecticides, solvent containers and IWTP sludge were also disposed of at the landfill. After the landfill ceased operating in 1979, the trenches were covered with several feet of compacted soil, and then planted with grasses.

A private well was sampled north of the site in 1983, and results of the sampling indicated some contamination. A follow-on sampling effort of several private wells in the area was performed by the OSDH, but no contamination was found in any of these wells. The residence where contamination was discovered was connected to the Tinker AFB water supply at that time, but the residence no longer exists.

In January 1986, a compacted clay cap cover system was installed over much of the landfill as part of an interim action. Subsequently, investigations revealed that additional uncapped trenches existed and an extension to the cap cover system was constructed in 1988. During the RI in 1990, solid waste samples of the trenches revealed VOCs and some metals.

The upper saturated zone (USZ) at the site also was sampled with the majority of contamination (arsenic, barium and cadmium) found in the western portion of the landfill. Groundwater is the primary route of contamination migration at the landfill. A 25-acre RCRA cap was installed over the landfill in 2000 as part of an interim action to reduce surface water infiltration, minimize the possibility of leachate migrating into the groundwater, and prevent any direct contact with the site. A DD was submitted on June 1, 2001; however, site closure has not yet been attained with the ODEQ. Long term care of the RCRA cap remains the RIP for Landfill 6, and monitoring of the groundwater around the site will continue as part of the remedy. The RRSE is not required.

Site #WP017 (SWMU 11) Supernatant Pond

The Supernatant Pond Site is situated on the west side of Tinker AFB east of, and adjacent to, Patrol Road and 200 feet north of Crutcho Creek. It is thought that from 1954 through 1970 the site was used as a containment area for sewage effluent from a former sanitary waste treatment plant. Base personnel continued to use the pond as a disposal site for liquid waste until 1980. Reportedly, this waste included petroleum hydrocarbon sludge, solvents and cyanide-contaminated liquids. Soil fill was placed in the pond area when it was abandoned in 1980. Significant settlement occurred and the site would not support growth of vegetation. Subsequently, construction rubble consisting of asphalt, concrete, plastic pipe and other non-hazardous waste was distributed over the area and covered by a layer of soil fill that did maintain grass over the site. The site was remediated in 1992 using solidification/stabilization technology, which locks contamination into a cement matrix. To close out the site, the ODEQ requested that additional soil sampling be performed. Analytical results from three shallow soil samples indicated no significant contamination. Consequently, a NFA request was submitted to ODEQ in July 2004. The Supernatant Pond was granted regulatory approval for NFA, and will be delisted from the RCRA permit in 2012. An Air Force DD was prepared and the site is considered closed for the soil media. The Supernatant Pond Site lies just within the boundary of the Southwest Contaminated Groundwater Management Unit, Site #CG037. Groundwater will continue to be evaluated and monitored as part of this GWMU. For additional groundwater information refer to the Capsule Site Description for Site #CG037. The RRSE is not required.

Site #WP018 (SWMU 12) Industrial Waste Pit #1

Industrial Waste Pit #1 (IWP-1) is located 500 yards southwest of Building 2121, approximately 400 yards west of Douglas Boulevard and northwest of the intersection of Runway Drive and SE 59th Street. The area of the waste pit is approximately 1.4 acres. The site was an unlined pit used for disposal of waste oils, stripping solutions and plating waste from

1947 to 1958. The pit was filled and graded in 1958, leaving no visible surface features to indicate its location. Because of the soil and vegetative cover over the site, migration of contaminants via air exposure and surface runoff has not occurred.

Initial investigations were conducted in the early 1980s to confirm the presence of contamination due to past waste practices. Geophysical surveys were performed and soil borings and groundwater monitoring wells were installed over the course of several field investigations. A RI for both soil and groundwater was completed in 1991, followed by a RFI for soils that was conducted between 1993 and 1996. Chlorinated solvents, compounds with BTEX constituents, and metals were identified. In 1998, an interim action was initiated to remove some of the contaminated soils, but contaminant levels were too high for off-Base disposal. A second interim action was performed in 2002 to perform on-site treatment of contaminated soils; however, the logistics of this remedy proved complicated on an active airfield, and the majority of the original contaminated soil and debris remains in IWP-1.

In 2004, an evaluation of vacuum enhanced dual-phase extraction (DPE) was conducted at Site #WP018, but because of uncertainties concerning the nature and extent of soil contamination, DPE was not considered a fully implementable remedial option. An addendum was completed for the CG039 RFI in the vicinity of IWP-1 in 2006. A CMS was completed in 2008, and MNA with ICs was recommended as the preferred alternative for the site. Contaminant migration in the unsaturated soil is considered minimal with little lateral movement.

IWP-1 lies within the boundary of the East Contaminated Groundwater Management Unit, Site #CG039. Groundwater monitoring around the waste pit will continue as part of CG039 LTM RIP. This remedy is consistent with that chosen for the entire CG039 groundwater monitoring unit. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #WP019 (SWMU 13) Industrial Waste Pit #2

IWP-2 is situated on the southeastern portion of the Base, 320 feet east of the Transient Munitions Facility and 200 yards west of Douglas Boulevard, between Patrol Road and the south end of the North-South runway. Waste oils, cyanides, chromates, phenols, solvents, waste acids, and alkalis were mixed with waste petroleum products and often burned to reduce volume during the site's operation from 1958 to 1965. The site was then back-filled and abandoned. A total of nine monitoring wells were installed to assess potential for contaminant migration to the groundwater. Analysis of soil and groundwater samples indicates that no significant contamination has migrated from the site. The DD was accepted on October 1, 1985 and site

remediation completed May 6, 1997. A human health and ecological risk assessment was approved by ODEQ in September 19, 2003. ODEQ approved NFA at IWP-2 in February 20, 2004. IWP-2 lies within the boundary of the East Contaminated Groundwater Management Unit, Site #CG039. Groundwater monitoring around the waste pit will continue as part of CG039 LTM RIP. This remedy is consistent with that chosen for the entire CG039 groundwater monitoring unit. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #OT020 Multiple Creeks

The Multiple Creeks Site was so named because the site included four creeks: Soldier, Crutcho, Kuhlman and Elm Creeks. In 1991, Site #OT020 was subdivided by creeks and investigated as three IRP sites rather than one. Soldier Creek has been investigated under IRP Site #OT002 Soldier Creek Sediment and Surface Water OU. Crutcho Creek, Kuhlman Creek, and a tributary of Elm Creek have been investigated under IRP Sites #OT009 Crutcho Creek and #OT010 Kuhlman Creek. A specific site identification number was not created for the tributary of Elm Creek. Because each of the above described creek systems were addressed as individual sites, the Multiple Creeks IRP site was closed on June 1, 1991. The RRSE is not required.

Site #FT021 (SWMU 7) Fire Training Area #1

Fire Training Area #1 is located on the west side of Tinker AFB, and is bounded by Crutcho Creek to the south, Patrol Road to the east, the 3rd Combat Communications Squadron Operations facility (Building 7017) to the north, and Air Depot Boulevard to the west. In use from 1950 to 1962, the site was unlined and contained a gravel bottom. During Tinker AFB Fire Department training operations, water was first added to the pit to saturate the soil and to reduce infiltration into the soil below. Fuel and sometimes solvents were then poured on top of the water, ignited for training purposes and then extinguished using water and/or protein-based foam. After each exercise the residual liquids were allowed to soak into the soil. Early investigations in the 1980s suggested that solvents were periodically used along with petroleum based fuels. Investigations performed at the site showed that minimal contamination exists in the soil. An assessment determined that risks to the most exposed population are less than the maximum risk allowed under USEPA guidelines. A RFI for soils was completed on September 30, 1997. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Since ODEQ concurred with the NFA request, Fire Training Area #1 (SWMU 7) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG037 groundwater contamination study area; therefore, groundwater at the site

will continue to be evaluated and monitored as part of CG037. For additional groundwater information, refer to the Capsule Site Description for Site #CG037. The RRSE is not required.

Site #FT022 (SWMU 8) Fire Training Area #2

This training area is situated northwest of the control tower and north of Crutcho Creek in the south-central portion of Tinker AFB. Fire Training Area #2 is approximately one-quarter acre in size. During its operation from 1963 to 1966, Fire Training Area #2 was a temporary, unlined pit used occasionally for fire training exercises. Typically, water was first added to the pit to saturate the soil to reduce infiltration. Fuel was then poured on top of the water, ignited and extinguished using water and protein-based foam. Residue was left in the pit to evaporate and infiltrate before the next training exercise. Early investigations in the 1980s suggested that solvents were used along with petroleum based fuels, but the 1995 Phase II RFI results indicated that no VOCs or SVOCs were detected in soil at concentrations outside established and approved soil screening levels. Approval for removal from the RCRA Operating permit was received from ODEQ and the site was closed on September 19, 2003. The site is contained within the boundary of the CG039 groundwater contamination study area. A chlorinated solvent plume exists in the groundwater beneath the Fire Training Area #2 site. The groundwater at the site will continue to be evaluated and monitored as part of the East Contaminated Groundwater Management Unit, Site #CG039. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #OT023 Facility 1123

Facility 1123 also known as Building 1123 was located on the south side of the Base. The facility was used to store incoming materials and hazardous material drums containing flammable materials and solvents such as MEK and PCE. Spills were reported to have occurred and a concrete floor was installed between 1984 and 1985, replacing the former dirt floor. Soil samples taken when the concrete floor was installed showed no contamination. Additional soil samples analyzed in March 1990 indicated contaminant concentrations were below established and approved soil screening levels. The building was removed, shortly thereafter, for the construction of the Navy runway approach in the early 1990s. A NFA DD was prepared by the Air Force on June 28, 1991. The site is contained within the boundary of the CG039 groundwater contamination study area. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #FT024 Fire Training Area #4

In December 1987, Tinker AFB personnel discovered a drawing that identified an area approximately 300 feet by 225 feet in the southwest portion of the Base as a fire training area. It had not been identified during earlier record searches or investigations. This potential site was named Fire Training Area #4 and identified as an IRP site. An intensive records search followed, which consisted of interviewing Base personnel, reviewing Base maps and aerial photographs and on-site reconnaissance. The search revealed that there was no additional evidence of any physical existence, construction or operation of Fire Training Area #4. The site was closed on August 25, 1990. The RRSE is not required.

Site #RW025 (SWMU 19) Radiological Waste Disposal Site 1030 West

This site is located within the Landfill 2 boundaries, on the south end of Tinker AFB, about 1200 feet west and 550 feet north of Building 1030. The IRP Phase I Records Search Report states that the area was used to burn and bury radium dial waste and rags. The waste was routinely placed in a pit and burned, then covered with a layer of soil. In the early 1970s, Pistol Pond was constructed on top of Landfill 2 and reportedly covered the Radiological Waste Disposal Site 1030 West (SWMU 19). The pond was drained in 1986. A surface survey was performed in 1990 followed by an intrusive survey in 1991. Approximately, 750 cubic yards of soil were removed in June 1992. A second removal action was conducted in 1997. The soil was disposed at an approved facility. The site is now covered by the RCRA cap installed at Landfill 2. For additional information regarding Landfill 2, refer to the Capsule Site Description for Site #LF012. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radiological Waste Disposal Site 1030 West (SWMU 19) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG038 groundwater contamination study area, and the groundwater in this area will continue to be evaluated and monitored as part of that study area. For additional groundwater information, refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #RW026 (SWMU 20) Radiological Waste Disposal Site 201 South

Radioactive Waste Disposal Site 201 South is located on the south side of Building 201 in an alcove area between the west wall of former Building 205 and the east wall of former Building 204. All three buildings are now combined and referred to as Building 201. The site was identified during the IRP Phase I Records Search in 1982. Records report that the site contained radium paint solids and dials from a radium paint room that was located inside Building 201. This room was used in the 1950s. Investigations determined the contamination

could be the result of radium paint/solvents spilled on the ground surface. Samples were collected and a soil removal action was conducted in 1996. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radioactive Waste Disposal Site 201 South (SWMU 20) was removed from the RCRA Operations Permit on August 12, 2002. The RRSE is not required.

Site #RW027 (SWMU 21) Radiological Waste Disposal Site 62598

Radiological Waste Disposal Site 62598 is situated north of Crutcho Creek, west of Reserve Road, near Landfill 3 on the south end of Tinker AFB. Soil was excavated in July 1991 and no radiological contamination or waste was found. Because nothing was found, there was no potential risk to the soil, water, and air migration pathways. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radiological Waste Disposal Site 62598 (SWMU 21) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG038 groundwater contamination study area and groundwater will continue to be monitored as part of this area. For additional groundwater information, refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #RW028 Radiological Waste Disposal Site 4000

Radiological Waste Disposal Site 4000 was thought to be located southeast of the intersection of Douglas Boulevard and 59th Street on off-Base property near Gate 29 (Marduer Gate). In 1989, the U.S. Army Corps of Engineers (USACE) reported that the existence of a radioactive waste site in active use in 1966 at this site was based solely on a verbal report from a Tinker AFB employee. No contamination could be found at the site. The site was closed June 1, 1991. The RRSE is not required.

Site #RW029 (SWMU 22) Radiological Waste Disposal Site 1022 East

Radiological Waste Disposal Site 1022 East (1022E) is located northwest of Landfill 3 between Landfills 1 and 3. It was believed that radiological material (thorium objects and radium compass waste) was disposed of at the site in the 1950s. The site was excavated in June 1991 and one small aircraft part containing thorium was discovered. A final survey indicated no contamination at the site. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radiological Waste Disposal Site 1022 East (SWMU 22) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG038 groundwater contamination study area and groundwater will continue to be monitored as part of that study area. For additional

groundwater information, refer to the Capsule Site Description for Site #CG038. The RRSE is not required.

Site #WP030 Pit Q-51 (OU 1)

Pit Q-51, located inside Building 3001 at column-line Q-51, is included as part of Building 3001 OU and addressed in the ROD reached on August 15, 1990 for the Soldier Creek/Building 3001 NPL site. Pit Q-51 was identified as an IRP site following a fire in November 1984. The pit was below-grade constructed of concrete and was used to store liquids from the engine overhaul process. Sampling showed the pit contained about 45 gallons of water contaminated with small amounts of TCE, cadmium, chromium and lead. A clean-up action involved removing the pit's contents, steam cleaning the pit and filling the pit with sand. The pit was then capped with concrete. The site was closed June 12, 1991. The RRSE is not required.

Site #OT031 Bonnewell

Site #OT031 is located north of Building 3900 in the former Kimsey addition, just north of the Base boundary perimeter fence. This site was addressed as part of the Soldier Creek Groundwater OU, which is part of Site #OT005, and as such was deleted as an IRP site on June 1, 1991. The RRSE is not required.

Site #ST032 3700 Fuel Yard

Located east of Building 3703, the 3700 Fuel Yard site has served as a jet fuel storage depot since the mid-1950s. In the past, both USTs and ASTs have been used to store fuel at this site; however, the 3700 Fuel Yard is now only used as an AST facility. The USTs were installed in 1954 and each had a capacity of 25,000 gallons of JP-4 fuel. In 1990, an initial investigation of the site indicated significant soil contamination in the proximity of six USTs. The tanks were removed in 1991 along with 1500 cubic yards of fuel contaminated soil. In 1992, a one-year bioventing pilot test was performed at the site, and additional soil and groundwater investigations were performed in 1993. The investigations performed in 1991 and 1993 reported the occurrence of solvents and jet fuel contamination in the soil and groundwater. In 1994, a RFI was performed to delineate the contaminant plumes. It was concluded that the solvent contamination was separate from the UST releases. The bioventing treatment was expanded in 1995 for remediation of the fuel contaminated soil. In March 1998, the bioventing system was turned off and the action was considered complete on April 7, 1998. The OCC approved case closure on September 22, 1999; however, this closure is limited to only petroleum hydrocarbons in the soil. By 2004, the CMS at Building 3703 determined that the solvent contamination in the groundwater was likely from the leaks in the industrial waste lines and oil/water separator

associated with Building 3703. The site is contained within the boundary of CG039 groundwater contamination study area. Long-term monitoring of the groundwater will continue as part of CG039. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #ST033 Area A Service (Fuel) Station

Located south of the original Building 414, the Area A Service Station served as a motor fuel station from 1942 until it closed in 1990. Gas and diesel fuels were stored in four USTs. Two of the tanks were used for leaded and unleaded mogas storage. The third tank stored unleaded gas and was taken out of service when the station closed in 1990. The fourth tank was installed in 1975 and was used for diesel storage until taken out of service in 1990. Soil and groundwater investigations conducted in 1990 and 1992 showed the presence of mogas contamination. A product recovery system was installed in 1992 to pump fuel from the groundwater. By 1996, the extent of soil contamination was delineated, the USTs were removed and the product recovery system expanded. VEP remediation began June 1997, and fuel product recovery was completed by 1999. The OCC approved site closure on December 18, 2000; however, this is limited to only petroleum hydrocarbons in soil and groundwater. A TCE plume (along with other chlorinated compounds) has been identified in the groundwater beneath the site. The Area A Service Station Site is within the boundary of CG037 and is regulated under the authority of ODEQ. The TCE groundwater plume borders the Base boundary; therefore, the VEP system remains active to capture and control migration of the chlorinated compounds. The RRSE is not required.

Site #OT034 (SWMUs 23, 24, and 32) Industrial Waste Treatment Plant and Associated Components

IRP Site #OT034 includes the existing and former components of the IWTP (SWMU 24), the former sanitary wastewater treatment plant (SWTP) including its components (SWMU 32), and 11 former solvent holding tanks (SWMU 23) that were located in the southwest corner of the IWTP. All of the components of IRP Site #OT034 with a RIP or RC status are listed in the table below. Site #OT034, located in the northeast corner of the Base, is the process treatment plant for all industrial and sanitary wastewater generated at Tinker AFB.

The SWTP was constructed in 1942 and 1943 for the treatment of sanitary wastewaters from the east side of Tinker AFB and the Douglas Aircraft Plant. From 1963 to 1971, the SWTP treated combined industrial and sanitary wastewaters. Following 1971, the treatment facility received only sanitary wastewater until 2001 when it was decommissioned. The IWTP was constructed in 1972 to treat industrial wastewater generated at the Base, including electroplating,

chemical cleaning and paint-stripping operations. These operations generated wastewater containing oil, grease, metals and organic solvents.

The areal extent of this site is contained wholly within the boundaries of the IWTP Groundwater OU, which is a component of IRP Site #OT005. Subsequent to the 1998 FFA, it was determined that soils, surface water and sediment associated with the IWTP would be managed under RCRA guidance, and the groundwater media would be managed under CERCLA. Remedial action at site #OT034 is only concerned with the process components and soils associated with the IWTP, SWTP and the 11 waste storage tanks. Investigation and cleanup of the groundwater beneath Site #OT034 is performed within IWTP Groundwater OU of Site #OT005.

Following the RFA in 1989 and listing of the IWTP and its associated components on the RCRA Operations Permit in 1992, RFIs were conducted between 1993 and 1996 at Site #OT034. Results of the investigations indicated the presence of chlorinated and non-chlorinated VOCs, SVOCs, phenolic compounds and metals in the soil, as well as VOCs in the soil gas. The 1996 Phase II RFI concluded that limited, localized soil contamination existed at IWTP; however, corrective measures were implemented for the IWTP associated components listed in the table below.

In April 1996, the Base permanently diverted discharge from both the IWTP and the SWTP to the Oklahoma City wastewater collection system under a City of Oklahoma City Industrial User Permit. Beginning in 1999, several interim measures and interim actions were implemented to address the contaminated soil beneath the site. The industrial waste sludge drying beds were removed, and a VEP system with five extraction wells was installed in 2000 to recover subsurface liquids and soil gas in the vicinity of the former industrial sludge drying beds and the 11 abandoned waste holding tanks at SWMU 23. In 2001, the former industrial waste tanks D-1 and D-2 were demolished and removed from the IWTP, and all of the process components associated with the SWTP were demolished and removed in 2001 and 2002. On August 12, 2002, the ODEQ renewed and issued the Tinker AFB RCRA Operations Permit. ODEQ concurred with the Base's request for NFA at SWMUs 24.2, 24.9, 24.10, 24.13 (formerly SWMU 24.19), 24.14 (formerly SWMU 23), and 32. Component status for these SWMUs is shown in the table below. In 2003, the VEP system was expanded to recover vapors and liquids from the soils beneath the former tanks D-1 and D-2. The Air Force submitted a DD to ODEQ in February 2004 requesting closure for the SWTP soils and selecting VEP as the remedy for treating the remaining IWTP soils (current SWMUs 24.2, 24.13, and 24.14). ODEQ approved

the DD and the selected remedy for IWTP and SWTP soils on May 5, 2004. A five-year review of this treatment alternative was proposed in the DD. The RRSE is not required.

Components of OT034 with Remedy in Place or Remedy Complete

Site OT034 Component Name	Investigated Media	Component Status
Former Waste Blending Tanks D-1 and D-2 (SWMU 24.2)	Soil, Soil Gas	Remedial Action – Cap along with Soil Gas Removal
IWTP - Wet Lift Station (SWMU 24.9)	Soil, Soil Gas	Equipment and Waste Removed. NFA
IWTP - Softener Basins (SWMU 24.10)	Soil, Soil Gas	Equipment Removed. NFA
Industrial Sludge Drying Beds (SWMU 24.13 formerly 24.19)	Soil, Soil Gas	Remedial Action – Cap along with Soil Gas Removal
Abandoned Waste Tanks (SWMU 24.14 formerly SWMU 23)	Soil	Equipment and Contaminated Soil Removed.
Sanitary Wastewater Treatment Plant (SWMU 32)	Soil	Equipment and Contaminated Soil Removed. NFA

Former Waste Blending Tanks D-1 and D-2 (SWMU 24.2)

Two partially underground storage tanks were used to segregate and temporarily store waste streams that contained high concentrations of phenols and other solvents from operations associated with the paint stripping hangars. Releases from these tanks were documented in the 1996 Phase II RFI Report. The tanks were removed from service and demolished in 2001. The underlying soil was heavily contaminated and free liquids, including phenols, were found beneath the former tank bottoms. The free liquids were removed to the extent practicable. Concrete flowable fill was placed in the base of the excavation to act as a permanent fluid and vapor barrier. The area was then backfilled with clean soil, then covered and transformed into a parking area. As reflected in the 2002 RCRA permit, ODEQ has concurred that no further action is necessary; therefore, the site was removed from the RCRA Operations permit issued on

August 12, 2002. However, soil gas and groundwater contamination beneath the concrete vapor and fluid barrier continues to be removed by VEP, as approved by ODEQ in the 2004 DD.

Wet Lift Station (SWMU 24.9)

This component consisted of a supernatant lift station, a sludge pump building and four chemical holding tanks that were located along the northern perimeter of the IWTP. Results of the 1994 RFI indicated trace levels of PCE and toluene in the soil gas, and low levels of PCE in one soil sample. NFA was recommended in the RFI. As reflected in the 2002 RCRA permit, ODEQ has concurred that no further action is necessary; therefore, the site was removed from the RCRA Operations permit issued on August 12, 2002. In 2006, the process units were either rehabilitated or demolished and eliminated from further use. This component is considered closed.

Softener Basin (SWMU 24.10)

Two side-by-side steel tank softener basins, 62 feet long by 11 feet wide by 11 feet deep, were installed in the early to mid 1980s. Soil and soil gas samples were collected in 1993. Results as presented in the 1994 RFI report indicated trace levels of chlorinated solvents in the soil gas. Soil samples indicated the presence of PCE, and the polycyclic aromatic hydrocarbon (PAHs) benzo(a)anthracene, benzo(a)pyrene, and benzo(b)fluoranthene. The softener basins were removed in 1994 to construct the new solids contact clarifier. As reflected in the 2002 RCRA permit, ODEQ concurred that no further action is necessary; therefore, the site was removed from the RCRA Operations permit issued on August 12, 2002. This component is considered closed.

Industrial Sludge Drying Beds (SWMU 24.13 formerly SWMU 24.19)

Located in the southwest corner of the IWTP, this process unit was used for drying sludges generated during treatment of industrial wastewaters. Soil underlying these beds was contaminated with industrial solvents such as TCE. Groundwater testing showed contaminants had leached into the groundwater and were thought to potentially be migrating to nearby Soldier Creek. The sludge beds were removed in 1999 and 2000. In 2000, a VEP system was installed to collect soil and groundwater contaminants in the vadose zone. As reflected in the 2002 RCRA permit, ODEQ concurred that no further action is necessary; therefore, the site was removed from the RCRA Operations permit issued on August 12, 2002. However, soil gas and groundwater contamination beneath the former sludge drying beds continues to be removed by VEP as approved by ODEQ in the 2004 DD.

Abandoned Waste Tanks (SWMU 24.14 formerly SWMU 23)

Abandoned waste treatment tanks were located in the southwest corner of the IWTP. A 1989 Final IRP Report found soil contamination below three of the 11 tanks. The tanks and associated contaminated soil were removed during an interim remedial action in August through October 1992. The proposed soil cleanup levels were achieved in all 11 excavations, with residual contaminants in the soil well below the proposed cleanup levels. Contamination in the excavated soil contained less than three parts per million of solvents such as 2-butanone, PCE, and total cresols. The excavations were tested and backfilled with impermeable clay. All but two were capped with an asphalt road base. Note that this SWMU was renumbered to SWMU 24.14 in the RCRA permit. As reflected in the 2002 RCRA permit, ODEQ has concurred that no further action is necessary; therefore, the site was removed from the RCRA Operations permit issued on August 12, 2002. However, soil gas and groundwater contamination beneath the former waste tanks continues to be removed by VEP as approved by ODEQ in the 2004 DD.

Sanitary Wastewater Treatment Plant (SWMU 32)

The Sanitary Wastewater Treatment Plant operated from 1941 until it was demolished in 2001 and 2002. Nine process units including primary clarifiers, trickling filters, final clarifiers, a sludge digester, and sludge drying beds were removed. All debris and contaminated soil were removed from the site. Minor residual organic and inorganic contamination remained on site; however, no human health exposure pathways were identified as complete. The Air Force submitted a DD to ODEQ in February 2004 requesting closure for the SWTP soils. ODEQ approved the DD on May 5, 2004.

Site #WP035 (SWMU 54) Building 17 Discharge Ditch, Soil, and Pad

Located in the north-central section of Tinker AFB, Building 17 was constructed in the 1950s as a paint shop. Over the years, various paints and solvents were stored outside in a paved fenced area adjacent to the facility. The paved area drained to a storm water culvert on the southwest corner of the site. During remediation of the site in August of 1992, the concrete pad and soil under the storage area were removed and an extensive survey found no contamination. A NFA document was submitted to ODEQ, and the agency concurred with the recommendation on April 23, 1997. The site was removed from the RCRA Operations permit issued on August 12, 2002. The RRSE is not required.

Site #WP036 Purge Facility/ Turnaround Soil

The purge facility is located in the east-central portion of the Base, approximately 400 feet southwest of Building 2121 and 2000 feet west of Douglas Boulevard on the east edge of

Tinker AFB. The site is located south of a hanger with a large concrete apron where aircraft maintenance is performed. The facility stores left-over aircraft fuel from the nearby maintenance hangars. As originally configured between 1975 and 1990, the purged fuels were fed into a metal above-ground bunker. An overflow port, designed to allow fuel to settle, led into an above-ground pipe that extended down slope to two ASTs. Once these ASTs were full, the fuel was transferred to one of six additional ASTs located nearby. This operation contaminated adjacent soil. In 1991, contaminated soil was removed from the site, followed by an investigation in 1992 to further delineate site contamination. In 1993, a RFI Phase I investigation was performed at the site with TPH detected as the principal contaminant of concern. In 1994, the eight ASTs, the above-ground bunker, and the above-ground pipe were removed. The entire system was replaced with a double-walled fiberglass UST that was fitted with a leak detection system and connected to a Roper pump to allow for down loading of the fuel to the UST. The site is still an active fuel storage area, and is used to load and off-load fuels for engine warm up and testing. With regard to fuel releases, the site was closed in accordance with OCC requirements on October 13, 1999. Chlorinated solvents have been detected in the groundwater beneath and south of the site, but are not considered attributable to Site #WP036. The site is contained within the boundary of the CG039 groundwater monitoring unit and groundwater will continue to be evaluated and monitored as part of CG039. For additional groundwater information, refer to the Capsule Site Description for Site #CG039. The RRSE is not required.

Site #CG037 Northwest Contaminated Groundwater Management Unit Site

The Northwest Contaminated Groundwater Management Unit is a geographical region located in the north-central portion of Tinker AFB defined for the purpose of monitoring groundwater for contaminants that come from a variety of sources. TCE and other chlorinated solvent plumes exist within this GWMU. Four IRP sites and two RCRA non-IRP sites are located within the geographic boundaries of CG037 as follows: Site#WP017, the Supernatant Pond; Site #FT021, Fire Training Area 1; Site #OT009, Crutcho Creek Sediment and Surface Water; Site #OT010 Kuhlman Creek Sediment and Surface Water; RCRA SWMU 14, Sludge Drying Beds; and RCRA AOC 2 - Old Pesticide Storage Area. The non-IRP sites, SWMU 14 and AOC 2, are included and described below, because both sites indicated the potential to be contaminant source areas for CG037. The CMS for CG037 was completed on July 24, 2003 and the DD was completed on January 13, 2004. The remedy in place is MNA with ICs. The RRSE is not required.

Sludge Drying Beds Site (SWMU 14)

The Sludge Drying Beds (SDB) site consists of eight sludge drying beds that were used to passively dewater wastewater treatment plant sludge from a municipal wastewater treatment facility (now demolished). The site is located west of Air Depot Rd. just south of Building 1001 and just north of Building 7017. Several borings were drilled around the perimeter of the former sludge drying beds in 1989. Although several organics were detected, none were considered a sufficient threat to warrant remedial action. A Phase I RFI was conducted in 1993 and 1994. Soil gas and soil sample results indicated the presence of chlorinated solvents at low levels. Groundwater samples also indicated that low levels of chlorinated solvents exist. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. The ODEQ concurred with the NFA request, and the SDB Site (SWMU 14) was removed from the RCRA Operations Permit on August 12, 2002. Groundwater contamination is managed under the CG037 RIP, which is MNA.

Old Pesticide Storage Area (AOC-2)

The Old Pesticide Storage Area (OPSA) at Building 1005 (now demolished) was located west of Air Depot Boulevard and west of the former Sludge Drying Beds Site (SWMU 14). Building 1005 was constructed as part of a sanitary waste treatment plant that was operational from the early 1950s until 1971. A RFI was performed between 1993 and 1994. Three soil borings were installed around the perimeter of the OPSA site for the collection of surface and subsurface soil samples. Beryllium was detected at a concentration that exceeded soil screening levels (SSL), but did not exceed background upper tolerance limits (UTLs). None of the other metals were detected in concentration levels exceeding either their respective 95-percent background UTLs or their risk-based SSLs. No organic constituents (VOCs, SVOCs, polychlorinated biphenyls, pesticides, or herbicides) were detected in any of the surface samples. In view of the findings, it was recommended that no further characterization be performed at the OPSA site. A NFA request was approved by ODEQ in a letter dated July 22, 1999. This AOC is considered closed. Although groundwater contamination occurs beneath the site, it is not thought to be attributable to OPSA, but is managed under the CG037 RIP, which is MNA.

Site #CG038 Southwest Contaminated Groundwater Management Unit Site

The Southwest Contaminated Groundwater Management Unit is located in the southwest quadrant of Tinker AFB. It was defined for the purpose of investigating groundwater contamination (principally solvents and hexavalent chromium) that may come from a variety of sources. The following IRP sites are within the geographic boundary of CG038: Site #LF011, Landfill 1; Site #LF012, Landfill 2; Site #LF013, Landfill 3; Site #LF014, Landfill 4; Site

#FT024, Fire Training Area #4; Site #RW025, Radiological Waste Disposal Site 1030 West; Site #RW027, Radiological Waste Disposal Site 62598; and Site #RW29, Radiological Waste Site 1022 East, as well as other potential contaminant sources such as barrel re-drumming and storage areas and aircraft facilities. An interim pump and treat system, primarily to prevent further off-site migration of solvent plumes, was completed for the site in 1998. The system has operated since March 1999. In addition, all four landfills have RCRA compliant caps. A RFI report was completed in 2003 and a CMS was approved on April 8, 2004. A permeable reactive barrier across the GWMU-2D plume was completed in late 2004 and became part of the selected remedy for CG038. A Statement of Basis was completed as the DD between Tinker AFB and the ODEQ, and was signed by the ODEQ on September 2005. In addition to the permeable reactive barrier (PRB) for GWMU-2D, continued operation of the pump and treat system became the selected remedy for GWMU-2E. Additional investigations completed in 2008 defined the extent of the hexavalent chromium plume in GWMU-2F near the western boundary of CG038. The 2010 remedial process optimization (RPO) report for CG038 suggested hotspot treatment of the GWMU-2D and 2E plumes. Site closure is anticipated for July 1, 2023. The RRSE is not required.

Site #CG039 East Contaminated Groundwater Management Unit Site

The East Contaminated Groundwater Management Unit is an area located in the southeast quadrant of Tinker AFB that was defined by the Air Force for the purpose of monitoring groundwater for contaminants, particularly solvents including TCE, that may come from a variety of sources. The following IRP sites are within the geographic boundary of CG039: Site #LF015, Landfill 5; Site #WP018, Industrial Waste Pit #1; Site #WP019, Industrial Waste Pit #2; Site #FT022, Fire Training Area #2; Site #FT023, Facility 1123; Site #ST032, 3700 Fuel Yard and Site #WP036, Purge Facility/Turnaround Soil. The area also includes an Industrial Waste Basin, recognized on aerial photographs, which was estimated to be in operation from the mid-1940s to the early 1950s, and an AOC known as the Fuel Truck Maintenance Facility. Two RFI reports were completed for CG039 (GWMU 3 and GWMU 4) in April and November of 2003 and a CMS report was completed in 2006. The Statement of Basis was completed as the DD between Tinker AFB and ODEQ in August 2006. The selected remedy consists of MNA for the contaminated groundwater at Site CG039, and IC with LUC and groundwater use restrictions. Site closure is anticipated for October 1, 2027. The RRSE is not required.

Site #CG040 Gator Facility Contaminated Groundwater Management Unit Site

The Gator Contaminated Groundwater Management Unit was designated as an IRP groundwater site in 1996. It is located at an adjunct facility approximately one mile east of the eastern boundary of Tinker AFB near the intersection of SE 59th St. and Post Road. The facility is non-industrial; only one building used for administrative purposes is found at the site. Chlorinated solvents including TCE have been detected above regulatory limits in the groundwater since the first monitoring wells were installed in 1995. No unique source has been identified for this contamination. A chlorinated plume has impacted shallow groundwater in the USZ and Lower Saturated Zone (LSZ); both are part of the Garber-Wellington Aquifer. Residences with private wells are extremely close to the site, one within 50 feet. This well has been tested several times by Tinker AFB and shows no contamination.

A groundwater extraction and treatment system began operation as an interim action in October 1999. The extraction system consists of two french drain segments in the USZ and a single pumping well in the LSZ. Contaminated groundwater is being pumped to an air stripper designed to treat chlorinated solvents to drinking water standards or better. The single pumping well in the LSZ was designed to capture the entire LSZ plume. Surrounding wells are monitored to ensure capture. Treated groundwater is discharged into a sanitary sewer near the site. The RFI report was completed in December 2003 and the CMS report was completed in July 2006. A Statement of Basis was completed as a DD between Tinker AFB and the ODEQ, and was signed by ODEQ on July 31, 2006. The selected remedy consists of continued operation of the groundwater extraction and treatment system along with institutional and engineering controls. The extraction system was evaluated in the 2008 RPO review to determine if it can remain as the final remedy for the site. The scheduled closure date is June 30, 2015. The RRSE is not required.

3.2 Compliance Restoration Program Sites

Several hydrogeologic cross sections are referenced in the following CRP site descriptions. These cross-sections are found in Appendix K which is attached as a separate CD to the Community Relations Plan. Appendix K can be obtained at the 72 ABW/CEPR Library, currently located on the second floor of Building 1 at Tinker AFB.

Site #CG041 AWACS Sector Groundwater Management Unit

Site #CG041 consists of chlorinated solvent groundwater plumes in the vicinity of the Air Warning and Control System (AWACS) flight apron. The site is in the north central portion of Tinker AFB and contains the contaminated groundwater beneath the tarmac and taxiways south

of Building 230. The site also extends beneath several industrial buildings to the west of Building 230 and unpaved areas to the south, east, and west of the tarmac (Figure 3.2). The facilities overlying CG041 have been used for industrial purposes since 1942. The subsurface hydrogeology is depicted on Cross Sections IT 1B-B', SB 5-5', and IT-Extension B-B' in Appendix K.

Two chlorinated solvent plumes exist within CG041. One is largely under the industrial buildings on the north side of CG041, while the other plume is on the southern border of CG041 underneath the tarmac and taxiways. The northern plume has impacted only the USZ, whereas the southern plume has impacted both the USZ and LSZ (Figure 3.2). For the northern plume, suspected sources of the contamination include: 1) USTs containing unknown materials that were located adjacent to the former Building 267 (a demolished auto maintenance shop), 2) former Building 227 (a demolished motor repair shop), 3) a formerly abandoned waste tank containing miscellaneous contaminated oil (tank 226) located near the former Building 228, 4) two 50,000 gallon USTs formerly located under the southwest corner of Building 289, and 5) potential leaks and breaks in the industrial waste lines in the vicinity of Building 289. For the southern plume, historical solvent usage on the tarmac from the 1940s to the 1970s is the suspected source. Currently, concentrations of chlorinated compounds are generally either stable or decreasing in the USZ and generally stable in the LSZ. The site was placed in the CRP in 2010. The next phase of response will be a RFI. The RRSE is high.

Site #CG042 BX Service Station Groundwater Management Unit

The Base Exchange (BX) Service Station Site #CG042 is located in the west-central portion of Tinker AFB, on Arnold Street between "L" Street, and Air Depot Boulevard (Figure 3.3). Currently, Site CG042 underlies mainly vacant land, although there is one water supply well within CG042 (i.e., well WS-3). Between the late 1940s and 2001, several shops and service establishments were located within or near the boundaries of this site. The former Tinker AFB BX Service Station was a vehicle refueling station that operated within CG042 between 1970 and 2001. Other shops and services that operated within CG042 during the 1950s and 1960s included a base laundry, a motor repair shop, and a gas storage compound with a filling station. The subsurface hydrogeology is depicted on Cross Sections IT 1G-G', SB 4-4', and IT 1H2M-1H2M' in Appendix K.

Fuel releases from USTs were reported in 1995 at the former BX Service Station, and a case was activated with the OCC to mitigate the fuel releases and remediate the site to regulatory cleanup levels. By 2005, fuel releases at the site had been successfully remediated by VEP and groundwater treatment, and the case was closed with the OCC in September 2006. The BTEX

plumes in the USZ and LSZ have stabilized and concentrations have been decreasing at the former BX Service Station. No free product has been observed at the site since 1998. Soil gas sampling was performed in the vicinity of Building 473 between 2006 and 2009. The results indicated elevated levels of petroleum hydrocarbon compounds along the exterior walls of the building.

Solvent contamination in the USZ and LSZ remains in CG042 west and southwest of the former BX Service Station (Figure 3.3). The shop activities conducted in the 1950s and 1960s are the suspected sources of chlorinated solvents such as TCE and its intermediate degradation products. However, documentation of the actual chemicals used and releases from these activities does not exist. The OCC does not regulate chlorinated compounds; therefore, regulatory authority for the site is the responsibility of the ODEQ. Corrective action for the chlorinated contaminants has not been negotiated with ODEQ or any other agency.

Chlorinated compounds have reached the USZ and LSZ of the Garber-Wellington Aquifer beneath this site. TCE is the primary chlorinated chemical of concern (Figure 3.3), with degradation products such as cis-1,2-DCE, 1,2-dichloroethane (DCA), and 1,1-DCE also present. The site was placed in the CRP in 2010. The next phase of response will be a RFI. The RRSE is medium.

Site #OT058 Building 3703

Building 3703 (Site #OT058) is located within CG039. This site is in the eastern portion of Tinker AFB, on Turbine Drive between East Drive to the west and Cells Road on the east (Figure 3.4). Building 3703 serves to mechanically test and service rebuilt jet engines and after-burners prior to redeployment. Wastewater associated with jet engine testing and cleaning is discharged to the industrial wastewater collection system. Building 3703 was constructed in 1951 and originally included four test cell chambers. Subsequently, four additional chambers were added. Currently, all eight jet engine test cell (JETC) chambers are operational. Solvents, such as TCE, were reportedly used in the past to clean the jet engines. Presently, JP-5 is the most commonly used fuel for engine testing. The fuel is transported to the facility by pipeline from the 3700 Fuel Yard. These fuel lines were entirely underground until the 1970s, when installation of aboveground lines was initiated. Portions of the fuel lines remain underground. The subsurface hydrogeology is depicted on Cross Sections IT 4C-4C', IT 4I-4I' and Basewide B-B' in Appendix K.

There are two known release sources at Building 3703: 1) leaks in the JP-5 supply line to Building 3703 within the building's underground duct bank; and 2) the oil-water-separator (OWS) system on the western side of Building 3703, which released industrial wastewater to the

subsurface. Since 1992, actions performed to remediate contaminant leakage at Building 3703 include the replacement of various industrial waste lines and OWS upgrades. A RFI was conducted between 2000 and 2002. An interim remedial action began in May 2002 to extract groundwater, vapor, and mobile nonaqueous phase liquids from the subsurface, and is still operating. A CMS was completed in 2005, and a RPO evaluation of the interim action was underway in 2010.

The most prevalent contaminants found in groundwater at this site are fuel-related compounds (i.e., TPH-gasoline, TPH-diesel, and BTEX) and chlorinated solvents (including PCE, TCE, and their anaerobic degradation products such as cis-1,2-DCE, 1,2-DCA, and vinyl chloride). Chlorinated solvent contamination in the USZ and LSZ extends beyond the boundary of OT058 to the east, south, and west (Figure 3.4). Some of the highest concentrations of TCE are directly south of OT058 near a former Industrial Waste Evaporation Basin identified overlying the USZ. Groundwater contamination beyond the boundaries of OT058 is being evaluated as part of CG039. Within the boundaries of the site, substantial amounts of dissolved and vapor phase contaminants have been recovered; however, no free product has been observed at the site. Nevertheless, significant contamination remains throughout OT058, particularly TPH and chlorinated compounds.

Soil gas sampling results conducted in 2007 near Building 3703 indicate that that there are probable contaminant sources beneath Building 3703 either in the soil, the groundwater, or both. PCE was detected in soil gas beneath Building 3703 at 41,000 parts per billion by volume. Therefore, contaminants in soil and/or groundwater beneath the building have the potential to migrate into indoor air via vapor intrusion (VI). The site was placed in the CRP in 2010. The next phase of response for Building 3703 will include sufficient evaluation of the site to either adopt or improve the current interim RIP (groundwater and soil vapor extraction) so that a Statement of Basis can be completed to implement the final remedy. The RRSE is high.

Site #OT062 Building 230

Building 230 (Site #OT062) is in the north central portion of Tinker AFB, between First Street and the ramp area at Avenue C (Figure 3.5). Building 230 is a four-bay hangar with support facilities that was used as a central repair hangar during World War II. Industrial activities in the building included aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance. Industrial processes are still conducted on the north end of the building, but are primarily limited to dry operations. There is an extensive network of industrial waste water drain lines along the north side of Building 230 and running north-south beneath the building. The

subsurface hydrogeology is depicted on Cross Sections SB 4-4', IT 1B-B', and SB 3-3' in Appendix K.

Chemicals were released to the environment from leaks in sumps and the industrial waste water drain lines at Building 230 as well as spills, allowing chemicals to percolate into the soil. The migrating contaminants have reached the uppermost units of the USZ. Contaminants in soil are primarily located on the north and west sides of Building 230 from approximately 2 to 9 feet below ground surface (bgs). The primary contaminants at the site are currently BTEX, carbon tetrachloride, cis-1,2-DCE, Freon 113 (1,1,2-trichloro-1,2,2-triflouroethane), methane, MEK, TCE, and vinyl chloride (Figure 3.5).

A VEP system was installed as an interim corrective measure to mitigate the potential risk posed by subsurface contaminants along the north and west sides of Building 230. The VEP system has operated continuously since startup in May 2005. The system uses groundwater extraction wells and horizontal soil vapor extraction (SVE) screens to remove contaminated groundwater and soil gas, respectively, that is then directed to a treatment plant constructed specifically for this cleanup action. There is no scheduled shut-off date for the VEP interim corrective measure. The site was placed in the CRP in 2010. The next phase of response for Building 230 will include sufficient evaluation of the site to either adopt or improve the current interim RIP (groundwater and soil vapor extraction) so that a Statement of Basis can be completed to implement the final remedy. The RRSE is high.

Site #OT063 Building 240

Building 240 Site #OT063 is located in the north central portion of Tinker AFB, on the southern end of "A" Avenue. OT063 is located east of Building 230, and south of the 290 Fuel Farm. It borders an active ramp area immediately to the south and east (Figure 3.6). Building 3001, a NPL site, lies approximately 2,000 feet east of Building 240. The subsurface hydrogeology is depicted on Cross Sections SB 4-4', IT 1D-1D', IT H-H', IT 1C-1C', IT 1E-1E', and IT 2J-2J' in Appendix K.

Building 240 was constructed in 1942 and originally served as a flight test center for repaired aircraft. Building 240 was also the flight planning and dispatch section of base flight operations. Various industrial activities have been performed at OT063 including: aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance. In the past, chlorinated solvents were used in degreasing activities at Building 240. A UST located northwest of the center of Building 240 was installed in 1942 and was used to store fuel for an emergency generator. Currently, Building 240 houses the flight operation center and is an active aircraft maintenance hangar providing operational support for the airfield.

