George Air Force Base, California

Installation Restoration Program

Prepared for
Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

Worldwide Full Service Remedial Action Contract
Contract F41624-97-D-8013
Delivery Order No. 0030

Final
Explanation of Significant Differences
Site OT-51 Remediation

July 2002

MWH
MONTGOMERY WATSON HARZA

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This document is the Explanation of Significant Differences documenting modification of the Record of Decision remedy for Site OT-51 in Operable Unit 3 at George Air Force Base.

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MWH
MONTGOMERY WATSON HARZA

8 July 2002

Mr. Jerry Bingham
Department of the Air Force
HQ AFCEE/ERB
3207 Sidney Brooks
Brooks AFB, TX 78235-5344

Subject: Transmittal of Final Explanation of Significant Differences, Site OT-51 Remediation, George Air Force Base, California.

Dear Mr. Bingham:

MWH is pleased to submit the Final Explanation of Significant Differences, Site OT-51 Remediation. Enclosed are two copies of the subject document for your use. We are also providing an extra copy of the Executive Summary and Statutory Determination for the Air Force Base Conversion Agency (Tony Wong), United States Environmental Protection Agency (James Chang), and the California Regional Water Quality Control Board, Lahontan Region (Jay Cass). We respectfully request that the signature section of the Executive Summary and Statutory Determination be completed and returned to MWH as soon as possible. MWH will then issue a set of final documents including a completed signature page; signed finals will be placed in public document repositories.

We appreciate the opportunity to have provided this service to the Air Force. Should you have questions or comments, please contact Chip Poalinelli, at (925) 975 3437, or myself, at (925) 975-3474.

Sincerely,

Pete Craig
MWH Delivery Order Manager

Enc.

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FINAL

EXPLANATION OF SIGNIFICANT DIFFERENCES
SITE OT-51 REMEDIATION

GEORGE AIR FORCE BASE, CALIFORNIA

Contract No. F41624-97-D-8013
Delivery Order No. 0030

Prepared for:

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Brooks Air Force Base, Texas

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FINAL

EXPLANATION OF SIGNIFICANT DIFFERENCES
SITE OT-51 REMEDIATION

GEORGE AIR FORCE BASE, CALIFORNIA

Prepared for:

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Brooks Air Force Base, Texas

Contract F41624-97-D-8013
Delivery Order 0030

Prepared by:

MWH Americas, Inc.
1340 Treat Boulevard, Suite 300
Walnut Creek, California

MWH hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under contract F41624-97-D-8013 are complete, accurate, and in compliance with all requirements of the contract.

Approved By: _____ Date: 8 July 2002
Rik Lewis, P.E.
MWH Certifying Official

Approved By: _____ Date: 7 July 2002
Pete Craig
MWH Project Manager

Approved By: _____ Date: 8 July 2002
Melih Ozbilgin, Ph.D.
MWH Installation/Quality Assurance Manager

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
a.m.	ante meridiem
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CA	California
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DO	delivery order
DTSC	Department of Toxic Substances Control
ESD	Explanation of Significant Differences
FFA	Federal Facilities Agreement
FS	Feasibility Study
ICE	internal combustion engine
JMM	James M. Montgomery
JP-4	jet propellant number 4
kg	kilogram
M&E	Metcalf and Eddy
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
O&M	operation and maintenance
OU	Operable Unit
NCP	National Contingency Plan
ND	not detected
NPL	National Priorities List
p.m.	post meridiem
RI	Remedial Investigation
ROD	Record of Decision
RPM	remedial project manager
RWQCB	Regional Water Quality Control Board
SCLA	Southern California Logistics Airport
SVE	soil vapor extraction
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons as diesel
TPH-G	total petroleum hydrocarbons as gasoline
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UST	underground storage tank

EXECUTIVE SUMMARY AND AFFIRMATION OF STATUTORY DETERMINATION

This Explanation of Significant Differences (ESD) documents a significant change to the remedy selected for Site OT-51 in the Record of Decision (ROD) for Operable Unit (OU) 3 at George Air Force Base (AFB) in Victorville, California (Montgomery Watson, 1998). Southern California Logistics Airport (SCLA) currently occupies much of what was once George AFB, including the Site OT-51 area. This ESD has been prepared to comply with regulatory requirements and to ensure that interested parties and citizens are kept informed of actions taken to address environmental concerns at George AFB.

Site OT-51 is in the western portion of George AFB, southwest of the aircraft runways, near former Jet Engine Test Cells 799 and 807. Analysis of soil and soil vapor samples from initial investigations onward has indicated persistent jet fuel contamination in the subsurface (MWH, 2002a). A bioventing system, in which fresh air is blown into the subsurface to encourage biodegradation of fuel compounds by indigenous microorganisms, was installed in 1996. This bioventing system was selected as the remedy for the site in the ROD (Montgomery Watson, 1998).

Results of a rebound test in August 1998 (Montgomery Watson, 1999) and an Interim Sampling Event in November 1999 (Montgomery Watson, 2000) showed that biodegradation rates at the site were relatively low and that contamination was likely to persist longer at the site than originally estimated. To accelerate remediation, Remedial Project Mangers (RPMs) decided to install a soil vapor extraction (SVE) system. Two soil vapor extraction wells were installed and a pilot test conducted in February 2000. After analysis of pilot test results, a full-scale SVE system was installed in September 2000. The SVE system, installed in the same area as the bioventing system, cleans the site by drawing air out from the subsurface for treatment. The air carries volatile contaminants, which are then destroyed above ground.

This ESD documents the installation of the SVE system, constituting the creation of a revised remedy for the Site. The revised remedy consists of both a bioventing and an SVE system; the two systems can be operated separately or together. Remedial Process Optimization for the revised remedy is documented in semi-annual operations and maintenance reports (for instance, MWH, 2002).

