UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas 66219

JUN 0 7 2013

MEMORANDUM

SUBJECT: Recommendation for Acceptance of the Second Five-Year Review
Operable Unit 2 (groundwater) Former Richards-Gebaur Air Force Base
Kansas City, Missouri

FROM: Ken Rapplean, Remedial Project Manager
Iowa/Nebraska Remedial Branch

THRU: Pradip L. Dalal, P.E., Chief
Iowa/Nebraska Remedial Branch

TO: Cecilia Tapia, Director
Superfund Division

The subject five-year review has been completed by the Air Force (Sites ST 005,SS 006,ST 011,SS 012) and the Navy (Sites ##-003 and SS-009) for CERCLIS Number MO9571824292. The Navy completed and signed their report on September 12, 2012 and the Air Force signed their report on May 2, 2013. The signature sheets and executive summaries are attached.

An Explanation of Significant Difference was signed in 2007 to formally document the remedy change for OU-1 soil sites from Land Use Controls (LUCs) to No Further Action.

The Region 7 risk assessment team discussed the review with both consultants in January 2012, particularly the approach on assessing the potential for vapor intrusion. The team has reviewed both draft reports, commented, and those comments were addressed in the final reports.

The EPA agrees that the remedial actions at all locations are protective of human health and the environment and will remain protective with the restrictions on use of the shallow groundwater in addition to the LUCs. The EPA does agree with the Missouri Department of Natural Resources (MDNR) that consideration of modifying the existing LUCs to notify the current property owners and occupants that the potential for soil vapor intrusion exists if construction of industrial/commercial buildings with basements or residential development overlying contaminated groundwater is planned. The notification could also be a means to advise the potential for vapor intrusion may be mitigated through engineered vapor controls or barriers confirmed through construction-area specific evaluations.

The EPA and MDNR have both commented that the next five-year report should be combined into one report. This would reduce the review time by the regulatory agencies.

Document consists of Cover Letter,
CD from Air Force, and CD from Navy
with Hard Copy that matches Navy CD

The EPA project manager has notified MDNR, the Air Force and Navy that budget restrictions continue to be an issue and that the EPA will be unable to participate in the capacity that it has in the past few years. MDNR will remain the lead agency for oversight of activities. Of course, the EPA will be available at the request of MDNR if the need exists.

We recommend the EPA accept the reports as the second five-year review report with your signature for concurrence below.

Concur: _____ Date: 6-7-13

FINAL
SECOND FIVE-YEAR REVIEW
FOR GROUNDWATER (OPERABLE UNIT 2)

Former Richards-Gebaur Air Force Base
Kansas City, Missouri

May 2013

Prepared for:
Air Force Civil Engineer Center

Performance-Based Remediation (PBR)
Contract No. FA8903-09-D-8565-0007

Prepared by:

FPM Remediations, Inc.
Rome, New York

URS Group, Inc.
Overland Park, Kansas

FINAL
SECOND FIVE-YEAR REVIEW
FOR GROUNDWATER (OPERABLE UNIT 2)

Former Richards-Gebaur Air Force Base
Kansas City, Missouri

March 2013

Prepared for:
Air Force Civil Engineer Center

Performance Based Remediation (PBR)
Contract No. FA8903-09-D-8565-0007

Approved by:

02 MAY 2013

ROBERT M. MOORE, SES, DAF
Director
Installations Center of Excellence

Date

DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER
JOINT BASE SAN ANTONIO LACKLAND TEXAS

May 6, 2013

Missouri Department of Natural Resources
Hazardous Waste Program
Attn: Mr. James Harris
P.O. Box 176
Jefferson City, MO 65102

SUBJECT: Final Second Five-Year Review for Groundwater (Operable Unit 2), Former Richards-Gebaur Air Force Base, Kansas City, Missouri

Dear Mr. Harris:

AFCEC is pleased to provide you the enclosed Final Second Five-Year Review for the Former Richards-Gebaur AFB.

Should you have any questions or comments regarding this submittal, please do not hesitate to call me at 210-395-8272.

Sincerely,

Kay M Grosinske

KAY M. GROSINSKE, GS-13, DAF
Program Manager, CIBE
Air Force Civil Engineer Center

cc: USEPA, Region VII (Mr. Kenneth Rapplean)
Booz Allen Hamilton (Ms. Sabina Chowdhury)
Cherokee Nation ™ Government Solutions (Mr. Robert Zuiss)

Attachments:
Final Second Five-Year Review for Groundwater (Operable Unit 2) for the Former Richards-Gebaur AFB

DISTIBUTION:

Federal Facilities Section (1 hard copy + 1 electronic)
Hazardous Waste Program
ATTN: Jim Harris
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Jefferson City, MO 65101

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Superfund Division
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LIST OF ACRONYMS

AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFRPA	Air Force Real Property Agency
AST	Aboveground Storage Tank
BRAC	Base Realignment and Closure
BCT	BRAC Cleanup Team
BTC	Belton Training Complex
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chemical of Concern
CZRB	Air Force Civil Engineer Center/BRAC Support
DCA	Dichloroethane
DCE	Dichloroethene
DoD	Department of Defense
ECS	Evaluation and Consolidation Study
EE/CA	Engineering Evaluation/Cost Analysis
EO	Executive Order
ESD	Explanation of Significant Difference
EPA	United States Environmental Protection Agency
FUDS	Formerly Used Defense Site
GSA	General Services Administration
IC	Institutional Control
IRA	Interim Remedial Action
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
KCAD	Kansas City Aviation Department
LTM	Long-Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
MOA	Memorandum of Agreement
MRBCA	Missouri Risk-Based Corrective Action
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

LIST OF ACRONYMS

NFA	No Further Action
NFRAP	No Further Response Action Planned
NPL	National Priorities List
OU	Operable Unit
OWS	Oil-Water Separator
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
POL	Petroleum, Oil, and Lubricants
PRG	Preliminary Remediation Goal
RACG	Remedial Action Cleanup Goal
RAO	Remedial Action Objective
RI	Remedial Investigation
ROD	Record of Decision
RSC	Regional Support Command
SARA	Superfund Amendments and Reauthorization Act
SI	Site Inspection
SVOC	Semivolatile Organic Compound
TCE	Trichloroethene
TPH	Total Petroleum Hydrocarbons
TPH-DRO	Total Petroleum Hydrocarbons-Diesel Range Organics
TPH-GRO	Total Petroleum Hydrocarbons-Gasoline Range Organics
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USAR	United States Army Reserves
USMC	United States Marine Corps
UST	Underground Storage Tank
VOC	Volatile Organic Compound

The former Richards-Gebaur Air Force Base (AFB), Missouri, is not on the National Priorities List (NPL) and this Five-Year Review was performed under Air Force (AF) policy. Although not required by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) certain remedial actions are being performed in accordance with CERCLA guidance that require five-year reviews to verify that previously implemented remedies remain protective of human health and the environment. This Five-Year Review was prepared in accordance with CERCLA guidance for preparing five-year reviews.

This Five-Year Review constitutes the second required review/reporting cycle for the former Richards-Gebaur AFB. Based on this review, the selected remedy for operable unit (OU) 2 remains protective of human health and the environment and are anticipated to remain protective in the future. The remedy remains protective in the short term because there has not been any industrial/commercial construction with basements or residential re-development and no residential construction is planned. The Air Force Civil Engineer Center (AFCEC) intends to accelerate closure of Sites ST 005, SS 006 and SS 012 to unrestricted use by 2017.

The Record of Decision (ROD) for OUs 1 and 2 was completed in 2004 and selected LUCs and Long-Term Monitoring (LTM) as the final remedy at all the above four sites. An Explanation of Significant Difference (ESD) (AFRPA, 2007) was signed in 2007 to formally document the remedy change for OU-1 soil sites from LUCs to No Further action (NFA).

A Memorandum of Agreement (MOA) was signed in 1998 providing the transfer of the management and execution of management of responsibility for Sites SS 003 and SS 009 to the United States Marine Corps (USMC). The Navy is completing the five-year review for Sites SS 003 and SS 009.

This Five-Year Review addresses the four OU-2–Basewide Groundwater sites under the responsibility of AFCEC:

- ST 005– Petroleum, Oil, and Lubricants (POL) Yard
- SS 006– Hazardous Materials Storage Area
- ST 011– Underground Storage Tank (UST) 620A
- SS 012– Communications Facility

The following are findings based on the evaluation conducted as part of this second Five-Year Review:

- In the short term, the LUC remedy remains effective and protective of human health and the environment at all four sites.
- Groundwater contamination at Sites ST 005, SS 006, ST 011, and SS 012 has remained within the established LUC boundaries for the past five years.
- Groundwater plumes at Sites ST 005, SS 006, and SS 012 have shown declining or stable trends in concentrations. Downgradient perimeter monitoring wells do not exhibit increases in concentration that would imply that the plumes are unstable or expanding.
- The vapor intrusion (VI) evaluation was updated utilizing the finalized TCE toxicity values. The VI evaluation indicated a future risk related to industrial/commercial buildings with basements and residences with and without basements.

- All contaminates of concern (COCs) at Site ST 011 have declined to below the remedial action cleanup goals (RACGs) and have met closure requirements according to the LTM decision rules. Having met the closure requirements of the ROD, Site ST 011 is being recommended for closure.

Based on these findings, the follow-up actions listed below are recommended for the former Richards-Gebaur AFB:

- One way to ensure long-term protectiveness of the remedy would be to modify the existing LUC/IC Management Plan (AFRPA, 2005) to notify the current property owners/occupants of the potential for soil vapor intrusion if construction of industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater. The notifications could also be a means to advise the property owners/occupants that the potential for soil vapor intrusion may be mitigated through engineered vapor controls or barriers or confirmed through construction-area specific evaluations.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Former Richards Gebaur Air Force Base, OU-2: Sites ST 005, SS 006, ST 011, SS 012		
EPA ID: MO9571824292		
Region: 7	**State:** Missouri	**City/County:** Kansas City/ Jackson

SITE STATUS	
NPL Status: Non-NPL	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** Air Force Real Property Agency
Author name (Federal or State Project Manager): AFCEC/ CZRB (Kay M. Grosinske)
Author affiliation: Air Force
Review period: April 2007 - April 2012
Date of site inspection: December 1, 2011
Type of review: Statutory
Review number: 2
Triggering action date: March 19, 2007
Due date *(five years after triggering action date)*: March 2012 (Note: Due date is five years following the signature of the last Five-Year Review)

Five-Year Review Summary Form (continued)

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 2	Issue Category: Institutional Controls			
	Issue: Vapor Intrusion			
	Recommendation: One way to ensure long-term protectiveness of the remedy, would be to modify the existing LUC/IC Management Plan (AFRPA, 2005) to notify the current property owners/occupants of the potential for soil vapor intrusion if construction of industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater. The notifications could also be a means to advise the property owners/occupants that the potential for soil vapor intrusion may be mitigated through engineered vapor controls or barriers or confirmed through construction-area specific evaluations.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Other	EPA/State	2013

To add additional issues/recommendations here, copy and paste the above table as many times as necessary to document all issues/recommendations identified in the FYR report.

Protectiveness Statement(s)
Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Five-Year Review Summary Form (continued)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU-2	Protective	Click here to enter date.

Protectiveness Statement:
The selected remedy for OU-2 remains protective of human health and the environment in the short-term and is anticipated to remain protective in the future in current site conditions. Groundwater at the former Richards-Gebaur AFB is not currently used for any purpose nor were any interferences with ordinances to any of the on-site monitoring wells observed, and LUCs prohibiting extraction and use of groundwater at the OU-2 sites are adequate to ensure that significant exposures do not occur in the future. The remedy remains protective in the short term because there has not been any industrial/commercial construction with basements or residential re-development and no residential construction is planned. AFCEC intends to accelerate closure of Sites ST 005, SS 006, and SS 012 to unrestricted use by 2017.

Site wide Protectiveness Statement (if applicable)

For sites that have achieved construction completion, enter a site wide protectiveness determination and statement.

Protectiveness Determination:	*Addendum Due Date (if applicable):*
Short-term Protective	Click here to enter date.

Protectiveness Statement:
Click here to enter text.

The purpose of the Five-Year Review is to determine whether the remedies at a site remain protective of human health and the environment. The Five-Year Review report documents the methods, findings, and conclusions of the protectiveness evaluation; identifies issues found during the review, if any; and provides recommendations to address the issues.

The United States Air Force Civil Engineer Center (AFCEC) prepared this Five-Year Review under AF policy.

As the lead agency, the United States Air Force (USAF) is responsible for conducting Five-Year Reviews at their installations and this responsibility is delegated to the AFCEC at installations that have been closed in accordance with Base Realignment and Closure (BRAC) actions.

AFCEC is currently responsible for environmental restoration issues related to past USAF activities on approximately 196 acres of the original cantonment area property.
This Five-Year Review was conducted by AFCEC in accordance with their responsibilities as CERCLA lead agency at the former Richards-Gebaur AFB. The review was conducted between December 2011 and April 2012 and is the second Five-Year Review for the former Richards-Gebaur AFB. This Five-Year Review addresses residual groundwater contamination sites for the OU-2 Sites that AFCEC is responsible for: ST 005 (POL Storage Yard), SS 006, (Hazardous Materials Storage Area), ST 001 (UST-620A), and SS 012 (Communications Facility).

This document was prepared in General Accordance with the *Comprehensive Five-Year Review Guidance,* dated June 2001 (Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P.

1.1 FACILITY BACKGROUND

Richards-Gebaur AFB was originally established in 1953 as Grandview AFB (**Figure 1-1**). The installation was operated by the Air/Aerospace Defense Command until 1970, when the Air Force Communication Service relocated its headquarters from Scott AFB, Illinois, to Richards-Gebaur AFB, and assumed command. In 1977, the Air Force Communication Service moved back to Scott AFB and Richards-Gebaur AFB became a Military Airlift Command base.

The former Richards-Gebaur AFB originally encompassed approximately 2,400 acres. In 1980, prior to BRAC, about 80 percent of the installation property was declared excess to USAF needs and transferred to the General Services Administration (GSA). Most of this property was transferred to the cities of Kansas City and Belton, Missouri in August 1985 via public benefit conveyance.

The environmental restoration of property that was transferred from USAF control in 1985, prior to BRAC and the 1986 Superfund Amendments and Reauthorization Act (SARA), is addressed under the Formerly Used Defense Sites (FUDS) Program. This property comprises OU-3 FUDS Sites, which have been addressed separately by the U.S. Army Corps of Engineers (USACE) under the FUDS program throughout the remedial process.

The Air Force Reserves assumed operational control of the remaining 20 percent installation in 1980 and remained the host organization until the installation closed in 1994. From 1985, the airfield was used jointly as a municipal airport and for Air Force Reserve flight operations. The Richards-Gebaur AFB closed on September 30, 1994, pursuant to the Defense Base Closure and Realignment Act of 1990 and recommendations of the BRAC Commission. At that time, the

Kansas City Aviation Department renamed the airport the Richards-Gebaur Memorial Airport.

The installation's operational history is summarized in the table below.

History of Installation Operations

Period	Type of Operations	Defense Systems Supported	Hazardous Substance Activities
Prior to 1941	Agriculture, Pasture, Undeveloped	None	None
1941 – 1952	Grandview Airport	None	General civilian aircraft maintenance
1952 – 1970	Aerospace Defense Command	F-86, F-102, and F-106 fighters; C-46, C-119, and C-124 cargo aircraft	Aircraft maintenance, munitions storage, bulk fuel storage, fuel hydrant system, fire protection training
1970 – 1977	Air Force Communications Service	C-130 cargo aircraft (1971)	Same as above except hazardous waste generation was reduced by half
1977 – 1980	Military Airlift Command	C-130 cargo aircraft	Same as above except fuel hydrant system decommissioned
1980 – 1982	Air Force Reserve 442nd Airlift Wing	C-130 cargo aircraft	Same as above except fewer personnel
1982 – 1994	Air Force Reserve 442nd Fighter Wing	A-10 Thunderbolt II fighter aircraft	Same as above except fire training ceased in 1989 and hazardous waste generation was again reduced by half
1985 - 1999	Municipal Airport	None	General civilian aircraft maintenance
1994	Base Closure	None	None

Since 1994, the environmental cleanup and property disposal at the former base has been the responsibility of the AFRPA. At base closure, Richards-Gebaur AFB was comprised of 429 acres of land that included 244 acres in the main cantonment area and 185 acres at the Belton Training Complex (BTC), located approximately four miles south of the cantonment area. The BTC is largely undeveloped land formerly used for Air Force training exercises.

The BRAC environmental sites were divided into the following two operable units (OUs) for the purposes of environmental investigation and remediation:

- OU-1—Basewide Soil
- OU-2—Basewide Groundwater

Following closure, all BRAC properties were transferred as follows

- USAR assumed ownership and responsibility for of the 185-acre BTC in 1999. The USAF retained responsibility for environmental restoration activities on the BTC property, also known as IRP Site XO 010, under the requirements of a Memorandum of Agreement (MOA) through completion and approval of No Further Response Action Planned (NFRAP) documentation in November 2003.
- Approximately 48 acres of the 244 acre cantonment area were transferred to the USMC in 2005, which included OU-2 Sites SS 003 and SS 009. The USAF retained responsibility for environmental restoration activities on this property until 2007.

- Approximately 184 acres of properties were transferred to the City of Kansas City in 2005, which included OU-2 Sites SS 006, SS 012, ST 005, and ST 011. AFRPA retains environmental restoration responsibilities of these sites.
- Approximately twelve acres were transferred to the City of Belton. No active environmental sites were associated with the property.

1.2 CURRENT USE

The City of Kansas City, Missouri decommissioned the Richards-Gebaur Memorial Airport in 1999. Since that time, the property transferred to the City of Kansas City, including the BRAC acreage transferred in 2005, has been managed through the Kansas City Port Authority and marketed for private sector light industrial reuse through its association with CenterPoint Properties.

The following presents the previous soil and groundwater investigations performed for each site. Also included is the frequency of groundwater sampling performed as part of the LTM program.

ST 005 – POL Storage Yard:

The site is a former above ground storage tank (AST) farm that operated from 1954 until 1994 as the main receiving, storage, and dispensing facility for various fuels, oils, and lubricants used by the base and its support services. The site location is shown on **Figure 1-2**, and Site ST 005 layout and LUC/IC boundary are shown on **Figure 1-3**. The area within the LUC/IC boundary has been unused since 1994. Centerpoint Properties has done surface improvements and is currently marketing the area for future industrial reuse.

Extensive investigations were conducted at Site ST 005 in 1986, 1989, 1991, and 1996. Over 350 soil samples were collected from across the site and analyzed for TPH, VOCs, SVOCs, and metals and extensive petroleum-contaminated soil was delineated and excavated from the site. The investigations also identified a separate area of the site where groundwater was contaminated with chlorinated solvents.

Groundwater contamination was further investigated during the RI 1999-2000. Throughout these investigations a total of 34 monitoring wells were installed across the site, which delineated an area of groundwater contamination with chlorinated solvents located east of the tank farm in the vicinity of the truck turnaround. The estimated area of groundwater contamination is 0.85 acre.

The ROD was signed in 2004 (for OU-1 and OU-2). The long-term monitoring (LTM) program commenced following the ROD. As part of the LTM, groundwater monitoring was conducted on a quarterly basis at the site from October 2000 through August 2004 and semi-annually in 2005 and 2006. Since that time, monitoring has been conducted annually.

SS 006 – Hazardous Materials Storage Area:

The site is located in the central portion of the former installation, east of Hangar Road and north of 155th Street. The site lies off the northeast corner of Building 927 and extends down the grassy hillside behind the building. The site was the previous location of a hazardous materials storage rack for Building 927, which was used as an aircraft engine and propeller maintenance shop from 1957 to 1994. The site location is shown on **Figure 1-2**, and Site SS 006 layout and LUC/IC boundary are shown on **Figure 1-4**.

The site was initially identified during a site inspection conducted as part of a Preliminary Assessment (PA) in 1990 that identified historical records of stressed vegetation behind the hazardous materials storage rack. Soil sampling conducted during the PA and during a Site Inspection (SI) in 1991 identified a small area of soil contamination. In 1993, approximately 40 cubic yards of contaminated soil were excavated from the site. During a groundwater investigation in 1996, the RI in 1999-2000, the RI Addendum in 2001, and in 2003, a total of 22 monitoring wells were installed and sampled. Ten soil samples were collected for analysis during these investigations. Soil and groundwater samples were analyzed for TPH, VOCs, SVOCs, and metals.

Investigations conducted during the base wide RI and RI Addendum did not identify additional soil contamination. However, an approximately 5.5-acre area of groundwater contaminated with chlorinated solvents was delineated beneath the grassy area east of the Facilities 927 and 930.

In 2008, an additional LTM well was installed (MW-26) to address an LTM Decision Rules.

In 2009, four performance monitoring wells (MW-27 through MW-30) were installed to monitor the Treatability Study (CH2M Hill, 2011) that was performed in the vicinity of MW-20 in the downgradient TCE plume at Site SS 006. The wells are not part of the LTM program.

The US Army Reserve 88th Regional Support Command (RSC) is constructing a new facility within a portion of the SS 006 LUC/IC boundary. The planned building is not located over any groundwater contamination, and will be a slab-on-grade construction with vapor barriers and vapor mitigation. The facility will primarily be used for military vehicle maintenance. A western portion of Site SS 006 within the LUC/IC boundary is leased to Kingston Environmental for light industrial use. Also within the LUC/IC boundary is an unused grassy area to the north.

The ROD (for OU-1 and OU-2) was signed in 2004. The LTM program commenced following the ROD. As part of the LTM, groundwater monitoring was conducted on a quarterly basis at the site from 2000 through 2003. Since that time, monitoring has been conducted semi-annually with the exception of 2004 in which three quarterly sampling events were conducted and 2010 in which only one sampling event was conducted (October 2012).

ST 011 – UST-620A:

The site is located in the east-central part of the Base at the northwest corner of Building 620. The former UST was used between 1966 and 1988 to receive waste liquids from the adjacent Air Force fuel-testing laboratory. The site location is shown on **Figure 1-2**, and Site ST 011 layout and LUC/IC boundary are shown on **Figure 1-5**. The UST was removed from the site in 1988, low level TPH contamination was detected in a single sample collected during tank removal, and subsequent investigations in 1995 identified an area of petroleum contaminated soil. As a result, about 50 cubic yards of contaminated soil were excavated and disposed of at an approved landfill in 1995.

The site was further investigated during the 1999-2000 Remedial Investigation (RI). Three monitoring wells were initially installed. Three groundwater and five soil samples were collected and analyzed for TPH, VOCs, SVOCs, and metals. These results identified an area of groundwater contaminated with chlorinated solvents, but they did not identify additional soil contamination. Thirteen additional monitoring wells were installed later in 2000 and one additional monitoring well in 2003 to better delineate the groundwater contamination.

The ROD (for OU-1 and OU-2) was signed in 2004. The LTM program commenced following the ROD. As part of the LTM, groundwater monitoring was conducted on a quarterly basis at the site from 2000 through 2003, three quarterly samples in 2004, semi-annually 2005 and 2006, then annually through 2010. In 2011, LTM monitoring was changed to semi-annually to obtain site closure. The property remains unused since 1994 and is marketed for light industrial reuse.

SS 012 – Communications Facility:

The site is located in the southeastern portion of the former installation on the northeast corner of the intersection of 155th Street and Maxwell Avenue. The site lies on the northeast side of Building 105, which operated as the base communications facility from 1954 to 1994. A 250-gallon UST was previously located on the north side of the building and was used to provide diesel fuel to a backup electric generator located inside Building 105. The site location is shown on **Figure 1-2**, and Site SS 012 layout and LUC/IC boundary are shown on **Figure 1-6**.

The UST was removed from the north side of the building in 1988 and replaced by a 275-gallon AST. A subsurface investigation was conducted in 1996, during which two soil samples and groundwater samples were collected and analyzed for VOCs, PAHs, and TPH-DRO. In 2001, the AST was removed and approximately 64 cubic yards of petroleum-contaminated soil was removed from the vicinity of the former UST. A total of 12 monitoring wells were installed and sampled during the RI Addendum in 2001, and five soil samples were collected from the wells closest to Facility 105. Soil and groundwater samples were analyzed for VOCs.

Investigations conducted during the RI Addendum did not identify additional soil contamination. However, an approximately 3.4 acre area of groundwater contaminated with chlorinated solvents was delineated beneath the grassy area northeast of Building 105. The property has been unused since 1994. The Kansas City Port Authority has not indicated any planned future reuse.

The ROD (for OU-1 and OU-2) was signed in 2004. The LTM program commenced following the ROD. As part of the LTM, groundwater monitoring was conducted on a quarterly basis at the site from 2002 through 2003, and semi-annually through 2006. Since that time, monitoring has been conducted annually.

This section describes the location, physiography, hydrology, basewide geology and hydrogeology of the former Richards-Gebaur AFB.

3.1 PHYSICAL SETTING

The former Richards-Gebaur AFB is located in western Missouri, approximately 18 miles south of downtown Kansas City and 3 miles east of the Missouri-Kansas state line. The northern portion of the former AFB is located in Jackson County and the southern portion of the AFB is in Cass County. **Figure 1-1** shows the general geographic location of the base.

At the time of base closure in 1994, the AFB covered approximately 429 acres of land, subdivided into 244 acres in the main cantonment area and 185 acres at the Belton Training Complex located approximately four miles south of the cantonment area. The four OU-2 sites are all located within the former main cantonment area (**Figure 1-2**).

3.1.1 Physiography

The former Richards-Gebaur AFB is located within the Osage Plains Region of the Central Lowlands Physiographic Province. The Osage Plains Region is characterized by low relief, wide, maturely dissected uplands and relatively steep valley slopes. The topography of the former base is gently rolling, with ground surface elevations ranging from 960 feet above mean sea level (amsl) on the northeast side of the former base to 1,125 feet amsl on the south property margin (CH2M Hill, 2005).

The former AFB lies on a broad plateau called the Blue Ridge. Blue River is located to the west and the Little Blue River to the east. The Blue and Little Blue Rivers are approximately three and two miles from the site, respectively.

3.1.2 Hydrology

The former Richards-Gebaur AFB is located primarily within the Missouri River drainage basin. The surface hydrology is dominated by the drainage systems of the Blue and Little Blue Rivers, which are tributaries to the Missouri River. On the base, surface runoff drains south and east toward Scope Creek, an intermittent stream that flows diagonally from southwest to northeast and discharges at an off-base location to the Little Blue River. The Little Blue River in turn flows into the Blue River and ultimately into the Missouri River. A number of small streams on and around the base have been dammed to create small lakes and ponds for surface water control.

The Missouri River is a drinking water source for the entire region. Water is supplied to the base and surrounding communities by the Kansas City Water and Pollution Control Department (CH2M Hill, 2005).

3.1.3 Geology

Unconsolidated surficial/overburden materials at the former Richards-Gebaur AFB consist of red-brown residual clays containing abundant chart fragments derived from in situ weathering of near surface limestone and shale bedrock. At higher elevations, the residual clays sometimes are overlain by windblown silt deposits. The unconsolidated materials overlying bedrock range in thickness from 0 to 20 feet. Surface soils at the site belong to the Macksburg-Urban Series.

These soils are characterized as poorly drained silt and silty-clay loams. The silt loam layer extends from 0 to 13 inches below ground surface (bgs). A silty-clay loam layer underlies the silt loam layer.

The bedrock geology consists of interbedded limestones and shale's belonging to the Kansas City Group of the Missourian Series, Pennsylvanian System. The local bedrock consists of cyclical or repetitive sequences of relatively thin beds of limestone and shale with minor amounts of sandstone, siltstone, and conglomerate. Individual rock units are typically not more than 40 feet thick and the combined thickness of rock units exposed at the surface at the former base is about 140 feet. The bedrock units are, in descending order, the Wyandotte, Lane, Iola, Chanute, Drum, and Cherryvale formations.

The uppermost bedrock unit is the Argentine Member of the Wyandotte Formation, which crops out at higher elevations. The Argentine Limestone is a thin-bedded, whitish or gray to pinkish, cherty and crystalline limestone that is roughly 30 to 35 feet thick. The bedding is generally somewhat irregular and wavy. Exposed Argentine Limestone develops solution cavities, and existing joints can be enlarged to several feet in width. The solution-widened joints extend throughout the Argentine Member and are commonly filled with red clay and chert fragments.

Beneath the Wyandotte Formation (Argentine Limestone) is the Lane Formation. The Lane Formation consists of a medium-gray to bluish-gray argillaceous shale that is commonly silty to sandy in the upper part. The Lane Shale typically is 25 to 40 feet thick and is considered relatively impermeable, commonly forming a barrier to vertical groundwater flow.

The Iola Formation occurs below the Lane Formation and consists of primarily limestone. The upper member of the Iola Formation is the Raytown Limestone Member, generally a massive bluish-gray, wavy bedded limestone ranging from 6 to 8 feet in thickness and locally containing interbedded lenses of shale roughly 3 inches thick. The upper 2 or 3 feet of the Raytown Limestone Member is massive and weathers to a deep red-brown color. However, unlike the Wyandotte Formation Limestone (Argentine Limestone), the Raytown Limestone Member is a hard, finely crystalline rock that is not readily susceptible to solution weathering. The Raytown Member passes downward into thin shale (Muncie Creek Member) and a second limestone band, known as the Paola Limestone Member before giving way to the Chanute Shale.

The Chanute Formation underlies the Iola and is a maroon and green claystone and shale with local occurrences of cross-bedded sandstone and conglomerate. The formation ranges from 25 to 30 feet in thickness and consists of upper gray shale overlying 2 or 3 feet of hard, resistant sandstone near its top, and a maroon to greenish-gray shale interbedded with a thin nodular limestone near the middle. About 10 feet of greenish-gray shale lies at the base of the formation. The high percentage of shale and claystone and the tightly-cemented sandstone in the upper part of the formation prevents the Chanute Formation from transmitting significant amounts of fluids.

3.1.4 Hydrogeology

The former Richards-Gebaur AFB is located in the Osage Plains groundwater province of the Central Lowland Non-glaciated Plains region. Groundwater is present in both the unconsolidated overburden soils and in the weathered limestone and shale bedrock. The presence of shallow groundwater in unconsolidated overburden soils and weathered near-surface bedrock is largely dependent on seasonal rainfall. Groundwater collects and resides in the transition zone between the soil overburden and weathered bedrock. The saturated portion of the soil overburden is not

laterally continuous access the base and frequently pinches out within the boundaries of the OU-2 sites, which inhibits horizontal movement of groundwater and associated contaminants, if present, within this zone. This saturated soil overburden is hydraulically connected to the underlying weather limestone and depending on the area, the underlying weathered shale. However the relatively impermeable, deeper underlying unweathered shale layer limits vertical groundwater movement. Low-flow velocities predominate within the shallow groundwater zone and near stagnant groundwater conditions are common during extended periods of little or no precipitation (CH2M Hill, 2005). When present in sufficient quantity, shallow groundwater flow occurs in the soil overburden-weathered bedrock interfacial zone and the flow direction typically follows surface topography. Many monitoring wells are screened in this interfacial zone at the former AFB.

The Argentine Limestone contains two sets of tightly fitted joints oriented almost at right angles to one another. The joints are subject to solution widening by groundwater which can result in large orthogonal-shaped blocks of limestone measuring approximately 30 to 40 feet on a side. A well drilled at the intersections of the two joint planes has the best opportunity to yield water at rates of 2 to 3 gallons per minute (gpm) (CH2M Hill, 2002). This groundwater zone is identified as water present within the fracture system of the weathered limestone bedrock. The solution-widened joints of the Argentine Limestone can extend to the top of the Lane Shale Formation. With depth, the jointing becomes tighter restricting groundwater movement.

The Lane Shale Formation underlies the Argentine Limestone and has been thinned or removed by erosion at lower elevations across the former AFB. Consequently, at those sites the Raytown Limestone Formation is exposed at the surface or directly underlies the silty-clay overburden layer. Because of its hard, crystalline composition, fractures/joints in the Raytown Limestone are relatively tight and are not widened as a result of chemical solution. Should shallow groundwater penetrate through the Raytown Limestone Formation, it would tend to stop at the top of the underlying Chanute Shale formation, another relative impermeable shale unit (CH2M Hill, 2002).

OU-2 site LTM wells are finished in the interfacial groundwater zone (overburden) or the deeper bedrock groundwater zone finished in shale or limestone layers (bedrock). Based on local historic monitoring well data, groundwater elevations can vary considerably over short distances in the overburden and bedrock groundwater zones. The measured depth to groundwater in monitoring wells is generally shallow, varying from less than 2 feet to about 15 feet bgs, across the former AFB. Higher groundwater levels are generally observed in the spring and fall, but remain fairly constant throughout the year.

In summary, the combination of the silty clay overburden, fractured limestone units, and relatively impermeable shale units results in subsurface conditions with limited opportunity for vertical groundwater movement. Low-flow velocities are present and near stagnant groundwater conditions exist during dry periods, as demonstrated by numerous AFB wells that can take days to recharge after bailing and sampling.

Groundwater levels vary at the base due to seasonal variations. Overall, shallow groundwater is typically present beneath each site within the transition zone between the silty clay overburden and the weathered layers of the uppermost bedrock unit, usually Lane Shale. Groundwater generally moves within the transition zone and mirrors the surface topography, flowing downhill through the soil overburden-weathered bedrock interface zone. Thus, if the land slopes to the

south, shallow groundwater also tends to flow south. Based on historic and 2011 site groundwater potentiometric surface maps, groundwater at the OU-2 sites generally flows north- easterly (SS 006 and SS 012) and south-easterly (ST 005 and ST 011).

According to Missouri Department of Natural Resources (MDNR), groundwater quality in Cass and Jackson counties is marginal; it is moderately saline with total dissolved solids ranging between 330 parts per million (ppm) and 7,000 ppm. In addition, wells are low yield. Shallow wells installed in Kansas City Group formations typically discharge less than five gallons per minute. Groundwater from wells installed at greater depths in the Kansas City Group formations indicates that salinity increases with depth.

At the request of the Air Force, MDNR's Division of Geology and Land Survey conducted a water well search within one, two, and five mile radii of the base in June 2000. The well search verified that shallow groundwater beneath and near the base is not used for domestic purposes and no record of shallow water wells was found. As stated previously, the base and nearby communities obtain their domestic water supply from the Kansas City Water and Pollution Control Department (CH2M Hill, 2005).

The ROD for OU-1 and OU-2 was signed in September 2004 and established the following RAO for OU-2:

- To prevent human exposure to contaminated groundwater with contaminant concentrations that pose risks greater than 1×10^{-4} to 1×10^{-6} or a hazard index of 1 for the reasonable maximum exposure scenario.

In order to accomplish the RAO, LUCs, supported by LTM, were selected as the final remedy for OU-2 to:

- Prohibit extraction and use of groundwater.
- Prohibit land surface activities that may interfere with or damage the on-site monitoring wells.

An LTM program is in place to support the LUCs and allow systematic, periodic evaluation of site groundwater quality to help ensure that the established LUC boundaries fully encompass the contaminant plumes and remain protective of human health and the environment, and to provide objective data to support termination of LUCs when RACGs have been achieved.

The property was transferred to the City of Kansas City (Sites ST 005, SS 006, ST 011, and SS 012) in 2005. Restrictive covenants were placed in the Deed for Sites ST 005, SS 006, ST 011, and SS 012.

No additional remedial actions have been performed for groundwater, although a treatability study (CH2M Hill, 2011) and a pilot study (AFCEC, 2012) were performed in the lower groundwater plume at Site SS 006. The treatability study was performed to evaluate the effectiveness of 3DMe, an advanced formula hydrogen release compound, to enhance reductive dechlorination in the lower groundwater plume.

In February of 2012, AFCEC performed a pilot study in the vicinity of MW-020 in the lower groundwater plume. The pilot study was performed in conjunction with a USACE construction project that was on-going in the area of the lower groundwater plume. The pilot study included the abandonment of MW-020, excavation of soil to bedrock and backfilling of the excavation with a mixture of crushed rock and a reducing agent (Adventus Daramend™) to create an in-site anaerobic treatment zone for contaminated groundwater.

The previous Five-Year Review concluded that the selected remedy for OU-2 at that time remained protective of human health and the environment. Groundwater at the former Richards-Gebaur AFB was not being used for any purpose, and LUCs prohibiting extraction and use of groundwater at the OU-2 sites were adequate to ensure that significant exposures did not occur in the future. No interference with or damage to any of the on-site monitoring wells had been observed.

The previous Five-Year Review recommended that a revised vapor intrusion evaluation be conducted after a new toxicity factor for TCE was approved and promulgated. In 2011, EPA finalized the toxicity values for TCE. Both cancer and non-cancer toxicity values for TCE changed since the first Five-Year Review. The cancer Inhalation Unit Risk factor changed from 1.7×10^{-6} to 4.1×10^{-6} ($\mu g/mg^3$)and the non-cancer Reference Concentration was changed from 0.021 to 0.002 mg/m^3. TCE is now considered more toxic for both cancer and non-cancer hazard, but the non-cancer Reference Concentration revision (~10X) is of greater magnitude than the Inhalation Unit Risk revision (~3X).

A revised vapor intrusion evaluation is presented in this Five-Year Review and is included in **Appendix F**.

During USACE construction activities for the 88th RSC at Site SS 006, selected monitoring wells were abandoned and/or replaced with MDNR and AFCEC concurrence.

Recommendations were made to modify the sampling frequency at Sites ST 005, ST 011 and SS 012 and those modifications were implemented as part of the LTM sampling program. Groundwater concentrations are evaluated on a yearly basis and modifications to the yearly sampling program are made, if necessary, according to the LTM decision rules (CH2M Hill, 2005).

6.1 ADMINISTRATIVE COMPONENTS

AFCEC conducted the Five-Year Review, in accordance with their role as the CERCLA lead agency for the former Richards-Gebaur AFB, with technical support from FPM/URS.

U.S. Environmental Protection Agency (EPA) and MDNR provide regulatory oversight of the Five-Year Review. In this capacity, they provide input and guidance during the Five-Year Review process and reviewed and provided comments on the report.

AFCEC has the responsibility for planning, coordinating, funding, and conducting Five-Year Reviews. AFCEC is responsible for making protectiveness determinations upon completion of each Five-Year Review. However, EPA retains final authority over whether the Five-Year Review adequately addresses the protectiveness of the remedies. While not formally part of the Five-Year Review team, EPA and MDNR are included as part of the review and comment process on the Five-Year Review.

The Five-Year Review process included notification to the regulatory agencies, the community, and other interested parties upon initiation of the Five-Year Review. Relevant documents and data were reviewed, and interviews were performed. Each of these elements is detailed in the following subsections.

6.2 NOTIFICATION OF POTENTIALLY INTRESTED PARTIES

Parties to most likely have a significant interest in the Five-Year Review process and results were identified at the outset of the review, notified that the review was being initiated, and solicited for input on the review process. The primary stakeholders include:

- Regulatory Agencies – EPA Region 7 and MDNR.
- Affected Property Owners – The City of Kansas City, Missouri and CenterPoint Properties and the Department of Army, Department of Navy, and Department of Marines.

On January 9, 2012, AFCEC met with the Department of Navy and the Department of Marines to coordinate both branches approaches and processes for the review. A draft outline of the Five-Year Review report was also presented at the meeting.

6.3 COMMUNITY NOTIFICATION INVOLVEMENT

A public notice announcing initiation of the Five-Year Review was published in the Southland Edition of the Kansas City Star on January 25, 2012 (**Appendix A**). No comments or questions were received from the community following the publication of the January public notice. Additional community involvement activities are not planned as part of this Five-Year Review due to lack of community interest. The Restoration Advisory Board (RAB) for the former Richards-Gebaur AFB was adjourned in November 2003, based on unanimous agreement of the RAB members. Public notices, published in November 2005 to determine whether there was public interest in restarting the RAB, resulted in no response.

The final Five-Year Review report will be placed in the information repository at the Grandview Mid-Continent Public Library located at 12930 Booth Lane, Grandview, Missouri, 64030. A

second public notice will be published announcing the completion of the Five-Year Review and its availability at the library.

6.4 DOCUMENT REVIEW

The following documents provided the primary basis for the Five Year Review:

- Comprehensive Five-Year Review Guidance, OSWER Directive 9355.7-03B-P (EPA, June 2001)
- First Five-Year Review Report (March, 2007)
- Final ROD (OUs 1 and 2)
- OU-1 ESD
- LUC/IC Management Plan
- LTM Groundwater Sampling Results

A compilation of reports and documents available during the preparation of this Five-Year Review is provided in **Appendix B**. These documents define the nature and extent of contamination that was identified in OU-2. This information provides the basis for this Five-Year Review.

6.5 DATA REVIEW

The data review focused on groundwater sampling results from the April 2006 through April 2012 long-term groundwater monitoring events. This data were also evaluated to determine whether any changes in contaminant distribution had a significant effect on the original conclusions and recommendations of the Five-Year Review.

6.5.1 Site ST 005

The highest contaminant concentrations at Site ST 005 were detected in the presumed source area at monitoring well MW-018, located northeast of the former location of Facility 959, the easternmost pump house (**Figure 6-1**). **Table 6-1** summarizes groundwater data from the April 2012 LTM sampling event. **Appendix C** presents the historical groundwater data. Monitoring conducted from April 2006 through April 2012 indicates that the overall nature and extent of contamination remains generally stable, as shown on the temporal trend graphs on **Figure 6-2**. The April 2012 potentiometric surface is presented on **Figure 6-3**. Although short-term increases in TCE and vinyl chloride concentrations have occurred in monitoring wells MW-018 and MW-020, the overall size of the plume and concentration of contaminants has remained consistent for the past five years.

Significant increases in concentrations were not observed in downgradient monitoring wells and the TCE concentration at the downgradient perimeter well remains non-detected. The observations indicate that, although an increase in concentration occurred in the source area, the overall distribution of contamination and size of the plume is stable and shows no signs of expansion beyond the LUC boundaries.

6.5.2 Site SS 006

The highest contaminant concentrations at Site SS 006 **(Figure 6-4**) were detected at downgradient monitoring well MW-020. **Table 6-1** summarizes groundwater from the April 2012 LTM samples. **Appendix C** presents the historical groundwater data. Monitoring conducted from April 2006 through April 2012 indicates that the overall nature and extent of contamination remains generally stable, as shown on the temporal trend graphs on **Figures 6-5** and **6-6**. The April 2012 potentiometric surface is presented on **Figure 6-7**. Concentrations in the original source area of the upgradient plume at monitoring well MW-005 and further down the central axis of the plume at monitoring well MW-015 exhibit decreasing trends. The observations indicate that the overall distribution of contamination and size of the upgradient plume is stable and shows no signs of expansion beyond the LUC boundaries.

Concentrations of TCE and cis, 1, 2-DCE in the downgradient plume in the original source area in monitoring well MW-020, have exhibited an overall decreasing trend since October 2006. In the downgradient plume, only MW-030 had a detection of TCE that exceeded the RACG during April 2012 LTM sampling event. This detection was comparable to the October 2011 sampling event. Monitoring well MW-020, which has historically had the highest TCE detection in the downgradient plume, was abandoned during the Site SS 006 Downgradient Pilot Groundwater Treatability Study conducted in February 2012. MW-020 could not be reinstalled in the same location due to the construction of drainage drop inlet in a drainage basin that is associated with the Army Reserve Center for the 88th RSC at the location of the well. Because several monitoring wells installed as part of a previous CH2M Hill treatability study remained in the area outside of the drainage basin in the immediate area around the identified extent of the downgradient plume, it was agreed by all parties that MW-20 did not need to be replaced and would no longer be part of the LTM program. As part of the SS 006 Downgradient Pilot Groundwater Treatability Study, soil was removed to the top of bedrock, unsaturated and saturated removing essentially the highest concentration portion of the plume. The removal of the saturated soil and the placement of amendments in the excavated portion of the plume should effectively reduce the downgradient plume.

6.5.3 Site ST 011

Minimal groundwater contamination, all below RAGs, remains at Site ST 011. The April 2012 analytical data for this site are presented in **Table 6-1** and **Figure 6-8** illustrates the concentrations detected during the April 2012 sampling event. Monitoring conducted from April 2006 through April 2012 exhibits a consistent decline in contaminant concentration in all monitoring wells across the site, as shown on the temporal trend graphs on **Figure 6-9**. The April 2012 potentiometric surface is presented on **Figure 6-10**. Concentrations at all monitoring wells remained below MCLs since October 2010. **Appendix C** presents the historical groundwater data.

During the April 2012 LTM sampling event TCE and cis-1, 2-DCE were the only COCs detected at Site ST 011 and both were detected at concentrations below their respective RACGs. This is the second consecutive semi-annual event where VOCs remained below their RACGs. According to the requirements of the ROD, this site is recommended for closure.

6.5.4 Site SS 012

The highest contaminant concentrations at Site SS 012 (**Figure 6-11**) were detected at monitoring well MW-001, near the former location of the UST. **Appendix C** presents the historical groundwater data. Monitoring conducted from April 2006 through April 2012 indicates that the overall nature and extent of contamination remains generally stable, as shown on the temporal trend graphs on **Figure 6-12**. The April 2012 potentiometric surface is presented on **Figure 6-13**. Although a significant spike in the TCE concentration was observed at monitoring well MW-001 in October 2010, the concentration has decreased. **Table 6-1** summarizes groundwater data from the April 2012 LTM sampling event.

The plume does not appear to be migrating based on the concentrations of TCE have decreased or are consistent with historical data, however during the October 2010 sampling event, TCE spiked in MW-001. The concentration was still elevated in April 2012, and will continue to be monitored. The observations indicate that although the concentration in MW-001 remain elevated (2,000 µg/L TCE and 3.9 µg/L vinyl chloride in April 2012), the overall distribution of contamination and size of the plume is stable and shows no signs of expansion beyond the LUC boundaries.

6.6 SITE INSPECTIONS

Inspections at Sites ST 005, SS 006, ST 011 and SS 012 were conducted on December 1, 2011, as part of the annual LUC/IC monitoring program and will continue to be conducted until the RAO established in the ROD for OU-2 is met. Copies of the inspection checklists and photo documentation of the inspections are included in **Appendix D**. No violations of the Deed restrictions were identified within the LUC/IC boundaries at Sites ST 005, SS 006, ST 011, and SS 012. Additional site inspections were not deemed necessary for this Five-Year Review.

6.7 INTERVIEWS

As part of the Five-Year Review, formal interviews were conducted with the City of Kansas City, Missouri, the U.S. Army Corps of Engineers and Kingston Environmental Inc., who leases buildings at Site SS 006. The interviews are summarized as follows:

- Kingston Environmental Inc.: Spoke with Mr. Bill Worley (Owner) regarding the current and planned use of the buildings that Kingston occupies (Buildings 927 and 930) at Site SS 006. Mr. Worley stated that they currently use the buildings for supply and vehicle staging and that personnel do not occupy the building other than to retrieve vehicles and supplies. Both buildings are slab-on-grade and workers do not occupy the buildings full time. Mr. Worley indicated that they do not anticipate using the buildings for anything other than the current uses.
- U.S Army Corps of Engineers (USACE), Kansas City District (Katie Trodden, Project Engineer): The Kansas City District is overseeing the construction of the Army Reserve Center for the 88th RSC that is just underway at Site SS 006. Ms. Trodden stated that the building is a slab-on-grade construction and that vapor barriers are being put in place per the construction specifications. Construction plans also call for a vapor mitigation system. The buildings planned for this facility are not located over any current extent of groundwater contamination at Site SS 006. The RSC and USACE provided construction

plans to AFCEC and MDNR prior to commencement of construction as the plans called for impacts to existing LTM wells. Following discussions between AFCEC, MDNR, USACE, RSC and EPA, approval was given to USACE to abandon MW-17 and MW-20 and relocate MW-16 to accommodate construction activities.

- City of Kansas City, Missouri (Zoraya Lara – Asset and Business Development Manager): Ms. Lara indicated that much of the re-development plans in place by CenterPoint Properties have been put on hold due to economic reasons. There are currently no immediate re-development plans for Sites ST 005, ST 011 or SS 012. A portion of Site SS 006 is in the process of a land swap with the Department of the Army. The property is currently being re-developed to house the 88th RCS Army Reserve Center. The City of Kansas City, Missouri is doing the land swap of approximately 18 acres for the same amount of acreage as at Site ST 005. The remaining SS 006 property will stay with the City of Kansas City, Missouri.

Additional information was gathered from the Air Force, regulatory agencies, and current property owners on an "as needed" basis, through informal conversations, and project meetings. In particular, extensive information was captured regarding future land use and regulatory requirements at a project meeting held on site on December 13, 2011, which was initiated by AFCEC and attended by representatives of the key stakeholders (AFCEC, EPA, MDNR, USMC, 88th RSC, CenterPoint Properties and the City of Kansas City).

As part of the Five-Year Review, OU-2 Sites ST 005, SS 006, ST 011, and SS 012 were re-evaluated to ensure that remedy identified in the 2004 ROD remains protective of human health and the environment. The sites were reviewed to ensure that:

- The remedy continues to function as intended by the ROD.
- Exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid.
- No additional information has come to light that would call into question the protectiveness of the remedy.

Each of these issues is addressed separately below.

7.1 QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes. The LUCs required by the ROD (i.e., restrictions prohibiting extraction and use of groundwater and land surface activities that may interfere with or damage the on-site monitoring wells) were included in the Deed at the time of property transfer to the City of Kansas City (**Appendix E**). A LUC inspection was conducted in December 2011 in accordance with ROD requirements and there was no evidence indicating that the LUCs had been breached at that time. Groundwater wells have not been installed and groundwater is not extracted or used for any purpose, nor has any other significant development occurred on any of the OU-2 sites. It should be noted that in 2008 re-development activities at Site ST 005, an LTM well was temporarily buried without prior knowledge or approval for AFCEC and MDNR. The LUC/IC breach was immediately identified and the well was restored to use.

7.2 QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEANUP LEVELS, AND REMEDIAL ACTION OBJECTIVES USED AT THE TIME OF THE REMEDY STILL VALID?

Yes. Exposure assumptions, cleanup levels and RAOs used at the time of remedy selection remain valid. Each of these items was evaluated and summarized below.

Exposure Assumptions: Site usage at all OU-2 sites remains commercial/light industrial in nature and groundwater at the sites is not used for any purpose. Drinking water in and around the former Richards-Gebaur AFB is obtained from the Missouri River via the City of Kansas City, Missouri Water Department. As a result, no direct contact pathways exist for exposure to contaminated groundwater at any of the OU-2 sites, and there is no expectation that direct contact exposure will occur in the future. Although highly unlikely given the current and anticipated future site usage, the remedy for OU-2 was based on ingestion and direct contact with contaminated groundwater by future residents, which is conservative and protective for those pathways. LUCs imposed as part of the remedy will effectively ensure that no direct exposure to contaminated groundwater will occur.

The current environmental setting at the site is consistent with the findings of the original RI. There are no identified terrestrial or aquatic ecological habitats, and as such, ecological exposure pathways are incomplete and there are no ecological risks associated with the site that need further evaluation.

Indirect exposure to VOCs in groundwater can occur when vapors released from groundwater are transported through the soil into overlying buildings. The only buildings currently on-site are slab-on-grade industrial/commercial buildings. Modeling indicates that VI risks to current or future slab-on-grade industrial/commercial buildings will be within the acceptable range of 1E-4 to 1E-6, and hazard indices less than 1.0, even if new buildings are placed directly over the most contaminated portions of the plume(s). Based on the model predictions, VI risks will exceed 1E-4, and hazard indices will exceed 1.0, in the event that industrial/commercial buildings with basements, or residences with or without basements, are constructed in areas overlying contaminated groundwater.

Screening Criteria and Toxicity Data: The risk assessment conducted during the Basewide RI used EPA Region 9 Preliminary Remediation Goals (PRGs) and Federal Maximum Contaminant Levels (MCLs) as the source of risk-based screening criteria to identify COCs for further risk evaluation. Since completion of the risk assessment, the PRGs have been renamed as the Regional Screening Levels (RSLs). Based on comparison to the most recent version of the RSLs (May, 2012), most RSLs, have changed significantly since the risk assessment was completed during the Basewide RI. **Table G-1** identifies the maximum detected concentrations of chemicals detected in site groundwater since 1999, and provides comparison of the previous PRG and MCL to the current RSL and MCL. It should be noted that these screening values relate to drinking water pathways, and the portion of the site remedy that prohibits groundwater use, and do not account for vapor intrusion. The impacts of RSL and MCL changes for the drinking water pathways are discussed in **Appendix G**.

Chemicals were not screened for vapor intrusion potential in the risk assessment, but were first evaluated in a supplemental risk assessment (CH2M Hill, 2002) and subsequently during the first Five-Year Review. Chemicals with the greatest potential for vapor intrusion (tetrachloroethene, trichloroethene (TCE), 1, 1-dichloroethene, cis-1,2-dichloroethene and vinyl chloride) were evaluated, with trichloroethene showing the highest potential risk. Because the toxicity values for TCE were not finalized at the time of the first Five-Year Review, it was recommended that this evaluation be repeated. As discussed previously, the current evaluation demonstrates that the remedy is protective in the short-term but may not be protective in the long-term because of vapor intrusion concerns for some potential future use scenarios.

Underlying toxicity data used to evaluate risks include slope factors used to evaluate cancer effects from oral and dermal exposure, inhalation unit risk values used to evaluate cancer effects from inhalation, reference doses used to evaluate non-cancer hazards from oral and dermal exposure, and reference concentrations used to evaluate non-cancer hazards from inhalation. Toxicity values for numerous chemicals have changed significantly since the risk assessment was conducted during the Basewide RI. Although the toxicity values used in the risk assessment were not presented in that document, the toxicity values can be identified from the PRG tables used in the risk assessment. **Table G-2** identifies those chemicals detected in site groundwater since 1999, and provides comparison of the toxicity values identified in the PRG tables to the current toxicity values. Toxicity values that have changed are highlighted. Cancer and non-cancer values have changed. TCE is now considered more toxic for both cancer and non-cancer. The impacts of the toxicity value changes are summarized in **Appendix G**.

In addition to quantitative changes in toxicity values, two of the primary groundwater constituents, trichloroethene and vinyl chloride, have now been classified by USEPA as

mutagenic carcinogens. Methylene chloride, detected at lower concentrations, is also classified as carcinogenic by the mutagenic mode of action. Chemicals with a mutagenic mode of action cause irreversible changes to DNA, with young children being particularly sensitive. As an example, USEPA assumes that mutagens are 10x more potent carcinogens for children in the 0-2 year age range than for adults, with susceptibility decreasing as the children get older. As documented in **Appendix F** (VI Evaluation), future inhalation risks for adult workers exceed 1E-4 for buildings with basements in three areas (ST 005, SS 006 and SS 012), and are even higher for residential scenarios where children would be present.

It should also be noted that the previous VI evaluation only evaluated VI for slab-on-grade building construction. At the present time there are no buildings at any of the four sites with subgrade (basement) constructions; however, basements are common throughout the Kansas City metropolitan area in both commercial/industrial and residential buildings. A VI re-evaluation was performed as part of this current Five-Year Review, calculating cancer risks and non-cancer hazard indices for industrial buildings and residences, with and without basements, using the finalized TCE toxicity values (**Appendix F**). Risks for industrial buildings without basements (i.e., slab-on-grade construction) were below the acceptable risk range of 1E-4 to 1E-6 for full-time workers in the buildings, and hazard indices were less than 1.0. However, industrial buildings with basements, and residences with and without basements, showed unacceptable risks (greater than 1E-4) in several areas, and hazard indices exceeded 1.0. In addition to the VI issue, there have been several changes in exposure assessment methods and exposure assumptions, and toxicity data since the remedy selection; however, none of these changes in methodology or toxicity values result in a change in the overall risk conclusions or remedy protectiveness or residential development occurs within a site's LUC/IC boundaries. Each of the items identified in Question B was evaluated in detail, as described in **Appendix G**.

7.3 QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No. The Five-Year Review identified and evaluated one issue that could potentially have an impact on the protectiveness of the OU-2 remedy: vapor intrusion. Based on the evaluation presented below, the issue does not call into question the current protectiveness of the remedy at this time.

Vapor Intrusion: Hypothetical indoor air risks posed by vapor intrusion of OU-2 groundwater contaminants were evaluated during the RI in 2002 using Version 2.0 of the Johnson and Ettinger (J&E) Model using TCE toxicity values that were withdrawn later. The first Five-Year Review updated the evaluation using California EPA's regional TCE values as interim, and recommended that a revised vapor intrusion risk evaluation be conducted after a new TCE toxicity factor was approved by EPA. The reevaluation was conducted using the most recent publicly available version of the J&E model (EPA, 2004) as described in detail in **Appendix F**.

The following issue was identified during the completion of this Five-Year Review as outlined below:

The VI evaluation concluded that future industrial/commercial buildings constructed with basements and residents constructed with and without basements in areas overlying contaminated groundwater will pose unacceptable risks in several areas, and hazard indices will exceed 1.0. The evaluation utilized the highest groundwater concentrations detected at each of the four sites during the latest (April 2012) LTM sampling event.

Recommendations and follow-up actions as they relate to the issue identified in Section 8.0 are summarized below:

- One way to ensure long-term protectiveness of the remedy would be to modify the existing LUC/IC Management Plan (AFRPA, 2005) to notify the current property owners/occupants of the potential for soil vapor intrusion if construction of industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater. The notifications could also be a means to advise the property owners/occupants that the potential for soil vapor intrusion may be mitigated through engineered vapor controls or barriers or confirmed through construction-area specific evaluations.
- Site ST 011 is recommended for closure as the site has met the requirements of the ROD.

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The selected remedy for OU-2 remains protective of human health and the environment and is anticipated to remain protective in the future. Groundwater at the former Richards-Gebaur AFB is not currently used for any purpose nor were any interferences with ordinances to any of the on-site monitoring wells observed. LUCs prohibiting extraction and use of groundwater at the OU-2 sites are adequate to ensure that significant exposures do not occur in the future.

The remedy remains protective in the short-term because there has not been any industrial/commercial construction with basements or residential re-development and no residential construction is planned. AFCEC intends to accelerate closure of Sites ST 005, SS 006, and SS 012 to unrestricted use by 2017.

The next Five-Year Review for OU-2 is due within five years of the signature date on the cover of this report. The Air Force will be responsible for completing the review for Sites ST 005, SS 006, ST 011, and SS 012. Sites SS 003 and SS 009 were transferred to the USMC in 2005 and the USMC assumed responsibility for implementing the environmental restoration program at these sites in October 2006; consequently, the USMC will be responsible for conducting the next Five-Year Review for Sites SS 003 and SS 009.

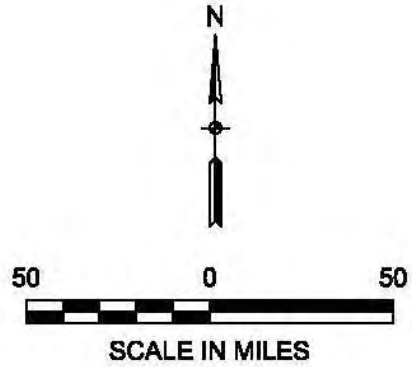
Table 6-1
Summary of Analytical Results - April 2012
Second Five-Year Review
Former Richards-Gebaur AFB, Missouri

Sample ID	Type of Well	Sample Date	Method	1,1-DCE	1,2-DCA	cis-1,2-DCE	PCE	TCE	VINYL CHLORIDE
RACGs				7	5	70	5	5	2
Units				ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
SITE ST 005									
ST005-MW011-GW12	Bedrock	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	4.2	< 1 U
ST005-MW013-GW12	Bedrock	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	**21**	< 1 U
ST005-MW017-GW12	Bedrock	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	**14**	< 1 U
ST005-MW018-GW12	Bedrock	4/6/2012	Peristaltic	2	NA	1.5	< 1 U	**530**	< 1 U
ST005-MW019-GW12	Overburden	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	< 1 U	< 1 U
ST005-MW020-GW12	Overburden	4/6/2012	Peristaltic	< 1 U	NA	1.5	< 1 U	0.71 J	0.82 J
ST005-MW021-GW12	Overburden	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	2.1	< 1 U
ST005-MW022-GW12	Bedrock	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	2.6	< 1 U
ST005-MW024-GW12	Bedrock	4/6/2012	Peristaltic	< 1 U	NA	2.1	< 1 U	**19**	< 1 U
ST005-MW025-GW12	Overburden	4/6/2012	Peristaltic	< 1 U	NA	5.1	< 1 U	< 1 U	0.33 J
ST005-MW026-GW12	Overburden	4/6/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	0.54 J	< 1 U
SITE SS 006									
SS006-MW005-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	29	< 1 U	**32**	0.62 J
SS006-MW008-GW12	Bedrock	4/12/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW011-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	2.9	< 1 U	**12**	< 1 U
SS006-MW014-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	7.4	< 1 U	**68**	< 1 U
SS006-MW015-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	2.9	< 1 U
SS006-MW016-GW12	Overburden	4/10/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW018-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	13	< 1 U	**7.6**	< 1 U
SS006-MW021-GW12	Overburden	4/12/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW023-GW12	Overburden	4/11/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW024-GW12	Overburden	4/12/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW025-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	7.3	< 1 U	**13**	< 1 U
SS006-MW026-GW12	Bedrock	4/10/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW027-GW12	Overburden	4/12/2012	Peristaltic	< 1 U	< 1 U	1.1	< 1 U	< 1 U	< 1 U
SS006-MW028-GW12	Overburden	4/12/2012	Peristaltic	< 1 U	< 1 U	5.2	< 1 U	3.6	< 1 U
SS006-MW029-GW12	Overburden	4/11/2012	Peristaltic	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
SS006-MW030-GW12	Overburden	4/12/2012	Peristaltic	< 1 U	< 1 U	3.6	< 1 U	**5.9**	< 1 U
SITE ST 011									
ST011-MW001-GW12	Overburden	4/3/2012	Peristaltic	< 1 U	NA	1.3	< 1 U	< 1 U	< 1 U
ST011-MW002-GW12	Overburden	4/4/2012	Peristaltic	< 1 U	NA	2.6	< 1 U	0.67 J	< 1 U
ST011-MW003-GW12	Overburden	4/4/2012	Peristaltic	< 1 U	NA	2.9	< 1 U	< 1 U	< 1 U
ST011-MW006-GW12	Bedrock	4/3/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	0.41 J	< 1 U
ST011-MW007-GW12	Bedrock	4/3/2012	Peristaltic	< 1 U	NA	2.2	< 1 U	0.73 J	0.22 J
ST011-MW008-GW12	Bedrock	4/3/2012	Peristaltic	< 1 U	NA	1.6	< 1 U	< 1 U	< 1 U
ST011-MW015-GW12	Bedrock	4/4/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	< 1 U	< 1 U
ST011-MW016-GW12	Overburden	4/4/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	< 1 U	< 1 U
ST011-MW017-GW12	Bedrock	4/4/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	0.44 J	< 1 U

Table 6-1
Summary of Analytical Results - April 2012
Second Five-Year Review
Former Richards-Gebaur AFB, Missouri

Sample ID	Type of Well	Sample Date	Method	1,1-DCE	1,2-DCA	cis-1,2-DCE	PCE	TCE	VINYL CHLORIDE
RACGs				**7**	**5**	**70**	**5**	**5**	**2**
Units				**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
SITE SS 012									
SS012-MW001-GW12	Overburden	4/4/2012	Peristaltic	< 5 U	NA	24	< 5 U	**2000**	**3.9 J**
SS012-MW002-GW12	Overburden	4/5/2012	Peristaltic	< 1 U	NA	24	< 1 U	**460**	< 1 U
SS012-MW003-GW12	Overburden	4/5/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	3.9	< 1 U
SS012-MW004-GW12	Overburden	4/5/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	0.31 J	< 1 U
SS012-MW007-GW12	Overburden	4/4/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	< 1 U	< 1 U
SS012-MW009-GW12	Overburden	4/5/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	**6.4**	< 1 U
SS012-MW011-GW12	Overburden	4/4/2012	Peristaltic	< 1 U	NA	< 1 U	< 1 U	< 1 U	< 1 U
SS012-MW012-GW12	Overburden	4/5/2012	Peristaltic	< 1 U	NA	16	< 1 U	**37**	< 1 U

Notes:
RACGs = remedial action cleanup goal
ug/L = micrograms per liter
NA = not analyzed
J = denotes result was an estimated value
U = denotes analyte was non-detect
Non-detection results were displayed as less than the reporting limit



AIR FORCE CENTER FOR ENGINEERING AND THE ENVIRONMENT	RICHARDS–GEBAUR AFB KANSAS CITY, MISSOURI	**SITE LOCATION MAP**	Figure 1–1
	FPM Remediations, Inc. URS		Project No. 16530827

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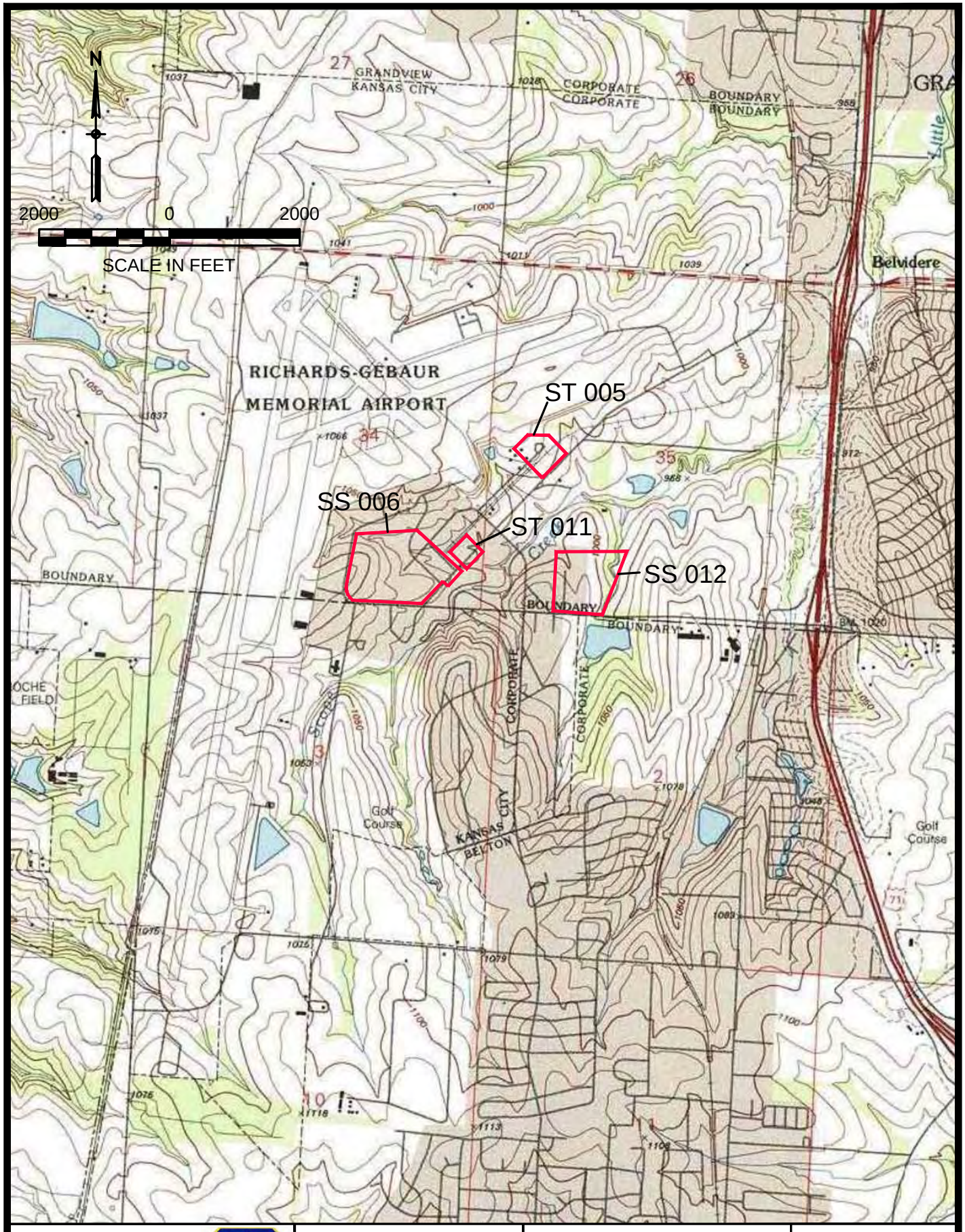

AIR FORCE CENTER FOR ENGINEERING AND THE ENVIRONMENT

RICHARDS–GEBAUR AFB
KANSAS CITY, MISSOURI

SITE LAYOUT MAP

Figure 1–2

FPM Remediations, Inc.

URS

Project
16530827

- bruary 6, 2012 8 . am (cra)
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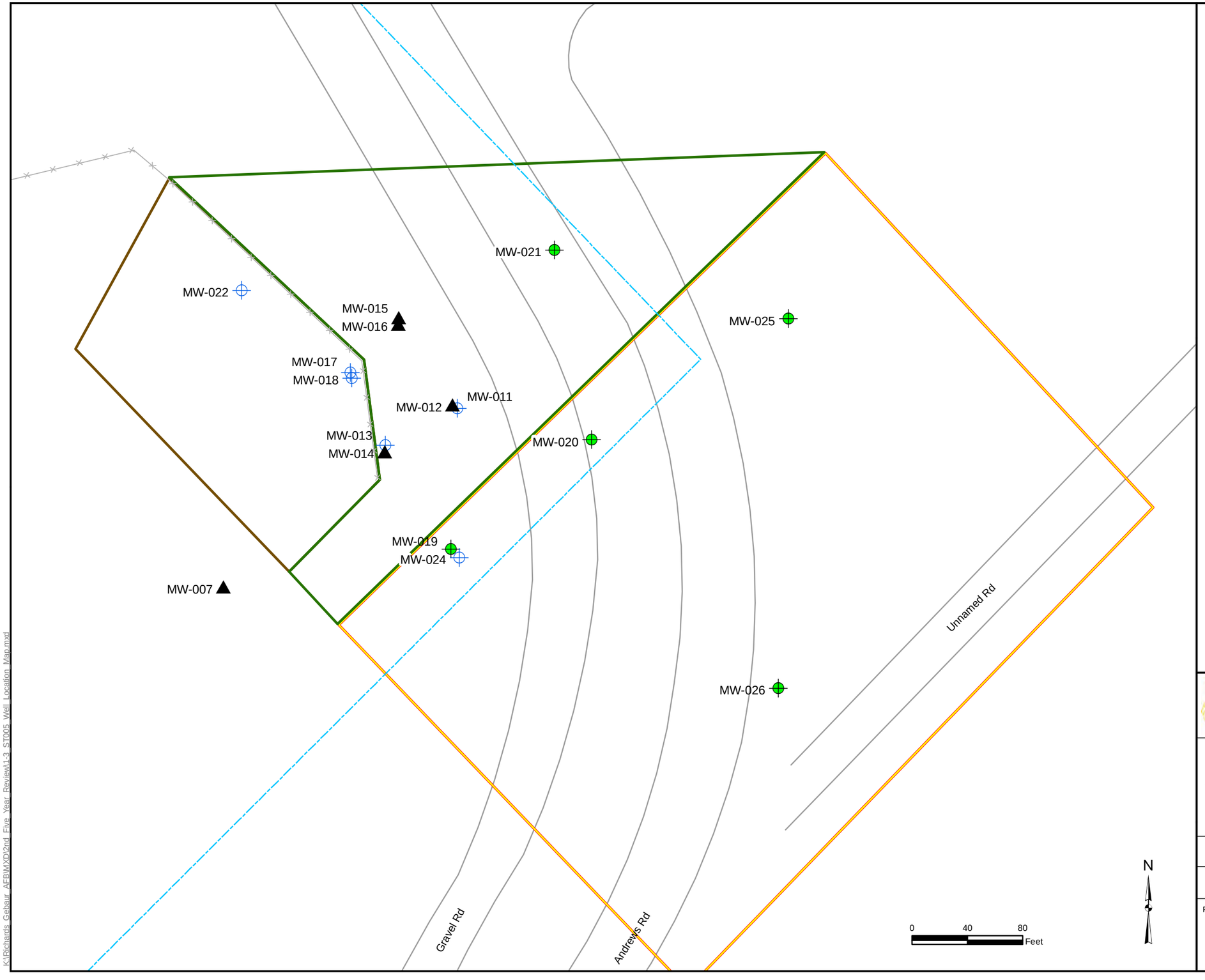

Legend

- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- Contingency Well
- Fence Line
- Former Base Boundary
- Road Line
- Exception Parcel (property transferred to Kansas City, MO prior to 1991 BRAC)
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 005**
LUC Boundaries and Monitoring Well Location Map

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 1-3

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\1-3_ST005_Well_Location_Map.mxd

FPM Remediations, Inc. URS

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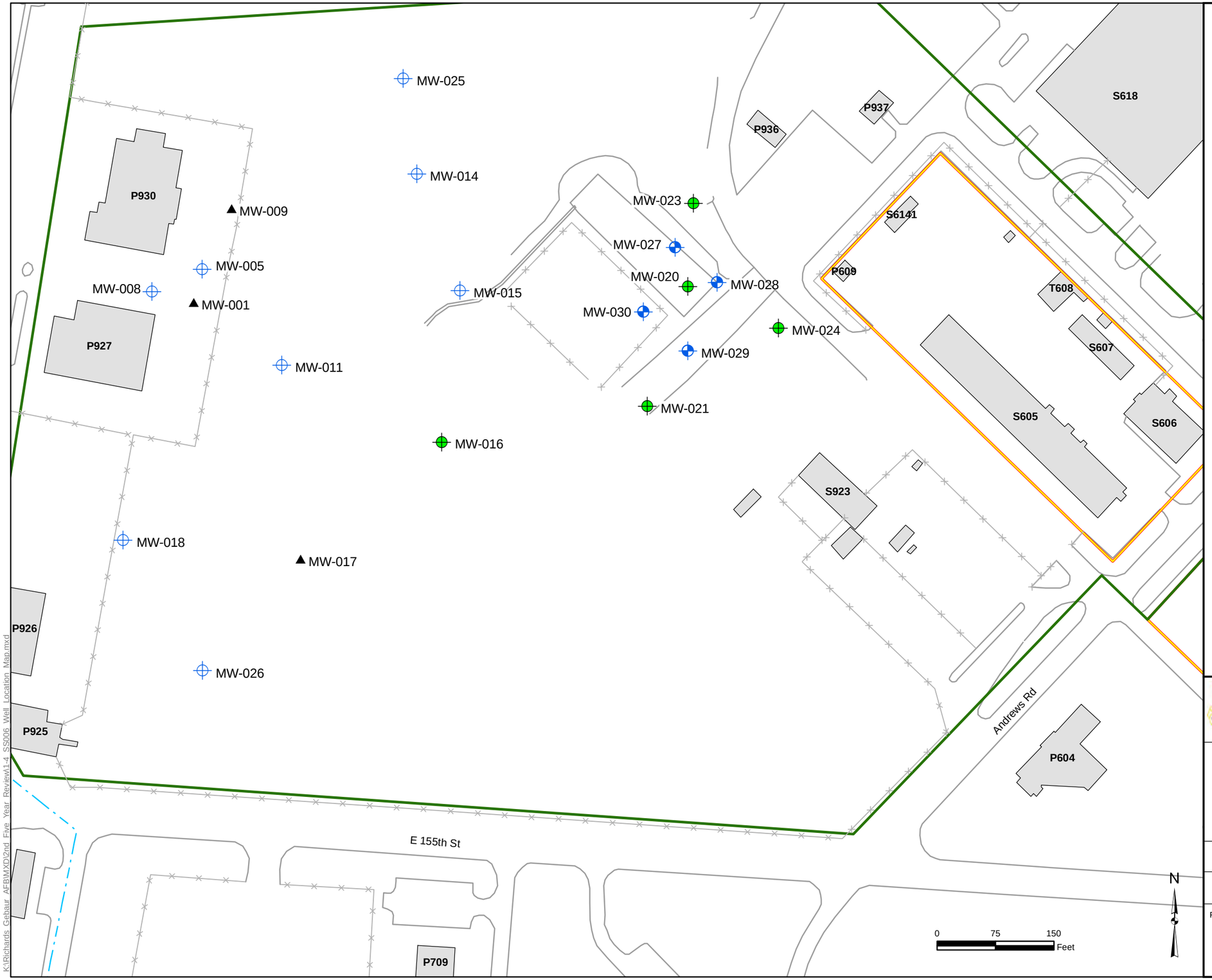

Legend

- Former Base Boundary
- Existing Structure
- Road Line
- Fence Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- CH2MHill Monitoring Well Location (2009)
- Contingency Well
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 006**
LUC Boundaries and Monitoring Well Location Map

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 1-4

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\1-4_SS006_Well_Location_Map.mxd

FPM Remediations, Inc. URS

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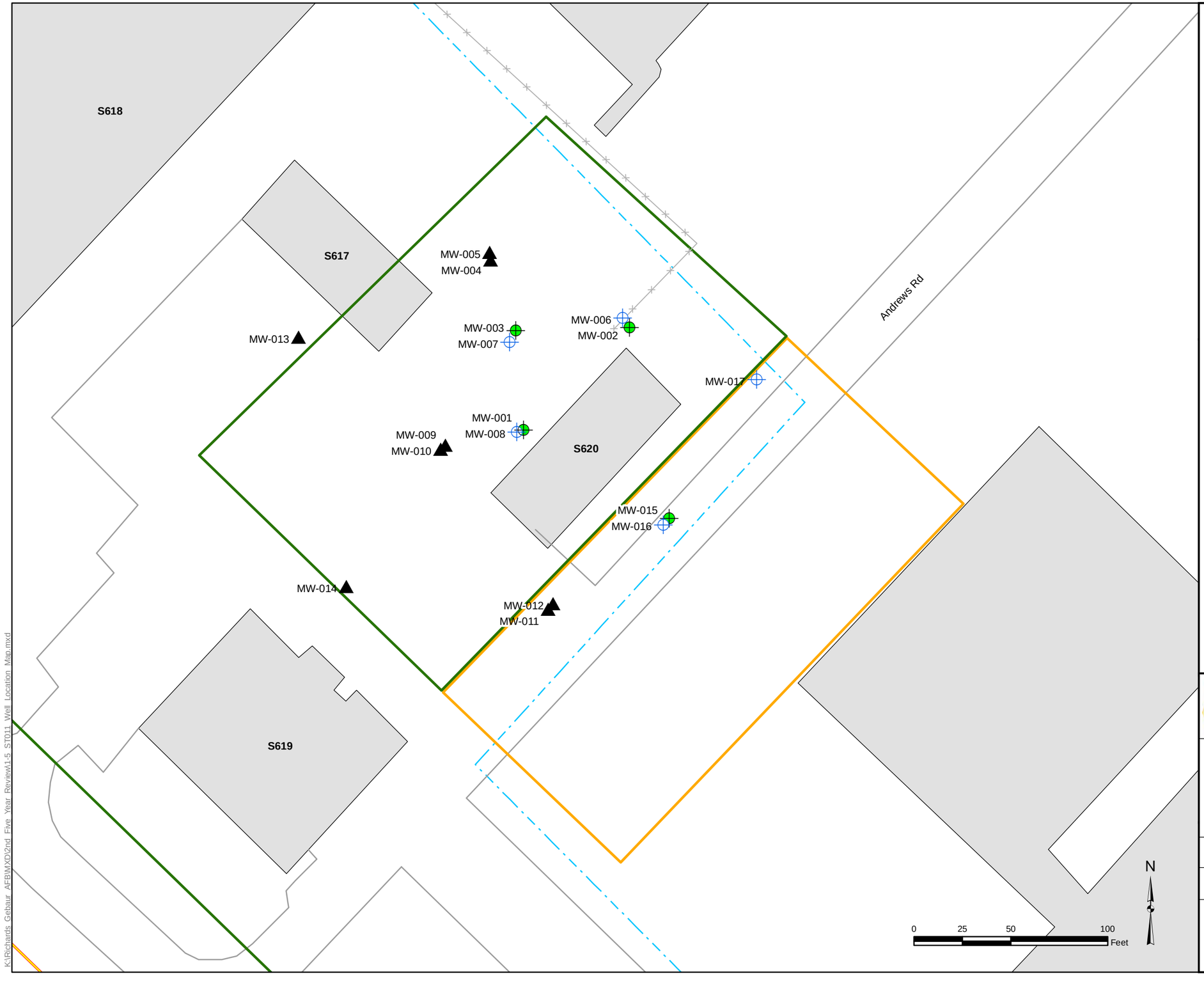

Legend

- Former Base Boundary
- Existing Structure
- Road Line
- Fence Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- Contingency Well
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 011**
LUC Boundaries and Monitoring Well Location Map

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 1-5

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\1-5_ST011_Well_Location_Map.mxd

FPM Remediations, Inc. URS

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Pond Source: Bing Maps imagery through Esri ArcMap server - accessed 12/23/11

Legend

- Overburden LTM Monitoring Well Location
- Contingency Well
- Fence Line
- Road Line
- Existing Structure
- Former Base Boundary
- Pond
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 012**
LUC Boundaries and Monitoring Well Location Map

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 1-6

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\1-6_SS012_Well_Location_Map.mxd

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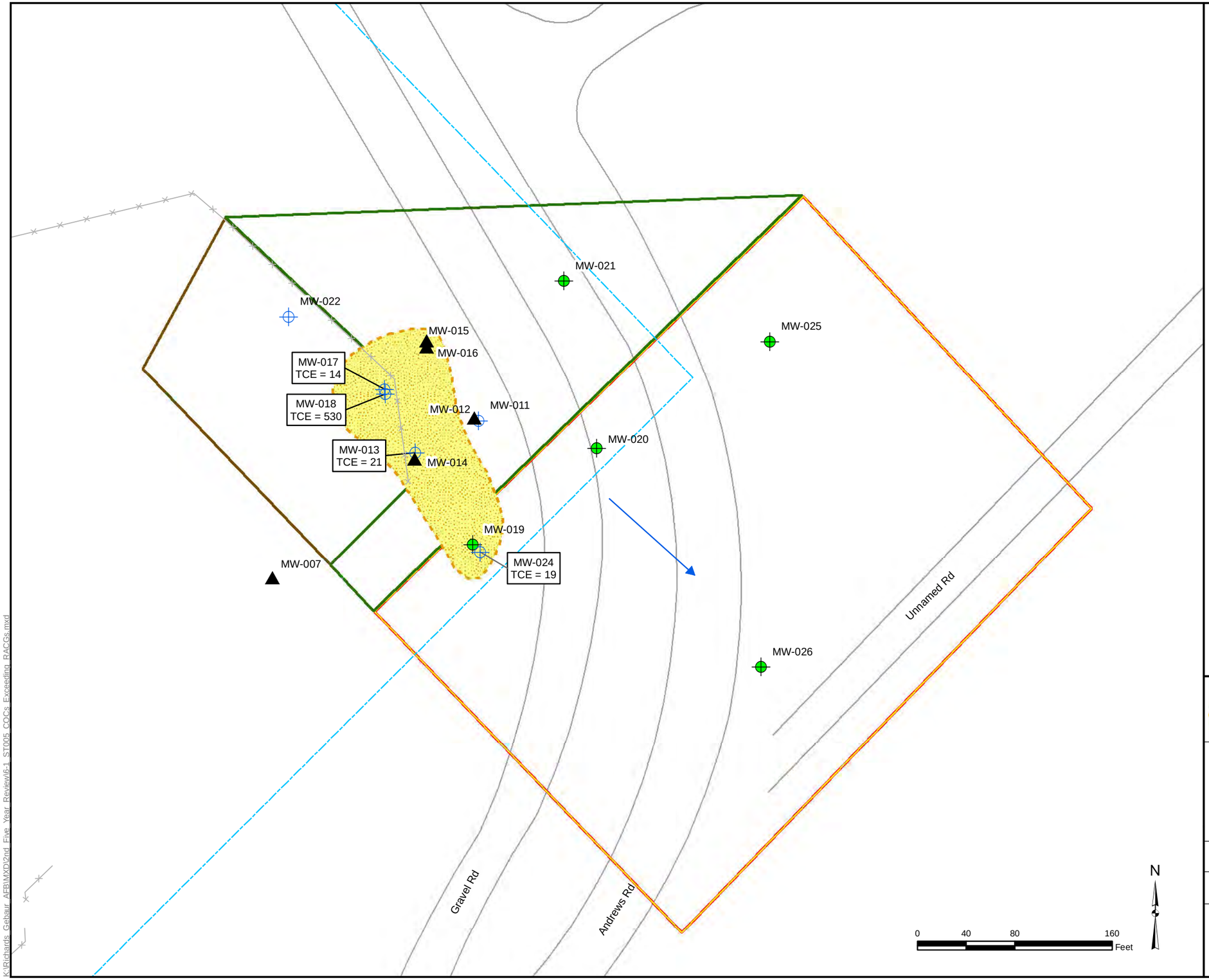

Legend

- Former Base Boundary
- Fence Line
- Road Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- Contingency Well
- General Groundwater Flow Direction
- Approximate Area of Concentrations greater than or equal to MCL 5 ug/L
- Estimated Area of COCs Exceeding RACGs in Upgradient Bedrock Groundwater Zone
- Exception Parcel (property transferred to Kansas City, MO prior to 1991 BRAC)
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005
- MW-011 TCE = 35 — LTM Monitoring Well Location and Analyte Concentration in ug/L

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 005**
COCs Exceeding RACGs
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-1

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\6-1_ST005_Groundwater_Results.mxd

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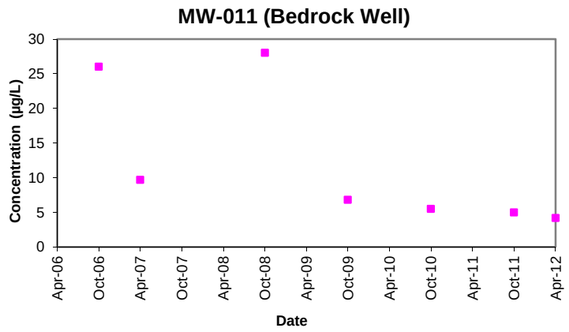

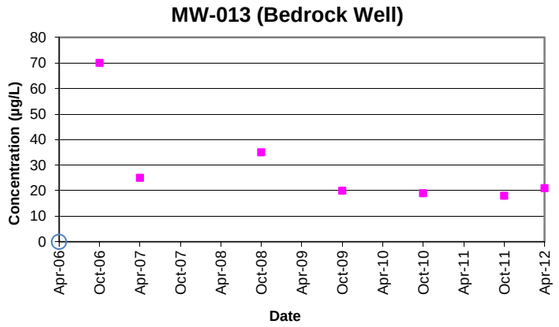

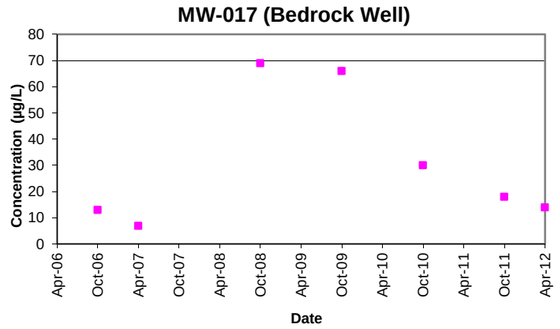

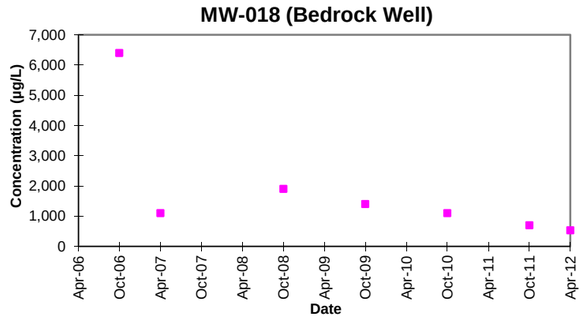

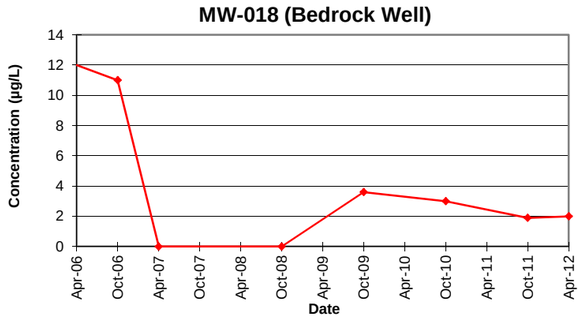

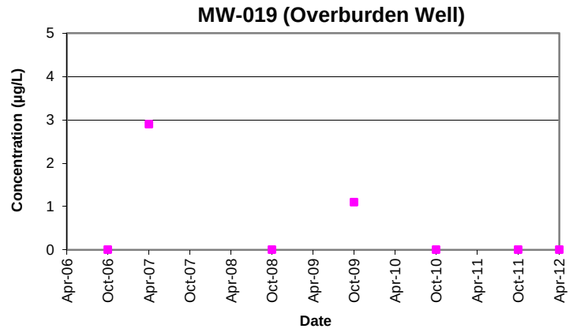

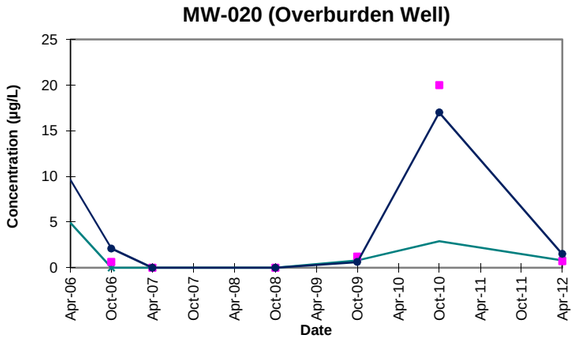

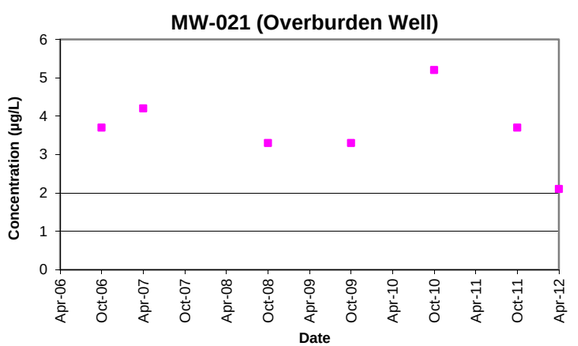

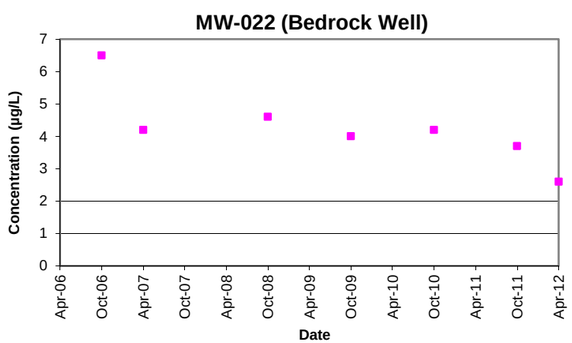

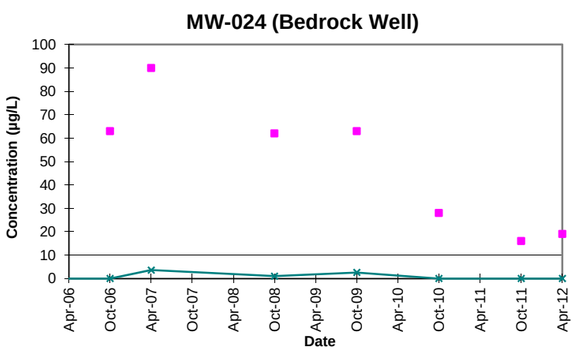

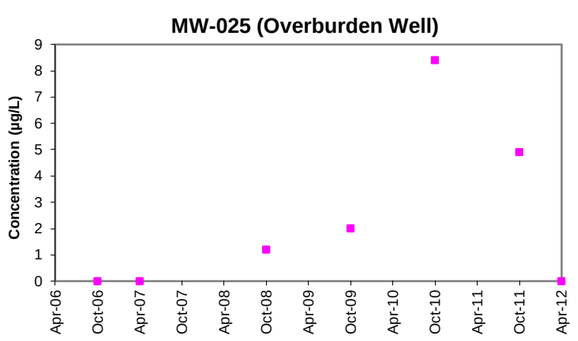

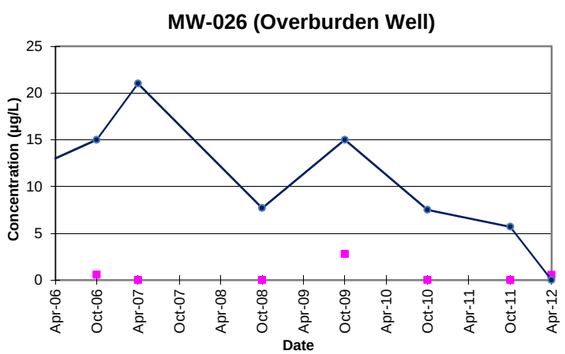

LEGEND:

- TCE (RACG = 5 µg/L)
- Vinyl Chloride (RACG = 2 µg/L)
- cis-1,2-DCE (RACG = 70 µg/L)
- 1,1-DCE (RACG = 7 µg/L)
- NS (Not Sampled/Dry)

µg/L - micrograms per liter
RACG - Remedial Action Cleanup Goal

Notes:

1.) COCs not shown have never exceeded a RACG.