A RFI for the soils was conducted at Building 240 between 2005 and 2008. Soil gas sampling was conducted beneath the building floor slab in the administrative and the hangar areas. In the administration area, PCE was consistently detected at levels exceeding 200 parts per billion by volume in August 2005 and August 2006. No significant levels of contamination were detected in the soils around the perimeter of the building. Although there are no groundwater plumes at OT063 in the USZ, there is a chlorinated solvent groundwater plume in the LSZ underneath the southeastern third of the building (Figure 3.6). Chlorinated solvent contamination that extends beyond the boundary of OT063 in the LSZ to the east and south is being evaluated as part of CG037 (under RCRA authority). TCE and 1,2-DCA are the principal contaminants of concern in the LSZ underneath OT063. The site was placed in the CRP in 2010. The next phase of response for Building 240 will include a Phase II RFI to either reach a NFA determination or recommend additional response action(s) to identify and characterize contaminant sources potentially impacting the site. The RRSE is medium.

Site #OT064 Building 210 Site

Site #OT064 is located in the north-central area of the Base and consists of Buildings 210 and 213, an unpaved grassy area, and a parking lot. The site is located north of First Street between "B" and "C" Avenues (Figure 3.7). The original Building 210 structure was built in 1942 and was used to refabricate and overhaul hydraulic and pneumatic control systems. The building included a paint shop, parts cleaning area, machine shop, test cells, and instrument repair area. Activities at the original Building 210 required the extensive use and storage of fuels, lubricants, and degreasing solvents. In addition, mercury filled manometers and temperature/pressure controls were used in the former test cells. In 2003-2004, approximately 90 percent of the building was demolished and removed. Most of the former Building 210 is now a paved parking lot. The northeast corner of the former Building 210 remains intact and contains a compressor room that serves a repair and maintenance facility located directly north in Building 200. This remnant of the original Building 210 is also currently used as a turbine maintenance and repair shop. In addition, Building 213, which is another turbine maintenance and repair shop built in 1993, is located in the southeast corner of OT064. The subsurface hydrogeology is depicted on Cross Sections IT 1A-1A', IT 1B-1B', IT 1C-1C', IT E-E' and IT 1G-1G' in Appendix K.

When a 6,000 gallon UST was removed in August 1997, several holes were observed on the underside. Approximately 1,500 gallons of mixed residual solvents and gasoline remained in the tank during excavation, and free product was also encountered on the shallow groundwater during the removal of the UST. At least three additional USTs were also located within the

boundaries of OT064, although these are indicated as having been abandoned prior to 1987. Two of these USTs stored fuels and one stored solvents. During demolition of the test cell area of Building 210 in 2003-2004, free-phase mercury was encountered in the test cell drain lines and surrounding soil. The drain lines and the surrounding mercury-impacted soil were excavated and removed in 2004.

VOCs have been detected in groundwater at the site; however, no groundwater plumes have been identified within OT064. There are chlorinated solvent groundwater plumes to the east, west, and south of OT064 in both the USZ and LSZ and fuel plumes to the east, northeast, and west of OT064 in the USZ (Figure 3.7). Soil gas data from 9 near slab soil gas probes collected from 2005 to 2009 around Buildings 210 and 208 indicate soil gas vapors exist along the northern boundary of OT064 at concentrations that may impact Building 200 directly to the north. As an interim remedial action, VEP extraction and recovery wells were installed in 1998 in the eastern portion of OT064. An additional VEP well was installed along the northern boundary of OT064 in 2007 near Building 200. These wells have been removing both contaminated soil vapor and groundwater from the site and continue to operate. The site was placed in the CRP in 2010. The next phase of response for Building 210 will include a Phase II RFI to determine the areal extent of VOC contamination at the site and impacts to adjoining facilities (e.g. Building 200). The RRSE is high.

Site #OT065 Buildings 283, 284, and 296

Site #OT065 is located in the north-central portion of Tinker AFB and consists of three buildings: Building 283 (Flight Simulator Training Facility & 552nd Squadron Operations Facility), Building 284 (Data Processing and AWACS Training Facility), and Building 296 (AWACS Supply Warehouse) (Figure 3.8). Sentry Road runs east-west through the center of OT065 with Building 284 on the north side and Building 283 and Building 296 on the south side of Sentry Road. The intersection of Sentry Road and "D" Avenue is adjacent to the northeast corner of Building 296. The subsurface hydrogeology is depicted on Cross Sections IT 1A-1A', IT 1B-1B', IT 1C-1C', IT E-E', and IT Extension B in Appendix K.

Past waste streams associated with OT065 include fuels (i.e., JP-4, JP-5, JP-8, and motor gasoline) and photographic developer waste from Building 283. In 1992, during the construction of Building 296, several abandoned utility lines were found containing jet fuel from a leaking adjacent JP-4 transfer line. Subsequently, the leaking JP-4 transfer line was cleaned of the remaining fuel and abandoned in place. The abandoned JP-4 transfer line runs north-south under the eastern portion of Building 296. Several other utility lines run under the east side of Building 296, including the main Tinker AFB industrial waste water line and a fuel distribution line.

There is also an OWS south of Building 296, just beyond the boundary of the site. Wash racks, a radar maintenance facility, and a motor repair shop previously existed in the vicinity of Buildings 283, 284, and 296 as well.

Subslab soil gas sampling conducted in 2009 at Building 296 revealed concentrations of TCE as high as 7630 parts per billion by volume. In the USZ, a TCE plume exists beneath the southeastern corner of B296 and extends beyond the boundary of OT065 to the northeast, south and southwest. High concentrations of TCE exist in the USZ directly south of Building 296, and at the southeastern corner of Building 289 (Figure 3.8). In addition, cis-1,2-DCE and vinyl chloride plumes in the USZ have been found below the eastern portion of Building 296. There is also a BTEX groundwater plume underneath Building 296 that extends west under Building 283 and northwest to Sentry Road. In the LSZ, a TCE plume has been identified beneath Building 283 and Building 296 that extends beyond the boundary of OT065 to the northeast. The site was placed in the CRP in 2010. The next phase of response will be a RFI. The RRSE is high.

Site #OT066 Building 2110

Site #OT066 is the fuel truck maintenance facility (FTMF) AOC. It includes an area potentially affected by suspected releases from the Building 2110 OWS, which may have affected associated environmental media (e.g., groundwater and soil). In operation since 1957, Building 2110 is a FTMF and has a washrack OWS. Residual fuel is released to the OWS and is then recycled. During construction operations at Building 2110 in November 1990, soil and water contamination were discovered under the concrete floor. A RFI for the soils was conducted at Building 2110 between 1993 and 1994. Contaminants within the soils consist of petroleum hydrocarbons including BTEX and chlorinated compounds typical of degreasers (acetone, chlorobenzene, and PCE). The 1994 RFI determined that these contaminants were released to the soils from the floor drain of Building 2110. The RFI contended that contamination attributed to the FTMF is limited to the upper 15 feet of soils and does not extend down to the water table.

Chlorinated solvent groundwater contamination in the USZ is located west/northwest of Building 2110 and has extended to underneath the building (Figure 3.9). The subsurface hydrogeology is depicted on Cross Sections IT 4D-4D', IT RFI C-C' and Basewide B-B' in Appendix K. The 1994 RFI contends that the PCE and TCE contamination detected in the groundwater beneath the FTMF does not appear to be attributable to the FTMF. Further, the RFI states that the contamination present within the groundwater beneath the FTMF appears to have come from a source upgradient of the FTMF based on the direction of groundwater flow and the lateral distribution of contaminant concentrations in the wells. To date the source of the

groundwater contamination has not been validated. The site is contained within the boundary of the CG039 groundwater monitoring unit and groundwater will continue to be evaluated and monitored as part of CG039. For additional groundwater information, refer to the Capsule Site Description for Site #CG039.

As reflected in the 2002 RCRA Operations Permit, ODEQ has concurred that no further action is necessary at the FTMF AOC; therefore, the site was removed from the RCRA permit issued on August 12, 2002. However, a facility inspection was completed in August 2009 and Site #OT066 was placed in the CRP in 2010. Since the site was removed from the RCRA permit, a Statement of Basis for NFA will be prepared. A relative risk determination will be performed at the same time to ensure NFA is the proper determination. The RRSE has not been performed.

Site #OT067 Building 2101

Building 2101 (Site #OT067) was built in the 1940s and was the original location of the motor pool (Figure 3.10). The suspected source of the groundwater contamination is leaks in the wastewater drain lines for Building 2101. This site includes contaminant releases from Building 2101 to environmental media including soil and groundwater. The subsurface hydrogeology is depicted on Cross Sections IT 4E-4E' and Basewide B-B' in Appendix K. Chlorinated solvent groundwater contamination is located immediately downgradient of Building 2101, and may be present under the building (Figure 3.10). A facility inspection was completed in August 2009 and Site #OT067 was placed in the CRP in 2010. The building is scheduled for demolition in 2011. A RFA or PA/SI will be conducted to determine the relative risk at this site. Building 2101 lies within the geographic boundaries of CG039. The RRSE has not been performed.

Site #OT068 North Apron Fuel Hydrant System

Site #OT068 (also known as Phillips Hydrant System #66230, Replaced Fuel Hydrant System, and SS-C504) is in the north central portion of Tinker AFB (Figure 3.11). The fuel hydrant system area is within CG041. The Phillips Hydrant System is an underground fueling system used to deliver fuels to airplanes on the tarmac at Tinker AFB. The fuel hydrant system is constructed beneath the tarmac and extends eastward from Building 260 to a point approximately 500 feet south of the center of Building 230. The subsurface hydrogeology is depicted on Cross Sections IT 1B-B', SB 5-5', and IT-Extension B-B' in Appendix K.

Prior to system upgrades conducted in 1992, fuel releases from the hydrant system were detected when fuel would seep to the surface between the joints in the concrete of the tarmac. At least six fuel releases from the hydrant system have been reported, with each release resulting in

the removal of approximately 500 yards^3 of contaminated soil. A plan to replace the fuel hydrant system included a component to remove contaminated soil. Test borings were drilled in the area subsequent to the hydrant replacement activities. Field measurements from one soil boring sample indicated high levels of volatile vapors at a depth of 4.5 feet bgs. BTEX has been detected at low concentrations in two wells in the USZ near the southern portion of the hydrant system. A facility inspection was completed in August 2009 and Site #OT068 was placed in the CRP in 2010. A RFA or PA/SI will be conducted to identify fuel releases into the soil and groundwater, then determine the relative risk at this site. The RRSE has not been performed.

Site #OT069 Buildings 2121 and 2122

Buildings 2121 and 2122 (Site #OT069) are hangars located in the southeast quadrant of Tinker AFB (Figure 3.12). Aircraft maintenance has been conducted in both buildings since the early 1940s. Solvents and stripping agents have been used in both buildings. More recently Building 2121 has been used for non-chemical maintenance operations; however, Building 2122 is still one of the main hangars for paint stripping operations using a variety of solvents. Products containing dichloromethane, phenol, monoethanolamine, and chromic acid were still in use in 2001. Degradation in caulking in the floor expansion joints has resulted in approximately 3/4-inch gaps open to the subgrade adjacent to the wastewater collection trenches. The solvents and wastewater have been observed to migrate through the expansion joints to the subgrade. A SI/RFI was performed at Building 2122 between 1999 and 2000, followed by a Supplemental SI/RFI in 2002, and CMS in 2003. Results of the investigations at Building 2122 indicated that the soils beneath Building 2122 were impacted by waste water leaking through floor/drains joints. Subsurface soil was impacted but localized and shallow. The identified levels of soil contamination have not impacted the shallow groundwater zone, primarily due to presence of the building floor slabs and foundation. The CMS stated that the current level of soil contamination does not pose significant risk to human health and environment, and there are no significant routes for further migration, provided that potential future releases are controlled. Current controls include using proper materials to seal the floor joints. In 2006, sub slab and indoor air sampling was performed in the administrative area of Building 2122. It was determined that contaminants were left in receptacles beneath the floor from shop activities performed in the past. The receptacles were drained and the contamination mitigated. In 2009 and 2010, sub slab soil gas sampling was performed at Buildings 2121 and 2122 to evaluate potential contaminant sources beneath the buildings. Groundwater releases are addressed under groundwater management unit CG039. The subsurface hydrogeology is depicted on Cross Sections IT 4A-4A', IT 4B-4B', IT 364H-364H', and Basewide B-B' in Appendix K. A facility inspection was completed in August 2009, and Site #OT069 was placed in the CRP in 2010. The RRSE has not

been performed. Depending on results of the 2009/2010 soil gas investigations at Buildings 2121 and 2122, a relative risk evaluation can be performed and the direction of further investigations will be determined.

Site #VI080 Aircraft Maintenance Building 3105

Building 3105 (Site #VI080) was used for aircraft maintenance, including mechanical sanding, calibration of hydraulic fuel pumps, and maintenance of electrical systems. This building is located approximately 700 feet east of the North-South Runway between West Drive and the southern extent of Building 3001 (Figure 3.13). Building 3105 is suspected to have leaking drain lines. A TCE groundwater plume immediately downgradient of Building 3105 has TCE concentrations up to 1,180 parts per billion (Figure 3.13). This site includes contaminant releases from Building 3105 to environmental media including soil. The groundwater is addressed as part of the Soldier Creek/Building 3001 NPL site. The subsurface hydrogeology is depicted on Cross Sections SB-7-7' and Battelle G-G' in Appendix K. A facility inspection was completed in August 2009 and Site #VI080 was placed in the CRP in 2010. A RFA or PA/SI will be conducted to determine the relative risk at this site. The RRSE has not been conducted.

Site #VI081 Aircraft Maintenance Area 2210

Building 2210 (Site #VI081) is an aircraft maintenance facility located approximately 200 feet east of East Drive, and directly north of the airfield ramp boundary (Figure 3.14). Leaking drain lines beneath the building resulted in the release of chlorinated solvents. TCE concentrations in groundwater under the building are estimated to be 50-700 parts per billion (based on groundwater sampling around the building and groundwater isopleths) (Figure 3.14). This site includes contaminant releases from Building 2210 to environmental media including soil. The groundwater is addressed as part of CG039. The subsurface hydrogeology is depicted on Cross Sections IT 4I-4I' and Basewide B-B' in Appendix K. A facility inspection was completed in August 2009 and Site #VI081 was placed in the CRP in 2010. A RFA or PA/SI will be conducted to determine the relative risk at this site. The RRSE has not been conducted.

FIGURES

Figure 3.1
Tinker AFB Restoration Sites

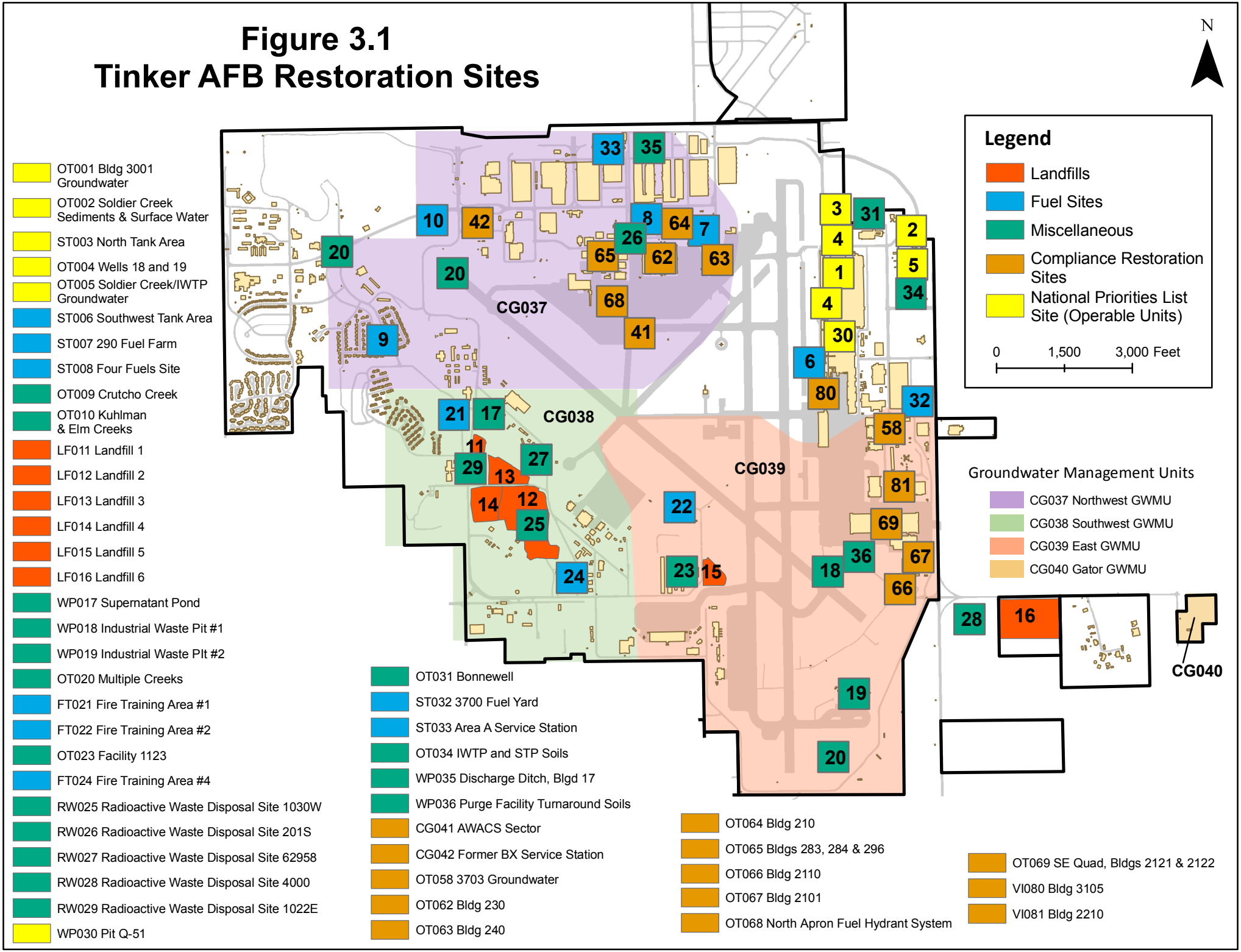
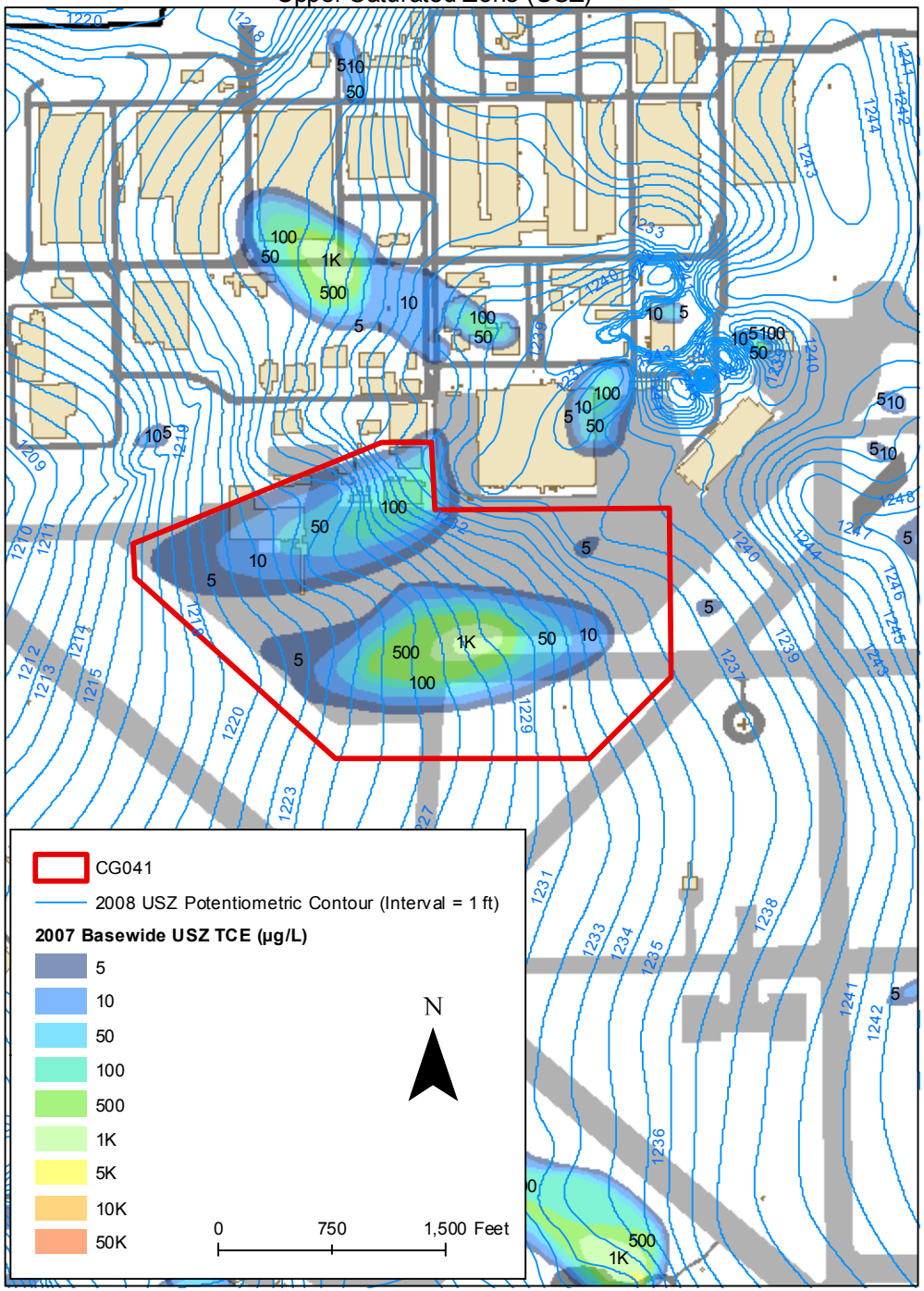


Figure 3.2
Site CG041 - AWACS Sector Groundwater Management Unit
Isopleth Map for Trichloroethene (TCE)

Upper Saturated Zone (USZ)



Lower Saturated Zone (LSZ)

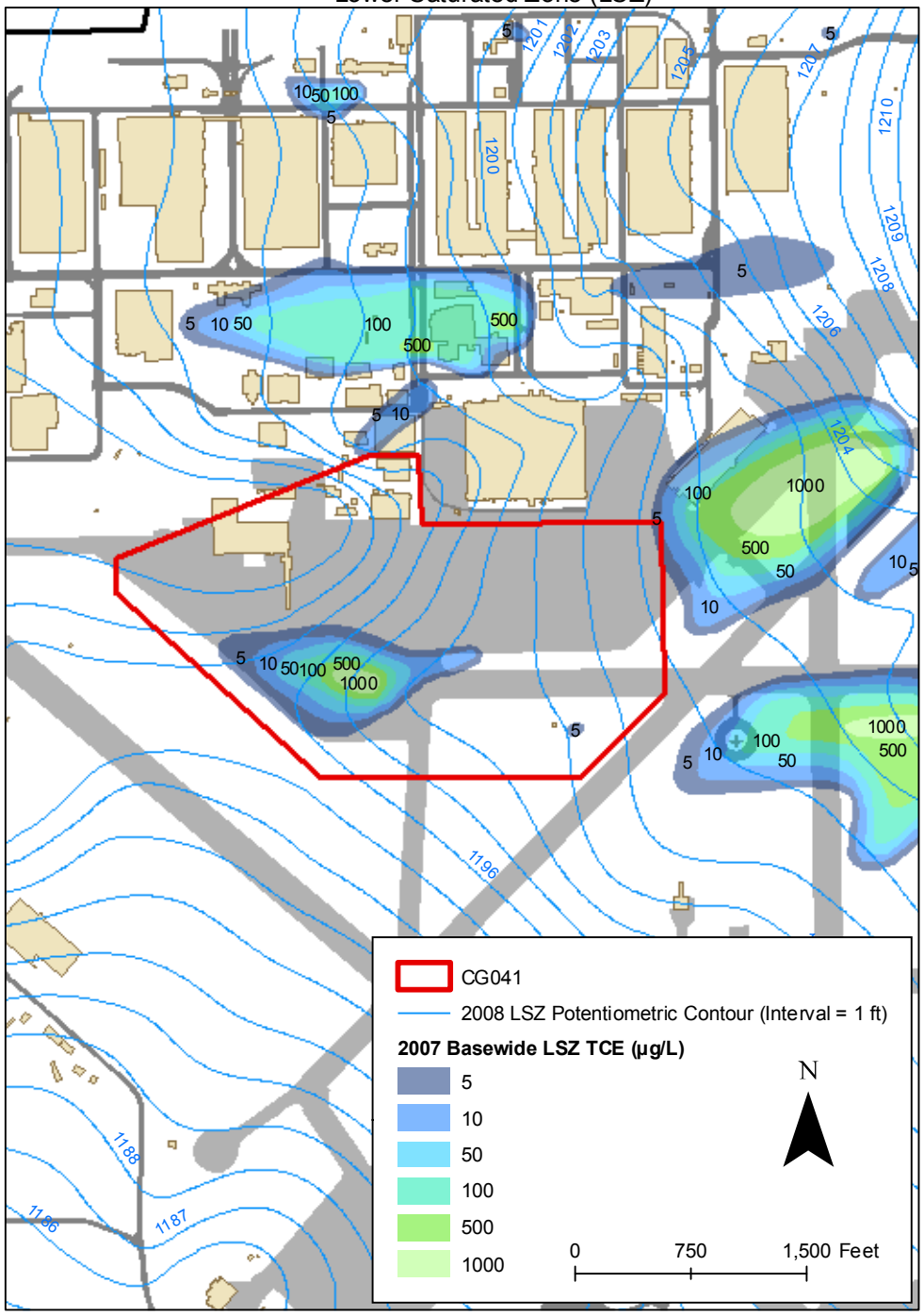


Figure 3.3
Site CG042 - BX Service Station Groundwater Management Unit
Isopleth Map for Trichloroethene (TCE)

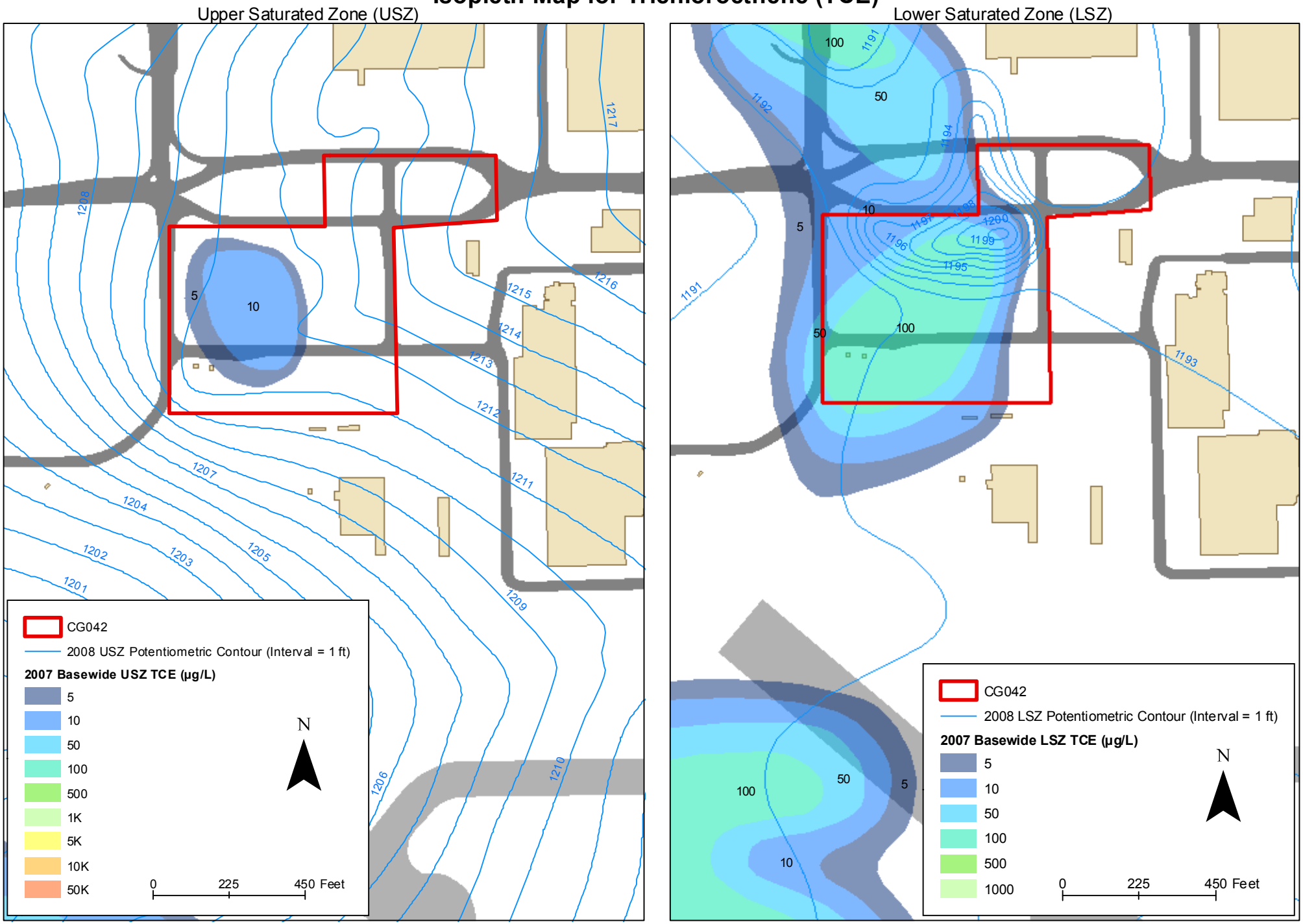
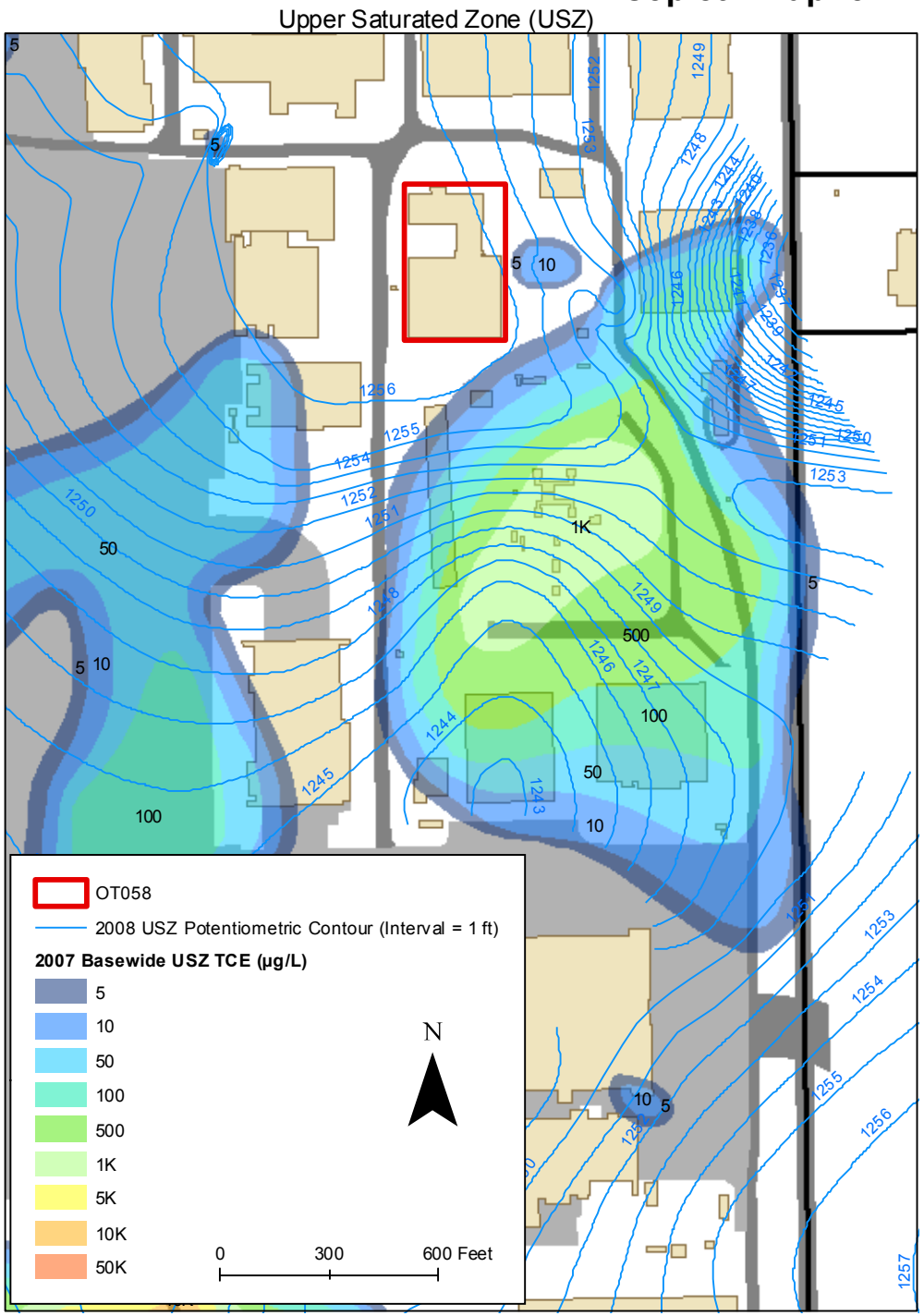


Figure 3.4
Site OT058 - Building 3703
Isopleth Map for Trichloroethene (TCE)



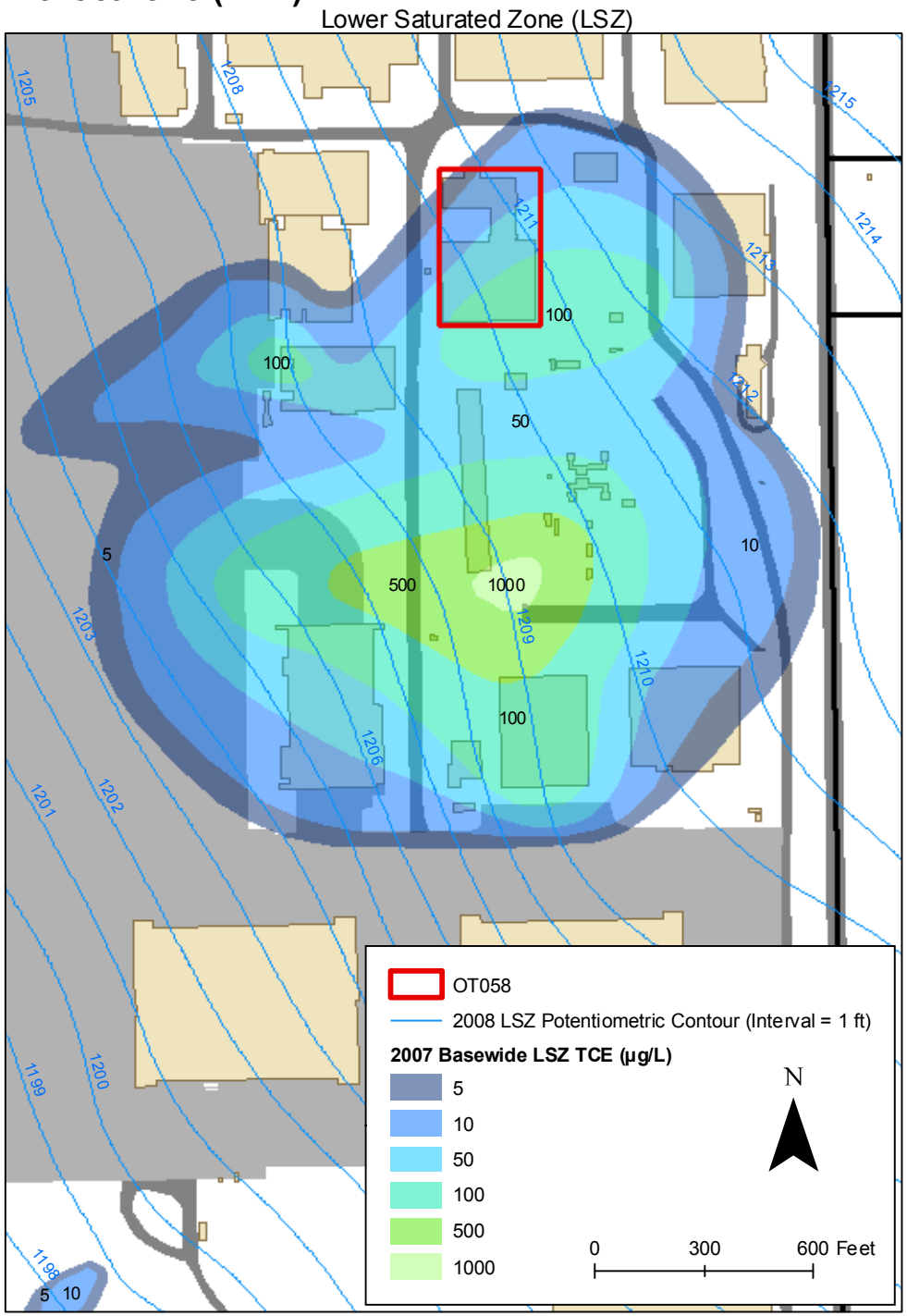
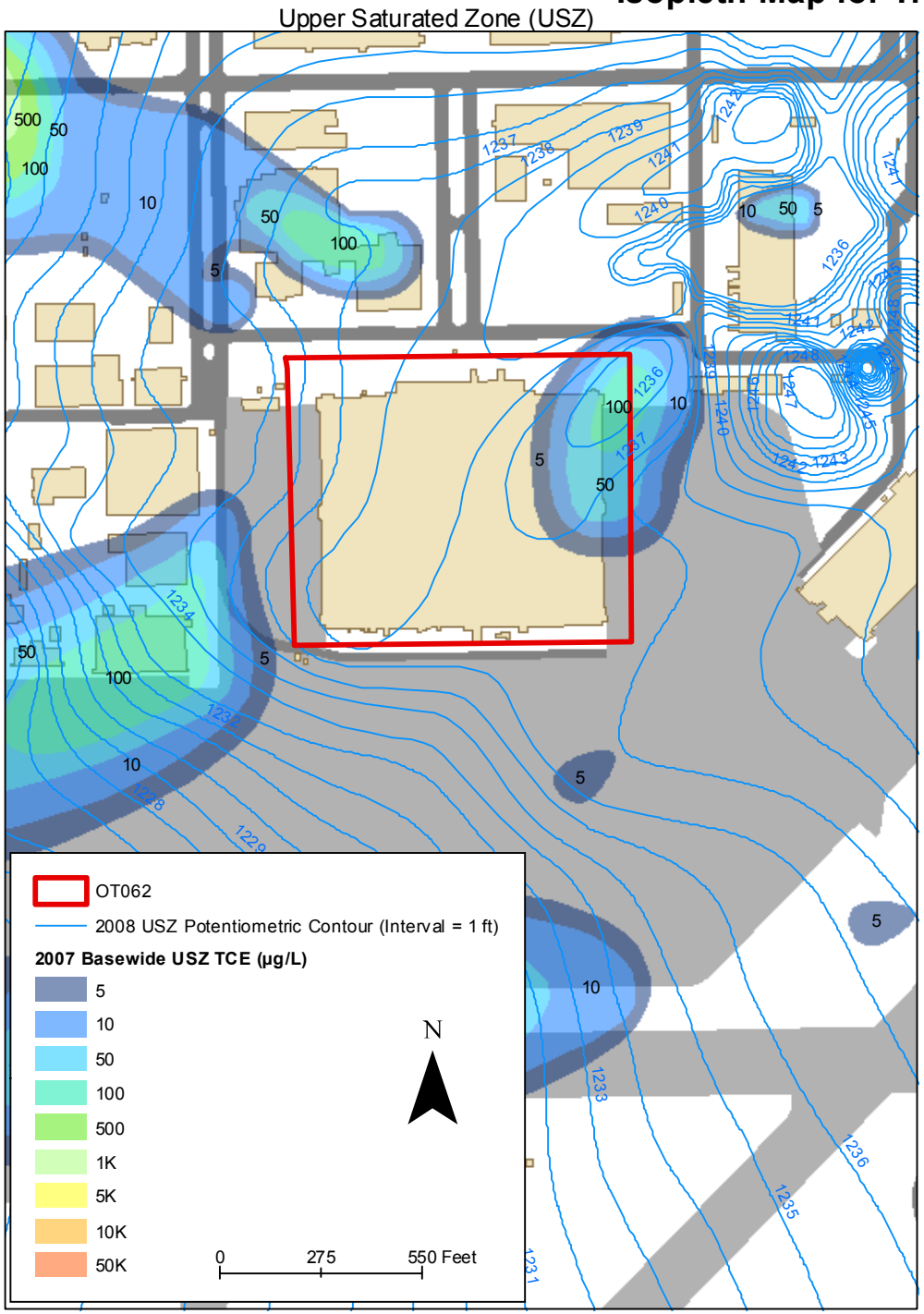


Figure 3.5
Site OT062 - Building 230
Isopleth Map for Trichloroethene (TCE)



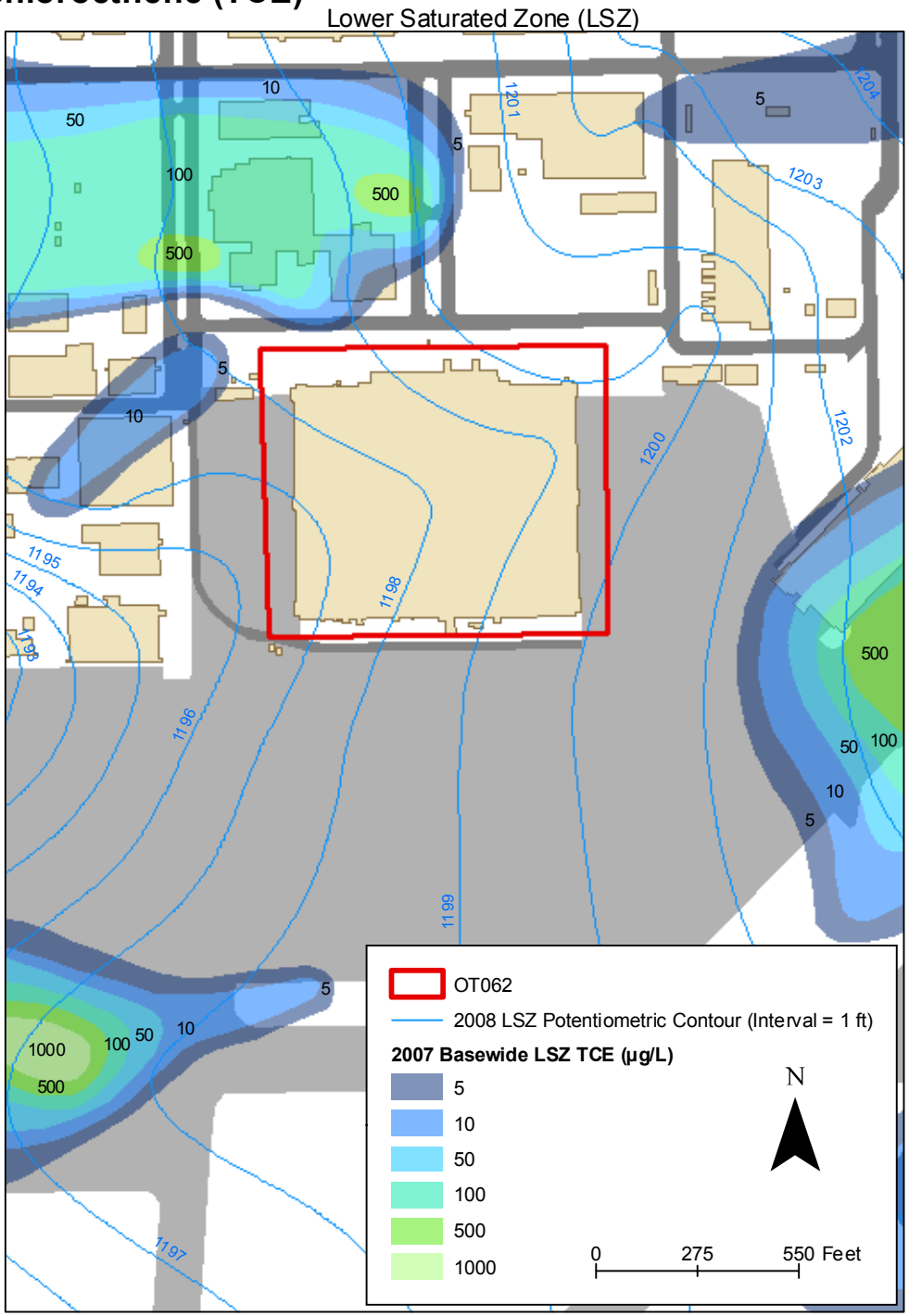


Figure 3.6
Site OT063 - Building 240
Isopleth Map for Trichloroethene (TCE)

