DEPARTMENT OF THE AIR FORCE
AIR FORCE CIVIL ENGINEER CENTER

FEB 13 2014

MEMORANDUM FOR U.S. Environmental Protection Agency, Region IX
Attn: Ms. Mary Aycock
75 Hawthorne Street
San Francisco, CA 94105

California RWQCB, Lahontan Region
Attn: Ms. Linda Stone
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

FROM: AFCEC/CIBW
3411 Olson Street
McClellan, CA 95652-1003

SUBJECT: Final Revised Proposed Plan, Operable Unit 1, Site CG070, former George Air Force Base (AFB), California

The purpose of this letter is to issue the Final Revised Proposed Plan, Operable Unit 1, Site CG070 (Revised Proposed Plan), former George AFB.

This Final Revised Proposed Plan has been prepared in response to comments on the Draft Final Revised Proposed Plan from the RWQCB, Lahontan Region, and the U.S. EPA received on January 31, 2014 and February 4, 2014, respectively. See Response to Comments Table within the final document.

Thank you for your support of the former George Air Force Base environmental program. If you have any questions or concerns, please do not hesitate to call me at (916) 643-6420, ext. 211.

DONALD GRONSTAL
BRAC Environmental Coordinator

Attachment:
Final Revised Proposed Plan, Operable Unit 1, Site CG070,
former George Air Force Base

cc:
AFCEC/CIBW-McClellan, Attn: Administrative Record (1 hard copy and 1 CD)
AFCEC/CIBW-McClellan, Attn: Mr. Don Gronstal (1 hard copy, 1 CD, and email notification – George AFB Project Portal)
AFCEC/CIBW-Lackland, Attn: Mr. Jerry Bingham (1 CD and email notification – George AFB Project Portal)
CNTS, Attn: Mr. Calvin Cox (2 hard copies, 1 CD, and email notification – George AFB Project Portal)
RWQCB, Lahonton Region, Attn: Ms. Cindi Mitton (1 hard copy, 1 CD, and email notification – George AFB Project Portal))
RWQCB, Lahonton Region, Attn: Ms. Linda Stone (1 hard copy, 1 CD, and email notification – George AFB Project Portal)
SAF/GCN-SA-McClellan, Attn: Mr. Michael P. Kelly (email notification – George AFB Project Portal)
Shaw E&I, Inc., Attn: Mr. Tarek Ladaa (1 hard copy, 1 CD, and email notification – George AFB Project Portal)
Shaw E&I, Inc., Attn: Mr. David Daftary (email notification – George AFB Project Portal)
Sologeo LLC, Attn: Dr. Susan Soloyanis (email notification – George AFB Project Portal)
TechLaw, Inc., Attn: Ms. Indira Balkissoon (1 hard copy, 1 CD, and email notification – George AFB Project Portal)
U.S. EPA, Attn: Ms. Mary Aycock (1 hard copy and 1 CD)
U.S. EPA, Attn: Mr. Eric Esler (1 hard copy and 1 CD)

Revised Proposed Plan
Operable Unit 1, Site CG070
Former George Air Force Base

Opportunities for Public Involvement

Community involvement is a valuable component of the U.S. Air Force (Air Force) **Environmental Restoration Program**. The Air Force encourages public involvement in cleanup decisions at the former George Air Force Base (GAFB) and is making this Revised Proposed Plan and supporting documentation available for public review at the locations detailed in Section J.

The Air Force has established a 30-day public comment period for this Revised Proposed Plan and invites public input on the preferred cleanup alternative proposed for Operable Unit (OU) 1 at GAFB.

Public Comment Period: February 18, 2014 to March 21, 2014

Please submit all comments in writing to Mr. Brian Sytsma, Air Force Civil Engineer Center, 3411 Olson Street, McClellan, CA 95652, via fax to 916.643.0460, or via e-mail to afrpa.west.pa@us.af.mil.

A comment form is attached at the end of this document, but you do not have to use the form. The decision makers will consider any comments received or postmarked before the end of the public comment period on **March 21, 2014**.

Public Meeting:
February 25, 2014, 6:00 pm
Victorville City Hall
Conference Room D
14343 Civic Drive
Victorville, CA 92392

The community is invited to ask clarifying questions and learn more about this Revised Proposed Plan during the public meeting.

The Air Force will evaluate community acceptance of the preferred cleanup alternative after the public meeting and public comment period. The Air Force will respond to comments in the **Responsiveness Summary** of the OU1 **Record of Decision Amendment (RODA)**.

The RODA will be available in the **Administrative Record** upon finalization. The Administrative Record is accessible on the Internet at the Air Force Civil Engineer Center Base Realignment and Closure document repository Web site at http://afcec.publicadmin-record.us.af.mil/.

A. INTRODUCTION

The **Operable Unit (OU)**[1] 1, Former **George Air Force Base (GAFB)**, Victorville, California, **Revised Proposed Plan** identifies the U.S. Air Force's (Air Force) **Preferred Alternative** for the cleanup of the OU1, **Installation Restoration Program (IRP) Site CG070, Trichloroethene (TCE) groundwater** plume. This Revised Proposed Plan provides background information about GAFB, OU1, and the rationale for the Air Force's preferred cleanup alternative. In addition, this Revised Proposed Plan includes summaries of other **remedial alternatives** evaluated for cleanup of Site CG070. The Plan is titled "Revised" because a "Proposed Plan" was previously prepared and entered into the Administrative Record for the **OU1 Record Of Decision (ROD)** (**Montgomery Watson Americas, Inc. [MWH]**, 1994). An indication in 2000 that the previous remedy was not operating as designed (described below) required the revision and resubmittal of this plan and revision of the ROD.

The cleanup of OU1, Site CG070 is part of the overall strategy to clean up the various OUs at GAFB that are described later in this Revised Proposed Plan. This Plan is issued by the Air Force, the **lead agency** for GAFB activities, and has been reviewed by the support regulatory agencies overseeing the cleanup, the **U.S. Environmental Protection Agency (EPA)** Region 9, and the **California Regional Water Quality Control Board, Lahontan Region (Lahontan Water Board)**.

The Air Force and EPA, in consultation with the Lahontan Water Board, will jointly select the final remedy for Site CG070after reviewing and considering all comments submitted during the public meeting and the 30-day public comment

[1]To assist the reader, as each key term is introduced, it appears in bold type. A glossary of key terms is provided on pages 46 through 52.

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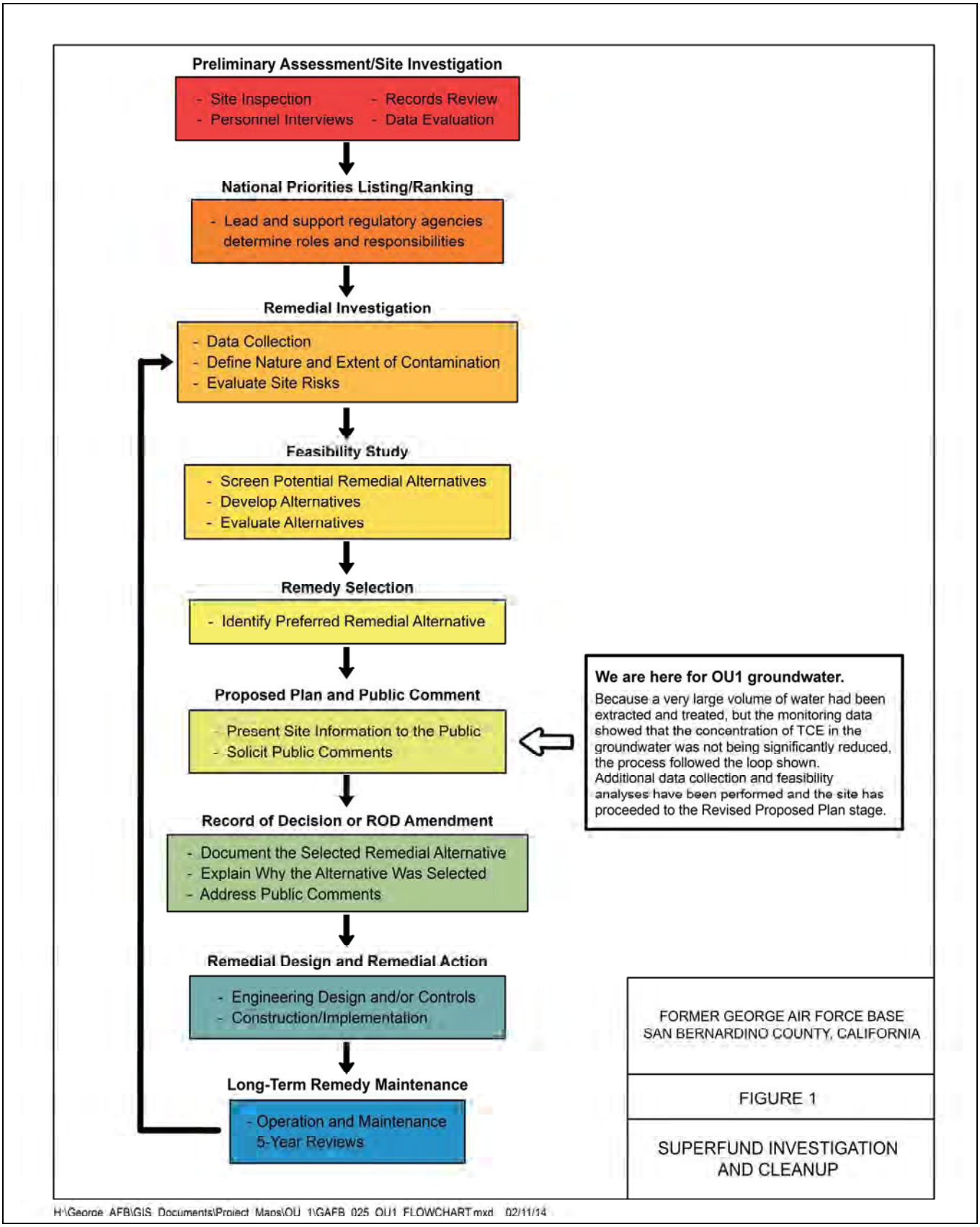
period. The Air Force may modify the preferred alternative presented in this Revised Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on the remedies presented in this Revised Proposed Plan.

The Air Force is issuing this Revised Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) and Section 300.435 (c)(2) and (ii) of the **National Oil and Hazardous Substances Pollution Contingency Plan (NCP)** and Section 117(a) (42 U.S. Code Section 9617) of the **Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA),** commonly known as **Superfund**. This Revised Proposed Plan was prepared following *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and other Remedy Selection Decision Documents* (EPA, 1999). The NCP, CERCLA, and EPA require public involvement when sites undergo a fundamental change to their original remedies. This Plan summarizes information that can be found in greater detail in the *Final* ***Focused Feasibility Study*** **(FFS)***, OU 1 TCE Groundwater Plume*, *George Air Force Base, California, Revision 4* (MWH, 2012) and other documents contained in the Administrative Record file for GAFB supporting the need to amend the selected remedy. The Air Force encourages the public to review these documents to gain a more comprehensive understanding of OU1, Site CG070, and GAFB and remedial actions that have been conducted at OU1.

This Revised Proposed Plan will be followed by a **Record of Decision Amendment (RODA)**, which will describe and document the selection of the revised cleanup decisions for OU1 based on information and technical analyses generated during the remedial actions and FFS (MWH, 2012) and consideration of public comments and community concerns. The investigation and cleanup process is illustrated on Figure 1.


Preliminary Assessment/Site Investigation
- Site Inspection
- Personnel Interviews
- Records Review
- Data Evaluation
National Priorities Listing/Ranking
- Lead and support regulatory agencies determine roles and responsibilities
Remedial Investigation
- Data Collection
- Define Nature and Extent of Contamination
- Evaluate Site Risks
Feasibility Study
- Screen Potential Remedial Alternatives
- Develop Alternatives
- Evaluate Alternatives
Remedy Selection
- Identify Preferred Remedial Alternative
Proposed Plan and Public Comment
- Present Site Information to the Public
- Solicit Public Comments
We are here for OU1 groundwater.
Because a very large volume of water had been extracted and treated, but the monitoring data showed that the concentration of TCE in the groundwater was not being significantly reduced, the process followed the loop shown. Additional data collection and feasibility analyses have been performed and the site has proceeded to the Revised Proposed Plan stage.
Record of Decision or ROD Amendment
- Document the Selected Remedial Alternative
- Explain Why the Alternative Was Selected
- Address Public Comments
Remedial Design and Remedial Action
- Engineering Design and/or Controls
- Construction/Implementation
Long-Term Remedy Maintenance
- Operation and Maintenance
5-Year Reviews
FORMER GEORGE AIR FORCE BASE
SAN BERNARDINO COUNTY, CALIFORNIA
FIGURE 1
SUPERFUND INVESTIGATION AND CLEANUP
H:\George_AFB\GIS_Documents\Project_Maps\OU_1\GAFB_025_OU1_FLOWCHART.mxd 02/11/14

B. SITE BACKGROUND

GAFB is located in San Bernardino County, California, approximately 70 miles northeast of Los Angeles in the upper Mojave River Groundwater Basin. The location of GAFB is shown on Figure 2. GAFB was established in the early 1940s and closed in December 1992. During its operation, GAFB was used as a fighter training base for many types of aircraft and housed two combat-ready squadrons. Over 50 years of military aircraft operations resulted in various **chemicals of concern (COC)** being released into the soil and leaching into the groundwater, potentially impacting human health and the environment.

GAFB was placed on the **National Priorities List (NPL)** on February 21, 1990, due to these releases of hazardous substances that occurred during the period of active operation of GAFB. A **Federal Facility Agreement (FFA)** was negotiated in 1990 among the Air Force, EPA, the Lahontan Water Board, and the California Department of Health Services Toxic Substances Control Program (known today as the **Department of Toxic Substances Control [DTSC]**) to remediate contaminated areas at the base. DTSC was part of the base cleanup team until 1998, when they deferred their roles and responsibilities to the Lahontan Water Board (DTSC, 1997).

Public involvement has been an integral part of the cleanup process at GAFB. From 1992 to 2005, a Restoration Advisory Board (RAB) for GAFB was the primary form of public outreach and involvement. Since then, the Air Force has continued to involve the public in the cleanup process through periodic mailings, additional public meetings, outreach to the local media, and the GAFB Web site: (http://www.afcec.af.mil/brac/george/index.asp).

Eighty-four IRP sites with potential chemical contamination were identified at GAFB, and these sites were grouped into five OUs (including OU1) described below. Additional information on these five OUs is provided in Section D.

OU1, OU2, and OU3 were initially created to address soil and groundwater contamination at various locations.

Groundwater at Site CG070 is impacted by **volatile organic compounds (VOC)**, primarily TCE. A nitrate plume has also been identified. Because these contaminants exceeded regulatory thresholds and represented a risk to human health and the environment, they were addressed under the **OU1** ROD (MWH, 1994).The approved Site CG070 remedial action for the groundwater plume was a **groundwater extraction and treatment** system (often called “pump-and-treat”).

OU2 was created to manage a groundwater plume containing petroleum hydrocarbons (jet fuel) and the soil sources for the plume. OU2 was removed from the CERCLA program when the cleanup was transferred to the non-CERCLA program, under the oversight of the Lahontan Water Board.

OU3 was created to encompass 60 IRP sites. The sites in the OU3 ROD were presented in three groups: 1) landfill sites and Southeast Disposal Area sites, 2) petroleum hydrocarbons-impacted sites, and 3) fire training sites that were recognized as contributing to separate VOC plumes in groundwater. Remedial investigations of the OU3 sites indicated 40 of the sites did not pose a threat and were determined to require no further action, as documented in the ROD for OU3 (MWH, 1998). Remedies identified for the other 20 sites included remedies that targeted the potential sources of VOCs for the groundwater. Remedies for the 20 sites were addressed in the ROD for OU3.

OU4 was created in 2005 and included eight soil sites. OU4 was removed from the CERCLA program in May 2008 (Department of the Air Force, 2008) when five of the eight sites (OT076, OT077, OT088, SR404, and XU403) were closed as No Further Response Action Planned sites. This action is described in the *Technical Document to Support No Further Response Action Planned for Sites OT076,*

OT077, OT080, SR404, and XU403 (MWH, 2008). The remaining sites (three **skeet ranges** [OT072, OT073, and OT074]), were transferred into OU5.

OU5 was initially created in 2006 to manage two **vadose zone** soil sources of TCE (FT082 and SS083) that were recognized as contributing to VOC plumes in groundwater, Site CG070 and OU3 Site OT069, respectively. Sites FT082 and SS083 were identified after completion of the OU1 and OU3 RODs. The OU5 ROD is being prepared.

OU1 Specific Background

The OU1 ROD was approved in 1994 as described previously. The OU1 ROD covers two potential soil sources (SD025 and WP026) and a TCE groundwater plume (CG070). The three OU1 sites and remedy decisions for each are briefly described below.

SD025 (Industrial Storm Drain/Outfall Ditch) is the industrial storm drain system that drains the tarmac and industrial area along the airfield. The storm drain system was thought to be a source of dissolved solvents to groundwater when the base was in operation. Subsequent soil sampling at SD025 demonstrated there was no residual contamination above action levels in the soil; therefore, the ROD documents site closure with no further action (MWH, 1994)**.**

WP026 (Sewage Treatment Plant Percolation Ponds) was used from the early 1950s through 1981 and consisted of three cells (ponds) that operated in series. The ponds were a source of nitrate in groundwater during their operation. Subsequent soil sampling at WP026 demonstrated there was no residual contamination above action levels in the soil; therefore, the ROD documents site closure with no further action for this site (MWH, 1994).

CG070 (TCE Groundwater Plume) is the VOC plume in the groundwater beneath the northeastern portions of GAFB and adjacent to the off-base area. Sources of VOCs in CG070 are OU3 soil Sites FT019 (a and c) and OU5 Site FT082. Soil at Sites FT019 (a and c) and FT082 contains VOCs, primarily TCE, from the ground surface down to the **water table** (110 to 135 feet below the ground surface). Remedial actions at OU3 and OU5soil sites are ongoing and are being addressed separately from this Revised Proposed Plan.

Figure 3 shows the locations of OU1 Sites SD025, WP026, and CG070; the Source Areas FT019 and FT082; and the current extent of the OU1 Site CG070 TCE plume.

The initially selected remedy (MWH, 1994) for the VOCs in the groundwater at CG070 was a groundwater extraction and treatment system that was a continuation of the interim cleanup action. The extraction and treatment system was combined with **land-use controls (LUC)** that applied to land areas comprising GAFB (i.e., **Air Force Lands**). These LUCs were planned and designed to prevent the use of groundwater until cleanup levels were achieved. For more information on LUCs, refer to Section C.

A very large volume of water had been extracted and treated, but the **monitoring** data showed the concentration of TCE in the groundwater was not being significantly reduced. The data also suggested the treatment might be spreading the plume rather than reducing the extent because of injection of the treated water.

In 2003, the **Base Realignment and Closure Team (BCT)**, consisting of the Air Force, EPA, and the Lahontan Water Board, evaluated the data and determined theOU1 groundwater extraction and treatment system was not performing as intended and would not achieve the statutory determinations identified in the 1994 OU1 ROD.

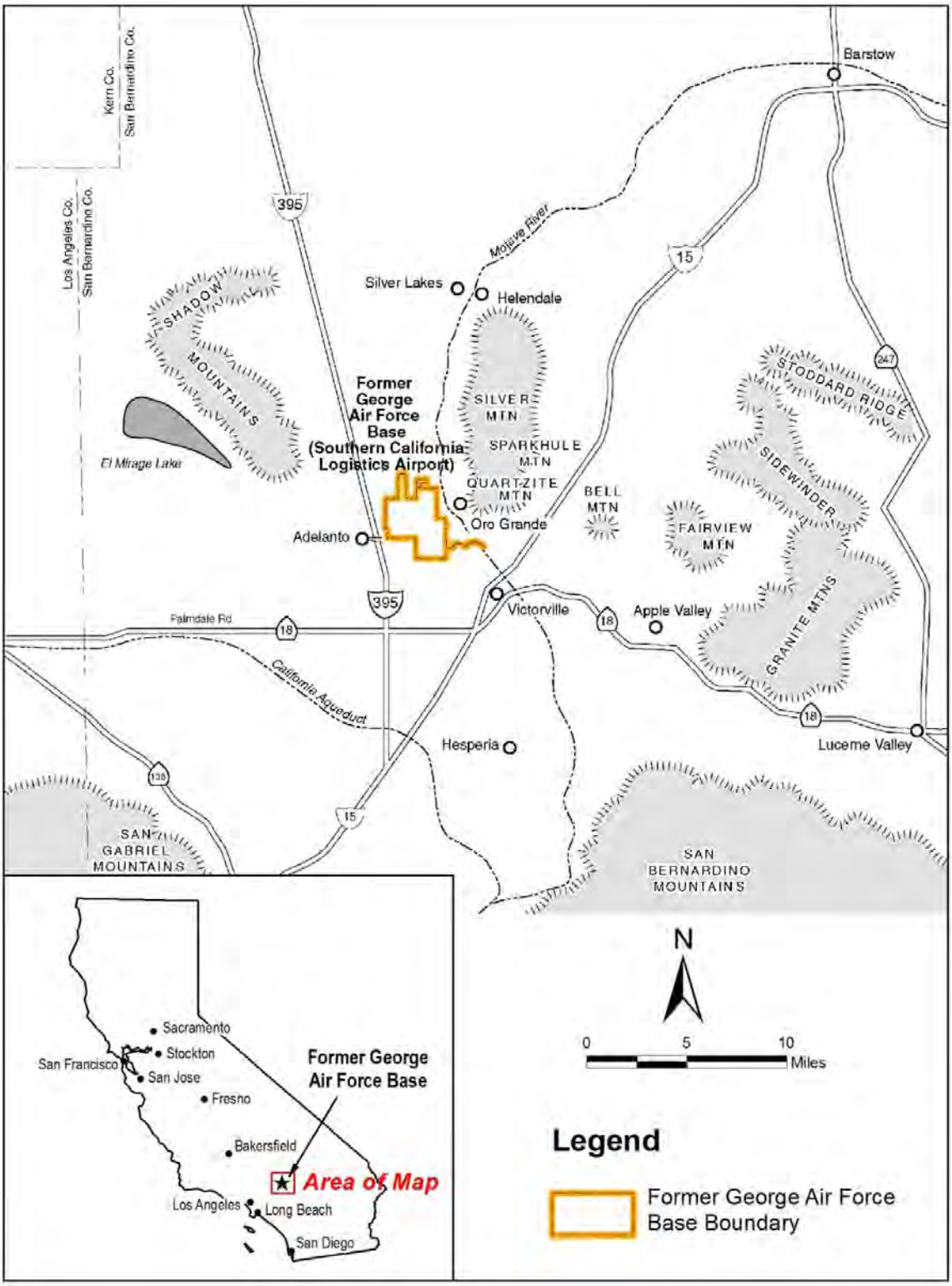


Figure 2
George Air Force Base Location Map

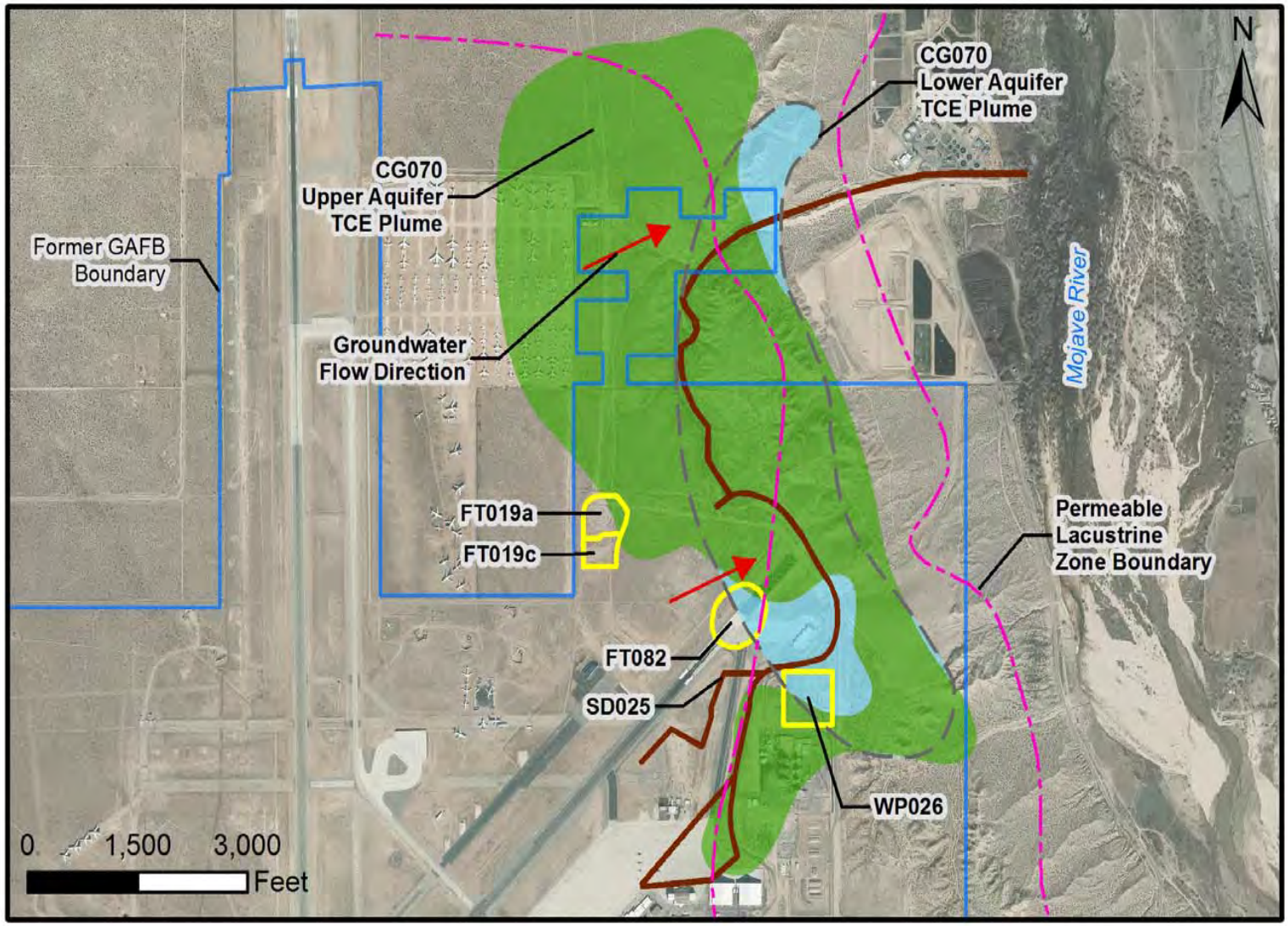


Figure 3
Aerial Location of the OU1 Sites SD025, WP026, CG070, the Source Areas FT019 and FT082, and the Current Extent of OU1 Site CG070 TCE Plume

The treatment system monitoring data suggested that TCE was migrating from the **Upper Aquifer** to the **Lower Aquifer** at an increased rate. The Air Force discharged the treated groundwater in areas overlying the Upper Aquifer plume, and the infiltration of this water into the Upper Aquifer plume appears to have increased the lateral and vertical migration of TCE rather than drawing it to the extraction wells for removal. Figure 8 shows the aquifers in relation to each other. After 12 years of operation, the groundwater extraction and treatment system was shut down in March 2003 to allow for further investigations and an optimization study, which are now being considered in the Revised Proposed Plan.

An initial optimization study was conducted from 2003 to 2007 to evaluate the design of the treatment system, including the extraction well configuration, recharge locations, and other remedial alternatives. Additional OU1 characterization work was performed from 2004 to 2009 to update the understanding of the groundwater's Upper Aquifer and Lower Aquifer. This characterization work also enhanced the understanding of the Site CG070 distribution and flow (that is, to update the groundwater **conceptual site model (CSM)** (FFS, Appendix A [MWH, 2012]). Figure 3 shows the current extent of Site CG070. This characterization and an updated CSM were also used to prepare an updated FFS to evaluate both remedy optimization and remedy alternatives (MWH, 2012).

As described in more detail in the FFS, the CSM (Appendix A, MWH, 2012), and Section C in this Revised Proposed Plan, the VOCs are contained in soil layers containing groundwater. However, the VOCs are also contained in a layer of subsurface soil material through which groundwater does not easily move, and pumping and treating groundwater does not remove the VOCs from these layers. The FFS included an evaluation of alternatives to pump and treat and address all the subsurface layers containing VOCs.

Previous Investigations and Remedial Actions

A number of investigations have been carried out to determine the type and extent of contamination at OU1. These were conducted prior to the OU1 ROD, during the implementation of the selected remedy, and after the treatment system was shut down.

Initial investigations, consisting of the OU1 remedial investigation (James M. Montgomery, Inc., 1992) and the OU1 **Feasibility Study** (James M. Montgomery, Inc., 1993), resulted in the previous remedy selection in the OU1 ROD (MWH, 1994).

To address VOCs in the groundwater, the Air Force began extracting and treating the groundwater in 1991 to remove TCE. The OU1 ROD continued the treatment as the selected remedy. Regular monitoring was carried out during the treatment to track the progress. By 2003, when the treatment system was shut down for initial optimization study, the monitoring data showed a total of 1.56 billion gallons of groundwater had been extracted and treated and placed in percolation ponds for **infiltration** back to the Upper Aquifer. Approximately 19 gallons (232 pounds) out of an estimated total of 215 gallons of TCE (MWH, 2012) had been removed.

Following the shutdown, data collection, optimization studies, and regulatory review continued until 2009. These included the following activities:

- Ongoing groundwater monitoring across the OU1 groundwater plume
- Final OU1 Site CG070 Source Area Investigation and Preliminary Engineering Report (MWH, 2006)
- Final Groundwater Modeling Report, OU1 Optimization – Volume 1 (MWH, 2007)
- Final Operable Unit 1 Focused Feasibility Study, OU1 TCE Groundwater Plume (MWH, 2012)
  - Final Hydrogeologic Conceptual Site Model for GAFB, Appendix A (Volume 1 of 3)

- OU1 Supplemental Investigation Report (Lower Aquifer/Flood Plain Aquifer), Appendix C (Volume 3 of 3).

A list of COCs detected in the OU1 groundwater plume in the years following the treatment system shutdown is presented in Table 1.

C. SITE CHARACTERISTICS

In 1992, the City of Victorville, California (the City) expanded the city limits to include GAFB. GAFB is located in the northwestern portion of the City within the **Southern California Logistics Airport (SCLA)** Land Use Plan area (Figure 4), which is defined in the **SCLA Specific Plan** (February 2004). The SCLA Specific Plan is a subset of the **City of Victorville General Plan 2030** (City Resolution Numbers 08-150 and 08-151, Oct 21, 2008) (Figure 5).The SCLA Land Use Plan area includes all lands within GAFB, extending to lands north and east of the former base boundary. OU1/Site CG070 lies entirely within the SCLA Land Use Plan area.

As a foundation to the City General Plan 2030, the SCLA Specific Plan provides focused guidance and the regulatory requirements necessary to implement any proposed development within the SCLA Land Use Plan area.

A new City Resolution (12-056) was approved and adopted on September 18, 2012, which affects the permitting of any proposed developments within the SCLA Land Use Plan area. This resolution creates a City **Consultation Zone** (Figure 6). The City Consultation Zone incorporates the majority of the SCLA Land Use Plan area and overlays GAFB, which encompasses the known, fullest extent of the OU1/CG070 plume that is being addressed by this Revised Proposed Plan.

This City resolution also implements the City **Consultation Process** requiring the City's Development Department to notify San Bernardino County's Division of Environmental Health Services (DEHS) and the Air Force of the receipt of any proposed development within the Consultation Zone that proposes the installation of a supply well instead of relying on the City's domestic water service for its water source.

The Air Force, upon City notification, will consult with the EPA and the Lahontan Water Board. The Air Force will then provide recommendations to the City and DEHS regarding the advisability of such a well installation given its proposed location relative to the OU1/CG070 plume.