2.) Monitoring well MW-20 was not sampled in October 2011 due to the well being dry.

3.) Monitoring well MW-13 was not sampled in April 2006 due to the well being dry.

AIR FORCE CIVIL ENGINEER CENTER

Five-Year Review Report
Richards-Gebaur AFB, Missouri

TITLE: **ST 005**
Temporal Trends of COCs in Groundwater

DRAWN BY	CHECKED BY	APPROVED BY
RJE	BPW	LAT
PROJECT No. 16530827	November 2012	FIGURE NO 6-2

Filename: I:\Richard Gebaur\Five Year Reviews\Second Five Year Review-2012\Draft\2012_FYR_Trend_graphs_110112.xls

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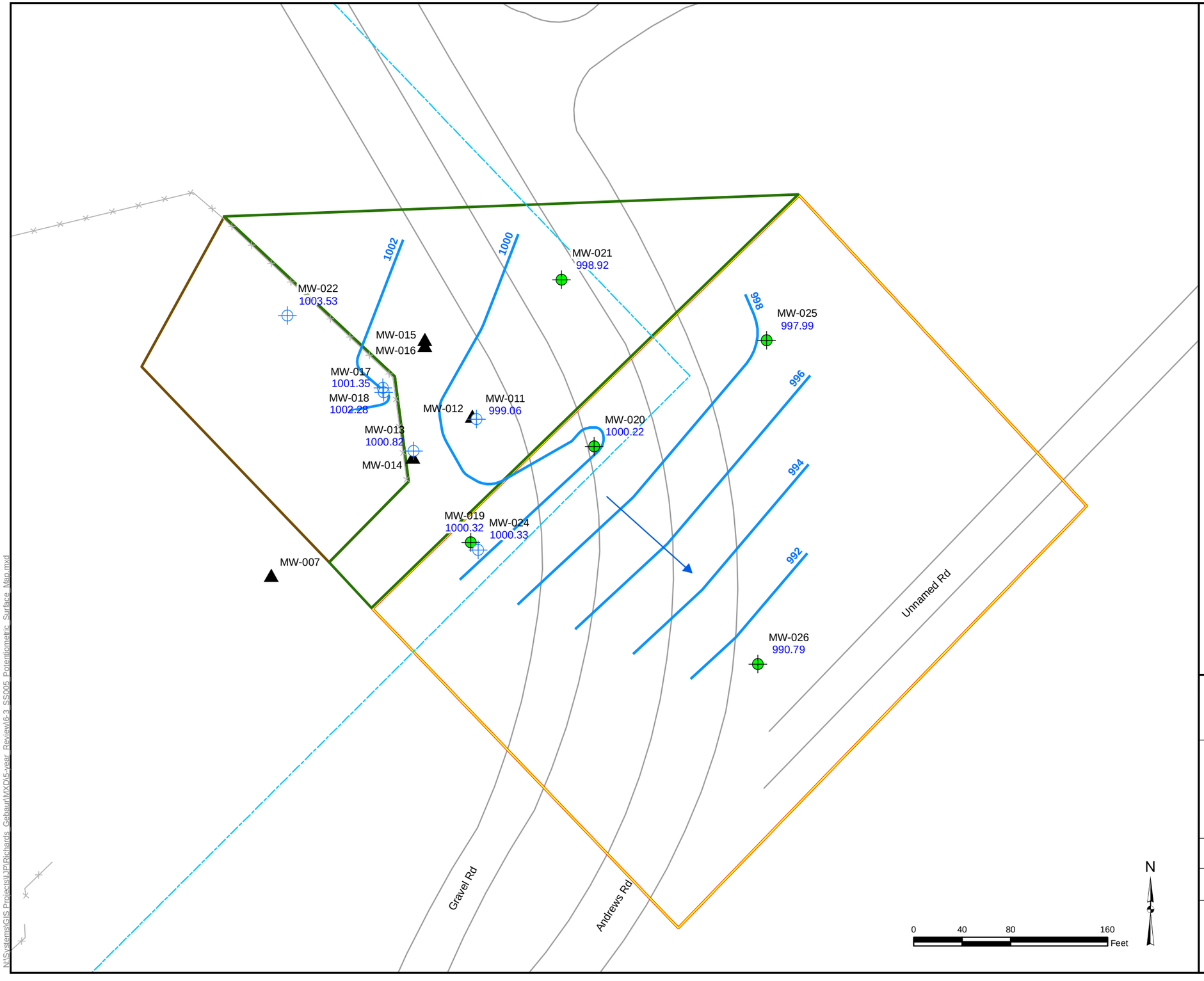

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Legend

- Former Base Boundary
- Road Line
- Fence Line
- General Groundwater Flow Direction
- Potentiometric Surface Line
- Bedrock Monitoring Well Location
- Overburden Monitoring Well Location
- Contingency Well
- 1005.65 Groundwater Elevation
- Exception Parcel (property transferred to Kansas City, MO prior to 1991 BRAC)
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005

Note: Groundwater elevation value estimated due to recent re-grading of ground surface near MW-26.

Air Force Civil Engineer Center

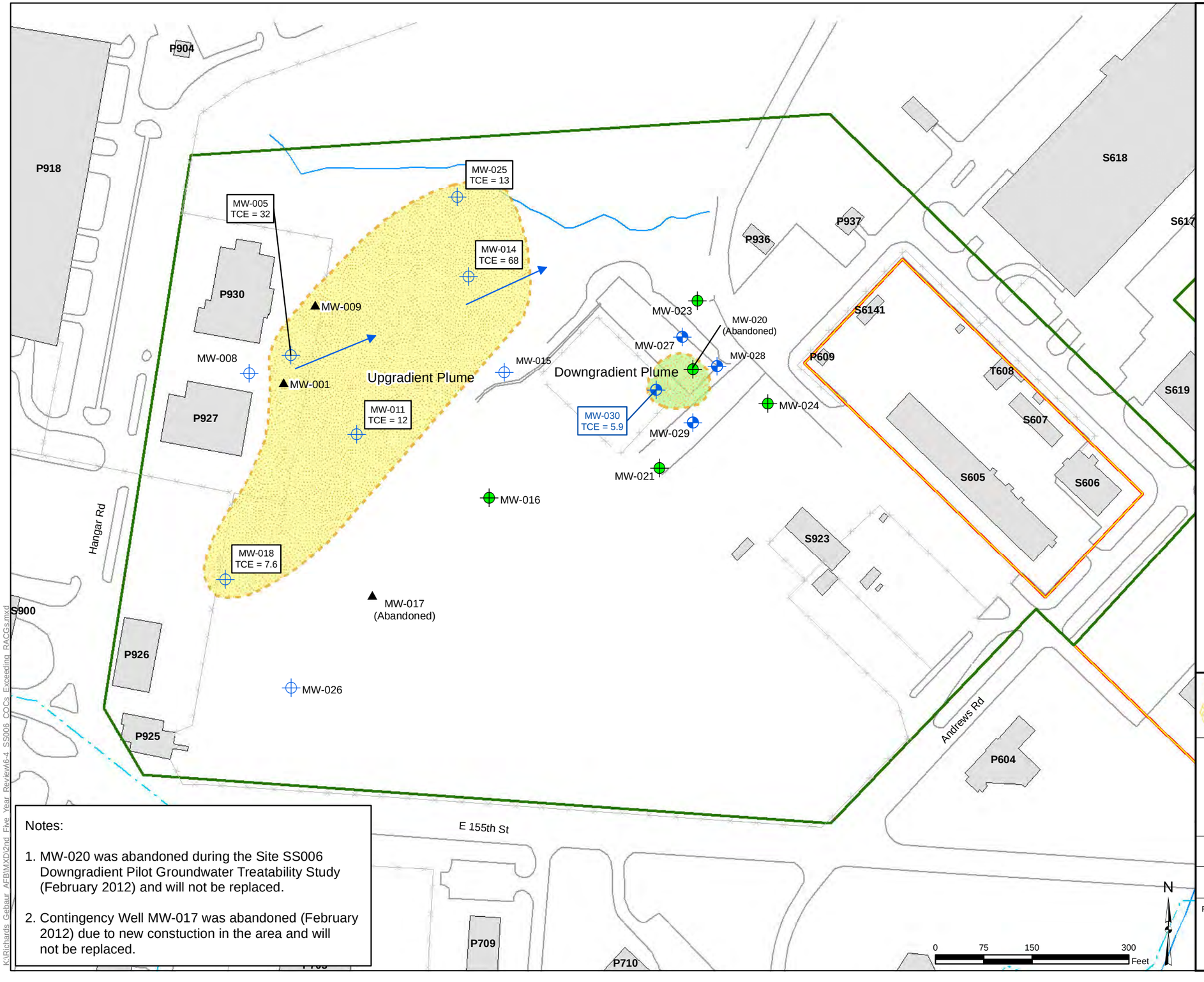
Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 005 Potentiometric Surface Map (April 2012)**

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-3

Filename: N:\Systems\GIS Projects\IJP\Richards_Gebaur\MXD\5-year_Review\6-3_SS005_Potentiometric_Surface_Map.mxd

FPM Remediations, Inc. URS



Notes:

1. MW-020 was abandoned during the Site SS006 Downgradient Pilot Groundwater Treatability Study (February 2012) and will not be replaced.
2. Contingency Well MW-017 was abandoned (February 2012) due to new constuction in the area and will not be replaced.

Legend

- Former Base Boundary
- Existing Structure
- Fence Line
- Stream/River
- General Groundwater Flow Direction
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- CH2MHill Monitoring Well Location (2009)
- Contingency Well
- Approximate Area of Concentrations greater than or equal to MCL 5 ug/L
- Estimated Area of COCs Exceeding RACGs in Upgradient Bedrock Groundwater Zone
- Estimated Area of COCs Exceeding RACGs in Downgradient Overburden Groundwater Zone
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005
- MW-011 TCE = 35 — LTM Monitoring Well Location and Analyte Concentration in ug/L
- MW-030 TCE = 35 — CH2M Hill Monitoring Well Location and Analyte Concentration in ug/L

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 006**
COCs Exceeding RACGs
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-4

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\6-4_SS006_Groundwater_Results.mxd

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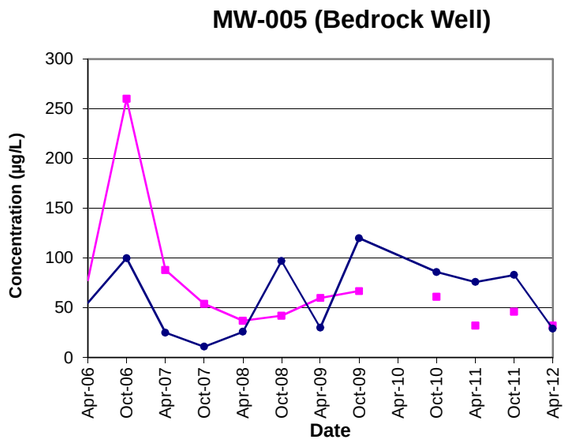

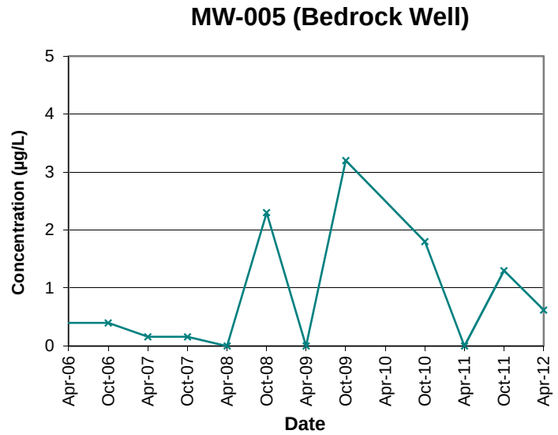

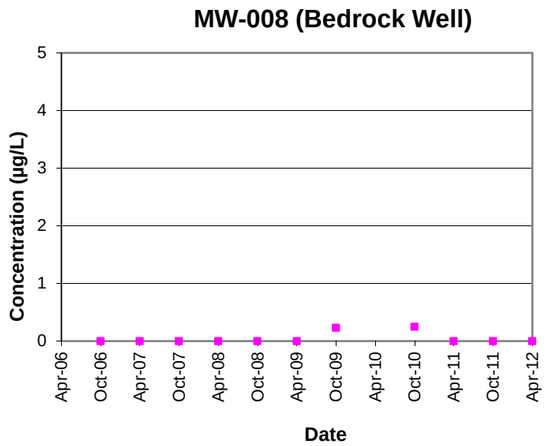

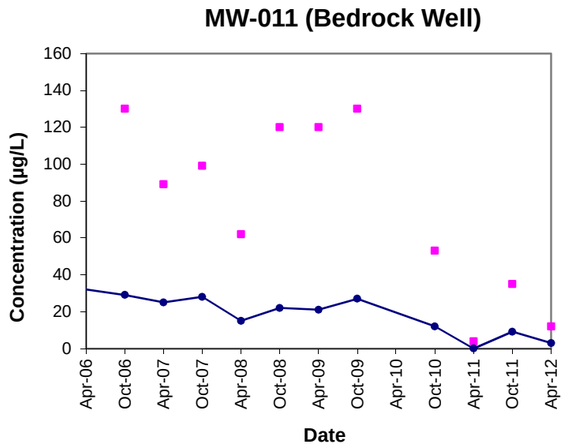

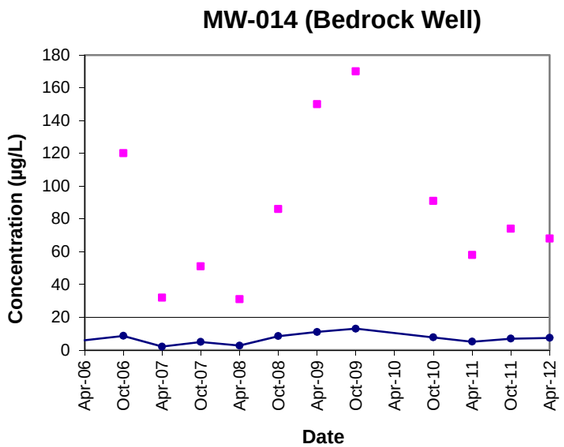

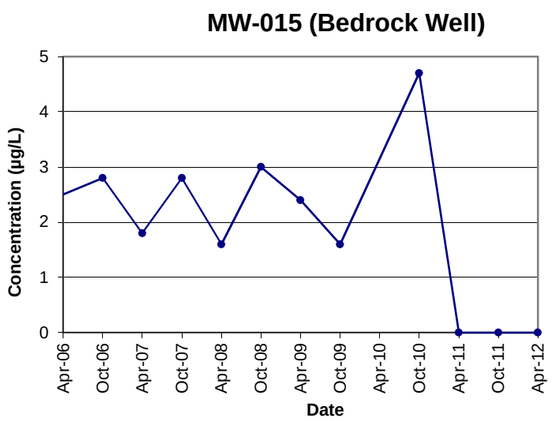

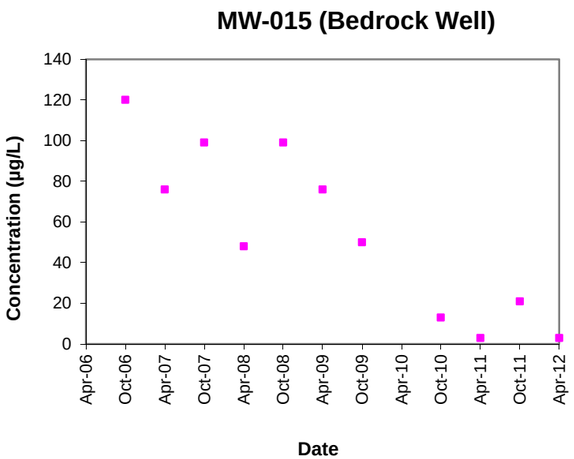

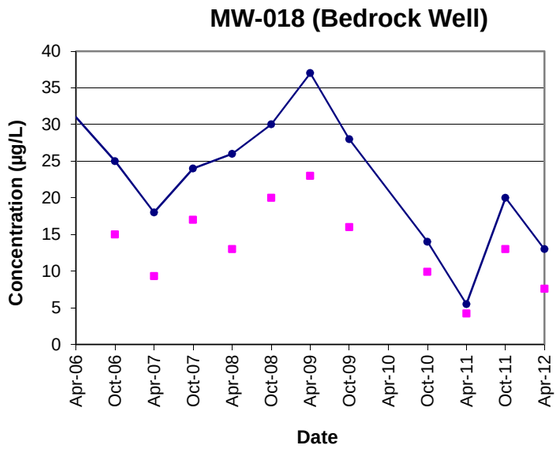

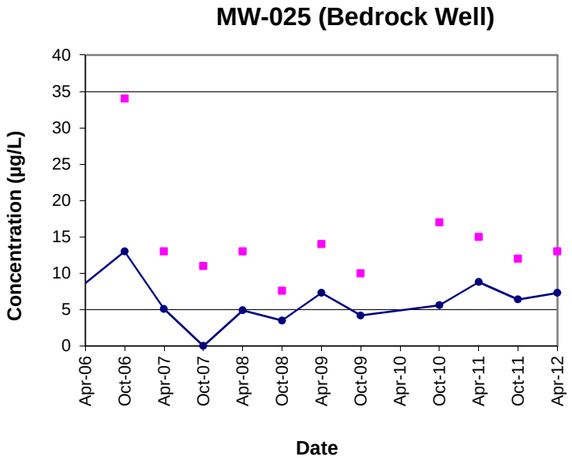

LEGEND:

- TCE (RACG = 5 µg/L)
- Vinyl Chloride (RACG = 2 µg/L)
- cis-1,2-DCE (RACG = 70 µg/L)

µg/L - micrograms per liter
RACG - Remedial Action Cleanup Goal

Notes:

1.) COCs not shown have never exceeded a RACG.

AIR FORCE CIVIL ENGINEER CENTER

Five-Year Review Report
Richards-Gebaur AFB, Missouri

TITLE: **SS 006 (Upgradient Plume)**
Temporal Trends of COCs in Groundwater

DRAWN BY	CHECKED BY	APPROVED BY
RJE	BPW	LAT
PROJECT No.	November	FIGURE NO
16530827	2012	6-5

Filename: I:\Richard Gebaur\Five Year Reviews\Second Five Year Review-2012\Draft\2012_FYR_Trend_graphs_110112.xls

FPM Remediations, Inc.

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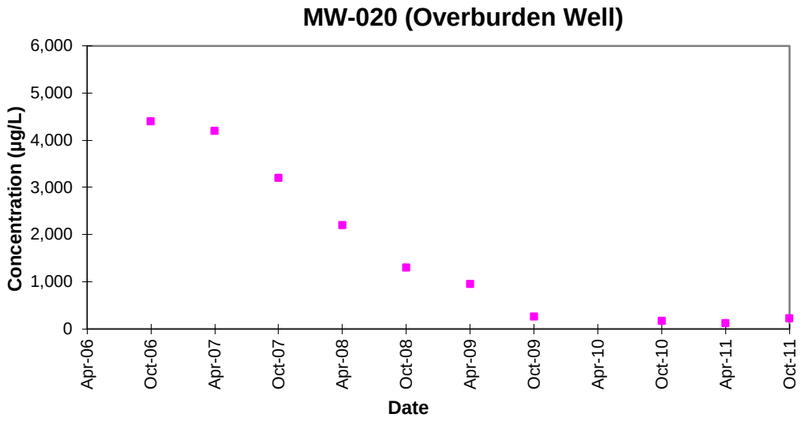

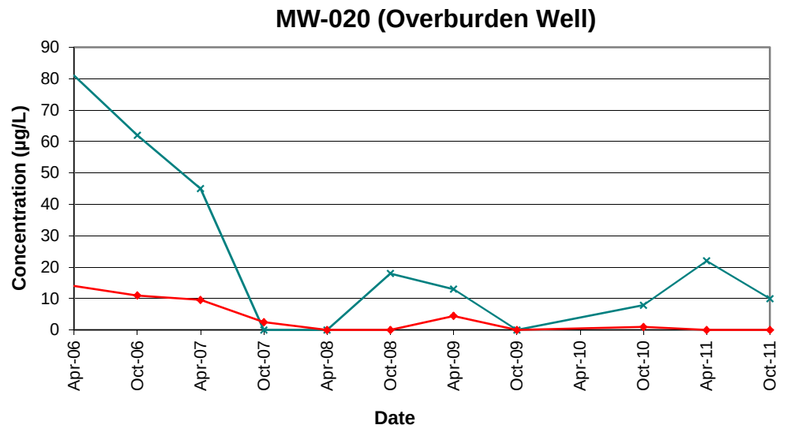

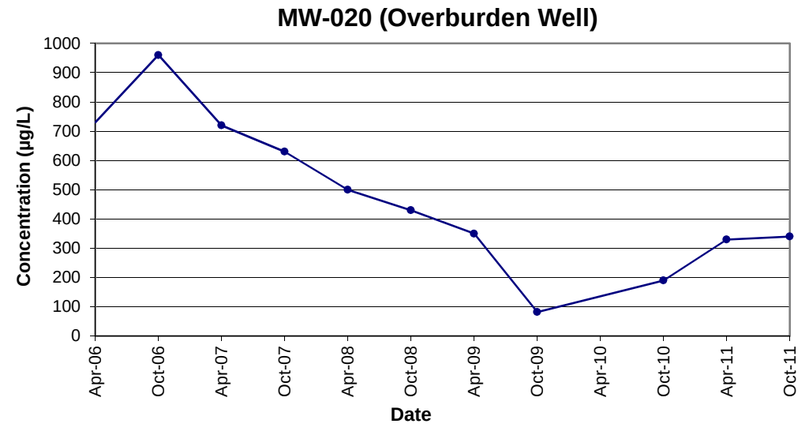

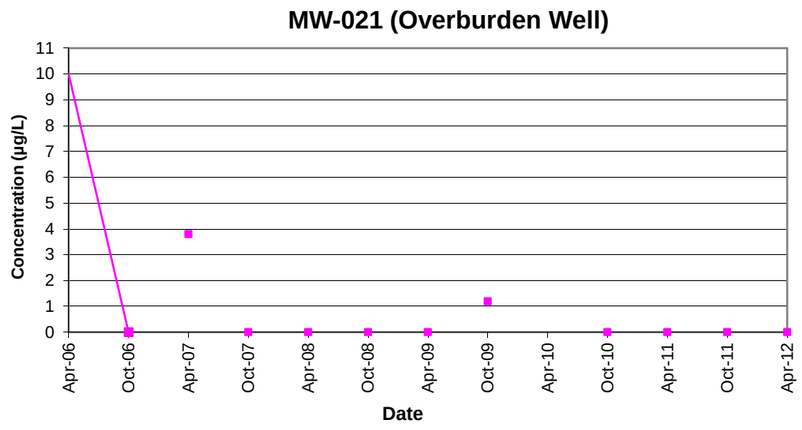

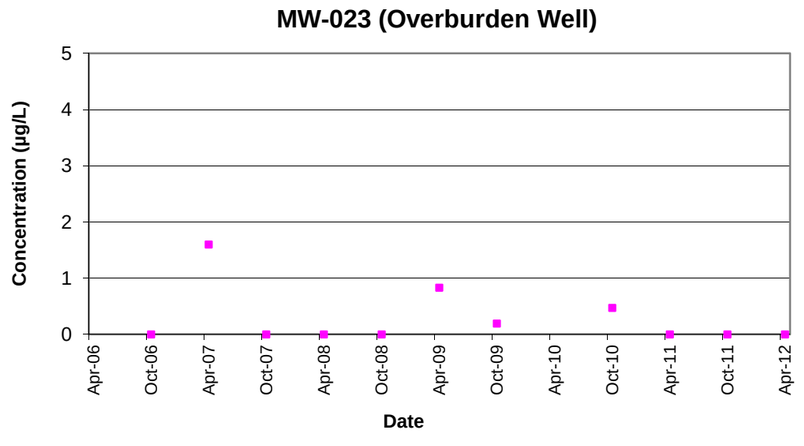

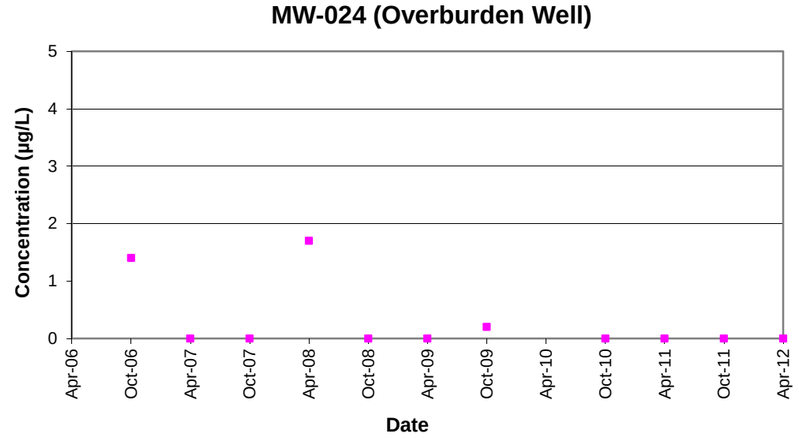

LEGEND:

- TCE (RACG = 5 µg/L)
- Vinyl Chloride (RACG = 2 µg/L)
- 1,1-DCE (RACG = 7 µg/L)
- cis-1,2-DCE (RACG = 70 µg/L)

µg/L - micrograms per liter
RACG - Remedial Action Cleanup Goal

Notes:

1.) COCs not shown have never exceeded a RACG.

2.) Monitoring well MW-20 was abandoned in February 2012.

AIR FORCE CIVIL ENGINEER CENTER

Five-Year Review Report
Richards-Gebaur AFB, Missouri

TITLE: **SS 006 (Downgradient Plume)**
Temporal Trends of COCs in Groundwater

DRAWN BY	CHECKED BY	APPROVED BY
RJE	BPW	LAT
PROJECT No.	November	FIGURE NO
16530827	2012	6-6

Filename: I:\Richard Gebaur\Five Year Reviews\Second Five Year Review-2012\Draft\2012_FYR_Trend_graphs_110112.xls

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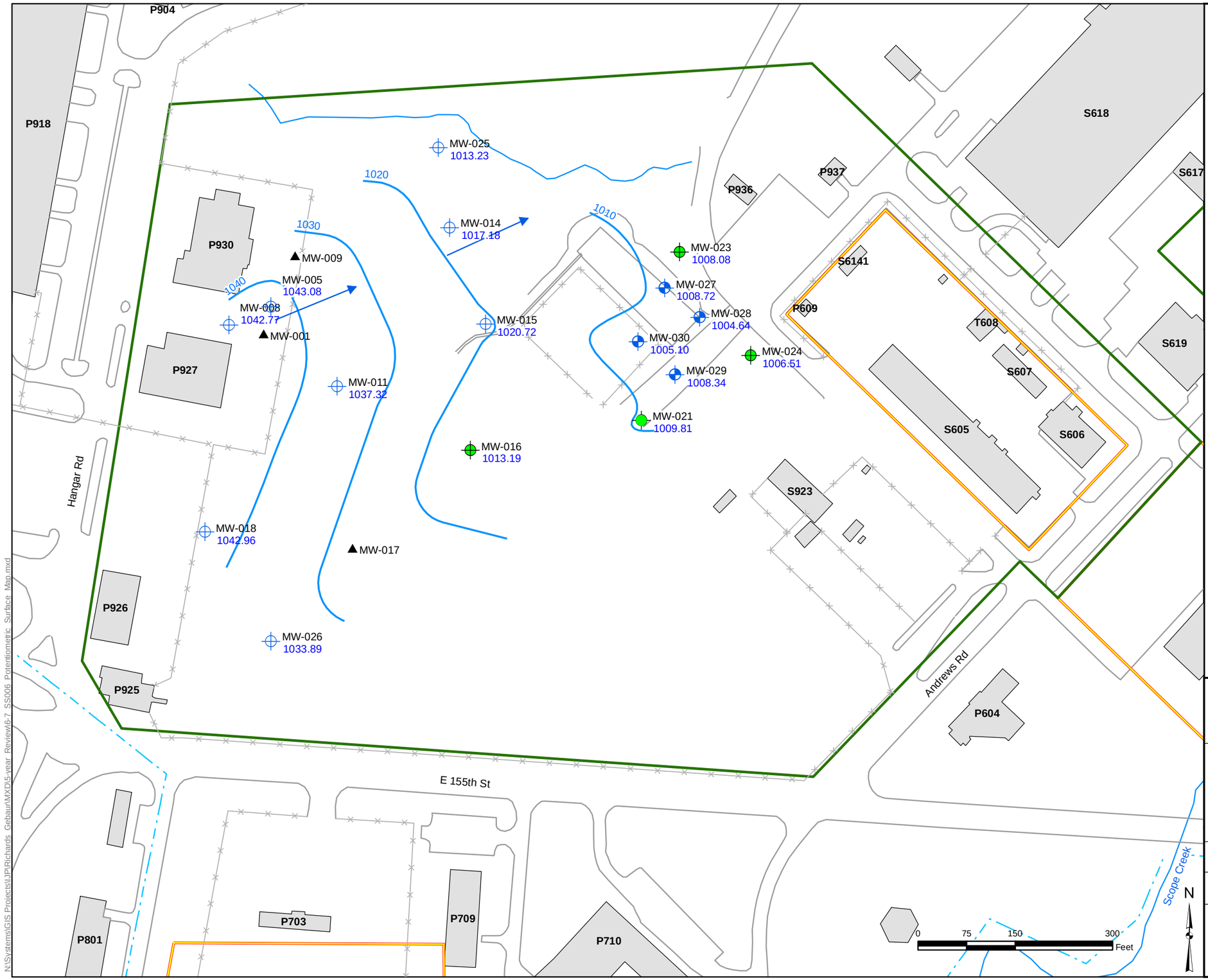

Legend

- Former Base Boundary
- Existing Structure
- Road Line
- Fence Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- CH2MHill Monitoring Well Location (2009)
- Contingency Well
- General Groundwater Flow Direction
- Potentiometric Surface Line
- 1005.65 Groundwater Elevation
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to U.S. Marine Corps in 2005

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 006**
Potentiometric Surface Map
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-7

Filename: N:\Systems\GIS Projects\IJP\Richards_Gebaur\MXD\5-year_Review\SS006_Potentiometric.mxd

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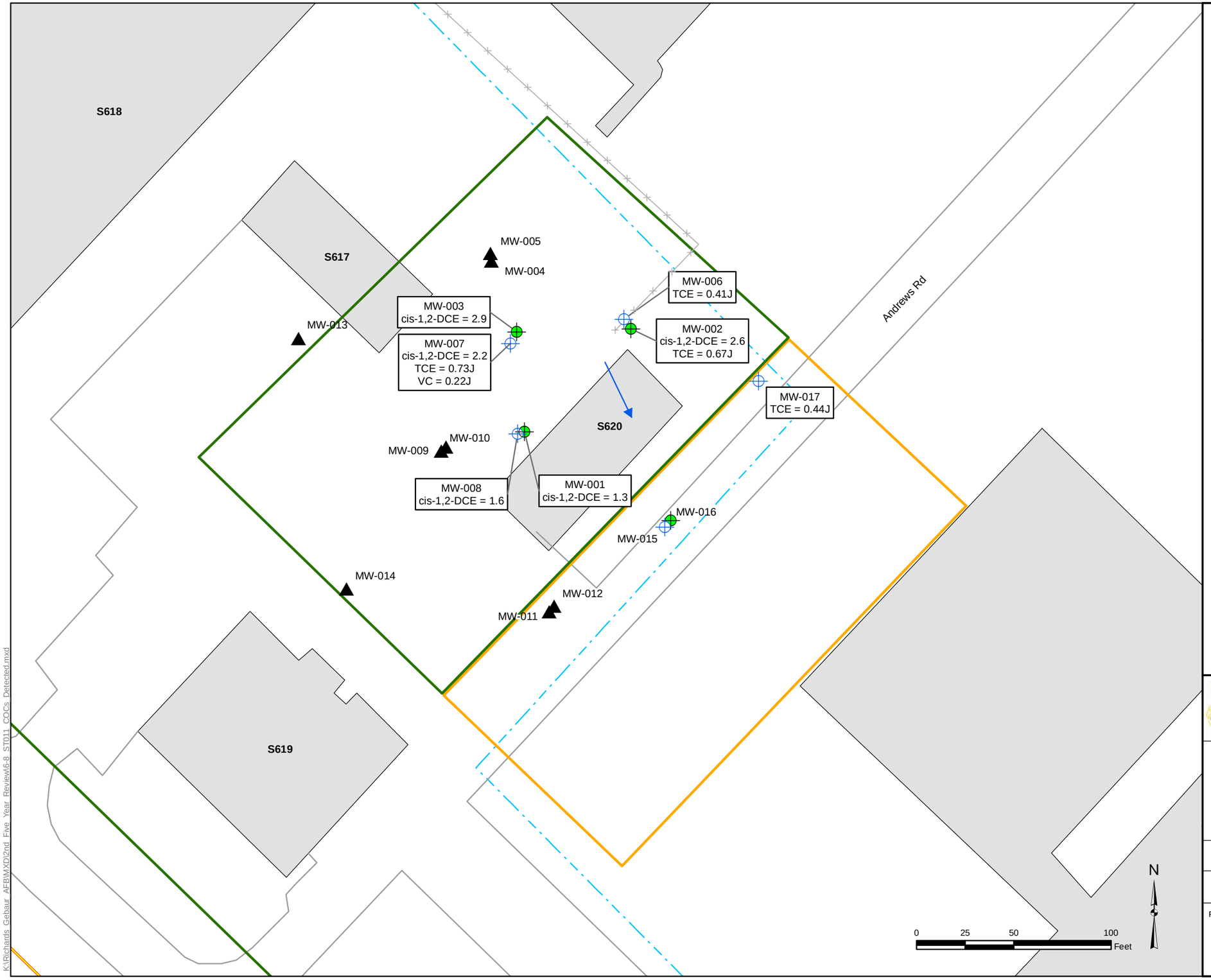

Legend

- Former Base Boundary
- Existing Structure
- Road Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- Contingency Well
- Fence Line
- General Groundwater Flow Direction
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985

Note: All COCs detected were below RACGs.

Air Force Civil Engineer Center

Five Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 011**
COCs Detected in Groundwater
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-8

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\6-8_ST011_COCs_Detected.mxd

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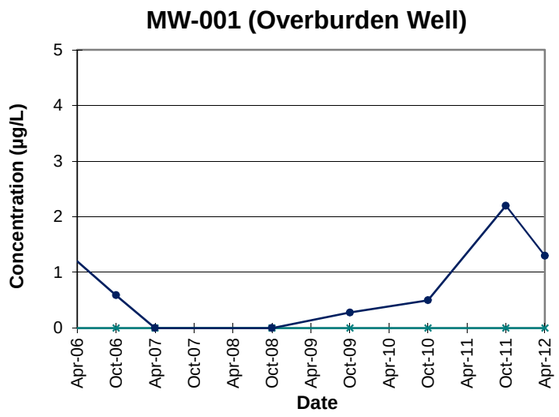

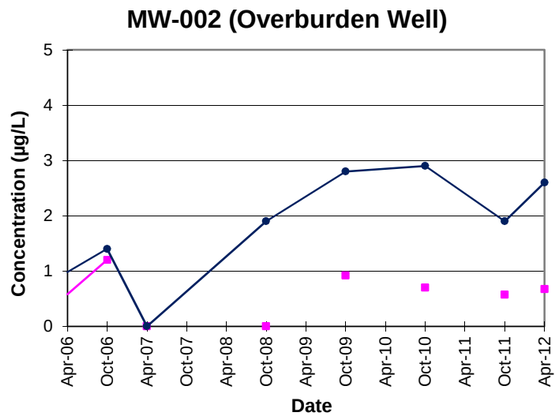

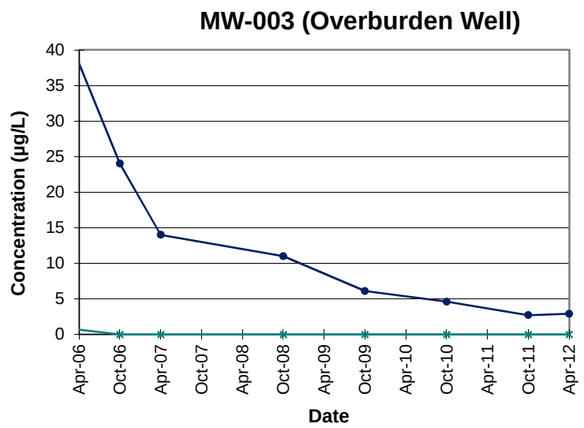

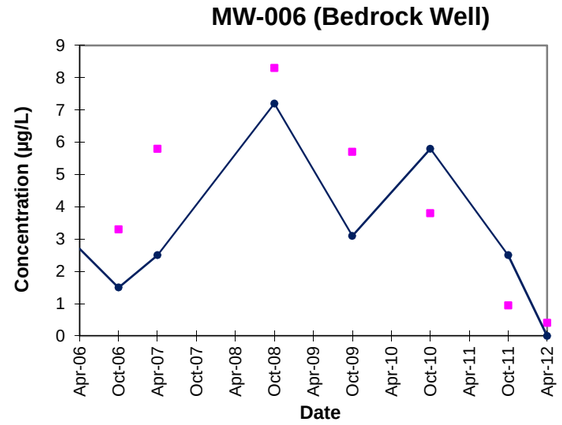

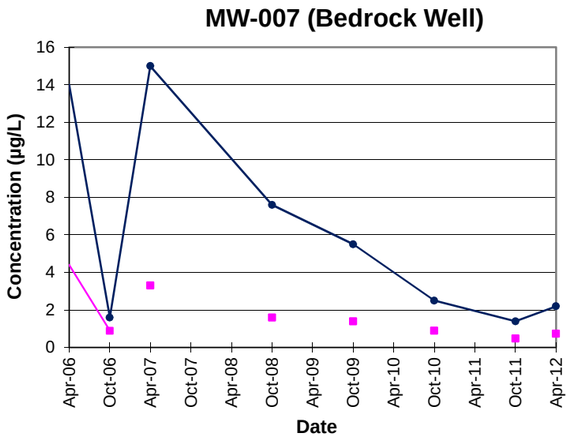

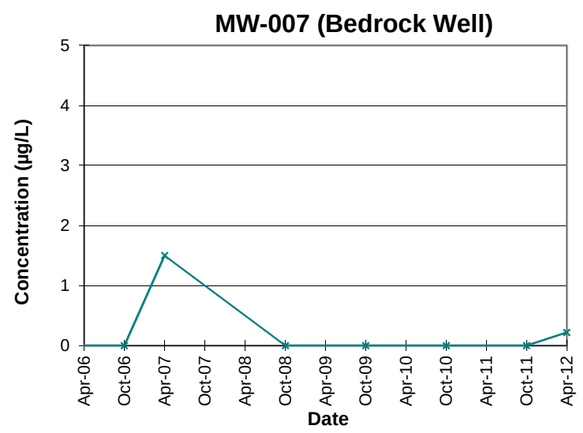

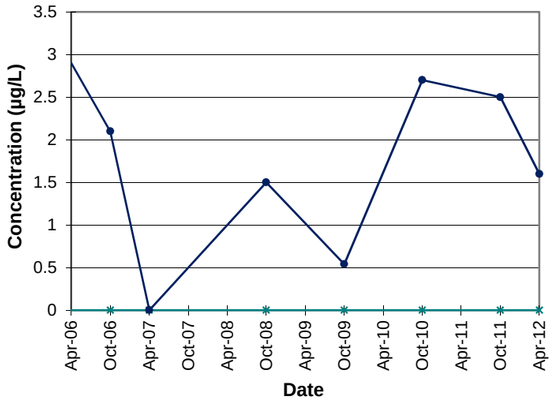

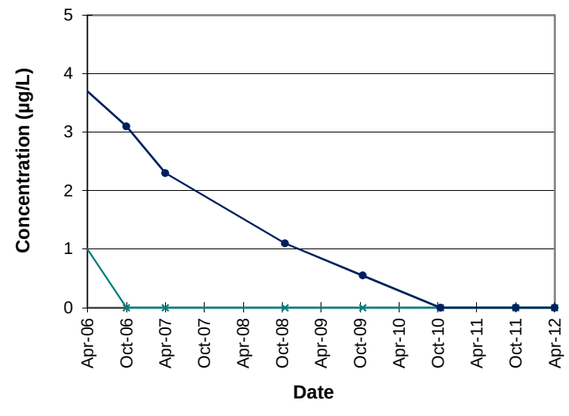

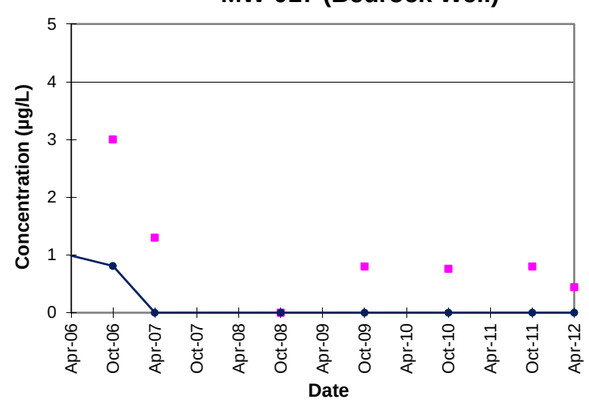

LEGEND:

TCE (RACG = 5 µg/L)
Vinyl Chloride (RACG = 2 µg/L)
cis-1,2-DCE (RACG = 70 µg/L)

µg/L - micrograms per liter
RACG - Remedial Action Cleanup Goal

Notes:

1.) COCs not shown have never exceeded a RACG.

AIR FORCE CIVIL ENGINEER CENTER

Five-Year Review Report
Richards-Gebaur AFB, Missouri

TITLE: **ST 011**
Temporal Trends of COCs in Groundwater

DRAWN BY	CHECKED BY	APPROVED BY
RJE	BPW	LAT
PROJECT No. 16530827	November 2012	FIGURE NO 6-9

Filename: I:\Richard Gebaur\Five Year Reviews\Second Five Year Review-2012\Draft\2012_FYR_Trend_graphs_110112.xls

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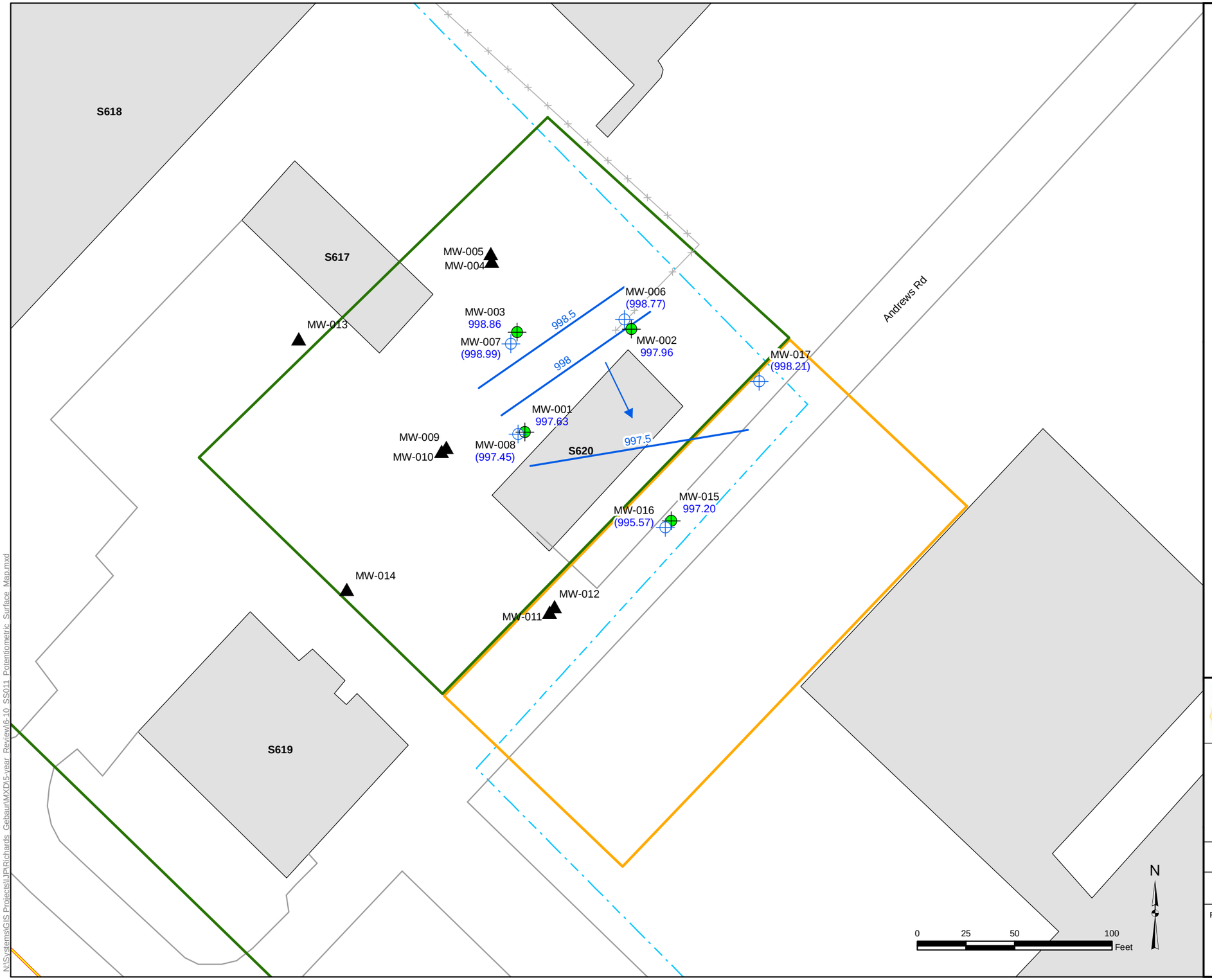

Legend

- Former Base Boundary
- Existing Structure
- Road Line
- Fence Line
- General Groundwater Flow Direction
- Potentiometric Surface Line
- Bedrock LTM Monitoring Well Location
- Overburden LTM Monitoring Well Location
- Contingency Well
- 1005.65 Groundwater Elevation
- (1005.65) Bedrock Groundwater Elevation
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985

Note:
Elevations from the bedrock wells were not used to interpret the potentiometric surface.

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **ST 011**
Potentiometric Surface Map
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	BPW	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-10

Filename: N:\Systems\GIS Projects\IJP\Richards_Gebaur\MXD\5-year_Review\6-10_SS011_Potentiometric_Surface_Map.mxd

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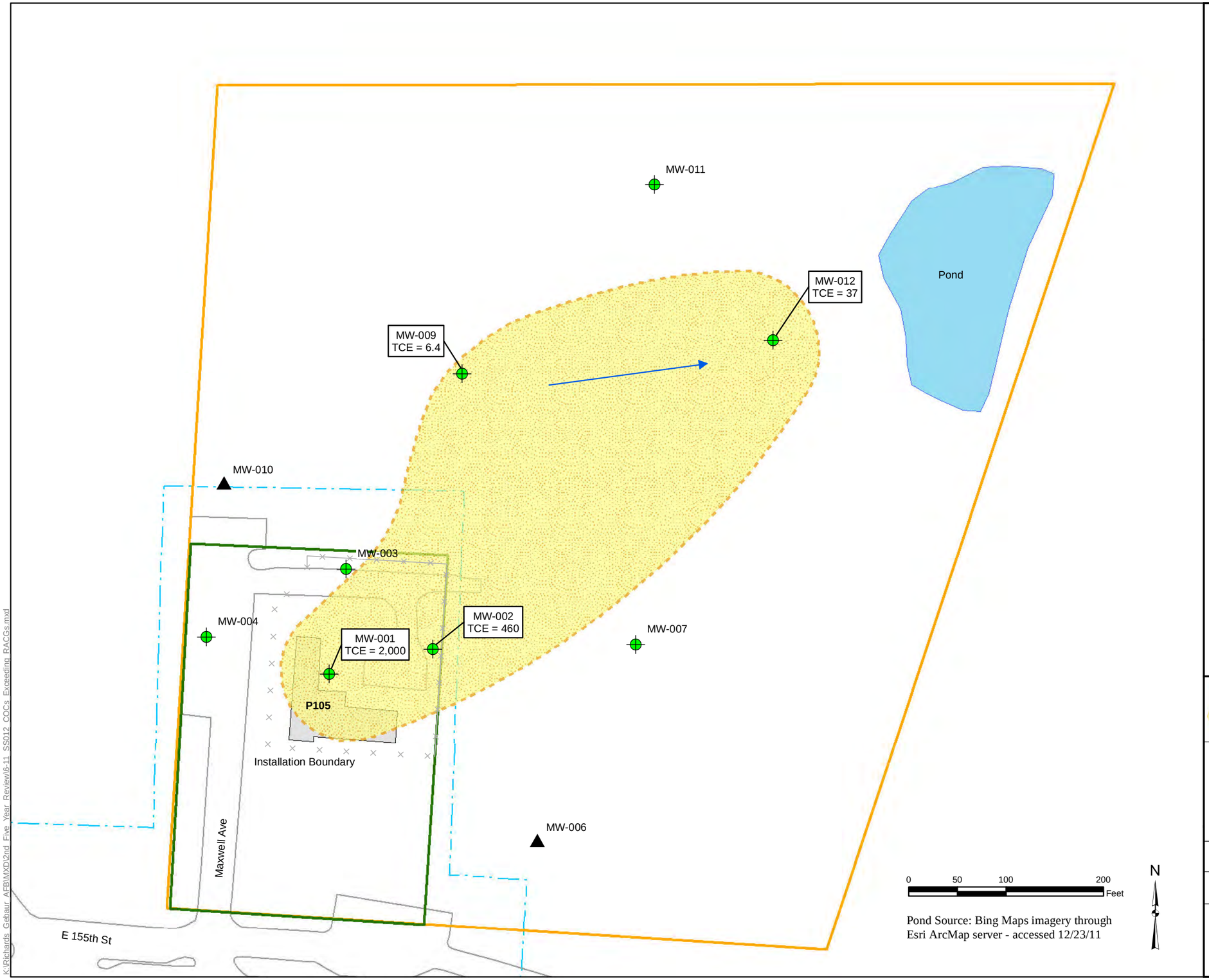

Pond Source: Bing Maps imagery through Esri ArcMap server - accessed 12/23/11

Legend

- Former Base Boundary
- Pond
- Existing Structure
- Road Line
- Fence Line
- Overburden LTM Monitoring Well Location
- Contingency Well
- General Groundwater Flow Direction
- Approximate Area of Concentrations greater than or equal to MCL
- Estimated Area of COCs Exceeding RACGs in Upgradient Bedrock Groundwater Zone
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985
- MW-011 TCE = 35 — LTM Monitoring Well Location and Analyte Concentration in ug/L

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 012**
COCs Exceeding RACGs
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No. 16530827	DATE OCTOBER 2012	FIGURE NO 6-11

Filename: K:\Richards_Gebaur_AFB\MXD\2nd_Five_Year_Review\6-8_SS012_Groundwater_Results.mxd

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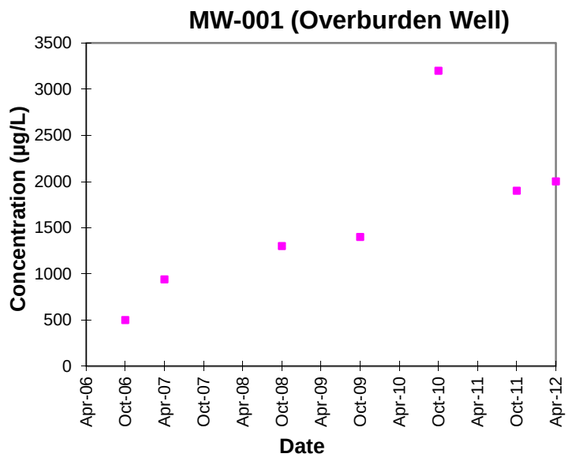

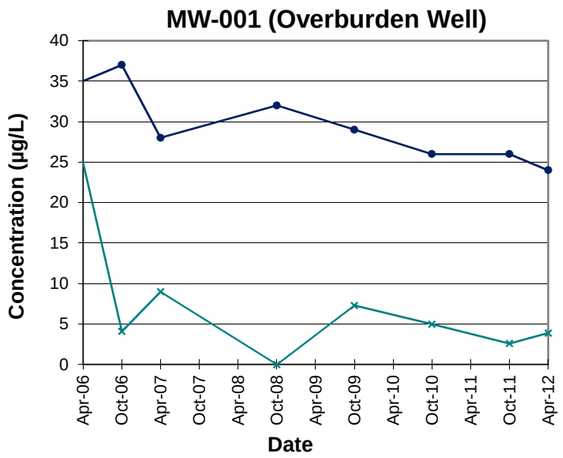

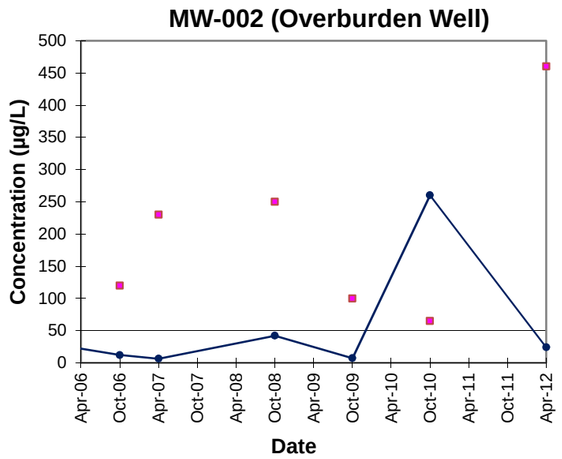

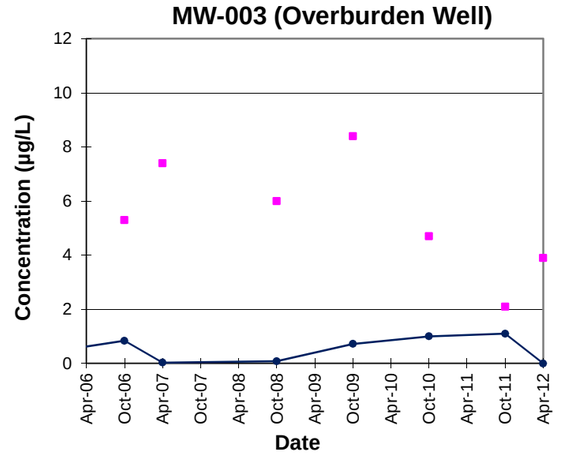

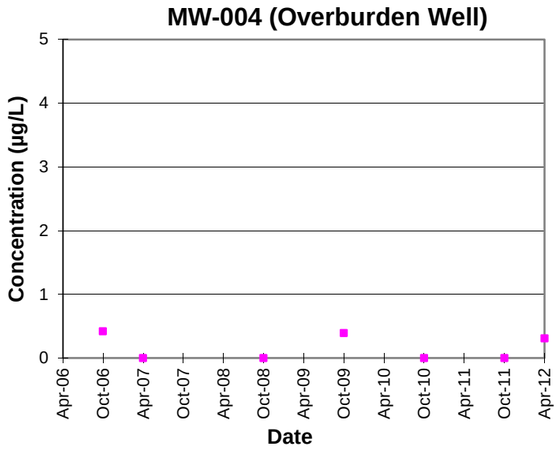

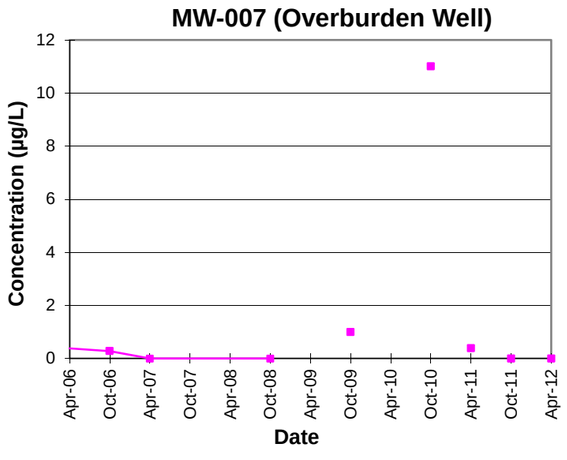

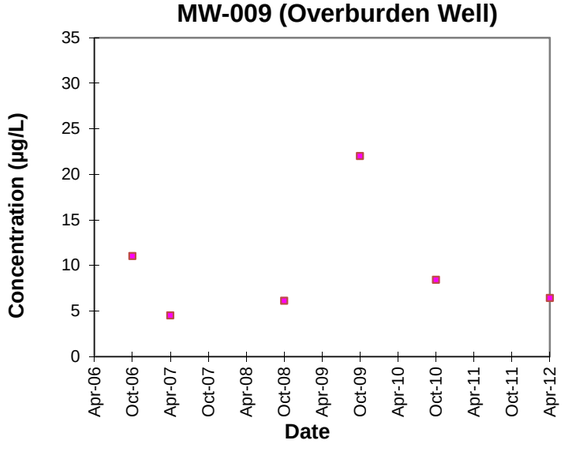

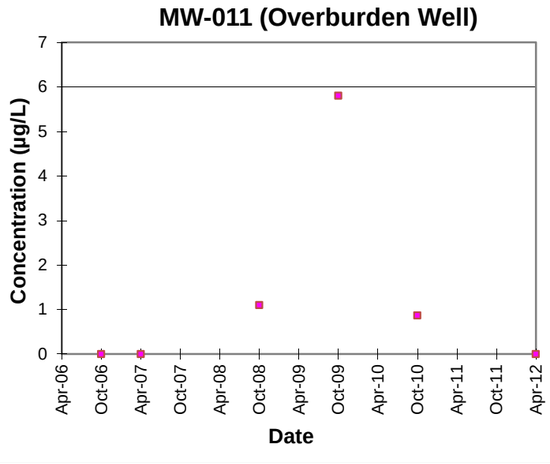

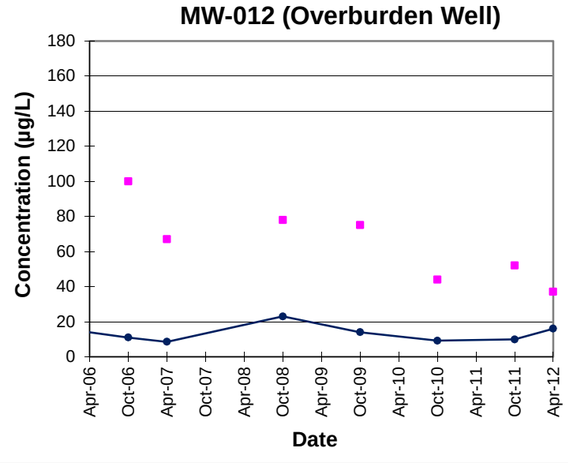

LEGEND:

- TCE (RACG = 5 µg/L)
- Vinyl Chloride (RACG = 2 µg/L)
- cis-1,2-DCE (RACG = 70 µg/L)

µg/L - micrograms per liter
RACG - Remedial Action Cleanup Goal

Notes:

1.) COCs not shown have never exceeded a RACG.

2.) Monitoring wells MW-002, MW-009, and MW-011 were not sampled in October 2011 due to the wells being dry.

AIR FORCE CIVIL ENGINEER CENTER

Five-Year Review Report
Richards-Gebaur AFB, Missouri

TITLE: **SS 012**
Temporal Trends of COCs in Groundwater

DRAWN BY	CHECKED BY	APPROVED BY
RJE	BPW	LAT
PROJECT No. 16530827	November 2012	FIGURE NO 6-12

Filename: I:\Richard Gebaur\Five Year Reviews\Second Five Year Review-2012\Draft\2012_FYR_Trend_graphs_110112.xls

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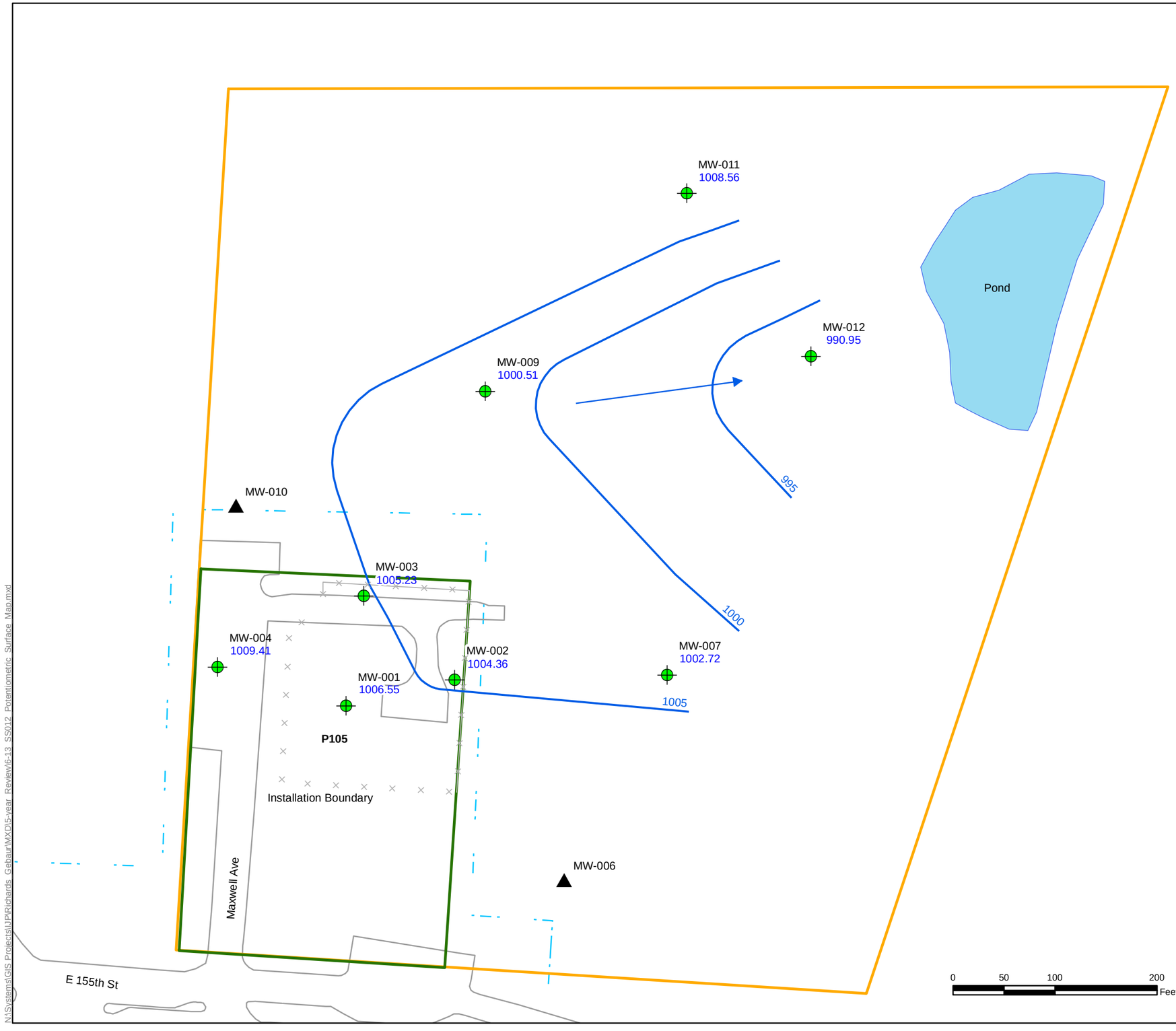

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Legend

- Former Base Boundary
- Pond
- Existing Structure
- Road Line
- Fence Line
- Potentiometric Surface Line
- General Groundwater Flow Direction
- Overburden LTM Monitoring Well Location
- Contingency Well
- 1005.65 Groundwater Elevation
- LUC Boundary for Property Transferred to Kansas City, MO in 2005
- LUC Boundary for Property Transferred to Kansas City, MO in 1985

Pond Source: Bing Maps imagery through Esri ArcMap server - accessed 12/23/11

Air Force Civil Engineer Center

Five-Year Review
Richards-Gebaur AFB, Missouri

TITLE: **SS 012**
Potentiometric Surface Map
(April 2012)

DRAWN BY	CHECKED BY	APPROVED BY
IJP	RJE	LAT
PROJECT No.	DATE	FIGURE NO
16530827	OCTOBER 2012	6-13

Filename: N:\Systems\GIS Projects\IJP\Richards_Gebaur\MXD\5-year_Review\6-13_SS012_Potentiometric_Surface_Map.mxd

FPM Remediations, Inc. URS

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FOR THE PERIOD OF: 1 Day (s)

COMMENCING: January 25, 2012

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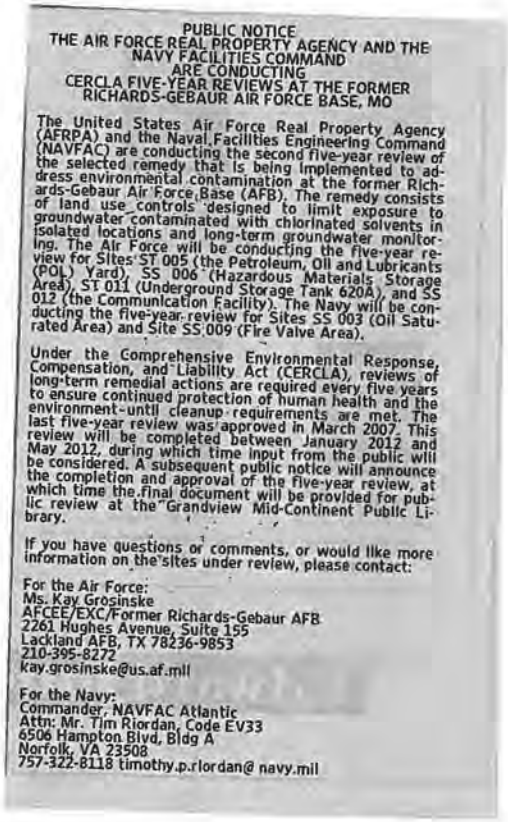
Subscribed and sworn to before
me, this 25th day of January, 2012.
I certify that I was duly qualified as
a Notary Public for the State of Missouri,
commissioned in Jackson County, Missouri.
My commission expires September 10, 2014.

Laura S. Keeling
LAURA S. KEELING, NOTARY

LAURA S. KEELING
Notary Public
Commissioned for Jackson County
My Commission Expires: September 10, 2014
Commission Number: 10429929



PUBLIC NOTICE
THE AIR FORCE REAL PROPERTY AGENCY AND THE NAVY FACILITIES COMMAND ARE CONDUCTING CERCLA FIVE-YEAR REVIEWS AT THE FORMER RICHARDS-GEBAUR AIR FORCE BASE, MO

The United States Air Force Real Property Agency (AFRPA) and the Naval Facilities Engineering Command (NAVFAC) are conducting the second five-year review of the selected remedy that is being implemented to address environmental contamination at the former Richards-Gebaur Air Force Base (AFB). The remedy consists of land use controls designed to limit exposure to groundwater contaminated with chlorinated solvents in isolated locations and long-term groundwater monitoring. The Air Force will be conducting the five-year review for Sites ST 005 (the Petroleum, Oil and Lubricants (POL) Yard), SS 006 (Hazardous Materials Storage Area), ST 011 (Underground Storage Tank 620A), and SS 012 (the Communication Facility). The Navy will be conducting the five-year review for Sites SS 003 (Oil Saturated Area) and Site SS 009 (Fire Valve Area).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), reviews of long-term remedial actions are required every five years to ensure continued protection of human health and the environment until cleanup requirements are met. The last five-year review was approved in March 2007. This review will be completed between January 2012 and May 2012, during which time input from the public will be considered. A subsequent public notice will announce the completion and approval of the five-year review, at which time the final document will be provided for public review at the Grandview Mid-Continent Public Library.

If you have questions or comments, or would like more information on the sites under review, please contact:

For the Air Force:
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United States Air Force (AFCEC) 2000. Basewide remedial Investigation, Former Richards-Gebaur Air Force Base, Kansas City, Missouri.

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HGL, 2011a. Final 2010 Basewide Groundwater and LUC/IC Monitoring Report, at Former Richards-Gebaur AFB, Kansas City, Missouri. August.