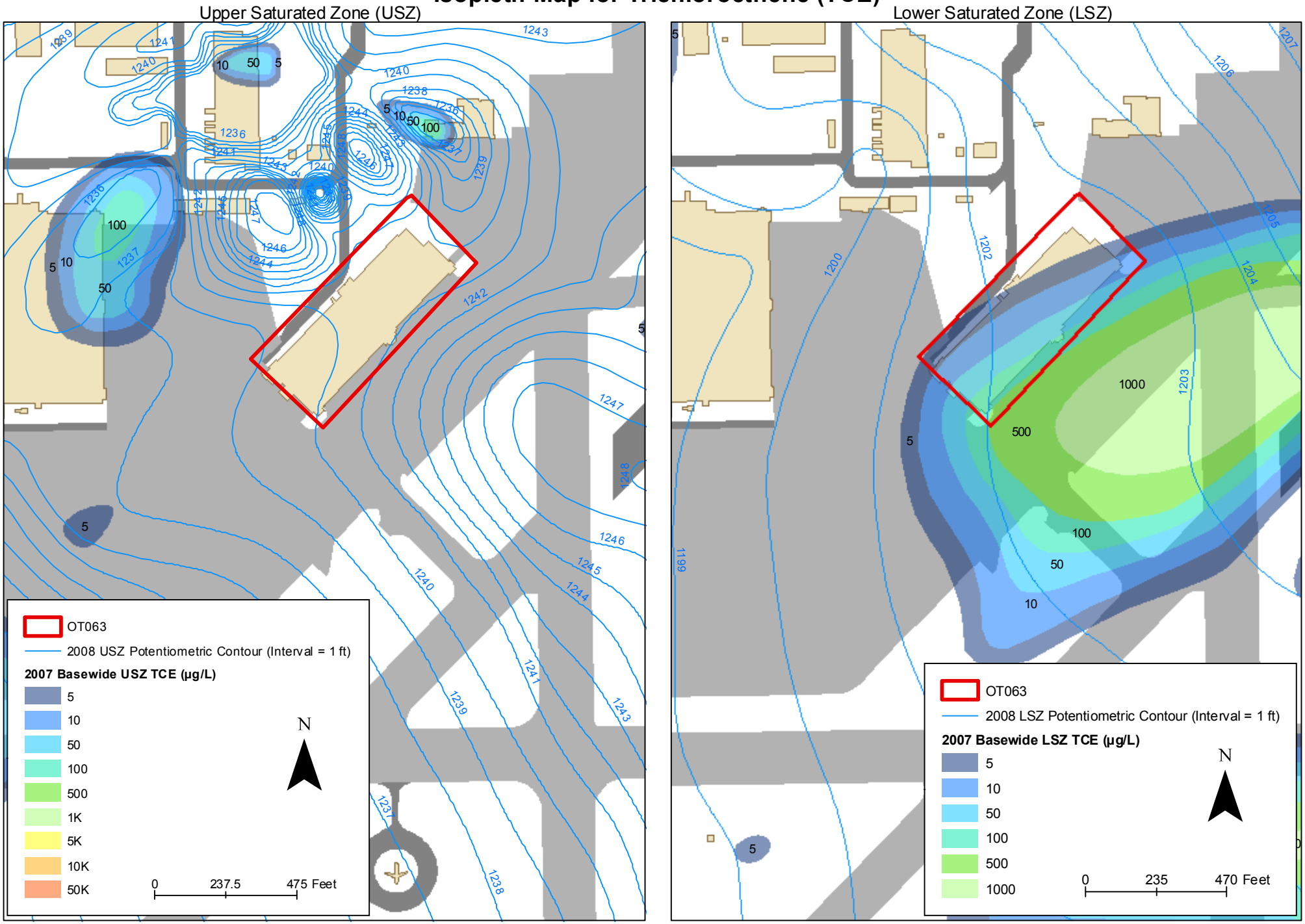
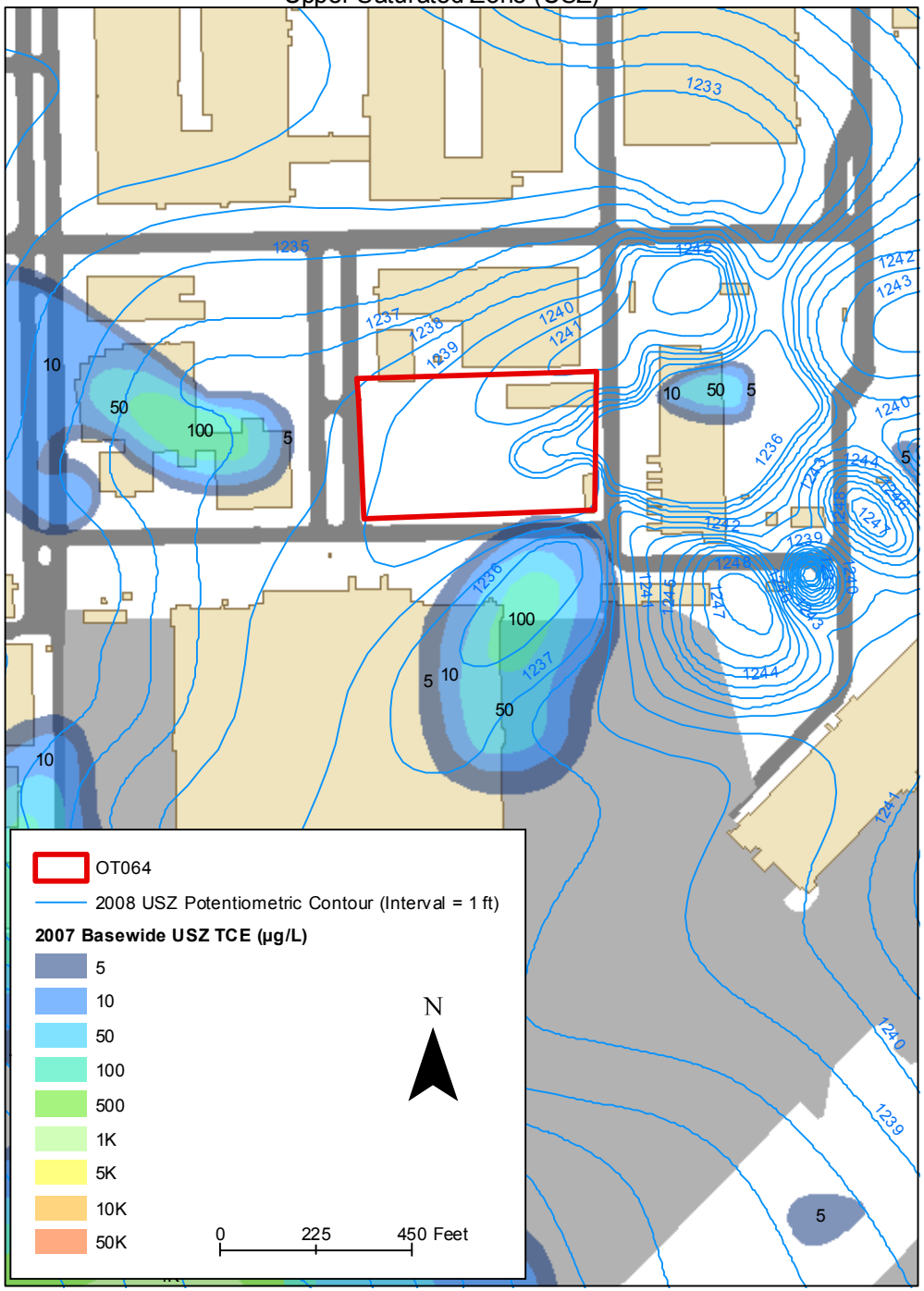


Figure 3.7
Site OT064 - Building 210 Site
Isopleth Map for Trichloroethene (TCE)

Upper Saturated Zone (USZ)



Lower Saturated Zone (LSZ)

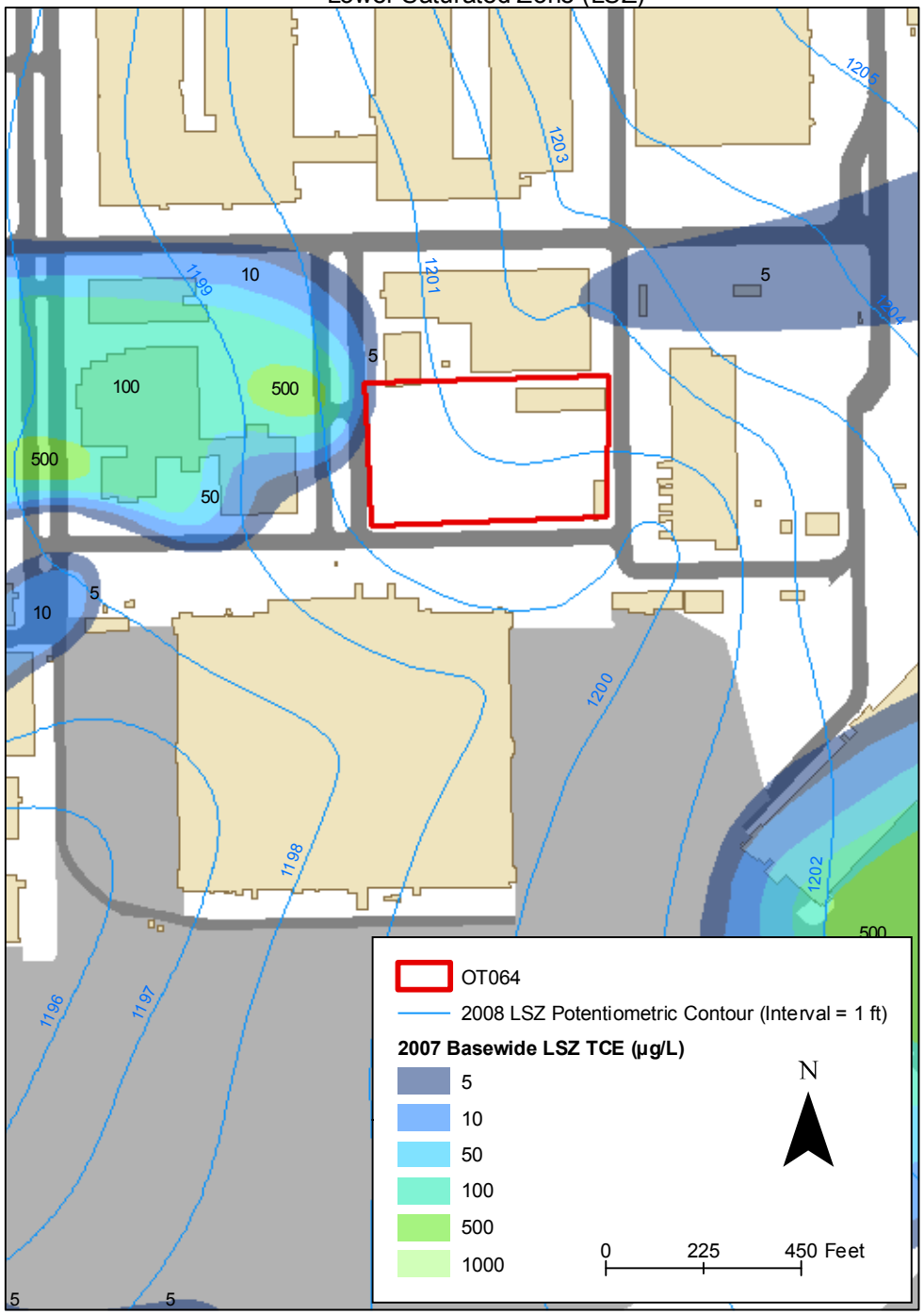


Figure 3.8
Site OT065 - Buildings 283, 284, and 296
Isopleth Map for Trichloroethene (TCE)

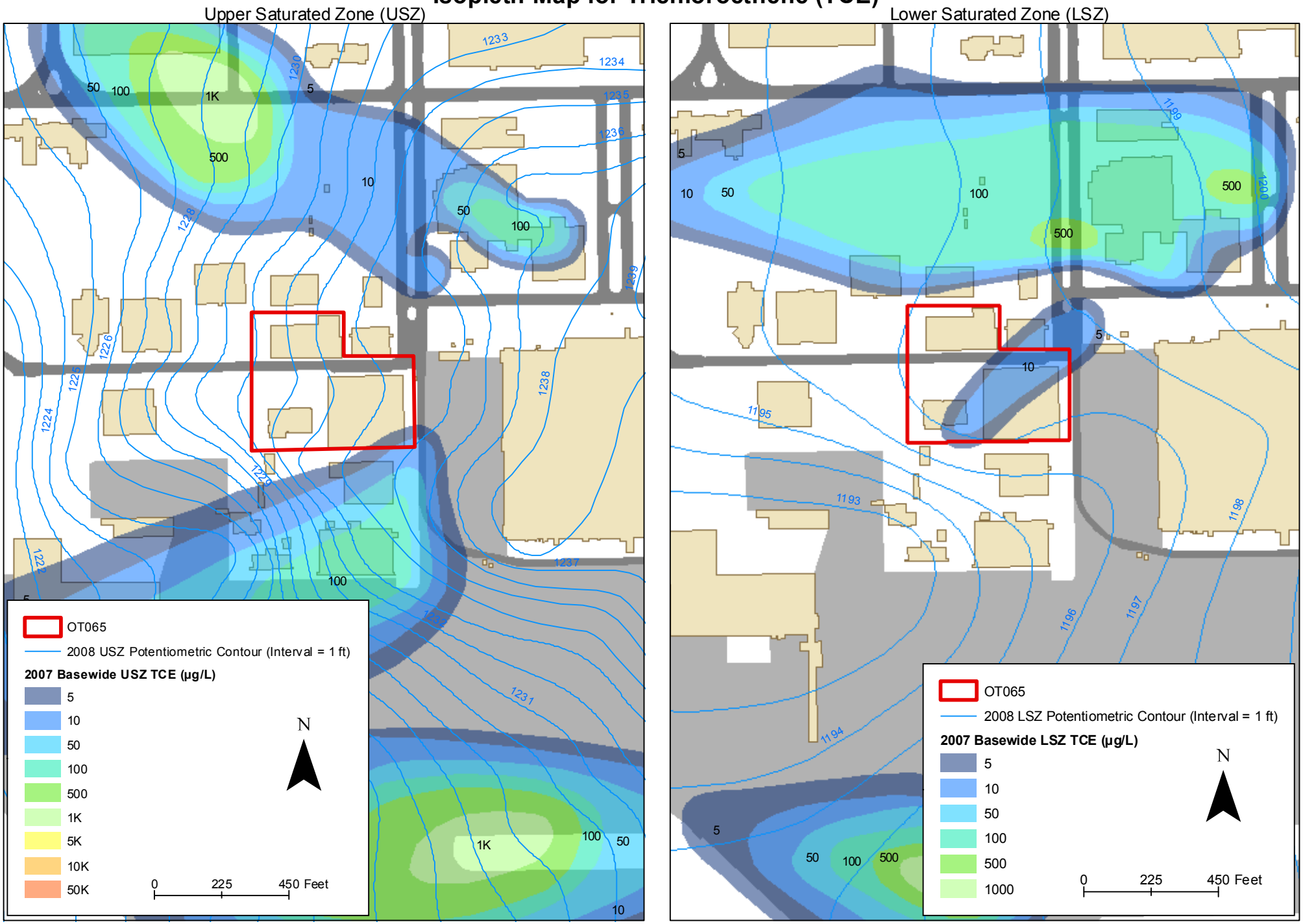


Figure 3.9
Site OT066 - Building 2110
Isopleth Map for Trichloroethene (TCE)

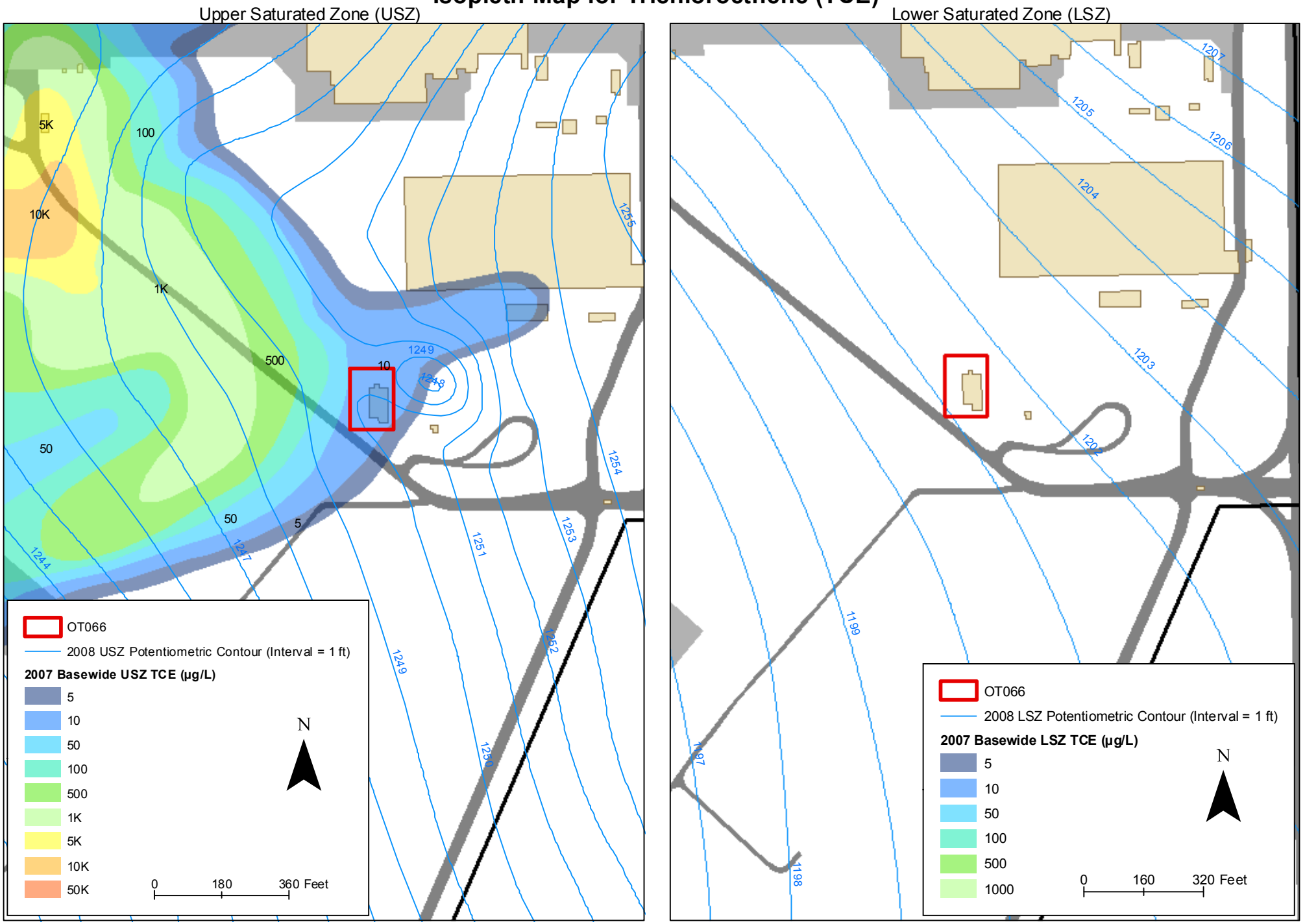
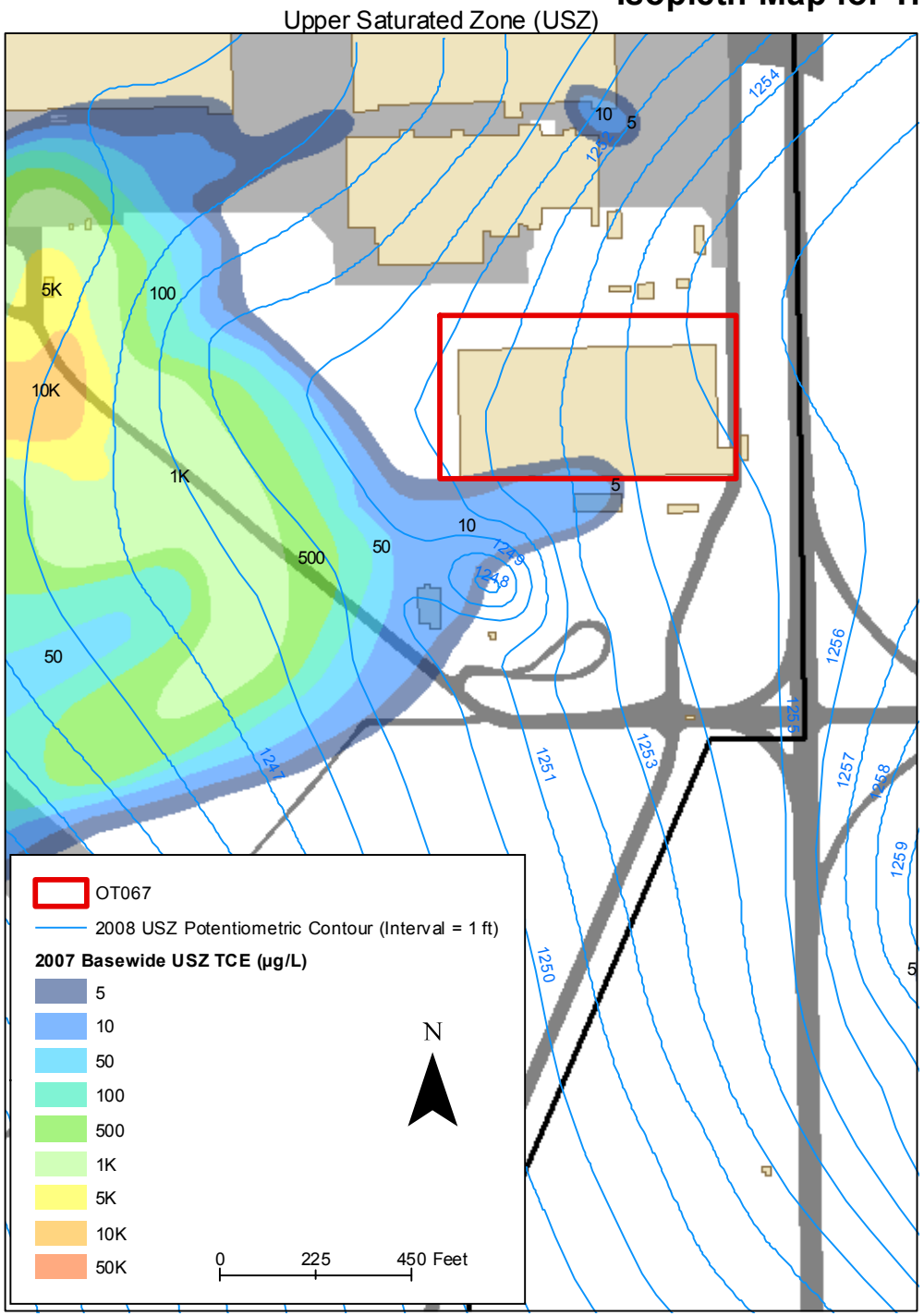


Figure 3.10
Site OT067 - Building 2101
Isopleth Map for Trichloroethene (TCE)



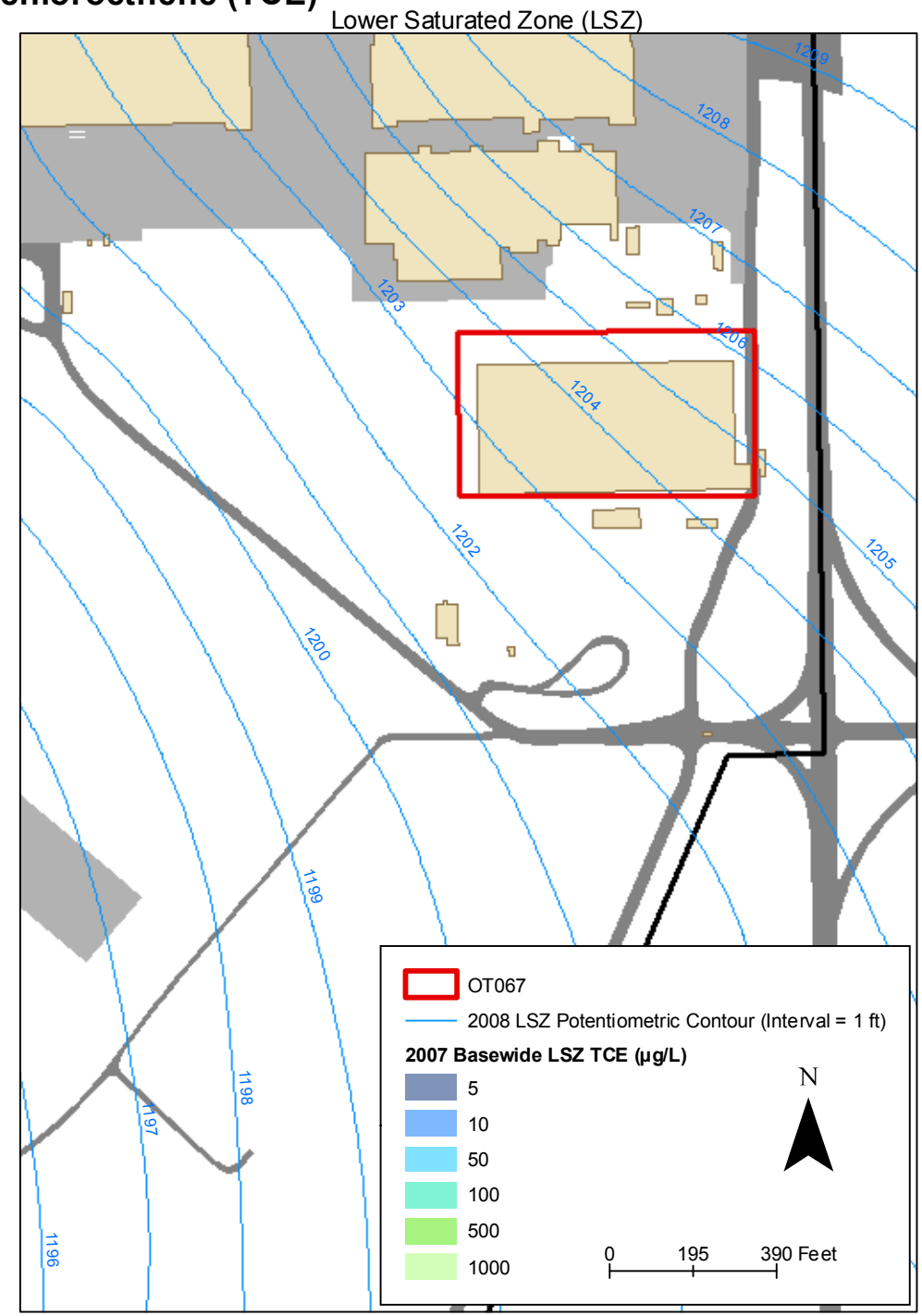
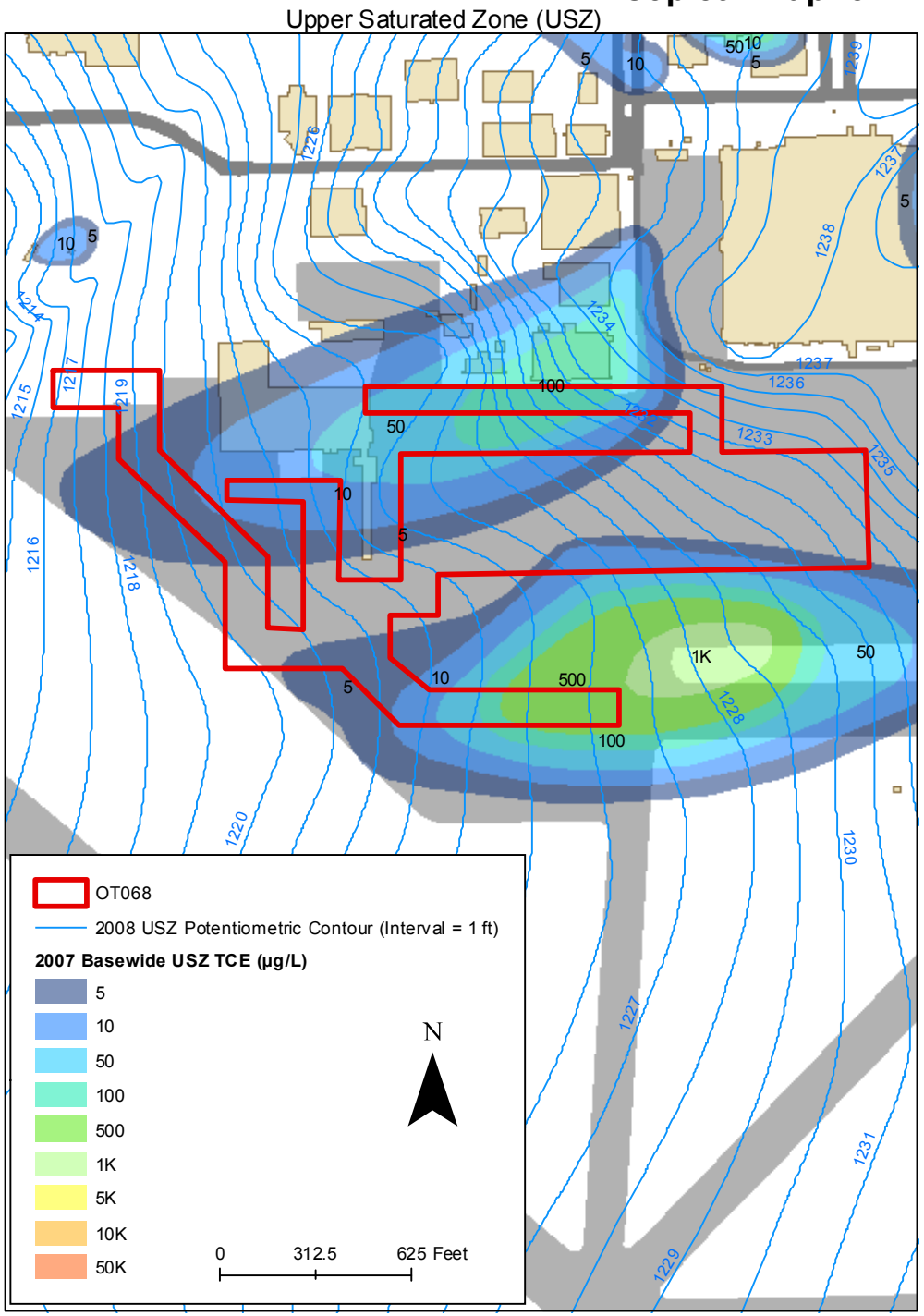


Figure 3.11
Site OT068 - North Apron Fuel Hydrant System
Isopleth Map for Trichloroethene (TCE)



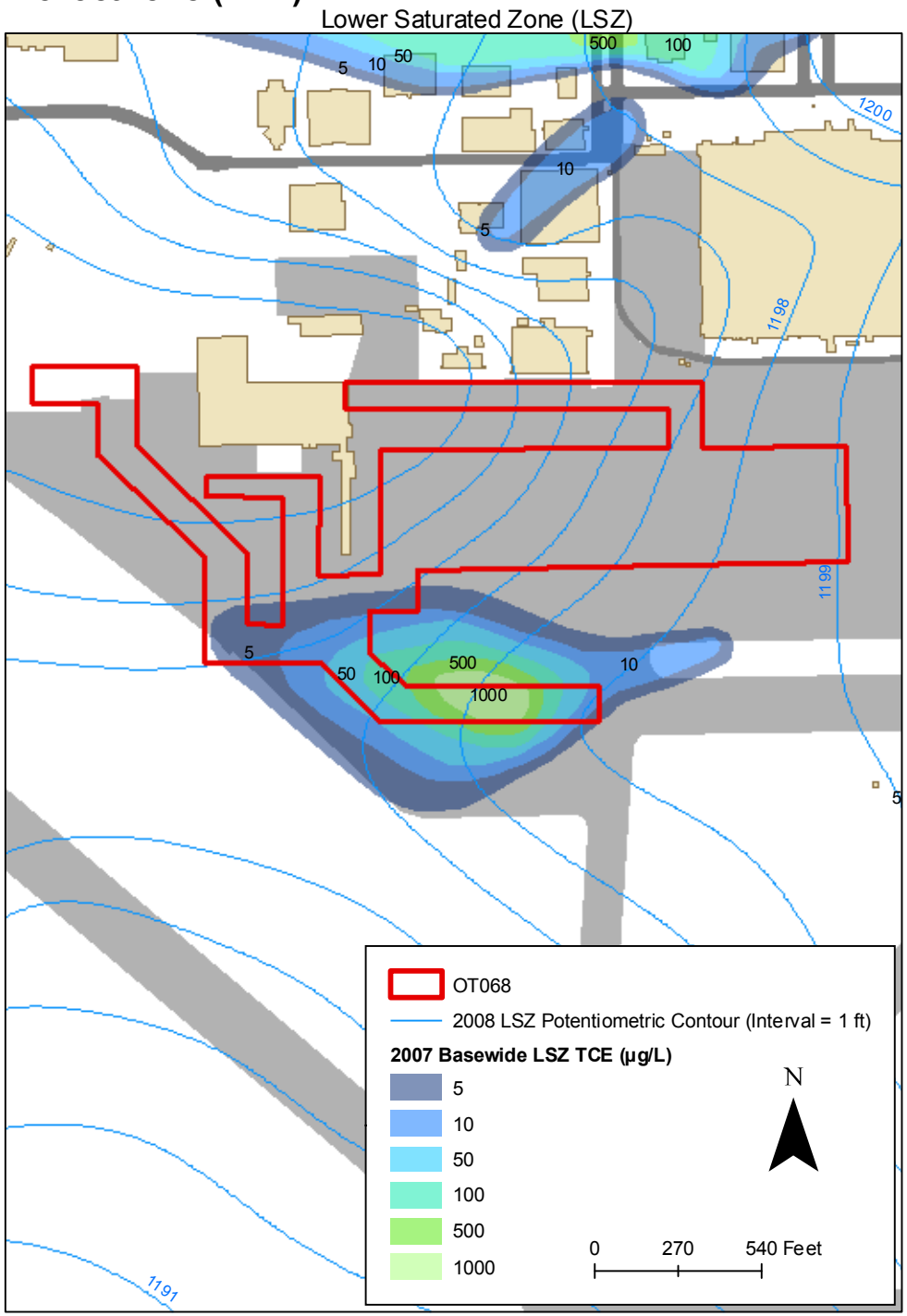
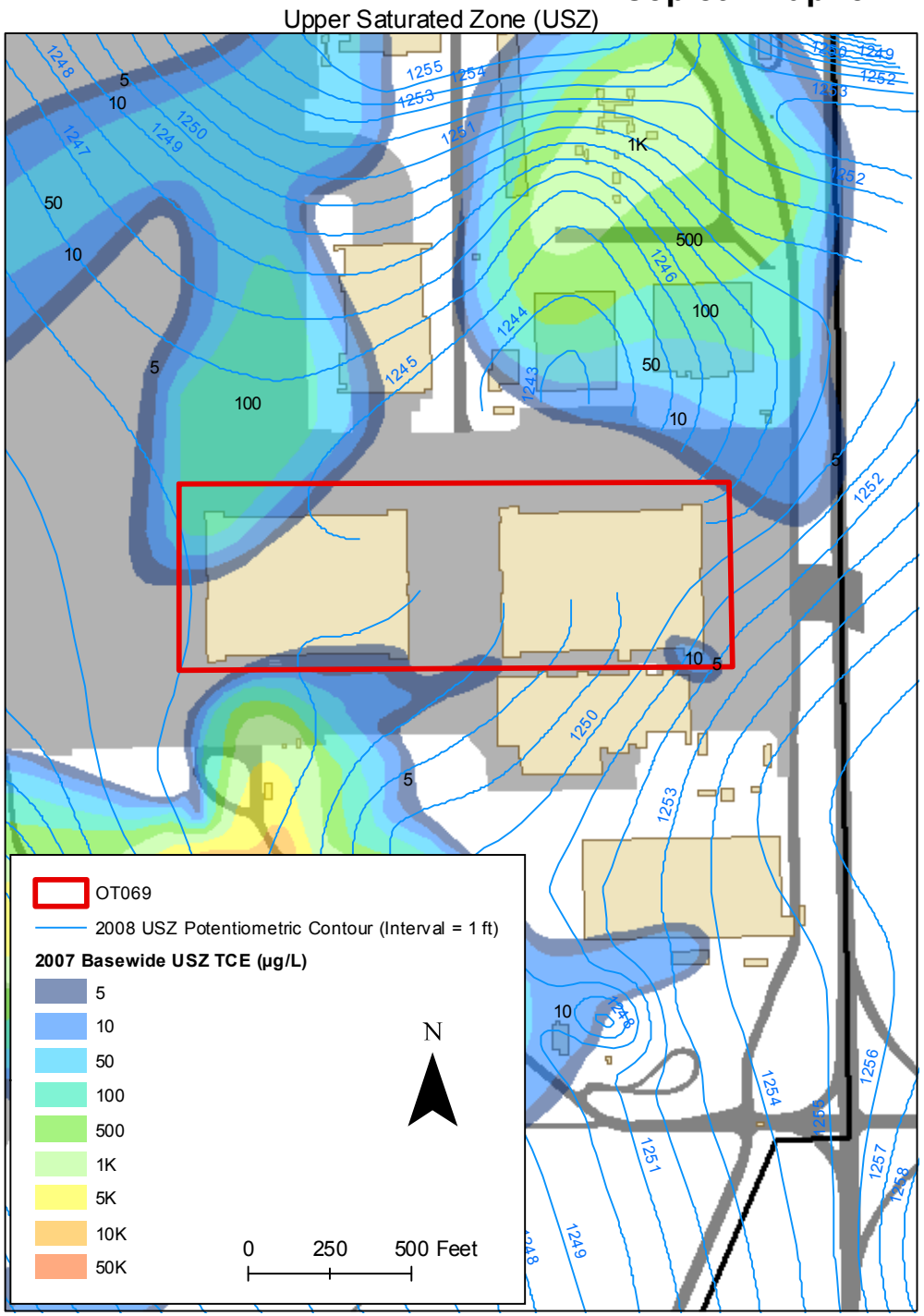


Figure 3.12
Site OT069 - Buildings 2121 and 2122
Isopleth Map for Trichloroethene (TCE)



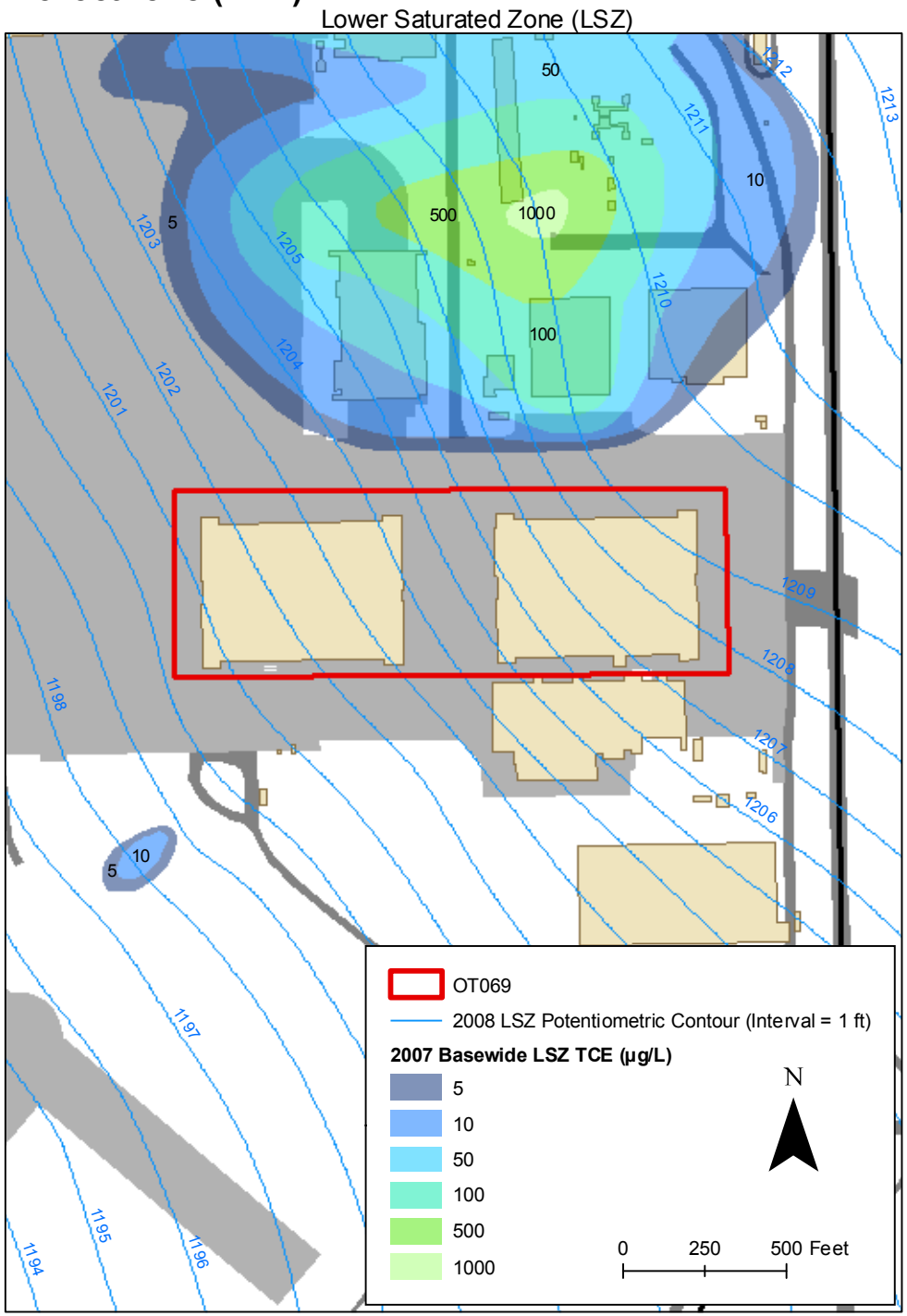
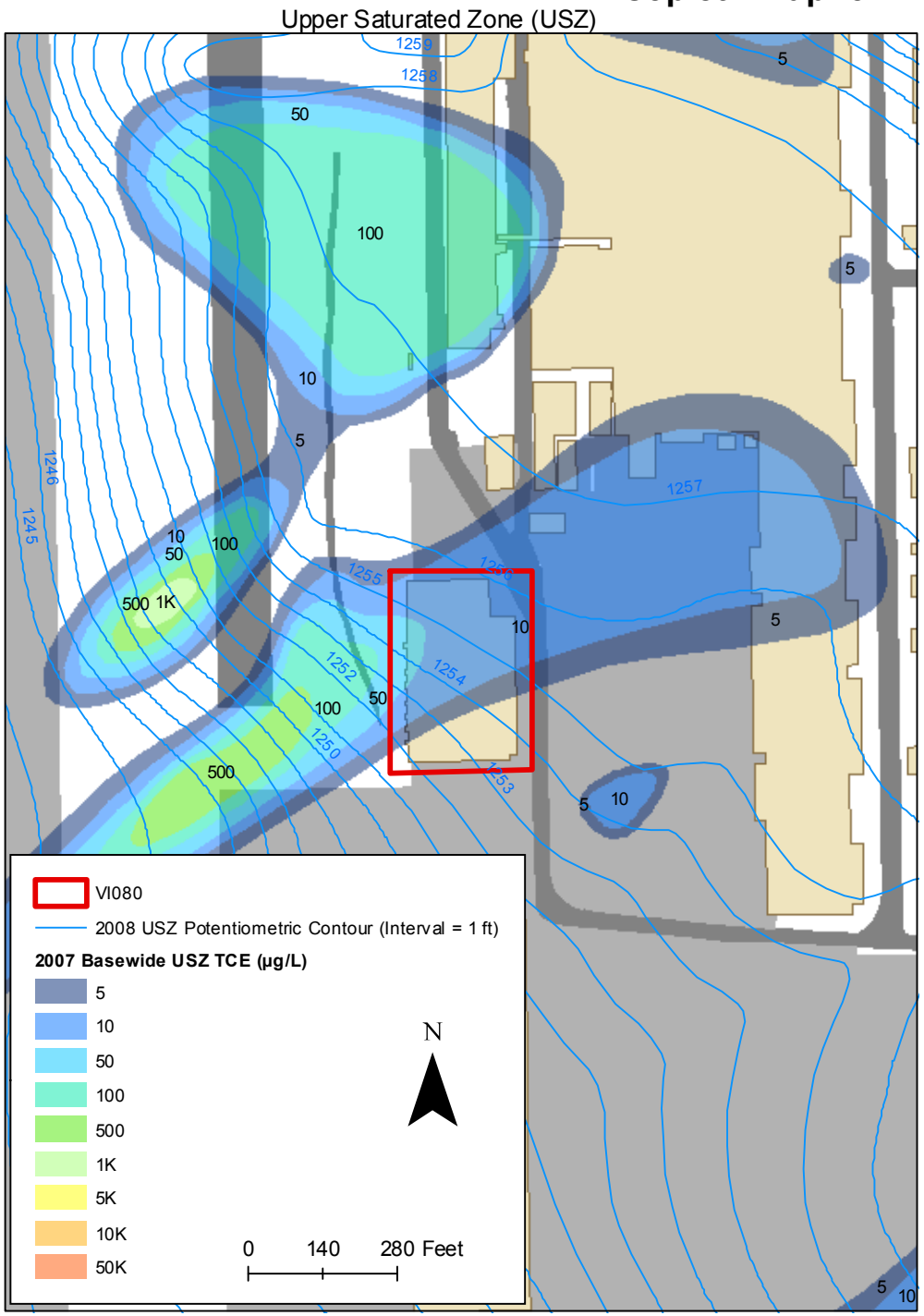


Figure 3.13
Site VI080 - Aircraft Maintenance Building 3105
Isopleth Map for Trichloroethene (TCE)



