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EXPLANATION OF SIGNIFICANT DIFFERENCES MEMORANDUM FOR AIR FORCE PLANT 4 NAS FORT WORTH TX

4/10/2007

AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE

CARSWELL AFB
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 743

Explanation of Significant Differences Memorandum

Air Force Plant 4 Superfund Site
EPA ID# TX7572024605
Fort Worth, Tarrant County, Texas

This U.S. Environmental Protection Agency (EPA) memorandum documents the EPA's concurrence to the attached Final Explanation of Significant Differences East Parking Lot Groundwater Plume and Terrace Alluvial Flow System, Air Force Plant 4, Fort Worth, Texas (April 2007). The Explanation of Significant Differences (ESD) to the Record of Decision (ROD) was prepared by the U.S. Air Force.

Summary of Findings

This ESD discusses an impending change in the Federal property boundary and documents the implementation of a ROD contingency, the addition of a remedial action objective (RAO), and the remedies to address the contamination.

The added RAO is "ensure human health and the environment are adequately protected in areas where Terrace Alluvial groundwater contaminants occur off-site above the MCLs, and ensure the existing remedies (including MNA) will reduce off-site Terrace Alluvial groundwater concentrations to below the MCLs within a reasonable timeframe."

The Air Force is responsible for implementing, maintaining, monitoring, enforcing, and reporting on Institutional Controls (ICs).

Determinations

I have determined that the remedy complies with CERCLA § 121, fulfills Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and remains protective of human health and the environment.

Since the selected remedy, including this ESD, results in hazardous substances, pollutants, or contaminants remaining off-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will continue to be conducted each five years after initiation of the original selected remedy to ensure that the remedy is, or will be, protective of human health and the environment.

Approved By: Date:

Pamela Phillips, Acting — April 10, 2007

Samuel Coleman, P.E., Director
Superfund Division
U.S. EPA Region 6

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
EAST PARKING LOT GROUNDWATER PLUME AND TERRACE ALLUVIAL FLOW SYSTEM
AIR FORCE PLANT 4

Prepared for:

Air Force Real Property Agency
San Antonio, Texas

through the

Air Force Center for Environmental Excellence
Brooks City-Base, Texas

April 2007

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LIST OF ACRONYMS/ABBREVIATIONS

AFB	Air Force Base
AFP 4	Air Force Plant 4
ARAR	Applicable or Relevant and Appropriate Requirement
BRA	baseline risk assessment
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DCE	*cis*-1,2-dichloroethene
DNAPL	dense non-aqueous phase liquid
EPL	East Parking Lot
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FS	Feasibility Study
gpm	gallons per minute
HGL	HydroGeoLogic, Inc.
IC	Institutional Control
LTM	long-term monitoring
LUC	Land Use Control
MCL	maximum contaminant level
µg/L	micrograms per liter
MNA	monitored natural attenuation
NAS Fort Worth JRB	Naval Air Station Fort Worth Joint Reserve Base
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PRB	permeable reactive barrier
RAO	remedial action objective
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act

LIST OF ACRONYMS/ABBREVIATIONS (continued)

TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TNRCC	Texas Natural Resource Conservation Commission
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VOC	volatile organic compound

FINAL
EXPLANATION OF SIGNIFICANT DIFFERENCES
EAST PARKING LOT GROUNDWATER PLUME AND
TERRACE ALLUVIAL FLOW SYSTEM
AIR FORCE PLANT 4
FORT WORTH, TEXAS
APRIL 2007

1.0 INTRODUCTION AND STATEMENT OF PURPOSE

The Superfund Program allows for changes in the remedy presented in the Record of Decision (ROD) if the remedial action taken differs significantly from the remedy selected in the ROD with respect to scope, performance, or cost. Such differences must be documented and made available to the public in accordance with federal, state, and Air Force regulations, policy, and/or procedures. A Significant Change is proposed for the Air Force Plant (AFP) 4 ROD associated with the East Parking Lot Groundwater Plume and Terrace Alluvial Flow System at AFP 4, in Fort Worth, Texas. Significant Changes are those changes that generally involve a change to a component of the selected remedy, but do not fundamentally alter the overall cleanup approach. A Significant Change is proposed at AFP 4 due to the impending change in the federal property boundary which will leave contamination "off-site." Because of this change, a new remedial action objective (RAO) addressing the off-site contamination, as well as the remedies (including institutional controls [ICs]) to address the contamination, needs to be added to the ROD.

Implementation of a Significant Change requires preparation of an Explanation of Significant Differences (ESD) document. The purpose of this document is to describe the nature of the significant changes, summarize the decisions that led to making the changes, and affirm that the revised remedy complies with Section 117 (c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as "Superfund, and its implementing regulation the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This ESD has been prepared in accordance with these regulations, the United States Environmental Protection Agency (USEPA) guidance *A Guide To Preparing Superfund Proposed Plans, Records of Decision, And Other Remedy Selection Decision Documents* (USEPA, July 1999), and applicable Air Force guidance.

This ESD applies to the remedial actions performed under the Final ROD for Air Force Plant 4 (AFP 4), signed in July and August 1996 by the United States Air Force (USAF), USEPA, and Texas Commission on Environmental Quality (TCEQ), formerly known as the Texas Natural Resource Conservation Commission (TNRCC). The USEPA and TCEQ have commented on the ESD, and public participation requirements have been conducted in accordance with 40 Code of Federal Regulations (CFR) 300.435(c)(2)(i). This ESD also complies with the requirement to issue decision documents for remedial actions taken pursuant to Sections 104, 106, 120, and 121 of CERCLA and the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Sections 40 CFR 300.430(f), 300.430(e), and 300.435(c)(2) of the NCP. The Air Force is the lead agency for AFP 4. Support agencies for AFP 4 are USEPA Region 6 and the TCEQ.

This ESD discusses an impending change in the Federal property boundary and documents the implementation of a ROD contingency, as well as an added RAO. The new property boundary and contingency action are related to the third RAO (listed below) for the East Parking Lot (EPL) Groundwater Plume and Terrace Alluvial flow system. The EPL Groundwater Plume is one of six areas of concern identified in the ROD where remedial actions are being performed at AFP 4. The three remedial action objectives associated with the EPL Groundwater Plume and Terrace Alluvial flow system, as stated in Section 9.4 of the ROD, are as follows:

1. Prevent trichloroethene (TCE) concentrations in the Window Area of the EPL Groundwater Plume from exceeding 400 micrograms per liter (µg/L).
2. Remove dense non-aqueous phase liquid (DNAPL) from the groundwater in the soil under Building 181 and under the southern portion of the Assembly Building/Parts Plant.
3. Prevent groundwater in the EPL Plume and Terrace Alluvial flow system with contamination above USEPA maximum contaminant levels (MCLs) from migrating off AFP 4 or Naval Air Station Fort Worth, and prevent groundwater contamination from causing excess risk in surface water.

The ROD has further provisions on Page 9-14 of Section 9.4 with regard to contaminant migration beyond the Federal property boundaries. The ROD states that "If monitoring indicates that contamination in the East Parking Lot Plume, the North Plume, or the West Plume may migrate off Federal property at levels that exceed MCLs, remedial actions or additional wells will be considered. Also, the Air Force, with the concurrence of the EPA and State of Texas, may use other technologies such as permeable treatment walls to mitigate contamination moving off Federal boundaries." This last statement is referred to as the "contingency clause" throughout this ESD.

AFP 4 is located upgradient (west-northwest) of Naval Air Station Fort Worth Joint Reserve Base (NAS Fort Worth JRB) and the former Carswell Air Force Base (AFB). The southern lobe of a TCE plume originating primarily from the AFP 4 EPL has impacted groundwater underlying NAS Fort Worth JRB and the former Carswell AFB. Although contamination above MCLs is currently within Federal property boundaries, the Federal property boundary will change when a 187-acre parcel of the former Carswell AFB downgradient of AFP 4 is transferred to a local redevelopment authority under the Base Realignment and Closure (BRAC) program. Groundwater underlying the property slated for transfer contains concentrations of TCE and daughter products (*cis*-1,2-dichloroethene [DCE] and vinyl chloride) above their respective MCLs of 5, 70, and 2 µg/L, respectively. Figure 1 presents the current and future Federal property boundaries and the extent of the solvent plume as of May 2006. Transfer of this Federal property where TCE, DCE, and vinyl chloride concentrations in groundwater currently exceed USEPA MCLs without consideration of additional remedial actions or monitoring would no longer satisfy the provision of the ROD discussed in the preceding paragraph.

This ESD documents post-ROD actions specific to the BRAC parcel and satisfies this ROD provision by (1) documenting the implementation of the contingency clause, as well as the implementation of Institutional Controls (ICs) and Monitored Natural Attenuation (MNA), (2)

describing the results of a Focused Feasibility Study (FFS) (HydroGeoLogic, Inc. (HGL), 2006a), and (3) adding an RAO. With respect to documenting implementation of the contingency, groundwater contamination at the future Federal property boundary is being treated by a zero-valent iron permeable reactive barrier (PRB) installed along the western BRAC property boundary during 2002 as part of a demonstration project. The FFS further satisfied the provision by evaluating risk and the protectiveness of the current remedy, as well as considering other remedial alternatives for the BRAC parcel in anticipation of the transfer. Once the BRAC parcel is transferred, contamination above MCLs will be considered off-site, therefore an additional remedial goal has been developed to augment the language in the third remedial goal (listed above) to account for this change in conditions (contamination already present off-site versus "appearing to migrate off Air Force Plant 4 or NAS Fort Worth JRB"). A fourth remedial goal will be added through this ESD and is as follows:

- Ensure human health and the environment are adequately protected in areas where Terrace Alluvial groundwater contaminants occur off-site above the MCLs, and ensure the existing remedies (including MNA) will reduce off-site Terrace Alluvial groundwater concentrations to below the MCLs within a reasonable timeframe.