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Appendix C
Historical Site Specific Monitoring Results at ST 005
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Aug-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
ST05-MW003	1,1-DCE	N	µg/L	7	MCL	< 0.1	< 0.1	NS	< 0.38	< 0.38	0.16 F	0.2 F	0.19 F	0.23 F	0.15 F	0.2 F	0.19 F	0.19 F	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	cis-1,2-DCE	N	µg/L	70	MCL	0.37 F	1.1 F	NS	< 0.27	0.6 F	0.55 F	0.74 F	0.78 F	0.71 F	0.56 F	0.75 F	0.71 F	0.68 F	0.37 F	0.34 F	NS	0.39 F	0.25 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	TCE	N	µg/L	5	MCL	189.1	210	NS	180	120	203	211	243	292	201	244	308	246	116	130	NS	164	116	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	Vinyl chloride	N	µg/L	2	MCL	< 0.12	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	0.16 F	NS	0.34 F	NS	0.18 F	0.15 F	0.21 F	0.23 F	< 0.046	< 0.059	NS	0.08 F	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	0.56 F	NS	1.1 F	NS	0.54 F	0.67 F	0.77 F	0.71 F	0.36 F	0.37 F	NS	0.33 F	0.24 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	202	NS	278	NS	217	231	303	258	110	128	NS	144	112	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	< 0.04	NS	< 0.04	NS	< 0.06	< 0.036	< 0.057	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW003	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	< 0.04	NS	< 0.04	NS	< 0.06	< 0.065	< 0.062	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	0.47 F	0.22 F	0.14 F	0.12 F	< 0.059	NS	0.12 F	0.13 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	0.22 F	0.3 F	0.3 F	0.26 F	0.27 F	0.31 F	0.42 F	0.35 F	0.23 F	0.23 F	NS	0.27 F	0.27 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	TCE	N	µg/L	5	MCL	NS	8.3	NS	8.1	6.9	8.6	8.2	10.3	10.6	12.6	17.3	31	27.7	23.1	18.3	NS	21.9	20.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	< 0.38	NS	NS	0.13 F	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	< 0.27	NS	NS	0.34 F	0.3 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	TCE	FD	µg/L	5	MCL	NS	NS	NS	7.9	NS	NS	8.7	9.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	< 0.53	NS	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW010	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	< 0.31	NS	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW011	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.046	< 0.046	< 0.059	NS	< 0.05	0.08 F	NS	0.14 F	< 1		0.21 U	0.23 F	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW011	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	0.32 F	0.32 F	0.17 F	0.17 F	0.38 F	0.49 F	0.26 F	0.55 F	0.34 F	0.64 F	NS	0.46 F	0.47 F	NS	0.51 F	1.12	0.79 J	0.53 F	0.72 F	0.20 U	0.21 U	0.21 J	0.50 U	< 1.0 U	< 1.0 U
ST05-MW011	TCE	N	µg/L	5	MCL	NS	0.2 F	NS	1.3	0.4	3.3	2.3	1.8	2	7.8	10.1	4.77	14.2	9.38	18.1	NS	9.98	8.78	NS	18.3	35.7	31.1	21	26	9.7	28	6.8	5.5	5	4.2
ST05-MW011	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW011	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW012	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.046	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	cis-1,2-DCE	N	µg/L	70	MCL	NS	0.5 F	NS	0.32 F	< 0.27	0.18 F	0.15 F	0.25 F	< 0.02	0.37 F	0.11 F	0.11 F	< 0.025	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	TCE	N	µg/L	5	MCL	NS	94.6	NS	84	39	43.8	30 J	63.3	36.6	105	41	43.7	26.1	18.3	13.8	NS	27.7	16.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	0.11 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	23.7 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW012	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW013	1,1-DCE	N	µg/L	7	MCL	NS	0.2 F	NS	< 0.38	< 0.38	0.8 F	0.26 F	0.37 F	0.27 F	0.24 F	0.32 F	0.15 F	0.17 F	< 0.046	0.17 F	NS	0.13 F	0.16 F	NS	0.21 F	0.662 J	0.447 J	NS	0.29 F	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW013	cis-1,2-DCE	N	µg/L	70	MCL	NS	0.9 F	NS	< 0.27	< 0.27	3.7	1.5	1.2	0.98 F	0.92 F	1.56	1.02 F	1.16 F	0.92 F	1.11 F	NS	0.88 F	0.92 F	NS	1.18	3.02	1.79	NS	1.2	0.20 U	0.21 U	0.47 J	0.44	0.41 J	< 1.0 U
ST05-MW013	TCE	N	µg/L	5	MCL	NS	18.1	NS	13	4.6	89.4	35.3	55	53.6	51.8	81.1	46	62.3	53.3	63.5	NS	43.4	42.5	NS	40.1	123	95.8	NS	70	25	35	20	19	18	21
ST05-MW013	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	NS	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW013	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	<1	NS	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW013	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
ST05-MW013	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
ST05-MW013	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	19	NS
ST05-MW013	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
ST05-MW013	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
ST05-MW014	1,1-DCE	N	µg/L	7	MCL	NS	1.8	NS	1.9	< 0.38	0.13 F	0.13 F	2	0.79 F	0.19 F	0.66 F	0.87 F	0.3 F	0.94 F	0.49 F	NS	0.93 F	0.49 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	cis-1,2-DCE	N	µg/L	70	MCL	NS	7.2	NS	5.9	2.6	1.9	0.95 F	4.4	2.3	0.74 F	1.72	2	1.13 F	2.35	1.67	NS	2.4	1.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	TCE	N	µg/L	5	MCL	NS	487	NS	180	46	41.2	20.3	556	269	71.1	374	317	155	228	210	NS	250	130	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	0.11 F	NS	NS	NS	0.21 F	0.71 F	0.82 F	0.33 F	0.92 F	0.64 F	NS	0.85 F	0.5 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	1 F	NS	NS	0.79 F	1.82	1.9	1.22	2.32	1.94	NS	2.3	1.52	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	21.8	NS	NS	71.4	357	301	160	197	185	NS	234	127	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW014	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW015	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW015	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW015	TCE	N	µg/L	5	MCL	NS	0.9 F	NS	0.7 F	< 0.2	0.51 F	0.26 F	0.76 F	0.82 F	0.78 F	0.91 F	0.84 F	0.56 F	0.5 F	0.52 F	NS	0.69 F	0.62 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW015	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW015	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	TCE	N	µg/L	5	MCL	NS	6.3	NS	3.6	1.5	2.4	3.3	2.8	2.2	1.9	2.77	2.74	2.72	1.78	2.6	NS	3.17	2.38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	< 0.27	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	2.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW016	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	< 0.31	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW017	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	0.14 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW017	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	< 0.05	< 1	NS	0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW017	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.2	< 0.2	0.67	0.63	0.27	0.52	0.16	0.62	0.34	0.39	0.36	0.42	NS	0.51	0.39	NS	0.56	1.06	<1	5.4	13	6.9	69	66	30	18	14
ST05-MW017	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW017	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW017	1,1-DCE	FD	µg/L	7	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.21 U	NS	NS	NS	NS	NS	NS
ST05-MW017	cis-1,2-DCE	FD	µg/L	70	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.2 U	NS	NS	NS	NS	NS	NS
ST05-MW017	TCE	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	13	NS	NS	NS	NS	NS	NS
ST05-MW017	Tetrachloroethene	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.5 U	NS	NS	NS	NS	NS	NS
ST05-MW017	Vinyl chloride	FD	µg/L	2	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.4 U	NS	NS	NS	NS	NS	NS
ST05-MW018	1,1-DCE	N	µg/L	7	MCL	NS	0.6 F	NS	< 0.38	0.54	1.2	1.2	1.4	1.3	1.3	1.87	0.85	1.09	0.7	0.85	NS	0.73	0.63	NS	1.39	2.84	3.99	12	11	1.3 U	2.2 U	3.6	3.0	1.9	2
ST05-MW018	cis-1,2-DCE	N	µg/L	70	MCL	NS	0.6 F	NS	< 0.27	0.49	15.1	5.3	2.9	2	2.5	8.06	3.81	3.16	1.83	1.98	NS	1.51 F	1.37	NS	1.85 F	2.95	3.21	5.2	8	1.0 U	2.1 U	2.4	2.3	1.6	1.5
ST05-MW018	TCE	N	µg/L	5	MCL	NS	226	NS	1200	420	854	2080	1160	2000	1230	831	900	1370	484	1060	NS	583	593	NS	1030	2910	2480	6,500	6,400	1,100	1,900	1,400	1,100	700	530
ST05-MW018	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.04	< 0.042	NS	< 0.18	< 0.04	NS	< 0.31	< 1	NS	2.5 U	2.5 U	0.9 U	1.4 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW018	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.024	< 0.028	< 0.024	NS	< 0.14	< 0.05	NS	< 0.5	< 1	<1	2 U	2 U	0.80 U	2.3	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW018	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	1.1 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.48 F	2.84	3.12	NS	NS	NS	2.2 U	NS	NS	NS	1.9
ST05-MW018	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	2.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.89 F	3.03	2.64	NS	NS	NS	2.1 U	NS	NS	NS	1.5
ST05-MW018	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	2510 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1230	2560	3600 J	NS	NS	NS	1800	NS	NS	NS	530
ST05-MW018	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.31	< 1	NS	NS	NS	NS	1.4 U	NS	NS	NS	< 1.0 U
ST05-MW018	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.5	< 1	<1	NS	NS	NS	2.3 U	NS	NS	NS	< 1.0 U

Appendix C
Historical Site Specific Monitoring Results at ST 005
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Aug-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
ST05-MW019	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	NS	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW019	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	1.8 J	< 0.27	< 0.27	< 0.03	0.1 F	< 0.03	< 0.02	0.7 F	0.87 F	0.36 F	NS	< 0.025	< 0.051	NS	0.28 F	1.37	NS	0.26 F	< 1	NS	0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW019	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	< 0.2	< 0.2	< 0.03	< 0.03	0.76	< 0.05	< 0.03	0.3	< 0.03	NS	< 0.04	< 0.04	NS	0.15	1.7	NS	< 0.04	< 1	<1	0.3	0.27 U	2.9	0.20 U	1.1	0.50 U	< 1.0 U	< 1.0 U
ST05-MW019	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	NS	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW019	Vinyl chloride	N	µg/L	2	MCL	NS	NS	0.42	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	0.97	0.28	< 0.065	NS	< 0.028	< 0.024	NS	< 0.03	4.73	NS	0.43	1.8	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW019	1,1-DCE	FD	µg/L	7	MCL	NS	NS	< 0.38	NS	NS	NS	< 0.02	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW019	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	1.3 J	NS	NS	NS	0.11 F	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW019	TCE	FD	µg/L	5	MCL	NS	NS	< 0.2	NS	NS	NS	< 0.03	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW019	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	< 0.53	NS	NS	NS	< 0.04	NS	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW019	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	0.41 F	NS	NS	NS	< 0.04	NS	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW020	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	0.41 F	< 0.02	< 0.02	< 0.02	NS	0.38 F	< 0.05	NS	NS	< 0.046	NS	NS	< 0.05	0.18 F	NS	0.16 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.38	NS	< 1.0 U
ST05-MW020	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	18	56	5.6	5.7	13.8	NS	27.4	9.65	NS	NS	87.7	NS	NS	31.5	24.8	NS	16.4	0.674	6.94	9.6	2.1	0.20 U	0.21 U	0.62	17	NS	1.5
ST05-MW020	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	12	24	7.1	10.1	18.7	NS	61.5	16.1	NS	NS	2.15	NS	NS	2.09	4.03	NS	2.01	< 1	NS	8.6	0.64	0.13 U	0.20 U	1.2	20	NS	0.71 J
ST05-MW020	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	NS	< 0.06	< 0.036	NS	NS	< 0.04	NS	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	NS	< 1.0 U
ST05-MW020	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	NS	0.48	1.31	NS	NS	0.71	NS	NS	5.66	1.69	NS	2.48	< 1	7.33	4.9	0.4 U	0.16 U	0.23 U	0.8	2.9	NS	0.82 J
ST05-MW021	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	0.11 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW021	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	< 0.05	< 1	NS	0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW021	TCE	N	µg/L	5	MCL	NS	NS	4.1	6.9	4.3	6.7	9.3	6.2	4	7.8	5.95	3.62	2.92	5.46	4.43	NS	4.36	4.74	NS	3.86	5.8	1	4	3.7	4.2	3.3	3.3	5.2	3.7	2.1
ST05-MW021	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW021	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW021	1,1-DCE	FD	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	0.11 F	< 1	NS	0.21 U	NS	NS	NS	NS	NS	NS	NS
ST05-MW021	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	< 0.05	< 1	NS	0.2 U	NS	NS	NS	NS	NS	NS	NS
ST05-MW021	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.5	1.79	4.5	NS	NS	NS	NS	NS	NS	NS
ST05-MW021	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	NS	NS	NS	NS	NS	NS	NS
ST05-MW021	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	NS	0.4 U	NS	NS	NS	NS	NS	NS	NS
ST05-MW022	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.04	< 0.05	< 0.036	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	0.15 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW022	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.02	< 0.051	< 0.022	< 0.051	< 0.025	< 0.051	NS	0.09 F	0.09 F	NS	0.1 F	< 1	NS	0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW022	TCE	N	µg/L	5	MCL	NS	NS	1.7	5.7	5.2	5.2	5.6	5.3	6.2	3.2	6.3	8.72	9.46	6.31	5.55	NS	4.9	5.33	NS	4.17	4.78	2.27	6.2	6.5	4.2	4.6	4	4.2	3.7	2.6
ST05-MW022	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW022	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW023	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW023	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW023	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	0.6 F	0.7 F	< 0.03	0.55 F	0.39 F	0.63 F	0.48 F	< 0.05	5.02	1.06	0.63 F	0.46 F	NS	0.37 F	0.51 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW023	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW023	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW024	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	NS	< 0.05	0.15 F	0.3 F	0.18 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW024	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	7.4	NS	4.71	9.41	12	10.3	5.73	5.03	6	4.6	9.4	5.5	5.2	2	1.1	2.1
ST05-MW024	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	59	NS	37.5	72.7	92.7	86.8	56.4	65.8	90	63	90	62	63	28	16	19
ST05-MW024	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	NS	< 0.04	< 0.04	< 0.03	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW024	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2	NS	< 0.03	1.83	6.99	1.08	< 1	<1	0.4 U	0.4 U	3.6	1	2.6	0.50 U	< 1.0 U	< 1.0 U
ST05-MW025	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	NS	< 0.05	< 0.06	< 0.02	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW025	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.18	NS	< 0.02	< 0.04	< 0.05	< 0.05	< 1	NS	0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	5.1
ST05-MW025	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.21	NS	0.11	0.37	0.53	0.71	0.95	<1	0.39	0.27 U	0.13 U	1.2	2	8.4	4.9	< 1.0 U
ST05-MW025	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	NS	< 0.04	< 0.04	< 0.03	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW025	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.19	NS	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	0.33 J
ST05-MW026	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.36	< 0.05	< 0.06	< 0.02	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW026	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	58.3	46.2	45.3	45.4	44.4	22.8	16.9	13	15	21	7.7	15	7.5	5.7	< 1.0 U
ST05-MW026	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.33	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	1.3	0.64	0.55 J	< 1.0 U
ST05-MW026	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.2	< 0.04	< 0.04	< 0.04	0.08 F	< 1	<1	0.27 U	0.57 F	0.13 U	0.20 U	2.8	0.50 U	< 1.0 U	0.54 J
ST05-MW026	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.38	< 0.04	< 0.04	< 0.03	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
ST05-MW026	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.33	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	1.3	0.64	0.55 J	< 1.0 U
ST05-MW026	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.2	< 0.04	< 0.04	< 0.04	0.08 F	< 1	<1	0.27 U	0.57 F	0.13 U	0.20 U	2.8	0.50 U	< 1.0 U	0.54 J
ST05-MW1207	1,1-DCE	N	µg/L	7	MCL	< 0.1	NS	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	NS	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW1207	cis-1,2-DCE	N	µg/L	70	MCL	< 0.12	NS	NS	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	NS	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW1207	TCE	N	µg/L	5	MCL	< 0.09	NS	NS	< 0.2	< 0.2	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	0.11 F	< 0.03	< 0.07	0.48 F	0.63 F	NS	0.42 F	0.46 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW1207	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	NS	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.04	< 0.042	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST05-MW1207	Vinyl chloride	N	µg/L	2	MCL	< 0.12	NS	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes
1,1-DCE - 1,1-dichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - trichloroethene
N - Field Sample
FD - Field Duplicate
J - analyte was detected but value is estimated
F - The analyte was positively identified
NS - Not Sampled
U - not detected and is displayed as less than the method detection limit
Bold results indicate a detection
Shaded results indicate a detection exceededing the screening value

Appendix C
Historical Site Specific Monitoring Results at SS 006
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site	Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Feb-01	Mar-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	Oct-10	Apr-11	Oct-11	Aprl-12
SS-006	AOC01-MW001	1,1-DCE	N	µg/L	7	MCL	< 0.1	NS	NS	NS	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.04	< 0.05	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	AOC01-MW001	cis-1,2-DCE	N	µg/L	70	MCL	< 0.12	NS	NS	NS	< 0.27	NS	NS	0.08 F	< 0.03	< 0.03	< 0.02	< 0.02	< 0.051	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	AOC01-MW001	TCE	N	µg/L	5	MCL	< 0.09	NS	NS	NS	< 0.2	NS	NS	0.27 F	< 0.03	< 0.03	< 0.05	< 0.05	0.13 F	< 0.03	< 0.07	< 0.04	< 0.04	0.07 F	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	AOC01-MW001	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	NS	NS	NS	< 0.53	NS	NS	0.12 F	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	AOC01-MW001	Vinyl chloride	N	µg/L	2	MCL	< 0.12	NS	NS	NS	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	AOC01-MW001	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	1,1-DCE	N	µg/L	7	MCL	0.26 F	0.27 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	cis-1,2-DCE	N	µg/L	70	MCL	146.6	178.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	TCE	N	µg/L	5	MCL	56.2	60.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	< 0.12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	Vinyl chloride	N	µg/L	2	MCL	7.75	1.93	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	1,1-DCE	FD	µg/L	7	MCL	0.25 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	cis-1,2-DCE	FD	µg/L	70	MCL	143.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	TCE	FD	µg/L	5	MCL	53.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	Tetrachloroethene	FD	µg/L	5	MCL	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	Vinyl chloride	FD	µg/L	2	MCL	7.07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW001	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW005	1,1-DCE	N	µg/L	7	MCL	NS	0.43 F	NS	< 0.38	< 0.38	NS	NS	0.17 F	< 0.02	0.16 F	< 0.04	NS	0.22 F	0.32 F	0.15 F	0.23 F	0.15 F	0.21 F	0.13 F	NS	0.09 F	< 1	<1	0.21 U	0.26 F	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW005	cis-1,2-DCE	N	µg/L	70	MCL	NS	70.1 F	NS	49 M	39	NS	NS	54.6	32.9 M	50.1 M	28.3	NS	142	187	107	92.9	108	112	46.6	NS	40.2	12.3	47.6	55	100	25	11	26	97	30	96 J	86	76	83	29
SS-006	SS06-MW005	TCE	N	µg/L	5	MCL	NS	507.4	NS	310	400	NS	NS	398	223	271	248	NS	201	196	188	190	151	151	103	NS	83.7	47	121	78	260	88	54	37	42	60	67	61	32	46	32
SS-006	SS06-MW005	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.12	NS	< 0.53	< 0.53	NS	NS	0.06 F	< 0.04	< 0.04	< 0.06	NS	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U	NS	0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW005	Vinyl chloride	N	µg/L	2	MCL	NS	11.74	NS	1.8	2.1	NS	NS	< 0.06	1.2	3.7	0.32 F	NS	1.4	1 F	0.7 F	0.45 F	< 0.024	0.17 F	0.57 F	NS	1.9	< 1	2.71	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	2.3	0.4 U	2.8	1.8	0.25 U	1.3	0.62 J
SS-006	SS06-MW005	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW005	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	< 0.38	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.28 F	NS	NS	NS	NS	NS	0.2 U	NS	NS	NS	NS
SS-006	SS06-MW005	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	32 J	NS	NS	NS	NS	NS	NS	28.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	88	NS	NS	NS	NS	NS	120 J	NS	NS	NS	NS
SS-006	SS06-MW005	TCE	FD	µg/L	5	MCL	NS	NS	NS	300	NS	NS	NS	NS	NS	NS	231	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	260	NS	NS	NS	NS	NS	56	NS	NS	NS	NS
SS-006	SS06-MW005	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	< 0.53	NS	NS	NS	NS	NS	NS	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.5 U	NS	NS	NS	NS	NS	0.3 U	NS	NS	NS	NS
SS-006	SS06-MW005	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	0.6 F	NS	NS	NS	NS	NS	NS	0.36 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.4 U	NS	NS	NS	NS	NS	3.2	NS	NS	NS	NS
SS-006	SS06-MW005	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.2 U	NS	NS	NS	NS
SS-006	SS06-MW006	1,1-DCE	N	µg/L	7	MCL	NS	0.32 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	cis-1,2-DCE	N	µg/L	70	MCL	NS	107.2 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	TCE	N	µg/L	5	MCL	NS	13.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	Vinyl chloride	N	µg/L	2	MCL	NS	97.1 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	1,1-DCE	FD	µg/L	7	MCL	NS	0.3 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	cis-1,2-DCE	FD	µg/L	70	MCL	NS	84.6 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	TCE	FD	µg/L	5	MCL	NS	12.24	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	Tetrachloroethene	FD	µg/L	5	MCL	NS	< 0.12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	Vinyl chloride	FD	µg/L	2	MCL	NS	68.1 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW006	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	1,1-DCE	N	µg/L	7	MCL	NS	0.43 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	cis-1,2-DCE	N	µg/L	70	MCL	NS	34.66	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	TCE	N	µg/L	5	MCL	NS	63.53	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	Vinyl chloride	N	µg/L	2	MCL	NS	31.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW007	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	1,1-DCE	N	µg/L	7	MCL	NS	< 0.09	NS	< 0.38	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.04	< 0.05	< 0.036	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW008	cis-1,2-DCE	N	µg/L	70	MCL	NS	1 F	NS	1.3	0.73 F	NS	NS	0.06 F	1.3	6.8	1.2 F	2.2	4.6	1.4	0.23 F	2.24	2.28	1.13	0.2 F	NS	0.25 F	< 1	<1	2.4	0.21 F	0.20 U	0.20 U	0.21 U	0.21 U	0.2 U	0.57 F	0.54 J	0.50 U	0.48 J	< 1.0 U
SS-006	SS06-MW008	TCE	N	µg/L	5	MCL	NS	0.47 F	NS	0.9 F	0.7 F	NS	NS	0.39 F	0.41 F	1.4	0.47 F	0.57 F	1.4	0.59 F	0.25 F	0.92 F	0.62 F	0.52 F	0.13 F	NS	0.21 F	< 1	<1	0.94 F	0.27 U	0.13 U	0.13 U	0.20 U	0.20 U	0.1 U	0.23 F	0.25 J	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW008	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.12	NS	< 0.53	< 0.53	NS	NS	0.13 F	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U	< 1.0 U	0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW008	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.13	NS	< 0.31	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW008	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW008	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	1.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	0.61 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW008	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	0.15 F	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	18	21	16	NS	NS	1.4	12.2	20.8	12	9.5	10.5	7.78	9.23	10.4	7.54	8.29	7.07	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	TCE	N	µg/L	5	MCL	NS	NS	85	73	81	NS	NS	3.2	20.7	30.3	49.2	50.5	40.2	50.4	51.9	63.1	56.1	59.7	47.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	Vinyl chloride	N	µg/L	2	MCL	NS	NS	1.4	0.64 F	2	NS	NS	0.37 F	2.5 J	0.5 F	< 0.06	0.27 F	< 0.062	0.38 F	< 0.024	0.3 F	0.17 F	0.47 F	0.29 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.02	< 0.02	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	1.4	11.2	22.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	3.3	22.4	25.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.04	1.7 J	0.5 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW009	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	0.56 F	NS	NS	0.5 F	< 0.02	0.35 F	0.5 F	0.51 F	0.33 F	0.23 F	0.66 F	0.42 F	0.38 F	0.42 F	0.46 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	130	150	140	NS	NS	141	91.8	97.2	132	129	78.6	70.6	170	95.8	126	96.9	120	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	TCE	N	µg/L	5	MCL	NS	NS	160	220	240	NS	NS	226	164	166	220	188	168	154	227	205	199	171	191	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	NS	NS	0.15 F	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	Vinyl chloride	N	µg/L	2	MCL	NS	NS	34	12	18	NS	NS	2.4 J	3.1	3.2	3.7	9.5	2.02	0.81 F	4.45	0.48 F	1.91	1.51	0.67 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	0.57 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	147	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	237	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	0.07 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	1.9 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW010	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW011	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	NS	< 0.38	NS	NS	0.25 F	< 0.02	0.16 F	0.15 F	0.38 F	0.16 F	< 0.036	0.14 F	0.26 F	0.2 F	0.17 F	0.12 F	NS	0.14 F	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW011	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	8.8	NS	52	NS	NS	82.3	82.1	73.7	60.8	96.3	69.7	62.1	64.1	81.1	82.5	56.7	48.6	NS	39.9	24.2	23.4	32	29	25	28	15	22	21	27	12	0.50 U	9.1	2.9
SS-006	SS06-MW011	TCE	N	µg/L	5	MCL	NS	NS	16	NS	81	NS	NS	188	163	141	139	251	155	131	139	266	220	141	147	NS	198	91.7	128	140	130	89	99	62	120 J	120	130	53	3.9	35	12
SS-006	SS06-MW011	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	NS	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW011	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	NS	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW011	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW011	1,1-DCE	FD	µg/L	7	MCL	NS	NS	< 0.38	NS	< 0.38	NS	NS	0.25 F	< 0.02	0.16 F	0.15 F	0.38 F	0.16 F	< 0.036	0.14 F	0.26 F	0.2 F	0.17 F	0.12 F	NS	0.14 F	< 1	NS	0.21 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
SS-006	SS06-MW011	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	8.8	NS	52	NS	NS	82.3	82.1	73.7	60.8	96.3	69.7	62.1	64.1	81.1	82.5	56.7	48.6	NS	39.9	24.2	NS	33	NS	NS	NS	NS	NS	NS	NS	NS	NS	10	NS
SS-006	SS06-MW011	TCE	FD	µg/L	5	MCL	NS	NS	16	NS	81	NS	NS	188	163	141	139	251	155	131	139	266	220	141	147	NS	198	91.7	NS	140	NS	NS	NS	NS	NS	NS	NS	NS	NS	40	NS
SS-006	SS06-MW011	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	< 0.53	NS	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U	NS	0.5 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
SS-006	SS06-MW011	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	< 0.31	NS	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.065	< 0.062	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	NS	0.4 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
SS-006	SS06-MW011	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U	NS
SS-006	SS06-MW012	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	NS	0.4 F	NS	NS	0.47 F	< 0.02	0.39 F	0.34 F	0.4 F	0.35 F	0.25 F	0.29 F	0.29 F	0.26 F	0.31 F	0.27 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW012	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	70	NS	71	NS	NS	78.3	10.8	78.1	64.2	72.9	67	59.5	56.6	52.2	59	57.5	52.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW012	TCE	N	µg/L	5	MCL	NS	NS	55	NS	95	NS	NS	112	98.2	86	90.9	73.1	78.2	69.8	75.8	63.7	78.4	69.9	65.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW012	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	NS	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.036	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Site	Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Feb-01	Mar-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	Oct-10	Apr-11	Oct-11	Aprl-12
SS-006	SS06-MW012	Vinyl chloride	N	µg/L	2	MCL	NS	NS	3.9	NS	0.95 F	NS	NS	0.22 F	< 0.04	0.78 F	< 0.06	0.97 F	0.29 F	0.18 F	< 0.024	0.62 F	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW012	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.02	< 0.02	< 0.02	NS	< 0.05	< 0.036	NS	NS	NS	< 0.059	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	7.4	5.8	9.9	NS	12.1	5.47	NS	NS	NS	10.2	9.88	2.73	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	14.2	12.9	18	NS	27.4	12.2	NS	NS	NS	14.8	23.5	7.31	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.04	< 0.04	< 0.04	NS	< 0.04	< 0.057	NS	NS	NS	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.04	< 0.04	< 0.04	NS	< 0.06	< 0.062	NS	NS	NS	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW013	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW014	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 UJ	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW014	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	4.4	NS	NS	4	6.8	6.5	5	6.4	7.15	7.47	6.91	8.68	10.4	3.16	7.56	NS	3.07	3.91	8.48	5.9	8.6	2.1	4.9	2.7	8.5 J	11	13	7.7	5.1	6.9	7.4
SS-006	SS06-MW014	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	48	NS	NS	52.8	90.4	70.2	40.5	78.2	72.9	77.4	65.3	84.6	110	35.3	70.6	NS	37.1	50	124	76	120	32	51	31	86 J	150	170	91	58	74	68
SS-006	SS06-MW014	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18	0.14 U	0.14 UJ	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW014	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16	0.23 U	0.23 UJ	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW014	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 UJ	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW014	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	<1	0.21 U	0.21 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U
SS-006	SS06-MW014	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	4.4	NS	NS	4	6.8	6.5	5	6.4	7.15	7.47	6.91	8.68	10.4	3.16	7.56	NS	3.07	3.91	8.48	5.9	8.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	6.5
SS-006	SS06-MW014	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	48	NS	NS	52.8	90.4	70.2	40.5	78.2	72.9	77.4	65.3	84.6	110	35.3	70.6	NS	37.1	50	124	76	120	NS	NS	NS	NS	NS	NS	NS	NS	NS	54
SS-006	SS06-MW014	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U
SS-006	SS06-MW014	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U
SS-006	SS06-MW014	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 1.0 U
SS-006	SS06-MW015	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	< 0.38	< 0.38	NS	NS	0.1 F	< 0.02	0.12 F	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1		0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 UJ	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW015	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	3	3.3	NS	NS	3.2	4.4	4.3	2.7	3.7	3.51	3.59	3.33	3.32	3.2	3.93	4.05	NS	3.2	1.27	2.42	2.5	2.8	1.8	2.8	1.6	3 J	2.4	1.6	4.5	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW015	TCE	N	µg/L	5	MCL	NS	NS	NS	85	93	NS	NS	155	141	128	78	173	122	136	128	125	123	104	119	NS	107	32.3	96.7	130	120	76	99	48	99 J	76	50	13	3	21	2.9
SS-006	SS06-MW015	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	< 0.53	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 UJ	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW015	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	< 0.31	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 UJ	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW015	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 UJ	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW015	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS	NS
SS-006	SS06-MW015	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.7	NS	NS	NS
SS-006	SS06-MW015	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	13	NS	NS	NS
SS-006	SS06-MW015	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS	NS
SS-006	SS06-MW015	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS	NS
SS-006	SS06-MW015	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS	NS
SS-006	SS06-MW016	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	< 0.38	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 UJ	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW016	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	< 0.27	< 0.27	NS	NS	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.04	NS	< 0.05	< 1	<1	0.2 U	0.2 U	0.20 U	0.20 U	0.21 U	0.21UJ	0.2 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW016	TCE	N	µg/L	5	MCL	NS	NS	NS	< 0.2	< 0.2	NS	NS	0.12 F	0.18 F	0.18 F	< 0.05	0.23 F	0.36 F	0.31 F	0.22 F	0.15 F	0.24 F	0.15 F	0.3 F	NS	< 0.04	< 1	<1	0.27 U	0.27 U	0.93 F	0.13 U	0.20 U	0.20 UJ	0.1 U	0.2 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW016	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	< 0.53	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 UJ	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW016	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	< 0.31	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 UJ	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW016	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 UJ	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW017	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW017	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	NS	NS	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW017	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	< 0.2	< 0.2	NS	NS	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	0.19 F	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW017	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	NS	NS	0.11 F	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW017	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW017	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	NS	NS	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	0.08 F	NS	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW018	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	15	32	30	NS	NS	29.4	36.7	33.7	28.4	34.3	35.8	33.9	39.1	35.7	38.8	39	42.3	NS	41.1	25.2	23.7	31	25	18	24	26	30	37	28	14	5.5	20	13
SS-006	SS06-MW018	TCE	N	µg/L	5	MCL	NS	NS	6.2	15	15	NS	NS	15.6	17.9	16.9	16.5	20	20.3	20.1	24.1	22	22.8	25.3	27.8	NS	24.1	14	13.2	20	15	9.3	17	13	20	23	16	9.9	4.2	13	7.6
SS-006	SS06-MW018	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	NS	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW018	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	NS	NS	< 0.04	0.22 F	0.2 F	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	0.21 F	< 0.024	0.27 F	0.31 F	NS	0.22 F	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW018	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW018	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	30	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	17	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	< 0.31	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW018	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	< 0.38	< 0.02	< 0.02	< 0.02	< 0.04	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	< 0.27	< 0.03	< 0.03	< 0.03	< 0.02	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	< 0.2	0.14 F	0.15 F	0.14 F	0.17 F	< 0.03	0.26 F	0.25 F	0.47 F	0.27 F	0.25 F	0.2 F	0.28 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	< 0.53	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	< 0.31	< 0.04	< 0.04	< 0.04	< 0.06	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW019	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW020	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	5.3	NS	2.9	5.5	5.6	4.8 J	5.1	2.8	3.76	5.4	5.11	5.75	7.16	7.44 F	NS	8.66 F	6.94 J	2.82	14	11	9.6 F	2.5 U	2.2 R	2.2 U	4.5	10 U	0.98 J	0.50 U	< 1.0 U	NS
SS-006	SS06-MW020	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	81	NS	72.8	104	132	113	120	90.6	123	163	168	208	250	325	NS	482	417	169	730	960	720	630	500	430	350	82	190	330	340	NS
SS-006	SS06-MW020	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	520	NS	460	777	930	997	912 J	681	1090	1730	1300	2220	2950	3400	NS	4750	3730	1930 J	5400	4400	4200	3200	2200	1300 J	950	260	170	120	220	NS
SS-006	SS06-MW020	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	< 0.53	NS	< 0.04	< 0.04	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	< 0.04	< 0.42	NS	< 0.61	< 10		2.5 U	2.5 U	0.18 U	1.8 U	1.4 U	1.4 U	0.3 U	15 U	0.50 U	0.50 U	< 1.0 U	NS
SS-006	SS06-MW020	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	21	NS	1.8	20.3	18.1	11.7	17.7	8.41	10	13.1 J	19.5	10.3	23	29.3	NS	35.3	10.5	11.8	81	62	45	1.6 U	2.3 U	18	13	20 U	7.9	22	10	NS
SS-006	SS06-MW020	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.5 U	2.5 U	2.2 U	2.2 U	0.1 U	5.0 U	0.50 U	0.50 U	< 1.0 U	NS
SS-006	SS06-MW020	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	5.3	NS	NS	NS	5.3	4.6	5.8	2.7	3.99	5.37	4.81	5.28	6.82 F	8.45	NS	7.89 F	6.68	2.65	NS	NS	NS	NS	2.2 R	NS	4.5	NS	NS	NS	NS	NS
SS-006	SS06-MW020	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	91	NS	NS	NS	125	116	124	89.1	127	170	175	208	299	319	NS	474	424	173	NS	NS	NS	NS	560	NS	340	NS	NS	NS	NS	NS
SS-006	SS06-MW020	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	540	NS	NS	NS	859	1010	1120 J	680	1100	1830	1430	2080	2960	3340	NS	4840	4070	2070 J	NS	NS	NS	NS	2500	NS	950	NS	NS	NS	NS	NS
SS-006	SS06-MW020	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	< 0.53	NS	NS	NS	< 0.04	< 0.06	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.36	< 0.04	NS	< 0.61	< 1.0 U		NS	NS	NS	NS	1.4 U	NS	0.3 U	NS	NS	NS	NS	NS
SS-006	SS06-MW020	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	22	NS	NS	NS	17	11.4 J	16.5	8.01	10.4	10.5 J	17.4	8.75	23.6	30.7	NS	36.9	5.87	10.4	NS	NS	NS	NS	2.3 U	NS	13	NS	NS	NS	NS	NS
SS-006	SS06-MW020	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.2 U	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW021	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	0.07 F	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW021	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.34 F	0.20 U	0.2 U	0.20 U	0.21 U	0.21 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW021	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	< 0.04	< 1	<1	10	0.27 U	3.8	0.13 U	0.20 U	0.20 U	0.1 U	1.2	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW021	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW021	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW021	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW022	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW022	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW022	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW022	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW022	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW022	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW023	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW023	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.12 F	0.12 F	< 1	<1	0.2 U	0.46 F	0.2 U	1.4	0.21 U	1.2	1.3	0.99 F	1.1	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW023	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.18 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.07 F	< 0.04	< 1	<1	0.27 U	0.27 U	1.6	0.13 U	0.20 U	0.20 U	0.83 F	0.19 F	0.47 J	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW023	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	< 0.03	< 1.0 U	< 1.0 U	0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW023	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW023	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.2 U	0.2 U	0.2 U	0.20 U	0.21 U	0.21 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.11 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.09 F	0.15 F	< 1	<1	1.1	1.4	0.13 U	0.13 U	1.7	0.20 U	0.1 U	0.2 J	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW024	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	0.22 U	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW024	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	0.21 U	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW024	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.16 F	NS	NS	NS	NS	NS	NS	NS	NS	0.20 U	NS	NS	NS	NS	NS	NS

Appendix C
Historical Site Specific Monitoring Results at SS 006
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site	Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Feb-01	Mar-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-07	Apr-08	Oct-08	Apr-09	Oct-09	Oct-10	Apr-11	Oct-11	Aprl-12
SS-006	SS06-MW024	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	0.14 U	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW024	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	0.23 U	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW024	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.22 U	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW025	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	0.1 F	0.08 F	< 0.02	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 U	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW025	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.1 F	9.92	5.74	6.05	5.65	7.74	4.78	8.6	13	5.1	0.20 U	4.9	3.5	7.3	4.2	5.6	8.8	6.4	7.3
SS-006	SS06-MW025	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.5	18.1	13.4	13.1	13.9	17.6	12.2	24	34	13	11	13	7.6	14	10	17	15	12	13
SS-006	SS06-MW025	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.04	< 0.04	< 0.03	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 U	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW025	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.19	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 U	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW025	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 U	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW025	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.22 R	NS	0.2 U	NS	NS	NS	NS	NS
SS-006	SS06-MW025	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.5	NS	7.3	NS	NS	NS	NS	NS
SS-006	SS06-MW025	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	14	NS	13	NS	NS	NS	NS	NS
SS-006	SS06-MW025	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.14 U	NS	0.3 U	NS	NS	NS	NS	NS
SS-006	SS06-MW025	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.23 U	NS	0.4 U	NS	NS	NS	NS	NS
SS-006	SS06-MW025	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.22 U	NS	0.1 U	NS	NS	NS	NS	NS
SS-006	SS06-MW026	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.05	< 0.06	< 0.02	< 0.02	< 1	<1	0.21 U	0.21 U	0.25 U	0.25 U	0.22 R	0.22 UJ	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW026	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.4	1.07	1.25	1.25	0.92 F	0.743 J	0.657 J	0.48 F	1.1	0.2 U	0.20 U	0.21 U	0.21UJ	0.2 U	0.2 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW026	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.41 F	0.48 F	0.63 F	0.63 F	0.63 F	0.883 J	<1	1.2	11	1.3	1	0.20 U	0.20 UJ	0.28 F	0.56 F	0.57 J	0.47 J	0.7 J	< 1.0 U
SS-006	SS06-MW026	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.04	< 0.04	< 0.03	< 0.03	< 1.0 U		0.5 U	0.5 U	0.18 U	0.18 U	0.14 U	0.14 UJ	0.3 U	0.3 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW026	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.19	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.16 U	0.23 U	0.23 UJ	0.4 U	0.4 U	0.50 U	0.25 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW026	1,2-DCA	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.25 U	0.25 U	0.22 U	0.22 UJ	0.1 U	0.1 U	0.50 U	0.50 U	< 1.0 U	< 1.0 U
SS-006	SS06-MW026	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.22 UJ	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW026	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.21UJ	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW026	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.20 UJ	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW026	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.14 UJ	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW026	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.23 UJ	NS	NS	NS	NS	NS	NS
SS-006	SS06-MW026	1,2-DCA	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.22 UJ	NS	NS	NS	NS	NS	NS

Notes
1,1-DCE - 1,1-dichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - trichloroethene
N - Field Sample
FD - Field Duplicate
J - analyte was detected but value is estimated
F - The analyte was positively identified
NS - Not Sampled
U - not detected and is displayed as less than the method detection limit
Bold results indicate a detection
Shaded results indicate a detection exceededing the screening value

Appendix C
Historical Site Specific Monitoring Results at SS 006
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site	Location	Analyte	Units	Screening Level	Screening Source	Jul-09	Nov-09	Jan-10	Mar-10	Jun-10	Sep-10	Apr-11	Oct-11	Apr-12
SS-006	SS06-MW027	1,1-DCE	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW027	cis-1,2-DCE	µg/L	70	MCL	3.1	3.1	3.6	6.3 J	9.2	7.1	3.1	1.1	1.1
SS-006	SS06-MW027	TCE	µg/L	5	MCL	3.3	1.8	2.3	1.3 J	0.79 J	0.45 J	0.25 U	0.28 J	< 1 U
SS-006	SS06-MW027	Tetrachloroethene	µg/L	5	MCL	0.20 U	0.20 U	0.21 U	0.21 U	0.21 U	0.21 U	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW027	Vinyl chloride	µg/L	2	MCL	0.24 U	0.24 U	0.18 U	0.18 U	1.6	1.3	0.25 U	0.44 J	< 1 U
SS-006	SS06-MW027.	1,2-DCA	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW027.	1,1-DCA	µg/L	--	MCL	0.24 U	0.24 U	0.15 U	0.15 U	0.15 U	0.15 U	NS	NS	NS
SS-006	SS06-MW027.	trans-1,2-DCE	µg/L	100	MCL	0.54 U	0.54 U	0.33 U	0.33 U	0.33 U	0.33 U	NS	NS	NS
SS-006	SS06-MW028	1,1-DCE	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	2.5 U	< 1 U	< 1 U
SS-006	SS06-MW028	cis-1,2-DCE	µg/L	70	MCL	1.8	2.3 U	3.8 J	5.6 J	5.1	5.4 J	3.1 J	5.9	5.2
SS-006	SS06-MW028	TCE	µg/L	5	MCL	2	2 U	1.9 U	4.6 J	4.7	4.4 J	2.7 J	5.1	3.6
SS-006	SS06-MW028	Tetrachloroethene	µg/L	5	MCL	0.20 U	2 U	2.1 U	1 UJ	0.21 U	0.21 UJ	2.5 U	< 1 U	< 1 U
SS-006	SS06-MW028	Vinyl chloride	µg/L	2	MCL	0.24 U	2.4 U	1.8 U	0.9 UJ	0.18 U	0.38 J	1.2 U	0.54 J	< 1 U
SS-006	SS06-MW028.	1,2-DCA	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	2.5 U	< 1 U	< 1 U
SS-006	SS06-MW028.	1,1-DCA	µg/L	--	MCL	0.24 U	2.4 U	1.5 U	0.75 UJ	0.15 U	0.15 UJ	NS	NS	NS
SS-006	SS06-MW028.	trans-1,2-DCE	µg/L	100	MCL	0.54 U	5.4 U	3.3 U	1.65 UJ	0.33 U	0.33 UJ	NS	NS	NS
SS-006	SS06-MW029	1,1-DCE	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW029	cis-1,2-DCE	µg/L	70	MCL	023 U	0.23 U	0.19 U	0.19 U	0.19 U	0.19 U	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW029	TCE	µg/L	5	MCL	0.20 U	0.20 U	0.19 U	0.19 U	0.19 U	0.19 U	0.25 U	< 1 U	< 1 U
SS-006	SS06-MW029	Tetrachloroethene	µg/L	5	MCL	0.20 U	0.20 U	0.21 U	0.21 U	0.21 U	0.21 U	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW029	Vinyl chloride	µg/L	2	MCL	0.24 U	0.24 U	0.18 U	0.18 U	0.18 U	0.18 U	0.25 U	< 1 U	< 1 U
SS-006	SS06-MW029.	1,2-DCA	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW029.	1,1-DCA	µg/L	--	MCL	0.24 U	0.24 U	0.15 U	0.15 U	0.15 U	0.15 U	NS	NS	NS
SS-006	SS06-MW029.	trans-1,2-DCE	µg/L	100	MCL	0.54 U	0.54 U	0.33 U	0.33 U	0.33 U	0.33 U	NS	NS	NS
SS-006	SS06-MW030	1,1-DCE	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW030	cis-1,2-DCE	µg/L	70	MCL	NS	3.1	3.5	8.2	12	5.7	3.5	7.2	3.6
SS-006	SS06-MW030	TCE	µg/L	5	MCL	NS	3.7	4	7.3	13	7.7	5.3	5.7	5.9
SS-006	SS06-MW030	Tetrachloroethene	µg/L	5	MCL	NS	0.20 U	0.21 U	0.21 U	0.21 U	0.21 U	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW030	Vinyl chloride	µg/L	2	MCL	NS	0.24 U	0.18 U	0.18 U	0.18 U	0.18 U	0.25 U	0.37 J	< 1 U
SS-006	SS06-MW030.	1,2-DCA	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	0.50 U	< 1 U	< 1 U
SS-006	SS06-MW030.	1,1-DCA	µg/L	--	MCL	NS	0.24 U	0.15 U	0.15 U	0.15 U	0.15 U	NS	NS	NS
SS-006	SS06-MW030.	trans-1,2-DCE	µg/L	100	MCL	NS	0.54 U	0.37 J	0.82 J	0.82 J	0.38 J	NS	NS	NS

Notes
1,1-DCE - 1,1-dichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - trichloroethene
J - analyte was detected but value is estimated
NS - Not Sampled
U - not detected and is displayed as less than the method detection limit
Bold results indicate a detection
Shaded results indicate a detection exceededing the screening value

Appendix C
Historical Site Specific Monitoring Results at ST 011
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site		QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
ST011-MW001	1,1-DCE	N	µg/L	7	MCL	< 0.1	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 UJ	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW001	cis-1,2-DCE	N	µg/L	70	MCL	92.6	69.6	NS	88	68	39	36.8	32.6	27.4	16.5	11.6	7.51	6.34	2.2	1.46	1.52	1.7	NS	0.87	0.504	0.389	1.2	0.59	0.20 U	0.21 U	0.28	0.5	2.2	1.3
ST011-MW001	TCE	N	µg/L	5	MCL	0.36 F	< 0.1	NS	0.4 F	0.3 F	0.2 F	0.16 F	0.16 F	0.14 F	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	0.16 F	NS	< 0.04	< 1	<1	0.29 F	0.52 F	0.13 U	0.20 U	0.1 U	0.50 U	< 1 U	< 1 U
ST011-MW001	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW001	Vinyl chloride	N	µg/L	2	MCL	17.02	7.1	NS	13	12	0.84	5.1	4.7	3	1.6	1.17	0.67	0.42	< 0.028	0.13	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW001	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	< 0.05	< 0.036	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.2 U	NS	< 1 U	< 1 U
ST011-MW001	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	30.6	NS	18.1	12	7.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.24 F	NS	2.8	1.5
ST011-MW001	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.03	NS	< 0.03	0.13 F	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.1 U	NS	< 1 U	< 1 U
ST011-MW001	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	< 0.04	< 0.057	< 0.036	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.3 U	NS	< 1 U	< 1 U
ST011-MW001	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	4.3	NS	1.8	1.26	0.66 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.4 U	NS	0.14 J	< 1 U
ST011-MW002	1,1-DCE	N	µg/L	7	MCL	< 0.1	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW002	cis-1,2-DCE	N	µg/L	70	MCL	11.14	0.4	NS	0.78	1.1	0.59	0.98	1.4	1.1	0.74	1.1	1.01	0.91	0.8	0.86	0.99	1.08	NS	0.97	0.574	0.867	0.98	1.4	0.20 U	1.9	2.8	2.9	1.9	2.6
ST011-MW002	TCE	N	µg/L	5	MCL	2.64	< 0.1	NS	0.3	0.7	0.33	0.44	0.54	0.43	0.37	0.35	0.37	0.36	0.28	0.25	0.3	0.31	NS	0.24	< 1	<1	0.58	1.2	0.13 U	0.20 U	0.92	0.7	0.57	0.67 J
ST011-MW002	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	< 0.1	NS	< 0.53	< 0.53	0.09 F	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW002	Vinyl chloride	N	µg/L	2	MCL	1.64	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW002	1,1-DCE	FD	µg/L	7	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
ST011-MW002	cis-1,2-DCE	FD	µg/L	70	MCL	NS	0.4 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.8	NS	NS
ST011-MW002	TCE	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.65	NS	NS
ST011-MW002	Tetrachloroethene	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
ST011-MW002	Vinyl chloride	FD	µg/L	2	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
ST011-MW003	1,1-DCE	N	µg/L	7	MCL	< 0.1	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW003	cis-1,2-DCE	N	µg/L	70	MCL	210.6	213	NS	230 M	220	222	213	151	118	113	101	76.4	92.3	69.4	66.2	35.3	60.7	NS	42.8	35.2	35.3	38	24	14	11	6.1	4.6	2.7	2.9
ST011-MW003	TCE	N	µg/L	5	MCL	2.29	2	NS	2.8	2.6	1.9	2.3	2.2	0.98 F	1.2	1.35	1.19	1.15	1.06	0.86 F	5.95	0.76 F	NS	0.67 F	< 0.811	<1	1.2	1	0.13 U	0.20 U	0.35 F	0.50 U	< 1 U	< 1 U
ST011-MW003	Tetrachloroethene	N	µg/L	5	MCL	< 0.1	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	< 0.03	< 1	NS	0.5 U	0.50 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW003	Vinyl chloride	N	µg/L	2	MCL	29.2	31.1	NS	24 M	23	2.5	19.6	19.8	7.9	6.9	9.46	8.29	2.93	3.71	4.45	3.7	2.77	NS	3.16	1.65	0.793 J	0.69 F	0.40 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW003	1,1-DCE	FD	µg/L	7	MCL	< 0.1	NS	NS	NS	NS	NS	NS	NS	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW003	cis-1,2-DCE	FD	µg/L	70	MCL	211.1	NS	NS	NS	NS	NS	NS	NS	117	113	99.5	72.4	92.6	73.7	65.1	38.1	61.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW003	TCE	FD	µg/L	5	MCL	1.93	NS	NS	NS	NS	NS	NS	NS	0.93 F	1.2	1.3	1.15	1.21	1.03	0.87 F	6.49	0.81 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW003	Tetrachloroethene	FD	µg/L	5	MCL	< 0.1	NS	NS	NS	NS	NS	NS	NS	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	0.08 F	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW003	Vinyl chloride	FD	µg/L	2	MCL	27.5	NS	NS	NS	NS	NS	NS	NS	7.7	8.3	9.18	7.84	2.91	3.82	4.23	4.14	2.66	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW004	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	NS	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW004	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	NS	< 0.27	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW004	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	NS	< 0.2	< 0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW004	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	NS	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW004	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	NS	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW005	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW005	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.1	NS	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW005	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW005	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW006	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	NS	< 0.38	0.07 F	< 0.02	< 0.02	< 0.02	< 0.05	0.1 F	0.11 F	< 0.059	< 0.046	< 0.059	0.09 F	0.17 F	NS	0.07 F	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW006	cis-1,2-DCE	N	µg/L	70	MCL	NS	20.5	NS	NS	6.4	5	0.9 F	4.9	5.7	5.1	7.31	5.63	5.55	4.4	6.85	8.88	5.48	NS	9.51	5.7	3.5	2.7	1.5	2.5	7.2	3.1	5.8	2.5	< 1 U
ST011-MW006	TCE	N	µg/L	5	MCL	NS	7.9	NS	NS	23	9.6	1.3	14.9	23	23.8	15.4	20.9	21.8	18.1	11.1	13	16.2	NS	8.1	8.82	7.35	5.7	3.3	5.8	8.3	5.7	3.8	0.95	0.41 J
ST011-MW006	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	NS	< 0.53	0.06 F	< 0.04	0.32 F	0.41 F	0.45 F	0.3 F	0.42 F	0.47 F	0.31 F	0.2 F	0.21 F	0.3 F	NS	0.13 F	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW006	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	NS	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	0.17 F	< 0.065	< 0.024	< 0.028	< 0.024	0.26 F	< 0.05	NS	0.36 F	0.568 J	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW006	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.059	0.14 F	< 0.059	0.1 F	< 0.02	NS	0.06 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW006	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	5.43	4.27	6.73	8.54	5.39	NS	9.87	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW006	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	21.8	17.9	10.4	12.6	15.5	NS	8.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW006	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.42 F	0.31 F	0.15 F	0.22 F	0.3 F	NS	0.13 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW006	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	0.35 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW007	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	0.15 F	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW007	cis-1,2-DCE	N	µg/L	70	MCL	NS	63.9	NS	73	61	38.5	60.4	49.7	53.3	53.3	48.7	47.9	42.6	38.9	33.9	56.7	35.2	NS	26.6	22.3	11.9	14	1.6	15	7.6	5.5	2.5	1.4	2.2
ST011-MW007	TCE	N	µg/L	5	MCL	NS	2.8	NS	4.8	4.8	4.4	3.5	5.2	5.3	5.7	5.7	9.05	6.69	7.69	5.08	0.78 F	5.86	NS	2.93	3.77	4.66	4.4	0.90 F	3.3	1.6	1.4	0.9	0.48	0.73 J
ST011-MW007	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW007	Vinyl chloride	N	µg/L	2	MCL	NS	7.1	NS	8.8	9.3	3.3	7.3	5.4	5.1	4.6	5.33	4.32	3.29	3.58	2.69	4.75	3.27	NS	2.89	2.96	0.51 J	0.4 U	0.4 U	1.5	0.23 U	0.4 U	0.50 U	< 1 U	0.22 J
ST011-MW007	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.21 U	NS	NS	NS	NS	NS	NS
ST011-MW007	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	39.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.6	NS	NS	NS	NS	NS	NS
ST011-MW007	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	4.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.89 F	NS	NS	NS	NS	NS	NS
ST011-MW007	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.5 U	NS	NS	NS	NS	NS	NS
ST011-MW007	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	3.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.4 U	NS	NS	NS	NS	NS	NS
ST011-MW008	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	0.18 F	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW008	cis-1,2-DCE	N	µg/L	70	MCL	NS	105	NS	82	70	60	44.9	43.7	27.1	31.4	25.6	22.4	17.9	11.5	7.05	6.58	5.91	NS	2.78	2.36	2.53	2.9	2.1	0.20 U	1.5	0.54 F	2.7	2.5	1.6
ST011-MW008	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.2	< 0.2	0.15 F	< 0.03	< 0.03	< 0.03	< 0.03	0.11 F	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	< 0.04	< 1	<1	0.27 U	0.64 F	0.13 U	0.20 U	0.1 U	0.50 U	< 1 U	< 1 U
ST011-MW008	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW008	Vinyl chloride	N	µg/L	2	MCL	NS	26.5	NS	16	16	5.4	8.1	7.3	3.1	4.1	3.76	3.59	2.2	1.55	0.71 F	0.98 F	< 0.05	NS	0.27 F	0.566 J	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW008	1,1-DCE	FD	µg/L	7	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW008	cis-1,2-DCE	FD	µg/L	70	MCL	NS	103	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW008	TCE	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW008	Tetrachloroethene	FD	µg/L	5	MCL	NS	< 0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW008	Vinyl chloride	FD	µg/L	2	MCL	NS	25.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	cis-1,2-DCE	N	µg/L	70	MCL	NS	3.4	NS	8.1	3.7	4.8	3.1	6.3	2.9	3.3	3.38	5.44	1.91	3.43	3.58	3.81	5.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	0.4 F	0.6 F	0.78 F	0.22 F	0.49 F	0.55 F	0.63 F	0.6 F	0.82 F	0.51 F	0.95 F	0.49 F	0.63 F	0.78 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	1.2	0.62 F	0.64 F	0.6 F	1.2	0.33 F	0.35 F	0.36 F	0.81 F	< 0.024	0.27 F	0.43 F	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	< 0.38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	8.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	TCE	FD	µg/L	5	MCL	NS	NS	NS	0.4 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	< 0.53	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW009	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

Appendix C
Historical Site Specific Monitoring Results at ST 011
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site		QA/QC Type	Units	Screening Level	Screening Source	Nov-99	Jun-00	Aug-00	Oct-00	Jan-01	Apr-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Apr-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
ST011-MW010	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	cis-1,2-DCE	N	µg/L	70	MCL	NS	2.1	NS	3.4	2.7	1 F	1.9	2.3	2.1	1.6	1.77	2.57	1.59	1.9	1.36	1.65	1.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.2	0.3 F	0.17 F	0.17 F	0.35 F	0.43 F	0.34 F	0.37 F	0.72 F	0.39 F	0.63 F	0.29 F	0.38 F	0.6 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	Vinyl chloride	N	µg/L	2	MCL	NS	0.4 F	NS	< 0.31	0.39 F	< 0.04	0.26 F	0.31 F	< 0.04	0.18 F	0.19 F	< 0.065	< 0.024	< 0.028	0.13 F	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	2.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	0.62 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW010	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW011	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	NS	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW011	cis-1,2-DCE	N	µg/L	70	MCL	NS	0.8 F	NS	NS	0.56 F	0.37 F	0.51 F	0.48 F	0.4 F	0.34 F	0.46 F	0.57 F	0.44 F	0.42 F	0.45 F	0.56 F	0.52 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW011	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	NS	< 0.2	< 0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW011	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	NS	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW011	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	NS	0.56 F	< 0.04	0.41 F	< 0.04	0.2 F	< 0.06	0.2 F	0.26 F	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	1,1-DCE	N	µg/L	7	MCL	NS	< 0.1	NS	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	cis-1,2-DCE	N	µg/L	70	MCL	NS	1.3	NS	< 0.27	0.58 F	0.59 F	0.55 F	0.48 F	0.42 F	0.37 F	0.49 F	0.62 F	0.47 F	0.43 F	0.52 F	0.6 F	0.58 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	TCE	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.2	< 0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.1	NS	< 0.53	< 0.53	0.09 F	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.1	NS	0.66 F	0.54 F	0.4 F	0.34 F	0.27 F	< 0.04	< 0.06	0.2 F	0.21 F	< 0.024	< 0.028	< 0.024	0.22 F	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	0.52 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW012	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	0.53 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW013	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW013	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW013	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	< 0.2	< 0.2	< 0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW013	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW013	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW014	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW014	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.27	< 0.27	< 0.27	< 0.03	< 0.03	0.11 F	< 0.03	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	0.07 F	0.09 F	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW014	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	< 0.2	< 0.2	< 0.11	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW014	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW014	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.31	< 0.31	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
ST011-MW015	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	NS	NS	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW015	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	< 0.27	0.11	< 0.03	< 0.03	< 0.03	< 0.05	< 0.022	< 0.051	< 0.051	< 0.025	< 0.051	< 0.02	< 0.04	NS	< 0.05	< 1	<1	NS	0.20 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW015	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	< 0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	< 0.04	< 1	<1	NS	0.60 F	0.13 U	0.20 U	0.1 U	0.50 U	< 1 U	< 1 U
ST011-MW015	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1	NS	NS	0.50 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW015	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	< 0.31	< 0.04	< 0.04	< 0.04	< 0.04	< 0.06	< 0.062	< 0.065	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	< 0.05	< 1	<1	NS	0.40 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW016	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.38	< 0.38	< 0.38	< 0.02	< 0.02	< 0.02	< 0.02	< 0.05	< 0.036	< 0.05	< 0.059	< 0.046	< 0.059	< 0.05	< 0.06	NS	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW016	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	0.82 F	6.2	14	10.9	10.6	8.8	5.4	5.3	4.89	3.28	2.35	2.13	2.59	3.1	3.21	NS	4.3	2.25	2.54	3.7	3.1	2.3	1.1	0.55	0.50 U	< 1 U	< 1 U
ST011-MW016	TCE	N	µg/L	5	MCL	NS	NS	< 0.2	< 0.2	< 0.2	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.05	< 0.03	< 0.07	< 0.04	< 0.04	< 0.04	< 0.04	NS	0.05 F	< 1	<1	0.27 U	0.39 F	0.13 U	0.20 U	0.1 U	2.2	< 1 U	< 1 U
ST011-MW016	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.53	< 0.53	< 0.53	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.057	< 0.036	< 0.042	< 0.036	< 0.042	< 0.04	< 0.04	NS	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW016	Vinyl chloride	N	µg/L	2	MCL	NS	NS	1.8	6	13	6.5	9.2	7.3	3.5	3.8	3.04	2.16	1.24	1.85	1.45	1.97	1.74	NS	2.08	1.42	0.994	1	0.40 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW017	1,1-DCE	N	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.05	< 0.06	< 0.02	< 0.02	< 1	NS	0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW017	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1.1	1.33	1.21	2.11	0.99	1.09	1.48	0.99	0.81	0.20 U	0.21 U	0.2 U	0.50 U	< 1 U	< 1 U
ST011-MW017	TCE	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.3	0.66	0.91	1.6	1.47	< 1.8	<1	2.7	3	1.3	0.20 U	0.8	0.76	0.8	0.44 J
ST011-MW017	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.04	< 0.04	0.06 F	< 0.03	< 1	NS	0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1 U	< 1 U
ST011-MW017	Vinyl chloride	N	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.19	< 0.03	< 0.05	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1 U	< 1 U
ST011-MW017	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.05	< 0.06	< 0.02	< 0.02	< 1	NS	0.21 U	NS	NS	NS	NS	NS	NS	NS
ST011-MW017	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.63 F	NS	NS	NS	NS	NS	NS	NS
ST011-MW017	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.3 F	0.66 F	0.91 F	1.6	1.47	< 1.8	NS	2.3	NS	NS	NS	NS	NS	NS	NS
ST011-MW017	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.22	< 0.04	< 0.04	0.06 F	< 0.03	< 1	NS	0.5 U	NS	NS	NS	NS	NS	NS	NS
ST011-MW017	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	< 0.19	< 0.03	< 0.05	< 0.05	< 0.05	< 1	NS	0.4 U	NS	NS	NS	NS	NS	NS	NS

Notes
1,1-DCE - 1,1-dichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - trichloroethene
N - Field Sample
FD - Field Duplicate
J - analyte was detected but value is estimated
F - The analyte was positively identified
NS - Not Sampled
U - not detected and is displayed as less than the method detection limit
Bold results indicate a detection
Shaded results indicate a detection exceededing the screening value

Appendix C
Historical Site Specific Monitoring Results at SS 012
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site	Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Apr-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
SS-012	SS012-MW001	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	0.22 F	0.28 F	0.2 F	0.25 F	0.25 F	0.21 F	0.22 F	0.32 F	0.32 F	0.527 J	0.424 J	0.8 F	0.47 F	1.3 U	2.2 U	0.85 F	5.0 U	< 5.0 U	< 5.0 U
SS-012	SS012-MW001	cis-1,2-DCE	N	µg/L	70	MCL	NS	11.7	35.5	45.7	18.2	14.2	28	45.8	37.5	22.4	42.8	25.9	17.4	35	37	28	32 J	28	26	26	24
SS-012	SS012-MW001	TCE	N	µg/L	5	MCL	NS	277	189	190	244	381	268	199	191	216	410	1110	569	590	500	940	1300	1,400	3,200	1,900	2,000
SS-012	SS012-MW001	Tetrachloroethene	N	µg/L	5	MCL	NS	1.2 F	1.6	2.78	1.75	1.05 F	2.28	2.99	2.4	1.62	2.51	1.09	0.975 J	1.2	1.5	0.9 U	1.4 U	0.61 F	5.0 U	< 5.0 U	< 5.0 U
SS-012	SS012-MW001	Vinyl chloride	N	µg/L	2	MCL	NS	3.5	4.7	8.03	4.74	3.25	8.4	3.43	6.97	8.49	7.57	4.58	7.07	25	4.1	9	2.3 U	7.3	5.0 J	2.6	3.9 J
SS-012	SS012-MW001	1,1-DCE	FD	µg/L	7	MCL	NS	0.17 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.84 F	NS	< 5.0 U	< 5.0 U
SS-012	SS012-MW001	cis-1,2-DCE	FD	µg/L	70	MCL	NS	11.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	29	NS	24	25
SS-012	SS012-MW001	TCE	FD	µg/L	5	MCL	NS	264	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	1,300	NS	2000	1900
SS-012	SS012-MW001	Tetrachloroethene	FD	µg/L	5	MCL	NS	1.2 F	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.74 F	NS	< 5.0 U	< 5.0 U
SS-012	SS012-MW001	Vinyl chloride	FD	µg/L	2	MCL	NS	3.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	6.9	NS	3.0 J	4.2 J
SS-012	SS012-MW002	1,1-DCE	N	µg/L	7	MCL	NS	NS	0.12 F	0.17 F	NS	NS	0.14 F	< 0.059	< 0.05	< 0.02	< 0.06	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW002	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	32.7	47.2	NS	NS	20.5	24.5	12.6	6.88	8.68	26.3	7.21	22	12	6.5	42	7.2	260	NS	24
SS-012	SS012-MW002	TCE	N	µg/L	5	MCL	NS	NS	754	421	NS	NS	582	409	376	314	377	680	192	240	120	230	250	100	65	NS	460
SS-012	SS012-MW002	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	0.17 F	0.2 F	NS	NS	< 0.036	0.1 F	0.1 F	0.09 F	0.12 F	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW002	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.06	< 0.065	NS	NS	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	5.8	NS	< 1.0 U
SS-012	SS012-MW002	1,1-DCE	FD	µg/L	7	MCL	0.11 F	NS	NS	0.23 F	NS	NS	NS	NS	NS	NS	0.08 F	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW002	cis-1,2-DCE	FD	µg/L	70	MCL	33.9	NS	NS	50.9	NS	NS	NS	NS	NS	NS	7.92	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW002	TCE	FD	µg/L	5	MCL	766	NS	NS	391	NS	NS	NS	NS	NS	NS	352	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW002	Tetrachloroethene	FD	µg/L	5	MCL	0.21 F	NS	NS	0.21 F	NS	NS	NS	NS	NS	NS	0.18 F	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW002	Vinyl chloride	FD	µg/L	2	MCL	< 0.06	NS	NS	< 0.065	NS	NS	NS	NS	NS	NS	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW003	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	< 0.05	< 0.036	< 0.05	< 0.046	< 0.046	< 0.059	< 0.05	< 0.02	< 0.06	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW003	cis-1,2-DCE	N	µg/L	70	MCL	NS	0.56 F	0.79 F	0.83 F	0.39 F	0.36 F	0.43 F	0.33 F	0.37 F	0.36 F	0.53 F	0.757 J	0.433 J	0.63 F	0.84 F	0.20 U	0.21 U	0.72 F	1	1.1	< 1.0 U
SS-012	SS012-MW003	TCE	N	µg/L	5	MCL	NS	9.7	10.1	9.87	7.16	7.49	6.31	7.47	6.8	6.66	7.47	7.98	5.88	6.8	5.3	7.4	6	8.4	4.7	2.1	3.9
SS-012	SS012-MW003	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	< 0.04	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW003	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW003	1,1-DCE	FD	µg/L	7	MCL	NS	NS	38.1 J	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW003	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	185	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW003	TCE	FD	µg/L	5	MCL	NS	NS	16.6 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW003	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	13.9 J	NS	NS	NS	NS	NS	NS	NS	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW003	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	13.9 J	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW004	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	< 0.05	< 0.036	< 0.05	< 0.046	< 0.046	< 0.059	< 0.05	< 0.02	< 0.06	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW004	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.02	< 0.05	< 0.022	< 0.051	< 0.025	< 0.025	< 0.051	< 0.02	< 0.05	< 0.04	< 1		0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW004	TCE	N	µg/L	5	MCL	NS	< 0.05	0.27 F	0.28 F	< 0.03	< 0.03	0.14 F	0.14 F	0.16 F	< 0.04	< 0.04	< 1	<1	0.44 F	0.42 F	0.13 U	0.20 U	0.39 F	0.50 U	< 1.0 U	0.31 J
SS-012	SS012-MW004	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.04	< 0.057	< 0.036	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	< 0.04	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW004	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.062	< 0.065	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW004	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
SS-012	SS012-MW004	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
SS-012	SS012-MW004	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
SS-012	SS012-MW004	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
SS-012	SS012-MW004	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.50 U	NS	NS
SS-012	SS012-MW005	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.04	< 0.05	< 0.036	NS	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW005	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.02	< 0.051	< 0.022	NS	< 0.025	< 0.051	< 0.02	< 0.05	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW005	TCE	N	µg/L	5	MCL	NS	NS	0.67 F	1.38	< 0.05	NS	0.14 F	0.11 F	0.1 F	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW005	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.06	< 0.036	< 0.057	NS	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW005	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.06	< 0.065	< 0.062	NS	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW006	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.05	< 0.05	NS	NS	NS	NS	< 0.05	< 0.02	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW006	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.05	< 0.051	NS	NS	NS	NS	< 0.02	< 0.05	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW006	TCE	N	µg/L	5	MCL	NS	NS	< 0.03	0.52 F	NS	NS	NS	NS	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW006	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.04	< 0.036	NS	NS	NS	NS	< 0.04	< 0.03	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW006	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.06	< 0.065	NS	NS	NS	NS	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW007	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	< 0.05	< 0.05	< 0.05	< 0.046	< 0.046	< 0.059	< 0.05	< 0.02	< 0.02	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW007	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.02	< 0.05	< 0.051	< 0.051	< 0.025	< 0.025	< 0.051	< 0.02	< 0.05	< 0.05	< 1		0.2 U	0.2 U	0.20 U	0.21 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW007	TCE	N	µg/L	5	MCL	NS	0.59 F	0.54 F	0.69 F	0.29 F	0.26 F	0.95 F	0.28 F	0.44 F	3.28	0.48 F	< 1	<1	0.38 F	0.28 F	0.13 U	0.20 U	1	11	< 1.0 U	< 1.0 U
SS-012	SS012-MW007	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.04	< 0.036	< 0.036	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	< 0.03	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW007	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.065	< 0.065	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW008	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	< 0.04	< 0.05	< 0.036	< 0.046	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	cis-1,2-DCE	N	µg/L	70	MCL	NS	3.9	5.5	1.95	2.16	2.64	2.28	3.61	3.31	1.65	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	TCE	N	µg/L	5	MCL	NS	242	289	108	160	168	157	215	213	122	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.06	< 0.036	< 0.057	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.065	< 0.062	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	1,1-DCE	FD	µg/L	7	MCL	NS	NS	NS	NS	< 0.036	< 0.059	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS

Appendix C
Historical Site Specific Monitoring Results at SS 012
Five-Year Review
Former Richards-Gebaur AFB, Kansas City, Missouri

Site	Location	Analyte	QA/QC Type	Units	Screening Level	Screening Source	Apr-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Apr-03	Jul-03	Oct-03	Jan-04	Aug-04	Mar-05	Aug-05	Apr-06	Oct-06	Apr-07	Oct-08	Oct-09	Oct-10	Oct-11	Apr-12
SS-012	SS012-MW008	cis-1,2-DCE	FD	µg/L	70	MCL	NS	NS	NS	NS	2.16	2.34	2.26	3.51	3.14	1.62	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	TCE	FD	µg/L	5	MCL	NS	NS	NS	NS	162	179	180	212	197	130	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	Tetrachloroethene	FD	µg/L	5	MCL	NS	NS	NS	NS	< 0.057	< 0.042	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW008	Vinyl chloride	FD	µg/L	2	MCL	NS	NS	NS	NS	< 0.062	< 0.024	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW009	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.05	< 0.036	NS	NS	< 0.046	< 0.059	NS	< 0.02	< 0.02	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW009	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	1 F	0.1 F	NS	NS	0.39 F	0.31 F	NS	0.1 F	0.06 F	< 1		0.43 F	0.2 U	0.20 U	0.21 U	0.38 F	0.50 U	NS	< 1.0 U
SS-012	SS012-MW009	TCE	N	µg/L	5	MCL	NS	NS	46.3	9.25	NS	NS	18.4	19.7	NS	12.9	6.21	< 1.44	<1	30	11	4.5	6.1	22	8.4	NS	6.4
SS-012	SS012-MW009	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.04	< 0.057	NS	NS	< 0.036	< 0.042	NS	< 0.03	< 0.03	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW009	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.06	< 0.062	NS	NS	< 0.028	< 0.024	NS	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW010	1,1-DCE	N	µg/L	7	MCL	NS	< 0.04	< 0.05	< 0.036	NS	NS	< 0.046	< 0.059	< 0.05	< 0.02	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW010	cis-1,2-DCE	N	µg/L	70	MCL	NS	< 0.02	< 0.05	< 0.022	NS	NS	< 0.025	< 0.051	< 0.02	< 0.05	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW010	TCE	N	µg/L	5	MCL	NS	< 0.05	< 0.03	< 0.05	NS	NS	< 0.04	< 0.04	< 0.04	< 0.04	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW010	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.04	< 0.057	NS	NS	< 0.036	< 0.042	< 0.04	< 0.03	NS	NS		NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW010	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.062	NS	NS	< 0.028	< 0.024	< 0.03	< 0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW011	1,1-DCE	N	µg/L	7	MCL	NS	NS	< 0.05	< 0.05	NS	NS	NS	NS	NS	< 0.02	< 0.02	< 1		0.21 U	Dry	0.25 U	0.22 U	0.2 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW011	cis-1,2-DCE	N	µg/L	70	MCL	NS	NS	< 0.05	< 0.051	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1		0.2 U	Dry	0.20 U	0.21 U	0.2 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW011	TCE	N	µg/L	5	MCL	NS	NS	< 0.03	0.33 F	NS	NS	NS	NS	NS	0.09 F	0.38 F	< 1	<1	0.27 U	Dry	0.13 U	1.1	5.8	0.87 J	NS	< 1.0 U
SS-012	SS012-MW011	Tetrachloroethene	N	µg/L	5	MCL	NS	NS	< 0.04	< 0.036	NS	NS	NS	NS	NS	< 0.03	< 0.03	< 1		0.5 U	Dry	0.18 U	0.14 U	0.3 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW011	Vinyl chloride	N	µg/L	2	MCL	NS	NS	< 0.06	< 0.065	NS	NS	NS	NS	NS	< 0.05	< 0.05	< 1	<1	0.4 U	Dry	0.16 U	0.23 U	0.4 U	0.50 U	NS	< 1.0 U
SS-012	SS012-MW012	1,1-DCE	N	µg/L	7	MCL	NS	0.26 F	0.23 F	0.21 F	0.19 F	0.17 F	0.22 F	0.18 F	0.18 F	0.21 F	0.18 F	< 1		0.21 U	0.21 U	0.25 U	0.22 U	0.2 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW012	cis-1,2-DCE	N	µg/L	70	MCL	NS	12.5	14.4	14.1	11.5	10.6	11.9	12.2	9.65	11.7	11	10.3	9.85	14	11	8.5	23	14	9.2	9.9	16
SS-012	SS012-MW012	TCE	N	µg/L	5	MCL	NS	127	124	104	143	124	114	138	158	123	117	115	81.2	120	100	67	78	75	44	52	37
SS-012	SS012-MW012	Tetrachloroethene	N	µg/L	5	MCL	NS	< 0.06	< 0.06	< 0.036	< 0.057	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	< 0.03	< 1		0.5 U	0.5 U	0.18 U	0.14 U	0.3 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW012	Vinyl chloride	N	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.065	< 0.062	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1	<1	0.4 U	0.4 U	0.16 U	0.23 U	0.4 U	0.50 U	< 1.0 U	< 1.0 U
SS-012	SS012-MW012	1,1-DCE	FD	µg/L	7	MCL	NS	0.26 F	0.23 F	0.21 F	0.19 F	0.17 F	0.22 F	0.18 F	0.18 F	0.21 F	0.18 F	< 1		0.21 U	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW012	cis-1,2-DCE	FD	µg/L	70	MCL														14	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW012	TCE	FD	µg/L	5	MCL	NS	127	124	104	143	124	114	138	158	123	117	115		120	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW012	Tetrachloroethene	FD	µg/L	5	MCL	NS	< 0.06	< 0.06	< 0.036	< 0.057	< 0.036	< 0.036	< 0.042	< 0.04	< 0.03	< 0.03	< 1		0.5 U	NS	NS	NS	NS	NS	NS	NS
SS-012	SS012-MW012	Vinyl chloride	FD	µg/L	2	MCL	NS	< 0.06	< 0.06	< 0.065	< 0.062	< 0.028	< 0.028	< 0.024	< 0.03	< 0.05	< 0.05	< 1		0.4 U	NS	NS	NS	NS	NS	NS	NS

Notes
1,1-DCE - 1,1-dichloroethene
cis-1,2-DCE - cis-1,2-dichloroethene
TCE - trichloroethene
N - Field Sample
J - analyte was detected but value is estimated
NS - Not Sampled
U - not detected and is displayed as less than the method detection limit
Bold results indicate a detection
Shaded results indicate a detection exceededing the screening value

Former Richards-Gebaur Air Force Base
Site ST 005 (POL Yard)
2011

LUC/IC Monitoring Field Checklist

Section 1 – Site Inspection

Coordinate site access with the following points of contact:

The Port Authority of Kansas City, Missouri
Ms. Zoraya Lara
300 Wyandotte, Suite 100
Kansas City, Missouri 64105
816-559-3722

1) Use a Global Positioning System (GPS) unit to locate the area encompassed by the LUC boundaries.

2) Note any change in land use.

a) Any building demolition? Yes No **X**

i) If yes, identify building number and attach a photo of area.

ii) Any residential building construction? Yes No X

iii) If yes, identify type (single family or multi-family), describe the type of construction (slab on grade or basement) and attach a photo of the building.

_____

_____

iv) Other changes in land use? Yes No **X**

v) If yes, describe (recreational, etc.) and attach a photo of the area.

Note: _____

3) Note any land disturbances.

a) Any indication of excavation activity? Yes No **X**

i) If yes, measure the dimensions, locate the approximate corners using GPS, depict the approximate location(s) on the appropriate attached site map and attach a photo for each instance.

_____

b) Any indication of drilling activity? Yes No **X**

i) If yes, identify type of activity (soil boring or well), locate the position(s) using GPS, depict the approximate location(s) on the appropriate attached site map, and attach a photo for each instance.

_____

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

_____

iii) If wells are identified, a request for information regarding the well will be submitted to the Missouri Department of Natural Resources Geological Survey and Resource Assessment Division (573-368-2165).

4) Other:

It was determined during the LUC/IC inspection that no violations of the deed restrictions within the LUC boundary of ST 005 were noted.

Spoke with Ms. Zoraya Lara concerning the status of any land transfers planned for this property.

Inspector Name**: Timothy Smith**

Title: Field Technician

Date: 12/1/2011

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
1	12/01/11

Direction Photo Taken:

Northwest

Description:

Looking across the site towards the northwest LUC boundary.

Photos taken by:
Tim Smith
Time: 1510

Photo No.	Date:
2	12/01/11

Direction Photo Taken:

North

Description:

Looking across the site towards the north LUC boundary. Note the stockpiled material in the background and beyond the LUC boundary.

Photos taken by:
Tim Smith
Time: 1511

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
3	12/01/11

Direction Photo Taken:

Northeast

Description:

Standing at the southern section of the site looking towards the northeast LUC boundary.

Photos taken by:
Tim Smith
Time: 1512

Photo No.	Date:
4	12/01/11

Direction Photo Taken:

Northeast

Description:

Standing on the gravel access road looking towards Andrews Road. Both roads intersect the site. Andrews Road is active and open to the public. The gravel road is accessed off of Andrews Road and dead ends north of the site.

Photos taken by:
Tim Smith
Time: 1513

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
5	12/01/11

Direction Photo Taken:

North

Description:

View of several monitoring wells and the gravel access road extending north across the site.

Photos taken by:
Tim Smith
Time: 1515

Photo No.	Date:
6	12/01/11

Direction Photo Taken:

Northeast

Description:

View of the site west of the gravel access road and several of the monitoring wells. Most of the site consists of native grass, shrubs and trees.

Photos taken by:
Tim Smith
Time:

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
7	12/01/11

Direction Photo Taken:

Southwest

Description:

Standing near the center of the site looking towards the southwestern LUC boundary in the distance. Monitoring wells MW-13 and MW-14 are at the right of the photo.

Photos taken by:
Tim Smith
Time: 1517

Photo No.	Date:
8	12/01/11

Direction Photo Taken:

North

Description:

Looking towards the northern LUC boundary of the site. The stockpiled material in the distance is located outside of the LUC boundary. Monitoring well MW-021 is in the foreground.

Photos taken by:
Tim Smith
Time:1518

URS

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
9	12/01/11

Direction Photo Taken:

Southeast

Description:

Standing at the northeast LUC boundary looking towards the southeast LUC boundary with a view of the open field east of Andrews Road.

Photos taken by:
Tim Smith
Time:1525

Photo No.	Date:
10	12/01/11

Direction Photo Taken:

Southeast

Description:

View of the open field east of Andrews Road and monitoring well MW- 025 in the tall grass.

Photos taken by:
Tim Smith
Time: 1528

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location**: ST 005	16530813

Photo No.	Date:
11	12/01/11

Direction Photo Taken:

Southeast

Description:

Looking towards the southeastern LUC boundary near the tree line and a view of monitoring well MW- 026.

Photos taken by:
Tim Smith
Time: 1531

Photo No.	Date:
12	12/01/11

Direction Photo Taken:

East

Description:

A view of monitoring well MW- 011. A culvert with rip rap is behind the monitoring well and extends across the access road.

Photos taken by:
Tim Smith
Time:1535

Former Richards-Gebaur Air Force Base
Site SS 006
2011

LUC/IC Monitoring Field Checklist

Section 1 – Site Inspection

Coordinate site access with the following points of contact:

The Port Authority of Kansas City, Missouri
Ms. Zoraya Lara
300 Wyandotte, Ste. 100
Kansas City, Missouri 64105
816-559-3722

1) Use a Global Positioning System (GPS) unit to locate the area encompassed by the LUC boundaries.

2) Note any change in land use.

a) Any building demolition? Yes No **X**

i) If yes, identify building number and attach a photo of area.

_____

b) Any residential building construction? Yes No **X**

i) If yes, identify type (single family or multi-family), describe the type of construction (slab on grade or basement) and attach a photo of the building.

_____

_____

c) Other changes in land use? Yes No **X**

i) If yes, describe (recreational, etc.) and attach a photo of the area.

3) Note any land disturbances.

a) Any indication of excavation activity? Yes No **X**

i) If yes, measure the dimensions, locate the approximate corners using GPS, depict the approximate location(s) on the appropriate attached site map and attach a photo for each instance.

b) Any indication of drilling activity? Yes No **X**

i) If yes, identify type of activity (soil boring or well), locate the position(s) using GPS, depict the approximate location(s) on the appropriate attached site map, and attach a photo for each instance.

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

_____

iii) If wells are identified, a request for information regarding the well will be submitted to the Missouri Department of Natural Resources Geological Survey and Resource Assessment Division (573-368-2165).

4) Other

Construction trailers are being set up on the south side of the site off of 155th Street. According to the 88th RSC and The Port Authority of Kansas City, Missouri, construction of a new Reserve Center and Operations Maintenance Service building will begin in 2012.

Inspector Name: Timothy Smith

Title: Field Technician

Date: 12/1/201

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
1	12/01/11

Direction Photo Taken:

Northwest

Description:

Looking at the northwest section of the site. The buildings in the background are outside of the LUC boundary. A drainage ditch leads from west to east and from left to right in the photo.

Photos taken by:
Tim Smith
Time: 1326

Photo No.	Date:
2	12/01/11

Direction Photo Taken:

North

Description:

A view of the same drainage ditch with monitoring well MW-025 in front of it. The ditch is the approximate location of the site's north LUC boundary.

Photos taken by:
Tim Smith
Time: 1327

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
3	12/01/11

Direction Photo Taken:

Southeast

Description:

Standing near the northwest corner of the site looking across the eastern half of the site.

Photos taken by:
Tim Smith
Time: 1328

Photo No.	Date:
4	12/01/11

Direction Photo Taken:

South-Southeast

Description:

View of the southeast corner of the site. The building and cars are on the south side of 155th Street and outside of the LUC boundary. Monitoring well MW-016 is in the foreground.

Photos taken by:
Tim Smith
Time: 1331

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
5	12/01/11

Direction Photo Taken:

Southwest

Description:

Near view of one of the Kingston Environmental buildings located near the head of the upgradiennt plume.

Photos taken by:
Tim Smith
Time: 1334

Photo No.	Date:
6	12/01/11

Direction Photo Taken:

South

Description:

View of the southwestern quadrant of the site with monitoring well MW-017 in the foreground.

Photos taken by:
Tim Smith
Time: 1335

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
7	12/01/11

Direction Photo Taken:

East

Description:

Looking towards the east corner of the site off in the distance.

Photos taken by:
Tim Smith
Time: 1337

Photo No.	Date:
8	12/01/11

Direction Photo Taken:

South

Description:

Standing at the center of the site and looking at temporary trailers being set up by a contractor. The trailers are located just inside of the south LUC boundary along 155th Street.

Photos taken by:
Tim Smith
Time: 1338

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
9	12/01/11

Direction Photo Taken:

South

Description:

Standing behind building 927 looking south at its parking and asphalt drive. Monitoring well MW-001 is in the tall grass next to the asphalt.

Photos taken by:
Tim Smith
Time: 1340

Photo No.	Date:
10	12/01/11

Direction Photo Taken:

Northeast

Description:

View of the building 931 access drive and looking towards the site's northeast LUC boundary in the distance beyond the buildings. The downgradient plume is to the left of the photo.

Photos taken by:
Tim Smith
Time: 1415

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
11	12/01/11

Direction Photo Taken:

Northwest

Description:

A view of the south entrance to building 931 and its fenced compound. The gate is secured with a cable lock.

Photos taken by:
Tim Smith
Time: 1415

Photo No.	Date:
12	12/01/11

Direction Photo Taken:

West

Description:

Standing behind monitoring well MW-021 and looking towards the west LUC boundary.

Photos taken by:
Tim Smith
Time: 1417

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
13	12/01/11

Direction Photo Taken:

South

Description:

Looking across the site's open grassy area adjacent to 155th Street. Temporary trailers are being set up by the contractor for future construction of the U.S. Army Reserve Center.

Photos taken by:
Tim Smith
Time: 1419

Photo No.	Date:
14	12/01/11

Direction Photo Taken:

Northwest

Description:

Standing inside the building 931 compound with a view of the building and staged 55 gallon IDW drums from the October 2011 LTM groundwater sampling event.