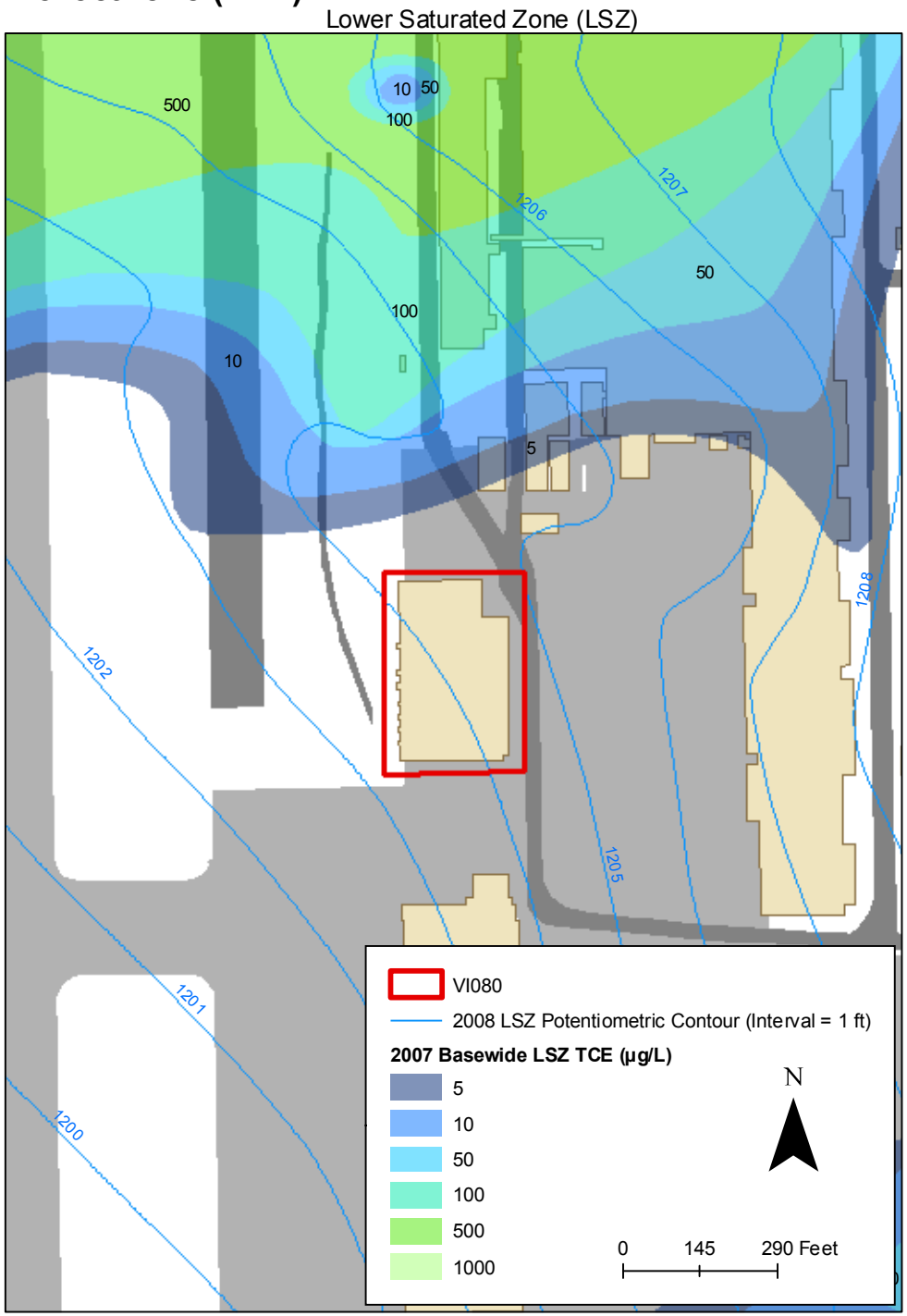
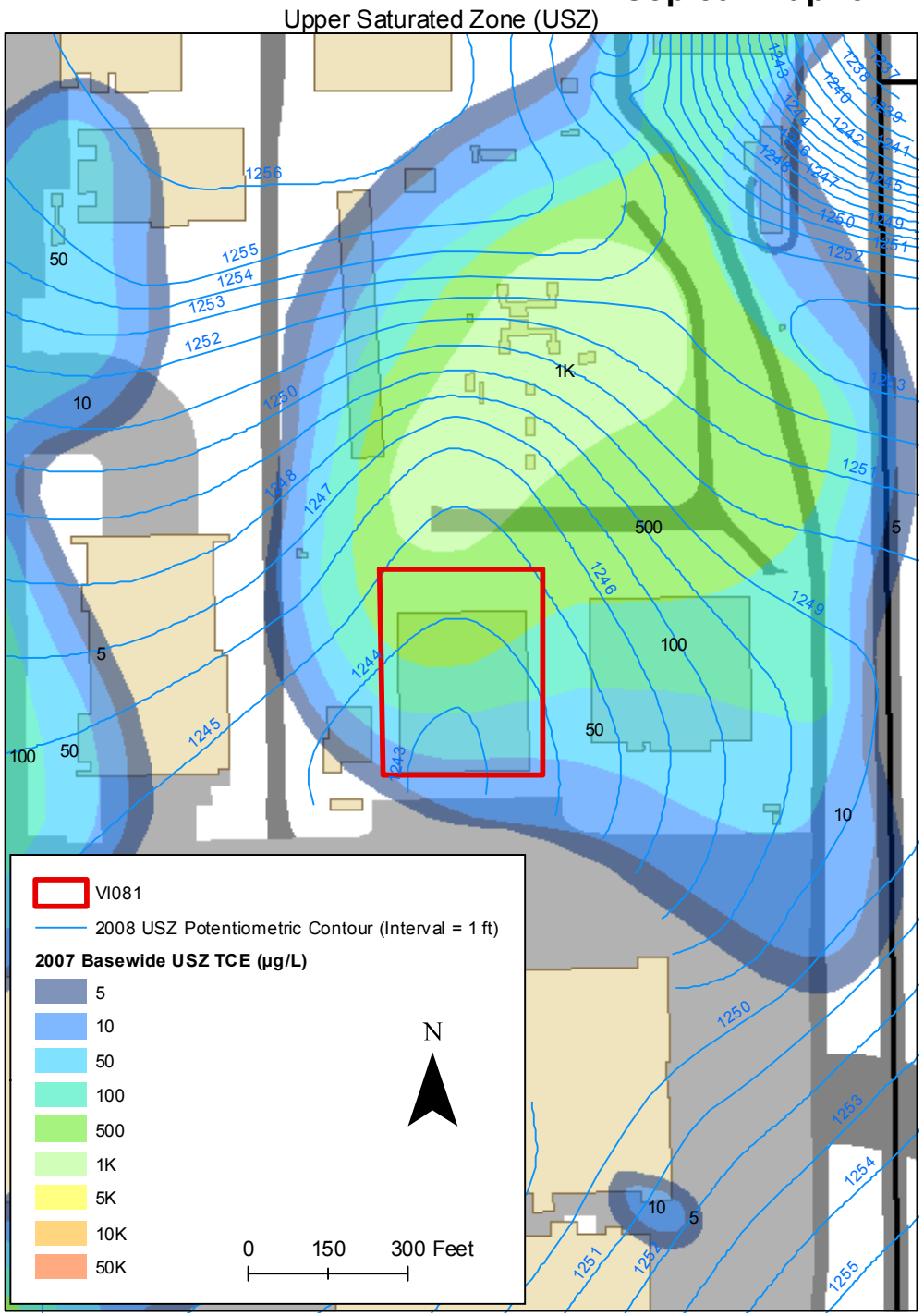
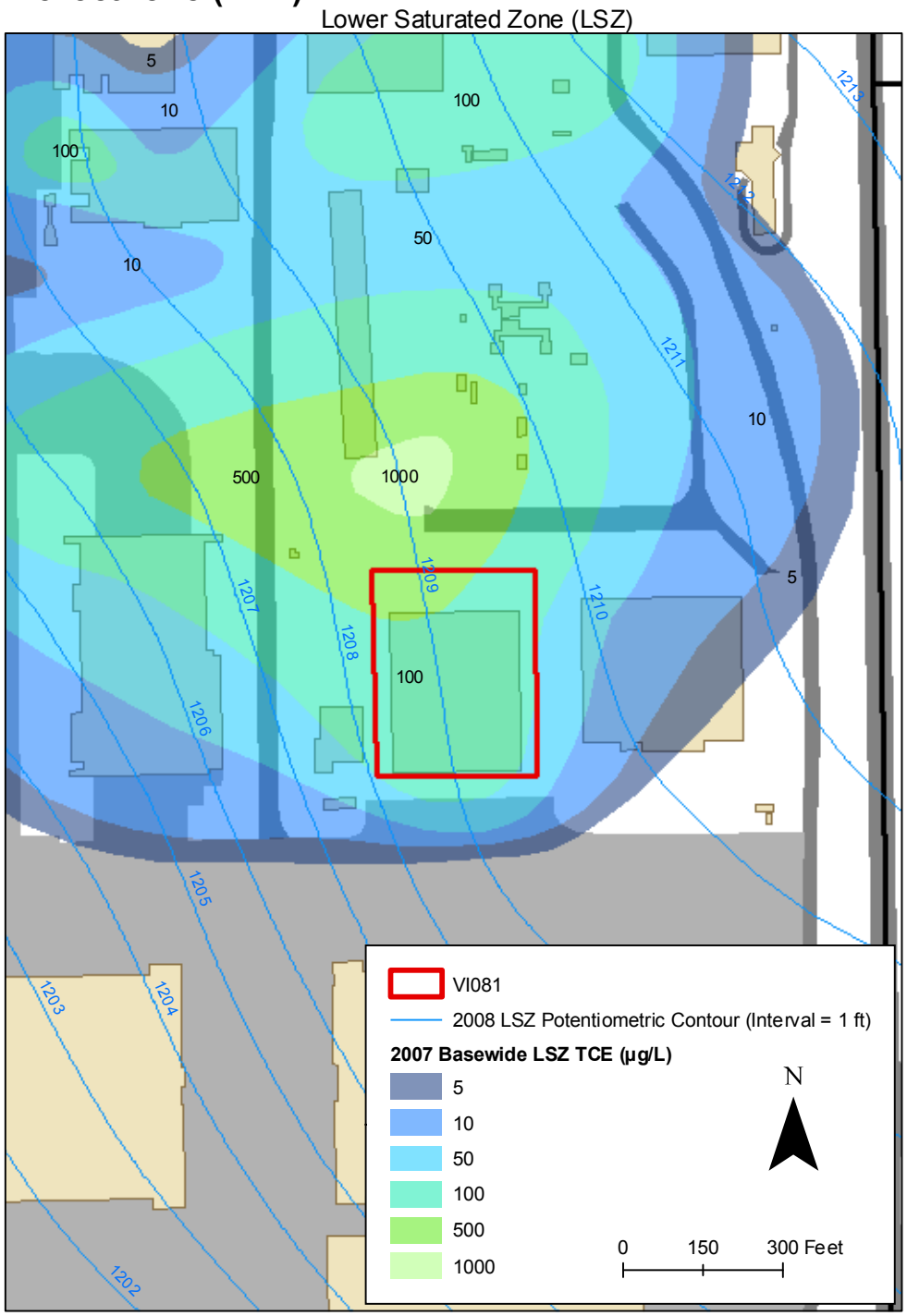


Figure 3.14
Site VI081 - Aircraft Maintenance Area 2210
Isopleth Map for Trichloroethene (TCE)





4.0 COMMUNITY BACKGROUND

4.1 Profile of Tinker Air Force Base and the Surrounding Community

Tinker AFB borders the Oklahoma City, Midwest City, and Del City municipalities, as shown in Section 2, Figures 2.1 and 2.2. The on-Base community consists of approximately 27,000 military and civilian employees. The installation has an annual statewide economic impact of $3.4 billion, creating an estimated 30,865 secondary jobs. There are 730 housing units available for service members with qualifying dependents. Also, Tinker AFB has 14 dormitories available for 1,226 single unaccompanied service members.

Tinker AFB's largest organization is the Oklahoma City Air Logistics Center (OC-ALC). More than 17,763 military, civilian and contract employees work at the OC-ALC, which is one of only three depot repair centers in the Air Force Materiel Command. The OC-ALC is composed of three wings that collaborate to ensure the overall success of the center: 72nd Air Base Wing, 76th Maintenance Wing, and 327th Aircraft Sustainment Wing. The center is headquartered out of historic Building 3001, which covers 62 acres and stretches for seven-tenths of a mile. Within its walls, workers perform a vast array of maintenance on aircraft, engines, components, and accessories and perform a multitude of administrative tasks.

Tinker AFB is also home to eight major Department of Defense, Air Force, and Navy activities with critical national defense missions: 448th Supply Chain Management Wing, 552nd Air Control Wing, Navy's Strategic Communications Wing ONE, 507th Air Refueling Wing, 3rd Combat Communications Group, 38th Cyberspace Engineering Group, Defense Distribution Depot Oklahoma, and Defense Information Security Agency.

Tinker AFB secured a long-term lease with Oklahoma County for a 430 acre property south of the Base. The property includes the former General Motors Oklahoma City vehicle assembly plant, which Tinker AFB began converting from vehicle assembly to jet engine repair and maintenance beginning in 2008. The facility has been formally named the Tinker Aerospace Complex (TAC) and labeled as Building 9001.

Additionally, the Maintenance, Repair, and Overhaul Technology Center (MROTC), located just east of Tinker at the intersection of Douglas Boulevard and SE 59th Street, is used by Tinker AFB to provide support functions. The MROTC is owned by the Oklahoma Industries Authority, and is developed and managed by the MROTC Development Partners (a private industry joint venture). The MROTC contains hangars and buildings that are used for aircraft maintenance and upgrades. The total acreage of MROTC is approximately 370 acres.

Oklahoma City borders Tinker AFB completely on the east and south, and partially on the west. It is the 31st largest city in the United States, covering over 620 square miles with a population of close to 550,000. Oklahoma City industries include oil processing and refining, livestock production, and agriculture. Oklahoma City has a manager-council form of government with eight council members and a mayor, all elected for staggered four-year terms and representing various wards.

Midwest City, located adjacent to Oklahoma City and north of Tinker AFB, has a population of almost 54,000 and covers a 25 square miles. It is primarily residential, with a large number of its citizens employed at Tinker AFB. It has a mayor and a manager-council form of government with four council members elected to four-year terms from designated wards in the city.

Del City, situated due west of Tinker AFB, has a population of 23,000, and covers 8 square miles. It has a mayor, manager-council form of government with four council members elected to four-year terms from designated wards in the city. Like Midwest City, it is a residential community with many of its citizens employed at Tinker AFB.

4.2 History of Community Involvement

Prior to 1982, community interest in the Base's IRP was minimal. According to the initial Community Relations Plan for Tinker AFB, community concern regarding past disposal practices emerged in 1982, when a USEPA report noted that a very low level of industrial solvent was present in a groundwater sample taken from a Base drinking well. Since that time, local interest can be characterized as low-to-moderate.

Local/media interest in environmental issues fluctuated in the mid-1980s. The December 1984 Congressional Subcommittee hearings held in Midwest City, Oklahoma and the August 1985 General Accounting Office (GAO) report on waste cleanup and disposal efforts at Tinker AFB triggered an upswing in media interest. After several weeks of media activity, interest once again died down. In 1985, the RAB (formerly known as the TRC) was created to provide direction for the IRP and facilitate communication between the Air Force, USEPA Region 6, the ODEQ, and the general public. In 1987, two significant events stimulated renewed local/media interest: 1) GAO issued a follow-up report acknowledging Tinker AFB's progress in environmental cleanup; and 2) the USEPA added the SoldierCreek/Building 3001 Site to the NPL.

In September 1989, USEPA hosted an open house at the five Oklahoma City/Metro Area Superfund sites, one of which was Tinker AFB, to provide the public with an opportunity to meet with project managers and discuss remedial alternatives. On April 5, 1990, Tinker AFB held a

public meeting to present the proposed plan for remediating groundwater contamination beneath Building 3001, along with proposed plans for cleaning up Pit Q-51 and the NTA. Over 100 citizens attended the meeting and were encouraged to participate in the discussions so all comments could be considered before final plans for the ROD were selected.

In December 1990, state health officials warned seven residents north and east of the Base not to drink their water after solvents were found in their privately owned wells. As a precautionary measure, Tinker AFB provided bottled water to these residents while a study was launched by Base officials to pinpoint the source and extent of contamination. In 1991 and 1992, print and broadcast media interest surged, covering issues on possible private well contamination in residential areas off-Base. Several follow-up reports on this issue appeared in the media, which highlighted the Base's extensive monitoring well study to determine if contamination was present.

In 1993, local/media interest continued to center around groundwater quality with coverage on the Soldier Creek Sediment and Surface Water and Soldier Creek Groundwater OUs. Special interest groups and state regulatory agencies announced their concern regarding possible contamination of the Garber-Wellington Aquifer. A principal water supply for central Oklahoma, the aquifer and an area of its recharge system lies beneath Tinker AFB. Tinker AFB hosted another public meeting in April 1993 to discuss the proposed plan for cleaning up Soldier Creek sediment and surface water. In January 1996, the Agency for Toxic Substances and Disease Registry (ATSDR) completed its *Public Health Assessment Addendum of Tinker AFB (Soldier Creek/Building 3001), Midwest City, Oklahoma County, Oklahoma, and CERCLIS No. OK1571724391*. Based on the data and information evaluated, the ATSDR placed Tinker AFB (Soldier Creek/Building 3001) in the category of no apparent public health hazard.

In August 1998, local media interest surged based on the ATSDR's publication of the *Health Statistics Review of the Community Adjacent to Tinker Air Force Base*. The ATSDR conducted this study in response to community health concerns and past exposure to airborne contaminants such as solvents. The study used vital records data from the Kimsey Addition, a residential area consisting of approximately 100 homes bounded by Tinker AFB to the south and west, Interstate 40 to the north, and Douglas Boulevard to the east, to evaluate cancer mortality and adverse birth outcomes. The results of analyses of death certificates indicated that there were no overall excess cancer deaths in the Kimsey Addition when compared with the state and city cancer rates for the period from 1965 to 1994. Results of analyses of birth certificates indicated that prevalence rates for low birth weight and pre-term birth were lower in the Kimsey Addition than in the rest of Oklahoma City over the entire study period.

In August 2000, TCE (believed to have originated in landfills on the southwest portion of the Base) was discovered in two private drinking water wells in the Tinker View Acres (TVA) Addition located at the southwest corner of the Base. Residents were contacted and informed about the release and have been continually kept informed about the progress of the cleanup through the RAB. Currently, the level of TCE in the two wells is either at, or below, allowable drinking water standards (MCLs).

Overall, a number of citizen groups have been relatively active in Base environmental issues, attending public and information meetings, organizing neighborhood association meetings, and contacting Base officials regarding various questions on CERCLA and RCRA sites.

4.3 Key Community Concerns

The Tinker AFB Office of Public Affairs and Directorate of Environmental Management conducted community interviews in February 1992. The interviews revealed that citizens living in areas surrounding the Base had been concerned about aquifer and private well water quality, migration of contamination, air pollution and other environmental health issues. Many citizens expressed praise during the February 1992 interviews for the Base's aggressive activity to clean up its waste sites. Residents surveyed during the February 1992 community interviews and those who attended the public meetings exhibited general knowledge of the Tinker AFB IRP and RCRA corrective actions. In addition, citizens were satisfied with the environmental public information program, specifically noting the Tinker AFB Environmental Action Update. However, some respondents requested more technical updates and presentations by Base officials on site cleanup status to include additional fact sheets on response activities. The community also showed a preference for increasing the number of public and information meetings chaired by the Base. Two of the off-Base communities where key concerns emerged were the Kimsey addition in the early 1990s and TVA beginning in 2000.

For the Kimsey Addition, a public/information meeting was conducted by Base officials on November 5, 1992 to address concerns from citizens living in this community near the IWTP. Residents voiced concern about IWTP odors, Soldier Creek groundwater, and the progress of cleanup efforts on Base. Specific issues included health problems, perceived loss of real estate values, jet noise, and frustration resulting from federal, state, and local agency bureaucracy. Informal telephone contact with residents/officials and door-to-door canvassing was initiated in December 1992 to maintain closer contact with the residents adjacent to Tinker AFB.

For TVA, the discovery of TCE in private drinking water wells in 2000 prompted public concern. Tinker AFB openness and responsiveness from the onset helped rebuild trust and ease

concerns of TVA homeowners. Sustained openness and public involvement has continued throughout the restoration process

In addition to off-Base concerns, Tinker AFB continues to apprise the on-Base community of ongoing environmental restoration activities. Although employees and personnel living on-Base have historically had limited involvement in restoration activities at the Base, some concern as to potential health hazards has been voiced by employees who work around these activities. Environmental Restoration staff and the Bioenvironmental Engineering staff have been integrated into a response team that effectively addresses the health concerns of the on-Base employees and residents. The Base strictly adheres to all public notice requirements and promotes various on-Base community outreach programs to maintain community awareness.

4.4 Response to Community Concerns

In 1992, responding to complaints from local residents concerning odors at the IWTP, Tinker AFB hired a contractor to obtain approximately 2,000 air samples and provide the sampling results to the ATSDR for review. The agency determined that air emissions released by the plant had been neither a long-term nor short-term health risk. A voluntary public meeting was held in April 1994 to inform the public of these findings and educate them on steps the Base was taking to further reduce odors in the future. On November 4, 1994, ATSDR conducted a follow-up meeting to report its findings of neither long-term nor short-term health risks to the public.

From late 1998 through mid 1999, the Base Office of Public Affairs and the ODEQ began receiving numerous odor complaints. Base environmental personnel met with the ODEQ and issued a special edition of *The Environmental Link* newsletter in an effort to address the communities' concerns about the odor emanating from the IWTP. Also, an update briefing on the IWTP odor was an agenda item for the July 1999 CAB meeting. An 'Odor Progress Report' was completed September 1999 with recommendations for reducing IWTP odor. A number of these recommendations, such as covering certain tanks and changing some processes, were then implemented.

The August 2000 discovery of TCE in the TVA private water supply wells prompted rapid response from Tinker's Environmental Management (EM)/Public Affairs team to ensure residents were protected and kept informed. Tinker AFB acted quickly to assist residents affected by the contamination, providing them with bottled water and carbon filtration systems for drinking water until they were supplied with city water. Residents were contacted one-on-one by the EM/Public Affairs team to gather input and ensure they were kept informed. Residents participated in decision-making and have been updated through resources such as

informational pamphlets, quarterly RAB meetings (now held semi-annually), a dedicated e-mail account, and the EM website (http://www.tinker.af.mil/library/environment/index.asp). Residents continue to be informed of the progress made by the final cleanup remedy, a PRB and a 20-well pump and treat system.

In 2002-2003, the Kimsey Addition was purchased by Oklahoma County due to its proximity to the air installation compatible use zone of Tinker AFB, and the residents were relocated to other neighborhoods. As of 2010, the land is vacant and secured by fencing. Environmental concerns for this community have been alleviated because this area is part of Soldier Creek Groundwater OU, which is now closed.

4.5 Summary of Communication Needs / Community Relations Goals

Based on the Tinker AFB local community profile and the Base's desire to satisfy the environmental information needs and concerns of its neighbors, Base leadership has set, and strives to achieve, the following goals:

(1) Promote two-way communication between Tinker AFB and the community.

(2) Encourage participation of local officials in community relations activities. These officials are visible and trusted leaders of the community, and it is essential they be regularly and fully informed of site activities, plans, findings, and developments. Various county administrators and directors are included as well as elected officials. A cooperative effort means that information of mutual interest is shared and surprises are avoided.

(3) Enlist the support of other business and environmental associations in the community. The Oklahoma County Chamber of Commerce and its constituent members, and the Oklahoma City, Del City, and Midwest City Councils provide a base of advocacy for Tinker AFB and its presence in the community. The Chamber has the ability to reach the majority of commercial interests in the region through its newsletter and membership programs. There are a number of active environmental organizations in the county. These groups have mailing lists and other communication mechanisms that could be accessed to provide information on Base environmental activities (See Section 5.1). Communication with key members of these groups is a priority.

(4) Facilitate support and participation of Tinker AFB employee groups and associations in community relations activities. Tinker AFB has a number of active groups whose combined memberships represent over 80 percent of the Base population. These groups include, but are not limited to, the American Federation of Government Employees, Company Grade Officer's Association, Airmen's Wives Club, Officer's Wives Club, NCO Association,

Tinker Management Association, Gerrity Chapter of the Air Force Association, and several Toastmasters chapters. Each of these organizations, with their active programs and member participation, are a valuable channel through which information flows to the Base and local community. To maintain support from these organizations, it is essential that they be regularly and fully informed of environmental activities, plans, findings, and developments.

(5) Provide ongoing information updates to the public and media on restoration progress. To keep the community apprised of environmental activities, Tinker AFB continues to disseminate information to the mailing list maintained by the RAB committee (as discussed in Section 5.1). News articles may also be published in both the Base's "Tinker Take Off" newspaper and community newspapers (also available online at http://journalrecord.com/tinkertakeoff/). Residents regularly receive information on results of sampling and possible subsequent impact on human health and the environment, criteria used to select cleanup alternatives, and the schedule of planned activities during the RI/FS and RD/RA phases, as well as in theRFI and CMS phases at RAB meetings. Much of this has already been completed under the IRP, and will continue under the CRP as response actions develop.

(6) Keep the media up-to-date with accurate program information. The media, especially the print media, is a major resource for information dissemination. The Base's weekly publication, the "Tinker Take Off", is widely read by military personnel, civilian employees, and their families. The publication is also available online at http://journalrecord.com/tinkertakeoff/. The Oklahoman, The Journal Record, and several other local newspapers should be utilized for substantive news and feature articles that spotlight environmental restoration and pollution prevention programs at Tinker AFB. Oklahoma City local television stations (KFOR, KOCO, KWTV, and KOKH) and radio stations also may be relied on for public service announcements providing dates and locations of public meetings and other events related to the Base's IRP, CRP, CERCLA, and RCRA corrective actions.

(7) Monitor and respond to community inquiries in a timely, professional manner. To ensure that all inquires are handled efficiently and consistently, the Tinker AFB Environmental Public Affairs Specialist monitors community concerns, coordinates community relations aspects of the IRP, CRP, CERLCA, and RCRA, and responds to public and media inquiries on environmental programs.

(8) Maintain a proactive stance. Tinker AFB strives to disseminate pertinent information and organize public outreach activities (i.e., information meetings) before the public requests these activities in order to foster trust and credibility with the community.

5.0 COMMUNITY RELATIONS PROGRAM

The overall goal of the community relations program is to promote two-way communications between citizens and Tinker AFB, and to provide opportunities for meaningful and active involvement by the community in the cleanup process. Tinker AFB implements the community relations activities described below. The following plan is based on the results of community interviews described in Section 4; it addresses each issue identified as being important to the community.

5.1 The Plan

Coordination with Agencies

Tinker AFB coordinates with USEPA, ODEQ, and local agencies on oversight and review of environmental restoration activities at the Base. These representatives convey to the public that the restoration process is a proactive and positive effort that is clearly visible and accessible to the public, and that the process is being directed in a manner that will assist in preserving the environment. Appendix A provides a list of points of contact for federal and state agencies and Appendix B provides information on federal, state, and local elected and appointed officials.

Tinker AFB Spokesperson

Tinker AFB appointed a single media point of contact (Brion Ockenfels, Environmental Public Affairs Specialist) that makes it clear to the public that concerns related to CERCLA and RCRA issues will be given serious consideration at the highest command levels. Tinker AFB also designated a senior environmental staff member to facilitate RAB meetings, respond to public concerns, and answer specific questions about restoration activities.

Community Relations Techniques

The following community relations techniques will be used to achieve this Community Relations Plan's goals and objectives:

(1) Mailing List — Tinker AFB has compiled a mailing list of local residents, local, state, and federal regulatory agencies, government offices, the news media, and other interested parties. There are approximately 300 names on the list. Fact sheets, news releases, meeting notices, and other important information are distributed to these interested parties. The list is periodically updated to ensure the Base is reaching all interested persons. A list of a few interested parties are presented in Appendix A (federal and state agency representatives), Appendix B (federal, state, and local elected officials), Appendix C (citizen groups), and

Appendix D (news media).

(2) Information Repository — An information repository has been established at the Midwest City Public Library (8143 East Reno, Midwest City, OK 73110) and the Tinker AFB Office of Environmental Management, Building 1. The information repository houses technical and site reports, the Management Action Plan, the Community Relations Plan, fact sheets and other pertinent information regarding the Base's IRP, CRP and other restoration activities.

(3) Administrative Record — CERCLA Section 113(k) requires that an Administrative Record be maintained, which is a compilation of all documents that have contributed to remediation decisions made at the facility. The record must be maintained for at least 50 years after remediation is completed to serve as a legal resource and public information.

(4) Environmental Webpage — The Tinker AFB website posts and archives environmental information on a webpage that can be accessed at http://www.tinker.af.mil/library/environment/index.asp. The RAB and Base environmental personnel post meeting minutes from the semi-annual RAB meetings on this site. Created to keep the public apprised of all environmental activities, the web page contains information on upcoming RAB meetings, project milestones, and new technology used to remediate contamination.

(5) News Releases — News releases are used as a vehicle to announce public meetings and the start of public comment periods in conjunction with project benchmarks such as completion of the RFI or draft Feasibility Study FS and prior to remedial action. News and feature articles are periodically released to the *Tinker Take Off* and local media on topics ranging from pollution prevention achievements, site cleanup status, and project milestones to announcement of public participation opportunities through Base meetings and events.

(6) Public Meetings — Tinker AFB has hosted a number of public meetings and will continue to do so in response to community concerns and at significant stages in the IRP, the CRP, CERCLA response actions, and RCRA corrective actions. Meetings will be announced on radio stations, in newsletters, and through public notices placed in Base and local newspapers. Public meetings provide additional information to citizens as well as an official forum for public comment.

(7) Public Comment Period — Under CERCLA, a public comment period may be provided at specific benchmarks in the restoration process. At CERCLA sites, a public comment period is required at the publication of the proposed plan. When a ROD is signed, a public notice of availability is published. Through public notices, residents are informed of the comment periods and encouraged to review technical documents at the information repository

and administrative record locations. Comments received are processed within the comment window by the 72nd Air Base Wing, Civil Engineering Restoration Program Branch, Office of Environmental Management (Restoration Branch of Environmental Management) for consideration by USEPA and state agencies before any decision-making takes place on proposed actions.

(8) Responsiveness Summaries — Administered by Tinker AFB, these summaries are a required component of the ROD. The document condenses the concerns, comments, and issues raised by citizens during the public comment period and includes Tinker AFB's responses.

(9) Fact Sheets — Fact sheets focus on a single site or issue to explain to the public technical aspects and milestones pertaining to site restoration, or to announce upcoming activities. Fact sheets will continue to be used as CERCLA and RCRA programs progress.

(10) Special Events — Various events such as Arbor Day celebrations, Earth Day observances, open houses, and tours can be used as a way to elevate the public's knowledge and understanding of Base environmental programs.

(11) Informal Meetings — Informal meetings/briefings are effective ways to communicate with local officials, employees, groups/associations and residents regarding site restoration status, and as a means to identify emerging community concerns and needs. Meetings may be planned whenever it is deemed necessary during the lengthy restoration process or in response to a specific group's request.

(12) News Media Coordination — Press conferences, media inquiries, news releases and answers to queries are coordinated through the Tinker AFB Office of Public Affairs. Media site visits are provided routinely and arranged through Public Affairs as well. A listing of media contacts is provided in Appendix D.

(13) Contact with Public Officials and Community Members — The Environmental Public Affairs Specialist maintains contact with key community members and public officials. These individuals should be kept apprised of Tinker AFB environmental activities and site cleanup progress so they may relay this information to their constituencies.

(14) Restoration/Community Advisory Board — A RAB/CAB was formed to enhance the Base's community outreach efforts. It replaced the Base's TRC, which was established in 1985. In 1999, the RAB transformed into the CAB, meaning the board would consider other environmental protocol issues, but would keep environmental restoration review as its main focus. In 2006, the RAB and its areas of responsibility were re-established. The RAB is an advisory body designed to act as a focal point for the exchange of information between Tinker

AFB and the local community. It brings together a diverse coalition of community members who reflect the interests within the local community, enabling early and continued two-way flow of information, concerns, values, and needs between the affected community and the Base.

(15) Community Relations Plan Update — The Community Relations Plan will be updated whenever Tinker AFB undergoes a major change in its environmental restoration programs and as community concerns and needs change. The document will be reviewed and updated as necessary so it reflects the current cleanup status and tracks community interest and concern.

5.2 Time-Frame Summary for Community Relations Activities

5.2.1 RCRA Community Relations Activities Process

Corrective Action Process

The corrective action process begins with a RFA, which is reviewed by the regulatory agency. If, after completion of the RFA, it appears likely that releases exist, the regulatory agency typically may develop a schedule of compliance to be included in the facility's permit that details further studies and actions the facility must undertake to fulfill the responsibilities imposed by 3004(u) and (v). The public may comment on the schedule of compliance or corrective action when the permit is issued and any subsequent permit modification. Community concerns during corrective action may differ from concerns during permitting for a new facility. Accordingly, the community may require more information on issues related to current or potential contamination, including levels of contamination, the extent of health and environmental risks, and potential for future risks.

Techniques and Schedule

Taking into consideration the community's low-to-moderate level of interest in Tinker AFB environmental issues, this Community Relations Plan identifies the following commonly used community relations techniques (Figure 5.1):

(1) Phase I and Phase II of the RCRA Facility Investigation:

- To keep in touch with the community and depending on the level of interest, fact sheets explaining the RFI's purpose and scope may be issued to community members early in the process, followed by periodic updates during the investigation. News articles updating the investigation may be released to the Base and local newspapers, as well as the Tinker AFB environmental webpage. All information is provided in the RAB meeting agenda and minutes, which are published semi-annually and posted on the Tinker AFB webpage.

- The mailing list is periodically updated by the RAB committee so members of the community can be kept informed of corrective actions as appropriate.
- The information repository receives updated documents and reports as they become available. News briefs are periodically placed in the Base and local newspapers announcing the availability of documents housed in the information repository. All environmental restoration documents are housed at the Tinker AFB, Environmental Restoration Library. Relevant documents for public viewing as part of the administrative record are made available at the Midwest City, Oklahoma Public Library.
- Meetings and/or briefings are conducted if the community expresses a desire for additional information on the investigation.
- Once the RFI is completed, it is appropriate to re-evaluate community concerns and the level of public involvement based on any new information gathered. If public needs or concerns have changed, the Community Relations Plan is revised accordingly.

(2) Corrective Measures Study:

- Depending on the level of interest, periodic informal meetings/briefings about the CMS process may be conducted to discuss remedies under consideration and activities being conducted at the Base. Typically this information is disseminated at least semi-annually on the Tinker AFB environmental webpage.
- A telephone hotline may be established if a large number of residents call the Base or regulatory agency with questions on the restoration effort. Availability of the hotline can be advertised in the Base and local newspapers, Tinker AFB environmental webpage, and/or via the mailing list. If the hotline is used, a logbook of citizen requests and comments will be maintained along with a statement of how each request is handled.

(3) Proposed Remedy Selection:

- Information on the corrective action design explaining the proposed modification and significant factual and legal reasons for proposing the remedy are briefed to the RAB. Following the RAB meeting, comments and/or additional data may result in changes to the remedy or in the choice of another remedy.
- The affected community may request a public hearing on the draft permit

modification. If a hearing is requested, a 30-day notice must be given to the public, which includes the date, time, and location of the hearing. A public hearing may also be held even if the public does not request one.

- Updates explaining the proposed remedy are posted on the Tinker AFB environmental webpage.

(4) Selection of Remedy:

- A notice of decision is sent to those who submitted public comments or requested a notice of the final decision.
- Written response to comments are prepared summarizing all significant comments received with an explanation of how they were addressed in the final permit modification or why they were rejected. The response to comments is made available to the public through the administrative record and information repository.

(5) Corrective Measures Implementation:

- Periodic fact sheets describing the pace and scope of the cleanup operation are issued to the mailing list. News releases during the cleanup effort may also be released to the Base and local newspapers.
- Those on the mailing list are notified that construction plans and specifications are available for inspection in the information repository.
- An informal meeting or availability session is suggested at this juncture to demonstrate and explain the activities involved in the restoration effort.

(6) Completion of Remedy:

- Once restoration has been completed at a site, the Base may request a permit modification to remove the site from the permit. Because this represents a significant change to the existing permit, the Base will issue a public notice and provide a 60-day public comment period and public meeting. After the conclusion of the comment period, the regulatory agency initiates permit issuance procedures of 40 CFR Part 124 for a Class 3 modification. This modification requires the regulatory agency to publish a notice allowing a 45-day comment period on the draft permit modification and approve or deny the permit modification. During this process, ODEQ considers and responds to all written comments received during the 60- and 45-day public comment

periods.

- Updates announcing completion of the clean up are posted on the Tinker AFB environmental webpage.

(7) Interim Measures:

- ODEQ may require interim measures and/or stabilization at any time during the RFI or CMS in situations where contamination poses an immediate threat to human health or the environment.
- Fact sheets describing the interim measure are issued to the mailing list and news releases on the subject are released to the Base and local newspapers as well as posted on the Tinker AFB environmental webpage.

5.2.2 CERCLA Community Relations Activities Schedule

Techniques and Schedule

The following community relations activities have been accomplished for the Tinker AFB Installation Restoration Program under CERCLA (Figure 5.2 and Table 5.1):

(1) Prior to approval of remedial investigation work plans:

- Establish contact with state and local officials, the office of area Congressional members and with key citizens (accomplished in 1982).
- Identify key community leaders and organizations (accomplished in 1982).
- Develop a mailing list of concerned citizens (periodically updated).
- Identify locations for the information repository (located in the Midwest City Public Library and Tinker AFB Office of Environmental Management).
- Identify locations for meetings/briefings/workshops (Midwest City Public Library, Midwest City community center, Rose State College, and other locations).
- Designate a Tinker AFB point-of-contact qualified to answer questions from the community and media (currently the Environmental Public Affairs Specialist).

(2) Remedial Investigation:

- Conduct community interviews with local officials, residents, and members of concerned groups/associations to identify community concerns (accomplished February 1992).

- Establish an information repository where site documents are made available for public review throughout the IRP process.
- Develop a general fact sheet on the overall IRP process taking place at Tinker AFB for distribution to area residents and/or concerned citizens.
- Distribute periodic news releases to Base and local media concerning the Tinker AFB IRP.
- Issue news briefs announcing availability of the information repositories and their locations.
- Issue fact sheets during the RI process describing technical activities.
- Conduct quarterly meetings of the RAB. (Since all of the IRP sites at at Tinker AFB have a RIP or have reached SC, this has been reduced to semi-annually).
- Hold informal meetings with the community to discuss RI findings.

(3) Following completion of the Remedial Investigation:

- Informal public meetings with local officials and area residents are arranged to discuss the findings and plans for the FS. This is in conjunction with the RAB, but is also conducted in such a way as to review all information.
- Distribute fact sheets to those on the mailing list explaining technical activities and plans for the FS.
- Issue a press release updating site plans and RI/FS activities.

(4) Feasibility Study:

Public concern usually peaks during the FS as residents wait to review the alternatives for site restoration. As such, the following activities are recommended for this stage of the IRP:

- Hold informal meetings with the public, interested groups and local officials explaining the extent of the cleanup effort, safety and health issues, and how community concerns are integrated into restoration decisions. Meetings provide the opportunity to solicit comments on criteria for evaluating and screening FS alternatives.
- Distribute fact sheets to those on the mailing list and news releases to Tinker AFB website and Base and local newspapers that report RI/FS progress.
- Place site reports and other pertinent materials in the information repository and

administrative record.

(5) Completion of the Remedial Investigation/Feasibility Study:

- A notice of availability of the proposed plan, RI/FS report and notice of a 30-day public comment period will be published in a major local newspaper of general circulation (to include the Base paper and Tinker AFB website at least two weeks before the comment period begins). Local radio stations also may be used to announce availability of the documents and public comment period. The notice summarizes the alternatives analyzed and identifies the preferred alternative. It also explains how to submit oral/written comments, identify the location of the information repository, and names a contact person and how to reach him/her. The 30-day comment period may be extended an additional 30 days upon timely request from the community.
- If there is significant public concern about the preferred restoration alternative, an informal information meeting for local officials and residents will be held to summarize the plan, answer questions, and clear up any misconceptions or misunderstandings. The meeting will be announced in the Base and local newspapers, Tinker AFB website, and through the mailing list. A transcript of the meeting will be placed in the information repository and administrative record for public review.
- Information obtained during the public comment period and from the informal meeting will be used to develop the responsiveness summary. This document is a summary of the issues, concerns and comments raised by citizens during the comment period. Additionally, it is useful in supplying information about community preferences in terms of specific remedial alternatives. The responsiveness summary is placed in the information repository, administrative record, and becomes a part of the ROD.
- A news release highlighting completion of the RI/FS will be posted on the Tinker AFB website, published in Base and local newspapers, and issued to those on the mailing list.

(6) Remedial Design:

- Following the public comment period, the Base, ODEQ and USEPA sign a ROD, which explains the remedial action selected for the site. The ROD also includes Tinker AFB's responses to comments received during the comment

period. Once the ROD is signed, a public notice is placed in a major local newspaper announcing the decision and the availability of the ROD. The ROD is made available to the public through the site administrative record before initiation of any remedial action.

- Prior to remedial design, the Community Relations Plan is reviewed to address new and changing community concerns. One method of evaluation is to determine the effectiveness of past community relations activities. Another technique is communicating with community groups and officials to identify any emerging concerns or interests, and inquire if their information/participation needs are being met through the information and public outreach programs. If the general consensus alludes to an ineffective program, Tinker AFB Environmental Management will update the Community Relations Plan to include different kinds of community relations techniques suitable to the community's needs.
- When the final engineering design is completed, a fact sheet briefly explaining the design will be prepared and issued to the mailing list. Residents will be notified on the availability of the fact sheet by publishing a news brief/notice on the Tinker AFB website and Base and local newspapers.
- Supplemental news articles on the design will also be released to the media and to those on the mailing list.

(7) Remedial Action:

- Before remedial action takes place at Tinker AFB, a community briefing will be conducted for residents, groups/associations, and local officials. The briefing will outline the cleanup plan and its objectives and indicate approximate time-frames for remediation. A news release will be provided through the Base and local media on the cleanup plan.
- During remedial action, the community is kept informed through updates released to those on the mailing list and Base and local newspapers regarding restoration progress and timetables, changes in the remedial action schedule, and any new findings at the site.
- An informal meeting or availability session will be scheduled to give the community an opportunity to meet face-to-face with Tinker AFB staff and discuss site issues.

TABLES

Table 5.1
CERCLA Activities

COMMUNITY INVOLVEMENT ACTIVITY	FREQUENCY	ACTIVITY TYPE
"The Environmental Link" newsletter	Semi-annual	Established
Fact Sheets	RI/FS, RD/RA	Recommended
News/Feature Articles	As needed	Recommended
Media Coordination	As needed	Recommended
Information Meetings	RI/FS, RD/RA	Recommended
Update CIP	As needed	Recommended
Tours	As requested	Recommended
Presentations/Briefings	RI/FS, RD/RA	Recommended
Update Information Repository	Ongoing	Required
Update Administrative Record	Ongoing	Required
Community Interviews	As needed	Recommended
Update Mailing List	Ongoing	Required
Special Events	As needed	Recommended
Videos	As needed	Recommended
Brochures	As needed	Recommended
Responsiveness Summary	Following ROD & RI/FS	Required
30-Day Public Comment Period	Following RI/FS	Required
RAB/RAB Meetings	Semi-annual	Recommended

Definitions:

CIP = Community Involvement Plan

RAB = Restoration Advisory Board

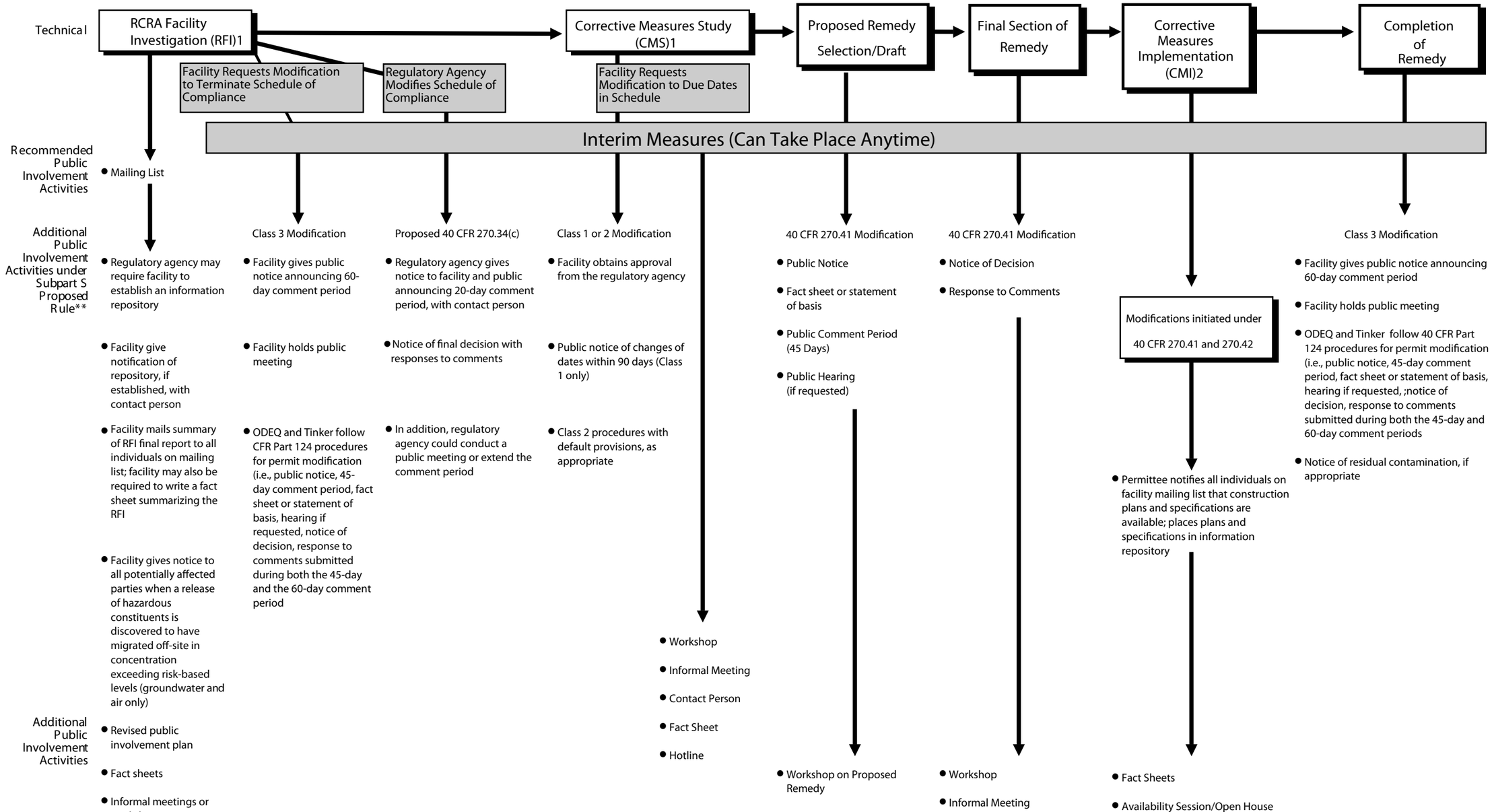
RD/RA = Remedial Design/Remedial Action

RI/FS = Remedial Investigation/Feasibility Study

ROD = Record of Decision

FIGURES

Figure 5.1
Public Involvement Activities in the RCRA



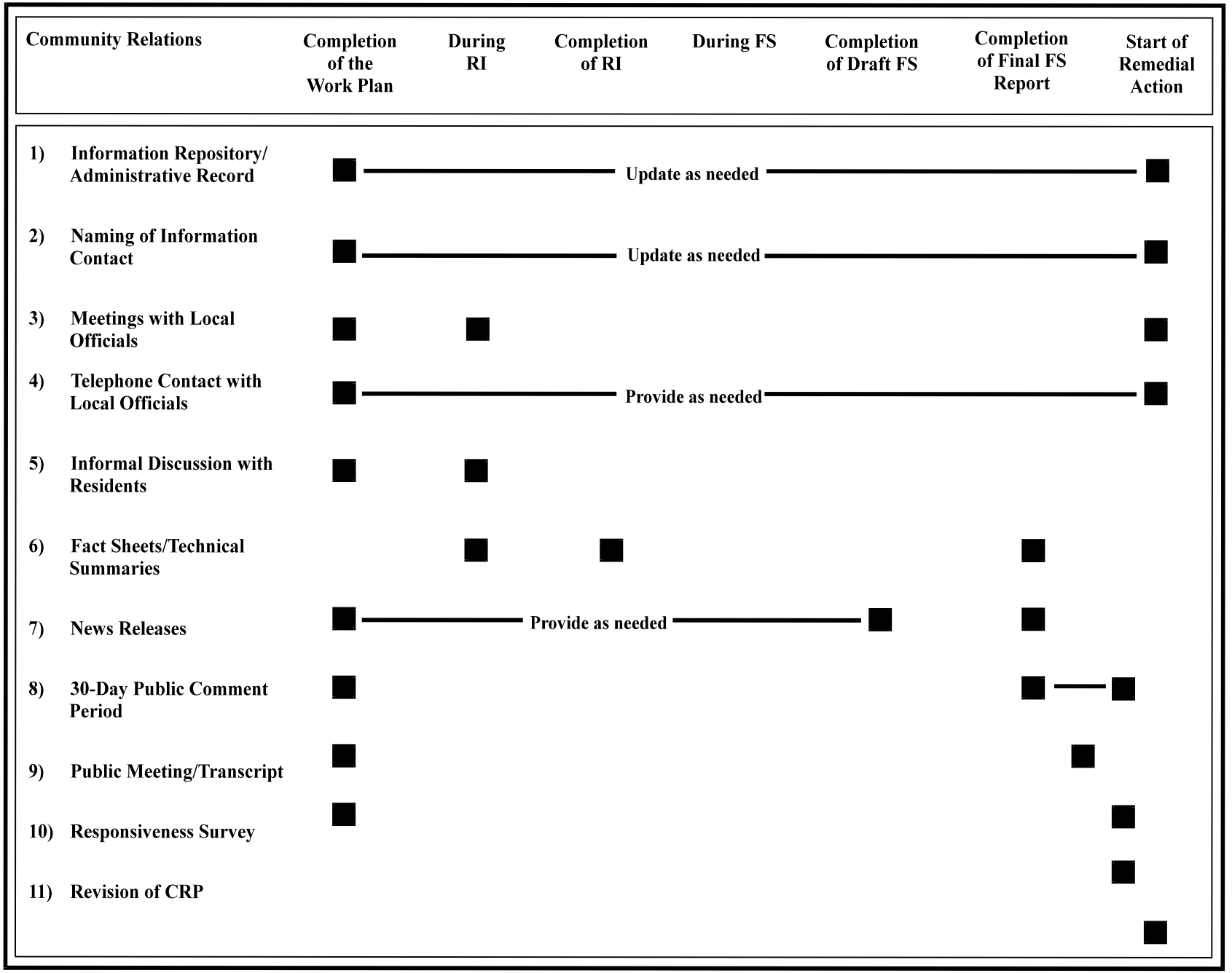
* These activities are strongly encouraged, but not required, for corrective action under §3008(h) orders.