Considering the information collected after the ROD was signed, specifically from rebound testing in 1998 (Montgomery Watson, 1999) and soil sample analysis in 1999 (Montgomery Watson, 2000a), the United States Air Force (USAF), the United States Environmental Protection Agency (USEPA), and the State of California, as represented by the Regional Water Quality Control Board (RWQCB), Lahontan Region, believe that the revised remedy remains protective of human health and the environment. The USAF, USEPA, and RWQCB also believe that the revised remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for the site, complies with the applicable or relevant and appropriate requirements (ARARs) identified in the ROD, and is cost-effective.

APPROVAL

ALBERT F. LOWAS, JR. Date
Director
Air Force Base Conversion Agency

CONCURRENCE

DEBORAH JORDAN Date
Chief, Federal Facilities and Site Cleanup Branch
United States Environmental Protection Agency

CONCURRENCE

HAROLD J. SINGER
Executive Officer
California Regional Water Quality Control Board
Lahontan Region

Date

1.0 INTRODUCTION

This Explanation of Significant Differences (ESD) documents a significant change to the remedy selected for Site OT-51 in the Record of Decision (ROD) for Operable Unit (OU) 3 at George Air Force Base (AFB) in Victorville, California (Montgomery Watson, 1998). This ESD has been prepared to comply with regulatory requirements and to ensure that interested parties and citizens are kept informed of actions taken to address environmental concerns at George AFB.

1.1 SITE NAME AND LOCATION

Site OT-51
OU 3
George AFB
Southern California Logistics Airport (SCLA)
City of Victorville, San Bernardino County, California (CA)

1.2 LEAD AGENCY

- United States Air Force (USAF), Air Force Base Conversion Agency (AFBCA)

1.3 SUPPORTING AGENCIES

- United States Environmental Protection Agency (USEPA), Region IX
- California Regional Water Quality Control Board (RWQCB), Lahontan Region

1.4 LEGAL BASIS

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 117(c).
- The National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR), Section 300.435(C)(2)(i).

1.5 EXPLANATION OF SIGNIFICANT DIFFERENCES

This document addresses a significant change to the selected remedy in the Final OU 3 ROD (Montgomery Watson, 1998). This ESD covers the modification of the remedy through the addition of a soil vapor extraction (SVE) system. The ROD-selected remedy for remediation of soils at Site OT-51 was bioventing. The performance of the bioventing system was such that the required remediation of soil contamination in the 5-year time frame set forth in the ROD was extremely unlikely. Results of a pilot SVE test and subsequent SVE operation showed that adding an SVE system to the bioventing system greatly improved the rate of soil remediation.

1.6 PUBLIC ACCESS

The Air Force will publish a notice of availability and a brief description of this ESD, when final, in a local newspaper of general circulation (as required by CERCLA Section 117(c)), the Victorville Daily Press. A short release summarizing the final ESD and its availability will be issued to the San Bernardino County Sun, and run as a public notice in the classified section of the Victorville Daily Press. The text of the press release is included as Appendix B. Pursuant to 40 CFR Section 300.435(c)(2)(i), a public comment period is not required for this document. The Air Force will make the ESD available to the public by placing it in the Administrative Record file at information repositories.

Specifically, this ESD will be entered in the Administrative Record at three local public repositories for public access, as follows:

- The AFBCA office at George AFB
  Address: 18374 Phantom Street, Victorville, CA 92392
  Hours: By Arrangement
  Telephone: (760) 246-5360

- Victorville Branch of the San Bernardino County Library
  Address: 15011 Circle Drive, Victorville, CA 92392
  Hours: Monday – 12 to 8 post meridiem (p.m.)
  Tuesday – 12 to 8 p.m.
  Wednesday – 10 ante meridiem (a.m.) to 6 p.m.
  Thursday – 10 a.m. to 6 p.m.
  Friday – 10 a.m. to 6 p.m.
  Saturday – 9 a.m. to 6 p.m.
  Sunday – Closed
  Telephone: (760) 245-4222

- Adelanto Branch of the San Bernardino County Library
  Address: 11744 Bartlett Avenue, Adelanto, CA 92301
  Hours: Monday – 12 to 8 p.m.
  Tuesday – 12 to 6 p.m.
  Wednesday – 10 a.m. to 6 p.m.
  Thursday – 12 a.m. to 6 p.m.
  Friday – 10 a.m. to 6 p.m.
  Saturday – 10 a.m. to 5 p.m.
  Sunday – Closed
  Telephone: (760) 246-5661

2.0 BACKGROUND

Site OT-51 is in the western portion of the George AFB (Figure 2-1), southwest of the aircraft runways. Five jet engine test cells were located near the site, where jet fuel spills reportedly occurred. Site OT-51 is located in the area of former jet engine test cells 799 and 807 (Figure 2-2) (Montgomery Watson, 1998). Figure 2-3 presents the current site plan.

2.1 SITE HISTORY

George AFB was a 5,347 acre Air Force facility constructed between 1941 and 1943 as a flight training school. George AFB's mission necessitated the handling, use, and disposal of hazardous materials, including fuels, oils, and solvents. Since 1980, the USAF has carried out an active environmental cleanup program at the base. CH2M Hill conducted initial investigations related to Site OT-51 for the USAF in 1982 (CH2M Hill, 1982).

In February 1990, the USEPA added George AFB to the National Priorities List (NPL), making it a Superfund site. In October 1990, George AFB signed a Federal Facilities Agreement (FFA) with USEPA Region IX, the California Department of Toxic Substances Control (DTSC), and the California RWQCB, Lahontan Region. The FFA separated investigation sites at George AFB into three OUs. Site OT-51 belongs to OU 3. George AFB was formally closed on 15 December 1992.