Any changes or variances to the development conditions established by the City General Plan 2030 and its supporting documents must be adopted and approved by the City of Victorville City Council.

In cooperation with, and in support of, the City's Consultation Zone and Consultation Process, the DEHS expanded their original **Notification Zone** (August 2010) to include all 305 parcels that are also located within the Consultation Zone (DEHS, 2013). Figure 7 is the updated County Notification Zone. The DEHS will notify the Air Force, the City, and the EPA when DEHS receives an application for a well permit on any parcel within the County's Notification Zone (the DEHS, and not the City, regulates the installation of wells within the County through its well permitting process). This Notification Zone process provides an additional governmental control, similar to the Consultation Zone/Process, to alert the Air Force and the regulators of any proposed well installation that could impact OU1/CG070 or expose **receptors** to contaminated groundwater. After consulting with EPA and the Lahontan Water Board, the Air Force will again provide recommendations to the DEHS and the City.

Table 1 - Chemicals of Concern

Chemicals of Concern	Units	Federal MCL	California MCL	Historical Update		Description
				Upper Aquifer	Lower Aquifer/ FPA	
1.1- Dichloroethane	µg/L	none	5	8.2	0.39	1,1-Dichloroethane is a colorless, oily liquid with a sweet odor. It evaporates easily at room temperature and burns easily. It does not occur naturally in the environment. 1.1 - Dichloroethane affects the function of the nervous system.
1,2-Dichloroethane	µg/L	5	0.5	3.5	0.9	One use of 1,2-Dichloroethane in industry is as a solvent. It is reasonably anticipated to be a human carcinogen. 1,2-Dichloroethane can cause kidney and liver problems.
Cis-1,2 Dicholoroethylene	µg/L	70	6	65.5	6.1	Cis-1,2 Dichloroethylene is an odorless organic liquid that has two slightly different forms, a "cis" form and a "trans" form, usually as a mixture and they are used as a solvent. Some people who drink water containing cis-1,2-dichloroethylene well in excess of the MCL for many years could experience problems with their liver.
1,2 - Dicholoropropane	µg/L	5	5	0.06	nd	1,2 - Dicholoropropane is a colorless. Flammable liquid with a chloroform-like odor. 1,2 - Dicholoropropane affects blood forming, liver, nervous system, and respiratory problems from nose to lungs.
Arsenic	µg/L	10	10	5.9	9.3	Arsenic is a naturally occurring mineral and is often found in groundwater due to natural processes. Arsenic is a probable human carcinogen. Exposure to arsenic can cause cardiovascular, pulmonary, immunological, neurological, and endocrinological (e.g., diabetes) effects.
Benzene	µg/L	5	1	10.6	14.5	Benzene is used by industry to make other chemicals and is also found in crude oil and gasoline. Benzene is known to be a human carcinogen. Benzene affects the blood-forming system, the immune system and the nervous system. Blood cancers, particularly leukemia, are the most common cancers found from benzene exposure.
Carbon tetrachloride	µg/L	5	0.5	0.84	1.1	Carbon tetrachloride is a manufactured chemical that does not occur naturally. It is a clear liquid with a sweet smell that can be detected at low levels. It effects heart and blood vessels, liver and nervous system.
Chloroform	µg/L	80	80	9.1	4.1	Chloroform is used to make other chemicals and can also be formed in small amounts when chlorine is added to water. It is reasonably anticipated to be a human carcinogen. Chloroform can cause cardiovascular, developmental, liver, neurological, kidney, and reproductive effects.

Table 1 - Chemicals of Concern

Chemicals of Concern	Units	Federal MCL	California MCL	Historical Update		Description
				Upper Aquifer	Lower Aquifer/ FPA	
Dibromo-chloromethane	µg/L	80	80	4.7	1.6	Dibromochloromethane is a colorless to yellow, heavy, nonflammable, liquid with a sweet odor. It affects liver, nervous system, and urinary system or kidneys
Methylene chloride	µg/L	5	5	21	74	Methylene chloride is a colorless liquid with a mild, sweet odor. Methylene chloride is used as an industrial solvent and as a paint stripper and also used as pesticides (chemicals used for killing pests, such as rodents, insects, or plants). Breathing large amounts of methylene chloride can damage the central nervous system. Contact with eyes and skin can result in burns.
Tetrachloroethene	µg/L	5	5	3.7	4.1	Tetrachloroethene is widely used for dry cleaning of fabrics and for metal degreasing. It is reasonably anticipated to be a human carcinogen. Tetrachloroethene can cause developmental, nervous system, and respiratory effects.
Trichloroethene	µg/L	5	5	1280	210	TCE was widely used in industrial operations as a cleaning solvent and was used at GAFB as a degreaser for jet engines. TCE is considered a probable human carcinogen. Short-term exposure to TCE can cause vomiting and abdominal pain. Long-term exposure can cause liver damage.
Vinyl Chloride	µg/L	2	0.5	nd	0.97	It can be formed when other substances such as trichloroethane and tetrachloroethene are broken down. Vinyl chloride is known to be a human carcinogen. Vinyl chloride can cause liver cancer, and nervous system effects.
Nitrate (as N)	mg/L	10	10	33.5	30.3	Excessive exposure to nitrate may result in severe methemoglobinemia that can cause brief loss of consciousness, irregular heartbeat, shock, convulsions, coma, and even death.

Notes:
FPA - Flood Plain Aquifer.
MCL - Maximum contaminant level.
µg/L - Micrograms per liter.
nd - Not detected.

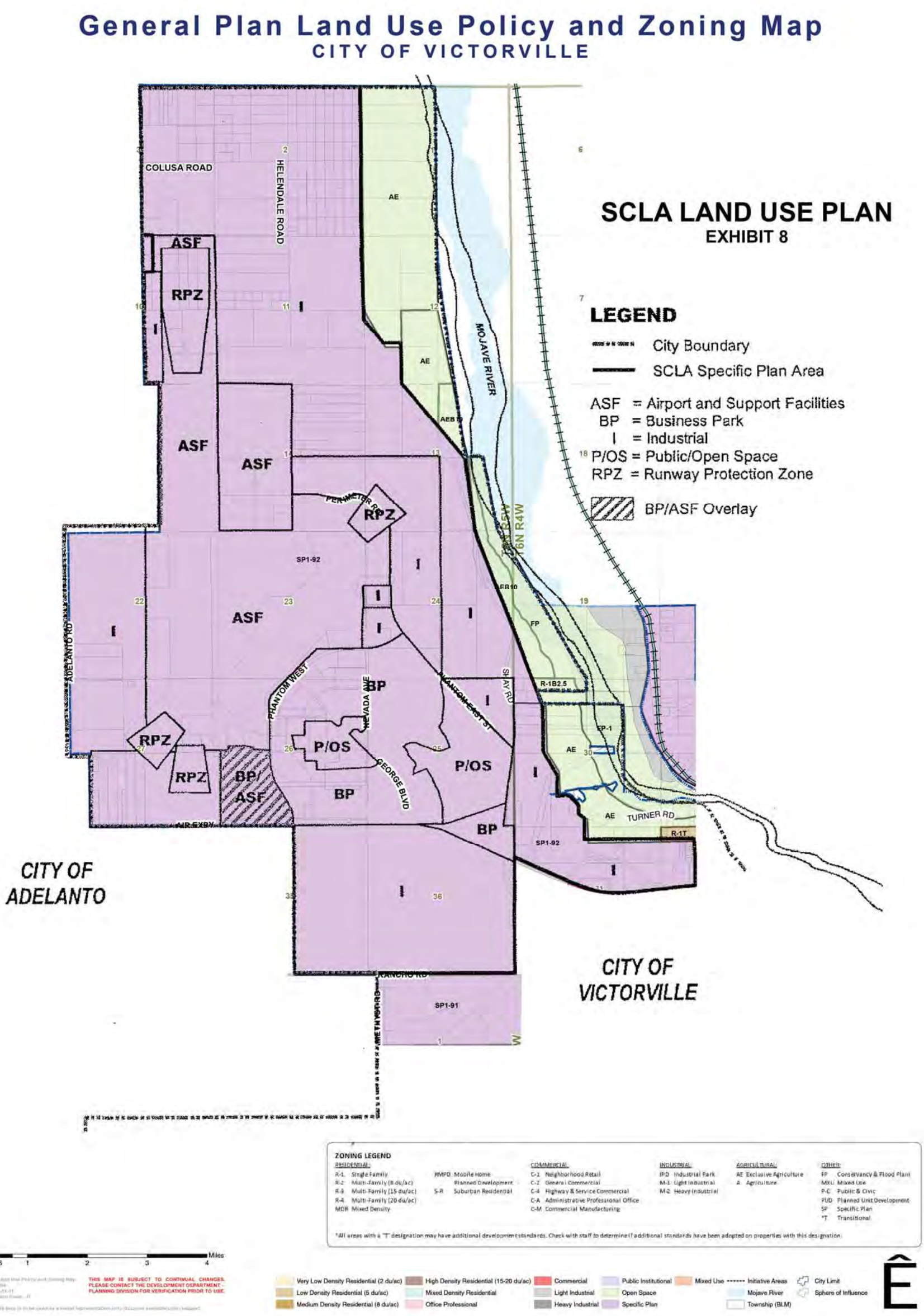


Figure 4
SCLA Land Use Plan

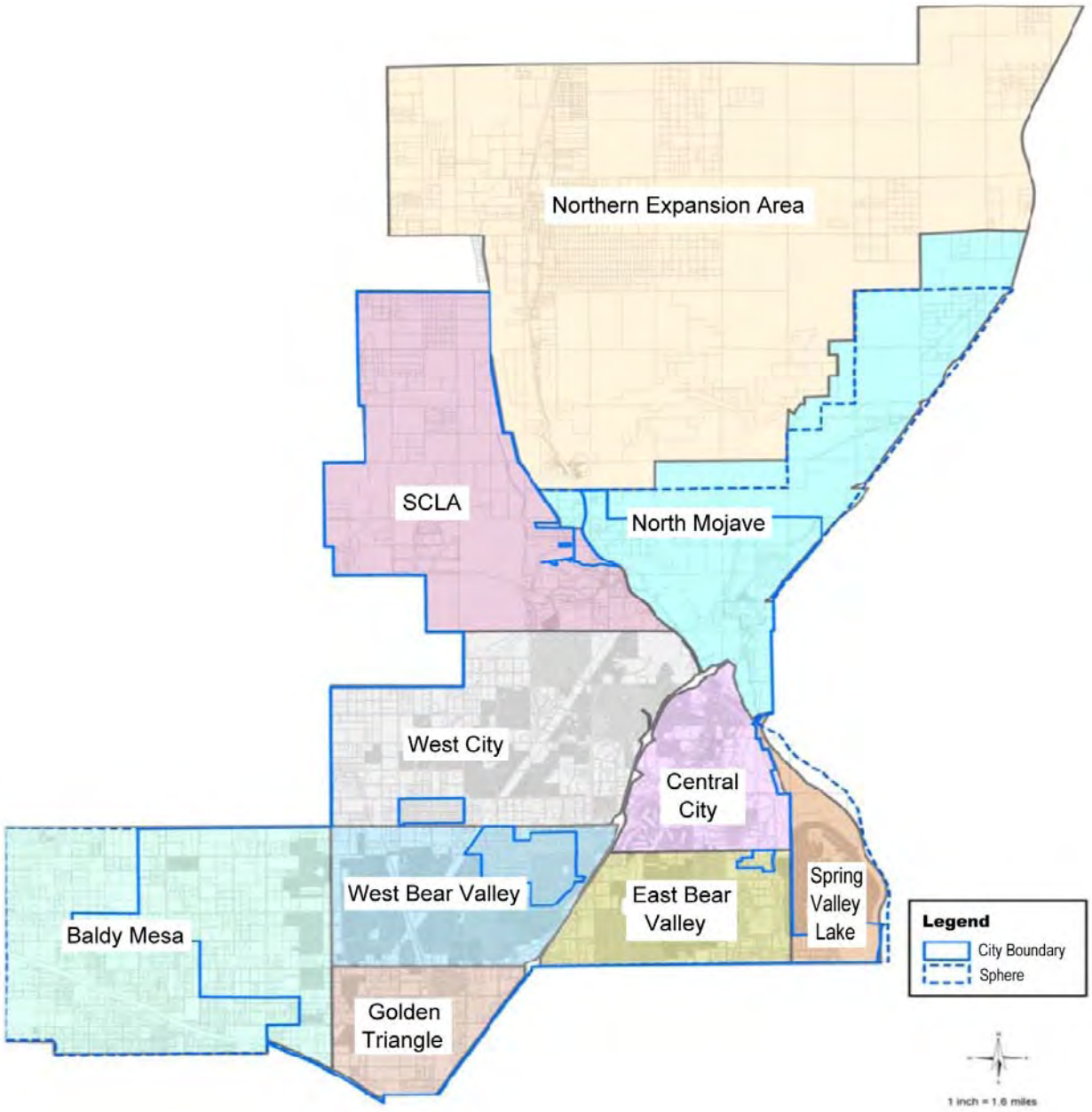


Figure 5
City of Victorville General Plan 2030 Planning Area Map

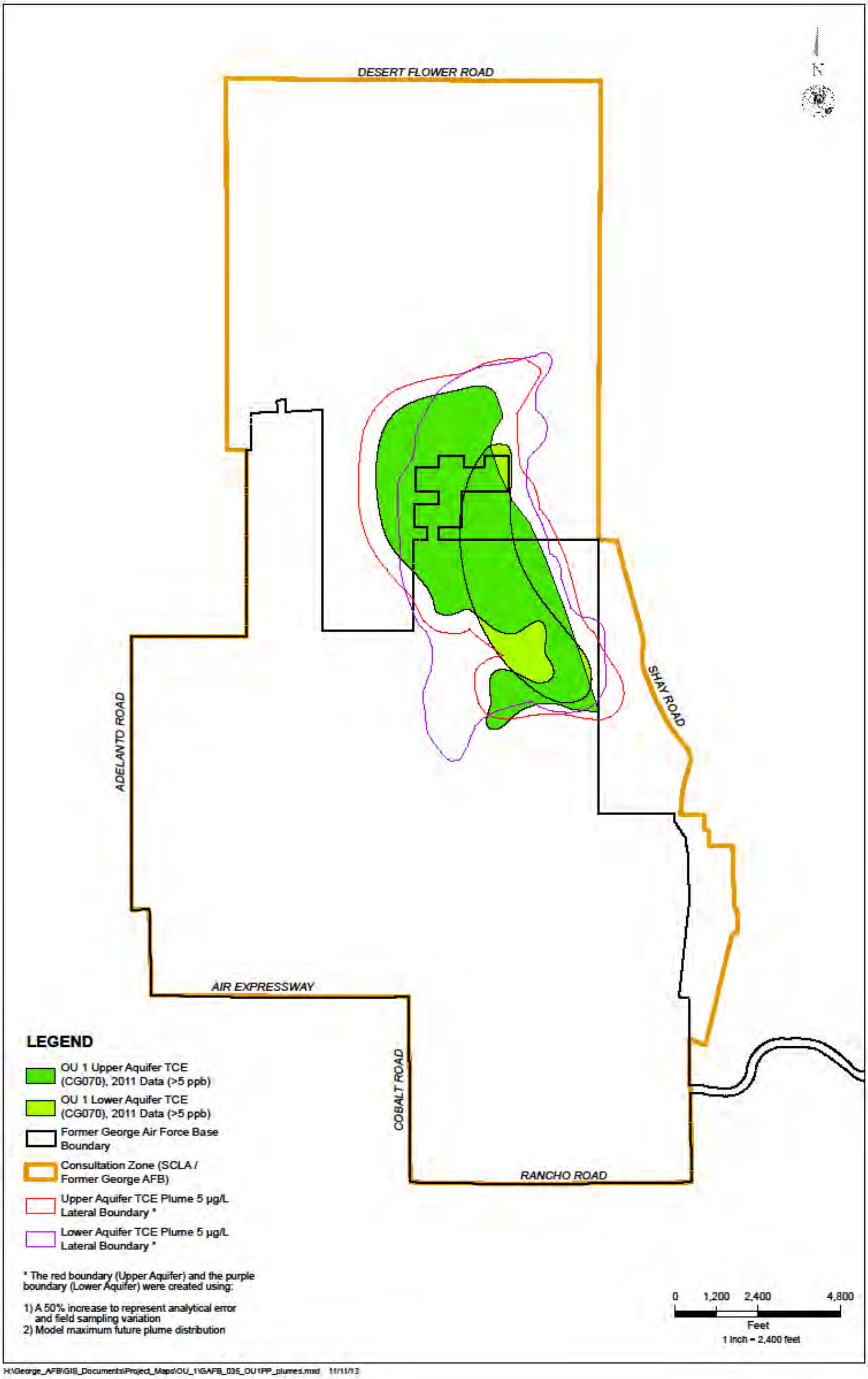


Figure 6
Consultation Zone Detail

Figure 7
Notification Zone Map

Please refer to the attached map in the map holder.

LUCs will be an important component of every remedial action alternative in the upcoming RODA. The two major types of LUCs are **institutional controls (IC)** and **engineering controls (EC)**. ECs will not be proposed in the RODA, so ECs will not be discussed further. Multiple, somewhat redundant, ICs will be proposed in the RODA. Such redundancy ensures the greatest likelihood of IC effectiveness. Implementation of multiple, redundant, or interlocking ICs is a technique referred to as "layering." This is a common practice at contaminated sites to ensure protectiveness of the selected remedy. Three subcategories of ICs are applicable to the RODA: (1) **informational devices (ID);** (2) **governmental controls (GC)**; and (3) **proprietary controls (PC)**.

Several ICs which fall within the subcategory of GCs are already fully implemented as mentioned above (City Consultation Zone/Process and County Notification Zone).All land areas above and in the vicinity of the OU1/CG070 plume are currently zoned by the City for commercial/industrial/agricultural uses pursuant to the SCLA Land Use Plan (City of Victorville, 2008). Zoning is a common type of GC. Zoning limits land use/reuse options. The City also controls construction within the City limits, as well as the sources of drinking/domestic-use water to support such construction/development/agricultural use. The City exercises its control through the construction/building permitting process, which is another type of GC. Finally, the County controls extraction and use of groundwater within San Bernardino County. The County exercises its control through the well permitting process, which is also a type of GC. The critical role of ICs as part of every remedial action alternative is explained in more detail in Section G. Section G also discusses Air Force modifications either completed or planned to make these IDs/GCs specific to the OU1/Site CG070/TCE plume when they are fully implemented.

The Air Force still owns/controls most of the land areas that overlay the OU1/CG070 plume. The IDs and GCs discussed above are already in effect and serve as ICs. Prior to land transfer, Air Force also controls use/reuse of its land formally through its lease agreement with the **Southern California Logistics Airport Authority (SCLAA)**.

- Pending transfer, the lease gives the Air Force absolute control over all construction activities, including any proposal to install a well or build a permanent, unlined surface impoundment of water. Either proposal would be disapproved by the Air Force to preclude possible exposure to COCs or migration of the plume.
- Pending transfer, the Air Force conducts annual lease compliance inspections to preserve the integrity and effectiveness of any ongoing remedial action. The Air Force enforces any violations of lease provisions against SCLAA or its sub-lessees, tenants, contractors, or other invitees. The Air Force may also require corrective action to include removal or abandonment of a prohibited improvement.

Base Hydrogeology

The OU1 plume is present in two groundwater-bearing zones called aquifers that are present beneath GAFB. These are the Upper Aquifer and Lower Aquifer. The two aquifers are separated by an **aquitard**. An aquitard is a type of soil material that slows or blocks the flow of groundwater. The aquitard beneath GAFB is called the **Middle Lacustrine Unit (MLU).** The groundwater in the Lower Aquifer is separated from the aquitard above by an unsaturated zone (vadose) of the Lower Aquifer (Figure 8). Along the **Permeable Lacustrine Zone (PLZ)** southwest of the Mojave River on the north and northeast side of the former base, there is a route for groundwater to move downward from the Upper Aquifer to the Lower Aquifer (Figure 8). Generally, the groundwater flow direction is to the northeast toward the Mojave River. Details of these zones are described below:

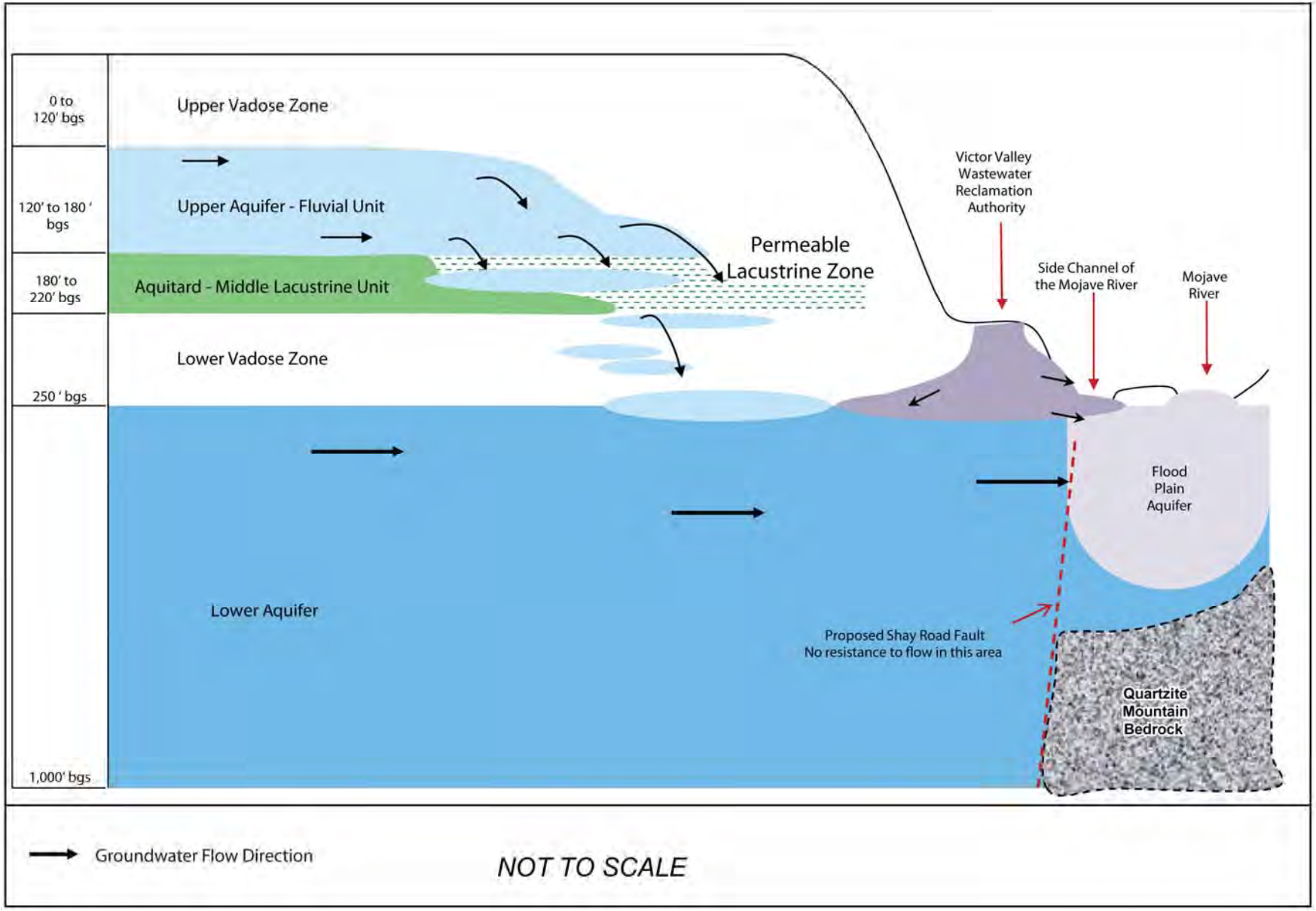


Figure 8
Base Hydrogeology

Upper Aquifer – The Upper Aquifer is an underground layer made up mostly of fine-grained sand and silt with water filling the spaces between sand and silt grains. The Upper Aquifer is beneath GAFB. Groundwater in the Upper Aquifer is present at 40 to 120 feet below the ground surface. Generally, the aquifer is between 40 and 60 feet thick. However, it thins to less than 5 feet before pinching out entirely in the eastern portion of the facility above the PLZ shown on Figure 3. The Upper Aquifer is a perched aquifer, i.e., it is separated from the Regional Aquifer by an unsaturated zone.

The Upper Aquifer is the closest aquifer to the original source of TCE and was the first aquifer to become impacted. Groundwater in the Upper Aquifer flows northeast from the sources of contamination toward the PLZ west of the Mojave River and then downward through the intermixed sand and clay layers that comprise the PLZ (Figures 3 and 8). The groundwater in the Upper Aquifer is estimated to move at rates ranging between 0.05 and 4 feet per day.

MLU and PLZ – The MLU is an underground layer made up mostly of clay and silt, with water filling spaces between clay or silt particles. The very fine nature of the material causes the water in the spaces to move very slowly. The MLU is beneath the Upper Aquifer at GAFB. The MLU is approximately 180 feet deep and approximately 40 feet thick. Groundwater moves horizontally very slowly in the MLU and generally does not flow vertically through the unit. In a sense, the MLU “holds up” the water in the Upper Aquifer due to its clay content. The PLZ is the eastern edge of the MLU, where thin clay and sand layers overlap in both horizontal and vertical directions. The PLZ is approximately 180 feet deep and approximately 40 feet thick. In the PLZ, the groundwater from the Upper Aquifer flows downward through thin sand and clay layers to the Lower Aquifer.

Lower (Regional) Aquifer – The Lower Aquifer is a layer made up mostly of sand. The Lower Aquifer is more extensive than the Upper Aquifer and the MLU/PLZ. The Lower Aquifer lies beneath the MLU. Groundwater flows downward from the Upper Aquifer through the PLZ and the upper unsaturated (dry) portion of the Lower Aquifer to the saturated (wet) portion of the Lower Aquifer. The groundwater in the Lower Aquifer moves at rates ranging between 0.36 and 1 foot per day. Flow in the Lower Aquifer east of the PLZ and west of the Mojave River is generally radially away from the groundwater mound created by the downward **percolation** of water from the Victor Valley Waste Reclamation Authority (VVWRA) recharge ponds next to Mojave River.

Flood Plain Aquifer – The Flood Plain Aquifer is more **porous** and **permeable** than the other two aquifers. It is located on either side and below the Mojave River (Figure 8). The aquifer structure is the result of erosion and subsequent redepositing of soil by the Mojave River. The Flood Plain Aquifer is approximately 150 feet thick and approximately 1 mile wide. Near GAFB, groundwater generally flows from the Lower Aquifer to the Flood Plain Aquifer, except during flood events and in areas where water is discharged to the river, such as at the VVWRA discharge point.

The former GAFB is in the Upper Mojave River Valley Ground Water Basin (DWR No. 6-42). Beneficial uses for this basin are municipal, agricultural, industrial, fresh water replenishment, and aquaculture. Both the Upper Aquifer and Lower Aquifer are considered potential sources of drinking water. The cities of Adelanto and Victorville have municipal water supply wells that extract water from these aquifers just east and south of GAFB.

A more detailed description of these aquifers can be found in the Groundwater CSM (Appendix A of MWH [2012]).

Nature and Extent of Contamination

TCE was widely used in industrial operations as a cleaning solvent and was used at GAFB as a

degreaser for jet engines. The groundwater became contaminated in both aquifers as a result of past activities at the base, including aircraft maintenance and fire fighting training. Wastewater containing TCE soaked into the soil at GAFB and migrated (i.e., moved) downward to the groundwater. The downward migration of the groundwater from the Upper Aquifer continued until the Lower Aquifer was impacted (Figure 8). The TCE at the soil source area FT19 (OU3) and FT082 (OU5) are being remediated using soil vapor extraction as an interim remedy.

The FFS identified a range of VOCs, including TCE, as OU1 groundwater plume COCs (MWH, 2012) (Table 1). TCE is the most prevalent VOC throughout the OU1 plume.

TCE is present in the groundwater at concentrations above the federal **Maximum Contaminant Level (MCL)** of 5 **micrograms per liter (µg/L)** or 5 **parts per billion**. Five parts per billion of contamination is equivalent to putting 5 teaspoons of liquid in 6.5 million gallons of water. The groundwater plume containing TCE at a concentration above the MCL is spread over an area of about 680 acres, as shown on Figures 3, 9a, and 9b (MWH, 2012). Approximately 9,714 acre-feet (3,165,320,761 gallons) of groundwater is impacted by 98 gallons of TCE that is contained within that area in the Upper and Lower Aquifers.

As of October 2011, based on computer model estimates, approximately 41 gallons (500 pounds) of TCE were estimated to remain in the Upper Aquifer; 1,160 pounds (95 gallons) in the Middle Lacustrine Unit (aquitard); and 700 pounds (57 gallons) in the Lower Aquifer.

In 2000, the maximum TCE concentration in the Upper Aquifer was 1,280 µg/L detected in well NZ-55, and the maximum TCE concentration in the Lower Aquifer was 580 µg/L detected in well NZ-67.In 2012, the maximum TCE concentration in the Upper Aquifer was 65 µg/L detected in well NZ-27, and the maximum concentration detected in the Lower Aquifer was 75 µg/L detected in well NZ-107.

Nitrate is also present in OU1 groundwater above the MCL of 10 **milligrams per liter (mg/L)**. Maximum nitrate concentration detected in the Upper Aquifer and Lower Aquifer were 19 mg/L detected in well NZ-52 and 13 mg/L detected in well LW03, respectively (Figures 10 and 11), (Shaw Environmental, Inc., 2013). Historical and recent data show the following:

- Nitrate concentrations exceeding the MCL in groundwater are confined to portions of the Upper and Lower Aquifers that are not in use.
- The source of nitrate in groundwater, i.e., the sewage treatment plant percolation ponds (Site WP026), has been controlled because the ponds ceased receiving water, and the extent and maximum concentrations of nitrate in groundwater are generally decreasing.
- The nitrate plume from the percolation ponds lays upgradient from and a portion within the boundary of the OU1 TCE plume.

Historical and recent data show nitrate is **attenuating** more rapidly than TCE within the OU1 plume. The portion of the Upper Aquifer plume with nitrate concentrations above the MCL (10 mg/L) decreased from approximately 225 acres in 2000 to approximately 17 acres in 2006, a 92 percent reduction in size. For the Lower Aquifer, the portion of the Lower Aquifer plume with nitrate concentrations above the MCL decreased from approximately 85 acres in 2000 to less than 3 acres in 2006, a 96 percent reduction, as shown on Figures 10 and 11.

The extent of the TCE plume is also affected by infiltration of treated water from the VVWRA percolation ponds to the Lower Aquifer.