This ESD will become a part of the Aeronautical Systems Center AFP 4 Administrative Record, which is online at: http://engineering.wpafb.af.mil/esh/esh.asp. Electronic copies of this document are available for public review at:

White Settlement Library
8215 White Settlement Road
White Settlement, Texas 76108
(817) 367-0166
The library hours are:

Monday	9:30 am to 8:30 pm
Tuesday	9:30 am to 6:00 pm
Wednesday	9:30 am to 6:00 pm
Thursday	9:30 am to 8:30 pm
Friday	Closed
Saturday	9:30 am to 1:30 pm
Sunday	Closed

2.0 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

2.1 SITE HISTORY AND CONTAMINATION

Throughout the history of AFP 4, manufacturing operations have resulted in the generation of waste oils, waste fuels, paint residues, used solvents, and process chemicals. Several spills of TCE have occurred within the Chemical Process Facility (Building 181) and have resulted in soil contamination and the localized presence of DNAPL in the immediate vicinity of the Chemical Process Facility. A dissolved TCE plume has migrated east of AFP 4 and extends under the NAS Fort Worth JRB and beneath the BRAC property. The regional TCE plume can be subdivided into northern, central, and southern lobes; the southern lobe, which has impacted groundwater underlying the BRAC property, is the subject of this ESD.

A baseline risk assessment (BRA) was performed at AFP 4 as part of the Remedial Investigation to identify any unacceptable risks to human health and the environment from contaminated groundwater (Rust Geotech, 1995a). The results of the BRA indicated that unacceptable risk under an unrestricted use scenario existed for the EPL Groundwater Plume due to elevated concentrations of TCE and other volatile organic compounds (VOCs). Although there is limited distribution, poor yield, and susceptibility to surface water/storm water pollution (United States Geological Survey [USGS], 1996) within the Terrace Alluvium making it an unlikely potable water source, the potential would still exist that an individual offsite could use this groundwater for potable purposes. Thus, achieving Texas Drinking Water Standards (written so as to comply with the MCLs of the Federal Safe Drinking Water Act) was deemed an Applicable or Relevant and Appropriate Requirement (ARAR) for the Terrace Alluvial flow system. These findings supported the need for remedial action.

2.2 SELECTED REMEDY

The 1996 ROD described the remedial alternatives for each of the six AFP 4 areas of concern (Rust Geotech, 1996). For the EPL Groundwater Plume/Terrace Alluvial flow system, four remedial alternatives were evaluated in the September 1995 Feasibility Study (FS) (Rust Geotech, 1995b). The remedy selected was Alternative 3, "Enhanced DNAPL/Groundwater Extraction and Treatment with Air Stripping and Destruction of Contaminants." The active remediation portion of this remedy was accompanied by ICs restricting future use of the Terrace Alluvial groundwater at AFP 4 and NAS Fort Worth JRB to prevent unacceptable exposure to VOCs.

Since the ROD was issued in 1996, electrical resistive heating with a soil vapor extraction system was proven to be effective for removing DNAPL from the subsurface, and in October 2002 an ESD was submitted in the form of a Fact Sheet to update the DNAPL component of the remedy. This fact sheet is included as Appendix A.

The primary remediation technology for the EPL dissolved plume is a pump and treat system. To mitigate further migration of TCE-contaminated groundwater in the study area, an interim groundwater pump and treat system was installed in 1991 and then upgraded in 1995. During the interim system operation, ten (10) extraction wells were operated and yielded a total system influent flow of 50 to 70 gallons per minute (gpm). In 2000, the interim groundwater pump and

treat system was expanded to maximize groundwater capture in the Terrace Alluvium and Upper Sand, and to create a hydraulic barrier upgradient of the study area. The expanded system, now referred to as the EPL groundwater pump and treat system, was completed in October 2001. In its current configuration, the system conveys groundwater from forty six (46) wells including thirty (30) Terrace Alluvium wells, fifteen (15) Terrace Alluvium (hydraulic control wells), and one (1) horizontal well. Three (3) Terrace Alluvium (standby wells) are also connected to the system. The treatment system consists of acidification for scaling control, mechanical filtration, air stripping, and carbon polishing before discharge to the Publicly-Owned Treatment Works. The design flow of the treatment system is 102 gpm with a maximum capacity of 140 gpm. Shaw Environmental assumed responsibility for operation and maintenance of the EPL remedial system on November 1, 2001. Data collected as part of system performance monitoring indicate hydraulic capture has been achieved by the system, and groundwater contaminant concentrations exhibit an overall downward trend in the study area. Containment of the TCE plume is further supported by a groundwater flow modeling effort conducted by the USGS (HGL, 2005). Particle tracking indicates groundwater from the Building 181 source area is contained by operation of the EPL extraction wells. The remedial action objective for the pump and treat system is to continue to operate the system in a similar capacity to maintain hydraulic capture of the groundwater plume. All source control remedial actions for AFP 4 are documented in the First Five-Year Review Report (Jacobs, 2002), Interim Remedial Action Completion Report (Earth Tech, 2006a) approved by EPA in June 2006, and further supported by the Preliminary Close Out Report produced by EPA in September 2006.

3.0 BASIS FOR THE DOCUMENT

This ESD has been prepared to document significant differences which are enhancements to the remedy, specifically to the portion of the EPL Groundwater Plume and Terrace Alluvial flow system that underlies the 187-acre parcel, recognizing that this parcel is slated for ownership transfer under BRAC. These enhancements were selected by completing a FFS (HGL, 2006a). The changes can be summarized as follows:

- Implementation of the "contingency clause" from the ROD with construction of the PRB in 2002;
- Addition of a RAO for the portion of the plume currently present on the BRAC parcel to support transfer of the property;
- MNA for the portion of the plume currently present on the BRAC parcel; and
- Establish ICs to ensure remediation systems on the BRAC parcel are protected, and human health and the environment remain protected, after property transfer.

When the BRAC parcel is transferred contamination above MCLs will be considered off-site, therefore an additional remedial goal has been developed to augment the language in the third remedial goal (listed in Section 1 of this ESD) to account for this change in conditions (contamination already present off-site versus "appearing to migrate off Air Force Plant 4 or NAS Fort Worth JRB"). A fourth remedial goal will be added through this ESD and is as follows:

- Ensure human health and the environment are adequately protected in areas where Terrace Alluvial groundwater contaminants occur off-site above the MCLs, and ensure the existing remedies (including MNA) will reduce off-site Terrace Alluvial groundwater concentrations to below the MCLs within a reasonable timeframe.

As described in the preceding sections, the remedy selected for the EPL Groundwater Plume/Terrace Alluvial flow system was "Enhanced DNAPL/Groundwater Extraction and Treatment with Air Stripping and Destruction of Contaminants" (i.e. source control/remediation) and ICs restricting future use of the Terrace Alluvial groundwater at AFP 4 and NAS Fort Worth JRB to prevent unacceptable exposure to VOCs. This remedy has been implemented and remains unchanged; therefore, the purpose of this ESD is to summarize each component of the remedy selected for the southern lobe of the TCE plume impacting the BRAC property and to add the fourth RAO in anticipation for the BRAC property transfer. Measures taken upgradient of the EPL pump and treat system (objective 2 of the current ROD) have no bearing on the southern lobe TCE plume as all the groundwater flowing from the EPL is contained. So while the upgradient measures affect the TCE plume at AFP 4, they do not change concentrations downgradient of the EPL pump and treat system, and thus do not affect achieving objectives for the BRAC property. Continued operation of the EPL pump and treat system (or other equally protective measure) is required to meet objectives 1 and 3 of the current ROD (listed in Section 1 of this ESD). Because the pump and treat system (or equally protective measure) will continue to capture groundwater contamination and prevent migration of contaminants off-site, the added

fourth goal of achieving MCLs on the BRAC property will also be achieved. All source control remedial actions for AFP 4 are documented in the First Five-Year Review Report (Jacobs, 2002) as well as the Interim Remedial Action Completion Report (Earth Tech, 2006a) approved by EPA in June 2006 and the Preliminary Closeout Report (USEPA, 2006). Table 1 provides a chronology of actions associated with the remedy and their purpose.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

To ensure human health and the environment are protected, and the ongoing implementation of the remedy will not be compromised following the transfer of the BRAC property to the local redevelopment authority, the ROD's contingency clause was utilized to implement the PRB contingency including MNA and ICs. The Air Force will monitor and maintain these remedies in accordance with CERCLA Section 120 (e) and the ROD until MCLs are achieved on the BRAC parcel.

PRB Contingency: The USAF recognized the benefits of implementing the "contingency clause" of the ROD when the opportunity for a PRB availed itself as a demonstration project in 2002. In Spring 2002, the 1,126-foot long, 30 to 40-foot deep, 2-foot wide PRB composed of 50 percent zero valent iron and 50 percent sand was constructed at the BRAC/NAS Fort Worth JRB property boundary. Installation at this site was logical to prevent further contaminant migration across the BRAC boundary, given the likelihood of future property transfer.