James M. Montgomery (JMM) conducted investigation of site OT-51 in 1992 (JMM, 1992). In 1994, Metcalf and Eddy (M&E) investigated Site OT-51, by advancing 21 soil borings and installing one groundwater monitoring well. M&E also removed an underground storage tank (UST) and septic system. The results of the M&E investigation at Site OT-51 are presented in the M&E Remedial Investigation (RI) Report (M&E, 1994) and are summarized in the OU 3 RI Report (Montgomery Watson, 1996).

Subsequent investigations performed by Montgomery Watson included collection of subsurface soil samples, monitoring well installation, and groundwater sampling (Montgomery Watson, 1996). The elevated total petroleum hydrocarbons (TPH) (extractable as Jet Propellant Number 4 [JP-4]) and benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations were detected primarily in soil samples from an area around groundwater monitoring well WZ-04. TPH as gasoline (TPH-G), TPH as diesel (TPH-D), and BTEX compounds were detected present in soil samples from some surrounding borings, with the highest detected concentrations occurring in samples from depths of approximately 100 feet below ground surface (bgs).

2.2 NATURE AND EXTENT OF CONTAMINATION

Evaluation of analytical results suggests that, in the course of engine test cell operation, jet fuel was released to the ground surface at Site OT-51, and migrated downwards. Records and analytical results indicate that the fuel released was JP-4, an aviation fuel similar in properties to a mixture of gasoline and kerosene. JP-4 contains a number of compounds that are potentially harmful to human health. Any initial shallow JP-4 contamination in soil, however, has largely dissipated, limiting the potential for human exposure.

Specifically, the best recent estimate of the contaminated region (Montgomery Watson, 2000a), as defined by the presence of TPH above 100 milligrams of TPH per kilogram of soil (mg/kg), is centered about 75 feet northwest of Building 799. It is roughly spherical in shape with a diameter of about 100 feet, extending from approximately 6 feet below ground surface to just above the top of the aquifer. According to this estimate, there was approximately 143,000 kilograms (kg) TPH (gas- and diesel-range) remaining in the contaminated area at the time RPMs decided to accelerate remediation through a modification of the selected remedy.

The RI baseline risk assessment estimated an excess cancer risk of 1.4 in 100 million ($1.4x10^{-8}$), primarily because of dermal (skin) exposure to soil in an industrial/commercial worker scenario (Montgomery Watson, 1996). Although the calculated risk is below the California benchmark of

$1x10^{-6}$, and the USEPA guidelines of $1x10^{-4}$ to $1x10^{-6}$, this site was included in the OU 3 Feasibility Study (FS) (Montgomery Watson, 1997) because detected concentrations of TPH-G, TPH-D, and BTEX exceeded the initial evaluation criteria set forth in the OU 3 ROD.

One of the compounds in jet fuel that is particularly harmful to human health is benzene. The results of vadose zone modeling presented in the RI indicated that under the base case scenario (that is, the best estimates of site conditions for the calibrated model), benzene would continue to reach the water table over the 100 years modeled. The protection of groundwater resources is a primary objective for OT-51 cleanup.

2.3 SELECTED REMEDY

Based on the data presented in the OU 3 RI (Montgomery Watson, 1996) and the alternatives analysis in the OU 3 FS (Montgomery Watson, 1997), the remedial technology selected and implemented at Site OT-51 was bioventing. Bioventing uses forced aeration of the vadose zone via air-injection wells to stimulate indigenous soil microorganisms. Increasing the supply of oxygen in the subsurface typically increases the rate at which the biodegradation of fuel constituents occurs, in the absence of limiting conditions. A bioventing pilot study was not conducted during the initial design stage for Site OT-51. However, the subsurface conditions at Site OT-51 were considered similar to Sites WP-17 and FT-19a, and pertinent data gathered during the bioventing pilot studies at those two sites were considered at the time to be sufficient for design of the Site OT-51 bioventing system. The bioventing system at Site OT-51 began operation on April 1, 1996. It was anticipated that remedy completion would be achieved within five years (Montgomery Watson, 1998).

3.0 SIGNIFICANT DIFFERENCES

The bioventing system currently in place at OT-51 has not been effective in meeting remediation goals in a timely manner. To augment the bioventing system, an SVE system consisting of two extraction wells was added. The bioventing and SVE systems can be operated separately or in conjunction as an active injection/soil vapor extraction system.

3.1 BASIS FOR DIFFERENCES

Information collected after the ROD-selected remedy was in place suggested that the remedy should be modified. This section describes this information. The bioventing system at Site OT-51 operated for a period of approximately 2 years. Bioventing was discontinued due to funding constraints, following completion of a rebound test on 28 August 1998. Biodegradation rates calculated from rebound tests during system operation ranged from zero biodegradation to 0.48 milligrams of TPH per kilogram of soil, per day (mg/kg-day) (Montgomery Watson, 1999). These calculated biodegradation rates were lower than assumed in the FS, which predicted that risks would be removed in three to five years.

An Interim Sampling Event was conducted at Site OT-51 in November 1999, and petroleum contamination was detected in soil samples from Site OT-51 at levels of concern (Montgomery Watson, 2000a). Petroleum contamination detected in the soil during the Interim Sampling Event ranged from non-detect (ND) to 18,500 mg/kg of TPH-G and ND to 10,700 mg/kg of TPH-D.

To determine the feasibility of an alternate remedial approach at Site OT-51, an SVE pilot test was conducted in February 2000 by Praxis Environmental Technologies (Praxis, 2000). This test included the installation of two nested SVE wells at the site. Strong fuel odors were noted on the boring logs for both well nests. Soil samples were collected from the boring for well

PEW-1 for chemical analysis. These samples contained TPH-G in concentrations ranging from 0.014 mg/kg to 578 mg/kg, and TPH-D concentrations ranging from 5.3 mg/kg to 68.3 mg/kg.

Based on the low observed biodegradation rates (less than or equal to 0.48 mg/kg-day) and the levels of contamination detected in samples from the Interim Sample Event (up to 18,500 mg/kg TPH-G), the total time to remediate the soils at Site OT-51 with the original remedy (bioventing) would probably have far exceeded the five years stated in the OU 3 ROD.