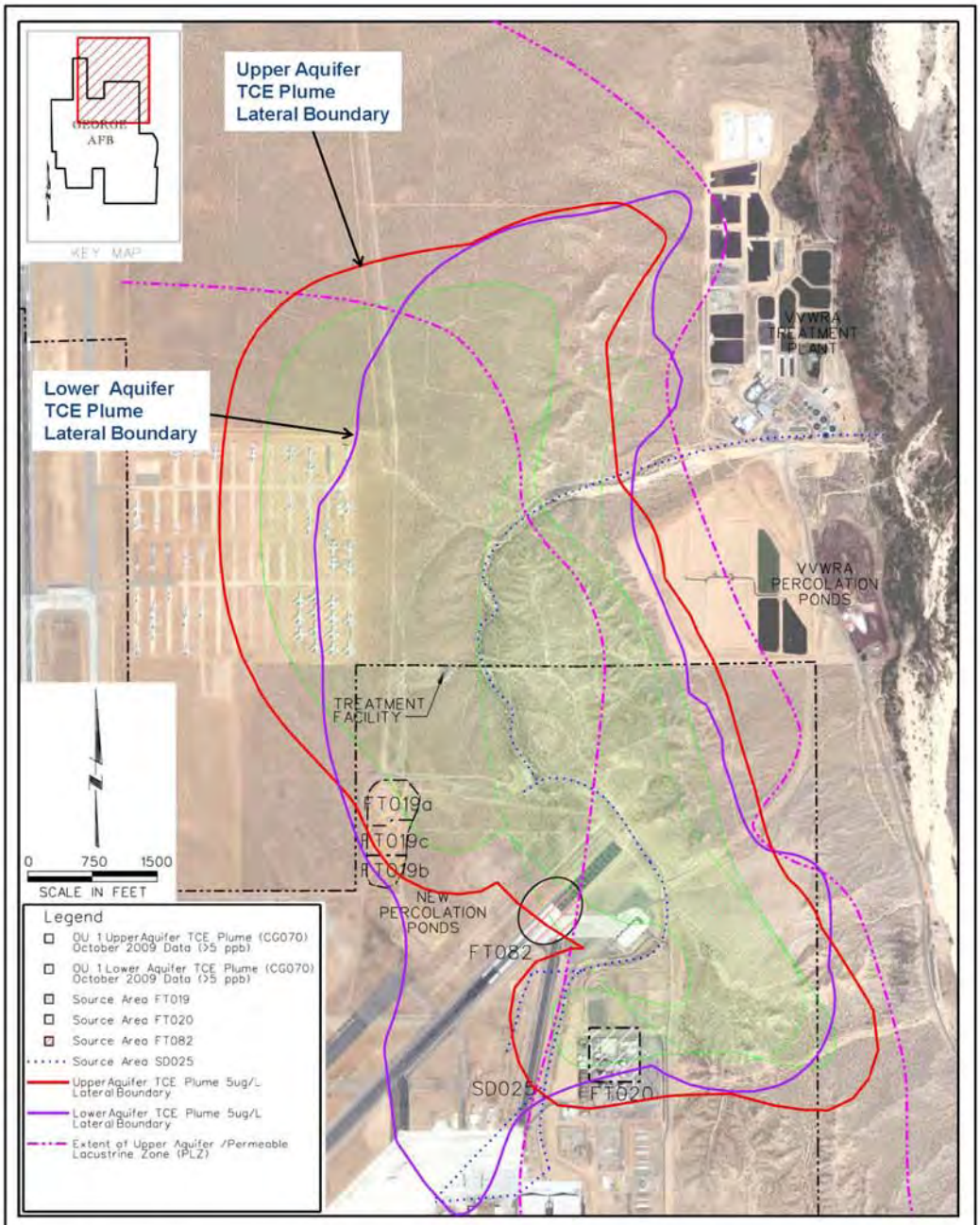
This source of water changes the direction of groundwater flow by adding water to the lower aquifer at a specific location, essentially creating a rise in the water level and driving water away from the location where the water infiltrates. Details of the

impacts to groundwater flow can be found in the FFS (MWH, 2012).

Maps depicting the extent of the TCE plume over time for the Upper and Lower Aquifers are included on Figures 12 and 13. Figure 12 indicates in the Upper Aquifer, since 2002, the boundaries where TCE concentration is at the MCL (5 µg/L) are stable or moving horizontally very slowly. Figure 12 also indicates the TCE concentrations in the Upper Aquifer have decreased. Figure 13 shows the extent on the TCE plume in the lower aquifer. Since 2007, the TCE concentrations in the northern portion of the plume have declined. Combination of the Upper and Lower Aquifer plumes makes up the OU1 TCE plume.

The extent of the TCE plume has been defined both horizontally and vertically in both aquifers, with the exception of vertically in the northern portion of the Lower Aquifer, in the vicinity of extraction well NZ50. Additional vertical delineation is also planned near well EW06 (Figure 14).

The relationships of the TCE plumes in the aquifers to the potential and actual water supply wells are shown on Figure 14.



Green hatched areas represent the 2009 TCE distribution in the Upper and Lower Aquifers.

The red boundary (Upper Aquifer) and the purple boundary (Lower Aquifer) were created using 1) a 50% areal increase to represent analytical error and field sampling variation and 2) model-predicted maximum future plume distribution.

Source: MWH Americas, Inc. (MWH), 2011a. ***Final Focused Feasibility Study, OU1 TCE Groundwater Plume, Former George Air Force Base, California,*** October

Former George Air Force Base
San Bernardino County, California
TCE Plume Boundary Map - Not to Exceed 5µg/L

Figure 9a
TCE Plume Boundary

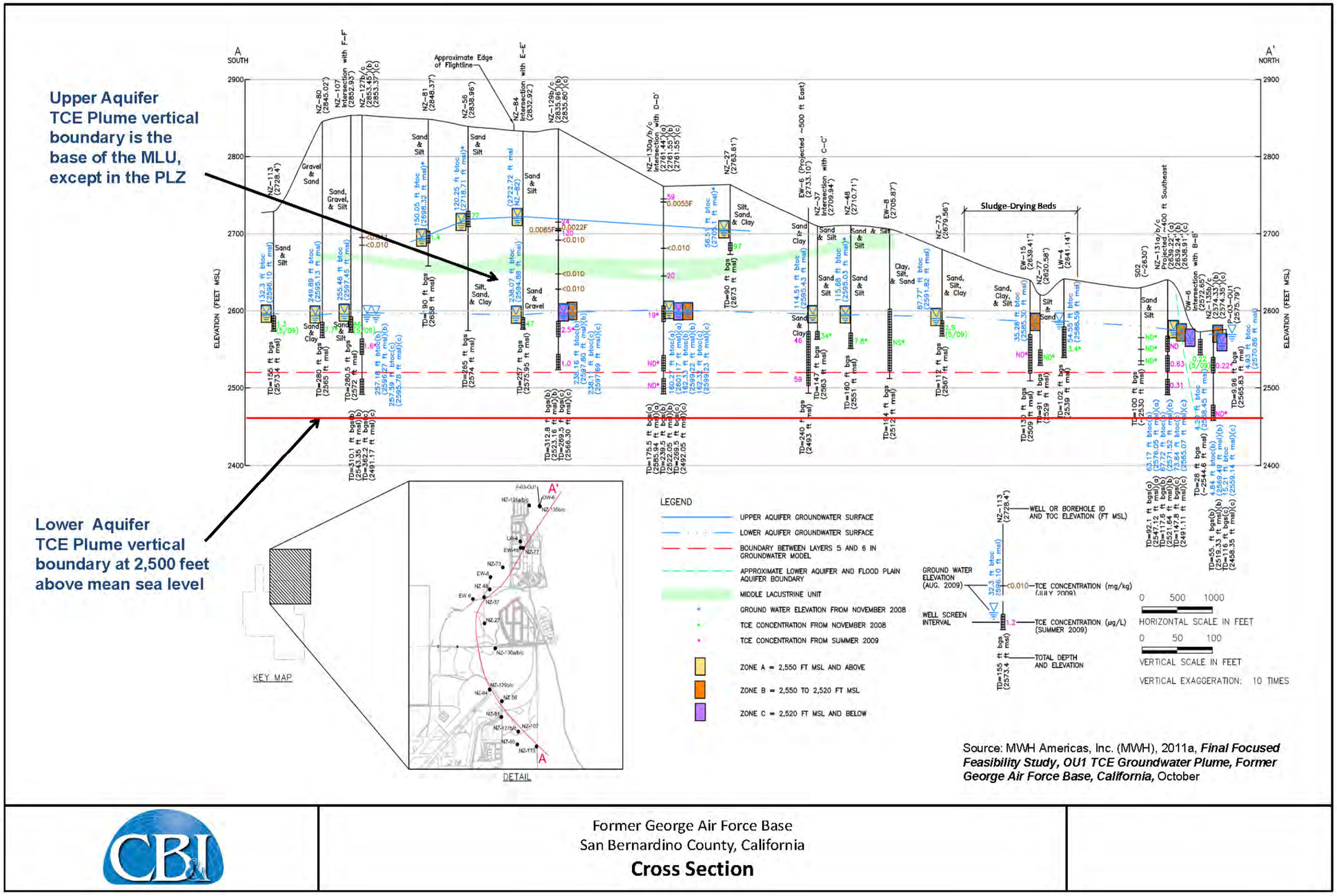


Figure 9b
TCE Plume Cross Section

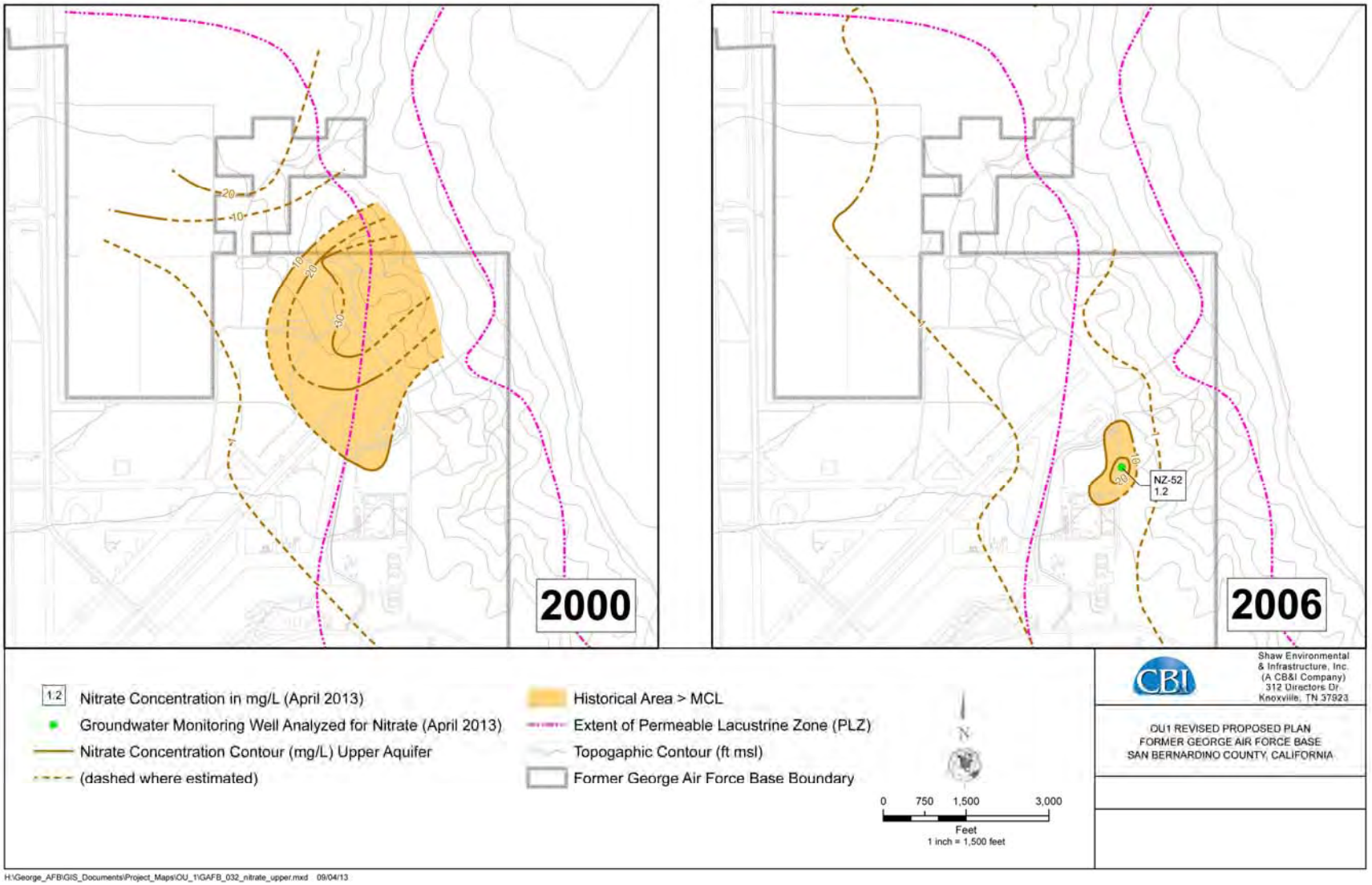


Figure 10
Nitrate Plume Maps for Upper Aquifer

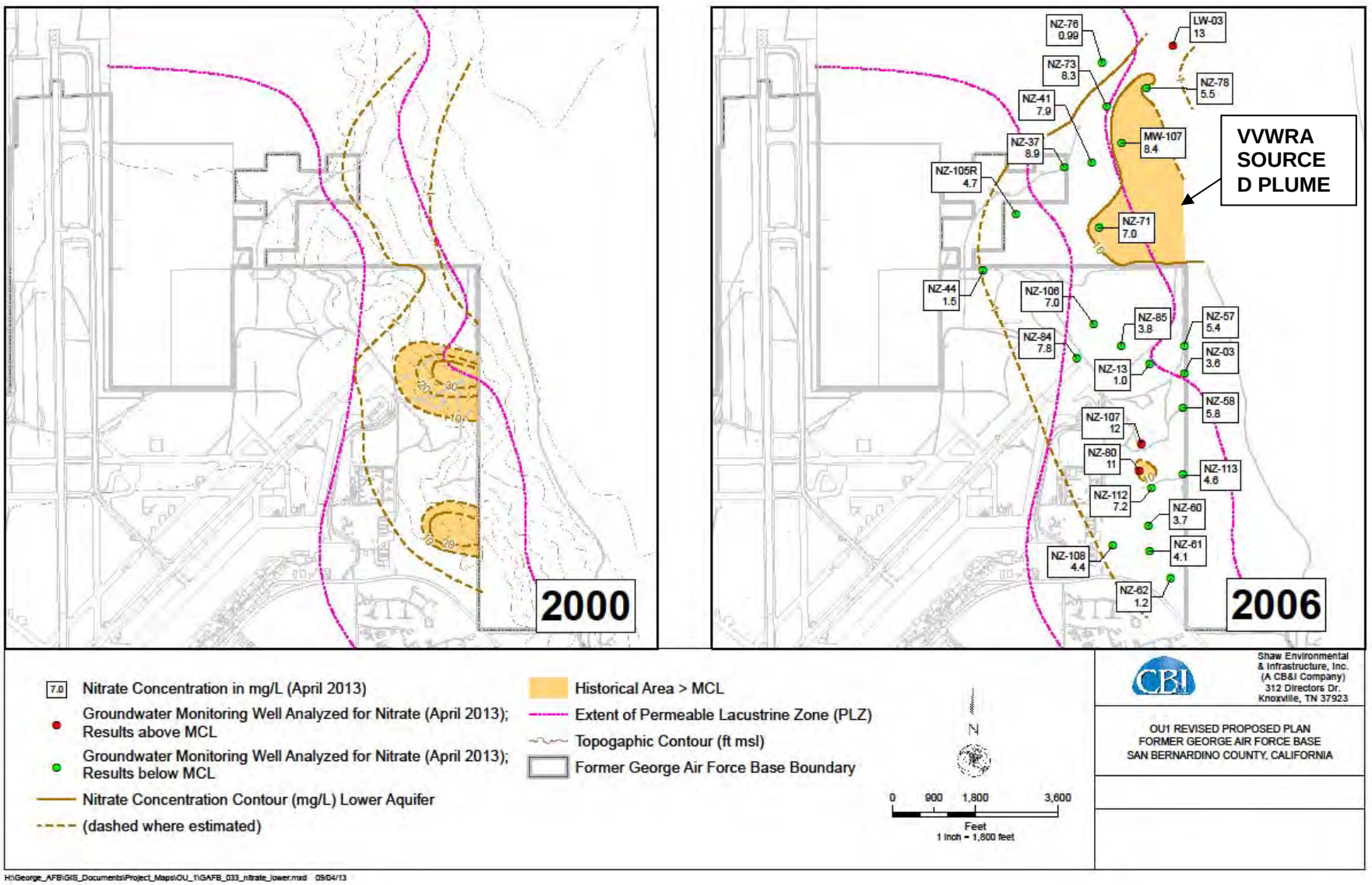


Figure 11
Nitrate Plume Maps for Lower Aquifer

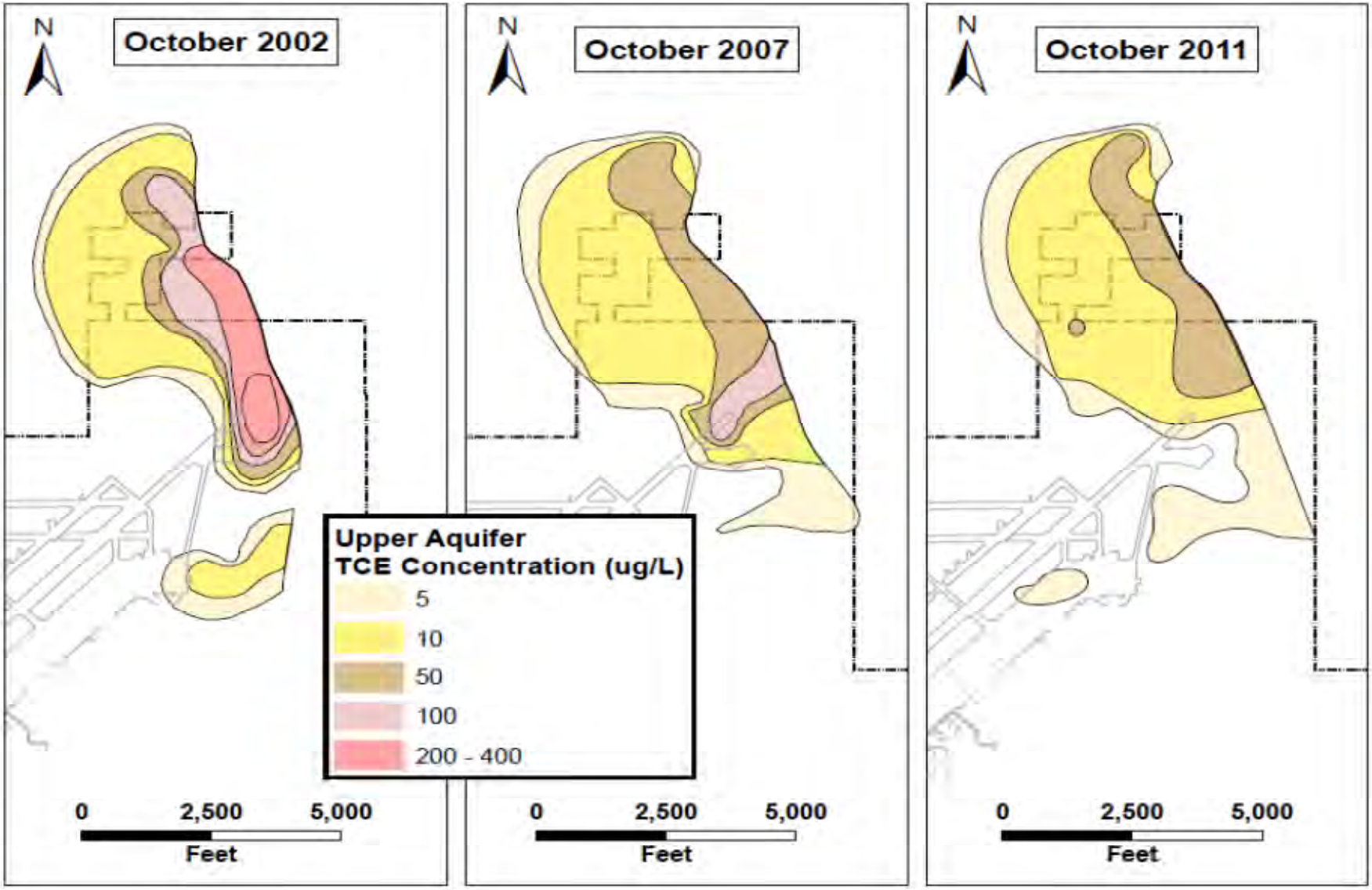


Figure 12
TCE Plume Maps for Upper Aquifers

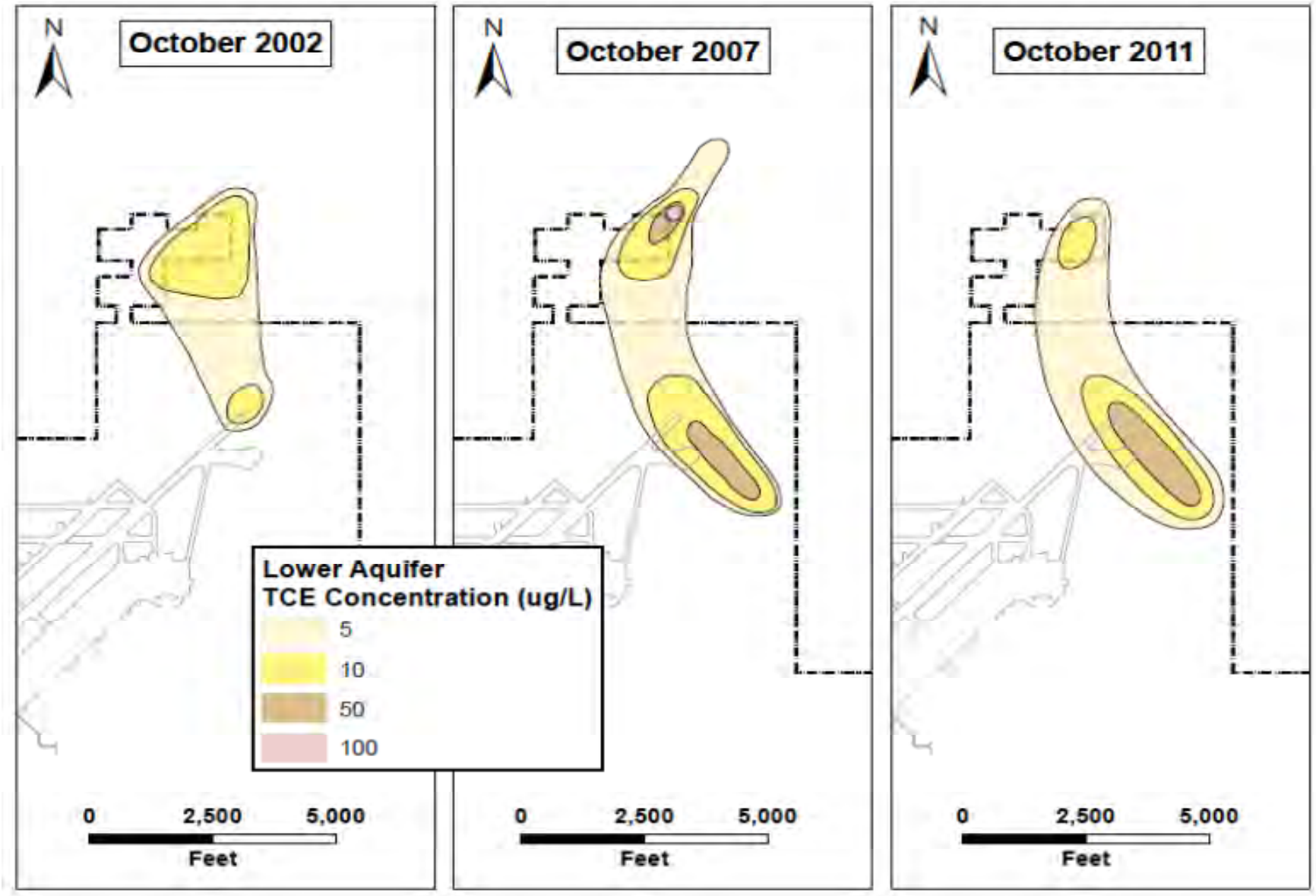


Figure 13
TCE Plume Maps for Lower Aquifers

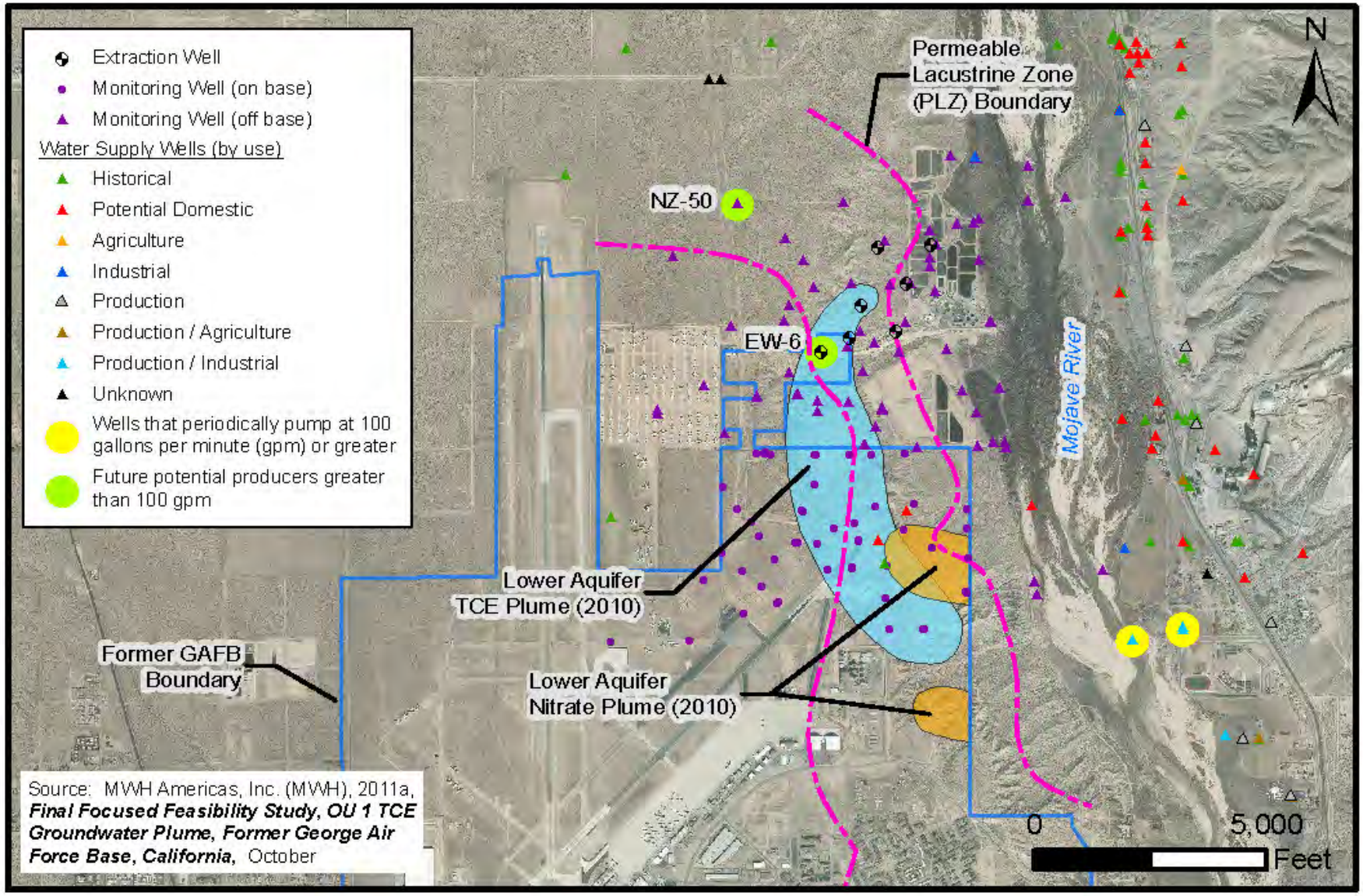


Figure 14
Water Supply Wells Downgradient from the Lower Aquifer Plume

D. SCOPE AND ROLE OF OPERABLE UNITS

The overall cleanup strategy for GAFB is removal of **primary sources** and **secondary sources** of contamination, reduction in or elimination of contaminant migration, compliance with federal and state **Applicable or Relevant and Appropriate Requirements (ARAR)**, and protection of human and ecological receptors through exposure controls. The Air Force evaluates the levels of COCs compared to levels that are considered safe for future **unrestricted land use/reuse**. The Air Force performed remedial investigations and prepared feasibility studies to determine the appropriate responses to the results of the investigations. As discussed in Section B, five OUs were created to address soil and groundwater contamination at GAFB. As mentioned earlier, the first three OUs (OU1, OU2, and OU3) were created to address contaminated soil and groundwater, and the other two OUs (OU4 and OU5) were created to address contaminated soil.

Remedial actions at OU3 and OU5 are ongoing and are being addressed separately from this Revised Proposed Plan, as described in Section B. OU2 was removed from the CERCLA program when the cleanup was transferred to the non-CERCLA program, under the oversight of the Lahontan Water Board. As discussed earlier, OU4 was removed from the CERCLA program when no further action was required at five of the eight sites. The remaining three sites (skeet range sitesOT072, OT073, and OT074), were transferred to OU5. OU5 had been created to address VOCs in soil. When OU4 was removed, OU5 was expanded to also include the potential soil contamination at the skeet ranges.

The preferred alternative for OU1 fits into the overall GAFB cleanup strategy by using **monitored natural attenuation (MNA)** with ICs until **Remedial Action Objectives (RAO)** are attained. ICs will administratively or legally restrict land use/reuse or certain activities within a specified land area. The ICs are planned and implemented to ensure the protectiveness of the selected remedy. The specific ICs associated with the upcoming RODA will be further addressed in Section G of this Revised Proposed Plan.

E. SUMMARY OF SITE RISKS

Risk assessment is the evaluation of the human health and ecological effects of chemicals that are found at a site in the soil, air, surface water, and groundwater as a result of prior human activities at a site. Soil, air, surface water, and groundwater are called **environmental media**. Chemicals, such as metals, can be naturally occurring in the environmental media. Naturally occurring concentrations are called **background concentrations (or background levels)**. Risk assessment takes naturally occurring levels of COCs into account when the conclusions are drawn. For instance, at GAFB, the range of background levels of **arsenic** typical for groundwater (up to 40 µg/L in the Upper Aquifer) are above the MCL (10 µg/L), a risk-based limit (MWH, 1996). The risk assessment described in this section included an evaluation of the risk to human health from the naturally occurring arsenic levels. However, the risk assessment conclusions focused on the risk from the COCs that were a result of the Air Force activities.

Risk assessors use a tool called a CSM when evaluating the risk at a site. The CSM identifies the following:

- The environmental media that are being evaluated for a site
- The possible human and ecological receptors that might come into contact with the COCs at a site
- The ways the human and ecological receptors might come into contact with those COCs at a site.

Human Health Risk Assessment Overview

The human health risk evaluation considered both cancer and **noncancer health effects**. The quantitative assessment included the calculation of the **lifetime cancer risk** to evaluate carcinogenic effects and the calculation of the **hazard index (HI)** to evaluate noncarcinogenic risk. The risk from the chemicals resulting from the Air Force activities at GAFB above the risk posed by the background levels of chemicals is called the **incremental risk**.

Cancer Risk

Cancer risk is a probability value representing the odds of an incidence of cancer in a community given 30 years of exposure to a chemical. The likelihood of any kind of cancer resulting from exposure is generally expressed, for example, as "1-in-1,000,000," "1 in 1×10^{-6}," or "one-in-one million." In other words, for every 1,000,000 people who are exposed to a carcinogenic contaminant over a period of 30 years, one extra cancer case could occur as a result of the exposure to a carcinogenic contaminant. If more than one carcinogenic contaminant is evaluated during a risk assessment, the risk is generally reported as the **total cancer risk**. The EPA **risk management range** for total cancer risk is between 1-in-1,000,000 (1×10^{-6}) and 1-in-10,000 (1×10^{-4}). Sites with a total cancer risk estimate within this range may be considered for no further action (EPA, 1991a).

Noncarcinogenic Risk

The **hazard quotient (HQ)** is a measure of noncancer health effects from exposure to a single chemical. The HQ is calculated by dividing the assumed daily dose to an individual by a reference dose. The daily dose is based on the concentration of the contaminant at the site (e.g., in the groundwater) and the proposed use of the site, including the groundwater. The reference dose is based on toxicological tests to determine the highest dose without an adverse effect. The HQs are added together for all the COCs at a site to obtain the HI. If the HI is greater than 1, there is a possibility an adverse noncancer health effect may occur. If the HI is less than 1, it indicates there is no appreciable risk that adverse noncancer health effects will occur.

OU1 Risk Assessment

The Air Force conducted a Human Health and Ecological Risk Assessment to estimate the future effects on human health and the environment from the COCs in the OU1 groundwater plume (Appendix D in MWH [2012]). The risk assessment was performed after the original remedial action, i.e., groundwater extraction and treatment, was shut down and additional investigations were conducted, as previously describe in this Revised Proposed Plan. The risk assessment was a baseline risk assessment, which evaluated the risks without taking into account proposed remediation or ICs.