The PRB was designed to treat the TCE in the groundwater that flows through the reactive media onto the BRAC property. Figure 2 presents pre-PRB and post-PRB concentrations for comparison purposes. The performance monitoring data for the PRB indicate that the TCE is also being remediated through microbial activity. An evaluation of pre- and post-PRB data suggests that the microbial populations were stimulated by the use of the guar gum during construction of the PRB. Guar gum was used for liquid shoring (as opposed to a physical shoring method such as sheet-piling) when excavating the PRB.

Post-PRB performance monitoring results show the majority of the PRB achieves a TCE removal efficiency greater than 99% (HGL, 2006a). The PRB does not span the entire TCE plume migrating on to the BRAC property. Where the PRB does not intersect the plume, the PRB has no effect on contaminant concentrations. Because the PRB was installed along the BRAC/NAS Fort Worth JRB property boundary, most of the contamination already present on the BRAC property was cut off from the remainder of the plume extending from AFP 4. Monitoring data indicate that groundwater treated by the PRB is flushing residual contamination downgradient of the PRB. In the area immediately downgradient of the PRB, modeling presented in the OPS Demonstration Report estimated that the TCE MCL will be achieved in 3.6 years. In areas further downgradient of the PRB and in the portions of the BRAC property plume not affected by the PRB, but being treated through MNA, it was estimated that TCE contamination will achieve the MCL in approximately 30 years (HGL, 2006b).

The cost for installation of the PRB was $1.85 M. Due to the relatively new technology of PRBs, periodic maintenance costs may be necessary should precipitation on the iron surface become an issue. The estimate of this uncertain cost is an additional $500,000 every 10 years, should it be required.

MNA: Long-term Monitoring (LTM) has been conducted for several years, both before and after the PRB installation, to verify the effectiveness of the EPL pump and treat system, PRB performance, and to evaluate MNA as the selected remedy for the Southern Lobe of the TCE plume impacting the BRAC property. LTM plans for each of these purposes are in place and are

periodically modified as appropriate based on the LTM results and evaluations conducted as part of the Five-Year Reviews. The latest LTM Work Plan Addendum was issued in December 2006 (HGL, 2006c). LTM will continue to assess the protectiveness of the remedies per the AFP 4 ROD; however, MNA will be incorporated into the remedy and LTM program to ensure MNA will be successful in remediating the plume downgradient of the PRB, within the BRAC property, to MCLs. As part of the MNA sampling program, seven monitoring wells located within the BRAC property are sampled for selected VOCs and natural attenuation parameters. Samples are collected on an annual basis in conjunction with the existing AFP 4 LTM event to track the PRB and MNA performance. In addition to the seven wells sampled as part of the BRAC property LTM, five additional AFP 4 LTM locations are also monitored and provide additional data on remedy performance.

The 30 year present value cost for MNA in addition to the already existing LTM is estimated at $1M.

Institutional Controls:

Objective and Geographic Location where ICs Apply:
ICs will continue to be enforced per the AFP 4 ROD and CERCLA Section 120(e) however, to ensure human health and the environment remain protected within the transferred property, additional ICs will be implemented until MCLs are met. An off-site BRAC parcel specific Air Force Institutional Control Implementation Plan and Checklist will be prepared and used post-transfer. The proposed BRAC property ICs can be summarized as follows:

a) The 187-acre parcel is restricted to non-residential use only except as shown in Figure 3;

b) Digging/excavation is restricted:

- at the PRB location as well as the surrounding 25-foot buffer zone to protect its integrity (Figure 4), and
- in shallow groundwater areas where exposure by a construction worker in a trench may cause unacceptable risks;

c) The integrity of the monitoring wells, including recirculation wells, must be protected and maintained; and

d) Groundwater cannot be used except for monitoring and/or treatment.

Notification
The Air Force is responsible for implementing, maintaining, monitoring, enforcing, and reporting on ICs. The Air Force will notify the EPA as soon as practicable but not longer than 10 days after discovery of any activity that violates or is inconsistent with the IC objectives or restrictions, or any other action that may interfere with the effectiveness of the ICs. The Air Force will, as necessary, take prompt measures to correct the violation or deficiency and/or prevent its recurrence. In this notification, the Air Force will identify any corrective measures it has taken or any corrective measures it plans to take and the estimated timeframe for completing

them. For corrective measures taken after the notification, the Air Force shall notify the EPA and the applicable regulators when the measures are complete.

Monitoring, Evaluation and Duration

The Air Force will report to EPA annually (via the existing AFP4 LTM report) the frequency, scope, and nature of IC monitoring activities, the results of such monitoring, and proposed changes to the ICs, and any corrective measures resulting from monitoring during the time period. The annual report will address whether the ICs referenced above were communicated in the deed, whether the local redevelopment authority (and/or its successor(s) and/or assignee(s)) and EPA were notified of the ICs and controls affecting the property, and whether use of the property has conformed to such restrictions and controls. The annual monitoring report will also be used in preparation of five-year reviews to evaluate the remedy's effectiveness. The five-year reviews will make recommendations on the continuation, modification, or elimination of annual reports and IC monitoring frequencies. The Air Force will submit all five-year reviews to the EPA for review and concurrence per CERCLA Section 121(c).

The Air Force will not modify or terminate ICs or modify land uses which may impact the effectiveness of the ICs or take any action that may disrupt the effectiveness of the ICs or alter or negate the need for ICs without prior notice to the EPA and an opportunity to review and concur on the proposed change.

Although the Air Force will transfer procedural responsibilities to the local redevelopment authority (and/or its successor(s) and/or assignee(s)) by deed and may contractually arrange for third parties to perform any and all of the actions associated with the ICs, the Air Force shall retain ultimate responsibility for the integrity of the remedy, including enforcement of the ICs.

Summary of Significant Differences

The FFS evaluated risk and considered four alternatives for the BRAC parcel in anticipation of the transfer (HGL, 2006a). The FFS concluded that the PRB and natural attenuation processes already in place, with the implementation of additional ICs by the Air Force, meets the threshold criteria of protectiveness and compliance with ARARs. Comparison of the balancing criteria show this to be the preferred alternative, since components of the remedy are already in place and functional. When evaluated with the anticipated costs of the remedy prior to PRB installation, future costs of this alternative are comparable, since performance monitoring, five-year reviews, and ICs were components of the original remedy, are in place, and will continue. The present value of the LTM, new ICs, five-year reviews and potential Iron Rejuvenation is estimated at $4,187,000 over the 30 years clean-up time frame. As required by CERCLA Section 121(c), five-year reviews at sites where hazardous substances, pollutants, or contaminants remain at the site will be conducted to ensure that human health and the environment are being protected by the remedial action being implemented.

The Air Force has implemented all remedial actions necessary to protect human health and the environment with respect to any such substance remaining on the BRAC property prior to the date of transfer. This statement is supported by the Operating Properly and Successfully Determination (HGL, 2006b).

5.0 SUPPORT AGENCY COMMENTS

The USEPA and TCEQ have reviewed this ESD and support the changes to the selected remedy.

6.0 STATUTORY DETERMINATION

The USAF, USEPA, and TCEQ believe that the remedy complies with CERCLA §121. It fulfills Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and remains protective of human health and the environment. In addition, the remedy is readily implemented since its components (with the exception of a portion of the new ICs) are in place, uses permanent solutions and alternative treatment technologies to the extent practicable, and is cost-effective. Since the selected remedy, including this ESD, results in hazardous substances, pollutants, or contaminants remaining off-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will continue to be conducted each five years after initiation of the original selected remedy to ensure that the remedy is, or will be, protective of human health and the environment.

7.0 PUBLIC PARTICIPATION

A notice summarizing the ESD shall be published in the Fort Worth Star Telegram upon finalization of the ESD. All public participation requirements outlined in 40 CFR 300.435(c)(2)(i) have been met.

A previous ESD was submitted in October 2002 to update the upgradient DNAPL component of the remedy using electrical resistive heating in place of injecting surfactants. This ESD is attached as an appendix. Signature of this 2007 ESD, also constitutes approval of the 2002 ESD.

Authorizing Signature:

Richard D Harstad Date: 6 Apr 12007

Richard D. Harstad
Chief, Acquisition Environmental, Safety & Health Division
Engineering Directorate
Aeronautical Systems Center
Wright Patterson Air Force Base, Ohio

Concurrence Signatures:
I have reviewed this document, and any comments I had have been addressed and/or incorporated:

George Walters Date: 6 Apr 2007

George Walters
Integrated Product Team Chief Air Force Plant 4
Aeronautical Systems Center

Pamela Phillips, Acting Date: Apr 10, 2007

Samuel Coleman, P.E., Director
Superfund Division
United States Environmental Protection Agency, Region 6

8.0 REFERENCES

Earth Tech, 2006a. Interim Remedial Action Completion Report, Groundwater and Soil Vapor Treatment Systems – Operable Unit 1 at Air Force Plant 4, Fort Worth, Texas.

Earth Tech, 2006b. Long-Term Monitoring Report at Air Force Plant 4, Fort Worth, Texas.

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HGL, 2006b. Operating Properly and Successfully Demonstration Report of the Trichloroethene Plume Impacting the BRAC Property at the Former Carswell Air Force Base, Texas

HGL, 2006c. Work Plan Addendum for Long-Term Monitoring at the BRAC Portion of the Former Carswell Air Force Base, Fort Worth, Texas

Jacobs Engineering Group, 2002. First Five-Year Review Report for Air Force Plant 4, Fort Worth, Tarrant County, Texas.

Rust Geotech, 1996. Final Record of Decision, Air Force Plant 4, Tarrant County, Texas.