Photos taken by:
Tim Smith
Time: 1425

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	Site Location: SS 006	16530813

Photo No.	Date:
15	12/01/11

Direction Photo Taken:

East

Description:

A view of monitoring well MW-028 looking towards the east corner of the building 931 compound. A tree at the bottom left of the photo was blown over by wind and fell next to the well. The tree was cut and moved from the well prior to the October 2011 LTM sampling event.

Photos taken by:
Tim Smith
Time: 1426

Photo No.	Date:
16	12/01/11

Direction Photo Taken:

Northeast

Description:

A view of the interior of building 931.

Photos taken by:
Tim Smith
Time: 1429

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
17	12/01/11

Direction Photo Taken:

Northwest

Description:

Looking along the northeast fence of building 931 compound and monitoring wells MW-027 and MW-028. Note the greener grass at the bottom of the photo where a shallow drainage ditch is. The ditch was holding water.

Photos taken by:
Tim Smith
Time: 1430

Photo No.	Date:
18	12/01/11

Direction Photo Taken:

Northeast

Description:

A view of the building 931 north entrance drive and culvert. Monitoring well MW-023 is in the background.

Photos taken by:
Tim Smith
Time: 1431

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site Location:** SS 006	16530813

Photo No.	Date:
19	12/01/11

Direction Photo Taken:

Southwest

Description:

A view of the building 931 north gate. The gate is secured with a chain and lock. Monitoring well MW-027 is in the bottom left corner of the photo.

Photos taken by:
Tim Smith
Time: 1431

Photo No.	Date:
20	12/01/11

Direction Photo Taken:

Southeast

Description:

A view of the vacant paved area southeast of building 931. Monitoring well MW-024 is at the left of the photo.

Photos taken by:
Tim Smith
Time: 1435

Former Richards-Gebaur Air Force Base
Site ST 011 (UST 620A)
2011

LUC/IC Monitoring Field Checklist

Section 1 – Site Inspection

Coordinate site access with the following points of contact:

The Port Authority of Kansas City, Missouri
Ms. Zoraya Lara
300 Wyandotte, Ste. 100
Kansas City, Missouri 64105
816-559-3722

1) Use a Global Positioning System (GPS) unit to locate the area encompassed by the LUC boundaries.

2) Note any change in land use.

a) Any building demolition? Yes No **X**

i) If yes, identify building number and attach a photo of area.

_____

ii) Any residential building construction? Yes No **X**

iii) If yes, identify type (single family or multi-family), describe the type of construction (slab on grade or basement) and attach a photo of the building.

_____

_____

b) Other changes in land use? Yes No **X**

i) If yes, describe (recreational, etc.) and attach a photo of the area.

_____

_____

3) Note any land disturbances.

a) Any indication of excavation activity? Yes No **X**

i) If yes, measure the dimensions, locate the approximate corners using GPS, depict the approximate location(s) on the appropriate attached site map and attach a photo for each instance.

_____

_____

b) Any indication of drilling activity? Yes No **X**

i) If yes, identify type of activity (soil boring or well), locate the position(s) using GPS, depict the approximate location(s) on the appropriate attached site map, and attach a photo for each instance.

_____
_____
_____

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

_____
_____
_____

iii) If wells are identified, a request for information regarding the well will be submitted to the Missouri Department of Natural Resources Geological Survey and Resource Assessment Division (573-368-2165).

4) Other:

It was determined that no violations of the deed restrictions at ST 011 within the LUC boundary were noted.

No interview(s) was conducted.

Inspector Name**:** Timothy Smith

Title: Field Technician

Date: 12/1/2011

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 011	16530813

Photo No.	Date:
1	12/01/11

Direction Photo Taken:

Southwest

Description:

Looking at the southwest corner of the LUC boundary and building 619 just outside of its limits.

Photos taken by
Tim Smith
Time: 1445

Photo No.	Date:
2	12/01/11

Direction Photo Taken:

North

Description:

Looking towards the west corner of the LUC boundary used as paved parking and drives.

Photos taken by
Tim Smith
Time: 1446

URS

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 011	16530813

Photo No.	Date:
3	12/01/11

Direction Photo Taken:

Northwest

Description:

Looking at the west quadrant of the site used as paved parking for building 610 and 617.

Photos taken by
Tim Smith
Time: 1446

Photo No.	Date:
4	12/01/11

Direction Photo Taken:

Northeast

Description:

Standing at the south corner of the LUC boundary and looking along the site's southeast LUC boundary. Building 620 on the left side of the photo is vacant. Flush mounted monitoring wells MW-015 and MW-016 are located in the grassy area next to the road.

Photos taken by
Tim Smith
Time: 1447

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 011	16530813

Photo No.	Date:
5	12/01/11

Direction Photo Taken:

Northwest

Description:

View of the northeast end of building 620 and grassy area of the east corner of the LUC boundaries.

Photos taken by
Tim Smith
Time: 1449

Photo No.	Date:
6	12/01/11

Direction Photo Taken:

West

Description:

Standing at the northeast end of building 620 and looking west into the fenced area and gravel lot. Building 617 is in the background. Flush mounted monitoring wells MW-002 and MW-006 are located just inside the fenced area.

Photos taken by
Tim Smith
Time: 1450

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 011	16530813

Photo No.	Date:
7	12/01/11

Direction Photo Taken:

Northwest

Description:

Looking along the fenced northeast LUC boundary of the site.

Photos taken by
Tim Smith
Time: 1452

Photo No.	Date:
8	12/01/11

Direction Photo Taken:

South

Description:

Looking at the sites gravel surfaced central area between buildings 617 and 620.

Photos taken by
Tim Smith
Time: 1455

Former Richards-Gebaur Air Force Base
Site SS 012 (Communications Facility)
2011

LUC/IC Monitoring Field Checklist

Section 1 – Site Inspection

Coordinate site access with the following points of contact:

The Port Authority of Kansas City, Missouri
Ms. Zoraya Lara
300 Wyandotte, Suite 100
Kansas City, Missouri 64105
816-559-3722

1) Use a Global Positioning System (GPS) unit to locate the area encompassed by the LUC boundaries.

2) Note any change in land use.

a) Any building demolition? Yes No **X**

i) If yes, identify building number and attach a photo of area.

_____
_____

b) Any residential building construction? Yes No **X**

i) If yes, identify type (single family or multi-family), describe the type of construction (slab on grade or basement) and attach a photo of the building.

_____
_____

c) Other changes in land use? Yes No **X**

i) If yes, describe (recreational, etc.) and attach a photo of the area.

3) Note any land disturbances.

a) Any indication of excavation activity? Yes No **X**

i) If yes, measure the dimensions, locate the approximate corners using GPS, depict the approximate location(s) on the appropriate attached site map and attach a photo for each instance.

_____
_____
_____

b) Any indication of drilling activity? Yes No **X**

i) If yes, identify type of activity (soil boring or well), locate the position(s) using GPS, depict the approximate location(s) on the appropriate attached site map, and attach a photo for each instance.

_____
_____
_____

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

_____
_____
_____

iii) If wells are identified, a request for information regarding the well will be submitted to the Missouri Department of Natural Resources Geological Survey and Resource Assessment Division (573-368-2165).

4) Other:

It was determined that no violations of the deed restrictions at SS 012 within the LUC boundary were noted.

No interview was conducted.

Inspector Name**: Timothy Smith**

Title: Field Technician

Date: 12/1/2011

Section 2 – Interview with Current Property Owner

If the answer to any of the questions in Section 1 is yes, then Section 2 must be completed. An interview with the Current Property Owner(s) of Site SS 012 will be scheduled and answers to the appropriate following questions obtained.

Name of Interviewed Owner:
Mailing Address:
Telephone Number:
Email Address:

Interview Date: _____ Interview Time: _____

1) If residential building construction occurred:
   a) Provide estimated date(s) of construction.

      _____

   b) Provide point of contact information for the owner of the constructed residential building, if not owned by the City of Kansas City, Missouri (name and telephone number)

      _____
      _____

2) If other changes in land use occurred that may affect the deed restriction, please describe type, identify when change occurred, and provide lessee contact information (if appropriate).

   _____
   _____

3) If excavation activities occurred:
   a) Confirm the location of the excavation identified during the site inspection. Identify the purpose of the excavation (why it occurred) and when excavation activities took place. _____

      _____
      _____

   b) If any excavated soil was relocated on-site, provide a detailed description of where (including GPS coordinates) and map the location. If not relocated on-site, identify final disposition of the excavated soil (name, location and type of landfill).

      _____
      _____
      _____
      _____

4) If drilling activities occurred:

   a) Identify if any drill cuttings were relocated on-site, provide a detailed description of where (including GPS coordinates) and map the location(s). If not relocated on-site, identify final disposition of the any drill cuttings,

      _____
      _____
      _____

   b) Describe the current status/use of all installed well(s).

      _____
      _____
      _____
      _____

Interviewer Name_____

Title_____

Date_____

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
1	12/01/11

Direction Photo Taken:

East

Description:

Looking at the site entrance from the outside. The gate is secured with a cable lock. Building 105 and its compound is secured with a 7 foot chain link fence. Some leaves have accumulated at the entrance.

Photos taken by
Tim Smith
Time: 1155

Photo No.	Date:
2	12/01/11

Direction Photo Taken:

South

Description:

Looking along the west LUC boundary towards the access drive from 155th Street. The concrete barriers at the intersection were moved to block traffic after the photo was taken.

Photos taken by
Tim Smith
Time: 1157

URS

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
3	12/01/11

Direction Photo Taken:

West

Description:

Standing at the northeast corner of the site looking along the north LUC boundary towards the gated entrance.

Photos taken by
Tim Smith
Time: 1208

Photo No.	Date:
4	12/01/11

Direction Photo Taken:

East

Description:

View of the northeast corner of the site and the open grass field beyond the fence.

Photos taken by
Tim Smith
Time: 1209

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
5	12/01/11

Direction Photo Taken:

West

Description:

View of a concrete vault located within the building compound.

Photos taken by
Tim Smith
Time: 1214

Photo No.	Date:
6	12/01/11

Direction Photo Taken:

East

Description:

View of monitoring well MW-002 located along the east LUC boundary.

Photos taken by
Tim Smith
Time: 1215

URS

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
7	12/01/11

Direction Photo Taken:

South

Description:

Looking towards the southeast corner of the site. The area consists of grass, shrubs and trees. Some wood debris was dumped here.

Photos taken by
Tim Smith
Time: 1220

Photo No.	Date:
8	12/01/11

Direction Photo Taken:

South

Description:

View of the former Communications Facility Building 105 looking at an open door near the east end of the building.

Photos taken by
Tim Smith
Time: 1222

URS

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
9	12/01/11

Direction Photo Taken:

Southwest

Description:

View of the former Communications Facility Building 105 looking at its northern side.

Photos taken by
Tim Smith
Time: 1225

Photo No.	Date:
10	12/01/11

Direction Photo Taken:

East

Description:

View of the former Communications Facility (Building P105) looking at its main entrance on the eastern side.

Photos taken by
Tim Smith
Time: 1226

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
11	12/01/11

Direction Photo Taken:

North

Description:

Standing north of the site and looking north at the open field with monitoring well MW-009 in the shade of the tree at the right of the photo.

Photos taken by
Tim Smith
Time: 1235

Photo No.	Date:
12	12/01/11

Direction Photo Taken:

East

Description:

Standing in the open field north and east of the site looking at monitoring well MW-012 and the pond in the background.

Photos taken by
Tim Smith
Time: 1237

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
13	12/01/11

Direction Photo Taken:

North

Description:

Standing in the open field north and east of the site looking at monitoring well MW-011. The field appears to be cultivated for grass feed and there is a bail resting next to the well.

Photos taken by
Tim Smith
Time: 1240

Photo No.	Date:
14	12/01/11

Direction Photo Taken:

East

Description:

Close up of monitoring well MW-012 and the pond in the background. The pond borders the east side of the plume.

Photos taken by
Tim Smith
Time: 1242

PHOTOGRAPHIC LOG

Client Name:	2011 LUC – IC Inspection	Project No.
Former Richards-Gebaur AFB, Missouri	**Site:** ST 012	16530813

Photo No.	Date:
15	12/01/11

Direction Photo Taken:

West

Description:

Standing in the open field east of the site looking at monitoring well MW-002 just inside the fence of the east LUC boundary.

Photos taken by
Tim Smith
Time: 1243

Photo No.	Date:
16	12/01/11

Direction Photo Taken:

South

Description:

Standing east of the site and looking towards 155th Street.

Photos taken by
Tim Smith
Time: 1246

NOTICE

BREACH OF ANY ENVIRONMENTAL USE RESTRICTIVE COVENANT IN SECTION VII.B. BELOW, MAY AFFECT THE FOREGOING WARRANTY

B. Environmental Use Restrictive Covenants

1. For purposes of the environmental use restrictive covenants in this section, the term "Affected Property" include Property specifically described in Exhibit D to this Deed to which one or more of these environmental restrictive covenants may apply.

2. The following environmental use restrictive covenant(s) in this section is (are) being created to protect human health and the environment against (a) residual contaminant(s) as a component of the remedial action taken in Section A.2. above:

(a) For Operable Unit (OU) No. 1 Sites which include portions of FT002 (Fire Training Area), ST005 (Petroleum, Oil, Lubricant, or "POL" Yard), Area of Concern (AOC) 006, and Facility 1025 as depicted on **Exhibit D**, the Grantee is prohibited from using these areas for residential use. The Grantee is prohibited from subsurface drilling and excavation of residually contaminated soils on the portions of Affected Property described in this section B.2(a) unless it can be demonstrated to the satisfaction of the Federal and State regulatory agencies and the Grantor that there will be no adverse environmental impact on the Property or to the public.

(b) For OU-2 Sites which include portions of SS006, SS009, SS012, ST005, and ST011 as depicted on **Exhibit D**, the Grantee is prohibited from subsurface drilling, extraction and use of groundwater on the portions of Affected Property described in this section B.2(b) unless it can be demonstrated to the satisfaction of Federal and State regulatory agencies and the Grantor that there will be no adverse environmental impact on the Property or to the public.

(c) The Grantee covenants not to disturb, move, damage, mar, tamper with, interfere with, obstruct, or impede any monitoring wells, treatment facilities, piping, and other facilities associated with environmental cleanup activities being conducted by the Government on the Property.

(d) The Grantee covenants not to disturb, interfere with, obstruct or impede any environmental investigation or remedial activity associated with environmental cleanup activities being conducted by the Government or to jeopardize the protectiveness of the environmental remedies put in place or to conduct or permit any activity that could negatively impact or restrict access for cleanup work on the Property.

3. It is the intent of the Grantor and the Grantee that the Environmental Use Restrictive Covenant(s) in this section bind the Grantee and shall run with the land. It is also the intent of the Grantor and the Grantee that the Grantor will retain the right to enforce any

restrictive covenant in this section through the chain of title, in addition to any State law that requires the State to enforce any restrictive covenant in this section. The Grantee covenants to insert all of this section in any deed to the Property that it delivers.

C. Modification or Release of Environmental Use Restrictive Covenant(s).

The Grantee may request from the United States a modification or release of one or more of the environmental use restrictive covenant(s) in whole or in part in this section, subject to the notification and concurrence or approval of the Missouri Department of Natural Resources ("MDNR"). In the event the request of the Grantee for modification or release is approved by the United States and MDNR, the United States agrees to modify or release the covenant(s), (the "Covenant Release") giving rise to such environmental use restriction in whole or in part. The Grantee understands and agrees that all costs associated with the Covenant Release shall be the sole responsibility of the Grantee, without any cost whatsoever to the United States. The United States shall deliver to the Grantee in recordable form the Covenant Release. The execution of the Covenant Release by the United States shall modify or release the environmental use restrictive covenant with respect to the Property in the Covenant Release.

Attachment F
Evaluation of Vapor Intrusion from Groundwater to Indoor Air

Introduction

Vapor intrusion (VI) is the pathway by which vapors from groundwater and/or soil contaminated with volatile organics can migrate into nearby buildings or other spaces and affect indoor air quality. VI is most often associated with volatile organic compounds (VOCs), but also can involve other species (e.g., mercury, ammonia, semi-volatiles). VI previously was evaluated at the Richards-Gebaur Air Force Base (AFB) as part of the Feasibility Study for OU-2 in 2002 and was considered during the First Five-Year review completed in 2007 (Booz Allen, 2007). VI was re-evaluated as part of the current Five-Year Review for Sites:

- ST 005 – Petroleum, Oil, and Lubricants (POL) Yard
- SS 006 – Hazardous Materials Storage Area
- ST 011 – Underground Storage Tank (UST) 620A
- SS 012 – Communications Facility

Dissolved-phase chlorinated volatile organic compounds (VOCs) have been detected in shallow groundwater at each of the four sites. The groundwater could serve as a source of vapors beneath future or existing buildings. The Operable Unit-2 (OU-2) groundwater chemicals of concern (COCs) are listed in **Table F-1**.

The evaluation of VI focused primarily on the future use scenario as the only existing buildings within 100 feet of a groundwater plume at these four sites are Buildings 927 and 930 at Site SS 006 (**Figure F-1**). These buildings are used for equipment/vehicle storage. There also is a building at Site SS 012, but it is abandoned and not inhabitable or usable.

In accordance with the Record of Decision (ROD) and the stated Land Use Controls/Institutional Controls (LUCs/ICs) future groundwater use is restricted, but future construction is not limited to commercial or industrial use. Therefore, both residential and non-residential uses were evaluated. The evaluation is based on the most recent groundwater data collected during the long-term monitoring (LTM) event in April 2012. No soil gas data are available for this site. Soils were remediated as part of OU-1 and there are no known VOC sources in soils. There are no known preferential pathways for vapor migration.

Modeling Approach

Future buildings are likely to be commercial/industrial with slab-on-grade construction although there are no current restrictions on including basements or other subterranean features. For the purpose of this evaluation two scenarios were evaluated: buildings with and buildings without basements.

Slab-on-Grade Construction – Indoor air concentrations were predicted using groundwater values used as input to the EPA spreadsheets that contain the Johnson &

Ettinger (J&E) model (USEPA, 2004). The most recent publicly available version of the J&E model was used (February 2004 version of the groundwater advanced model).[1]

The EPA spreadsheet version of the J&E model incorporates soil lithology, building parameters, the extent of contamination, and the duration of exposure to estimate risks due to exposure from indoor air concentrations. The model is designed to be conservative and the model predictions are likely to over-predict the amount of vapor intrusion. Since there are no buildings at three of the four sites, the sub-slab soil gas or indoor air concentrations predicted by the model cannot readily be checked via sub-slab soil gas or indoor air measurements.

Commercial/Industrial Scenario – The input values used in each set of model runs are shown in **Table F-2**. Appropriate model inputs were determined based on site specific information, if available. If site specific information was not available, EPA default values were used. The model inputs were identical to those used in past modeling exercises at the site, with the following exceptions:

- The default values for clay loam were used for dry bulk density, total soil porosity, and water-filled porosity. The previous modeling used general default values not specific to any soil type.
- A floor-wall seam crack width of 0.1 centimeters (cm) was used (i.e., the USEPA default value was used). The previous modeling used a value of 1 cm.

The rate of vapor intrusion (Q_{soil}) was calculated by the model, as opposed to using a default value of 5 liters per minute (L/min). In the previous modeling, this issue was not documented, but it is assumed that the same approach was used at that time, as using the default value would not be appropriate for the assumed building dimensions.

For the buildings in the commercial or industrial scenario, the model inputs were selected to reflect typical industrial building characteristics. An indoor air exchange rate of 1 air change per hour (ACH) was used in place of the default value of 0.25 ACH. The default exchange rate is based on conservative rates for residential buildings and is considered to be overly conservative for industrial or commercial buildings. The input value was based on the typical air exchange rate for office buildings from a US EPA study where ventilation was measured at 369 office buildings and a median of 0.98 ACH was found (Persily and Gorfain, 2004).

Residential Scenario – The input values used in each set of model runs are shown in **Table F-3**. Appropriate model inputs were determined based on site specific information, if available. If site specific information was not available, EPA default values were used. The rate of vapor intrusion (Q_{soil}) was calculated by the model, as opposed to using a default value of 5 liters per minute (L/min). Past modeling exercises at the site did not address the residential scenario.

Basement Construction – For buildings with basements, there is only a minimal transport distance between the contaminated groundwater and the building basement and the J&E model does not apply (the assumed depth to groundwater of 152 cm is less than the assumed 305 cm depth of a basement). For the basement scenarios, an attenuation

[1] http://www.epa.gov/oswer/riskassessment/airmodel/johnson_ettinger.htm

factor (α) of 0.001from soil gas to indoor air was used for modeling both residential and non-residential buildings (i.e., the soil gas values were assumed to be diluted by a factor of 1,000 inside the building).

Groundwater Data

The most recent LTM groundwater data available (April 2012) were used. The April 2012 data set adequately represents current site conditions, and October 2011 and April 2012 were compared and found to be comparable. Because the April 2012 data set was the most representative of current Site conditions, and is consistent with long-term site conditions, the April data were used in this evaluation. In general the same VOCs were detected in both sampling events and the concentration levels for the primary risk drivers were very similar.

Four of the five OU-2 COCs were detected in one or more samples at each of the sites. No tetrachloroethylene (PCE) was detected in any of the monitoring wells during the April 2012 sampling event. Therefore, this compound was not included in the VI modeling. The groundwater concentration input values are shown in **Table F-4**.

Results

The J&E model predicts an equilibrium soil gas concentration immediately above the contaminated groundwater based on Henry's Law. These values are shown in **Table F-4**.

Commercial/Industrial Scenario – The modeling results by area are presented in **Table F-5** for both building scenarios. The inputs to the J&E model for the slab-on-grade scenarios were the same for every run with only the groundwater concentration varying from run to run. The calculated attenuation factors (α) from the J&E model runs are provided in **Table F-5**. The value varies somewhat from compound to compound because of differences in the physical properties (e.g., diffusivity in air) of each compound.

For comparison purposes, site-specific screening levels (SLs) are given in **Table F-6** for both cancer and non-cancer effects for non-residential scenario, which are derived from the current USEPA Regional Screening Levels (RSLs) for industrial indoor air. The RSLs were last updated in May 2012.[2] For carcinogens, the RSLs generally are based on a risk of one-in-a-million (1E-06). For non-carcinogens, the RSLs generally are based on a hazard quotient of 1 (HQ=1). Site-specific SLs were developed based on a 1E-05 risk and HQ=1.

The predicted risk for carcinogenic effects for non-residential indoor air are shown in **Table F-7**. The previous five-year review used a risk level of 1E-05 as the limit of what is considered to be acceptable. This is the mid-point of the usual EPA risk management range of 1E-04 to 1E-06. A 1E-05 risk level was used in this Five-Year Review in the same manner (i.e., indoor air SLs were calculated by multiplying the EPA regional RSL by factor of 10 for cancer risk). For TCE, the screening value based on non-cancer risk is lower than screening value based on 1E-5 cancer risk. The predicted indoor air

[2] http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

concentrations were below the SLs for cancer risk for all of the slab-on-grade scenarios. For the basement scenario, the 1E-05 risk level was exceeded for TCE at two Sites: ST 005 and SS 012.

For non-cancer risk, the HQ values for individual compounds and the aggregate hazard index (HI) for each area of interest are shown in **Table F-8**. All of the slab-on-grade scenarios had acceptable values. For the basement scenario, the HI=1 risk level was exceeded at Site ST 005, SS 006, and SS 012. TCE was the only chemical that displayed an unacceptable hazard index. The hazard index for each of the other chemicals was substantially below 1.0.

Residential Scenario – The modeling results by area are presented in **Table F-9** for both building scenarios. The inputs to the J&E model for the slab-on-grade scenarios were the same for every run with only the groundwater concentration varying from run to run. The calculated attenuation factors (α) from the J&E model runs are provided in **Table F-9**. As previously discussed, the value varies somewhat from compound to compound because of differences in the physical properties (e.g., diffusivity in air) of each compound.

For comparison purposes, the site-specific SLs derived from the current USEPA Regional Screening Levels (RSLs) for residential indoor air are given in **Table F-10** for both cancer and non-cancer effects. Site-specific SLs were developed based on a 1E-05 risk and HQ=1.

The predicted risks for carcinogenic effects for residential indoor air are shown in **Table F-11**. For the slab-on-grade scenario, the predicted indoor air concentrations exceeded a 1E-05 cancer risk for TCE at ST 005 and SS 012. All other values were acceptable. For the basement scenario, the 1E-05 risk level was exceeded for TCE at three Sites: ST 005, SS 006, and SS 012; and for VC at SS 012.

For the non-carcinogen effects, the HQ values for individual compounds and the aggregate hazard index (HI) for each area of interest are shown in **Table F-12**. There were exceedances for TCE at Sites ST 005 and SS 012 for the slab-on-grade scenario. For the basement scenario, the HI=1 risk level was exceeded at Sites ST 005, SS 006, and SS 012. TCE was the only chemical that displayed an unacceptable hazard index. The hazard index for each of the other chemicals was substantially below 1.0.

Conclusion and Recommendation

Based on the available information, VI at this site will be a pathway of concern for residential buildings, whether they have basements or are slab-on-grade. The estimated indoor air concentrations for TCE are above risk-based screening values at three of the four Sites. It should also be noted that the basements could be in direct contact with contaminated water due to the shallow level of groundwater at each site and, therefore, vapor intrusion might not be the only exposure pathway (e.g., wet basements).

Based on the available information and the model, future non-residential buildings with basements also could be an issue for three of the four sites.

References

Booz Allen, 2007. First Five Year Review Report for Former Richards Gebaur Air Force Base, Kansas City, Missouri. March.

Persily, A. and J. Gorfain. Analysis of Ventilation Data from the US EPA Building Assessment Survey and Evaluation (BASE) Study. NISTIR 7145. December 2004.

U.S. EPA. User's Guide for Evaluating Subsurface Vapor Intrusion Into Buildings. U.S. EPA, OEER. February 22, 2004.

Table F-1
Target Compounds - COCs

Compound	CAS #	Molecular Weight	Gas-Phase Conversion Factor[a]
1,1-Dichloroethylene (1,1-DCE)	75-35-4	96.9	1 ppbv = 3.97 $\mu g/m^3$
cis-1,2-Dichloroethylene (cis-1,2-DCE)	156-59-2	96.9	1 ppbv = 3.97 $\mu g/m^3$
Trichloroethylene (TCE)	79-01-6	131.4	1 ppbv = 5.37 $\mu g/m^3$
Vinyl Chloride (VC)	75-01-4	62.5	1 ppbv = 2.56 $\mu g/m^3$

a – At room temperature and one atmosphere pressure

Table F-2
Input Values for VI Modeling for Non-Residential Scenario

Parameter[a]	Input Value	Comments
VOC Concentration	See Table F-4	
Soil temperature	13.9 °C	Typical value for area
Depth to bottom of slab	15 cm	Typical value for commercial building
Soil type	Clay Loam (CL)	Based on site data
Soil bulk density	1.48	Default value for CL
Soil total porosity	0.442	Default value for CL
Soil water-filled porosity	0.168	Default value for CL
Depth to groundwater	152 cm	Based on site data
Soil-Building Pressure Differential, ΔP	40 g/cm-s^2	Default value
Floor-Wall Seam Crack Width, w	0.1 cm	Default value
Average vapor flow rate into building (Q_{soil})	Not specified	Q_{soil} calculated by model
Building width and length	1928 cm x 1928 cm	Typical value for non-residential building
Ceiling height	244 cm	Conservative assumption
Building ventilation rate	1 ACH	Typical value for commercial building.
Exposure duration	25 years	Default value for industrial scenario
Exposure frequency	250 days/year	Default value for industrial scenario

a – US EPA default values were used for any parameters not listed in this table.

Table F-3
Input Values for VI Modeling for Residential Scenario

Parameter[a]	Input Value	Comments
VOC Concentration	See Table F-4	
Soil temperature	13.9 °C	Typical value for area
Depth to bottom of slab	15 cm	Typical value for slab-on-grade construction
Soil type	Clay Loam (CL)	Based on site data
Soil bulk density	1.48	Default value for CL
Soil total porosity	0.442	Default value for CL
Soil water-filled porosity	0.168	Default value for CL
Depth to groundwater	152 cm	Based on site data
Soil-Building Pressure Differential, ΔP	40 g/cm-s^2	Default value
Floor-Wall Seam Crack Width, w	0.1 cm	Default value
Average vapor flow rate into building (Q_{soil})	Not specified	Q_{soil} calculated by model
Building width and length	1000 cm x 1000 cm	Default value for residential building
Ceiling height	244 cm	Conservative assumption
Building ventilation rate	0.25 ACH	Typical value for residential building.
Exposure duration	30 years	Default value for residential scenario
Exposure frequency	350 days/year	Default value for residential scenario

a – US EPA default values were used for any parameters not listed in this table.

Table F-4
Model Input Values for Groundwater Concentration

Site	Compound	Groundwater Input Value (µg/L)	Basis	Calculated Equilibrium Soil-Gas Concentration ($\mu g/m^3$)
ST 005	1,1-DCE	2.0	Maximum	1,460
	cis-1,2-DCE	5.1	Maximum	533
	TCE	530	Maximum	133,000
	Vinyl Chloride	0.82	Maximum	678
SS 006	cis-1,2-DCE	29	Maximum	3,030
	TCE	68	Maximum	17,000
	Vinyl Chloride	0.62	Maximum	513
ST 011	cis-1,2-DCE	2.9	Maximum	303
	TCE	0.73	Maximum	183
	Vinyl Chloride	0.22	Maximum	182
SS 012	cis-1,2-DCE	24	Maximum	2,510
	TCE	2,000	Maximum	501,000
	Vinyl Chloride	3.9	Maximum	3,230

Notes:

Groundwater concentrations from the April 2012 LTM event were used as input values.

1,1-DCE = 1,1-dichloroethene
Cis-1,2-DCE = cis-1,2-dichloroethene
TCE = Trichloroethylene
DCE = Dichloroethylene

Table F-5
Predicted Indoor Air Quality Impacts for Non-Residential Buildings

Site	Compound	Attenuation Factor (α) for Slab-on-Grade Model Run	Predicted Indoor Air Concentration (µg/m^3)	
			Slab-on-Grade Scenario	Basement Scenario[a]
ST 005	1,1-DCE	5.85E-06	0.009	1.46
	cis-1,2-DCE	6.03E-06	0.003	0.53
	TCE	5.74E-06	0.762	133
	Vinyl Chloride	6.18E-06	0.004	0.68
SS 006	cis-1,2-DCE	6.03E-06	0.018	3.03
	TCE	5.74E-06	0.098	17.0
	Vinyl Chloride	6.18E-06	0.003	0.51
ST 011	cis-1,2-DCE	6.03E-06	0.002	0.30
	TCE	5.74E-06	0.001	0.18
	Vinyl Chloride	6.18E-06	0.001	0.18
SS 012	cis-1,2-DCE	6.03E-06	0.015	2.51
	TCE	5.74E-06	2.88	501
	Vinyl Chloride	6.18E-06	0.020	3.23

a – An attenuation factor of 0.001 was used in each case for the Basement Scenario.

Table F-6
Indoor Air Site-Specific Screening Levels for Non-Residential Scenarios

Compound	Site-Specific Screening Level ($\mu g/m^3$)	
	Cancer	Non-Cancer
1,1-Dichloroethylene (1,1-DCE)	n/a	880
cis-1,2-Dichloroethylene (cis-1,2-DCE)	n/a	No value [trans = 260]
Trichloroethylene (TCE)	30	8.8
Vinyl Chloride (VC)	28	440

Table F-7
Predicted Cancer Risk for Non-Residential Scenarios

Site	Compound	Slab-on-Grade Scenario	Basement Scenario
ST 005	TCE	2.5E-07	4.4E-05
	Vinyl Chloride	<1E-08	2.4E-07
	Cumulative Risk for Site	2.6E-07	4.5E-05
SS 006	TCE	3.3E-08	5.7E-06
	Vinyl Chloride	<1E-08	1.8E-07
	Cumulative Risk for Site	3.4E-08	5.9E-06
ST 011	TCE	<1E-08	6.0E-08
	Vinyl Chloride	<1E-08	6.4E-08
	Cumulative Risk for Site	<1E-08	1.2E-07
SS 012	TCE	9.6E-07	1.7E-04
	Vinyl Chloride	<1E-08	1.2E-06
	Cumulative Risk for Site	9.7E-07	1.7E-04

Notes:
Highlighted risk levels exceed 1E-05 risk level.

Table F-8
Predicted Non-Cancer Risk for Non-Residential Scenarios

Site	Compound	Predicted Indoor Air Risk (HQ)	
		Slab-on-Grade Scenario	Basement Scenario
ST 005	1,1-DCE	<0.01	<0.01
	cis-1,2-DCE	<0.01	<0.01
	TCE	0.09	15
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = 0.09	HI = 15
SS 006	cis-1,2-DCE	<0.01	0.01
	TCE	0.01	1.9
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = 0.01	HI = 1.9
ST 011	cis-1,2-DCE	<0.01	<0.01
	TCE	<0.01	0.02
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = <0.01	HI = 0.02
SS 012	cis-1,2-DCE	<0.01	0.01
	TCE	0.33	57
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = 0.33	HI = 57

Table F-9
Predicted Indoor Air Quality Impacts for Residential Buildings

Site	Compound	Attenuation Factor (α) for Slab-on-Grade Model Run	Predicted Indoor Air Concentration (µg/m^3)	
			Slab-on-Grade Scenario	Basement Scenario[a]
ST 005	1,1-DCE	3.55E-05	0.052	1.46
	cis-1,2-DCE	3.73E-05	0.020	0.53
	TCE	3.46E-05	4.59	133
	Vinyl Chloride	3.83E-05	0.026	0.68
SS 006	cis-1,2-DCE	3.73E-05	0.11	3.03
	TCE	3.46E-05	0.59	17.0
	Vinyl Chloride	3.83E-05	0.020	0.51
ST 011	cis-1,2-DCE	3.73E-05	0.011	0.30
	TCE	3.46E-05	0.006	0.18
	Vinyl Chloride	3.83E-05	0.007	0.18
SS 012	cis-1,2-DCE	3.73E-05	0.094	2.51
	TCE	3.46E-05	17.3	501
	Vinyl Chloride	3.83E-05	0.12	3.23

a – An attenuation factor of 0.001 was used in each case.

Table F-10
Site-Specific Screening Levels for Residential Scenarios

Compound	Site-Specific Screening Level (µg/m^3)	
	Cancer	Non-Cancer
1,1-Dichloroethylene (1,1-DCE)	n/a	210
cis-1,2-Dichloroethylene (cis-1,2-DCE)	n/a	No value [trans = 63]
Trichloroethylene (TCE)	4.3	2.1
Vinyl Chloride (VC)	1.6	100

Table F-11
Predicted Cancer Risk for Residential Scenarios

Site	Compound	Slab-on-Grade Scenario	Basement Scenario
ST 005	TCE	1.1E-05	3.1E-04
	Vinyl Chloride	1.7E-07	4.3E-06
	Cumulative Risk for Site	1.1E-05	3.1E-04
SS 006	TCE	1.4E-06	4.0E-05
	Vinyl Chloride	1.3E-07	3.2E-06
	Cumulative Risk for Site	1.5E-06	4.3E-05
ST 011	TCE	1.4E-08	4.2E-07
	Vinyl Chloride	4.4E-08	1.1E-06
	Cumulative Risk for Site	5.8E-08	1.5E-06
SS 012	TCE	4.0E-05	1.2E-03
	Vinyl Chloride	7.5E-07	2.0E-05
	Cumulative Risk for Site	4.1E-05	1.2E-03

Notes:
Highlighted risk levels exceed 1E-05 risk level.

Table F-12
Predicted Non-Cancer Risk for Non-Residential Scenarios

Site	Compound	Predicted Indoor Air Risk (HQ)	
		Slab-on-Grade Scenario	Basement Scenario
ST 005	1,1-DCE	<0.01	<0.01
	cis-1,2-DCE	<0.01	<0.01
	TCE	2.2	63
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = 2.2	HI = 63
SS 006	cis-1,2-DCE	<0.01	0.05
	TCE	0.28	8.1
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = 0.28	HI = 8.1
ST 011	cis-1,2-DCE	<0.01	<0.01
	TCE	<0.01	0.09
	Vinyl Chloride	<0.01	<0.01
	Cumulative Hazard for Site	HI = <0.01	HI = 0.09
SS 012	cis-1,2-DCE	<0.01	0.04
	TCE	8.2	240
	Vinyl Chloride	<0.01	0.03
	Cumulative Hazard for Site	HI = 8.2	HI = 240

Attachment G
Evaluation of Screening Criteria and Toxicity Data

Introduction

The former Richards-Gebaur Air Force Base (AFB) Five-Year Review process includes a review of the screening criteria, toxicity data, exposure assumptions, and remedial action objectives that were used at the time of the remedy selection. The primary objective of this review is to evaluate if these data, criteria, assumptions, and objectives are still protective of human health and the environment based on current land use scenarios. For example, a change in land use or new, more stringent toxicological data could affect the remedy selected in the ROD to such a degree that it would no longer be considered protective. This evaluation was performed for OU-2 (Groundwater) for AFCEE Sites ST 005, SS 006, ST 011, and SS 012. As inorganic constituents in groundwater are thought to be naturally occurring, and unrelated to site contamination, this review focuses on organic chemicals detected in site groundwater.

Screening Criteria and Toxicity Data: The risk assessment conducted during the Basewide Remedial Investigation (RI) used EPA Region 9 Preliminary Remediation Goals (PRGs) and Federal Maximum Contaminant Levels (MCLs) as the primary source of risk-based screening criteria to identify Chemicals of Concern (COCs) for further risk evaluation. Since completion of the risk assessment, the PRGs have been renamed as the Regional Screening Levels (RSLs). Based on comparison to the most recent version of the RSLs (May, 2012), most RSLs, and one MCL, have changed significantly since the risk assessment was completed during the Basewide RI. **Table G-1** identifies the maximum detected concentrations of chemicals detected in site groundwater since 1999, and provides comparison of the previous PRG and MCL to the current RSL and MCL. It should be noted that these screening values relate to drinking water pathways, and the site remedy prohibits groundwater use. These values do not account for vapor intrusion, the pathway of interest here. The impacts of RSL and MCL changes for the drinking water pathways are summarized below:

Chemicals that have MCLs

- MCLs have remained unchanged, but RSLs have changed (either higher or lower than the PRGs used in the risk assessment), for the following chemicals: , benzene, bromodichloromethane, bromoform, carbon tetrachloride, chlorobenzene, chloroform, 1,2-dichlorobenzene, 1,4-dichlorobenzene,1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, dibromochloromethane, ethylbenzene, methylene chloride, styrene, tetrachloroethene, toluene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane,1,1,2-trichloroethane, trichloroethene, vinyl chloride, and xylene. While the majority of these chemicals were found at low concentrations, several of these, most notably trichloroethene and vinyl chloride, were found at relatively high concentrations and were considered chemicals of concern. Because the MCLs were used as screening values for the risk assessment, changes in the RSLs/PRGs would not affect the choice of chemicals of concern, the conclusions of the risk assessment, or the protectiveness of the remedy.

Chemicals that do not have MCLs

- RSLs are now lower than the PRGs used in the risk assessment, but are still higher than the maximum detected concentrations, for the following chemicals: bromomethane, dichlorodifluoromethane, 1,1-dichloroethane, hexachlorobutadiene, isopropylbenzene, naphthalene (ST 011), and tert-butyl methyl ether. These changes would not affect the choice of chemicals of concern, the conclusions of the risk assessment, or the protectiveness of the remedy.
- RSLs are now lower than the PRGs used in the risk assessment, and are lower than the maximum detected concentrations, for the following chemicals: naphthalene (ST 005, SS 006, SS 012), and trichlorofluoromethane (ST 005). While this could result in changes in the choice of chemicals of potential concern, these changes would not affect the protectiveness of the remedy, as there are restrictions on use of site groundwater.
- RSLs are now higher than the PRGs used in the risk assessment for the following chemicals: acetone, n-butylbenzene, chloroethane, chloromethane, methyl ethyl ketone, n-propylbenzene, 1,2,4-trimethylbenzene, and 1,3,5-trimethylbenzene,. These changes reflect a scientific consensus that these chemicals are less toxic than once thought. These changes would not affect the choice of chemicals of concern, the conclusions of the risk assessment, or the protectiveness of the remedy.
- PRGs were available for sec-butylbenzene, tert-butlybenzene, and 1,3-dichlorobenzene at the time of the risk assessment, but have since been withdrawn. The maximum detected concentrations of these chemicals were very low (< 1 µg/L). While the lack of screening criteria reflects uncertainties in the toxicity of these chemicals, these changes would not be expected to affect the choice of chemicals of concern, the conclusions of the risk assessment, or the protectiveness of the remedy.
- There was no PRG for 1,2,3-trichlorobenzene at the time of the risk assessment, there is now a RSL of 5.2 µg/L. The concentration of 1,2,3-trichlorobenzene exceeded the RSL at one site (SS 006), however, this change would not affect the conclusions of the risk assessment, or the protectiveness of the remedy.

Underlying toxicity data used to evaluate risks: Toxicity values include slope factors used to evaluate cancer effects from oral and dermal exposure, inhalation unit risk values used to evaluate cancer effects from inhalation, reference doses used to evaluate non-cancer hazards from oral and dermal exposure, and reference concentrations used to evaluate non-cancer hazards from inhalation. Toxicity values for numerous chemicals have changed significantly since the risk assessment was conducted during the Basewide RI. **Table G-2** identifies those chemicals detected in site groundwater since 1999, and compares the toxicity values identified in the PRG tables to the current toxicity values. Toxicity values that have changed are highlighted. The impacts of the toxicity value changes are summarized below:

Non-Cancer

- The reference dose is now higher for the following chemicals: acetone, benzene, n-butylbenzene, carbon tetrachloride, copper, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,1-dichloroethene, hexachlorobutadiene, iron, manganese, n-propylbenzene, and 1,1,1-trichloroethane. A higher reference dose means that these chemicals are now considered less toxic via direct contact routes (i.e., the ingestion and dermal contact routes of

exposure). Because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.

- The reference dose is now lower for the following chemicals: 1,2-dichloroethane, cis-1,2-dichloroethene, methylene chloride, tetrachloroethene, toluene, trichloroethene, 1,3,5-trimethylbenzene, and o-, m- and p-xylenes. A lower reference dose means that these chemicals are now considered more toxic via direct contact routes. Because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- USEPA no longer provides a reference dose for the following chemicals: sec-butylbenzene, t-butylbenzene, chloroethane, 1,3-dichlorobenzene, or 1,2,4-trimethylbenzene. While the lack of a reference dose represents a source of uncertainty for the direct contact routes, because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- USEPA now provides a reference dose, where none existed previously, for 1,2,3-trichlorobenzene. While the presence of a reference dose means that a hazard quotient could now be calculated for the direct contact routes for this chemical, because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for this chemical.
- The reference concentration is now higher for the following chemicals: acetone, benzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,1-dichloroethene, isopropylbenzene, methyl ethyl ketone, n-propylbenzene, toluene, 1,1,1-trichloroethane, and 1,2,4-trimethylbenzene. All of these chemicals are considered volatile, and exposure could occur via inhalation, with vapor intrusion being considered the primary inhalation concern at these sites. While a higher reference concentration typically means that a chemical is now considered less toxic via inhalation, the vapor intrusion route was not addressed in the baseline risk assessment. Vapor intrusion was subsequently evaluated in a supplemental risk assessment, in the first Five-Year Review, and in this second Five-Year Review for those chemicals with the greatest potential to pose an inhalation risk. Of the chemicals identified above, 1,1-dichloroethene was the only chemical evaluated quantitatively in those vapor risk assessments. Excluding the remaining volatile chemicals from quantitative evaluation could potentially result in an underestimation of hazard indices, but would not change the conclusion that soil vapor intrusion could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.
- The reference concentration is now lower for the following chemicals: chlorobenzene, chloromethane, dichlorodifluoromethane, trans-1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,2,4-trichlorobenzene, 1,1,2-trichloroethane, trichloroethene, and o-, m-, and p-xylenes. All of these chemicals are considered volatile, and exposure could occur via inhalation. While a lower reference concentration typically means that a chemical is now considered more toxic via inhalation, the vapor intrusion route was not addressed in the baseline risk assessment. Two of the chemicals listed above, tetrachloroethene and trichloroethene, were subsequently evaluated. Excluding the remaining volatile chemicals from quantitative evaluation could potentially result in an underestimation of hazard indices, but would not change the conclusion that soil vapor intrusion could pose a potential problem

in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.

- USEPA no longer provides a reference concentration for the following chemicals: bromodichloromethane, bromoform, n-butylbenzene, sec-butylbenzene, tert-butylbenzene, dibromochloromethane, 1,3-dichlorobenzene, 1,1-dichloroethane, cis-1,2-dichloroethene, hexachlorobutadiene, or 1,3,5-trimethylbenzene. All of these chemicals are considered volatile, and exposure could occur via inhalation. The lack of a reference concentration represents a source of uncertainty for inhalation; however, as discussed previously, soil vapor intrusion could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.

Cancer

- The cancer slope factor is now higher for the following chemicals: chloroform and trichloroethene. A higher slope factor means that these chemicals are now considered more potent carcinogens via direct contact routes. Because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- The cancer slope factor is now lower for the following chemicals: carbon tetrachloride, 1,4-dichlorobenzene, methylene chloride, tetrachloroethene, and vinyl chloride. A lower slope factor means that these chemicals are now considered less potent carcinogens via direct contact routes. Because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- USEPA no longer provides a slope factor for the following chemicals: chloroethane, chloromethane, and 1,1-dichloroethene. While the lack of a slope factor represents a source of uncertainty for the direct contact routes, because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- USEPA now provides slope factors, where none existed previously, for the following chemicals: tert-butyl methyl ether, 1,1-dichloroethane, ethylbenzene, and 1,2,4-trichlorobenzene. These four chemicals are now considered carcinogens, while they were not at the time the risk assessment was performed. The presence of a slope factor means that cancer risks could now be calculated for the direct contact routes for these chemical; however, because the current remedy prohibits use of groundwater, and thus potential ingestion or dermal contact, the remedy would still be protective for direct contact routes for these chemicals.
- The inhalation unit risk value is now higher for the following chemicals: bromodichloromethane, dibromochloromethane, 1,4-dichlorobenzene, and trichloroethene. All of these chemicals are considered volatile, and exposure could occur via inhalation. While a higher inhalation unit risk value means that a chemical is now considered a more potent carcinogen via inhalation, the vapor intrusion route was not addressed in the baseline risk assessment. One of the chemicals listed above, trichloroethene, was quantitatively evaluated in the supplemental risk assessment, in the first Five-Year Review, and in this second Five-Year Review. Excluding the remaining volatile chemicals from quantitative evaluation could potentially result in an underestimation of cancer risks, but would not

change the conclusion that soil vapor intrusion could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.

- The inhalation unit risk value is now lower for the following chemicals: carbon tetrachloride, methylene chloride, tetrachloroethene, and vinyl chloride. All of these chemicals are considered volatile, and exposure could occur via inhalation. While a lower inhalation unit risk value means that a chemical is now considered a less potent carcinogen via inhalation, the vapor intrusion route was not addressed in the baseline risk assessment. One of the chemicals listed above, vinyl chloride, was quantitatively evaluated in the supplemental risk assessment, in the first Five-Year Review, and in this second Five-Year Review. Excluding the remaining volatile chemicals from quantitative evaluation could potentially result in an underestimation of cancer risks, but would not change the conclusion that soil vapor intrusion could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.
- USEPA no longer provides an inhalation unit risk value for the following chemicals: chloroethane, chloromethane, or 1,1-dichloroethene. These chemicals are considered volatile, and exposure could occur via inhalation. The lack of inhalation unit risk values represents a source of uncertainty for inhalation; however, as discussed previously, soil vapor intrusion is could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.
- USEPA now provides inhalation unit risk values, where none existed previously, for the following chemicals: n-butylbenzene, 1,1-dichloroethane, ethylbenzene, naphthalene, and tert-butyl methyl ether. These chemicals are now considered inhalation carcinogens, while they were not at the time the risk assessment was performed. All of these chemicals are considered volatile, and exposure could occur via inhalation. None of these chemicals were evaluated for inhalation exposure in the risk assessment, the supplemental risk assessment, the first Five-Year Review, or in this second Five-Year Review. Excluding these remaining volatile chemicals from quantitative evaluation could potentially result in an underestimation of cancer risks, but would not change the conclusion that soil vapor intrusion could pose a potential problem in the future where industrial/commercial buildings with basements or residential development occurs in areas overlying contaminated groundwater.

In addition to quantitative changes in toxicity values, three of the groundwater constituents, methylene chloride, trichloroethene and vinyl chloride, have now been classified by USEPA as mutagenic carcinogens. Two of these, trichloroethene and vinyl chloride, were evaluated in the vapor intrusion studies and are considered chemicals of potential concern. Chemicals with a mutagenic mode of action cause irreversible changes to DNA, with young children being particularly sensitive. As an example, USEPA assumes that mutagens are 10x more potent carcinogens for children in the 0-2 year age range than for adults, with susceptibility decreasing as the children get older. As documented in **Appendix F**, future inhalation risks for adult workers exceed 1E-4 for buildings with basements at three sites (ST 005, SS 006 and SS 012), and would be even higher under a residential scenario where children would be present.

Table G-1
Comparison of Screening Criteria and Maximum Detected Groundwater Concentrations
Second Five-year Review
Former Richards Gebaur AFB, Missouri

Chemcial	Screening Concentrations				Maximum Detected Concentraions			
	Risk-Based		Regulatory		Sites			
	2000 PRG	2012 RSL	2000 MCL	2012 MCL	ST 005	SS 006	ST 011	SS 012
Acetone	608	12000			27.6	204	9.2	7.9
Benzene	0.35	0.39	5	5	2.4	3.34	1.6	1.5
Bromodichloromethane**	0.18	0.12	80	80			0.11	
Bromoform**	8.5	7.9	80	80	0.15	0.78	0.34	
Bromomethane	8.7	7			0.14		0.1	
n-Butylbenzene	61	780			3.5			
sec-Butylbenzene	61				2.7	0.24	0.2	
t-Butylbenzene	61				1.84	0.17		
tert-Butyl Methyl Ether	20	12					0.31	
Carbon Tetrachloride	0.17	0.39	5	5	2.5	0.07		
Chlorobenzene	110	72	100	100		2.04		7.27
Chloroethane	4.6	21000				1.46	0.32	
Chloroform**	0.16	0.19	80	80	4.62	1.3		0.26
Chloromethane	1.5	190			0.12	0.52	0.46	0.7
P-Cymene (P-Isopropyltoluene)					1.2	0.36		0.31
Dibromochloromethane**	0.13	0.15	80	80	0.07	0.39	0.26	
1,2-Dichlorobenzene	370	280	600	600		1.8		4.15
1,3-Dichlorobenzene	5.5					1.64		0.21
1,4-Dichlorobenzene	0.47	0.42	75	75		1.68		1.03
Dichlorodifluoromethane	395	190			0.79			
1,1-Dichloroethane	811	2.4			0.769	1.38	0.05	0.96
1,2-Dichloroethane	0.12	0.15	5	5	0.57	0.3	1.6	0.32
1,1-Dichloroethene	0.046	260	7	7	*12*	*14*	0.18	0.85
cis-1,2-Dichloroethene	61	28	70	70	*87.7*	*960*	*230*	*260*
trans-1,2-Dichloroethene	122	86	100	100	0.29	*123*	37.6	10.2
Ethylbenzene	1340	1.3	700	700	6.6	0.626	0.07	0.38
Hexachlorobutadiene	0.86	0.26			0.11			
Isopropylbenzene	658	390			3.9	0.18	0.3	
Methyl Ethyl Ketone (2-Butanone)	1904	4900			2.7	117	0.7	
Methylene Chloride	4.3	9.9	5	5	0.53	3.99		
Naphthalene	6.2	0.14			*0.79*	*1.26*	0.1	*0.85*
n-Propylbenzene	61	530			4	0.27	0.3	
Styrene	1600	1100	100	100		0.62		
Tetrachloroethene (PCE)	1.1	9.7	5	5		0.15	0.47	2.99
Toluene	723	860	1000	1000	0.45	45	1.3	177
1,2,3-Trichlorobenzene		5.2			0.11	*286*		
1,2,4-Trichlorobenzene	190	0.99	70	70		0.74		
1,1,1-Trichloroethane	540	7500	200	200	0.11			
1,1,2-Trichloroethane	0.2	0.24	5	5		0.12		
Trichloroethylene (TCE)	1.6	0.44	5	5	*6500*	*5400*	*23.8*	*3200*
Trichlorofluoromethane	1288	1100			*4900*			
1,2,4-Trimethylbenzene	12	15				2.12	3.5	0.22
1,3,5-Trimethylbenzene	12	87			0.2	1.15		0.19
Vinyl Chloride	0.020	0.015	2	2	*6.99*	*97.1*	*31.1*	*25*
m-,p-Xylene(Sum of Isomers)*	1431	190	10000	10000			0.09	0.46
o-Xylene (1.2-Dimethylbenzene)*	1431	190	10000	10000		0.98		0.32

Notes:

Shaded cells indicate changes in screening values or MCLs.

PRG - Preliminary Remediation Goal (USEPA, 2000)

RSL - Regional Screening Level (USEPA, 2011)

MCL - Maximum Contaminant Level

ug/L - micrograms per liter

* The MCL of 10,000 ug/L is based on total xylenes (sum of o-, m-, and p-xylene)

** The MCL of 80 ug/L applies to total trihalomathanes (sum of bromodichloromethane, bromoform, chloroform, and dibromochloromethane)

2012 values are less conservative (the MCL has been rescinded [nickel]; or the 2012 RSL is higher than the 2000 PRG)

2012 values are more conservative (the MCL is lower [arsenic]; or the 2012 RSL is lower than the 2000 PRG)

Values in bold exceed MCL, or if no MCL available, exceed RSL.

Table G-2
Comparison of Toxicity Values Used In HHRA and Current Values
Second Five-year Review
Former Richards Gebaur AFB, Missouri

Chemical	Toxicity Values From PRG Table (2000)				Current Toxicity Values (2012)			
	RfD	RfC	SF	IUR	RfD	RfC	SF	IUR
Acetone	1.0E-01	3.5E-01			9.0E-01	3.1E+01		
Benzene	3.0E-03	6.0E-03	5.5E-02	7.8E-06	4.0E-03	3.0E-02	5.5E-02	7.8E-06
Bromodichloromethane	2.0E-02	7.0E-02	6.2E-02	1.8E-05	2.0E-02		6.2E-02	3.7E-05
Bromoform	2.0E-02	7.0E-02	7.9E-03	1.1E-06	2.0E-02		7.9E-03	1.1E-06
Bromomethane	1.4E-03	5.0E-03			1.4E-03	5.0E-03		
n-Butylbenzene	1.0E-02	3.5E-02			5.0E-02			
sec-Butylbenzene	1.0E-02	3.5E-02						
t-Butylbenzene	1.0E-02	3.5E-02						
tert-Butyl Methyl Ether		3.0E+00				3.0E+00	1.8E-03	2.6E-07
Carbon Tetrachloride	7.0E-04	2.5E-03	1.3E-01	1.5E-05	4.0E-03	1.0E-01	7.0E-02	6.0E-06
Chlorobenzene	2.0E-02	6.0E-02			2.0E-02	5.0E-02		
Chloroethane	4.0E-01	1.0E+01	2.9E-03	8.3E-07		1.0E+01		
Chloroform	1.0E-02	3.0E-04	6.1E-03	2.3E-05	1.0E-02	9.8E-02	3.1E-02	2.3E-05
Chloromethane		3.0E-01	1.3E-02	1.8E-06		9.0E-02		
P-Cymene (P-Isopropyltoluene)								
Dibromochloromethane	2.0E-02	7.0E-02	8.4E-02	2.4E-05	2.0E-02		8.4E-02	2.7E-05
1,2-Dichlorobenzene	9.0E-02	2.0E-01			9.0E-02	2.0E-01		
1,3-Dichlorobenzene	9.0E-04	3.2E-03						
1,4-Dichlorobenzene	3.0E-02	8.0E-01	2.4E-02	6.3E-06	7.0E-02	8.0E-01	5.4E-03	1.1E-05
Dichlorodifluoromethane	2.0E-01	2.0E-01			2.0E-01	1.0E-01		
1,1-Dichloroethane	1.0E-01	5.0E-01			2.0E-01		5.7E-03	1.6E-06
1,2-Dichloroethane	3.0E-02	4.9E-03	9.1E-02	2.6E-05	6.0E-03	7.0E-03	9.1E-02	2.6E-05
1,1-Dichloroethene	9.0E-03	3.2E-02	6.0E-01	5.0E-05	5.0E-02	2.0E-01		
cis-1,2-Dichloroethene	1.0E-02	3.5E-02			2.0E-03			
trans-1,2-Dichloroethene	2.0E-02	7.0E-02			2.0E-02	6.0E-02		
Ethylbenzene	1.0E-01	1.0E+00			1.0E-01	1.0E+00	1.1E-02	2.5E-06
Hexachlorobutadiene	2.0E-04	1.1E-03	7.8E-02	2.2E-05	1.0E-03		7.8E-02	2.2E-05
Isopropylbenzene	1.0E-01	3.9E-01			1.0E-01	4.0E-01		
Methyl Ethyl Ketone (2-Butanone)	6.0E-01	1.0E+00			6.0E-01	5.0E+00		
Methylene Chloride	6.0E-02	3.0E+00	7.5E-03	4.7E-07	6.0E-03	6.0E-01	2.0E-3*	1.0E-8*
Naphthalene	2.0E-02	3.0E-03			2.0E-02	3.0E-03		3.4E-05
n-Propylbenzene	1.0E-02	3.5E-02			1.0E-01	1.0E+00		
Styrene	2.0E-01	1.0E+00			2.0E-01	1.0E+00		
Tetrachloroethene (PCE)	1.0E-02	4.0E-01	5.2E-02	5.8E-07	6.0E-03	4.0E-02	2.1E-03	2.6E-07
Toluene	2.0E-01	3.9E-01			8.0E-02	5.0E+00		
1,2,3-Trichlorobenzene					8.0E-04			
1,2,4-Trichlorobenzene	1.0E-02	2.0E-01			1.0E-02	2.0E-03	2.9E-02	
1,1,1-Trichloroethane	2.0E-02	1.0E+00			2.0E+00	5.0E+00		
1,1,2-Trichloroethane	4.0E-03	1.4E-02	5.7E-02	1.6E-05	4.0E-03	2.0E-04	5.7E-02	1.6E-05
Trichloroethylene (TCE)	6.0E-03	2.1E-02	1.1E-02	1.7E-06	5.0E-04	2.0E-03	4.6E-02*	4.1E-06*
Trichlorofluoromethane	3.0E-01	7.0E-01			3.0E-01	7.0E-01		
1,2,4-Trimethylbenzene	5.0E-02	6.0E-03				7.0E-03		
1,3,5-Trimethylbenzene	5.0E-02	6.0E-03			1.0E-02			
Vinyl Chloride	3.0E-03	1.0E-01	1.5E+00	8.9E-06	3.0E-03	1.0E-01	7.2E-01*	4.4E-06*
m-,p-Xylene(Sum of Isomers)	2.0E+00	7.0E-01			2.0E-01	1.0E-01		
o-Xylene (1.2-Dimethylbenzene)	2.0E+00	7.0E-01			2.0E-01	1.0E-01		

Notes:

* Methylene chloride, Trichloroethene and Vinyl chloride are considered mutagenic chemicals.

Shaded cells indicate changes in toxicity values.

RfD - Reference Dose (mg/kg-day)

RfC - Reference Concentration (mg/m^3)

SF - Slope Factor $(mg/kg\text{-}day)^{-1}$

IUR - Inhalation Unit Risk $(ug/m^3)^{-1}$

mg - milligram

ug - microgram

m^3 - cubic meter

kg - kilogram

2012 values are less conservative (toxicity vales have been rescinded; or the RfC and/or RfD are higher, or SF and/or IUR are lower, than in 2000)

2012 values are more conservative (toxicity values are now available; or the RfC and/or RfD are lower, or SF and/or IUR are higher, than in 2000)

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Final
Five-Year Review Report
Sites SS-003 and SS-009
Former Richards-Gebaur Air Force Base, Kansas City, MO
September 2012

NIRIS Document #: ***[Supplied by NAVFAC]***
Installation SSIC#: 5090

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Five-Year Review Report

Second Five-Year Review Report

for Sites SS-003 and SS-009

Former Richards-Gebaur Air Force Base

Kansas City, MO

September 2012

PREPARED BY:

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Richard Godchaux
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Site SS-003

12 Sept 2012
Date

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David Criswell, P. E.
Deputy Base Closure Manager
Navy Base Realignment and Closure Program Management Office Southeast
Site SS-009

Date

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EXECUTIVE SUMMARY

The Department of Navy (Navy), the lead agency, conducted this Five-Year Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) review at the former Richards-Gebaur Air Force Base (AFB) with regulatory oversight from the United States Environmental Protection Agency (USEPA) Region 7 and Missouri Department of Natural Resources (MDNR). The Five-Year Review was prepared in accordance with the USEPA *Comprehensive Five-Year Review Guidance* (USEPA, 2001). This document addresses remedy components and Remedial Actions (RAs) that have been implemented within operable unit (OU) 2 Groundwater, Sites SS- 003 (Oil Saturated Area) and SS-009 (Fire Valve Area) for which there is a Record of Decision (ROD) in place.

The objective of this Five-Year Review is to evaluate current remedies at former Richards-Gebaur AFB and to determine whether the remedies remain protective of human health and the environment in accordance with the requirements outlined in the ROD. The protectiveness of the remedies was evaluated through review of reports, site visits and inspections, and community involvement in the form of advertisements, information repositories and interviews with stakeholders. In addition, the objective of the Five-Year Review Report is to identify any issues that may be preventing a particular remedy from functioning as designed or as appropriate, and that could endanger the protection of human health and the environment.

This Five-Year Review constitutes the second required review/reporting cycle for the former Richards-Gebaur AFB, OU 2, Sites SS-003 and SS-009. A summary table of the OU 2 sites reviewed, documents reviewed, RODs, remedial action objectives (RAOs), and Remedy Components is provided as **Table ES-1**. This table also summarizes the protectiveness statements, and recommendations for each site.

Overall the remedy for OU 2 Groundwater at Sites SS-003 and SS-009 is protective of human health and the environment.

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Table ES-1. Five-Year Review Summary Table

Operable Unit 2 – Groundwater				
Data and Documents Reviewed	**RAOs**	**Remedy Components**	**Protectiveness**	**Recommendations**
SS-003 Oil Saturated Area				
First Five Year Review for Former Richards-Gebaur AFB, March 2007 *ROD*, July 2004 *Long Term Monitoring Plan for Groundwater* (Operable Unit-2), March 2005 *Land Use Control/Institutional Control Management Plan*, August 2005 *Environmental Condition of Property Report*, April 2006 *Finding of Suitability to Transfer Marine Corps Activity, October* 2011 LTM Reports 2006-2011	Prevent human exposure to contaminated groundwater with contaminant concentrations that pose risks greater than 1X10-4 to 1X10-6 (carcinogens) or a hazard index of 1 (non-carcinogens) for the reasonable maximum exposure scenario.	Land Use Controls (LUCs) -Prohibit extraction and use of groundwater -Prohibit land surface activities that may interfere with or damage the on-site monitoring wells	The remedial actions are protective of human health and the environment and are anticipated to remain protective in the future. LUCs prohibiting extraction and use of groundwater are adequate to ensure that exposure to unacceptable risk does not occur in the future.	Continue LUCs until RACGs are met.
		LTM to support the LUCs and allow systematic, periodic evaluation of site groundwater quality to help ensure that the established LUC boundaries fully encompass the contaminated plumes and provide data to support terminating LUCs when RACGs are achieved	COC concentrations indicate that the groundwater plumes remain inside the LUC boundaries, and there is no indication that off-site migration is occurring.	Reduce monitoring to every other year beginning in April/May 2013. This will support the Five-Year Review. If results of samples are below RACGs, a follow on sampling event should be scheduled at least three (3) months later but no longer than one (1) year after the initial sampling event to determine if RACGs have been achieved.

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Table ES-1. Five-Year Review Summary Table (continued)

Operable Unit 2 – Groundwater				
Data and Documents Reviewed	**RAOs**	**Remedy Components**	**Protectiveness**	**Recommendations**
SS-009 Fire Valve Area				
First Five Year Review for Former Richards-Gebaur AFB, March 2007 ROD, July 2004 *Long Term Monitoring Plan for Groundwater (Operable Unit-2),* March 2005 Memorandum of Agreement for the Transition of the Environmental Program of Richards-Gebaur Air Force Base between Unites States Marine Corps and Air Force Base Conversion, August 1998 *Amendment to Memorandum of Agreement for the Transition of the Environmental Program at Richards-Gebaur Air Force Base between Unites States Marine Corps and Air Force Real Property Agency, December 2004* *Land Use Control/Institutional Control Management Plan,* August 2005 *Environmental Condition of Property Report,* April 2006 *Finding of Suitability to Transfer Marine Corps Activity, October* 2011 *LTM Reports* 2006-2011	Prevent human exposure to contaminated groundwater with contaminant concentrations that pose risks greater than 1X10-4 to 1X10-6 (carcinogens) or a hazard index of 1 (non-carcinogens) for the reasonable maximum exposure scenario.	LUCs -Prohibit extraction and use of groundwater -Prohibit land surface activities that may interfere with or damage the on-site monitoring wells	The remedial actions are protective of human health and the environment and are anticipated to remain protective in the future. LUCs prohibiting extraction and use of groundwater are adequate to ensure that exposure to unacceptable risk does not occur in the future.	Maintain LUCs on the site until RACGs have been met
		LTM to support the LUCs and allow systematic, periodic evaluation of site groundwater quality to help ensure that the established LUC boundaries fully encompass the contaminated plumes and provide data to support terminating LUCs when RACGs are achieved	COC concentrations indicate that the groundwater plumes remain inside the LUC boundaries, and there is no indication that off-site migration is occurring.	Reduce monitoring to every other year beginning in April/May 2013. This will support the Five-Year Review. If results of samples are below RACGs, a follow on sampling event should be scheduled at least three (3) months later but no longer than one (1) year after the initial sampling event to determine if RACGs have been achieved. .

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Former Richards-Gebaur Air Force Base, OU2: Sites SS-003 and SS-009		
EPA ID: M09571824292		
Region: 7	**State:** MO	**City/County:** Belton/Cass

SITE STATUS	
NPL Status: Non-NPL	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** US Navy
Author name (Federal or State Project Manager): Commander, NAVFAC Midwest and BRAC Program Manager Office Southeast
Author affiliation: US Navy
Review period: November 2011 - September 2012
Date of site inspection: December 22, 2011
Type of review: Statutory
Review number: 2
Triggering action date: September 30, 2007
Due date *(five years after triggering action date)*: September 17, 2012

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Five-Year Review Summary Form (continued)

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU2

Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 2 Groundwater	**Issue Category: No Issue**			
	Issue: N/A			
	Recommendation: N/A			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
Choose an item.	Choose an item.	Choose an item.	Choose an item.	

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Five-Year Review Summary Form (continued)

To add additional issues/recommendations here, copy and paste the above table as many times as necessary to document all issues/recommendations identified in the FYR report.

Protectiveness Statement(s)
Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
2 - Groundwater	Protective	N/A

Protectiveness Statement:

The remedial actions at OU 2, Site SS-003 and SS-009 are protective of human health and the environment and are anticipated to remain protective in the future. Groundwater at the former Richards-Gebaur AFB is not currently used for any purpose, and LUCs prohibiting extraction and use of groundwater at OU 2 Site SS-003 and Site SS-009 are adequate to ensure that exposures do not occur in the future. The LTM program supports the LUCs and allows periodic evaluation of groundwater quality to help ensure that the LUC boundaries fully encompass the contaminant plume and remain protective of human health and the environment. Overall, COC concentrations indicate that the groundwater plumes remain inside the LUC boundaries at both sites, and there is no indication that off-site migration is occurring.

Sitewide Protectiveness Statement (if applicable)
For sites that have achieved construction completion, enter a sitewide protectiveness determination and statement.

Protectiveness Determination:	*Addendum Due Date (if applicable):*
Protective	*N/A*

Protectiveness Statement:

The remedy at OU2 Groundwater at Sites SS-003 and SS-009 is protective of human health and the environment. (The first Five-Year Review addressed both OUs 1 and 2. OU 1 Sites included FT002 and ST005. OU 2 Sites included SS003, SS006, SS009, SS012, ST005 and ST011. This second Five-Year review will address OU 2 Sites SS-003 and SS-009 which are under the responsibility of the United States Marine Corps (USMC). The other sites will be addressed in a separate Five-Year Review document prepared by United States Air Force (USAF).)

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
AFB	Air Force Base
AFRPA	Air Force Real Property Agency
AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-term Environmental Action—Navy
COC	chemical of concern
CSM	Conceptual Site Model
DCE	dichloroethene
FOST	Finding of Suitability for Transfer
HVAC	Heating, Ventilation and Air Conditioning
IC	Institutional controls
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
J&E	Johnson and Ettinger
LTM	long-term monitoring
LUC	land use control
µg/L	micrograms per liter
µg/	micrograms per meter cubed
MCL	Maximum Contaminant Level
MDNR	Missouri Department of Natural Resources
MNA	monitored natural attenuation
MW	monitoring well
MOA	Memorandum of Agreement
NAVFAC	Naval Facilities Engineering Command
Navy	Department of the Navy
NCP	National Contingency Plan
NPL	National Priorities List
OU	operable unit
PCE	tetrachloroethene
ppb	parts per billion
RRG	Preliminary Remediation Goal
PRB	permeable reactive barrier
RA	remedial action
RAB	Restoration Advisory Board
RACG	Remedial Action Cleanup Goals

RAO	remedial action objective
RBC	risk-based concentration
RD	Remedial Design
Rfc	reference concentration
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RSL	risk-based screening level
SARA	Superfund Amendments and Reauthorization Act
SI	Site Investigation
SVOC	semivolatile organic compound
TCE	trichloroethene
TPH	total petroleum hydrocarbons
URF	unit risk factor
USMC	United States Marine Corps
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UU/UE	unrestricted use and unlimited exposure
VI	vapor intrusion
VOC	volatile organic compound

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1.0 INTRODUCTION

The Department of Navy (Navy), the lead agency, conducted this Five-Year Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) review at the former Richards-Gebaur Air Force Base (AFB) with regulatory oversight from the United States Environmental Protection Agency (USEPA) Region 7 and the Missouri Department of Natural Resources (MDNR). The Five-Year Review was prepared in accordance with the USEPA *Comprehensive Five-Year Review Guidance* [Reference 1]. This document addresses remedies and Remedial Actions (RAs) that have been implemented within operable unit (OU) 2 Groundwater, Sites SS-003 Oil Saturated Area and SS-009 Fire Valve Area for which there is a Record of Decision (ROD) in place.

The objective of this Five-Year Review is to evaluate current remedies at former Richards-Gebaur AFB and to determine whether the remedies remain protective of human health and the environment in accordance with the requirements outlined in the ROD. The protectiveness of the remedies was evaluated through review of reports, site visits and inspections, and community involvement. In addition, the objective of the Five-Year Review Report is to identify any issues found during the review, if any, and recommendations to address them.

The Navy prepared this Five-Year Review Report pursuant to CERCLA 121 and the National Contingency Plan (NCP). CERCLA Section 121 states:

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

The USEPA interpreted this requirement further in the NCP as stated in 40 Code of Federal Regulations (CFR) 300.430 (f)(4)(ii):

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

The statutory review process was initiated based on implementation of Land Use Controls (LUCs) at OU 2 in August 2002. The first Five-Year Review was completed September 2007, [Reference 2]. The first Five-Year Review addressed both OUs 1 and 2. OU 1 Sites included FT002 and ST005. OU 2 Sites included SS003, SS006, SS009, SS012, ST005 and ST011. This

second Five-Year review will address OU 2 Sites SS-003 and SS-009 which are under the responsibility of the United States Marine Corps (USMC). The other sites will be addressed in a separate Five-Year Review document prepared by United States Air Force (USAF). The current Five-Year Review for OU 2 Sites SS-003 and SS-009 is required because hazardous contaminants remain at concentrations exceeding criteria that allow for unlimited use and unrestricted exposure (UU/UE).

The Navy conducted this five-year review of the remedial actions implemented at the former Richards-Gebaur AFB, OU 2 Sites SS-003 and SS-009 in Kansas City, Missouri (Figure 1-1) from December, 2011 through September 2012. This report documents the results of that review. Resolutions Consultants conducted the 2011 site visits and data analysis from the long term monitoring results as a task order under the Navy's Naval Facilities Engineering Command (NAVFAC) Atlantic Comprehensive Long-term Environmental Action Navy (CLEAN) Contract Number N62470-11-D-8013. HydroGeoLogic, Inc. conducted the 2007, 2008, 2009, and 2010 site visits and data analysis from the long term monitoring results as a task order under the contract the USAF Contract Number FA8903-10-D-8596-0028. Technical support for the technical assessment was provided by the Navy and Marine Corps Public Health Center.

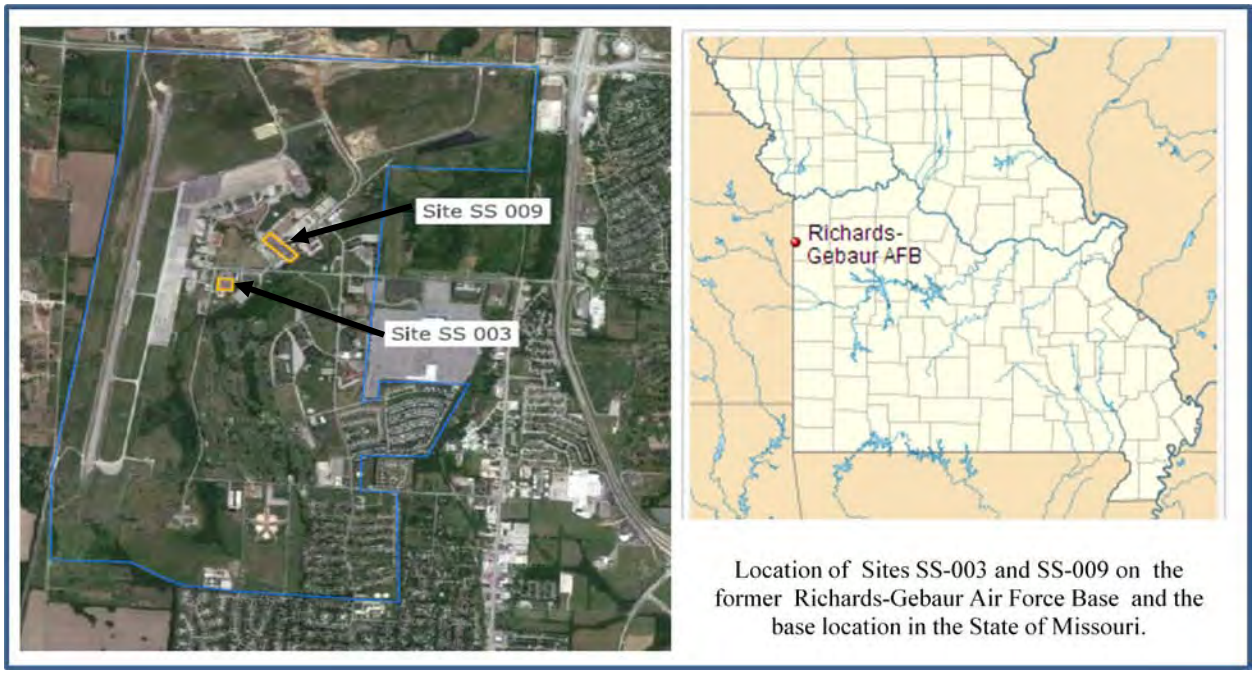

Figure 1-1. Location of Base and Sites

1.1 Facility Background

Richards-Gebaur AFB was originally established in 1953 as Grandview AFB. The installation was operated by the Air/Aerospace Defense Command until 1970, when the Air Forces Communication Service relocated its headquarters from Scott AFB, Illinois to Richards-Gebaur AFB, and assumed command. In 1977, the Air Force Communication Service moved back to Scott AFB and Richards-Gebaur AFB became a Military Airlift Command base. The Air Force Reserves assumed operational control of the installation in 1980 and remained the host organization until the installation closed in 1994 [Reference 2].

A Memorandum of Agreement (MOA) was signed in 1998 providing for the transfer of the management and execution management responsibilities of the Installation Restoration Program (IRP) from the Air Force Conversion Agency to the United States Marine Corps (USMC) [Reference 3]. As part of this MOA, the Air Force Base Conversion Agency agreed to complete actions at IRP sites SS-003 and SS-009, and obtain the necessary no further action, closure and decision documents from the appropriate regulatory agencies.

The MOA was amended in 2004 [Reference 4] to indicate that the USAF would remain responsible for groundwater monitoring and implementation of land use control measures at the site until Fiscal Year 2007, including the five year review program review in Fiscal Year 2007, after which point the USMC assumed responsibility. The property was formally transferred to the USMC in January of 2005.

In December 2011, City of Kansas City, Missouri accepted the Quitclaim Deed for approximately 0.378 acres of land for Homeless Provider Assistance under the provisions of 42 USC § 11411. This property is a portion of parcel O formerly owned by the MCSC and described in the Finding of Suitability for Transfer (FOST) dated April 2006 [Reference 5]. This area is also within the boundaries of Site SS-009 and therefore constrained by the environmental requirements applicable to that site. The City of Kansas City, Missouri entered a legally binding agreement dated January 20, 2011 with Heart N Hand Ministries, a Missouri non-profit corporation. Heart N Hands uses the property for warehousing purposes only .There is no residential use of the property by Heart N Hand in support of homeless persons. The use of the property for transitional housing or other residential purpose is restricted and any use of the property for that purpose would require additional actions and approvals.

The FOST addresses the entire 8.40 acres making up Parcel O which included the 0.378 acres previously transferred to the Heart N Hands Ministries as well as the remaining 8.022 acres which was transferred to the Kansas City Port Authority on May 22, 2012 for the intended use as an intermodal freight hub support facility.

The Navy currently manages the USMC environmental restoration program at SS-003 and SS-009. The chronology of the property environmental responsibility and ownership are included in Table 1-1.

Table 1-1. Chronology of Ownership and Environmental Responsibility

Timeframe	Site Description	Property Ownership	DoD Environmental Responsibility	Documentation
Prior 1941	Agriculture, Pasture, Undeveloped	Non-DoD	N/A	N/A
1941 – 1953	Grandview Airport	Non-DoD	N/A	N/A
1953 – 1994	Richards-Gebaur AFB	USAF	USAF	N/A
1994 – 1998	Air Force Real Property Agency (AFRPA) and Army Corps	AFRPA and Army Corps	AFRPA and Army Corps	Base Closure and Realignment Act of 1990
1998	Sites SS-003 and SS-009	USMC	AFB Conversion Agency	MOA dated August, 1998
2007	Sites SS-003 and SS-009	USMC	USMC	Amendment to MOA dated December 2004
2006	Site SS-009, Parcel O	USMC	USMC	FOST dated April 2006 – suitable for transfer
2011	Site SS-009, Parcel O (partial), 0.387 Acres	City of Kansas City, Missouri	Navy	Quitclaim Deed dated December 2011, transfer to Heart N Hands Ministries
2011	Site SS-009, Parcel O (full parcel), 8.40 Acres	City of Kansas City, Missouri	Navy	FOST dated October 2011 – suitable for transfer
2012	Site SS-009, Parcel O, 8.013 Acres	Kansas City Port Authority	Navy	Quitclaim Deed dated May 2011 – Transfer to Kansas City Port Authority

1.2 Report Organization

The Five-Year Review for the former Richards-Gebaur AFB, OU 2, Sites SS-003 and SS-009 is organized as follows:

- **Executive Summary** - Five-Year Review process. A summary table of OU 2 Sites SS-003 and SS-009, documents reviewed, Remedial Action Objectives (RAOs), and Remedy Components is provided as **Table ES-1**. This table also summarizes the protectiveness statements and recommendations.

- **Section 1-** Introduction and purpose of Five-Year Review. Includes the background of Richards-Gebaur AFB, Sites SS-003 and SS-009 and the chronology of ownership and environmental responsibilities.

- **Section 2 -** Description of the Five-Year Review process, including administrative components, site inspections, community involvement, interviews and the team members.

- **Section 3 –** Background information on Sites SS-003 and SS-009, including the physical characteristics, land and resource use, history of contamination, initial response and the basis for taking action.

- **Section 4 –** RAs including the RAOs, the selected remedy, Remedial Action Cleanup Goals (RACGs), cost, and progress since last Five-Year Review.
- **Section 5 –** Technical assessment including responses to questions.
- **Section 6 –** Issues
- **Section 7 –** Recommendations and Follow-up Actions
- **Section 8 -** Protectiveness Statements
- **Section 9** – Next Review

References and Appendices are provided at the end of the document.

2.0 FIVE YEAR REVIEW PROCESS

The Five-Year Review for the former Richards-Gebaur AFB, OU 2, Sites SS-003 and SS-009 was conducted in accordance with the *Comprehensive Five-Year Review Guidance* [Reference 1]. Remedy protectiveness for OU 2, Sites SS-003 and SS-009 was evaluated through document reviews, site inspections, and community involvement activities as described in the subsections below.

2.1 Document Review

This Five-Year Review consisted of a review of site-specific documentation for each site. First, the ROD for OU 2 [Reference 6] was reviewed to identify the potential risks to human health and the environment, RAOs, selected remedy, and applicable or relevant and appropriate requirements (ARARs). The Long Term Monitoring Plan for Groundwater (Operable Unit-2) [Reference 6] was then reviewed to evaluate the design components for the remedy, monitoring requirements, and LUC boundaries. To confirm that the remedies were operational and functional in accordance with the RAOs, monitoring reports; including Land Use Controls/Institutional Control Management Plan [Reference 8] and Long-term Monitoring (LTM) Reports; were also reviewed to assess remedy performance and continued protection of human health and the environment.

Table ES-1 summarizes the documents reviewed for each site.

2.2 Site Inspections

Annual site inspections were conducted from 2007 through 2011 as part of the annual LUC monitoring program and will continue to be conducted until the RAOs established in the ROD for OU 2 are met for sites SS-003 and SS-009. The dates and specific information for each

LUC/Institutional Controls (ICs) inspection is provided in table 2-1. Additional site inspections were not deemed necessary for the five year review.