Risk assessors use conservative concentrations for the COCs when doing a risk assessment. They use a conservative statistical method to arrive at a concentration of a chemical technically known as the **exposure point concentration**, which the general public might call the "average concentration." The concentrations of the COCs used for the OU1 risk assessment were the average levels detected during the groundwater monitoring from 2004 to 2007, i.e., the 3 years preceding the risk assessment.

The final risk estimates were developed using the **toxicity** of the COCs and conservative assumptions about the frequency and duration of a human or ecological receptor's exposure to the groundwater and surface water. The human and ecological risk assessments, including the CSM elements for each, are described in more detail below.

Human Health Risk Assessment

Potential Lower Aquifer water plume-related exposures and risks were evaluated for four areas:

- Four areas of the OU1 plume were evaluated individually:

  - On-site plume area (the portion of the OU1 VOC plume beneath the northeast corner of GAFB)
  - Off-site plume area (the portion of the OU1 VOC plume north of GAFB, including the Flood Plane Aquifer)
  - Mojave River observation wells within the Mojave River flood plain
  - Water supply wells within the Mojave River floodplain

These four areas represent potential sources of groundwater that might become contaminated with OU1 COCs if the TCE expands.

- The environmental media evaluated during the human health risk assessment are as follows:
  - The groundwater in the Lower Aquifer in the area generally defined by the TCE plume on Figure 3 and concentrations on Figure 13.
  - The surface water of the Mojave River and associated wetlands. The Upper Aquifer is not a source of **potable water** and, therefore, was not considered a medium with which humans would come into contact.
- The risk was estimated for future on-site and off-site workers, potential future on-site and off-site residents, and future off-site residents that include agricultural uses. The information presented in this section, however, is the estimates for the risk to potential future residents, which is considered the most conservative.
- The groundwater **exposure pathways** that were considered potentially complete for residents were breathing of vapors migrating from the groundwater into indoor air, ingestion as drinking water, skin contact during washing and bathing, and eating homegrown fruits and vegetables irrigated with groundwater. Additionally, a pathway that includes agricultural use and consumption of homegrown livestock was considered potentially complete for residents.
- People could be exposed to COCs in groundwater if wells were pumped in the plume in on-site or off-site locations.
- The surface water exposure pathways that were considered potentially complete for residents were eating plants irrigated with Mojave River water and consuming animals that drank Mojave River water. Direct contact with contaminated water in the Mojave River, such as during recreational activities, was considered possible but insignificant, and was not evaluated.
- Nitrate in OU1 groundwater is considered a COC because it has been detected at concentrations above the MCL (10 mg/L) and, therefore, may pose a risk to potential receptors. However, nitrate in groundwater associated with activities at GAFB is confined to a portion of the Upper and Lower Aquifers near Site WP026, and there are no current or future receptors in the area where nitrate concentrations exceed the MCL. Therefore, the exposure pathway is incomplete, and nitrate was not quantitatively evaluated in the risk assessment.

The four areas of the OU1 plume are detailed below:

1–On-Site (Air Force Lands) OU1 Plume Area

The COCs identified for risk assessment for the on-site plume area were arsenic, 1,2-dichloroethane, chloroform, tetrachloroethene, and TCE.

Future On-Site Resident - Because elevated concentrations of arsenic are natural occurring in a desert environment and do not represent an increased risk due to Air Force activities, the risk was evaluated without arsenic. The incremental HI excluding arsenic was 0.02, which is less than the screening hazard criterion of 1. The estimated total cancer risk to possible future on-site residents excluding arsenic was 9×10^{-6}. Excluding arsenic, the total cancer risk falls within the EPA risk management range (1×10^{-4} to 1×10^{-6} or 1:10,000 to 1:1,000,000). The risk estimates were primarily due to tetrachloroethene and TCE when arsenic was excluded.

2–Off-Site (Non-Air Force Lands) OU1 Plume Area

Because elevated concentrations of arsenic are natural occurring in a desert environment and do not

represent an increased risk due to Air Force activities, the risk was evaluated without arsenic.

The COCs identified for risk assessment for the off-site plume area were benzene, chloroform, tetrachloroethene, TCE, and vinyl chloride.

Future Off-Site Resident - The incremental HI for future off-site residents was 0.1, which is less than the screening hazard criterion of 1. The estimated total cancer risk to possible future off-site residents was 1×10^{-5}. The total cancer risk falls within the EPA risk management range. The risk estimates were due to TCE, tetrachloroethene, benzene, and vinyl chloride.

Future Off-Site Resident that includes Agricultural Use - The incremental HI for future off-site residents that includes agricultural use was 0.1, which is less than the screening hazard criterion of 1. The estimated total cancer risk was 1×10^{-5}. The total cancer risk falls within the EPA risk management range. The risk estimates were due to TCE, tetrachloroethene, benzene, and vinyl chloride.

3 – TCE in Off-Site Observation Wells

The risk estimates for the Mojave River observation wells were based on computer modeling of possible future higher concentrations of TCE, rather than on current data, to be conservative. Other chemicals were not modeled because TCE represented the highest concentrations of COCs in the OU1 groundwater plume.

Future Off-Site Resident - The incremental HI for future off-site residents was 0.0000003, which is less than the screening hazard criterion of 1. The estimated total cancer risk to possible future off-site residents was 2×10^{-6}. The total cancer risk falls within the EPA risk management range.

Future Off-Site Resident with Agricultural Use - The incremental HI for future off-site residents that includes agricultural use was 0.1, which is less than the screening hazard criterion of 1. The estimated total cancer risk was 1×10^{-5}. The total cancer risk falls within the EPA risk management range.

4 – TCE in Off-Site Water Supply Wells

The risk estimates for the water supply wells in the Flood Plain Aquifer (Figure 14) was based on computer modeling of possible future concentrations of TCE, rather than on current data, to be conservative. Other chemicals were not modeled because TCE represented the highest concentrations for COCs in the OU1 groundwater plume.

Future Off-Site Resident - The incremental HI for future off-site residents was 0.00000007, which is less than the screening hazard criterion of 1. The estimated total cancer risk to possible future off-site residents was 5×10^{-7}. The total cancer risk falls below the EPA risk management range.

Future Off-Site Resident that includes Agricultural Use - The incremental HI for future off-site residents that includes agricultural use was 0.00000007, which is less than the screening hazard criterion of 1. The estimated total cancer risk to possible future off-site residents was 5×10^{-7}. The total cancer risk falls within the EPA risk management range.

Ecological Risk Assessments

There are three levels of ecological risk assessments, from simplest to most complex:

- Scoping Risk Assessment
- Phase I Predictive Risk Assessment
- Phase II Predictive Risk Assessment.

The Phase I and Phase II Predictive Risk Assessments are only carried out if the lower level indicates additional evaluations are necessary.

A **Scoping Ecological Risk Assessment** consists of a chemical, physical, and biological characterization of a site and an evaluation of which exposure pathways are potentially complete for ecological receptors. The purpose of the GAFB scoping ecological risk assessment was to

determine whether the potential exists for contact between ecological receptors and OU1 COCs.

The ecological receptors evaluated in the scoping ecological risk assessment were based on the vegetation and wildlife near GAFB. The vegetation and wildlife reflect the climatic conditions of the high-desert environment, with both desert and riparian (that is, near rivers and streams) ecological species present. The nearest surface water bodies that might be affected by the OU1 plume includes the Mojave River and a wetland area near the VVWRA. These surface water bodies are freshwater aquatic habitats that were also evaluated during the scoping risk assessment.

In the event OU1 groundwater discharges to the Mojave River and associated wetlands, aquatic receptors inhabiting these wetlands may potentially be exposed to VOCs in surface water through direct (i.e., ingestion and dermal contact) and indirect (i.e., food-chain uptake) exposure pathways. Therefore, chemicals detected in off-site OU1 groundwater were further evaluated in a **Phase I Predictive Ecological Risk Assessment**.

The purpose of the Phase I Predictive Ecological Risk Assessment is to further characterize and evaluate the potential for ecological impacts. Predictive ecological risk assessment is a process of comparing concentrations of chemicals in the environmental media at a site with chemical-specific toxicity data believed to protect the vegetation and wildlife. The Phase I Predictive Ecological Risk Assessment process begins with the identification of contaminated media and chemicals of potential ecological concern. If chemicals of potential ecological concern are not identified in the site media, further steps in the Phase I Predictive Ecological Risk Assessment are not required.

Concentrations of chemicals in OU1 groundwater were below applicable chemical of potential ecological concerns screening criteria for freshwater aquatic receptors. Therefore, OU1 groundwater was not further evaluated in the Phase I Predictive Ecological Risk Assessment.

Risk Conclusion Summary

The human health risk assessment estimates that the total incremental cancer risks for future residents including agricultural use range from 5×10^{-7} to 1×10^{-5}. These risks are calculated using average concentrations of COCs. These results are within the EPA risk management range (1×10^{-4} to 1×10^{-6},or 1 in 10,000 to 1 in 1,000,000) for remedial action decision making. Sites with a total cancer risk estimate within this range, as previously stated, may be considered for no further action (EPA, 1991a).

The human health risk assessment estimates that the HI values range from 0.0000007 to 0.1 for future residents, both on-site and off-site (including agricultural use), when calculated using average concentrations of COCs. An HI of less than 1.0 suggests that no noncarcinogenic health effects should occur (EPA, 1991b).

The level of TCE in the OU1 groundwater exceeds the MCL, which is the highest level of TCE allowed in drinking water. The Lower Aquifer groundwater is a current source of drinking water south and east of GAFB.

The ecological risk assessment results show there are no ecological concerns for the current and modeled levels of TCE in the OU1 groundwater at GAFB or in the Mojave River.

F. REMEDIAL ACTION OBJECTIVES

The revised RAOs for the OU1 groundwater plume (on-site and off-site) are for the following reasons:

- To prevent human receptors from being exposed to groundwater containing COCs at concentrations exceeding the primary MCL for drinking water or other **risk-based cleanup**

goals (RBCG) for chemicals that lack primary MCLs.

- To prevent ecological receptors from being exposed to groundwater containing COCs at concentrations exceeding regulatory limits (Freshwater Chronic Ecotox Threshold) or RBCGs for such ecological receptors.
- To reduce concentrations of COCs in groundwater to at or below the MCLs, which are specified in Table 2-2 of the FFS (MWH, 2012).
- To prevent the future expansion of the existing TCE plume in groundwater beyond the vertical and lateral boundaries defined on Figure 9.

If groundwater extraction and treatment is necessary in the future, two additional RAOs are proposed:

- Reduce TCE in effluent discharged from a groundwater treatment system to meet the enforceable level of 2.5 µg/L TCE on a median basis with a maximum discharge level of 5 µg/L TCE, as measured at any point of discharge.
- Seek to treat any effluent discharge to attain a level of 0.5 µg/L TCE as measured at any point of discharge.

The numerical remediation goals for OU1 groundwater are the MCLs. As noted previously in this Revised Proposed Plan, TCE is the most prevalent and is used as an indicator COC for all of the VOCs and for remedial action at OU1. The primary MCL for TCE is 5 µg/L. The primary MCLs for the other VOCs determined to be COCs based on the 2008 risk assessment are as follows (MWH, 2012):

1,2-Dichloroethane	5 µg/L 0.5 µg/L	Federal California
Benzene	5 µg/L 1 µg/L	Federal California
Chloroform	80 µg/L	Federal
Tetrachloroethene	5 µg/L	Federal
Vinyl Chloride	2 µg/L 0.5 µg/L	Federal California
Nitrate	10 mg/L	Federal

G. SUMMARY OF REMEDIAL ALTERNATIVES

This section presents the remedial alternatives evaluated for cleanup of Site CG070. Greater detail may be found in the FFS (MWH, 2012). This Proposed Plan presents six alternatives: the No-Action and five remedial action alternatives. The No-Action alternative was evaluated as a baseline for comparative purposes as required in CERCLA regulatory requirements. The discussion of each remedial action alternative includes (1) a brief description, (2) the cost to implement the alternative (with an accuracy of 50 percent greater to 30 percent lower than the number shown), and (3) the estimated time for the alternative to clean up each of the impacted aquifer units.

Monitored natural attenuation, ICs, and a **Water Supply Contingency Plan (WSCP)** are common components included in every remedial action alternative. Descriptions of these three common components are presented next, before the individual remedial action alternatives, to make it easier to understand each of the alternatives.

Monitored Natural Attenuation

MNA is a technology used to monitor the progress of natural contaminant reduction (i.e., attenuation) processes that act without human intervention to reduce contaminant toxicity, mobility, or volume in groundwater. Specific attenuation mechanisms include **dilution**, **dispersion**, **sorption**, volatilization, or biodegradation. Dilution and dispersion are the reduction of chemical concentrations as the plume mixes with clean groundwater and spreads through the aquifer. Sorption is the process by which one substance takes up or holds another, for example, the VOC TCE will sorb to the soil particles in the formation. Volatilization is the conversion of a contaminant

(TCE) from a liquid state to a gaseous or vapor state. Biodegradation is a process by which microbial organisms transform or alter (through metabolic or enzymatic action) the structure of chemicals, such as TCE, in the groundwater. A combination of any or all of these processes will result in **natural attenuation** of the plume.

MNA at OU1 would include periodic sampling of the groundwater in and around the OU1 plume to ensure the RAOs are being achieved. The Air Force will sample using a comprehensive network of monitoring wells. This monitoring network will be designed with EPA and the Lahontan Water Board input and concurrence to provide all of the necessary information about the nature and extent of the OU1 plume to include the natural attenuation of COCs.

Land-Use Controls in the Form of Institutional Controls

LUCs in the form of ICs are administrative or legal controls implemented, maintained, and enforced to ensure the protectiveness of the selected remedy. For example, with respect to Air Force Lands, environmental restrictive covenants will be drafted and inserted into the federal deeds that transfer land from the Air Force to the next property owner. These environmental restrictive covenants fall within the IC subcategory of PCs and are established by a legally enforceable agreement. Additionally, environmental restrictive covenants in the deeds will be used to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure. For Non-Air Force Lands where there will be no transfer by deed, the Air Force, as necessary, will acquire easements to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure.

Institutional Controls for Non-Air Force Lands

For purposes of this document, “Non-Air Force Lands” are those lands that were never owned by the Air Force. Certain Non-Air Force Lands directly overlay the OU1/SiteCG070 plume or are in the vicinity of this plume. A combination of overlapping, interlocking GCs such as zoning, the building permitting process, and the well permitting process, along with IDs such as publically accessible registries and informational repositories, provide the necessary layers of ICs. The Air Force is in the process of modifying and/or updating some of the existing IDs to ensure they are OU1 plume-specific when fully implemented. The Air Force is also in the process of identifying and acquiring necessary easements.

Other devices or processes will serve to maintain and enforce these GCs/IDs throughout their entire life cycle (e.g., Air Force notification letters to property owners, annual monitoring/reporting processes, and administrative or judicial enforcement proceedings). The GCs will be fully implemented, and these other devices or processes will apply within the City Consultation Zone and the County Notification Zone. Multiple layers of ICs are intended to provide maximum assurance that the remedial action alternative ultimately selected as the remedy is and will remain protective.

The ICs will be collectively implemented by the Air Force, San Bernardino County, the City, and the EPA, with the Lahontan Water Board serving in a consultative role. Each of the basic GC systems is already in place, but the Air Force has modified and/or created special procedures to implement OU1 plume-specific GCs. The modified GCs include the following:

- The City has developed both general and specific zoning ordinances and plans (City of Victorville, 2004; 2008) for all lands on and in the vicinity of the former GAFB. The land areas above and in the vicinity of SiteCG070 are zoned commercial/industrial/agricultural. These

City plans preclude any type of residential uses, thereby making the installation of small-capacity "individual domestic wells" or wells to supply water for on-site "**water users**" unlikely at least without notifications to the Air Force and EPA per the City Consultation Zone Process and the County Notification Zone Process. Such small-capacity wells are collectively referred to in this plan as *de minimis* user wells. *De minimis* user wells are those wells that produce a maximum of 10 acre-feet of groundwater per year. The owner/operator of such a *de minimis* user well is withdrawing and using the groundwater as part of the Mojave Water Agency's Minimal Producer Program. Such owner/operators do not need to own sufficient water rights or even purchase the right to withdraw such small amounts of groundwater (the owner/operators do pay a program participation fee) from aquifers beneath their land. These owner/operators have a legal responsibility to obtain a well construction permit from the DEHS, and as discussed above, the DEHS will notify the Air Force, the City of Victorville, and the EPA.

- The City requires source(s) of water be identified by any commercial/industrial developer as part of the construction/ building permitting process.

- Per the City Resolution Number 12-056, which establish the Consultation Zone/Process, the City will notify the Air Force and the San Bernardino County's Department of Public Health, DEHS, of any proposed well installations within land areas above or in the vicinity of Site CG070. The Air Force, in consultation with the EPA and the Lahontan Water Board, will review any proposed well installations and then issue a support/non-support notice and make any necessary recommendations for well siting or construction conditions and requirements to the City and DEHS. This new procedure modifies the existing construction/building permitting process and was created by City Council Resolution 12-056, adopted September 18, 2012, which created a well installation Consultation Zone. Figure 6 is a map showing the Site CG070 boundary and the Consultation Zone.

- The City will use its construction/building permitting process to control exposure to the CG070 TCE plume by commercial/industrial developers. The City will require such commercial/industrial users in all land areas above or in the vicinity of Site CG070 to connect to the municipal water supply system operated by the City, if the anticipated quantity of water withdrawal is more than a *de minimis* user well's maximum production capacity. For the land areas in and around GAFB, the City owns the water rights and has the right to supply water within this land area that is part of its "sphere of influence." Construction of permanent, unlined surface impoundments of water that might cause migration of the plume will also be controlled and prohibited, if necessary, through the City construction/building permitting process.

- San Bernardino County's DEHS must issue a permit for any proposed well installations. If a well installation is proposed for land areas above or in the vicinity of CG070 TCE plume, DEHS will inform the applicant/land owner about the groundwater plume. Per the County Notification Zone Process, DEHS will also notify the Air Force, the City of Victorville, and the EPA of any such well permit applications. The Air Force, in consultation with the EPA and the Lahontan Water Board, will review any proposed well installations and then issue a support/non-support notice and make any necessary recommendations for well siting or construction conditions and requirements to DEHS. Based upon the Air Force's recommendations, DEHS will ensure they enforce the State well construction standards to preclude any vertical migration of COCs from the Upper to the Lower Aquifers. These County Notification Process procedures modify the existing well permitting process and were created by an agreement between the Air Force and DEHS. The Air Force has provided DEHS with all relevant "assessor parcel numbers" and corresponding maps to identify and depict this well installation Notification Zone (Figure 7). The land area comprising the County's Notification Zone is coextensive with the City's Consultation Zone. (The County's modified well permitting process provides redundancy with the City's Consultation Zone/Process procedures).

Institutional Controls for Air Force Lands

For the purposes of this document, "Air Force Lands" are those lands that were or are still owned by the Air Force. Certain Air Force Lands directly overlay the CG070 plume or are in the vicinity of the plume. The GCs described above for Non-Air Force Lands apply equally to Air Force Lands. In addition, as the Air Force disposes of its lands at GAFB, it will

draft and insert environmental restrictive covenants in its federal transfer deeds. Such covenants will prohibit (1) the installation of any domestic-use wells unless approved by the DEHS, and (2) the construction of permanent, unlined surface impoundments of water, if it is determined by the Air Force that such construction might cause migration of the plume. The federal deed is drafted so any environmental restrictive covenants also constitute "state land use covenants" that "run with the land" (i.e., bind all subsequent owners of the land) when the deed is properly recorded. The Lahontan Water Board may also implement similar prohibitions/ restrictions on the property recipient in a corresponding **State Land Use Covenant (SLUC)**. Such deed and/or SLUC prohibitions/restrictions, though redundant, provide up to two additional layers of ICs, which are fully implemented on or shortly after transfer of the land. Deed and/or SLUC prohibitions/restrictions will also be used to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure. Environmental restrictive covenants in the federal deeds and prohibitions/ restrictions in SLUCs both fall within the IC subcategory of PCs.

Water Supply Contingency Plan

The Air Force will prepare a WSCP as a component of the selected remedy. For non-Air Force Lands, if the multiple layers of interlocking GCs fail to prevent potential exposure of human or ecological receptors to CG070COCs in the groundwater (e.g., the County permits an individual domestic supply well to be installed into a portion of the CG070plume where the COCs create an unacceptable risk to human health or the environment), then the Air Force will implement its WSCP. For Air Force Lands, if the multiple layers of interlocking GCs along with any PCs fail to prevent potential exposure of the human or ecological receptors to OU1 COCs in the groundwater, then the Air Force will implement its WSCP. By implementing the WSCP, the minimal producer does not have to use contaminated groundwater for domestic purposes, since the Air Force WSCP will ensure no human or ecological receptor is exposed to contaminated groundwater that creates an unacceptable risk to human health or the environment.

The No-Action and Remedial Action Alternatives

Alternative 1: No Action

*Estimated **Capital Cost**: $1,720,000*
*Estimated Annual **Operation and Maintenance (O&M) Cost**: $0*
*Estimated **Present Worth Cost**: $1,720,000*
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 500 years

Under Alternative 1, the Air Force would take no action at OU1 to remove VOC contamination from the groundwater or to prevent exposure to chemicals in the groundwater. The existing monitoring wells and treatment system would be removed, which would require capital costs. Under the alternative, some reduction in toxicity, mobility, or volume of organic COCs would be expected via natural attenuation. However, the reduction would not be monitored. The Air Force would take no further action to fully implement or maintain ICs. (However, PCs would be drafted and inserted into federal transfer deeds for Air Force Lands). The Air Force would not prepare and implement a WSCP.

Alternative 2: MNA, ICs, and WSCP (Preferred Alternative)

Estimated Capital Cost: $169,975
Estimated Annual O&M Cost: $19,653,423
Estimated Present Worth Cost: $19,823,398
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 500 years

Under Alternative 2, the chemicals in groundwater would be cleaned up by natural processes, as described previously in this Revised Proposed Plan. Long-term monitoring would be conducted to track the nature and extent of the OU1 groundwater plume and to evaluate the continued effectiveness and

protectiveness of the cleanup. The existing water treatment system will remain off. The Air Force would implement the ICs and a WSCP, both described above, to ensure the protectiveness of this remedy.

Alternative 3A: In Situ Chemical Oxidation (Targeted Injections for TCE Concentrations Exceeding 50 µg/L) with MNA, ICs, and WSCP

Estimated Capital Cost: $141,073,483
Estimated Annual O&M Cost: $22,563,569
Estimated Present Worth Cost: $163,637,052
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 500 years

Under Alternative 3A, the Air Force would target areas of the plume with concentrations of TCE exceeding 50 µg/L for chemical oxidation injection. TCE would be allowed to naturally attenuate, as described above, in the areas of the OU1 groundwater plume where it is present at concentrations less than 50 µg/L. The existing water treatment system will remain off. The Air Force would implement the ICs and a WSCP, both described above, to ensure the protectiveness of this remedy.

Pilot testing would be necessary for the implementation of this alternative to determine the appropriate chemical to use, effective radius of influence of the injected chemical (to determine the number of injection wells), and the time intervals in which injection would take place. It is estimated a total of 204 acres would be treated. Costs are estimated for the use of potassium permanganate as the chemical oxidant, which is effective at treating TCE, and a radius of influence of 50 feet, which would require 1,100 injection wells.

Alternative 3B: In Situ Chemical Oxidation (Barrier Implementation in Upper Aquifer) with MNA, ICs, and WSCP

Estimated Capital Cost: $12,076,232
Estimated Annual O&M Cost: $129,092,940
Estimated Present Worth Cost:$141,169,172
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 500 years

Under Alternative 3B, the Air Force would conduct periodic oxidant injections using a barrier of Upper Aquifer injection wells to prevent TCE migration to the PLZ. TCE that is not intercepted by the barrier of injection wells would degrade via natural attenuation.

The Air Force would implement the ICs and a WSCP, both described above, to ensure the protectiveness of this remedy.

This alternative could require the Air Force to construct or install remedial or monitoring systems on Non-Air Force Lands. Therefore, the Air Force would acquire easements to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure.

Pilot testing would be necessary for the implementation of this alternative to determine the appropriate chemical to use and the effective radius of influence of the injected chemical (to determine the number of injection wells).It is estimated the barrier would be approximately 7,200 feet long. Costs are estimated for the use of potassium permanganate as the chemical oxidant, which is effective at treating TCE, with injections occurring every 10 years for 140 years, and a radius of influence of 50 feet, which would require 288 injection wells.

Alternative 4: Pump-and-Treat in the Upper and Lower Aquifers, ICs, and WSCP

Estimated Capital Cost: $7,442,768
Estimated Annual O&M Cost: $99,453,107
Estimated Present Worth Cost: $106,895,875
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 100 years

Under Alternative 4, the Air Force would extract groundwater from 30 Upper Aquifer extraction wells and 9 Lower Aquifer extraction wells at a combined pumping rate of 1,000 gallons per minute (gpm) (1,613 acre-feet/year). Extracted water would be

pumped through air-stripping towers to remove chemicals through evaporation. The existing water treatment system, an air stripping tower, is not functional and likely would require refurbishment. Treated water would be conveyed to the Mojave River or another location. The Air Force would conduct long-term groundwater monitoring to evaluate the effectiveness and protectiveness of the remedy. The Air Force would implement the ICs and a WSCP, both described above, to ensure the protectiveness of this remedy.

Capital costs for this alternative include the installation of 16 new Upper Aquifer extraction wells and 6new Lower Aquifer extraction wells, which would be connected to the existing, but currently idle, pump-and-treat system. Costs also include the improvement of the existing treatment plant and repair or replacement of equipment over the life of the project. Existing extraction wells would require redevelopment and pump replacement. The estimated costs also include redevelopment of the monitoring wells over the life of the project. If water cannot be returned to the river, additional costs will be incurred for discharge of the treated water.

This alternative could require the Air Force to construct or install remedial or monitoring systems on Non-Air Force Lands. Therefore, the Air Force would acquire easements to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure.

Alternative 5: MNA in the Upper Aquifer and Pump-and-Treat Containment in the Lower Aquifer, ICs, and WSCP

Estimated Capital Cost: $3,035,016
Estimated Annual O&M Cost: $58,994,592
Estimated Present Worth Cost:$62,029,608
Estimated Time to Achieve Cleanup Goal:
Upper Aquifer: 200 years
Lower Aquifer: 500 years

Under Alternative 5, the Air Force would focus primarily on containment of the Lower Aquifer plume with an extraction barrier near the “toe” (i.e., the leading edge) of the Lower Aquifer plume. This extraction barrier is expected to be provided by pumping approximately 300 gpm (484 acre-feet/year) from existing Lower Aquifer extraction well EW-14 and two new, large-diameter extraction wells. The extracted water would be treated using the same type of system as described for Alternative 4. The chemicals in the Upper Aquifer groundwater would be cleaned up by natural attenuation, as described previously in this Revised Proposed Plan. The Air Force would conduct long-term groundwater monitoring to evaluate the effectiveness and protectiveness of the remedy.

The Air Force would implement the ICs and a WSCP, both described above, to ensure the protectiveness of this remedy.

Capital costs for this alternative include the installation of two new Lower Aquifer extraction wells, which would be connected to the existing, but currently idle, pump-and-treat system. Costs also include the improvement of the existing treatment plant and repair or replacement of equipment over the life of the project. One existing extraction well would require redevelopment and pump replacement. The estimated costs also include redevelopment of the monitoring wells over the life of the project. If water cannot be returned to the river, additional costs will be incurred for discharge of the treated water.

This alternative could require the Air Force to construct or install remedial or monitoring systems on Non-Air Force Lands. Therefore, the Air Force would acquire easements to protect and preserve access to Air Force-installed remedial or monitoring systems, as well as any associated supporting infrastructure.

H. EVALUATION OF ALTERNATIVES

Section 121(a) & (b) of CERCLA and NCP Section 300.430(e)(9)(iii) identify the nine criteria used to evaluate the different remedial alternatives individually and compare them one to another in order to select a remedy. The nine evaluation criteria are described on Figure 15 and are applied to the remedial alternatives in Table 2. These criteria are classified as threshold criteria, primary balancing criteria, and modifying criteria as follows:

- Threshold Criteria (criteria 1 and 2) are requirements that each alternative must meet in order to be eligible for selection.
- Primary Balancing Criteria (criteria 3 through 7) are used to weigh major trade-offs among alternatives.
- Modifying Criteria (criteria 8 and 9) may be considered to the extent that information is available during the FFS, but can be fully considered only after public comment is received on this Revised Proposed Plan.

Additional information on the nine criteria and detailed analysis of alternatives are provided in the NCP, CERCLA, and EPA guidance for conducting **Remedial Investigations/Feasibility Studies** under CERCLA (EPA, 1988). A detailed analysis of the remedial alternatives can be found in the FFS (MWH, 2012) and is summarized in the following paragraphs:

1. Protection of Human Health and the Environment: Alternative 1 is not protective of human health and the environment because groundwater monitoring would not be implemented to ensure protection of human health and the environment. Alternatives 2 thru 5 are protective of human health and the environment. Alternatives 2 and 5 are passively protective, while Alternatives 3A, 3B, and 4 are actively protective. All the alternatives, except Alternative 1, include LUCs that would prevent the use of groundwater until RAOs are achieved and a WSCP that would be implemented in the event properly permitted water supply wells are potentially impacted. Groundwater monitoring would verify the effectiveness of each alternative.

2. Compliance with ARARs: All the alternatives are compliant with ARARs over time. Action- and location-specific ARARs will be attained with remedy implementation for all the alternatives. The alternatives will comply with chemical-specific ARARs over time, specifically the ARARs to achieve the MCL for TCE and nitrate in the Upper and Lower Aquifers. The FFS (MWH, 2012) estimated the time frame for achieving the chemical-specific ARARs for TCE is similar for all the alternatives, i.e., more than 100 years for both aquifers. Nitrate ARARs are anticipated to be achieved in a shorter time.

3. Long-Term Effectiveness and Permanence: All the alternatives provide for long-term effectiveness and permanent achievement of RAOs. However, the effectiveness of Alternative 1 could not be evaluated because it does not provide for monitoring. The long-term effectiveness of Alternatives 2 to 5 would be assessed using the monitoring programs and the statutorily required CERCLA **Five-Year Reviews**.

4. Reduction in Toxicity, Mobility, and Volume through Treatment: Alternatives 1 and 2 do not provide an active reduction in the toxicity, mobility, and volume of contaminated groundwater because they are passive remedies. Natural attenuation processes would reduce the volume of contaminated groundwater over time for these two alternatives.

Alternatives 3A, 3B, and 4are active remedies. Alternative 5 does not prove a significant active reduction in toxicity, mobility, and volume. Alternative 4 best meets this criterion, if Upper Aquifer extraction is implemented. Alternatives 3A, 3B, and 5 do not meet this criterion as well as Alternative 4 because of the natural attenuation components of the remedies.

5. Short-Term Effectiveness: Alternatives 1 and 2 can be implemented immediately and would not

pose an immediate risk to the community, workers, or the environment. Established health and safety measures, deed restrictions, and environmental habitat protection plans are in place and are being followed. The implementation of Alternatives 1 and 2 would include limited construction work, which would have minimal to no impact on the community and environment.

Threshold Criteria

1. **Protection of Human Health and Environment.** Determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).** Evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Primary Balancing Criteria

3. **Long-term Effectiveness and Permanence.** Considers the ability of an alternative to maintain protection of human health and the environment after remedial action objectives have been met.

4. **Reduction in Toxicity, Mobility, or Volume through Treatment.** Evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

5. **Short-term Effectiveness.** Considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. **Implementability.** Considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. **Cost.** Includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

Modifying Criteria

8. **State Acceptance.** Considers whether the State agrees with the Air Force's analyses and recommendations, as described in the Remedial Investigation/Feasibility Study and Proposed Plan.