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FIGURES

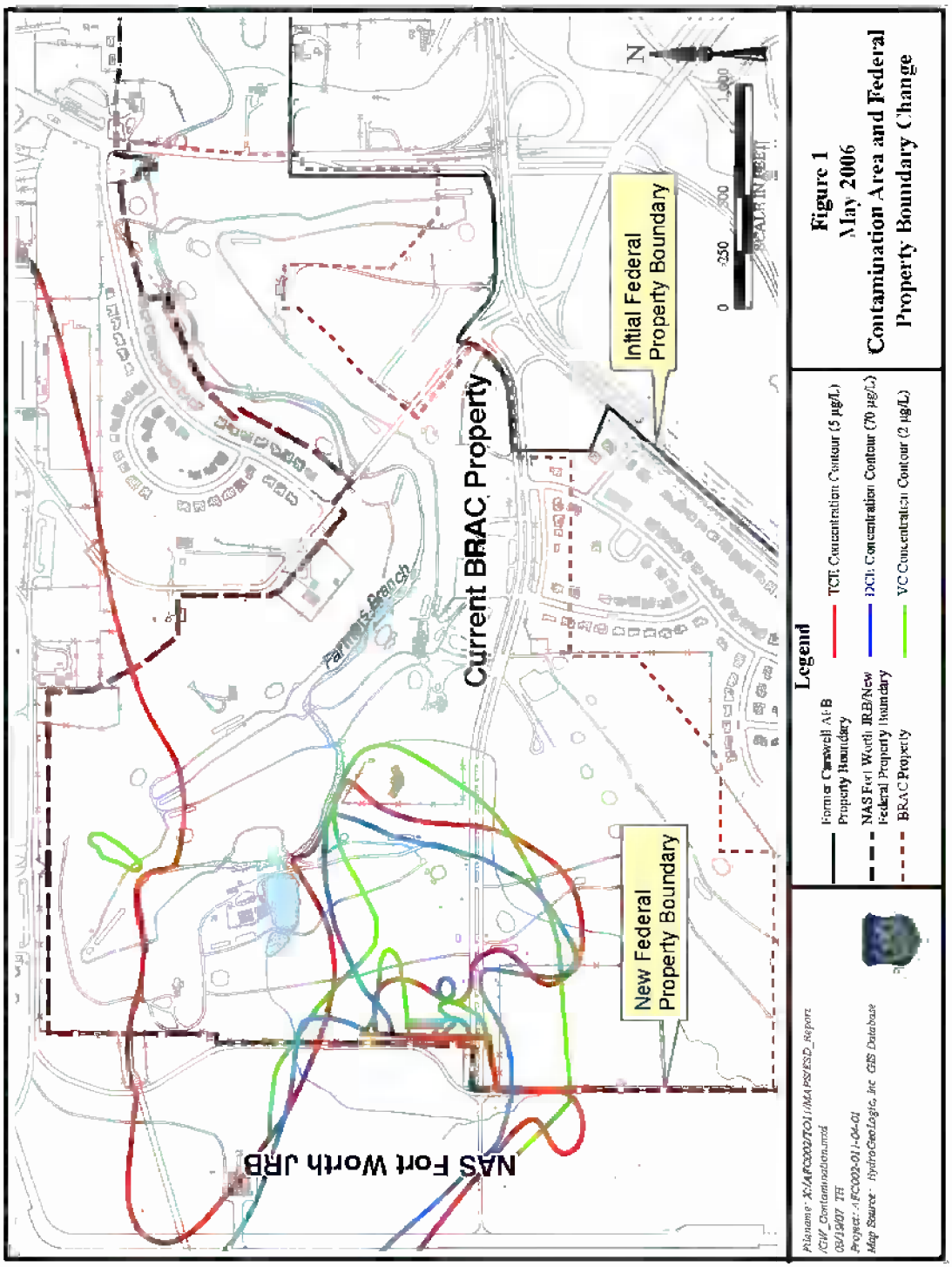
Figure 1
May 2006
Contamination Area and Federal
Property Boundary Change
Legend
Former Carswell AFB
Property Boundary
NAS Fort Worth JRB/New
Federal Property Boundary
BRAC Property
TCE Concentration Contour (5 µg/L)
DCE Concentration Contour (70 µg/L)
VC Concentration Contour (2 µg/L)
Initial Federal
Property Boundary
New Federal
Property Boundary
Current BRAC Property
NAS Fort Worth JRB
Farrell's Branch
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0
250
500
1,000
FEET