Table 2-1. Documentation of LUC Inspections

Site SS-003 Oil Saturated Area				
Date of Inspection	**Reason for Inspection**	**Inspector**	**Activities and Documentation of Completed Checklists**	**Results**
October 1, 2007	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, Annual Monitoring Report for Site SS-003, August 200	No violations or concerns noted.
November 6, 2008	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2008 Annual Monitoring Report for Site SS- 003, September 2009	No violations or concerns noted.
November 24, 2009	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2009 Basewide Groundwater and Land Use Controls/Institutional Controls Monitoring Report, July 2011	A land disturbance was noted, but there was no concern because the disturbance was associated with the well installation approved by the MDNR as part of LTM.
October 27, 2010	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2010 Basewide Groundwater and Land Use Controls/Institutional Controls Monitoring Report, August 2011	No violations or concerns noted.
December 22, 2011	LUC/IC Monitoring	Resolutions Consultants	Site Visit, Draft 2011 Groundwater Monitoring and Land Use Controls Report, May 2012	No violations or concerns noted.
Site SS-009 Fire Valve Area				
Date of Inspection	**Reason for Inspection**	**Inspector**	**Activities and Documentation of Completed Checklists**	**Results**
October 1, 2007	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, Annual Monitoring Report for Site SS 009, August 2009	No violations or concerns noted.
November 6, 2008	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2008 Annual Monitoring Report for Site SS009, September 2009	No violations or concerns noted.
November 24, 2009	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2009 Basewide Groundwater and Land Use Controls/Institutional Controls Monitoring Report, July 2011	No violations or concerns noted.
October 27, 2010	LUC/IC Monitoring	HydroGeoLogic, Inc.	Site Visit, 2010 Basewide Groundwater and Land Use Controls/Institutional Controls Monitoring Report, August 2011	No violations or concerns noted.
December 22, 2011	LUC/IC Monitoring	Resolutions Consultants	Site Visit, Draft 2011 Groundwater Monitoring and Land Use Controls Report, May 2012	No violations or concerns noted.

2.3 Community Involvement

A public notice announcing the initiation of the five-year review was published in the Kansas City Star, a newspaper in the City of Kansas City, County of Jackson, State of Missouri on January 25, 2012 as shown in the affidavit included in Appendix A.

The final five-year review report will be placed in the information repository at Grandview Mid-Continent Public Library and the Administrative Record (AR). A second public notice will be published announcing the completion of the five-year review and its availability at the library. The restoration advisory board (RAB) for the former Richards-Gebaur AFB was adjourned in November 2003, based on unanimous agreement of the RAB members, and no response was received from public notices published in November 2005, to determine whether there was public interest in restarting the RAB as discussed in [Reference 2].

2.4 Interviews

Formal interviews by telephone were conducted with the USMC Reserves on May 14, 2012, Kansas City Port Authority on May 11, 2012 and the Heart N Hands Ministries on May 7, 2012. The results of the interviews were positive. The requests for points of contact and additional information were forwarded to the appropriate Navy and Kansas City Port Authority personnel. The details of the interviews are included in Appendix B.

Additional information was gathered from the Air Force, regulatory agencies, and current property owners on an "as needed" basis, through informal conversations, and project meetings. In particular, extensive information was captured regarding future land use, building use and characteristics, and regulatory requirements at project meetings on May 2, 2012.

2.5 Team Members

The USMC conducted the five-year review, in accordance with their role as the CERCLA lead agency for the former Richards-Gebaur AFB, OU 2 Sites SS-003 and SS-009, with technical support from the Navy.

- Janice Nielsen, NAVFAC Atlantic (LANT) was the team leader. She provided oversight of all aspects of the review and approved the final five-year review report.
- Timothy Riordan, P.E., NAVFAC LANT provided technical support, coordinated with stakeholders, attended site visits and provided oversight for the review.
- Donna Caldwell, P.G., NAVFAC LANT provided technical support and expertise for the vapor intrusion aspects of the review.

3.0 SITE HISTORY AND BACKGROUND

The former Richards-Gebaur AFB originally encompassed approximately 2,400 acres. It closed on September 30, 1994, pursuant to the Defense Base Closure and Realignment Act of 1990 and recommendations of the Defense Base Closure and Realignment Commission (BRAC). At base

closure, Richards-Gebaur AFB was comprised of 429 acres of land that included 244 acres in the main cantonment area and 185 acres at the Belton Training Complex.

OU 2 was established to address groundwater contamination issues on the 429 acres of land that remained under Air Force control at the time of base closure in 1994. Extensive groundwater investigation was conducted for OU 2 at locations across the installation and groundwater was found to have tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), 1,1-DCE and vinyl chloride above the RACGs. Site SS-003 was found to have groundwater contaminated with TCE in excess of the RACGs and SS-009 was found to have groundwater contaminated with PCE, TCE, cis-1,2-DCE, 1,1-DCE and vinyl chloride in excess of the RACGs. [Reference 6]

The LTM and LUC remedy for all of the sites at Richards-Gebaur was selected and implemented by the Air Force, USEPA and MDNR in 2004 as documented in the Final Record of Decision (Operable Units 1 and 2) [Reference 2]. The Navy will continue to follow the guidelines and procedures described in the ROD for sites SS-003 and SS-009.

3.1 Site SS-003

Site SS-003, Oil Saturated Area (Figure 3-1) is located in the southern part of the former base, situated near the southeast corner of the intersection of East 155th Street and Bales Avenue and south of Building 703. The site was used to store waste oil products generated by vehicle maintenance from the mid-1950s to the late 1980s [Reference 9]. The site is currently used as a vehicle maintenance and storage facility known as the Humvee Area. The adjacent fenced area located south of the Humvee Area is used for base facility maintenance operations.

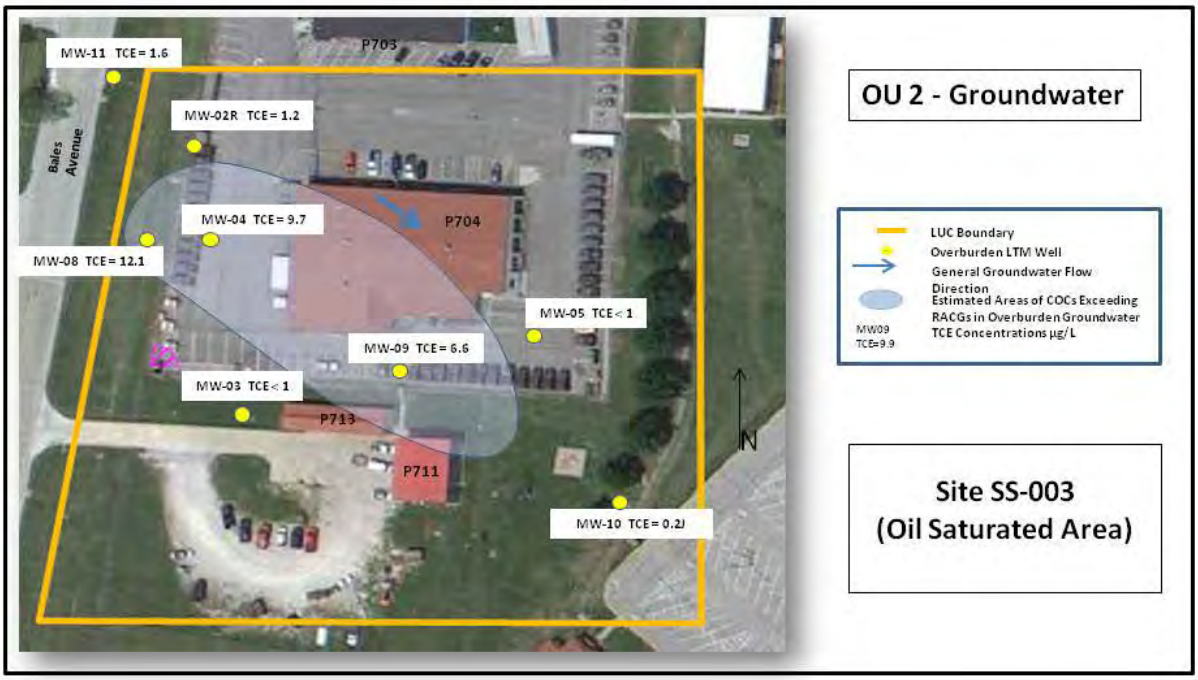

Figure 3-1. Site SS-003 Oil Saturated Area

Investigations in 1986 and 1989 identified a small area of total petroleum hydrocarbon (TPH) contamination in soil at the site. Approximately 42 cubic yards of contaminated soils were removed from the site in 1991 and 1992. Additional sampling conducted during the Remedial Investigation (RI) in 1999 to 2000 did not identify any additional soil contamination. This RI identified an area of chlorinated solvent groundwater contamination encompassing approximately 2.7 acres [Reference 2].

The source of the groundwater contamination is unknown, but is suspected to have originated from historical activities at the former waste oil storage area. The chemical of concern (COC) in groundwater at SS-003 is TCE, which has historically been detected at concentrations above the RACG. The highest groundwater concentrations have generally been located west and south of Building 703 [Reference 10].

The chronology of site events is shown on Table 3-1.

Table 3-1. SS-003 – Chronology of Site Events

Document	Date	Activities	AR #
Installation Restoration Program Records Search for Richards-Gebaur Air Force Base, Missouri	1983	Identified oil stained soil	2
Soil Investigations	1986 and 1989	Identified small area of petroleum hydrocarbon contamination in soil	N/A
Installation Restoration Program Phase II Confirmation/ Quantification, Stage 2	July 1988	Collected soil, sediment, and surface water samples. Identified TPH compounds and lead at elevated concentrations in soil. Recommended excavation of affected soils. Concluded that impacted soil originated from a spill of waste oil previously stored at the site.	14, 15, 16
Remedial Investigation (RI) at Richards-Gebaur Air Force Base, Belton, Missouri, for,FT002 – North Burn Pit,SS003 – Oil Saturated Area,SS004 – Hazardous Waste Drum Storage, ST005 – POL Storage Yard	October 1991	Collected additional soil samples and evaluated concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals. Identified no additional areas of contamination and determined that existing impacts had not migrated off-site. A risk assessment was performed and concluded that potential risk was limited to direct contact of soil by site workers.	37
Interim Remedial Action for SS003, Oil Saturated Area & SS004, Hazardous Waste Drum Storage, Final Closure Report	September 1992	Performed excavation of approximately 42 cubic yards of soil contaminated with TPH and lead. The area was backfilled with clean fill and resurfaced to match original conditions.	47
Final Preliminary Groundwater Assessment, Oil Saturated Area SS003),Hazardous Waste Storage Area (SS004), Hazardous Materials Storage (SS006), and Fire Valve Area (SS009)	November 1996	Installed three monitoring wells to evaluate site groundwater. Results indicated that all concentrations (TPH, VOCs, and metals) were below maximum contaminant levels (MCLs). Site was recommended for closure because source was previously excavated and no groundwater impacts were identified.	140
Remedial Strategies for VOCs in Groundwater	September 29, 2000	Development of strategy to address VOCs in groundwater. Evaluated remedial alternatives. Recommended pursuing a Negligible Impact on Water Quality determination with Monitored Natural Attenuation (MNA) as a contingency.	215
Richards-Gebaur AFB Basewide Remedial Investigation (SS 003 Oil Saturated Area), RI Report	December 2000	Installation and sampling of groundwater MWs; TCE was detected in concentrations above RACGs in four wells. Goals were to delineate the nature and extent of contamination in soil and groundwater, and to characterize risks posed by the site to human health and the environment.	285

Document	Date	Activities	AR #
Results of October 2000Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	February 26, 2001	First monitoring event for the quarterly groundwater monitoring program established based on the 1999 Basewide RI. Objectives were to determine whether groundwater contamination was delineated, to evaluate trends of COC concentrations, and to investigate the potential for MNA. TCE was detected above the regulatory limit in five wells. It was recommended that MW- 006 be added to the quarterly groundwater monitoring program.	216
Results of January 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	May 8, 2001	TCE was detected above screening levels in four wells. Results were consistent with previous events and site was adequately delineated.	217
Results of April 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	July 9, 2001	TCE was detected above screening levels in four wells. Results were consistent with previous events and site was adequately delineated.	218
Results of October 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	March 13, 2002	TCE was detected above screening levels in three wells. Results were consistent with previous events and site was adequately delineated.	209
Final Feasibility Study for Groundwater (Operable Unit– 2)	November 2002	Developed and evaluated remedial action alternatives for site groundwater. Identified RAOs for groundwater. Developed and evaluated remedial alternatives for groundwater.	396
Final Record of Decision(Operable Units 1 and 2)	June 2004	Set forth the selected remedial action alternative of LTM and implementation of LUCs.	395
Land Use Control/Institutional Control Management Plan	August 2005	Implementation, monitoring, and enforcement of LUCs and institutional controls (ICs) to prevent exposure of VOCs in groundwater.	393
Final Technical Memorandum for Long-Term Monitoring, April 2006 Semiannual Sampling Event	October 2006	Performed semiannual sampling of groundwater in accordance with the LTM and LUC/IC remedy. TCE exceeded the RACG in three wells.	303
Former Richards-Gebaur AFB Five-Year Review Report, Final	March 2007	Review of groundwater monitoring data since 2002. Recommended installation of a new well upgradient of site and performance of a vapor intrusion risk evaluation after USEPA revises the toxicity factors for TCE. Also included recommendations to reduce monitoring frequency to annual, with the exception of the new upgradient well, which should be sampled on a semiannual basis.	389
Final 2006 Annual Monitoring Report	October 2007	Provided a summary of the April and October 2006 semiannual monitoring events and the LUC/IC activities performed in October 2006. TCE was detected at concentrations exceeding the RACG in three wells.	391
Final Annual Monitoring Report for Site SS 003	August 2009	Provided a summary of the April 2007 sampling events and the LUC/IC activities. Monitoring frequency reduced from semiannually to annually in 2007. TCE was detected at concentrations exceeding the RAGG in three wells.	N/A
Final 2008 Annual Monitoring Report for Site SS 003	September 2009	Provided a summary of the October 2008 sampling event and the LUC/IC activities. TCE was detected at concentrations exceeding the RACG in three wells.	N/A
Final 2009 LTM Sampling and Groundwater Modeling Report	July 2011	Provided a summary of the October 2009 sampling event and the LUC/IC activities. Upgradient well installed. TCE was detected at concentrations exceeding the RACG in three wells.	N/A
Final 2010 Basewide Groundwater and Land Use Controls Monitoring Report	August 2011	Provided a summary of the October 2010 sampling event and the LUC/IC activities. TCE was detected at concentrations exceeding the RAGG but the plume is stable or shrinking.	N/A
Draft 2011 Groundwater Monitoring and Land Use Controls Report	May 2012	Provided a summary of the December 2011 sampling event and the LUC/IC activities. TCE was detected at concentrations exceeding RAGGs. An analysis of the data indicates the groundwater contamination plumes are stable or decreasing in concentration.	N/A

3.2 Site SS-009

Site SS-009, Fire Valve Area (Figure 3-2) is located on relatively level ground in the southeastern portion of the installation and consists of two parcels. One parcel of the SS-009 site is located between Westover Road and Andrews Road and consists of several buildings including Building 605. The other parcel of Site SS-009 is located southeast of Building 605 and is situated between Andrews Road and Scope Creek. This parcel contains the former Navy dental clinic (Building 601) and is vacant. Site SS-009 was part of the Civil Engineering Complex and was in use by the Air Force from 1955 until 1994 [Reference 2]. During this time, Building 605 was used for various purposes, including a carpenter shop, roads and grounds shop, and sanitation shop. Building 609 was used as a hazardous waste storage area but has since been properly closed. The larger Building 605 is vacant and Building 607 has been demolished.

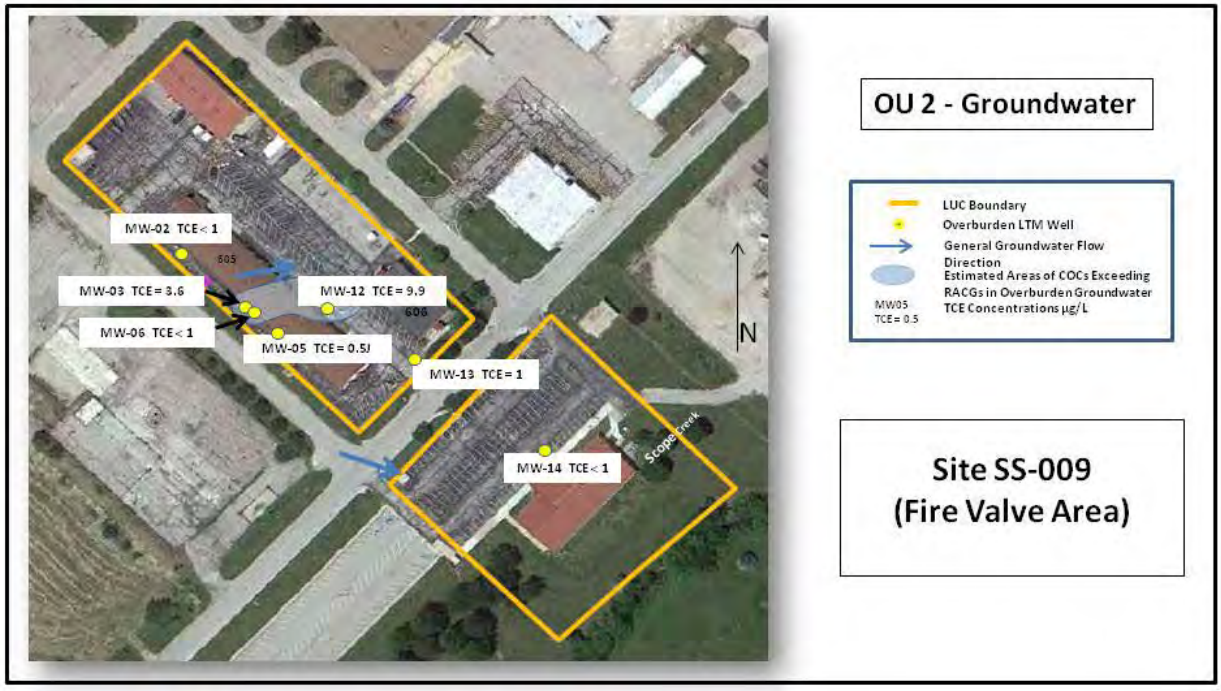

Figure 3-2. Site SS-009 Fire Valve Area

In 1992, petroleum-contaminated soils were discovered during repair of an underground water valve on site. Approximately 10 cubic yards of petroleum-contaminated soils were excavated from the site in 1993 [Reference 12]. Supplemental investigations did not identify additional soil contamination; however, an approximately 0.7-acre area of groundwater impacted by chlorinated solvents was identified during a subsequent investigation [Reference 6]. The source of the groundwater contamination was not determined, but is believed to be related to spills in the drainage swale adjacent to the fire valve located at the site. COCs in groundwater that have been detected above RACGs are 1,1-DCE; cis-1,2-DCE; PCE; TCE; and vinyl chloride. The source of this chlorinated solvent groundwater contamination was theorized to be related to spills that entered the drainage swale near a fire valve [Reference 12]. Groundwater contamination migrated under Building 605 and extended southeast to an area near Andrews Road.

The site chronology is shown in Tables 3-2.

Table 3-2. SS-009 – Chronology of Site Events

Document	Date	Activities	AR #
Installation Restoration Program (IRP) Final Technical Report for Preliminary Assessment / Site Investigation of IRP Site SS009	September 29, 1995	Delineated area of impacted soil discovered and removed during a March 1992 repair of a water line at the site. Collected soil samples; results indicated that a potential for TPH contamination in groundwater existed. A qualitative risk evaluation found no significant impacts or risks to human health or the environment in site soils. The report recommended pursuing a No Further Response Action for soil. Further investigation was recommended for groundwater.	352
Final Preliminary Groundwater Assessment, Oil Saturated Area (SS003),Hazardous Waste Storage Area (SS004), Hazardous Materials Storage (SS006), and Fire Valve Area (SS009)	November 1996	Installed two temporary wells for the evaluation of VOCs, TPH, semi-volatile organic compounds, metals, and polychlorinated biphenyls in groundwater. VOCs and metals were detected above MCLs. Site was recommended for closure because source was previously removed, exceedances in groundwater were detected slightly above one order of magnitude over MCLs, and the groundwater exposure pathway was incomplete.	140
Remedial Strategies for VOCs in Groundwater	September 29, 2000	Development of strategy to address VOCs in groundwater. Evaluated remedial alternatives. Recommended pursuing a Negligible Impact on Water Quality determination with Monitored Natural Attenuation (MNA) as a contingency.	215
Richards-Gebaur AFB Basewide Remedial Investigation (SS 009 Fire Valve Area), RI Report	December 2000	Installation and sampling of groundwater monitoring wells; PCE; TCE; cis-1,2-DCE; 1,1-DCE and VC were detected above RACGs in two wells. Goals were to delineate the nature and extent of contamination in soil and groundwater, and to characterize risks posed by the site to human health and the environment.	274
Results of October 2000 Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	February 26, 2001	First monitoring event for the quarterly groundwater monitoring program established based on the 1999 Basewide RI. Objectives were to determine whether groundwater contamination was delineated, to evaluate trends of COC concentrations, and to investigate the potential for MNA. VOCs were detected above the regulatory limit in well Monitoring Well (MW)-003. It was recommended that MW-009 be added to the quarterly groundwater monitoring program.	216
Results of January 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	May 8, 2001	VOCs were detected above screening levels in well MW-003. Results were consistent with previous events and site was adequately delineated.	217
Results of April 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	July 9, 2001	VOCs were detected above screening levels in wells MW-003 and MW-009. Results were consistent with previous events and site was adequately delineated.	218
Results of October 2001Quarterly Groundwater Monitoring at Richards-Gebaur Air Force Base	March 13, 2002	VOCs were detected above screening levels in wells MW-003 and MW-009. Results were consistent with previous events and site was adequately delineated.	209
Final Feasibility Study for Groundwater (Operable Unit– 2)	November 2002	Developed and evaluated remedial action alternatives for site groundwater. Identified RAOs for groundwater. Developed and evaluated remedial alternatives for groundwater.	396
Final Record of Decision (Operable Units 1 and 2)	June 2004	Set forth the selected remedial action alternative of LTM and implementation of LUCs.	395
Land Use Control/Institutional Control Management Plan	August 2005	Implementation, monitoring, and enforcement of LUCs and ICs to prevent exposure of VOCs in groundwater.	393

Document	Date	Activities	AR #
Final Technical Memorandum for Long-Term Monitoring, April 2006 Semiannual Sampling Event	October 2006	Performed semiannual sampling of groundwater in accordance with the LTM and LUC/IC remedy. TCE exceeded the RACG in three wells.	303
Former Richards-Gebaur AFB Five-Year Review Report, Final	March 2007	Review of groundwater monitoring data since 2002. The report recommended installation of a new well upgradient of site and performance of a vapor intrusion risk evaluation after USEPA revises the toxicity factors for TCE. Also included recommendations to reduce monitoring frequency to annual, with the exception of the new upgradient well, which should be sampled on a semiannual basis.	389
Final 2006 Annual Monitoring Report	October 2007	Provided a summary of the April and October 2006 semiannual monitoring events and the LUC/IC activities performed in October 2006. VOCs were detected at concentrations exceeding RACGs in two wells.	391
Final Annual Monitoring Report for Site SS 009	August 2009	Provided a summary of the April 2007 sampling events and the LUC/IC activities. Monitoring frequency reduced from semiannually to annually in 2007. PCE, TCE, Cis-1,2-DCE, and vinyl chloride was detected at concentrations exceeding the RAGGs.	N/A
Final 2008 Annual Monitoring Report for Site SS 009	September 2009	Provided a summary of the October 2008 sampling event and the LUC/IC activities. PCE, TCE, Cis-1,2-DCE, and vinyl chloride was detected at concentrations exceeding the RAGGs.	N/A
Final 2009 LTM Sampling and Groundwater Modeling Report	July 2011	Provided a summary of the October 2009 sampling event and the LUC/IC activities. PCE, TCE, Cis-1,2-DCE, and vinyl chloride was detected at concentrations exceeding the RAGGs.	N/A
Final 2010 Basewide Groundwater and Land Use Controls Monitoring Report	August 2011	Provided a summary of the October 2010 sampling event and the LUC/IC activities. VOCs were detected at concentrations exceeding the RAGG but the plume is stable or shrinking.	N/A
Draft 2011 Groundwater Monitoring and Land Use Controls Report	May 2012	Provided a summary of the December 2011 sampling event and the LUC/IC activities. VOC's were detected at concentrations exceeding RAGGs. An analysis of the data indicates the groundwater contamination plumes are stable or decreasing in concentration.	N/A

3.3 Conceptual Site Model

The former Richards-Gebaur AFB is located in the Osage Plains groundwater province of the Central Lowland Non-glaciated Plains region. Groundwater is present in both the unconsolidated overburden soils and in the weathered limestone and shale bedrock. The presence of shallow groundwater in unconsolidated overburden soils and weathered near-surface bedrock is largely dependent on seasonal rainfall. Groundwater collects and resides in the transition zone between the soil overburden and weathered bedrock and is typically present as a perched groundwater zone. This perched zone is not laterally continuous across the base and frequently pinches out within the boundaries of the OU-2 sites, which inhibits horizontal movement of groundwater and associated contaminants, if present, within this zone. This perched groundwater zone is hydraulically connected to the underlying weathered limestone and, depending on the area, the underlying weathered shale. However, the relatively impermeable, deeper underlying consolidated shale layer limits vertical groundwater movement. Low-flow velocities predominate within the shallow groundwater zone and near stagnant groundwater conditions are common during extended periods of little or no precipitation. When present in sufficient quantity, shallow groundwater flow occurs in the soil overburden-weathered bedrock interfacial zone and the flow

direction typically follows surface topography. The topography ranges from 960 feet above mean sea level (amsl) on the northeast side of the AFB to 1,125 feet amsl on the south property margin. Dependent on seasonal rainfall and laterally discontinuous across the AFB, perched groundwater is present in the transition zone between the soil overburden and weathered bedrock. Shallow groundwater flow mimics topography with low flow velocities, and near stagnant groundwater conditions are common during extended periods of little or no precipitation. The conceptual site models for SS-003 and SS-009 are illustrated on Figures 3-3 and 3-4, respectively.

Groundwater is present in overburden soils at SS-003 generally between four to seven feet below ground surface (bgs). Borings advanced at SS-003 documented 15 to 20 feet of low to medium plasticity silty clay overburden underlain by up to 10 feet of weathered shale bedrock [Reference 10]. Groundwater flow is estimated to be less than 10 feet per year and flows to the east. Figure 3-3 shows the SS-003 monitoring well network, geologic setting, and distribution of TCE in shallow groundwater.

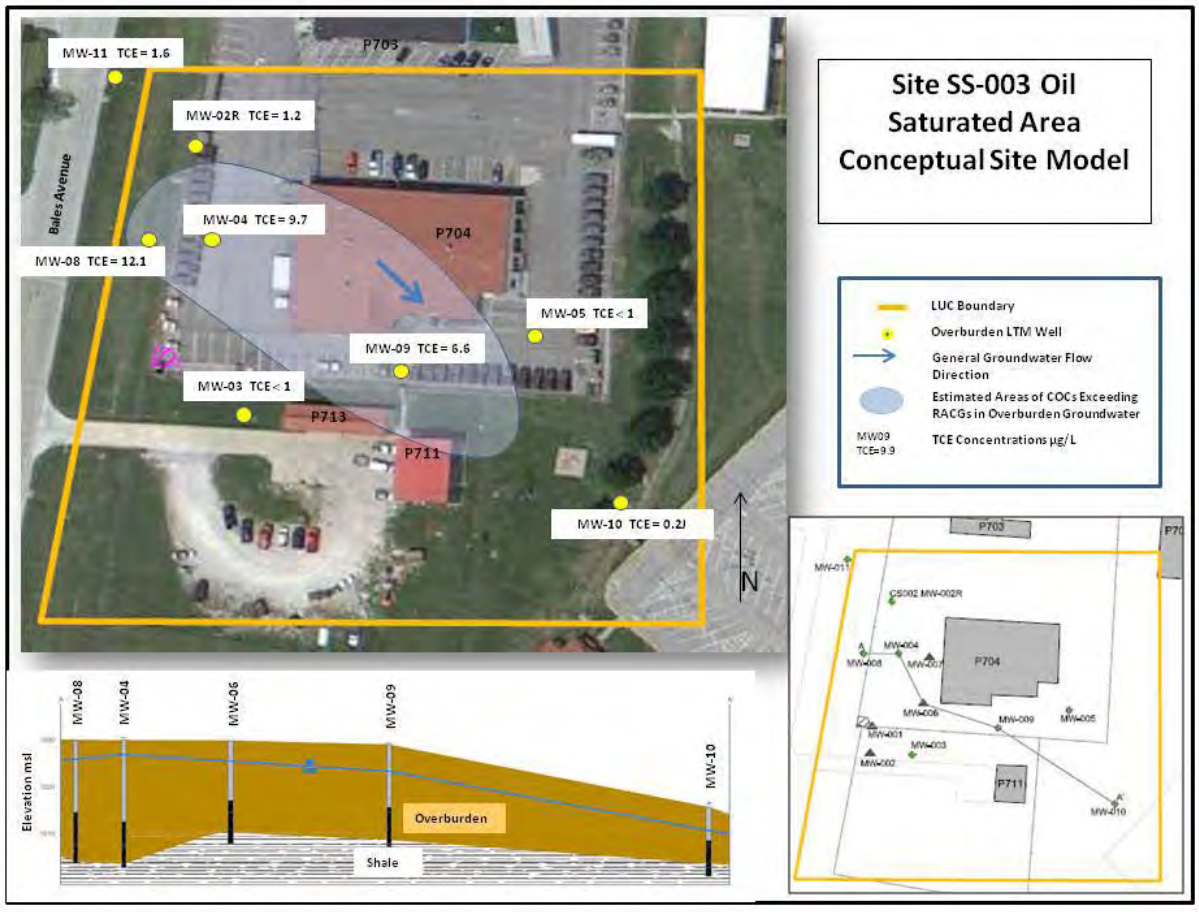

Figure 3-3. Site SS-003 Oil Saturated Area Conceptual Site Model

Groundwater is also present in overburden soils at SS-009 generally between six to ten feet bgs. The overburden is underlain by limestone and the limestone is underlain by shale. Groundwater flow is to the east at a low velocity on the order of less than 1 foot per year [Reference 10]. Figure 3-4 shows the SS-009 monitoring well network, geologic setting, and distribution of COCs in shallow groundwater.

As a result of the past storage and handling of solvents; VOC's are present in groundwater at both sites at concentrations slightly above remedial action goals. Impacted soils were removed from both sites prior to implementation of the groundwater LTM.

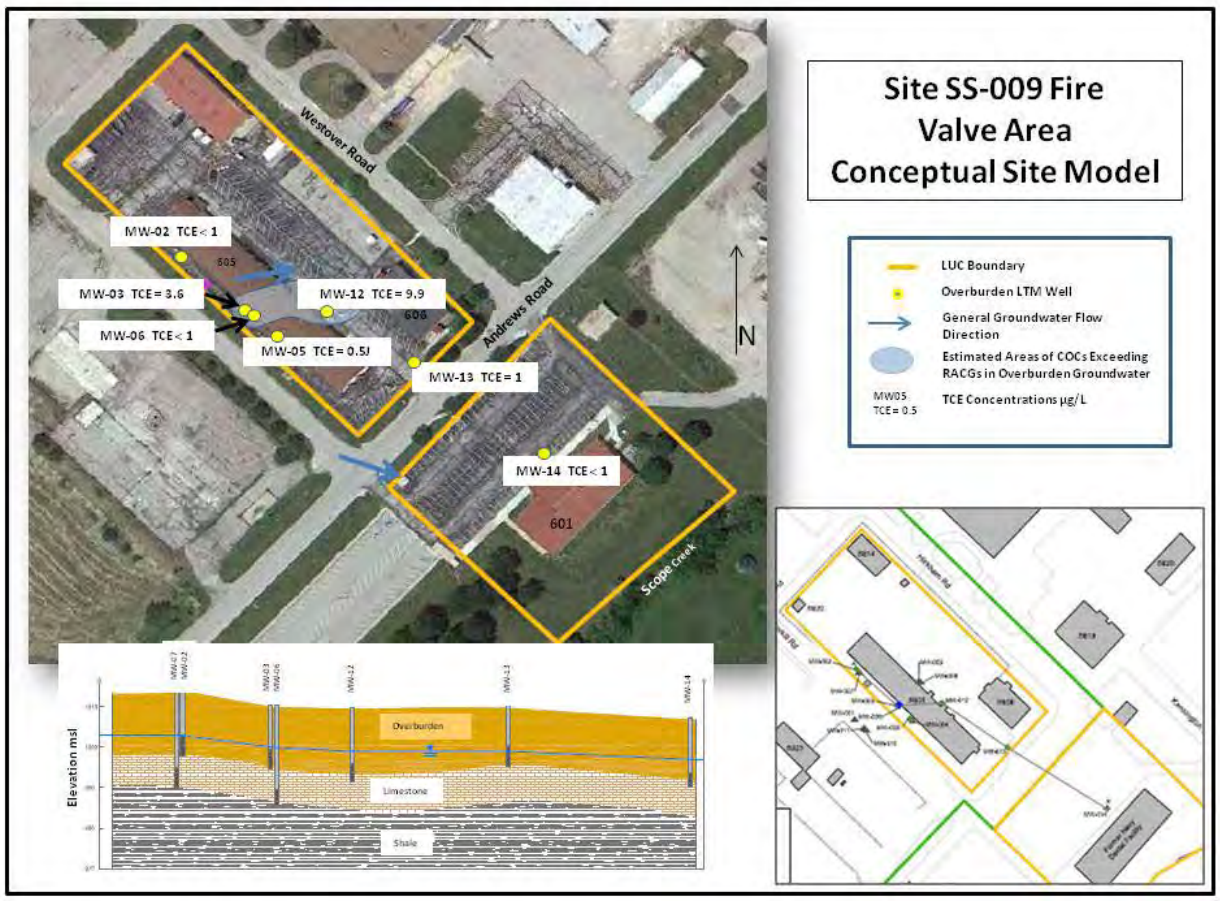

Figure 3-4. Site SS-009 Fire Valve Area Conceptual Site Model

The Conceptual Site Model (CSM) for each site includes consideration of potential risks to human and ecological receptors for current and reasonably anticipated future land use. A Tier 1 qualitative ecological exposure assessment concluded that there are no unacceptable ecological risks at Sites SS-003 and SS-009 [Reference 10].

Potential human health risks from exposure to site media were evaluated for: current/future site workers, current/future construction workers, current/future trespassers, and future residents

[Reference 10]. Current LUCs prohibit residential use. Because all contaminated soils have been removed from Sites SS-003 and SS-009, potential exposure to soil via incidental ingestion, dermal absorption, and inhalation of airborne particulates and soil source vapors by human receptors does not exist. Additionally, potential exposure pathways to surface water and sediment are incomplete because receptors would have negligible potential for contact with sediment and surface water in the drainage ditch at Site SS-003. Exposure pathways to groundwater through ingestion and dermal contact for current/future construction workers any incidental contact via construction worker to groundwater is not expected to pose unacceptable risk. Construction workers may expose ground water. Per OSHA requirements, work plans would notify workers that ground water might be contaminated, and appropriate precautions instituted, thus essentially eliminating the possibility of exposure through ingestion or dermal contact. While inhalation exposure is possible from vaporization of chemicals from exposed ground water, it is expected that both the magnitude and duration would be sufficiently small as to pose an insignificant risk. The vapor intrusion model demonstrates a risk below regulatory concern for vaporization from the totality of the ground water and dilution into a room. Vaporization from a smaller surface area of part of the ground water plus the greater dilution of outdoors (as contrasted with a room) would be expected to pose a lower risk, as the same physical and chemical properties govern both processes. Exposure pathways to groundwater through ingestion and dermal contact are incomplete under current and future conditions for current/future site workers, current/future trespassers, and future residents because there are no potable water supply wells and potable water at the Base is obtained from the Kansas City Water and Pollution Control Department. Because of poor quality and low yield of area groundwater, potable water is supplied by the City; exposure to groundwater for potable residential use is therefore considered an incomplete exposure pathway. The ROD included prohibiting groundwater extraction or use so as to eliminate this potential exposure pathway [Reference 6]. Current/future trespassers exposure to groundwater is considered to be an incomplete pathway as trespassers are unlikely to come into contact with groundwater.

The vapor intrusion pathway (volatilization of VOCs from groundwater beneath the building to soil gas and then to indoor air) was evaluated as part of this and previous Five-Year Reviews to assess potential risks to current/future site workers and potential future residence within 100 feet of impacted groundwater at Sites SS-003 and SS-009. Current/future construction workers may have the potential for dermal absorption and/or inhalation exposure to shallow groundwater at Sites SS-003 and SS-009 during excavation activities that extend below the water table but this activity will require approval from regulatory agencies prior to any excavation.

3.4 Basis for Action

The response actions selected in the ROD for OU 2 Groundwater for Sites SS-003 and SS-009 are necessary to protect public health and the environment from actual or threatened releases of pollutants or contaminants that may present a substantial endangerment to public health or the environment.

For OU 2 Groundwater, the implementation of LUCs, supported by LTM, represents the final remedy for Site SS-003 and SS-009, which have VOCs in groundwater. The LUCs will prevent

potential risks posed by exposure to groundwater by prohibiting extraction and any use of the contaminated groundwater at both of the sites. Risks to future residents or workers from exposure to indoor air that is potentially contaminated as a result of VOC vitalization from groundwater is discussed in this Five-Year Review Report (Section 5.3).

Although not addressed in the ROD, potential risk to future residents or current/future workers via the vapor intrusion pathway have been evaluated (Section 5.3 of this Five-Year Review Report) with no unacceptable risks for current or future receptors based on current groundwater concentrations as a vapor source. There is no basis for additional action for the vapor intrusion pathway.

4.0 REMEDIAL ACTIONS

The ROD was signed in September 2004 and there have been no changes to OU 2 Groundwater remedy.

4.1 Remedial Action Objectives

The ROD for OU 1 and OU 2 was signed in September 2004. Only OU 2 sites SS-003 and SS-009 are addressed in this Five-Year Review. The OU 1 sites and the OU 2 sites not included in this Five-Year Review are addressed in the Air Force Five-Year Review issued in September 2012.

- To prevent human exposure to contaminated groundwater with contaminant concentrations that pose risks greater than 1 x to 1 x (carcinogens) or a hazard index of 1 (noncarcinogens) for the reasonable maximum exposure scenario.

The property was transferred to the City of Kansas City (Site SS-009) in 2012 and the USMC (Site SS-003) in 2005. Restrictive covenants were placed in the Deed for Site SS-009 property use and restrictions were placed in the USMC's master plan to implement the LUCs. Appendix C provides the LUC boundaries for each site.

4.2 Remedial Action Clean Up Goals for OU 2

The ROD established the following RACGs for OU 2:

Consistent with the RAO, chemical specific RAGCs were derived from published MCLs promulgated under the Federal Clean Water Act. Table 4-1 lists the RACGs that were established in the ROD for OU 2.

Table 4-1. RACGs from ROD 2004 for OU 2

Chemical	Groundwater Clean Up Goals*
PCE	5 ppb
TCE	5 ppb
Cis-1,2-DCE	70 ppb
1,1-DCE	7 ppb
Vinyl Chloride	2 ppb

* The groundwater cleanup goals were based on MCLs in effect at the time of the remedy selection, none of which have changed: therefore all of the clean up levels remain valid.

4.3 Cost

Sites SS-003 and SS-009 were previously administered by the United States Air Force (USAF) as part of the former Richards- Gebaur Air Force base. 2011 was the first year the Navy was responsible for the LTM and LUC inspection program started by the USAF and their contractors. The USAF continues to perform LTM and LUC inspections at the remaining Richards-Gebaur sites. The costs associated with work performed at Sites SS-003 and SS-009 during Fiscal Year 2012 was estimated to be $14,000 for SS-003and $30,000 for SS-009. The total amount of $44,000 includes project planning, one annual groundwater monitoring event and LUC inspections, laboratory analysis, reporting, and IDW disposal as shown in [Reference 13].

4.4 Progress Since Last Five-Year Review

Based on groundwater monitoring conducted from November 1999 – November 2011 for Site SS-003 and July 1998 – December 2011 for Site SS-009, all of the chlorinated solvent containing plumes in OU 2 Site SS-003 and SS-009 are not moving and shrinking. Although concentrations have increased sporadically at individual monitoring wells, the overall nature and extent of contamination has remained consistent over time and within established LUC boundaries. The periodic increases were minimal and within expected concentrations based on previous levels detected. Therefore they periodic increases were not deemed to be substantial. The current and historic groundwater concentrations were plotted for trend analysis of the data from sites SS-003 and SS-009.

COC concentration trends in groundwater for site SS-003 are provided in Appendix D and the COC concentration trends in groundwater for site SS-009 are provided in Appendix E. TCE concentrations in groundwater at site SS-003 show a generally stable to slightly decreasing trend over time. A nominal increase in TCE was observed at Site SS-003 well MW-008; however, the concentration detected during the December 2011 monitoring event was well below the historical maximum.

In February 2005, it was determined that the TCE concentration in upgradient well MW-008 at site SS-003 exceeded the action trigger in the Decision Rules listed in the Final LTM Plan for

groundwater, requiring the installation of a new upgradient well. To satisfy the requirements of the Decision Rules, well MW-011 was installed in November 2009 to replace well MW-008 as the upgradient LTM well for SS-003. Well MW-011 contained a TCE concentration of 1.6 micrograms per liter during the Round 28 monitoring event. This result is below the RACG of 5 micrograms per liter but is higher than the previous sampling result.

At Site SS-009, COC concentrations in groundwater show generally decreasing to stable trends over time. COC concentrations were non-detect or decreasing in all wells with the exception of MW-012, which showed nominal increases in concentrations for all COCs. However, COC concentrations have fluctuated historically, and the concentrations detected during the Round 28 event were consistent with historical trends. Furthermore, the presence of 1,1-DCE; cis-1,2-DCE, TCE, and vinyl chloride is an indication that dechlorination of PCE is occurring. The overall trend of PCE at well MW-012 is decreasing, which provides another line of evidence that dechlorination is occurring at the site.

The concentrations of TCE in the upgradient well MW-011 are below the RACG of 5 µg/l as reported in the 2010, 2011 and 2012 long term monitoring reports. The results from sampling well MW-011 were reported as 0.3 U µg/l, 0.50 U µg/l and 1.6 µg/l in October of 2009, October of 2010 and December 2011, respectfully. Two results were flagged with a U, meaning the chemical was undetected and the numerical value is at or below the method detection limit. Overall, COC concentrations indicate that the groundwater plumes remain inside the LUC boundaries at both sites, and there is no indication that off-site migration is occurring.

An updated indoor air risk evaluation was conducted for Site SS-003 and SS-009.

5.0 TECHNICAL ASSESSMENT

As part of this second Five-Year review, OU 2 Sites SS-003 and SS-009 were reevaluated to determine if the remedies identified in the 2004 ROD remain protective of human health and the environment. The sites were reviewed to determine if:

- The remedy continues to function as intended by the ROD;
- Exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid; and
- If any additional information has come to light that would call into question the protectiveness of the remedy.

Each issue is addressed separately below.

5.1 Remedy Function

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

Yes. The LUCs required by the ROD (i.e., restrictions prohibiting extraction and use of groundwater and land surface activities that may interfere with or damage the on-site monitoring

wells) were included in the Deed at the time of property transfer for Site SS-009 to the City of Kansas City in Appendix F, Kansas City Port Authority in Appendix G and Site SS-003 in the USMC's Master Plan Appendix H. A LUC inspection was conducted annually in accordance with ROD requirements, and there was no evidence indicating that the LUCs had been breached at that time. Additional groundwater wells have not been installed with the exception of the one monitoring well installed at Site SS-003 as part of the on-going LTM, and groundwater is not extracted or used for any purpose, nor has any other significant development occurred on either of the OU 2 sites SS-003 and SS-009.

The costs associated with work performed at Sites SS-003 and SS-009 during Fiscal Year 2012 was estimated to be $14,000 for SS-003and $30,000 for SS-009. The total amount of $44,000 includes project planning, one annual groundwater monitoring event and LUC inspections, laboratory analysis, reporting, and IDW disposal as shown in [Reference 12].

5.2 Exposure Assumptions, Toxicity Data, Cleanup Levels, Remedial Action Objectives Validity

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

Yes. Exposure assumptions, cleanup levels, and RAOs used at the time of remedy selection remain valid. Although some toxicity data were updated, the remedy for potential risk remains valid. Each of these items was evaluated and summarized below.

Exposure Assumptions: Site usage at OU 2 Sites SS-003 and SS-009 remains commercial/light industrial in nature and groundwater at the sites is not used for any purpose. The vapor intrusion pathway was evaluated as part of this Five-Year Review and there are no unacceptable risks to current or future receptors; the current remedy therefore remains protective. Exposure to chemical vapors potentially volatilizing from any exposed ground water during any future construction would not pose an unacceptable risk, as the exposure is below that which was estimated from vapor intrusion, as the potential source is smaller, the dilution factor greater, and the same chemical and physical properties apply to modeling both pathways. Drinking water in and around the former Richards-Gebaur AFB is obtained from the Missouri River via the City of Kansas City Water Department. Under current and future anticipated land use controls no direct exposure pathway for groundwater exists at the OU 2 Sites SS-003 and SS-009, and there is no expectation that any direct exposure will occur in the future. Although highly unlikely given the current and anticipated site usage, the remedy for OU 2 was based on ingestion and direct contact with contaminated groundwater by future residents, which is conservative and protective of human health. LUCs imposed as part of the remedy will effectively ensure that no exposure to groundwater occurs.

The vapor intrusion pathway was evaluated as part of this Five-Year Review and there are no unacceptable risks to current or future receptors; the current remedy therefore remains protective.

Screening Criteria and Toxicity Data: The risk assessment conducted during the Basewide RI used EPA Region 9 Preliminary Remediation Goals (PRGs) that are now termed Regional Screening Levels (RSLs) and Federal MCLs as the primary source of risk-based screening criteria to identify COCs for further risk evaluation. In cases where the analytical reporting limit was greater than the RSL and/or MCL, the reporting limit was used as the default screening level as summarized in Table 5-1.

Table 5-1. RACGs for Groundwater in µg/L (ppb)

Chemical of Concern	PCE	TCE	cis-1,2-DCE	1,1-DCE	Vinyl Chloride
MCL-based RACG from ROD; same as 2012 MCL	5	5	70	7	2
2004 PRG*	0.1	0.028	61	340	0.02
2012 RSL*	9.7	0.44	28	260	0.015

* http://www.epa.gov/reg3hwmdlrisk/humanlrbconcentration table/index.htm

Several RSLs have changed since the risk assessment was completed during the first 5-year review in 2007. These changes are listed in table 5-2, and discussed below.

- **None of the MCLs that were used for the remedy selection in the ROD have changed. Therefore, remedy selection remains valid.**
- The RSL for PCE increased from 0.1 to 9.7 µg/L.
- The RSL for TCE increased from 0.028 to 0.44 µg/L.
- The RSL for 1,1-DCE decreased from 340 to 260 µg/L; however, the new value remains higher than the 0.046 µg/L that was operative when the criteria for ROD were established.

The RSL for cis-1,2-DCE has decreased from 61 to 28; for 1,1-DCE, from 340 to 260; for vinyl chloride from 0.2 to 0.15µg/L. However, the risk assessment conducted during the RI already concluded that some of the COCs posed a potential risk to human health at these sites, and the existing remedies (i.e., LUCs) prohibit extraction and any use of contaminated groundwater, which ensures that all human exposure pathways to groundwater will remain incomplete.

Table 5-2. Comparison of Toxicity Data (Cancer Potency and Reference Doses, i.e., RfDs) for COCs

Chemical	Cancer Oral Slope Factor			Change?	Oral Reference Dose RfD			Change?
	ROD 2004	Cancer 2007	Cancer 2012	Yes/No	ROD 2004	RfD 2007	RfD 2012	Yes/No
PCE	-	$5.4x10^{-1}$	$2.1x10^{-3}$	yes***	-	$1.0x10^{-2}$	$6.0x10^{-3}$	yes
TCE	$1.1x10^{-2}$	$4.0x10^{-1}$	$4.6x10^{-2}$ *	yes***	$6.0x10^{-3}$	$3.0x10^{-4}$	$5.0x10^{-4}$	yes***
cis-1,2-DCE	-	-	-	no	$1.0x10^{-2}$	$1.0x10^{-2}$	$2.0x10^{-3}$	yes
1,1-DCE	$6.0x10^{-1}$	-	-	no	$9.0x10^{-3}$	$5.0x10^{-2}$	$5.0x10^{-2}$	no
vinyl chloride	1.9	1.5**	1.5**	no	-	$3.0x10^{-3}$	$3.0x10^{-3}$	no

* Adult value. Mutagenic mode of action (MOA) for carcinogenicity increases cancer potency for children.
** Lifetime value. Adult exposure only value: $7.2x10^{-1}$.
*** Change makes chemical less toxic, therefore presents less risk.

With two exceptions, the changes resulted in less conservative toxicity data than were used in the original risk assessment. The RfD for PCE has changed, but less than two-fold; moreover, as RfDs are considered accurate to within an order of magnitude, these values are considered fundamentally equivalent or were not substantial enough to significantly change the risk evaluation. The RfD for cis-1,2-DCE has decreased more substantially; however, the remedy in the ROD prevents consumption of the water until the concentrations meet the goals. Thus, the current remedy remains protective of human health.

Remedial Action Objectives: As described in Section 5.3, the RAO is to prevent exposure to groundwater with contaminant concentrations that pose risks greater than 1×10^{-6} to 1×10^{-4} or a hazard index of 1 for the reasonable maximum exposure scenario. This risk range remains consistent with EPA remedy selection requirements; therefore, the RAO remains valid.

Cleanup Levels: Table 5-1 lists the remedial action cleanup goals (RACGs) that were established in the ROD. These RACGs were based on MCLs in effect at the time of remedy selection, none of which have changed; therefore, all of the cleanup levels remain valid.

5.3 Protectiveness of Remedy

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

No. The five year review evaluated potential vapor intrusion (VI). As described below, no unacceptable risk was identified for the vapor intrusion pathway and therefore the remedy remains protective.

5.3.1 Vapor Intrusion Evaluation

Because VOCs are present in groundwater near occupied buildings, the VI pathway was evaluated to ensure potential risks to current and future building occupants are considered. The conceptual model for the vapor intrusion pathway consists of a groundwater vapor source with potential VI risk based on 2011 maximum TCE concentrations measured in shallow groundwater at Sites SS003 and SS009. Although low concentrations of other VOCs (PCE and DCE) were detected, TCE drives potential VI risk at these sites. Information on building characteristics, occupancy and use are based on interviews with building superintendents and property managers.

5.3.2 Vapor Intrusion Conceptual Site Model Site SS-003

The potential vapor source at Site SS003 is a TCE groundwater plume 2.7 acres in size with maximum TCE concentration measured in 2011 of 12 µg/L (Figure 5-1). Three buildings: P704, P711, and P713, are located with 100 ft of the plume. Depth to groundwater measured in 2011 generally ranged from four to seven feet below ground surface and occurs in silty clay overburden soils overlying weathered shale bedrock. Building characteristics most relevant to the VI pathway are summarized below.

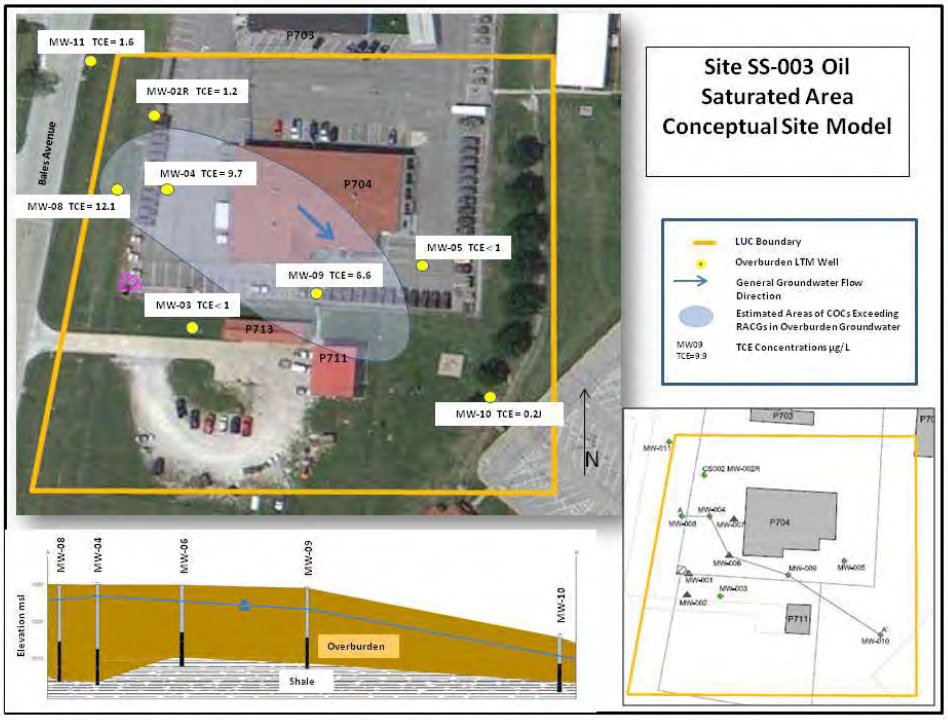

Figure 5-1. SS-003 Conceptual Site Model

Building P704 currently supports the Marine Regiments vehicle maintenance and communications administrative activities. Future use is anticipated to remain a vehicle maintenance facility however Building P704 is not expected to continue to support

communication administrative functions. Occupants consist of 12 active duty Marines working a standard 40-hour week. Constructed in 1954, Building P704 is concrete slab-on-grade brick and cinder block construction with two-story-high ceiling and metal roof. The majority of the building floor space is open with high ceiling with the exception of few work spaces at ground level and steps to a mezzanine area of two administrative offices.

Office spaces are carpeted and the exposed maintenance area slab shows the concrete to be in good condition with no observed cracks visible. A floor drain in the vehicle maintenance area runs to a below grade oil-water separator outside the building. On the northwest portion of the building and outside the extent of the groundwater plume, a utility piping chase pit associated with steam heat system has been noted to fill with water. Groundwater is assumed to be the source of water in the chase pit. Chemicals and equipment typical for vehicle maintenance can be found in the building; a hazardous materials storage cabinet for the shop is outside the building.

Figure 5-2. Building P704

The building is expected to have high air exchange rates with several windows that open and four garage bay doors that remain open during fair weather conditions. Heating, Ventilation and Air Conditioning (HVAC) system includes four 1200 cubic feet per minute (cfm) air handling units as well as window air conditioning units in office spaces.

Building P711, constructed in 1968, is a corrugated metal out-building with concrete slab floor with two garage bay roll up doors and four walk-out doors. Concrete slab is in excellent condition with no visible cracks. The building is used as a public works facility by seven contractor maintenance personnel and is not typically occupied full time (40-hour week) as personnel muster in Building 711 in the morning, at lunch, and at the end of the work day, while leaving the building for daily work sites across the base. P711 is also used for storage. There is a potential that Building P711 will be demolished in 2018 or if not slated for demolition may be used as a training facility for the Marine Corps.

P711is expected to have high air exchange rates with garage bay doors that remain open during fair weather conditions. HVAC system includes one 1200 cfm air handling unit.

Constructed since 2004, Building P713 is a brick and metal slab-on-grade structure that is used only for storage with no office space or heating and air systems.

5.3.3 Vapor Intrusion Conceptual Site Model Site SS-009

The potential vapor source at Site SS-009 is TCE groundwater plume about 0.6 acres in size with maximum TCE concentration of 9.9 µg/L (Figure 5-3). Two buildings: SS605 and SS606 are located with 100 ft of the plume. Depth to groundwater measured in 2011 generally ranged from

six to ten feet below ground surface and occurs in silty clay overburden soils overlying weathered shale bedrock. Building characteristics most relevant to the VI pathway are summarized below.

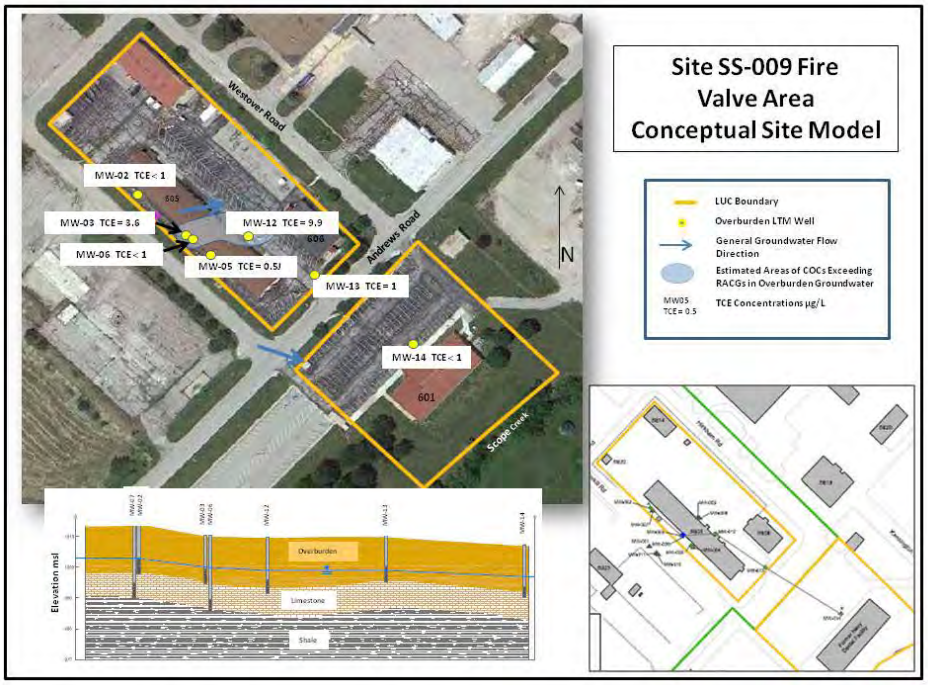

Figure 5-3. SS-009 Conceptual Site Model

Building SS605, constructed in 1953, is concrete slab-on-grade with stucco exterior walls. SS605 is about 15,800 ft^2 with approximately 3,000 ft^2 of open area and the majority comprised of individual office/classroom spaces. Most spaces have windows that open and are commonly open during fair weather. There is currently no full-time (40hr-week) occupancy of SS605. Current Port Authority tenant is the Metropolitan Community College using about 4,000 ft^2 for classroom space for about 4 hours/week-day for adult education (welding training). It is the expectation of the Port Authority to market the remaining space to future tenants as office space.

About 80% of the concrete floor is carpeted. Based on recently pulled carpet and inspection of non-carpeted areas, the concrete slab is in good condition with no visible cracks. High air exchange rates are expected with the six HVAC system air handling units and roof vents that range in capacity from 2,200 to 4,000 cfm.

Figure 5-4. Building 605

Similar to SS605, Building SS606 is concrete slab-on-grade with stucco exterior walls. SS606 is about 4,500 ft^2 with approximately 400 ft^2 of basement (8-10 ft below grade) mechanical room for boiler and water heater. The mechanical room does not overly the plume and no moisture problems have been identified in the mechanical room. Concrete floors are in good condition. Building 606 is comprised of individual office spaces; most spaces have windows that open and are expected to be open during fair weather.

Building 606 is currently vacant. It is the expectation of the Port Authority to market the building to future tenants as office space. High air exchange rates are expected with one 3,800 cfm and one 1,200 cfm HVAC system units and roof vents.

5.3.4 VI Evaluation

A multiple line of evidence approach was used for the VI evaluation in this 2012 Five-Year Review, including consideration of the magnitude of potential vapor sources, distance from vapor sources to buildings, building characteristics, and potential use and occupancy of the buildings. In addition, consistent with previous vapor intrusion evaluations at the Sites, the Johnson and Ettinger (J&E) Model was used to estimate potential risks should vapor intrusion occur for current industrial land use as well as the most conservative potential future residential land use.

Johnson and Ettinger Model

As noted in the previous Five-Year Review, the VI pathway was initially evaluated at Richards-Gebaur AFB as part of the 2002 Feasibility Study [Reference 13]. The 2002 VI evaluation using the J&E Model concluded no unacceptable industrial or residential exposure risks (cancer risk within 10^{-6} and 10^{-4} and hazard index less than one) for the VI pathway. Appendix I of the 2007 Five-Year Review documented an updated VI evaluation using version 3.1 of the 2004 J&E Model and taking into account current toxicity values for TCE (CalEPA toxicity value and EPA provisional value). For this 2012 Five-Year Review, the VI pathway was evaluated using the same version 3.1 of the 2004 J&E Model. The only model inputs that were updated/changed were:

- Initial groundwater concentrations based on maximum detected TCE groundwater concentrations measured in 2011
- Depth to groundwater based on water levels measured in 2011
- Updated 2011 Integrated Risk Information System (IRIS) toxicity profile for TCE (http://www.epa.gov/iris/subst/0199.htm) inhalation unit risk factor (URF) of $4.1x10^{-6}$ $(\mu g/m^3)^{-1}$ for cancer and an inhalation non-cancer reference concentration (RfC) of 2x10-3 $\mu g/m^3$.

All other inputs to the 2012 model runs remained the same as the initial 2002 VI evaluation. Model input parameters are provided in Appendix I and demonstrate there are no unacceptable vapor intrusion risks for future residential or current industrial land use. Table 5-3 below summarizes vapor intrusion risk estimates from the J&E Model.

Table 5-3. Vapor Intrusion Risk Summary Results for TCE

Richards Gebaur AFB Sites SS 003 and SS 009 Vapor Intrusion Risk Summary Results for TCE Johnson & Ettinger Model V3.1 2004					
Site / Building	**2011 TCE Source Concentration (µg/L)**	**Industrial Exposure Lifetime Cancer Risk**	**Industrial Exposure Non cancer Hazard**	**Residential Exposure Lifetime Cancer Risk**	**Residential Exposure Non cancer Hazard**
SS-003 Oil Saturated Area / Building P704	12.1	$9.1x10^{-9}$	$3.1x10^{-3}$	$5.2x10^{-8}$	$1.5x10^{-2}$
SS-009 Fire Valve Area / Building S605	9.9	$6.6x10^{-9}$	$2.3x10^{-3}$	$3.8x10^{-8}$	$1.1x10^{-2}$
Notes: TCE updated IRIS values used in Model: RFC 0.002 mg/m3; URF 4.1 $x10^{-6}$ µg/m3					

Potential vapor intrusion is not a concern at Sites SS-003 or SS-009 based on the following:

- Vapor source strength in groundwater is very low (12 µg/L for SS-003) with maximum concentrations only slightly above the drinking water standard of 5 µg/L
- Building characteristics inhibiting vapor migration across the foundation based on good condition and high integrity of slab foundations
- Building characteristics suggestive of well ventilated structures with typical or higher than typical air exchange rates based on open bay garage doors, open windows, and high efficiency HVAC systems.
- Building characteristics with a potential to enhance vapor intrusion (SS-003chase pit at Bldg. P704 and SS-009 basement mechanical room at Bldg. 605) do not overly the groundwater plume.
- No estimated unacceptable risks based on J&E Model using 2011 maximum concentrations of TCE for current receptors or the most conservative future residential receptors.

Vapor intrusion is not a concern at the current time based on the multiple lines of evidence presented herein. The Navy will include vapor intrusion consideration in the 5 year reviews as long as volatile organic compounds are present in groundwater above levels of concern.

5.4 Technical Assessment Summary

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

Yes. The LUCs required by the ROD (i.e., restrictions prohibiting extraction and use of groundwater and land surface activities that may interfere with or damage the on-site monitoring wells) were included in the Deed at the time of property transfer to the City of Kansas City and have been included in the USMC's Master Plan. A LUC inspection was conducted annually in accordance with ROD requirements, and there was no evidence indicating that the LUCs had been violated. One monitoring well was installed at Site SS-003 as part of the on-going long-LTM and groundwater is not extracted or used for any purpose, nor has any other significant development occurred on either of the OU 2 sites SS-003 and SS-009.

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

Yes. Exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of remedy selection remain valid.

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

No. The five year review evaluated one issue that could potentially have an impact on the protectiveness for the OU 2 remedy which is potential vapor intrusion and the remedy has been determined to be protective.

6.0 ISSUES

Based on groundwater monitoring conducted from November 2009 – December 2011 for Site SS-003 and July 1998 – April 2012 for Site SS-009 , all of the chlorinated solvent plumes in OU 2 Site SS-003 and SS-009 are not moving and shrinking. The Trend Analysis for the sampling current and historic groundwater concentrations were plotted for trend analysis of the data from sites SS- 003 and SS-009 and are included in Appendix E and Appendix F, respectively. The groundwater plumes have been shown to be stable and the frequency of monitoring is not necessary to characterize the plume and to continue to monitor for degradation to RACGs.

Overall, COC concentrations indicate that the groundwater plumes remain well inside the LUC boundaries at both sites, and there is no indication that off-site migration is occurring.

An updated indoor air risk evaluation was conducted for Site SS-003 and SS-009. Because vapor intrusion is not a concern based on the multiple lines of evidence presented herein, future vapor intrusion evaluations are not recommended unless groundwater concentrations are observed to significantly (one or more orders of magnitude) increase during future monitoring events or there are significant structural failures to the buildings overlying the plume.

7.0 RECOMMENDATIONS AND FOLLOW UP ACTIONS

There are no recommendations required to resolve issues affecting protectiveness. Data results from the LTM program indicate groundwater contamination remains at both sites in concentrations above applicable RACGs. An analysis of the data from both sites indicates the groundwater contamination plumes are stable or decreasing in concentration.

As stated in the ROD, LUCs at both sites must remain in place until groundwater concentrations fall below applicable RACGs. The current strategy at both sites is to continue the LTM program and maintain the LUCs until natural attenuation of the groundwater plumes results in COC concentrations below applicable RACGs.

The following discussions include recommendations that optimize the LTM program and not implementing these recommendations will not affect the protectiveness of the remedies at the site.

No changes in exit strategy are recommended based on the current and historical data. The analytical suite for both sites has been minimized and no reductions are feasible or recommended at this time.

Concentrations of COCs in site groundwater at Site SS-003 are currently above RACGs, and will likely remain so for several years. It is therefore recommended that the sampling frequency be reduced to every other year beginning in April/May 2013 as allowed in the ROD. The plume is not moving and shrinking which supports reducing the frequency of sampling in accordance with the Decision Rule pertaining to LTM sampling frequency at the former Richards-Gebaur Air Force Base which states, “If three successive years of annual monitoring indicate that the groundwater contaminant plume is stable or shrinking, then monitoring frequency will be reduced to every five years to coincide with the mandatory five-year remedial performance review.”

Concentrations of COCs at site SS-009 continue to trend downward and there is no evidence that plume migration beyond the LUC boundaries is occurring. However, concentrations of COCs in site groundwater are currently above RACGs, and will likely remain so for several years. It is therefore recommended that the sampling frequency at site SS-009 be reduced to every other year beginning in April/May 2013 as allowed in the ROD. The plume is not moving and shrinking which supports reducing the frequency of sampling in accordance with the Decision Rule pertaining to LTM sampling frequency at the former Richards-Gebaur Air Force Base which states, “If three successive years of annual monitoring indicate that the groundwater contaminant plume is stable or shrinking, then monitoring frequency will be reduced to every five years to coincide with the mandatory five-year remedial performance review.”

For both sites SS-003 and SS-009, when COC concentrations approach RACGs, reverting back to annual monitoring may be warranted to meet the requirements for site closure in accordance with the Long Term Monitoring Plan, which states: “The LUCs will be removed when the

concentrations of contaminants in groundwater are below the RACGs listed in Table 2 for two (2) consecutive sampling events occurring at least three (3) months apart but no longer than one (1) year apart." [Reference 6].

Based on the Decision Rules, the current groundwater concentrations and the historical concentration trends, no additional monitoring wells are proposed. Wells at both sites are in good condition and do not require repair, replacement or abandonment.

An updated indoor air risk evaluation was conducted for Site SS-003 and SS-009. Because vapor intrusion is not a concern based on the multiple lines of evidence presented herein, future vapor intrusion evaluations are not recommended unless groundwater concentrations are observed to significantly (one or more orders of magnitude) increase during future monitoring events or there are significant structural failures to the buildings overlying the plume.

8.0 PROTECTIVENESS STATEMENTS

The remedial actions at OU 2, Site SS-003 and SS-009 are protective of human health and the environment and are anticipated to remain protective in the future. Groundwater at the former Richards-Gebaur AFB is not currently used for any purpose, and LUCs prohibiting extraction and use of groundwater at OU 2 Site SS-003 and Site SS-009 are adequate to ensure that exposures do not occur in the future. The LTM program supports the LUCs and allows periodic evaluation of groundwater quality to help ensure that the LUC boundaries fully encompass the contaminant plume and remain protective of human health and the environment. Overall, COC concentrations indicate that the groundwater plumes remain inside the LUC boundaries at both sites, and there is no indication that off-site migration is occurring.

The remedy at OU2 Groundwater at Sites SS-003 and SS-009 is protective of human health and the environment. (The first Five-Year Review addressed both OUs 1 and 2. OU 1 Sites included FT002 and ST005. OU 2 Sites included SS003, SS006, SS009, SS012, ST005 and ST011. This second Five-Year review will address OU 2 Sites SS-003 and SS-009 which are under the responsibility of the United States Marine Corps (USMC). The other sites in OU2 as well as the entire OU1 will be addressed in a separate Five-Year Review document prepared by United States Air Force (USAF) since this is under the responsibility of the USAF.)

9.0 NEXT REVIEW

The next Five-Year Review for OU 2, Site SS-003 and Site SS-009 is due within five years of the signature date on the cover of this five-year review report. The USMC will be responsible for the implementation of the environmental restoration program and completing the next five-year review. Planning and development of the next five year review should begin 12 months prior to the due date to ensure statutory deadline is met.

ACKNOWLEDGEMENTS

The map used on Figure 1-1 used *Wikipedia, The Free Encyclopedia*. Wales, Jimmy. last modified on 10 May 2012 at 03:04. Wikipedia Foundation, May 16, 2012, http://en.wikipedia.org/wiki/Richards-Gebaur_Air_Force_Base

The satellite views on the following Figures: (3-1, 3-2, 3-3, 3-4, 5-1 and 5-3) were obtained from Google Earth, last modified March 1, 2012, www.google.com/earth/

The information used to address question B utilized information provided to NAVFAC LANT by Dr. Resha M. Putzrath, Ph.D., DABT, Navy and Marine Corps Public Health Center; Portsmouth, VA, Resha.Putzrath@med.navy.mil

RFERENCES

[1] United States Environmental Agency, Office of Emergency and Remedial Response, *Comprehensive Five-Year Review Guidance,* Washington D. C.: 2001

[2] United States Air Force, Air Force Real Property Agency, *Five Year Review Report, First Five Year Review Report for Former Richards-Gebaur AFB,* Kansas City, Missouri: 2007

[3] Unites States Air Force and Department of the Navy, Air Force Conversion Agency and United States Marine Corps, *Memorandum of Agreement for the Transition of the Environmental Program of Richards-Gebaur Air Force Base between the Unites States Marine Corps and Air Force Conversion Agency,* Kansas City, Missouri: 1998

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[5] Department of the Navy, Base Realignment and Closure Program Management Office Southeast, *Finding of Suitability to Transfer Marine Corps Activity,* Kansas City, Missouri: 2011

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APPENDIX A

AFFIDAVIT OF PUBLICATION

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APPENDIX A – AFFIDAVIT OF PUBLICATION

AFFIDAVIT OF PUBLICATION

THE McCLATCHY COMPANY, publishers of
THE KANSAS CITY STAR, a newspaper published in
the City of Kansas City, County of Jackson, State of
Missouri, confirms that the notice and/or advertisement of

URS CORPORATION
8300 COLLEGE BLVD.
OVERLAND PARK, S 66210
25146850

3441000

a true copy of which is hereto attached,
was duly published in the above said newspaper

FOR THE PERIOD OF: 1 Day (s)

COMMENCING: January 25, 2012

ENDING: January 25, 2012

STAR EDITION (S): 1/25 (Zone only)

STAR PAPER (S): #130

VOLUME: #132

Subscribed and sworn to before
me, this 25th day of January, 2012.
I certify that I was duly qualified as
a Notary Public for the State of Missouri,
commissioned in Jackson County, Missouri.
My commission expires September 10, 2014.

Laura S. Keeling
LAURA S. KEELING, NOTARY

LAURA S. KEELING
Notary Public
Commissioned for Jackson County
My Commission Expires: September 10, 2014
Commission Number: 10429929

PUBLIC NOTICE
THE AIR FORCE REAL PROPERTY AGENCY AND THE NAVY FACILITIES COMMAND ARE CONDUCTING CERCLA FIVE-YEAR REVIEWS AT THE FORMER RICHARDS-GEBAUR AIR FORCE BASE, MO

The United States Air Force Real Property Agency (AFRPA) and the Naval Facilities Engineering Command (NAVFAC) are conducting the second five-year review of the selected remedy that is being implemented to address environmental contamination at the former Richards-Gebaur Air Force Base (AFB). The remedy consists of land use controls designed to limit exposure to groundwater contaminated with chlorinated solvents in isolated locations and long-term groundwater monitoring. The Air Force will be conducting the five-year review for Sites ST 005 (the Petroleum, Oil and Lubricants (POL) Yard), SS 006 (Hazardous Materials Storage Area), ST 011 (Underground Storage Tank 620A), and SS 012 (the Communication Facility). The Navy will be conducting the five-year review for Sites SS 003 (Oil Saturated Area) and Site SS 009 (Fire Valve Area).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), reviews of long-term remedial actions are required every five years to ensure continued protection of human health and the environment until cleanup requirements are met. The last five-year review was approved in March 2007. This review will be completed between January 2012 and May 2012, during which time input from the public will be considered. A subsequent public notice will announce the completion and approval of the five-year review, at which time the final document will be provided for public review at the Greenview Mid-Continent Public Library.

If you have questions or comments, or would like more information on the sites under review, please contact:

For the Air Force:
Ms. Kay Greisiaka
AFCEE/EXC/Former Richards-Gebaur AFB
2261 Hughes Avenue, Suite 155
Lackland AFB, TX 78236-9853
210-395-8272
kay.greisiaka@us.af.mil

For the Navy:
Commander, NAVFAC Atlantic
Attn: Mr. Tim Riordan, Code EV31
6506 Hampton Blvd, Bldg A
Norfolk, VA 23508
757-322-8118 timothy.p.riordan@navy.mil

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APPENDIX B

INTERVIEW DOCUMENTATION

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APPENDIX B – INTERVIEW DOCUMENTATION

Property Owners/Tenants Interviews for Kansas City Five Year Review

Participants:	Ron Phelps	Jim Webb
Organization:	Asset Management and Assessment Branch Facilities, Marine Forces Reserves	Asset Management and Assessment Branch Facilities, Marine Forces Reserves
Phone Number:	(816) 843-3745	(816) 843-3746
e-mail:	Ronald.o.phelps.ctr@usmc.mil	James.p.webb.ctr@usmc.mil
Interviewers:	Jan Nielsen, NAVFAC LANT	Donna Caldwell, LANT
Date:	Monday, May 14, 2012, 7:00 AM	
Location:	Telephone Interview	

	Question	Response
1.	What is your overall impression of the project?	Comfortable, relaxed, several sets of visitors have visited the site to view the site and well heads
2.	What effects have site operations had on the surrounding community?	Nil. Sampling wells heads are all mostly inside of the compound. Public is not impacted by the site. The plume and well heads are inside the LUC boundaries and all on DoD owned property. Have not slowed down any of the operations at the site.
3.	Are you aware of any community concerns regarding the site or its operation and administration?	None.
4.	Are you aware on any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses? Details.	No and have been involved and located here for 10 years.
5.	Do you feel well informed about the site's activities and progress?	OK. Would like to be included on the distribution for the annual reports and five year reviews.
6.	Have there been routine communications or activities (site visits, inspections, reporting activities, etc) conducted by your office regarding the site? Details.	Annual site visits and communications are good during the sampling efforts. The teams accessing the site always give notice of need to enter. We are the point of contact for these visits for access.
7.	Do you have any comments, suggestions, or recommendations regarding the site's management or operation?	Would like to have the data from the LTM annual reports and sampling efforts. Would also like to have a copy of the Five Year Review Report.

Additional Information:

- There is an area in building 704 that is below grade and fills with water on a regular basis. Would like the data on the plume so the potential concentrations of chemicals could be shared with the disposal facility for the water. Pumping of the pipe chase pit has not been continued because they did not want to impact the plume and the water may be groundwater. The pit is not within the plume boundaries but is located in the general area of the plume.
- Would like to know the anticipated and projected length of time that actions will be going on at the site for the Plume. Anticipates seeing this in the reports.
- There was significant discussion on the current and future use of the buildings on the site, the construction and condition of the buildings. This information is presented separately as part of the vapor intrusion discussion in the Five Year Review Report.

APPENDIX B – INTERVIEW DOCUMENTATION

Property Owners/Tenants Interviews for Kansas City Five Year Review

Participants:	Zoraya Lara	William Rulon	David Criswell, P.E.
Organization:	Kansas City Port Authority	Kansas City Port Authority	Navy BRAC Program Management Office Southeast
Title:	Associate Director, Real Estate and Trade	Superintendent	Deputy Base Closure Manager
Phone Number:	816-559-3722		(843) 743-2130
e-mail:	zlora@kcportauthority.com		david.criswell@navy.mil
Interviewers:	Jan Nielsen, NAVFAC LANT	Donna Caldwell, LANT	
Date:	Friday, May 11, 2012, 10:00 AM		
Location:	Telephone Interview		

Questions:

	Question	Response
1.	What is your overall impression of the project?	Fine, Port Authority is happy with the project
2.	Have there been any complaints, violations or other incidents related to the site that you are aware of?	No, no incidents
3.	Do you feel well informed about the site's activities and progress?	Yes
4.	Do you have any comments, suggestions, or recommendations regarding the site's management or operation?	No, everything is fine
5.	What are the construction plans for this site?	Leasing the buildings for office and classroom use. Not all areas are currently leased but they are marketing the property for office use. There is currently a tenant in Building 605 that uses the area for classroom training.
6.	Do you know who to contact with any questions or concerns?	Yes, the BRAC Point of Contact, David Criswell

Additional Information: There was significant discussion on the current and future use of the buildings on the site, the construction and condition of the buildings. This information is presented separately as part of the vapor intrusion discussion in the Five Year Review Report.

I shared with Ms. Lara the interest from Mr. Dawson of Heart N Hands in being invited to future public meetings on use of the Port Authority Site since it is adjacent to his area. I provided Ms. Lara, Mr. Dawson's e-mail and contact information.

APPENDIX B – INTERVIEW DOCUMENTATION

Property Owners/Tenants Interviews for Kansas City Five Year Review

Interviewee:	Rick Dawson
Organization:	Heart N Hand
Title:	Executive Director
Phone Number:	(816)322-1133
e-mail:	hhhcenter@gmail.com
Interviewer:	Jan Nielsen, NAVFAC LANT
Date:	Monday, May 7, 2012 – 12:00 Noon
Location:	Telephone Interview

	Question	Response
1.	What is your overall impression of the project?	OK, likes the location and neighbors
2.	Have there been any complaints, violations or other incidents related to the site that you are aware of?	HNH site is a fenced in lot and they had a good relationship with the neighbors that are currently in place.
3.	Do you feel well informed about the site's activities and progress?	Yes but would like to be included on the invites to public meetings that the Port Authority hosts on planned actions on their site.
4.	Do you have any comments, suggestions, or recommendations regarding the site's management or operation?	A concern (not CERCLA related) that the fire alarm in their building has a panel box for their building and another building. Mr. Dawson can send the building number. The concern is the alarm keeps going off for the other building and he has to keep turning the power off to reset. Who can Mr. Dawson contact to resolve?
5.	What are the construction plans for this site?	Currently used as a warehouse and there are no anticipated changes in the use for the future
6.	Do you know who to contact with any questions or concerns?	Mr. Dawson's initial point of contact would be EPA. I indicated I would send the Navy BRAC point of contact to Mr. Dawson in case he had any questions or concerns related to the CERCLA issues on the property.

Additional Information:

I forwarded Mr. Dawson's questions to Mr. David Criswell, Deputy Base Closure Manager, Navy BRAC Program Management Office Southeast. Mr. Criswell provided the following points of contact:

Kansas City Port Authority (Fire Alarm):
Joe Perry
Director of Real Estate and Development
300 Wyandotte, Suite 100,
Kansas City, Missouri 64105
816-559-3750 (office) 816-559-3759 (fax)

jperry@kcportauthority.com

Regarding CERCLA related environmental concerns; your point of contact for the Navy is Ms. Thuane Fielding.