3.2 DIFFERENCES

To accelerate site remediation, the Air Force has added an SVE system to the site. The SVE system can be operated separately or in conjunction with the bioventing system. The SVE system creates a vacuum in extraction wells, drawing air from the subsurface. This air carries volatilized contaminants out of the ground for treatment. Currently, the USAF is using an internal combustion engine (ICE) SVE system (essentially a modified automobile engine), in which the intake vacuum is used to pull fuel vapors from the subsurface and into the engine for combustion (destruction) with a supplemental fuel (propane). Table 3-1 compares bioventing to SVE and combined bioventing/SVE. Table 3-2 shows original cost estimates for the Site OT-51 bioventing system, as well as the additional costs of the ICE SVE system.

When both the bioventing and SVE systems are operated simultaneously, the system constitutes an active injection/extraction system. SVE extracts volatile compounds from the vicinity of extraction wells, while the bioventing system continues to inject air to the subsurface. The oxygen in injected air continues to facilitate the aerobic metabolism of organic compounds by microorganisms; in addition, the injected air helps move gas-phase TPH and BTEX toward the SVE wells. This combined approach was expected by the Air Force to reduce the predicted cleanup time compared to specifically operating one system at a time; however, process variables, including combined operation, must be continuously evaluated and adjusted to ensure optimal operation.

3.3 RATIONALE FOR DIFFERENCES

To determine the feasibility of an alternate remedial approach at Site OT-51, an SVE pilot test was conducted in February 2000. This test included the installation of two SVE wells at the site (Praxis, 2000). A 22-day continuous pumping test of one of the extraction wells yielded approximately 1,818 kg of TPH, or about 82.6 kg/day, indicating that SVE would be effective. During SVE system startup, the system achieved a mass removal rate of approximately 56.2 kg/day. Linear extrapolation of this mass removal rate to the total contaminant mass estimate from the Interim Sampling Event leads to an estimated cleanup time of 4.3 years (Montgomery Watson, 2002a). In reality, the concentration of fuel in extracted vapor declines over time, reducing the mass removal rate. When the SVE system is no longer cost-effective, it can be shut down and site remediation finished with (injection) bioventing. The net result will be a significant decrease in the time required for cleanup. This decrease in cleanup time justifies SVE as an effective and appropriate remediation technology for this site.

3.4 COMPARISON TO ORIGINAL REMEDY

The use of SVE and bioventing was compared to the use of bioventing alone using the same criteria used to evaluate bioventing in the OU 3 ROD. Results are summarized below.

3.4.1 Protectiveness

Both the original remedy, bioventing, and the modified remedy, SVE and bioventing, will remediate the site to approximately the same endpoint, the reduction of contaminants to levels below the remedial goals specified in the OU 3 ROD. Both are thus considered to be approximately as protective of human health and the environment. Bioventing carries with it the risk of spreading recalcitrant contaminants away from the source area. To protect against this possibility, the Air Force takes samples from soil vapor monitoring points and will conduct comprehensive soil sample collection and analysis before closing the site. SVE carries with it

the risk of air pollution if treatment of extracted vapors is interrupted or inefficient. For this reason, the Air Force collects and analyzes air samples from the SVE system on a monthly basis to verify proper air emissions control.

3.4.2 Compliance with Requirements

Both bioventing and SVE, separately and together, comply with applicable or relevant and appropriate requirements identified in the ROD (Montgomery Watson, 1998)

3.4.3 Short-Term Effectiveness

The addition of SVE to the system increases the remedy's short-term effectiveness by increasing the rate at which contaminants are removed.

3.4.4 Long-Term Effectiveness

Both the original remedy and the modified remedy are projected to eventually remediate contamination at the site to levels that do not pose a significant risk to human health or the environment. Both the original and modified remedy are approximately as effective in the long-term.

3.4.5 Reduction of Toxicity, Mobility, and Volume

Both the original remedy and the modified remedy reduce toxicity, mobility, and volume of contaminants by destruction. The modified remedy, however, destroys contaminants more quickly than the original remedy, and has a slightly reduced risk of spreading contamination in the course of remediation.

3.4.6 Implementability

Both the original remedy and the modified remedy were easily implemented.

3.4.7 Cost

As presented in Table 3-2, the addition of SVE increases the lifetime (five year) cost estimate for the remedy (as presented in the FS), by approximately $485,000.

3.4.8 State Acceptance

The modified remedy has been accepted by the State.

3.4.9 Community Acceptance

The site is in a restricted area close to an active runway. There are no residences or businesses impacted by the operation of either the original or the modified remedy. As the modified remedy is expected to clean up the site faster than bioventing alone, and thus accelerate the transfer and economically beneficial use of property, community acceptance is anticipated.

4.0 SCHEDULE

An SVE pilot study was conducted in February of 2000 (Praxis, 2000). Praxis installed two extraction well nests (PEW-01 and PEW-02), performed PneuLog® test of existing bioventing injection wells, and performed PneuLog® and extraction tests of new well clusters. Montgomery Watson collected soil samples from the borehole for well PEW-01 for analysis.

The SVE system was constructed in September 2000 by Montgomery Watson. Desert climate modifications were made to ICE engine on September 22, 2000, and a system start-up test was executed on September 27, 2000. The bioventing system was restarted on October 31, 2000. Both systems were operated simultaneously. A Draft ESD was submitted in October 2000 (Montgomery Watson, 2000b).

The pilot study, system start-up, and the first two months of operation are described in the Final Site OT-51 Active Vapor Injection/Soil Vapor Extraction System Startup Report (MWH, 2002a). Subsequent operation is reported in semiannual operations and maintenance (O&M) reports, the most recent of which was issued in May of 2002 (MWH, 2002b). A Draft Final ESD was issued in June 2002 (MWH, 2002c).