9. **Community Acceptance.** Considers whether the local community agrees with the Air Force's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance. Assessment of community acceptance may not be completed until comments on the Proposed Plan are received during the public comment period.

Figure 15
Evaluation Criteria for Superfund Remedial Alternatives

Table 2: Detailed Remedial Action Alternative Evaluation and Comparative Analysis

		Threshold Criteria		Balancing Criteria							Modifying Criteria	
		1) Protection of Human Health and Environment	2) Compliance with ARARs	3) Long Term Effectiveness	4) Reduction in Toxicity, Mobility, or Volume of Contaminant	5) Short-term Effectiveness	6) Implementibility	7) Cost			8) Probability of State Acceptance	9) Probability of Community Acceptance
	Alternative Description	Assessment	Assessment	Comparative Ranking	Comparative Ranking	Comparative Ranking	Comparative Ranking	Net Present Value in Millions at 0.86% Discount Rate	Water Take Costs in Millions*	Comparative Ranking	Comparative Ranking	Comparative Ranking
1)	No Action in the Upper Aquifer and Lower Aquifer	Not Protective	Compliant Over Time	Least Favorable	Least Favorable	Least Favorable	Most Favorable	$ 2	NA	Most Favorable	Low	Low
2)	MNA, LUCs and Water Supply Contingency Plan	Passive Protectiveness	Compliant Over Time	Favorable	Least Favorable	Least Favorable	More Favorable	$ 20	NA	Most Favorable	TBD	TBD
3A)	ISCO (targeted injections for TCE> 50 ug/L) with MNA, LUCs and Water Supply Contingency Plan	Active Protectiveness	Compliant	Favorable, at treated areas. Overall effectiveness less than MNA	Favorable, but limited	Favorable, but limited to areas that exceed 50 ug/L	Least Favorable	$ 164	NA	Least Favorable	TBD	TBD
3B)	ISCO (barrier implementation in UA) with MNA, LUCs and Water Supply Contingency Plan	Active Protectiveness	Compliant	Favorable, at treated areas. Overall effectiveness less than MNA	Favorable, but limited	Less favorable. Very limited short term impact	Least Favorable	$ 141	NA	Least Favorable	TBD	TBD
4)	Pump and Treat and LUCs in the Upper and Lower Aquifers with Water Supply Contingency Plan	Active Protectiveness	Compliant	Most Favorable, if UA extraction can be implemented	Most Favorable, if UA extraction can be implemented	Most Favorable, if UA extraction can be implemented	Favorable, if recharge rates are adequate for UA extraction	$ 107	$ 45	Least Favorable	TBD	TBD
5)	MNA and LUCs in the Upper Aquifer and Pump-and-Treat Containment and LUC in the Lower Aquifer with Water Supply Contingency Plan	Passive Protectiveness	Compliant Over Time	Favorable	Least Favorable	Least Favorable. Overall short term effectiveness comparable to MNA	Favorable	$ 62	$ 85	Least Favorable	TBD	TBD

Notes:

* This cost a rough value presented to indicate that additional cost could be incurred. To date the water rights and associated costs have not been established.

ARARs - Applicable or Relevant and Appropriate Requirements
ISCO - In-situ Chemical Oxidation
LA - Lower Aquifer
LTM - Long Term Monitoring
LUCs - Land Use Controls

ug/L - microgram per liter
MNA - Monitored Natural Attenuation
NA - Not Applicable
TBD - to be determined
UA - Upper Aquifer

Alternatives 3A and 3B would provide short-term effectiveness. Although the use of strong oxidants can potentially be hazardous to site workers and the surrounding community, health and safety procedures could be implemented to minimize these impacts. Delays in implementation of the chemical oxidation would result from obtaining various permits and access agreements. Environmental habitat protection plans would be developed and followed; however, additional evaluation would be required to address the installation of new injection wells. MNA, ICs, and a WSCP are considered readily implementable.

Alternatives 4 and 5 are not expected to generate any adverse impacts on the surrounding community and the environment. Established health and safety measures would be implemented to protect workers and environmental habitat protection plans would be followed. Potential environmental impacts include the destruction of habitat during construction activities.

6. *Implementability:* Alternatives 1 and 2 can be implemented immediately with little impact on existing water rights or local agency and community plans. Alternatives 3A and 3B require the most time to implement because of the number of wells that would be required; however, the required equipment and materials are readily available. Implementability of Alternatives 4 and 5 is similar. Implementation of Alternative 4 would include installing several wells and new water lines. Implementation of Alternative 5 would likely include installing two new wells and new water lines and inspecting and upgrading the existing treatment system. These are standard activities and the technologies are proven. An evaluation of water rights would need to be completed for either alternative to determine the effects of the Air Force extracting 800 gpm (1,290 acre-feet/ year) from the Lower Aquifer, which might delay implementation.

7. *Cost:* Costs are presented for each of the alternatives in Section G and Table 2 of this Revised Proposed Plan. Alternative 1 is the lowest-cost alternative, because the only expenditure is associated with removing the existing system. Alternative 2 is the next lowest-cost alternative, because, while a limited number of wells must be installed, there are few other costs associated with this alternative. The installation of more wells and treatment equipment and the continued active treatment requirements, increase the cost of implementing Alternatives 3A, 3B, 4, and 5. As presented in Section G, Alternative 3A is estimated to be the most costly, followed by Alternative 3B, Alternative 4, and Alternative 5.

8. *State Acceptance:* Alternative 1 does not ensure protection of human health and the environment due to a lack of continued groundwater monitoring and does not comply with ARARs; therefore, it has a low probability of State acceptance. The State acceptance of the other alternatives is not fully known at this time but has been evaluated in the FFS (MWH, 2012) as described below.

Although Alternative 2 does not provide an active remedy, it is protective of human health and the environment, and a WSCP provides the minimal producer an opportunity to use the resource. The State has concerns regarding the application of MNA to CG070 without any additional active remediation. Additionally, the proposed MNA plan does not include sufficient contingency remedies with clear triggers if the plumes migrate beyond the boundaries delineated in the FFS. Additional consultation with the State will be required during preparation of the RODA and the Remedial Design. The Remedial Design will be robust enough to ignore false positives but will have contingencies such as evaluating the use of an active methodology (such as groundwater removal and treatment, hydraulic control, or in situ reduction of concentrations at the site of the observation of concentrations above the MCL). After these

consultations, this alternative is expected to have a medium-to-high level of State acceptance.

Alternatives 3A and 3B provide an active remedy, are protective of human health and the environment, and provide for a WSCP in the event water supply wells are impacted. Remedial progress and stability of the plume would be periodically evaluated over the life of the remedy. Injection of oxidants to the OU1 aquifers could have detrimental impacts on water quality. Alternatives 3A and 3B are therefore expected to have a moderate level of State acceptance.

Alternative 4 provides for cleanup of both the Upper and Lower Aquifers to meet established ARARs; therefore, this alternative has a high probability of State acceptance.

Alternative 5 provides for cleanup of the Lower Aquifer to meet established ARARs, and it is protective of human health and the environment. AWSCP provides the minimal producer an opportunity to use the resource. This alternative does not provide an active remedy for the Upper Aquifer. This alternative should have a medium-to-high level of State acceptance.

9. Community Acceptance: Community acceptance of the preferred alternative will be evaluated after comments are received from the public meeting and during the public comment period.

I. SUMMARY OF PREFERRED ALTERNATIVE

OU1 characteristics make it difficult to contain, remove, and treat TCE in the groundwater plume. One condition challenging the cleanup of OU1 is the very slow movement of groundwater and TCE through the MLU and the zones with high silt and clay content of the PLZ. Therefore, the TCE is released very slowly to the Lower Aquifer, the MLU, and the zones with high silt and clay content. In effect, the MLU and PLZ act as a trap and slow-release source of TCE into groundwater. For the same reason, it is not possible to inject treatment chemicals into the MLU and have them spread through the unit effectively. Excavation of the MLU is not feasible because it is more than 100 feet beneath the runway and the High Desert Power Plant.

The same technology used to remediate the TCE plume will be used to remediate the other VOCs found within the same plume.

Therefore, the Air Force preferred alternative for OU1 plume is Alternative 2: MNA, LUCs, and a WSCP. The preferred alternative meets the threshold criteria and provides the best balance of trade-offs with respect to the balancing and modifying criteria without the implementation limitations associated with Alternatives 3, 4, and 5, and has high marks for the modifying evaluation criteria. The preferred alternative will satisfy the following statutory requirements of CERCLA Section 121(b):

- Be protective of human health and the environment.
- Comply with ARARs.
- Be cost-effective.
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- Satisfy the preference for treatment as a principal element.

With ICs in place and conditions defined under which a WSCP will be developed and implemented, Alternative 2 provides for protection of human health and the environment. It preserves the integrity and availability of the aquifer for beneficial use and maximizes the ability to beneficially redevelop and reuse property, as the Air Force would not need to limit property reuse for the installation of extensive infrastructure. Alternative 2 complies with ARARs in that MNA will achieve the chemical-specific ARARs

(cleanup levels) during the course of remedy implementation, and action- and location- specific ARARs will be attained when the remedy is implemented. Alternative 2 is the least expensive alternative that can achieve ARARs and protect human health and the environment. Although it does not provide an immediate active reduction in the toxicity, mobility, and volume of contaminated groundwater, natural attenuation processes would reduce the volume of contaminated groundwater over time.

Five-Year Reviews, required by CERCLA, will be performed to ensure the remedy is functioning as intended and continues to be protective of human health and the environment. Any changes in land or water use or deficiencies in the current understanding of the groundwater plume behavior that may affect the remedy will be addressed in these reviews.

ICs are included in the preferred alternative to protect human health against exposure to site contaminants until RAOs are achieved and/or to protect the integrity of the ongoing remedial action. ICs will be removed following achievement of RAOs, but only with EPA and the Lahontan Water Board's support and approval.

Note: The Air Force's identification of a preferred alternative may be changed or modified in response to public comments or new information.

Both the EPA and the Lahontan Board had comments on this proposed plan. The comments along with a description of the way the comments were addressed are included in Attachment 2a and 2b. The Lahontan Water Board does not concur with the proposed alternative and indicates that it may prefer active remediation. New data recorded since the release of the FFS may require additional consultation between the Air Force and the Lahontan Board. These consultations could occur during preparation of the RODA and the Remedial Design.

J. COMMUNITY PARTICIPATION

The Air Force provides information to the public regarding the cleanup of OU1 at GAFB through public meetings, the Administrative Record for GAFB, and announcements published in the *Victorville Daily Press*. Information on how the public can be involved in the remedy process is provided in the green text box on page 1 of this Revised Proposed Plan. The Air Force, along with EPA and the Lahontan Water Board, encourages the public to gain a more comprehensive understanding of OU1 and GAFB and the remedial activities that have been conducted at OU1 and GAFB.

The public is invited to review and comment on this Revised Proposed Plan for OU1. Please submit comments on this Revised Proposed Plan in writing to Mr. Brian Sytsma, Air Force Civil Engineer Center, 3411 Olson Street, McClellan, California 95652; via fax to 916.643.0460; or via e-mail to afrpa.west.pa@us.af.mil from **February 18, 2014** to **March 21, 2014**. A comment form with a mailing address is provided at the back of this Revised Proposed Plan for your use, but you do not have to use the form. The Air Force, EPA, and Lahontan Water Board will consider any comments received or postmarked before the end of the public comment period on **March 21, 2014,** and respond to the comments in writing in the RODA Responsiveness Summary. A public meeting will be held on **February 25, 2014**, during which the Air Force will be available to answer any questions.

This Revised Proposed Plan, in consultation with the regulators, and public comments will lead to a RODA, in which the revised final cleanup decision is established and described in detail. Based on the consideration of public comments or new information, the final cleanup choice presented in the RODA may be different from the Air Force's preferred alternative presented in this Revised Proposed Plan. As described in Section H, community acceptance of the preferred alternative will be evaluated after the Revised Proposed Plan

comment period ends. The RODA is programmed to be completed by **November 3, 2014**. As previously stated, the Air Force will also respond to all comments received during the public comment period. The comments and responses will appear in the RODA in a section called the Responsiveness Summary. The RODA will be available in the GAFB Administrative Record upon finalization.

OU1 documents are available to the public through the GAFB Administrative Record/Information Repository, which is accessible as follows:

By appointment at the Air Force Civil Engineer Center (AFCEC) local Administrative Records office. The office is located at 18374 Phantom West Street, Victorville, California, 92394. To make an appointment, call Calvin Cox at 760.246.5360.

On the Internet at the AFCEC BRAC document repository Web site: http://afcec.publicadmin-record.us.af.mil/.
For further information on OU1, please contact:

Air Force Civil Engineer Center
Brian Sytsma
Community Relations
AFCEC/CIBW
916.643.1250 ext. 257
afrpa.west.pa@us.af.mil

U.S. Environmental Protection Agency
Mary Aycock
Remedial Project Manager
415.972.3289
mary.aycock@epa.gov

California Regional Water Quality Control Board, Lahontan Region
Linda Stone, PG, CHG
Engineering Geologist
530.542.5471
linda.stone@waterboards.ca.gov

The dates for the public comment period and the date, location, and time of the public meeting are provided on the front page of this Revised Proposed Plan. The Air Force will prepare a fact sheet summarizing this Revised Proposed Plan and have it available at the public meeting. The fact sheet will also be sent to the GAFB mailing list prior to the meeting. The location of the public meeting will be included in the fact sheet prior to the public comment period and in the public notice published in the *Victorville Daily Press*.

K. GLOSSARY OF KEY TERMS

Air Force Land—Lands that were or are still owned by the Air Force

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

Applicable or Relevant and Appropriate Requirements (ARARs)—Those federal and state environmental laws and state facility siting laws that must be considered in choosing a remedial action.

Aquitard—A saturated bed, formation, or group of formations that does not yield appreciable water freely due to low **permeability**.

Arsenic—A naturally occurring mineral that is often found in groundwater due to natural processes. Arsenic is a probable human carcinogen. Exposure to arsenic can cause cardiovascular, pulmonary, immunological, neurological, and endocrinological (e.g., diabetes) effects. see http://www.epa.gov/ttnatw01/hlthef/arsenic.html.

Attenuating - to reduce in force, value, amount, or degree.

Background Concentration or Level—The concentration of a compound in the soil or water that is not influenced by the discharge of the compound into the environment at a specific site. For many constituents these are “naturally occurring” concentrations.

Base Realignment and Closure Team (BCT)—Consists of the Air Force, the EPA, and the Lahontan Water Board.

California Regional Water Quality Control Board, Lahontan Region (Lahontan Water Board)—The lead State regulatory agency whose role is to preserve, enhance, and restore the quality of California’s water resources for the benefit of present and future generations and to ensure the cleanup efforts comply with all State requirements.

Capital Cost—Initial setup costs for an alternative, which may include cost for items such as well installation and piping connection. For a No Action alternative, this would include decommissioning costs for existing wells and treatment systems.

Chemicals of Concern (COC)—Substances selected for environmental cleanup based on a health risk posed by the chemical and predicted impacts to groundwater resources.

City of Victorville General Plan 2030—In California, every city must adopt "a comprehensive, long-term general plan" (§65300). The General Plan must cover a local jurisdiction's entire planning area and address the broad range of issues associated with the city's development. The City of Victorville General Plan is the city's constitution or blueprint for its long-range physical development.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)—Legislation passed in 1980 and designed to respond to past disposal of hazardous substances. The act was extensively revised in 1986 by the Superfund Amendments and Reauthorization Act, which added many provisions and clarified unclear areas in the original law.

Conceptual Site Model(CSM)—The conceptual site model is a written and/or illustrative representation of the physical, chemical, and biological processes that control the transport, migration, and actual/potential impacts of contamination (in soil, air, groundwater, surface water, and/or sediments) to human and/or ecological receptors.

Consultation Process—Adopted by City of Victorville under City Council Resolution No. 12-056, September 18, 2012, to allow the City during the development and plan check process to identify the source of water for projects proposed for construction in the Consultation Zone. The process also requires the City's Development Department to notify the Air Force and the DEHS when the proposed development does not rely on the City's domestic water service. This process was created to help the Air Force ensure human and ecological receptors are not exposed to groundwater impacted above the MCLs. For more information, please refer to Department of the Air Force (2013).

Consultation Zone—Adopted by City of Victorville under City Council Resolution No. 12-056, September 18, 2012, to establish a map to support the City Consultation Process, which includes the land areas encompassing both the GAFB, a reasonable buffer zone surrounding GAFB including Non-Air Force Lands, which overlay the CG070 plume (Figure 6). All land areas in this zone lie within the boundaries of the City of Victorville and the County of San Bernardino. Also see Notification Zone. For more information, please also refer to Department of the Air Force (2013).

Department of Toxic Substances Control (DTSC)—An agency of the government of the state of California created to provide the highest level of safety, and to protect public health and the environment from toxic harm. DTSC is part of the California Environmental Protection Agency that regulates the generation, handling, treatment and disposal of hazardous waste in California.

Dilution—A solution that has had additional liquid, such as water, added to it in order to make it less concentrated.

Dispersion—A system in which particles are dispersed in a continuous phase of a different composition (or state).

Engineering Controls (EC)—Physical or "engineered" controls are physical barriers or structures designed to control, limit, or preclude chemical exposure pathways to the COCs.

Environmental Media—Soil, air, surface water, and groundwater.

U. S. Environmental Protection Agency(EPA)—An agency of the federal government which was created for the purpose of protecting human health and the environment by writing and enforcing regulations based on laws passed by Congress.

Environmental Restoration Program—The Air Force program to identify the locations of and releases from past hazardous waste disposal sites, and to minimize associated hazards to public health. This program was formerly known as the Installation Restoration Program.

Exposure Pathway—A way that people can be exposed to chemicals. Common pathways include breathing, ingestion, or absorption through the skin.

Exposure Point Concentration—Estimated as either the 95 percent upper confidence limit on the arithmetic mean concentration, or the maximum detected contaminant concentration. If the calculated 95 percent upper confidence limit was greater than the maximum value, then the maximum value was assumed as the exposure point concentration.

Feasibility Study (FS)—A study undertaken by the lead agency to develop and evaluate options for remedial action. This includes an analysis of the practicability of proposals (e.g., a description and analysis of potential cleanup alternatives), which usually recommends a preferred cost-effective alternative.

Federal Facility Agreement (FFA)—The FFA is a legal agreement governing the CERCLA administrative process for cleanup. It is intended to establish roles and responsibilities, and to improve communication between all parties by providing a mechanism for EPA and the state to review all work in support of a remedy selection. At an NPL site, the FFA outlines the working relationship between the state, EPA, and the Air Force. The GAFB FFA was completed in September 1990 and signed by the Air Force, EPA, California Department of Health Services, and Lahontan Water Board.

Five-Year Review—CERCLA-required regular checkups conducted on certain Superfund/NPL sites (where either remedial systems are still operating after 5 years or where any hazardous substances, pollutants, or contaminants are left in place) to make sure the site is still safe (i.e., the selected and implemented remedial actions/cleanup methods are protective of human health and the environment). Five-Year Review reports contain recommendations on the continuation, modification, or elimination of annual reports and/or IC maintenance, effectiveness, protectiveness, as well as the impact of new regulations that have come into effect and are entered into the Administrative Record. Five-Year Reviews also represent an opportunity for the public to voice concerns.

Flood Plain Aquifer—One of the two major water-bearing zones beneath the Mojave River Groundwater Basin. The flood plain aquifer is shallower, and is up to 250 feet in thickness. It is comprised mainly of sand and gravel deposited by the Mojave River and extends beyond the recent flood plain in some areas. The flood plain aquifer ranges in width from 120 feet at the Upper Narrows to more than 5 miles in parts of the Baja subarea.

Fluvial—Term used in Earth science referring to deposits and landforms created by river action.

Focused Feasibility Study (FFS)—A focused feasibility study is appropriate when a very limited selected number of potential cleanup alternatives are developed and evaluated.

George Air Force Base (GAFB)—The former George Air Force Base which was established in the early 1940s and closed in December 1992. Its location within southern California is depicted on Figure 2.

Governmental Controls (GC)—Administrative or legal controls imposing restrictions on land or resource use using the authority of a government entity. Typical examples of governmental controls include zoning; building codes; and state, tribal, or local groundwater-use regulations imposed by federal, state, and/or local authorities, and/or public health agencies. GCs are a subcategory of ICs.

Groundwater—Underground water that fills pores between particles of soil, sand, and gravel or that fills openings in rocks to the point of saturation. Where groundwater occurs in significant quantity, it can be used as a source of drinking water.

Groundwater Extraction and Treatment—A process for removing volatile chemicals from groundwater in which water is pumped to the surface and through air-stripping towers to remove chemicals through evaporation.

Hazard Index (HI)—The ratio of chemical concentration divided by the safe exposure level. If the HI exceeds 1, people are exposed to chemicals that may pose noncancer health risks. Noncancer health risks are chemical-dependent but may include kidney disease, headaches, dizziness, and anemia. For more information, go to ToxFAQs at www.atsdr.cdc.gov/toxfaqs/index.asp.

Hazard Quotient (HQ)—The ratio of an individual chemical concentration divided by the safe exposure level for that chemical. If the HQ exceeds 1, people or animals are exposed to a chemical at a level that may pose noncancer health risks. Noncancer health risks are chemical-dependent but may include kidney disease, headaches, dizziness, and anemia. For more information, go to ToxFAQs at www.atsdr.cdc.gov/toxfaqs/index.asp.

Incremental Risk—The separate, independent cancer risk that is determined by subtracting the risk posed by background levels/concentrations of a chemical from the total risk posed by levels/concentrations of a chemical remaining at a site. This is effectively the separate risk created by prior Air Force activities at GAFB and used by GAFB (i.e., the Air Force contamination of a site). Remedial actions focus on reducing this incremental risk to human health and the environment.

Infiltration —The process of a liquid such as rainwater or wastewater moving into a porous material such as soil and rock.

Informational Devices (ID)—Information repositories or systems that provide information or notification, often as recorded notice in property records or as advisories to local communities, tourists, recreational users, or other interested persons that residual contamination remains on site. As such, informational devices generally do not provide enforceable restrictions. These devices should be accessible to the public. Typical informational devices include state registries of contaminated sites, notices in deeds, tracking systems, and consumption advisories.

Installation Restoration Program (IRP)—A federal program designed to clean up contamination associated with Department of Defense facilities.

Institutional Controls (IC)—Non-engineered instruments, such as administrative or legal controls, that help to minimize the potential for human exposure to remaining contaminants and/or to protect the integrity of the ongoing remedial action. Examples are permits, zoning, deed restrictions, and state land use covenants. Three ICs which fall within the subcategory of GCs are fully implemented within the relevant land area—city zoning, city building/construction permitting, and county well permitting.

Land-Use Controls (LUC)—Actions that include any type of engineered, legal, or administrative controls put in place to protect human health and the environment by controlling chemical exposure pathways and/or protecting the integrity of the ongoing remedial action. In other words, LUCs help ensure the protectiveness of a cleanup remedy. The two major types of LUCs are institutional controls (IC) and engineering controls (EC). Three subcategories of ICs are applicable to the RODA: (1) informational devices (ID), (2) governmental controls (GC), and (3) proprietary controls (PCs).

Lead Agency—The government agency (e.g., the Air Force) responsible for selecting, implementing, and incurring costs associated with the selected cleanup remedies for a site.

Lifetime Cancer Risk—The risk of developing cancer, given 30 years of exposure to a chemical.

Lower Aquifer—A water-bearing zone occurring in the lower alluvial unit at GAFB. It is separated from the upper aquifer, or water-bearing zone, by a sedimentary layer known as the “Middle Lacustrine Unit” and the unsaturated (vadose) zone.

Maximum Contaminant Levels (MCL)—Standards set by the EPA for drinking water quality. An MCL is the legal threshold limit on the amount of a hazardous substance allowed in drinking water under the Safe Drinking Water Act. The limit is usually expressed as a concentration in milligrams per liter (mg/L) or micrograms per liter (µg/L) of water.

Micrograms per Liter (µg/L)—A measure of concentration in weight (millionth of a gram) per unit volume units.

Middle Lacustrine Unit (MLU)—One of four primary sedimentary units beneath GAFB. It lies beneath the uppermost unit (the upper **fluvial** unit) and is characterized as an “aquitard,” which may store groundwater but does not transmit or yield groundwater readily due to low permeability.

Milligrams per Liter (mg/L)—A measure of concentration in weight (thousandth of a gram) per unit volume units.

Minimal Producer — Wells that produce a maximum of 10 acre-feet of groundwater per year.

Monitoring — Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action. Monitoring wells drilled at different locations and different depths are used to collect soil vapor or groundwater samples to determine how the remedy is functioning.

Monitored Natural Attenuation (MNA) — A technique used to monitor or test the progress of natural contaminant reduction (natural attenuation) processes that can degrade contaminants in soil and groundwater. It may be used with other remediation processes as a finishing option or as the only remediation process if the rate of contaminant degradation is fast enough to protect human health and the environment. Natural processes can then mitigate (clean up) the remaining amount of pollution. Regular monitoring of the soil and groundwater can verify those reductions.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 Code of Federal Regulations 300—The federal regulation established under the Clean Water Act and expanded under CERCLA that provides for the coordinated and effective response to discharges of oil and to releases of hazardous substances, pollutants, and contaminants.

National Priorities List (NPL)—The list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. The

NPL is intended primarily to guide EPA in determining which sites warrant further investigation.

Natural Attenuation—A variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater. These in situ processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

Non-Air Force Lands—Lands that were never owned by the Air Force.

Noncancer Health Effects—The health impact to a human exposed to a noncarcinogenic but toxic chemical. Adverse health effects may be caused by chronic exposure to a chemical. Noncancer risk is represented by HQs and HIs; HQs or HIs greater than 1 indicate an adverse (noncancer) health effect could occur due to chemical exposure. The HQ is a ratio that evaluates the potential for noncancer adverse health effects over a specified time period (e.g., a lifetime). Typically, the HQ is calculated by dividing the expected daily intake of the chemical by the amount an individual may be exposed to that is not expected to cause any adverse effect. The HI is the sum of all HQs for chemicals that affects the same target organ or act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed.

Notification Zone—A map used to support a process established by the County of San Bernardino DEHS, July 29, 2013, to notify the Air Force, the City of Victorville, and the EPA when DEHS receives a well drilling permit for any of 305 parcels within the GAFB Consultation/Notification Zone. All land areas in this zone lie within the boundaries of the City of Victorville and the County of San Bernardino. The land area comprising the County's Notification Zone is coextensive with the City's Consultation Zone. (The County's modified well permitting process provides redundancy with the City's Consultation Zone/Process procedures.) (The County modified well permitting process provides redundancy with the City's Consultation Zone/Process procedures.). Also see Consultation Zone. For more information, please also refer to Department of the Air Force (2013).

Operable Unit (OU)—Under CERCLA, the cleanup of a site can be divided into a number of OUs depending on the complexity of the problems associated with a site. OUs may address geographic portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions that are concurrent but located in different parts of a site. Five OUs were identified for GAFB, but OU2, composed of petroleum hydrocarbon sites, was removed from the CERCLA program, and the sites are now addressed under Lahontan Water Board authority. OU4 was dissolved since the sites either did not warrant further consideration or were consolidated into OU5 (skeet ranges).

Operation and Maintenance (O&M) Cost—The sum of the cost of operating and maintaining a remedial alternative through the lifetime of the alternative. This includes items such as labor, materials, and energy to run the treatment system and to conduct soil vapor and groundwater monitoring.

Parts per Billion—A measure of concentration. One part per billion equals 0.000000001 percent.

Percolation—Draining or seeping through a porous material.

Permeable—A soil texture characteristic that allows water (or gas) to move through the soil.

Permeability—The ease or rate with which fluid (e.g., water) is transmitted through a rock's pore space.

Permeable Lacustrine Zone (PLZ)—One of four primary sedimentary units beneath GAFB. It is characterized as the area where groundwater from the Upper Aquifer percolates downward to the Lower Aquifer.

Phase I Predictive Ecological Risk Assessment—A process of comparing concentrations of chemicals in the environmental media at a site with chemical-specific toxicity data believed to protect the vegetation and wildlife.

Porous—A material (e.g., soil or rock) able to easily absorb fluids or allow liquid to pass through it.

Potable Water—Water suitable for drinking.

Preferred Alternative(s)—The Air Force's suggested cleanup method(s) for the contaminated site(s). The preferred alternative is protective of human health and the environment, complies with ARARs, and is cost-effective.

Present Worth Cost—Any up-front construction costs and annual O&M costs over the life of the alternative. It is the amount of money that would

need to be invested today to yield the funds required over the life of the alternative.

Primary Source—An area where a hazardous substance may have been deposited, stored, disposed, or placed.

Proprietary Controls (PC)—Administrative or legal controls on land use that are considered private in nature because they tend to affect a single parcel of property and are established by private agreement between the property owner and a second party who, in turn, can enforce the controls. Common examples include easements that restrict use (also known as negative easements) and restrictive covenants. These types of controls can prohibit activities that may compromise the effectiveness of the response action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment. State and tribal law typically authorize proprietary controls. In some states, the authority comes solely from common law. In other states, such as California, the state has enacted a statute that directly authorizes proprietary controls for the purpose of preventing use/reuse in conflict with environmental contamination or remedies (i.e., Cal. Civ. Code § 1471, as implemented by Title 22 C.C.R. § 67391.1).

Proposed Plan—A summary of cleanup alternatives for a contaminated site, including a preferred alternative and the reasons for the recommendation. This step is the community's opportunity to review and comment on all cleanup alternatives under consideration. The responses to the comments are presented in the ROD. All changes from the Proposed Plan are explained in the ROD.

Receptor—A species, population, community, habitat, or ecosystem that may be exposed to a contaminant or other stressor.

Record of Decision (ROD)—A document explaining and legally committing the lead agency to the cleanup alternative(s) that will be used at a site. The ROD is based on information and technical analyses generated during the remedial investigation and feasibility study, and considering public comments and community concerns.

Record of Decision Amendment (RODA)—When a fundamental change is made to the basic features of the remedy selected in a ROD with respect to scope, performance, or cost, then the lead agency is required to develop and document the change consistent with the original ROD process in a new document called a ROD Amendment.

Remedial Action Objective (RAO)—Site-specific goal for protecting human health and the environment.

Remedial Alternative (s)—A cleanup option consisting of one or more treatment technologies adapted to specific site conditions.

Remedial Investigation/Feasibility Study—A hazardous waste site study that examines the nature and extent of the contaminated site that must be completed before a cleanup remedy can be chosen and implemented. The feasibility study identifies and evaluates alternatives for addressing the contamination.

Responsiveness Summary—The section within the Record of Decision that summarizes comments received during the public comment period and provides lead agency responses.

Revised Proposed Plan—When a fundamental change is made to a **Proposed Plan**, the lead agency is required to amend the existing plan and document the proposed changes.

Risk Assessment—An evaluation performed as part of the remedial investigation to assess conditions at a site and to determine the risk posed to public health and/or the environment.

Risk-Based Cleanup Goal—Concentrations of contaminants for specific media that must be achieved for a corrective measure to be protective of human health.

Risk Management Range—Sites with a total cancer risk estimate within this range, 1 in 10,000 to 1 in 1,000,000, may be considered for no further action, according to EPA guidance.

Scoping Ecological Risk Assessment—Consists of a chemical, physical, and biological characterization of a site, and an evaluation of which exposure pathways are potentially complete for ecological receptors.

Secondary Source—A volume of soil, air, groundwater, surface water, or surface water sediment that may have become contaminated through migration of a hazardous substance from a primary source and from which further migration of the hazardous substance may occur.

Skeet Range—A facility where participants attempt to break disks flung into the air at high speeds by shooting them, most often using a shotgun. Skeet shooting is a recreational and competitive activity.

Sorption—A physical and chemical process by which one substance becomes attached to another.

Southern California Logistics Airport Authority (SCLAA)—A public/private partnership between the City of Victorville and Sterling (a development company) to redevelop GAFB into a multi-modal freight transportation hub supported by air, ground, and rail connections.