Thuane Fielding
Base Closure Manager
Navy BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, SC 29405
phone number 843-743-2133,
thuane.fielding@navy.mil

I also provided a point of contact for the Port Authority for invitations to future public meetings:

Zoraya Lara
Associate Director, Real Estate and Trade
300 Wyandotte, Suite 100
Kansas City, MO 64105
Phone: 816-559-3722
Fax: 816-559-3759

zlara@kcportauthority.com
www.kcportauthority.com

APPENDIX C

LAND USE CONTROL BOUNDARIES

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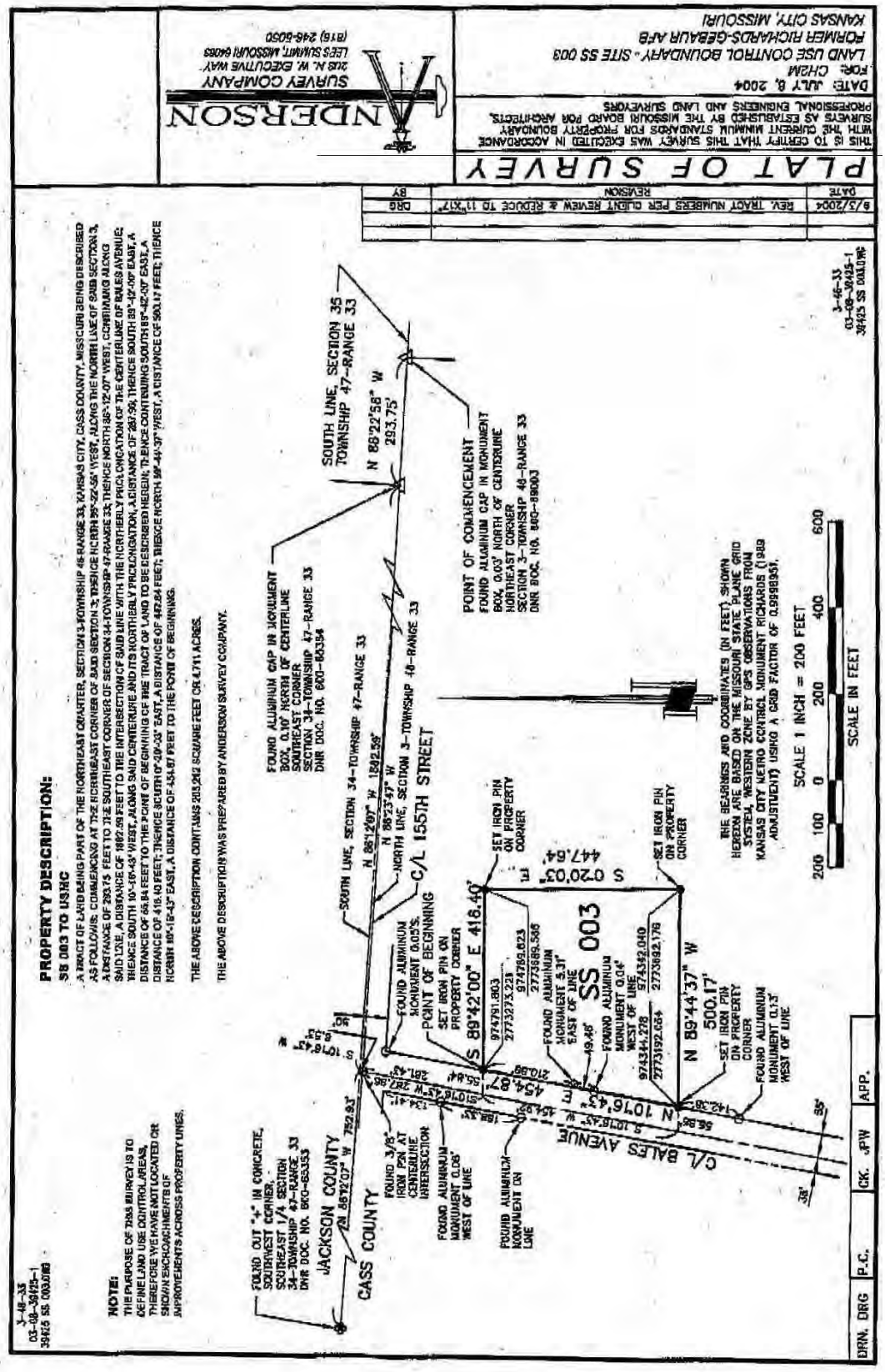
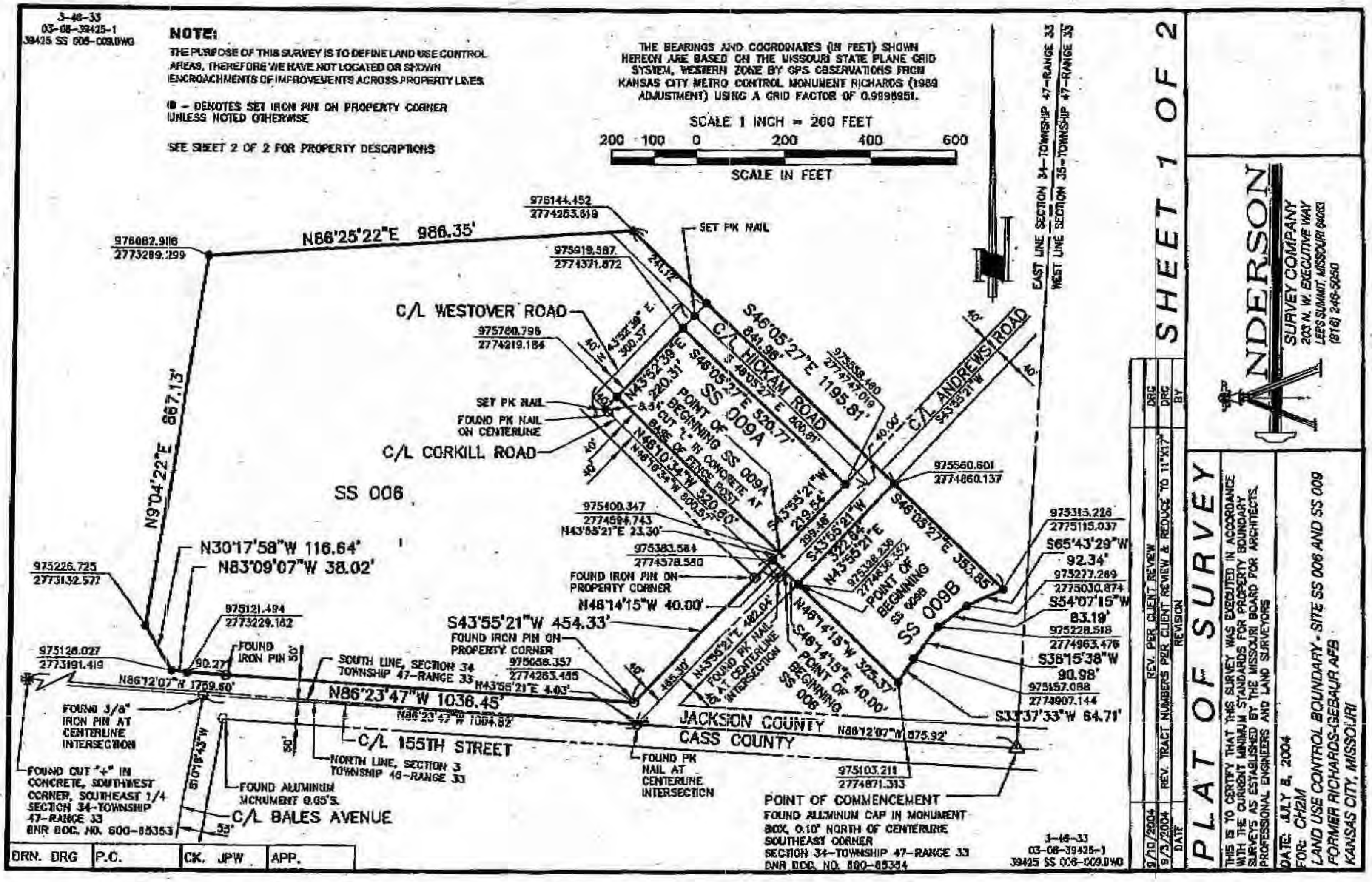
APPENDIX C – LAND USE CONTROL BOUNDARIES



APPENDIX C – LAND USE CONTROL BOUNDARIES



3-48-33
03-08-39425-1
39425 SS 008-009.DWG

PROPERTY DESCRIPTION:

SS 008 TO KANSAS CITY 2004

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 88°-12-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET TO THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 40.00 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD; THENCE SOUTH 43°-55'-21" WEST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH SAID CENTERLINE, A DISTANCE OF 454.33 FEET TO THE NORTH RIGHT OF WAY LINE OF SAID 155TH STREET; THENCE NORTH 88°-23'-47" WEST, ALONG SAID RIGHT OF WAY LINE 60.00 FEET NORTH OF AND PARALLEL WITH THE CENTERLINE OF SAID 155TH STREET, A DISTANCE 1038.45 FEET; THENCE NORTH 83°-09'-07" WEST, A DISTANCE OF 39.02 FEET; THENCE NORTH 30°-17'-53" WEST, A DISTANCE OF 118.54 FEET; THENCE NORTH 5°-01'-22" EAST, A DISTANCE OF 887.19 FEET; THENCE NORTH 35°-26'-27" EAST, A DISTANCE OF 693.35 FEET; THENCE SOUTH 48°-05'-27" EAST, ALONG THE NORTHEASTERLY RIGHT OF WAY OF HICKAM ROAD AND ITS NORTHWESTERLY AND SOUTHEASTERLY PROLONGATION, A DISTANCE OF 841.99 FEET TO THE SOUTHEASTERLY RIGHT OF WAY LINE OF ANDREWS ROAD; THENCE SOUTH 43°-55'-21" WEST, 40.00 FEET SOUTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 322.64 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 40.00 FEET TO THE POINT OF BEGINNING, EXCEPT FOR THE FOLLOWING DESCRIBED TRACT OF LAND.

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 88°-12-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 40.00 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH SAID CENTERLINE, A DISTANCE OF 23.30 FEET TO THE POINT OF INTERSECTION OF SAID NORTHWESTERLY RIGHT OF WAY LINE AND THE NORTHEASTERLY RIGHT OF WAY LINE OF CORNILL ROAD, SAID POINT ALSO BEING THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 48°-10'-34" WEST, ALONG SAID NORTHEASTERLY RIGHT OF WAY LINE 40.00 FEET NORTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 220.69 FEET; THENCE NORTH 43°-52'-39" EAST, ALONG THE SOUTHEASTERLY RIGHT OF WAY LINE OF WESTOVER ROAD 40.00 FEET SOUTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 220.31 FEET; THENCE SOUTH 48°-05'-27" EAST, ALONG THE SOUTHWESTERLY RIGHT OF WAY LINE OF HICKAM ROAD 40.00 FEET SOUTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 520.77 FEET; THENCE SOUTH 43°-55'-21" WEST, ALONG THE NORTHWESTERLY RIGHT OF WAY OF SAID ANDREWS ROAD 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 219.64 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIPTION CONTAINS 1,282,239 SQUARE FEET OR 29.687 ACRES MORE OR LESS.

THE ABOVE THE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

PROPERTY DESCRIPTION:

SS 008A TO USMC

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 88°-12-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 40.00 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH SAID CENTERLINE, A DISTANCE OF 23.30 FEET TO THE POINT OF INTERSECTION OF SAID NORTHWESTERLY RIGHT OF WAY LINE AND THE NORTHEASTERLY RIGHT OF WAY LINE OF CORNILL ROAD, SAID POINT ALSO BEING THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 48°-10'-34" WEST, ALONG SAID NORTHEASTERLY RIGHT OF WAY LINE 40.00 FEET NORTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 520.69 FEET; THENCE NORTH 43°-52'-39" EAST, ALONG THE SOUTHEASTERLY RIGHT OF WAY LINE OF WESTOVER ROAD 40.00 FEET SOUTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 220.31 FEET; THENCE SOUTH 48°-05'-27" EAST, ALONG THE SOUTHWESTERLY RIGHT OF WAY LINE OF HICKAM ROAD 40.00 FEET SOUTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 520.77 FEET; THENCE SOUTH 43°-55'-21" WEST, ALONG THE NORTHWESTERLY RIGHT OF WAY OF SAID ANDREWS ROAD 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 219.64 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIPTION CONTAINS 114,543 SQUARE FEET OR 2.295 ACRES MORE OR LESS.

THE ABOVE THE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

PROPERTY DESCRIPTION:

SS 009B TO USMC

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 88°-12-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET; THENCE SOUTH 46°-14'-15" EAST, A DISTANCE OF 40.00 FEET TO THE SOUTHEASTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD AND THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 43°-55'-21" EAST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET SOUTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 322.64 FEET; THENCE SOUTH 46°-05'-27" EAST, ALONG THE SOUTHEASTERLY PROLONGATION OF THE NORTHEASTERLY RIGHT OF WAY LINE OF HICKAM ROAD, A DISTANCE OF 353.26 FEET; THENCE SOUTH 85°-43'-29" WEST, A DISTANCE OF 82.34 FEET; THENCE SOUTH 54°-07'-15" WEST, A DISTANCE OF 83.19 FEET; THENCE SOUTH 38°-19'-35" WEST, A DISTANCE OF 90.95 FEET; THENCE SOUTH 33°-37'-33" WEST, A DISTANCE OF 84.71 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 325.37 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIPTION CONTAINS 102,912 SQUARE FEET OR 2.363 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

3-48-33
03-08-39425-1
39425 SS 008-009.DWG

DRN. DRG	P.C.	CK. JPW	APP.

DATE	REVISION	BY
9/10/2004	REV. PER CLIENT REVIEW	DRG
5/3/2004	REV. TRACT NUMBERS PER CLIENT REVIEW & REDUCE TO 11"X17"	DRG

SHEET 2 OF 2

PLAT OF SURVEY

THIS IS TO CERTIFY THAT THIS SURVEY WAS EXECUTED IN ACCORDANCE WITH THE CURRENT MINIMUM STANDARDS FOR PROPERTY BOUNDARY SURVEYS AS ESTABLISHED BY THE MISSOURI BOARD FOR ARCHITECTS, PROFESSIONAL ENGINEERS AND LAND SURVEYORS

DATE: JULY 8, 2004
FOR: CH2M
LAND USE CONTROL BOUNDARY - SITE SS 008 AND SS 009
FORMER RICHARDS-GEBAUR AFB
KANSAS CITY, MISSOURI

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

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APPENDIX D

SITE SS-003 PLUME MAP AND TREND GRAPHS

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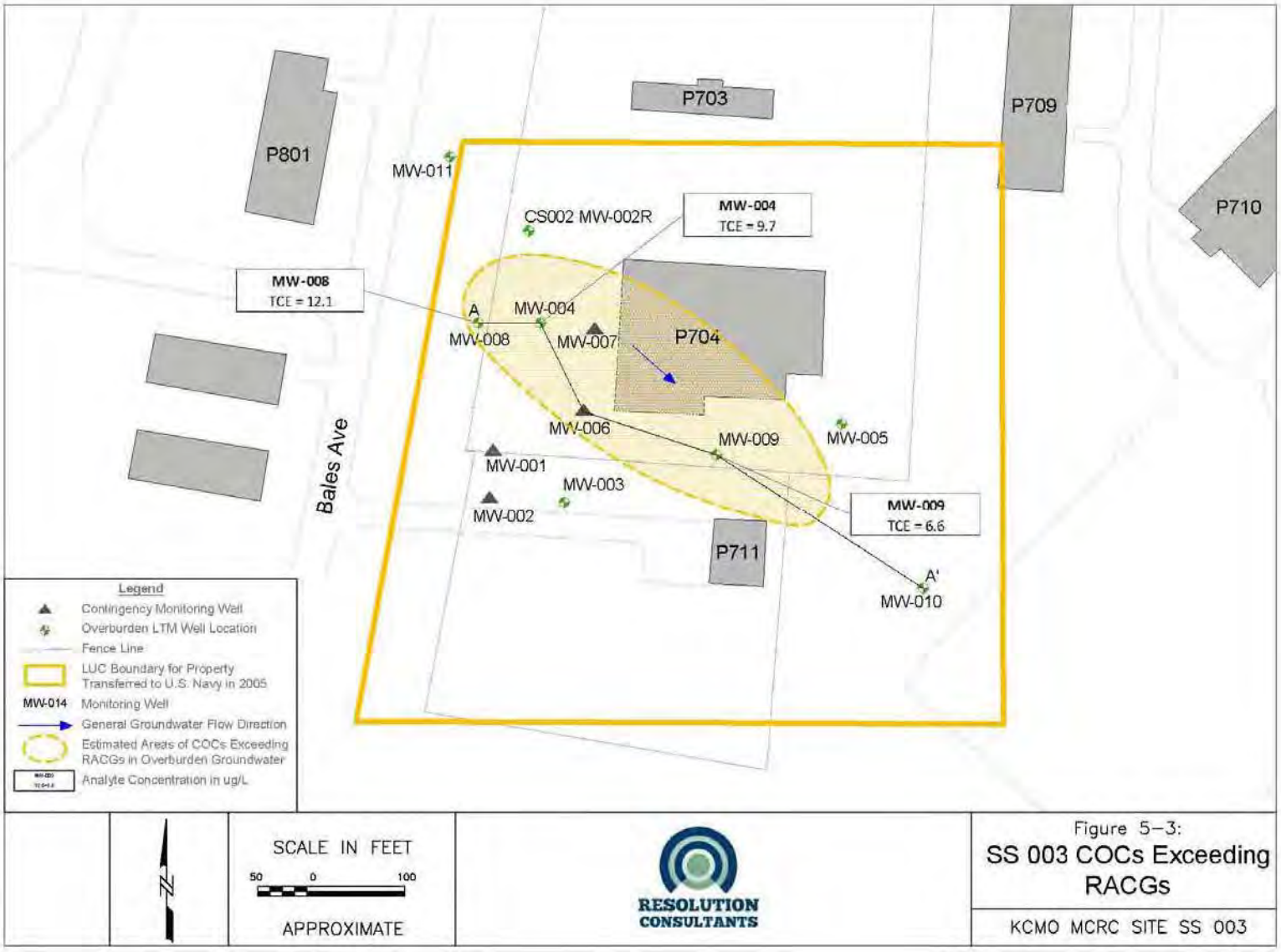
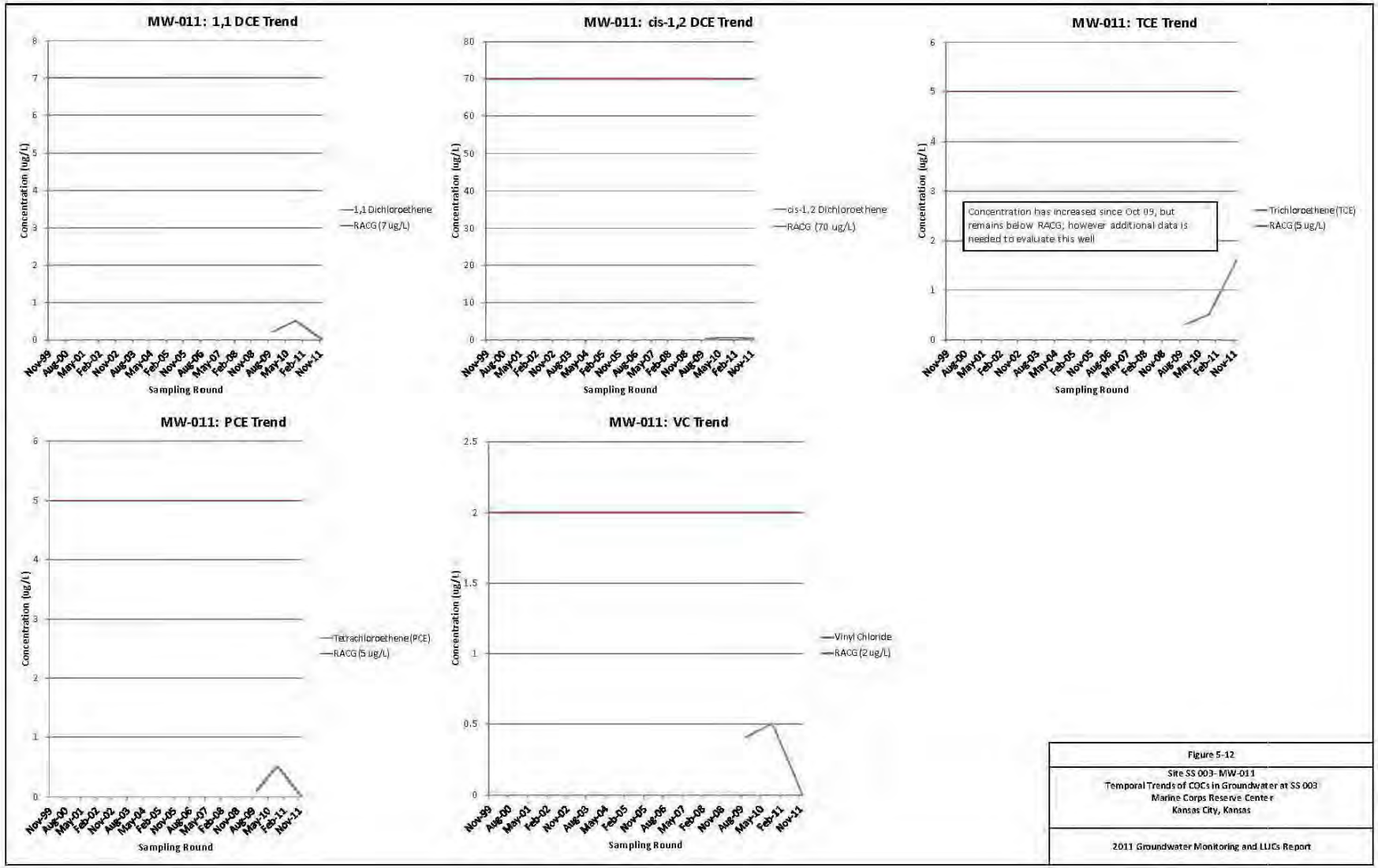
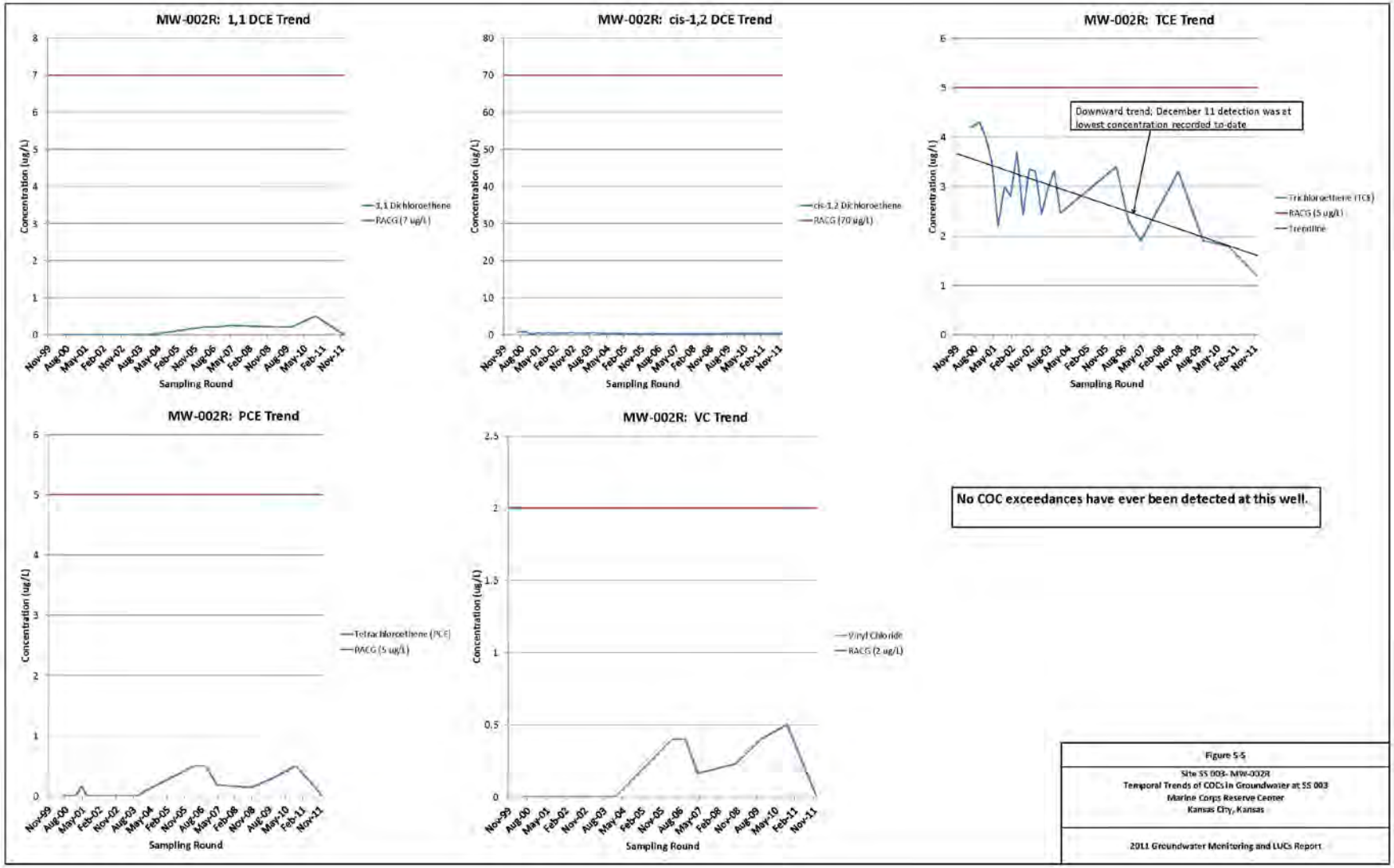
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



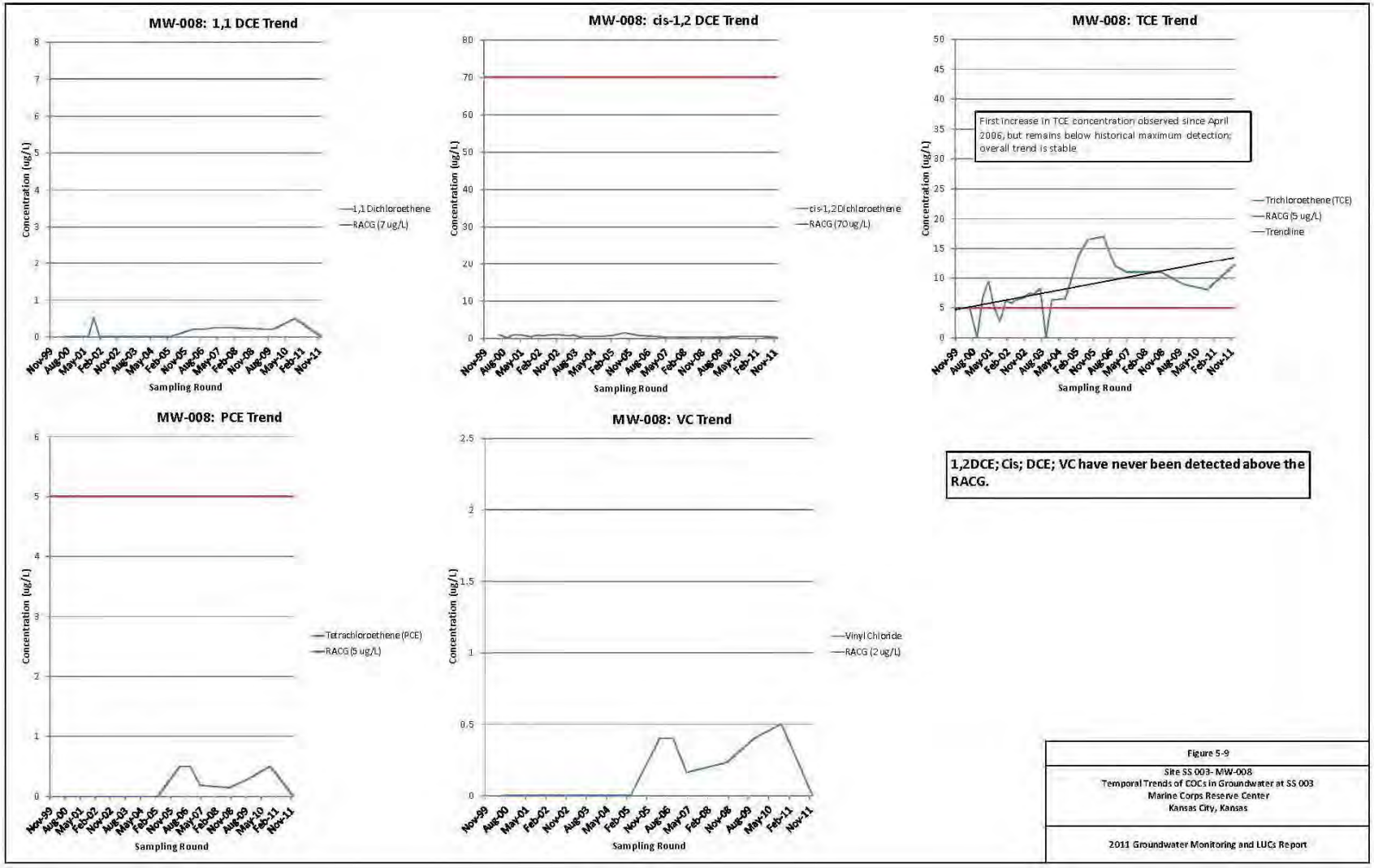
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



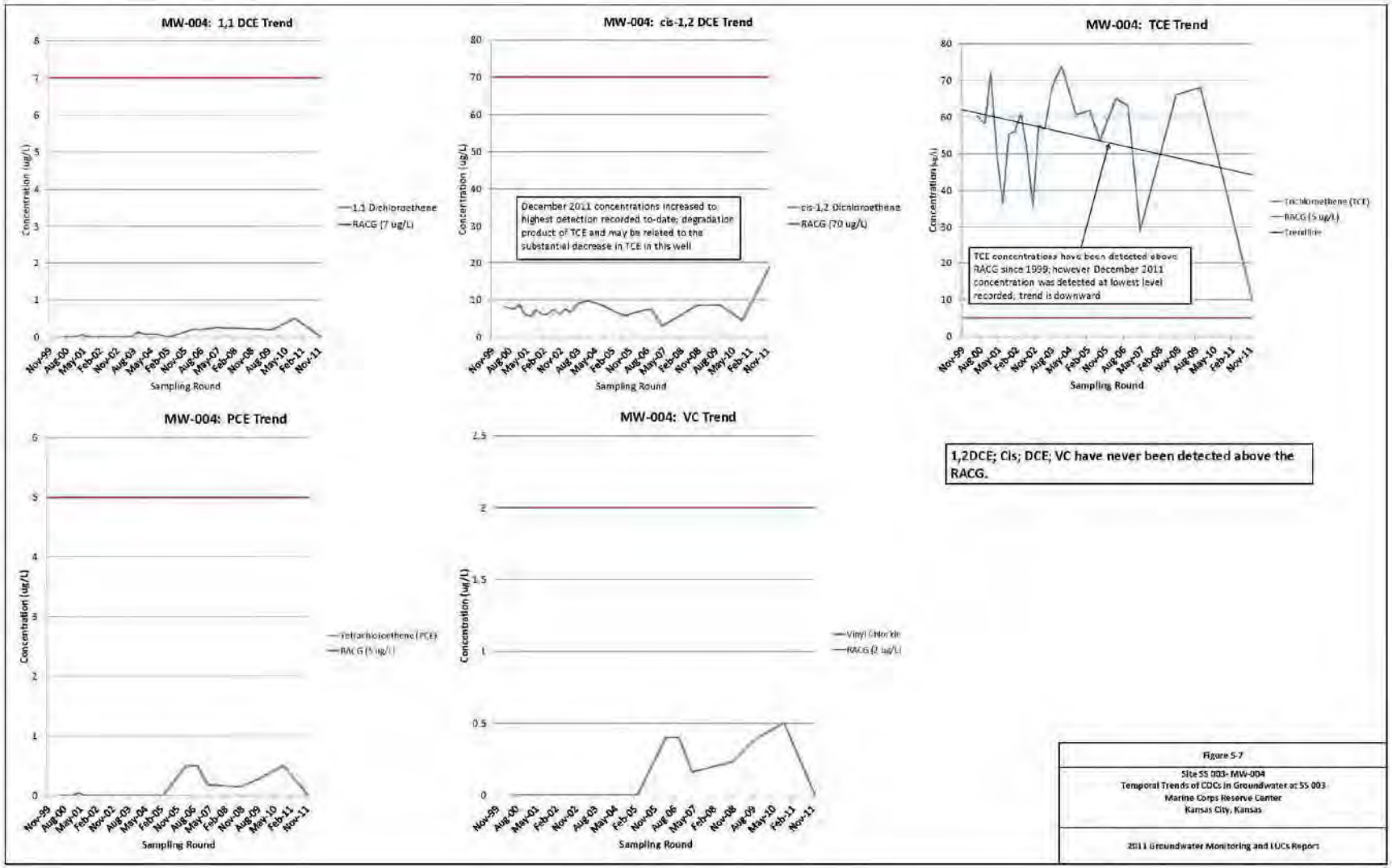
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



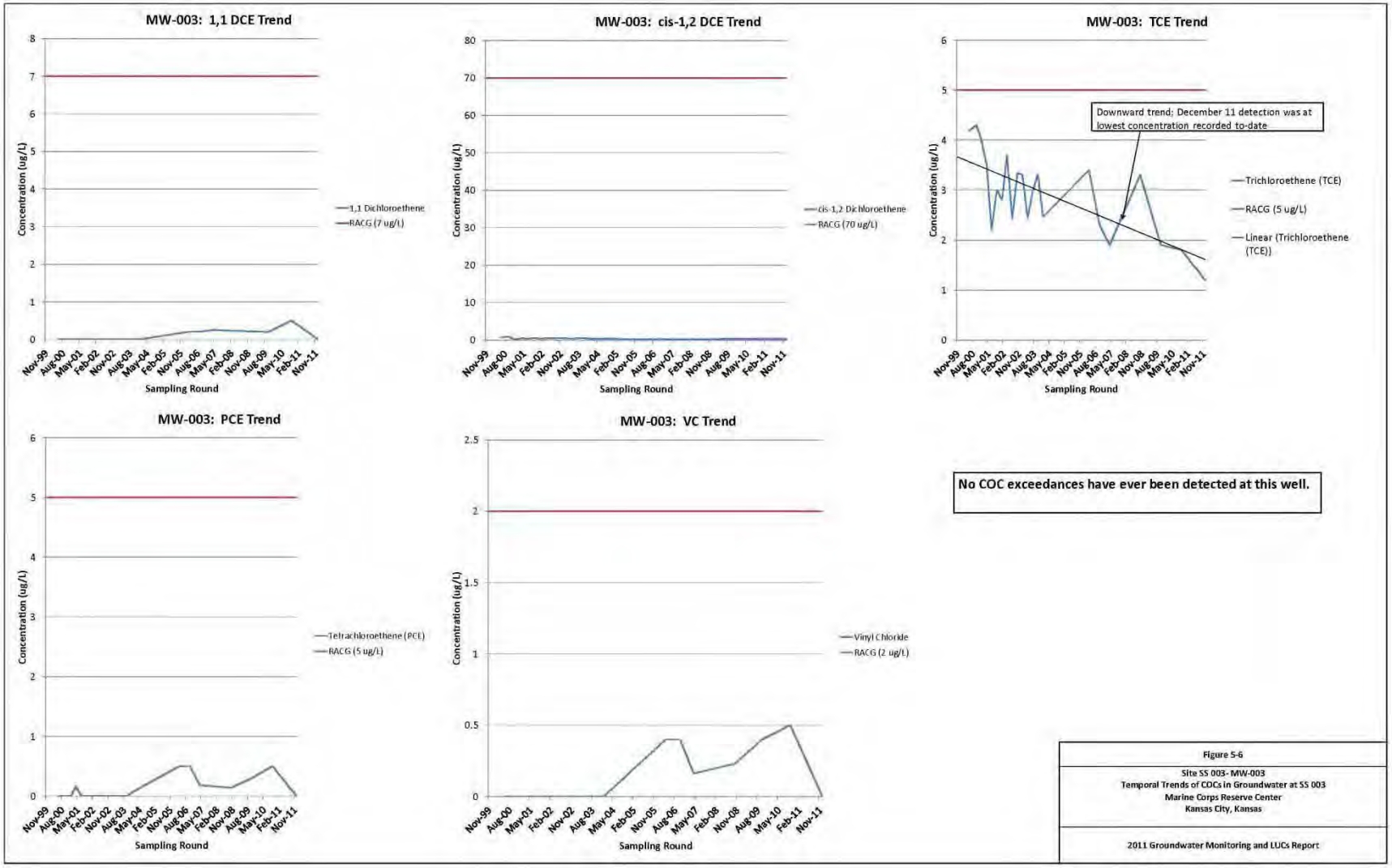
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



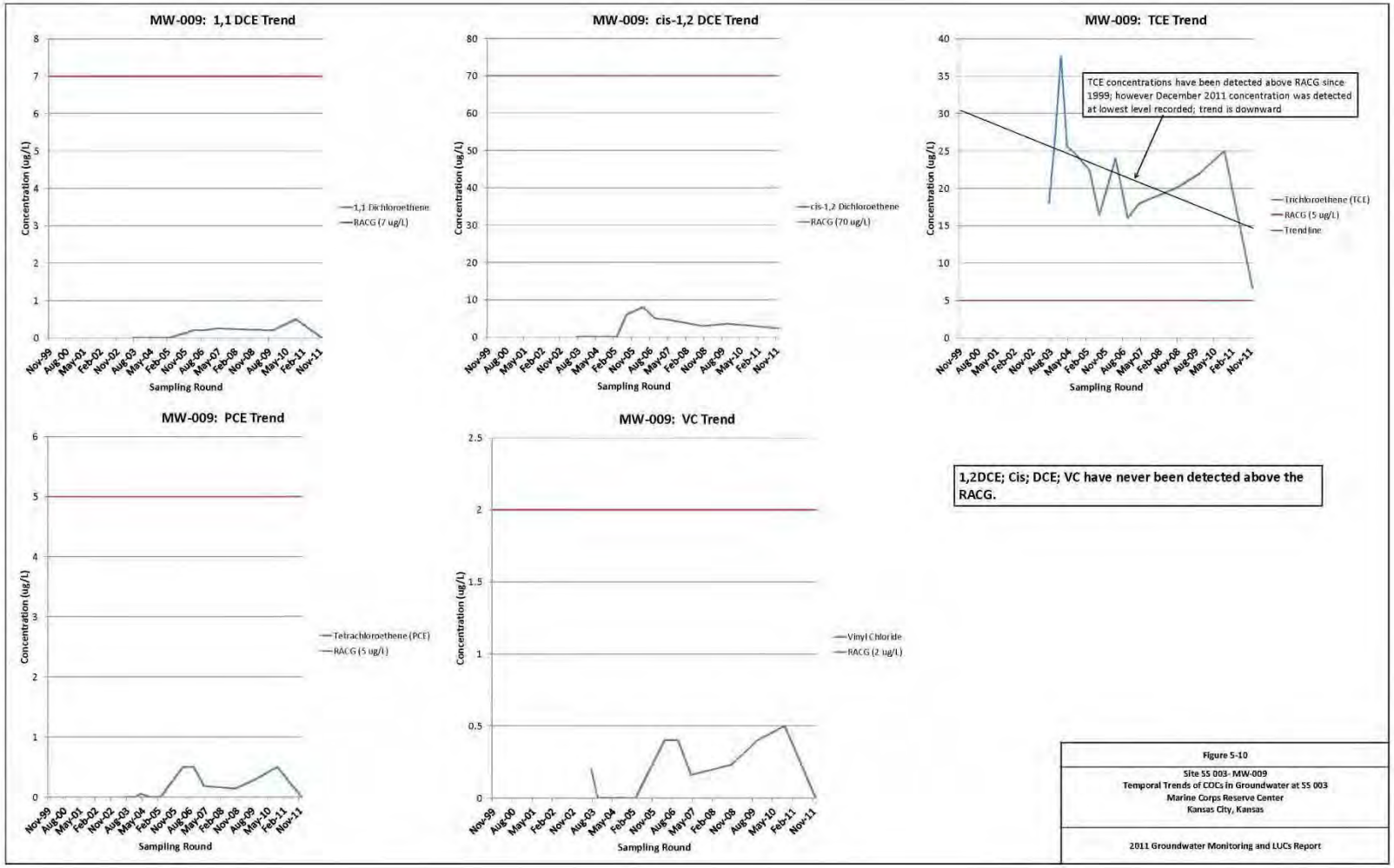
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



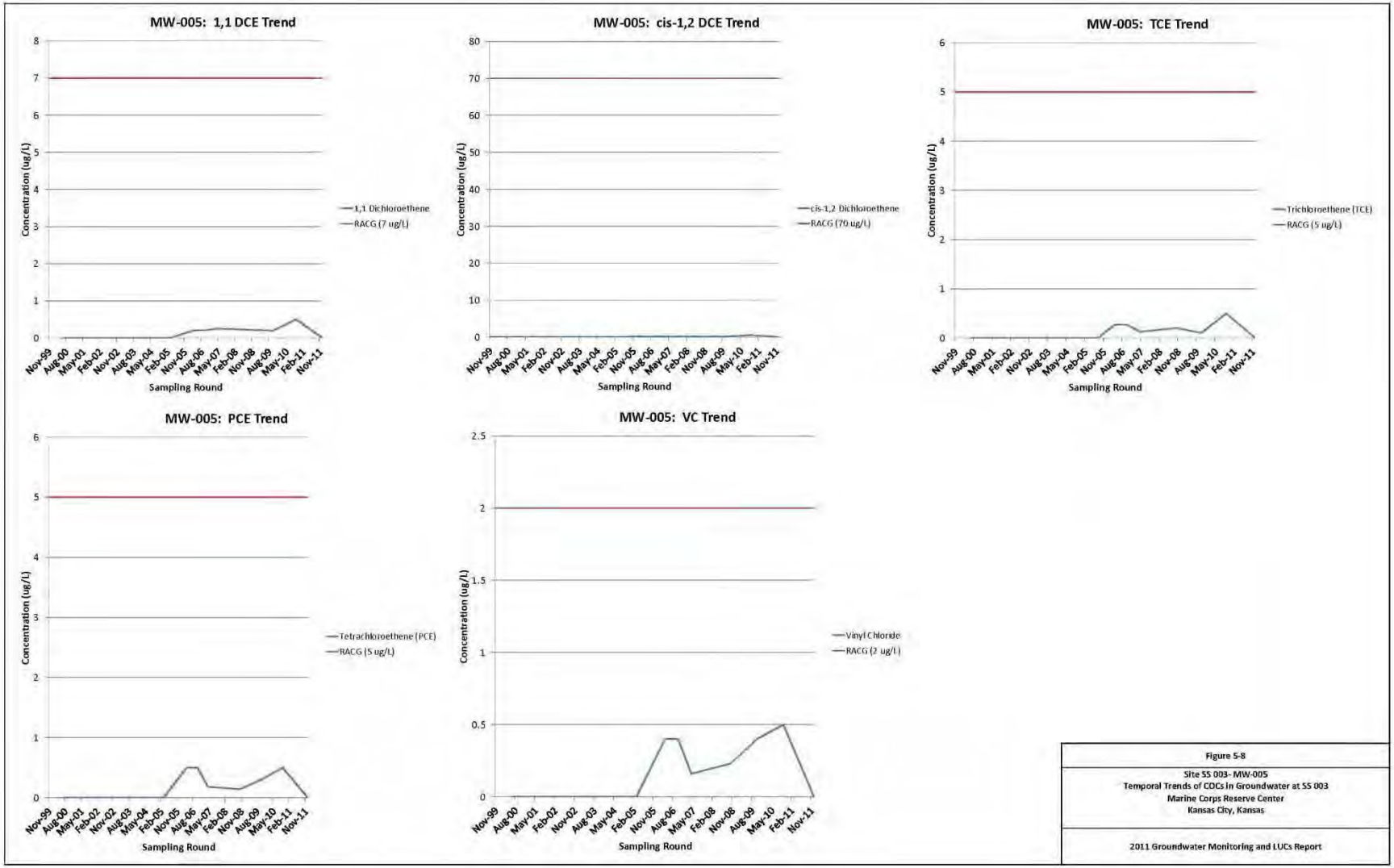
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



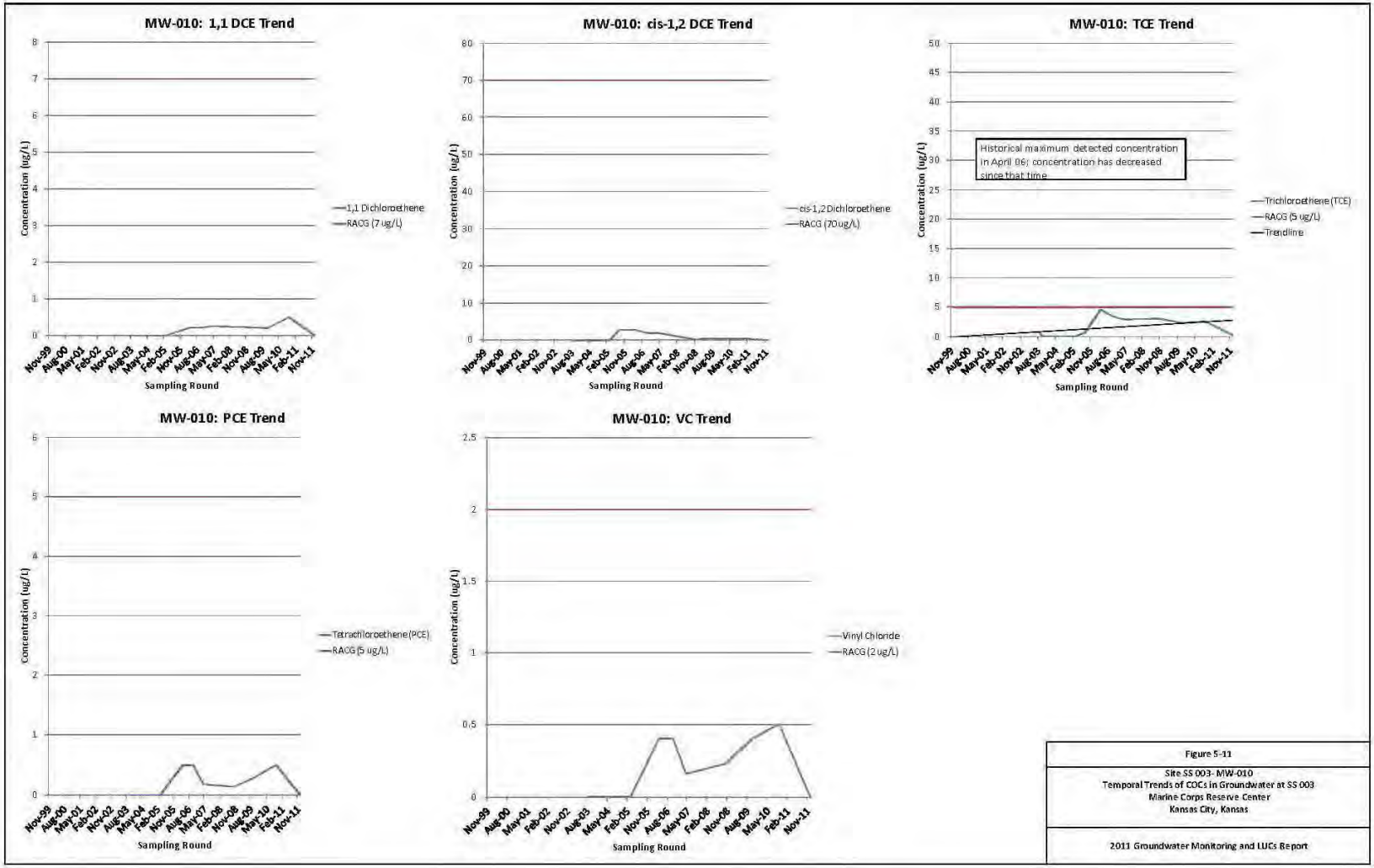
APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



APPENDIX D – SS-003 PLUME MAPS AND TREND GRAPHS



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APPENDIX E

SITE SS-009 PLUME MAP AND TREND GRAPHS

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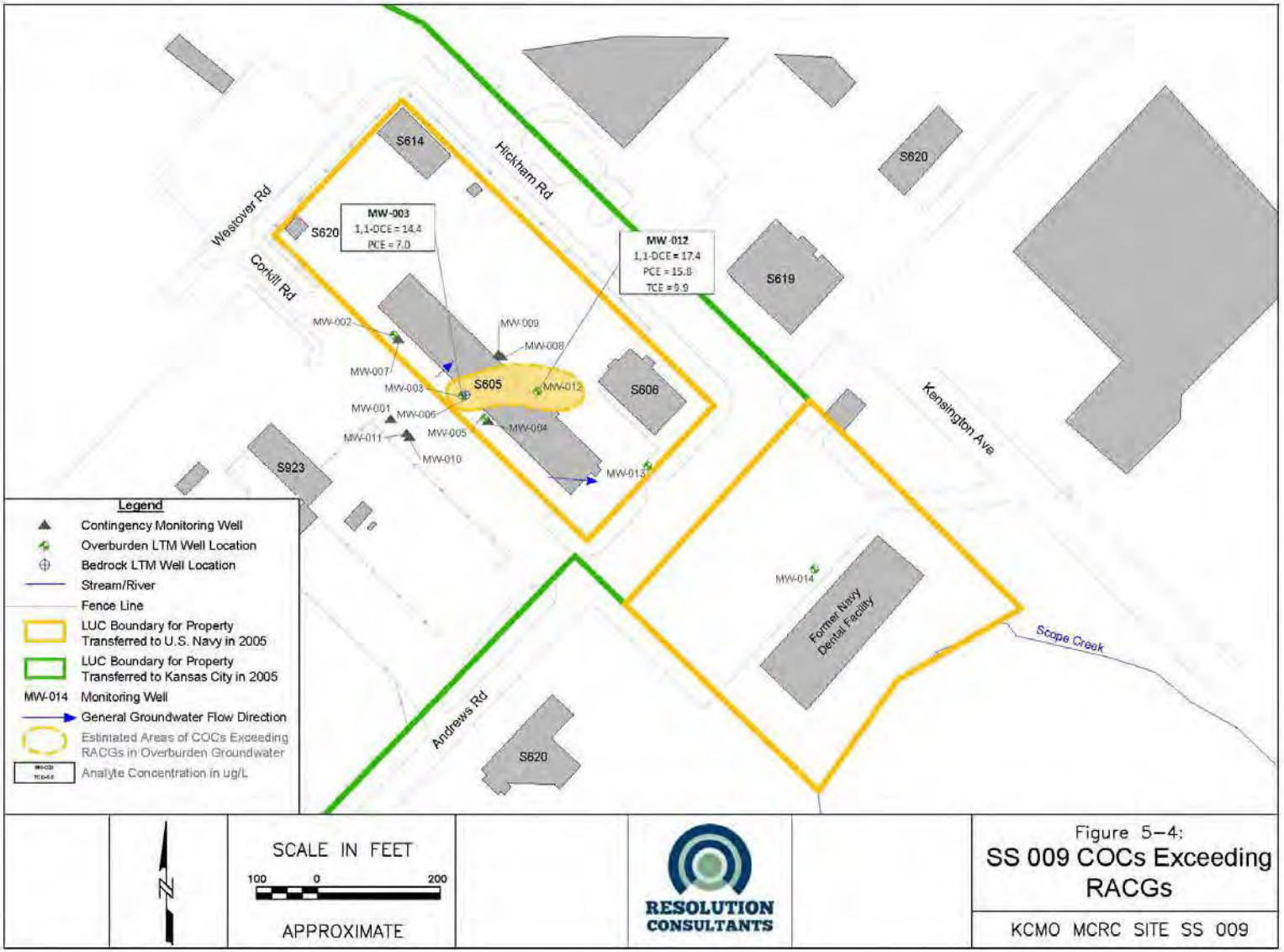
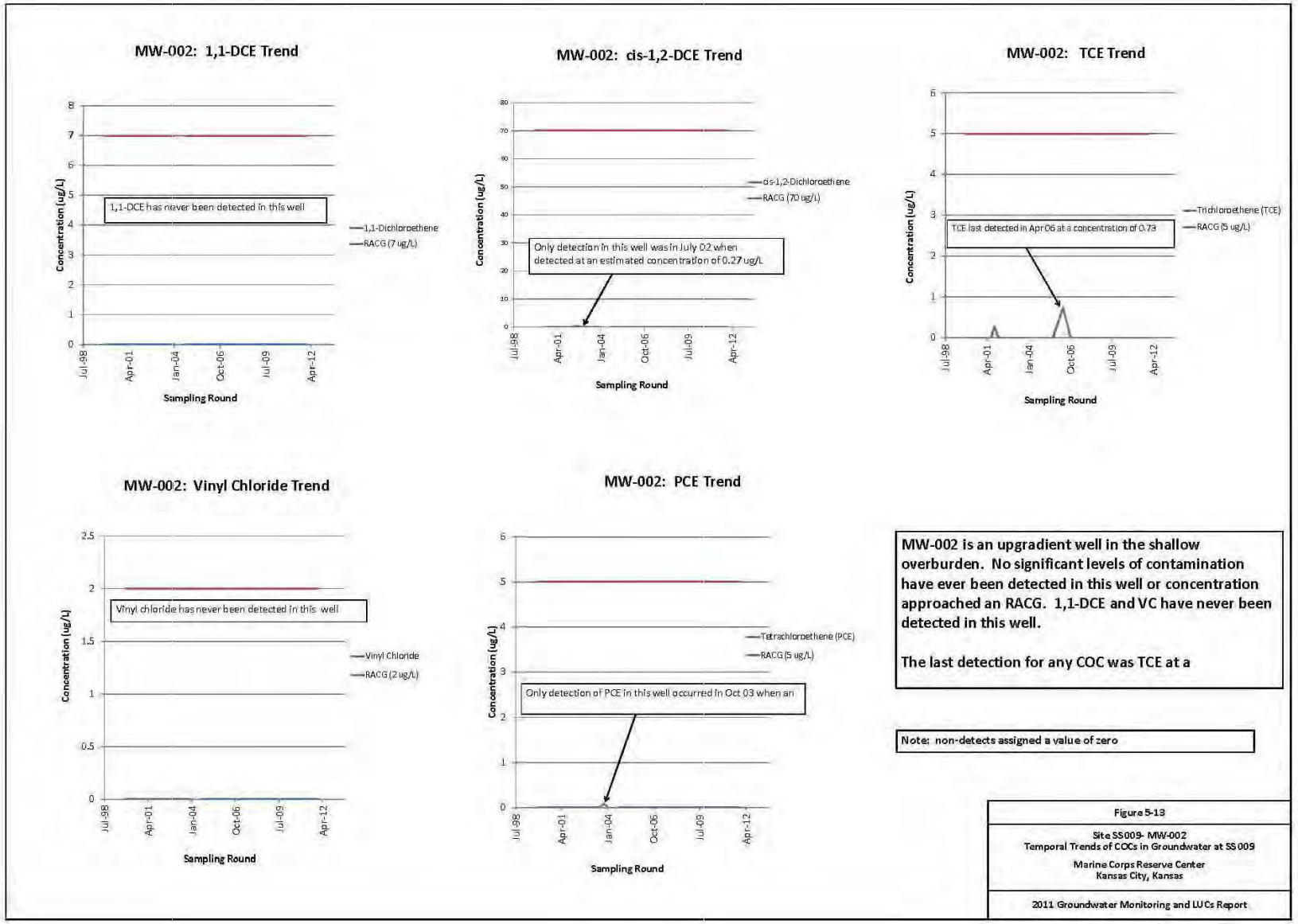
APPENDIX E – SS-009 PLUME MAPS AND TREND CHARTS



APPENDIX E – SS-009 PLUME MAPS AND TREND CHARTS



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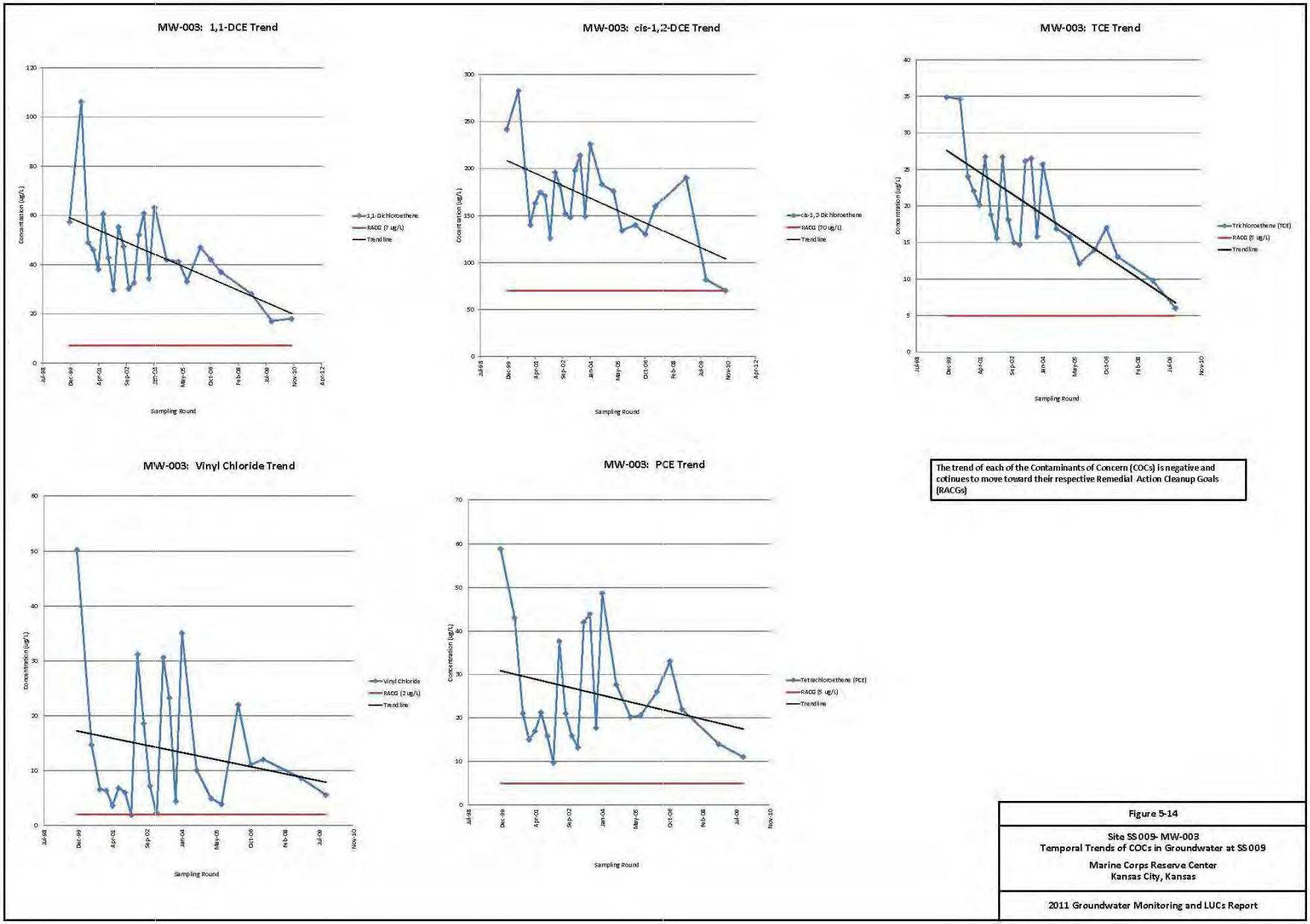

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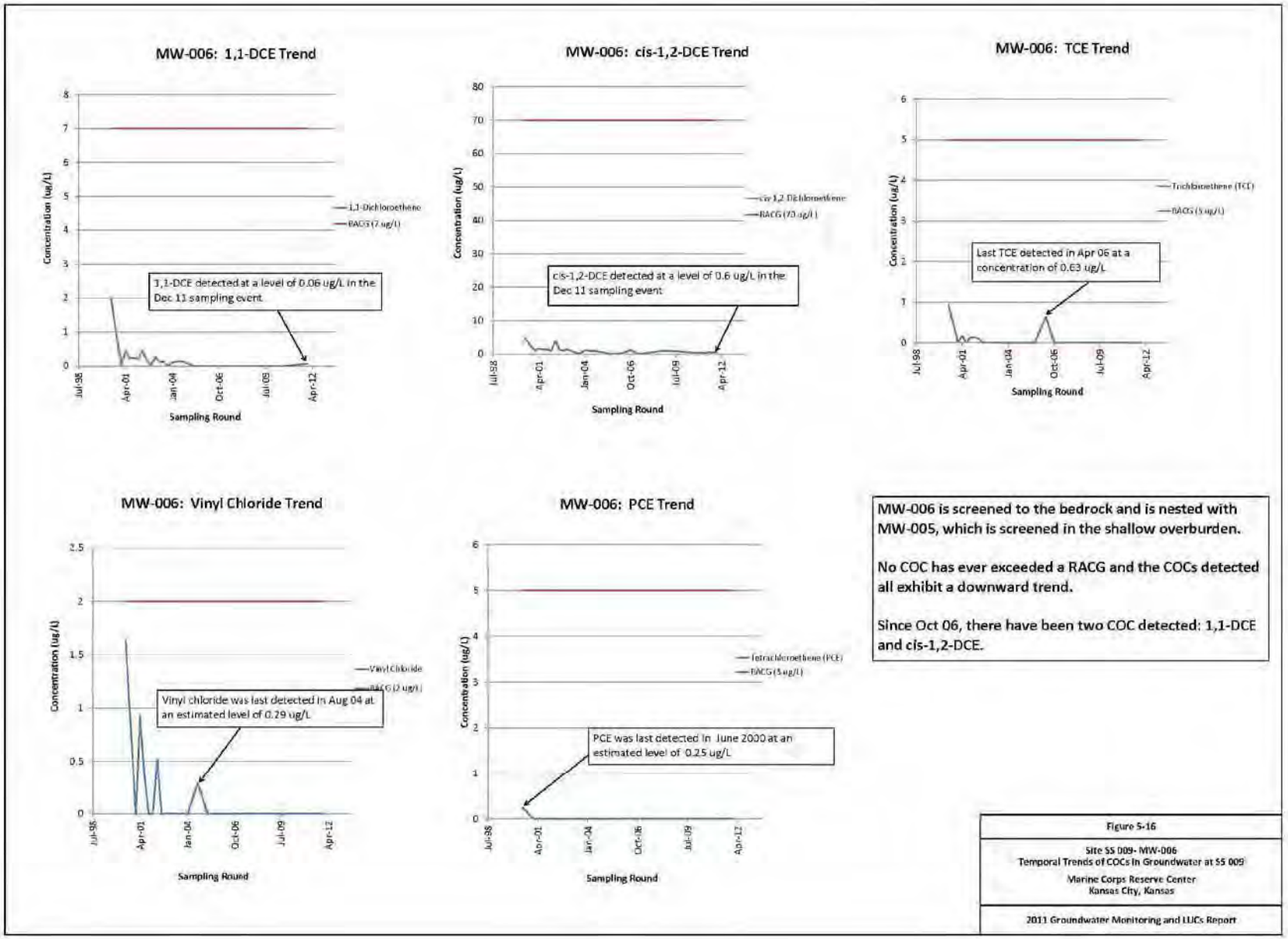
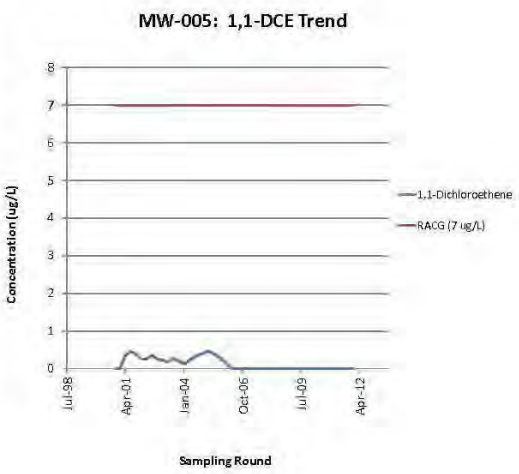
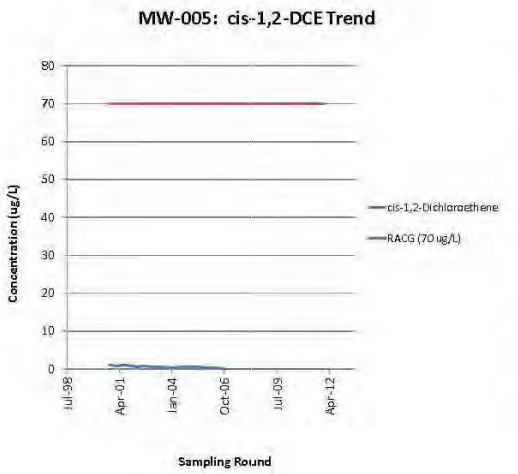
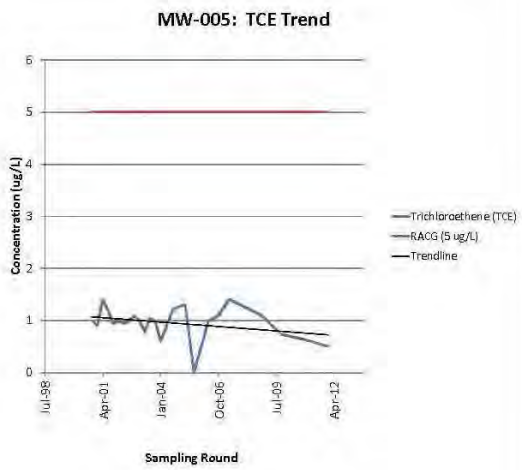
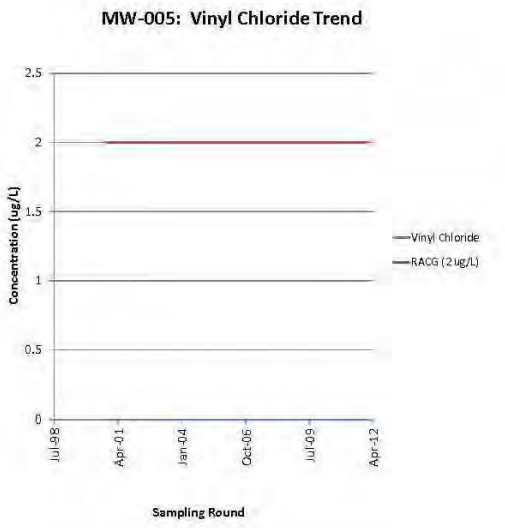


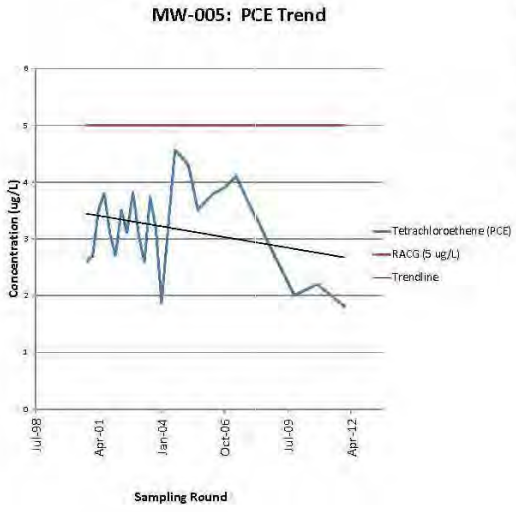
APPENDIX E – SS-009 PLUME MAPS AND TREND CHARTS











No RACG has ever been exceeded in this well and only TCE and PCE have been detected since Aug 05. Both exhibit downward concentration trends.

Vinyl chloride has never been detected in this well and 1,1-DCE and cis-1,2-DCE have not been detected since Apr 06.

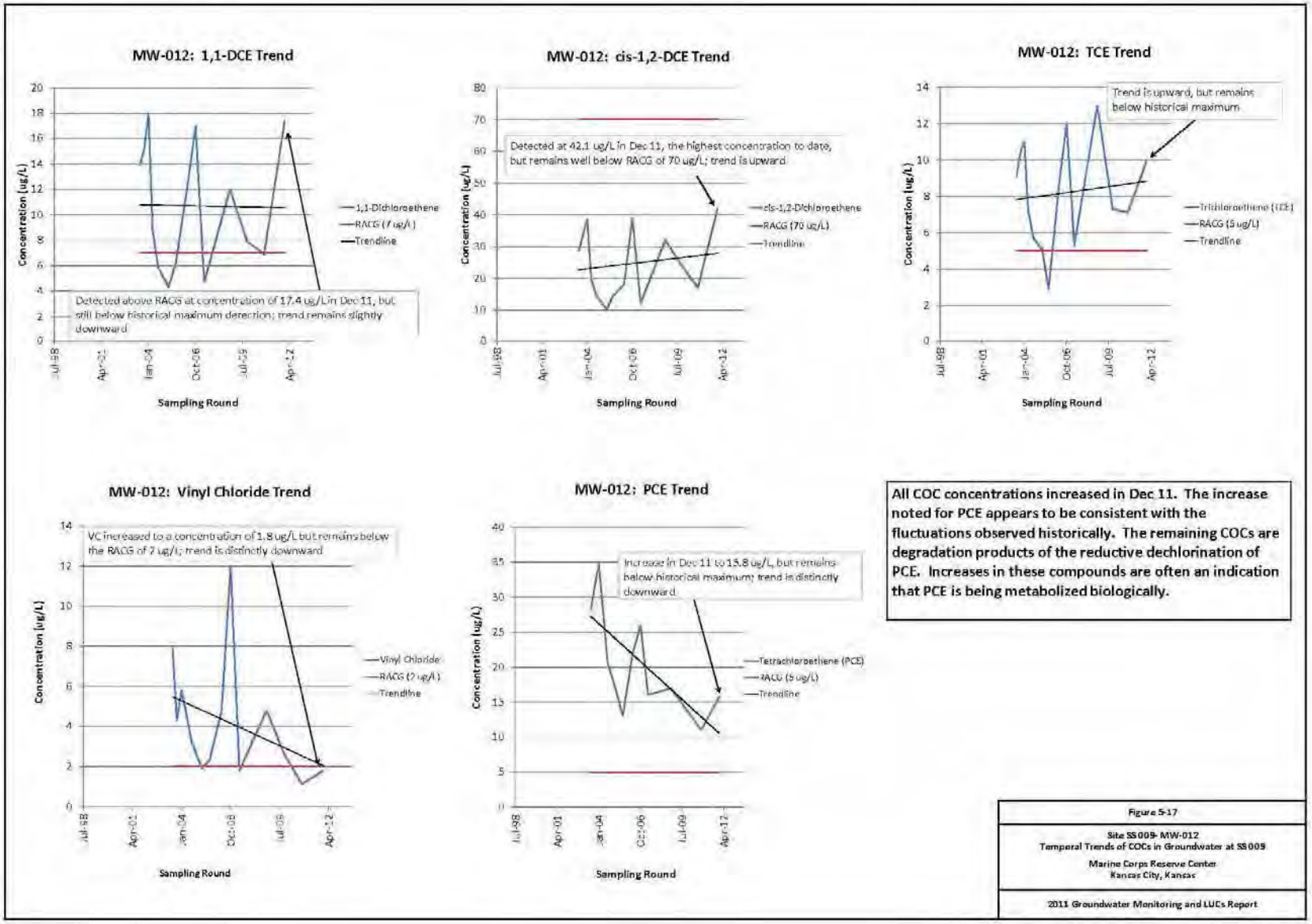
Figure 5-15

Site SS009- MW-005
Temporal Trends of COCs in Groundwater at SS009

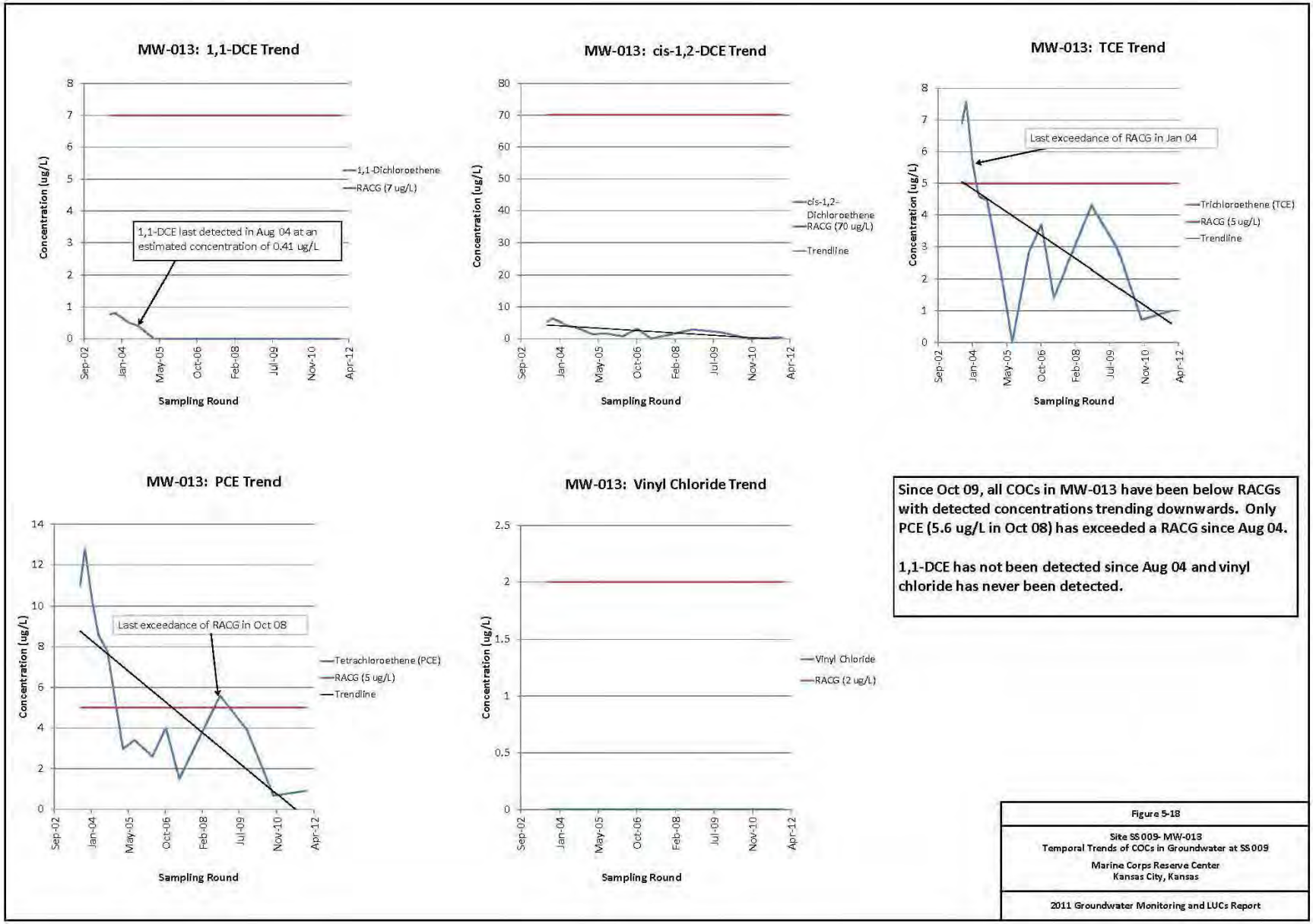
Marine Corps Reserve Center
Kansas City, Kansas

2011 Groundwater Monitoring and LUCs Report

APPENDIX E – SS-009 PLUME MAPS AND TREND CHARTS



APPENDIX E – SS-009 PLUME MAPS AND TREND CHARTS



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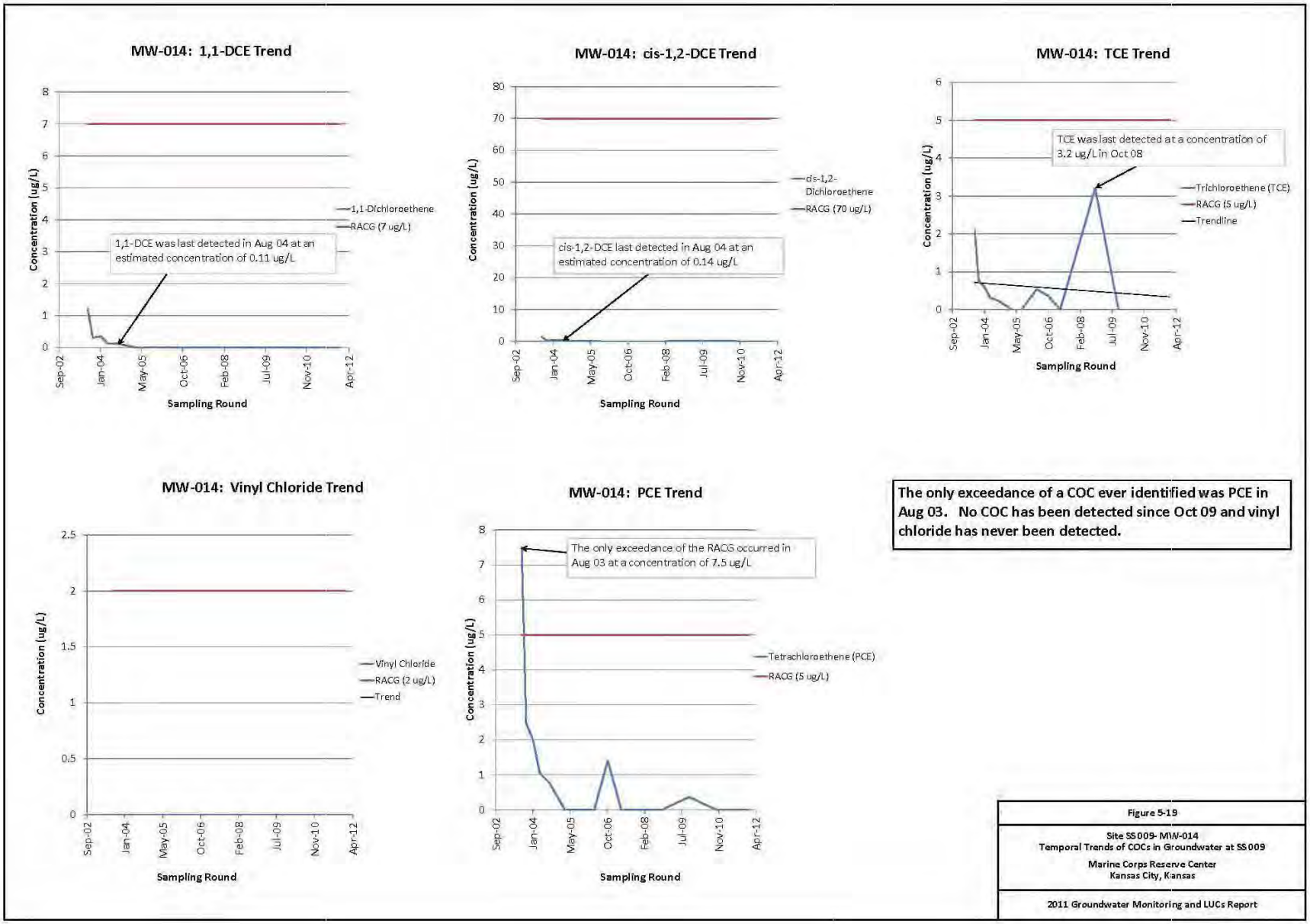

APPENDIX F

DEED TRANSFER TO CITY OF KANSAS CITY

(WITHOUT ENCLOSURES)

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RECORDER'S CERTIFICATION
JACKSON COUNTY, MISSOURI
04/04/2012 01:56:02 PM
INSTRUMENT TYPE: QCD FEE: $642.00 206 Pages

INSTRUMENT NUMBER/BOOK & PAGE:

2012E0035995

ROBERT T. KELLY, DIRECTOR, RECORDER OF DEEDS

Title of Document:	QuitClaim Deed
Date of Document:	December 22, 2011
Grantor:	United States of America
Grantee:	City of Kansas City, Missouri
Grantee's Mailing Address:	414 E. 12th St. 28th Floor Kansas City, MO 64106
Legal Description:	see Exhibits A and B on pages 14 and 17 attached hereto
Reference Document No:	

499900

Please return to:
Robert L. Patterson
First American Title Insurance Company
911 Main St., Suite 2500
Kansas City, MO 64105

QUITCLAIM DEED

THIS INDENTURE ("Quitclaim Deed") is made the 22 nd day of December 2011 between the **United States of America**, acting by and through the Secretary of the Navy, Navy Base Realignment and Closure Program Management Office Southeast, Charleston, South Carolina, hereinafter referred to as "GOVERNMENT," and the **City of Kansas City, Missouri**, hereinafter referred to as "GRANTEE," acting as the Local Redevelopment Authority for surplus Government real and personal property at the former Marine Corps Support Activity, Kansas City, Missouri. This Quitclaim Deed is based upon the following facts:

Recitals

A. GRANTOR is acting hereunder pursuant to the authority contained in the Federal Property and Administrative Services Act of 1949, approved June 30, 1949, (63 Stat. 377), as amended, and 49 U.S.C. Sections 47151-47153 (formally known as the Surplus Property Act of 1944 [58 Stat. 765], as amended), and a delegation of that authority from the Administrator of General Services to the Secretary of Defense and subsequent delegation to the Secretary of the Navy whereby, the Secretary of the Navy may convey surplus property at a closing installation to representatives of the homeless or to the installation's Local Redevelopment Authority for homeless assistance use pursuant to Section 2905(b)(7) of the Defense Base Closure and Realignment Act of 1990 (P.L. 101-510; 10 U.S.C. 2687 note), as amended, and the implementing regulations of the Department of Defense (32 CFR Parts 174 and 176).

B. GRANTEE, by submission of its Reuse Plan for surplus government property located at the former Marine Corps Support Activity, Kansas City, Missouri ("MCSA Kansas City"), dated February 11, 2011, requested a portion of said surplus property containing approximately 0.378 acres of land and improvements for Homeless Provider Assistance under the provisions of 42 U.S.C. § 11411.

C. GRANTEE's Reuse Plan was approved by the United States Department of Housing and Urban Development ("HUD") on March 10, 2011 and the GOVERNMENT approved a transfer of approximately 0.378 acres of land and improvements (referred to hereinafter as the "PROPERTY") to the GRANTEE for subsequent conveyance to its selected Homeless Provider.

D. The GOVERNMENT has found and determined that the PROPERTY at MCSA Kansas City to be conveyed to GRANTEE is suitable for transfer pursuant to the Finding of Suitability for Transfer ("FOST") dated October 3, 2011. The FOST sets forth the basis of the GRANTOR'S determination that all the property at MCSA Kansas City, including the portion being conveyed by this Quitclaim Deed, is suitable for transfer pursuant to 42 U.S.C. Section 9620(h)(3).

NOW THEREFORE, by the acceptance of this Quitclaim Deed or any rights hereunder, the GRANTEE, for itself, its successors and assigns, agrees that the transfer of PROPERTY by this Quitclaim Deed is accepted subject to the following terms, restrictions, reservations, covenants, and conditions set forth below, which shall run with the land, provided that the PROPERTY, both real and personal, transferred hereby may be successively transferred only with the proviso that any such subsequent transferee assumes all of the obligations upon the GRANTEE by the provisions of this Quitclaim Deed.

IN CONSIDERATION OF THE FOREGOING, of the terms and conditions set forth below and of other good and valuable consideration (the receipt and adequacy of which, as consideration, the parties hereto both acknowledge), the parties hereto, intending to be legally bound hereby, have agreed to, and do hereby, effectuate the conveyance set forth below.

Conveyance Language

GOVERNMENT does hereby, subject to any easements and encumbrances of record and subject to the reservations, exceptions, notices, covenants, conditions, and restrictions expressly contained herein, grant, sell, convey, remise, release, and quitclaim unto GRANTEE, its successors, and its assigns, without any warranty express or implied as to the quantity or quality of GOVERNMENT's title (except such warranties as are specifically set forth herein, required by 42 U.S.C. § 9620(h)(3), or otherwise required by law), all GOVERNMENT's right, title, and interest in the PROPERTY, including, but not limited to the underlying estate, buildings, structures, and improvements, and personal property situated or installed thereon, commonly known as and referred to herein as "Parcel HUD", together with a dedicated right of ingress and egress identified as "Easement", more fully described on the documents attached to this Quitclaim Deed and incorporated herein as **Exhibits "A"** and **"B"** respectively.