** Activities included in proposed rules under 40 CFR 264 and 270, 55 FR 30873 ff

[1] The public has the opportunity for notice and comment on the permit schedule of compliance for corrective

[2] As indicated in this exhibit, the public receives notice of and has the opportunity for comment on the permit schedule of compliance for correct

Figure 5.2
CERCLA IRP Timing



APPENDIX A

FEDERAL AND STATE AGENCY REPRESENTATIVES

APPENDIX A
FEDERAL AND STATE AGENCY REPRESENTATIVES
(Points of Contact)

I. Tinker Air Force Base Representatives

Brion Ockenfels
Office of Public Affairs
Wing Headquarters Building 460
7460 Arnold Street, Ste 127
Tinker Air Force Base, OK 73145
(405) 739-2026

II. U.S. Environmental Protection Agency Region VI Representatives

Michael Hebert (Region 6)
Remedial Project Manager
USEPA Region 6, Mailcode 6SF-LP
1445 Ross Avenue, Ste. 1200
Dallas, TX 75202-2733
(214) 665-8315

Bob Sturdivant
RCRA Project Coordinator
U.S. Environmental Protection Agency
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 665-6733

III. State of Oklahoma Agency Representatives

Scott Thompson
Director, Land Protection Division
Department of Environmental Quality
707 North Robinson Avenue
Oklahoma City, OK 73101-1677
(405) 702-4157

Skylar McElhaney
Department of Environmental Quality
Public Information Officer - Media Inquiries & News Releases
707 North Robinson Avenue
Oklahoma City, OK 73101-1677
(405) 702-7167

Terry Cline
Commissioner of Health
Oklahoma State Department of Health
1000 Northeast 10th
Oklahoma City, OK 73117-1212
(405) 271-5600

J. D. Strong
Executive Director
Oklahoma Water Resource Board
3800 North Classen
Oklahoma City, OK 73118
(405) 530-8800

APPENDIX B

FEDERAL, STATE, AND LOCAL SELECTED OFFICIALS

APPENDIX B
FEDERAL, STATE, AND LOCAL ELECTED OFFICIALS

I. Federal Elected Officials

Senator James M. Inhofe

Washington, D.C. Office
453 Russell Senate Office Building
Washington, D.C. 20510-3603
(202) 224-4721

District Office
1900 NW Expressway Suite 1210
Oklahoma City, Oklahoma 73118
(405) 608-4381

Senator Tom Coburn

Washington, D.C. Office
172 Russell Senate Office Building
Washington, D.C. 20510
(202) 224-5754

District Office
100 North Broadway
Suite 1820
Oklahoma City, Oklahoma 73102
(405) 231-4941

Representative John Sullivan (District 1)*

Washington, D.C. Office
434 Cannon House Office Building
Washington, D.C. 20515-3601
(202) 225-2211

District Office
5727 S. Lewis Avenue, Suite 520
Tulsa, Oklahoma 74105-7146
(918) 749-0014

Representative Dan Boren (District 2)*

Washington, D.C. Office
216 Cannon House Office Building
Washington, D.C. 20515-3602
(202) 225-2701

District Office
431 West Broadway
Muskogee, Oklahoma 74401
(918) 687-2533

Representative Frank Lucas (District 3)*

Washington, D.C. Office
2311 Rayburn House Office Building
Washington, D.C. 20515
(202) 225-5565

District Office
10952 N.W. Expressway, Suite B
Yukon, OK 73099
(405) 373-1958

Representative Tom Cole (District 4)*

Washington, D.C. Office
2458 Rayburn House Office Building
Washington, D.C. 20515
(202) 225-6165

District Office
2420 Springer Drive, Suite 120
Norman, Oklahoma 73069
(405) 321-7369

Representative Mary Fallin (District 5)*

Washington, D.C. Office
1432 Longworth House Office Building
Washington, D.C. 20515
(202) 225-2132

District Office
120 N. Robinson, Ste. 100
Oklahoma City, Oklahoma 73102
(405) 234-9900

II. State Elected Officials

Governor Brad Henry

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 212
Oklahoma City, Oklahoma 73105
(405) 521-2342

State Senator Cliff Aldridge (Senate District 42)*

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 511
Oklahoma City, Oklahoma 73105
(405) 521-5584

State Senator Jim Reynolds (Senate District 43)*

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 412
Oklahoma City, Oklahoma 73105
(405) 521-5522

State Senator Constance N. Johnson (Senate District 48)*

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 534B
Oklahoma City, Oklahoma 73105
(405) 521-5531

State Representative Scott Inman (House District 94)*

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 319
Oklahoma City, Oklahoma 73105
(405) 557-7370

State Representative Charlie Joyner (House District 95)*

Oklahoma State Capitol
2300 N. Lincoln Blvd., Room 336
Oklahoma City, Oklahoma 73105
(405) 557-7314

District Office
3500 Bella Vista Drive.
Midwest City, Oklahoma 73110

State Representative Gary Banz (House District 101)*

Oklahoma State Capitol
2300 N. Lincoln Blvd. Room 406
Oklahoma City, Oklahoma 73105
(405) 557-7395

III. Local Elected and Appointed Officials

Oklahoma City

Mayor Mick Cornett

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2424

James D. Couch

City Manager
Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2345

M. T. Berry

Assistant City Manager
Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2345

Catherine O'Connor

Assistant City Manager
Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2345

James E. Thompson

Assistant City Manager
Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2345

City Treasurer

Finance Department
100 N. Walker, 4th Floor
Oklahoma City, Oklahoma 73102
(405) 297-2962

Planning Department

420 W. Main, 9th Floor
Oklahoma City, Oklahoma 73102
(405) 297-2576

Mike Randall

Director, Neighborhood Services
420 W. Main, 10th Floor
Oklahoma City, Oklahoma 73102
(405) 297-2972

Oklahoma City Council

Council Member Gary Marrs (Ward 1)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2404

Council Member Sam Bowman (Ward 2)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2402

Council Member Lawrence McAtee, Jr. (Ward 3)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2404

Council Member Pete White (Ward 4)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2402

Council Member J. Brian Walters (Ward 5)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2569

Council Member Meg Salyer (Ward 6)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2402

Council Member Ronald Skip Kelly (Ward 7)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2569

Council Member Patrick J. Ryan (Ward 8)

Municipal Building
200 North Walker, 3rd Floor
Oklahoma City, Oklahoma 73102
(405) 297-2404

Midwest City

Mayor Russell Smith

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1209

J. Guy Henson

City Manager
City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

William (Billy) Harless

Community Development Director
City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1228

Midwest City Council

Council Member Jerry Maynard (Ward 1)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Council Member Turner Mann (Ward 2)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Council Member Ruth Cain (Ward 3)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Council Member Jim Ray (Ward 4)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Council Member Michael Pung (Ward 5)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Council Member Richard Rice (Ward 6)

City Hall
100 N. Midwest Boulevard
Midwest City, Oklahoma 73110
(405) 739-1204

Del City

Mayor Brian Linley

3701 SE 15th Street
Del City, Oklahoma 73115
(405) 670-7309

City Manager
Mark Edwards
3701 SE 15th Street
Del City, Oklahoma 73115
(405) 671-2800

Office of Planning and Zoning
3701 SE 15th Street
Del City, Oklahoma 73115
(405) 677-5741

Del City Council

Council Member Dick Carter (Ward 1)

3701 SE 15th Street
Del City, Oklahoma 73115
(405) 677-5741

Council Member Bill Giles (Ward 2)

3701 SE 15th Street
Del City, Oklahoma 73115
(405) 677-5741

Council Member Ken Bartlett (Ward 3)

3701 SE 15th Street
Del City, Oklahoma 73115
(405) 677-5741

Council Member Mike Grimmett (Ward 4)

3701 SE 15th Street
Del City, Oklahoma 73115
(405) 677-5741

Oklahoma County

Gary Cox, Director

Oklahoma City-County Health Dept.
921 NE 23rd
Oklahoma City, Oklahoma 73105-7998
(405) 427-8651

Robert Jamison, Deputy Director

Oklahoma City-County Health Dept.
921 NE 23rd Street
Oklahoma City Oklahoma 73105-7998
(405) 427-8651

Oklahoma County Commissioners

Jim Roth (District 1)

320 Robert S. Kerr
Oklahoma City, Oklahoma 73105
(405) 270-0082

Brian Maughan (District 2)

320 Robert S. Kerr
Oklahoma City, Oklahoma 73105
(405) 270-0082

Ray Vaughn (District 3)

320 Robert S. Kerr
Oklahoma City, Oklahoma 73105
(405) 270-0082

Canadian County

Jay Smith,

Administrative Director
Canadian County Health Department
100 South Rock Island
El Reno, Oklahoma 73036
(405) 262-0042

Cleveland County

Shari Kinney

Administrative Director
Cleveland County Health Department
250 12th Avenue North East
Norman, Oklahoma 73071
(405) 321-4048

Pottawatomie County

Tina R. Johnson

Administrative Director
Pottawatomie County Health Department
1904 Gordon Cooper Dr
Shawnee, Oklahoma 74801-8698
(405) 273-2157

Oklahoma City Chamber of Commerce

123 Park Avenue
Oklahoma City, Oklahoma 73102
(405) 297-8900

Midwest City Chamber of Commerce

5905 Trosper Road
Midwest City, Oklahoma 73110
(405) 733-3801

Del City Chamber of Commerce

4505 SE 15th St
Oklahoma City, OK 73115
(405) 677-1910

South Oklahoma City Chamber of Commerce

701 W I 240 Service Rd
Oklahoma City, Oklahoma 73139
(405) 634-1436

Garber-Wellington Association

c/o John Harrington
21 E. Main Street, Suite 100
Oklahoma City, OK 73104
(405) 234-2264 ext. 121

Association of Central Oklahoma Governments

Zach Taylor
Executive Director
21 E. Main Street, Suite 100
Oklahoma City, Oklahoma 73104
(405) 234-2264

American Federation of Government Employees (District 9)

Michael Kelly
National Vice President
3000 Tower Drive, Suite 708
Del City, Oklahoma 73115
(405) 670-2656

APPENDIX C

CITIZEN GROUPS

APPENDIX C
CITIZEN GROUPS

Oklahoma Wildlife Federation
P.O. Box 60126
Oklahoma City, Oklahoma 73146
(405) 721-3530

Audubon Society of Central Oklahoma
5505 NW 66th
Oklahoma City, Oklahoma 73146
(405) 721-5711

Sierra Club Oklahoma Chapter
10 NE 10th
Oklahoma City, Oklahoma 73104
(405) 246-0173

League of Women Voters of Oklahoma County
3200 NW 48th Street, Room 217
Oklahoma City, Oklahoma 73112
(405) 232-8683

Oklahoma City Jaycees
P.O. Box 15159
Oklahoma City, Oklahoma 73155
(405) 236-3222

Neighborhood Services Organization, Inc.
431 Southwest 11th Street
Oklahoma City, Oklahoma 73122
(405) 236-0413

American Association of Retired Persons
126 N. Bryant Avenue
Edmond, Oklahoma 73034
1-866-295-7277 (toll free)

Del City Community Center
450 Southeast 15th
Del City, Oklahoma 73115
(405) 671-2867

Midwest City Community Center
200 N. Midwest Blvd.
Midwest City, Oklahoma 73110
(405) 739-1293

Midwest City Senior Citizens Center
8251 E. Reno Ave.
Midwest City, Oklahoma 73110
(405) 737-7611

APPENDIX D

MEDIA

APPENDIX D
MEDIA

I. NEWSPAPERS

The Oklahoman
9000 North Broadway
Oklahoma City, Oklahoma 73114
(405) 475-3280
Managing Editor: Ed Kelly

The Journal Record
101 N Robinson Ave, Suite 101
Oklahoma City, Oklahoma 73102
Telephone: (405) 235-3100
Managing Editor: Ted Streuli

The Edmond Evening Sun
P.O. Box 2470
123 S. Broadway
Edmond, Oklahoma 73083
Telephone: (405) 341-2121
Managing Editor: Lisa Shearer

The Shawnee News-Star
Shawnee, Oklahoma 74802
Telephone: (405) 214-3922
Executive Editor: Mike McCormick

Moore American
215 E. Comanche Street
Moore, Oklahoma 73070
(405) 366- 3573

Norman Transcript
215 East Comanche Street
Norman, Oklahoma 73069
(405) 321-1800
Executive Editor: Andy Rieger

Oklahoma Gazette
3701 North Shartel Avenue
Oklahoma City, Oklahoma 73118
(405) 528-6000
Managing Editor: Rod Lott

Oklahoma Press Association
3601 North Lincoln Blvd.
Oklahoma City, Oklahoma
73105-5499
(405) 499-0020

Associated Press
525 Central Park Drive, Ste. 202
Oklahoma City, Oklahoma 73105
(405) 525-2121

II. U.S. AIR FORCE NEWSPAPERS

Tinker Take Off
101 N. Robinson Ave, Ste. 101
Oklahoma City, Oklahoma 73102
(405) 739-7626
Operations Manager: April McDonald

III. TELEVISION STATIONS

KFOR TV - Channel 4 (NBC Affiliate)
444 East Britton Road
Oklahoma City, Oklahoma 73131
(405) 424-4444

KOCO TV - Channel 5 (ABC Affiliate)
1300 East Britton Road
Oklahoma City, Oklahoma 73131
(405) 478-3000

KWTV - Channel 9 (CBS Affiliate)
7401 N. Kelley
Oklahoma City, Oklahoma 73111
(405) 843-6641

KOKH TV – Channel 25 (FOX Affiliate)
1228 East Wilshire Blvd.
Oklahoma City, Oklahoma 73111
(405) 843-2525

OETA (OK Educational Television Authority) PBS/Local - Channel 13
7403 North Kelley Avenue
Oklahoma City, Oklahoma 73111
(405) 848-8501

Cox Communications - Channel 3
2312 Northwest 10th
Oklahoma City, Oklahoma 73107
(405) 600-8282

IV. RADIO STATIONS

WKY (930 AM)
4045 Northwest 64th Street
Oklahoma City, Oklahoma 73116
(405) 460-9393

KTOK (1000 AM)
50 Penn Place 10th Floor, Suite 1000
Oklahoma City, Oklahoma 73118
(405) 840-5271

KOMA (1520 AM)
400 E. Britton Road
PO Box 14818
Oklahoma City, Oklahoma 73131
(450) 478-5104

KMGL (104.1 FM)
400 E. Britton Road
PO Box 14818
Oklahoma City, Oklahoma 73131
(405) 478-5104

KCSC (90.1 FM) National Public Radio
University of Central Oklahoma
100 North University
Edmond, Oklahoma 73034
(405) 974-3333

KGFF-AM
2610 North Bryan
Shawnee, Oklahoma 74804
(405) 273-4390

KYIS (98.9 FM)
4045 NW 64th, Suite 600
Oklahoma City, Oklahoma 73111
(405) 848-0100

KGOU (106.3 FM/KROU 105.7 FM)
Copeland Hall, Room 300
University of Oklahoma
Norman, Oklahoma 73019
(405) 325-3388

APPENDIX E

TINKER AFB RESTORATION ADVISORY BOARD (RAB)

APPENDIX E
TINKER AFB RESTORATION ADVISORY BOARD (RAB)

In 1985, Tinker AFB identified the need for increased public participation in its restoration program and organized a Technical Review Committee (TRC). The TRC, which included representatives from Tinker AFB, U.S. Environmental Protection Agency (USEPA) Region 6, the Oklahoma State Department of Health (predecessor to the Oklahoma Department of Environmental Quality ([ODEQ]), and one community member, met quarterly to discuss Tinker's environmental cleanup progress and plans. The meetings were open to the public, but not well-attended.

Since that time, the Department of Defense (DoD) has taken steps to increase public participation in its cleanup program. As a result of the DoD's participation in the Federal Facilities Environmental Restoration Dialogue Committee, the policy evolved and called for the formation of Restoration Advisory Boards (RAB) at installations. The goal of the RAB was to expand upon the TRC concept. Advisory boards are a forum for exchange of information and partnership among citizens, the installation, USEPA, and the state. Most importantly, they promote community awareness and create a forum for constructive community review and comment on environmental restoration actions associated with federal facilities. The RAB also facilitates open communication and disseminates information concerning the Installation Restoration Program (IRP).

Tinker AFB's RAB was officially formed in February 1995, following a year-long selection process that began with a wide-spread campaign to publicize the new board. Applications were made available to all interested parties and were voluntarily distributed to more than 1,000 groups and/or individuals. To ensure fair selection, members were selected by an independent selection panel not affiliated with the Base.

In April 1999, the RAB transformed into the Community Advisory Board (CAB), indicating the board would consider other environmental issues but keep environmental restoration as its main focus. The charter was amended to reflect the new name change. A CAB Speaker's Bureau was also formed in 1999 with members from the RAB and Tinker personnel communicating and disseminating information about the environmental restoration program and other environmental issues to the community. In 2006, the CAB reverted to a RAB, restoring full focus to restoration activities at Tinker AFB.

Proactive public meetings are an integral part of Tinker AFB's good-neighbor policy. The RAB is comprised of 11 leaders from the areas surrounding the Base, along with representatives from Tinker AFB, the USEPA and the ODEQ. Community members represent groups such as the Association of Central Oklahoma Governments, Oklahoma Toxics Campaign and USEPA Region 6 - Superfund Division. The RAB meetings were originally held quarterly, but are now held semi-annually. These

meetings thoroughly involve and consult stakeholders throughout the cleanup process. The Environmental Restoration staff provides briefings on a myriad of issues related to cleanup activities, fostering open channels of communication. The RAB technical committee reviews and provides input on all restoration documents.

Citizens interested in applying for RAB membership may contact Ms. Susie Beasley, Community Relations Subcommittee Chair, at (405) 390-8418 extension 3. Questions concerning the RAB may be directed to Mr. William Janacek, RAB Community Co-Chair, at (405) 739-1380.

RAB Members, the Groups They Represent and Their Telephone Numbers

NAME	ADDRESS	WORK/DAY PHONE	HOME PHONE/ E-Mail ADDRESS	SUBCOMMITTEE
William J. Janacek City of Midwest City, Director of Environmental Services	8730 SE 15th St Midwest City, OK 73110	(405) 739-1380 Fax: (405) 732-8107	wjanacek@Midwestcityok.org	Community Co-Chair; Executive Committee Technical Committee
Betty A. Realties Oklahoma DEQ	Oklahoma City, OK	(405) 702-5284	Bnb-tortola@cox.net	Technical Committee
John Harrington Association of Central OK Governments (ACOG) – Garber-Wellington Assoc.	21 E. Main Suite 100 Oklahoma City, OK 73102-2405	(405) 234-2264 ext. 121 Fax: (405) 234-2200	jharrington@acogok.org	Community Relations Committee

NAME	ADDRESS	WORK/DAY PHONE	HOME PHONE/ E-Mail ADDRESS	SUBCOMMITTEE
Kathy Lippert Greystone Environmental, Inc.	1000 W. Wilshire Suite 340 Oklahoma City, OK 73116	(405) 848-3750 Fax: (405) 848-5932 Cell: (405) 229-4070	jlipp2001@aol.com	Technical Committee, Chair Executive Committee
Earl Hatley OK Toxics Campaign	19257 S. 4403 Dr. Vinita, OK 74301	(918) 631-3049 (918) 256-5269 Fax: (918) 631-2194	ehatley@neok.com	Technical Committee
Susie Beasley Choctaw Public Library	2525 Muzzy Box 549 Choctaw, OK 73020-0549	(405) 390-8418 Ext. 3 Fax: (405) 606-3269 Cell: (405) 822-2834	(405) 672-6898 HM (405) 822-2834 Cell labelle52@hotmail.com gaokpeach52@yahoo.com sbeasley@metrolibrary.org	Community Relations Committee, Chair Executive Committee
Michael Hebert Superfund Division USEPA Region 6 (6SS-RL)	1445 Ross Avenue Suite 200 Dallas, TX 75202-2733	(214) 665-8315 Fax: (214) 665-6660	Hebert.michael@epa.gov	
Jim DePuy City of Del City	4517 S.E. 29th P. O. Box 15177 Del City, OK 73155	(405) 671-2815 Fax: (405) 671-2897	asstcitymanager@cityofdelcity.com	

NAME	ADDRESS	WORK/DAY PHONE	HOME PHONE/ E-Mail ADDRESS	SUBCOMMITTEE
Brion Ockenfels Environmental Public Affairs	Wing Headquarters Building 460 7460 Arnold Street, Ste 127 Tinker AFB, OK 73145	(405) 739-2027 Fax: (405) 739-2882	brion.ockenfels@tinker.af.mil	Community Relations Committee
Cathy Scheirman Deputy Director 72 ABW Civil Engineering Group	72 ABW/CE Bldg 400 Tinker AFB, OK 73145-9100	(405) 734-3451	cathy.scheirman@tinker.af.mil	
Mr. Albert Aguilar Chief, Environmental Restoration Branch	72 ABW/CEPR 7701 Arnold St., Ste. 221 Tinker AFB, OK 73145-9100	(405) 734-4574 Fax: (405) 734-4210	Albert.Aguilar@tinker.af.mil	Installation Co-Chair Executive Committee

APPENDIX F

PUBLIC MEETINGS

APPENDIX F
PUBLIC MEETINGS

Public meetings regarding environmental activities at Tinker AFB are primarily held at the Midwest City Public Library because of its close proximity to the local populations. Contact information is provided below:

Midwest City Public Library

8143 E. Reno
Midwest City, Ok 73110-7589
(405) 732-4828

APPENDIX G

GLOSSARY OF ENVIRONMENTAL TERMS

APPENDIX G
GLOSSARY OF ENVIRONMENTAL TERMS

Administrative Record. The Administrative Record consists of all documents which have a legal bearing on the remedial action. It is required for every response action, is used for judicial review, and forms the basis for the selection of response actions at third-party sites.

Agency for Toxic Substances and Disease Registry (ATSDR). A branch of the Public Health Service within the U.S. Department of Health and Human Services. Based in Atlanta, Ga., this agency conducts health assessments of all facilities/sites listed on the National Priority List (NPL).

Air Stripping. A treatment system that removes, or "strips" volatile organic compounds (VOCs) from contaminated groundwater or surface water by forcing an airstream through the water and causing the compounds to evaporate.

Applicable or Relevant and Appropriate Requirements (ARAR). These are federal and state laws which must be considered in choosing a remedial action.

Aquifer. An underground geological formation or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Area of Concern (AOC). Any discernable unit or area which may have received solid or hazardous waste or waste containing hazardous constituents at any time.

BTEX. Benzene, toluene, ethylbenzene, and xylene. These organic compounds are common constituents of vehicle fuels.

Carcinogen. A substance that can cause cancer.

Carbon Adsorption. A treatment system where contaminants are removed from groundwater or surface water when the water is forced through tanks containing activated carbon.

Categorical Exclusion (CATEX). A class of actions that either individually or cumulatively would not have a significant effect on the human environment and therefore would not require preparation of an Environmental Assessment (EA) or Environmental Impact Statement (EIS) under the National Environmental Policy Act (NEPA).

Community Relations Plan. A plan required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at all National Priorities List (NPL) sites. The plan is a guide to assist in the implementation of public involvement activities as well as a mechanism for informing the community about cleanup progress under the base's Installation Restoration Program (IRP), as well as responding to community concerns.

Community/Restoration Advisory Board (CAB/RAB). A board comprised of community members functioning as an advisory body that facilitates the open exchange of information between Air Force installations and local residents concerning restoration activities.

Compliance Restoration Program (CRP). A Department of Defense program to identify hazardous waste sites not addressed by the Installation Restoration Program (IRP), and implement the investigation and cleanup requirements for these sites in order to minimize the associated hazards to human health and the environment. The Program is funded under the Defense Environmental Restoration Account (DERA).

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). This federal law (PL96-510), passed in 1980, provides a series of programs to address the cleanup of hazardous waste disposal sites and areas where spills have occurred. CERCLA is codified in 42 USC 9601 et seq.; and 26 USC 4611, 4612, 4661, 4662, 4671, and 4672. It has been modified and amended several times, most significantly in 1986 by the Superfund Amendments and Reauthorization Act, known as SARA.

Confirmation Study. In former Installation Restoration Program (IRP) terminology, the confirmation study took place during the Phase II investigation, which verifies the existence or absence of contamination at a site. It is comparable to the Remedial Investigation in current IRP terminology.

Consent Decree (CD). A legal document approved and issued by a judge that formalizes an agreement reached between USEPA and potentially responsible parties (PRPs) whereby PRPs will perform all or part of a Superfund site cleanup. The consent decree describes actions that PRPs must perform and is subject to a public comment period.

Cost-Effective Alternative. The cleanup alternative selected for a site on the National Priorities List based on technical feasibility, permanence, reliability, and cost. The Air Force and USEPA are not required to choose the least expensive alternative. If there are several cleanup alternatives available that deal effectively with the problems at a site, the Air

Force must choose and USEPA concur on the choice of a remedy on the basis of permanence, reliability and cost.

Contaminant Standards. Limits on concentrations of contaminants in water, oil, sediments, or air as established by federal, state or local law or regulation.

Control Measures. Management methods and technologies that are applied for control and cleanup of hazardous waste sites.

Cost Recovery. A legal process whereby potentially responsible parties (PRPs) can be required to pay back USEPA for money spent during any cleanup actions.

Decision Document (DD). A means of recording significant decisions in the Installation Restoration Program. Actions which merit a DD include: selecting a remedial action, closing out a site, and reactivating a site.

Defense Environmental Restoration Account (DERA). The Department of Defense funding program for the Installation Restoration Program.

Defense Environmental Restoration Program (DERP). A Department of Defense program mandated in the Superfund Amendments and Reauthorization Act (SARA) Section 211, which includes the Installation Restoration Program as a component.

Detailed Alternatives. Potential, comprehensive solutions to site problems, composed of one or more control measures, which are developed and evaluated in detail in the Remedial Action Plan.

Effluent. Wastewater -- treated or untreated -- that flows out of a treatment plant, sewer, or industrial outfall. Generally refers to wastes discharged into surface waters.

Emergency Response. A control measure or combination of control measures implemented to prevent or mitigate an immediate and substantial threat to public welfare posed by a hazardous waste site.

Endangerment Assessment. A study conducted as a supplement to a remedial investigation to determine the nature and extent of contamination at a site and the risks posed to public health and/or the environment. An Endangerment Assessment is conducted when legal action is pending to require potentially responsible parties (PRPs) to perform or pay for the site cleanup.

Enforcement Action. USEPA's efforts, through legal action if necessary, to force potentially responsible parties (PRPs) to perform or pay for a Superfund site cleanup.

Enforcement Decision Document (EDD). A public document that explains USEPA's selection of a cleanup alternative at a third-party site through an USEPA enforcement action. Similar to a Record of Decision (ROD).

Environmental Assessment (EA). A concise public document that serves to: (1) briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI), (2) aid an agency's compliance with the National Environmental Policy Act when no EIS is necessary, and (3) facilitate preparation of an EIS when one is necessary.

Environmental Impact Analysis Process (EIAP). A process to determine the potential environmental impacts of proposed Air Force actions and alternatives and use of these analyses in making decisions or recommendations on whether to proceed and how to proceed with those actions. The EIAP is conducted in accordance with AF Regulation 19-2, the National Environmental Policy Act of 1969 and 40 CFR et. seq., the President's Council on Environmental Quality regulations.

Environmental Impact Statement (EIS). A document required of federal agencies by the National Environmental Policy Act for major projects or legislative proposals significantly affecting the environment. A tool for decision-making, it describes the positive and negative effects of the undertaking and lists alternative actions.

Exposure Assessment. A determination of human exposure to, and the resulting effects of, contaminants on public health and welfare.

Feasibility Study. A description and analysis of the potential cleanup alternatives for a site or alternatives for a site on the National Priorities List. This restoration phase identifies the means for development, evaluation, selection, and description of remedial action alternatives. It usually starts as soon as the Remedial Investigation is underway; together, they are commonly referred to as the RI/FS.

Finding of No Significant Impact (FONSI). A document prepared by a federal agency that states why a proposed action would not have a significant impact on the environment and thus would not require preparation of an Environmental Impact Statement. The FONSI is based on the results of an Environmental Assessment.

Groundwater. Water found beneath the Earth's surface that fills pore spaces in the soil. In aquifers, groundwater occurs in sufficient quantities that it can be used for drinking water, irrigation and other purposes.

Hazard Ranking System (HRS). The principal screening tool used by USEPA to evaluate risks to public health and the environment associated with abandoned or uncontrolled hazardous waste sites. The HRS calculates a score based on the potential of hazardous substances spreading from a site through the air, surface water, or groundwater and on other factors such as nearby population.

This score is the primary factor in deciding if a site should be on the National Priorities List and, if so, what ranking it should have compared to other sites on the list.

Hazardous Substance. Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

Hazardous Waste. A solid waste, or combination of solid wastes, that can pose a substantial or potential hazard to human health or the environment when improperly managed. It possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special USEPA lists.

Heavy Metals. Metallic elements with high atomic weights such as mercury, chromium, cadmium, arsenic, and lead.

Herbicide. A chemical pesticide designed to control or destroy plants, weeds, or grasses.

Hydrology. Science dealing with the properties, movement, and effects of water on the Earth's surface, in the soil and rocks below, and in the atmosphere.

Incineration. Burning of certain types of solid, liquid, or gaseous materials under controlled conditions to destroy hazardous waste.

Influent. Water, wastewater, or other liquid flowing into a reservoir, basin, or treatment plant.

Information Repository. A file containing technical reports, information and reference documents regarding cleanup activities under the Installation Restoration Program and/or Superfund. The repository is usually located in a public building such as a school, public library, or city hall that is conveniently located for local residents.

Installation Restoration Program (IRP). A Department of Defense program to identify the location of former hazardous waste disposal sites, to determine if any contamination releases have occurred, and to minimize the associated hazards to public health.

Interim (Permit) Status. Period during which treatment, storage and disposal facilities coming under Resource Conservation and Recovery Act (RCRA) are temporarily permitted to operate while awaiting denial or issuance of a permanent permit. Permits issued under these circumstances are usually called Part A or Part B permits.

Leachate. A contaminated liquid resulting when water percolates, or trickles, through waste materials and collects chemical components of those wastes. Leaching may occur at landfills and may result in hazardous substances entering soil, surface water, or groundwater.

Leachate Collection System. A system that gathers leachate and pumps it to the surface for treatment.

Long-Term Monitoring (LTM). A program of water, soil or sediment analysis intended to track the migration (or non-migration) of contaminants. Monitoring is implemented without concurrent implementation of a remedial action.

Material Safety Data Sheets (MSDS). A compilation of information required under the OSHA Communication Standard on the identity of hazardous chemicals, health, and physical hazards, exposure limits, and precautions. Section 311 of SARA requires facilities to submit MSDSs under certain circumstances.

Maximum Contaminant Level (MCL). The maximum permissible level of a contaminant in groundwater and soil. MCLs are enforceable standards.

Mitigation. Measures taken to reduce adverse impacts on the environment.

Monitoring. Periodic or continuous surveillance or testing to determine the level of compliance with statutory requirements and/or pollutant levels in various media or in humans, animals, and other living things.

Monitoring Wells. Wells drilled at specific locations on or off a hazardous waste site where groundwater can be sampled at selected depths. Analyses to determine such things as the depth to groundwater and the types and amounts of contaminants present can then be performed.

National Ambient Air Quality Standards (NAAQS). Air quality standards established by USEPA that apply to outside air.

National Emissions Standards for Hazardous Air Pollutants (NESHAPs). Also known as NESHAPs, these emissions standards set by USEPA for an air pollutant not covered by NAAQS that may cause an increase in deaths or serious, irreversible, or incapacitating illness.

National Oil and Hazardous Substances Contingency Plan (NCP) 40 CFR 300. The federal regulation established under the Clean Water Act and expanded under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), which provides for the coordinated and effective response to discharges of oil and to releases of hazardous substances, pollutants and contaminants.

National Pollutant Discharge Elimination System (NPDES). A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by USEPA, a state, or (where delegated) a tribal government on an Indian reservation.

National Priorities List (NPL). A compiled list of the most serious hazardous waste sites identified for possible long-term remedial response. The list is based primarily on the score a site receives on the Hazard Ranking System (HRS). The USEPA is required to update the NPL at least once a year.

No Further Action. This term has been replaced by the term: "site close-out." Site closeout may occur during several different stages of the cleanup process, depending upon the particular site.

On-Scene Coordinator. The predesignated USEPA, Coast Guard, or Department of Defense official who coordinates and directs Superfund removal actions or Clean Water Act oil- or hazardous-spill corrective actions.

Operable Unit (OU). A portion of a site requiring further specialized investigation. A site can be made up of several discreet operable units. Typical restoration activities at an operable unit would be removing drums and tanks from the surface of a site.

Organics. Chemicals containing carbon, with the exception of carbon dioxide and carbonates such as calcium carbonate.

Outfall. The location where an effluent is discharged into receiving waters.

Particulates. Fine liquid or solid particles such as dust, smoke, mist, fumes, or smog, found in air or emissions.

Parts per Billion (ppb), or Parts per Million (ppm). Units commonly used to express concentrations of contaminants. For instance, 1 ounce of trichloroethylene (TCE) in 1 million ounces of water is 1 ppm; 1 ounce of TCE in 1 billion ounces of water is 1 ppb.

Percolation. The movement of water downward and radially through the subsurface soil layers, usually continuing downward to the groundwater.

Plume. A visible or measurable discharge of a contaminant from a given point of origin. It can be visible in the air as, for instance, a plume of smoke.

Potentially Responsible Party (PRP). Owners, operators, transporters, or generators of waste potentially responsible for, or contributing to, the contamination at a site.

Preferred Alternative. The detailed cleanup alternative that is selected by a Major Command for review and concurrence by the Air Force Installation Restoration Management committee. After review by Air Force, regulatory agencies and the public, the preferred alternative becomes the Remedial Action outlined in the Remedial Action Plan (RAP).

Preliminary Assessment. Part of the Installation Restoration Program (IRP), this process collects and reviews available information about a known or suspected hazardous waste site or release. The information is used to determine if the IRP site requires further study.

Proposed Plan. A document used for recommendation of the restoration alternative selected in the final Feasibility Study as part of the Installation Restoration Program.

Public Affairs Office. Installation personnel who are responsible for maintaining proper communication channels with the public regarding site restoration activities.

Public Comment Period. A designated time period (usually coinciding with the release of the Remedial Investigation/Feasibility Study draft report or revision of the Record of Decision) when comments from citizens about environmental activities are invited.

Public Meetings. Meetings organized by the agency that are open to the public. Experts are available to present information and answer questions. Citizens are encouraged to ask questions and offer comments.

Public Notices. Advertisements published in major local newspapers, broadcast via local radio stations, or mailed to community members to announce Air Force decisions, major project milestones, public meetings, or to solicit public comment on Air Force actions.

Record of Decision (ROD). A public document that explains which cleanup alternative(s) will be used at National Priorities List sites. The ROD is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns.

Relative Risk Site Evaluation (RRSE). A process used by the Department of Defense to categorize sites based on their relative risk to human health and the environment. The RRSE is a tool for the DoD to prioritize known requirements such as remedial investigations or cleanup actions.

Remedial Action. The actual construction or implementation phase that follows the remedial design of the selected cleanup alternative at a site.

Remedial Action Plan. A report documenting the process of selecting and describing remedial actions; also the report remedial action selected.

Remedial Design. An engineering phase that follows the Record of Decision (ROD) when technical drawings and specifications are developed for remedial action at a site.

Remedial Investigation. The Installation Restoration Program (IRP) or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) related process to determine the nature and extent of contamination at a site. This phase of the IRP emphasizes data collection and site characterization of hazardous waste sites in an interactive fashion with the Feasibility Study phase.

Remedial Investigation/Feasibility Study. The term indicating the iterative/interactive combination of the two related Installation Restoration Program studies.

Remedial Response. A long-term action that stops or substantially reduces a release or threatened release of hazardous substances that is serious, but not an immediate threat to public health and/or the environment.

Removal Action. Short-term immediate actions taken to address releases or threatened releases of hazardous substances that require expedited response.

Response Action. A CERCLA-authorized action involving either a short-term removal action or a long-term remedial response that may include but is not limited to: removing hazardous materials from a site to an USEPA-approved hazardous waste facility for treatment, containment, or destruction, containing the waste safely on site, destroying or treating the waste on site, and identifying and removing the source of groundwater contamination and halting further migration of contaminants.

Responsiveness Summary. A required summary of oral and/or written public comments received by the installation during a comment period concerning key Installation Restoration Program documents, combined with the Air Force's responses to those comments.

Resource Conservation and Recovery Act (RCRA). The federal law that established a regulatory system to track hazardous substances from the time of generation to disposal. The law requires safe and secure procedures to be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new, uncontrolled hazardous waste sites.

Risk Assessment. An evaluation to assess conditions at a site and determine the risk posed to public health and/or the environment.

Site Closeout. Site closeout may occur during several different stages of the cleanup process, depending upon the particular site and its circumstances. Regardless of the stage during which closeout occurs, the process must be accompanied by proper documentation.

Site Inspection. A technical phase that follows a Preliminary Assessment designed to collect more information on a hazardous waste site. The information is used to score the site with the Hazard Ranking System to determine whether a response action is needed.

Site Monitoring Plan. The procedures and requirements by which a long-term or postclosure monitoring program is implemented.

Solid Waste Management Unit (SWMU). Any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

Solvents. Cleaning agents and degreasing compounds. Some chemical solvents are suspected of being carcinogenic.

Standard. Any limits established by regulatory agencies on quantities, rate and concentrations of chemical, physical, biological and other constituents.

Statement of Work. Specifies to the contractor, efforts needed to conduct and document various stages of the Installation Restoration Program and to describe the selected site control measures.

Superfund Amendments and Reauthorization Act (SARA); PL 99-499. Modifications to the Comprehensive Environmental Response, Compensation and Liability Act enacted on October 17, 1986.

Superfund. The common name used to denote the trust fund for site restoration established in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), or CERCLA itself.

Surface Water. Bodies of water that are above ground, such as rivers, streams or lakes.

Title I, Title II, or Title III. Title I, II, or III of the Superfund Amendments and Reauthorization Act (SARA).

Treatment, Storage or Disposal Facility (TSD). Site where a hazardous substance is treated, stored, or disposed. TSD facilities are regulated by USEPA and states under the Resource Conservation and Recovery Act (RCRA).

Trichloroethene (TCE). A solvent commonly used to wash or degrease industrial equipment. Breaks down into vinyl chloride given appropriate site conditions.

Underground Storage Tank (UST). A tank located all or partially underground that is designed to hold gasoline or other petroleum products or chemical solutions.

Volatile Organic Compound (VOC). An organic (carbon-containing) compound that evaporates (volatilizes) readily at room temperature.

Wastewater. The spent or used water from individual homes, a community, a farm, or an industry that contains dissolved or suspended matter.

APPENDIX H

GLOSSARY OF ENVIRONMENTAL ACRONYMS

APPENDIX H
GLOSSARY OF ENVIRONMENTAL ACRONYMS

AFB	Air Force Base
AFOSH	Air Force Occupational Safety and Health
AOC	Area of Concern
AST	Above-Ground Storage Tank
ATSDR	Agency for Toxic Substances and Disease Registry
AWACS	Air Warning and Control System
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
BX	Base Exchange
CA	Corrective Action
CAB	Community Advisory Board
CD	Compact Disk
CE	Civil Engineering
CEPR	Civil Engneering Restoration Program Branch
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CG	Contaminated Groundwater Management Unit
CMI	Corrective Measures Implementation
CMS	Corrective Measures Study
CRP	Compliance Restoration Program
CSE	Comprehensive Site Evaluation
DCE	Dichloroethene
DD	Decision Document
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Response Program
DoD	Department of Defense
DPE	Dual Phase Extraction
D&N	Discovery and Notification
ECP	Environmental Compliance Program
EM	Environmental Management
EPC	Environmental Protection Committee
EPI	Environmental Priorities Initiative
ESD	Explanation of Significant Difference
ESOH	Environmental, Safety, and Occupational Health
FFA	Federal Facilities Agreement

FS	Feasibility Study
FSA	Feasibility Study Addendum
FT	Fire Training Area
FTMF	Fuel Truck Maintenance Facility
FY	Fiscal Year
GAO	General Accounting Office
GWMU	Groundwater Management Unit
HSWA	Hazardous and Solid Waste Amendments
IC	Institutional Controls
IRP	Installation Restoration Program
IWP	Industrial Waste Pit
IWTP	Industrial Wastewater Treatment Plant
JETC	Jet Engine Test Cell
JP	Jet Propulsion Fuel
LF	Landfill
LSZ	Lower Saturated Zone
LTM	Long Term Monitoring
LTO	Long Term Operations
LUC	Land Use Controls
MCL	Maximum Contaminant Level
MEK	Methyl Ethyl Ketone
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
MRA	Munitions Response Areas
MROTC	Maintenance, Repair, and Overhaul Technology Center
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NFRAP	No Further Response Action Planned
NPDES	National Pollutant Discarge Elimination System
NPL	National Priorities List
NR	Not Required
NTA	North Tank Area
OC-ALC	Oklahoma City Air Logistics Center
OCC	Oklahoma Corporation Commission
ODEQ	Oklahoma Department of Environmental Quality
OPSA	Old Pesticide Storage Area

OSDH	Oklahoma State Department of Health
OT	Other
OU	Operable Unit
OWS	Oil-Water-Separator
O&M	Operations and Maintenance
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PA/SI	Preliminary Assessment/Site Investigation
PCE	Tetrachloroethene
PRB	Permeable Reactive Barrier
PSTD	Petroleum Storage Tank Division
RA	Remedial Action
RAB	Restoration Advisory Board
RA-C	Remedial Action-Construction
RA-O	Remedial Action-Operation
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RIP	Remedy in Place
ROD	Record of Decision
RPO	Remedial Process Optimization
RRSE	Relative Risk Site Evaluation
RW	Radioactive Waste Disposal
SB	Statement of Basis
SC	Site Closeout
SI	Site Inspection
SARA	Superfund Amendments and Reauthorization Act
SCGW	Soldier Creek/Off-Base Groundwater
SDB	Sludge Drying Bed
SSL	Soil Screening Level
ST	Storage Tank

SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
SWMU	Solid Waste Management Unit
SWTP	Sanitary Wastewater Treatment Plant
TAC	Tinker Aerospace Center
TCE	Trichloroethene
TPH	Total Petroleum Hydrocarbons
TRC	Technical Review Committee
TSD	Treatment, Storage, or Disposal
TVA	Tinker View Acres
TWG	Technical Working Group
USC	U.S. Code
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
USZ	Upper Saturated Zone
UTL	Upper Tolerance Limit
VEP	Vacuum Enhanced Pumping
VI	Vapor Intrusion
VOC	Volatile Organic Compound
WP	Waste Pit
WSW	Water Supply Well

APPENDIX I

FACT SHEETS

APPENDIX I
FACT SHEETS

INTRODUCTION

The following fact sheets are brief summary documents that are used to provide site-related information to affected communities. These basic information fact sheets provide community residents with general site information along with historical site activities and the current cleanup progress.