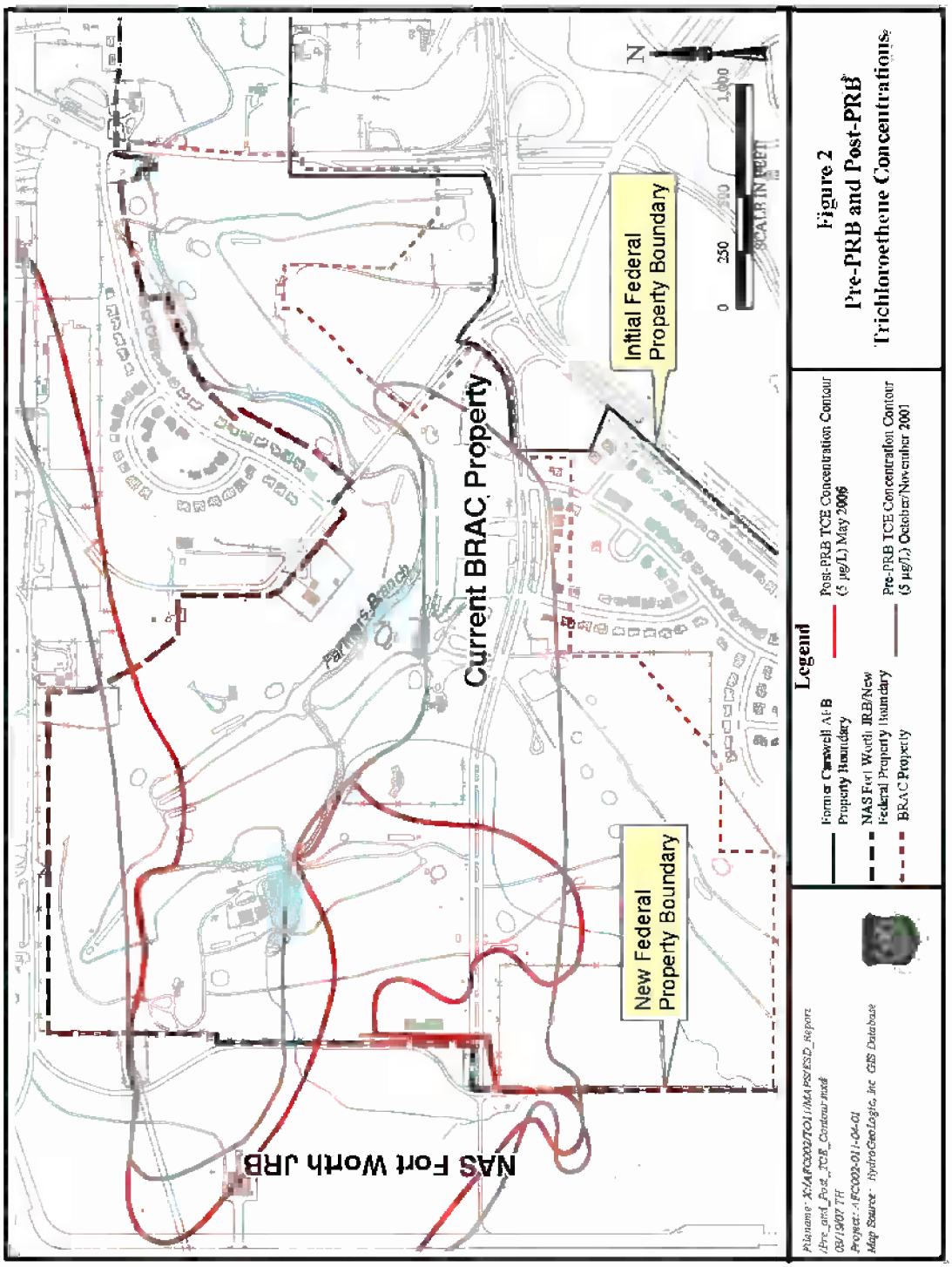
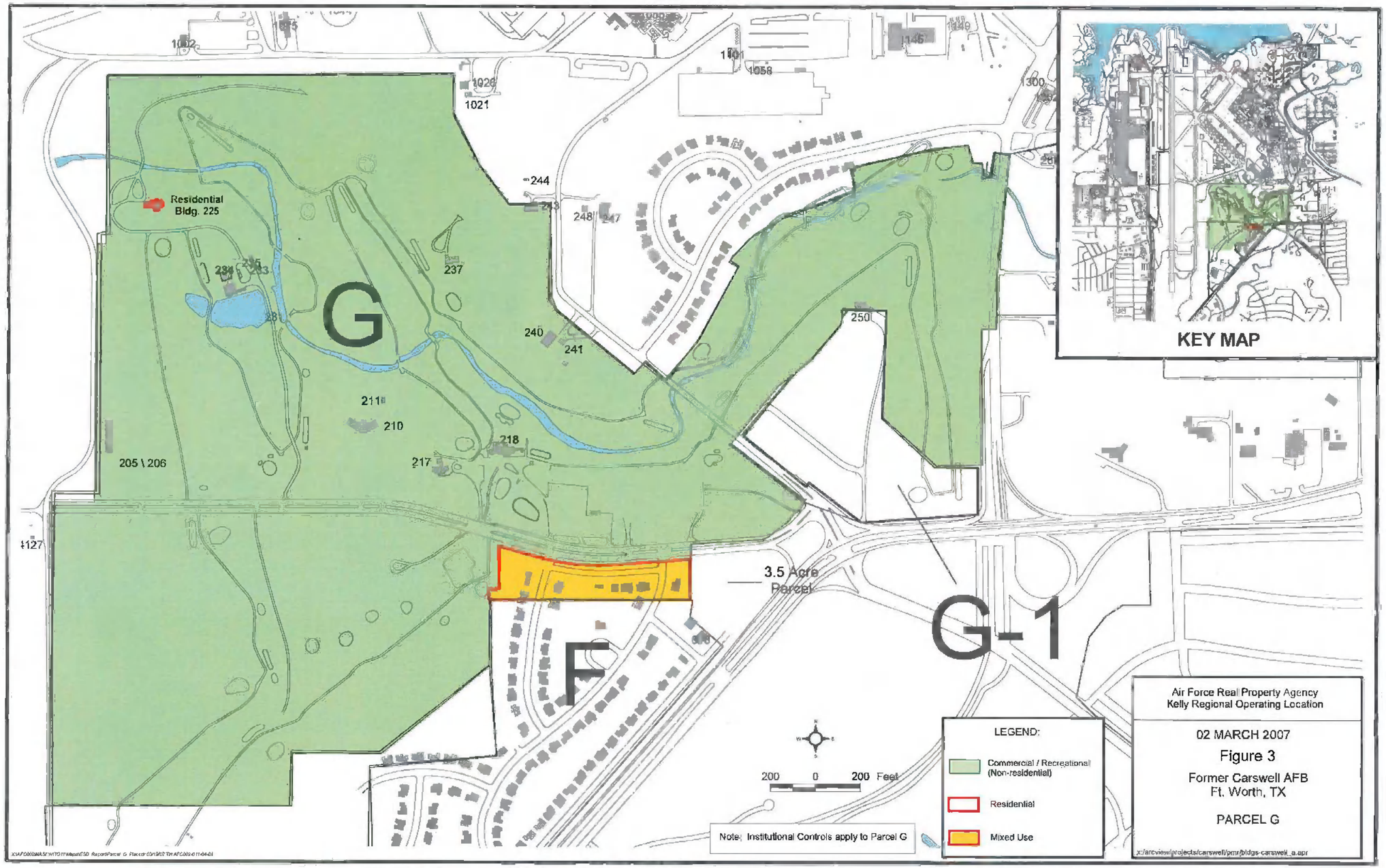
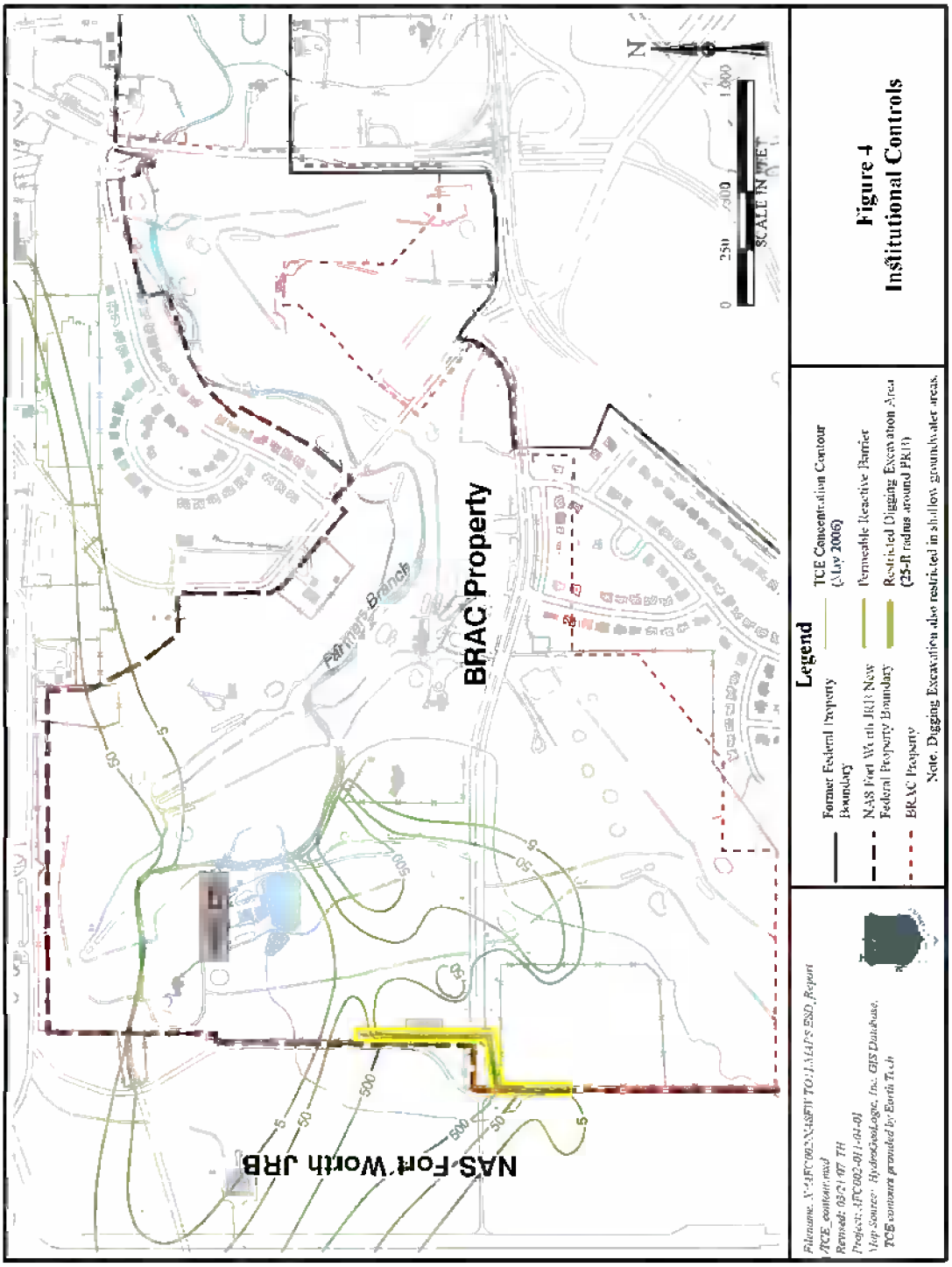


Figure 2
Pre-PRB and Post-PRB
Trichloroethene Concentrations
Legend
Former Carswell AFB Property Boundary
NAS Fort Worth JRB/New Federal Property Boundary
BRAC Property
Post-PRB TCE Concentration Contour (5 µg/L) May 2006
Pre-PRB TCE Concentration Contour (5 µg/L) October/November 2001
SCALE IN FEET
0
250
500
1,000
N
Current BRAC Property
Initial Federal Property Boundary
New Federal Property Boundary
NAS Fort Worth JRB
Farmers Branch


1032
1026
1021
1101
1058
145
149
300
Residential
Bldg. 225
244
243
248
247
237
234
235
233
238
G
240
241
250
211
210
218
205 \ 206
217
127
3.5 Acre
Parcel
F
G-1
KEY MAP
200 0 200 Feet
LEGEND:
Commercial / Recreational
(Non-residential)
Residential
Mixed Use
Note: Institutional Controls apply to Parcel G
Air Force Real Property Agency
Kelly Regional Operating Location
02 MARCH 2007
Figure 3
Former Carswell AFB
Ft. Worth, TX
PARCEL G
x:/arcview/projects/carswell/pmr/bldgs-carswell_a.apr


BRAC Property
NAS Fort Worth JRB
Farrington Branch
N
SCALE IN FEET
0
250
500
1,000
Legend
Former Federal Property Boundary
NAS Fort Worth JRB Now Federal Property Boundary
BRAC Property
TCE Concentration Contour (May 2006)
Permeable Reactive Barrier
Restricted Digging Excavation Area (25-ft radius around PRB)
Note: Digging Excavation also restricted in shallow groundwater areas.
Figure 4
Institutional Controls

TABLES

Table 1
Chronology of Events
Associated with the East Parking Lot Groundwater Plume
and Terrace Alluvial Flow System