Southern California Logistics Airport (SCLA) Specific Plan—Describes a commercial air facility and related uses for an approximately 8,703–acre site with the majority of the site (5,350acres) being previously known as George Air Force Base. The Specific Plan serves as a tool for implementing the reuse plan established by the Victor Valley Economic Development Authority pursuant to the Base Closure and Realignment Act as well as the related policies of the City of Victorville General Plan.

State Land Use Covenant—A land use covenant imposes appropriate limitations on land use that should be executed and recorded when (1) facility closures, corrective actions, remedial or removal actions, or other response actions are undertaken and (2) hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels which are not suitable for unrestricted use of the land. The land use covenants shall be executed by the state and the landowner and shall be recorded in the county where the land is located. For more information, see Title 22, California Code of Regulations, § 67391.1. Requirements for [State] Land Use Covenants.

Superfund—The common name used to denote (1) the trust fund established in CERCLA or (2) CERCLA itself.

Tetracholoroethene—A manufactured chemical widely used for dry cleaning of fabrics and for metal degreasing. It is also used to make other chemicals and is used in some consumer products.

Total Cancer Risk—The total probability that chemicals from the groundwater plume would cause people to become ill with cancer.

Toxicity—The degree to which a substance can cause damage to an organism, such as a person or animal. Toxicity can include cancer and noncancer health effects from short- or long-term exposure.

Trichloroethene (TCE)—An organic compound (i.e., containing carbon) that evaporates readily at room temperature. It is an industrial solvent used for aircraft engine maintenance and other degreasing operations. It is a known carcinogen. For more information, go to ToxFAQs at http://www.atsdr.cdc.gov/toxfaqs/index.asp.

Unrestricted Land Use/Reuse—Use/reuse of property is allowed without any land use restrictions. Such use/reuse would include residences, schools, recreational sites, hospitals, and other similar uses/reuses. This situation exists when remedial actions at a site have reduced the levels/ concentrations of the chemicals of concern to such an extent exposure is unlikely to present risk to human health or the environment. Because land use restrictions are created through the implementation of institutional controls, no institutional controls are required for property in this condition. Equivalent to EPA's unlimited use and unrestricted exposure characterization for formerly contaminated property or sites.

Upper Aquifer—A water-bearing zone occurring in the upper alluvial unit at GAFB. The Upper Aquifer occurs in the Upper Fluvial Unit. It is separated from the upper aquifer, or water-bearing zone, by a sedimentary layer known as the "middle lacustrine unit."

Vadose Zone—The area of soil beneath the ground surface and above the water table which is not saturated.

Volatile Organic Compounds (VOC)—A collection of chemicals which contain carbon and have a high vapor pressure (readily evaporate at room temperature). Many VOCs are toxic and some can cause cancer. Examples of VOCs include solvents and chemicals present in oils and fuels.

Water Table—The level of groundwater below the ground surface.

Water Supply Contingency Plan (WSCP)—The Air Force's plan for ensuring an alternate supply of potable water for *de minimis* well users who wish to install a groundwater production well in an area impacted by the OU1 TCE plume. The alternate supply may be wellhead treatment, connection to municipal supply, or the provisioning of potable water from an alternative source where municipal water is not reasonably available.

Water Users—Persons, customers, and properties served by a water purveyor within the incorporated boundaries of the City.

L. ACRONYMS

AFCEC	Air Force Civil Engineer Center
ARAR	Relevant and Appropriate Requirement
BCT	Base Realignment and Closure Cleanup Team
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
COCs	chemicals of concern
CSM	conceptual site model
DEHS	Division of Environmental Health Services
DTSC	Department of Toxic Substances Control
ECs	engineering controls
EPA	U. S. Environmental Protection Agency
FFA	Federal Facility Agreement
FFS	Final Focused Feasibility Study
GC	governmental control
gpm	gallons per minute
HI	hazard index
HQ	hazard quotient
ICs	institutional controls
IDs	informational devices
IRP	Installation Restoration Program
LUC	land-use controls
GAFB	George Air Force Base
GCs	governmental controls
Lahontan Water Board	California Regional Water Quality Control Board, Lahontan Region
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
MLU	Middle Lacustrine Unit
mg/L	milligrams per liter
MNA	monitored natural attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	operation and maintenance
OU	Operable Unit
PCs	proprietary controls
PLZ	Permeable Lacustrine Zone
RAB	Restoration Advisory Board
RAOs	Remedial Action Objectives
RBCG	risk-based cleanup goals
ROD	Record Of Decision
RODA	Record of Decision Amendment
SCLA	Southern California Logistics Airport
SCLAA	Southern California Logistics Airport Authority
SLUC	State Land Use Covenant
TCE	trichloroethene
VOCs	volatile organic compounds
VVWRA	Victor Valley Waste Reclamation Authority
WSCP	Water Supply Contingency Plan

M. LIST OF REFERENCES

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REVISED PROPOSED PLAN

Operable Unit 1 at the Former George Air Force Base, Victorville, California

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on this Revised Proposed Plan for OU1 at the Former George Air Force Base is important to the Air Force. Comments provided by the public help the Air Force select revised final cleanup remedy. Comments received or postmarked by the deadline will be responded to in writing in the Responsiveness Summary section of the Record of Decision Amendment.

You may use the space below to write your comments. Use additional pages, if needed. Comments must be received or postmarked by March 21, 2014. Send your comments to Mr. Brian Sytsma, AFCEC/CIBW, 3411 Olson Street, McClellan, CA 95652 or email at afrpa.west.pa@us.af.mil.

PRIVACY STATEMENT

Your comments on this Revised Proposed Plan for Operable Unit 1 are requested. Letters or other written or oral comments provided may be published in the Operable Unit 1 Record of Decision Amendment (RODA). As required by law, comments will be addressed in the Responsiveness Summary of the Operable Unit 1 RODA and made available to the public. Personal home addresses and phone numbers will not be published in the Operable Unit 1 RODA or any other documents. Any personal information you provide will only be used to facilitate your ability to make a statement during the public comment portion of any public meeting or hearings, or to fulfill requests for copies of the Operable Unit 1 Final Revised Proposed Plan, RODA, or associated documents. Private addresses will be compiled to develop a mailing list for those requesting copies of these documents. However, only the names of the individuals and their comments will be disclosed.

If you have any questions about the comment period, contact Mr. Brian Sytsma at 916.643.1250, ext. 257.

If you would like to be on the mailing list to receive information about environmental restoration activities at the former George Air Force Base, complete the Name and Address section below.

Comments:

_____

_____

_____

_____

_____

_____

_____

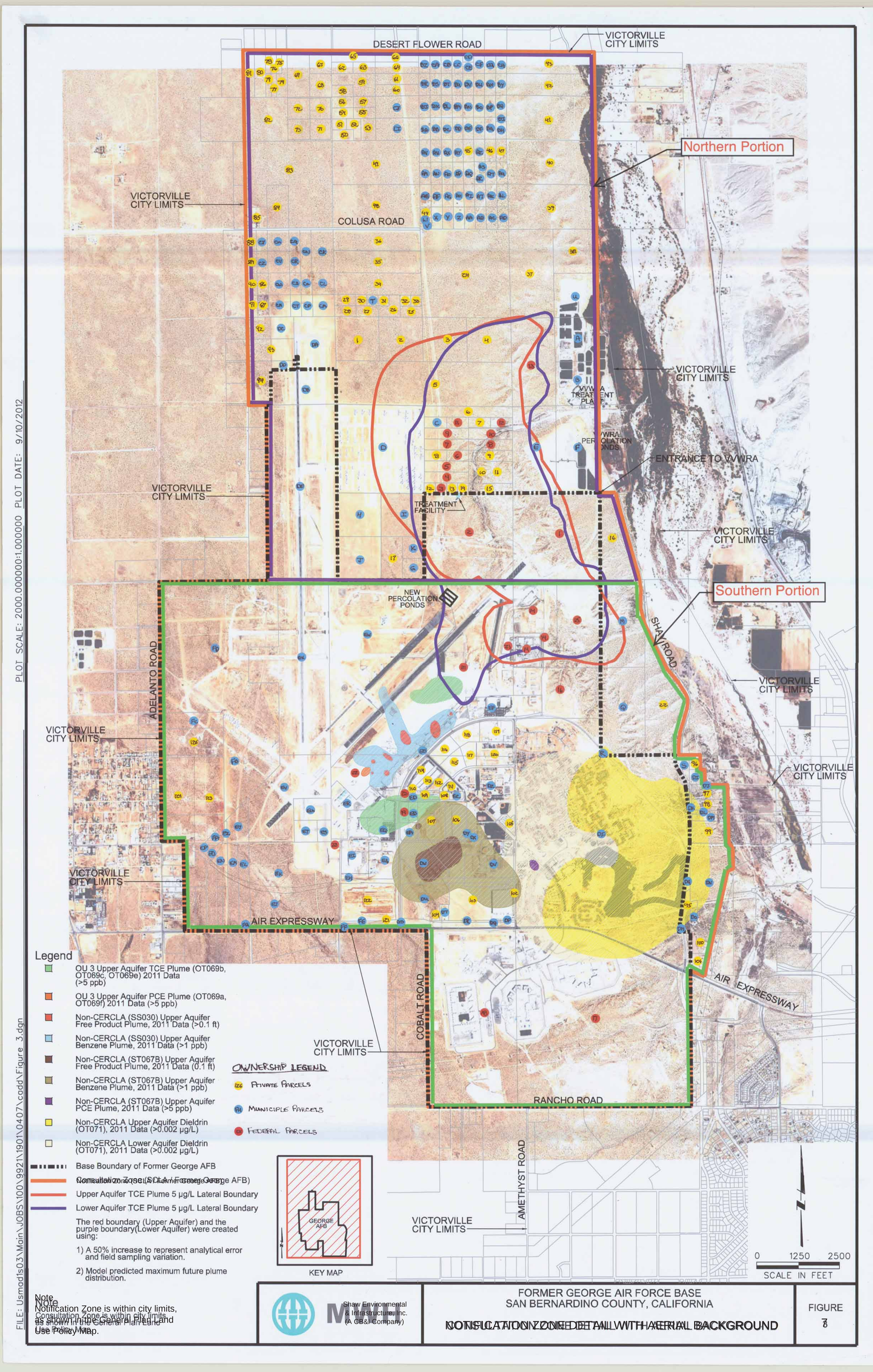
Name_____ _____Yes, add me to the mailing list.

Address_____

City_____ State_____ Zip_____ e-mail address_____
(optional)

Affix
stamp
here

Mr. Brian Sytsma
AFCEC/CIBW
3411 Olson Street
McClellan, CA 95652


DESERT FLOWER ROAD
VICTORVILLE CITY LIMITS
Northern Portion
COLUSA ROAD
VICTORVILLE CITY LIMITS
VICTORVILLE CITY LIMITS
ENTRANCE TO VVWRA
TREATMENT FACILITY
VICTORVILLE CITY LIMITS
NEW PERCOLATION PONDS
Southern Portion
SHAY ROAD
ADELANTO ROAD
VICTORVILLE CITY LIMITS
VICTORVILLE CITY LIMITS
VICTORVILLE CITY LIMITS
AIR EXPRESSWAY
COBALT ROAD
VICTORVILLE CITY LIMITS
AIR EXPRESSWAY
RANCHO ROAD
AMETHYST ROAD
VICTORVILLE CITY LIMITS
Legend
OU 3 Upper Aquifer TCE Plume (OT069b, OT069c, OT069e) 2011 Data (>5 ppb)
OU 3 Upper Aquifer PCE Plume (OT069a, OT069f) 2011 Data (>5 ppb)
Non-CERCLA (SS030) Upper Aquifer Free Product Plume, 2011 Data (>0.1 ft)
Non-CERCLA (SS030) Upper Aquifer Benzene Plume, 2011 Data (>1 ppb)
Non-CERCLA (ST067B) Upper Aquifer Free Product Plume, 2011 Data (0.1 ft)
Non-CERCLA (ST067B) Upper Aquifer Benzene Plume, 2011 Data (>1 ppb)
Non-CERCLA (ST067B) Upper Aquifer PCE Plume, 2011 Data (>5 ppb)
Non-CERCLA Upper Aquifer Dieldrin (OT071), 2011 Data (>0.002 µg/L)
Non-CERCLA Lower Aquifer Dieldrin (OT071), 2011 Data (>0.002 µg/L)
Base Boundary of Former George AFB
Consultation Zone (SCLA Former George AFB)
Upper Aquifer TCE Plume 5 µg/L Lateral Boundary
Lower Aquifer TCE Plume 5 µg/L Lateral Boundary
The red boundary (Upper Aquifer) and the purple boundary(Lower Aquifer) were created using:
1) A 50% increase to represent analytical error and field sampling variation.
2) Model predicted maximum future plume distribution.
OWNERSHIP LEGEND
PRIVATE PARCELS
MUNICIPLE PARCELS
FEDERAL PARCELS
GEORGE AFB
KEY MAP
N
0 1250 2500
SCALE IN FEET
Note
Notification Zone is within city limits, as shown in the General Plan and Use Policy Map.
Shaw Environmental & Infrastructure, Inc. (A CB&I Company)
FORMER GEORGE AIR FORCE BASE
SAN BERNARDINO COUNTY, CALIFORNIA
NOTIFICATION ZONE DETAIL WITH AERIAL BACKGROUND
FIGURE 7
PLOT SCALE: 2000.000000:1.000000 PLOT DATE: 9/10/2012
FILE: Usmad1s03\Main\JOBS\100.9921\1901\0407\cadd\Figure 3.dgn

Attachment 2
Response to Comments

Attachment 2a

AIR FORCE RESPONSE TO TECHNICAL REVIEW COMMENTS

Environmental Protection Agency Comments on
Draft Proposed Plan for Operable Unit 1 (OU 1),
FORMER GEORGE AIR FORCE BASE,
VICTORVILLE, CALIFORNIA

March 2013

The US Environmental Protection Agency (EPA) comments, in a letter to the US Air Force (Air Force) dated March 14, 2013:

Enclosed with this letter are the US Environmental Protection Agency's (EPA) comments on the above-referenced Air Force (AF) submission, the Draft OU 1 PP (Draft OU 1 PP), dated December 26, 2012, and received by EPA on December 28, 2012. The Draft OU 1 PP presents the AF's preferred remedial alternative(s) to the 1994 Record of Decision for groundwater contamination at Site CG070, and provides the rationale for the AF's preference. Similar to the initial Draft OU 5 Proposed Plan submitted by the AF, the Draft OU 1 PP does not provide a complete and well organized explanation of OU 1 or the proposed remedial alternatives. The quality of the writing is inconsistent, portions are difficult to understand, and the document lacks overall cohesiveness. In addition, critical components of the conceptual site model and Site description either are missing from the discussion or are inadequately addressed. For example, nitrate is not adequately addressed as a contaminant of concern, and monitored natural attenuation, a significant component of the preferred remedy, is not sufficiently described. The document also contains typographical errors and in some cases presents inaccurate information. Due to the inadequacies of the Draft OU 1 PP, EPA considers the Draft OU 1 PP to be incomplete, and requires that it be rewritten and resubmitted again as a Draft OU 1 PP. Please refer to the enclosed comments for further details. EPA expects the Air Force to perform a more rigorous quality control review of Draft documents prior to submitting them to EPA for review.

Response:
The entire OU1 Proposed Plan has been updated and revised to accommodate the EPA's comments and is now consistent with the format and structure of the approved OU5 Proposed Plan. Relevant subjects discussed in subsequent meetings have also been addressed. The AF believes the content and quality are appropriate for "EPA consideration" as a Draft Final version of the document.

General and Specific Comments Table:

Item	Section, Page	Comment	Response
General Comments			
1.	General Comment	The Draft Proposed Plan for Operable Unit 1 (the OU 1 PP) contains typographical errors, such as errors with the table of contents and a reference to OU 5 on Page 1, and also appears to be written by several different authors, impacting the overall quality and comprehensibility of the document. Additionally, a number of issues identified during the US Environmental Protection Agency's (EPA) review of the Draft OU 5 Proposed Plan are similar to the OU 1 PP. For example, the location and formatting of the Privacy Notice and community involvement information should be modified to better highlight the public involvement process, and other changes are needed to better describe the process and regulatory role. Please revise the OU 1 PP to address the similar formatting and organizational issues identified in EPA's comments on the Draft OU 5 Proposed Plan (for example, Specific Comments #1-6 and 29-37 from EPA's letter dated January 18, 2013).	The Draft Final OU1 Propose Plan is revised to address the formatting and organizational issues identified in EPA's comments on the OU5 approved Proposed Plan.
2.	General Comment	MNA is the Air Force's (AF) preferred alternative, but it has not been adequately described in the OU 1 PP. The specific physical, chemical and/or biological attenuation mechanisms, e.g. dilution, dispersion, sorption, volatilization, or	Document is revised and MNA is described in more detail in Section G. Summary of Remedial Alternatives on Page 31.

Item	Section, Page	Comment	Response
		biotransformation, have not been described or explained adequately for the public to understand the alternative or the significance of the AF's preference for it. Please provide a more detailed description of MNA in the OU 1 PP.	
3.	General Comment	The OU 1 PP does not provide an adequate description of the nitrate contamination, and should be revised to include a specific discussion of nitrate concentrations including, as part of the conceptual site model discussion, why nitrate concentrations exceed the Maximum Contaminant Level (MCL), and a specific rationale to support monitored natural attenuation (MNA) as a viable remedy to address the concentrations. For example, the OU 1 PP should provide evidence that decreasing concentrations of nitrate over time demonstrates that MNA is a viable remedy to address nitrate, even though trichloroethene (TCE) is the primary risk driver and therefore was the chemical of concern (COC) used to evaluate alternatives in the Focused Feasibility Study (FFS).	Text is revised to address the comment. Please refer to Nature and Extent of Contamination Page 18, right column.
4.	General Comment	There are a number of key technical terms that should be defined to ensure that the public is able to understand the OU 1 PP. Terms that should be defined include but are not limited to permeable (permeability), porous, Base Closure Team (BCT), upper aquifer, lower aquifer, flood plain aquifer, middle	Document is revised and definition of the terms is included in the glossary.

Item	Section, Page	Comment	Response
		lacustrine unit, permeable lacustrine unit, infiltration, and percolation. Please define these terms for a non-technical reader.	
5.	General Comment	The presentation of information in the OU 1 PP provides the description of the Institutional Control (IC) components of the remedial alternatives before the presentation of the technical components of the remedial alternatives in various sections. However, the proposed remedy would be easier for the public to understand if this information was presented in the opposite order, with the primary technical" elements that address the proposed treatment of the contamination discussed first. Please revise the document so that the ICs discussions follow the discussions of the associated technical components of the remedial alternatives.	Document is revised and the description of ICs is presented in Section G. Summary of Remedial Alternatives.
Specific Comments			
1.	Section A. Introduction, First Paragraph, Page 2	The introduction does not adequately describe what the original groundwater remedial action was, it's purpose, why it didn't work, and why a ROD amendment is now necessary. Please add a specific reference to the date and title of the original Record of Decision for OU 1 in the introductory sentence, provide more detail about what it was intended to accomplish and why it was not operating as intended, and move the introduction	Document is revised and the comment is addressed in Section B., Site Background, Page 5, right column, 3rd paragraph.

Item	Section, Page	Comment	Response
		and purpose of the OU 1 PP, currently appearing on Page 3, to the beginning of the introduction.	
2.	Section A. Introduction, Second Paragraph, Page 2 and Section B. Site Background,Page 6:	The Base Closure Team (BCT) also includes the AF as well as EPA and the Lahontan Regional Water Quality Control Board. Please revise this description of the BCT.	Text is revised to: “In 2003, the Base Realignment and Closure Team (BCT), consisting of the Air Force, EPA, and the Lahontan Water Board,……..”
3.	Section A. Introduction, First Paragraph, Page 3, and Section B. Site Background, Page 4:	The information regarding the two sites SD025 and WP026 that were "probable sources of contamination to groundwater appears to contradict the statements that they are not contaminated later on Page 3, and statements they were sources on Page 4. Please reconcile these statements, provide clarity regarding whether they were identified as sources or potential or probable sources and how they were later designated as no further action (ie., were they previously contaminated and no longer contaminated), and provide information on how the no further action was officially approved (i.e., selected in the OU 1 ROD or determined during the RI, etc.?) Additionally, please specifically describe what "sources of contamination" are being referenced in terms of activity being conducted and chemicals used, for what purpose, etc.	The comment is addressed in OU1 Specific Background Section (Page 5). Text is revised to: “The OU1 ROD was approved in 1994 as described above. The OU1 ROD covers two potential soil sources (SD025 and WP026) and a TCE groundwater plume (CG070). The three OU1 sites and remedy decisions for each are briefly described below……”
4.	4. Section A. Introduction, Figure 1,	It is unclear if this figure is intended to be a general description of the Superfund	Figure 1 is revised to address the comment.

Item	Section, Page	Comment	Response
	Superfund Investigation and Cleanup Process, Page 3:	clean-up process or is specific to George Air Force Base (AFB). If the latter, additional detail should be provided to make this figure more descriptive. Information such as a timeline for the steps that have already been completed or a short description for each of the steps presented on the figure will provide clarity. The "You Are Here" orange box also appears to be misplaced, and should follow the Focused Feasibility step. The National Priorities listing should be specifically included on the figure. Please revise this figure to be more descriptive of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process as it applies to the former George AFB. Also please include steps and dates specific to George AFB or provide a separate figure to include this site-specific information. In addition, the resolution on this figure is poor for both the electronic and printed versions, and is mostly illegible. Please improve the image resolution or change the figure to improve legibility.	
5.	Section A. Introduction, Page 4:	The location, e.g. appendix of the FFS, of the post-Record of Decision (ROD) characterization data should be specifically identified in the Proposed Plan, because it provides the information that is used to support the change in remedy. Please reference the specific location of	Text is revised and comment addressed on Page 2 as recommended.

Item	Section, Page	Comment	Response
		the post-ROD characterization data.	
6.	'Section A. Introduction, Page 4, last sentence:	Please provide more information on the status of the OU 3 and OU 5 remedies for the OU 1 source areas, especially as the Proposed Plan and Record of Decision for OU5 have yet to be released and there consequently has been no opportunity for public comment on the OU5 Proposed Plan.	Document is revised and the information is provided in Section B., Site Background on Page 4, and also in Section D, Page 26.
7.	Section B. Site Background, Pages 4 through 6:	Per EPA's Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents (1999) (PP & ROD Guidance), this section should include "[a] description of major public participation activities initiated prior to the issuance of the Proposed Plan." Please describe public participation activities in this section.	Document is revised and public participation has been described in details in Section J., Community Participation.
8.	Section B. Site Background, Nature and Extent of Contamination, Page 5:	This section does not clearly describe and link contaminant use and the transport mechanisms for the groundwater contamination, nor specify all the contaminants of concern. Please revise this section to describe how specific contaminants of concern entered the groundwater (uses, disposal practices, etc.), at what locations, and how that ties into the current extent of the plume, and the c0mponents of the conceptual site model described later in the document.	Document is revised and the comment is addressed in Section B., Site Background, Page 5, OU1 Specific Background.

Item	Section, Page	Comment	Response
9.	Section B. Site Background, Nature and Extent of Contamination, Page 6	The following sentence is confusing and should be revised, "The Upper and Lower Aquifers contain approximately one billion gallons of dilute stable TCE plume (OU 1 groundwater plume)." In addition, the text should be revised to describe the conceptual site model of the OU 1 plume as a continuous plume that started in the upper aquifer, but over time and through infiltration has migrated to the lower aquifer due to more permeable substrate. Please revise the plume description.	Text in Nature and Extent of Contamination, Page 18, is revised to address the comment.
10.	Section B. Site Background, Previous Investigations, Page 6:	The reference to "The site" should be replaced by "OU 1 ," unless the reference to "the site" is intended to be the entire George AFB Superfund Site, in which case the defined term "Site" may be used (assuming it previously has been defined)	Document is revised and for consistency the site is referred to as CG070 or Site CG070.
11.	Section B. Site Background, Previous Investigations, Page 6	There is an apparent gap in activity between 2003-2009. Information about what was happening during this time period should be included, such as data collection, optimization studies, and/or regulatory review, etc.	Text in Page 8 is revised to: “An initial optimization study was conducted from 2003 to 2007 to evaluate the design of the treatment system, including the extraction well configuration, recharge locations, and other remedial alternatives.. Additional OU1 characterization work was performed from 2004 to 2009 to update the understanding of the groundwater’s Upper Aquifer and Lower Aquifer.”
12.	Section C. Site Characteristics, Pages 7 through 9	The statement in the second paragraph that the "main chemical of concern in the OU 1 groundwater is TCE" more appropriately should state that TCE is the major risk driver throughout the OU 1 plume. The presence and risk associated with other chemicals of concern present in the plume should also be discussed,	Document is revised and the comment is addressed in Nature and Extent of Contamination (Page 18), and Section E., Summary of Site Risks (Page 26) of the Revised Proposed Plan, OU1.

Item	Section, Page	Comment	Response
		even if they are not the primary risk drivers. For example, there is very little information presented in the OU 1 PP on the presence of nitrate concentrations in the OU1 groundwater, or evidence for how "the plume is diminishing via natural attenuation processes." Please provide additional information on nitrate and any other chemicals of concern in the groundwater at OU 1, including references to existing reports.	
13.	Section C. Site Characteristics, Pages 7 through 9 and Figure 3	Location of the three OU 1 Sites: There are a number of features discussed in this section that are relevant to understanding the conceptual site model and groundwater flow that are not presented in Figure 3, such as the "bluffs" and the Mojave River. Please revise Figure 3 to include the identification of key surface features.	Key surface features are depicted on the revised Figure 3.
14.	Section C. Site Characteristics, Pages 7 through 9	The presentation of information in this section should be improved to better explain the conceptual site model to the public. For example, the aquifer systems and hydrogeology should be presented first, followed by an explanation of the contaminant and transport mechanisms. Also, the information that is provided on Page 8 should be integrated with the information on Page 7. Please reorganize this section to better present this technical information so that a non-technical reader may better understand it.	A Base Hydrogeology section that includes the description of the aquifer systems has been added to the text on Page 15.
15.	Section C. Site	This figure is important and contains	The figure is revised and the figure number has changed to Figure 8.

Item	Section, Page	Comment	Response
	Characteristics, Figure 4. Base Geology, Page 8	useful information to support the text, but it is too small to read as currently presented. Please enlarge this figure to an entire page so it can be easily read and reviewed alongside the text at the same time.	
16.	Section C. Site Characteristics, Pages 7 and 8	Groundwater flow directions are described in this section but compass directions are not included. In addition, none of the plan view figures depict groundwater flow directions. Please add compass directions to the text description of groundwater flow; also please provide a figure with groundwater flow directions.	The groundwater flow direction is described in the Base Hydrogeology Section on Page 15 and in addition it is depicted on Figure 3.
17.	Section C. Site Characteristics, First Paragraph, Page 8	The purpose and meaning of the statement additional delineation is planned is unclear. Please elaborate on the meaning of the planned additional delineation, or remove the statement.	Document is revised and the comment is addressed in Nature and Extent of Contamination on Page 18, Last paragraph, in the left column.
18.	Section C. Site Characteristics, Last Paragraph, Page 8	The statement that there is "retention of TCE in the MLU" is better expressed as "the movement of TCE is retarded in the MLU" because subsequent text indicates groundwater moves slowly. Additionally, the last few sentences regarding the advantages and disadvantages of the different technologies should be moved to the description and comparison of remedial alternatives. This section should focus on the general conceptual site model concepts, such as why the groundwater moves slowly, and how that is related to the hydrogeology types. Also, information about how monitored	Document is revised and the comment is addressed in Base Hydrogeology Section,(Pages 15 through 19).

Item	Section, Page	Comment	Response
		natural attenuation is taking place should be explained here. Please revise the text accordingly.	
19.	Section C. Site Characteristics, Page 8 and Section E, Summary of Site Risks, Page 10	The proposed plan states that "TCE in groundwater from the Lower Aquifer is not expected to reach the FPA;" also the text indicates that TCE should not reach the Mojave River; however, no information or evidence is cited to support these conclusions, and it is our understanding that detections of TCE have reached the FPA.	Text is revised and the reference sentence is deleted.
20.	Section C. Site Characteristics, Bulleted statements, Page 9	Both statements should state that it is treated waste water that infiltrates into the aquifers, not water containing specific chemicals. Additionally, these concepts should be added to Figures 3 and 4. Please revise the text and figures accordingly.	Text in Nature and Extent of Contamination, Page 18, the 3rd full paragraph in the right column is revised to address the comment.
21.	Section D. Scope and Role of the Response Action, Pages 9 and 10	This section should describe in more detail the scope and role of the response action in relationship to previous similar actions at the Site, provide a brief description of the other Site OU s, such as soil actions, and discuss if and how these soil sources are tied to groundwater sites. Previous RODs and planned RODs should also be described, so it is clear where this proposed action fits in to the overall Site cleanup strategy (this information may already be included in Site Background, and could be referenced). Section 3.3.4 of EPA's PP & ROD Guidance provides an example of	Section D. Scope and Role of Operable Units is revised in its entirety following the format of the approved OU5 Proposed Plan.

Item	Section, Page	Comment	Response
		what information could be included in the "Scope and Role Section" of a Proposed Plan. Please discuss OU 3 and OU 5 in this section and include a discussion of the relationship between the Groundwater OUs and source area OUs. In addition, this discussion mentions that the remedial alternatives will address "TCE and its degradation products," but the transformation products, particularly vinyl chloride, are not prevalent in Site groundwater. Please explain this statement or note that transformation products generally have not been observed in OU 1 groundwater.	
22.	Figure 5, TCE Plume Maps for Upper and Lower Aquifers, Page 10	The size and resolution of this figure make it unreadable. Three or four figures for each aquifer should suffice to demonstrate plume characteristics, and the figures should be enlarged. Please revise this figure to ensure that key elements are legible.	The figure referenced in the Draft Final OU 1 Proposed Plan is simplified and split in two (Figures 12 and 13) for ease of understanding.
23.	Section E, Summary of Site Risks, Pages 10 and 11	This section generally needs improvement to better present the cancer and non-cancer risk concepts, as well as to provide more consistent and complete handling of risk information, especially the ecological risk. For example, it is not clear in the text whether cancer or non-cancer risks are being discussed, as the text switches back and forth between the two. The text describes the risk information presented in the last	Section E., Summary of Site Risk is revised in its entirety to address the comment.

Item	Section, Page	Comment	Response
		paragraph of page 10 as "below" the risk range when it is a number that is actually "within" the risk range. The last paragraph on Page l uses an excessive amount of parenthesis, which makes the concepts presented difficult to follow. The ecological risk is not completely presented, and it is unclear how statements such as "it is not anticipated that TCE will ever reach the Mojave River" and "It is the Air Force's judgment that the preferred alternative identified in the PP is more effective ..., etc. is relevant to the risk assessment information the way it is currently presented. Please rewrite this section to better introduce the risk assessment evaluation and concepts, correct the inaccuracies, and remove language not relevant to risk assessment.	
24.	Section E, Summary of Site Risks, Pages 10 and 11	The use of the word "determined" in this section seems more definitive than warranted given the uncertainties in the risk assessment process. Please describe the risk assessment results as estimates, recognizing that exposures have not occurred. Additionally, the text indicates that groundwater was determined to be the only medium of concern however; the text does not provide information on how the vapor intrusion pathway from groundwater was assessed.	Section E., Summary of Site Risk is revised in its entirety to address the comment.
25.	Section E, Summary of Site Risks, Page 11	The paragraph beginning "It is the Air Force's current judgment that the Preferred Alternative ... is more effective	Section E., Summary of Site Risk is revised in its entirety to address the comment.