There are 53 Fact Sheets for the 40 Installation Restoration Program (IRP) and 13 Compliance Restoration Program (CRP) sites at Tinker Air Force Base (AFB). The structure of each fact sheet is presented in the following template. Each category of information is defined in this template.

Title: FACT SHEET for (Site Number)

Site Number: Installation Restoration or Compliance Restoration Program Number *(e.g. OT001, ST006, LF011, WP017, FT021, RW025, CG037)*

Site Name: Installation Restoration or Compliance Restoration Program Name *(the name associated with the Site Number)*

Installation: Name of DoD Installation *(For all fact sheets the installation name will be Tinker AFB)*

Current Site Phase/Status of Corrective or Remedial Action: The current response action milestone - whether discovery/notification, investigation/study, remedial action, or no further response action planned (NFRAP).

Current Relative Risk to the Environment: DoD Relative Risk Site Evaluation (RRSE) status prior to establishing a Remedy in Place (RIP) for the site. *Once a RIP is underway, relative risk is considered mitigated, and consideration of relative risk is no longer applicable (N/A). Any site that has a RIP, response complete (RC), or has reached site closeout (SC) considers relative risk as N/A.*

Site Description: A brief description of the location, historical use, activities contributing to site contamination, and potential exposure pathways.

Chemicals of Concern: The principle chemical or types of chemicals contributing to human health and environmental risk. *This may be a specific chemical such as trichloroethene (TCE) or hexavalent chromium, or may be a class of chemicals such as chlorinated solvents or metals.*

Media Impacted: As defined by the USEPA, the major categories of material found in the physical environment that surround or contact organisms (e.g., surface water, ground water, soil, or air), and through which chemicals or pollutants can move and reach organisms.

Schedule of Regulatory Milestones: The Regulatory Response Phases (following Discovery/Notification) that have been performed at the site and the year completed. *The typical DoD milestone sequence (depending on the level and severity of contaminant exposure risk) is modeled after CERCLA, and includes: Preliminary Assessment/Site Investigation (PA/SI), Remedial Investigation (RI), Feasibility Study (FS), Interim Remedial Action (IRA), Record of Decision (ROD), Remedial Design (RD), Remedial Action (RA), RA-Construction (RA-C), Remedy in Place (RIP), RA-Operating or Operation (RA-O), Response Complete (RC), Long Term Monitoring (LTM), and Site Closeout (SC).*

For DoD RCRA permitted sites, the typical corrective action (CA) milestone sequence following notification (and depending on the level of contaminant exposure risk) is: RCRA Facility Assessment (RFA), RCRA Facility Investigation (RFI), Interim Measures (IM), Corrective Measures Study (CMS), Statement of Basis (SB), Decision Document (DD) for the selected corrective action, Corrective Measures Implementation (CMI) which is equivalent to RIP. All other RCRA corrective action is completed in accordance with standard IRP Milestones (which are RA-O through SC).

Remedy Type: The remedy specified in the ROD or DD. *Typical RA-O remedies at Tinker AFB are operation and maintenance (O&M) programs that may include: Monitored Natural Attenuation (MNA), Soil Vapor Extraction (SVE), Groundwater Pump and Treat (P&T), Permeable Reactive Barriers (PRB), Vacuum Enhanced Pumping (VEP), along with various "hot spot" reduction techniques. Institutional controls (ICs), including land use controls (LUCs) may also be used as part of a remedy.*

Responsible Organization/MAJCOMM: The responsible organization for all of Tinker AFB's Installation and Compliance Restoration Program sites is the Air Force Materiel Command (AFMC), Headquarters, Wright-Patterson AFB, Ohio.

FACT SHEET for OT001

Site Number: OT001

Site Name: Building 3001 (Operable Unit 1)

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O), with a focused remedial investigation and feasibility study (RI/FS)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: This IRP Site is comprised of a mile-long industrial complex and its surrounding areas, and is listed as an operable unit of the Soldier Creek/Building 3001 National Priorities List site. Subsurface concrete lined pits and trenches, used to remove solvents and wastewater byproducts of industrial processes from the building interior, leaked and allowed the solvents to percolate into the soil. The migrating contaminants have reached the upper and lower saturated zones of the Garber-Wellington Aquifer. Underground contaminant plumes extend to a maximum depth of 175 feet and laterally across an area of about 220 acres. The RA-O is groundwater treatment. Groundwater extraction with treatment and on-site reuse was the remedy prescribed in the 1990 Record of Decision. However, it was determined that this remedy was not achieving anticipated contaminant reduction rates, and the treatment system was shut down in 2004 to evaluate the Building 3001 remedial action, as well as to monitor plume stability. USEPA has approved shut down of the system through February 2011. A focused FS is in progress and will make recommendations as to the optimal technology(ies) for future remediation.

Chemicals of Concern: Trichloroethene (TCE), tetrachloroethene (PCE), and hexavalent chromium

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI –Complete 1988
FS – Complete 1989
ROD/DD – 1990
RD – Complete 1991
RA-C- Complete 1994
RA-O – In Progress 1994-2023
Focused RI – 2008 - 2010
Focused FS – 2010-2011
LTM – 2023-2028

Remedy Type: Groundwater pumping and treatment (P&T)

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT002

Site Number: OT002

Site Name: Soldier Creek Sediment and Surface Water (Operable Unit 2)

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Soldier Creek drains the northeast corner of Tinker AFB, including Building 3001. In the past, cross-connections existed between industrial waste lines and the storm drains leading to Soldier Creek. These cross connections as well as discharges from the Industrial Wastewater Treatment Plant (IWTP) caused the creek to become contaminated with solvents (from degreasing operations) and metals used in plating. In addition, fuel spills have contributed contamination. The cross-connections were located and removed in 1990. Soldier Creek's sediment and surface water exit the base in the northeast corner. Soldier Creek flows by or near several residential and commercial properties including two trailer parks, a golf course, and an apartment complex. Potential receptors include people (children and adults) swimming or playing in the creek off-Base. On-Base receptors would include people working in the creek. A diverse amount of biota living in the creek could be affected. The first sediment removal actions were conducted in 1986. Following the remedial/investigation and feasibility study (RI/FS), the 1993 record of decision (ROD) identified long-term monitoring and an ecological assessment as the preferred action for the creeks. In 2003, USEPA and ODEQ determined that the site no longer presents a potential threat to human health or the environment and the sediment and surface water monitoring could be discontinued. West Soldier Creek was modified to become a concrete channel, which minimized the potential for sediments to move off-Base and pose a human health or ecological threat to downstream receptors. USEPA issued a Certificate of Completion (RC) for the Soldier Creek Sediment and Surface Water Operable Unit on January 19, 2006. The Air Force discontinued the surface water monitoring program, but creek sampling is still performed under the National Pollutant Discharge Elimination System (NPDES) program.

Chemicals of Concern: Solvents and metals

Media Impacted: Sediment and Surface Water

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI –Complete 1993
FS – Complete 1993
ROD/DD – 1993
RD – Complete 1993
RA-C– Complete 1993
RA-O – Complete 1999
LTM – Complete 2004

Remedy Type: Waste Removal (Sediment) and Long Term Monitoring completed. USEPA issued Certificate of Completion January 19, 2006.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for ST003

Site Number: ST003

Site Name: North Tank Area (a component of Operable Unit 1)

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The North Tank Area is situated just east of the northwest corner of Building 3001. This site is included as part of the Building 3001 Operable Unit of the Soldier Creek/Building 3001 NPL site. The site originally housed 5 underground storage tanks (USTs) constructed or installed between 1943 and 1958. All the tanks have been either removed or cleaned and abandoned in place. Primary contamination appears to be located adjacent to the abandoned 235,000 gallon #2 heating oil tank. The Record of Decision (ROD) reached on August 15, 1990 for the B3001 NPL site includes the North Tank Area. The ROD specified installation of a floating fuel product removal system to recover free-phase hydrocarbons floating above the groundwater table, installation of a vapor extraction system to remove fuel vapors from the subsurface soils, removal and disposal of a 750 gallon waste tank, and proper closure of the #2 heating oil tank. Several free product removal techniques were implemented at the NTA beginning May 1, 1991, and removal of the USTs was completed in 1992. Vacuum enhanced pumping (VEP) is the current free product removal technology in use at NTA, and consists of nine extraction wells for free product recovery. The treatment system removes vapor, water, and free product from all of the extraction wells. The containment and recovery of free-floating oil product remains the current response action.

Chemicals of Concern: Gasoline, fuel oil, and waste solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI –Complete 1988
FS – Complete 1989
ROD/DD – 1990
RD – Complete 1991
RA-C– Complete 1991
RA-O – In Progress 1990-2010

Remedy Type: Free Product and Vapor Recovery

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT004

Site Number: OT004

Site Name: Wells 18 and 19

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Water supply Wells 18 and 19, both located in Building 3001, were removed from service in 1984 after trichloroethene (TCE) and tetrachloroethene (PCE) were detected in water samples drawn at the wellhead. Investigation of these wells in 1984 concluded that contaminants probably were migrating downward from the shallow saturated zones in the annular space between well casing and the formation, and were entering wells through corrosion holes in casing at depths around 100 and 150 feet. Both wells were plugged in September 1986. The wells are identified in the Federal Facilities Agreement (FFA) as operable units of the Soldier Creek/Building 3001 NPL site but are not included in the Building 3001 Record of Decision (ROD) because remediation was complete before the ROD was signed in 1990. A NFRAP agreement was reached in February 1990, and the site was closed on June 1, 1991.

Chemicals of Concern: TCE and PCE

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
FS – Complete 1986
RD – Complete 1986
RA-C – Complete 1986
ROD/DD – 1990

Remedy Type: Wells Plugged. Site was closed June 1, 1991.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT005

Site Number: OT005

Site Name: Soldier Creek Groundwater (Operable Unit 3) and IWTP Groundwater (Operable Unit 4)

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Operable Unit (OU) 3 - No Further Response Action Planned (NFRAP), OU 4 - Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC) for OU 3, and the remedy in place (RIP) for OU 4 is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Site #OT005 consists of two operable units, Soldier Creek Groundwater and the Industrial Wastewater Treatment Plant (IWTP) Groundwater. Both are listed as operable units of the Soldier Creek/Building 3001 National Priority List site. Site #OT005 encompasses roughly 320 acres of land with surface drainage into Soldier Creek and its tributaries. The pathways of concern for the Soldier Creek Groundwater have been exposure to contaminants in the groundwater underlying the site, and exposure to contaminants which may have traveled with the groundwater and infiltrated into Soldier Creek. Potential receptors, albeit reduced from 10 years ago, include human exposure to contaminants in the groundwater and possible human and ecological exposure to the contaminants in Soldier Creek.

Soldier Creek Groundwater (OU 3)
The Soldier Creek Groundwater OU consists of approximately 190 acres of primarily off-Base private (commercial and former residential) properties located northeast of Tinker AFB. Following the remedial investigations (RI) completed in the 1990s, the 2000 feasibility study (FS) concluded there are no contaminants in the off-Base groundwater attributable to Tinker AFB. A supplemental risk assessment was completed for the Soldier Creek Groundwater OU in 2007, which supported the findings of the 2000 FS. As a result, no further action (NFA) was recommended and in January 2008, the Air Force, ODEQ, and USEPA signed the Record of Decision (ROD) affirming that the response is complete (RC) for this portion of Site #OT005.

IWTP Groundwater (OU 4)
The IWTP Groundwater OU was identified as a potential source of groundwater contamination because it treated industrial wastewater generated at the Base, including electroplating, chemical cleaning and paint-stripping operations. These operations generated wastewater containing oil, grease, metals and organic solvents. The primary contaminants associated with OU 4 are trichloroethene (TCE) and degradation products

such as vinyl chloride. The risk assessment for the Soldier Creek Groundwater OU and IWTP Groundwater OU was finalized in 2000. Results of the human health risk assessment for the IWTP Groundwater OU indicated that further evaluation of vinyl chloride and its parent compounds was warranted. In 2007, a FS addendum concerning the IWTP Groundwater OU recommended monitored natural attenuation (MNA) and Land Use Controls (LUCs) as the preferred remedy for groundwater. Source removal for volatile organic contaminants in the IWTP soils are managed under the Resource Conservation and Recovery Act (RCRA). For additional information on response actions for soils, refer to the fact sheet for Site #OT034.

Chemicals of Concern:
Soldier Creek Groundwater OU
Arsenic, thallium, and pentachlorophenol
IWTP Groundwater OU
TCE and vinyl chloride

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:
Soldier Creek Groundwater OU
PA – Complete 1985
SI – Complete 1985
RI –Complete 2000
FS – Complete 2000
IRA-C – Complete 2003
ROD/DD – 2007
IRA-O – Complete 2007

IWTP Groundwater OU
PA – Complete 1985
SI – Complete 1985
RI –Complete 2000
FS – Complete 2000
IRA-C – Complete 2003
FS Addendum – Complete 2007
IRA-O – 2007

Remedy Type:
Soldier Creek Groundwater OU
LTM complete for Groundwater, NFA as of January 2008
IWTP Groundwater OU
Groundwater MNA along with VEP for hotspot treatment and LUCs.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for ST006

Site Number: ST006

Site Name: Southwest Tank Area

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Southwest Tank Site, encompassing an area of about 2.5 acres, is located in the northeast quadrant of Tinker AFB, southwest of Building 3001. The site was in operation from 1945 to 1980 and consisted primarily of underground storage tanks (USTs) 3140 – 3147, plus several other USTs nearby. The tanks reportedly stored lubricating oils, fuel and Stoddard solvents. All of the tanks have either been removed or cleaned and abandoned in place. Investigations of the soils surrounding the tanks indicated the presence of benzene, toluene, ethylbenzene and xylene (BTEX) compounds. In March 1997, an Air Force Decision Document (DD) described the existing pump and treat (P&T) and vacuum technologies as adequate technologies for remediating the site. The DD also stated that sufficient institutional controls (ICs) were in place for a "no further action" (NFA) remedy to be protective of human health and the environment. A vacuum-enhanced pumping (VEP) system was used to continue removing free phase fuel and solvent from the soil matrix and from the top of the groundwater, and to enhance biodegradation of fuel components in the soil. The VEP system operated from 1997 until 2003, when free product was no longer observed on the groundwater. In 2007, the extraction and monitoring wells were abandoned and equipment was removed from the site. Groundwater underlying the Southwest Tank Area lies entirely within the Building 3001 Operable Unit (OU 1) and is subject to the remediation requirements of the Building 3001 Record of Decision (ROD). The source of chlorinated solvents dissolved in the groundwater beneath the Southwest Tank Area is believed to be either the adjacent tanks or Building 3001. It was determined that the system had achieved the objective of fuel product removal and a NFRAP agreement was completed as an Air Force DD on September 28, 2007. The VEP system was completely dismantled and removed by November 2007.

Chemicals of Concern: Total Petroleum Hydrocarbons (TPH), BTEX, and Stoddard solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1987
SI – Complete 1987
RI – Complete 1994
FS – Complete 1996
IRA-C – Complete 1997
ROD/DD – Complete 1997
IRA-O – Complete 1997
RC – Complete 2007

Remedy Type: Soil vapor extraction, free product removal, and groundwater extraction/treatment by means of VEP; groundwater extraction and treatment by means of Building 3001 P&T system.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for ST007

Site Number: ST007

Site Name: 290 Fuel Farm

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The 290 Fuel Farm opened in 1942 with five 18,000 gallon underground storage tanks (USTs) and twelve 25,000 gallon USTs, which were used to store motor fuels, JP-4 jet fuel, and aviation gas. In 1952, eight 25,000 gallon USTs were added. Two 17,500 gallon USTs were located at the west end of the site, and used for solvent storage. Buildings 215 and 246 (now demolished) were two engine testing facilities located within the 290 Fuel Farm site. Following the preliminary assessment and initial site investigation (PA/SI), an expedited interim response action (IRA) was initiated in 1987 for free product removal at the 290 Fuel Farm Site. In 1988, all USTs were abandoned in place and replaced with aboveground storage tanks. Fuels and chlorinated solvents including trichloroethene (TCE) were identified in the 1999 remedial investigation (RI) report. Two VEP systems were installed at the site between 1998 and 2000 as IRAs, then became the RIP in 2002. Collectively, the two systems extract groundwater and soil vapor from 34 recovery wells around Building 214, the former Building 210 (substantially demolished in 2002), near Tank 349, and near Building 117. Building 214 is an engine testing facility. Building 117 is the Base Fire Department. The site is predominantly paved east and south side of Building 214, with some unpaved areas north and west of Building 214; the subsurface consists of clay, clayey sands, sandstone, and sand. The area east and north of Building 214 is still used today as a fuel farm. The area is fenced in; however, workers are in the area constantly.

Chemicals of Concern: Fuels and chlorinated solvents, including TCE

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1987
SI – Complete 1987
IRA-C – Complete 1989
RI – Complete 1999
IRA-C – Complete 2000
IRA-O – Complete 2001
IRA-C – Complete 2001
IRA-O – Complete 2001
ROD/DD – Complete 2002
RA-O – In Progress 2002-2013
LTM – 2013-2018

Remedy Type: Free product (fuel) skimming, groundwater and soil vapor extraction (SVE) via VEP, with treatment of influent water and vapor prior to discharge

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for ST008

Site Number: ST008

Site Name: Four Fuels Sites

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Four Fuel Sites consists of four underground storage tanks (USTs) which were used to store solvents and fuels. Three of these USTs were located around Building 201 and were designated Solid Waste Management Units (SWMUs) 15,16, and 17, while the other was located at Building 214 and designated SWMU 18. All of the tanks were constructed in the 1940s. All four tanks have not been used since the early 1980's, and have been abandoned or removed. Following investigations at these sites, the Oklahoma Department of Environmental Quality (ODEQ) dropped SWMUs 16, 17 and 18 from the RCRA permit in 2002, thus requiring no further action for these SWMUs. In 2005, a Statement of Basis was accepted by ODEQ for SWMU 15, with no further action required for the soils, and monitored natural attenuation (MNA) as the remedy for groundwater.

Chemicals of Concern: Chlorobenzene, trichloroethene (TCE), and vinyl chloride

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1987
SI – Complete 1987
RI – Complete 2003
IRA-O – Complete 2005
RD – Complete 2005
ROD/DD – Complete 2005
RA-O – In Progress 2005-2015
LTM – 2015-2018

Remedy Type: Monitored Natural Attenuation (MNA) for groundwater

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT009

Site Number: OT009

Site Name: Crutcho Creek

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Crutcho Creek originates south of Tinker AFB and flows northward through the Base toward the North Canadian River. The creek receives drainage from the western and southern sections of the Base, including the main instrument runway. Contamination from landfill seeps (Landfills 4 and 5 and possibly from Landfills 2 and 3), occasional spills originating from limited industrial operations located on the western portion of Tinker AFB, and water from outfalls may have contributed to contamination of the creeks. Extensive sampling of the sediment and surface water of the creek systems was conducted during the remedial investigation (RI) completed in September 1992. Sampling data from the RI was used to conduct a risk assessment based on USEPA guidelines. The risk assessment determined that the Crutcho and Kuhlman Creeks'sediment and surface water did not pose an unacceptable risk. A NFRAP agreement was completed as an Air Force Decision Document (DD) in January 2006, and the site has been closed. This site is contained within the boundary of the groundwater contamination study areas known as the Northwest (CG037), Southwest (CG038), and East (CG039) contaminated groundwater management sites.

Chemicals of Concern: Volatile organic compounds, semi-volatile organic compounds, and metals

Media Impacted: Sediment and Surface Water

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI – Complete 1992
ROD/DD – 1993
LTM – 1993-2006

Remedy Type: LTM completed in 2006. Site was closed January 12, 2006.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT010

Site Number: OT010

Site Name: Kuhlman Creek

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Kuhlman Creek, a tributary of Crutcho Creek, originates in the northern portion of the Base and is fed by storm sewer outfalls that drain the northern portion of the Base. Kuhlman Creek was identified as a potential contaminated site in 1984. Water from the outfalls may have contributed to contamination of Kuhlman Creek. Extensive sampling of the sediment and surface water of the creek systems was conducted during the remedial investigation (RI) completed in September 1992. Sampling data from the RI was used to conduct a risk assessment based on USEPA guidelines. The risk assessment determined that Kuhlman Creek's sediment and surface water did not pose an unacceptable risk. A NFRAP agreement was completed as an Air Force Decision Document (DD) in January 2006. This site is contained within the boundary of the groundwater contamination study area known as the Northwest Contaminated Groundwater Site (CG037).

Chemicals of Concern: Volatile organic compounds, semi-volatile organic compounds, and metals

Media Impacted: Sediment and Surface Water

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI –Complete 1992
ROD/DD – 1993
LTM – 1993-2006

Remedy Type: LTM completed in 2006. Site was closed January 12, 2006.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for LF011

Site Number: LF011

Site Name: Landfill 1

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-term Monitoring (LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 1 occupies an area of approximately 1.5 acres and was used for disposal of general refuse from the Base. The landfill was in operation from 1942 to 1945. Disposal records are not available. Landfill 1 was capped in 1991 with a RCRA landfill cap designed and constructed in accordance with USEPA technical guidelines. Landfill 1 trenches are located in a thin section of the Hennessey Group, immediately overlying the Garber Sandstone. It is possible that some of the trenches actually penetrate through the Hennessey into the Garber. The Garber-Wellington Formation is part of the Central Oklahoma Aquifer System, also known as the Garber Wellington Aquifer. The Garber-Wellington is classified as a Class II aquifer since it is currently utilized as a source of drinking water. Tinker AFB is situated in the recharge zone of this aquifer. Potential for human exposure to water contaminated by Landfill 1 exists because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, no contaminant plumes have been found in the groundwater that are attributable to Landfill 1. Surface water from Landfill 1 discharges to Crutcho Creek which is located adjacent to the landfill. Crutcho Creek flows through Base housing, the Base Golf Course, and on to Midwest City. Human exposure to contaminated soils is unlikely since the landfill is fenced and is covered by a RCRA landfill cap.

Chemicals of Concern: Volatile organic compounds, semi-volatile organic compounds, and metals

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI –Complete 1998
ROD/DD – 2001
IRA-C – Complete 1990
IRA-O – Complete 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap along with land use controls (LUCs)

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for LF012

Site Number: LF012

Site Name: Landfill 2

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-Term Monitoring (LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 2 covers an area of approximately 27.5 acres and was used for disposal of general refuse from the Base. The landfill was generally in operation from 1945 to 1952. Disposal records are not available. Landfill 2 was capped in 1998 with a RCRA landfill cap designed and constructed in accordance with USEPA technical guidelines. It is believed that one specific use dump composed primarily of industrial solvents and petroleum products was located in the northeast corner of the landfill. The inactive Radiological Waste Disposal Site (RWDS) 1030W, located in the central portion of Landfill 2, was reported to be a burial site for burned radium dial waste. Landfill 2 trenches are located in a thin section of the Hennessey Group, immediately above the Garber Sandstone. It is possible that some of the trenches actually penetrate through the Hennessey into the Garber. The Garber-Wellington Aquifer is a Class II aquifer since it is currently utilized as a source of drinking water. Surface water from Landfill 2 discharges to an intermittent stream which dissects the landfill. This stream drains to Crutcho Creek located approximately 150 feet north of the landfill. Crutcho Creek flows through Base housing, the Base Golf Course, and on to Midwest City. Potential for human exposure to water contaminated by Landfill 2 exists because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, there are no known water supply wells in the groundwater pathway or downgradient of Landfill 2. Human exposure to contaminated soils is unlikely since the landfill is fenced and is covered by a RCRA landfill cap. Long term care of the RCRA cap will continue for Landfill 2, and monitoring of groundwater around the site will continue as part of the CG038 RIP.

Chemicals of Concern: Trichloroethene (TCE), cis-1, 2-dichloroethene, vinyl chloride, and hexavalent chromium

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI –Complete 1998
IRA-C – Complete 1998
ROD/DD – 2001
IRA-O – Complete 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap along with land use controls (LUCs), groundwater pump and treat (P&T), and "hot spot reduction" techniques, under CG038.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for LF013

Site Number: LF013

Site Name: Landfill 3

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-term Monitoring (LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 3 occupies an area of approximately 8.25 acres and was used for disposal of general refuse from the Base. The landfill was in operation from 1952 to 1961. Disposal records are not available. It is believed that two specific use dump areas were located within the landfill: an area containing lead contaminated soils, and a sludge dump containing waste oils and sludges from the Petroleum Oil Lubricant Facility. Landfill 3 was capped in 1991 with a RCRA landfill cap designed and constructed in accordance with USEPA technical guidelines. Landfill 3 trenches are located in a thin section of the Hennessey Group, immediately above the Garber Sandstone. It is possible that some of the trenches actually penetrate through the Hennessey into the underlying Garber. The Garber-Wellington Formation is part of the Central Oklahoma Aquifer System, also known as the Garber Wellington Aquifer. The Garber-Wellington is classified as a Class II Aquifer since it is currently utilized as a source of drinking water. Tinker AFB is situated in the recharge zone of this aquifer. Surface water from Landfill 3 discharges to Crutcho Creek which is located adjacent to the landfill. Crutcho Creek flows through Base housing, the Base Golf Course, and on to Midwest City. Potential for human exposure to water contaminated by Landfill 3 exists because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, there are no known water supply wells in the groundwater pathway or downgradient of Landfill 3. Human exposure to contaminated soils is unlikely since the landfill is fenced and is covered by a RCRA landfill cap. Long term care of the RCRA cap will continue for Landfill 3, and monitoring of groundwater around the site will continue as part of the CG038 RIP.

Chemicals of Concern: Trichloroethene (TCE), cis-1, 2- dichloroethene, and vinyl chloride

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
IRA-C – Complete 1991
RI – Complete 1998
IRA-O – Complete 2001
ROD/DD – 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap along with land use controls (LUCs), groundwater pump and treat (P&T), a permeable reactive barrier (PRB), various "hot spot reduction" techniques under CG038, and alternate water supply/ treatment

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for LF014

Site Number: LF014

Site Name: Landfill 4

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-term Monitoring LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 4 covers an area of approximately 12.4 acres and was used for disposal of general refuse from the Base. The landfill was in operation from 1962 to 1968. Disposal records are not available. It is believed that one specific-use dump used for landfarming sludges collected from the bottom of petroleum and solvent storage tanks was located in the central portion of the landfill. Landfill 4 was capped in 1998 with a RCRA landfill cap designed and constructed in accordance with USEPA technical guidelines. Landfill 4 trenches are located in a thin section of the Hennessey Group, immediately above the Garber Sandstone. The Garber-Wellington Formation is part of the Central Oklahoma Aquifer System, also known as the Garber Wellington Aquifer. The Garber-Wellington is classified as a Class II aquifer since it is currently utilized as a source of drinking water. Tinker AFB is situated in the recharge zone of this aquifer. Prior to installation of the RCRA cap, surface water (and occasionally leachate) discharged to a drainage ditch adjacent to the landfill. This ditch leads to Crutcho Creek approximately 300 yards north of the landfill. Crutcho Creek flows through Base housing, the Base Golf Course, and on to Midwest City. Potential for human exposure to water contaminated by Landfill 4 did exist (prior to RCRA cap installation), because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, there are no known water supply wells in the groundwater pathway or downgradient of Landfill 4. Human exposure to contaminated soils is unlikely since the landfill is fenced and is covered by a RCRA landfill cap.

Chemicals of Concern: Trichloroethene (TCE) and hexavalent chromium

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI –Complete 1998
IRA-C – Complete 1998
IRA-O – Complete 2001
ROD/DD – 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap along with land use controls (LUCs), and groundwater pump and treat (P&T) under CG038

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for LF015

Site Number: LF015

Site Name: Landfill 5

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-term Monitoring (LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 5 is located in the south central portion of Tinker AFB and is bounded by Tower Road on the west, Taxiway E to the south, and Crutcho Creek to the north and east. Landfill 5 is triangular in shape and encompasses an estimated six acres. The landfill consists of trenches that run from northwest to southeast. The trenches are estimated to be 400 feet long, 50 feet wide and 16 feet deep. A compacted clay and topsoil cover was constructed over the trenched area in August 1990 to minimize infiltration of precipitation. Landfill 5 was capped in 1998-1999 with a RCRA landfill cap designed and constructed in accordance with USEPA technical guidelines. Landfill 5 was in operation from 1968 to 1970. During its operational period the landfill received approximately 75,000 cubic yards of waste. The waste disposed of in the landfill consisted of general refuse with small quantities of industrial waste. Landfill 5 trenches are located in a thin section of the Hennessey Group, immediately above the Garber Sandstone. It is possible that some of the trenches actually penetrate through the Hennessey into the Garber. The Garber-Wellington Formation is part of the Central Oklahoma Aquifer System, also known as the Garber-Wellington Aquifer. The Garber-Wellington is classified as a Class II Aquifer since it is currently utilized as a source of drinking water. Tinker AFB is situated in the recharge zone of this aquifer. Surface water from Landfill 5 discharges to Crutcho Creek which is located adjacent to the landfill. Crutcho Creek flows through Base housing, the Base Golf Course, and on to Midwest City. Potential for human exposure to water contaminated by Landfill 5 exists because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, there are no known water supply wells in the groundwater pathway or downgradient of Landfill 5. Human exposure to contaminated soils is unlikely since the landfill is fenced and is covered by a RCRA landfill cap. Long term care of the RCRA cap will continue for Landfill 5, and monitoring of groundwater around the site will continue as part of the CG039 RIP.

Chemicals of Concern: Trichloroethene (TCE)

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI –Complete 1998
IRA-C – Complete 1998
ROD/DD – 2001
IRA-O – Complete 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap, along with land use controls (LUCs)

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for LF016

Site Number: LF016

Site Name: Landfill 6

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Long-term Monitoring (LTM)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Landfill 6 is located in the western portion of Area "D" approximately 0.5 miles south-east of Tinker AFB along Southeast 59th Street. Area D was developed on land leased from Oklahoma City. The landfill operated from 1970 to 1979 and was used to dispose of general refuse from Tinker AFB. Refuse was deposited into a number of parallel trenches within the landfill at depths of up to 30 feet and covered daily. Cover material consisted of either sand, clay, or a sand/clay mixture. Although 40 acres were available at the site, only about 25 acres were occupied by the landfill trenches in the eastern half, adjacent to SE 59th Street. Upon closure in 1979, several feet of compacted soil was used to cover the trenches. Records indicate the site was used for the disposal of general refuse, industrial refuse, and sludges from industrial wastewater treatment plants. Approximately 500,000 cubic yards of material were disposed in the landfill during its operating years. A RCRA cap has been constructed over the Landfill 6 trenches which are located in a thin section of the Hennessey Group, immediately above the Garber Sandstone. It is possible that some of the trenches actually penetrate through the Hennessey into the Garber. The Garber-Wellington Formation is part of the Central Oklahoma Aquifer System, also known as the Garber Wellington Aquifer. The Garber-Wellington is classified as a Class II aquifer since it is currently utilized as a source of drinking water. Tinker AFB is situated in the recharge zone of this aquifer. Surface drainage in the vicinity of Landfill 6 is influenced by the RCRA cap in place at the site. The cap was designed to divert surface drainage away from the landfill to a centrally located drainage ditch. Ultimately, surface drainage is intercepted by tributaries leading to Elm and Soldier Creeks. Potential for human exposure to water contaminated by Landfill 6 exists because Tinker AFB and the surrounding communities of Midwest City and Del City derive their water supplies from the Garber-Wellington Aquifer and surface water sources. However, there are no known water supply wells in the groundwater pathway or downgradient of Landfill 6. Potential for human exposure to soils contaminated by Landfill 6 is limited since the landfill is fenced and has a RCRA cap.

Chemicals of Concern: Chlorinated solvents, including trichloroethene (TCE)

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
IRA-C – Complete 1988
RI –Complete 1998
FS – Complete 1998
IRA-C – Complete 2000
IRA-O – Complete 2001
ROD/DD – 2001
LTM – 2001-2023

Remedy Type: RCRA cap, LTM and care of the cap, along with land use controls (LUCs)

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for WP017

Site Number: WP017

Site Name: Supernatant Pond

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Supernatant Pond is situated on the west side of Tinker AFB east of, and adjacent to, Patrol Road and 200 feet north of Crutcho Creek. It is thought that from 1954 through 1970 the site was used as an unlined containment area for sewage effluent from the former Sanitary Waste Treatment Plant. Base personnel continued to use the pond as a disposal site for liquid wastes until 1980. Reportedly, these wastes included petroleum hydrocarbon sludge, solvents and cyanide-contaminated liquids. Soil fill was placed in the pond area when it was abandoned in 1980. Significant settlement occurred and the site would not support growth of vegetation. Subsequently, construction rubble consisting of non-hazardous waste was distributed over the area and covered with soil fill to maintain grass over the site. In 1992, a solidification/stabilization technology, which locks contamination into a cement matrix, was used to remediate the site. Additional sampling performed at the site found no significant contamination. A no further action (NFA) request was submitted to the Oklahoma Department of Environmental Quality (ODEQ) in July 2004. Regulatory approval for NFA was granted, and the site will be delisted from the RCRA permit in 2012. A decision document (DD) was completed, the site is considered closed for soils. Solvent plumes still exist in the groundwater at or near this site, which lies just within the boundary of the Southwest Contaminated Groundwater Management Unit (GWMU) Site #CG037. Groundwater will continue to be evaluated and monitored as part of this GWMU.

Chemicals of Concern: Petroleum hydrocarbon sludge, solvents, and cyanide-contaminated liquids

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI –Complete 1991
IRA-C – Complete 1992
ROD/DD – 1993
LTM – 1993-2004

Remedy Type: Solidification/Stabilization

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for WP018

Site Number: WP018

Site Name: Industrial Waste Pit #1

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action – In Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Industrial Waste Pit #1 is located 500 yards southwest of Building 2121, approximately 400 yards west of Douglas Boulevard, and northwest of the intersection of Runway Drive and 59th Street. The area of the waste pit is approximately 1.4 acres. The site is an unlined pit in which waste oils, stripping solutions and plating wastes were disposed from 1947 to 1958. The pit was filled in 1958 and graded, leaving no visible surface features to indicate its location. Contaminant migration in the soil is minimal with little lateral movement but solvents have probably migrated downward to the upper saturated zone groundwater. In 1998 and 2002, actions were taken to remove some of the contaminated soil. The 2002 action included on-site treatment of contaminated soils; however, not all of the contaminated soil could be removed. Industrial Waste Pit #1 lies within the boundary of the East Contaminated Groundwater Management Unit, Site #CG039. Following a pilot test for vauum enhanced pumping (VEP), a corrective measures study (CMS) was completed in 2008, and monitored natural attenuation (MNA) of the groundwater with institutional controls (ICs) was recommended as the preferred alternative for the site. Groundwater monitoring around the waste pit will continue as part of CG039 groundwater management unit (GWMU) long term monitoring RIP. This remedy is consistent with the entire CG039 RIP.

Chemicals of Concern: Waste oils, cyanide, chromates, phenols, and solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI –Complete 1998
IRA-C – Complete 2002
IRA-C – Complete 2008
CMS – Complete 2008
IRA-O – 2008-2013
LTM – 2013-2018

Remedy Type: Ex situ soil treatment with off-Base disposal, VEP pilot test, and MNA of groundwater with ICs

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for WP019

Site Number: WP019

Site Name: Industrial Waste Pit #2

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Industrial Waste Pit #2 is situated on the southeastern portion of the Base, 320 feet east of the Transient Munitions Facility and 600 feet west of Douglas Boulevard, between Patrol Road and the south end of the North-South runway. Waste oils, cyanides, chromates, phenols, solvents, waste acids and alkali's were mixed with waste petroleum products and often burned to reduce volume during the site's operation from 1958 to 1965. The site was then back-filled and abandoned. A total of nine monitoring wells were installed to assess potential contaminant migration to the groundwater. Based on analytical results from soils and groundwater sampling, no significant contamination has migrated from the contents of the waste pit to the surrounding native soils or groundwater. The Human Health and Ecological Risk Assessment for Industrial Waste Pit #2 was approved by the Oklahoma Department of Environmental Quality (ODEQ) in September 2003. ODEQ approved Tinker AFB's request for no further action at Industrial Waste Pit #2 on February 20, 2004. Industrial Waste Pit #2 is within the geographic boundaries of contaminated groundwater management unit (GWMU) CG039, and is still monitored as part of the CG039 GWMU.

Chemicals of Concern: Waste oils, cyanides, chromates, phenols, solvents, waste acids, and alkalis

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
ROD/DD – Complete 1985
RA-O – Complete 1997
LTM – Complete 2003

Remedy Type: LTM continues under CG039.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT020

Site Number: OT020

Site Name: Multiple Creeks

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: A Relative Risk Site Evaluation was not required, because requirements for remedial response were assigned to Site #OT009 and Site #OT010.

Site Description: Multiple Creeks Site was so named because the site consisted of four creeks: Soldier, Crutcho, Kuhlman and Elm Creeks. In 1991, the site was subdivided and investigated as three Installation Restoration Program (IRP) sites rather than one. Site #OT020 was closed on of June 1, 1991.

Chemicals of Concern: Refer to OT009 and OT010.

Media Impacted: Sediment and Surface Water

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1985
ROD/DD – Complete 1991

Remedy Type: Not Applicable. Site was closed on June 1, 1991.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for FT021

Site Number: FT021

Site Name: Fire Training Area #1

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. Response is complete, and the site was closed in December 1999. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Fire Training Area #1, located on the west side of Tinker AFB, is bounded by Crutcho Creek to the south, Patrol Road to the east, a 3rd Combat Communications Squadron facility to the north, and Air Depot Boulevard to the west. In use from 1950 to 1962, the site was unlined pit and contained a gravel bottom. During Tinker AFB Fire Department training operations, water was first added to the pit to saturate the soils and to reduce infiltration into the soils below. Fuel and sometimes solvents were then poured on top of the water, ignited for training purposes and then extinguished using water and/or protein-based foam. After each exercise the residual liquids were allowed to soak into the soils. Investigations performed at the site showed that minimal contamination exists. An assessment determined that risks to the most exposed population are less than the maximum risk allowed under USEPA guidelines. A RCRA Facility Investigation (RFI) for soils was completed on September 30, 1997. A NFRAP was written and the site was closed on December 22, 1999. The site is contained within the boundary of the CG037 groundwater contamination study area; groundwater at the site will continue to be evaluated and monitored as part of CG037.

Chemicals of Concern: Solvents, particularly chlorinated solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI (RFI) Phase I – Complete 1992
ROD/DD – Complete 1992
RI (RFI) Phase II – Complete 1997
RC – Complete 1997
LTM – Complete 1999
SC - Complete 1999

Remedy Type: Long-Term Monitoring. Site was closed December 22, 1999.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for FT022

Site Number: FT022

Site Name: Fire Training Area #2

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. Response is complete, and the site was closed in September 2003. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: This training area is situated northwest of the control tower and north of Crutcho Creek in the south-central portion of Tinker AFB. During its operation from 1962 to 1966, the pit was used infrequently. Typically, water was first added to the pit to saturate the soils so that infiltration was reduced. Fuel and sometimes solvents were then poured on top of the water, ignited and extinguished using water and protein based foam. Residue was left in the pit to evaporate and infiltrate before the next training exercise. Monitoring well and soil boring sampling investigations determined that no toxicologically significant contamination exists in the soil at the site. A Decision Document (DD) was accepted on June 12, 1992 and the response action completed in September 20, 1992. A NFRAP document was submitted to ODEQ in September 2000 and a request for permit removal was made. Approval for permit removal was received and the site was closed on September 19, 2003. The site is contained within the boundary of the CG039 groundwater contamination study area. The groundwater at the site will continue to be evaluated and monitored as part of CG039.

Chemicals of Concern: Fuels and solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI – Complete 1992
ROD/DD – Complete 1992
RC – Complete 1992
LTM – Complete 2000
SC – Complete 2003

Remedy Type: None. Site was closed September 19, 2003.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT023

Site Number: OT023

Site Name: Facility 1123

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Facility 1123 also known as Building 1123 was located on the south side of the Base. The facility was used to store incoming materials and hazardous material drums containing flammable materials and solvents such as methyl ethyl ketone (MEK) and tetrachloroethene (PCE). Spills were reported to have occurred and a concrete floor was installed between 1984 and 1985, replacing the former dirt floor. Soil samples taken when the concrete floor was installed showed no contamination. Additional soil samples analyzed in March 1990 indicated contaminant concentrations were below established and approved soil screening levels. The building was removed, shortly thereafter, for the construction of the Navy runway approach project in the early 1990s. A no further action (NFA) decision document (DD) was prepared by the Air Force on June 28, 1991. The site is contained within the boundary of the CG039 groundwater contamination study area.

Chemicals of Concern: Solvents

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1985
SI – Complete 1985
ROD/DD – Complete 1991

Remedy Type: None. Site was closed on June 28, 1991.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for FT024

Site Number: FT024

Site Name: Fire Training Area #4

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: A Relative Risk Site Evaluation was not required, because it has been concluded that the site does not exist.

Site Description: In December 1987, Tinker AFB personnel discovered a drawing which identified an area approximately 300' x 225' in the southwest portion of the Base as a fire training area. It had not been identified during earlier record searches or investigations. This potential site was name Fire Training Area #4 and added to the Installation Restoration Program (IRP) list. An intensive records search followed which consisted of interviewing Base personnel, reviewing Base maps and aerial photographs and on-site reconnaissance. The search revealed that there was no additional evidence of any physical existence, construction or operation of Fire Training Area #4. The site was closed on August 25, 1990, and has been designated No Further Response Action Planned (NFRAP).

Chemicals of Concern: Not Applicable (N/A)

Media Impacted: N/A

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1987
ROD/DD – Complete 1990
SC – Complete 1990

Remedy Type: None. Site was closed August 25, 1990

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for RW025

Site Number: RW025

Site Name: Radioactive Waste Disposal Site 1030W

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: RCRA Cap Long-Term Care and No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: RWDS 1030W is located on Landfill 2 (SWMU-4) approximately 1,700 feet west and 550 feet north of Building 1030. Prior to capping of the landfill, RWDS 1030W was located in a depression and was mainly covered with vegetation. A drainage channel, which formerly ran across the site, was rerouted to the west, and the drainage channel was covered by the same material used for the landfill cap. Between 1951 and the early 1960's, radium paint solids were disposed of at this site. In April - June 1997, approximately 2150 cubic yards of contaminated soils were removed. The site was surveyed to ensure no residual radium 226 remained above the cleanup criteria. The pathways have been eliminated due to removal of the source material. Potential for human exposure to soils is unlikely since the contaminated soils have been removed, the entire landfill is covered by a RCRA cap, and the entire site is fenced.

Chemicals of Concern: Radium

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1982
IRA-C – Complete 1997
RI –Complete 1998
IRA-C – Complete 1998
IRA-O – Complete 1999
ROD/DD – Complete 1999

Remedy Type: Waste removal (soils) and RCRA cap long-term care

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for RW026

Site Number: RW026

Site Name: Radioactive Waste Disposal Site 2015

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: This site is located in the southern alcove of Building 201. This site was reported to contain radium paint solids and dials from the radium paint room previously located in Building 201. Material was probably placed at the site in the late 1950's. All potentially contaminated soil from the roughly 50 feet by 80 feet site was removed and disposed of in February/March 1996. Groundwater is located 15 foot below ground surface. No surface water is on the site, but surface drainage goes into the storm sewer system. The contamination was located primarily in the top two feet of soil which is vegetated. No radium has ever been found in any nearby groundwater monitoring wells, indicating no radioactive materials have migrated to the groundwater.

Chemicals of Concern: Radium

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1982
IRA-C – Complete 1996
RI –Complete 1998
ROD/DD – Complete 1999

Remedy Type: Waste Removal – soils

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for RW027

Site Number: RW027

Site Name: Radioactive Waste Disposal Site 62958

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: A Relative Risk Site Evaluation was not required, because no radiological contamination was found at this site.

Site Description: Radiological Waste Disposal Site 62598 is situated north of Crutcho Creek, west of Reserve Road, near Landfill 3 on the south end of Tinker AFB. Soils were excavated in July 1991 and no radiological contamination or waste was found. Because nothing was found, the potential risk from soils, water, and air migration pathways was eliminated. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radiological Waste Disposal Site 62598 (SWMU 21) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG038 groundwater contamination study area and groundwater will continue to be monitored as part of this area.

Chemicals of Concern: No radiological contamination found.

Media Impacted: N/A

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1982
SI – Complete 1982
RI – Complete 1990
ROD/DD – Complete 1991
LTM – Complete 1999

Remedy Type: Long-Term Monitoring-Complete 1999

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for RW028

Site Number: RW028

Site Name: Radioactive Waste Disposal Site 4000

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: A Relative Risk Site Evaluation was not required, because no radiological contamination was found at this site.

Site Description: Radiological Waste Disposal Site 4000 was thought to be located southeast of the intersection of Douglas Boulevard and SE 59th Street on off-Base property near Gate 29. In 1989, the U.S. Army Corps of Engineers reported that the existence of a radioactive waste site in active use in 1966 at this site is based solely on a verbal report from a Tinker AFB employee. No contamination could be found at the site. The site has been designated as closed with NFRAP. The site was closed June 1, 1991.