Additional actions are scheduled for late summer 2002. As discussed in the Draft Site OT-51 Vapor Point Installation Work Plan (MWH, 2002d), five soil vapor monitoring points will be installed to obtain additional data on system performance, remedial progress, and the current extent of contamination.

5.0 SOURCES FOR ADDITIONAL INFORMATION

Document repositories at the Victorville and Adelanto branches of the San Bernardino County Public Library contain administrative records for George AFB. This ESD, the OU 3 ROD, and all other documents listed in Section 6.0, References, are part of the Administrative Record maintained by the United States Government for George AFB, and are available in public repositories or by request. To request documents, or for any other information, interested parties are encouraged to contact the AFBCA Field Office, at 18374 Phantom Street, in Victorville, California. The Field Office can be reached by telephone at (760) 246 5360, or by fax at (760) 246 3315.

6.0 REFERENCES

CH2M Hill, 1982. Installation Restoration Program Phase I Search for George Air Force Base, California. Gainesville, Florida. January.

JMM, 1992. Remedial Investigation Report, George Air Force Base. Walnut Creek, California. August.

Metcalf & Eddy, 1994. Remedial Investigation Summary Report for Soil Removal at Miscellaneous OU 3 Sites, George Air Force Base, California. Redwood City, California. June.

Montgomery Watson, 1996. Remedial Investigation Report, Operable Unit 3, George Air Force Base, California. Walnut Creek, California. April.

Montgomery Watson, 1997. Final Operable Unit 3 Feasibility Study Report, George Air Force Base, California. Walnut Creek, California. February.

Montgomery Watson, 1998. Final Operable Unit 3 Record of Decision, George Air Force Base, California. Walnut Creek, California. February.

Montgomery Watson, 1999. Draft Technical Memorandum Rebound Test and Status of Remedial Actions, Sites WP-17, FT-19a, and OT-51, George Air Force Base, California. Walnut Creek, California. August.

Montgomery Watson, 2000a. Interim Sampling Event Report, Site OT-51, George Air Force Base, California. Walnut Creek, California. August.

Montgomery Watson, 2000b. Draft Explanation of Significant Differences, Site OT-51, George Air Force Base, California. Walnut Creek, California. November.

MWH, 2002a. Final Site OT-51 Active Vapor Injection/Soil Vapor Extraction System Startup Report, George Air Force Base, California. Walnut Creek, California. May.

MWH, 2002b. Semiannual Report for Remedial Activities at Sites FT-19a, FT-19c, OT-51, and Landfills DP-03, DP-04, LF-12, LF-14, and the SEDA, George Air Force Base, California. Walnut Creek, California. May.

MWH, 2002c. Draft Final Explanation of Significant Differences, Site OT-51, George Air Force Base, California. Walnut Creek, California. June.

MWH, 2002d. Draft Site OT-51 Vapor Point Installation Work Plan, George Air Force Base, California. Walnut Creek, California. June.

Praxis, 2000. Draft Final PneuLog® Data Evaluation Report Site OT-51, George Air Force Base, California. Burlingame, California. May.

TABLE 3-1

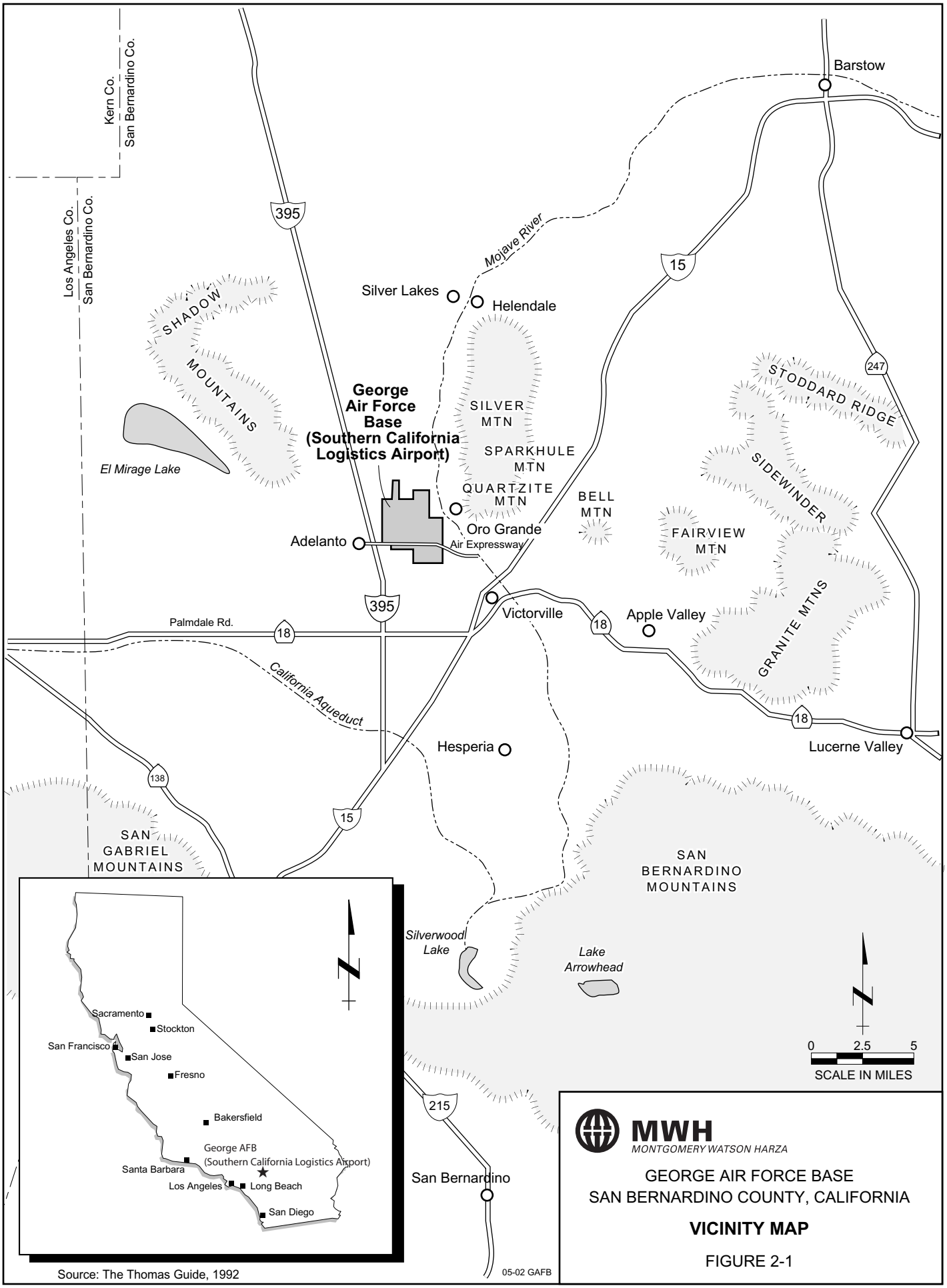
COMPARISON OF BIOVENTING WITH SOIL VAPOR EXTRACTION
SITE OT-51
GEORGE AIR FORCE BASE, CALIFORNIA