TOGETHER WITH all and singular the ways, waters, water-courses, driveways, rights, hereditaments and appurtenances, whatsoever thereunto belonging, or in any wise appertaining, and the reversions and remainders, rents, issues and profits thereof; and all the estate, right, title, interest, property, claim and demand whatsoever of GOVERNMENT, in law, equity, or otherwise howsoever, of, in, and to the same and every part thereof; and

TO HAVE AND TO HOLD the said lots or pieces of ground above described, the hereditaments and premises hereby granted, or mentioned and intended so to be, with the appurtenances, unto the said GRANTEE, its successors, and its assigns, and subject to the reservations, restrictions, and conditions set forth in this instrument, to and for the only proper use and behoof of the said GRANTEE, its successors, and its assigns forever.

Special Sections

I. **Use of PROPERTY Solely to Assist Homeless:** GRANTEE covenants that it will use the PROPERTY solely to assist the homeless as authorized under Section 2905(b)(7) of Public Law 101-510 for purposes in support of homeless persons as defined in 24 CFR Part 586 and 42 U.S.C. § 11301. However, use of the PROPERTY for transitional housing or other residential purposes is restricted hereunder pursuant to Special Section IX below, and would require approvals in accordance with Special Sections XIV and XV below. Any use of the PROPERTY for residential purposes would also require the proper abatement of Asbestos Containing Materials and Lead Based Paint in accordance with Special Sections XVI and XVII below.

II. **Compliance with Legally Binding Agreement:** GRANTEE covenants that it shall comply with the terms and provisions of the Legally Binding Agreement dated January 20, 2011, between GRANTEE and Heart N Hand Ministries, a Missouri non-profit corporation.

III. **Notice of Environmental Condition:** Information concerning the environmental condition of the PROPERTY is contained in the document known as the **FOST,** dated October 3, 2011, which is attached hereto and made a part hereof as **Exhibit "C"** and incorporated herein by reference. An **Environmental Condition of Property ("ECP")** report is referenced in the FOST; the FOST and ECP reference environmental conditions on the PROPERTY and on other property not subject to this Quitclaim Deed. Those restrictions and environmental conditions described in the FOST and ECP which are applicable to the PROPERTY are contained in this Quitclaim Deed. The FOST sets forth the basis for the GOVERNMENT's determination that the PROPERTY is suitable for transfer. Together, the ECP and FOST contain all pertinent information currently known by the GOVERNMENT as to the environmental condition of the PROPERTY. GRANTEE hereby acknowledges that it has been provided copies of the ECP and FOST.

IV. **Notice of Potential for Vapor Intrusion:** Groundwater contamination in excess of Remedial Action Cleanup Goals ("RACGs") remains on the PROPERTY. Before construction of any improvements on this site, the potential for vapor intrusion from groundwater and possible resulting impacts to indoor air quality should be considered and, as needed, addressed during building and design.

V. **Description of Remedial Action Taken:** Pursuant to section 120(h)(3)(A)(i)(III) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA") (42 U.S.C. § 9620(h)(3)(A)(i)(III)), a remedial action consisting of Land Use Controls/Institutional Controls ("LUCs/ICs") supported by a Long-Term Monitoring ("LTM") program for groundwater has been taken on the PROPERTY. The selected remedial actions being implemented at the PROPERTY, although not yet completed, have been determined by the United States Environmental Protection Agency ("USEPA") to be "operating properly and successfully" ("OPS") pursuant to CERCLA Section 120(h)(3)(B).

VI. **Notices Pursuant to Section 120(h)(3)(A)(i)(I) and (II) of CERCLA:** Pursuant to section 120(h)(3)(A)(i)(I) and (II) of CERCLA, available information regarding the type, quantity, and location of hazardous substances and the time at which such substances were stored, released, or disposed of, as defined in section 120(h), is provided in **Exhibit "D"**, attached hereto and made a part hereof.

VII. **CERCLA Covenants:** Pursuant to section 120(h)(3)(A)(ii) and (B) of CERCLA, the GOVERNMENT warrants that:

a. all remedial action necessary to protect human health and the environment with respect to any hazardous substance identified pursuant to section 120(h)(3)(A)(i)(I) of CERCLA remaining on the PROPERTY has been taken before the date of this Quitclaim Deed; and

b. that any additional remedial action found to be necessary after the date hereof shall be conducted by the United States of America.

VIII. <u>Access Rights Pursuant to Section 120(h)(3)(A)(iii) of CERCLA</u>: GOVERNMENT retains and reserves a perpetual and assignable easement and right of access on, over, and through the PROPERTY, to enter upon the PROPERTY in any case in which a remedial action or corrective action is found to be necessary on the part of GOVERNMENT, without regard to whether such remedial action or corrective action is on the PROPERTY or on adjoining or nearby lands. Such easement and right of access includes, without limitation, the right to perform any environmental investigation, survey, monitoring, sampling, testing, drilling, boring, coring, testpitting, installing, monitoring or pumping wells or other treatment facilities, response action, corrective action, or any other action necessary for the GOVERNMENT to meet its responsibilities under applicable laws as provided for in this Quitclaim Deed. Such easement and right of access shall be binding on the GRANTEE and its successors and assigns and shall run with the land.

In exercising such easement and right of access, the GOVERNMENT shall provide the GRANTEE or its successors or assigns, as the case may be, with reasonable notice of its intent to enter upon the PROPERTY and exercise its rights under this clause, which notice may be severely curtailed or eliminated in emergency situations. The GOVERNMENT shall use reasonable means to avoid and to minimize interference with the GRANTEE's and the GRANTEE's successors' and assigns' quiet enjoyment of the PROPERTY. At the completion of work, the work site shall be reasonably restored. Such easement and right of access includes the right to obtain and use utility services, including water, gas, electricity, sewer and communications services available on the PROPERTY at a reasonable charge to the GOVERNMENT. Excluding the reasonable charges for such utility services, no fee, charge, or compensation will be due the GRANTEE, nor its successors and assigns, for the exercise of the easement and right of access hereby retained and reserved by the GOVERNMENT.

In exercising such easement and right of access, neither the GRANTEE nor its successors and assigns, as the case may be, shall have any claim at law or equity against the GOVERNMENT, or any officer or employee of the GOVERNMENT, based on actions taken by the GOVERNMENT or its officers, employees, agents, contractors of any tier, or servants pursuant to and in accordance with this clause: Provided, however, that nothing in this paragraph shall be considered as a waiver by the GRANTEE and its successors and assigns from any remedy available to them under the Federal Tort Claims Act.

IX. <u>Covenant and Restriction regarding Non-residential Use</u>: GRANTEE hereby covenants, on behalf of itself, its successors, and its assigns, that residential reuse of the PROPERTY, without prior written approval of the GOVERNMENT, USEPA, and Missouri Department of Natural Resources ("MDNR") will be prohibited. Prohibited residential uses shall include, but are not limited to, any form of housing, child-care facilities, any kind of school, including pre-schools, elementary schools, and secondary schools, playgrounds, and adult convalescent and nursing care facilities.

X. <u>Covenant and Restriction regarding Groundwater</u>: GRANTEE hereby covenants, on behalf of itself, its successors, and its assigns, that use and/or extraction of the groundwater within the PROPERTY, for any purpose (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and/or industrial or agricultural uses) is prohibited without prior written approval from the GOVERNMENT, USEPA, and MDNR.

Subsurface drilling and/or excavation of the groundwater within the PROPERTY are prohibited without prior written approval from the GOVERNMENT, USEPA, and MDNR.

XI. <u>Covenant and Restriction regarding GRANTEE compliance with Health and Safety Plan</u>: GRANTEE covenants that it shall comply or require its lessees and licensees to comply with the provisions of any health and safety plan put into effect by the GOVERNMENT in connection with any ongoing or future environmental investigative and/or remedial activities to be undertaken by the GOVERNMENT on the PROPERTY.

XII. <u>Covenant and Restriction regarding Non-interference with Remedial Systems' Operations and Controls</u>: The GRANTEE, its successors and assigns, shall not hinder or prevent the GOVERNMENT from constructing, upgrading, operating, maintaining, and monitoring any groundwater and/or soil treatment facilities and groundwater and/or soil monitoring networks or engage in any activity that will disrupt or hinder further remedial investigation, response actions, or oversight activities on any known or hereafter discovered sites within the PROPERTY. The GRANTEE, its successors and assigns, shall not disturb, move, damage, mar, tamper with, interfere with, obstruct, or impede any monitoring wells, treatment facilities, piping, and other facilities associated with environmental cleanup activities being conducted by the GOVERNMENT on the PROPERTY. The GRANTEE, its successors and assigns, shall not disturb, move, damage, mar, tamper with, interfere with, obstruct, or impede any environmental investigation or remedial activity associated with environmental cleanup activities being conducted by the GOVERNMENT or jeopardize the protectiveness of the environmental remedies put in place or conduct or permit any activity that could negatively impact or restrict access for cleanup on the PROPERTY.

XIII. <u>Covenant and Restriction regarding Annual Inspections</u>: GRANTEE covenants that it or its designee shall perform annual inspections of the PROPERTY to ensure that all Land Use Controls (LUCs), are being complied with and provide a written certification to MDNR, with a copy to the GOVERNMENT certifying such compliance, for as long as LUCs are required on the PROPERTY. Such annual certifications shall be provided using the form attached hereto as **Exhibit "E"** or similar form as may later be approved by MDNR. If a LUC violation is discovered after transfer of the PROPERTY, the Grantee, its successors and assigns, shall notify the GOVERNMENT, USEPA and MDNR, as soon as practicable, but in no case longer than 10 days after the specific deficiency(ies) is found. Within 10 days of reporting the deficiency(ies), the GRANTEE, its successors and assigns, shall provide a written explanation indicating the specific deficiencies and what efforts or measures have been or will be taken to correct those deficiencies.

XIV. <u>Release of Environmental Conditions and/or GRANTEE Covenants</u>: The GOVERNMENT shall release the aforementioned groundwater notification and groundwater LUCs from the PROPERTY only with USEPA and MDNR written concurrence. It is anticipated that USEPA and MDNR shall both give their concurrence if sampling demonstrates that the RACGs applicable to the PROPERTY and remedial objectives have been met. The GOVERNMENT shall consider a request to release the environmental conditions and GRANTEE covenants related o the PROPERTY only with EPA and MDNR written concurrence. The GOVERNMENT shall respond promptly and in good faith to any written request by the GRANTEE, its successors or assigns that the GOVERNMENT extinguish, release

or otherwise modify any of the environmental conditions or GRANTEE covenants because of full satisfaction of the essential purposes thereof, or achievement of remedial goals. Any such request must include a letter from EPA and MDNR, or other suitable documentation, stating that site rehabilitation with respect to environmental conditions on the PROPERTY has been achieved and no further remedial action is required. Once the required regulatory concurrences noted above have been obtained by the GRANTEE, or its successors or assigns, the GOVERNMENT shall deliver to the GRANTEE, or its successors or assigns, in recordable form a Deed Amendment or Covenant Release relating specifically to the aforementioned LUCs. The execution of the Deed Amendment or Covenant Release by the GOVERNMENT shall remove these LUCs with respect to the portion(s) of the PROPERTY specified in the Deed Amendment or Covenant Release.

XV. <u>Development, Improvement or Maintenance of Land Restricted by Environmental Conditions, Covenants or LUCs</u>: In the event the GRANTEE, its successors and assigns desires to develop, improve, use, or maintain the PROPERTY in a manner that is restricted or prohibited by the environmental conditions, covenants or LUCs contained within this Quitclaim Deed, the GRANTEE, its successors and assigns shall provide the GOVERNMENT with a written request seeking approval for the requested activity. The GOVERNMENT shall respond to these written requests promptly and in good faith PROVIDED the request includes both a full description of the proposed work, including but not limited to the actual work plan maps, drawings and specifications AND, documentation from EPA and MDNR indicating that EPA and MDNR have reviewed the proposed development, improvement, or maintenance activity and do not object thereto.

XVI. <u>Asbestos-Containing Materials Hazard Disclosure and Acknowledgement</u>: GRANTEE hereby acknowledges that asbestos containing materials ("ACM") remain in buildings on the PROPERTY and agrees to manage any and all remaining ACM in accordance with applicable laws and regulations. An Asbestos Containing Materials Hazard Disclosure and Acknowledgement Statement is provided as **EXHIBIT "F"** to this Quitclaim Deed.

The GRANTEE covenants, on behalf of itself, its successors and assigns, as a covenant running with the land, that it will prohibit occupancy and use of buildings and structures, or portions thereof, containing known asbestos hazards or known ACM hazards prior to abatement of such hazards. In connection with its use and occupancy of the PROPERTY, including, but not limited to, demolition of buildings and structures containing ACM, GRANTEE will comply with all applicable Federal, State and local laws relating to asbestos or ACM.

The GRANTEE acknowledges that the GOVERNMENT assumes no liability for damages for personal injury, illness, disability, or death to the GRANTEE, its successors, assigns, employees, invitees, or to any other person, including members of the general public, arising from or incident to the purchase, transportation, removal, handling, use, disposition, or other activity causing or leading to contact of any kind whatsoever with ACM in structures on the PROPERTY, whether the GRANTEE, its successors or assigns, has properly warned, or failed to properly warn the persons injured.

XVII. <u>Lead Based Paint Hazard Disclosure and Acknowledgment</u>: The PROPERTY contains improvements that, due to their age, are likely to have been painted with lead based

paint ("LBP"). This, in turn, creates the possibility, through the action of normal weathering and maintenance, that there may be lead from LBP in the soil surrounding these structures. Lead from paint, paint chips, and dust can pose health hazards if not managed properly. A Lead Based Paint Hazard Disclosure and Acknowledgment Statement is provided as **Exhibit "G"** to this Quitclaim Deed.

The GOVERNMENT shall have no obligation for the demolition of nonresidential buildings, structures, or facilities built prior to 1978, which creates the potential for lead to be released to soil as a result of such activities. With respect to nonresidential buildings, structures, or facilities, which the GRANTEE intends to demolish or redevelop for residential use after conveyance, the GRANTEE may, under applicable law or regulation, be required by regulatory agencies to evaluate the soil adjacent to such nonresidential buildings, structures, or facilities for soil-lead hazards, and to abate any such hazards that may be present, after demolition and prior to occupancy of any newly constructed residential structures.

The GRANTEE covenants and agrees that it shall prohibit residential occupancy and use of buildings and structures, or portions thereof, prior to identification and/or evaluation of any LBP hazards, and abatement of any hazards identified as required.

The GRANTEE covenants and agrees, on behalf of itself, its successors and assigns, that is shall comply with all Federal, State, and local laws relating to LBP in its use and occupancy of the PROPERTY (including demolition and disposal of existing improvements). The GRANTEE shall hold harmless and indemnify the GOVERNMENT from and against any and all loss, judgment, claims, demands, expenses, or damages of whatever nature or kind which might arise or be made against the GOVERNMENT as a result of LBP having been present on the PROPERTY. Improvements on the PROPERTY were constructed prior to 1978 and, as with all such improvements, a LBP hazard may be present.

XVIII. <u>Pesticides</u>: The PROPERTY may contain pesticide residue from pesticides that have been applied in the management of the PROPERTY. The GOVERNMENT knows of no use of any registered pesticide in a manner inconsistent with its labeling and believes that all applications were made in accordance with the Federal Insecticide, Fungicide and Rodenticide Act ("FIFRA") (7 U.S.C. Sec. 136, et seq.), its implementing regulations, and according to the labeling provided with such substances. It is the GOVERNMENT's position that it shall have no obligation under the covenants provided pursuant to section 120(h)(3)(A)(ii) of CERCLA for the remediation of legally applied pesticides.

XIX. <u>GRANTEE Notice Requirement regarding future sale or assignment</u>: GRANTEE, on behalf of its successors and assigns, lessees and licensees, contractors and agents, covenants that it shall provide written notice to the GOVERNMENT, USEPA and MDNR, and other applicable local regulatory agencies, if any, of any subsequent sale, assignment, or lease of the PROPERTY or any portion thereof, and provide contact information concerning the new owner or occupant.

The following are points of contact for the GOVERNMENT, USEPA, and MDNR:

GOVERNMENT
Director
BRAC Program Management Office SE
4130 Faber Place Drive
Suite 202
North Charleston, SC 29405

USEPA
US Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101

State of Missouri
Missouri Department of Natural Resources
Attn: Mr. Ruben Zamarripa
P.O. Box 176, Jefferson City, MO 65102-0176

The GRANTEE, its successors and assigns, agree that if any portion of the PROPERTY is conveyed by deed, the GRANTEE, its successors and assigns, shall provide notice to the party to whom the PROPERTY or any portion thereof is transferred ("the subsequent owner") of all CERCLA Hazardous Substances as contained in the Quitclaim Deed, LUCS, and GRANTEE covenants, and the subsequent owner, its successors and assigns, shall then be bound by the same LUCS and GRANTEE covenants.

General Provisions

XX. Conveyance is "As Is – Where Is": Except as expressly provided in this Quitclaim Deed or as otherwise required by law, the PROPERTY is being conveyed "AS IS" and "WHERE IS," without representation, warranty, or guaranty as to quality, quantity, character, condition, size, kind, or fitness for a particular purpose.

XXI. **Covenant regarding Non-Discrimination:** GRANTEE covenants for itself, its successors, and assigns and every successor in interest to the PROPERTY, or any part thereof, that GRANTEE and its successors, and assigns shall not discriminate upon the basis of race, color, religion, disability, or national origin in the use, occupancy, sale, or lease of the PROPERTY, or in their employment practices conducted thereon. This covenant shall not apply however, to the lease or rental of a room or rooms within a family dwelling unit, nor shall it apply with respect to PROPERTY used primarily for religious purposes. The GOVERNMENT shall be deemed a beneficiary of this covenant without regard to whether it remains the owner of any land or interest therein in the locality of the PROPERTY hereby conveyed and shall have the sole right to enforce this covenant in any court of competent jurisdiction.

XXII. **General Notice Provision:** To facilitate such future cooperation, the following points of contact have been designated by the GOVERNMENT, GRANTEE, and the State of Missouri:

GOVERNMENT – US Government Point of Contact:
Director
Navy BRAC Program Management Office Southeast
4130 Faber Place Drive, Suite 202
North Charleston, SC 29405

GRANTEE:
Mr. Claude Page
City Of Kansas City, Planning Department
29th Floor City Hall
414 East 12th Street
Kansas City, Missouri 64106

State of Missouri:
Missouri Department of Natural Resources
Attn: Mr. Ruben Zamarripa
P.O. Box 176, Jefferson City, MO 65102-0176

USEPA
US Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101

[SIGNATURE PAGE FOLLOWS]

EXECUTION

EFFECTIVE this 22nd day of December, 2011.

UNITED STATES OF AMERICA
Acting by and through
Department of the Navy

WITNESSES:

By: _____
WILLIAM R. CARSILLO
Real Estate Contracting Officer

_____
(Print Name)

_____
(Print Name)

ACCEPTANCE

The **CITY OF KANSAS CITY, MISSOURI** does hereby accept this Quitclaim Deed and by acceptance agrees to all of the terms and condition thereof.

Executed this 28th day of March, 2012

By _____
Title Director of Finance

(OFFICIAL SEAL)

Attest Vickie Thompson-Carr
Title City Clerk

[NOTARY PAGES ATTACHED TO THIS SIGNATURE PAGE]

CALIFORNIA ALL-PURPOSE CERTIFICATE OF ACKNOWLEDGMENT

State of California

County of San Francisco

On 12/22/2011 before me, Thom O'Brien, notary public
(Here insert name and title of the officer),

personally appeared William R. Carsillo,

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature of Notary Public

THOM O'BRIEN
COMM. #1782116
NOTARY PUBLIC-CALIFORNIA
SAN FRANCISCO COUNTY
My Comm. Expires Dec. 25, 2011

(Notary Seal)

ADDITIONAL OPTIONAL INFORMATION

DESCRIPTION OF THE ATTACHED DOCUMENT

(Title or description of attached document)

(Title or description of attached document continued)

Number of Pages _____ Document Date _____

(Additional information)

CAPACITY CLAIMED BY THE SIGNER

- ☐ Individual (s)
- ☐ Corporate Officer

(Title)

- ☐ Partner(s)
- ☐ Attorney-in-Fact
- ☐ Trustee(s)
- ☐ Other _____

INSTRUCTIONS FOR COMPLETING THIS FORM

Any acknowledgment completed in California must contain verbiage exactly as appears above in the notary section or a separate acknowledgment form must be properly completed and attached to that document. The only exception is if a document is to be recorded outside of California. In such instances, any alternative acknowledgment verbiage as may be printed on such a document so long as the verbiage does not require the notary to do something that is illegal for a notary in California (i.e. certifying the authorized capacity of the signer). Please check the document carefully for proper notarial wording and attach this form if required.

- State and County information must be the State and County where the document signer(s) personally appeared before the notary public for acknowledgment.
- Date of notarization must be the date that the signer(s) personally appeared which must also be the same date the acknowledgment is completed.
- The notary public must print his or her name as it appears within his or her commission followed by a comma and then your title (notary public).
- Print the name(s) of document signer(s) who personally appear at the time of notarization.
- Indicate the correct singular or plural forms by crossing off incorrect forms (i.e. ~~he~~/she/~~they,~~ is /~~are~~) or circling the correct forms. Failure to correctly indicate this information may lead to rejection of document recording.
- The notary seal impression must be clear and photographically reproducible. Impression must not cover text or lines. If seal impression smudges, re-seal if a sufficient area permits, otherwise complete a different acknowledgment form.
- Signature of the notary public must match the signature on file with the office of the county clerk.
  - ❖ Additional information is not required but could help to ensure this acknowledgment is not misused or attached to a different document.
  - ❖ Indicate title or type of attached document, number of pages and date.
  - ❖ Indicate the capacity claimed by the signer. If the claimed capacity is a corporate officer, indicate the title (i.e. CEO, CFO, Secretary).
- Securely attach this document to the signed document

NOTARY CERTIFICATION

State of Missouri)

County of Jackson)

On this 28th day of March, 2012, before me appeared Randall J. Landes, to me personally known, who, being by me duly sworn did say that he is the Director of Finance of Kansas City, Missouri and that the seal affixed to the foregoing instrument is the seal of Kansas City, Missouri and that said instrument was signed and sealed in behalf of said City by authority of its City Council and said Randall J. Landes acknowledged said instrument to be the free act and deed of said City.

Lisa Lynnette Brown

Notary Public

LISA LYNNETTE BROWN
Notary Public - Notary Seal
State of Missouri
Commissioned for Jackson County
My Commission Expires: September 02, 2015
Commission Number: 11386322

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Exhibit "A"

LEGAL DESCRIPTION AND PLAT OF CONVEYED PROPERTY

EXHIBIT A

PARCEL HUD

PARCEL DESCRIPTION: ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°56'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 758.50 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE N46°05'07"W ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, A DISTANCE OF 327.24 FEET TO THE POINT OF BEGINNING; THENCE S43°54'53"W, A DISTANCE OF 78.17 FEET; THENCE N46°05'07"W, A DISTANCE OF 168.67 FEET; THENCE S43°54'53"W, A DISTANCE OF 54.65 FEET; THENCE N46°05'07"W, A DISTANCE OF 24.81 FEET TO A POINT ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE N43°52'08"E ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 132.82 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID HICKAM ROAD AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 193.58 FEET TO THE POINT OF BEGINNING. THE PARCEL DESCRIBED ABOVE CONTAINS 16,487 SQUARE FEET OR 0.378 ACRES, MORE OR LESS.

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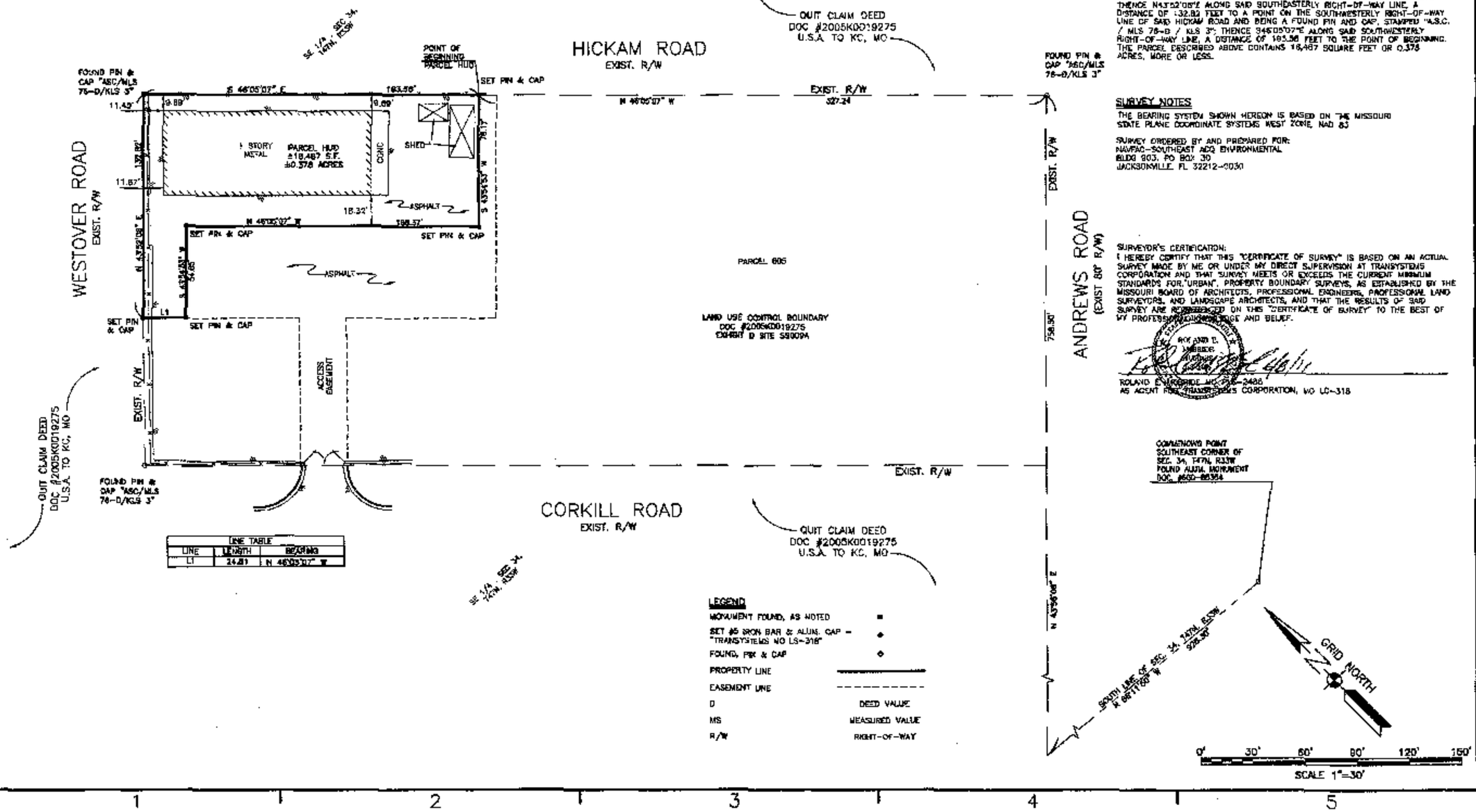
CERTIFICATE OF SURVEY

SOUTHEAST QUARTER, SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI



LINE TABLE		
LINE	LENGTH	BEARING
L1	24.81	N 46°05'07" W

LEGEND

MONUMENT FOUND, AS NOTED	■
SET #5 IRON BAR & ALUM. CAP - "TRANSYSTEMS MO LS-318"	◆
FOUND, PIN & CAP	◇
PROPERTY LINE	———
EASEMENT LINE	- - - - -
D	DEED VALUE
MS	MEASURED VALUE
R/W	RIGHT-OF-WAY

PARCEL DESCRIPTION: ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-86364; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°56'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 758.90 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE N46°00'07"W ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, A DISTANCE OF 327.24 FEET TO THE POINT OF BEGINNING; THENCE S43°54'53"W, A DISTANCE OF 78.17 FEET; THENCE N46°06'07"W, A DISTANCE OF 198.57 FEET; THENCE S43°54'53"W, A DISTANCE OF 54.65 FEET; THENCE N46°05'07"W, A DISTANCE OF 24.81 FEET TO A POINT ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE N43°52'08"E ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 132.82 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF SAID HICKAM ROAD AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 183.56 FEET TO THE POINT OF BEGINNING. THE PARCEL DESCRIBED ABOVE CONTAINS 16,487 SQUARE FEET OR 0.378 ACRES, MORE OR LESS.

SURVEY NOTES

THE BEARING SYSTEM SHOWN HEREON IS BASED ON THE MISSOURI STATE PLANE COORDINATE SYSTEMS WEST ZONE, NAD 83

SURVEY ORDERED BY AND PREPARED FOR:
NAVFAC-SOUTHEAST ACQ ENVIRONMENTAL
BLDG 903, PO BOX 30
JACKSONVILLE, FL 32212-0030

SURVEYOR'S CERTIFICATION:
I HEREBY CERTIFY THAT THIS "CERTIFICATE OF SURVEY" IS BASED ON AN ACTUAL SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION AT TRANSYSTEMS CORPORATION AND THAT SURVEY MEETS OR EXCEEDS THE CURRENT MINIMUM STANDARDS FOR "URBAN", PROPERTY BOUNDARY SURVEYS, AS ESTABLISHED BY THE MISSOURI BOARD OF ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS, AND LANDSCAPE ARCHITECTS, AND THAT THE RESULTS OF SAID SURVEY ARE REPRESENTED ON THIS "CERTIFICATE OF SURVEY" TO THE BEST OF MY PROFESSIONAL KNOWLEDGE AND BELIEF.

ROLAND E. LAMBERT
LAND SURVEYOR
STATE OF MISSOURI
2488

ROLAND E. LAMBERT, MO PLS 2488
AS AGENT FOR TRANSYSTEMS CORPORATION, MO LC-318

TranSystems
2400 Pershing Road • Suite 400
Kansas City • Missouri • USA, 64108
Phone 816-329-8600
www.transystems.com

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA

MARINE CORPS SUPPORT ACTIVITY
KANSAS CITY, MISSOURI

BOUNDARY SURVEY
MARINE CORPS SUPPORT ACTIVITY

PARCEL HUD

AS NOTED

F-16

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Exhibit "B"

LEGAL DESCRIPTION AND PLAT OF ACCESS EASEMENT

EXHIBIT B

EASEMENT

EASEMENT DESCRIPTION: ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°56'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 538.95 FEET TO A POINT ON THE NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED; THENCE N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 403.18 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, A DISTANCE OF 27.00 FEET; THENCE N43°54'53"E, A DISTANCE OF 87.37 FEET; THENCE N46°05'07"W, A DISTANCE OF 65.65 FEET; THENCE N43°54'53"E, A DISTANCE OF 54.65 FEET; THENCE S46°05'07"E, A DISTANCE OF 168.67 FEET; THENCE N43°54'53"E, A DISTANCE OF 78.17 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 9.98 FEET; THENCE S43°54'53"W, A DISTANCE OF 132.82 FEET; THENCE N46°05'07"W, A DISTANCE OF 86.00 FEET; THENCE S43°54'53"W, A DISTANCE OF 87.33 FEET TO THE POINT OF BEGINNING.
THE EASEMENT DESCRIBED ABOVE CONTAINS 12,902 SQUARE FEET OR 0.296 ACRES, MORE OR LESS.

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CERTIFICATE OF SURVEY

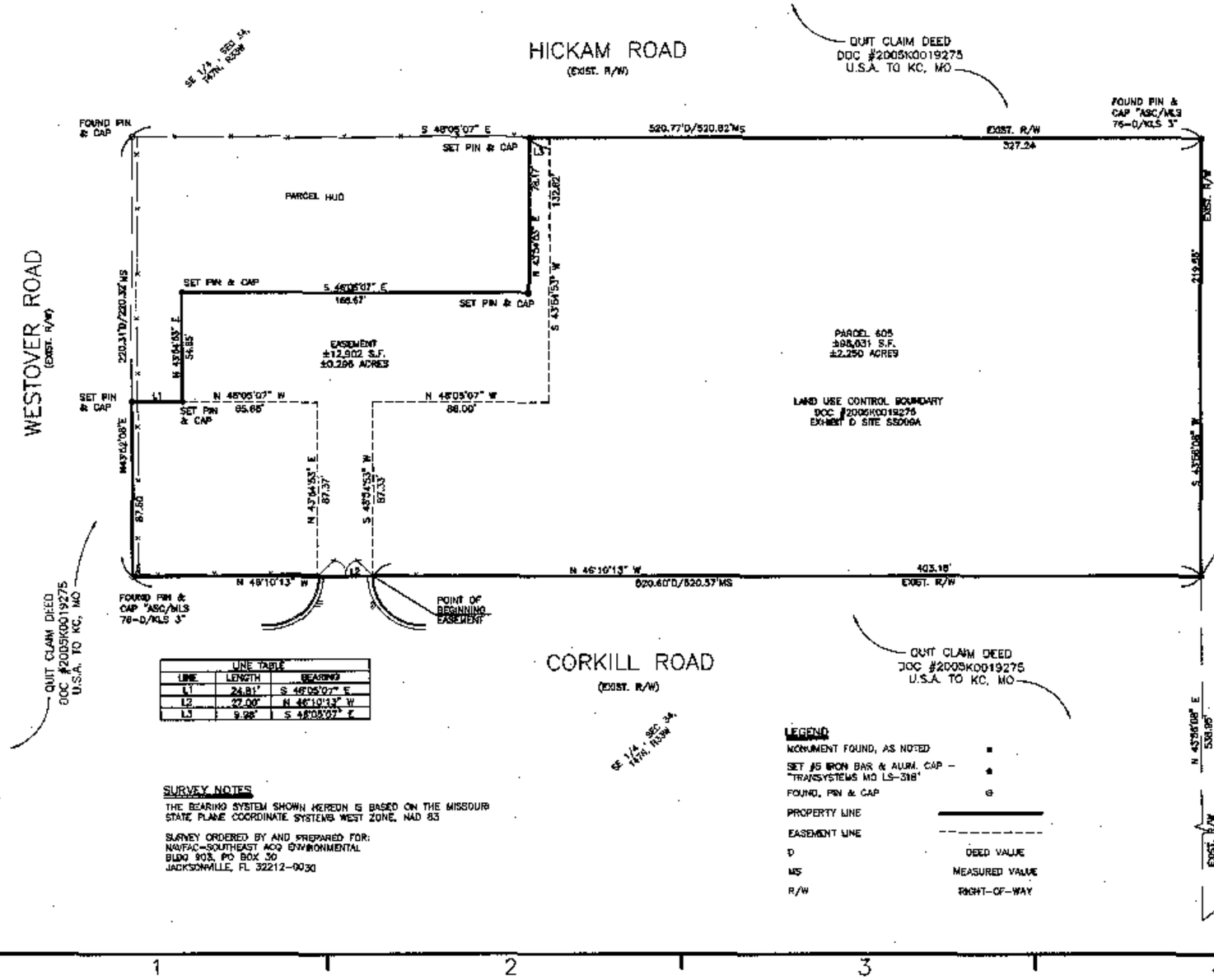
SOUTHEAST QUARTER, SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI

SURVEYOR'S CERTIFICATION:
I HEREBY CERTIFY THAT THIS "CERTIFICATE OF SURVEY" IS BASED ON AN ACTUAL SURVEY MADE BY ME OR UNDER MY DIRECT SUPERVISION AT TRANSYSTEMS CORPORATION AND THAT SURVEY MEETS OR EXCEEDS THE CURRENT MINIMUM STANDARDS FOR "URBAN", PROPERTY BOUNDARY SURVEYS, AS ESTABLISHED BY THE MISSOURI BOARD OF ARCHITECTS, PROFESSIONAL ENGINEERS, PROFESSIONAL LAND SURVEYORS, AND LANDSCAPE ARCHITECTS, AND THAT THE RESULTS OF SAID SURVEY ARE REPRESENTED ON THIS "CERTIFICATE OF SURVEY" TO THE BEST OF MY PROFESSIONAL KNOWLEDGE AND BELIEF.

ROLAND E. [illegible] LS-2486
AS AGENT FOR TRANSYSTEMS CORPORATION, MO LC-318

PARCEL DESCRIPTION: ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 800-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°58'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 538.95 FEET TO A POINT ON THE NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED AND BEING THE POINT OF BEGINNING; THENCE N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, A DISTANCE OF 520.57 FEET MEASURED, (520.60 FEET DEED), TO A POINT ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275, AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE N43°52'08"E ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, A DISTANCE OF 87.50 FEET; THENCE S46°05'07"E, A DISTANCE OF 24.81 FEET; THENCE N43°54'53"E, A DISTANCE OF 54.65 FEET; THENCE S46°05'07"E, A DISTANCE OF 168.67 FEET; THENCE N43°54'53"E, A DISTANCE OF 78.17 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 327.24 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF SAID ANDREWS ROAD AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE S43°56'08"W ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 219.88 FEET TO THE POINT OF BEGINNING. THE PARCEL DESCRIBED ABOVE CONTAINS 98,031 SQUARE FEET OR 2.250 ACRES, MORE OR LESS.

EASEMENT DESCRIPTION: ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 800-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°58'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 538.95 FEET TO A POINT ON THE NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED; THENCE N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 403.18 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, A DISTANCE OF 27.00 FEET; THENCE N43°54'53"E, A DISTANCE OF 87.37 FEET; THENCE N46°05'07"W, A DISTANCE OF 85.85 FEET; THENCE N43°54'53"E, A DISTANCE OF 54.65 FEET; THENCE S46°05'07"E, A DISTANCE OF 168.67 FEET; THENCE N43°54'53"E, A DISTANCE OF 78.17 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 9.98 FEET; THENCE S43°54'53"W, A DISTANCE OF 132.82 FEET; THENCE N46°05'07"W, A DISTANCE OF 86.00 FEET; THENCE S43°54'53"W, A DISTANCE OF 87.33 FEET TO THE POINT OF BEGINNING. THE EASEMENT DESCRIBED ABOVE CONTAINS 12,902 SQUARE FEET OR 0.296 ACRES, MORE OR LESS.



LINE TABLE		
LINE	LENGTH	BEARING
L1	24.81'	S 46°05'07" E
L2	27.00'	N 46°10'13" W
L3	9.98'	S 46°05'07" E

SURVEY NOTES
THE BEARING SYSTEM SHOWN HEREON IS BASED ON THE MISSOURI STATE PLANE COORDINATE SYSTEMS WEST ZONE, NAD 83

SURVEY ORDERED BY AND PREPARED FOR:
NAVFAC-SOUTHEAST ACQ ENVIRONMENTAL
BLDG 903, PO BOX 30
JACKSONVILLE, FL 32212-0030

LEGEND

MONUMENT FOUND, AS NOTED	■
SET #5 IRON BAR & ALUM. CAP - "TRANSYSTEMS MO LS-318"	▲
FOUND, PIN & CAP	⊕
PROPERTY LINE	———
EASEMENT LINE	- - - - -
D	DEED VALUE
MS	MEASURED VALUE
R/W	RIGHT-OF-WAY

TranSystems
2400 Pershing Road ~ Suite 400
Kansas City ~ Missouri ~ USA 64108
Phone 816-329-8600
www.transystems.com

ATLANTIC DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
NORFOLK, VIRGINIA
MARINE CORPS SUPPORT ACTIVITY
KANSAS CITY, MISSOURI
BOUNDARY SURVEY
MARINE CORPS SUPPORT ACTIVITY
PARCEL 605

DEPARTMENT OF THE NAVY
NAVAL STATION
MARINE CORPS SUPPORT ACTIVITY

SCALE: AS NOTED
N68460-10-D-0001

F-19

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APPENDIX G

DEED FOR PORT AUTHORITY TRANSFER

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ELECTRONICALLY RECORDED
JACKSON COUNTY, MISSOURI
05/29/2012 12:27:07 PM
QCD FEE: $ 96.00 26 Pages

INSTRUMENT NUMBER:
2012E0057011

Above Line for Recorder Use Only

Document Title:	**Quitclaim Deed**
Grantor: Grantor's Statutory Address:	**United States of America** 1455 Frazee Road, Suite 900 San Diego, CA 92108
Grantee: Grantee's Statutory Address:	**The Port Authority of Kansas City, Missouri** 300 Wyandotte, Suite 100 Kansas City, Missouri 64105
Effective Date of Document:	May 22, 2012
Legal Description:	See Exhibit "A," pp. 15-16 Exhibit "B," pp. 19-20
Reference Book and Page:	N/A

CONTINENTAL TITLE C135565 / 1 of 3

Above Line for Recorder Use Only

Document Title:	**Quitclaim Deed**
Grantor: Grantor's Statutory Address:	**United States of America** 1455 Frazee Road, Suite 900 San Diego, CA 92108
Grantee: Grantee's Statutory Address:	**The Port Authority of Kansas City, Missouri** 300 Wyandotte, Suite 100 Kansas City, Missouri 64105
Effective Date of Document:	May 22, 2012
Legal Description:	See Exhibit "A," pp. 15-16 Exhibit "B," pp. 17-20
Reference Book and Page:	N/A

CONTINENTAL TITLE C135565 / 1 of 3

QUITCLAIM DEED

THIS INDENTURE (hereinafter referred to as the "Quitclaim Deed") is made effective this 22nd day of May, 2012 between the United States of America, acting by and through the Secretary of the Navy, Base Realignment and Closure Program Management Office Southeast, Charleston, South Carolina, hereinafter referred to as the "GOVERNMENT" or the "GRANTOR", and The Port Authority of Kansas City, Missouri, a political subdivision of the State of Missouri created pursuant to Section 68.010, et seq., RSMo., hereinafter referred to as the "GRANTEE", for surplus government real and personal property at the former Marine Corps Support Activity, Kansas City, Missouri ("MCSA"). This Quitclaim Deed is based upon the following facts:

RECITALS

WHEREAS:

The GOVERNMENT is acting hereunder pursuant to the authority contained in the Federal Property and Administrative Services Act of 1949, approved June 30, 1949, (63 Stat. 377), as amended, and 49 U.S.C. Sections 47151-47153 (formally known as the Surplus Property Act of 1944 [58 Stat. 765], as amended), and a delegation of that authority from the Administrator of General Services to the Secretary of Defense and subsequent re-delegation to the Secretary of the Navy whereby, the Secretary of the Navy may convey surplus property at a closing installation to a public body for public purposes at fair market value pursuant to the negotiated sale provisions of 40 U.S.C. 545(b) as implemented by 41 CFR 102-75.885 and under the power and authority provided by the Defense Base Closure and Realignment Act of 1990, as amended (Pub. L. No. 101-510; "Base Closure Act"); and

GRANTEE, under the provisions of 40 U.S.C. 545(b)(8), by submission of its offer to purchase, dated January 5, 2012 offered fair market value for approximately 8.02 acres of land and improvements at MCSA, such land being more fully described on the document attached to this Quitclaim Deed and incorporated herein as Exhibit "A" (hereinafter referred to as the "Negotiated Sale Property") for public use, including, but not limited to, the development of an intermodal transportation facility; and

The GOVERNMENT has found and determined that the Negotiated Sale Property is suitable for transfer pursuant to the Finding of Suitability for Transfer ("FOST") dated October 3, 2011. The FOST sets forth the basis of the GRANTOR's determination that all the property at MCSA, including the portion being conveyed by this Quitclaim Deed, is suitable for transfer pursuant to 42 U.S.C. Section 9620(h)(3); and

NOW THEREFORE, by the acceptance of this Quitclaim Deed or any rights hereunder, the GRANTEE, for itself, its successors and assigns, agrees that the transfer of the Negotiated Sale Property by this Quitclaim Deed is accepted subject to the following terms, restrictions, reservations, covenants, and conditions set forth below, which shall run with the land, provided that the Negotiated Sale Property, both real and personal, transferred hereby may be successively transferred only with the proviso that any such subsequent transferee assumes all of the obligations upon the GRANTEE by the provisions of this Quitclaim Deed.

IN CONSIDERATION OF THE FOREGOING, of the terms and conditions set forth below and of other good and valuable consideration of six hundred and fifteen thousand dollars and no cents ($615,000.00), the receipt and adequacy of which, as consideration, the parties hereto, intending to be legally bound hereby, have agreed to, and do hereby, effectuate the conveyance set forth below.

Conveyance Language

The GOVERNMENT does hereby, subject to any easements and encumbrances of record and subject to the reservations, exceptions, notices, covenants, conditions, and restrictions expressly contained herein, grant, sell, convey, remise, release, and quitclaim unto GRANTEE, its successors and its assigns, without any warranty express or implied as to the quantity or quality of GOVERNMENT's title (except such warranties as are specifically set forth herein, required by 42 U.S.C. Section 9620(h)(3), or otherwise required by law), all of GOVERNMENT's right, title, and interest in that certain real property, including, but not limited to the underlying estate, buildings, structures, and improvements, and personal property situated or installed thereon, being referred to herein as the Negotiated Sale Property; and

TOGETHER WITH all and singular the ways, waters, water courses, driveways, rights, hereditaments and appurtenances, whatsoever thereunto belonging, or in any wise appertaining, and the reversions and remainders, rents, issues and profits thereof; and all the estate, right, title, interest, property, claim and demand whatsoever of the GOVERNMENT, in law, equity, or otherwise howsoever, of, in, and to the same and every part thereof; and

TO HAVE AND TO HOLD the Negotiated Sale Property, the hereditaments and premises hereby granted, or mentioned and intended so to be, with the appurtenances, unto the said GRANTEE, its successors, and its assigns, and subject to the reservations, restrictions, and conditions set forth in this instrument, to and for the use and behoof of the said GRANTEE, its successors and assigns forever.

Special Sections

I. Notice of Environmental Condition: Information concerning the environmental condition of the Negotiated Sale Property is contained in the FOST and an Environmental Condition of the Property ("ECP") report also prepared by the GOVERNMENT in preparation for transfer of the Negotiated Sale Property. The FOST further identifies the environmental notifications, covenants, and restrictions applicable to that portion of the Negotiated Sale Property referred to as "Site SS009" in the FOST. These notifications, covenants and restrictions, which are applicable only to that portion of the Negotiated Sale Property designated as Site SS 009, are contained in this Quitclaim Deed. Site SS 009 is more fully described in the Plat of Survey attached to this Quitclaim Deed and incorporated herein as Exhibit "B". The FOST sets forth the basis for the GOVERNMENT's determination that the Negotiated Sale Property is suitable for transfer. Together, the ECP and FOST contain all pertinent information currently known by the

GOVERNMENT as to the environmental condition of the Negotiated Sale Property. GRANTEE hereby acknowledges that it has been provided copies of the ECP and FOST.

II. Covenant regarding Mineral Interests in the Negotiated Sale Property. By that certain Quitclaim Deed recorded on March 26, 2009, in the public records of Jackson County, Missouri under document number 2009E0028142, the United States of America, by and through the Bureau of Land Management, as grantor, quitclaimed to The Port Authority of Kansas City, Missouri, as grantee, federally owned mineral interests associated with certain property as more particularly described therein, which property included the Negotiated Sale Property. Such federally owned mineral interests consisted of all of the Bureau of Land Management's right, title, interest and estate in and to all minerals, excepting oil and gas, lying upon the surface or at any depth of the property and including, but not limited to, those minerals which may be produced by wells, mines and open pit or strip mining, together with the right of ingress and egress at all times for the purpose of mining, drilling, exploring, operating and developing the property for all minerals, excepting oil and gas, and removing the same therefrom. GRANTEE covenants and agrees for itself and its successors and assigns as a covenant running with the land that it shall not take any action in furtherance of its interests under the March 26, 2009 Quitclaim Deed described above, that either interferes with the GRANTOR's Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA") remedial actions or the environmental covenants, conditions and reservations described in this Quitclaim Deed.

III. Notice of Potential Vapor Intrusion for Site SS 009: Groundwater contamination in excess of Remedial Action Cleanup Goals ("RACGs") remains on Site SS 009. Before construction of any improvements on any portion of the Negotiated Sale Property including Site SS 009, the potential for vapor intrusion from groundwater and possible resulting impacts to indoor air quality should be considered and, as needed, addressed during building and design.

IV. Description of Remedial Action Taken at Site SS 009: Pursuant to section 120(h)(3)(A)(i)(III) of CERCLA (42 U.S.C. § 9620(h)(3)(A)(i)(III)), a remedial action consisting of Land Use Controls/Institutional Controls ("LUCs/ICs") supported by a Long-Term Maintenance ("LTM") program for groundwater has been taken on Site SS 009. The selected remedial actions being implemented at Site SS 009, although not yet completed, have been determined by the United States Environmental Protection Agency ("USEPA") to be "operating properly and successfully" ("OPS") pursuant to CERCLA Section 120(h)(3)(B). The specific environmental covenants and restrictions set out in this Quitclaim Deed are part of the LUCs/ICs and LTM program (collectively, the LUCs/ICs and LTM program are hereinafter referred to as the "LUCs") for Site SS 009.

V. Notices Pursuant to Section 120(h)(3)(A)(i)(I) and (II) of CERCLA: Pursuant to section 120(h)(3)(A)(i)(I) and (II) of CERCLA, available information regarding the type, quantity, and location of hazardous substances and the time at which such substances were stored, released, or disposed of, as defined in Section 120(h), is provided in Exhibit "C", attached hereto and made a part hereof.

VI. CERCLA Covenants: Pursuant to section 120(h)(3)(A)(ii) and (B) of CERCLA, the GOVERNMENT warrants that:

a. All remedial action necessary to protect human health and the environment with respect to any hazardous substance identified pursuant to section 120(h)(3)(A)(i)(I) of CERCLA remaining on the Negotiated Sale Property has been taken before the date of this Quitclaim Deed; and

b. That any additional remedial action found to be necessary after the date hereof shall be conducted by the United States of America.

VII. Access Rights Pursuant to Section 120(h)(3)(A)(iii) of CERCLA: GOVERNMENT retains and reserves a perpetual and assignable easement and right of access on, over, and through the Negotiated Sale Property, to enter upon the Negotiated Sale Property in any case in which a remedial action or corrective action is found to be necessary on the part of the GOVERNMENT, without regard to whether such remedial action or corrective action is on the Negotiated Sale Property or on adjoining or nearby lands. Such easements and right of access includes, without limitation, the right to perform any environmental investigation, survey, monitoring, sampling, testing, drilling, boring, coring, testpitting, installing, monitoring or pumping wells or other treatment facilities, response action, correction action, or any other action necessary for the GOVERNMENT to meet its responsibilities under applicable laws as provided for in this Quitclaim Deed. Such easement and right of access shall be binding on the GRANTEE and its successors and assigns and shall run with the land.

In exercising such easement and right of access, the GOVERNMENT shall provide the GRANTEE or its successors or assigns, as the case may be, with reasonable notice of its intent to enter upon the Negotiated Sale Property and exercise its rights under this clause, which notice may be severely curtailed or eliminated in emergency situations. The GOVERNMENT shall use reasonable means to avoid and to minimize interference with the GRANTEE's and the GRANTEE's successors' and assigns' quiet enjoyment of the Negotiated Sale Property. At the completion of work, the work site shall be reasonably restored. Such easement and right of access includes the right to obtain and use utility services, including water, gas, electricity, sewer and communications services available on the Negotiated Sale Property at a reasonable charge to the GOVERNMENT. Excluding the reasonable charges for such utility services, no fee, charge, or compensation will be due the GRANTEE, nor its successors and assigns, for the exercise of the easement and right of access hereby retained and reserved by the GOVERNMENT.

In exercising such easement and right of access, neither the GRANTEE nor its successors and assigns, as the case may be, shall have any claim at law or equity against the GOVERNMENT, or any officer or employee of the GOVERNMENT, based on actions taken by the GOVERNMENT or its officers, employees, agents, contractors of any tier, or servants pursuant to and in accordance with this clause; provided, however, that nothing in this paragraph shall be considered as a waiver by the GRANTEE and its successors and assigns from any remedy available to them under the Federal Tort Claims Act.

VIII. Covenant and Restriction regarding Non-residential Use of Site SS 009: GRANTEE hereby covenants, on behalf of itself, its successors and assigns, that residential reuse of Site SS 009, without prior written approval of the GOVERNMENT, USEPA, and the Missouri Department of Natural Resources ("MDNR") will be prohibited. Prohibited residential uses shall include, but are not limited to, any form of housing, child-care facilities, any kind of school, including pre-schools, elementary schools, and secondary schools, playgrounds, and adult convalescent and nursing care facilities.

IX. Covenant and Restrictions regarding Groundwater at Site SS 009: GRANTEE hereby covenants, on behalf of itself, its successors and assigns, that use and/or extraction of the groundwater within Site SS 009, for any purpose (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and/or industrial or agricultural uses) is prohibited without prior written approval from the GOVERNMENT, USEPA, and MDNR. Subsurface drilling and/or excavation of the groundwater within Site SS 009 are prohibited without prior written approval from the GOVERNMENT, USEPA, and MDNR.

X. Covenant and Restriction regarding GRANTEE compliance with Health and Safety Plan for Site SS 009: GRANTEE covenants that it shall comply or require its lessees and licensees to comply with any reasonable provisions of any health and safety plan put into effect by the GOVERNMENT in connection with any ongoing or future environmental investigation and/or remedial activities to be undertaken by the GOVERNMENT on Site SS 009. As of the date of this Quitclaim Deed, no such health and safety plan has been put into effect or is contemplated by the GOVERNMENT.

XI. Covenant and Restriction regarding Non-interference with Remedial Systems' Operations and Controls at Site SS 009: The GRANTEE, its successors and assigns, shall not hinder or prevent the GOVERNMENT from constructing, upgrading, operating, maintaining, and monitoring any groundwater and/or soil treatment facilities and groundwater and/or soil monitoring networks or engage in any activity that will disrupt or hinder further remedial investigation, response actions, or oversight activities on any known or hereafter discovered sites within Site SS 009. The GRANTEE, its successors and assigns, shall not disturb, move, damage, mar, tamper with, interfere with, obstruct, or impede any monitoring wells, treatment facilities, piping, and other facilities associated with environmental cleanup activities being conducted by the GOVERNMENT on Site SS 009. The GRANTEE, its successors and assigns, shall not disturb, move, damage, mar, tamper with, interfere with, obstruct, or impede any environmental investigation or remedial activity associated with environmental cleanup activities being conducted by the GOVERNMENT or jeopardize the protectiveness of the environmental remedies put in place or conduct or permit any activity that could negatively impact or restrict access for cleanup on Site SS 009.

XII. Covenant regarding Annual Certification of Compliance with LUCs on Site SS 009: GRANTEE covenants that it or its designee shall annually provide a written certification to MDNR, with a copy to the GOVERNMENT, certifying that the LUCs set out in Special Sections VIII, IX, X and XI are being complied with, for as long as LUCs are required on Site SS 009. Such annual certifications shall be provided using the form attached hereto as Exhibit "D," or similar form as may later be approved by MDNR. If a LUC violation is discovered after transfer

of the Negotiated Sale Property, the GRANTEE, its successors and assigns, shall notify the GOVERNMENT, USEPA, and MDNR, as soon as practicable, but in no case longer than ten (10) days after the specific deficiency(ies) is found. Within ten (10) days of reporting the deficiency(ies), the GRANTEE, its successors and assigns, shall provide a written explanation indicating the specific deficiencies and what efforts or measures have been or will be taken to correct those deficiencies.

XIII. Release of Environmental Condition and/or GRANTEE Covenant LUCs: The GOVERNMENT shall release the groundwater notification and groundwater LUCs from Site SS 009 only with USEPA and MDNR written concurrence. It is anticipated that USEPA and MDNR shall both give their concurrence if sampling demonstrates that the RACGs applicable to Site SS 009 and remedial objectives have been met. The GOVERNMENT shall consider a request to release the LUCs related to Site SS 009 only with USEPA and MDNR written concurrence. The GOVERNMENT shall respond promptly and in good faith to any written request by the GRANTEE, its successors or assigns that the GOVERNMENT extinguish, release or otherwise modify any of the LUCs because of full satisfaction of the essential purposes thereof, or achievement of remedial goals. Any such request must include a letter from USEPA and MDNR, or otherwise suitable documentation, stating that site rehabilitation with respect to environmental conditions on Site SS 009 has been achieved and no further remedial action is required. Once the required regulatory concurrences noted above have been obtained by the GRANTEE, or its successors or assigns, the GOVERNMENT shall deliver to the GRANTEE, or its successors or assigns, in recordable form, a Deed Amendment or Covenant Release relating specifically to the applicable LUCs. The execution of the Deed Amendment or Covenant Release by the GOVERNMENT shall remove these LUCs with respect to the portion(s) of Site SS 009 specified in the Deed Amendment or Covenant Release.

XIV. Development, Improvement or Maintenance of Land Restricted by LUCs: In the event the GRANTEE, its successors and assigns desires to develop, improve, use, or maintain any portion of the Negotiated Sale Property that includes any portion of Site SS 009 in a manner that is restricted or prohibited by the LUCs contained within this Quitclaim Deed, the GRANTEE, its successors and assigns shall provide the GOVERNMENT with a written request seeking approval for the requested activity. The GOVERNMENT shall respond to these written requests promptly and in good faith PROVIDED the request includes both a full description of the proposed work, including but not limited to the actual work plan maps, drawings, and specifications AND, documentation from both the USEPA and MDNR indicating that USEPA and MDNR have reviewed the proposed development, improvement, or maintenance activity and do not object thereto.

XV. Asbestos-Containing Materials Hazard Disclosure and Acknowledgement: GRANTEE hereby acknowledges that asbestos-containing materials ("ACM") remain in buildings on the Negotiated Sale Property and agrees to manage any and all remaining ACM in accordance with applicable laws and regulations. An Asbestos-Containing Materials Hazard Disclosure and Acknowledgement Statement is provided as Exhibit "E" to this Quitclaim Deed.

In addition to the aforementioned covenants and restrictions contained in this Quitclaim Deed, the GRANTEE covenants, on behalf of itself, its successors and assigns, as a covenant running

with the land, that it will prohibit occupancy and use of buildings and structures, or portions thereof, containing known asbestos hazards or known ACM hazards prior to abatement of such hazards. In connection with its use and occupancy of the Negotiated Sale Property, including, but not limited to, demolition of buildings and structures containing ACM, GRANTEE will comply with all applicable Federal, State, and local laws relating to asbestos or ACM.

The GRANTEE acknowledges that the GOVERNMENT assumes no liability for damages for personal injury, illness, disability, or death to the GRANTEE, its successors and assigns, employees, invitees, or to any other person, including members of the general public, arising from or incident to the purchase, transportation, removal, handling, use, disposition, or other activity causing or leading to contact of any kind whatsoever with ACM in structures on the Negotiated Sale Property, whether the GRANTEE, its successors or assigns, has properly warned, or failed to properly warn the persons injured.

XVI. Lead Based Paint Hazard Disclosure and Acknowledgement: The Negotiated Sale Property contains improvements that, due to their age, are likely to have been painted with lead based paint ("LBP"). This in turn, creates the possibility, through the action of normal weathering and maintenance, that there may be lead from LBP in the soil surrounding these structures. Lead from paint, paint chips, and dust can pose health hazards if not managed properly. A Lead Based Paint Hazard Disclosure and Acknowledgement Statement is provided as Exhibit "F" to this Quitclaim Deed.

The GOVERNMENT shall have no objections for the demolition of nonresidential buildings, structures, or facilities built prior to 1978, which creates the potential for lead to be released to soil as a result of such activities. With respect to nonresidential buildings, structures, or facilities, which the GRANTEE intends to demolish or redevelop for residential use after conveyance, the GRANTEE may, under applicable law or regulation, be required by regulatory agencies to evaluate the soil adjacent to such nonresidential buildings, structures, or facilities for soil-lead hazards, and to abate any such hazards that may be present, after demolition and prior to occupancy of any newly constructed residential structures.

In addition to the aforementioned covenants and restrictions contained in this Quitclaim Deed, the GRANTEE covenants and agrees that it shall prohibit residential occupancy and use of buildings and structures, or portions thereof, prior to identification and/or evaluation of any LBP hazards, and abatement of any hazards identified as required.

The GRANTEE covenants and agrees, on behalf of itself, its successors and assigns, that it shall comply with all federal, state, and local laws relating to LBP in its use and occupancy of the Negotiated Sale Property (including demolition and disposal of existing improvements). The GRANTEE shall hold harmless and indemnify the GOVERNMENT from and against any and all loss, judgment, claims, demands, expenses, or damages of whatever nature or kind which might arise or be made against the GOVERNMENT as a result of LBP having been present on the Negotiated Sale Property. Improvements on the Negotiated Sale Property were constructed prior to 1978 and, as with all such improvements, a LBP hazard may be present.

XVII. Pesticides: The Negotiated Sale Property may contain pesticide residue from pesticides that have been applied in the management of the Negotiated Sale Property. The GOVERNMENT knows of no use of any registered pesticide in a manner inconsistent with its labeling and believes that all applications were made in accordance with the Federal Insecticide, Fungicide and Rodenticide Act ("FIRFA") (7 U.S.C. Sec 136, et seq.), its implementing regulations, and according to the labeling provided with such substances. It is the GOVERNMENT's position that it shall have no obligation under the covenants provided pursuant to section 120(h)(3)(A)(ii) of CERCLA for the remediation of legally applied pesticides.

XVIII. GRANTEE Notice Requirement regarding Future Sale or Assignment: GRANTEE, on behalf of itself and its successors and assigns, lessees and licensees, contractors and agents, covenants that it shall provide written notice to the GOVERNMENT, USEPA, and MDNR, and other applicable local regulatory agencies, if any, of any subsequent sale, assignment, lease, and transfer of the Negotiated Sale Property or any portion thereof, and provide contact information concerning the new owner or occupant.

The following are points of contact for the GOVERNMENT, USEPA, and MDNR:

GOVERNMENT
Director
BRAC Program Management Office SE
4130 Faber Place Drive
Suite 202
North Charleston, SC 29405

USEPA
US Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101

State of Missouri
Missouri Department of Natural Resources
Attn: Mr. Ruben Zamarripa
P.O. Box 176
Jefferson City, MO 65102-0176

The GRANTEE, its successors and assigns, agrees that if any portion of the Negotiated Sale Property is conveyed by deed, the GRANTEE, its successors and assigns, shall provide notice to the party to whom the Negotiated Sale Property or any portion thereof is transferred ("the subsequent owner") of all CERCLA Hazardous Substances, LUCs, and GRANTEE covenants, as contained in this Quitclaim Deed, and the subsequent owner, its successors and assigns, shall then be bound by the same LUCs and GRANTEE covenants.

XIX. Excess Profits Covenant for Negotiated Sales to Public Bodies:

a. This covenant shall run with the land for a period of three (3) years from the date of conveyance. With respect to the Negotiated Sale Property described in this Quitclaim Deed, if at any time within a three (3) year period from the date of transfer of title by the GOVERNMENT, the GRANTEE, or its successors or assigns, shall sell or enter into agreements to sell the Negotiated Sale Property, either in a single transaction or in a series of transactions, it is covenanted and agreed that all proceeds received or to be received in excess of the GRANTEE's or a subsequent seller's actual allowable costs will be remitted to the GOVERNMENT. In the event of a sale of less than the entire Negotiated Sale Property, actual allowable costs will be apportioned to the Negotiated Sale Property based on a fair and reasonable determination by the GOVERNMENT.

b. For purposes of this covenant, the GRANTEE's or a subsequent seller's allowable costs shall include the following:

1. The purchase price of the Negotiated Sale Property.

2. The direct costs actually incurred and paid for improvements that serve only the Negotiated Sale Property, including road construction, storm and sanitary sewer construction, other public facilities or utility construction, building rehabilitation and demolition, landscaping, grading, and other site or public improvements.

3. The direct costs actually incurred and paid for design and engineering services with respect to the improvements described in b.2 of this section.

4. The finance charges actually incurred and paid in conjunction with loans obtained to meet any of the allowable costs enumerated above.

c. None of the allowable costs described in paragraph b. of this section will be deductible if defrayed by federal grants or if used as matching funds to secure federal grants.

d. To verify compliance with the terms and conditions of this covenant, the GRANTEE, or its successors or assigns, shall submit an annual report for each of the subsequent three (3) years to the GOVERNMENT at the address set out in Special Section XVIII on the anniversary date of this Quitclaim Deed. Each report will identify the Negotiated Sale Property involved in this transaction and will contain such of the following items of information as are applicable at the time of submission:

1. A statement indicating whether or not a resale has been made.
2. A description of each portion of the Negotiated Sale Property that has been resold.
3. The sale price of each of such resold portion.
4. The identity of each purchaser.
5. The proposed land use.
6. An enumeration of any allowable costs incurred and paid that would offset any realized profit.

e. The GOVERNMENT may monitor the Negotiated Sale Property and inspect records related thereto to ensure compliance with the terms and conditions of this covenant and may take any actions that it deems reasonable and prudent to recover any excess profits realized through the resale of the Negotiated Sale Property.

General Provisions

XX. Conveyance is "As Is-Where Is": Except as expressly provided in this Quitclaim Deed or as otherwise required by law, the Negotiated Sale Property is being conveyed "AS IS" and "WHERE IS," without representation, warranty, or guaranty as to quality, quantity, character, condition, size, kind, or fitness for a particular purpose.

XXI. Covenant regarding Non-Discrimination: GRANTEE covenants for itself, its successors and assigns, and every successor in interest to the Negotiated Sale Property, or any part thereof, that GRANTEE and its successors and assigns shall not discriminate upon the basis of race, color, religion, disability, or national origin in the use, occupancy, sale, or lease of the Negotiated Sale Property, or in their employment practices conducted thereon. This covenant shall not apply however, to the lease or rental of a room or rooms within a family dwelling unit, nor shall it apply with respect to Negotiated Sale Property used primarily for religious purposes. The GOVERNMENT shall be deemed a beneficiary of this covenant without regard to whether it remains the owner of any land or interest therein in the locality of the Negotiated Sale Property hereby conveyed and shall have the sole right to enforce this covenant in any court of competent jurisdiction.

XXII. General Notice Provision: To facilitate future cooperation, the following points of contact have been designated by the GOVERNMENT, GRANTEE, and the State of Missouri:

GOVERNMENT – US Government Point of Contact:
Director
BRAC Program Management Office SE
4130 Faber Place Drive
Suite 202
North Charleston, SC 29405

GRANTEE:
Mr. Michael Collins, President
The Port Authority of Kansas City, Missouri
300 Wyandotte
Suite 100
Kansas City, MO 64105

USEPA
US Environmental Protection Agency
Region 7
901 North 5th Street

Kansas City, Kansas 66101

State of Missouri
Missouri Department of Natural Resources
Attn: Mr. Ruben Zamarripa
P.O. Box 176
Jefferson City, MO 65102-0176

XXIII. Non-Applicability to Other Property. None of the provisions of this Quitclaim Deed, including, but not limited to, the environmental notifications, covenants and restrictions contained herein, are intended to be applicable to the property identified and described on Exhibit "B" as Site SS 006.

XXIV. Exhibits: The following exhibits are attached hereto and made a part of this Quitclaim Deed:

Exhibit "A"	Property Description
Exhibit "B"	Site SS009 Plat Survey
Exhibit "C"	CERCLA Sec 120(h) Notification of Hazardous Substances
Exhibit "D"	Annual Certification Form
Exhibit "E"	ACM Hazardous Disclosure and Acknowledgement Statement
Exhibit "F"	LBP Hazardous Disclosure and Acknowledgement Statement

EXECUTION

Effective this 22nd day of May 2012.

UNITED STATES OF AMERICA
Acting by and through
Department of the Navy

WITNESSES:

By: Esther P Ewell
ESTHER P. EWELL
Real Estate Contracting Officer

Sarah Ann Moore
SarahAnnMoore
(Printed Name)

Katie A. Slayton
Katie A. Slayton
(Printed Name)

[NOTARY PAGES ATTACHED TO THIS SIGNATURE PAGE]

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of San Diego }

On May 22, 2012 (Date) before me, Dorann Pons, Notary Public (Here Insert Name and Title of the Officer)
personally appeared Esther P. Ewell, and in witness of Katie Slayton and Sarah Ann Moore (Name(s) of Signer(s))

who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that ~~he/she~~/they executed the same in ~~his/her~~/their authorized capacity(ies), and that by ~~his/her~~/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

DORANN PONS
Commission # 1806799
Notary Public - California
San Diego County
My Comm. Expires Jul 18, 2012

Signature _____ (Signature of Notary Public)

Place Notary Seal Above

Dorann Pons

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Quitclaim Deed to Port Authority of Kansas City

Document Date: 22 May 12 Number of Pages: 26

Signer(s) Other Than Named Above: _____

Capacity(ies) Claimed by Signer(s)

Signer's Name: Esther P. Ewell
- ☐ Individual
- ☐ Corporate Officer — Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney in Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☒ Other: Real Estate Contracting Officer

Signer Is Representing: Dept of Navy

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

Signer's Name: _____
- ☐ Individual
- ☐ Corporate Officer — Title(s): _____
- ☐ Partner — ☐ Limited ☐ General
- ☐ Attorney in Fact
- ☐ Trustee
- ☐ Guardian or Conservator
- ☐ Other: _____

Signer Is Representing: _____

RIGHT THUMBPRINT OF SIGNER
Top of thumb here

ACKNOWLEDGEMENT OF GRANTEE'S COVENANTS

TO INDICATE ACCEPTANCE of the covenants and agreements contained in this Quitclaim Deed and receipt of the documents described herein, GRANTEE has executed this document on the date written below.

(GRANTEE)

Executed this 21st day of May, 2012.

THE PORT AUTHORITY OF KANSAS CITY, MISSOURI

By: _____
Joanne M. Collins
Title: Chairwoman

(OFFICIAL SEAL)

Attest: _____
Michael M. Collins
Title: President

Approved as to form:

_____
Mark R. Coulter, General Counsel,
Director of Intergovernmental Affairs

STATE OF MISSOURI)
) ss.
COUNTY OF JACKSON)

On this 21st day of May, 2012, before me, a Notary Public in and for the county and state aforesaid, personally appeared Joanne M. Collins and Michael M. Collins, to me personally known to be the persons described in and who executed the foregoing instrument, who, being by me duly sworn, did say that they are the Chairwoman and President, respectively, of the Board of Commissioners of The Port Authority of Kansas City, Missouri, a political subdivision of the State of Missouri created pursuant to Section 68.010, et seq., RSMo., that said instrument was signed on behalf of said political subdivision by authority of its Board of Commissioners, and said persons acknowledged said instrument to be the free act and deed of said political subdivision.

{Notarial Seal}

SUSAN Y. SCHEERER
Notary Public - State of Missouri
My Commission Expires April 22, 2015
Clay County
Commission #11446873

_____
Signature of Notary Public

SUSAN Y. SCHEERER
Printed or Typed Name of Notary Public

My Commission expires: April 22, 2015

EXHIBIT "A"

LEGAL DESCRIPTIONS OF NEGOTIATED SALE PROPERTY

Tract I:

ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34 AND THE SOUTHWEST QUARTER OF SECTION 35, ALL IN TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-65354; THENCE N03°35'06"E ALONG THE EAST LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 49.97 FEET TO A POINT ON THE NORTH RIGHT-OF-WAY LINE OF ARNOLD AVENUE, AS NOW ESTABLISHED; THENCE N86°23'26"W ALONG SAID NORTH RIGHT-OF-WAY LINE, A DISTANCE OF 305.54 FEET TO THE POINT OF BEGINNING; THENCE CONTINUING N86°23'26"W ALONG SAID NORTH RIGHT-OF-WAY LINE, A DISTANCE OF 478.04 FEET, TO A POINT ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI, AND BEING A FOUND "CORPS OF ENGINEERS" CAP IN CONCRETE; THENCE N43°56'08"E ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, A DISTANCE OF 774.51 FEET TO A POINT BEING A FOUND "CORPS OF ENGINEERS" CAP IN CONCRETE; THENCE S46°04'26"E, A DISTANCE OF 403.51 FEET TO A POINT BEING A FOUND "CORPS OF ENGINEERS" CAP IN CONCRETE; THENCE S43°38'39"W, A DISTANCE OF 65.14 FEET TO A POINT AT THE APPROXIMATE CENTERLINE OF A CREEK; THENCE THE FOLLOWING FIVE COURSES ALONG THE APPROXIMATE CENTERLINE OF SAID CREEK, ALSO SAID FIVE COURSES BEING DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275: N88°33'00"W, A DISTANCE OF 28.96 FEET (DEED AND MEASURED); THENCE S74°58'12"W, A DISTANCE OF 80.48 FEET (DEED AND MEASURED); THENCE S54°07'46"W, A DISTANCE OF 73.49 FEET (DEED AND MEASURED); THENCE S38°16'09"W, A DISTANCE OF 85.59 FEET (DEED AND MEASURED); THENCE S33°38'04"W, A DISTANCE OF 156.59 FEET (DEED AND MEASURED) TO THE POINT OF BEGINNING. THE PARCEL DESCRIBED ABOVE CONTAINS 221,768 SQUARE FEET OR 5.091 ACRES, MORE OR LESS.

Tract II:

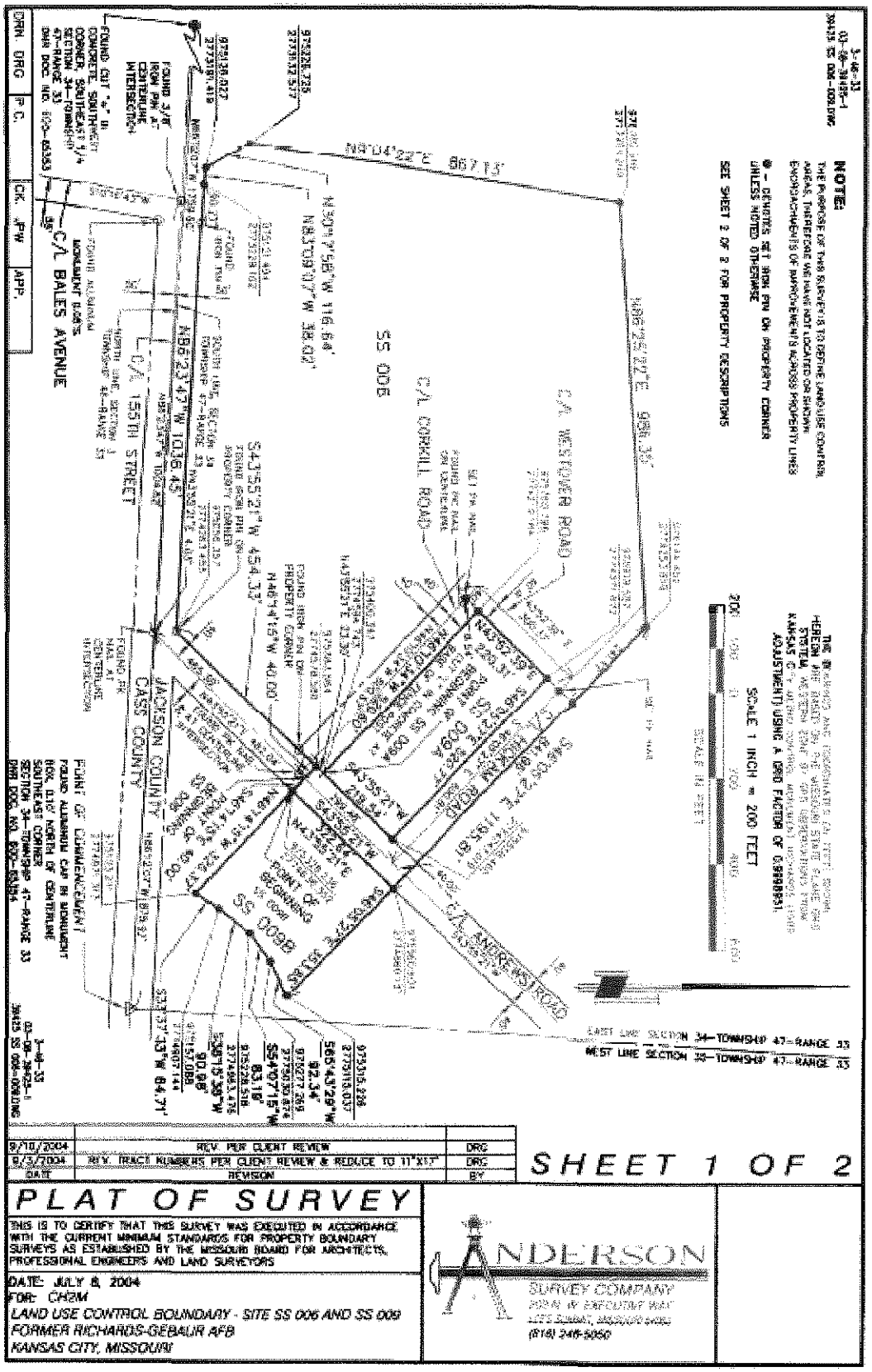
ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°56'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 538.95 FEET TO A POINT ON THE NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED AND BEING THE **POINT OF BEGINNING**; THENCE N46°10'13"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE OF CORKILL ROAD, A DISTANCE OF 520.57 FEET MEASURED, (520.60 FEET DEED), TO A POINT ON THE SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275,

AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE N43°52'08"E ALONG SAID SOUTHEASTERLY RIGHT-OF-WAY LINE OF WESTOVER ROAD, A DISTANCE OF 87.50 FEET; THENCE S46°05'07"E, A DISTANCE OF 24.81 FEET; THENCE N43°54'53"E, A DISTANCE OF 54.65 FEET; THENCE S46°05'07"E, A DISTANCE OF 168.67 FEET; THENCE N43°54'53"E, A DISTANCE OF 78.17 FEET TO A POINT ON THE SOUTHWESTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275; THENCE S46°05'07"E ALONG SAID SOUTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 327.24 FEET TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF SAID ANDREWS ROAD AND BEING A FOUND PIN AND CAP, STAMPED "A.S.C. / MLS 76-D / KLS 3"; THENCE S43°56'08"W ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 219.55 FEET TO THE **POINT OF BEGINNING**. THE PARCEL DESCRIBED ABOVE CONTAINS 98,031 SQUARE FEET OR 2.250 ACRES, MORE OR LESS.

Tract III:

ALL THAT PART OF THE SOUTHEAST QUARTER OF SECTION 34, TOWNSHIP 47 NORTH, RANGE 33 WEST, IN KANSAS CITY, JACKSON COUNTY, MISSOURI, BEARINGS ARE REFERENCED TO GRID NORTH OF THE MISSOURI STATE PLANE COORDINATE SYSTEM, 1983, WEST ZONE, MORE PARTICULARLY DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHEAST CORNER OF THE SOUTHEAST QUARTER OF SECTION 34, T47N, R33W, BEING A FOUND ALUMINUM CAP IN MONUMENT BOX, PER CERTIFIED LAND CORNER RECORD, DOCUMENT NUMBER 600-65354; THENCE N86°11'50"W ALONG THE SOUTH LINE OF SAID SOUTHEAST QUARTER, A DISTANCE OF 928.30 FEET TO A POINT ON THE SOUTHWESTERLY PROLONGATION OF THE NORTHWESTERLY RIGHT-OF-WAY LINE OF ANDREWS ROAD, AS DESCRIBED IN QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275 AND RECORDED AT THE JACKSON COUNTY, MISSOURI RECORDER OF DEEDS OFFICE IN KANSAS CITY, MISSOURI; THENCE N43°56'08"E ALONG THE SOUTHWESTERLY PROLONGATION OF AND ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 838.50 FEET TO A POINT ON THE NORTHEASTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, AS DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275, AND BEING THE **POINT OF BEGINNING**; THENCE N46°05'07"W ALONG SAID NORTHEASTERLY RIGHT-OF-WAY LINE OF HICKAM ROAD, A DISTANCE OF 175.84 FEET (DEED AND MEASURED); THENCE N43°49'15"E ALONG A LINE DESCRIBED IN SAID QUIT CLAIM DEED, DOCUMENT NUMBER 2005K0019275, A DISTANCE OF 167.03 FEET (DEED AND MEASURED);; THENCE S46°03'47"E ALONG A LINE DESCRIBED IN SAID QUIT CLAIM DEED, A DISTANCE OF 176.17 FEET (MEASURED), (176.11 FEET, DEED) TO A POINT ON THE NORTHWESTERLY RIGHT-OF-WAY LINE OF SAID ANDREWS ROAD; THENCE S43°56'08"W ALONG SAID NORTHWESTERLY RIGHT-OF-WAY LINE, A DISTANCE OF 166.96 FEET TO THE **POINT OF BEGINNING**. THE PARCEL DESCRIBED ABOVE CONTAINS 29,392 SQUARE FEET OR 0.675 ACRES, MORE OR LESS.

EXHIBIT "B"


PLAT OF SURVEY
SHEET 1 OF 2
ANDERSON SURVEY COMPANY
C/L BALES AVENUE
C/L 155TH STREET
C/L WESTOVER ROAD
C/L CORRELL ROAD
C/L MYRTLE ROAD
JACKSON COUNTY
CASS COUNTY
SS 006
SS 009
NOTES
SCALE 1 INCH = 200 FEET
FOR: CH2M
LAND USE CONTROL BOUNDARY - SITE SS 006 AND SS 009
FORMER RICHARDS-GEBAUR AFB
KANSAS CITY, MISSOURI

PROPERTY DESCRIPTION:

SS 098 TO KANSAS CITY 2004

A TRACT OF LAND BEING PART OF SECTION 34 TOWNSHIP 47 RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH [illegible] WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF [illegible] FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE [illegible]

A TRACT OF LAND BEING PART OF SECTION 34 TOWNSHIP 47 RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI, BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; [illegible]

THE ABOVE DESCRIPTION CONTAINS [illegible] SQUARE FEET OR [illegible] ACRES MORE OR LESS.

THE ABOVE THE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

PROPERTY DESCRIPTION:

SS 098A TO USMC

A TRACT OF LAND BEING PART OF SECTION 34 TOWNSHIP 47 RANGE 33, KANSAS CITY, JACKSON COUNTY, [illegible]

THE ABOVE DESCRIPTION CONTAINS [illegible] SQUARE FEET OR [illegible] ACRES MORE OR LESS.

THE ABOVE THE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

PROPERTY DESCRIPTION:

SS 098B TO USMC

A TRACT OF LAND BEING PART OF SECTION 34 TOWNSHIP 47 RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; [illegible]

THE ABOVE DESCRIPTION CONTAINS [illegible] SQUARE FEET OR [illegible] ACRES MORE OR LESS.

THE ABOVE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

DRN. CRG	P.E.	CK. JFW	APP.