Item	Section, Page	Comment	Response
		than the original remedy" is not supported until the comparisons of alternatives are described, and appears to be out of place. Please relocate this paragraph to a more appropriate position (perhaps paragraph I).	
26.	Section F, Remedial Action Objectives, Page 12	It is understood that clean-up values will be finalized in the Amended ROD however, the specific numerical values should be provided in the Proposed Plan for TCE and Nitrate as preliminary cleanup goals (PRGs). Please include specific numerical cleanup values in the OU 1 PP.	Section F., Remedial Action Objectives is revised in its entirety to address the comment.
27.	Section G. Summary of Remedial Alternatives, Land-use Controls Institutional Controls (LUC/IC), Page 13 through 17	The discussion of the Land Use Controls (LUCs) in this section is unclear, presented out of context with the remedial alternatives, and in some cases, inaccurate. Please reorganize this entire section to introduce the primary components of the alternatives before describing the LUCs, and provide a clear and comprehensive identification of all of the potential controls being proposed as part of each of the remedial alternatives. If the AF desires to discuss LUCs together in a separate section from the remedial alternatives, to the extent they are similar for each alternative, then the discussion must be organized in a manner so that the separate remedial alternatives may, if necessary and appropriate, clearly refer back to individual LUC components discussed in the LUCs section. General issues with	Section G., Summary of Remedial Alternatives is revised in its entirety to address the comment.

Item	Section, Page	Comment	Response
		this section are as follows: • This section does not provide sufficient context or introductory information to understand the significance of why they are organized by property type and the relevance of property type for the various "layers" of LUCs being proposed. • The description of the LUC components within this section, as well as throughout the document, are inconsistent with each other. • LUCs identified are referred to as "examples" or wording is used such as "could be implemented" is used. The LUCs should be specific to the proposed remedial alternatives, and definitive, not simply examples or what "might be" or "could be" implemented. If a particular measure is a contingent component of the remedy, it should be so identified; however, it still "is" (as opposed to "may be") part of the remedy, but whether it will be necessary to implement it is contingent. • Not all types of controls are listed, such as enforcement tools, permitting, etc. The need for LUCs for the protection of the integrity of the remedy is also missing as a concept throughout this section.	
28.	Section G. Summary	The term "Consultation Zone" is	Section G., Summary of Remedial Alternatives is revised in its entirety

Item	Section, Page	Comment	Response
	of Remedial Alternatives, Non-Air Force Lands, Page 13	introduced, however not specifically described or defined. It is unclear what components listed in subsequent paragraphs may be part of the Consultation Zone, and how this relates to the "combination of overlapping governmental controls" listed in the introductory sentence. Please provide a definition and context for the term "Consultation Zone."	to address the comment.
29.	Section G. Summary of Remedial Alternatives, Non-Air Force Lands and Air Force Lands, Pages 14 and 15	The stated positions of the various agencies critical to the land use control components of the remedial alternatives, such as the San Bernardino County Department and Lahontan Water Board, are not consistent within the document and, as stated in some cases, are not consistent with EPA's understanding of them either. Please confirm the language with the agencies critical to the development of the LUCs to ensure there is a shared understanding of the remedial alternatives that are being proposed	Section G., Summary of Remedial Alternatives is revised in its entirety to address the comment.
30.	Section G. Summary of Remedial Alternatives, Non-Air Force Lands, Page 14	The statement that the AF is committed to a Water Contingency Plan suggests that this is an optional or additional activity that is not part of the proposed remedy. If the AF intends for the Water Contingency Plan to be part of the LUC component of any proposed remedy, please ensure that the description of the Plan clearly identifies it as a component of the proposed remedy(even if a contingent component), and that the description is	Section G., Summary of Remedial Alternatives is revised in its entirety to address the comment. Refer to Page 34, Water Supply Contingency Plan (WSCP). "The Air Force will prepare a WSCP as a component of the selected remedy."

Item	Section, Page	Comment	Response
		consistent throughout the document.	
31.	Section G. Summary of Remedial Alternatives, Page 14	The beginning of the second column describes retention of the existing network of extraction wells, and the discussion of the appropriate ICs associated with this, such as the easements mentioned earlier, could be added here to clarify the context for the ICs.	Section G., Summary of Remedial Alternatives is revised in its entirety and reference to the retention of the existing network of extraction wells is removed.
32.	Section G. Summary of Remedial Alternatives, Page 15:	The following sentence provides little information to assist the public in understanding the remedy of MNA and therefore should be deleted from this section of the proposed plan: "Natural attenuation has been going on since the first drop of contamination was leaked into the groundwater." Additionally, the two sentences regarding effectiveness and protectiveness would be better placed in the discussion of comparison of alternatives, instead of the description of remedial components.	Section G., Summary of Remedial Alternatives is revised in its entirety to address the comment.
33.	Section G. Summary of Remedial Alternatives, Pages 16 and 17	Please move the language comparing Alternative 5 to Alternatives 2 and 4 to the comparison of alternatives section.	Section G., Summary of Remedial Alternatives is revised in its entirety to address the comment.
34.	Section H., Evaluation of Alternatives, Pages 17-19	This section is critical for the presentation of the AF evaluation and rationale for its preferred alternative, however, most of the information relied on is set forth in Table 1 and there is only a very limited textual discussion. Please provide more narrative in Section H outlining the comparison of	Following the format of the approved OU5 Proposed Plan, Section H, is revised and expanded to address the comment.

Item	Section, Page	Comment	Response
		alternatives, which is needed to support the rationale behind the AF preference for a remedial alternative.	
35.	Section I., Summary of Preferred Alternatives, Page 19	EPA does not officially provide concurrence on the preferred alternative until it is selected in the ROD. Please remove the reference to EPA and the Lahontan Water Board in the following statement, "The Air Force, with EPA and the Lahontan Water Board concurrence, recommends Alternative 2, Monitored Natural Attenuation (MNA), ICs, and a Water Supply Contingency Plan for the CG070 TCE groundwater plume."	Text is revised in its entirety to address the comment. The reference sentence is deleted.
36.	Section I., Summary of Preferred Alternatives, Page 19	The text states that, "Alternative 2 has the lowest environmental impact;" however for clarity this should be described in reference to the balancing criterion of short-term effectiveness, as environmental impact is not currently a specific evaluation criterion for CERCLA, but rather a component of the short-term effectiveness criterion. Please revise this statement accordingly.	Section I., Summary of Preferred Alternatives is revised in its entirety to address the comment.
37.	Section K Glossary of Terms, Page 23, Proposed Plan (PP):	The definition refers to the "selection" of the preferred alternative, but should refer to the AF's proposed preferred alternative, as the selection of the remedy occurs in the ROD or ROD Amendment. Additionally, the definition should specify that the AF will present its responses to comments on the OUI PP in the ROD or ROD Amendment.	Text is revised to: **"Proposed Plan—**A summary of cleanup alternatives for a contaminated site, including a preferred alternative and the reasons for the recommendation. This step is the community's opportunity to review and comment on all cleanup alternatives under consideration. The responses to the comments are presented in the ROD. All changes from the Proposed Plan are explained in the ROD."

Item	Section, Page	Comment	Response
38.	Section L., List of References, Page 24	Please ensure that the references to significant documents, such as the Focused Feasibility Study, indicate the approved revision number and date of the final revisions.	Reference lists is revised to address the comment.
39.	Proposed Plan Comment Card, located after Page 24	The comment card is vague regarding the comment period deadline, and is combined with a statement about the AF response to comments. Please clearly state and highlight or bold the comment period deadline in the introductory paragraph, and separate this from the sentence regarding the Air Force Response to Comments.	The Proposed Plan Comment Card is revised in its entirety to address the comment.

AF RESPONSE TO TECHNICAL REVIEW COMMENTS

Regional Water Quality Control Board Comments on
DRAFT PROPOSED PLAN,
OPERABLE UNIT 1, CG070, FORMER GEORGE AIR FORCE BASE, VICTORVILLE,
SAN BERNARDINO COUNTY, CA

February 28, 2013

The California Regional Water Quality Control Board, Lahontan Region (Lahontan Water Board) received the *Draft Proposed Plan, Operable Unit* 1 (Proposed Plan) on December 28,2012. Operable Unit 1 (OU1) consists of a large groundwater plume that contains trichloroethene (TCE) above background levels and above the maximum contaminant level (MCl) of 5 micrograms/liter (Ilg/l). The purpose of the Proposed Plan is to inform the public that the Air Force is proposing to change the selected remedy for OU1 from groundwater extraction and treatment to monitored natural attenuation with institutional controls and a groundwater supply contingency plan. Lahontan Water Board staff has reviewed the Proposed Plan and has the following comments on the document.

Specific Comments Table:

Item	Section, Page	Comment	Response
1.	Mailing List	Please submit the Proposed Plan's mailing list for Lahontan Water Board staff's review.	The mailing list is provided in Attachment 1.
2.	Table of Contents, page 2.	Many of the sections are shown on the wrong page in the table of contents. Revise the table of contents to reflect the correct page numbers for the referenced sections.	Table of contents is revised to reflect the correct page numbers.
3.	Introduction, page 2	It is not clear what is meant by the term "Base Closure Team." The text states that the Base Closure Team consists of the "EPA and Lahontan Water Board." These entities are the regulatory agencies overseeing cleanup at the facility and are part of the Base Realignment and Closure	The document is revised. Base Realignment and Closure Team (BCT) is defined in the glossary.

Item	Section, Page	Comment	Response
		(BRAC) Team, which includes the Air Force. Please revise the document to accurately describe the Team and its function. Include the appropriate terms in the glossary.	
4.	Introduction, page 2	The second paragraph should be revised to state that, based on evidence provided by the Air Force, the regulatory agencies concurred with the Air Force's conclusion that the groundwater extraction and treatment system was not operating as intended.	Text on page 5, last paragraph in the right column is revised to: “In 2003, the Base Realignment and Closure Team (BCT), consisting of the Air Force, EPA, and the Lahontan Water Board, after evaluating the data determined that the OU1 groundwater extraction and treatment system was not performing as intended and would not achieve the statutory determinations identified in the 1994 OU1 ROD. “
5.	Introduction, page 2	The term "Lahontan Water Board" is not defined. It should be defined as the "California Regional Water Quality Control Board, Lahontan Region" the first time it is used in the document. The document should also explain Lahontan Water Board's role as the lead State regulatory agency, which includes protection of the beneficial uses of State waters and ensuring that all state requirements are complied with during cleanup efforts.	The term “Lahontan Water Board” is defined on the first page, in the right column, second paragraph. The document is revised and the roles and responsibilities of the regulatory agencies are defined in the glossary.
6.	Introduction, page 3	The first full paragraph on this page states that SC025 and WP026 were probable sources of groundwater contamination. This paragraph continues to state that the two sites were not contaminated and required no further actions. It is not clear how the sites could be responsible for groundwater contamination but not be contaminated. Revise this paragraph to	The comment is addressed in OU1 Specific Background Section (Page 5). Text is revised to: “The OU1 ROD was approved in 1994 as described above. The OU1 ROD covers two potential soil sources (SD025 and WP026) and a TCE groundwater plume (CG070). The three OU1 sites and remedy decisions for each are briefly described below…….”

Item	Section, Page	Comment	Response
		clarify this discussion and include a reference to the "Site Background" Section for additional information on the sources of groundwater contamination.	
7.0	Introduction, page 4	For clarity, revise the second to last sentence in this section to future tense i.e., "The Proposed Plan will be followed by a Record of Decision, which will. .. "	Text on page 2, last paragraph, right column is revised to: “This Revised Proposed Plan will be followed by a Record of Decision Amendment (RODA), which will describe and document the selection of the revised cleanup decisions for OU1 based on information and technical analyses generated during the remedial actions and FFS (MWH, 2012), and consideration of public comments and community concerns.”
8.0	Site Background, page 4	Revise the first sentence to specify whether the "upper Mojave River Basin" is a watershed basin or a groundwater basin. Also this sentence includes a reference to Figure 2, but this figure does not show the basin. Reconcile this inconsistency.	Text is revised to: “GAFB is located in San Bernardino County, California, approximately 70 miles northeast of Los Angeles. The location of GAFB is shown on Figure 2.”
9.0	Site Background, page 4	This section describes the role of the Air Force in the cleanup effort, but does not describe the role of the regulatory agencies. Revise the discussion to include the role of the regulatory agencies. Additionally, the discussion of the roles of the entities should be included early in the document. Consider discussing the various entities' roles in the introduction section.	Roles and responsibilities of the regulatory agencies are defined in the glossary.
10.	Site Background, page 4	Please clarify the discussion regarding the source sites, SD025 and WP026. Were these sites eliminated as potential sources of TCE contamination of groundwater? See Comment 6.	Text in the OU1 Specific Background Section, Page 5, is revised to clarify the discussion regarding the soil source sites.
11.	Site Background, page 4	Add a statement that FT019 and FT082 are	Text in OU1 Specific Background under CG070 (TCE

Item	Section, Page	Comment	Response
		being addressed separately from the actions described in the Proposed Plan.	Groundwater Plume is revised to address the comment.
12.	Site Background, page 6	The second sentence of the first paragraph on this page describes the plume as "dilute" with a volume of "one billion gallons." The term dilute is overly vague and should be eliminated. Instead the TCE concentration used to estimate the volume should be included in this discussion, e.g., the volume above the MCl or the volume containing detectable concentrations.	Text in Nature and Extent of Contamination Section, Page 18, 2nd paragraph in the left column is revised to: TCE is present in the groundwater at concentrations above the federal Maximum Contaminant Level (MCL) of 5 micrograms per liter (µg/L) or 5 parts per billion. Five parts per billion of contamination is equivalent of putting 5 teaspoons of liquid in 6.5 million gallons of water. The groundwater plume containing TCE at a concentration above the MCL is spread over an area of about 680 acres as shown on Figure 3 (MWH, 2012). Approximately 9,714 acre-feet (3,165,320,761 gallons) of groundwater is impacted by 98 gallons of TCE that is contained within that area in the Upper and Lower Aquifers.
13.	Nature and Extent of Contamination, page 6	This section refers to contamination of the "Upper and lower Aquifers" but the document has not previously described the groundwater basin or the various aquifers. A description of the aquifers should be presented prior to the discussion of impacts to the aquifers.	Document is revised and a section on Base Hydrogeology, Page 15, has been added to the Proposed Plan.
14.	Site Characteristics, page 7	This section states that former George Air Force Base is primarily undeveloped land. However, much of the facility has been disturbed by historic or current activities. Revise this section to describe historic and current uses of the facility and its immediate vicinity. The Proposed Plan should also include a discussion of the reuse plans for the facility and planned uses in its immediate vicinity.	Text is revised and reference to the undeveloped land is deleted.
15.	Site Characteristics, page 7	This section states that the groundwater plume "moves slowly toward the Mojave	Text is revised and the comment addressed in the Base Hydrogeology Section, Page 15.

Item	Section, Page	Comment	Response
		River." The word "slowly" is ambivalent in this context and should be replaced by a more quantified description, e.g., an average rate of x feet/year.	
16.	Site Characteristics, page 7	This section discusses impacts to specific hydrogeologic units, e.g., Middle Lacustrine Unit, that have not been previously described. The hydrogeologic units and conditions should be described before the impacts to the units are discussed.	See response to Comment No. 13.
17.	Site Characteristics, page 7	This section includes the sentence: "Groundwater moves relatively freely in the Upper Aquifer under the force of gravity." It is unclear what is intended by this sentence. Is it meant to describe a strong vertical gradient? Lahontan Water Board staff suggests replacing this sentence with a description of groundwater movement horizontally and vertically.	Text is revised to address the comment.
18.	Site Characteristics, page 7	A description of the range in thickness of the hydrologic units would be helpful to the public's understanding of the hydrogeology at the facility.	Text in the Base Hydrogeology Section, Page 17 is revised and thicknesses of the hydrogeologic units if available are included.
19.	Site Characteristics, page 7	The discussion of the Permeable Lacustrine Zone should include a discussion of how and where the zone allows groundwater to move from the Upper Aquifer to the lower Aquifer. Also, the use of the acronyms MlU, PLZ, and FPA may make the discussion less accessible to the public. Consider eliminating the use of unnecessary and	Text in the Base Hydrogeology Section, Page 17 is revised to address the comment.

Item	Section, Page	Comment	Response
		potentially confusing acronyms.	
20.	Site Characteristics, page 8	The bulleted item on this page states that TCE from the OU1 groundwater plume has not reached the Flood Plain Aquifer. However, Flood Plain Aquifer monitoring well, OW- 06, has contained low (less than 1 ~g/l) but detectable concentrations of TCE since 2005. Revise this statement for accuracy, e.g., TCE has not been detected above the MCL in the Flood Plain Aquifer.	Text is revised and the referenced sentence deleted.
21.	Site Characteristics, page 8	The section states that the TCE concentrations have "consistently decreased through time." This statement is overly board. Based on Figure 5 of the Proposed Plan, it appears that the core plume concentration increased in the Upper Aquifer from 1995 to 2000 and in the Lower Aquifer from 2002 to 2007. Additionally, the Air Force's responses to Lahontan Water Board comments on the Draft Technical and Economic Feasibility Analysis (TEFA) states that, of the 60 wells evaluated, TCE showed increasing trends in 11 wells, decreasing trends in 25 wells, and the remaining wells show no discernible trend over time. Please reconcile these inconsistencies and clarify the text.	Text is revised and detailed description of the plume configuration through time is described in the Nature and Extent of Contamination, pages 17, 18, and 19.
22.	Site Characteristics, page 8	This section should be revised to acknowledge that additional plume delineation is proposed for the northern portion of the plume (in the vicinity of NZ-50) as described in the Draft TEFA.	Text on Page 18 is revised to address the comment.

Item	Section, Page	Comment	Response
23.	Site Characteristics, page 9	The text references Figure 5 as demonstrating the TCE plumes in the Upper and Lower Aquifers are "laterally stable at the 5 ug/L plume boundaries." There are several problems with the use of Figure 5 to support this statement. Firstly, the plume maps on this figure are too small to adequately characterize the plume extent, do not contain legible scales or show clear spatial references, such as the facility boundary, roads, the Mojave River, or other major landmarks (note: because of these deficiencies, Lahontan Water Board staff could not verify the accuracy of the plume maps). Also, the plume maps appear to portray more complex plume behaviors (e.g., lateral expansion and contraction, increasing and decreasing concentrations) than the text describes. The use of inconsistent time intervals between plume maps (ranging from 5 years to 5 months) is confusing and is not appropriate for the purpose of plume characterization. Revise this figure and text to correct these problems and to provide a more accurate characterization of the behavior of the plumes.	The figure referenced in the Draft Final OU 1 Proposed Plan is simplified and split in two (Figures 12 and 13) for ease of understanding.
24.	Summary of Site Risks, page 10	The acronym "COCs" should be defined the first time it is used. Also, consider minimizing the use of acronyms, if possible.	Acronym “COCs” is defined in the Background Section on Page 4, 1st paragraph.
25.	Figure 6, page 12	This figure should be revised so that the legend is larger and clearly legible. Also, the figure shows sites that are not	A revised Consultation Zone map is included the Draft Final Proposed Plan. The figure is revised and there are no other plumes depicted on the map.

Item	Section, Page	Comment	Response
		discussed in the Proposed Plan, e.g., non-CERCLA sites and OU3 sites. A brief discussion of these sites should be included in the text.	
26.	Non-Air Force Lands, page 13	The word "consultation" in the first sentence of the second bulleted item should be changed to "consult."	Summary of Remedial Alternatives section is completely revised and updated.
27.	Alternative 2, Alternative 2, page 15	The statement that San Bernardino County "will not permit any well in an area where City provided municipal water is reasonable available" should be revised to reflect the County's current position, which Lahontan Water Board staff understands to be that the County does not have the legal authority to deny a well permit based on that criteria.	Text is completely revised to address the comment.
28.	Summary of Preferred Alternative, page 19	The first sentence of this section, that the Lahontan Water Board concurs with the adoption of Alternative 2, is incorrect. To date, the Lahontan Water Board has not concurred with the selection of Alternative 2. Revise this sentence to accurately reflect this fact.	Text is completely revised to address the comment.
29.	Summary of Preferred Alternative, page 19	The acronym, ARARs, should be defined the first time it is used. Also, consider minimizing the use of acronyms, if possible.	“ARARs” is defined for the first time in Evaluation of Alternatives, 2, Page 37.

Attachment 2b

Regional Water Quality Control Board, Lahontan Region,
Review Comments Regarding the Draft Final Revised Proposed Plan, Operable Unit 1, Site CG070,
Former George Air Force Base, Victorville, CA (January 31, 2014)

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Item	*Section*	*Pg*	*Comments*	*Responses*
	Introduction		In accordance to the National Oil and Hazardous Substances Pollution Contingency Plan, the Proposed Plan must be revised to summarize major comments from the support agency (see Comment 30). Staff requests that the Air Force revise the Proposed Plan to address all of staff's comments prior to issuing the final version for public review. Staff believes that the current version does not clearly convey to the public the character of the site or the various alternatives. Additionally, staff requests that the Air Force work with the Lahontan Water Board to achieve a mutually agreement on the selected remedy for CG070 prior to issuance of the Operable Unit 1 (OU1) Record of Decision Amendment.	Major comments from the support agencies (RWQCB and EPA) are summarized on Pages 42 and 44. All Agency comments are provided below with Air Force responses. Agency comments that could be addressed before the Public Comment period begins are included in the document and the responses include a reference to the locations within the Proposed Plan where the adjustment has been made. Some comments are more appropriately addressed in later documents (the Record of Decision, Remedial Design or Long Term Monitoring Plan). Where that is the case, the future document is referenced in the response to comments. The Air Force is committed to working with the Lahontan Water Board and the EPA to achieve a mutually agreed-upon selected remedy for CG070 prior to issuance of the Operable Unit 1 (OU1) Record of Decision Amendment
1	General Comment		From December 1991 to March 2003, the Air Force operated a pump and treat system to remediate the OU1 groundwater contamination. This system was selected as the remedy for the groundwater contamination in the 1994 Record of Decision for OU1. The pump and treat system was successful in reducing the highest concentration from over 1,000 µg/L to just over 200 µg/L and it reduced TCE concentrations in the Flood Plain Aquifer to less than the MCL. However, the system had several performance issues and was shut down in 2003 to collect additional data and evaluate ways to optimize the system. The system was never restarted and the Proposed Plan describes the Air Force's current preferred alternative, i.e., MNA with land use controls and a water supply contingency plan. MNA is frequently implemented following active remediation. However, staff has concerns regarding the application of MNA to CG070 without any additional active remediation. Additionally, the proposed MNA plan does not include sufficient contingency remedies with clear triggers if the plumes migrate beyond the boundaries delineated in the Focused Feasibility Study. The Lower Aquifer and the Flood Plain Aquifer are the water supply aquifers for the region. Therefore, the remaining portion of this comment focuses on the effectiveness of the remediation of the Lower Aquifer and protection of the Flood Plain Aquifer. Based on the U.S. Environmental Protection Agency (USEPA)	This General Comment is one of the items that is better addressed in the Amended Record of Decision (ROD). No changes were made to the Proposed Plan on the basis of this comment because recent data demonstrate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the RODA. The attached graph shows maximum TCE concentrations over time for the two aquifers. The GETS was operational from 1991 through 2003. An increasing trend is noted from 2003 to 2005 in the Upper Aquifer and from 2003 to 2007 in the Lower Aquifer. However, since 2005, the Upper Aquifer maximum TCE concentrations show a declining trend and, since 2007, the Lower Aquifer maximum TCE concentrations show a stable trend. Because the decline occurs after operation of the GETS, it is apparent that the upper aquifer is declining as a result of factors other than operation of the GETS, probably degradation. The Air Force believes that the historical maximum TCE concentration data provides greater support for natural attenuation as a remedy than pump and treat. If abiotic degradation results from interaction with the aquifer matrix, the faster advection provided locally by pump and treat may decrease the natural attenuation that is occurring.

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Item	*Section*	*Pg*	*Comments*	*Responses*
			Directive, *Use of Monitored Natural Attenuation at Superfund, RCRA, Corrective Action, and Underground Storage Tank Sites* (April 1999), there are several problems with applying MNA to the CG070, which are described below. **a. Plume Stability**. The Directive states that the most important criteria for determining the appropriateness of MNA are a stable or decreasing plume and the potential for conditions that influence plume stability to change over time. In the absence of active remediation, stable or shrinking plumes are typically the result of natural processes that degrade the constituents of concern. The Air Force has found no evidence that natural degradation of TCE is occurring in site groundwater. The natural attenuation of TCE at this site appears to be exclusively the result of advection-dispersion, i.e., dilution of TCE concentrations as the plume moves away from the source areas. The Focused Feasibility Study found that TCE mass is continuing to increase in the Lower Aquifer as TCE moves down from the Upper Aquifer. The Air Force has not provided a trend analysis that adequately characterizes the behavior of the plume. The Air Force's groundwater model predicts that the Lower Aquifer plume will continue to migrate. The Air Force is proposing to allow the portion of the Lower Aquifer plume that is above the MCL to migrate up to a boundary (referred to as the not-to-exceed line) as shown in Figure 9 of the Proposed Plan.	We do not agree that the Air Force has found "no evidence that natural degradation of TCE is occurring in site groundwater". Concentration declines in both aquifers since 2009 indicate that more than simple advection-dispersion is operating on site. Compound Specific Isotope Analysis and CENSUS analysis were performed on selected groundwater samples to evaluate evidence for anaerobic TCE biodegradation in either the Upper or Lower Aquifer. These analyses indicated that bio-attenuation is not highly active. It is more likely that abiotic processes are working to reduce the concentrations. The Focused Feasibility Study was completed in 2010/2011 before the more recent sampling results that demonstrated a dominant downward trend. From 2009 to present, wells in the upper aquifer showed 1 upward trend, 29 stable trends, 20 downward trends, and 4 wells with no trend because they have had no detections. Wells in the lower aquifer showed 5 upward trends, 19 stable trends, 8 downward trends, and 33 wells with no trend because they have had no detections. These trends suggest that the TCE mass in the Lower Aquifer is now declining. Various analyses may be performed as a part of the CG070 monitoring and reporting activities to determine what abiotic processes are occurring. For example, analyses of ethene and methane in selected wells, comparison of those daughter products to the concentrations of typical bioattenuation daughter products, and characterization of the site mineralogy. These may assist in accurately defining a "zone of attenuation" that includes advection-dispersion and abiotic processes. The 5-year review process will be used to evaluate the

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Item	*Section*	*Pg*	*Comments*	*Responses*
				effectiveness of the remedy in meeting clean up goals and protection of human health and the environment.
			b. Timeframe for cleanup. The Focused Feasibility Study used the results of a groundwater model in its comparison of the relative performance of some of the alternatives and these results are incorporated in the evaluation of alternatives that is summarized in the Proposed Plan. Although there is uncertainty associated with the model's predictions of the cleanup timeframes, the model results are usable as very general estimates and provide a basis to evaluate the relative performance of the alternatives. The model estimated that, in the Lower Aquifer, it will take more than 500 years for TCE concentrations to dilute to levels at or below the MCL using the MNA alternative and 100 years to reach MCLs using a pump and treat (active remediation) alternative. State Water Resources Control Board, *Resolution No. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304* requires that a cleanup effort must achieve compliance with cleanup goals and objectives in a "reasonable timeframe." The EPA Directive states that the MNA remedy is appropriate where it has been demonstrated to be capable of achieving a site's remediation objectives within a timeframe that is reasonable compared to the timeframe offered by other methods. Staff does not believe that a 500-year cleanup timeframe for a regional water supply aquifer is reasonable compared to a 100-year timeframe to achieve cleanup goals using active remediation.	The Focused Feasibility Study alternative (Alternative 4) describing and modeling a pump and treat scenario is actually described as taking 200 years to complete. The Lower Aquifer is described as taking 100 years to reduce concentrations below the MCL. However, it is not appropriate to decouple the two aquifers. The aquifer system as a whole will take 200 years to complete remediation because the Upper Aquifer acts as a source of TCE to the Lower Aquifer.; groundwater containing TCE moves naturally downward from the Upper to the Lower Aquifer. At present the VVWRA has no plan to stop using the ponds. Instead, it appears that additional ponds may be constructed with associated additional discharges. However, should the discharges ever cease, the five-year reviews mandated by the CERCLA process will detect changes in groundwater flow with the potential to impact plume migration in time to adjust the remedy. Triggers and contingencies are best left to the design of the Long Term Monitoring Plan (LTMP) to be completed during the Remedial Design. Triggers, using statistical analysis, can be defined for sentinel wells. For the proposed plan, the AF will be clear that the Remedial Design will be robust enough to ignore false positives but will have contingencies such as evaluating the use of an active methodology (such as groundwater removal and treatment, hydraulic control, or in situ reduction of concentrations at the site of the observation of concentrations above the MCL). It is possible that a more accurate estimate of the "time to completion" for MNA might be made during the ROD and Remedial Design based on analyses of exponential decay now available given the more recent data showing concentration declines,

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Item	*Section*	*Pg*	*Comments*	*Responses*
			c. Significant Uncertainties Associated with the Application of the Proposed Remedy Over a 500-Year Timeframe. The USEPA Directive states that, in cases of a long cleanup timeframe, uncertainties increase dramatically. The uncertainties associated with MNA include the following. • **Plume Migration**. There are significant uncertainties regarding factors that could influence the direction and extent of plume migration, including artificial recharge and extraction. Currently, the Victor Valley Wastewater Reclamation Authority's (VVWRA) infiltration ponds create a groundwater mound that deflects the plume to the northwest, away from the Flood Plain Aquifer and the Mojave River. If VVWRA stops using these ponds (e.g. through increased use of recycled water), the Lower Aquifer plume will move toward the Flood Plain Aquifer and the Mojave River. Other potential influences on plume migration are the City of Adelanto infiltration ponds, groundwater extraction from nearby supply wells, including municipal supply wells for the cities of Adelanto and Victorville. These potential influences would not be controlled by the Air Force's proposed land use controls. Over a 500-plus period, these uncertainties and additional uncertainties associated with the model could cause the plume to behave significantly differently than as predicted by the model. Additionally, the Air Force's proposed remedy does not include any remedial contingencies if the plume migrates beyond the not-to-exceed line. The USEPA Directive recommends that such contingencies and clear triggers should be in place at sites with a significant degree of uncertainty. • **Reliability of Maintaining a Monitoring over long time periods.** There must be adequate performance monitoring and remedial contingencies with clear triggers at sites with a significant degree of uncertainty as described in the guidelines in USEPA's guidance on *Performance Monitoring of MNA Remedies for VOCs in*	The LTMP, to be completed during the Remedial Design, will address contingencies and triggers should the plume stability analysis indicate the plume is likely to migrate past the defined boundaries. The mechanism within CERCLA that addresses uncertainty over time is the 5-year review process. Whether the Air Force is performing a 200-year active remediation or 500-year monitoring, the 5-year reviews will be performed to ensure that the remedy remains viable and on track. The 5 year reviews will evaluate the effectiveness of LUCs over time.