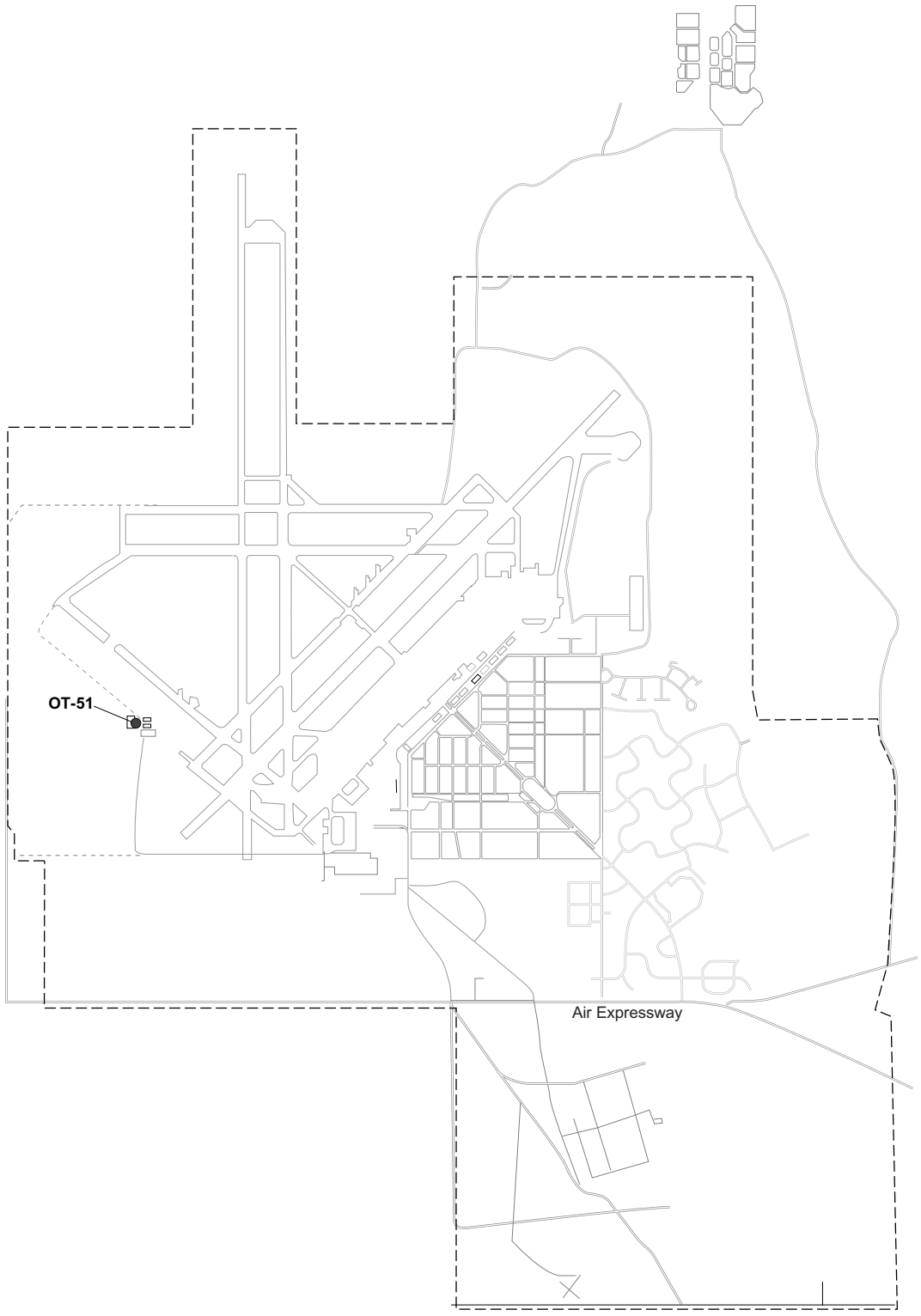
Technology	Injection Bioventing	Soil Vapor Extraction
Target Media	Soil	Soil
Physical Process	Injection of Clean Air	Extraction of Contaminated Air (Soil Vapor)
Primary Remedial Mechanism	Oxygen Provided for Biodegradation of Contaminants	Volatile Contaminants in Gas Phase Extracted
Secondary Remedial Mechanism	Volatile, Less Degradable Compounds Dispersed	Clean Air Drawn into Contaminated Area to Increase Biodegradation
Suitability for Jet Fuel Contamination	Suitable for Biodegradable Constituents	Suitable for Volatile Constituents
Relative Speed	Typically Slower Than Soil Vapor Extraction	Typically Faster Than Bioventing
Relative Cost	Typically Cheaper Than Soil Vapor Extraction	Typically More Expensive than Bioventing