Chemicals of Concern: N/A

Media Impacted: N/A

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1990
ROD/DD – Complete 1991

Remedy Type: None

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for RW029

Site Number: RW029

Site Name: Radioactive Waste Disposal Site 1022E

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations and studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Radiological Waste Disposal Site 1022 East (1022E) is located northwest of Landfill 3 between Landfills 1 and 3. It was believed that radiological material (thorium objects and radium compass waste) was disposed of at the site in the 1950s. The site was excavated in June 1991 and one small aircraft part containing thorium was discovered. A final survey indicated no contamination at the site. A NFA request was approved by ODEQ on July 22, 1999 and the site was closed. Because ODEQ concurred with the NFA request, Radiological Waste Disposal Site 1022 East (SWMU 22) was removed from the RCRA Operations Permit on August 12, 2002. The site is contained within the boundary of the CG038 groundwater contamination study area and groundwater will continue to be monitored as part of that study area.

Chemicals of Concern: Thorium

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1982
RI – Complete 1990
ROD/DD – Complete 1991
LTM – Complete 1999

Remedy Type: Long-Term Monitoring (LTM) complete 1999

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for WP030

Site Number: WP030

Site Name: Pit Q-51 (a component of Operable Unit 1)

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Pit Q-51 was located within Building 3001 and was identified as an Installation Restoration Program (IRP) site following a fire in November 1984. Pit Q-51 is part of the Soldier Creek/Building 3001 National Priorities List (NPL) site, and is a component of Operable Unit 1. The pit was below-grade, constructed of concrete and was used to store liquids from the engine overhaul process. After the pit was taken out of service, sampling showed the pit contained about 45 gallons of water contaminated with small amounts of trichloroethene (TCE), cadmium, chromium and lead. A clean-up action involved removing the pit's contents, steam cleaning the pit and filling the pit with sand. The pit was then capped with concrete. The site was closed June 12, 1991. No Further Response Action Planned (NFRAP) has been accepted in the decision document (DD).

Chemicals of Concern: TCE, cadmium, chromium, and lead

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1985
SI – Complete 1985
RI – Complete 1988
FS – Complete 1990
ROD/DD – Complete 1990
RA-C – Complete 1990

Remedy Type: Waste Removal, Steam Clean and Cap

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT031

Site Number: OT031

Site Name: Bonnewell

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: A Relative Risk Site Evaluation was not required, because the site was combined with Site #OT005, and deleted from the Installation Restoration Program (IRP).

Site Description: Site #OT031 is located north of Building 3900 in the former Kimsey Addition, just north of the Base boundary perimeter fence. This site is addressed as part of the Soldier Creek Groundwater Operable Unit and as such was deleted as an IRP site on June 1, 1991. The site is designated NFRAP.

Chemicals of Concern: Not applicable (N/A) - See Site #OT005 Soldier Creek Groundwater Operable Unit

Media Impacted: N/A - See Site #OT005 Soldier Creek Groundwater Operable Unit

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1988
ROD/DD – 1991

Remedy Type: N/A - See Site #OT005 Soldier Creek Groundwater Operable Unit

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for ST032

Site Number: ST032

Site Name: 3700 Fuel Yard

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Located east of Building 3703, the 3700 Fuel Yard site has served as a jet fuel storage depot since the mid-1950s. In the past, both underground storage tanks (USTs) and above ground storage tanks (ASTs) have been used to store fuel at this site; however, the 3700 Fuel Yard is now only used as an AST facility. The USTs were installed in 1954 and each had a capacity of 25,000 gallons of JP-4 fuel. In 1990, an initial investigation of the site indicated significant soil contamination in the proximity of six USTs. The tanks were removed in 1991 along with 1500 cubic yards of fuel contaminated soil. In 1992, a one-year bioventing pilot test was performed at the site, and additional soil and groundwater investigations were performed in 1993. The investigations performed in 1991 and 1993 reported the occurrence of solvents and jet fuel contamination in the soil and groundwater. In 1994, a RCRA Facility Investigation (RFI) was performed to delineate the contaminant plumes. It was concluded that the solvent contamination was separate from the UST releases. The bioventing treatment was expanded in 1995 for remediation of the fuel contaminated soil. In March 1998 the bioventing system was turned off and the action was considered complete on April 7, 1998. The Oklahoma Corporation Commission (OCC) approved case closure on September 22, 1999; however, this closure is limited to only petroleum hydrocarbons in the soil. By 2004, the corrective measures study (CMS) at Building 3703 determined that the solvent contamination in the groundwater was likely from the leaks in the industrial waste lines and oil/water separator associated with Building 3703. A former waste evaporation basin, located just south of the 3700 Fuel Yard, is also a potential source of solvent contamination to the groundwater. The 3700 Fuel Yard site is contained within the boundary of the CG039 groundwater contamination study area. Long-term monitoring of the groundwater will continue as part of CG039.

Chemicals of Concern: Jet Fuel

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1990
SI – Complete 1993
RI (RFI) – Complete 1994
ROD/DD – Complete 1994
RD – Complete 1994
RA-C- Complete 1995
RA-O – Complete 1998
LTM – Complete 1999

Remedy Type: Bioventing for fuels in response to OCC

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for ST033

Site Number: ST033

Site Name: Area A Service Station

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC) for fuel compounds regulated by the Oklahoma Corporation Commission (OCC), with a remedy in place (RIP) for Oklahoma Department of Enviromental Quality (ODEQ) regulated compounds. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Located south of the original Building 414, the Area A Service Station served as a motor fuel station from 1942 until it closed in 1990. Four underground storage tanks (USTs) were used for leaded and unleaded mogas and gasoline as well as diesel fuel. All of the tanks were taken out of service by 1990. Soil and groundwater investigations conducted in 1990 and 1992 showed the presence of mogas contamination. A product recovery system was installed in 1992 to pump fuel from the groundwater. By 1996, the extent of soil contamination was delineated, the USTs were removed and the product recovery system expanded. Vacuum enhanced pumping (VEP) remediation began June 1997, and fuel product recovery was completed by 1999. The OCC approved site closure on December 18, 2000; however, this is limited to only petroleum hydrocarbons in soil and groundwater. A chlorinated solvent plume including trichloroethene (TCE) has been identified in the groundwater beneath the site. Area A was a former motor pool centered around Building 410 (now demolished) with a paint and chemical storage area located at former Building 415 (now demolished) within the ST033 site. The Area A Service Station Site is within the boundary of CG037 and is regulated under the authority of the ODEQ. The chlorinated solvent groundwater plume borders the Base boundary; therefore, the VEP system remains active to capture and control migration of the chlorinated compounds.

Chemicals of Concern: Fuels and chlorinated solvents, including TCE

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1990
SI – Complete 1993
RI –Complete 1995
ROD/DD – Complete 1996
RD – Complete 1997
RA-C – Complete 1998
RA-O – Complete 2007

Remedy Type: VEP

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for OT034

Site Number: OT034

Site Name: IWTP and SWTP Soils

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action – In Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy in Place (RIP) is mitigating risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Sanitary Wastewater Treatment Plant (SWTP) was constructed in 1942 for the principal treatment of domestic wastewater generated at Tinker AFB. During the 1950's, increasing amounts of industrial wastewater discharges were added to the SWTP. In the mid 1950's, Industrial Wastewater Treatment (IWTP) units were added to the plant. By the 1960's, a separate IWTP had been established at the plant with discharges to the SWTP. By 1972, both plants were completely separated with the IWTP treating concentrated waste stripping and electroplating solutions and the SWTP treating only domestic sewage. The wastewater treatment facility has processed numerous waste solutions over 52 years including cyanide solutions, paint stripping waste and solvents, acids, bases, electroplating solutions, and heavy metals. Numerous releases have been documented that are attributable to the site. The identified exposure pathway at this site is direct contact with contaminated soil or soil vapor. The human receptors are personnel employed at the site who could be exposed to soil contamination. The former industrial waste sludge drying beds were demolished in 2000, and a vacuum enhanced pumping (VEP) system was put into operation to capture both soil vapor and groundwater associated with the sludge beds. The former industrial waste tanks D-1 and D-2 were removed in 2001. The SWTP was decommissioned in 2001, with demolition and removal completed in 2002. The VEP system was expanded in 2003 and 2004 to recover contaminant sources beneath the former D-1 and D-2 tanks. Groundwater beneath this site is addressed under the IWTP Groundwater Operable Unit.

Chemicals of Concern: Metals, chlorinated solvents including trichloroethene (TCE), polycyclic aromatic hydrocarbons (PAHs), and phenolic compounds

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestone:

PA – Complete 1985
SI – Complete 1985
RI – Complete 1996
IRA-C – Complete 2000
FS – Complete 2004
IRA-O – Complete 2004
ROD/DD – Complete 2004
RA-O – In Progress 2004-2013
LTM – 2014-2018

Remedy Type: Soil vapor extraction by means of VEP.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for WP035

Site Number: WP035

Site Name: Discharge Ditch, Bldg 17, Soils and Pad

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: Located in the north-central section of Tinker AFB, Building 17 was constructed in the 1950s as a paint shop. Over the years, various paints and solvents were stored outside in a paved and fenced area adjacent to the facility. The paved area drained to a storm water culvert on the southwest corner of the site. During remediation of the site in August 1992, the concrete pad and soils under the storage area were removed and an extensive survey found no contamination. The site was closed September 29, 1992. The site is designated as finished with NFRAP. The site was removed from the RCRA Operations permit issued on August 12, 2002.

Chemicals of Concern: Paints and solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:
PA – Complete 1989
SI – Complete 1989
RI –Complete 1992
RA-C – Complete 1992
ROD/DD – Complete 1992

Remedy Type: Concrete and soil removed. RC September 1992. Site Closed (SC).

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for WP036

Site Number: WP036

Site Name: Purge Facility/Turnaround Soils

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: No Further Response Action Planned (NFRAP)

Current Relative Risk to the Environment: The investigations/studies milestones are complete. The remedial response is complete (RC). The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The original configuration of the Fuel Purge Area (FPA) was in operation from 1975 through 1990. The sytem was renovated and upgraded in the early 1990s to meet stricter environmental standards and remains in operation. Waste fuels (JP-4 and JP-5) were drained from aircraft in the maintenance facility and transported by truck to the FPA for disposal. The original FPA consisted of a 6 foot x 8 foot x 2 foot deep metal bunker located on-Base soil. The bunker was elevated about 1.5 foot above ground surface and was equipped with a steel ramp to accommodate trucks which were connected to the bunker via hoses for dumping. The bunker was connected by a steel pipe line to two aboveground storage tanks also on-Base soil approximately 310 feet south of the bunker. Fuel dumped into the bunker was allowed to gravity feed to the holding tanks. Approximately 1/3 of the pipe line was buried. Fuel contamination appears to be confined to the soils at the site. Because workers in the area may receive some exposure to the surface and subsurface soils, a bioventing system was installed in 1998 to eliminate free product fuel contamination in the soil. Oklahoma Corporation Commission (OCC) regulatory cleanup levels were attained using bioventing, and site closure was approved by the OCC in October 1999. Also, chlorinated solvents have been detected in the groundwater beneath and south of the site, but are not considered attributable to the FPA. The site is contained within the boundary of the CG039 groundwater management unit. Groundwater monitoring will continue within CG039.

Chemicals of Concern: Fuels

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1991
SI – Complete 1992
RI –Complete 1996
IRA-C – Complete 1996
FS – Complete 1999
IRA-O – Complete 1999
ROD/DD – Complete 2001

Remedy Type: Bioventing

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for CG037

Site Number: CG037

Site Name: Northwest Groundwater Management Unit

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy is in Place (RIP) to mitigate risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Northwest Contaminated Groundwater Management Unit is a geographic region located in the northwest quadrant of Tinker AFB. It was defined for the purpose of monitoring groundwater contaminated by various localized sources. Based on contaminant distribution and type, this groundwater management unit underlies an area where small quantities of chlorinated solvents were used over a long period of time. Chlorinated solvents were probably used for cleaning equipment, trucks and airplanes, and then released to the environment through leaking tanks and lines. Potential pathways originally included groundwater to water supply wells (Base wells and Midwest City wells to the west and northwest). Potential for human exposure to contaminated groundwater in this area exists because Tinker AFB, and nearby Midwest City, and Del City derive or supplement their water supplies from the Garber-Wellington Aquifer (Class II).

Chemicals of Concern: Chlorinated solvents, including trichloroethene (TCE)

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:

PA– Complete 1982
SI – Complete 1985
RI – Complete 2001
FS – Complete 2003
ROD/DD – Complete 2004
IRA-O – Complete 2004
RA-O – In Progress 2004-2011
LTM – 2011-2014

Remedy Types: Monitored natural attenuation (MNA) of groundwater plumes, groundwater and/soil vapor extraction (SVE) with treatment via vacuum enhanced pumping (VEP) at the localized contaminant sources within CG037, institutional controls (ICs) sitewide

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for CG038

Site Number: CG038

Site Name: Southwest Groundwater Management Unit

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - in Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy is in Place (RIP) to mitigate risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The Southwest Groundwater Management Unit encompasses four landfills (1942-1968) with several sludge disposal pits, a fire training area (1950-1970), a sewage impoundment (1954-1970), and a radioactive waste disposal site (1951-1960s). Wastes include general refuse, industrial and sanitary wastes, and low level radioactive waste. Groundwater contaminants are principally solvents, including trichloroethene (TCE), and metals. Multiple sites are located in close proximity to one another. Groundwater over a large area under this management unit is contaminated. Potential for human exposure to contaminated groundwater in this area exists. The principal pathway is groundwater to off-Base down gradient private water supply wells. Most of these wells intersect the same hydrogeologic units as the contaminated units on-Base. Though lower in probability, a potential pathway of migration to nearby streams also exists.

Chemicals of Concern: Chlorinated solvents (including TCE) and metals (including hexavalent chromium)

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
IRA-C – Complete 1999
RI –Complete 2002
IRA-C – Complete 2002
FS – Complete 2004
ROD/DD – Complete 2005
RD – Complete 2005
IRA-O – Complete 2005
RA-C – Complete 2005
IRA-O – Complete 2005
RA-O – In Progress 2005-2018
LTM – 2018-2023

Remedy Type: Groundwater pump and treat (P&T), a permeable reactive barrier (PRB), various “hot spot reduction” techniques, and alternate water supply/ treatment

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for CG039

Site Number: CG039

Site Name: East Groundwater Management Unit

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - In Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy is in Place (RIP) to mitigate risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: The East Groundwater Management Unit encompasses Waste Pit-1 (1947-1958), Waste Pit 2 (1958-1965), Landfill 5 (1968-1970), a truck maintenance facility (since 1957), a fire training area (1962-1966), a former waste evaporation basin, fuel sites, and an assortment of other industrial buildings. The waste pits received unspecified waste from plating and maintenance facilities. Principal groundwater contaminants are fuel and chlorinated solvents, including trichloroethene (TCE). The primary pathway is groundwater to Base drinking water supply wells. Five such wells are found within this area. Potential for human exposure to contaminated groundwater in this area exists because Tinker AFB derives its water supply from the Garber-Wellington Aquifer (Class II).

Chemicals of Concern: Fuels and chlorinated solvents, including TCE

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1982
SI – Complete 1985
RI – Complete 2004
FS – Complete 2006
ROD/DD – Complete 2006
RD – Complete 2006
IRA-O – Complete 2006
RA-C – Complete 2006
RA-O – In Progress 2006-2022
LTM – 2022-2027

Remedy Type: Monitored natural attenuation (MNA) of groundwater plumes, Institutional Controls (ICs) sitewide, groundwater extraction and soil vapor extraction (SVE) with treatment via vacuum enhanced pumping (VEP) at localized contaminant sources within CG039

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for CG040

Site Number: CG040

Site Name: Gator Facility Groundwater Management Unit

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Action - In Operation (RA-O)

Current Relative Risk to the Environment: The investigations/studies milestones are complete, and the Remedy is in Place (RIP) to mitigate risk to the environment. The pre-remedy Relative Risk Site Evaluation has been resolved, and is no longer applicable.

Site Description: This facility has been used since the 1950's for a training site for mobile communications groups. The contamination probably originated from spills that occurred during training exercises and possibly from the lateral lines of a septic tank. An identified pathway is groundwater to private wells that intersect contaminated aquifer zones. A potential pathway is surface water which is recharged by the groundwater. Potential for human exposure to contaminated groundwater in this area exists. Nearby residents derive their water supplies from the Garber-Wellington Aquifer (Class II). In addition, local residents may become potential receptors by swimming in nearby ponds, and livestock may be exposed by drinking from the ponds.

Chemicals of Concern: Chlorinated solvents, including trichloroethene (TCE)

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – Complete 1994
SI – Complete 1995
IRA-C – Complete 2000
RI – Complete 2003
FS – Complete 2006
ROD/DD – Complete 2006
IRA-O – Complete 2006
RA-O – In Progress 2006-2010
LTM – 2010-2015

Remedy Type: Groundwater pump and treat (P&T) (includes two French drains and a single extraction well along with air stripper treatment of volatile organic compounds), along with institutional controls (ICs)

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for CG041

Site Number: CG041

Site Name: AWACS Sector Groundwater Management Unit

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: High

Site Description: Site CG041 is in the north central portion of Tinker AFB and includes impacted groundwater beneath the tarmac and taxiways south of Building 230. There are two large chlorinated solvent plumes at CG041. One is largely under the industrial buildings on the north side of CG041, while the other is on the southern border of CG041, underneath the tarmac and taxiways. For the northern plume, suspected sources of the contamination include: 1) underground storage tanks (USTs) containing unknown materials that were located adjacent to the former Building 267 (a demolished auto maintenance shop), 2) former Building 227 (a demolished motor repair shop), 3) a formerly abandoned waste tank containing miscellaneous contaminated oil (Tank 226) located near the former Building 228, 4) two 50,000 gallon USTs formerly located under the southwest corner of Building 289, and 5) potential leaks and breaks in the industrial waste lines in the vicinity of Building 289. For the southern plume, historical solvent usage on the tarmac from the 1940s to the 1970s is the suspected source.

Chemicals of Concern: Chlorinated solvents

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:
PA – 2010
SI – 2010
RI (RFI) – 2011
FS/CMS – 2012
RD/RA – As needed

Remedy Type: To Be Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for CG042

Site Number: CG042

Site Name: Former BX Service Station

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: Medium

Site Description: Contaminated groundwater management unit CG042 is located in the west-central portion of Tinker AFB. Site CG042 is bounded on the north by Arnold Street, on the south by the open area north of Building 773, on the east by "L" Street, and on the west by Air Depot Boulevard. This site includes the chlorinated solvent groundwater plume near the current location of the Base Exchange (BX) Service Station. The source of the chlorinated solvent contamination is not certain, but a review of historical information shows numerous facilities in this area during the 1940s and 1950s, including a laundry facility, motor repair shop, wash racks, and gasoline filling station. Fuel releases occurred at this site, and cleanup was conducted by Tinker AFB under the regulatory authority of the Oklahoma Corporation Commission (OCC). The fuel release case was closed in September 2006. Vacuum enhanced pumping (VEP) was the remedy employed for fuel contaminant cleanup of the vadose zone and upper saturated zone (USZ) groundwater, and groundwater pump and treat was the remedy used for fuel contaminants in the lower saturated zone (LSZ).

Chemicals of Concern: Chlorinated solvents, including trichloroethene (TCE)

Media Impacted: Groundwater

Schedule of Regulatory and Corrective Milestones:
PA – 2010
SI – 2010
RI (RFI) – 2011
FS/CMS – 2012
RD/RA – As needed

Remedy Type: To Be Determined for chlorinated solvent remediation

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT058

Site Number: OT058

Site Name: Building 3703

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Interim Remedial Action in place (IRA-O)

Current Relative Risk to the Environment: High

Site Description: Building 3703 is located within contaminated groundwater management unit CG039. This site is in the eastern portion of Tinker AFB, on Turbine Drive between East Drive to the west and Cells Road on the east. Building 3703 serves to mechanically test and service rebuilt jet engines and after-burners prior to redeployment. Wastewater associated with jet engine testing and cleaning is discharged to the industrial wastewater collection system. Building 3703 was constructed in 1951 and originally included four test cell chambers. Subsequently, four additional chambers were added. Currently, all eight jet engine test cell (JETC) chambers are operational. Presently, jet propulsion fuel (JP-5) is the most commonly used fuel for engine testing, and it has been reported that leaks have occurred in the past. Chlorinated solvents, such as trichloroethene (TCE), were reportedly used in the past as part of cleaning the jet engines. Leaks in the industrial waste collection system have resulted in tetrachloroethene (PCE) and TCE contaminated soil, and groundwater. High concentrations of TCE have been observed in monitoring wells directly south of OT058, and probably result from other sources in the area such as the former industrial waste evaporation basin. A multi-phase vacuum extraction system is currently in use as an interim remedy for vapor removal and dissolved fuel and solvent recovery. The system has been active since 2002.

Chemicals of Concern: Chlorinated solvents, including PCE and TCE

Media Impacted: Soil and groundwater

Schedule of Regulatory and Corrective Milestones:

RI (RFI) – Complete 2002	FS/CMS – Complete 2005
IRA-C(ICM) – Complete 2001	ROD/DD – 2011
IRA-O (ICM) – 2002-Present	RD/RA – As needed

Remedy Type: The current interim remedy is vacuum extracton.

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT062

Site Number: OT062

Site Name: Building 230

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Interim Remedial Action in place (IRA-O)

Current Relative Risk to the Environment: High

Site Description: The Building 230 site is in the north central portion of Tinker AFB. The site is subject to restricted access. The building has four large hangar bays, three stories of administration, and several support facilities. Building 230 was a central repair hangar during World War II. Industrial processes have included aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance along with laboratory testing. There is an extensive network of industrial waste water lines that parallel the north side of Building 230 and are aligned north-south beneath the building. Chemical releases to the environment have occurred from leaks in sumps and the industrial waste water drain lines at Building 230 as well as from other sources. The underlying soil and groundwater have been impacted. Soil vapors have accumulated beneath the floor slab from contaminant sources. Vacuum enhanced pumping (VEP) was initiated as an interim corrective measure (ICM) in May 2005. The VEP system uses wells and horizontal screens to remove and treat contaminated groundwater and vapors from the north and west sides of Building 230. There is no scheduled shut-off date for the VEP ICM. A trichloroethene (TCE) plume occurs on the east side of Building 230 in the upper saturated zone (USZ). The source of the plume may be former UST 231, a 12,000 gallon tank which contained mixed de-icing fluids near former Building 248.

Chemicals of Concern: Benzene, toluene, ethylbenzene, xylene (BTEX), carbon tetrachloride, cis-1,2-dichloroethene, Freon 113 (1,1,2-trichloro-1,2,2-triflouroethane), methane, methyl ethyl ketone (MEK), TCE, and vinyl chloride

Media Impacted: Soil and groundwater

Schedule of Regulatory and Corrective Milestones:

RI (RFI) – Complete 2004	FS/CMS – Complete 2006
IRA-C(ICM) – Complete 2005	ROD/DD – 2011
IRA-O (ICM) – 2006-Present	RD/RA – As needed

Remedy Type: VEP is the current ICM for soil and groundwater remediation

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT063

Site Number: OT063

Site Name: Building 240

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Investigation (RI) as a RCRA Facility Investigation (RFI)

Current Relative Risk to the Environment: Medium

Site Description: Building 240 is located in the north-central portion of Tinker AFB, on the southern end of "A" Avenue. Building 240 was constructed in 1942 and originally served as a flight test center for repaired aircraft. Various industrial activities have been performed at OT064 including: aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance. Building 240 was also the flight planning and dispatch section of base flight operations. In the past, chlorinated solvents were used in degreasing activities at Building 240. Currently, Building 240 is an active aircraft maintenance hangar and provides operational support for the airfield. A UST located northwest of the center of Building 240 was constructed in 1942 and was used to store fuel for an emergency generator. A RFI was completed in 2008 indicating no restrictions on land use; however, there is concern that tetrachloroethene (PCE) vapors may intrude into Building 240. The next phase of response for Building 240 will include sufficient evaluation of the site to either reach a NFA determination or complete additional action(s).

Chemicals of Concern: Chlorinated solvents, including PCE

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:
RI (RFI) – Phase I Completed 2008
RI (RFI)/FS (CMS) – Phase II – 2011
ROD/DD – 2012
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT064

Site Number: OT064

Site Name: Building 210

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Remedial Investigation (RI) as a RCRA Facility Investigation (RFI), Interim Remedial Action in place (IRA-O)

Current Relative Risk to the Environment: High

Site Description: Site #OT064 is located in the north-central area of the base and consists primarily of Building 210, along with Building 213, an unpaved grassy area, and a parking lot. The site is located north of First Street between "B" and "C" Avenues. Building 210 was constructed in 1942 and was used to refabricate and overhaul hydraulic and pneumatic control systems. The building included a paint shop, parts cleaning area, machine shop, test cells, and instrument repair area. Activities at Building 210 required the extensive use and storage of fuels, lubricants, and degreasing solvents. In addition, mercury filled manometers and temperature/pressure controls were used in the former test cells. In 2003-2004, approximately 90% of the building was demolished and removed. Most of the former Building 210 is now a paved parking lot. The northeast corner of the former Building 210 remains intact and contains a compressor room which serves a repair and maintenance facility that is located directly north in Building 200, which was constructed in 2003. The site also includes Building 209 (now demolished) which was used for reclaimed cleaning fluid storage, as well as UST 211, a 7,000 gallon tank which contained solvents from 1960-1963. Groundwater in the vicinity of the current Buildings 200, 208, and 213 is contaminated with solvents and undergoing treatment as part of Installation Restoration Program (IRP) Site #ST007, which includes soil vapor and groundwater extraction by means of vacuum enhanced pumping (VEP). However, there is concern that chlorinated solvent vapors may intrude into Building 210 and the other nearby buildings. An additional VEP well was added at the northern boundary of the site (near Building 200) in 2008. The next phase of response for Building 210 will include a Phase II RFI to determine the areal extent of VOC contamination at the site and impacts to adjoining facilities (e.g. Building 200).

Chemicals of Concern: Chlorinated solvents, including trichloroethene (TCE) and tetrachloroethane (PCE)

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

IRA-C (ICM) Complete 1998	RI (RFI)/FS (CMS) Phase II – 2011
IRA-O (ICM) 1999-Present	ROD/DD - 2012
RI (RFI) – Phase I Completed 2008	RD/RA – As needed

Remedy Type: Current IRA-O is VEP for soil vapor and groundwater.

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for OT065

Site Number: OT065

Site Name: Buildings 283, 284 and 296

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: High

Site Description: OT065 is located in the north-central portion of Tinker AFB and consists of three buildings: Building 283 (Flight Simulator Training Facility & 552nd Squadron Operations Facility), Building 284 (Data Processing and AWACS Training Facility), and Building 296 (AWACS Supply Warehouse). Past waste streams associated with OT065 include fuels (i.e., JP-4, JP-5, JP-8, and motor gasoline) and photographic developer waste from Building 283. Wash racks were used during the 1940s-50s just south of Building 283, and a radar repair shop (Building 282, now demolished) was located east of Building 284. Also, a motor maintenance/repair shop was located in Building 227 (now demolished). In 1992, during the construction of Building 296, it was discovered that jet fuel was leaking from a JP-4 transfer line. Subsequently, the leaking JP-4 transfer line was cleaned of the remaining fuel and abandoned in place. The abandoned JP-4 transfer line runs north-south under the eastern portion of Building 296. Several other utility lines run under the east side of Building 296, including the main Tinker AFB industrial waste water line and a fuel distribution line. Benzene has also been detected, which is likely associated with a JP-4/JP-8 fuel line in the area that has been taken out of service. Underground storage tanks (USTs) were formerly located south of Building 296 that may have contributed to the fuel releases. Just upgradient of this site, two USTs near the former Building 236 were used to store solvents. The suspected source of the solvents is past releases from leaking industrial waste lines and possibly USTS at or near these buildings. A subslab soil gas sample collected at Building 296 in 2009 revealed a trichloroethene (TCE) concentration of 7630 parts per billion by volume.

Chemicals of Concern: Fuels and chlorinated solvents, including TCE

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:

PA – 2010
SI – 2010
RI (RFI) – 2011
FS/CMS – 2012
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT066

Site Number: OT066

Site Name: Building 2110

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: A relative risk site evaluation (RRSE) has not been conducted.

Site Description: Site #OT066 is the fuel truck maintenance facility (FTMF) AOC ands has been in operation since 1957. It includes an area potentially affected by suspected releases from the Building 2110 oil/water separator (OWS), which may have affected associated groundwater and soil. During construction operations at Building 2110 in November 1990, soil and water contamination were discovered under the concrete floor. A RCRA Facility Investigation (RFI) for the soils was conducted at Building 2110 between 1993 and 1994. Contaminants within the soils consist of petroleum hydrocarbons including benzene, toluene, ethylbenzene, and xylene (BTEX) and chlorinated compounds typical of degreasers (acetone, chlorobenzene, and tetrachloroethene [PCE]). The 1994 RFI determined that these contaminants were released to the soils from the floor drain of Building 2110. The RFI contended that contamination attributed to the FTMF is limited to the upper 15 feet of soils and does not extend down to the water table. Chlorinated solvent groundwater contamination occurs in the upper saturated zone (USZ) west/northwest of Building 2110 and has extended underneath the building. The 1994 RFI contends that the PCE and trichloroethene (TCE) contamination detected in the groundwater beneath the FTMF does not appear to be attributable to the FTMF. Further, the RFI states that the contamination present within the groundwater beneath the FTMF appears to have come from a source upgradient of the FTMF based on the direction of groundwater flow and the lateral distribution of contaminant concentrations in the wells. To date the source of the groundwater contamination has not been validated. The site is contained within the boundary of the CG039 groundwater monitoring unit and groundwater will continue to be evaluated and monitored as part of CG039.

The site was removed from the RCRA Operations Permit issued on August 12, 2002. Around 2004, a fuel leak from the OWS to the soil was observed. Soil around the OWS was removed so that the leak could be repaired, but there are no records of any remediation or sampling to determine the completion of the soil removal action. A facility inspection was completed in August 2009 and Site #OT066 was placed in the CRP in 2010. Since the site was removed from the RCRA permit, a Statement of Basis for no further action (NFA) will be prepared. A relative risk determination will be performed at the same time to ensure NFA is the proper determination.

Chemicals of Concern: Fuels and chlorinated solvents

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:
RI/RFI – 1994
ROD/DD – 2011
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

FACT SHEET for OT067

Site Number: OT067

Site Name: Building 2101

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: A relative risk site evaluation (RRSE) has not been conducted.

Site Description: Building 2101 was built in the 1940s as the original location of the motor pool. The building is scheduled for demolition in 2011. Solvents and fuels are the contaminants of concern because of the nature of the motor pool operations including parts degreasing. Leaks are suspected in the industrial waste lines around and beneath Building 2101, and the waste lines are a potential source of groundwater contamination. Immediately west and south of the site, chlorinated solvent plumes including trichlorothene (TCE) exist in the upper saturated zone (USZ) of the Garber-Wellington Aquifer (Class II). The focus of the remedial response at this site is the soils; however, potential impacts to the geoundwater will be delineated. Site #CG039 addresses the contaminated groundwater since the building overlies this site. A RCRA Facility Assessment (RFA) or Preliminary Assessment/Site Investigation (PA/SI) will be conducted to identify fuel releases into the soil and groundwater, then determine the relative risk at this site.

Chemicals of Concern: Chlorinated solvents, including TCE

Media Impacted: Soil and Groundwater

Schedule of Regulatory and Corrective Milestones:
PA – 2011
SI – 2011
RI (RFI) – 2012
FS/CMS – 2013
ROD/DD - 2014
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT068

Site Number: OT068

Site Name: North Apron Fuel Hydrant System

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: A relative risk site evaluation (RRSE) has not been conducted.

Site Description: Site #OT068 (also known as Phillips Hydrant System #66230, Replaced Fuel Hydrant System, and SS-C504) is in the north-central portion of Tinker AFB. The fuel hydrant system area is within CG041. The Phillips Hydrant System is an underground fueling system used to deliver fuels to airplanes on the tarmac at Tinker AFB. The fuel hydrant system is constructed beneath the tarmac and extends eastward from Building 260 to a point approximately 500 feet south of the center of Building 230. Prior to system upgrades conducted in 1992, fuel releases from the hydrant system were detected when fuel would seep to the surface between the joints in the concrete of the tarmac. At least six fuel releases from the hydrant system have been reported. The line was repaired, but there is no information available concerning the removal of contaminated soil and no groundwater monitoring wells exist within approximately 500 ft of the repair. A RCRA Facility Assessment (RFA) or Preliminary Assessment/Site Investigation (PA/SI) will be conducted to identify fuel releases into the soil and groundwater, then determine the relative risk at this site.

Chemicals of Concern: Fuels

Media Impacted: Soil and groundwater

Schedule of Regulatory and Corrective Milestones:
PA – Complete 2011
SI – Complete 2011
RI (RFI) – 2012
FS/CMS – 2013
ROD/DD - 2014
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for OT069

Site Number: OT069

Site Name: Buildings 2121 and 2122

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification for Building 2121, RA-O for Building 2122

Current Relative Risk to the Environment: Relative risk site evaluation (RRSE) has not been conducted.

Site Description: Buildings 2121 and 2122 are hangars located in the southeast quadrant of Tinker AFB. Aircraft maintenance has been conducted in both buildings since the early 1940s. Solvents and stripping agents have been used in both buildings. More recently Building 2121 has been used for non-chemical maintenance operations; however, Building 2122 is still one of the main hangars for paint stripping operations using a variety of solvents. Products containing dichloromethane, phenol, monoethanolamine, and chromic acid were still in use in 2001. Degradation in caulking in the floor expansion joints has resulted in approximately 3/4-inch gaps open to the subgrade adjacent to the wastewater collection trenches. The solvents and wastewater have been observed to migrate through the expansion joints to the subgrade. As a result, this site has potential environmental issues related to soil contamination and vapor associated with releases from these buildings. Installation Restoration Program (IRP) Site #CG039 addresses the contaminated groundwater since the building overlies this site. A RCRA Facility Assessment (RFA) or Preliminary Assessment/Site Investigation (PA/SI) will be conducted at Building 2121 to identify releases into the soil and groundwater, then determine the relative risk at this site.

Chemicals of Concern: Chlorinated solvents

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:

SI/RFI – 2000 (Building 2122)	SI –2010 (Building 2121)
Supplemental SI/RFI – 2002 (Building 2122)	RI/RFI – 2011 (Building 2121)
CMS – 2003 (Building 2122)	FS/CMS – 2012 (Building 2121)
RA-C – 2004 (Building 2122)	ROD/DD – 2013 (Building 2121 and 2122)
PA – 2010 (Building 2121)	RD/RA – As needed

Remedy Type: Joint Seaslants for Building 2122; Not Determined for Building 2121

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for VI080

Site Number: VI080

Site Name: Building 3105

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: Relative risk evaluation has not been conducted.

Site Description: Buildings 3102, 3105, and 3108 are used for aircraft maintenance, including mechanical sanding, calibration of hydraulic fuel pumps, and maintaining electrical systems. These buildings are located approximately 700 feet east of the North-South Runway between West Drive and the southern extent of Building 3001. Building 3105 is suspected to have leaking drain lines; however, the contamination may also be an extension from sources beneath Building 3001. A trichlorothene (TCE) groundwater plume immediately downgradient of Building 3105 has concentrations up to 1,180 parts per billion. The groundwater is addressed as part of the Soldier Creek/Building 3001 National Priority List (NPL) site.

Chemicals of Concern: Chlorinated solvents, including TCE

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:
PA –2010
SI –2010
RI (RFI) – 2011
FS/CMS – 2012
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

FACT SHEET for VI081

Site Number: VI081

Site Name: Building 2210

Installation: Tinker Air Force Base

Current Site Phase/Status of Corrective or Remedial Action: Discovery/Notification

Current Relative Risk to the Environment: Relative risk site evaluation has not been conducted.

Site Description: Building 2210 is an aircraft maintenance facility located approximately 200 feet east of East Drive, and directly north of the airfield ramp boundary. Leaking drain lines beneath the building resulted in the release of chlorinated solvents. Groundwater TCE concentrations under the building are estimated to be 50-700 parts per billion (based on groundwater sampling around the building and groundwater isopleths). This site includes contaminant releases from Building 2210 to soil. The groundwater is addressed as part of the CG039 groundwater management unit.

Chemicals of Concern: Chlorinated solvents including TCE

Media Impacted: Soil

Schedule of Regulatory and Corrective Milestones:
PA – 2010
SI – 2010
RI (RFI) – 2011
FS/CMS – 2012
ROD/DD – 2013
RD/RA – As needed

Remedy Type: Not Determined

Responsible Organization/MAJCOMM: AFMC

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX J

RELATIVE RISK SITE EVALUATIONS (RRSEs)

APPENDIX J
RELATIVE RISK SITE EVALUATION

The Department of Defense (DoD) has implemented the relative risk site evaluation (RRSE) (DoD 1997) process as a way to categorize sites based on their relative risk to human health and the environment. Sites were categorized into three relative risk groups (High, Medium, or Low) based on an evaluation of contaminant risk from groundwater, surface soils, surface water/sediment and soil gas. The RRSE is not a substitute for a baseline risk assessment, nor is it a means of placing sites into a "no further action" category. The evaluation is only a tool for the DoD to prioritize known requirements such as remedial investigations or cleanup actions. The purpose of the RRSE is to use common standards and rating definitions to ensure uniform site categorization so that sites that pose the most risk to human health and the environment are prioritized for restoration work. RRSEs are not required for sites with remedies in place or for sites classified as response complete (i.e., no further action with the possible exception of long-term monitoring).

The RRSE methodology uses three factors to evaluate the relative risks posed by a site: 1) contaminant hazard, 2) migration pathway, and 3) receptor. The three factor ratings are combined to determine an environmental impact potential of High, Medium, or Low for groundwater, soil, surface water/sediment and soil gas. An overall category of High, Medium, or Low is then assigned for the site based on the highest medium-specific rating. A detailed description of the methodology is discussed below.

DoD guidance does not list soil gas as an environmental concern for site evaluations. However, vapor intrusion has recently become a significant pathway of concern. Therefore, soil gas was included as part of the RRSE for sites when data was available.

CONTAMINANT HAZARD FACTOR

The contaminant hazard factor (CHF) is based on the concentrations of contaminants known to be at the site. The maximum detected concentrations in groundwater, soil, surface water/sediment and soil gas are compared to USEPA (2009) residential Regional Screening Levels (RSLs). The residential RSLs are risk-based concentrations that are designed to be protective of residential exposures at a site, assuming a target hazard index of 1 and a target cancer risk of one in 1,000,000 (i.e., 1×10^{-6}). However, for use in the RRSE process, the cancer-based RSLs are adjusted to be protective of a risk of one in 10,000 (i.e., 1×10^{-4}) based on "the remedial action threshold for carcinogens defined in the Preamble to the National Oil and Hazardous Substance Pollution Contingency Plan (55 Federal Register 8716, March 8, 1990)" (DoD 1997). Note that the RSLs have replaced the USEPA Region 3 Risk-Based

Concentrations, USEPA Region 6 Human Health Medium-Specific Screening Levels, and the USEPA Region 9 Preliminary Remediation Goals.

The RSLs were derived following USEPA (2009) guidance using toxicology information from the following hierarchy of sources:

1) USEPA's Integrated Risk Information System on-line database;
2) USEPA's Provisional Peer Reviewed Toxicity Values;
3) Agency for Toxic Substances and Disease Registry's Minimal Risk Levels;
4) Office of Environmental Health Hazard Assessment's Toxicity Criteria Database;
5) USEPA's Health Effects Assessment Tables.

For soil gas, the residential air RSLs (after adjusting the target risk as described above) are divided by the USEPA (2002) default attenuation factor of 0.1 to provide a health protective risk-based screening level. An attenuation factor of 0.1 assumes that one tenth of the contaminants found in soil gas will migrate into the air in the overlying building.

The CHF is categorized as *significant*, *moderate* or *minimal*, based on the sum of the ratios of the maximum detected concentrations to the modified RSLs. The CHF is categorized as *significant* if the sum of the ratios exceeded 100, *moderate* if the sum of the ratios is from 2 to 100, and *minimal* if the sum of the ratios is less than 2.

Groundwater, soil, surface water/sediment and soil gas data used to derive the CHF are obtained from representative sampling and analysis data. For groundwater, this includes only the most recent year of groundwater monitoring results. Total petroleum hydrocarbons were not included in the analysis; only specific petroleum constituents were listed and evaluated.

MIGRATION PATHWAY FACTOR

The migration pathway factor qualitatively evaluates whether contaminants have migrated, or have the potential to migrate, away from their source(s) at the site. The migration pathway factor is categorized as *evident*, *potential*, or *confined.*

The migration pathway factor is categorized as *evident* when data from the site indicates one of the following:

1) contamination is moving, or has moved away, from the source area; or
2) contamination is present at, moving toward, or has moved to a point of exposure.

The migration pathway factor is categorized as *potential* when data from the site indicates for one or more of the following:

1) contamination has moved only slightly beyond the source area (i.e., tens of feet);
2) contamination could move but is not noticeably moving; or

3) insufficient information is available to categorize the migration potential of contaminants at the site as either *evident* or *confined.*

The migration pathway factor is categorized as *confined* when data from the site indicates one of the following:

1) there are no complete exposure pathways at the site; or
2) the potential for contaminant migration from the source is limited due to physical barriers to migration. For groundwater, such barriers can include hydraulic barriers or confining clay layers. For soils, vapor barriers, clay layers, or extremely low rainfall can prevent migration.

RECEPTOR FACTOR

The receptor factor qualitatively evaluates the likelihood that human receptors may be exposed to contaminants at the site. Information from recent site investigations and site history are used to determine if human receptors are exposed, or potentially exposed, to contamination. Human receptors evaluated in the RRSE are residents, non-intrusive workers, and intrusive workers. The likelihood of receptors being exposed to contaminants in soil or groundwater or from soil gas is categorized as *identified*, *potential*, or *limited*.

The receptor factor is classified as *identified* when one of the following conditions is met:

1) Soils/Soil Gas and Surface Water/Sediment: People reside, work, recreate, or attend school or daycare in the area of contamination.
2) Groundwater: A currently used water supply well has been impacted by contamination released at the site, or is likely to be impacted by contamination within a reasonable timeframe.

The receptor factor is classified as *potential* when one of the following conditions is met:

1) Soils/Soil Gas and Surface Water/Sediment: There are no workplaces, residences, schools, or daycare centers in the area of contamination, but access is not restricted.
2) Groundwater: There are no impacted water supply wells downgradient from the source, but the groundwater is currently or potentially usable for drinking water, irrigation, or agriculture.

The receptor factor is classified as *limited* when one of the following conditions is met:

1) Soils/Soil Gas and Surface Water/Sediment: It is unlikely that humans will come into contact with the contaminated soil, sediment, or surface water. This would be appropriate when the migration pathway factor is categorized as *confined*. For example, at a site with soil contamination under asphalt or pavement, the receptor factor for soils would be categorized as *limited*.
2) Groundwater: There is no potentially impacted groundwater supply well downgradient from the source, groundwater is not considered to be a potential source of drinking water, and it is of limited beneficial use.

SITE CATEGORIZATION

For each medium, the factor ratings are combined to determine the environmental medium-specific rating of *High*, *Medium*, or *Low*. The process used to determine the rating for each medium is shown in Figure J-1. Then, an overall category of *High*, *Medium*, or *Low* is assigned for the site based on the highest medium-specific rating. The overall site rating assists with prioritizing sites based on their relative risk to human health and the environment.

RRSE WORKSHEETS

The RRSE is summarized in the RRSE worksheets. The RRSE worksheets include a brief description of the site, pathways, receptors, and an evaluation of all environmental media at each site.

UNCERTAINTIES

The RRSE involve the use of assumptions, professional judgment, and imperfect data to varying degrees, which results in uncertainty in the site categorization. The following uncertainties are associated with the RRSE:

- The use of maximum detected concentrations assumes that these concentrations are present across the entire exposure area, and that potential receptors would be exposed to the maximum detected concentrations across the entire site. Therefore, contaminant hazard factor ratios based on maximum detected concentrations are likely to be overestimated.
- Regional Screening Levels were not available for some of the detected contaminants. However, the uncertainty associated with a lack of toxicity data for these contaminants is not expected to be significant.
- A few tentatively identified compounds (TICs) were detected in the sites evaluated at Tinker AFB. These chemicals were excluded from analysis as it is not certain which chemical is actually present.

REFERENCES

Department of Defense (DoD). 1997. Relative Risk Site Evaluation Primer, Revised Edition. Summer 1997.

United States Environmental Protection Agency (USEPA). 1990. National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (Final Rule). 40 CFR Part 300: 55 Federal Register 8666.

United States Environmental Protection Agency (USEPA). 2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). EPA530-D-02-004. November 2002.

United States Environmental Protection Agency (USEPA). 2009. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update. April 2009.