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Item	*Section*	*Pg*	*Comments*	*Responses*
			Ground Water (April 2004). How such a system would be maintained over a 500 year period that could include political and climatic changes is subject to a great deal of uncertainty. • **Land Use Controls.** The Air Force is proposing a complex, layered approach to land use controls involving interagency coordination and notifications. There is a great deal of uncertainty in terms of how this complex system will be effectively maintained over 500 or more years. Staff recognizes that MNA will be a component of any remedy applied to this site. However, staff finds that the Air Force's proposed remedy does not include active remediation that would reduce TCE concentrations and achieving cleanup goals in a reasonable timeframe. Further, the proposed remedy does not contain clear triggers and contingencies that are needed to address plume migration if and when it occurs.	
2	Document Title and Section A, Introduction		The draft version of the document was titled "Proposed Plan. In the current version, it is referred to as the "Revised Proposed Plan." The Introduction section should explain why the current document is considered "revised."	The introduction has been revised to explain why the current document is considered "revised."
3	Section B, Site Background	4	This section states that groundwater at CG070 is impacted by volatile organics. This discussion should be revised to state that the plume also includes nitrate contamination.	This discussion is revised to state that a Nitrate plume has also been identified.
4	Section B, Site Background	4	The discussion of the fire training areas should be revised to clarify that OU3 fire training areas, FT019a and FT019c, are sources for the CG070 groundwater plume.	The discussion in "OU1 Specific Background" on page 5 already states that "Sources of VOCs in CG070 are OU3 soil Sites FT019 (a and c) and OU5 Site FT082. Soil at Sites FT019 (a and c)"

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Item	*Section*	*Pg*	*Comments*	*Responses*
5	Section B, Site Background, Heading CG070 (TCE Groundwater Plume)	5	The text states that the monitoring data showed that the concentration of TCE in groundwater was not significantly reduced during the period of the pump and treat remedy. The evaluation of trends over time at this site is challenging because: 1) changes in the monitoring programs, e.g., many of the monitoring wells with the highest concentrations were converted to extraction wells, 2) the plume was not fully delineated when treatment was initiated, and 3) the lag time between when the treatment system began operating and when the effects were observed in downgradient wells. However, there was a significant decrease in the highest concentrations detected before and during the treatment system operation, December 1991 to March 2003. The highest concentration detected during this period was over 1,000 µg/L and several of the wells reported concentrations in excess of 200 µg/L. Since 2004 there have only been a few detections above 200 µg/L. Therefore, it appears the treatment system was effective in reducing the highest concentrations of TCE in groundwater. Additionally, the treatment system was also successful in reducing the concentrations of TCE in the Flood Plain Aquifer to below the MCL.	No changes we made to the Proposed Plan on the basis of this comment. Recent (2012 and 2013) data indicate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD. The attached graph showing maximum TCE concentrations over time for the two aquifers and the time period of operation of the GETS does not confirm that there was a significant decrease in the highest concentrations detected before and during the treatment system operation. Instead concentration declines in both aquifers since 2009 indicate that it is more likely that abiotic processes are working to reduce the concentrations. A review of the individual well graphs show that the concentrations in the majority of the wells began to decline after the GETS system was shut down and have continued to decline or remained stable since the shut down. The Air Force considers this to be evidence of degradation rather than cleanup by the pump and treat system.
6	Section B, Site Background	8	The text states that data suggests that the treatment system was causing migration from the Upper Aquifer to the Lower Aquifer. This statement is overly board and should be revised in accordance with the Focused Feasibility Study, i.e., the Air Force discharged the treated groundwater in areas overlying the Upper Aquifer plume and the infiltration of this water into the Upper Aquifer plume appears to have increased the lateral and vertical migration of TCE.	The statement has been revised.
7	Figure 3	7	This figure should be revised as two figures, one showing the extent of TCE in the Upper Aquifer and one showing the extent of the TCE in the Lower and Flood Plain Aquifers. The figures should show the extent of TCE impacts (i.e., greater than the detection limit of 0.5 µg/L) and the extent greater than the MCL. The figures should indicate the year the data used to delineate the extent was collected.	The figure could not be revised in the time allotted, because the requested extent of TCE impacts greater than the detection limit of 0.5 µg/L could not be finalized in consultation with the EPA and the Lahontan Board.

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Item	*Section*	*Pg*	*Comments*	*Responses*
8	Section B, Site Background	8	The second paragraph on this page describes an optimization study. Include the reference(s) that report the results of this effort.	No changes we made to the Proposed Plan on the basis of this comment. No formal optimization report was prepared. Changing conditions since 2003 require that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD.
9	Table 1, Chemicals of Concern	10	Staff understands the text's focus on the Lower Aquifer since it is the regional supply aquifer. However, for completeness, revise the text to include the chemicals of concern and concentrations in the Lower Aquifer and Upper Aquifer.	The Table has been revised to include the chemicals of concern and concentrations in the Lower Aquifer and Upper Aquifer.
10	Section C, Site Characteristics, Heading: Upper Aquifer	17	The document should include a map showing the extent of the Upper Aquifer. The discussion of the unit's thickness should be revised to indicate that it thins to less than 5 feet before pinching out entirely in the eastern portion of the facility. This section should make it clear that this is a perched aquifer, i.e., is separated from the Regional Aquifer by an unsaturated zone. The section should also discuss whether there are any known users of this aquifer.	The text of the "Upper Aquifer" section on page __ has been revised to include the suggested discussion.
11	Section C, Site Characteristics, Heading: Lower (Regional) Aquifer and Heading: Flood Plain Aquifer	17	These sections should make it clear that these two aquifers are the water supply aquifers for the region. These sections should include discussions of the current uses of these aquifers. The cities of Adelanto and Victorville have municipal water supply wells that extract water from these aquifers just east and south of GAFB.	The text has been revised.
12	Section C, Site Characteristics, Heading: Nature and Extent of Contamination		This section's discussion of the nitrate source seems to be saying that nitrate was present in TCE contaminated wastewater. The text should be revised to describe the mobilization of nitrate from the former sewer treatment plant percolation ponds as described in Appendix A of the Focused Feasibility Study and as referenced under the second bullet on page 18 of the Proposed Plan.	The text has been revised to remove the reference to Nitrate in the first paragraph and defer discussion of the Nitrate source to the discussion later in the sixth paragraph..

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Item	*Section*	*Pg*	*Comments*	*Responses*
13	Section C, Site Characteristics, Heading: Nature and Extent of Contamination	18	The second paragraph on this page should discuss the extent of TCE impacts to groundwater that are below the MCL but above background. The text should also discuss how the TCE mass appears to be decreasing in the Upper Aquifer and increasing in the Lower Aquifer as shown in Figure 1-19 of the Focused Feasibility Study.	No changes we made to the Revised Proposed Plan on the basis of this comment. Recent (2012 and 2013) data indicate that the mass may actually be reducing in the Lower Aquifer. Because of this change, the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD.
14	Section C, Site Characteristics, Heading: Nature and Extent of Contamination	18	The discussion of historical and recent data on nitrate does not discuss data collected since 2006. The document should be revised to reflect current data. If this data is not available or is not considered usable or complete, the Air Force should discuss these deficiencies and its plans to characterize the current extent of the nitrate plume.	No changes we made to the Revised Proposed Plan on the basis of this comment. Recent (2013) data indicate that the Nitrate plumes may actually be significantly reduced in both aquifers. A plan is in preparation to sample for Nitrate in April to confirm the reduction. Because of this change the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD and Remedial Design.
15	Section D, Scope and Role of Operable Units	26	The first sentence of this section describes the Air Force's overall cleanup strategy for GAFB." This statement should be revised to include compliance with Federal and State ARARs.	"Compliance with Federal and State ARARs" has been added.
16	Section E, Summary of Site Risks, Heading: Human Health Risk Assessment	28	The discussion of risk is not consistent with the Draft Proposed Plan and the Focused Feasibility Study. For example, the Proposed Plan does not contain the risk posed by the Upper Aquifer described in Section 2.1 of the Focused Feasibility Study and summarized in Table 2-1 of the Focused Feasibility Study. The section should be revised for consistency with the Focused Feasibility Study.	No change was made to the current document. The recent changes in concentration trends at the site may require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD and Remedial Design.
17	Section E, Summary of Site Risks, Heading: Risk Conclusion Summary	31	The first paragraph on this page contains the sentence, "The Lower Aquifer groundwater is considered a potential future source of drinking water." The Lower Aquifer is a current source of drinking water in the immediate vicinity of GAFB. Revise the text accordingly.	The text has been changed to state that "*The Lower Aquifer groundwater is current source of drinking water south and East of GAFB."*

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Item	*Section*	*Pg*	*Comments*	*Responses*
18	Section F, Remedial Action Objectives	31	The compilation of primary MCLs for the constituents of concern must be revised to include California MCLs when the California MCL is lower than the federal. The California MCLs are included in Table 2.2 of the Focused Feasibility Study.	The California MCLs are now included
19	Section G, Summary of Remedial Alternatives, Heading: Monitored Natural Attenuation	32	This section should include a discussion of specific processes responsible for natural attenuation at CG070, i.e., dispersion and dilution of the plume as it moves outward, and that there is no evidence of degradation of the contaminant mass.	Dispersion and dilution of the plume are defined in this section. Downward trends of TCE concentrations indicate that there is evidence of degradation of the contaminant mass. This evidence will be further documented during preparation of the ROD.
20	Section G, Summary of Remedial Alternatives, Heading: Institutional Controls for Non-Air Force Lands	33	The first full paragraph on this page states that the Institutional Controls (ICs) will be implemented by various agencies, including the Lahontan Water Board. However, the only role described for the Lahontan Water Board under this heading is for consultation purposes and not implementation of any of the ICs. Please revise the text to better characterize the Lahontan Water Board's role in the ICs described under this heading.	The text has been revised to indicate the Lahontan Board will serve in a consultative role. DON?
21	Section G, Summary of Remedial Alternatives, Heading: Institutional Controls for Non-Air Force Lands	33	The term "de minimis user" is used throughout the following text. Staff suggests that it be included in the document's Glossary of Terms.	The proper usage is "Minimal Producer" and it has been added
22	Section G, Summary of Remedial Alternatives, Heading: Institutional Controls for	33	The fifth bulleted item on this page states that the City of Victorville will control and prohibit the construction of permanent, unlined surface impoundments that might cause migration of the plume. Staff requests the Air Force provide the documentation that shows the City has committed to this prohibition. Additionally, specify who will make the determination regarding the potential to cause migration and any criteria this entity will	Deferred to the preparation of the RODA

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Item	*Section*	*Pg*	*Comments*	*Responses*
	Non-Air Force Lands		employ.	
23	Section G, Summary of Remedial Alternatives, Heading: Institutional Controls for Air Force Lands	34	This section states that covenants will prohibit the construction of unlined surface impoundments, "if it is determined that such construction might cause migration of the plume." Please specify who will make that determination and any criteria this entity will employ.	The text has been revised to state *"if it is determined **by the Air Force**, that such construction might cause migration of the plume"*
24	Section G, Summary of Remedial Alternatives, Heading: The No-Action and Remedial Action Alternatives	Pages 34 through 36	Under each subheading for the various alternatives, the Air Force includes the estimated cleanup times for the Upper Aquifer, Permeable Lacustrine Zone, and the Lower Aquifer. The Permeable Lacustrine Zone was not considered an aquifer in the Focused Feasibility Study. For the purposes of clearly communicating to the public, the staff recommends only considering the cleanup time for the Upper and Lower Aquifers. Staff also recommends further emphasizing the cleanup times for the Lower Aquifer since it is the water supply aquifer for the region.	References to times to achieve the cleanup goals for the Permeable Lacustrine Zone have been removed.
25	Section G, Summary of Remedial Alternatives, Heading: The No-Action and Remedial Action Alternatives	Pages 34 through 36	This section does not discuss the uncertainty associated with the estimates of the cleanup timeframe. The groundwater model used for these estimates was accepted by the regulators as a tool to evaluate the relative performance of the alternatives. As stated in the Focused Feasibility Study, the cleanup times used in the remedial action evaluation "are only estimates and do not predict actual cleanup times." The Focused Feasibility Study statement that the estimates may underestimate the time required for cleanup should also be included. The text should be revised to convey these qualifications regarding the cleanup times.	No changes we made to the Proposed Plan on the basis of this comment. Recent (2012 and 2013) data indicate that the uncertainty may also include a more rapid than anticipated time to attain cleanup goal and will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD.

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Item	*Section*	*Pg*	*Comments*	*Responses*
26	Section H, Evaluation of Alternatives, Heading: Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	37	The second to the last sentence under this heading is inaccurate and must be revised. The Focused Feasibility Study estimated that the time to cleanup the Lower Aquifer, the regional water supply aquifer, for Alternative 4 is 100 years. This time estimate is reported correctly on page 36 of the Proposed Plan. The time estimates for cleanup of the Lower Aquifer under the other alternatives was greater than 500 years. As stated above, these are estimates, but the results indicate that Alternative 4 results in a significantly shorter cleanup time than the other alternatives for the regional water supply aquifer.	No changes we made to the Proposed Plan on the basis of this comment. Recent (2012 and 2013) data indicate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD.
27	Table 2: Detailed Remedial Action Alternative Evaluation and Comparative Analysis	39	The relatively timeframe to reach remedial goals is an important component in the "Reduction in Toxicity Mobility or Volume" criteria and should be a considered in evaluation of the alternatives. Therefore the information for the cleanup times for the aquifers should be included in this table.	The table is referenced directly from the FS and should not be altered as it is best considered in reference to the FS text. The timeframes are clearly listed in the text for consideration.
28	Section H, Evaluation of Alternatives, Heading: Reduction in Toxicity, Mobility, and Volume Through Treatment	40	See Comment 27. Alternative 4 results in a cleanup time for the Lower Aquifer, the water supply aquifer, that is five times faster than the other alternatives. This is an important component in the comparison of the alternatives and should be discussed here.	No changes we made to the Proposed Plan on the basis of this comment. The cleanup time for the remedy is 200 years. Lower and Upper Aquifer cleanups cannot be decoupled because groundwater containing TCE moves naturally downward from the Upper to the Lower Aquifer. In addition, recent (2012 and 2013) data indicate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the ROD.
29	Section H, Evaluation of Alternatives, Heading State Acceptance	41	The National Oil and Hazardous Substances Pollution Contingency Plan Section 300.430(f)(2) requires that the Proposed Plan summarize major comments from the support agency. The Proposed Plan must be revised to include a summary of Comment 1 in its discussion of agency acceptance.	This portion of the Proposed Plan has been revised to include a summary of Comment 1 in its discussion of agency acceptance. However, as discussed in the response to Comment 1 recent data demonstrate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the RODA.

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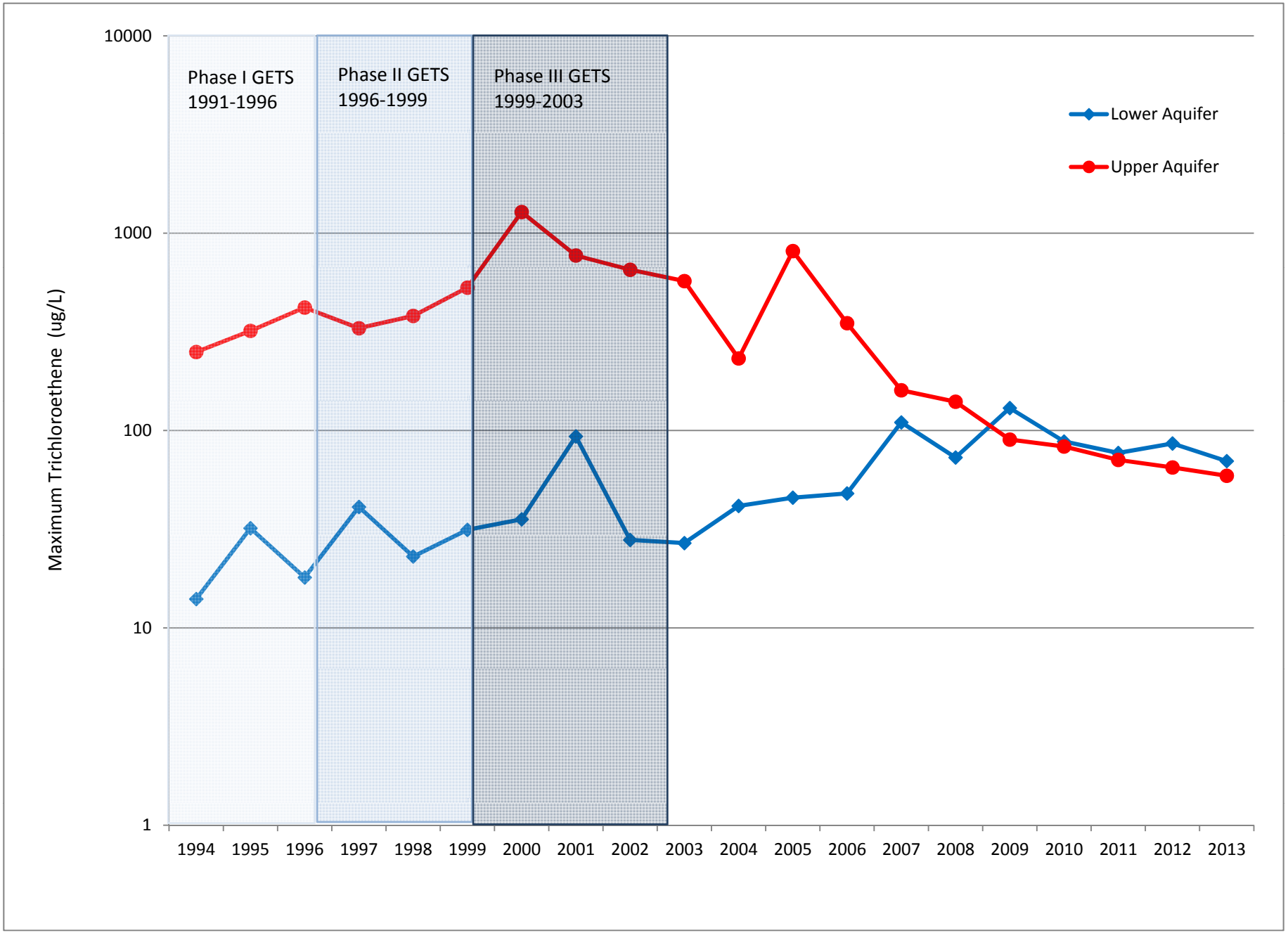
Item	*Section*	*Pg*	*Comments*	*Responses*
				The LTMP, to be completed during the Remedial Design, will address contingencies and triggers should the plume stability analysis indicate the plume is likely to migrate past the defined boundaries.
30	Section H, Evaluation of Alternatives, Heading State Acceptance	41	The second and third paragraphs states that groundwater would require treatment because of naturally-occurring arsenic. Water Board does not agree that this has been established for all groundwater beneath the former GAFB. The statement should be deleted.	The reference to treatment of naturally-occurring arsenic has been deleted.
31	Section J, Community Participation	42	The process of finalizing the preferred alternative should be revised to reflect regulator acceptance of the remedy.	As discussed in the response to General comment 1, no significant changes were made to the Proposed Plan on the basis of this comment because recent data demonstrate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the RODA.
32	Glossary	44	*California Regional Water Quality Control Board, Lahontan Region (Lahontan Water Board)* The glossary definition should be revised to state the following: "The lead State regulatory agency whose role is to preserve, enhance, and restore the quality of California's water resources for the benefit of present and future generations and to ensure the cleanup efforts comply with all State requirements."	The glossary definition has been replaced with the suggested language.
33	Proposed Plan Mailing List		Please ensure that the people that indicated interest in Operable Unit 5 Proposed Plan are included in the mailing for the OU1 Proposed Plan	Done.

Maxiamum TCE Concentration Over Time by Aquifer



Data is from the Former George ABF Database

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Item	Section	Pg	Comments	Responses
General Comment 1			The Introduction does not explain why George AFB is publishing a Revised Proposed Plan with resultant Record of Decision Amendment (RODA). Without this explanation up front, the reason for Proposed Plan production is unclear. Please briefly explain the reason for Revised Proposed Plan production and the RODA in the Introduction.	The text in the introduction has been revised as requested.
General Comment 2			The Glossary is nicely populated with definitions; however, the frequent use of acronyms throughout the text strongly suggests the need for a separate acronym list. Please create a separate acronym list to enhance readability for those who are unfamiliar with the terminology.	An acronym list has been added
Specific	**Comments**			
1	Section A, Introduction,	2	The first sentence in the first paragraph on this page cites Section 300.435(C)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan; however, it does not explain that this section applies to significant changes in an existing remedy. Please add an explanation that clarifies how this citation applies to the Revised Proposed Plan.	The explanation was added.
2	Section B, Site Background	4	The sixth paragraph in this section discusses Site CG070; however, the text in this paragraph does not explain how trichloroethylene (TCE) and volatile organic compounds (VOCs) warranted a Record of Decision and this Proposed Plan. Please include a statement explaining how TCE and VOCs became an issue at George.	The statement explaining how TCE and VOCs became an issue at George has been included.
3	Figure 3	7	The second paragraph on page 8 refers to the extent of the groundwater plume shown on Figure 3; however, Figure 3 has limited landmark references. Please include landmarks, such as street names, so that readers can identify the extent of the plume boundaries.	There are no streets which could serve as good landmarks within the boundary of the map. However, the airport runway and Mojave River are significant landmarks and are called out on the map.

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Item	Section	Pg	Comments	Responses
4	Table 1, Chemicals of Concern	10	The maximum contaminant levels (MCLs) for each contaminant of concern (COC) are not listed. Please include in Table 1, MCLs for each COC.	Table 1 has been revised to include the MCLs.
6	Section C, Site Characteristics	15	The second paragraph on this page indicates that land above Site OU1/CG070 is zoned for commercial/industrial/ agricultural uses; however, the remainder of this section prior to Base Hydrogeology does not discuss agricultural protectiveness. Please include text that assures readers that agricultural wells, as well as agrarian uses are also protected.	Done.
7	Section C, Site Characteristics	18	The first sentence in the seventh paragraph on this page introduces the term “attenuating”, which is not bolded nor defined in the Glossary. Please bold this term and define it in the Glossary.	This term is defined in the Glossary.
8	Section C, Site Characteristics	18	The seventh paragraph discusses nitrate plume reductions over time and refers to Figure 11; however, the eastern plume boundaries on Figure 11 are straight lines that truncate the plumes. Please clarify whether the stated reductions in plume volumes represent the total plume volume or whether they represent plume reductions within base boundaries.	The 2000 plumes are constrained by the base boundary. However, the recent data show that the plume is limited to a few wells that are surrounded by wells with concentrations below the MCL. The remnants of the plume are restricted to the base property.
9	Figure 9, TCE Plume Boundary Map – Not to Exceed 5 ug/L	20	In the printed form, this figure is not readable, especially the cross-sectional diagram below the main figure. Further, there are no landmarks to identify plume boundaries. Please remove the cross-section and present it as its own figure and include street names or landmarks.	The two portions of the Figure are now included as Figures 9a and 9b. The primary landmarks visible in the map area are the airport runway and the Mojave River.
10	Figure 11, Nitrate Plume Map for Lower Aquifer	22	It appears that nitrate plume boundaries on the eastern side of this figure are either missing are in a perfectly straight line. Please include the nitrate concentrations above MCLs on the eastern side of the base boundary on this figure, or explain why it is not necessary to present the full extent of the plumes.	See comment 8 above

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Item	Section	Pg	Comments	Responses
11	Figure 14, Water Supply Wells Downgradient from the Lower Aquifer Plume	25	When printed out on an 8 x 11 inch sheet of paper, the supply wells are difficult to identify and impossible to associated with the TCE and nitrate plumes. Please embolden the supply wells and overlay the plumes so that the community can see what this figure is attempting to depict.	The suggested changes have been made to the figure.
12	Figure 14, Water Supply Wells Downgradient from the Lower Aquifer Plume	25	The significance of Figure 14 is not discussed within the text of the Draft Final Revised PP (the only reference is for additional delineation in the vicinity of EW-6). Since this figures shows water supply wells, it should be discussed in the text of the PP. Please revise the PP to discuss Figure 14 in the text of the Draft Final Revised PP.	The following has been added to the end of the section: *"The relationships of the TCE plumes in the aquifers to the potential and actual water supply wells are shown on Figure 14."*
13	Section E, Summary of Site Risks	27	Text in the paragraph starting "Risk assessors use conservative concentrations for the COCs" should be revised to explain how using an average concentration is conservative. Logically, it would appear to be more conservative to use the highest concentration. Please revise the Draft Final Revised PP to provide an explanation of how an average concentration is conservative.	Deferred to the preparation of the RODA
14	Section E, Summary of Site Risks	28	In the first bullet in the right column, the intent of this statement is unclear: "People will be exposed to groundwater used as potable water from wells in on-site and off-site locations." For example, people exposure to uncontaminated groundwater is not a risk, while people exposure to contaminated groundwater could be a risk. Please revise the text to clarify this statement.	The text has been revised
15	Section E, Summary of Site Risks, 4-TCE in Off-Site Water Supply Wells and Risk Conclusion Summary	29 and 30	The risk 5x10-7 falls below the risk management range, but the text states "The total cancer risk falls within the EPA risk management range." Please resolve this discrepancy.	**"**Within' has been changed to "below"

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Item	Section	Pg	Comments	Responses
16	Section G, Summary of Remedial Alternatives	31-37	The components of the Remedial Action alternatives do not include the disposition of the existing water treatment system. Please clarify whether the existing water treatment system will remain off, or whether its disposition changes with each alternative.	For alternatives with active pump and treat, the existing water treatment system, an air stripping tower, is not functional and likely would require refurbishment of the existing system
17	Section E, Summary of Site Risks, Human Health Risks at the Skeet Range	32	Monitored natural attenuation (MNA) is not a technique; it is considered a technology or remedy. Alternatively, the first sentence should be reworded to state something like "Groundwater monitoring is the component of MNA that is used to evaluate the process of natural contaminant reduction (i.e., attenuation) processes…" Please revise the Draft Final Revised PP to define MNA as a technology or remedy and reword accordingly.	The text has been changed to "technology".
18	Section G, Summary of Remedial Alternatives	37	The last sentence on the page indicates that the estimated timeframe for achieving cleanup goals for all alternatives would be the same; however, the remedial alternative comparison on Page 36 indicates that Alternative 4, Pump-and-Treat, would result in cleanup of the Lower Aquifer in 100 years. The text indicates that the other alternatives would cleanup the Lower Aquifer in 500 years. Please revise the last statement to be consistent with the explanation of Alternative 4 on Page 36.	The text has been revised to state that the timeframe for achieving the chemical-specific ARARs for TCE is similar for all the alternatives, i.e., more than 100 years for both aquifers.
19	Table 2	39	Table 2 does not provide enough distinction for a comparative ranking of cost. Currently the only two categories are "most favorable" and "least favorable." Since there is a significant difference between 62M and 164M, it would appear that additional categories could be developed. Please revise Table 2 to provide more categories and more	The table is referenced directly from the FS and should not be altered as it is best considered in reference to the FS text. The costs are listed in the text for consideration.
20	Section H, Evaluation of Alternatives	40	The alternative explanations of short-term effectiveness on this page do not correspond to the details for short-term effectiveness contained in Table 2: Detailed Remedial Action Alternative Evaluation and Comparative Analysis. For example, Alternatives 1 and 2 in the table are "least favorable," but the textual explanation does not reflect this conclusion. Since there is minimal impact to site workers, residents, and the environment for Alternative, it appears that this Alternative is more favorable than Alternatives 4 and 5. Moreover, Alternative 4 is most favorable and Alternative 5 "least favorable," but both Alternatives 4 and 5 are treated similarly in the text. Please revise the text to reflect the	Deferred to the preparation of the RODA

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Item	Section	Pg	Comments	Responses
			alternative analysis for short-term effectiveness as shown in Table 2.	
21	Section J, Community Participation	43	This section does not contain information about community involvement. Please include information on Air Force outreach efforts in this section, if applicable.	Deferred to the preparation of the RODA
22	Section J, Community Participation	43	The hours operating hours of the Administrative Records Office are not included in the third paragraph on this page. Please include the hours of operation of the Administrative Records Office in this paragraph.	Because the phone is only manned intermittently throughout the day, the text was not changed.
Minor Comments				
1	Figure 1	3	The text box in Figure 1 is confusing. It appears to have a title "We are here for OU1 Groundwater" followed by a loosely formulated sentence. The confusion is associated with capitalization of "Groundwater" on the first line and capitalization of "Because," the first word on the second line. This information is very important in the explanation of the purpose of the Revised Proposed Plan and should be very clear. Please change the "G" in Groundwater to lowercase and add a period after "groundwater" to clarify that there are two sentences.	Done.
2	Section B, Site Background	8	The first sentence in the first paragraph on this page introduces the bolded terms Upper Aquifer and Lower Aquifer. Please include a reference to Figure 8, Basic Hydrogeology, for clarification.	"*Figure 8 shows the aquifers in relation to each other.*" Has been added to the text
3	Table 1, Chemicals of Concern	10	The term Vinyl Chloride has a question mark after TCE in its definition. Please ascertain whether the question mark should remain or not before finalizing the plan.	The table has been revised to address Lahontan Board comments. The question mark is removed.

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Item	Section	Pg	Comments	Responses
4	Section C, Site Characteristics	18	The last sentence in the fifth paragraph on this page mentions Figure 14; however, the last figure introduced was Figure 8. Please renumber figures in the order of introduction throughout the text.	The paragraph containing the reference to Figure 14 has been moved to the end of the section and the figure call outs are now in order.
5	Section G, Summary of Remedial Alternatives	31	The text reads "monitoring natural attenuation," which should read "monitored natural attenuation." Please resolve this discrepancy.	Done
6	Glossary	44	The term "Background Concentrations" is ambiguous. The text describing this term indicates the background concentrations are "naturally occurring" concentrations. Please revise the definition in the Glossary to reflect the text in Section E, Summary of Site Risks, Page 26.	The definition in the Glossary has been revised.
7	Glossary	48	The term "Primary Sources "is not in alphabetical order. Please insert the definition of "Primary Sources" into its correct alphabetical sequence.	Done
Review of Response Comments on the Draft Final Revised Proposed Plan Operable Unit 1, Site CG070, Former George Air Force Base, California, December 2013				
1	Response to General Comment 1		The response addresses the comment, but a number of working and reference issues remain. Also, some text needs to be clarified. Please review the new comments that have been include below to identify these issues.	See the responses below

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Item	Section	Pg	Comments	Responses
2	Response to General Comment 3		While the response indicates that the text has been revised to address the concerns of the comment, it does not appear that Draft Final Revised Proposed Plan Operable Unit 1, Site CG070, Former George Air Force Base, California, December 2013 (the PP) includes an adequate description of the nitrate contamination and how the decreasing concentrations of nitrate over time demonstrates that monitored natural attenuation (MNA), the preferred alternative, is a viable remedy to address nitrate, even though trichloroethene (TCE) is the primary risk driver and the chemical of concern. Further, the text does not explain why the nitrate plume in the lower aquifer appears in a different location in 2006 than it was in 2000. Please review the comment and revise the PP to provide a discussion of how the decreasing concentrations of nitrate over time demonstrates MNA is a viable remedy to address nitrate, even though TCE is the primary risk driver and the chemical of concern and provide a discussion that explains they the nitrate plume appears in a different location in 2006 than it was in 2000	Deferred to the preparation of the RODA
3	Response to Specific Comment 10		The response addresses the comment; however one additional "site" should be removed from Section J, Page 43, second full paragraph: "OU1 site documents…" should be changed to "OU 1 document" or to "OU 1/Site CG070 documents." Please resolve this issue.	“Site” has been removed.
4	Response to Specific Comment 13		The response partially addresses the comment; however, "bluffs' occurs on Page 17 (near the top of the right column), but this feature was not added to Figure 3. Please resolve this discrepancy.	“Bluffs” replaced by “PLZ”
5	Response to Specific Comment 17		The text no longer discusses the presence of TCE in the Middle Lacustrine Unit (MLU). Since Figure 9 indicates that TCE is present in the MLU, the text should be revised to discuss this and include the revised statement providing in the original comment that "the movement of TCE is retarded in the MLU." Please review the original comment and discuss the presence of TCE in the MLU.	No changes were made to the Proposed Plan on the basis of this comment because recent data demonstrate that the approach to the remedy will require additional consultation between the Air Force and the Lahontan Board. These consultations will occur during preparation of the RODA.

EPA Region IX Review Comments Regarding the Draft Final Revised Proposed Plan Operable Unit 1, Site CG070, Former George Air Force Base (February 4, 2014)

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Item	Section	Pg	Comments	Responses
6	Response to Specific Comment 28		It is still unclear how the concept of a Consultation Zone applies to the OU 1/CG070 contaminant plumes area. The PP needs to be revised to explain this concept fully. For example. It is unclear if a Consultation Zone will be established for the OU1/CG070 contaminant plumes area. The glossary definition does help to define the Zone, but this should be incorporated into the text of Section G. Please revise the PP to discuss the concept of a Consultation Zone as it applies to the OU 1/CG070 contaminant plumes area.	Deferred to the preparation of the RODA
7	Response to Specific Comment 30		The response partially addresses the comment; however, the text on Page 34 does not explain what would happen if a well is installed into the plume. For example, it is unclear if the Air Force would provide potable water. Please provide a discussion of what would happen if a well is installed into the contaminant plume.	Deferred to the preparation of the RODA