Event or Report	Date
NAS Fort Worth JRB Basewide Groundwater Sampling	April 1994 – present
Final ROD selecting the remedy signed. (Rust Geotech, 1996)	July/August 1996
AFP 4 Long-Term Monitoring Groundwater Sampling Program	1998 – present
100% Design Report Building 181 Soil Vapor Extraction System Expansion (Jacobs, 1998)	November 1998
100% Design Report East Parking Lot and Window Area Groundwater Pump and Treat System, Air Force Plant 4, Texas (Jacobs, 1999)	December 1999
Draft Hydraulic Control Alternatives Evaluation Report. Prepared for United States Air Force Aeronautical Systems Center. (Jacobs, 1999)	June 1999
Groundwater Modeling of East Parking Lot and Window Area; Groundwater Remediation Systems; Air Force Plant 4, Fort Worth, TX (Jacobs, 1999)	July 1999
Construction begins on East Parking Lot/Window Area Groundwater Pump and Treat System	2000
Expansion and upgrade of Building 181 SVE system by IT Corporation	March 2000
Remedial Action Report Building 181 Soil Vapor Extraction System, Air Force Plant 4, Texas (Jacobs, 2000)	August 2000
Air Force Plant 4, East Parking Lot Groundwater Plume Technology Performance Report, Six-Phase Heating Pilot-Scale Test (URS Corporation, May 2001)	March – December 2000
East Parking Lot/Window Area Groundwater Pump and Treat System completed and operational	2001 – present
March 2000 through December 2000 Building 181 SVE System Operation & Sampling Report (IT Corporation, 2001)	June 2001
Final Remedial Action Report East Parking Lot and Window Area Groundwater Pump and Treat System, Air Force Plant 4, Texas (Jacobs, 2002)	March 2002
PRB completed; PRB performance Monitoring	June 2002 – present
Full scale ERH system constructed at Building 181	2002
Final Five-Year Report for Air Force Plant 4 (Jacobs, 2002) Approved by USEPA on September 28, 2004.	October 2002
AFP 4 Explanation of Significant Differences for the East Parking Lot Groundwater Plume and Terrace Alluvial Flow System	October 2002
Final Permeable Reactive Barrier Installation Report, Former Carswell AFB, Texas (HGL, 2003)	February 2003
October 2001 through October 2002 EPL GW Recovery and Treatment System AFP 4 (IT Corporation, 2003)	February 2003
Final Enlarged Electrical Resistive Heating Application Construction and Performance Report, Building 181 Trichloroethene Source Area, Air Force Plant 4, Texas (URS Corporation, 2004)	June 2004
Subsurface Occurrence and Potential Source Areas of Chlorinated Ethenes Identified Using Concentrations and	2005

Table 1 (continued)
Chronology of Events
Associated with the East Parking Lot Groundwater Plume
and Terrace Alluvial Flow System

Event or Report	Date
Concentration Ratios, AFP 4 and NAS JRB (USGS, 2005)	
Final Focused Feasibility Study Southern Lobe Trichloroethene Groundwater Plume, Former Carswell AFB, Texas (HGL, 2005). Approved by regulators February 2006.	June 2005
Final Five-Year Review Summary Report for Base Realignment and Closure at the Former Carswell Air Force Base, Fort Worth, Texas (HGL, 2005)	September 2005
Draft Interim Remedial Action Completion Report – Groundwater and Soil Vapor Treatment Systems – Operable Unit 1 at Air Force Plant 4 (Earth Tech, 2006)	January 2006
Final IRACR submitted to EPA Region 6	May 2006
Final IRACR approved by EPA Region 6	June 2006
Preliminary Close Out Report issued by EPA Region 6	September 2006
Operating Properly and Successfully Demonstration Report of the Southern Lobe Trichloroethene Plume, Former Carswell Air Force Base, Texas (HGL, 2006)	December 2006

APPENDIX A

Air Force Plant 4

Operated by Lockheed Martin Aeronautical Company, Fort Worth, Texas

Fact Sheet

Aeronautical Systems Center, Wright-Patterson Air Force Base, Ohio • October 2002

EXPLANATION OF SIGNIFICANT DIFFERENCES AIR FORCE PLANT 4, FORT WORTH, TEXAS EAST PARKING LOT GROUNDWATER PLUME AND TERRACE ALLUVIAL FLOW SYSTEM

1.0 INTRODUCTION

The purpose of this document is to explain the significant differences between the remedial action (RA) alternative selected in the Record of Decision (ROD) and the RA that will be implemented at the East Parking Lot (EPL) Groundwater Plume and Terrace Alluvial Flow System at Air Force Plant 4 (AFP4). The ROD was signed by the United States Air Force (Air Force), United States Environmental Protection Agency (EPA), and the Texas Natural Resource Conservation Commission (TNRCC) in July and August 1996, and is included in the administrative record files. The lead agency for the site is the Air Force; EPA and TNRCC are the support agencies.

In accordance with Title 40 of the Code of Federal Regulations (CFR) 300.825(a)(2), the National Contingency Plan (NCP), the administrative record that contains this Explanation of Significant Differences (ESD), as well as complete documentation pertaining to the remediation of AFP4, is available for public review at:

White Settlement Library
8215 White Settlement Road
White Settlement, Texas 76108
(817) 367-0166

The library hours are:
Monday - 9:30 am to 8:30 pm
Tuesday - 9:30 am to 6:00 pm
Wednesday - 9:30 am to 6:00 pm
Thursday - 9:30 am to 8:30 pm
Friday - Closed
Saturday - 9:30 am to 1:30 pm
Sunday - Closed

AFP4 is located in Tarrant County, Texas approximately 7 miles northwest of downtown Fort Worth. The facility occupies 760 acres adjacent to the northwest boundary of the City of Fort Worth (**Figure 1**). The plant is bounded on the north by Lake Worth, on the east by Naval Air Station (NAS) Fort Worth (formerly known as Carswell Air Force Base), and on the south and west by the city of White Settlement.

AFP4 is an operating military aircraft manufacturing facility. The facility is currently operated by Lockheed Martin Aeronautical Company and is used for production of military aircraft, radar units, and various aircraft and missile components.

This ESD has been prepared to fulfill the Air Force's public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601, *et seq.* (CERCLA), commonly known as "Superfund", as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and 40 CFR Part 300.435(c)(2)(i). Additionally, preparation of the ESD, the opportunity for EPA and TNRCC to comment on the ESD, and the public participation activities described in Section 7.0 have been conducted in accordance with 40 CFR 300.435(c)(i). This ESD has been prepared in accordance with EPA guidance titled *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*.

This ESD has been prepared to address a significant change to a component of the RA at the EPL Groundwater Plume and Terrace Alluvial Flow System. The primary type of remediation technology selected to address the RA at EPL Groundwater Plume and Terrace Alluvial Flow System has not changed (i.e., pump and treat) and a ROD amendment is not required by the NCP and EPA guidance cited above.

As the lead agency, the Air Force continually assesses new and/or revisions to remediation technologies. The ROD presented the use of surfactants (chemicals injected into the groundwater to increase the dissolution of contaminants) to enhance Dense Non-Aqueous Phase Liquid (DNAPL) removal. However, since the ROD was issued in 1996, electrical resistive heating (ERH) has been used successfully and has proven to be a safe DNAPL removal technology. The ERH technology and its application to the EPL Groundwater

Plume and Terrace Alluvial Flow System are discussed in detail in Section 4.0.

2.0 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Site History. Throughout the history of AFP4, manufacturing operations have resulted in the generation of waste oils, waste fuels, paint residues, used solvents, and process chemicals. During much of the plant history, the wastes were disposed of at on-site landfills or were burned in fire-training exercises. Chemical process wastes were initially discharged to the sanitary sewer system and treated by the city of Fort Worth treatment system. Beginning in the 1970s, chemical process wastes were treated on-site, before being discharged to the sanitary sewer system. Burning of wastes on-site was discontinued, and waste oils and solvents are currently disposed of off site.

Contamination. Building 181, the Chemical Process Facility, is part of the Assembly Building/Parts Plant, located in the approximate center of AFP4 (**Figure 2**). Spills of trichloroethene (TCE) occurred within the Chemical Process Facility, and have resulted in soil contamination under Building 181.

Three flow directions within the Terrace Alluvial flow system beneath the Assembly Building/Parts Plant have resulted in three separate organic constituent plumes, with the largest plume of groundwater contamination being the EPL Plume. Soil contamination under Building 181 is the main source of TCE contamination in the EPL Plume (**Figure 2**). The extent of the EPL Plume is defined by elevated concentrations of TCE.

A baseline risk assessment (BRA) was performed at AFP4 as part of the Remedial Investigation (RI) to identify any unacceptable risks to human health and the environment from contaminated groundwater. The results of the BRA indicated that an unacceptable risk does exist in the EPL Plume-Terrace Alluvial flow system due to elevated concentrations of TCE and other organic compounds. The unacceptable risk finding in the BRA supported the need to perform an RA for the EPL Plume-Terrace Alluvial flow system.

Selected Remedy. The 1996 ROD Decision Summary describes the remedial alternatives for each of the sites at AFP4. For the EPL Plume-Terrace Alluvial flow system, four remedial alternatives were presented in the ROD.

Alternative 1, the No Action alternative, is required by the NCP for a baseline comparison with other alternatives. Under this alternative, the Air Force would take no action at the East Parking Lot to prevent exposures to groundwater contamination.

Alternative 2a consists of removal of DNAPL by dissolution into the groundwater and then extraction of the groundwater. The groundwater would then be treated with air stripping. After treatment, the groundwater would be discharged to surface water or to a sewage treatment plant.

Alternative 2b consists of all the components of Alternative 2a except that treatment is by ultraviolet oxidation rather than air stripping. Ultraviolet oxidation treatment uses ultraviolet light and oxidation to destroy contaminants in the groundwater.

Alternative 3 is similar to Alternatives 2a and 2b except that removal of DNAPL would be enhanced by use of surface active agents (surfactants). Surfactants are chemicals that can be injected into the groundwater to increase dissolution of DNAPL, thereby reducing remediation time.

Alternative 3 was the preferred remedial alternative identified in the 1996 ROD, because the use of surfactants would increase the rate of DNAPL removal in the Window Area, while continuing groundwater extraction and treatment worked to reduce the concentration of TCE in the Terrace Alluvium groundwater. Air Force, EPA, and TNRCC believed that Alternative 3 would be protective of human health and the environment and would comply with applicable or relevant and appropriate requirements (ARARs). The public did not have any significant comments on the selected remedy during the public comment period.

3.0 BASIS FOR THIS EXPLANATION OF SIGNIFICANT DIFFERENCES

This ESD was prepared to explain one significant change to the selected RA. The change involves the technology to enhance DNAPL removal and to reduce elevated TCE concentrations in groundwater.