TABLE 3-2

COST COMPARISON
ORIGINAL AND MODIFIED REMEDY
SITE OT-51
GEORGE AIR FORCE BASE, CALIFORNIA

	Bioventing	Additional Costs Related to SVE/ICE	Combined System
Direct Capital Costs	$280,675	$46,568	$327,243
Indirect Capital Costs	$102,076	$49,599	$151,675
Subtotal	$382,751	$96,167	$478,918
Annual Costs	$41,355	$91,403	$132,758
Present Worth of Annual Costs Discount Rate: 7% Years: 5	$169,564	$374,770	$544,334
Closure Costs (Year 5, Discounted)	$107,685	$14,200	$121,885
Total Present Worth	$660,000	$485,137	$1,145,137


Kern Co.
San Bernardino Co.
Los Angeles Co.
San Bernardino Co.
Barstow
395
Mojave River
15
Silver Lakes
Helendale
SHADOW MOUNTAINS
El Mirage Lake
George Air Force Base (Southern California Logistics Airport)
SILVER MTN
SPARKHULE MTN
QUARTZITE MTN
BELL MTN
STODDARD RIDGE
247
SIDEWINDER
FAIRVIEW MTN
GRANITE MTNS
Adelanto
Oro Grande
Air Expressway
395
Victorville
Apple Valley
18
Palmdale Rd.
18
California Aqueduct
18
Lucerne Valley
Hesperia
138
15
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
Silverwood Lake
Lake Arrowhead
Sacramento
Stockton
San Francisco
San Jose
Fresno
Bakersfield
George AFB
(Southern California Logistics Airport)
Santa Barbara
Los Angeles
Long Beach
San Diego
215
San Bernardino
0
2.5
5
SCALE IN MILES
MWH
MONTGOMERY WATSON HARZA
GEORGE AIR FORCE BASE
SAN BERNARDINO COUNTY, CALIFORNIA
VICINITY MAP
FIGURE 2-1
Source: The Thomas Guide, 1992
05-02 GAFB



LEGEND

_ _ _ _ . Base Boundary

0 2437.5 4875

SCALE IN FEET

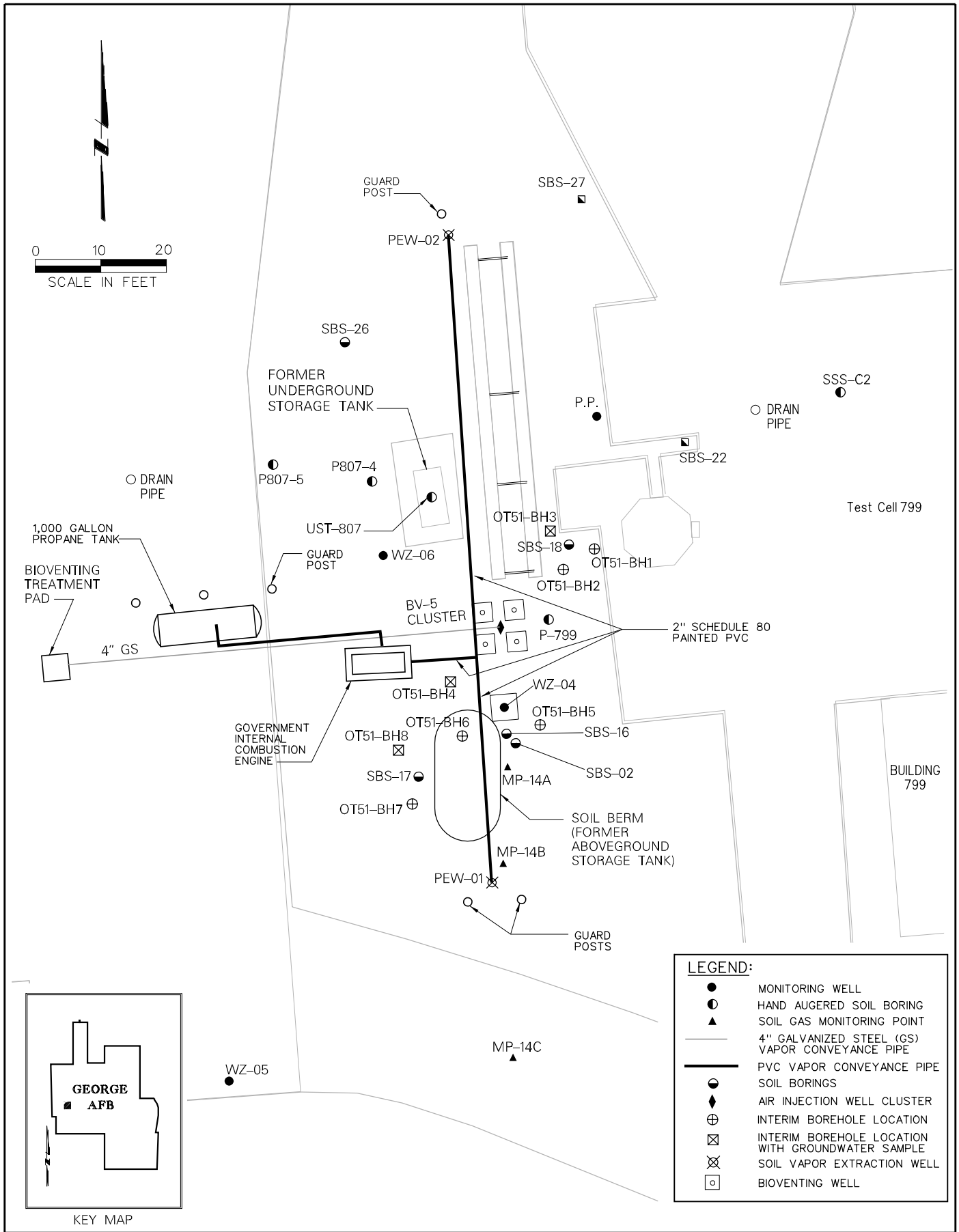
05-02 GAFB

MWH
MONTGOMERY WATSON HARZA

GEORGE AIR FORCE BASE
SAN BERNARDINO COUNTY, CALIFORNIA

SITE LOCATION MAP

FIGURE 2-2



SCALE: 20.000000:1.000000
DATE: 6/3/2002
FILE: k:\projects\mars\prj\GAFB\CAD\sve51\ot51fg23a.dgn
JOB No.