SHEET 2 OF 2

ANDERSON SURVEY COMPANY

PLAT OF SURVEY

DATE: JULY 8, 2004

LAND USE CONTROL BOUNDARY
FORMER RICHARDS-GEBAUR AFB
KANSAS CITY, MISSOURI

EXHIBIT "B" Continued

PROPERTY DESCRIPTION:

SS 009A TO USMC

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSIOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 86°-12'-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 40.00 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH SAID CENTERLINE, A DISTANCE OF 23.30 FEET TO THE POINT OF INTERSECTION OF SAID NORTHWESTERLY RIGHT OF WAY LINE AND THE NORTHEASTERLY RIGHT OF WAY LINE OF CORKILL ROAD, SAID POINT ALSO BEING THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 46°-10'-34" WEST, ALONG SAID NORTHEASTERLY RIGHT OF WAY LINE 40.00 FEET NORTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 520.60 FEET; THENCE NORTH 43°-52'-39" EAST, ALONG THE SOUTHEASTERLY RIGHT OF WAY LINE OF WESTOVER ROAD 40.00 FEET SOUTHEASTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 220.31 FEET; THENCE SOUTH 46°-05'-27" EAST, ALONG THE SOUTHWESTERLY RIGHT OF WAY LINE OF HICKAM ROAD 40.00 FEET SOUTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 520.77 FEET; THENCE SOUTH 43°-55'-21" WEST, ALONG THE NORTHWESTERLY RIGHT OF WAY OF SAID ANDREWS ROAD 40.00 FEET NORTHWESTERLY OF AND PARALLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 219.54 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIPTION CONTAINS 114,513 SQUARE FEET OR 2.296 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

EXHIBIT "B" Continued

PROPERTY DESCRIPTION:

SS 009B TO USMC

A TRACT OF LAND BEING PART OF SECTION 34-TOWNSHIP 47-RANGE 33, KANSAS CITY, JACKSON COUNTY, MISSOURI BEING DESCRIBED AS FOLLOWS: COMMENCING AT THE SOUTHEAST CORNER OF SAID SECTION 34; THENCE NORTH 86°-12'-07" WEST, ALONG THE SOUTH LINE OF SAID SECTION 34, A DISTANCE OF 875.92 FEET TO THE CENTERLINE OF ANDREWS ROAD; THENCE NORTH 43°-55'-21" EAST, ALONG SAID CENTERLINE, A DISTANCE OF 482.04 FEET; THENCE SOUTH 46°-14'15" EAST, A DISTANCE OF 40.00 FEET TO THE SOUTHEASTERLY RIGHT OF WAY LINE OF SAID ANDREWS ROAD AND THE POINT OF BEGINNING OF THE TRACT TO BE DESCRIBED HEREIN; THENCE NORTH 43°-55'-21" EAST, ALONG SAID RIGHT OF WAY LINE 40.00 FEET SOUTHEASTERLY OF AND PARLLEL WITH THE CENTERLINE THEREOF, A DISTANCE OF 322.64 FEET; THENCE SOUTH 46°-05'-27" EAST, ALONG THE SOUTHEASTERLY PROLONGATION OF THE NORTHEASTERLY RIGHT OF WAY LINE OF HICKAM ROAD, A DISTANCE OF 353.85 FEET; THENCE SOUTH 65°-43'-29" WEST, A DISTANCE OF 92.34 FEET; THENCE SOUTH 54°-07'-15" WEST, A DISTANCE OF 83.19 FEET; THENCE SOUTH 38°-15'-38" WEST, A DISTANCE OF 90.98 FEET; THENCE SOUTH 33°-37-33" WEST, A DISTANCE OF 64.71 FEET; THENCE NORTH 46°-14'-15" WEST, A DISTANCE OF 325.37 FEET TO THE POINT OF BEGINNING.

THE ABOVE DESCRIPTION CONTAINS 102,912 SQUARE FEET OR 2.363 ACRES MORE OR LESS.

THE ABOVE DESCRIPTION WAS PREPARED BY ANDERSON SURVEY COMPANY.

EXHIBIT "C"

Marine Corps Support Center, Kansas City

CERCLA Hazardous Substance Notice/Response Action Summary

The table below identifies those hazardous substances that it is known, based upon a complete search of agency files, were stored for one year or more in quantities greater than or equal to 1,000 kg (or greater than or equal to 1 kg if designated an acutely hazardous waste under 40 CFR Part 261.30) and/or were released or disposed of on the property to be transferred in quantities greater than or equal to their respective reportable quantities under 40 CFR 302.4. The information in this notice is required under the authority of regulations promulgated under Section 120(h) of the Comprehensive Environmental Response, Compensation and Liability Act ("CERCLA" or "Superfund"), 42 U.S.C. Section 9620(h).

Bldg or Facility ID	Description	Substance Name	CAS Registry Number	40 CFR 302.4 Regulatory Synonyms	RCRA HW No.	Quantity Stored	Date of Storage	Quantity Released	Date of Release	Response Actions Taken
SS09	Fire Valve Area	Perchloroethylene	127184	Ethene, tetrachloro Tetrachloroethene Tetrachloroethylene PCE	U210	Unknown	Unknown	Unknown	Unknown	10 cubic yards of soil were removed in 1993. Selected remedy for groundwater is monitored natural attenuation and implementation of Land Use Controls (LUCs). The remedy was deemed to be Operating Properly and Successfully (OPS) by USEPA in Aug 2011.
SS09	Fire Valve Area	Trichloroethene	79-01-6	TCE	U228	Unknown	Unknown	Unknown	Unknown	
SS09	Fire Valve Area	1,1-Dichloroethene	--	--	--	Unknown	Unknown	Unknown	Unknown	
SS09	Fire Valve Area	cis-1,2-Dichloroethene	--	--	--	Unknown	Unknown	Unknown	Unknown	
SS09	Fire Valve Area	Vinyl Chloride	--	--	--	Unknown	Unknown	Unknown	Unknown	

EXHIBIT "D"

Land Use Control (LUC) Inspection Form

for Port Authority of Kansas City Transferred Sites

"NEGOTIATED SALE PARCEL"

Evaluation Period (month/year): From _____/_____ through _____/_____

SITE	Restricted Media			Inspection Frequency	A check mark indicates the LUC has been complied with. "N" means a LUC has not been complied with. Shading indicates LUC not required									
	Groundwater	Soil	Sediment		Groundwater Not Being Used	Monitoring Wells Not Disturbed	Land Not Being Used for Residential Use	Sediment Not Disturbed	Surface Soils Not Disturbed	Subsurface Soils Not Disturbed	Adjacent Wetlands Not Disturbed	Landfill Cover Not Disturbed	Site Access Restrictions in Place	Remarks
SS009	●			Annual										See Note 1

Notes:

1- Site remedy includes long-term groundwater monitoring with LUC inspections and certification.

Inspections conducted by: _____ Date: _____ Page 1 of 1

Annual Land Use Control (LUC) Compliance Certification

Marine Corps Support Activity Kansas City

Property Owner: Port Authority of Kansas City **Evaluation Period** (month/year): From _____/_____through _____/_____

I, the undersigned, hereby certify that I am an authorized representative of Port Authority of Kansas City and that the above described land use controls have been complied with for the period noted. Any known deficiencies and completed or planned actions to address such deficiencies shall be described in the comment section below.

_____ _____

Signature: Date:

_____ (_____)_____

Print Name: Phone Number:

Comments: (attach additional sheets as needed)

Mail original form to EPA Region 7, and copies to MDNR and the Navy at the below addresses:

EPA Point of Contact
US Environmental Protection Agency
Region 7
Missouri/Kansas Remedial Branch
Attn: Kenneth Rapplean
901 North 5th Ave.
Kansas City, Kansas 66101

MDNR Point of Contact
Missouri Department of Natural Resources
Attn: Mr. Ruben Zamarripa
P.O. Box 176
Jefferson City, MO 65102-0176

Navy Point of Contact
BRAC PMO SE
Attn: David Criswell
4130 Faber Place Dr
Suite 202
North Charleston, SC 29405

EXHIBIT "E"

ASBESTOS-CONTAINING MATERIALS HAZARD DISCLOSURE AND ACKNOWLEDGEMENT FORM (NON-RESIDENTIAL STRUCTURES)

ASBESTOS WARNING STATEMENT

YOU ARE ADVISED THAT CERTAIN BUILDINGS WITHIN THE MARINE CORPS SUPPORT ACTIVITY (MCSA) KANSAS CITY MAY HAVE ASBESTOS-CONTAINING MATERIALS. INDIVIDUALS (WORKERS) MAY SUFFER ADVERSE HEALTH EFFECTS AS A RESULT OF INHALATION EXPOSURE TO ASBESTOS. THESE ADVERSE HEALTH EFFECTS INCLUDE ASBESTOSIS (PULMONARY FIBROSIS) AND MESOTHELIOMAS (BENIGN OR MALIGNANT TUMORS).

ACKNOWLEDGEMENT

I acknowledge the following:

(1) I have read and I understand the above-stated Asbestos Warning Statement.

(2) I have received from the Government the following document(s): The *Environmental Condition of Property Report for the Marine Corps Support Activity (MCSA) Kansas City dated April 28, 2006* and the *Finding of Suitability to Transfer the MCSA Kansas City dated October 3, 2011*, representing the best information available to the Government as to the presence of and condition of asbestos-containing-materials hazards in the buildings covered by this transfer (deed).

(3) I understand that my failure to inspect or to become fully informed of the condition of all or any portion of the property offered will not constitute grounds for any claim or demand for adjustment or withdrawal of any bid or offer made after its opening or tender.

(4) I understand that, upon execution of this transfer (deed), I shall assume full responsibility for preventing future asbestos exposure by properly managing and maintaining or, as required by applicable federal, state, or local laws or regulations, for abating any asbestos hazard that may pose a risk to human health.

Transferee (or duly authorized agent) — Date: 5/21/12

EXHIBIT "F"

LEAD BASED PAINT HAZARD DISCLOSURE AND ACKNOWLEDGEMENT FORM
LEAD-BASED PAINT HAZARD DISCLOSURE AND ACKNOWLEDGEMENT FORM (NON-RESIDENTIAL STRUCTURES)

LEAD WARNING STATEMENT

YOU ARE ADVISED THAT STRUCTURES CONSTRUCTED PRIOR TO 1978 MAY PRESENT EXPOSURE TO LEAD FROM LEAD-BASED PAINT THAT MAY PLACE YOUNG CHILDREN AT RISK OF DEVELOPING LEAD POISONING. LEAD POISONING IN YOUNG CHILDREN MAY PRODUCE PERMANENT NEUROLOGICAL DAMAGE. YOU ARE FURTHER ADVISED THAT LEAD POISONING ALSO POSES A PARTICULAR RISK TO PREGNANT WOMEN. WORKERS MAY ALSO SUFFER ADVERSE HEALTH EFFECTS FROM LEAD DUST AND FUME EXPOSURE.

ACKNOWLEDGEMENT

I acknowledge that:

(1) I have read and understand the above stated Lead Warning Statement;

(2) I have received from the Federal Government the following document(s): *The Environmental Condition of Property Report for the Marine Corps Support Activity (MCSA) Kansas City dated April 28, 2006* and the *Finding of Suitability to Transfer the MCSA Kansas City dated October 3, 2011*, representing the best information available to the Government as to the presence of Lead-Based Paint and Lead-Based Paint hazards for the buildings covered by this Transfer;

(3) I understand that my failure to inspect, or to become fully informed as to the condition of all or any portion of the property offered will not constitute grounds for any claim or demand for adjustment or withdrawal of any bid or offer made after its opening or tender; and

(4) I understand that upon execution of this Transfer, I shall assume full responsibility for preventing future lead exposure by properly managing and maintaining or, as required by applicable Federal, state, or local laws or regulations, for abating any lead-based paint hazard that may pose a risk to human health.

Transferee (or duly authorized agent) Date 5/21/12

REAL PROPERTY CERTIFICATE OF VALUE - JACKSON COUNTY, MISSOURI

(REQUIRED TO BE FILED WITH DEED AT TIME OF RECORDING)

Please type or print all information. This form must be prepared by the Buyer or his/her Representative.

Grantor's (Seller) Name: United States of America, acting by and through the Secretary of the Navy

Grantee's (Buyer) Name: The Port Authority of Kansas City, Missouri

Address of Property: 15400-15431 Andrews Road, Kansas City, Missouri

Grantee's address, if different from above: 300 Wyandotte, Suite 100, Kansas City, MO 64105

Parcel ID Number: See Attachment A page 2

FOR OFFICE USE ONLY
DO NOT WRITE IN THIS SPACE

1. **Is this newly constructed residential property?** ☐ YES **Date occupied:** ___/___/_____ ☒ NO
2. **Is this vacant land?** ☐ YES ☒ NO
3. **Intended use of property:** **Present Use** ☐ **Renovation** ☐ **New Development / Construction** ☒
   Other ☐ _____
4. ☑ **Check if the transaction transfers property in any of the following ways:**

- ☐ **sale for delinquent taxes**
- ☐ **sale of cemetery lot**
- ☐ **lease or transfer of severed mineral interests**
- ☐ **by order of any court**
- ☐ **by executory contract for deed**
- ☐ **by lease or easement**
- ☒ **to or from the United States, the State of Missouri, or any agency, or political subdivision thereof.**
- ☐ **for purpose of confirming, correcting, modifying, or supplementing a previously recorded deed, without additional consideration**
- ☐ **solely for the purpose of releasing security for a debt or other obligation**
- ☐ **by deed of partition**
- ☐ **by deed where no money or other valuable consideration is given for the transfer.**
- ☐ **by deed pursuant to merger, consolidation, sale or transfer of substantially all of the assets of a corporation.**
- ☐ **by deed as a part of the contribution to the capital of a corporation, partnership, limited liability company, or other similar entity.**
- ☐ **by deed executed by personal representative to convey to devisees or heirs property passing by testate or intestate succession**
- ☐ **by deed which conveys property held in name of any partnership, not a family, to any partner or his or her spouse.**
- ☐ **by deed which is a gift of property.**
- ☐ **by deed between family members, or to or from a family corporation, partnership, or trust for the benefit of a family member, for no consideration.**

IF ANY OF THE ABOVE ITEMS IN THE SHADED BOX ARE CHECKED, PLEASE PROCEED TO #11 BELOW

5. **Total Sales Price (including all assumed mortgages and liens): $**_____
   Points were paid by: ☐ **SELLER** ☐ **BUYER** ☐ **NONE**
6. **Was there new financing?** ☐ **YES** ☐ **NO** **Did financing concessions affect sales price?** ☐ **YES** ☐ **NO**
7. **Is this deed part of a trade?** ☐ **YES** ☐ **NO**
8. **Was any personal property included in the sale price?** (For example: furniture, equipment, machinery, livestock, crops, business franchise or inventory... etc.) ☐ **YES** ☐ **NO**
   Please describe: _____
9. **Was this transaction at arm's length?** ☐ **YES** ☐ **NO**
   (An arm's length transaction is one between unrelated parties under no duress.)
10. **If you believe this transaction does not represent market value, please attach any additional information that you want the county assessor to consider.**
11. **I certify, under penalties of law, that this statement has been examined by me and, to the best of my knowledge and belief, is a true, correct and complete statement.**

ANY PERSON WHO FAILS TO FILE A COMPLETED CERTIFICATE OF VALUE WHEN REQUIRED BY LAW, OR WHO KNOWINGLY FILES A FALSE CERTIFICATE, MAY BE PUNISHED BY A FINE OF UP TO $1,000.

5/21/12
Date

Signature of Grantee/Representative

Michael M. Collins, President
Print Name and Position

For assistance in filing this form,
Call the Assessor's Office at (816) 881-3530
415 E. 12th St., Suite 100M
Kansas City, MO 64106-2752

ATTACHMENT A
to
Jackson County Certificate of Value

Grantor/Seller: United States of America, acting by and through the Secretary of the Navy

Grantee/Buyer: The Port Authority of Kansas City, Missouri

Property: 15400-15431 Andrews Road, Kansas City, Missouri

Parcel ID Numbers: **To the best of the Grantee's/Buyer's knowledge, the real property generally affects the following tax parcels:**

Parcel Number: 67-900-04-01-03-0-00-000
Parcel Number: 67-900-04-02-00-0-00-000
Parcel Number: 67-900-04-01-02-0-00-000

2

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APPENDIX H

BASE MASTER PLAN

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Master Plan

For

Marine Corps Support Activity Kansas City, Missouri

Southern Division Naval Facilities Engineering Command

August 2001

Produced by:

WOOLPERT

Charlotte, NC
www.woolpert.com

3.E.1.C Land Use Controls (Amendment 5/12/05)

On 22 December 2004, the Air Force transferred land parcels B, D, I, and O to the Marine Corps Mobilization Command (MOBCOM). A Memorandum of Agreement (MOA) between the Air Force and the Marine Corps executed this transfer.

As a result of the transfer MOBCOM received responsibility for the two remediation sites discussed earlier in the Base Master Plan. Sites SS003 and SS009 are now on Marine Corps owned properties. MOBCOM took responsibility for performing Land Use Controls (LUC), Institutional Controls (IC), and the associated Communication Plan. Additionally, MOBCOM will take over responsibility for the monitoring wells, which are part of the remediation process, in fiscal year 2007. The Metes and Bounds surveys and the LUC boundary diagrams are displayed in this Master Plan, Appendix D

The intent of the LUC/IC actions is to restrict subsurface drilling and the extraction and subsequent use of the contaminated ground water, within the prescribed LUC/IC boundaries. Also, the LUC/IC actions involve protecting the monitoring wells. The Land Use Control/Institutional Control Management Plan, 2005 (LUC/ICMP) should be consulted prior to any deep land disturbance within the LUC/IC boundaries. In addition to a detailed description of LUC/IC implementation, monitoring, enforcement and termination, the LUC/ICMP also provides aerial photos, metes and bounds surveys, site maps, and a Communication Plan. Finally, the plan has within the appendices a copy of the MOA between the Air Force and the Marine Corps.

3.E.1.D Land Use Controls From Adjacent City of Kansas City Leased Property (ST005) (Amendment 5/12/05)

The Marine Corps leases property from the City of Kansas City, Missouri (Government Lease N62467-93-RP-00026). The affected Marine Corps leased properties are Tracts 2 and 3. Tract 2 is roughly bounded on its northwestern boundary by land parcel A (see LUC/ICMP), and on its southeast boundary by Andrews road. Tract 3 in turn is roughly bounded on its northwestern boundary by Andrews Road, and on its southeast boundary by a southwest to northeast line, which runs roughly parallel to Scope Creek. The City of Kansas City has leased parcel A, from the Air Force Real Property Agency (AFRPA). Site ST005 is located on AFRPA property leased by the City of Kansas City (Parcel A). This site has an associated groundwater plume. This plume has crossed the Parcel A/Tract 2 boundary and spread onto the Marine Corps controlled property Tract 2. The plume is spreading southeasterly across Tract 2 and in the direction of Tract 3 of Marine Corps controlled property. Consequently, the Land Use Control boundary related to ST005 extends onto Marine Corps controlled property Tracts 2 and 3, as evidenced in Appendix A, Figure 15 "ST 005 POL Storage Yard Land Use Control Boundaries For Groundwater" of the LUC/ICMP. Additionally, the Metes and Bounds survey of the LUC boundary is displayed in Appendix A of the LUC/ICMP. The same figures are incorporated into Appendix D of this Master Plan.

The Land Use Control/Institutional Control Management Plan, March 2005 (table 4, page 11) prescribes the following use restriction for site ST005. "No subsurface drilling, extraction and subsequent use of groundwater within the LUC/IC boundaries without prior approval from Air Force, MDNR, and USEPA." And "No disturbance of, interference with, or damage to, the groundwater monitoring wells."

5/12/05
RP

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APPENDIX I

VAPOR INTRUSION INPUTS

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Vapor Intrusion Calculations for Former Richards-Gebaur Air Force Base

OU 2 Site SS-003
TCE Industrial Building P704

Calculations by Donna Caldwell, P.G.
NAVFAC LANT

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Richards-Gebaur AFB SS009 Industrial 2012 5 YR Review

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	9.90E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13.9	15	274	274			A	CL	CL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
CL	1.50	0.430	0.3								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1928	1928	244	1	1	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	8.333	250	1.0E-05	1
				Used to calculate risk-based groundwater concentration.	

END

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	4.1E-06	2.0E-03

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
2.63E+08	259	0.130	ERROR	ERROR	0.630	1.27E-09	0.531	6.74E-10	46.88	0.43	0.055	0.375	7,712

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.52E+05	3.72E+06	2.07E-03	15	8,509	5.90E-03	2.50E-01	1.77E-04	4.82E-04	0.00E+00	0.00E+00	3.46E-05	1.44E-04	259

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.48E+03	1.00	8.33E+01	4.82E-04	7.71E+03	8.76E+145	8.02E-06	1.99E-02	4.1E-06	2.0E-03

END

Richards-Gebaur AFB SS009 Industrial 2012 5 YR Review

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
6.6E-09	2.3E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.24E+00	3.03E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00		
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	14,000	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	7.30E+00	5.73E-04	1.40E-05	25	596.55	839.36	15,000	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	5.73E+00	7.82E-02	8.61E-06	5.68E+04	1.35E+00	3.29E-02	25	307.50	466.74	6,338	0.0E+00	7.0E-01		X
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.18E-04	1.51E-05	25	613.32	842.25	17,000	4.6E-03	1.8E-04		X
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.87E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01		X
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00		
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	3.5E-03		X
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.03E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	2.2E+00		
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	1.00E-01	6.46E-04	1.58E-05	25	651.02	848.49	16,000	0.0E+00	1.8E-02		X
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.59E-04	2.09E-05	25	636.44	860.38	15,000	9.7E-05	0.0E+00	X	
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.55E-01	6.22E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	2.12E+00	1.26E-01	6.50E-06	5.33E+03	3.61E-01	8.80E-03	25	249.00	416.25	5,115	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	3.80E+00	1.93E-01	2.10E-05	1.00E+06	5.44E-03	1.33E-04	25	299.00	456.70	6,676	0.0E+00	3.0E-03		
74953	Methylene bromide	1.26E+01	4.30E-02	8.44E-06	1.19E+04	3.52E-02	8.59E-04	25	370.00	583.00	7,868	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	4.40E+00	2.71E-01	1.15E-05	5.68E+03	3.61E-01	8.80E-03	25	285.30	460.40	5,879	8.3E-07	1.0E+01	X	
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250	8.8E-06	1.0E-01		
75058	Acetonitrile	4.20E+00	1.28E-01	1.66E-05	1.00E+06	1.42E-03	3.45E-05	25	354.60	545.50	7,110	0.0E+00	6.0E-02		
75070	Acetaldehyde	1.06E+00	1.24E-01	1.41E-05	1.00E+06	3.23E-03	7.87E-05	25	293.10	466.00	6,157	2.2E-06	9.0E-03		
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.96E-02	2.18E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00		
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.33E+00	1.04E-01	1.45E-05	3.04E+05	2.27E-02	5.54E-04	25	283.60	469.00	6,104	1.0E-04	0.0E+00		
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.41E-02	5.88E-04	25	422.35	696.00	9,479	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.54E-02	1.60E-03	25	363.15	585.85	7,800	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	9.14E+00	8.88E-02	1.01E-05	3.73E+03	5.93E-01	1.45E-02	25	308.70	485.00	6,286	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01		
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.60E-02	25	304.75	576.05	6,247	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	4.79E+01	1.01E-01	1.28E-05	2.00E+00	1.10E+00	2.70E-02	25	232.40	369.30	4,836	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	4.97E+02	8.70E-02	9.70E-06	1.10E+03	3.97E+00	9.68E-02	25	296.70	471.00	5,999	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	4.57E+02	6.65E-02	9.92E-06	2.80E+02	1.40E+01	3.42E-01	25	243.20	384.95	9,421	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	1.11E+04	7.80E-02	8.20E-06	1.70E+02	1.97E+01	4.80E-01	25	320.70	487.30	6,463	0.0E+00	3.0E+01		
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	6.05E+01	1.48E+00	25	603.69	846.31	13,000	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.10E+00	2.69E-02	25	512.15	746.00	10,931	0.0E+00	2.0E-04		
78831	Isobutanol	2.59E+00	8.60E-02	9.30E-06	8.50E+04	4.83E-04	1.18E-05	25	381.04	547.78	10,936	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.79E-03	25	369.52	572.00	7,590	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	2.30E+00	8.08E-02	9.80E-06	2.23E+05	2.29E-03	5.58E-05	25	352.50	536.78	7,481	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.73E-02	9.11E-04	25	386.15	602.00	8,322	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505	4.1E-06	2.0E-03	X	
79209	Methyl acetate	3.26E+00	1.04E-01	1.00E-05	2.00E+03	4.84E-03	1.18E-04	25	329.80	506.70	7,260	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.96E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	2.1E-01		X
79469	2-Nitropropane	1.17E+01	9.23E-02	1.01E-05	1.70E+04	5.03E-03	1.23E-04	25	393.20	594.00	8,383	2.7E-03	2.0E-02		
80626	Methylmethacrylate	6.98E+00	7.70E-02	8.60E-06	1.50E+04	1.38E-02	3.36E-04	25	373.50	567.00	8,975	0.0E+00	7.0E-01		
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	3.57E+00	6.34E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01		X
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.60E-03	6.34E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.20E+00	3.33E-01	8.13E-03	25	486.15	738.00	10,206	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	3.24E+02	5.87E-02	8.67E-06	6.50E+02	5.11E-04	1.25E-05	25	495.00	720.00	12,239	0.0E+00	3.5E-02		X
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.82E-04	25	491.14	748.40	10,373	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	2.81E+03	5.22E-02	7.75E-06	2.46E+01	2.12E-02	5.17E-04	25	514.26	761.00	12,600	0.0E+00	7.0E-02		X
92524	Biphenyl	4.38E+03	4.04E-02	8.15E-06	7.45E+00	1.23E-02	2.99E-04	25	529.10	789.00	10,890	0.0E+00	1.8E-01		X
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.77E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01		

95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	1.35E+03	6.06E-02	7.92E-06	5.70E+01	2.52E-01	6.14E-03	25	442.30	649.17	9,369	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	2.20E+01	7.10E-02	7.90E-06	1.75E+03	1.67E-02	4.08E-04	25	430.00	652.00	9,171	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	4.53E+00	9.76E-02	1.02E-05	6.00E+04	7.68E-03	1.87E-04	25	353.70	536.00	7,749	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	2.95E+01	6.53E-02	8.37E-06	3.67E+03	3.44E-02	8.40E-04	25	390.00	571.00	10,957	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	7.71E+02	5.65E-02	8.02E-06	2.95E+01	4.87E-01	1.19E-02	25	442.10	1220.00	8,980	0.0E+00	1.4E-01		X
98828	Cumene	4.89E+02	6.50E-02	7.10E-06	6.13E+01	4.74E+01	1.46E-02	25	425.56	631.10	10,335	0.0E+00	4.0E-01		
98862	Acetophenone	5.77E+01	6.00E-02	8.73E-06	6.13E+03	4.38E-04	1.07E-05	25	475.00	709.50	11,732	0.0E+00	3.5E-01		X
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.82E-04	2.39E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03		
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00		
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.12E-01	2.74E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00		
100447	Benzylchloride	6.14E+01	7.50E-02	7.80E-06	5.25E+02	1.70E-02	4.14E-04	25	452.00	685.00	8,773	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	4.59E+01	7.21E-02	9.07E-06	3.30E+03	9.73E-04	2.37E-05	25	452.00	695.00	11,658	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	5.62E+02	6.01E-02	7.83E-06	6.00E+01	4.37E-01	1.07E-02	25	432.20	630.00	9,123	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	1.11E+03	5.70E-02	8.12E-06	2.00E+00	5.38E-01	1.31E-02	25	456.46	660.50	9,290	0.0E+00	1.4E-01		X
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.90E+01	9.82E-02	2.39E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibromide)	2.50E+01	2.17E-02	1.19E-05	4.18E+03	3.04E-02	7.41E-04	25	404.60	583.00	8,310	2.2E-04	2.0E-04		
106990	1,3-Butadiene	1.91E+01	2.49E-01	1.08E-05	7.35E+02	3.01E+00	7.34E-02	25	268.60	425.00	5,370	3.0E-02	2.0E-03		
107028	Acrolein	2.76E+00	1.05E-01	1.22E-05	2.13E+05	4.99E-03	1.22E-04	25	325.60	506.00	6,731	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.00E-02	9.77E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00		
107131	Acrylonitrile	5.90E+00	1.22E-01	1.34E-05	7.40E+04	4.21E-03	1.03E-04	25	350.30	519.00	7,786	6.8E-05	2.0E-03		
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.09E-02	5.10E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2-pentanone)	9.06E+00	7.50E-02	7.80E-06	1.90E+04	5.64E-03	1.38E-04	25	389.50	571.00	8,243	0.0E+00	3.0E+00		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	1.35E+03	6.02E-02	8.67E-06	2.00E+00	2.41E-01	5.87E-03	25	437.89	637.25	9,321	0.0E+00	6.0E-03		
108872	Methylcyclohexane	7.85E+01	7.35E-02	8.52E-06	1.40E+01	4.22E+00	1.03E-01	25	373.90	572.20	7,474	0.0E+00	3.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01		
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.51E-01	3.69E-03	25	404.87	632.40	8,410	0.0E+00	6.0E-02		
109693	1-Chlorobutane	1.72E+01	8.26E-02	1.00E-05	1.10E+03	6.93E-01	1.69E-02	25	351.60	542.00	7,263	0.0E+00	1.4E+00		X
110009	Furan	1.86E+01	1.04E-01	1.22E-05	1.00E+04	2.21E-01	5.39E-03	25	304.60	490.20	6,477	0.0E+00	3.5E-03		X
110543	Hexane	4.34E+01	2.00E-01	7.77E-06	1.24E+01	6.82E+01	1.66E+00	25	341.70	508.00	6,895	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.36E-04	1.80E-05	25	451.15	659.79	10,803	3.3E-04	0.0E+00		
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.58E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	5.00E-03	5.40E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	4.88E+01	5.81E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	4.82E+00	9.56E-02	1.07E-05	3.69E+04	7.99E-04	1.95E-05	25	375.20	568.00	9	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.20E-02	7.81E-04	25	416.14	678.20	5,900	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	3.58E+01	1.12E-01	1.32E-05	2.54E+04	1.01E-02	2.46E-04	25	363.30	554.00	7,600	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloroprene)	6.73E+01	8.58E-02	1.03E-05	2.12E+03	4.91E-01	1.20E-02	25	332.40	525.00	8,075	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	5.9E-06	6.0E-01		
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E+00	4.50E-04	1.10E-05	25	667.95	936	14370	0.0E+00	1.1E-01		X
132649	Dibenzofuran	5.15E+03	2.38E-02	6.00E-06	3.10E+00	5.15E-04	1.26E-05	25	560	824	66400	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	9.66E+02	5.70E-02	8.12E-06	3.94E+00	5.68E-01	1.39E-02	25	446.5	679	88730	0.0E+00	1.4E-01		X
141786	Ethylacetate	6.44E+00	7.32E-02	9.70E-06	8.03E+04	5.64E-03	1.38E-04	25	350.26	523.3	7633.66	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.54E-03	1.11E-04	25	715.9	969.27	17000	2.1E-04	0.0E+00	X	
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	6.30E-03	3.87E-03	9.44E-05	25	714.15	979	16455	2.1E-06	0.0E+00	X	
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.70E-02	6.95E-03	1.70E-04	25	603.01	839.37	15000	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.34E-04	1.06E-05	25	596.55	839.36	15000	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	1.98E+03	6.92E-02	7.86E-06	1.34E+02	1.27E-01	3.09E-03	25	446	684	9230.18	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.24E-01	1.77E-02	25	381.15	587.38	7900	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	1.16E+02	7.10E-02	7.90E-06	1.10E+03	9.90E-02	2.41E-03	25	403.5	624	9768.282525	7.4E-06	1.1E-01		X
1634044	MTBE	7.26E+00	1.02E-01	1.05E-05	5.10E+04	2.56E-02	6.23E-04	25	328.3	497.1	6677.66	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	2.00E+01	4.40E-01	1.07E-02	25	629.88	1750	14127	0.0E+00	3.0E-04		

Vapor Intrusion Calculations for Former Richards-Gebaur Air Force Base

OU 2 Site SS-003
TCE Residential Building P704

Calculations by Donna Caldwell, P.G.
NAVFAC LANT

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Richards-Gebaur AFB SS003 Residential 2012 5 YR Review

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	1.21E+01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13.9	15	183	183			A	CL	CL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
CL	1.50	0.430	0.3								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	961	961	488	1	0.45	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-05	1
				Used to calculate risk-based groundwater concentration.	

END

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	4.1E-06	2.0E-03

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	168	0.130	ERROR	ERROR	0.630	1.27E-09	0.531	6.74E-10	46.88	0.43	0.055	0.375	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.63E+04	9.24E+05	4.16E-03	15	8,509	5.90E-03	2.50E-01	1.77E-04	4.82E-04	0.00E+00	0.00E+00	3.46E-05	1.05E-04	168

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.03E+03	1.00	8.33E+01	4.82E-04	3.84E+03	6.25E+292	1.01E-05	3.07E-02	4.1E-06	2.0E-03

END

Richards-Gebaur AFB SS003 Residential 2012 5 YR Review

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
5.2E-08	1.5E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.24E+00	3.03E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00		
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	14,000	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	7.30E+00	5.73E-04	1.40E-05	25	596.55	839.36	15,000	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	5.73E+00	7.82E-02	8.61E-06	5.68E+04	1.35E+00	3.29E-02	25	307.50	466.74	6,338	0.0E+00	7.0E-01		X
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.18E-04	1.51E-05	25	613.32	842.25	17,000	4.6E-03	1.8E-04		X
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.87E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01		X
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00		
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	3.5E-03		X
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.03E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	2.2E+00		
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	1.00E-01	6.46E-04	1.58E-05	25	651.02	848.49	16,000	0.0E+00	1.8E-02		X
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.59E-04	2.09E-05	25	636.44	860.38	15,000	9.7E-05	0.0E+00	X	
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.55E-01	6.22E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	2.12E+00	1.26E-01	6.50E-06	5.33E+03	3.61E-01	8.80E-03	25	249.00	416.25	5,115	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	3.80E+00	1.93E-01	2.10E-05	1.00E+06	5.44E-03	1.33E-04	25	299.00	456.70	6,676	0.0E+00	3.0E-03		
74953	Methylene bromide	1.26E+01	4.30E-02	8.44E-06	1.19E+04	3.52E-02	8.59E-04	25	370.00	583.00	7,868	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	4.40E+00	2.71E-01	1.15E-05	5.68E+03	3.61E-01	8.80E-03	25	285.30	460.40	5,879	8.3E-07	1.0E+01	X	
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250	8.8E-06	1.0E-01		
75058	Acetonitrile	4.20E+00	1.28E-01	1.66E-05	1.00E+06	1.42E-03	3.45E-05	25	354.60	545.50	7,110	0.0E+00	6.0E-02		
75070	Acetaldehyde	1.06E+00	1.24E-01	1.41E-05	1.00E+06	3.23E-03	7.87E-05	25	293.10	466.00	6,157	2.2E-06	9.0E-03		
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.96E-02	2.18E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00		
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.33E+00	1.04E-01	1.45E-05	3.04E+05	2.27E-02	5.54E-04	25	283.60	469.00	6,104	1.0E-04	0.0E+00		
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.41E-02	5.88E-04	25	422.35	696.00	9,479	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.54E-02	1.60E-03	25	363.15	585.85	7,800	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	9.14E+00	8.88E-02	1.01E-05	3.73E+03	5.93E-01	1.45E-02	25	308.70	485.00	6,286	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01		
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.60E-02	25	304.75	576.05	6,247	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	4.79E+01	1.01E-01	1.28E-05	2.00E+00	1.10E+00	2.70E-02	25	232.40	369.30	4,836	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	4.97E+02	8.70E-02	9.70E-06	1.10E+03	3.97E+00	9.68E-02	25	296.70	471.00	5,999	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	4.57E+02	6.65E-02	9.92E-06	2.80E+02	1.40E+01	3.42E-01	25	243.20	384.95	9,421	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	1.11E+04	7.80E-02	8.20E-06	1.70E+02	1.97E+01	4.80E-01	25	320.70	487.30	6,463	0.0E+00	3.0E+01		
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	6.05E+01	1.48E+00	25	603.69	846.31	13,000	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.10E+00	2.69E-02	25	512.15	746.00	10,931	0.0E+00	2.0E-04		
78831	Isobutanol	2.59E+00	8.60E-02	9.30E-06	8.50E+04	4.83E-04	1.18E-05	25	381.04	547.78	10,936	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.79E-03	25	369.52	572.00	7,590	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	2.30E+00	8.08E-02	9.80E-06	2.23E+05	2.29E-03	5.58E-05	25	352.50	536.78	7,481	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.73E-02	9.11E-04	25	386.15	602.00	8,322	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505	4.1E-06	2.0E-03	X	
79209	Methyl acetate	3.26E+00	1.04E-01	1.00E-05	2.00E+03	4.84E-03	1.18E-04	25	329.80	506.70	7,260	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.96E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	2.1E-01		X
79469	2-Nitropropane	1.17E+01	9.23E-02	1.01E-05	1.70E+04	5.03E-03	1.23E-04	25	393.20	594.00	8,383	2.7E-03	2.0E-02		
80626	Methylmethacrylate	6.98E+00	7.70E-02	8.60E-06	1.50E+04	1.38E-02	3.36E-04	25	373.50	567.00	8,975	0.0E+00	7.0E-01		
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	3.57E+00	6.34E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01		X
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.60E-03	6.34E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.20E+00	3.33E-01	8.13E-03	25	486.15	738.00	10,206	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	3.24E+02	5.87E-02	8.67E-06	6.50E+02	5.11E-04	1.25E-05	25	495.00	720.00	12,239	0.0E+00	3.5E-02		X
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.82E-04	25	491.14	748.40	10,373	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	2.81E+03	5.22E-02	7.75E-06	2.46E+01	2.12E-02	5.17E-04	25	514.26	761.00	12,600	0.0E+00	7.0E-02		X
92524	Biphenyl	4.38E+03	4.04E-02	8.15E-06	7.45E+00	1.23E-02	2.99E-04	25	529.10	789.00	10,890	0.0E+00	1.8E-01		X
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.77E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01		

95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	1.35E+03	6.06E-02	7.92E-06	5.70E+01	2.52E-01	6.14E-03	25	442.30	649.17	9,369	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	2.20E+01	7.10E-02	7.90E-06	1.75E+03	1.67E-02	4.08E-04	25	430.00	652.00	9,171	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	4.53E+00	9.76E-02	1.02E-05	6.00E+04	7.68E-03	1.87E-04	25	353.70	536.00	7,749	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	2.95E+01	6.53E-02	8.37E-06	3.67E+03	3.44E-02	8.40E-04	25	390.00	571.00	10,957	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	7.71E+02	5.65E-02	8.02E-06	2.95E+01	4.87E-01	1.19E-02	25	442.10	1220.00	8,980	0.0E+00	1.4E-01		X
98828	Cumene	4.89E+02	6.50E-02	7.10E-06	6.13E+01	4.74E+01	1.46E-02	25	425.56	631.10	10,335	0.0E+00	4.0E-01		
98862	Acetophenone	5.77E+01	6.00E-02	8.73E-06	6.13E+03	4.38E-04	1.07E-05	25	475.00	709.50	11,732	0.0E+00	3.5E-01		X
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.82E-04	2.39E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03		
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00		
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.12E-01	2.74E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00		
100447	Benzylchloride	6.14E+01	7.50E-02	7.80E-06	5.25E+02	1.70E-02	4.14E-04	25	452.00	685.00	8,773	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	4.59E+01	7.21E-02	9.07E-06	3.30E+03	9.73E-04	2.37E-05	25	452.00	695.00	11,658	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	5.62E+02	6.01E-02	7.83E-06	6.00E+01	4.37E-01	1.07E-02	25	432.20	630.00	9,123	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	1.11E+03	5.70E-02	8.12E-06	2.00E+00	5.38E-01	1.31E-02	25	456.46	660.50	9,290	0.0E+00	1.4E-01		X
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.90E+01	9.82E-02	2.39E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibromide)	2.50E+01	2.17E-02	1.19E-05	4.18E+03	3.04E-02	7.41E-04	25	404.60	583.00	8,310	2.2E-04	2.0E-04		
106990	1,3-Butadiene	1.91E+01	2.49E-01	1.08E-05	7.35E+02	3.01E+00	7.34E-02	25	268.60	425.00	5,370	3.0E-02	2.0E-03		
107028	Acrolein	2.76E+00	1.05E-01	1.22E-05	2.13E+05	4.99E-03	1.22E-04	25	325.60	506.00	6,731	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.00E-02	9.77E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00		
107131	Acrylonitrile	5.90E+00	1.22E-01	1.34E-05	7.40E+04	4.21E-03	1.03E-04	25	350.30	519.00	7,786	6.8E-05	2.0E-03		
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.09E-02	5.10E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2-pentanone)	9.06E+00	7.50E-02	7.80E-06	1.90E+04	5.64E-03	1.38E-04	25	389.50	571.00	8,243	0.0E+00	3.0E+00		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	1.35E+03	6.02E-02	8.67E-06	2.00E+00	2.41E-01	5.87E-03	25	437.89	637.25	9,321	0.0E+00	6.0E-03		
108872	Methylcyclohexane	7.85E+01	7.35E-02	8.52E-06	1.40E+01	4.22E+00	1.03E-01	25	373.90	572.20	7,474	0.0E+00	3.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01		
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.51E-01	3.69E-03	25	404.87	632.40	8,410	0.0E+00	6.0E-02		
109693	1-Chlorobutane	1.72E+01	8.26E-02	1.00E-05	1.10E+03	6.93E-01	1.69E-02	25	351.60	542.00	7,263	0.0E+00	1.4E+00		X
110009	Furan	1.86E+01	1.04E-01	1.22E-05	1.00E+04	2.21E-01	5.39E-03	25	304.60	490.20	6,477	0.0E+00	3.5E-03		X
110543	Hexane	4.34E+01	2.00E-01	7.77E-06	1.24E+01	6.82E+01	1.66E+00	25	341.70	508.00	6,895	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.36E-04	1.80E-05	25	451.15	659.79	10,803	3.3E-04	0.0E+00		
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.58E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	5.00E-03	5.40E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	4.88E+01	5.81E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	4.82E+00	9.56E-02	1.07E-05	3.69E+04	7.99E-04	1.95E-05	25	375.20	568.00	9	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.20E-02	7.81E-04	25	416.14	678.20	5,900	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	3.58E+01	1.12E-01	1.32E-05	2.54E+04	1.01E-02	2.46E-04	25	363.30	554.00	7,600	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloroprene)	6.73E+01	8.58E-02	1.03E-05	2.12E+03	4.91E-01	1.20E-02	25	332.40	525.00	8,075	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	5.9E-06	6.0E-01		
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E+00	4.50E-04	1.10E-05	25	667.95	936	14370	0.0E+00	1.1E-01		X
132649	Dibenzofuran	5.15E+03	2.38E-02	6.00E-06	3.10E+00	5.15E-04	1.26E-05	25	560	824	66400	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	9.66E+02	5.70E-02	8.12E-06	3.94E+00	5.68E-01	1.39E-02	25	446.5	679	88730	0.0E+00	1.4E-01		X
141786	Ethylacetate	6.44E+00	7.32E-02	9.70E-06	8.03E+04	5.64E-03	1.38E-04	25	350.26	523.3	7633.66	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.54E-03	1.11E-04	25	715.9	969.27	17000	2.1E-04	0.0E+00	X	
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	6.30E-03	3.87E-03	9.44E-05	25	714.15	979	16455	2.1E-06	0.0E+00	X	
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.70E-02	6.95E-03	1.70E-04	25	603.01	839.37	15000	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.34E-04	1.06E-05	25	596.55	839.36	15000	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	1.98E+03	6.92E-02	7.86E-06	1.34E+02	1.27E-01	3.09E-03	25	446	684	9230.18	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.24E-01	1.77E-02	25	381.15	587.38	7900	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	1.16E+02	7.10E-02	7.90E-06	1.10E+03	9.90E-02	2.41E-03	25	403.5	624	9768.282525	7.4E-06	1.1E-01		X
1634044	MTBE	7.26E+00	1.02E-01	1.05E-05	5.10E+04	2.56E-02	6.23E-04	25	328.3	497.1	6677.66	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	2.00E+01	4.40E-01	1.07E-02	25	629.88	1750	14127	0.0E+00	3.0E-04		

Vapor Intrusion Calculations for Former Richards-Gebaur Air Force Base

OU 2 Site SS-009
TCE Industrial Building 605

Calculations by Donna Caldwell, P.G.
NAVFAC LANT

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Richards-Gebaur AFB SS003 Industrial 2012 5 YR Review

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	1.21E+01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13.9	15	183	183			A	CL	CL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
CL	1.50	0.430	0.3								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	1928	1928	244	1	1	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	8.33	250	1.0E-05	1

Used to calculate risk-based groundwater concentration.

END

*Exposure Duration 25 years divided by 3 to account for 8-hr day exposure time

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	4.1E-06	2.0E-03

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
2.63E+08	168	0.130	ERROR	ERROR	0.630	1.27E-09	0.531	6.74E-10	46.88	0.43	0.055	0.375	7,712

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.52E+05	3.72E+06	2.07E-03	15	8,509	5.90E-03	2.50E-01	1.77E-04	4.82E-04	0.00E+00	0.00E+00	3.46E-05	1.05E-04	168

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.03E+03	1.00	8.33E+01	4.82E-04	7.71E+03	8.76E+145	8.94E-06	2.71E-02	4.1E-06	2.0E-03

END

Richards-Gebaur AFB SS003 Industrial 2012 5 YR Review

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)
NA	NA	NA	1.47E+06	NA

INCREMENTAL RISK CALCULATIONS:

Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
9.1E-09	3.1E-03

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.24E+00	3.03E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00		
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	14,000	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	7.30E+00	5.73E-04	1.40E-05	25	596.55	839.36	15,000	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	5.73E+00	7.82E-02	8.61E-06	5.68E+04	1.35E+00	3.29E-02	25	307.50	466.74	6,338	0.0E+00	7.0E-01		X
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.18E-04	1.51E-05	25	613.32	842.25	17,000	4.6E-03	1.8E-04		X
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.87E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01		X
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00		
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	3.5E-03		X
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.03E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	2.2E+00		
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	1.00E-01	6.46E-04	1.58E-05	25	651.02	848.49	16,000	0.0E+00	1.8E-02		X
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.59E-04	2.09E-05	25	636.44	860.38	15,000	9.7E-05	0.0E+00	X	
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.55E-01	6.22E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	2.12E+00	1.26E-01	6.50E-06	5.33E+03	3.61E-01	8.80E-03	25	249.00	416.25	5,115	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	3.80E+00	1.93E-01	2.10E-05	1.00E+06	5.44E-03	1.33E-04	25	299.00	456.70	6,676	0.0E+00	3.0E-03		
74953	Methylene bromide	1.26E+01	4.30E-02	8.44E-06	1.19E+04	3.52E-02	8.59E-04	25	370.00	583.00	7,868	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	4.40E+00	2.71E-01	1.15E-05	5.68E+03	3.61E-01	8.80E-03	25	285.30	460.40	5,879	8.3E-07	1.0E+01	X	
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250	8.8E-06	1.0E-01		
75058	Acetonitrile	4.20E+00	1.28E-01	1.66E-05	1.00E+06	1.42E-03	3.45E-05	25	354.60	545.50	7,110	0.0E+00	6.0E-02		
75070	Acetaldehyde	1.06E+00	1.24E-01	1.41E-05	1.00E+06	3.23E-03	7.87E-05	25	293.10	466.00	6,157	2.2E-06	9.0E-03		
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.96E-02	2.18E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00		
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.33E+00	1.04E-01	1.45E-05	3.04E+05	2.27E-02	5.54E-04	25	283.60	469.00	6,104	1.0E-04	0.0E+00		
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.41E-02	5.88E-04	25	422.35	696.00	9,479	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.54E-02	1.60E-03	25	363.15	585.85	7,800	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	9.14E+00	8.88E-02	1.01E-05	3.73E+03	5.93E-01	1.45E-02	25	308.70	485.00	6,286	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01		
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.60E-02	25	304.75	576.05	6,247	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	4.79E+01	1.01E-01	1.28E-05	2.00E+00	1.10E+00	2.70E-02	25	232.40	369.30	4,836	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	4.97E+02	8.70E-02	9.70E-06	1.10E+03	3.97E+00	9.68E-02	25	296.70	471.00	5,999	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	4.57E+02	6.65E-02	9.92E-06	2.80E+02	1.40E+01	3.42E-01	25	243.20	384.95	9,421	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	1.11E+04	7.80E-02	8.20E-06	1.70E+02	1.97E+01	4.80E-01	25	320.70	487.30	6,463	0.0E+00	3.0E+01		
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	6.05E+01	1.48E+00	25	603.69	846.31	13,000	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.10E+00	2.69E-02	25	512.15	746.00	10,931	0.0E+00	2.0E-04		
78831	Isobutanol	2.59E+00	8.60E-02	9.30E-06	8.50E+04	4.83E-04	1.18E-05	25	381.04	547.78	10,936	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.79E-03	25	369.52	572.00	7,590	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	2.30E+00	8.08E-02	9.80E-06	2.23E+05	2.29E-03	5.58E-05	25	352.50	536.78	7,481	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.73E-02	9.11E-04	25	386.15	602.00	8,322	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505	4.1E-06	2.0E-03	X	
79209	Methyl acetate	3.26E+00	1.04E-01	1.00E-05	2.00E+03	4.84E-03	1.18E-04	25	329.80	506.70	7,260	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.96E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	2.1E-01		X
79469	2-Nitropropane	1.17E+01	9.23E-02	1.01E-05	1.70E+04	5.03E-03	1.23E-04	25	393.20	594.00	8,383	2.7E-03	2.0E-02		
80626	Methylmethacrylate	6.98E+00	7.70E-02	8.60E-06	1.50E+04	1.38E-02	3.36E-04	25	373.50	567.00	8,975	0.0E+00	7.0E-01		
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	3.57E+00	6.34E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01		X
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.60E-03	6.34E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.20E+00	3.33E-01	8.13E-03	25	486.15	738.00	10,206	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	3.24E+02	5.87E-02	8.67E-06	6.50E+02	5.11E-04	1.25E-05	25	495.00	720.00	12,239	0.0E+00	3.5E-02		X
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.82E-04	25	491.14	748.40	10,373	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	2.81E+03	5.22E-02	7.75E-06	2.46E+01	2.12E-02	5.17E-04	25	514.26	761.00	12,600	0.0E+00	7.0E-02		X
92524	Biphenyl	4.38E+03	4.04E-02	8.15E-06	7.45E+00	1.23E-02	2.99E-04	25	529.10	789.00	10,890	0.0E+00	1.8E-01		X
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.77E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01		

95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	1.35E+03	6.06E-02	7.92E-06	5.70E+01	2.52E-01	6.14E-03	25	442.30	649.17	9,369	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	2.20E+01	7.10E-02	7.90E-06	1.75E+03	1.67E-02	4.08E-04	25	430.00	652.00	9,171	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	4.53E+00	9.76E-02	1.02E-05	6.00E+04	7.68E-03	1.87E-04	25	353.70	536.00	7,749	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	2.95E+01	6.53E-02	8.37E-06	3.67E+03	3.44E-02	8.40E-04	25	390.00	571.00	10,957	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	7.71E+02	5.65E-02	8.02E-06	2.95E+01	4.87E-01	1.19E-02	25	442.10	1220.00	8,980	0.0E+00	1.4E-01		X
98828	Cumene	4.89E+02	6.50E-02	7.10E-06	6.13E+01	4.74E+01	1.46E-02	25	425.56	631.10	10,335	0.0E+00	4.0E-01		
98862	Acetophenone	5.77E+01	6.00E-02	8.73E-06	6.13E+03	4.38E-04	1.07E-05	25	475.00	709.50	11,732	0.0E+00	3.5E-01		X
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.82E-04	2.39E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03		
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00		
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.12E-01	2.74E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00		
100447	Benzylchloride	6.14E+01	7.50E-02	7.80E-06	5.25E+02	1.70E-02	4.14E-04	25	452.00	685.00	8,773	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	4.59E+01	7.21E-02	9.07E-06	3.30E+03	9.73E-04	2.37E-05	25	452.00	695.00	11,658	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	5.62E+02	6.01E-02	7.83E-06	6.00E+01	4.37E-01	1.07E-02	25	432.20	630.00	9,123	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	1.11E+03	5.70E-02	8.12E-06	2.00E+00	5.38E-01	1.31E-02	25	456.46	660.50	9,290	0.0E+00	1.4E-01		X
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.90E+01	9.82E-02	2.39E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibromide)	2.50E+01	2.17E-02	1.19E-05	4.18E+03	3.04E-02	7.41E-04	25	404.60	583.00	8,310	2.2E-04	2.0E-04		
106990	1,3-Butadiene	1.91E+01	2.49E-01	1.08E-05	7.35E+02	3.01E+00	7.34E-02	25	268.60	425.00	5,370	3.0E-02	2.0E-03		
107028	Acrolein	2.76E+00	1.05E-01	1.22E-05	2.13E+05	4.99E-03	1.22E-04	25	325.60	506.00	6,731	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.00E-02	9.77E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00		
107131	Acrylonitrile	5.90E+00	1.22E-01	1.34E-05	7.40E+04	4.21E-03	1.03E-04	25	350.30	519.00	7,786	6.8E-05	2.0E-03		
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.09E-02	5.10E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2-pentanone)	9.06E+00	7.50E-02	7.80E-06	1.90E+04	5.64E-03	1.38E-04	25	389.50	571.00	8,243	0.0E+00	3.0E+00		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	1.35E+03	6.02E-02	8.67E-06	2.00E+00	2.41E-01	5.87E-03	25	437.89	637.25	9,321	0.0E+00	6.0E-03		
108872	Methylcyclohexane	7.85E+01	7.35E-02	8.52E-06	1.40E+01	4.22E+00	1.03E-01	25	373.90	572.20	7,474	0.0E+00	3.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01		
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.51E-01	3.69E-03	25	404.87	632.40	8,410	0.0E+00	6.0E-02		
109693	1-Chlorobutane	1.72E+01	8.26E-02	1.00E-05	1.10E+03	6.93E-01	1.69E-02	25	351.60	542.00	7,263	0.0E+00	1.4E+00		X
110009	Furan	1.86E+01	1.04E-01	1.22E-05	1.00E+04	2.21E-01	5.39E-03	25	304.60	490.20	6,477	0.0E+00	3.5E-03		X
110543	Hexane	4.34E+01	2.00E-01	7.77E-06	1.24E+01	6.82E+01	1.66E+00	25	341.70	508.00	6,895	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.36E-04	1.80E-05	25	451.15	659.79	10,803	3.3E-04	0.0E+00		
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.58E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	5.00E-03	5.40E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	4.88E+01	5.81E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	4.82E+00	9.56E-02	1.07E-05	3.69E+04	7.99E-04	1.95E-05	25	375.20	568.00	9	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.20E-02	7.81E-04	25	416.14	678.20	5,900	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	3.58E+01	1.12E-01	1.32E-05	2.54E+04	1.01E-02	2.46E-04	25	363.30	554.00	7,600	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloroprene)	6.73E+01	8.58E-02	1.03E-05	2.12E+03	4.91E-01	1.20E-02	25	332.40	525.00	8,075	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	5.9E-06	6.0E-01		
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E+00	4.50E-04	1.10E-05	25	667.95	936	14370	0.0E+00	1.1E-01		X
132649	Dibenzofuran	5.15E+03	2.38E-02	6.00E-06	3.10E+00	5.15E-04	1.26E-05	25	560	824	66400	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	9.66E+02	5.70E-02	8.12E-06	3.94E+00	5.68E-01	1.39E-02	25	446.5	679	88730	0.0E+00	1.4E-01		X
141786	Ethylacetate	6.44E+00	7.32E-02	9.70E-06	8.03E+04	5.64E-03	1.38E-04	25	350.26	523.3	7633.66	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.54E-03	1.11E-04	25	715.9	969.27	17000	2.1E-04	0.0E+00	X	
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	6.30E-03	3.87E-03	9.44E-05	25	714.15	979	16455	2.1E-06	0.0E+00	X	
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.70E-02	6.95E-03	1.70E-04	25	603.01	839.37	15000	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.34E-04	1.06E-05	25	596.55	839.36	15000	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	1.98E+03	6.92E-02	7.86E-06	1.34E+02	1.27E-01	3.09E-03	25	446	684	9230.18	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.24E-01	1.77E-02	25	381.15	587.38	7900	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	1.16E+02	7.10E-02	7.90E-06	1.10E+03	9.90E-02	2.41E-03	25	403.5	624	9768.282525	7.4E-06	1.1E-01		X
1634044	MTBE	7.26E+00	1.02E-01	1.05E-05	5.10E+04	2.56E-02	6.23E-04	25	328.3	497.1	6677.66	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	2.00E+01	4.40E-01	1.07E-02	25	629.88	1750	14127	0.0E+00	3.0E-04		

Vapor Intrusion Calculations for Former Richards-Gebaur Air Force Base

OU 2 Site SS-009
TCE Residential Building 605

Calculations by Donna Caldwell, P.G.
NAVFAC LANT

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Richards-Gebaur AFB SS009 Residential 2012 5 YR Review

GW-ADV Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	9.90E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
13.9	15	274	274			A	CL	CL		

MORE ↓

ENTER Stratum A SCS soil type (Lookup Soil Parameters)	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type (Lookup Soil Parameters)	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type (Lookup Soil Parameters)	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
CL	1.50	0.430	0.3								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
15	40	961	961	488	1	0.45	5

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	30	30	350	1.0E-05	1
				Used to calculate risk-based groundwater concentration.	

END

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	4.1E-06	2.0E-03

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
9.46E+08	259	0.130	ERROR	ERROR	0.630	1.27E-09	0.531	6.74E-10	46.88	0.43	0.055	0.375	3,844

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.63E+04	9.24E+05	4.16E-03	15	8,509	5.90E-03	2.50E-01	1.77E-04	4.82E-04	0.00E+00	0.00E+00	3.46E-05	1.44E-04	259

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.48E+03	1.00	8.33E+01	4.82E-04	3.84E+03	6.25E+292	9.08E-06	2.25E-02	4.1E-06	2.0E-03

END

Richards-Gebaur AFB SS009 Residential 2012 5 YR Review

RISK-BASED GROUNDWATER CONCENTRATION CALCULATIONS:

INCREMENTAL RISK CALCULATIONS:

Indoor exposure groundwater conc., carcinogen (µg/L)	Indoor exposure groundwater conc., noncarcinogen (µg/L)	Risk-based indoor exposure groundwater conc., (µg/L)	Pure component water solubility, S (µg/L)	Final indoor exposure groundwater conc., (µg/L)	Incremental risk from vapor intrusion to indoor air, carcinogen (unitless)	Hazard quotient from vapor intrusion to indoor air, noncarcinogen (unitless)
NA	NA	NA	1.47E+06	NA	3.8E-08	1.1E-02

MESSAGE AND ERROR SUMMARY BELOW: (DO NOT USE RESULTS IF ERRORS ARE PRESENT)

MESSAGE: Risk/HQ or risk-based groundwater concentration is based on a route-to-route extrapolation.

SCROLL DOWN TO "END"

END

VLOOKUP TABLES

Soil Properties Lookup Table

SCS Soil Type	K_s (cm/h)	α_1 (1/cm)	N (unitless)	M (unitless)	n (cm^3/cm^3)	θ_r (cm^3/cm^3)	Mean Grain Diameter (cm)	Bulk Density (g/cm^3)	θ_w (cm^3/cm^3)	SCS Soil Name
C	0.61	0.01496	1.253	0.2019	0.459	0.098	0.0092	1.43	0.215	Clay
CL	0.34	0.01581	1.416	0.2938	0.442	0.079	0.016	1.48	0.168	Clay Loam
L	0.50	0.01112	1.472	0.3207	0.399	0.061	0.020	1.59	0.148	Loam
LS	4.38	0.03475	1.746	0.4273	0.390	0.049	0.040	1.62	0.076	Loamy Sand
S	26.78	0.03524	3.177	0.6852	0.375	0.053	0.044	1.66	0.054	Sand
SC	0.47	0.03342	1.208	0.1722	0.385	0.117	0.025	1.63	0.197	Sandy Clay
SCL	0.55	0.02109	1.330	0.2481	0.384	0.063	0.029	1.63	0.146	Sandy Clay Loam
SI	1.82	0.00658	1.679	0.4044	0.489	0.050	0.0046	1.35	0.167	Silt
SIC	0.40	0.01622	1.321	0.2430	0.481	0.111	0.0039	1.38	0.216	Silty Clay
SICL	0.46	0.00839	1.521	0.3425	0.482	0.090	0.0056	1.37	0.198	Silty Clay Loam
SIL	0.76	0.00506	1.663	0.3987	0.439	0.065	0.011	1.49	0.180	Silt Loam
SL	1.60	0.02667	1.449	0.3099	0.387	0.039	0.030	1.62	0.103	Sandy Loam

Chemical Properties Lookup Table

CAS No.	Chemical	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Pure component water solubility, S (mg/L)	Henry's law constant H' (unitless)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)	URF extrapolated (X)	RfC extrapolated (X)
56235	Carbon tetrachloride	1.74E+02	7.80E-02	8.80E-06	7.93E+02	1.24E+00	3.03E-02	25	349.90	556.60	7,127	1.5E-05	0.0E+00		
57749	Chlordane	1.20E+05	1.18E-02	4.37E-06	5.60E-02	1.99E-03	4.85E-05	25	624.24	885.73	14,000	1.0E-04	7.0E-04		
58899	gamma-HCH (Lindane)	1.07E+03	1.42E-02	7.34E-06	7.30E+00	5.73E-04	1.40E-05	25	596.55	839.36	15,000	3.7E-04	1.1E-03	X	X
60297	Ethyl ether	5.73E+00	7.82E-02	8.61E-06	5.68E+04	1.35E+00	3.29E-02	25	307.50	466.74	6,338	0.0E+00	7.0E-01		X
60571	Dieldrin	2.14E+04	1.25E-02	4.74E-06	1.95E-01	6.18E-04	1.51E-05	25	613.32	842.25	17,000	4.6E-03	1.8E-04		X
67641	Acetone	5.75E-01	1.24E-01	1.14E-05	1.00E+06	1.59E-03	3.87E-05	25	329.20	508.10	6,955	0.0E+00	3.5E-01		X
67663	Chloroform	3.98E+01	1.04E-01	1.00E-05	7.92E+03	1.50E-01	3.66E-03	25	334.32	536.40	6,988	2.3E-05	0.0E+00		
67721	Hexachloroethane	1.78E+03	2.50E-03	6.80E-06	5.00E+01	1.59E-01	3.88E-03	25	458.00	695.00	9,510	4.0E-06	3.5E-03		X
71432	Benzene	5.89E+01	8.80E-02	9.80E-06	1.79E+03	2.27E-01	5.54E-03	25	353.24	562.16	7,342	7.8E-06	3.0E-02		
71556	1,1,1-Trichloroethane	1.10E+02	7.80E-02	8.80E-06	1.33E+03	7.03E-01	1.72E-02	25	347.24	545.00	7,136	0.0E+00	2.2E+00		
72435	Methoxychlor	9.77E+04	1.56E-02	4.46E-06	1.00E-01	6.46E-04	1.58E-05	25	651.02	848.49	16,000	0.0E+00	1.8E-02		X
72559	DDE	4.47E+06	1.44E-02	5.87E-06	1.20E-01	8.59E-04	2.09E-05	25	636.44	860.38	15,000	9.7E-05	0.0E+00	X	
74839	Methyl bromide	1.05E+01	7.28E-02	1.21E-05	1.52E+04	2.55E-01	6.22E-03	25	276.71	467.00	5,714	0.0E+00	5.0E-03		
74873	Methyl chloride (chloromethane)	2.12E+00	1.26E-01	6.50E-06	5.33E+03	3.61E-01	8.80E-03	25	249.00	416.25	5,115	1.0E-06	9.0E-02		
74908	Hydrogen cyanide	3.80E+00	1.93E-01	2.10E-05	1.00E+06	5.44E-03	1.33E-04	25	299.00	456.70	6,676	0.0E+00	3.0E-03		
74953	Methylene bromide	1.26E+01	4.30E-02	8.44E-06	1.19E+04	3.52E-02	8.59E-04	25	370.00	583.00	7,868	0.0E+00	3.5E-02		X
75003	Chloroethane (ethyl chloride)	4.40E+00	2.71E-01	1.15E-05	5.68E+03	3.61E-01	8.80E-03	25	285.30	460.40	5,879	8.3E-07	1.0E+01	X	
75014	Vinyl chloride (chloroethene)	1.86E+01	1.06E-01	1.23E-05	8.80E+03	1.10E+00	2.69E-02	25	259.25	432.00	5,250	8.8E-06	1.0E-01		
75058	Acetonitrile	4.20E+00	1.28E-01	1.66E-05	1.00E+06	1.42E-03	3.45E-05	25	354.60	545.50	7,110	0.0E+00	6.0E-02		
75070	Acetaldehyde	1.06E+00	1.24E-01	1.41E-05	1.00E+06	3.23E-03	7.87E-05	25	293.10	466.00	6,157	2.2E-06	9.0E-03		
75092	Methylene chloride	1.17E+01	1.01E-01	1.17E-05	1.30E+04	8.96E-02	2.18E-03	25	313.00	510.00	6,706	4.7E-07	3.0E+00		
75150	Carbon disulfide	4.57E+01	1.04E-01	1.00E-05	1.19E+03	1.24E+00	3.02E-02	25	319.00	552.00	6,391	0.0E+00	7.0E-01		
75218	Ethylene oxide	1.33E+00	1.04E-01	1.45E-05	3.04E+05	2.27E-02	5.54E-04	25	283.60	469.00	6,104	1.0E-04	0.0E+00		
75252	Bromoform	8.71E+01	1.49E-02	1.03E-05	3.10E+03	2.41E-02	5.88E-04	25	422.35	696.00	9,479	1.1E-06	7.0E-02		X
75274	Bromodichloromethane	5.50E+01	2.98E-02	1.06E-05	6.74E+03	6.54E-02	1.60E-03	25	363.15	585.85	7,800	1.8E-05	7.0E-02	X	X
75296	2-Chloropropane	9.14E+00	8.88E-02	1.01E-05	3.73E+03	5.93E-01	1.45E-02	25	308.70	485.00	6,286	0.0E+00	1.0E-01		
75343	1,1-Dichloroethane	3.16E+01	7.42E-02	1.05E-05	5.06E+03	2.30E-01	5.61E-03	25	330.55	523.00	6,895	0.0E+00	5.0E-01		
75354	1,1-Dichloroethylene	5.89E+01	9.00E-02	1.04E-05	2.25E+03	1.07E+00	2.60E-02	25	304.75	576.05	6,247	0.0E+00	2.0E-01		
75456	Chlorodifluoromethane	4.79E+01	1.01E-01	1.28E-05	2.00E+00	1.10E+00	2.70E-02	25	232.40	369.30	4,836	0.0E+00	5.0E+01		
75694	Trichlorofluoromethane	4.97E+02	8.70E-02	9.70E-06	1.10E+03	3.97E+00	9.68E-02	25	296.70	471.00	5,999	0.0E+00	7.0E-01		
75718	Dichlorodifluoromethane	4.57E+02	6.65E-02	9.92E-06	2.80E+02	1.40E+01	3.42E-01	25	243.20	384.95	9,421	0.0E+00	2.0E-01		
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	1.11E+04	7.80E-02	8.20E-06	1.70E+02	1.97E+01	4.80E-01	25	320.70	487.30	6,463	0.0E+00	3.0E+01		
76448	Heptachlor	1.41E+06	1.12E-02	5.69E-06	1.80E-01	6.05E+01	1.48E+00	25	603.69	846.31	13,000	1.3E-03	1.8E-03		X
77474	Hexachlorocyclopentadiene	2.00E+05	1.61E-02	7.21E-06	1.80E+00	1.10E+00	2.69E-02	25	512.15	746.00	10,931	0.0E+00	2.0E-04		
78831	Isobutanol	2.59E+00	8.60E-02	9.30E-06	8.50E+04	4.83E-04	1.18E-05	25	381.04	547.78	10,936	0.0E+00	1.1E+00		X
78875	1,2-Dichloropropane	4.37E+01	7.82E-02	8.73E-06	2.80E+03	1.15E-01	2.79E-03	25	369.52	572.00	7,590	1.9E-05	4.0E-03	X	
78933	Methylethylketone (2-butanone)	2.30E+00	8.08E-02	9.80E-06	2.23E+05	2.29E-03	5.58E-05	25	352.50	536.78	7,481	0.0E+00	5.0E+00		
79005	1,1,2-Trichloroethane	5.01E+01	7.80E-02	8.80E-06	4.42E+03	3.73E-02	9.11E-04	25	386.15	602.00	8,322	1.6E-05	1.4E-02		X
79016	Trichloroethylene	1.66E+02	7.90E-02	9.10E-06	1.47E+03	4.21E-01	1.03E-02	25	360.36	544.20	7,505	4.1E-06	2.0E-03	X	
79209	Methyl acetate	3.26E+00	1.04E-01	1.00E-05	2.00E+03	4.84E-03	1.18E-04	25	329.80	506.70	7,260	0.0E+00	3.5E+00		X
79345	1,1,2,2-Tetrachloroethane	9.33E+01	7.10E-02	7.90E-06	2.96E+03	1.41E-02	3.44E-04	25	419.60	661.15	8,996	5.8E-05	2.1E-01		X
79469	2-Nitropropane	1.17E+01	9.23E-02	1.01E-05	1.70E+04	5.03E-03	1.23E-04	25	393.20	594.00	8,383	2.7E-03	2.0E-02		
80626	Methylmethacrylate	6.98E+00	7.70E-02	8.60E-06	1.50E+04	1.38E-02	3.36E-04	25	373.50	567.00	8,975	0.0E+00	7.0E-01		
83329	Acenaphthene	7.08E+03	4.21E-02	7.69E-06	3.57E+00	6.34E-03	1.55E-04	25	550.54	803.15	12,155	0.0E+00	2.1E-01		X
86737	Fluorene	1.38E+04	3.63E-02	7.88E-06	1.98E+00	2.60E-03	6.34E-05	25	570.44	870.00	12,666	0.0E+00	1.4E-01		X
87683	Hexachloro-1,3-butadiene	5.37E+04	5.61E-02	6.16E-06	3.20E+00	3.33E-01	8.13E-03	25	486.15	738.00	10,206	2.2E-05	7.0E-04		X
88722	o-Nitrotoluene	3.24E+02	5.87E-02	8.67E-06	6.50E+02	5.11E-04	1.25E-05	25	495.00	720.00	12,239	0.0E+00	3.5E-02		X
91203	Naphthalene	2.00E+03	5.90E-02	7.50E-06	3.10E+01	1.98E-02	4.82E-04	25	491.14	748.40	10,373	0.0E+00	3.0E-03		
91576	2-Methylnaphthalene	2.81E+03	5.22E-02	7.75E-06	2.46E+01	2.12E-02	5.17E-04	25	514.26	761.00	12,600	0.0E+00	7.0E-02		X
92524	Biphenyl	4.38E+03	4.04E-02	8.15E-06	7.45E+00	1.23E-02	2.99E-04	25	529.10	789.00	10,890	0.0E+00	1.8E-01		X
95476	o-Xylene	3.63E+02	8.70E-02	1.00E-05	1.78E+02	2.12E-01	5.18E-03	25	417.60	630.30	8,661	0.0E+00	1.0E-01		
95501	1,2-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	1.56E+02	7.77E-02	1.90E-03	25	453.57	705.00	9,700	0.0E+00	2.0E-01		

95578	2-Chlorophenol	3.88E+02	5.01E-02	9.46E-06	2.20E+04	1.60E-02	3.90E-04	25	447.53	675.00	9,572	0.0E+00	1.8E-02		X
95636	1,2,4-Trimethylbenzene	1.35E+03	6.06E-02	7.92E-06	5.70E+01	2.52E-01	6.14E-03	25	442.30	649.17	9,369	0.0E+00	6.0E-03		
96184	1,2,3-Trichloropropane	2.20E+01	7.10E-02	7.90E-06	1.75E+03	1.67E-02	4.08E-04	25	430.00	652.00	9,171	5.7E-04	4.9E-03	X	
96333	Methyl acrylate	4.53E+00	9.76E-02	1.02E-05	6.00E+04	7.68E-03	1.87E-04	25	353.70	536.00	7,749	0.0E+00	1.1E-01		X
97632	Ethylmethacrylate	2.95E+01	6.53E-02	8.37E-06	3.67E+03	3.44E-02	8.40E-04	25	390.00	571.00	10,957	0.0E+00	3.2E-01		X
98066	tert-Butylbenzene	7.71E+02	5.65E-02	8.02E-06	2.95E+01	4.87E-01	1.19E-02	25	442.10	1220.00	8,980	0.0E+00	1.4E-01		X
98828	Cumene	4.89E+02	6.50E-02	7.10E-06	6.13E+01	4.74E+01	1.46E-02	25	425.56	631.10	10,335	0.0E+00	4.0E-01		
98862	Acetophenone	5.77E+01	6.00E-02	8.73E-06	6.13E+03	4.38E-04	1.07E-05	25	475.00	709.50	11,732	0.0E+00	3.5E-01		X
98953	Nitrobenzene	6.46E+01	7.60E-02	8.60E-06	2.09E+03	9.82E-04	2.39E-05	25	483.95	719.00	10,566	0.0E+00	2.0E-03		
100414	Ethylbenzene	3.63E+02	7.50E-02	7.80E-06	1.69E+02	3.22E-01	7.86E-03	25	409.34	617.20	8,501	0.0E+00	1.0E+00		
100425	Styrene	7.76E+02	7.10E-02	8.00E-06	3.10E+02	1.12E-01	2.74E-03	25	418.31	636.00	8,737	0.0E+00	1.0E+00		
100447	Benzylchloride	6.14E+01	7.50E-02	7.80E-06	5.25E+02	1.70E-02	4.14E-04	25	452.00	685.00	8,773	4.9E-05	0.0E+00	X	
100527	Benzaldehyde	4.59E+01	7.21E-02	9.07E-06	3.30E+03	9.73E-04	2.37E-05	25	452.00	695.00	11,658	0.0E+00	3.5E-01		X
103651	n-Propylbenzene	5.62E+02	6.01E-02	7.83E-06	6.00E+01	4.37E-01	1.07E-02	25	432.20	630.00	9,123	0.0E+00	1.4E-01		X
104518	n-Butylbenzene	1.11E+03	5.70E-02	8.12E-06	2.00E+00	5.38E-01	1.31E-02	25	456.46	660.50	9,290	0.0E+00	1.4E-01		X
106423	p-Xylene	3.89E+02	7.69E-02	8.44E-06	1.85E+02	3.13E-01	7.64E-03	25	411.52	616.20	8,525	0.0E+00	1.0E-01		
106467	1,4-Dichlorobenzene	6.17E+02	6.90E-02	7.90E-06	7.90E+01	9.82E-02	2.39E-03	25	447.21	684.75	9,271	0.0E+00	8.0E-01		
106934	1,2-Dibromoethane (ethylene dibromide)	2.50E+01	2.17E-02	1.19E-05	4.18E+03	3.04E-02	7.41E-04	25	404.60	583.00	8,310	2.2E-04	2.0E-04		
106990	1,3-Butadiene	1.91E+01	2.49E-01	1.08E-05	7.35E+02	3.01E+00	7.34E-02	25	268.60	425.00	5,370	3.0E-02	2.0E-03		
107028	Acrolein	2.76E+00	1.05E-01	1.22E-05	2.13E+05	4.99E-03	1.22E-04	25	325.60	506.00	6,731	0.0E+00	2.0E-05		
107062	1,2-Dichloroethane	1.74E+01	1.04E-01	9.90E-06	8.52E+03	4.00E-02	9.77E-04	25	356.65	561.00	7,643	2.6E-05	0.0E+00		
107131	Acrylonitrile	5.90E+00	1.22E-01	1.34E-05	7.40E+04	4.21E-03	1.03E-04	25	350.30	519.00	7,786	6.8E-05	2.0E-03		
108054	Vinyl acetate	5.25E+00	8.50E-02	9.20E-06	2.00E+04	2.09E-02	5.10E-04	25	345.65	519.13	7,800	0.0E+00	2.0E-01		
108101	Methylisobutylketone (4-methyl-2-pentanone)	9.06E+00	7.50E-02	7.80E-06	1.90E+04	5.64E-03	1.38E-04	25	389.50	571.00	8,243	0.0E+00	3.0E+00		
108383	m-Xylene	4.07E+02	7.00E-02	7.80E-06	1.61E+02	3.00E-01	7.32E-03	25	412.27	617.05	8,523	0.0E+00	1.0E-01		
108678	1,3,5-Trimethylbenzene	1.35E+03	6.02E-02	8.67E-06	2.00E+00	2.41E-01	5.87E-03	25	437.89	637.25	9,321	0.0E+00	6.0E-03		
108872	Methylcyclohexane	7.85E+01	7.35E-02	8.52E-06	1.40E+01	4.22E+00	1.03E-01	25	373.90	572.20	7,474	0.0E+00	3.0E+00		
108883	Toluene	1.82E+02	8.70E-02	8.60E-06	5.26E+02	2.72E-01	6.62E-03	25	383.78	591.79	7,930	0.0E+00	4.0E-01		
108907	Chlorobenzene	2.19E+02	7.30E-02	8.70E-06	4.72E+02	1.51E-01	3.69E-03	25	404.87	632.40	8,410	0.0E+00	6.0E-02		
109693	1-Chlorobutane	1.72E+01	8.26E-02	1.00E-05	1.10E+03	6.93E-01	1.69E-02	25	351.60	542.00	7,263	0.0E+00	1.4E+00		X
110009	Furan	1.86E+01	1.04E-01	1.22E-05	1.00E+04	2.21E-01	5.39E-03	25	304.60	490.20	6,477	0.0E+00	3.5E-03		X
110543	Hexane	4.34E+01	2.00E-01	7.77E-06	1.24E+01	6.82E+01	1.66E+00	25	341.70	508.00	6,895	0.0E+00	2.0E-01		
111444	Bis(2-chloroethyl)ether	1.55E+01	6.92E-02	7.53E-06	1.72E+04	7.36E-04	1.80E-05	25	451.15	659.79	10,803	3.3E-04	0.0E+00		
115297	Endosulfan	2.14E+03	1.15E-02	4.55E-06	5.10E-01	4.58E-04	1.12E-05	25	674.43	942.94	14,000	0.0E+00	2.1E-02		X
118741	Hexachlorobenzene	5.50E+04	5.42E-02	5.91E-06	5.00E-03	5.40E-02	1.32E-03	25	582.55	825.00	14,447	4.6E-04	2.8E-03		X
120821	1,2,4-Trichlorobenzene	1.78E+03	3.00E-02	8.23E-06	4.88E+01	5.81E-02	1.42E-03	25	486.15	725.00	10,471	0.0E+00	4.0E-03		
123739	Crotonaldehyde (2-butenal)	4.82E+00	9.56E-02	1.07E-05	3.69E+04	7.99E-04	1.95E-05	25	375.20	568.00	9	5.4E-04	0.0E+00	X	
124481	Chlorodibromomethane	6.31E+01	1.96E-02	1.05E-05	2.60E+03	3.20E-02	7.81E-04	25	416.14	678.20	5,900	2.4E-05	7.0E-02	X	X
126987	Methacrylonitrile	3.58E+01	1.12E-01	1.32E-05	2.54E+04	1.01E-02	2.46E-04	25	363.30	554.00	7,600	0.0E+00	7.0E-04		
126998	2-Chloro-1,3-butadiene (chloroprene)	6.73E+01	8.58E-02	1.03E-05	2.12E+03	4.91E-01	1.20E-02	25	332.40	525.00	8,075	0.0E+00	7.0E-03		
127184	Tetrachloroethylene	1.55E+02	7.20E-02	8.20E-06	2.00E+02	7.53E-01	1.84E-02	25	394.40	620.20	8,288	5.9E-06	6.0E-01		
129000	Pyrene	1.05E+05	2.72E-02	7.24E-06	1.35E+00	4.50E-04	1.10E-05	25	667.95	936	14370	0.0E+00	1.1E-01		X
132649	Dibenzofuran	5.15E+03	2.38E-02	6.00E-06	3.10E+00	5.15E-04	1.26E-05	25	560	824	66400	0.0E+00	1.4E-02		X
135988	sec-Butylbenzene	9.66E+02	5.70E-02	8.12E-06	3.94E+00	5.68E-01	1.39E-02	25	446.5	679	88730	0.0E+00	1.4E-01		X
141786	Ethylacetate	6.44E+00	7.32E-02	9.70E-06	8.03E+04	5.64E-03	1.38E-04	25	350.26	523.3	7633.66	0.0E+00	3.2E+00		X
156592	cis-1,2-Dichloroethylene	3.55E+01	7.36E-02	1.13E-05	3.50E+03	1.67E-01	4.07E-03	25	333.65	544	7192	0.0E+00	3.5E-02		X
156605	trans-1,2-Dichloroethylene	5.25E+01	7.07E-02	1.19E-05	6.30E+03	3.84E-01	9.36E-03	25	320.85	516.5	6717	0.0E+00	7.0E-02		X
205992	Benzo(b)fluoranthene	1.23E+06	2.26E-02	5.56E-06	1.50E-03	4.54E-03	1.11E-04	25	715.9	969.27	17000	2.1E-04	0.0E+00	X	
218019	Chrysene	3.98E+05	2.48E-02	6.21E-06	6.30E-03	3.87E-03	9.44E-05	25	714.15	979	16455	2.1E-06	0.0E+00	X	
309002	Aldrin	2.45E+06	1.32E-02	4.86E-06	1.70E-02	6.95E-03	1.70E-04	25	603.01	839.37	15000	4.9E-03	1.1E-04		X
319846	alpha-HCH (alpha-BHC)	1.23E+03	1.42E-02	7.34E-06	2.00E+00	4.34E-04	1.06E-05	25	596.55	839.36	15000	1.8E-03	0.0E+00		
541731	1,3-Dichlorobenzene	1.98E+03	6.92E-02	7.86E-06	1.34E+02	1.27E-01	3.09E-03	25	446	684	9230.18	0.0E+00	1.1E-01		X
542756	1,3-Dichloropropene	4.57E+01	6.26E-02	1.00E-05	2.80E+03	7.24E-01	1.77E-02	25	381.15	587.38	7900	4.0E-06	2.0E-02		
630206	1,1,1,2-Tetrachloroethane	1.16E+02	7.10E-02	7.90E-06	1.10E+03	9.90E-02	2.41E-03	25	403.5	624	9768.282525	7.4E-06	1.1E-01		X
1634044	MTBE	7.26E+00	1.02E-01	1.05E-05	5.10E+04	2.56E-02	6.23E-04	25	328.3	497.1	6677.66	0.0E+00	3.0E+00		
7439976	Mercury (elemental)	5.20E+01	3.07E-02	6.30E-06	2.00E+01	4.40E-01	1.07E-02	25	629.88	1750	14127	0.0E+00	3.0E-04		