THIS PAGE INTENTIONALLY LEFT BLANK

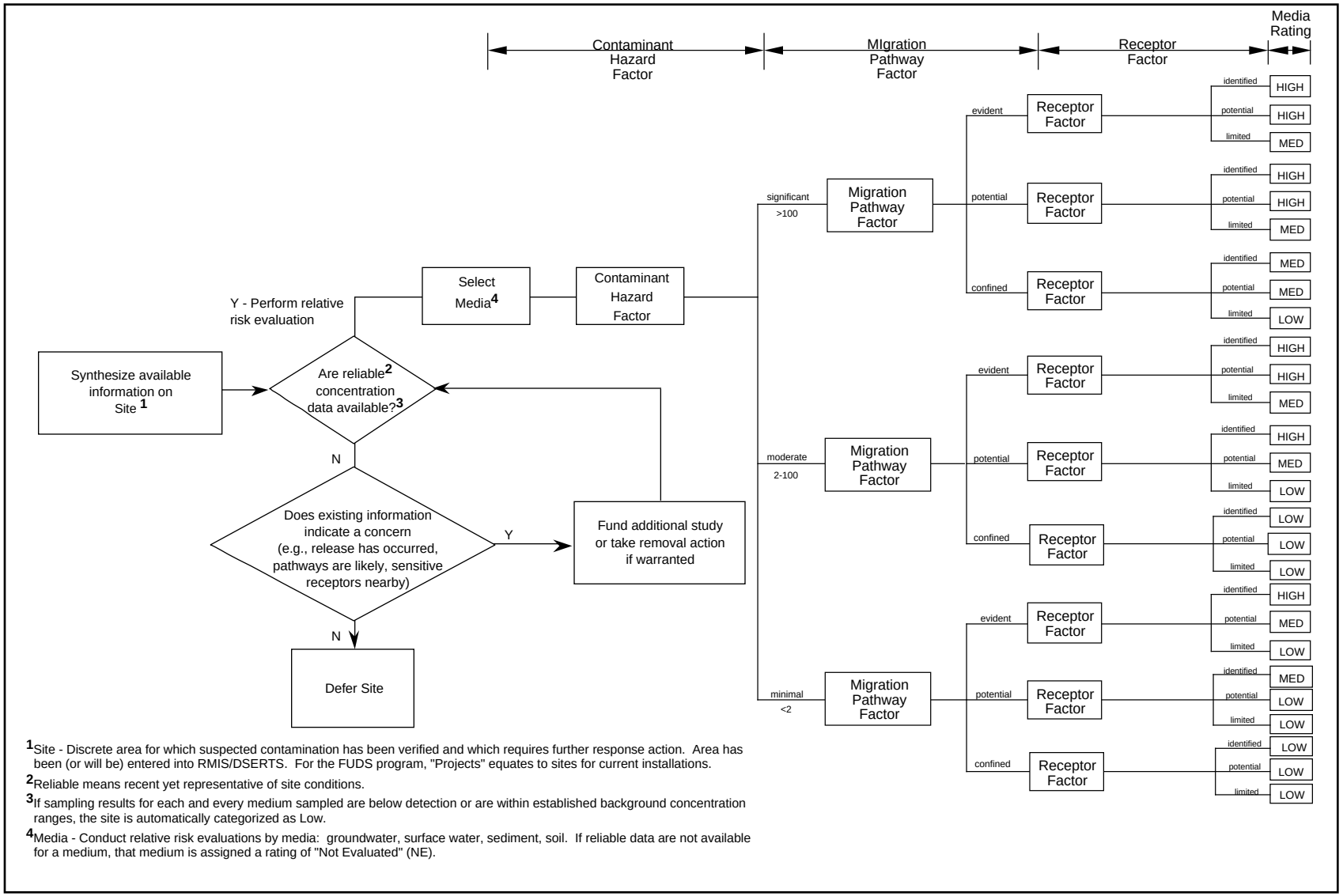


Figure J-1. Relative Risk Site Evaluation Framework: Decision Flowchart

THIS PAGE INTENTIONALLY LEFT BLANK

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): CG041
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK
Date Entered: March 23, 2010
Media Evaluated: All media
Phase of Execution: Preliminary Assessment
Agreement Status: Identified

Site Summary

Brief Site Description:
Site CG041 is in the north central portion of Tinker Air Force Base (AFB) and includes impacted groundwater beneath the tarmac and taxiways south of Building 230. The site is located on an active military base owned by the Air Force and is subject to restricted access. In the northern portion of CG041, there are multiple industrial buildings. The buildings include repair/maintenance facilities (Building 220, Building 289), hazardous waste storage (Building 221), air freight terminals (Building 260, Building 265), a passenger air terminal (Building 268), a training facility (Building 267), an equipment and chemical storage shed (Building 11289), and a fire protection water pump station (Building 61289). South of the buildings, CG041 includes a large tarmac and some unpaved grassy areas.

There are two large chlorinated solvent plumes at CG41. One is largely under the industrial buildings on the north side of CG041, while the other plume is on the southern border of CG041, underneath the tarmac and taxiways. For the northern plume, suspected sources of the contamination include: 1) underground storage tanks (USTs) containing unknown materials that were located adjacent to the former Building 267 (a demolished auto maintenance shop), 2) former Building 227 (a demolished motor repair shop), 3) a formerly abandoned waste tank containing miscellaneous contaminated oil (Tank 226) located near the former Building 228, 4) two 50,000 gallon USTs formerly located under the southwest corner of Building 289, and 5) potential leaks and breaks in the industrial waste lines in the vicinity of Building 289. For the southern plume, historical solvent usage on the tarmac from the 1940s to the 1970s is the suspected source. In the upper saturated zone (USZ), the concentrations of chlorinated solvents are generally either stable or decreasing; however, trichloroethene (TCE) concentrations in the lower saturated zone (LSZ) are increasing (albeit slightly) in one well (2-423A) (SAIC 2008). Although there have been multiple uses of fuels within CG041, and several minor releases, there are no documented fuel related groundwater plumes within CG041 (SAIC 2006).

Brief Description of Pathways:
Soil: Most of the area within CG041 is covered by buildings, concrete, or asphalt. The only areas with exposed soils are the grassy areas adjacent to the tarmac/taxiways on the southern, eastern, and western margins of the site. The subsurface lithology in the area is discontinuous with clay being the predominant surficial layer. The lithology beneath the clay consists of discontinuous silt, sand, and clay components of varying thicknesses.

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is considered to be in the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

The Hennessey Water Bearing Zone (HWBZ) is absent. The top of the water table occurs in the USZ at approximately 10-15 feet below ground surface (bgs). The USZ is characterized as interbedded layers of sandstone, siltsone, and mudstone with varying degrees of saturation and permeability. The USZ near Building 230 is approximately 25 feet thick at this site and extends to a depth of approximately 35 feet bgs. The USZ is separated from the LSZ by a 20 foot thick mudstone and siltstone unit. The LSZ extends to approximately 170 feet bgs and is separated from the production zone (PZ) by another mudstone/siltstone unit. The PZ occurs at approximately 200 feet bgs. The USZ and LSZ at the site are contaminated with chlorinated solvents, including TCE.

Soil Gas: Since there are buildings overlying the chlorinated solvent plumes in the USZ, there is potential for vapor intrusion of volatile organic compounds (VOCs) into buildings. Therefore, vapor intrusion from subsurface-to-indoor air is a pathway of potential concern.

Surface Water/Sediment: There is no surface water or associated sediment at CG041.

Brief Description of Receptors:
Human receptors: CG041 is on the airfield of Tinker AFB and is considered an industrialized area. For the foreseeable future, the only human receptors in the area are industrial and construction workers. The closest off-Base residence is located approximately 4,000 feet to the north and the closest on-Base residences are located approximately 3,100 feet west of CG041. The site is distant from potentially sensitive receptors such as the Tinker elementary school (approximately 5,500 feet), the Tinker AFB hospital (6,500 feet), and the nearer of the two Tinker AFB daycare centers (4,900 feet). None of the residences or sensitive receptors (on-Base or off-Base) lie in a groundwater flow path contaminated by sources associated with CG041.

Ecological receptors: To the south, west, and east of the tarmac in CG041, there are unpaved grassy areas. However, the vegetation in these areas consists of non-native grasses and there are no threatened or endangered species (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

A relative risk site evaluation (RRSE) was performed for CG041 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that CG041 received a LOW relative risk rating for the soil and surface water/sediment pathways, and a HIGH relative risk rating for the groundwater and soil gas pathways. These ratings resulted in an overall site relative risk rating of HIGH.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Minimal	Potential	Potential	Low
Groundwater	Moderate	Evident	Potential	High
Soil gas	Moderate	Potential	Identified	High
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	High

References

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT Corporation. 2002. Final Basewide Non-NPL Groundwater Phase II, RCRA Facility Investigation for Appendix I and II SWMUs Addendum 3, Tinker AFB, Oklahoma, September 2002.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

SAIC. 2006. 2005 Basewide Environmental Groundwater Sampling and Analysis Program. Tinker Air Force Base, Oklahoma.

SAIC. 2008. 2006 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

URS. 2009. Final Evaluation Report, Volume II. Air Force Compliance Clean-Up Sites, Identification and Evaluation of Defense Environmental Restoration Account (DERA) Eligibility for Air Force Center for Engineering and the Environment (AFCEE), Multiple Locations. Tinker Air Force Base, Oklahoma. August 2009.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site CG042 (former BX Service Station)
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK
Date Entered: February 8, 2010
Media Evaluated: All media
Phase of Execution: Preliminary Assessment
Agreement Status: Identified

Site Summary

Brief Site Description:

Contaminated groundwater management unit CG042 is located in the west-central portion of Tinker AFB. CG042 is bounded on the north by Arnold Street, on the south by the open area north of Building 773 on the east by "L" Street, and on the west by Air Depot Boulevard. The site is located on an active military base owned by the Air Force and is subject to restricted access. A historic review of the site identified numerous commercial facilities that were located at CG042. From the 1950s thru early 1960s, the base laundry facility (Building 744), motor repair shop (Building 731), gas storage, and gas filling station (Building 735) were located in the vicinity of Arnold Street, "N" Street, and Air Depot Boulevard. The general activities that took place in these buildings during the late 1950s may have contributed to groundwater contamination currently present within the area. However, documentation of actual chemicals used and releases from these facilities does not exist. Also, located at Site CG042 from the early 1970s until it was demolished in October 2001, was the former Tinker AFB Base Exchange (BX) Service Station (Building 740). The former BX Service Station, also known as UST Site 23, was a vehicle refueling station (IT 2001, Parsons 2003).

Fuel contamination from leaking USTs and flow lines was identified at Building 740 in 1992. The USTs were removed and replaced with vaulted USTs in 1995. Subsequently, remediation using vacuum enhanced pumping (VEP) technology began at the former BX Service Station under Oklahoma Corporation Commission (OCC) guidance to abate free product and remediate benzene, toluene, ethylbenzene and total xylene (BTEX) contamination in the vadose zone and upper saturated zone (USZ) groundwater beneath the site. Pump and treat technology was employed in the lower saturated zone (LSZ) for hydraulic containment of the BTEX plume. By October 2005, the OCC approved case closure for the former BX Service Station (Parsons 2006a, b).

Trichloroethene (TCE) contamination in the USZ and LSZ continues to be widespread in CG042 west and southwest of the former BX Service Station. Nearby TCE contamination in the USZ and LSZ beyond the boundary of CG042 is evaluated under CG037. TCE is not regulated by the OCC and corrective measures for chlorinated contaminants have not been negotiated with other regulatory

agencies (Parsons 2006b). Currently, Site CG042 consists entirely of open space, although water supply (WS) well WS-3 is on the western boundary of this groundwater management unit.

Brief Description of Pathways:

Soil: Site CG042 is primarily an undeveloped grassy areas used for recreation and ceremonial events. However, there is no surface soil data for CG042. The subsurface lithology in the area is discontinuous with clay being the predominant first lithology encountered. Clay materials typically occur from the surface to an average depth of approximately 9 feet. The lithology beneath the clay consists of discontinuous silt, sand, and clay components of varying thicknesses.

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is considered to be in the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

The Hennessey Water Bearing Zone (HWBZ) is absent. The top of the water table for CG042 occurs in the USZ at approximately 10 feet below ground surface (bgs). The USZ at this site is characterized as silty sands to moderately clean sands to approximately 14.5 feet bgs. The USZ is separated from the LSZ by a confining mudstone and siltstone unit. The LSZ (inclusive of the lower-lower saturated zone) extends from approximately 35 to 200 feet bgs and is separated from the underlying production zone (PZ) by another mudstone/siltstone unit.

WS-3 is approximately ¼ mile west of the service station site. Since WS-3 is located downgradient of the former BX Service Station, this well was shutdown in 1998 to prevent potential migration of contaminants from CG042 to WS-3. A wellhead protection plan was prepared, and the integrity of WS-3 was evaluated in 2004. WS-3 resumed operating in 2005. WS-2 is located approximately 900 feet north of the site. All of the Tinker AFB water supply wells are cased off from the USZ and LSZ and are completed from the PZ of the Garber-Wellington, which is a confined aquifer (Parsons 2006b).

Soil Gas: Since volatile organic compound (VOC) impacted subsurface media has been identified at CG042, there is the potential for vapor intrusion of VOCs into future buildings if constructed within the boundaries of this site. Therefore, vapor intrusion from soil gas is a future pathway of potential concern.

Surface Water/Sediment: Kuhlman Creek is located approximately 2,300 feet west from Site CG042. However, there is no surface water, or associated sediment, at the site.

Brief Description of Receptors:
Human receptors: Site CG042 is in the industrial and commercial portion of Tinker AFB. For the foreseeable future, the only human receptors in the area are industrial and construction workers. The closest off-Base residence is located within the city of Midwest City approximately 2,000 feet to the north of Site CG042. The closest on-Base residences are located approximately 2,000 feet southwest of the site. None of the residences or sensitive receptors (on-base or off-base) lie in a groundwater flow path contaminated by sources associated with CG042.

Ecological receptors: At CG042, the habitat for ecological receptors has generally experienced fragmentation and disturbance as a result of urbanization and industrialization. Although there are unpaved open areas at CG042, these areas are "improved turf" (Tinker 2007) and are actively maintained. There are also no threatened or endangered species at the site (Parsons 2005, Tinker AFB 2007).

Summary of Relative Risk Site Evaluation

A relative risk site evaluation (RRSE) was performed for CG042 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that CG042 received a LOW relative risk rating for the surface water/sediment and soil gas pathways, and a MEDIUM relative risk rating for the groundwater pathway. The soil pathway was NOT EVALUATED because there was insufficient information. These ratings resulted in an overall site relative risk rating of MEDIUM.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Not Evaluated	Not Evaluated	Potential	Not Evaluated
Groundwater	Significant	Evident	Limited	Medium
Soil gas	Moderate	Confined	Potential	Low
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	Medium

References

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT Corporation. 2001. Final RCRA Facility Investigation Contaminated Groundwater Site CG037 GWMU 1B and GWMU 1F. Tinker AFB, Oklahoma. October 2001.

IT Corporation. 2002. Final Basewide Non-NPL Groundwater Phase II, RCRA Facility Investigation for Appendix I and II SWMUs Addendum 3, Tinker AFB, Oklahoma, September 2002.

Parsons. 2003. Final Focused Feasibility Study for Groundwater at Site CG-037. Tinker AFB, Oklahoma City, Oklahoma. October 2003.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

Parsons. 2006a. Final Tenth Year, First Quarter Monitoring Report for UST Site 23. Tinker AFB, Oklahoma. June 2006.

Parsons. 2006b. Final Closure Report for the UST 23 Site, Tinker AFB, Oklahoma. August 2006.

SAIC.2008. 2006. Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker AFB, Oklahoma. February 2008.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site OT058 (Building 3703)
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK

Date Entered: March 10, 2010
Media Evaluated: All media
Phase of Execution: Preliminary Assessment
Agreement Status: Identified

Site Summary

Brief Site Description:

OT058 (Building 3703) is located within consolidated groundwater management unit CG039. This site is in the eastern portion of Tinker AFB on Turbine Drive between East Drive to the west and Cells Road on the east. Building 3703 serves to mechanically test and service rebuild jet engines and after-burners prior to redeployment. Wastewater associated with jet engine testing and cleaning is discharged to the industrial wastewater collection system. Building 3703 was constructed in 1951 and originally included four test cell chambers. Subsequently, four additional chambers were added. Currently, all eight chambers are operational. Solvents, such as trichloroethene (TCE), were reportedly used in the past as part of cleaning the jet engines (CH2MHill 2005, SAIC 2006, URS 2009).

There are two known release sources at Building 3703: 1) the JP-5 fuel supply line has leaked fuel to the subsurface, and 2) the oil-water-separator (OWS) system west of Building 3703 has released industrial wastewater to the subsurface (CH2MHill 2005). A multi-phase vacuum extraction system has been recovering groundwater, vapor, and mobile nonaqueous phase liquids from the subsurface along the JP-5 line east and south of Building 3703 since May 2002.

The most prevalent contaminants found in groundwater at this site are fuel-related compounds such as total petroleum hydrocarbons (TPH), as well as benzene, toluene, ethylbenzene, and xylene (BTEX) and chlorinated solvents including TCE and tetrachloroethene (PCE), and their anaerobic degradation products. Chlorinated solvent contamination in the upper saturated zone (USZ) and lower saturated zone (LSZ) extends beyond the building to the east, south, and west (SAIC 2008). The highest concentrations of TCE are directly south of OT058, at monitoring well 2-363B, which probably results from other sources in the area such as the former industrial waste evaporation basin, but may be commingled with releases from Building 3703. Groundwater contamination outside of OT058 is being evaluated as part of CG039 (SAIC 2008). Within the boundaries of the site, the vacuum system has recovered substantial amounts of dissolved and vapor phase contaminants; however, no free product has been observed at the site. Nevertheless, there is still significant contamination throughout OT058, particularly TPH and chlorinated compounds (Parsons 2008).

Brief Description of Pathways:

Soil: Building 3703 is an industrial building surrounded by asphalted surfaces. Beneath the building's foundation and the surrounding asphalt, there is a fill layer (composed of sand and clay) which usually extends to a depth of 6 to 8 feet below ground surface (bgs). The lithology beneath the fill material consists of discontinuous silt, sand, and clay layers of varying thicknesses. Due to the presence of B3703 and the surrounding asphalted surfaces, there are no complete surface soil exposure pathways at OT058 under current conditions.

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is considered to be in the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

The Hennessey Water Bearing Zone (HWBZ) is absent. The uppermost groundwater at OT058 occurs in the USZ, which starts at approximately 15 to 22 feet bgs and extends to an average depth of about 30 feet bgs (Parsons 2002). The USZ consists of silty fine sand and sandstone with interbedded clay and siltstone layers. The LSZ extends from approximately 40 feet to 180 feet bgs. A fine grain siltstone layer acts as a hydraulic confining layer separating the USZ from the LSZ. A shale layer approximately 20 feet thick separates the LSZ from the producing zone (PZ). Beneath Tinker AFB, the PZ is generally encountered at depths greater than 200 feet bgs (Parsons 2003). Groundwater in the USZ flows to the east on the east side of Building 3703 and to the southwest on the west side of Building 3703. In the underlying LSZ, groundwater flows primarily to the southwest (Parsons 2002).

The closest active water supply (WS) well to the site is WS-12 (approximately 32 feet west of the site). All of the Tinker AFB supply wells are cased off from the USZ and LSZ and are completed in the PZ, which is a confined aquifer (SAIC 2006).

Soil Gas: Since volatile organic compound (VOC) impacted subsurface media has been identified at OT058, vapor intrusion of VOCs into Building 3703 is a pathway of potential concern.

Surface Water/Sediment: There is no surface water, or associated sediment, at the site.

Brief Description of Receptors:

Human receptors: The current and future designated land use at OT058 is "aircraft operations and maintenance" (Parsons 2005). Therefore, for the foreseeable future, the only human receptors in the area are industrial and construction workers. OT058 is approximately 680 feet west of the eastern Tinker AFB boundary. The closest off-Base residence is approximately 2,400 feet to the east of the site. The closest on-Base residences are located approximately 11,000 feet west of OT058. The site is also distant from potentially sensitive receptors, such as Tinker Elementary School (approximately 12,000 feet), the Tinker AFB Hospital (13,000 feet), and Tinker day care (7,000 feet). None of the residences or sensitive receptors (either on-Base or off-Base) lie in a groundwater flow

path contaminated by sources associated with OT058. The site is unlikely to be converted to residential land use in the future because of the industrial nature of the area and its proximity to the Tinker AFB runway, which is not expected to change.

Ecological receptors: OT058 consists entirely of buildings and asphalted surfaces. Therefore, there is no habitat for ecological receptors at OT058. There are also no threatened or endangered species at the site (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

The relative risk site evaluation (RRSE) was performed for Site OT058 (Building 3703) following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that OT058 received a LOW relative risk rating for the soil and surface water/sediment pathways, and a HIGH relative risk rating for the groundwater and soil gas pathways. These ratings resulted in an overall site relative risk rating of HIGH.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Minimal	Confined	Limited	Low
Groundwater	Significant	Evident	Potential	High
Soil gas	Significant	Potential	Identified	High
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	High

References

CH2MHill. 2005. JETC Corrective Measure Study Report. Tinker Air Force Base, Oklahoma. April 2005.

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT Corporation. 2002. Final Basewide Non-NPL Groundwater Phase II, RCRA Facility Investigation for Appendix I and II SWMUs Addendum 3, Tinker AFB, Oklahoma, September 2002.

Parsons. 2002. Southeast Quadrant Phase II Jet Engine Test Cells Site Investigation Report. Tinker Air Force Base, Oklahoma. July 2002.

Parsons. 2003. Treatability/Feasibility Investigation Involving Demonstration of PDD Technology at SE Quadrant, Sector II. Tinker Air Force Base, Oklahoma. May 2003.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

Parsons. 2008. Annual Monitoring and Technical Report for Operation and Maintenance of Environmental Treatment Systems (CERCLA and RCRA Actions) at Tinker Air Force Base, Oklahoma.

SAIC. 2006. Corrective Measures Study Report. Installation Restoration Program Site CG039, Tinker Air Force Base, Oklahoma. February 2008.

SAIC. 2008. 2006 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

URS. 2009. Final Evaluation Report, Volume II. Air Force Compliance Clean-Up Sites, Identification and Evaluation of Defense Environmental Restoration Account (DERA) Eligibility for Air Force Center for Engineering and the Environment (AFCEE), Multiple Locations. Tinker Air Force Base, Oklahoma. August 2009.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site OT062 (Building 230)
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK

Date Entered: October 13, 2009
Media Evaluated: All media
Phase of Execution: Remedial Action
Agreement Status: Interim

Site Summary

Brief Site Description:

Site OT062 (Building 230) is in the northern portion of Tinker AFB, between 1st Street and the ramp area at Avenue C. The site is located on an active military base owned by the Air Force and is subject to restricted access. The building has four large hangar bays, two on each side of a three story administration and support facility located in the middle portion of the building. Building 230 was a central repair hangar during World War II. Industrial activities in the building have included aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance. Also, sections within the building have served as laboratories for system design and fabrication. Industrial processes are still conducted on the north end of the building, but are limited primarily to dry operations.

There is an extensive network of industrial wastewater drain lines along the north side of Building 230, and running north-south beneath the building. Chemicals were released to the environment from leaks in sumps and the industrial wastewater drain lines at Building 230 as well as from other sources, allowing chemicals to percolate into the soil. The migrating contaminants have reached the uppermost units of the upper saturated zone (USZ). Contaminants in soil are primarily located on the north and west sides of Building 230 from approximately 2 to 9 feet below ground surface (bgs). The primary contaminants at the site are benzene, toluene, ethylbenzene, and xylene (BTEX), carbon tetrachloride, cis-1,2-dichloroethene, Freon 113 (1,1,2-trichloro-1,2,2-triflouroethane), methane, methyl ethyl ketone, trichloroethene (TCE), and vinyl chloride. A TCE plume occurs on the east side of Building 230 in the USZ. The source of the plume may be former underground storage tank (UST) 231, a 12,000 gallon tank which contained mixed de-icing fluids near former Building 248.

A vacuum enhanced pumping (VEP) system was installed as an interim corrective measure to mitigate the potential risk posed by subsurface contaminants along the north and west sides of Building 230. The VEP system has operated continuously since startup in May 2005. The system uses groundwater extraction wells and horizontal soil vapor extraction (SVE) screens to remove contaminated groundwater and soil gas, respectively, that is then directed to a treatment plant constructed specifically for this cleanup action. There is no scheduled shut-off date for the VEP interim corrective measure.

Brief Description of Pathways:
Soil: The area surrounding Building 230 is almost entirely covered with concrete and asphalt. The only areas with exposed soils are grassy islands located along the northern and southern sides of the building. These grassy areas generally lie between the edge of Building 230 and sidewalks, roads, or parking lot areas adjacent to the building. The subsurface lithology in the area is discontinuous with clay being the predominant first lithology encountered beneath Building 230 (Parsons, 2004). The lithology beneath the clay consists of discontinuous silt, sand, and clay components of varying thicknesses.

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is considered to be in the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

The Hennessey Water Bearing Zone (HWBZ) is absent. The top of the water table occurs in the USZ at approximately 10 feet below ground surface (bgs). The USZ is characterized as interbedded layers of sandstone, siltsone, and mudstone with varying degrees of saturation and permeability. The USZ at Building 230 is approximately 25 feet thick at this site and extends to a depth of approximately 35 feet bgs. The USZ is separated from the LSZ by a 20 foot thick mudstone and siltstone unit. At Building 230, the LSZ extends to approximately 170 feet bgs and is separated from the production zone (PZ) by another mudstone/siltstone unit. The PZ occurs at approximately 200 feet bgs. The USZ and LSZ at the site are contaminated with chlorinated solvents, including TCE.

Soil Gas: Since Building 230 is located near the vicinity of impacted subsurface media, there is potential for vapor intrusion of volatile organic compounds (VOCs) into buildings. Therefore, vapor intrusion from subsurface-to-indoor air is a pathway of potential concern.

Surface Water/Sediment: There is no surface water or associated sediment at B230.

Brief Description of Receptors:
Human receptors: Building 230 is in a heavily industrialized area of Tinker AFB. For the foreseeable future, the only human receptors in the area are industrial and construction workers. The closest off-Base residence is located approximately 2,870 feet to the north of the Building 230 site. The closest on-Base residences are located approximately 5,410 feet southwest of the Building 230 site. The site is distant from potentially sensitive receptors such as the Tinker elementary school (approximately 7,530 feet), the Tinker AFB hospital (8,560 feet), and the Tinker AFB daycare center (7,420 feet). None of the residences or sensitive receptors (on-Base or off-Base) lie in a groundwater flow path contaminated by sources associated with Building 230.

Ecological receptors: Ecological receptors were not evaluated since the area surrounding Building 230 is almost entirely covered with concrete and asphalt. Therefore, habitat for ecological receptors is very limited at Building 230. There are also no threatened or endangered species at the site (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

A relative risk site evaluation (RRSE) was performed for OT062 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that OT062 received a LOW relative risk rating for the soil and surface water/sediment pathways, and a HIGH relative risk rating for the groundwater and soil gas pathways. These ratings resulted in an overall site relative risk rating of HIGH.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Minimal	Confined	Limited	Low
Groundwater	Moderate	Evident	Potential	High
Soil gas	Significant	Evident	Identified	High
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	High

References

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT Corporation. 2002. Final Basewide Non-NPL Groundwater Phase II, RCRA Facility Investigation for Appendix I and II SWMUs Addendum 3, Tinker AFB, Oklahoma, September 2002.

Parsons. 2004. Final RCRA Facility Investigation for B230. Tinker AFB, Oklahoma. March 2004.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

Parsons. 2008a. Remedial Process Optimization Evaluation of the Building 230 Remedial System. Tinker Air Force Base, Oklahoma.

Parsons. 2008b. Annual Monitoring and Technical Report for Operation and Maintenance of Environmental Treatment Systems (CERCLA and RCRA Actions) at Tinker Air Force Base, Oklahoma.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site OT063 (Building 240)
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK

Date Entered: March 24, 2010
Media Evaluated: All media
Phase of Execution: Remedial Investigation
Agreement Status: Pending

Site Summary

Brief Site Description:
OT063 (Building 240) is located in the north central portion of Tinker AFB on the southern end of "A" Avenue. OT063 is located east of Building 230, south of the 290 Fuel Farm, and borders an active ramp area immediately to the south and east. Building 240 was constructed in 1942 and originally served as a flight test center for repaired aircraft (Parsons 2008). Also, an underground storage tank (UST) was constructed in 1942 in the central portion of Building 240 and was used to store fuel for an emergency generator (Tinker AFB 1992). Various industrial activities have been performed at OT063 including: aircraft overhaul, cleaning, retrofitting, upgrades, and general maintenance (Parsons 2008). Currently, Building 240 is an active aircraft maintenance hangar and provides operational support for the airfield (Parsons 2008).

Soil gas sampling was conducted beneath the building floor slab in the administrative and the hangar areas. In the administration area, tetrachloroethene (PCE) was consistently detected at levels exceeding 200 parts per billion by volume in August 2005 and August 2006. A source could not be determined for the occurrence of PCE below the floor slab at that time. Although there are no groundwater plumes at OT063 in the upper saturated zone (USZ), there is a chlorinated solvent groundwater plume in the lower saturated zone (LSZ) underneath the southeastern third of the building (SAIC 2008). However, the source of the groundwater plume is unknown (Parsons 2008). The general groundwater flow direction in the LSZ is to the west. Consequently, the Building 3001 groundwater plume may be a potential source for the Building 240 groundwater contamination (Parsons 2008). However, it should be noted that the TCE plumes underneath OT063 and B3001 are discontinuous (SAIC 2008).

Brief Description of Pathways:
Soil- Most of the area within OT063 is covered by buildings, concrete, or asphalt. The only areas with exposed soils are grassy areas located along the northeast and southwest ends of Building 240. Beneath the building's foundation and the surrounding asphalt and concrete, there is a fill layer (composed of silty clay) which usually extends to a depth of 2 to 4 feet below ground surface (bgs). The lithology beneath the fill material consists of discontinuous silt, sand, and clay layers of varying thicknesses.

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is located within the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

Because the Hennessey Water Bearing Zone (HWBZ) is absent, the uppermost groundwater at OT063 occurs in the USZ at approximately 13 feet bgs. The USZ extends to an average depth of about 25 feet bgs. Two silty sand units are usually present within the USZ separated by a silty clay layer. The LSZ is encountered at a depth of approximately 53 feet bgs. A fine grain siltstone layer separates the LSZ from the USZ acting as a hydraulic confining layer. The production zone (PZ) is generally encountered at depths greater than 200 feet bgs. A shale layer separates the LSZ from the PZ. Groundwater in the USZ flows primarily to the west-southwest (Parsons 2008). Groundwater flow in the LSZ is generally to the west.

Soil Gas: Since volatile organic compounds (VOCs) impacted subsurface media has been identified at OT063, vapor intrusion of VOCs into Building 240 is a pathway of potential concern.

Surface Water/Sediment: There is no surface water or associated sediment at the site.

Brief Description of Receptors:

Human receptors: The current and future designated land use at OT063 is aircraft operations and maintenance (Parsons 2005, 2008). Therefore, for the foreseeable future, the only human receptors in the area are industrial and commercial workers. The closest off-Base residence is approximately 3,300 feet to the northwest of the site. The closest on-Base residences are located approximately 6,670 feet southwest of OT063. The site is also distant from potentially sensitive receptors such as Tinker Elementary School (approximately 9,100 feet), the Tinker AFB Hospital (10,100 feet), and Tinker day care (3,644 feet). None of the residences or sensitive receptors (on-Base or off-Base) lie in a groundwater flow path contaminated by sources associated with OT063. The site is unlikely to be converted to residential land use in the future because of the industrial nature of the area and its proximity to the Tinker AFB runway, which is not expected to change.

Ecological receptors: The only areas with exposed soil are grassy areas located along the northeast and southwest ends of Building 240 (Parsons 2008). However, the vegetation in these areas consists of “improved turf.” There are no threatened or endangered species at the site (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

A relative risk site evaluation (RRSE) was performed for OT063 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that OT063 received a LOW relative risk rating for the surface water/sediment pathway and a MEDIUM relative risk rating for the groundwater and soil gas pathways. The surface soil pathway was NOT EVALUATED because there was insufficient information. These ratings resulted in an overall site relative risk rating of MEDIUM.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Not evaluated	Not evaluated	Identified	Not Evaluated
Groundwater	Moderate	Potential	Potential	Medium
Soil gas	Moderate	Potential	Potential	Medium
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	Medium

References

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT Corporation. 2002. Final Basewide Non-NPL Groundwater Phase II, RCRA Facility Investigation for Appendix I and II SWMUs Addendum 3, Tinker AFB, Oklahoma, September 2002.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

Parsons. 2008. RCRA Facility Investigation Report for Building 210 and 240. Tinker Air Force Base, Oklahoma.

SAIC. 2008. 2006 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma.

Tinker Air Force Base. 1992. Description of Current Conditions. Oklahoma City, Oklahoma.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site OT064 (former Building 210)
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK
Date Entered: March 9, 2010
Media Evaluated: All media
Phase of Execution: Interim RA-C
Agreement Status: Interim

Site Summary

Brief Site Description:

OT064 is located in the north-central area of the Base and consists of Buildings 210 and 213, an unpaved grassy area, and a parking lot. This site is located north of First Street between "B" and "C" Avenues. Building 210 was constructed in 1942 and was used to refabricate and overhaul hydraulic and pneumatic control systems (Tetra Tech 1998, Parsons 2008). The building included a paint shop, parts cleaning area, machine shop, test cells, and instrument repair area. Activities at Building 210 required the extensive use and storage of fuels, lubricants, and degreasing solvents (Parsons, 2002, 2003, 2008). In addition, mercury filled manometers and temperature/pressure controls were used in the former test cells (Caldwell Environmental Associates 2004). In 2003-2004, approximately 90% of the building was demolished and removed. Most of the former Building 210 is now a paved parking lot. The northeast corner of the former Building 210 remains intact and contains a compressor room (Parsons 2008). Building 213, in the southeast corner of OT064, is used as a turbine maintenance and repair shop.

Available records indicate that either a 6,000 or 10,000-gallon underground storage tank (UST) 210 was installed in either 1953 or 1956 along the southeast side of Building 210. This UST received fuel and solvent wastes through 1975. When the UST was removed in August 1997, it was found to have several holes on the underside. Free product was also encountered in shallow groundwater during the removal of the UST (Tetra Tech 1998, Parsons 2008). At least three additional USTs were also located at OT064, although these are indicated as having been abandoned prior to 1987. Two of these USTs stored fuels and one stored solvents (Burke Engineers 1987, Tinker AFB 1992). During demolition of the test cell area of Building 210 in 2003-2004, free-phase mercury was encountered in the test cell drain lines and surrounding soil. Drain lines and the surrounding mercury impacted soils were excavated and removed in 2004 (Caldwell Environmental Associates 2004, Parsons 2008). The site also includes Building 209 (now demolished) which was used for reclaimed cleaning fluid storage, as well as UST 211, a 7,000 gallon tank which contained solvents from 1960-1963.

Although volatile organic compounds (VOCs) are present in groundwater at the site, no groundwater plumes have been identified within OT064. However, there are chlorinated solvent groundwater plumes to the east, west, and south of OT064 in both the upper saturated zone (USZ) and lower saturated zone (LSZ) and fuel plumes to the east, northeast, and west of OT064 in the USZ (SAIC 2006, 2008). Soil gas data from 9 near-slab soil gas probes collected from 2005 to 2009 around Buildings 210 and 208 indicate soil

gas vapors exist along the northern boundary of OT064 at concentrations that may impact Building 200 directly to the north. As an interim remedial action, vacuum enhanced pumping (VEP) extraction and recovery wells were installed in 1998 in the eastern portion of OT064. An additional VEP well was installed along the northern boundary of OT064 in 2007 near Building 200. These wells have been removing both contaminated soil vapor and groundwater from the site and continue to operate.

The 290 Fuel Farm and SWMU-18 are located across Avenue B to the east of OT064. The 290 Fuel Farm was used to store aviation fuel, motor gasoline, JP-4, JP-5, solvents, de-icing fluids, and waste oils. SWMU-18 (at Building 214) was a storage facility for fuels, solvents, and degreaser and is upgradient of OT064 (Parsons 2008a).

Brief Description of Pathways:
Soil: Most of OT064 is covered by an asphalt parking lot. However, immediately to the south of the current Building 210, there is an unpaved grassy area. Immediately beneath the surface, there is a continuous clay layer across the site of varying thickness underlain by alternating discontinuous layers of sand, clay, and silt (Parsons 2008).

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is located within the recharge zone of the aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

Because the Hennessey Water Bearing Zone (HWBZ) is absent, the uppermost groundwater at OT064 occurs in the USZ at approximately 10 to 15 feet bgs. The USZ at this site is characterized by 1-3 sand layers separated by a clay layer from a lower sand layer (Parsons 2008).

The closest active water supply (WS) well to the site is WS-32 (approximately 2,000 feet to the northwest) (Parsons 2005). All of the Tinker AFB water supply wells are cased off from the USZ and LSZ and are completed from the production zone of the Garber-Wellington, which is a confined aquifer (Parsons 2006).

Soil Gas: Since volatile organic compounds (VOCs) impacted subsurface media (i.e., groundwater and soil) have been identified at OT064, there is the potential for vapor intrusion of VOCs into buildings. Therefore, vapor intrusion from soil gas is a pathway of potential concern.

Surface Water/Sediment: There is no surface water or associated sediment at OT064.

Brief Description of Receptors:
Human receptors: Site OT064 is in the industrial and commercial portion of Tinker AFB. For the foreseeable future, the only human receptors in the area are industrial and construction workers. The closest off-Base residence is located approximately 2,700 feet to the

north and the closest on-Base residences are located approximately 6,200 feet west of OT064. The site is distant from potentially sensitive receptors such as the Tinker elementary school (approximately 8,600 feet), the Tinker AFB hospital (9,000 feet), and the nearer of the two Tinker AFB daycare centers (4,700 feet). None of the residences or sensitive receptors (on-base or off-base) lie in a groundwater flow path contaminated by sources associated with OT064.

Ecological receptors: Site OT064 is surrounded by industrial buildings, parking lots, roads, and an airfield. There is a small unpaved grassy area at OT064. This area is designated as "improved turf" in the Tinker Integrated Natural Resources Management Plan (Tinker 2007). Surrounding OT064, there are multiple small landscaped areas that are also designed as "improved turf" (Tinker 2007). There are no threatened or endangered species at OT064 (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

A relative risk site evaluation (RRSE) was performed for OT064 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that OT064 received a LOW relative risk rating for the soil and surface water/sediment pathways, and a HIGH relative risk rating for the groundwater and soil gas pathways. These ratings resulted in an overall site relative risk rating of HIGH.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Minimal	Potential	Potential	Low
Groundwater	Significant	Potential	Potential	High
Soil gas	Significant	Potential	Identified	High
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	High

References

Burke Engineers. 1987. Investigation of Underground Storage Tanks. Tinker Air Force Base, Oklahoma.

Caldwell Environmental Associates. 2004. Removal of Building 210 Drain Lines and Contaminated Soil, Tinker AFB, Oklahoma.

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

IT. 2002. Basewide Non-NPL Groundwater Phase II RCRA Facility Investigation Report for Appendix I and II SWMUs, Addendum 3, Tinker AFB, Oklahoma. September 2002.

Parsons. 2002. First Semiannual Monitoring Report for the 290 Remediation system. Installation Restoration Program. Tinker Air Force Base, OK.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

Parsons. 2008. RCRA Facility Investigation Report for Building 210 and 240. Tinker Air Force Base, Oklahoma.

SAIC. 2006. Corrective Measures Study Report. Installation Restoration Program Site CG039, Tinker Air Force Base, Oklahoma.

SAIC. 2008. 2006 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma.

Tetra Tech. 1998. Final Report for the Installation of Recovery System, Wellfield, and Recovery Compound Construction for the UST 210 Remediation Network.

Tinker Air Force Base. 1992. Description of Current Conditions. Oklahoma City, Oklahoma.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.

Relative Risk Site Evaluation Worksheet

Site Background Information

Installation/Site Name: Tinker Air Force Base
Location (City, State): Oklahoma City, Oklahoma
Site (Name/RMIS ID): Site OT065
Point of Contact: Albert Aguilar, 72 ABW/CEPR, Tinker AFB, OK
Date Entered: April 2, 2010
Media Evaluated: All media
Phase of Execution: Discovery/Notification
Agreement Status: Identified

Site Summary

Brief Site Description:
OT065 is located in the north-central portion of Tinker AFB and consists of three buildings: Building 283 (Flight Simulator Training Facility & 552nd Squadron Operations Facility), Building 284 (Data Processing and AWACS Training Facility), and Building 296 (AWACS Supply Warehouse). Sentry Road runs east-west through the center of OT065 with Building 284 on the north side and Buildings 283 and 296 on the south side of Sentry Road. In 2008, Building 283 (the 552nd Squadron Operation building) was expanded for training and administrative support space. The intersection of Sentry Road and "D" Avenue is adjacent to the northeast corner of Building 296.

A 10,000-gallon underground storage tank (UST) was installed in the alley east of Building 284 in 1976. The UST was used to store diesel fuel for an emergency generator in Building 284. Between 1991 and 1992, two diesel fuel spills occurred, releasing a total of 21 gallons. In 1995, the UST was removed and replaced with a 10,000-gallon double-walled, fiberglass reinforced plastic tank (Parsons 1996, Tetra Tech 1995, 1996). Past waste streams associated with OT065 include fuels (i.e., JP-4, JP-5, JP-8, and motor gasoline) and photographic developer waste from Building 283 (Tinker 1992).

In 1992, during the construction Building 296, several abandoned utility lines were found containing jet fuel from a leaking adjacent JP-4 transfer line. Subsequently, the leaking JP-4 transfer line was cleaned of the remaining fuel and abandoned in place. The abandoned JP-4 transfer line runs north-south under the eastern portion of Building 296 (Parsons 1996, Tetra Tech 1996). Several other utility lines run under the east side of Building 296, including the main Tinker AFB industrial wastewater line and a fuel distribution line (Parsons 2005). There is also an oil/water separator (OWS 220) south of Building 296, just beyond the boundary of the site (FPM Group 2004).

The most prevalent contaminants found in groundwater at this site are fuel-related compounds including benzene, toluene, ethylbenzene, and xylene (BTEX) and chlorinated solvents including trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride. Subslab soil gas sampling conducted in 2009 at Building 296 revealed concentrations of TCE as high as 7,630 parts per billion by volume.

Brief Description of Pathways:

Soil: Most of OT065 is covered by buildings, concrete, or asphalt. However, there are multiple small landscaped areas. Beneath the building foundations and the surrounding asphalt and concrete, there is a fill layer (primarily composed of silt and clay) which usually extends to a depth of 8 to 9.5 feet bgs, although between Buildings 283 and 296 the fill layer appears to only extend to approximately 4 ft bgs. The lithology beneath the fill material consists of discontinuous silt, sand, and clay layers of varying thicknesses (Tetra Tech 1996).

Groundwater: Tinker AFB lies entirely within the limits of the Garber-Wellington Aquifer, and is located within the recharge zone of this aquifer. Groundwater flow beneath Tinker AFB is complex due to the heterogeneity in the subsurface geology prevalent throughout the area.

The Hennessey Water Bearing Zone (HWBZ) is absent. The uppermost groundwater at OT065 occurs in the upper saturated zone (USZ) at approximately 10 feet bgs (Tetra Tech 1995, 1996). The USZ at this site is characterized by sands, silty and clayey sands, and weathered sandstone. Groundwater in the USZ is suspected to primarily flow to the south-southwest (Tetra Tech 1996).

Soil Gas: Since volatile organic compounds (VOCs) and impacted subsurface media (i.e., groundwater and soil) have been identified at OT065, there is the potential for vapor intrusion of VOCs into buildings. Therefore, vapor intrusion from soil gas is a pathway of potential concern.

Surface Water/Sediment: There is no surface water or associated sediment at OT065.

Brief Description of Receptors:

Human receptors: Site OT065 is in the industrial and commercial portion of Tinker AFB. For the foreseeable future, the only human receptors in the area are industrial and construction workers. The closest off-Base residence is located approximately 3,200 feet to the northwest and the closest on-Base residences are located approximately 4,700 feet west-southwest of OT065. The site is distant from potentially sensitive receptors such as the Tinker elementary school (approximately 7,200 feet), the Tinker AFB hospital (7,700 feet), and the nearer of the two Tinker AFB daycare centers (5,900 feet). None of the residences or sensitive receptors (on-base or off-base) lie in a groundwater flow path contaminated by sources associated with OT065.

Ecological receptors: Site OT065 is surrounded by industrial buildings, parking lots, roads, and an airfield. There are small landscaped areas around the buildings at OT065. These areas are designated as “improved turf” and there are no threatened or endangered species at OT065 (Parsons 2005, Tinker AFB 2007).

Relative Risk Site Evaluation Summary

A relative risk site evaluation (RRSE) was performed for OT065 following Department of Defense (1997) guidance. The results of the RRSE, summarized in the table below, indicate that OT065 received a LOW relative risk rating for the surface soil and surface water/sediment pathways, and a HIGH relative risk rating for the groundwater and soil gas pathways. These ratings resulted in an overall site relative risk rating of HIGH.

	Factor			
Media/Exposure Endpoint	**Contaminant Hazard**	**Migration Pathway**	**Receptor**	**Relative Risk**
Surface soil	Minimal	Potential	Potential	Low
Groundwater	Moderate	Evident	Potential	High
Soil gas	Moderate	Potential	Identified	High
Surface water/sediment	Minimal	Confined	Limited	Low
			Overall	High

References

Department of Defense. 1997. Relative Risk Site Evaluation Primer.

FPM Group. 2004. Final Report, Oil/Water Separator Management Plan for Tinker Air Force Base, OK. June 2004.

IT. 2002. Basewide Non-NPL Groundwater Phase II RCRA Facility Investigation Report for Appendix I and II SWMUs, Addendum 3, Tinker AFB, Oklahoma. September 2002.

Parsons. 1996. Final Special Case Investigation Work Plan, Underground Storage Tank Remedial Support Program. Tinker Air Force Base. October 1996.

Parsons. 2005. General Plan, Tinker AFB, Oklahoma. September 2005.

SAIC. 2006. 2005 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma .

SAIC. 2008. 2006 Basewide Environmental Groundwater Sampling and Water Level Measurements. Tinker Air Force Base, Oklahoma.

Tetra Tech. 1995. Initial Site Characterization Report, UST 20. Basewide Investigation of UST Sites II at Tinker Air Force Base, Oklahoma City, OK. January 1995.

Tetra Tech. 1996. Final Investigation for Soil and Groundwater Cleanup Report, UST Site 20. Investigation of Five UST Sites II at Tinker Air Force Base, Oklahoma. June 1996.

Tinker Air Force Base. 1992. Description of Current Conditions. Oklahoma City, Oklahoma.

Tinker Air Force Base. 2007. Integrated Natural Resources Management Plan. Environmental Management Division, 72 ABW/CEVOE, Tinker Air Force Base, Oklahoma.

United States Geological Survey (USGS). 2006. Age-Dating Ground Water Beneath Tinker Air Force Base, Midwest City, Oklahoma, 2003-04.