MWH
MONTGOMERY WATSON HARZA

GEORGE AIR FORCE BASE

OT-51 SITE PLAN

Figure 2-3

ATTACHMENT A

RESPONSE TO SUPPORTING AGENCY COMMENTS

ATTACHMENT A

RESPONSE TO SUPPORTING AGENCY COMMENTS

RESPONSE TO UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA) REVIEW COMMENTS ON DRAFT FINAL EXPLANATION OF SIGNIFICANT DIFFERENCES, SITE OT-51 GEORGE AIR FORCE BASE, CALIFORNIA DATED JUNE, 2002

Note: USEPA did not submit formal written comments on the subject document, but did convey the following direction via electronic mail.

GENERAL COMMENT

Comment: **The signatory page should reflect the names of agency representatives authorized to sign the [Record of Decision] ROD unless the responsibility of signing an [Explanation of Significant Differences] ESD has been delegated down to the [Remedial Project Manager] RPM(s). For USEPA, only the below should be on the signatory page of decision documents:**

Deborah Jordan
Chief, Federal Facilities & Site Cleanup Branch

Response: The signatory page has been changed as directed.

RESPONSE TO SUPPORTING AGENCY COMMENTS (CONTINUED)

RESPONSE TO CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD (RWQCB), LAHONTAN REGION, REVIEW COMMENTS ON DRAFT FINAL EXPLANATION OF SIGNIFICANT DIFFERENCES, SITE OT-51 GEORGE AIR FORCE BASE, CALIFORNIA DATED JUNE, 2002

SPECIFIC COMMENTS

Comment No. 1 Executive Summary **- Please replace the Regional Board signatory of this document from Jehiel Cass to Harold J. Singer, Executive Officer. During the August 2002 Board meeting, the Executive Officer intends to inform the Regional Board of his intention to sign the ROD.**

Response: The signatory page has been changed as directed.

Comment No. 2 Section 4.0**, Schedule – [This section] should describe the general actions that are planned for 2002.**

Response: Discussion of the installation of five new vapor monitoring points and a reference to the most recent version of the work plan for the project has been added.

Comment No. 2 Section 5.0**, Sources for Additional Information - Because this document modifies the signed OU-3 ROD, it would be appropriate to identify the OU-3 ROD in this section and indicate that it and the documents listed in** Section 6.0 **[References] are in the administrative record.**

Response: The section has been modified to indicate that the ROD, and the other documents referenced in Section 6.0, are part of the administrative record, and provides information on how they can be obtained by the public.

ATTACHMENT B

PRESS RELEASE

ATTACHMENT B

PRESS RELEASE

NEWS RELEASE

FOR IMMEDIATE RELEASE
ATTENTION: NEWS EDITOR

AIR FORCE ACCELERATES FUEL SPILL CLEANUP

Explanation of Significant Differences modifies Record of Decision for fuel spill site at former George Air Force Base.

DAY MONTH YEAR
Victorville, California.

The United States Air Force (USAF), United States Environmental Protection Agency (USEPA), Region IX, and California Regional Water Quality Board, Lahontan Region, finalized a modification of the clean-up strategy for jet engine test cell Site OT-51 at the former George Air Force Base (AFB) today, making an explanation of differences available to the public at San Bernardino County Libraries in Victorville and Adelanto, as well as at the Air Force Base Conversion Agency (AFBCA) Office at Southern California Logistics Airport.

The Explanation of Significant Differences (ESD) documents a change from the Record of Decision (ROD) signed in 1998. While George AFB was active, jet fuel was spilled at Site OT-51. Since 1996, bioventing technology has been used to clean subsurface soil by providing oxygen for the biodegradation of fuel constituents by naturally occurring microorganisms. Progress was slower than expected. The Air Force has carried out a pilot study and installed a soil vapor extraction (SVE) system to accelerate site cleanup.

Issuing the ESD for public reference marks the final step in this change from the ROD. Together, the USAF, USEPA, and RWQCB believe that this change will speed site cleanup, clearing the way for productive re-use.

For more information on the environmental cleanup at Site OT-51, or any other site at the former George AFB, please contact the Air Force Base Conversion Agency Field Office, 18374 Phantom Street, Victorville, California, 92392, at (760) 246 5360 (telephone) or (760) 246-3315 (fax).

FOR FURTHER INFORMATION PLEASE CONTACT:

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Booz-Allen & Hamilton
Air Force Base Conversion Agency
3430 Bundy Avenue
Riverside, CA 92518
(909) 656 1940
Cox_calvin@bah.com

ABOUT THE AIR FORCE BASE CONVERSION AGENCY

The mission of the Air Force Base Conversion Agency (AFBCA) is to execute the environmental programs and real and personal property disposal for major Air Force bases in the United States being closed or realigned. AFBCA focuses on speeding the economic recovery of those communities affected by base closure using job-centered property disposal, fast-track cleanup, establishment of transition coordinators at each closing base, easy access to transition and redevelopment help, and larger economic development planning grants and technical assistance.

For more information, please visit the AFBCA on the Web, at http://www.afbca.hq.af.mil/ .