The injection of surfactants into the groundwater to increase the dissolution of contaminants and enhance DNAPL removal as described in the July 1996 ROD will not be used. Instead, ERH and then vapor (air) extraction will be used.

During technology screening for the RI/FS, surfactants appeared to be the best choice for DNAPL removal. ERH was not considered a viable DNAPL removal technology primarily because of safety concerns. However, since the ROD was signed, ERH has been demonstrated at multiple sites and has proven to be a safe DNAPL removal technology. Like surfactants, ERH is considered an innovative technology.

Following a detailed evaluation of available thermal enhancements, and subsequent pilot-scale testing within Building 181, ERH appears capable of reducing elevated TCE concentrations in groundwater to meet the Remedial Action Objective (RAO) of less than 10 milligrams per liter (mg/L). The pilot-scale test at AFP4 also showed that ERH can be implemented in an active industrial setting without disrupting manufac-turing processes or creating an excess safety

concern.

One of the assumptions in the ROD is that DNAPL is present everywhere TCE concentrations in groundwater are greater than 10 mg/L. This 10 mg/L criterion (which is roughly 1% of the aqueous solubility of free-phase TCE) is often used as a preliminary indication of DNAPL presence. For the ROD, the mapped extent of dissolved-phase TCE groundwater concentrations greater than 10 mg/L, which is approximately 5.7 acres, was used as a basis for the estimated extent of DNAPL presence, and hence DNAPL-related remedial activities.

The current understanding is that DNAPL *is not* present everywhere TCE concentrations are greater than 10 mg/L, but instead may be limited to the "source" area within Building 181 (an approximately ½-acre area) where historical spills/leaks from degreasing operations occurred. With source area groundwater concentrations of TCE typically over 100 mg/L, dilution/dispersion processes alone could readily account for the current down-gradient expanse of the TCE plume with concentrations greater than 10 mg/L. Therefore, the ERH remediation will be focused on source reduction in the ½-acre area of verified soil and groundwater contamination greater than the RAOs for these media. The remaining dissolved phase groundwater plume with TCE concentrations less than 10 mg/L will be monitored to verify decreasing concentrations with source reduction, or possibly addressed with a less aggressive remedial approach in the future. The existing EPL groundwater extraction and treatment system should intercept the downgradient dissolved phase plume and ensure that ROD remediation goals are met. Figure 3 shows the proposed ERH application area in Building 181. Also shown are the plan view extents of: 1) the area of soil contamination beneath Building 181 with TCE concentrations greater than 11.5 mg/kg, and 2) soil gas TCE isoconcentration contours. The locations of the removed degreaser tanks T-544 and T-534, believed to be the source of the TCE contamination, are included on the figure as well.

4.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES

Surfactant flushing is most effective in homogeneous, high-permeability aquifers that afford uniform distribution and relatively high flow rates of the injected surfactant solution. Previous demonstrations of surfactant flushing have been most effective in sandy soils. The silty sands, sandy silts, and clayey sands comprising the Terrace Alluvium at AFP4 may limit the effectiveness of surfactant flushing. An advantage of ERH is the ability to treat low- permeability materials.

TCE is amenable to surfactant flushing. The solubility of TCE in water at 25° C is 1,100 mg/L. Observed and theoretical solubilities for TCE in surfactant solutions range from 10,000 mg/L to 60,000 mg/L, which significantly increase mass removal rates. Thus, the waste characteristics are suitable for surfactant flushing.

Technology limitations for surfactant flushing include limited demonstration of the technology, potential operation and maintenance problems associated with fouling of injection wells, and the uncertainty of ensuring capture of the high TCE-concentration surfactant solution.

Alternatively, ERH is designed to enhance the removal of volatile and semivolatile contaminants from the subsurface during soil vapor extraction (SVE). The innovation combines an emerging technology, ERH, with a baseline technology, SVE, to produce a more efficient in situ remediation system for difficult soil and/or contaminant applications. ERH is especially suited to sites where contaminants are tightly bound to clays and are thus difficult to remove using SVE alone. A major benefit of ERH is it treats both the saturated and unsaturated zones, making dewatering unnecessary.

In addition to enhancing DNAPL removal from the saturated zone, ERH has the potential to enhance the performance of SVE by heating and drying contaminated soil; thus (1) creating steam to strip contaminants and (2) increases the permeability of the formation. Soil drying may lead to increased mass removal rates and faster site remediation, particularly in low-permeability soils where contaminant removal is limited by diffusion.

Because the lateral extents of elevated TCE concentrations in the soil and soil gas (which forms the basis for the ERH application area) are estimated in some locations, the ERH electrode placements will be flexible along the perimeter of the proposed application area. Additional boreholes will be drilled outside the proposed extent of remediation, and soil samples screened for volatile organic compound levels, to help determine whether the remediation area needs expanding and ensure that heating encompasses all unsaturated zone source material.

Some additional benefits of ERH over surfactants for the EPL source reduction include the following:

- No need to identify exact location of DNAPL for remediation. Surfactant use requires prior tracer testing to identify DNAPL areas.
- Remediates the unsaturated zone (soils), expediting the Building 181 remediation (the intent of the Building 181 SVE selected remedy is to reduce the TCE concentration in soils to less than 11.5 mg/kg, which, based on leaching modeling, will be protective to groundwater).
- Makes use of the existing SVE and treatment system at the site.
- Extracted contaminants are easier to treat in air than in water, and there is no need for surfactant removal from the extracted groundwater.
- Quicker source removal (esti-

mated 11-week heating period for ½-acre).

- Proven at Building 181 site (safety and effectiveness).

5.0 SUPPORT AGENCY COMMENTS

This section will present all EPA and TNRCC comments after their review of the ESD. This section will also include the Air Force response to each comment before the ESD is submitted to the administrative record and for public review.

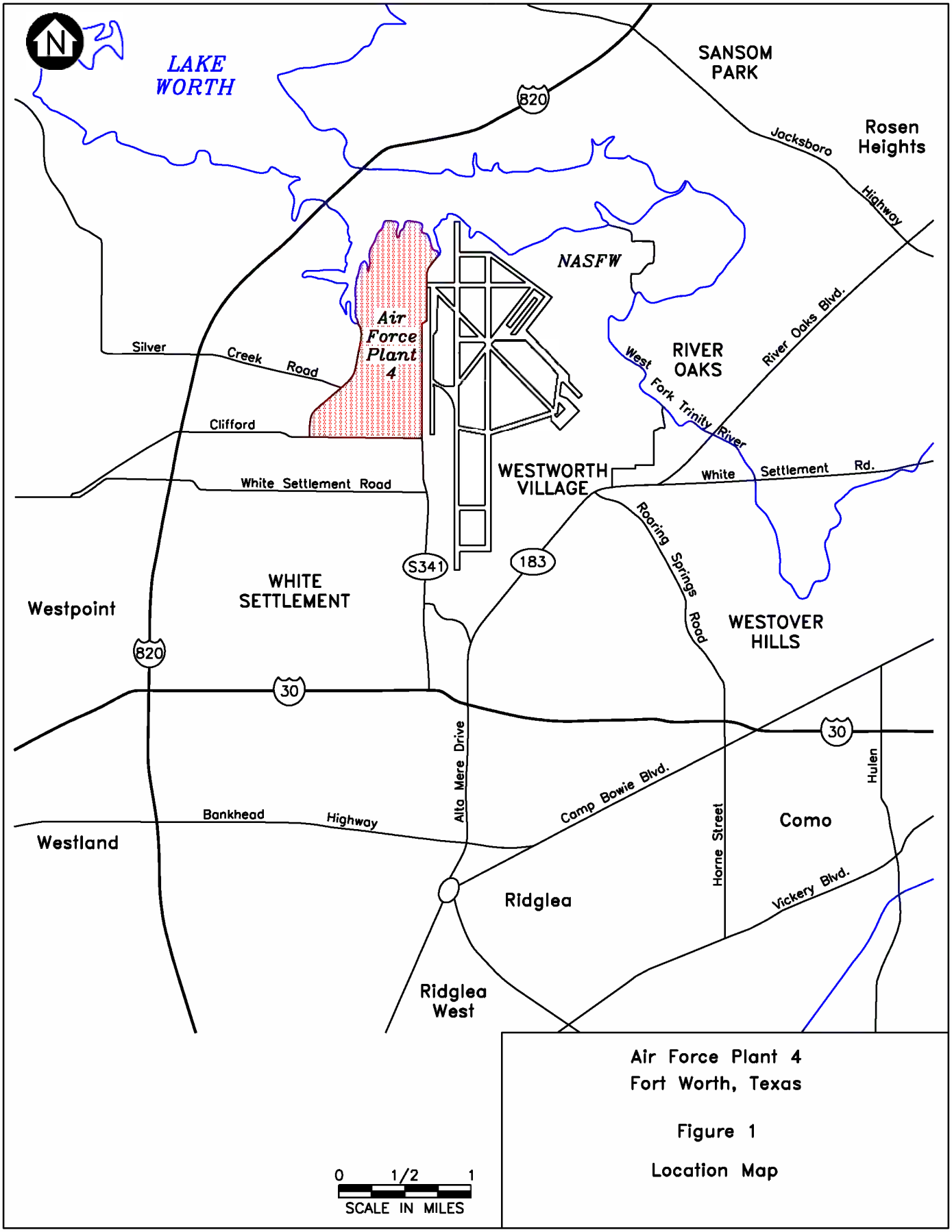
6.0 STATUTORY DETERMINATIONS

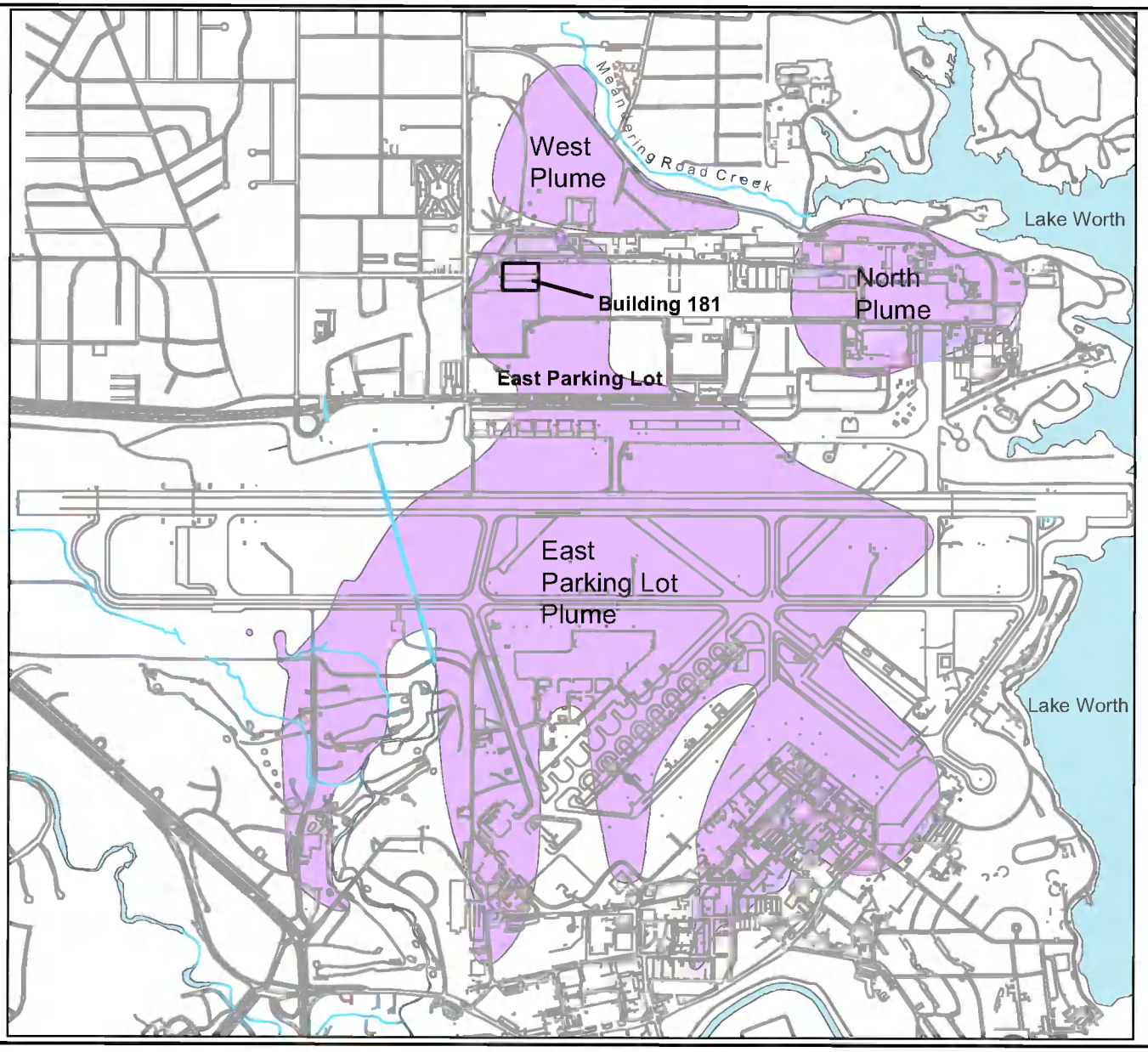
Considering the new information that has been evaluated and developed and the changes that have been made to the selected RA in the July 1996 ROD, the Air Force believes that the ERH technology will remain protective of human health and the environment; will satisfy CERCLA 121; comply with federal and state requirements that are legally applicable or relevant and appropriate to this RA; be more efficient at DNAPL removal; and be more cost effective.

This RA technology uses permanent solutions to the maximum extent possible for this site and satisfies the statutory preference for remedies employing treatment that reduces toxicity, mobility, or volume.

7.0 PUBLIC PARTICIPATION ACTIVITIES

The public participation requirements as outlined in NCP 300.435(c)(2)(i) will be met by publishing this fact sheet and submitting it to the administrative record file at the location specified in Section 1.0.


N
LAKE WORTH
820
SANSOM PARK
Jacksboro Highway
Rosen Heights
NASFW
Air Force Plant 4
Silver Creek Road
Clifford
White Settlement Road
West Fork Trinity River
River Oaks Blvd.
RIVER OAKS
WESTWORTH VILLAGE
White Settlement Rd.
Roaring Springs Road
WESTOVER HILLS
S341
183
WHITE SETTLEMENT
Westpoint
820
30
30
Alta Mere Drive
Camp Bowie Blvd.
Hulen
Bankhead Highway
Westland
Horne Street
Como
Ridglea
Vickery Blvd.
Ridglea West
0 1/2 1
SCALE IN MILES
Air Force Plant 4
Fort Worth, Texas
Figure 1
Location Map



TCE Plumes

East Parking Lot TCE Plume
from HydroGeoLogic, Inc. 05/17/2002

N

0 1,000 2,000 3,000 4,000

Feet

Figure 2
Areas of Interest and
Plume Map

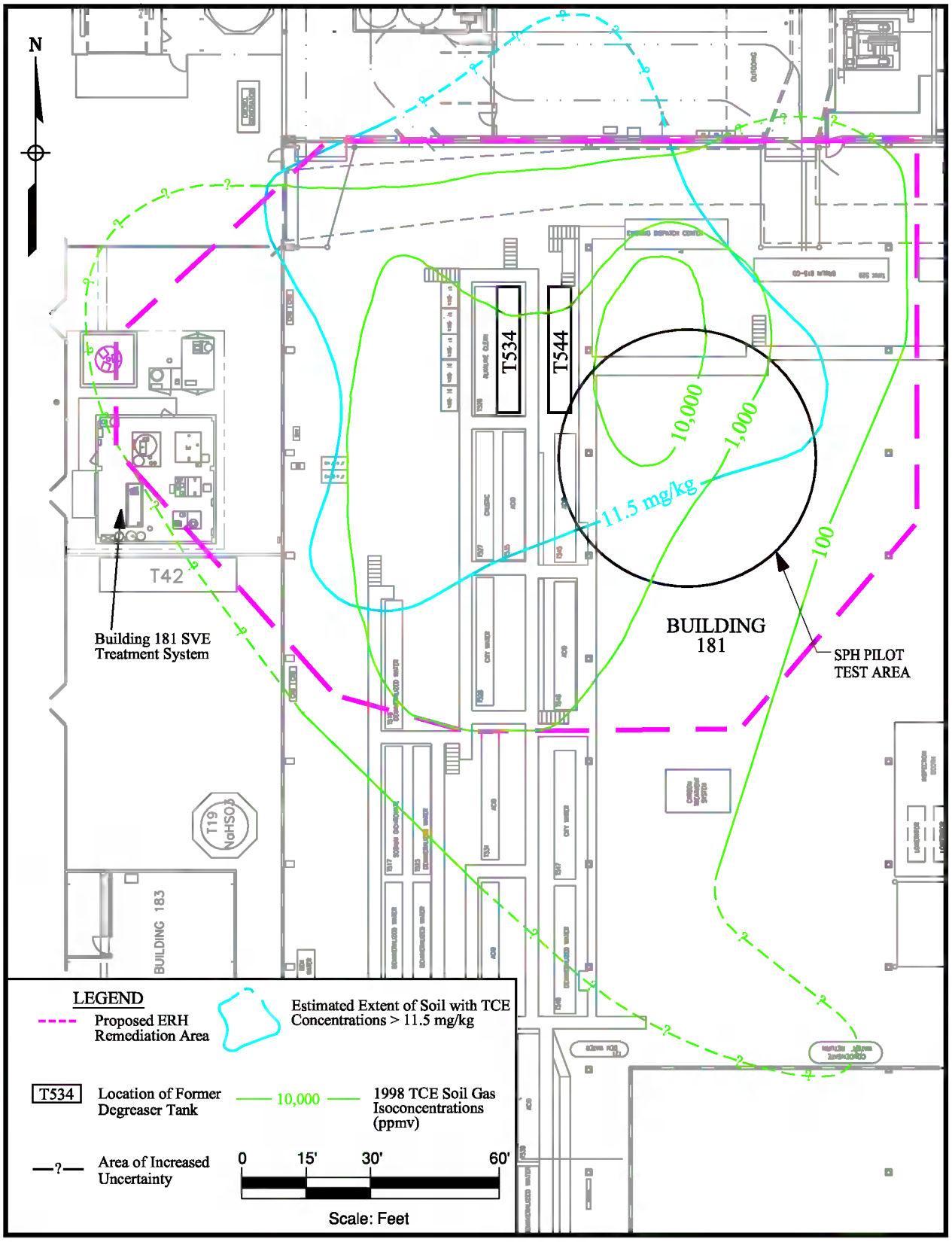


Figure 3 - Proposed Extent of ERH Remediation

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE