MCCLELLAN AFB
CALIFORNIA

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 7522

DEPARTMENT OF THE AIR FORCE
AIR FORCE REAL PROPERTY AGENCY

MEMORANDUM FOR SEE DISTRIBUTION

APR 2 6 2012

FROM: AFRPA Western Region Execution Center
3411 Olson Street
McClellan CA 95652-1003

SUBJECT: Submission of the Final Focused Strategic Sites (FSS) Record of Decision (ROD) (DSR# 1442-7), former McClellan Air Force Base, California

1. Enclosed is the signed final version of the FSS ROD (DSR# 1442-7). This final ROD is categorized as a primary document, with a due date of 2 May 2012. This has been a long and technically challenging process, and we can all be very proud of the successful teamwork that went in to completing this document. The Air Force is now diligently working to award a contract which will implement the ROD remedies. We anticipate having this contract awarded in June 2012, with the required remedial design/remedial action project schedule provided shortly thereafter. Thanks again for your support.

2. Any questions should be directed to me at (916) 643-0830, ext 224.

STEVEN K. MAYER, PMP, P.E.
BRAC Environmental Coordinator

Attachment:
FSS ROD, Final Copy

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Final

Focused Strategic Sites Record of Decision

Former McClellan Air Force Base
Air Force Real Property Agency

McClellan, California

February 2012

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Acronyms and Abbreviations

AEC	Atomic Energy Commission
AFRPA	Air Force Real Property Agency
AOC	Area of Concern
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
Base	former McClellan Air Force Base
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
CAMU	Corrective Action Management Unit
CCR	*California Code of Regulations*
CDHS	California Department of Health Services
CDI	chronic daily intake
CDPH	California Department of Public Health
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFR	*Code of Federal Regulations*
CFRTA	California Fire and Rescue Training Authority
CHHSL	California Human Health Screening Level
COC	contaminant of concern
CS	Confirmed Site
CU	Consolidation Unit
cy	cubic yard(s)
DCA	dichloroethane
DCB	dichlorobenzene

DCE	dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DLM	Designated Level Methodology
DP	disposal pit
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ESD	Explanation of Significant Differences
FS	feasibility study
FSP	field sampling plan
FSS	Focused Strategic Sites
FSSR	Final Status Survey Report
ft	foot/feet
FTA	Fire Training Area
FTO	flameless thermal oxidizer
GC	gas chromatograph
HDPE	high-density polyethylene
HI	hazard index
HQ	hazard quotient
HVOC	halogenated volatile organic compound
IC	institutional control
IRP	Installation Restoration Program
Jacobs	Jacobs Engineering Group, Inc.
km	kilometer(s)
LDR	Land Disposal Restriction
LRA	Local Reuse Authority

MCL	maximum contaminant level
mg/kg	milligram(s) per kilogram
mg/kg-day	milligram(s) per kilogram of body weight per day
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFEI	No Further Ecological Investigation
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NTCRA	Non-time Critical Removal Action
O&M	operation and maintenance
OU	Operable Unit
OVA	organic vapor analyzer
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCG	Preliminary Cleanup Goal
pCi/g	picocurie(s) per gram
PEF	particulate emission factor
PHC	Principal Hazardous Constituent
ppb	part(s) per billion
ppbv	part(s) per billion by volume
ppmv	part(s) per million by volume
PRG	preliminary remediation goal
PRL	Potential Release Location
PW_{30}	present worth cost at 30 years
QA/QC	quality assurance/quality control
RAB	Restoration Advisory Board
Radian	Radian Corporation
RAO	remedial action objective
RCOPC	radiological contaminant of potential concern
RCRA	Resource Conservation and Recovery Act of 1976

RD	Remedial Design
RfD	reference dose
RHB	Radiological Health Branch
RI	remedial investigation
RICS	remedial investigation characterization summary
ROD	record of decision
RSL	Regional Screening Level
RUSLE	Revised Universal Soil Loss Equation
SAFR	Small Arms Firing Range
SARA	Superfund Amendments and Reauthorization Act of 1986
SLUC	State Land Use Covenant
STOP	soil vapor extraction termination and optimization process
SVE	soil vapor extraction
SVM	soil vapor monitoring
SVOC	semivolatile organic compound
SWAT	solid waste assessment test
TCDD	tetrachlorodibenzodioxin
TCE	trichloroethene
TCRA	Time Critical Removal Action
TEDE	total effective dose equivalent
TOD	Technical Operations Division
TPH	total petroleum hydrocarbon
TPH-D	total petroleum hydrocarbon as diesel
TPH-G	total petroleum hydrocarbon as gasoline
UST	underground storage tank
UTS	Universal Treatment Standards
VGAC	vapor granular activated carbon
VOC	volatile organic compound
VZ	Vadose Zone (site)
WQL	water quality limit

SECTION 1

Declaration

1.1 Site Name and Location

This Focused Strategic Sites (FSS) Record of Decision (ROD) is for 11 large-volume sites located at the former McClellan Air Force Base (McClellan or Base) in Sacramento County, California.

Department of the Air Force
Air Force Real Property Agency / Western Region
3411 Olson Street
McClellan Park, California 95652-1003
CERCLIS Identification Number: CA4570024337
National Superfund Database Identification Number: 0902759

The 11 Installation Restoration Program (IRP) sites represent the largest volume of wastes yet to be addressed at McClellan. These sites are included in this ROD for both volatile organic compound (VOC) contaminants in soil gas and for non-VOC contaminants and radionuclides in soil. The 11 FSS included in this ROD are listed below:

- Area of Concern (AOC) 313 (Fire Training Area [FTA])
- Confirmed Site (CS) 010
- CS 011
- CS 012
- CS 013
- CS 014
- CS 022
- CS 024
- Potential Release Location (PRL) 008
- Small Arms Firing Range (SAFR)
- Vadose Zone (VZ) (Disposal Pit 178 [DP 178] and Operable Unit D [OU D])

A map showing the location of McClellan is presented on Figure 1 (note: all figures are located at the end of this document). The locations of the 11 FSS are shown on Figure 2.

McClellan is listed on the National Priorities List (NPL) and has a Federal Facilities Agreement in place that governs investigation and cleanup at this former military facility. The Air Force and federal and state regulatory agencies work as a team to investigate and clean up McClellan. The Air Force is the lead agency for environmental cleanup activities at McClellan. The primary regulatory agencies overseeing the McClellan cleanup are the U.S. Environmental Protection Agency (EPA) and the State of California Environmental Protection Agency (Cal/EPA), represented by the Department of Toxic Substances Control (DTSC) and the Central Valley Regional Water Quality Control Board (Central Valley Water Board) (collectively, the "State"). The Air Force and EPA jointly select the remedies, with concurrence from the State.

1.2 Statement of Basis and Purpose

This ROD presents the selected remedies for the 11 FSS at McClellan and addresses public comments to the Proposed Plan. The Air Force issued a Proposed Plan (Air Force Real Property Agency [AFRPA], 2006) as part of its public responsibility under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 117 Section 300.430 (f)(2) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Public involvement in decisions related to the cleanup and closure of the sites is required under 42 United States Code Section 9617. The Proposed Plan and subsequent ROD address the community involvement requirements of CERCLA.

This ROD addresses VOCs in soil gas that may present a threat to human health through the vapor inhalation pathway and non-VOCs, including radionuclides, in soil that may present a threat to human health through direct contact, inhalation, or ingestion or that may present a threat to surface water or groundwater quality.

The remedies in this ROD do not address contamination in groundwater that may be present at these sites nor the potential threat to surface water from VOCs. Impacts to surface water are not expected for VOCs because of their inherent volatility. Groundwater beneath the FSS is addressed in the *Basewide VOC Groundwater Record of Decision* (AFRPA, 2007) and the *Non-VOC Amendment to the Basewide VOC Groundwater Record of Decision* (AFRPA, 2009). The threat to groundwater from VOCs at CS 011, CS 012, CS 013, CS 014, CS 022, CS 024, AOC 313, PRL 008, and the VZ site is currently being addressed through soil vapor extraction (SVE) as selected in the VOC ROD (AFRPA, 2007). Potential VOC impacts to groundwater will continue to be addressed at these sites using SVE until a soil vapor extraction termination and optimization process (STOP) decision is made per the VOC ROD (AFRPA, 2007). Potential impacts to groundwater from residual VOCs in the disposal pits will also be addressed by capping (which will minimize infiltration of water through the waste) and long-term monitoring.

VOCs include many chlorinated solvents and petroleum-related compounds. Non-VOCs include semivolatile organic compounds (SVOCs), metals, radionuclides, and petroleum hydrocarbons. As defined for this ROD, SVOCs include polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins/furans, and pesticides. Petroleum hydrocarbons include two primary classes of compounds: total petroleum hydrocarbons (TPH) as diesel (TPH-D) and as gasoline (TPH-G). Petroleum product contamination is exempt from CERCLA; however, EPA guidance states that if petroleum product contamination is commingled with CERCLA-regulated contamination, the petroleum contamination is also addressable under CERCLA. Because the TPH contamination at the 11 FSS is commingled with other contaminants regulated under CERCLA, the TPH contamination is addressed in this ROD.

The Air Force, which is the lead agency, and EPA selected the soil remedial actions in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) 42 United States Code, Section 9601 et seq., and to the extent practicable, with the NCP, 40 *Code of Federal Regulations* (CFR) Part 300. This decision is based on the Administrative Record (AR) file for the FSS. The AR contains the documents used in the selection of the remedial actions and is available for review at the AFRPA office

(located at 3411 Olson Street, McClellan Park, California). The State concurs with the selected remedies.

1.3 Assessment of the Sites

As a result of past industrial activities, releases of hazardous substances have contaminated soil at the 11 sites. The response actions selected in this ROD are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of Selected Remedy

The selected remedies and their major components are summarized in this section.
The selected remedies provide the best approach for cost-effective risk reduction. They will provide protection to human health and the environment by either removing contaminants from the site, thereby reducing any residual risk, or by limiting exposure to human receptors by implementing the engineering and institutional controls (ICs) discussed below. The Air Force retains responsibility for the operation and maintenance (O&M) of all the selected remedies, including but not limited to the consolidation unit, caps, wells, and ICs.

1.4.1 CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the Vadose Zone

The Air Force and EPA have selected Alternative 3 (Composite Cap with Restricted Land Use) for CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site. Contaminated soil and debris at these sites would be covered with an engineered cap to eliminate human or ecological receptor exposure pathways, reduce infiltration of precipitation, minimize potential for contaminants to leach to groundwater, and prevent offsite transport of contaminants. In addition to the cap itself, the selected remedy also includes sampling to support the development of the capping plans, requirements for vapor controls in future construction, landfill gas controls, monitoring/enforcement, and ICs. ICs are land use controls and activity restrictions used to reduce or prevent human exposure to contaminants. These ICs will include soil disturbance restrictions to prevent breaches of the cap and a requirement for regulatory review and approval of any proposed change in the current or future land use on top of the caps to prevent incompatible land uses; landfill gas mitigation, for any future construction, for the capped areas as well as a 300-foot buffer surrounding the cap's perimeter; and residential and sensitive use restrictions. The site features maps and compliance boundary maps for each site (Figures 3, 5, 14, 16, 19, and 21) show the remedies and the associated IC compliance boundaries.

The SVE systems installed at these sites would continue to operate under the VOC ROD (AFRPA, 2007). Well locations would be optimized following cap construction to address VOCs both within and beneath the landfills.

The VZ site has been capped since 1985. This was implemented as a best management practice to limit surface water infiltration, minimize the migration of soil gas contamination, and eliminate the surface exposure pathway. The existing cap with a potential excavation of approximately 500 cubic yards (cy) near the northeastern boundary of the cap is the final remedy selected for this site.

1.4.2 CS 010, CS 024, and the SAFR

The Air Force and EPA have selected Alternative 6R (Excavation/Ex Situ Treatment/ Consolidation Unit with Restricted Land Use) for CS 010 and CS 024, and Alternative 6U (Excavation/Ex Situ Treatment/Consolidation Unit with Unrestricted Land Use) for the SAFR. Alternatives 6R and 6U include treatment, as required by applicable or relevant and appropriate requirements (ARARs), of some of the excavated soil prior to placement in the consolidation unit (CU) to be constructed at CS 010. At these sites, contaminated soil and debris will be excavated; any material that constitutes principal hazardous constituents would be treated; and the material will be consolidated to eliminate human or ecological receptor exposure pathways, reduce infiltration of precipitation, minimize potential for contaminants to leach to groundwater, and prevent offsite transport of contaminants.

The remedy at CS 010 has the following main components:

- The former disposal pit at CS 010 has been previously excavated. Approximately 29,000 cy of soil and 533 drums have been shipped offsite for disposal. Approximately 23,000 cy of previously excavated and segregated soil is currently stockpiled at CS 010 awaiting implementation of the final remedy. As a result of the segregation process, bulking of the soil has increased the stockpiled volume to approximately 25,000 cy. The locations of the excavation and the stockpiled soil are shown in the CS 010 current conditions map (Figure 6). The excavation at CS 010 will be expanded in order to serve as a CU for the 25,000 cy of soil currently onsite and soil to be removed from the SAFR, CS 024, and CS 022. The CU is being sized so that it can also accept soils associated with several other McClellan RODs, currently in development. These could include the Small Volume Sites, Ecological Sites, and Follow-on Strategic Sites.

- The currently stockpiled soil will be temporarily removed from the existing pit to allow for additional excavation and the construction of the CU, as described below.

- The first phase of the CS 010 remedy will consist of the excavation of any residual contamination above selected cleanup levels from the floor and walls of the pit. This is estimated to be approximately 4,000 cy of soil. The next phase will be the excavation of native soil creating a four-fold expansion of the pit's capacity from 60,000 cy to approximately 260,000 cy to accommodate soils from this remedy and other future McClellan soil remedies.

- The CU will be constructed per California Code of Regulations (CCR) Title 22 Section 66264.552 to meet Resource Conservation and Recovery Act (RCRA) Subtitle C standards in 40 CFR 264.301 (c) that specify a dual-composite liner, leachate collection and monitoring, and a composite cap. The alternative also includes sampling, landfill gas control, ICs, and monitoring/enforcement. Land use and activity restrictions similar to those described in Section 1.4.1 will apply to the CU. Figures 3 and 5 show the remedy and the associated IC compliance boundaries. Procedures for the operation and eventual closure of the CU will be spelled out in the FSS Remedial Design/Remedial Action Work Plan. In the event there is a significant break in CU disposal activity between this project and the subsequent soils RODs, interim closure measures would be implemented. A significant break means any interruption in disposal activities long enough to necessitate interim closure measures to (1) protect the CU during significant

rain events, typically during the winter and spring seasons, and (2) protect the public during the periods the CU has no disposal activity. Final closure would be accomplished within 180 days following disposal of the last soils unless an extension is requested by the Air Force and approved by the regulatory agencies.

- Prior to placement in the CU, excavated material will be segregated to remove any drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), incompatible wastes, and other materials that are deemed unsuitable for placement in the CU. Segregated material will be disposed of offsite at an appropriate facility. The remaining soil would be stockpiled and tested. Soil with concentrations of contaminants greater than the acceptance criteria (described in Section 2.12 and in Tables 61 and 62) for the CU would be treated and then, if the acceptance criteria are met, placed in the unit or, if the acceptance criteria are not met, shipped offsite for disposal at an appropriate facility. Soil that does not require any treatment will be placed directly into the CU.

Excavation at CS 024 will consist of the removal of all waste and debris within the former disposal pit and any surrounding soil that contains contaminant concentrations above selected cleanup levels for chemical constituents and unrestricted release levels for radionuclides. The total volume is estimated to be 39,000 cy of which approximately 21,000 cy is waste material buried below approximately 18,000 cy of overburden soil. The overburden will be laid back for reuse as backfill soil. The excavated waste material will be segregated, tested, and treated as necessary to meet requirements and acceptance criteria for disposal in the CU. The remedy also includes sampling, ICs, and monitoring/enforcement. These ICs will include residential and sensitive use restrictions and shallow soil gas mitigation measures for any future construction of occupied structures resulting from residual levels of shallow soil gas surrounding the disposal pit. Figures 11 and 13 show the remedy and the associated IC compliance boundaries.

Excavation at the SAFR will consist of the removal of all soil from the surface of the former firing range backstop and the stockpiled soil previously removed from the face of the backstop that contains contaminant concentrations above unrestricted cleanup levels. The volume of contaminated soil is estimated to be 16,000 cy. This soil will be sampled and stabilized as necessary to meet acceptance criteria for the CU. Figure 17 shows the remedy.

1.4.3 CS 022

CS 022 is a 1-acre former burial pit located in the southern portion of OU C1, within the west McClellan District. This site lies within a 17-acre parcel of land (known as the Rock Crusher Yard) that has experienced several periods of waste deposition over an approximately 50-year period of time. The Air Force intends to implement a comprehensive remedy within this parcel such that residual risks are reduced to acceptable levels for both human health and the environment based on the industrial use exposure scenario.

Chemical and radiological contamination is present at the site. The chemical contamination is localized in and around the former burial pit, between 10 and 30 feet below ground surface (bgs). The Air Force conducted a gamma radiation surface scan over the entire parcel. Readings indicated discrete areas of elevated gamma radiation. Soil borings indicated primarily near-surface radium contamination with diminishing radium

concentrations to background levels at approximately 7 feet bgs. The likely cause of this near-surface contamination is believed to be from both the incineration and rock crushing processes.

Based on this understanding of the site conditions, the Air Force and EPA have selected Alternative 3 Modified as the chosen remedy alternative, which includes excavation of the impacted surface soils in this parcel to a maximum depth of 7 feet and installation of a composite cap over the remaining buried lens of CS 022 debris. The estimated volume of impacted soil is 22,000 cy. The cap construction will begin at approximately 7 feet bgs with the required drainage slopes achieved below grade and approximately 3 feet of clean soil making up the final cover, with minimal surface mounding, thereby facilitating site reuse options. Clean soil refers to soil that meets the residential cleanup standards.

The excavated material will be segregated to remove any drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), and other incompatible materials for offsite disposal at an appropriate facility. The remaining soil would be stockpiled and tested. Soil with concentrations of contaminants greater than the acceptance criteria for the CU would be treated and then placed in the unit or shipped offsite for disposal at an appropriate facility. Soil that does not require any treatment will be placed directly into the CU. In addition to the excavated soil described above, the material to be placed in the CU will include the estimated 12,700 cy of crusher product (because of sporadic detections of low-level radium) and an estimated 1,000 cy of radium-contaminated surface soils to be excavated from other parts of the 17-acre parcel.

Upon completion of this remedy, the entire 17-acre parcel will be resurveyed and a Final Status Survey Report (FSSR) will be provided. The SVE system installed adjacent to this site would continue to operate under the VOC ROD (AFRPA, 2007). Well locations may be optimized once the cap is constructed to address VOCs within and below the pit. Appropriate ICs will be assigned to the capped area, and long-term monitoring and any required maintenance will be a retained responsibility of the Air Force. These ICs will include soil disturbance restrictions to prevent breaches of the cap and a requirement for regulatory review and approval of any proposed change in the current or future land use on top of the caps to prevent incompatible land uses; landfill gas mitigation, for any future construction, for the capped areas as well as a 300-foot buffer surrounding the cap's perimeter; and residential and sensitive use restrictions. Figures 7 and 10 show the remedy and the associated IC compliance boundaries.

1.5 Statutory Determinations

The selected remedies are protective of human health and the environment, comply with federal and state requirements that are applicable or relevant and appropriate to the remedial action, are cost-effective, and utilize permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable. Overall, the remedies selected for the FSS (either in this ROD or in the VOC ROD [AFRPA, 2007]) meet the statutory preference for treatment. The selected remedies comply with the offsite disposal requirements of CERCLA and the NCP. They also comply with the preference stated in CERCLA and the NCP for not disposing of contamination offsite without treatment (see Section 1.5.4).

The selected remedies will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that would allow for unlimited use and unrestricted exposure. Therefore, a statutory review (i.e., a CERCLA five-year review) will be conducted within 5 years after initiation of remedial action, and every 5 years thereafter, to ensure that the remedy is, or will be, protective of human health and the environment.

1.5.1 CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the Vadose Zone

The Air Force and EPA have selected a remedy (Alternative 3 [Composite Cap with Restricted Land Use]) for CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site. This remedy is protective of human health and the environment, complies with federal and state ARARs for the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent possible. CERCLA five-year reviews will be required for these sites.

For CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site, SVE will continue to operate under the VOC ROD (AFRPA, 2007). Well locations may be optimized following cap construction to address VOCs both within and below the disposal pits. Therefore, from an overall standpoint, the remedies selected for these sites satisfy the statutory preference for treatment as a principal element by reducing the volume, toxicity, and/or mobility of contaminants.

1.5.2 CS 010, CS 024, and the SAFR

The Air Force and EPA have selected a remedy for CS 010 and CS 024 (Alternative 6R [Excavation/Ex Situ Treatment/Consolidation Unit with Restricted Land Use]) and for the SAFR (Alternative 6U [Excavation/Ex Situ Treatment/Consolidation Unit with Unrestricted Land Use]). Alternatives 6R and 6U include treatment, as required by ARARs, of some of the excavated soil prior to placement in the CU. Excavated material will be segregated to remove drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), and other incompatible materials for offsite disposal at an appropriate facility. The remaining soil would be stockpiled and tested. Soil with concentrations of contaminants greater than the acceptance criteria for the CU would be treated and then placed in the unit or shipped offsite for disposal at an appropriate facility. Soil that does not require any treatment would be placed directly into the CU. This alternative is protective of human health and the environment, complies with federal and state ARARs for the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent possible. The treatment component of Alternatives 6R and 6U satisfies the statutory preference for treatment as a principal element by reducing the volume, toxicity, and/or mobility of contaminants. CERCLA five-year reviews will be required for CS 010 and CS 024.

1.5.3 CS 022

The Air Force and EPA have selected a remedy (Alternative 3 Modified [Partial Excavation, and Composite Cap with Restricted Land Use]) for CS 022. Alternative 3 has been modified to include excavation, treatment, and consolidation of surface soil from the site, and the immediately surrounding area, prior to placement of the cap. Excavation of this surface soil will be performed to eliminate surface exposures to existing contaminants and better facilitate industrial reuse of the property. This would consist of the removal of up to the first

7 feet of soil from within the incinerator and disposal pit area, and the removal and consolidation of elevated radium detections from the immediately surrounding area as well as the existing stockpile of rock crusher product. Excavated material will be segregated to remove drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), and other incompatible materials for offsite disposal at an appropriate facility. The remaining soil would be stockpiled and tested. Soil with concentrations of contaminants greater than the acceptance criteria for the CU would either be treated and placed in the unit or shipped offsite for disposal at an appropriate facility. Soil that does not require any treatment would be placed directly into the CU. This alternative is protective of human health and the environment, complies with federal and state ARARs for the remedial action, is cost effective, and utilizes permanent solutions to the maximum extent possible. The treatment component of modified Alternative 3 satisfies the statutory preference for treatment as a principal element by reducing the volume, toxicity, and/or mobility of contaminants. The SVE system installed at CS 022 would continue to operate under the VOC ROD (AFRPA, 2007). CERCLA five-year reviews will be required for this site.

1.5.4 Treatment and Offsite Disposal

CERCLA and the NCP include an explicit bias against offsite land disposal without treatment (42 USC § 9621 [b] [1] and 40 CFR § 300.430 [f] [1] [ii] [E]). Offsite disposal is not the primary component of the remedy at any site. Under Alternative 6R/6U (Excavation/Ex Situ Treatment /Consolidation Unit with Restricted Land Use), which was selected for CS 010, CS 024, and the SAFR, and Alternative 3 Modified (Partial Excavation, and Composite Cap with Restricted Land Use), which was selected for CS 022, a fraction of the waste from CS 022 and CS 024 might be sent offsite for disposal. This will be limited to wastes that are incompatible with the CU such as drums, containers, and saturated wastes/sludges. Waste sent offsite will be subject to the treatment requirements of the receiving facility. Therefore, the selected remedies comply with the preference for not sending untreated waste offsite for land disposal.

CERCLA and the NCP also place restrictions on facilities used for offsite disposal and authorize EPA to determine the acceptability of any facility selected for the treatment, storage, or disposal of CERCLA waste (42 USC § 9621(d)(3) and 40 CFR § 300.440). All waste sent offsite for disposal under Alternative 6R/6U (Excavation/Ex Situ Treatment /Consolidation Unit with Restricted Land Use) or Alternative 3 Modified (Partial Excavation, and Composite Cap with Restricted Land Use) will be sent to EPA-authorized facilities. Therefore, the selected remedies comply with the offsite disposal restrictions of CERCLA and the NCP.

1.6 Data Certification Checklist

The following information is included in the remainder of this ROD (additional information can be found in the Base AR):

- Detailed site descriptions (Section 2.5)
- Site histories, including the use of radionuclides (Section 2.2.1)
- Contaminants of concern (COCs) and their respective concentrations (Section 2.5)

- Risk represented by the COCs (Section 2.7)
- Cleanup levels established for COCs and the basis for these levels (Section 2.8.3 and Tables 55 through 58)
- Source materials constituting principal threats (Section 2.11)
- Current and reasonably anticipated future land use assumptions (Section 2.6)
- Estimated remedy costs (Sections 2.12.5 and 2.13.6 and Table 64)
- Potential land use that will be available at the sites as a result of the selected remedies (Section 2.12.7)
- Key factor(s) that led to selecting the remedies (Sections 2.11 and 2.12.6)

This ROD was prepared consistent with guidance published by EPA for preparation of RODs (EPA, 1999).

1.7 Authorizing Signatures

This is the signature sheet for the FSS ROD. The Air Force and EPA jointly selected the remedies described in this ROD.

Robert M. Moore — 3 FEB 2012

APPROVED BY: Date

ROBERT M. MOORE
Director, Air Force Real Property Agency
U.S. Air Force

4/4/12

APPROVED BY: Date

MICHAEL M. MONTGOMERY
Assistant Director, Federal Facilities and Site Cleanup Branch
Region 9, U.S. Environmental Protection Agency

4/13/12

The Department of Toxic Substances Control and the Central Valley Regional Water Quality Control Board (the State) had an opportunity to review and comment on the FSS ROD, and their concerns have been addressed. Date

CHARLES RIDENOUR
Performance Manager
Sacramento Office Brownfields and
Environmental Restoration Program
Department of Toxic Substance Control
California Environmental Protection Agency

SECTION 2

Decision Summary

2.1 Site Name, Location, and Description

McClellan is located in Sacramento County, 7 miles northeast of downtown Sacramento, California (CERCLIS Identification Number CA4570024337). It comprises approximately 3,000 acres and is bounded by the City of Sacramento on the west and southwest, the unincorporated areas of Antelope on the north, Rio Linda on the northwest, and North Highlands on the east. The following 11 sites within McClellan are included in this ROD:

- AOC 313, a former firefighting training area
- CS 010, a former disposal pit, now excavated
- CS 011, a former disposal pit
- CS 012, a former disposal pit
- CS 013, a former disposal pit
- CS 014, a former disposal pit
- CS 022, a former burn pit and disposal pit
- CS 024, a former disposal pit
- PRL 008, a former disposal pit
- SAFR, the small arms firing range
- VZ, a collection of former disposal pits under an engineered cap

More detailed information is provided in Sections 2.2, 2.4, 2.5, 2.6, and 2.7 of this ROD. A map showing the location of McClellan is presented on Figure 1. The locations of the 11 FSS are shown on Figure 2.

The predominant current land uses at McClellan are industrial, aviation, commercial, and residential. There are also open areas, some of which are relatively large. Land parcels designated for commercial, office, and industrial uses are interspersed around the Base and are used for shopping centers, office complexes, military operations (U.S. Coast Guard), rescue training, schools, and warehouses.

As previously indicated, the Air Force and state and federal regulatory agencies work as a team to investigate and clean up McClellan. The Air Force is the lead agency for environmental cleanup activities at McClellan. The primary regulatory agencies overseeing the McClellan cleanup are EPA and Cal/EPA (represented by DTSC) and the Central Valley Water Board (collectively, the "State"). The Air Force and EPA jointly select the remedies. Both DTSC and the Central Valley Water Board had an opportunity to review and comment on the FSS ROD and their concerns have been met. Cleanup monies for implementation of the selected remedies will be provided by the Air Force.

2.2 Site History and Enforcement Activities

2.2.1 Site History

McClellan was an active industrial facility since its dedication in 1936, when it was called the Sacramento Air Depot. Operations changed from the maintenance of bombers during World War II and the Korean conflict to the maintenance, repair, modification, and disassembly of jet aircraft in the 1960s. More recently, operations were expanded to include the maintenance and repair of communications equipment and electronics. Hazardous material facilities onbase included disposal pits, washracks, fuel and oil storage, electronics repair and testing facilities, aircraft painting facilities, wastewater treatment plants, machine shops, and open storage areas. In 1995, the Congressional Base Realignment and Closure Commission recommended closure of McClellan; and on July 13, 2001, McClellan was closed as an active military facility.

2.2.1.1 CS 010 History

CS 010 is an inactive, unlined disposal pit in OU C, within the west McClellan District (see Figures 2 and 3). CS 010 was used for burial of waste from Air Force activities and ash and other burn residue from waste incinerated elsewhere onbase. CS 010 operated from roughly 1949 to 1964. In 1987, a contaminated soils holding area began operation on top of CS 010. This was an area approximately 100 by 300 feet, which was lined with 40-mil high-density polyethylene (HDPE) over a clay base and used to store petroleum-contaminated soil from underground storage tank (UST) removals conducted elsewhere at the former McClellan AFB. By 1993, the contaminated soil had been disposed of, and the HDPE liner was removed. Areas of staining were observed on the clay base, so the top foot of soil was removed. The area was then paved, fenced, and enclosed by a berm. The Investigation Cluster 19 SVE system started operation in the vicinity of CS 010 in 1997 and is still operating. In 1994, a drum buried at the site became visible at the surface. The drum was marked with the radiation warning symbol. The site was fenced to control access. In August 2000, a removal action was started to address the buried drums at the site. In September 2000, a 20-gallon drum was discovered containing plutonium 239 in glass bottles and vials. In response to this discovery, a time critical removal action (TCRA) was started in December 2000. The site was completely covered by a tent to allow work to continue during the rainy season. The pit was excavated down to native soil, leaving a hole about 600 feet long by 180 feet wide by 25 feet deep. The material from the pit was segregated for disposal. Drums were emptied and crushed. The crushed drums and their contents were sent offsite for disposal. Approximately 52,000 cy of soil were excavated, of which 29,000 cy were shipped offsite for disposal and the remaining 23,000 cy were retained under the tent for future disposition. As a result of the segregation process, bulking of the soil has increased the stockpiled volume to approximately 25,000 cy. The boundary of the excavation and the location of the stockpiled soil are shown on Figure 6.

2.2.1.2 CS 011, CS 012, CS 013, CS 014, and AOC 313 History

The fire training area at AOC 313 and the disposal pits at CS 011, CS 012, CS 013, and CS 014 are being treated together for the purposes of this ROD because of their geographic proximity and the similarity of the disposal pits. The locations of these sites are shown on Figures 2 and 3.

The disposal pits at CS 011 through CS 014 were unlined pits where industrial and laboratory wastes were buried along with ash and burn debris from incineration of industrial waste elsewhere at the former McClellan AFB. These pits are oriented approximately north-south parallel to one another in Investigation Cluster 19 of OU C on the western side of the former Base (see Figure 3). They were used one at a time starting with CS 011. When one pit was filled, a new pit was opened to the west of it. The newest pit, which is farthest west, is CS 014. The periods of operations of the CS 011 through CS 014 disposal pits are as follows:

- **CS 011 –** 1964 to 1966
- **CS 012 –** 1966 to 1971
- **CS 013 –** 1969 to 1971
- **CS 014 –** 1971 to 1974

The contaminated soils holding area discussed above in relation to CS 010 also overlies CS 011 and CS 012. In 1993, CS 014 and part of CS 013 were graded for construction of a contractor staging area. Approximately 4 feet of soil were removed, but no evidence of contamination was observed in this material.

There is no historical record of radioactive waste being buried in CS 011 through CS 014. These pits did not begin operation until after the application of radium-based paint ended at McClellan AFB. Furthermore, during most of the period that these pits were open, other radioactive waste disposal options were available to the Air Force, and documentation shows that radioactive waste was shipped from McClellan AFB to offbase locations starting in 1965 through base closure in 2001. However, radiological laboratories were in operation at McClellan AFB throughout the period when these pits were open. In 1965, there appears to have been no offbase disposal option for radioactive waste. Sampling results for these pits show the limited presence of radium 226 above background in several locations. Sampling results are discussed in more detail in Section 2.5. The historical information and sampling results are inconclusive as to whether radioactive waste was buried in CS 011 through CS 014. To ensure protectiveness, this ROD assumes that low-level radioactive waste similar to that found in CS 010 could have been buried in CS 011 through CS 014. However, because the application of radium-based paint stopped at McClellan AFB by the time CS 011 opened, it is likely that less radium is present in CS 011 through CS 014 than was found in CS 010.

AOC 313 was used to train firefighters from 1977 to 1987. Petroleum and possibly solvents were discharged to the soil and ignited. This site lies on top of parts of CS 011 and CS 012 (see Figure 3). AOC 313 was the location of Building 1088 and UST 1088 (a 2,000 gallon UST) believed to have stored fuel used in the fire training exercises. The tank was removed, but approximately 780 feet of underground pipe associated with the tank remains in place. It is unknown whether the pipe was rinsed, pressure tested, or grouted. During the RD/RA phase of the project, the location and condition of the pipe will be determined and appropriate actions taken to meet State requirements.

In 1997, as part of the groundwater remedy, the Investigation Cluster 19 SVE system started operation in the vicinity of AOC 313 and CS 011 through CS 014. The system is still operating.

2.2.1.3 CS 022 History

CS 022 is a 1-acre former burial pit located in the southern portion of OU C1, within the west McClellan District (see Figures 2 and 7). This site lies within a 17-acre parcel of land (known as the Rock Crusher Yard) that experienced several periods of waste deposition over approximately 50 years. Prior to 1946, this parcel was undisturbed native soil. Beginning in 1946 until its closure in the late 1960s, CS 022 was used as a burial pit for industrial refuse, waste solvents, and ash from an industrial (teepee-style) incinerator that operated from 1956 until 1966. This was the primary industrial solid waste disposal facility from 1946 to 1963, and was used periodically until 1968. From 1946 until the incinerator started operating in 1956, the pit was used for burning all refuse and oily wastes. The partially burned ash and residue was then removed for disposal at other burial pits. Once the incinerator began operating, the original pit was used for disposal of ash from the incinerator.

The incinerator was located approximately 100 feet south of the burial pit. Ash from the incinerator was moved across the surface and into this burial pit. The dimensions of the pit were 400 feet long and 100 feet wide with a bottom depth of approximately 30 feet bgs. Based on aerial photos, the site was covered and used intermittently for parking from 1970 until the 1990s when Base Civil Engineering began using the area as a fenced storage yard for building materials, sand and gravel, and a construction-debris stockpile. Also during the mid-1990s, rock crushing equipment was purchased by the Air Force and operated within this 17-acre parcel. Construction debris from base operations and demolition work (principally asphalt, concrete, and brick) was crushed by this equipment, creating an estimated 12,700-cy pile of crushed product that exists on this parcel today. Also within this 17-acre parcel was a purported lead-acid battery storage facility (PRL 055) and a gas station. Based on aerial photos, the location of the lead-acid battery storage facility is partially covered by the pile of crushed product.

2.2.1.4 CS 024 History

CS 024 is an inactive, unlined disposal pit located in the southern portion of OU A, at the southern end of McClellan (see Figures 2 and 11). CS 024 was used for burning and burial of demolition debris and scrap material from approximately 1953 to 1969. Prior to 1953, the area was undeveloped grassland. Wastes were burned monthly in the eastern half of the pit. The western half of the pit was used to discard unburned waste. One interview report indicated that drums from a radiological laboratory at McClellan were taken to CS 024. Waste drums from that laboratory typically contained used glassware from the lab. Ordinary trash from another radiological laboratory at McClellan AFB was also reportedly taken to CS 024.

2.2.1.5 PRL 008 History

PRL 008 is an inactive, unlined disposal pit located in OU C within the west McClellan District (see Figures 2 and 14). PRL 008 was used for burial of industrial waste, demolition debris, drainage debris, wood, plant trimmings, and dewatered sludge from both the sanitary sewer treatment plant and the industrial wastewater treatment plant. The pit operated from approximately 1974 to 1988. When the pit ceased operation in 1988, it was covered with a 3-foot-thick layer of soil. The site is currently covered by a soil stockpile

made up of soils brought from various parts of the Base when construction projects resulted in surplus soil.

There is no historical evidence that radioactive waste was buried in PRL 008, and this pit did not begin operation until after the use of radium-based paint was ended at McClellan AFB. During the entire period that the pit was open, radioactive waste from McClellan AFB was shipped to offbase locations. However, sampling results for PRL 008 detected radium 226 above screening levels in a few samples. Sampling results are discussed in more detail in Section 2.5.

In 2005, as part of the groundwater remedy, the Investigation Cluster 19 SVE system was expanded into the area of PRL 008. The system is still operating.

2.2.1.6 SAFR History

The SAFR site is the location of a former outdoor small arms firing range built sometime between 1957 and 1962, and used until the Base closed in 2001. The site is located in OU C within the west McClellan District (see Figures 2 and 17). Small arms were fired into targets backed by a large soil berm. Soil from the berm, which contained spent ammunition, was periodically scraped off and piled at the southeastern end of Building 712 at the site. The soil pile and the berm are both contaminated. Local law enforcement agencies currently operate an indoor small arms firing range at the same location. The current indoor facility does not have the potential to impact the outdoor environment at the site.

2.2.1.7 Vadose Zone History

The VZ site consists of 11 former unlined disposal pits located in OU D at the northern end of the west McClellan District (see Figures 2 and 19). The VZ is also known as DP 178 and OU D in previous documents. These pits operated from approximately 1959 to 1981. Activities reported to have occurred at the VZ site include refuse burning and burial, oil and solvent burning, skimmed oil burning, liquid sludge and paint residue disposal, and disposal of sludge from the industrial wastewater treatment plant. Once the disposal pits were no longer being used, they were covered with imported soil. Four of the VZ disposal pits (CS 004, CS 006, CS 026, and PRL 027) are reported to have been excavated and backfilled. In 1985, a composite cap was installed over the VZ disposal pits. In 1986, six groundwater extraction wells were installed through the cap. The water removed by these wells is piped to the McClellan AFB Groundwater Treatment Plant. In 1992, an SVE system was installed. The cap is still in place and undergoes quarterly inspection and maintenance. Both the groundwater extraction system and SVE system have been incorporated into the basewide groundwater remedy and are still operating.

2.2.2 Previous Investigations

In response to detections of contaminants in soil and groundwater, McClellan initiated the first phase of the IRP in 1981. Under the IRP, the investigation and remediation of contamination at the Base has been conducted in accordance with CERCLA as amended by SARA and the NCP. The principal data collection and analysis component of the restoration program is the remedial investigation (RI) at the Base. The RI is the primary source of site characterization data for the 11 sites.

Several phases of investigation have been conducted at each site. Generally, the media collected during the sampling events included soil, soil gas, and groundwater. Information on site history, investigations performed, COCs, and resulting risk is discussed by site in Section 2.5. In addition, the McClellan AR contains all of the investigatory and feasibility study (FS) documents for each of the sites (see Appendix A for an index to the AR for the FSS).

2.2.2.1 CS 010 Investigations

Eight investigations conducted from 1985 through 2003 at McClellan AFB addressed CS 010. The two most detailed of these investigations were the Investigation Cluster 19 RI conducted from 1994 to 1996 and the Data Gap Investigation conducted in 1999. The investigations involved geophysical surveys, radiological scans, sediment samples, groundwater samples, soil samples, and soil gas samples. Samples were analyzed for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. A non-time-critical removal action (NTCRA) was started in 2000, which discovered a drum containing plutonium. As a result of that discovery, a TCRA was performed between 2001 and 2003. The complete contents of CS 010 were excavated, and the excavated materials were characterized for disposal. Approximately 52,000 cy of soil and debris were excavated, 29,000 cy were shipped to disposal facilities, and 23,000 cy were retained at the site pending final remedy determination. As a result of the segregation process, bulking of the soil has increased the stockpiled volume to approximately 25,000 cy. The investigations, including the removal actions, are summarized in Table 1 (note: all tables are located at the end of this document).

2.2.2.2 CS 011, CS 012, CS 013, CS 014, and AOC 313 Investigations

Ten investigations were conducted at CS 011 through CS 014 and AOC 313 from 1985 through 1998. The two most detailed of these investigations were the Investigation Cluster 19 RI conducted from 1994 to 1996 and the Data Gap Investigation conducted in 1998. The investigations involved geophysical surveys, radiological scans, sediment samples, groundwater samples, soil samples, and soil gas samples. Samples were analyzed for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. The investigations are summarized in Tables 2, 3, 4, 5, and 6.

2.2.2.3 CS 022 Investigations

Nine investigations conducted from 1984 through 2007 at McClellan AFB addressed CS 022. The most detailed of these investigations were the investigation of Area C contamination conducted between 1984 and 1986, the RI conducted in 1995, and the Data Gap Investigation conducted in 1998 and 1999. The investigations involved radiological scans, groundwater samples, soil samples, soil gas samples, and a steam injection vapor extraction treatability study. Samples were analyzed for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. The investigations are summarized in Table 7.

2.2.2.4 CS 024 Investigations

Five investigations conducted from 1985 through 1990 at McClellan AFB addressed CS 024. The investigations involved soil, soil gas, and groundwater samples. Samples were analyzed

for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. The investigations are summarized in Table 8.

2.2.2.5 PRL 008 Investigations

Seven investigations conducted from 1985 through 1997 at McClellan AFB addressed PRL 008. The investigations involved geophysical surveys, groundwater samples, soil samples, and soil gas samples. Samples were analyzed for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. The investigations are summarized in Table 9.

2.2.2.6 SAFR Investigations

Five investigations conducted from 1985 through 2001 at McClellan AFB addressed the SAFR. The investigations involved sediment, soil, soil gas, and groundwater samples. Samples were analyzed for VOCs, SVOCs, and metals. The investigations are summarized in Table 10.

2.2.2.7 Vadose Zone Investigations

Four investigations conducted from 1984 through 1996 at McClellan AFB addressed the VZ site. The investigations involved radiological scans and soil, soil gas, and groundwater samples. Samples were analyzed for VOCs, SVOCs, PAHs, TPH, PCBs, pesticides and herbicides, dioxins/furans, metals, and radionuclides. The investigations are summarized in Table 11.

2.2.3 Enforcement Activities

On October 15, 1984, EPA proposed listing McClellan as a candidate site for inclusion on the NPL. McClellan was formally placed on the NPL on July 22, 1987. In 1989, the Air Force, EPA Region 9, and the California Department of Health Services (CDHS) signed an Interagency Agreement for the cleanup. The Interagency Agreement was executed in 1990. CDHS was later reorganized, and DTSC assumed CDHS's responsibilities under the Interagency Agreement.

2.3 Community Participation

McClellan has had an active community relations/public participation program since the beginning of restoration activities in the early 1980s. The purpose of the program is to help community members understand McClellan's cleanup program and learn how to become involved in the cleanup decision making process.

Highlights of the community relations activities undertaken by McClellan are as follows:

- **Restoration Advisory Board (RAB).** In 1995, a RAB was formed to increase communication between the Air Force and the neighboring community. Key members of the RAB include the Air Force, EPA, DTSC, Central Valley Water Board, the Local Reuse Authority (LRA), and community members. Through open communication and the exchange of ideas, interests, and concerns, the RAB supports the search for safe, timely, and effective cleanup solutions so that McClellan may be transferred from Air Force ownership to public/private ownership. The RAB meetings are held quarterly. These

public meetings include discussions of the RAB's advice on particular issues, information on cleanup actions or public interest items, and updates on the status of the cleanup program. The Air Force provides seminars to RAB members to aid in their review of documents and cleanup actions. In addition, the Technical Assistance for Public Participation program is available to provide funds to retain an independent contractor to assist the community members in their reviews.

- **Administrative Record.** McClellan established the AR at the beginning of its environmental investigation to store all information that supports cleanup decisions at McClellan. An Information Repository was set up to make all of the information, reports, and reference materials available for public review. More than 15 years of documentation is available for review by the public. This repository is at the AFRPA office, 3411 Olson Street, McClellan Park, California 95652. Documents related to the cleanup efforts at McClellan also are available for review at EPA Region 9, DTSC, and Central Valley Water Board offices.

- **Community Relations Plan.** The first McClellan Community Relations Plan was approved in August 1985. The Community Relations Plan was updated and revised in 1988, 1991, 1993, 1996, 1999, 2002, and 2009.

- **Mailing List.** A mailing list of all interested parties in the community is maintained by the Air Force and updated monthly or as address change notifications are received from the U.S. Post Office or from direct requests from individuals. In 2002, blanket mailings to all residents in the vicinity of McClellan were conducted in an effort to add new/interested parties to the mailing list. Since then, the mailing list has been updated repeatedly.

- **Newsletters.** Since May 1984, McClellan's quarterly newsletter, the *Environmental Action Update*, has been distributed to interested individuals and organizations. The newsletter includes articles on the status of the IRP, meeting announcements, listings of recently issued documents, and names of individuals to contact for more information. The newsletter is mailed to more than 2,500 neighbors of the Base, community leaders, businesses, environmental organizations, civic clubs, and the news media.

- **Web Site.** The Air Force has established a Web site to support communication about its environmental program (http://afrpaar.lackland.af.mil/ar). The following information is available on the Web site:

  - A search feature identifying the documents stored in the AR
  - Announcements for upcoming public meetings and RAB meetings
  - RAB information and meeting minutes
  - Copies of newsletters and fact sheets

- **Fact Sheets.** Since May 1990, the Air Force has published fact sheets to help explain specific topics, including descriptions of new cleanup technologies, cleanup milestones, and removal action plans. Fact sheets are also provided to increase the community's knowledge of technologies or the science of cleanup at McClellan.

- **Public Comment Periods/Public Meetings.** Public comment periods give the community an opportunity to review documents and provide comments verbally or in writing. Public meetings are held to solicit public comment on documents or actions

and to address areas of public concern or interest. The final Proposed Plan for the 11 FSS was issued on October 30, 2006, and an associated public comment period was held from October 30 through December 8, 2006, to provide the community an opportunity to comment on the proposed action and anticipated future land use at this site. A public meeting was also held on November 9, 2006, to solicit public input on the proposed actions at the FSS and anticipated future land use at the sites and to provide the community an additional opportunity to provide comments. Based on requests from RAB members during the December 5, 2006, RAB meeting, the Air Force agreed to extend the comment period for the FSS Proposed Plan to January 16, 2007. The Air Force has prepared written responses to the public comments pertaining to the Proposed Plan. The responses to the public comments are included in the Responsiveness Summary section of this ROD. This ROD will be available in the AR upon publication. The public participation requirements of CERCLA and the NCP were met for the remedy selection process.

2.4 Scope and Role of Strategic Sites or Response Action

For environmental management purposes, McClellan has subdivided the Base into the following 11 OUs: A, B, B1, C, C1, D, E, F, G, H, and Groundwater, which encompasses the entire Base.

Because of the complexity of different types of contaminants commingling at McClellan; the presence of contamination in the soil, sediment, and groundwater; and the large extent of contamination across the Base, the investigation and remediation of contamination at the Base under the IRP are subdivided into several projects based on geographic areas and/or media. This subdivision allows for more efficient planning and implementation of each project. This discussion of the interaction of remedial projects is focused on those that relate to this ROD for non-VOC and VOC contaminants.

Several RODs have been completed at McClellan, as follows:

- VOC ROD (AFRPA, 2007) addresses basewide VOC contamination in groundwater and in the vadose zone that threatens groundwater. The remedies under this ROD were previously implemented as removal actions and interim remedies.
- Non-VOC Amendment to the Basewide VOC Groundwater ROD (AFRPA, 2009) addresses non-VOC contamination in groundwater. The remedies under this ROD Amendment have been implemented.
- Local Reuse Authority Initial Parcel ROD #1 (AFRPA, 2004) addresses non-VOC contaminants in soil at seven sites. The remedies under this ROD have been implemented.
- Local Reuse Authority Initial Parcel ROD #2 (AFRPA, 2008) addresses non-VOC and VOC contaminants in soil and shallow soil gas at 16 sites and VOC contaminants in shallow soil gas at 7 sites included in Initial Parcel ROD #1. The remedies under this ROD will be implemented in the near future under an Environmental Services Cooperative Agreement between the Air Force and Sacramento County.

- Area of Concern G-1 ROD (AFRPA, 2010) addresses non-VOC and VOC contaminants in soil and shallow soil gas at a single site. The remedy has been implemented.
- Former Skeet Range ROD (AFRPA, 2011a) addresses cleanup of lead and PAHs remaining in surface soils at the former skeet range. The remedy is being implemented in Fall 2011.

The remaining IRP sites at McClellan are grouped geographically or because of similar attributes into the following RODs:

- Ecological Sites ROD is planned for completion in 2011 and addresses contaminants in soil and sediment at 12 sites with ecological habitat such as creeks and vernal pools.
- Local Reuse Authority Initial Parcel ROD #3 for 45 sites will be completed in the near future under an Environmental Services Cooperative Agreement between the Air Force and Sacramento County. The sites are located in the southwestern and eastern portions of the Base.
- Small Volume Sites ROD is planned for completion in 2013 and addresses non-VOC and VOC contaminants in soil and soil gas at 123 sites throughout the Base.
- Follow-on Strategic Sites ROD is planned for completion in 2013 and addresses non-VOC and VOC contaminants in soil and soil gas at 79 sites. The sites are located near the flightline and in the northern and western portions of the Base.

Waste material from additional IRP sites at McClellan, which will be addressed in future RODs, may be disposed of in the CU at CS 010. The timeline for completion of the capping aspect of the remedy at the CU may be dependent on the selection of remedies by the Air Force and regulatory agencies in future RODs.

This ROD addresses VOCs in shallow soil gas and non-VOCs in soil at the FSS, which are located within portions of OUs A, C, and D.

VOC contamination in groundwater at the FSS is addressed under the VOC ROD that was completed in 2007 (AFRPA, 2007). VOC contamination in the vadose zone that threatens groundwater is also addressed under the VOC ROD (AFRPA, 2007). However, the capping remedy that reduces infiltration and potential contaminant migration provides for additional mitigation of VOC contamination in the vadose zone that threatens groundwater. Non-VOCs that may be present in groundwater at the FSS are addressed in the Non-VOC Amendment to the Basewide VOC Groundwater ROD (AFRPA, 2009). The monitoring component of the capping and CU remedies will also provide for long-term assessment of groundwater quality, including VOCs and non-VOCs. Deed restrictions specified in the VOC ROD restrict the use of groundwater, protect the integrity of the groundwater remedial systems at the FSS, and provide for access to the wells. Sacramento County Well Ordinance, Sacramento County Code, Chapter 6.28 Wells and Pumps, Section G established a consultation zone for groundwater; the FSS fall within this zone. Under this ordinance, any application for a well permit within 2,000 feet of a known groundwater contaminant plume is subject to special review by appropriate regulatory agencies, including, but not limited to, the Sacramento County Environmental Management Department and the Central Valley Water Board, to evaluate potential impacts to public health and groundwater quality.

2.4.1 Past Removal Actions

Several removal actions have occurred at the FSS, including both an NTCRA and a TCRA at CS 010; excavation of portions of the VZ site; installation, operation, and maintenance of a cap at the VZ site; and the installation and operation of SVE systems at Investigation Cluster 19 (CS 011 through CS 014, and AOC 313), Investigation Cluster 21 (PRL 008), OU C1 (CS 022), Investigation Cluster 42 (CS 024), and OU D (the VZ site). These removal actions are summarized in the following sections. The VOC ROD (AFRPA, 2007), which facilitated the early groundwater remediation activities, was finalized in August 2007. The remedies under this ROD were previously implemented as removal actions and interim remedies. The Non-VOC Amendment to the Basewide VOC Groundwater ROD (AFRPA, 2009) was finalized in September 2009. The remedies under this ROD Amendment have been implemented.

2.4.1.1 CS 010

The NTCRA was performed at CS 010 from August to September 2000. The TCRA was performed from December 2000 through September 2003 (URS, 2001a, 2001b, and 2004). The TCRA was performed in accordance with the Action Memorandum for CS 010 to eliminate contaminant exposure from the site. This Action Memorandum was issued after a small quantity of plutonium was discovered during the NTCRA at CS 010. Both removal actions involved excavating, segregating, and disposing of waste materials and contaminated soils from CS 010.

The excavation phase of the TCRA for the CS 010 disposal pit began in November 2001 upon completion of the construction of the weatherization tent (a large tent that covers the entire excavation area to keep it from being exposed to the elements). Information gathered prior to the excavation indicated that the volume of soil in the disposal pit exceeded the original estimate of 33,000 cy. On December 3, 2002, the Air Force discontinued transporting and disposing of soil offbase and began staging excavated soil piles inside the weatherization tent. The excavation phase was completed in September 2003. Approximately 52,000 cy of soil and debris have been excavated; the excavation measures 600 feet long, 180 feet wide, and 25 feet deep. The stockpiled soil remaining at CS 010 was sampled to support segregation; however, soil profile samples were not collected because the material was stockpiled rather than shipped offbase for disposal. Based on the soil screening results, waste segregation colors were assigned to the excavation quadrants. Approximately 25,000 cy of stockpiled soil and waste remain at CS 010 and are segregated as follows:

- About 9,000 cy of soil/waste containing radium 226 above screening levels
- About 16,000 cy of soil/waste containing both radium 226 and metals above screening levels

2.4.1.2 The Vadose Zone Site

At the VZ site, several of the disposal pits have had waste and contaminated soil excavated. In April 1984, approximately 10,000 cy of contaminated soils within CS 004 and 10,000 cy of contaminated underlying soil were excavated. The site was then backfilled with imported material. The imported material came from the foundation of demolished storage buildings located in the 600-building series onbase. No confirmation samples were collected after the excavation. CS 006 and CS 026 are believed to have been excavated and backfilled. Material

that could be visually classified as waste was not encountered in borings completed near these disposal pits. Presumably, the waste materials at both sites were removed at the time of construction of Building 1093. The presence of gravelly, cobbly, and sandy soil encountered in several borings suggests that imported backfill was used to replace the excavated soil/waste because such cobbly soil is not typical of the other soils encountered throughout OU D.

In 1985, a composite cap was installed over CS 001 through CS 005, CS A, CS S, CS T, and parts of CS 006 and CS 026 (Radian Corporation [Radian], 1991). The VZ site cap consists of four separate composite caps. The composite caps are constructed of five layers, which include from bottom to top: (1) granular fill, (2) 6 inches of sand and gravel, (3) 18 inches of compacted clay, (4) a 40-mil HDPE membrane, and (5) 2 to 3 feet of imported top soil.

Most of the contamination reported during the investigations conducted at the VZ site is covered by the caps. However, a small area exists outside the footprint of the existing cap where contaminant concentrations exceed industrial cleanup levels. This small area may require excavation to ensure protection of human health and the environment.

2.4.1.3 Soil Vapor Extraction

SVE was selected under the VOC ROD (AFRPA, 2007) for removal actions at CS 011 through CS 014, AOC 313, CS 022, CS 024, PRL 008, and the VZ site.

In Investigation Cluster 19, the SVE system was installed to address an area that had exhibited high concentrations of VOCs (Jacobs Engineering Group, Inc. [Jacobs], 1997) and posed a threat to groundwater. The system was started in June 1997 and is currently operating. The system currently consists of 2 SVE wells, 2 dual-phase extraction wells, and 29 soil vapor monitoring (SVM) wells. This system addresses VOC contamination associated with CS 011 through CS 014 and AOC 313. Additionally, the Investigation Cluster 19 SVE system was expanded to include PRL 008; the expanded Investigation Cluster 19/21 system became operational in July 2006 and consists of both flameless thermal oxidizer (FTO) and vapor granular activated carbon (VGAC) systems. A STOP evaluation is ongoing for the Investigation Cluster 21 system, but the Investigation Cluster 19 system continues to operate.

At CS 022, the OU C1 SVE system was installed in 1995 to address VOC contamination that posed a threat to groundwater. The OU C1 system consists of 9 SVE wells and 29 SVM wells. Soil vapors are treated by FTO and VGAC. The OU C1 SVE system is currently operating to address residual contamination within OU C1.

In July 2000, the Investigation Cluster 42 SVE system was installed to address the elevated levels of VOCs in soil gas beneath CS 024 (Radian, 2000) that posed a threat to groundwater. The system consists of 2 SVE wells and 14 SVM wells but is currently not operating. Soil vapors were treated by the Investigation Cluster 41/42/43 VGAC system located in Investigation Cluster 43. A STOP evaluation is ongoing for the Investigation Cluster 42 system.

The OU D SVE system was installed through the cap on top of CS 004, CS 005, CS A, CS S, and CS T (portions of the VZ site) to address VOC contamination that posed a threat to

groundwater. The system began operation in 1992. The catalytic oxidizer was removed and replaced with a thermal oxidizer system in November 2005. This SVE system includes a VGAC system. The OU D SVE system is currently operating and has removed more VOCs than any other SVE system onbase.

2.5 Site Characteristics

Site locations and features are presented on Figures 2 through 21. Conceptual site models for the sites were developed during preparation of the FSS FS (CH2M HILL, 2006) and are included herein as Figures 22 and 23.

COCs were identified for each site in the FSS FS (CH2M HILL, 2006) and are presented in site-specific write-ups. All COCs identified in the FSS FS will be addressed during the remedial actions.

2.5.1 CS 010 Site Characteristics

CS 010 lies in the northern portion of OU C on the western side of McClellan AFB. It was a disposal pit oriented approximately north-south (see Figures 2 and 3). The disposal pit at CS 010 was used for burial of Air Force–generated waste, ash, and other burn residue. The pit was unlined and covered with soil. The pit has been excavated down to native soil and has not been backfilled. It is approximately 600 feet long, 180 feet wide, and 25 feet deep (see Figure 6). Approximately 50,000 cy of waste and fill material were removed from the pit. Most of the excavated material has been shipped offsite for disposal. However, approximately 25,000 cy of excavated soil contaminated with radionuclides and metals remain at the site. That remaining soil has been placed in the open excavation in two piles. A weatherization tent covers the excavation and soil piles. The tent was originally erected to allow excavation work at the site to continue during the rainy season. It remains in place to prevent rain from eroding the soil piles and accumulating in the open excavation and to help control access. The site lies inside a locked fence, which is in place to control access. The locations of the excavation, the soil piles, the tent, and the fence are shown on Figure 6.

No viable habitat exists at the site. Most of the site lies inside the tent. The area inside the fenced area surrounding the tent is bare soil and gravel.

This site is bounded on the east by the airfield, on the west by CS 011 and an area used for training firefighters and rescue workers, on the south by a shallow drainage ditch and a large open space, and on the north by PRL 008. See the description of site characteristics for CS 011 through CS 014 and AOC 313 for a more detailed discussion of the fire and rescue training area. The Investigation Cluster 19 SVE system operates in the area as part of the basewide groundwater remedy.

The contents of the disposal pit at CS 010 were varied and intermixed. Many different materials were buried, and some of the materials were placed in drums while other materials were buried loose. The materials were generally not segregated before burial so that different materials lay next to or atop one another without any discernable pattern. Because the site has been excavated, and most of the excavated material has been shipped offsite for disposal, the only material from the disposal pit that remains onsite is approximately 25,000 cy of soil and small debris. The soil is contaminated with metals and radionuclides (see Table 12a). A list of COCs in the remaining soil is given below. The relatively low mobility of the COCs,

the sharp boundary between the disposal pit and the less permeable surrounding soil, and RI data collected before the excavation support the conclusion that contamination is likely to be limited to the disposal pit boundary (see Figure 6). However, no confirmation samples were taken at the end of the NTCRA, so there is some possibility that contamination exists in the native soil surrounding the excavation. Based on RI data for CS 010 collected prior to excavation of the site, it is possible that contaminants other than the COCs listed below might be present in the surrounding soil. It is not known whether such contaminants are present at concentrations that would require action.

Contaminants of Concern at CS 010		
Arsenic	Lead	Silver
Cesium 137	Radium 226	

2.5.2 CS 011, CS 012, CS 013, CS 014, and AOC 313 Site Characteristics

CS 011 through CS 014 and AOC 313 lie in the northern portion of OU C on the western side of McClellan AFB. CS 011 through CS 014 were a series of disposal pits oriented approximately north-south, running parallel to one another, just to the west of CS 010. AOC 313 is a circular area that overlies parts of CS 011 and CS 012 (see Figures 2 and 3). The disposal pits at CS 011 through CS 014 were used for burial of Air Force–generated waste, ash, and other burn residue. The pits are unlined and covered with soil. AOC 313 was used for training firefighters. Petroleum and waste solvents were released to the ground and ignited. The firefighters then extinguished the fire.

Limited non-native grassland covers most of this area. CS 011 and CS 012 are unpaved and have some non-native annual grassland. CS 013 and CS 014 are partially paved with non-native annual grassland species growing in open areas. These sites are routinely mowed, and habitat is marginal.

This area is bounded on the east by CS 010, on the west by a concrete-lined portion of Don Julio Creek, on the south by contractor field trailers and a large open space, and on the north by an area actively used for training firefighters and rescue workers. The current training area to the north includes both paved and unpaved land, a brick tower, and a number of temporary structures. The training conducted there does not involve the use of fire. The Investigation Cluster 19 SVE system operates in the area to address VOCs from the disposal pits and AOC 313 as part of the groundwater remedy.

The contents of the disposal pits at CS 011 through CS 014 are varied and intermixed. Many different materials were buried at these sites. Some of the materials were placed in drums before burial. Other materials were buried loose. The materials were generally not segregated before burial so that different materials can lie next to or atop one another without any discernable pattern. Soil samples, soil gas samples, trenches, radiological scans, and geophysical scans have all been used to characterize these pits. Contaminants detected at these sites include VOCs, SVOCs, PAHs, PCBs, pesticides, TPH, and metals (see Tables 12b through 22). The COCs for each site are presented below. The contamination is limited to the disposal pits and the areas between the disposal pits. There is no evidence of contamination east of the eastern edge of CS 011 or west of the western edge of CS 014. There is also no evidence that contamination extends beyond the northern or southern boundaries of the pits

(see Figure 3). RI data and boring data indicate that the pits are approximately 25 feet deep. The RI data also indicate that almost all of the contamination at these sites is shallower than that (see Figure 4).

Contaminants of Concern at CS 011

Antimony	1,2-DCA	Nickel
Arsenic	1,4-Dichlorobenzene (DCB)	PCB-1260
Benzene	1,1-Dichloroethene (DCE)	Tetrachloroethene (PCE)
Benzo(b)fluoranthene	cis-1,2-DCE	Trichloroethene (TCE)
Bis(2-ethylhexyl)phthalate	Dieldrin	Thallium
Cadmium	Ethylbenzene	TPH-D
Carbon tetrachloride	Hexane	TPH-G
Chloroethane	Lead	1,2,4-Trimethylbenzene
Chromium	Methylene chloride	1,3,5-Trimethylbenzene
Hexavalent chromium	4-Methylphenol	Vinyl chloride
1,1-Dichloroethane (DCA)	Naphthalene	

Contaminants of Concern at CS 012

Antimony	1,2-DCA	Nickel
Arsenic	1,4-DCB	PCB-1260
Benzo(a)anthracene	1,1-DCE	PCE
Benzo(a)pyrene	cis-1,2-DCE	TCE
Cadmium	Dibenzo(a,h)anthracene	Thallium
Carbon tetrachloride	2,4-Dinitrotoluene	TPH-D
Chromium	2,6-Dinitrotoluene	TPH-G
Hexavalent chromium	Indeno(1,2,3-cd)pyrene	Vinyl chloride
Chrysene	Lead	m,p-Xylene
1,1-DCA	Naphthalene	

Contaminants of Concern at CS 013

Antimony	1,2-DCA	PCB-1260
Arsenic	1,4-DCB	PCE
Benzene	1,1-DCE	Silver
Bis(2-ethylhexyl)phthalate	cis-1,2-DCE	2,3,7,8-Tetrachlorodibenzodioxin (TCDD)
Cadmium	4,4-dichlorodiphenyldichloroethene (DDE)	TCE
Carbon tetrachloride	2,6-Dinitrotoluene	TPH-D
Chlordane	Ethylbenzene	TPH-G
Chlorobenzene	Lead	1,2,4-Trimethylbenzene
Chloroethane	Naphthalene	Vinyl chloride
Chromium	Nickel	m,p-Xylene
Hexavalent chromium	n-nitro-di-n-propylamine	Zinc
Copper		
1,1-DCA		

Contaminants of Concern at CS 014		
Antimony	1,1-DCA	PCE
Arsenic	1,2-DCA	Radium 226
Benzene	1,4-DCB	2,3,7,8-TCDD
Cadmium	1,1-DCE	TCE
Carbon tetrachloride	cis-1,2-DCE	Thallium
Chloroethane	Ethylbenzene	TPH-D
Chromium	Lead	Vinyl chloride
Hexavalent chromium	Naphthalene	
Cobalt	Nickel	

Contaminants of Concern at AOC 313 (FTA)		
Benzo(a)anthracene	Hexavalent chromium	Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene	1,1-DCA	Nickel
Benzo(b)fluoranthene	1,2-DCA	PCB-1260
Benzo(k)fluoranthene	1,1-DCE	PCE
Carbon tetrachloride	cis-1,2-DCE	TCE
Chromium	Dieldrin	Vinyl chloride

2.5.3 CS 022 Site Characteristics

CS 022 is the site of a burn pit, incinerator, and disposal pit used for burial of incinerated and partially incinerated waste. It is now a fenced area of marginal non-native grassland overlain in two places by soil piles, in one place by a pile of product from a rock crusher that operated at the site during the 1990s, and in another place by a pile of concrete debris. A portable storage shed mid-way along the northern fence line is the only building at the site. Groundwater and SVE wells are present in the fenced area, and large concrete pipes have been placed around the wells to protect them. The site is currently not being used. Figures 2 and 7 show the location and site features of CS 022.

CS 022 is bounded on the north by the service road leading to the Groundwater Treatment Plant, on the east by the Contaminated Soils Staging Facility, on the south by a service road leading to the airfield, and on the west by Patrol Road. The OU C1 SVE system operates in this vicinity as part of the groundwater remedy. The SVE system is in place to address VOCs from the disposal pits in the area and from the industrial wastewater treatment plant that used to exist north of CS 022.

The disposal pit at CS 022 has two legs, an east-west leg that was the original burn pit and primary disposal pit and a north-south leg that appears to have been associated with the incinerator (see Figure 7). The depth of the east-west leg ranges from about 4 feet bgs at the margins to approximately 30 feet bgs along its center line. The north-south leg is shallower, extending to a depth of about 4 feet bgs. Both legs appear to be covered by about 2 feet of fill.

Contamination is present in surface and subsurface soils within the fenced area at CS 022. Contaminants include metals, VOCs, various PAHs, PCB-1260, pesticides, SVOCs, and radionuclides (see Tables 23 through 25). A list of COCs is presented below.

Most of the contamination at the site is localized around the disposal pit. Concentrations are highest and extend deepest within the pit boundary. Shallow contamination around the margins of the pit boundary appears to be associated with the practice of laying waste adjacent to the pit then pushing it into the pit (see Figure 7).

Two areas of radium 226 contamination in shallow soil exist west of the pit boundary. The maximum radium 226 concentration detected at the site was 30,700 picocuries per gram (pCi/g). However, this result was due to a small object that has been removed from the site and disposed of. The maximum radium 226 concentration detected during the RI in soil that still remains at the site is 516 pCi/g. A surface scan of the entire fenced area revealed that gamma-emitting radionuclides were present in several locations (see Figure 8). Several of the elevated gamma readings are due to large concrete pipes placed at several locations to protect groundwater and SVE wells. The pipes have a different background than the surrounding area, which causes elevated gamma readings. This is not indicative of contamination. However, radium 226 contamination has been confirmed in the large pile of rock crusher product. The majority of the radium 226 contamination at the site is in shallow soil, less than 7 feet bgs (see Figure 9). A small quantity of radium 226 contamination exists deeper than 7 feet bgs within the boundary of the disposal pit.

Contaminants of Concern at CS 022

Antimony	1,2-DCB	PCB-1254
Arsenic	1,4-DCB	PCB-1260
Benzene	cis-1,2-DCE	PCE
Benzo(a)anthracene	Dichlorodiphenyldichloroethane (DDD)	Radium 226
Benzo(a)pyrene	Dichlorodiphenyltrichloroethane (DDT)	2,3,7,8-TCDD
Benzo(b)fluoranthene	1,3-Dichlorobenzene	TCE
Benzo(k)fluoranthene	2,4-Dimethylphenol	Thallium
Cadmium	1,4-Dioxane	Thorium 232
Chlorobenzene	Ethylbenzene	TPH-D
Hexavalent chromium	Heptanes	1,2,4-Trimethylbenzene
Chrysene	Hexane	1,3,5-Trimethylbenzene
Cobalt	Indeno(1,2,3-cd)pyrene	Vinyl chloride
Copper	Lead	m,p-Xylene
Cyclohexane	Methylene chloride	o-Xylene
1,1-DCA	Naphthalene	Zinc

2.5.4 CS 024 Site Characteristics

CS 024 lies in the southern portion of OU A near the southern tip of McClellan AFB (see Figures 2 and 11). It was a burn pit and disposal pit oriented approximately northeast-southwest (see Figure 11). Based on aerial photographs and boring logs, the pit is approximately 500 feet long, 55 feet wide, and 30 feet deep. Air Force–generated wastes

were burned monthly in the eastern half of the pit. The western half of the pit was used to discard unburned waste. Waste encountered during investigation of the site included burned wood, plastic, glass, wire, concrete, sludge, and metal. The pit is unlined and covered with soil. The site is fenced, and no permanent structures are present.

Limited non-native grassland covers most of the northern half of the site. The southern half of the site is paved, and a small asphalt area is located at the northern tip of the site. A non-jurisdictional wetland lies east of the site, between railroad tracks. Habitat at CS 024 is marginal.

CS 024 is bounded on the east by railroad tracks and on the north, south, and west by open space. The open space is covered by a mix of marginal, non-native grassland; bare dirt; and pavement. There are no permanent structures at CS 024 or in the surrounding area. The Investigation Cluster 42 SVE system operates in the area to address VOCs from the disposal pit as part of the groundwater remedy.

The contents of the disposal pit are expected to be varied and intermixed. Many different materials appear to have been buried at the site. Some of the materials might have been placed in drums before burial, but other materials were buried loose. Materials were generally not segregated before burial so that different materials can lie next to or atop one another without any discernable pattern. Soil samples, soil gas samples, and boring logs have been used to characterize the site. Contaminants include VOCs, PCBs, dioxins/furans, and metals (see Tables 26 through 28). The list of COCs is presented below. The contamination at CS 024 is localized around the disposal pit. Most of the contamination lies within the pit boundary. However, some contamination exists in shallow soils to the east and north of the pit. RI data indicate that the contamination is shallower than the depth of the disposal pit. See Figure 11 for the horizontal distribution of contaminants and Figure 12 for the vertical distribution.

Contaminants of Concern at CS 024

Benzene	1,2-DCA	Nickel
Cadmium	1,2-DCB	PCB-1260
Chloroethane	cis-1,2-DCE	2,3,7,8-TCDD
Hexavalent chromium	Ethylbenzene	TCE
Cobalt	Hexane	Thallium
Copper	Lead	Vinyl chloride
1,1-DCA	Manganese	

2.5.5 PRL 008 Site Characteristics

PRL 008 lies in the northern portion of OU C on the western side of McClellan AFB, north of CS 010 and southeast of the SAFR (see Figure 2 and 14). PRL 008 was a disposal pit and is oriented approximately southeast-northwest. It has an approximately rectangular central area and four curved arms, two each on the northern and southern ends of the site. The shape of the site vaguely suggests a crab, so the site is sometimes referred to informally as the “crab site” (see Figure 14). PRL 008 is about 435 feet long, 135 feet wide, and 30 to 40 feet

deep. Air Force–generated wastes, reportedly including sanitary sewer sludge, industrial wastewater treatment plant sludge, demolition debris, creek debris, and paint chips, were buried at the site. The pit is unlined and covered to grade with soil. The surface of the site is covered with soil mounds consisting of clean soil brought to the site from various unspecified areas of the Base. No permanent structures are present.

The soil mounds that cover PRL 008 are sparsely vegetated with non-native annual grasses and weedy plants. Habitat is of low to marginal quality.

PRL 008 is bounded on the east by the airfield, on the south by a road and CS 010, on the west by an area used for training firefighters and rescue workers, and on the north by open space. See the description of site characteristics for CS 011 through CS 014 and AOC 313 for a more detailed discussion of the fire and rescue training area. The Investigation Cluster 19 SVE system operates in this area to address VOCs from the disposal pits and AOC 313 as part of the groundwater remedy.

The contents of PRL 008 are expected to be varied and intermixed. Many different materials appear to have been buried at the site. Some of the materials might have been placed in drums before burial, but other materials were buried loose. Materials were generally not segregated before burial so that different materials can lie next to or atop one another without any discernable pattern. Soil samples, soil gas samples, and boring logs have been used to characterize the site. Contaminants include VOCs, SVOCs, PCBs, dioxins/furans, TPH, and metals (see Tables 29 through 31). The list of COCs is presented below. The contamination at PRL 008 is localized within the disposal pit boundary (see Figure 14). The deepest contamination is located at approximately 30 feet bgs (see Figure 15).

Contaminants of Concern at PRL 008

Arsenic	Ethylbenzene	2,3,7,8-TCDD
Benzene	Lead	TCE
Benzo(a)pyrene	Mercury	Toluene
Cadmium	Nickel	TPH-D
Chromium	PCB-1260	Vinyl chloride
Hexavalent chromium	PCE	m,p-Xylene
Copper	Radium 226	o-Xylene
cis-1,2-DCE	Silver	

2.5.6 SAFR Site Characteristics

The SAFR lies in the northern portion of OU C on the western side of McClellan AFB, northwest of PRL 008 (see Figures 2 and 17). The SAFR was the site of an outdoor small arms firing range. The firing range was approximately 300 feet wide and 100 feet long. It is fronted by Building 710 and backed by a large soil berm that is approximately 30 feet high, 350 feet long, and 90 feet wide (see Figure 17). Concrete covers the ground surface between Building 710 and the berm. Building 710 is surrounded by asphalt parking lots, enclosed firing ranges, and buildings. Building 712 lies southwest of Building 710. Bullets from the old firing range impacted the berm. Soil from the berm was periodically scraped off and

piled at the southeastern end of Building 712. That soil pile is still present. The berm and the soil pile southeast of Building 712 are contaminated with metals, predominantly lead, and are the focus of this remedy.

A cultivated lawn surrounds Building 712. Because of extensive development of the site area, habitat is of marginal quality.

The SAFR is bounded on the east and south by open space containing grassland and vernal pools. The vernal pools to the south of the site (Vernal Pools 421, 422, 423, and 601) are proposed to be excavated under the Draft Ecological Sites ROD. PRL 008 lies to the southeast. CS 007, which lies to the south, will be addressed in the Follow-on Strategic Sites ROD. The SAFR is bounded on the west by a concrete-lined reach of Don Julio Creek. A fenced area consisting of an asphalt paved parking lot, a large building (Building 1069), and open grassland lies to the north.

The contamination at the SAFR consists of metals from bullets in the large berm northeast of Building 710 and in the soil pile southeast of Building 712 (see Tables 32 and 33). The COCs are listed below. The vertical extent of contamination appears to be limited to the upper 3 feet of soil, except at one sampling location where it appears to extend to 6 feet bgs (see Figure 18). Contamination appears to extend 75 feet from the backstop in all directions. Contamination at the soil pile is localized to the original footprint of the soil pile (see Figure 17).

Contaminants of Concern at SAFR

Antimony	Cobalt	Lead
Cadmium	Copper	Nickel
Hexavalent chromium		

2.5.7 Vadose Zone Site Characteristics

The VZ site lies in OU D on the western side of McClellan AFB (see Figures 2 and 19). The site consists of 11 disposal pits and covers about 19 acres. The site has an irregular boundary, and is oriented approximately north-south (see Figure 19). Air Force–generated wastes, reportedly including industrial wastewater treatment plant sludge, paint, metal, wood, concrete, glass, bricks, roofing shingles, petroleum, and solvents, were buried at the site. Oils and solvents were also burned at the site. The pits are unlined. An engineered composite cap covers 11 acres of the site. The OU D SVE system operates at the site, extracting VOCs from the disposal pits beneath the cap as part of the groundwater remedy. The conveyance piping, blowers, and treatment system for the SVE system are located on top of the cap.

The surface of the site is soil and non-native grasses both on top of and adjacent to the engineered cap.

The VZ site is bounded on the east by a concrete-lined reach of Don Julio Creek, on the south by a portion of Patrol Road, on the west by the Base boundary, and on the north by open space. Building 1093 lies to the northeast of the site.

The contents of the pits at the VZ site are varied and intermixed. Many different materials appear to have been buried at the site. Some of the materials might have been placed in drums before burial, but other materials were buried loose. Materials were generally not segregated before burial so that different materials can lie next to or atop one another without any discernable pattern. Oil and solvent burning is known to have occurred at the site. Soil samples, soil gas samples, boring logs, and radiological scanning have been used to characterize the site. Contaminants include VOCs, SVOCs, PAHs, PCBs, pesticides, dioxins/furans, TPH, and metals (see Tables 34 through 36). The list of COCs is presented below. The contamination is localized in the area around the pits (see Figure 19). A single detection of dioxins/furans in excess of industrial cleanup levels was found outside the cap footprint in the area of former disposal pit CS 006. The vertical extent of contamination is limited to the upper 17 feet bgs (see Figure 20).

Contaminants of Concern at the VZ Site

Aldrin	Cobalt	Mercury
Arsenic	Copper	4-Methylphenol
Benzene	1,1-DCA	Naphthalene
Benzo(a)anthracene	1,2-DCA	Nickel
Benzo(b)fluoranthene	1,2-DCB	PCB-1260
Benzo(k)fluoranthene	1,4-DCB	PCE
Bis(2-ethylhexyl)phthalate	1,1-DCE	2,3,7,8-TCDD
Cadmium	cis-1,2-DCE	TCE
Carbon tetrachloride	2,4-Dimethylphenol	TPH-D
Chloroform	1,4-Dioxane	1,2,4-Trimethylbenzene
Chromium	Ethylbenzene	Vinyl chloride
Hexavalent chromium	Lead	

2.6 Current and Potential Future Land and Resource Use

Current land use at McClellan is a combination of open grassland, aircraft industrial, heavy and light industrial, warehouses, military operations (U.S. Coast Guard), training, office buildings, schools, and residential (none of the sites included in this ROD are currently used, or planned, for residential use). Most of the industrial facilities are located near the flightline and in the southeastern portion of the Base. The southwestern portion has both industrial and storage areas. The far western part of the Base has areas of environmentally sensitive vernal pools and wetlands. Between these wetlands and the taxiways, there is an open area historically used for disposal pits and a series of engine test cells. Generally, parking areas and washracks were located in the northeastern area of the Base.

Although specific future land uses are not known with certainty, the framework for reuse and redevelopment of the Base has been established. Future land use is expected to change only slightly from its current use. The open space preserve area to the west will remain largely unchanged, and office and heavy industrial uses will be concentrated in the eastern section of the Base. In general, future land use will probably include like or similar use of

Base property, facilities, and infrastructure. Specifically, the anticipated future land use at CS 010 through CS 014, AOC 313, and PRL 008 is industrial in nature and may consist of a regional fire and rescue training facility or some other suitable facility through a public benefit conveyance. The future anticipated land use at the VZ site consists of open storage. For CS 022, the anticipated future land use is industrial, including light industrial, warehousing, and open storage activities. For CS 024, the future anticipated land use is light industrial, or an intermodal rail facility. The future anticipated land use for the SAFR is the continued use of a firing range by local law enforcement.

Most of the McClellan property will be subject to the planning and zoning authority of Sacramento County. The exception is a small area on the west-central periphery that lies within the jurisdiction of the City of Sacramento.

The beneficial uses of the groundwater at the FSS are municipal and domestic water supply, agricultural supply, industrial service supply, and industrial process supply (Central Valley Water Board, 2011). However, there are no actual current or future groundwater uses of groundwater at or in the vicinity of any of the FSS. Groundwater use is prohibited by restrictions described in the *Basewide VOC Groundwater Record of Decision* (AFRPA, 2007).

There are no current or future human uses (e.g., drinking water, irrigation, or recreational) of surface waters at or in the vicinity of any of the FSS. No perennial surface waters exist at or in the vicinity of the FSS. There are seasonal drainage ditches and creeks, seasonal wetlands, and vernal pools. The seasonal drainage features contribute to downstream receiving waters which empty into the Sacramento River. The potential beneficial uses of the receiving waters include drinking, irrigation, and recreational. The seasonal wetlands and vernal pools serve as habitat for various aquatic species.

2.7 Summary of Site Risks

The response actions selected in this ROD are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment into the environment and from actual or threatened releases of pollutants, or contaminants from the sites into the environment that may present an imminent and substantial endangerment to public health or welfare. The basis for action is that one or more of the following is true at each site: (1) cumulative excess carcinogenic risk to an individual exceeds 1×10^{-4}, (2) the non-carcinogenic hazard index (HI) is greater than 1, or (3) chemical-specific standards for lead (based on blood lead levels) are exceeded. There is no significant ecological habitat at any of the FSS, so exposure of ecological receptors is not part of the basis of decision. Vernal pools and creeks are present near several of the FSS, and ecological risks and remedies at the vernal pools and creeks will be addressed in the Ecological Sites ROD. The specific basis of action for each site is described below.

2.7.1 Human Health Risks

The baseline risk assessment estimates what risks a site would pose if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. This section of the ROD summarizes the results of the baseline risk assessments for the FSS. As stated in the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*

(EPA, 1989), baseline risk assessments are site-specific and therefore may vary in both detail and the extent to which qualitative and quantitative analyses are used. There are four elements required in a baseline risk assessment process: identification of COCs, exposure assessment, toxicity assessment, and risk characterization. Baseline human health risk assessments were conducted for each of the FSS using the process outlined in the following subsections.

2.7.1.1 Identification of Contaminants of Concern

COCs in soil and soil gas were identified based on data collected and analyzed during the RI. COCs were selected by comparison of maximum detected contaminant concentrations with risk-based screening levels. The risk-based screening levels were set at an excess lifetime cancer risk of 1×10^{-6} for carcinogens and a non-cancer hazard quotient (HQ) of 1.0 for non-carcinogens. Screening levels were developed for both unrestricted and industrial land use scenarios. Information used to develop the screening levels is presented in Appendix B. Chemicals for which the maximum detected concentration exceeded the screening level were identified as COCs. The COCs for each FSS are identified in Section 2.5 of this ROD. For each site, Tables 37 through 54 present the maximum and minimum concentrations of each COC, the frequency of detection of each COC, and the exposure point concentration for each COC at each site. For each COC, the maximum detected concentration was used as the exposure point concentration. Toxicity data summary tables are presented in Appendix B, and COCs, exposure point concentrations, and risk characterization summaries are presented in Tables 37 through 54.

2.7.1.2 Exposure Assessment

The exposure pathways that were included in the calculation of the human health risk screening levels are illustrated in the conceptual site models shown on Figures 22 and 23. For non-VOCs in soil, the exposure pathways were soil ingestion, skin contact with soil, inhalation, and homegrown produce ingestion. For radionuclides in soil, the exposure pathways included all of the exposures evaluated for non-VOCs plus external exposure. External exposure is exposure to ionizing radiation emitted by a radionuclide, and does not require direct contact, inhalation, or ingestion of the radionuclide. For VOCs in shallow soil gas, the only exposure pathway was inhalation of VOCs emitted from soil into indoor air. The potentially exposed populations were hypothetical future residents, current and future outdoor workers, future indoor workers, and current and future construction workers. Children and families that consume produce grown onsite are considered sensitive subpopulations. Potential exposures of these two groups were considered by including 6 years of childhood exposure and ingestion of homegrown produce in the development of the screening levels for the unrestricted use scenario. Specific exposure parameters used in the screening values are presented in detail in Appendix B.

2.7.1.3 Toxicity Assessment

Toxicity assessments for carcinogens and non-carcinogens follow the procedures described in Appendix B. Table B1-1 in Appendix B provides carcinogenic and non-carcinogenic risk information which is relevant to the COCs at the FSS. Availability of toxicity data, adjustments, and extrapolations for specific COCs are identified in the notes to that table. Toxicity information was obtained from the following sources in order of precedence: the

Integrated Risk Information System (IRIS), EPA's Provisional Peer Reviewed Toxicity Values, California EPA's Cancer Potency Factors and Reference Exposure Levels, Health Effects Assessment Summary Tables (HEAST), National Center for Environmental Assessment (NCEA), and route extrapolated values cited in the 2004 EPA Region 9 PRG table.

2.7.1.4 Risk Characterization

For carcinogens, risks are generally expressed as the incremental probability of a population of individuals developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where:

risk = a unitless probability (e.g., 2×10^{-5}) of a population of individuals developing cancer

CDI = chronic daily intake averaged over 70 years (milligrams per kilograms per day [mg/kg-day])

SF = slope factor, expressed as $(\text{mg/kg-day})^{-1}$

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that a population of individuals experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of a population of individuals developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 1×10^{-4} to 1×10^{-6}.

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that a population of individuals may be exposed to that is not expected to cause any deleterious effect. An HQ is the ratio of exposure to toxicity. An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that chemical are unlikely. The HI is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given population of individuals may reasonably be exposed. An HI less than 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI}/\text{RfD}$$

where:

CDI = chronic daily intake
RfD = reference dose

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Uncertainties associated with the calculation of the risk-based screening levels could affect the risk estimates developed using the screening levels. These uncertainties include the following:

- **Use of the residential exposure assumptions –** The current and reasonably anticipated future land use for the FSS is industrial. Use of screening levels based on residential exposure assumptions might result in chemicals being identified as COCs that would not be COCs using the industrial exposure parameters. It will tend to overestimate potential risk by including the homegrown produce pathway, increasing exposure times, and including exposures to a child.
- **Particulate emission factor (PEF) –** The PEF used in the screening level was based on site-specific wind speed data for McClellan and other climate and dispersion data for Fresno, California. The source of the data for Fresno was the *Soil Screening Guidance Technical Background Document* (EPA, 1996). Data for Fresno were used because the technical background document did not include data for McClellan AFB or Sacramento, California. It included data for only three locations in California, and Fresno was the most representative of conditions in the Sacramento area. Because climate differs between Fresno and McClellan, the PEF is not entirely specific to McClellan. The McClellan-specific PEF used for total chromium and hexavalent chromium is less conservative than the PEF used for EPA Region 9 preliminary remediation goals (PRGs). Use of the McClellan-specific PEF will tend to reduce risk estimates for total chromium and hexavalent chromium.
- **Homegrown produce pathway –** Plant root uptake of metals was only evaluated for the six metals included in EPA's Soil Screening Guidance (EPA, 1996) because the soil partition coefficients (K_{ps}) values available in literature for other metals were not as well defined as the Soil Screening Guidance values. Leaving plant root uptake out of the evaluation of the homegrown produce pathway for some metals will tend to underestimate risk via the homegrown produce pathway for those metals.
- **Route-to-route extrapolation for toxicity factors –** For some chemicals, cancer slope factors or RfDs have only been established for one exposure route in the IRIS database. In those cases, toxicity values were extrapolated across exposure routes. For instance, oral toxicity values were used to evaluate inhalation exposure in some cases. This simple extrapolation method allows a pathway for which no cancer slope factors or RfDs have been defined in IRIS to be evaluated. However, it also introduces uncertainties into the risk estimates because it does not account for differences in "port-of-entry" effects of

pharmacokinetic behavior of chemicals in the body. The contribution from the exposure route for which the extrapolated toxicity factor was used might be overestimated or underestimated. The contribution from dermal exposure might be underestimated because no adjustment was made to the oral toxicity values used for the dermal route.

- For lead, risks were evaluated by comparing soil concentrations with EPA Region 9 PRGs considered to be protective of human health. The California Modified residential PRG of 150 milligrams per kilogram (mg/kg) was adopted as the unrestricted screening level, and the industrial PRG of 800 mg/kg was adopted as the industrial screening level.

2.7.1.5 CS 010 Human Health Risks

As part of the RI, a baseline human health risk assessment was conducted for CS 010. However, the disposal pit has been excavated, and much of the excavated material has been sent offsite for disposal. Therefore, the risk at CS 010 has been greatly reduced. About 25,000 cy of soil and small debris contaminated with radionuclides and metals remain at the site. Current site risks are from this stockpiled soil.

Following the TCRA, another risk assessment was performed. The soils at CS 010 were sampled before excavation in order to help segregate soils for disposal. The soil stockpiled in CS 010 was not sampled after it was excavated, so the only quantitative data available for this soil is the pre-excavation data. Therefore, the risk assessment was based on the pre-excavation data. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations.

The risk estimates for the remaining soil piles are presented below. A summary of the risks presented by each COC in the remaining soil piles is presented in Tables 37 and 38.

Risk Summary for CS 010

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	7.7×10^{-5}	1.6	2×10^{-4}
Unrestricted	1.5×10^{-3}	179	1×10^{-3}

For both the unrestricted and industrial use scenarios, the total lifetime cancer risk exceeds 1×10^{-4}, and the non-cancer risk exceeds 1.0. Lead is present at a maximum concentration of 157,827 mg/kg, which exceeds both the industrial and unrestricted use levels.

2.7.1.6 CS 011, CS 012, CS 013, CS 014, and AOC 313 Human Health Risks

During the RI/FS, data collected from CS 011 through CS 014 were used to perform a combined risk assessment, and data collected from AOC 313 were used to perform an independent risk assessment for that site. A separate risk assessment was conducted for radionuclides (actinium 228, cesium 137, and radium 226) at CS 011 and CS 014.
No radionuclides were detected at CS 012 and CS 013, so no radiological risk assessment was performed for those sites. A risk assessment for radionuclides was not performed for AOC 313 because there is no evidence that radionuclides were used, stored, or disposed of

as part of the fire training activities at this site. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations.

The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 39 through 42.

Risk Summary for CS 011 through CS 014

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	2.8×10^{-4}	12	6×10^{-5}
Unrestricted	1.3×10^{-2}	270	3×10^{-4}

The risk estimates for CS 011 through CS 014 were taken as representative of the entire area because they were more than an order of magnitude higher than the risk estimates for AOC 313. The total lifetime cancer risk exceeds 1×10^{-4}, and the non-cancer risk exceeds 1.0 for both the unrestricted and industrial use scenarios. Lead is present at all four sites at concentrations exceeding the unrestricted use level. Lead also exceeds the industrial use level at CS 013 and CS 014. The maximum concentrations are 520 mg/kg at CS 011, 250 mg/kg at CS 012, 3,700 mg/kg at CS 013, and 970 mg/kg at CS 014.

2.7.1.7 CS 022 Human Health Risks

Data collected from CS 022 during the RI were used to perform the risk assessment. All soil and soil gas data collected shallower than 15 feet bgs were used to estimate the risk. Shallow soil gas data collected prior to the installation of the SVE system in OU C1 were included. Those shallow soil gas data might not be representative of current site conditions because of the operation of the OU C1 SVE system. A separate risk assessment was conducted for radium 226. The maximum radium 226 concentration was used as the exposure point concentration, regardless of depth and including samples taken outside of the CS 022 pit. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations.

The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 43 through 45.

Risk Summary for CS 022

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	2.7×10^{-3}	56	2×10^{-2}
Unrestricted	3.7×10^{-2}	870	7×10^{-2}

For both the unrestricted and industrial use scenarios, the total lifetime cancer risk exceeds 1×10^{-4}, and the non-cancer risk exceeds 1.0. Lead is present at a maximum concentration of 6,300 mg/kg, which exceeds both the industrial and unrestricted use levels.

2.7.1.8 CS 024 Human Health Risks

Data collected from CS 024 during the RI were used to perform a risk assessment. Shallow soil gas data collected prior to the installation of the Investigation Cluster 42 SVE system were included. Those shallow soil gas data might not be representative of current site conditions because of the operation of the Investigation Cluster 42 SVE system. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations.

The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 46 and 47.

Risk Summary for CS 024

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	8.2×10^{-5}	1	N/A*
Unrestricted	1.3×10^{-3}	24	N/A*

*No radionuclides were identified as COCs at CS 024.

For the unrestricted use scenario, the total lifetime cancer risk exceeds 1×10^{-4}, and the non-cancer risk exceeds 1.0. For the industrial use scenario, the total lifetime cancer risk is in the 1×10^{-6} to 1×10^{-4} risk management range, and the non-cancer risk equals 1.0. Lead is present at a maximum concentration of 850 mg/kg which exceeds both the industrial and unrestricted use levels.

2.7.1.9 PRL 008 Human Health Risks

Data collected from PRL 008 during the RI were used to perform the risk assessment. A separate risk assessment was conducted for radium 226. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations. The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 48 through 50.

Risk Summary for PRL 008

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	2.4×10^{-4}	5.4	1×10^{-4}
Unrestricted	3.9×10^{-3}	100	3×10^{-4}

Cancer risk at PRL 008 exceeds 1×10^{-3} for the unrestricted use scenario and 1×10^{-4} for the industrial scenario. The non-cancer risk exceeds 1.0 for both the unrestricted use scenario and the industrial scenario. Lead exceeds the unrestricted use levels but not the industrial use level. The maximum lead concentration is 660 mg/kg.

2.7.1.10 SAFR Human Health Risks

Data collected from the SAFR during the RI were used to perform the risk assessment. The risk assessment applied to the entire area of the SAFR, including the backstop and soil pile area. In 2001, approximately 500 cy of contaminated soil were removed from the soil pile for use in a soil washing technology demonstration project. This represented approximately half of the 800 to 1,000 cy estimated to be present in the soil pile at that time. The risk assessment was based on data collected prior to the excavation of contaminated soil from the soil pile area. No sampling was conducted at the soil pile after the soil was removed, so it is not possible to predict whether concentration-based risk estimates would be increased, decreased, or unchanged from conditions prior to the excavation. Since some quantity of contamination was removed, it is assumed that the risk can be no greater than it was before. Therefore, the pre-excavation risk estimates were used as a reasonable, protective basis for decision making. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations. The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 51 and 52.

Risk Summary for SAFR

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	1.7×10^{-8}	0.41	N/A*
Unrestricted	3.5×10^{-8}	12	N/A*

*No radionuclides were identified as COCs at the SAFR.

For both the unrestricted and industrial use scenarios, the total lifetime cancer risk is less than 1×10^{-6}. The non-cancer risk exceeds 1.0 for the unrestricted use scenario but not for the industrial use scenario. Lead is present at a maximum concentration of 64,800 mg/kg which exceeds both the industrial and unrestricted use levels. Lead is the major risk driver for this site.

2.7.1.11 Vadose Zone Human Health Risks

Data collected from the VZ site during the RI were used to perform a risk assessment. The exposure area was the entire area of the VZ site. The risk assessment included shallow soil gas data collected during the operation of the OU D SVE system. Those data might not be representative of current site conditions because of the potential reduction in shallow soil gas concentrations from the operation of the OU D SVE system. Lead was evaluated by comparing soil concentrations with the industrial and unrestricted use PRGs. The maximum detected concentrations of COCs were used for exposure point concentrations. The risk estimates are presented below. A summary of the risks presented by each COC is presented in Tables 53 and 54.

Risk Summary for the VZ Site

Risk Scenario	Cancer Risk from Non-radioactive COCs	Non-cancer Risk	Radiological Risk
Industrial	3.6×10^{-3}	6	N/A*
Unrestricted	3.6×10^{-2}	141	N/A*

*No radionuclides were identified as COCs for the VZ site.

For both the unrestricted and industrial use scenarios, the total lifetime cancer risk exceeds 1×10^{-4}, and the non-cancer risk exceeds 1.0. Lead is present at a maximum concentration of 4,500 mg/kg which exceeds both the industrial and unrestricted use levels.

2.7.2 Ecological Risks

None of the FSS provide significant ecological habitat onsite. All of the sites have been significantly disturbed by man, and are covered by some combination of pavement, an engineered cap, gravel, man-made soil piles, and bare dirt. Small patches of low-quality grassland are present at some of the sites. All of the sites except CS 024 are subject to ongoing human activities that continue to limit the establishment of natural habitats. A more detailed discussion of habitat at each site is given in Section 2.5, "Site Characteristics." While significant ecological habitat is not present at any of the 11 FSS, the remedial alternatives consider the potential for ecological impacts associated with offsite migration of contaminants via the surface water pathway to nearby ecologically sensitive areas. Three vernal pools are adjacent to the SAFR and PRL 008, and other vernal pools and creeks are adjacent to several of the FSS in OU C and OU D. Ecologically-sensitive habitats at McClellan AFB, including those adjacent to the FSS, are being addressed in a separate ROD. A tiered ecological risk assessment approach has been applied base-wide, and ecologically-sensitive sites were identified and investigated. Potential remedies for ecological sites, including the vernal pools and creeks adjacent to the FSS were evaluated in the *Ecological Sites Feasibility Study* (CH2M HILL, 2010). Remedies were proposed and presented to the public for comment in the *Ecological Sites Proposed Plan* (AFRPA, 2011b), and the selected remedies will be identified in the Ecological Sites ROD.

2.7.3 Summary of Site Risks

The basis for the action at the FSS is that risks to human health for industrial use exceed acceptable levels. At CS 011, CS 012, CS 013, CS 014, CS 022, CS 024, AOC 313, PRL 008, and the VZ site, excess lifetime cancer risk estimates exceed the NCP acceptable risk range and/or the non-cancer HI exceeds 1.0. Exposure to lead in soil results in predicted blood lead levels that exceed acceptable thresholds at all sites except AOC 313. Based on these data, the response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

2.8 Remedial Action Objectives

McClellan has developed remedial action objectives (RAOs) to describe how the remedy is expected to address site risks. These RAOs are based on current and future land uses and

address exposure risks by removing contamination and isolating potential receptors from remaining contamination. The RAOs are as follows:

- For protection of human health, prevent inhalation, ingestion, direct contact, and external exposure to contaminants in shallow soil gas, soil, and ionizing radiation having carcinogen(s) posing excess cancer risk levels extending up to 1×10^{-4} to 1×10^{-6}, or non-carcinogenic effects in excess of the reference dose (an HI of 1) for the current and reasonably anticipated future land use scenario, with a point of departure of 1×10^{-6} for determining remediation goals for alternatives. This RAO will be achieved if all contaminants with concentrations greater than or equal to the cleanup levels presented in Section 2.8.3 are addressed by the selected remedies.
- For protection of surface water quality, prevent migration of non-VOCs above surface water protection standards contained in this ROD. For VOCs, impacts to surface water are not expected because of the inherent volatility of VOCs.
- To further protect groundwater, reduce the potential for residual contamination at the disposal pit sites to migrate to groundwater.

2.8.1 Basis and Rationale for Remedial Action Objectives

The RAOs were selected in consideration of the current land use and to support the anticipated future land use. Current land use at the FSS is a combination of capped and uncapped disposal pits and small arms and firefighting training. The anticipated future land use at CS 010 through CS 014, AOC 313, and PRL 008 is industrial in nature and may consist of a regional fire and rescue training facility or some other suitable facility. The future anticipated land use at the VZ site consists of open storage. For CS 022, the anticipated future land use is industrial, including light industrial, warehousing, and open storage activities. For CS 024, the future anticipated land use is light industrial or an intermodal rail facility. The future anticipated land use for the SAFR site is as part of the current indoor firing range complex. Current firing range practices preclude future contamination.

The groundwater RAO was selected in consideration of potential beneficial groundwater use. VOC contamination in groundwater at the FSS is addressed under the VOC ROD that was completed in 2007 (AFRPA, 2007). VOC contamination in the vadose zone that threatens groundwater is also addressed under the VOC ROD (AFRPA, 2007). However, the capping remedy that reduces infiltration and potential contaminant migration provides for additional mitigation of VOC contamination in the vadose zone that threatens groundwater. Non-VOCs that may be present in groundwater at the FSS are addressed in the Non-VOC Amendment to the Basewide VOC Groundwater ROD (AFRPA, 2009). The monitoring component of the capping and CU remedies will also provide for long-term assessment of groundwater quality including VOCs and non-VOCs.

2.8.2 How the Remedial Action Objectives Address Risks

The RAOs will address risks identified in the risk assessment by preventing exposure to ensure that, After implementation of the remedies, the remaining risks will be within the acceptable risk management range for the anticipated future land use.

2.8.3 Basis of Cleanup Levels

For human health, cleanup levels for all contaminants except radionuclides were calculated using inputs specific to McClellan (some of the exposure parameters used in the risk calculations, such as the particulate emission factor and the homegrown produce pathway, have been derived specifically for McClellan) and represent the lesser of the concentration equivalent to a 1×10^{-6} carcinogenic risk or the concentration equivalent to an HI of 1 for the industrial exposure scenario. For soil, risk-based cleanup levels supportive of industrial use were developed based on exposure via ingestion of soil, inhalation, and dermal contact. The cleanup levels for shallow soil gas are based on the vapor inhalation pathway because the risk-based values for that scenario are more conservative than the values for the direct contact scenario (including incidental ingestion, inhalation of VOCs in ambient air, and dermal contact). Following attainment of the cleanup levels for the protection of human health, residual risk associated with chemical constituents on an individual basis would be at or less than a carcinogenic risk of 1×10^{-6} or a non-carcinogenic HI of 1 for industrial exposure.

Cleanup levels for lead in the soil horizon from 1 to 15 feet bgs are based on the State's residential CHHSL of 80 mg/kg as the unrestricted use level, and the industrial CHHSL of 320 mg/kg as the industrial level. The cleanup level for lead in surface soil (0 to 1 foot horizon) for protection of surface water is 140 mg/kg, which represents a cleanup to the anthropogenic background levels for lead at McClellan.

Cleanup levels for protection of human health for radionuclides were calculated using the EPA PRG calculator (http://epa-prgs.ornl.gov/radionuclides/) calculator using default assumptions for the residential scenario and a 1×10^{-4} carcinogenic risk level, and are inclusive of background. Following attainment of the cleanup levels for the protection of human health, incremental risk above background associated with radionuclides on an individual basis would be at or less than a carcinogenic risk of 1×10^{-4} for residential exposure. The 1×10^{-4} carcinogenic risk cleanup level for residential radionuclide exposure was selected because the 1×10^{-6} carcinogenic risk cleanup levels (for both industrial and residential) would be indistinguishable from established site background levels.

Cleanup levels for protection of groundwater from metals, radionuclides, SVOCs, and TPH in soil (0 to 30 feet bgs) were derived separately. Cleanup levels for metals, radionuclides, and TPH-D were calculated using the Designated Level Methodology (DLM) (Central Valley Water Board, 1989). The basis used for the development of cleanup levels for metals, radionuclides, and TPH-D is either the maximum contaminant levels (MCLs) or risk-based Water Quality Limits (WQLs) as recommended by the Central Valley Water Board. For SVOCs and TPH-G, cleanup levels for protection of groundwater were developed using vadose zone and groundwater mixing-cell models. The basis for the evaluation is either MCLs or other risk-based WQLs. The MCLs or WQLs for each contaminant were identified in consultation with the Central Valley Water Board.

Cleanup levels for protection of surface water were calculated using an approach where the annual mass of eroded soil is calculated using the Revised Universal Soil Loss Equation (RUSLE). The cleanup levels were back-calculated to derive the average sitewide soil concentration that results in a surface water concentration at the site boundary equal to the Limiting WQL. The mass of contaminants in soil are assumed to be present in the annual

mass of eroded soil. The resulting annual mass of eroded contaminant is then assumed to be dissolved in the average rainfall incident on the site to calculate the concentration of the average annual discharge. The Limiting WQLs were identified in consultation with the Central Valley Water Board.

Cleanup levels for the FSS are presented in Tables 55 through 58 and are included below.

Industrial Use Cleanup Levels for Non-VOCs in Soil

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Metals (mg/kg)						
Antimony	1.9E+02	Protection of surface water	3.7E+02	Protection of human health[a]	6.0E+02	Protection of groundwater
Arsenic	5.8E+00	Surface soil background	4.9E+00	Combined background	4.9E+00	Combined background
Cadmium	4.1E+00	Surface soil background	9.6E+01	Protection of groundwater	9.6E+01	Protection of groundwater
Chromium, hexavalent	2.1E+02	Protection of groundwater	2.1E+02	Protection of groundwater	2.1E+02	Protection of groundwater
Chromium, total	1.6E+03	Protection of surface water	5.5E+03	Protection of human health[b]	8.1E+04	Protection of groundwater
Cobalt	2.7E+02	Protection of human health[a]	2.7E+02	Protection of human health[a]	4.7E+04	Protection of groundwater
Copper	1.3E+02	Protection of surface water	3.7E+04	Protection of human health[a]	2.5E+05	Protection of groundwater
Iron	2.4E+04	Surface soil background	9.1E+04	Protection of groundwater	9.1E+04	Protection of groundwater
Lead	1.4E+02	Surface soil background	3.2E+02	Protection of human health	4.3E+03	Protection of groundwater
Manganese	1.6E+03	Protection of surface water	2.2E+04	Protection of human health[a]	2.8E+04	Protection of groundwater
Mercury	1.6E+00	Protection of surface water	1.2E+02	Protection of groundwater	1.2E+02	Protection of groundwater
Nickel	7.7E+02	Protection of surface water	5.8E+03	Protection of groundwater	5.8E+03	Protection of groundwater
Silver	2.3E+01	Protection of surface water	3.5E+03	Protection of groundwater	3.5E+03	Protection of groundwater
Thallium	1.4E+01	Protection of groundwater	1.4E+01	Protection of groundwater	1.4E+01	Protection of groundwater
Zinc	1.7E+03	Protection of surface water	1.4E+05	Protection of groundwater	1.4E+05	Protection of groundwater
SVOCs (mg/kg)						
1,2-Dichlorobenzene[c]	7.7E+02	Protection of surface water	3.9E+03	Protection of human health[a]	4.1E+03	Protection of groundwater
1,4-Dichlorobenzene	4.5E+00	Protection of human health[b]	4.5E+00	Protection of human health[b]	5.2E+02	Protection of groundwater
1,4-Dioxane	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater
2,3,7,8-TCDD	4.2E-07	Protection of surface water	1.6E-05	Protection of human health[b]	3.4E-03	Protection of groundwater
2,4-Dimethylphenol	9.6E+03	Protection of human health[a]	9.6E+03	Protection of human health[a]	1.2E+04	Protection of groundwater
2,4-Dinitrotoluene	1.6E+00	Protection of surface water	2.5E+00	Protection of groundwater	2.5E+00	Protection of groundwater
2,6-Dinitrotoluene	1.6E+00	Protection of surface water	2.0E+00	Protection of human health[b]	2.5E+00	Protection of groundwater
4-Methylphenol	2.4E+03	Protection of human health[a]	2.4E+03	Protection of human health[a]	3.1E+03	Protection of groundwater
Aldrin	4.1E-03	Protection of surface water	1.0E-01	Protection of groundwater	1.0E-01	Protection of groundwater

Industrial Use Cleanup Levels for Non-VOCs in Soil

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Benzo(a)anthracene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	1.3E+01	Protection of groundwater
Benzo(a)pyrene	1.4E-01	Protection of human health[b]	1.4E-01	Protection of human health[b]	9.5E-01	Protection of groundwater
Benzo(b)fluoranthene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.9E+00	Protection of groundwater
Benzo(k)fluoranthene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.1E+01	Protection of groundwater
Bis(2-ethylhexyl)phthalate	5.8E+01	Protection of surface water	9.6E+01	Protection of human health[b]	2.5E+02	Protection of groundwater
Chlordane	1.8E-02	Protection of surface water	5.2E+00	Protection of human health[b]	6.5E+00	Protection of groundwater
Chrysene	1.4E-01	Protection of surface water	8.7E+00	Protection of human health[b]	2.1E+02	Protection of groundwater
DDD	2.7E-02	Protection of surface water	7.6E+00	Protection of human health[b]	1.0E+01	Protection of groundwater
DDE	1.9E-02	Protection of surface water	5.4E+00	Protection of human health[b]	7.0E+00	Protection of groundwater
DDT	1.9E-02	Protection of surface water	5.4E+00	Protection of human health[b]	7.0E+00	Protection of groundwater
Dibenzo(a,h)anthracene	1.4E-01	Protection of surface water	2.6E-01	Protection of human health[b]	1.2E+00	Protection of groundwater
Dieldrin	4.5E-03	Protection of surface water	1.1E-01	Protection of human health[b]	1.1E-01	Protection of groundwater
Indeno(1,2,3-cd)pyrene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	4.8E+00	Protection of groundwater
Naphthalene	6.0E-01	Protection of human health[b]	6.0E-01	Protection of human health[b]	6.4E+01	Protection of groundwater
N-nitroso-di-n-propylamine	1.6E-01	Protection of surface water	1.9E-01	Protection of human health[b]	9.5E-01	Protection of groundwater
PCB	5.4E-03	Protection of surface water	5.3E-01	Protection of human health[b]	1.5E+02	Protection of groundwater
TPH (mg/kg)						
TPH-D	3.2E+03	Protection of surface water	3.9E+03	Protection of groundwater	3.9E+03	Protection of groundwater
TPH-G	1.6E+02	Protection of surface water	2.2E+02	Protection of groundwater	2.2E+02	Protection of groundwater

Industrial Use Cleanup Levels for Non-VOCs in Soil

Contaminant of Concern	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
	Cleanup Level	Basis for Cleanup Level	Cleanup Level	Basis for Cleanup Level	Cleanup Level	Basis for Cleanup Level
Radionuclides (pCi/g)[d]						
Cesium 137	1.1E+01	Protection of human health[e]	1.1E+01	Protection of human health[e]	2.0E+04	Protection of groundwater
Plutonium 239	4.8E+02	Protection of surface water	1.4E+03	Protection of human health[e]	1.5E+03	Protection of groundwater
Radium 226	2.0E+00	Protection of human health[e]	2.0E+00	Protection of human health[e]	5.0E+02	Protection of groundwater
Thorium 232	4.8E+02	Protection of surface water	1.5E+03	Protection of groundwater	1.5E+03	Protection of groundwater
Uranium 238DHP	1.8E+02	Protection of human health[e]	1.8E+02	Protection of human health[e]	2.0E+03	Protection of groundwater

[a]Protection of human health cleanup level is based on an HI of 1.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]The cleanup levels for 1,2-dichlorobenzene in soil exceed the estimated soil saturation concentration of 380 mg/kg.

[d]Cleanup levels for radionuclides are inclusive of background.

[e]Protection of human health cleanup level is based on an incremental carcinogenic risk (i.e., risk in excess of background) of 1×10^{-4}.

Notes:

bgs = below ground surface
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
mg/kg = milligram(s) per kilogram
PCB = polychlorinated biphenyl
pCi/g = picocurie(s) per gram
SVOC = semivolatile organic compound
TCDD = tetrachlorodibenzodioxin
TPH-D = total petroleum hydrocarbon as diesel
TPH-G = total petroleum hydrocarbon as gasoline
VOC = volatile organic compound

Industrial Use Cleanup Levels for VOCs in Shallow Soil Gas (0 to 15 feet bgs)

Contaminant of Concern	Cleanup Level (ppbv)[a]
1,1-Dichloroethane[b]	6.2E+02
1,1-Dichloroethene[c]	7.3E+04
1,2,4-Trimethylbenzene[c]	2.1E+03
1,2-Dichlorobenzene[c]	4.8E+04
1,2-Dichloroethane[b]	3.9E+01
1,3,5-Trimethylbenzene[c]	1.8E+03
1,3-Dichlorobenzene[c]	2.5E+04
1,4-Dichlorobenzene[b]	5.8E+01
Benzene[b]	1.6E+02
Carbon tetrachloride[b]	4.4E+01
Chlorobenzene[c]	1.6E+04
Chloroethane[b]	1.9E+03
Chloroform[b]	3.6E+01
cis-1,2-Dichloroethene[c]	1.3E+04
Cyclohexane[c]	2.5E+06
Ethylbenzene[b]	3.7E+02
Heptane[c]	2.5E+05
Hexane[c]	2.9E+05
Methylene chloride (dichloromethane)[b]	2.5E+03
Naphthalene[b]	2.3E+01
PCE[b]	9.8E+01
TCE[b,d]	3.8E+02
Vinyl chloride[b,e]	1.8E+02
Xylene, m-[c]	3.2E+04
Xylene, o-[c]	3.2E+04
Xylene, p-[c]	3.2E+04

[a]Cleanup levels for VOCs in soil gas are based on protection of human health (including the indoor air pathway) and are applicable from 0 to 15 feet bgs.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Protection of human health cleanup level is based on an HI of 1.

[d]The cleanup level for TCE represents a slightly higher carcinogenic risk (i.e., 3×10^{-6}) due to a recent revision to the EPA IRIS value for TCE.

[e]The vinyl chloride cleanup value (180 ppbv) is not considered protective by the State of California. Vinyl chloride contamination falling between 20 and 180 ppbv may not be suitable for industrial reuse without additional institutional controls.

Unrestricted Use Cleanup Levels for Non-VOCs in Soil

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Metals (mg/kg)						
Antimony	1.4E+01	Protection of human health[a]	1.4E+01	Protection of human health[a]	6.0E+02	Protection of groundwater
Arsenic	5.8E+00	Surface soil background	4.9E+00	Combined background	4.9E+00	Combined background
Cadmium	4.1E+00	Surface soil background	6.2E+00	Protection of human health[a]	9.6E+01	Protection of groundwater
Chromium, total	1.6E+03	Protection of surface water	2.6E+03	Protection of human health[b]	8.1E+04	Protection of groundwater
Cobalt	1.6E+01	Surface soil background	1.7E+01	Combined background	4.7E+04	Protection of groundwater
Copper	1.3E+02	Protection of surface water	1.4E+03	Protection of human health[a]	2.5E+05	Protection of groundwater
Iron	2.4E+04	Surface soil background	4.0E+04	Combined background	9.1E+04	Protection of groundwater
Lead	1.4E+02	Surface soil background	8.0E+01	Protection of human health	4.3E+03	Protection of groundwater
Manganese	8.3E+02	Protection of human health	1.6E+03	Combined background	2.8E+04	Protection of groundwater
Mercury	1.6E+00	Protection of surface water	3.5E+00	Protection of human health[a]	1.2E+02	Protection of groundwater
Silver	2.3E+01	Protection of surface water	1.7E+02	Protection of human health[a]	3.5E+03	Protection of groundwater
Thallium	2.3E+00	Protection of human health	2.3E+00	Protection of human health[a]	1.4E+01	Protection of groundwater
Zinc	1.7E+03	Protection of surface water	3.1E+03	Protection of human health[a]	1.4E+05	Protection of groundwater
SVOCs (mg/kg)						
1,2-Dichlorobenzene	1.9E+02	Protection of human health[a]	1.9E+02	Protection of human health[a]	4.1E+03	Protection of groundwater
1,4-Dichlorobenzene	1.5E-02	Protection of human health[b]	1.5E-02	Protection of human health[b]	5.2E+02	Protection of groundwater
1,4-Dioxane	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater
2,3,7,8-TCDD	4.2E-07	Protection of surface water	1.3E-06	Protection of human health[b]	3.4E-03	Protection of groundwater
2,4-Dimethylphenol	1.3E+01	Protection of human health[a]	1.3E+01	Protection of human health[a]	1.2E+04	Protection of groundwater
2,4-Dinitrotoluene	6.3E-03	Protection of human health[b]	6.3E-03	Protection of human health[b]	2.5E+00	Protection of groundwater
2,6-Dinitrotoluene	2.4E-03	Protection of human health[b]	2.4E-03	Protection of human health[b]	2.5E+00	Protection of groundwater
4-Methylphenol	1.9E+00	Protection of human health[a]	1.9E+00	Protection of human health[a]	3.1E+03	Protection of groundwater
Benzo(a)anthracene	8.8E-02	Protection of human health[b]	8.8E-02	Protection of human health[b]	1.3E+01	Protection of groundwater
Benzo(a)pyrene	1.8E-02	Protection of human health[b]	1.8E-02	Protection of human health[b]	9.5E-01	Protection of groundwater
Benzo(b)fluoranthene	1.1E-01	Protection of human health[b]	1.1E-01	Protection of human health[b]	2.9E+00	Protection of groundwater
Benzo(k)fluoranthene	1.1E-01	Protection of human health[b]	1.1E-01	Protection of human health[b]	2.1E+01	Protection of groundwater
Bis(2-ethylhexyl)phthalate	1.2E+01	Protection of human health[b]	1.2E+01	Protection of human health[b]	2.5E+02	Protection of groundwater

Unrestricted Use Cleanup Levels for Non-VOCs in Soil

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Chlordane	1.8E-02	Protection of surface water	4.3-01	Protection of human health[b]	6.5E+00	Protection of groundwater
Chrysene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.1E+02	Protection of groundwater
DDD	2.7E-02	Protection of surface water	5.0E-01	Protection of human health[b]	1.0E+01	Protection of groundwater
DDE	1.9E-02	Protection of surface water	4.9E-01	Protection of human health[b]	7.0E+00	Protection of groundwater
DDT	1.9E-02	Protection of surface water	4.7E-01	Protection of human health[b]	7.0E+00	Protection of groundwater
Dibenzo(a,h)anthracene	3.8E-02	Protection of human health	3.8E-02	Protection of human health[b]	1.2E+00	Protection of groundwater
Dieldrin	4.5E-03	Protection of surface water	5.8E-03	Protection of human health[b]	1.1E-01	Protection of groundwater
Indeno(1,2,3-cd)pyrene	1.2E-01	Protection of human health[b]	1.2E-01	Protection of human health[b]	4.8E+00	Protection of groundwater
Naphthalene	4.7E-02	Protection of human health[b]	4.7E-02	Protection of human health[b]	6.4E+01	Protection of groundwater
N-nitroso-di-n-propylamine	1.2E-04	Protection of human health[b]	1.2E-04	Protection of human health[b]	9.5E-01	Protection of groundwater
PCB	5.4E-03	Protection of surface water	6.3E-02	Protection of human health[b]	1.5E+02	Protection of groundwater
Radionuclides (pCi/g)[c]						
Cesium 137	6.0E+00	Protection of human health[d]	6.0E+00	Protection of human health[d]	2.0E+04	Protection of groundwater
Plutonium 239	2.6E+02	Protection of human health[d]	2.6E+02	Protection of human health[d]	1.5E+03	Protection of groundwater
Radium 226	2.0E+00	Protection of human health[d]	2.0E+00	Protection of human health[d]	2.0E+00	Protection of human health
Thorium 232	3.1E+02	Protection of human health[d]	3.1E+02	Protection of human health[d]	1.5E+03	Protection of groundwater
Uranium 238DHP	7.7E+01	Protection of human health[d]	7.7E+01	Protection of human health[d]	2.0E+03	Protection of groundwater

[a]Protection of human health cleanup level is based on an HI of 1.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Cleanup levels for radionuclides are inclusive of background.

[d]Protection of human health cleanup level is based on an incremental carcinogenic risk (i.e., risk in excess of background) of 1×10^{-4}.

Unrestricted Use Cleanup Levels for VOCs in Shallow Soil Gas (0 to 15 feet bgs)

Contaminant of Concern	Cleanup Level (ppbv)[a]
1,1-Dichloroethane	3.7E+01[b]
1,1-Dichloroethene	5.0E+03[c]
1,2,4-Trimethylbenzene	1.4E+02[c]
1,2-Dichlorobenzene	3.3E+03[c]
1,2-Dichloroethane	2.3E+00[b]
1,3,5-Trimethylbenzene	1.2E+02[c]
1,3-Dichlorobenzene	1.7E+03[c]
1,4-Dichlorobenzene	3.5E+00[b]
Benzene	9.8E+00[b]
Carbon tetrachloride	2.6E+00[b]
Chlorobenzene	1.1E+03[c]
Chloroethane	1.1E+02[b]
Chloroform	2.1E+00[b]
cis-1,2-Dichloroethene	8.8E+02[c]
Cyclohexane	1.7E+05[c]
Ethylbenzene	2.2E+01[b]
Heptane	1.7E+04[c]
Hexane	2.0E+04[c]
Methylene chloride (dichloromethane)	1.5E+02[b]
Naphthalene	1.4E+00[b]
PCE	5.8E+00[b]
TCE[d]	2.3E+01[b]
Vinyl chloride	1.1E+01[b]
Xylene, m-	2.2E+03[c]
Xylene, o-	2.2E+03[c]
Xylene, p-	2.2E+03[c]

[a]Cleanup levels for VOCs in soil gas are based on protection of human health (including the indoor air pathway) and are applicable from 0 to 15 feet bgs.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Protection of human health cleanup level is based on an HI of 1.

[d]The cleanup level for TCE represents a slightly higher carcinogenic risk (i.e., 3×10^{-6}) due to a recent revision to the EPA IRIS value for TCE.

2.9 Description of Alternatives

Representative process options were screened and assembled into nine remedial alternatives that address a broad range of site conditions and contaminant types. Two of the alternatives (Alternatives 2 and 4) were screened out prior to the detailed analysis of alternatives in the FFS FS. Alternative 2 (ICs [Restricted Land Use]) was screened out because it was not effective at attaining RAOs. Alternative 4 (Excavation/Ex Situ Treatment/Backfill [Restricted Land Use]) was also screened out because it was not effective at attaining RAOs and may not be compliant with ARARs. The seven remaining alternatives are as follows:

- Alternative 1: No Action
- Alternative 3: Composite Cap (Restricted Land Use)
- Alternative 5: Excavation/Consolidation Unit (Restricted Land Use)
- Alternative 6R: Excavation/Ex Situ Treatment/Consolidation Unit (Restricted Land Use)
- Alternative 6U: Excavation/Ex Situ Treatment/Consolidation Unit (Unrestricted Land Use)
- Alternative 7R: Excavation/Disposal (Restricted Land Use)
- Alternative 7U: Excavation/Disposal (Unrestricted Land Use)

A description of each of the seven alternatives is provided in Table 59.

2.9.1 Common Elements and Distinguishing Features of Each Alternative

These alternatives include common elements, as well as distinguishing features unique to each option. As previously noted, Alternatives 2 and 4 were not evaluated in the detailed analysis. Therefore, the following discussion summarizes the common elements and distinguishing features of Alternatives 1, 3, 5, 6R, 6U, 7R, and 7U.

2.9.1.1 Common Elements

Common elements for the alternatives are as follows:

- All of the alternatives, except for Alternatives 1 and 7U, include sampling in the subsequent Remedial Design phase to refine the capping and excavation plans, ICs, and monitoring (e.g., groundwater and soil gas) and reporting of results.
- All of the alternatives, except for Alternative 1, are compatible with intended site reuse.
- All of the alternatives, except for Alternative 1 and closure of the CU in Alternatives 6R and 6U, are expected to be completed and facilitate reuse within 2 to 3 years.
- Alternatives 3, 5, 6R, and 7R all result in restricted (i.e., industrial) land use.

2.9.1.2 Distinguishing Features

The distinguishing features of Alternative 1 are that no remedial action would take place under this alternative and that there is no cost associated with this alternative.

The distinguishing feature of Alternatives 3 (Composite Cap) is the composite cap that would be constructed to contain and minimize the mobility of the waste at a site.
The long-term reliability of the remedy under Alternative 3 is considered to be high because of the robust design of the cap. Routine inspection and maintenance of the cap as a component of this alternative would ensure continued performance, compliance with ICs and deed restrictions, and early detection of any problems that could lead to remedy failure.

Site-specific venting, extraction, and monitoring wells (and associated sampling and reporting) are also distinguishing features of the capping remedy. These will support the overall protectiveness of the remedy. It is expected that the remedy could be completed within 2 to 3 years.

A CU is a distinguishing feature of both Alternatives 5 and 6. Under these alternatives, the CU would be constructed at the CS 010 site and soil from CS 010, CS 022, CS 024, SAFR, and potentially the VZ site would be placed into the CU. Under Alternatives 6R and 6U, soil with contaminant concentrations exceeding acceptance criteria (see Section 2.12 and Tables 61 and 62) would be treated to reduce the volume, toxicity, and/or mobility of the contaminants before placement in the CU. The long-term reliability of the remedy under Alternatives 5 and 6R/6U is considered to be high because of the robust design of the CU (constructed to RCRA Subtitle C requirements), and Alternatives 6R and 6U gain additional reliability from the treatment of soil prior to placement in the CU. Routine inspection and maintenance of the CU as a component of this alternative would ensure the continued performance of the cap. IC compliance inspections at restricted sites are a distinguishing component of Alternatives 5 and 6R. These will identify any site-specific breaches of ICs or deed restrictions, and early detection of any problems that could lead to remedy failure at the CU. Site-specific venting, extraction, and monitoring wells (and associated sampling and reporting) are also distinguishing features of the CU remedy. These will support the overall protectiveness of the remedy. It is estimated that the consolidation of all the applicable soils under the CU remedy could be completed within 5 to 10 years. A further distinguishing feature of Alternative 6U is that this alternative will result in unrestricted land use.

The distinguishing feature of Alternatives 7U and 7R is excavation and offbase disposal of all excavated wastes. The long-term reliability of these alternatives is high because the waste is removed from the site and placed into an offbase landfill. It is expected that the remedy under Alternatives 7R and 7U could be completed within 2 to 3 years. A further distinguishing feature of Alternative 7U is that this alternative will result in unrestricted land use.

2.10 Summary of Comparative Analysis of Alternatives

In accordance with the NCP (Section 300.430 (f)(5)(i)), the remedial alternatives were evaluated against the following nine criteria:

Criterion 1: Overall Protection of Human Health and the Environment—This criterion addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

Criterion 2: Compliance with ARARs—Section 121(d) of CERCLA and NCP 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites attain ARARs, unless such ARARs are waived under CERCLA Section 121(d)4.

Criterion 3: Long-term Effectiveness and Permanence—Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been

met. This criterion includes the consideration of residual risk that will remain onsite following remediation and the adequacy and reliability of controls.

Criterion 4: Reduction of Toxicity, Mobility, or Volume through Treatment—Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

Criterion 5: Short-term Effectiveness—Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until cleanup levels are achieved.

Criterion 6: Implementability—Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other government entities are also considered.

Criterion 7: Cost—The cost of an alternative addresses all engineering, construction, and operation and maintenance costs incurred over the life of the project. The assessment against this criterion is based on the estimated present worth of these costs for each alternative. Present worth is used to estimate expenditures that occur over different lengths of time.

Criterion 8: State Acceptance—This assessment evaluates the technical and administrative issues, concerns, and preferences the State may have regarding each of the alternatives. Resource agencies have reviewed the site documents and have agreed with the selected remedies.

Criterion 9: Community Acceptance—This assessment evaluates the issues, concerns, and preferences the public may have regarding each of the alternatives.

The nine criteria are categorized as threshold criteria, primary balancing criteria, or modifying criteria. Threshold criteria are requirements that each alternative must meet to be eligible for selection as the preferred alternative. The threshold criteria are 1 and 2—overall protection of human health and the environment and compliance with ARARs. Primary balancing criteria are used to weigh effectiveness and cost tradeoffs among alternatives. They are the main technical criteria upon which the alternative evaluation is based. The balancing criteria are 3 through 7—long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. Modifying criteria may be used to modify aspects of the preferred alternative when preparing this ROD. The modifying criteria are 8 and 9—State acceptance and community acceptance.

The comparative analysis of alternatives based on the CERCLA criteria is summarized in Table 60. Site-specific details were considered when comparing the performance of each alternative. However, not all of the alternatives are evaluated for each site because not all alternatives are appropriate at every site. For example, Alternative 3 is not applicable at the SAFR and CS 010. As discussed in Section 2.9 of this ROD, Alternatives 2 and 4 were not retained for detailed analysis and are not included in the comparative analysis or the discussion below.

All of the alternatives except Alternative 1, the No Action alternative, provide adequate protection of human health and the environment. (With the exception of Alternative 1, all alternatives would comply with identified action-, location-, and chemical-specific ARARs [Appendix C].)

Under Alternative 3, the RAO for the protection of groundwater and surface water will be achieved with implementation of the composite cap. Under Alternatives 5 and 6R/6U, the RAO will be achieved by the composite cap and liner, and each will include a layer of low permeability compacted clay and a geomembrane liner. The CU will also include a leachate collection and removal system, effectively isolating the waste from the surrounding environment. (No hydrologic pathway will exist whereby any agricultural or drinking water source could be contaminated with radioactive waste to such an extent as to harm public health or the environment [i.e., exceeding MCLs].)

Alternatives 3, 5, 6R/6U, and 7R/7U provide some measure of long-term effectiveness and permanence, although Alternatives 3, 5, 6R/6U, and 7R are dependent on proper and sustained implementation of ICs and/or maintenance of the cap and/or CU.
For Alternatives 6U and 7U, excavation of the unrestricted target volume provides the greatest relative long-term effectiveness for protection of human health and the environment.

Alternatives 3, 5, and 7R/7U do not by themselves include treatment; therefore, these alternatives do not result in the reduction of volume, toxicity, or mobility of contaminants through treatment. When SVE is performed in concert with these alternatives (under the VOC ROD), SVE operations do reduce contaminant mobility and volume through treatment, and the treatment process is irreversible. Alternative 6R/6U is better because the excavated soil is treated prior to placement in the CU.

Under Alternative 3, the RAO for the protection of human health would be achieved with implementation of the composite cap and land use controls. Construction of the CU and excavation of the sites could be completed within a relatively short timeframe; therefore, Alternatives 5, 6R, and 6U would provide short-term effectiveness. However, Alternatives 5, 6R/6U, and 7R/7U are rated lower in terms of short-term effectiveness because of the risk of exposure associated with excavation and transport of the material.

Some uncertainties exist with the implementation of Alternatives 3, 5, 6R/6U, and 7R/7U. For Alternative 3, construction of a composite cap is common practice, and technical services and equipment for capping are readily available. Vapor barriers are also readily implementable. The greatest uncertainty associated with Alternative 3 is the type of waste remaining in each disposal pit. For Alternative 6, uncertainties are associated with the effectiveness of the treatment given the heterogeneous nature of the waste. For Alternatives 3, 5, 6R, and 7R, coordination will be required prior to and during property transfer between the Air Force, the State, and the property recipient to address land use controls. For Alternatives 7R and 7U, excavation is readily implementable, technically feasible, and reliable; however, some waste may not be disposable at an offbase landfill because of the presence of certain combinations of specific contaminants.

For all sites except CS 010 and the SAFR, Alternative 3 has the lowest associated cost. Implementation of Alternative 5 would result in the lowest cost for CS 010 and the SAFR.

With the exception of CS 024 and the SAFR, Alternative 7R represents the highest cost for all sites. The costs for Alternative 7R are higher than those for Alternative 7U because the costs for ICs and groundwater monitoring are incurred in perpetuity under Alternative 7R, while the volume of soil to be excavated under each alternative is similar. For CS 024 and the SAFR, the costs associated with Alternatives 6U and 7U are higher because of the increase in target volume necessary to achieve unrestricted use.

2.11 Principal Threat Wastes

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable. The principal threat concept applies to source materials that are highly mobile or highly toxic and cannot be reliably controlled in place or that would present a significant risk to human health or the environment should exposure occur. A source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air or that act as a source for direct exposure.

Radium 226 is present in soil at CS 010 and CS 022 at concentrations that are highly toxic. Radium 226 is also present, or is possibly present, in soil at the other FSS disposal pit sites. Radium has a low aqueous solubility and strong absorptive affinity for organic matter and soil particles. It generally occurs as a solid precipitate in the vadose zone. Radium 226 does not readily partition into the aqueous phase. Due to these physiochemical properties, radium 226 is not readily mobile in the environment. Even in the presence of free phase solvents, there would be little likelihood that radium 226 would migrate through the soil because of its low solubility and high affinity for organic matter in the soil column. Furthermore, no free-phase solvents have been identified at the FSS., Although radium 226 is not highly mobile, it is considered highly toxic; therefore, it is identified as a principal threat waste for the FSS. The toxicity of radium 226 is primarily related to emitted ionizing radiation. No known treatment technology is available that would chemically or physically reduce the toxicity of radium 226. The use of stabilization could potentially be used as a technique to further reduce radium's already low mobility. Further mobility retardation provided by stabilization would be inconsequential; therefore, treatment is not needed for the radioactive material.

Lead is present in soil at CS 010 and the SAFR at concentrations that are highly toxic. Lead is also present, or is possibly present, in soil at the other FSS disposal pit sites. Lead is considered highly toxic[1]; therefore, it is identified as a principal threat waste for the FSS. No treatment technology is readily available that would chemically or physically reduce the toxicity of lead. However, lead can be leached from soil under low pH conditions. Treatment technologies such as soil stabilization reduce the leachability (i.e., mobility) and bioavailability of lead. For CS 010 and the SAFR, soil containing lead at levels that meet the definition of principal hazardous constituents will be treated using a stabilization process prior to the soil being placed into the CU.

[1] Because of its affinity to bind with hemoglobin in blood, the risk associated with exposure to lead is typically assessed by evaluating blood lead levels (as opposed to the calculation and assessment of carcinogenic and non-carcinogenic risk numbers).

VOC contaminants currently present at the FSS are highly mobile and moderately toxic. Treatment (e.g., using SVE) of these contaminants is practicable. SVE systems have been in place and operating at the VZ site since 1993 (the OU D system), at CS 022 since 1995 (the OU C1 system), and at CS 010 through CS 014 and the FTA since 1997 (the Investigation Cluster 19 system). An SVE system (the Investigation Cluster 42 system) also operated at CS 024 from 2000 to 2006, and another SVE system (the Investigation Cluster 21 system) operated at PRL 008 from 2006 to 2008. These SVE systems have achieved 80 to 99 percent reductions in VOC concentrations in extracted soil gas. Furthermore, these SVE systems have removed over 1.2 million pounds of VOCs, including more than 100,000 of toxic organic compounds (based on EPA Method TO 15). Therefore, VOCs are no longer considered a principal threat waste because both the mass and concentrations of VOCs have been significantly reduced, and residual VOC concentrations are reliably contained by existing SVE treatment systems and are no longer at highly toxic concentrations.

SVOCs are neither a principal threat waste nor a principal hazardous constituent based on existing data for CS 010, CS 022, CS 024, and the SAFR. If SVOCs are encountered at levels requiring treatment prior to consolidation, those soils will either be stabilized prior to consolidation or disposed of offsite.

2.12 Selected Remedies

The selected remedy for addressing contamination at CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site is Alternative 3 (Composite Cap with Restricted Land Use). At the VZ site, the existing composite cap would remain, but a small area located outside the existing cap may require excavation. This small additional area would be excavated under Alternative 6R. To refine the required extent of the cap at some of the sites and the possible excavation at the VZ site, sampling will be conducted during the Remedial Design phase. The actual extent of each cap will be documented in the Remedial Design document. For all the sites (CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site), ICs are a component of Alternative 3 and are applicable under this alternative. At CS 011, CS 012, CS 013, CS 014, CS 022, AOC 313, PRL 008, and the VZ site, the SVE systems would continue to operate under the VOC ROD (AFRPA, 2007). The Air Force retains responsibility for the O&M of all the selected remedies, including but not limited to the consolidation unit, caps, wells, and ICs.

Alternative 6R (Excavation/Treatment/Consolidation Unit with Restricted Land Use) is the selected remedy for CS 010 and CS 024. Alternative 6U (Excavation/Treatment/Consolidation Unit with Unrestricted Land Use) is the selected remedy for the SAFR. The alternative selected (Alternative 6R/6U) includes treatment, as required by ARARs, of some of the excavated soil prior to placement in the CU. Where RCRA waste that would otherwise be subject to Land Disposal Restrictions (LDRs) is managed in a unit as part of a corrective or remedial action, the California Corrective Action Management Unit (CAMU) regulations allow the material to be placed in the unit without treatment unless the material has been designated as a Principal Hazardous Constituent (PHC). If the material has been identified as a PHC, treatment is generally required to achieve either a 90 percent reduction in the concentration of the toxic constituents or a level equal to 10 times the Universal Treatment Standard. There are additional adjustment factors that may be considered to

allow the placement of material in the CU even if the designated treatment standards are not met. The regulation provides for the determination to be made by DTSC, but under CERCLA, the selection of the remedy is made by the Air Force and EPA. This ROD must demonstrate that the remedy will comply with the substantive requirements of the California CAMU regulation.

Based on available information, Table 61 identifies the contaminant concentrations that would trigger designation as PHCs, the associated treatment requirements, and the applicable adjustment factors. In the event that additional COCs are discovered, they will be compared with the contaminant concentrations in Table 62. The excavated material will be characterized to determine if the PHC levels identified in Table 61 are present. If the specified concentrations are exceeded, the material will be treated prior to placement in the CU. If treatment standards cannot be achieved, the Air Force and the regulators will determine either that an adjustment criterion described in the table is appropriate or that the material will be disposed of at an appropriate offsite facility. If any other contaminants are encountered at concentrations that could represent PHCs, the Air Force and the regulators will establish acceptance criteria and treat such material in a similar manner.

For radium 226, no known treatment technology is available that would chemically or physically reduce its toxicity. The use of stabilization could potentially be used as a technique to further reduce radium's already low mobility. Further mobility retardation provided by stabilization would be inconsequential and therefore treatment is not needed for the radioactive material.

CERCLA and the NCP include an explicit bias against offsite land disposal without treatment (42 USC § 9621(d)(3) and 40 CFR Section 300.430). However, some waste excavated from the FSS might be incompatible with the CU, for instance drums, containers, and saturated wastes / sludges. Such waste will be sent for offsite disposal, and will be subject to the treatment requirements of the receiving facility. For CERCLA hazardous substances that are to be disposed of offsite and/or off the facility, state hazardous waste requirements must directly be complied with as applicable by the Air Force, independent of the CERCLA process. This includes, but is not limited to state LDRs. To the extent these laws impose requirements at the facility in preparation for off-facility disposal, the Air Force must directly comply with these requirements wherever on the facility they are triggered. The Air Force must also comply with the offsite rule as detailed in 42 USC § 9621(b)(1) and 40 CFR Section 300.440.

An additional volume of soil requires excavation at CS 010 before the CU could be constructed at this location. Excavated material from CS 010 (excavated previously and stockpiled onsite, and soil excavated during the remedial action), CS 024, and from the SAFR would be segregated and treated (when the CU acceptance criteria described in Section 2.12 and in Tables 61 and 62 are exceeded) and then would be deposited in the CU. The CU will be constructed per CCR Title 22 Section 66264.552 to meet RCRA Subtitle C standards in 40 CFR 264.301 (c) that specify a dual-composite liner, leachate collection and monitoring, and a composite cap. ICs are a component of this remedy.

The selected remedy for CS 022 is Alternative 3 Modified (Composite Cap with Restricted Land Use). For CS 022, Alternative 3 has been modified to include excavation, treatment, and consolidation of some soil from the site prior to placement of the cap. The excavated material under this modification will be managed in the same manner as the materials being

excavated under Alternative 6R/6U. Excavation of the impacted surface soil at CS 022 will be performed to better facilitate reuse of the property. This will consist of the removal of up to 7 feet of soil from within the burial pit and incineration area and installation of a composite cap over the remaining buried lens of CS 022 debris. This cap construction will begin approximately 7 feet bgs with the required drainage slopes achieved below grade and approximately 3 feet of clean soil making up the final cover, with minimal surface mounding, thereby facilitating site reuse options.

In addition to the excavated soil described above, the material to be placed in the CU will include the estimated 12,700 cy of crusher product (because of sporadic detections of low-level radium) and an estimated 1,000 cy of radium-contaminated surface soils to be excavated from other parts of the 17-acre parcel.

Upon completion of this remedy, the area will be resurveyed and an FSSR will be provided. The SVE system installed adjacent to CS 022 will continue to operate under the VOC ROD (AFRPA, 2007). Well locations may be optimized once the cap is constructed to address VOCs within and below the pit. Appropriate ICs will be assigned to the capped area and long-term monitoring and any required maintenance will be a retained responsibility of the Air Force.

Each of the selected remedies is described in detail in Sections 2.12.1 through 2.12.3. Because ICs are a component of all remedies and are applicable to all sites, they are discussed in detail in Section 2.12.4 following the remedy descriptions.

2.12.1 Alternative 3 – Composite Cap (Restricted Land Use)

Under Alternative 3, CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site will be covered with an engineered composite cap to eliminate human and ecological receptor exposure pathways, reduce infiltration of precipitation, minimize potential for contaminants to leach to groundwater, and prevent offsite migration of contaminants (see Figures 3, 14, and 19). The composite caps will be designed to cover all soil containing contaminants with concentrations at or above cleanup levels for protection of human health (in an industrial setting), surface water, or groundwater, whichever is lowest (see Table 55). During construction of the combined CS 011 through CS 014 and AOC 313 cap, the approximately 780 feet of piping associated with former UST 1088 will also be located, removed, and disposed of offbase or cleaned and abandoned in place, as appropriate.

A typical composite cap is composed (from bottom to top) of a foundation layer, a low-permeability clay layer, a liner (an impermeable membrane usually made from plastic or other synthetic materials), a drainage layer, and a layer of topsoil and vegetation. The foundation layer would be configured to provide adequate slope for drainage. The foundation layer would be constructed of clean soil or minimally contaminated soil (see Table 63 for foundation layer acceptance criteria) that meets geotechnical requirements (e.g., compaction). The drainage layer collects and diverts precipitation or irrigation water, while the liner and low-permeability clay layers act to minimize further downward infiltration of precipitation. The composite cap design will also include biotic barriers documented to prevent animals and plant roots from damaging underlying layers of the cap and erosion control measures. During construction of the cap and once the cap is in place, stormwater runoff will be controlled using best management practices to ensure that

discharges of stormwater do not negatively impact surrounding surface water. The composite cap complies with applicable or relevant and appropriate sections of CCR Titles 22 and 27, as well as other ARARs, which are identified in Appendix C.

This remedy also includes sampling, which will be done in the Remedial Design phase to support development of the capping and excavation plans. In areas where the horizontal and/or vertical extent of the target volume is uncertain, some sampling will be required to ensure that all soil containing contaminants at concentrations above industrial use cleanup levels is contained underneath the cap or removed through excavation in the case of the VZ site. This sampling may include surface soil sampling and the drilling and sampling of soil borings. The actual extent of each cap will be documented in the Remedial Design document.

Potential VOC impacts to groundwater at CS 011, CS 012, CS 013, CS 014, CS 022, CS 024, AOC 313, PRL 008, and the VZ site will continue to be addressed by the existing SVE systems, which were selected in the VOC ROD (AFRPA, 2007). In addition, potential migration of residual VOCs in the disposal pits will also be addressed by capping (which will minimize infiltration of water through the waste) and long-term monitoring.

For this remedy, mitigation of the vapor intrusion pathway (e.g., vapor barriers) would be required for future buildings constructed within approximately 300 feet of the cap to limit migration of VOCs and methane gas into indoor air (see Figures 5, 16, and 21). ICs in the form of a grantee covenant in the deed will require mitigation for potential vapor intrusion or sampling and analysis to demonstrate acceptable risk for future construction.

Construction of a cap will also require implementation of ICs (see Section 2.12.4) and restricted land use to prevent uncontrolled excavation or other activities that could damage the cap and create exposure pathways to human and ecological receptors and to restrict the type of buildings that could be constructed on top of the caps (it is possible that certain types of buildings may not be suitable for construction on top of the cap).

Long-term monitoring per CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) will be required to verify continued effectiveness of the caps at containing the contamination (the regulations specify a minimum of 30 years of monitoring). Monitoring of the caps will be performed quarterly to start; however, monitoring frequency will likely be decreased over time as appropriate (all reductions in monitoring will be coordinated with the regulatory agencies prior to implementation). The capped disposal pits will be closed in compliance with the provisions of CCR Titles 22 or 27 (see the specific ARARs provided in Appendix C). Because contamination will be left in place, groundwater monitoring at the site would continue in perpetuity to ensure no long-term unacceptable impacts to groundwater. Monitoring for landfill gas will also be required and would initially be performed quarterly but may be eliminated if it can be established that landfill gas generation and accumulation is not significant. The number, location, and construction of groundwater and landfill gas monitoring wells would be established during the Remedial Design phase and would be documented in a post-closure maintenance and monitoring plan that will be developed in accordance with CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) and with regulatory agency approval.

2.12.2 Alternative 6R/6U – Excavation/Treatment/Consolidation Unit (Restricted/ Unrestricted Land Use)

Alternative 6R consists of site excavation to restricted cleanup levels at CS 010 and CS 024 and subsequent consolidation of soil and waste into the CU at CS 010 (see Figures 3 and 11). Alternative 6U consists of site excavation to unrestricted cleanup levels at the SAFR and subsequent consolidation of soil and waste into the CU (see Figure 17). Alternatives 6R and 6U include the treatment, as required by ARARs, of some of the excavated soil prior to placement in the CU.

Excavation at CS 024 will consist of the removal of all waste and debris within the former disposal pit, which may extend to a depth of about 30 feet bgs. Excavation will also include any surrounding soil from 0 to 1 foot bgs that contains concentrations of non-VOCs (excluding radionuclides) at or above cleanup levels for protection of human health (in an industrial setting), surface water, or groundwater (whichever is lowest); any surrounding soil from 1 to 15 feet bgs that contains concentrations at or above cleanup levels for protection of human health (in an industrial setting) or groundwater (whichever is lowest); and any surrounding soil from 15 feet bgs to the bottom of the excavation that contains concentrations at or above cleanup levels for protection of groundwater (Table 55). For radionuclides, excavation will include any surrounding soil that contains concentrations at or above unrestricted cleanup levels (Table 57). Excavation at the SAFR will consist of the removal of all soil in and around the backstop (berm) and existing stockpiled soil that contains non-VOC contaminant concentrations above unrestricted cleanup levels. At CS 010, excavation will consist of the removal of residual non-VOCs (excluding radionuclides) above cleanup levels for the protection of groundwater from the floor of the pit (excavation will occur after the stockpiled soil is removed). For radionuclides, excavation will include any soil at the floor of the pit that contains concentrations at or above unrestricted release cleanup levels. Field screening and/or onsite laboratory analysis might be used to guide excavation.

Following excavation of CS 024, the SAFR, and CS 010, confirmation sampling will be conducted to verify that the cleanup levels have been met. The details of this confirmation sampling, including sampling locations, sampling frequency, specific analytical methods, and acceptable confirmation sampling results, will be provided in the work plans associated with the Remedial Design phase of the project. If the analytical results indicate that contamination has been adequately removed, excavation will be terminated. Otherwise, excavation will continue until the cleanup levels are satisfied. At CS 024, the excavation void will be backfilled with clean soil from the McClellan Clean Soils Holding Area, which sits atop PRL 008. Any areas requiring backfill at the SAFR will also be filled with this clean soil. Verification sampling of the backfill, including sampling frequency, analytical methods, and acceptable results, will be provided in the work plan associated with the Remedial Design phase of this project. The excavation at CS 010 will be used for construction of the CU. During excavation, as well as during construction and subsequent operation of the CU, stormwater runoff will be controlled using best management practices (e.g., staked straw waddles, silt fence curtains) to ensure that discharges of stormwater do not negatively impact surrounding surface water.

Excavated material will be segregated to remove drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), and other incompatible materials for offbase disposal at an appropriate facility. The details of the characterization sampling that

will be performed on this material and the proposed disposal or recycle facility options will be provided in the work plan associated with the Remedial Design phase of this project. Segregation and any preparation required for transportation offbase (e.g., overpacking of drums) will be performed in a dedicated area at each site during excavation. The segregation and preparation area will be engineered to ensure that all contaminated material is contained. The remaining material (presumably mostly soil) would be stockpiled.

CCR Title 22 Sections 66264.550, 66264.552, and 66264.552.5 provide the requirements for CAMUs (i.e., CUs). CCR Title 22, Section 66264.552 requires treatment of wastes containing principal hazardous constituents prior to placement within a CU. The stockpiled soil would be tested to determine whether principal hazardous constituents were present and their concentrations. The frequency of sampling and the specific analytical methods will be provided in the work plan associated with the Remedial Design phase of this project. Soil and waste material with concentrations of principal hazardous constituents greater than the acceptance criteria (see Table 61) for the CU would be treated per the regulations and then would be placed in the CU or shipped offbase for disposal at an appropriate facility. Soil and waste material not requiring any treatment and any treated soil would then be placed into the CU.

Radium 226 has been identified as the principal threat waste for the FSS; therefore, treatment of radium 226 was also considered. As previously indicated (Section 2.11), the toxicity of radium 226 is primarily associated with emitted ionizing radiation, and no known treatment technology is available that would chemically or physically reduce the toxicity of radium 226. The primary way to reduce the risk associated with radium 226 is to break the exposure pathway by containment and shielding.

Waste acceptance criteria have been developed for disposal of radium and cesium contaminated soils at the CU. The waste acceptance criterion is 600 pCi/g for radium 226 and 6 pCi/g for cesium 137. The CU cap will provide a physical barrier between contaminated soil and the surface, shielding potential receptors from ionizing radiation, preventing direct contact with the contaminated soil, controlling migration of radon gas to the surface, and preventing migration of contamination in runoff. The low mobility of radium 226 and cesium 137 in soil combined with the CU liner will effectively eliminate migration of these radionuclides to groundwater. A long-term operations and maintenance (O&M) program will ensure the integrity of the cap, and a long-term monitoring program will verify the effectiveness of the physical controls in preventing radium migration. ICs will be in place to preclude residential use and eliminate associated exposure pathways. ICs will also limit any activity which would disturb the cap including the construction of buildings which could result in the accumulation of radon gas. A more detailed discussion of the risks associated with this waste acceptance criterion is provided in the *Risk Assessment for the Focused Strategic Sites Consolidation Unit Radiological Waste Acceptance Criteria* (Noblis, 2012).

SVOCs are neither a principal threat waste nor a principal hazardous constituent based on existing data for CS 010, CS 022, CS 024, and the SAFR. If SVOCs are encountered at levels requiring treatment prior to consolidation, those soils will either be stabilized prior to consolidation or disposed of offsite.

For this alternative, the CU will be constructed to meet RCRA Subtitle C standards in 40 CFR 264.301 (c) that specify a dual-composite liner, leachate collection and monitoring,

and a composite cap. The rigorous design of the CU meets the requirements for engineered long-term protection and will provide the necessary containment and shielding of wastes containing radium 226. CCR Title 22 Section 66264.552 (e)(4)(E) provides for an adjustment or waiver of the treatment requirements based on one or more factors. These factors include the technical impracticability of treatment and the long-term protection offered by the engineering design of the CU and related engineering controls. The remedy jointly selected by the Air Force and EPA satisfies the substantive requirements of the CAMU regulations, including the conditions for disposal of principal hazardous constituents in the proposed CU under CCR Title 22 Section 66264.552 (e)(4)(E).

Contaminated soil and excavated waste materials will be transported from individual excavation sites to the designated CU at CS 010 for permanent consolidation. A CU is a specialized unit created to facilitate the treatment, storage, and disposal of wastes associated with site remediation. The CU would be established and constructed under CERCLA in accordance with CCR Title 22 Sections 66264.550, 66264.552, and 66264.552.5. To ensure protectiveness, the CU will be constructed to meet RCRA Subtitle C standards in 40 CFR 264.301 (c) that specify a dual-composite liner, leachate collection and monitoring systems, and a composite cap. The unit would also be operated in accordance with CCR Titles 22 and/or 27 waste management requirements (see the specific ARARs provided in Appendix C).

The CU will be sized to hold waste from CS 010, CS 022, CS 024, and the SAFR (approximately 100,000 cy) and an additional 160,000 cy of waste from other IRP sites at McClellan (for a total volume of 260,000 cy). Wastes from other IRP sites will not be placed into the CU without a separate Proposed Plan and ROD, or other decision documents, identifying consolidation as the remedy for those sites.

The CU's ability to protect water sources from chemical and radioactive contamination stems from a combination of features. First, the low-permeability clay layers of the cap and liner will greatly inhibit the infiltration of rainwater into the CU and exfiltration of any liquids from the CU into deeper layers of soil. In addition, the drainage layer above the clay layer of the cap will limit the quantity of rainwater that comes into contact with the clay layer. Although some components of the cap and liner can be expected to degrade over time, the clay layers should remain in place over geologic time periods, acting as aquitards in perpetuity. While the clay layers have very low permeability, they are not impermeable, and over time, cracks might develop in them, depending on their state of hydration and the amount of differential settling within the CU. Therefore, the clay layers will not preclude the possibility that some liquids might leach into the leachate collection system of the CU, albeit in very small quantities.

Any leachate trying to leave the CU will be captured by the geomembrane liner and the leachate collection system. This liquid will be recovered at the surface, tested, and properly disposed of based on analytical results. Moisture sensors will also be employed to detect any significant change in the soil moisture content within and below the CU. This technology will monitor for any degradation of the cap or liners, allowing for corrective actions to be implemented in a timely manner.

Furthermore, the nature of the radionuclides of concern in the CU, radium 226 and cesium 137, will also protect water sources. Because of their physiochemical properties,

radium 226 and cesium 137 are not readily mobile in the environment. They tend to bind strongly to soils and do not move unless the soil in which they occur is moved. Radium 226 has a low aqueous solubility and does not readily partition into the aqueous phase. It generally occurs as a solid precipitate in the environment. It readily forms insoluble precipitates with sulfates and carbonates, and is strongly adsorbed to clays. Some studies suggest that radium also may be strongly adsorbed by organic material and mineral oxides present in soils. In addition, no free-phase solvents have been identified at the FSS. Although relatively soluble, cesium 137 is also strongly adsorbed to most soils. It is taken up by mica-like minerals via a nearly irreversible process. It also forms chemical complexes with iron oxides.

The concentrations of radium 226 and cesium 137 in water presumed by EPA to be protective of human health are 5 and 200 pCi/L, respectively. The State of California has not established stricter WQLs for these two contaminants. In 2002 and 2003 the Air Force conducted a study to determine whether radionuclides were likely to be present in groundwater at McClellan. Groundwater samples were taken up-gradient and down-gradient from 11 potential radiological sites. Radium 226 and cesium 137 were included in this study. No evidence was found for radioactive contamination in groundwater. Given (1) the small source terms of radium 226 and cesium 137 likely to be present in the CU, (2) the elements of the CU specifically designed to preclude migration of contaminants and the persistence of those elements over geological timeframes, and (3) the physiochemical properties of radium 226 and cesium 137, a preponderance of evidence indicates that there is essentially no likelihood of radioactive waste being transported from the CU to agricultural or drinking water sources at concentrations high enough to exceed protectiveness standards even if the containment layers of the CU degrade over time.

Site controls, such as fencing, signage, and security, will be implemented as necessary during the remedial actions and would remain in place after the remedy is completed as appropriate. Because waste materials will be consolidated at the CU, future land use will be restricted at this facility and long-term ICs will be required as well. ICs (see Section 2.12.4) and restricted land use would be required to prevent uncontrolled excavation or other activities that could damage the cap and create exposure pathways to human and ecological receptors and to restrict the type of buildings that could be constructed on top of the caps (it is possible that certain types of buildings may not be suitable for construction on top of a cap). ICs will be required during implementation, and the controls would continue after implementation because of the residual levels of contaminants remaining at CS 024 (see Section 2.12.4 for more details).

Long-term monitoring per CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) will be required to verify the continued effectiveness of the CU at containing the contamination (the regulations specify a minimum of 30 years of monitoring). Monitoring of the CU will be performed quarterly to start; however, monitoring frequency will likely be decreased over time as appropriate (all reductions in monitoring will be coordinated with the regulatory agencies prior to implementation). Once consolidation has been completed, the unit will be closed in compliance with the provisions of CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C). A post-closure period of groundwater, landfill gas, and leachate monitoring will ensue, and restrictions will be placed on land use. Post-closure monitoring and restrictions will be established in the

post-closure maintenance and monitoring plan that will be developed in accordance with CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) and with regulatory agency input.

2.12.3 Alternative 3 Modified – Composite Cap (Restricted Land Use)

Under Alternative 3 Modified, CS 022 will be covered with an engineered composite cap (see Figure 7). Alternative 3 Modified includes excavation, treatment, and consolidation of some soil from the site prior to placement of the cap.

Excavation of soil at CS 022 will be performed to better facilitate industrial reuse of the property and would consist of the removal of up to 7 feet of material from within the burial pit and incineration area (i.e., from 0 to 7 feet bgs). For soil immediately surrounding the burial pit, the excavation will also include any soil from 0 to 1 foot bgs that contains concentrations of non-VOCs at or above cleanup levels for protection of human health in an industrial setting, surface water, or groundwater (whichever is lowest). Radium cleanup in surrounding soils will be to unrestricted release levels.

Excavated material will be segregated to remove drums, containers, saturated wastes/sludges (i.e., wastes containing less than 50 percent solids), and other incompatible materials for offbase disposal at an appropriate facility. Segregation and any preparation required for transportation offbase (e.g., overpacking of drums) will be performed in a dedicated area at the site during excavation. The segregation and preparation area will be engineered to ensure that all contaminated material is contained. The remaining material (presumably mostly soil) would be stockpiled, tested, treated (as necessary), and placed in the CU at CS 010 in the manner described in Section 2.12.2.

Following the excavation work at CS 022, confirmation sampling (including radiological screening) will be conducted to verify that any significant risk drivers (such as commodity components) at the excavated surface have been removed. Once this is achieved, a composite cap will be constructed beginning at approximately 7 feet bgs to eliminate human and ecological receptor exposure pathways, reduce infiltration of precipitation, minimize potential for contaminants to leach to groundwater, and prevent offsite migration of contaminants. The composite cap will be designed to cover all remaining soil at CS 022 containing contaminants with concentrations at or above cleanup levels for protection of human health (in an industrial setting) or groundwater, whichever is lowest (see Table 55). Note that because the first foot of soil with contaminants exceeding cleanup levels will have been excavated and backfilled with clean soil, protection of surface water will have already been addressed.

The composite cap would be constructed as described in Section 2.12.1. By constructing the cap below grade, the final surface will contain approximately 3 feet of clean soil, which is even with the surrounding grade to provide more flexibility in site reuse. The composite cap complies with applicable or relevant and appropriate sections of CCR Titles 22 and 27, as well as other ARARs, which are identified in Appendix C.

Potential VOC impacts to groundwater at CS 011, CS 012, CS 013, CS 014, CS 022, CS 024, AOC 313, PRL 008, and the VZ site will continue to be addressed by the existing SVE systems, which were selected in the VOC ROD (AFRPA, 2007). In addition, potential

migration of residual VOCs in the disposal pits will also be addressed by capping (which will minimize infiltration of water through the waste) and long-term monitoring.

For this remedy, vapor barriers would be required for future buildings constructed within approximately 300 feet of the cap to limit migration of VOCs and methane gas into indoor air (see Figure 10). ICs in the form of a grantee covenant in the deed will require vapor barriers for mitigation for potential vapor intrusion or will require sampling and analysis to demonstrate acceptable risk for future construction.

Construction of a cap will also require implementation of ICs (see Section 2.12.4) and restricted land use to prevent uncontrolled excavation or other activities that could damage the below grade cap and create exposure pathways to human and ecological receptors and to restrict the type of buildings that could be constructed on top of the caps (it is possible that certain types of buildings may not be suitable for construction on top of a cap).

Long-term monitoring per CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) will be required to verify continued effectiveness of the cap at containing the contamination (the regulations specify a minimum of 30 years of monitoring). Monitoring of the cap will be performed quarterly to start; however, monitoring frequency will likely be decreased over time as appropriate (all reductions in monitoring will be coordinated with the regulatory agencies prior to implementation). The capped disposal pit will be closed in compliance with the provisions of CCR Titles 22 or 27 (see the specific ARARs provided in Appendix C). Because contamination will be left in place, groundwater monitoring at the CS 022 site would continue to ensure no long-term impacts to groundwater. Monitoring for landfill gas will also be required and would initially be performed quarterly but may be eliminated if it can be established that landfill gas generation and accumulation is not significant. The number, location, and construction of groundwater and landfill gas monitoring wells would be established during the design phase and would be documented in a post-closure maintenance and monitoring plan that will be developed in accordance with CCR Titles 22 and/or 27 (see the specific ARARs provided in Appendix C) and with regulatory agency input.

2.12.4 Institutional Controls

ICs are a component of each of the selected remedies. With the exception of the SAFR site (which will be cleaned up to unrestricted use), all the sites in this ROD will have restrictions against residential use, and capped sites will carry soil disturbance restrictions as well. The site feature maps for each site show the remedy and the associated IC compliance boundaries. ICs are non-engineering, non-technical mechanisms (e.g., land use controls) used to reduce or prevent human exposure to contaminants.

At capped sites, the design will incorporate below-ground caps with several feet of clear space consisting of clean soil on top of the cap itself. This clear space will prevent breaches of the caps by future reuse activities on top of the capped surfaces. In addition, the ICs will require that any plans for proposed redevelopment on the caps be submitted to the Air Force and regulators for evaluation of compatibility and a final decision approving or disapproving the proposed development.

Specific language is included in this ROD regarding implementation, monitoring, reporting, and enforcement of ICs. Therefore, compliance with the terms of this ROD will be protective

of human health and the environment. Because the restrictions and the means for implementing the restrictions are specifically described in the following subsections, it is not necessary for the Air Force to submit any new, post-ROD IC implementation documents, such as a land use control implementation plan or new O&M plans.

The IC alternative includes an enforceable use restriction and IC on the use of certain properties. The Air Force is responsible for implementing, operating and maintaining, and monitoring the remedial actions (including the ICs) at the sites in this ROD (including the CU) before and after property transfer. The Air Force will exercise this responsibility in accordance with CERCLA and the NCP.

Meeting the RAO will be the primary and fundamental indicator of IC performance, the ultimate aim of which is to protect human health and the environment. Performance measures for ICs are the RAO plus the actions necessary to achieve those objectives. It is anticipated that successful implementation, operation, maintenance, and completion of these measures will achieve protection of human health and the environment and compliance with all legal requirements.

Except as provided below, the Air Force may contractually arrange for third parties to perform any of the actions associated with ICs, although the Air Force is ultimately responsible under CERCLA for the successful implementation of ICs, including monitoring, maintenance, and review of ICs. Monitoring, maintenance, and other controls as established in accordance with this ROD and the appropriate transfer documents will be continued until ICs are no longer necessary. ICs shall be maintained until the concentration of hazardous substances in the soil and groundwater are at such levels as to allow for unlimited use and unrestricted exposure.

The FSS for which ICs are being selected are currently leased by the Air Force to the LRA. During the time between the adoption of this ROD and deeding of the property, equivalent restrictions will be implemented pursuant to the terms of the existing lease, which requires the approval of the Air Force and the regulators for any construction or soil disturbance activity. The lease restrictions are in place and operational and will remain in place until the property is transferred by deed. At the time of deed transfer, lease restrictions will be superseded by equivalent use restrictions to be included in the federal deed and the State Land Use Covenant (SLUC) as described in this ROD.

2.12.4.1 Deed Restriction and Reservation of Access

The federal deed(s) for any property containing the sites will include a description of the residual contamination on the property, consistent with the Air Force's obligations under CERCLA Section 120(h) and the specific restrictions set forth in this section. The federal deeds may require additional specific restrictions from RODs addressing other residual contamination in groundwater beneath the property. ICs, in the form of deed restrictions, are "environmental restrictions" under California Civil Code Section 1471 ("Section 1471"). The deeds will include a legal description of the property to which the ICs apply and will contain the provisions required by Section 1471 to qualify the ICs as "environmental restrictions" so that they run with the land (i.e., the restrictions will be binding on all subsequent purchasers of the land whether or not the deed to them contained the restrictions).

The Air Force and regulatory agencies may conduct inspections of the ICs and the affected property. The deeds or associated transaction documents will also contain a reservation of access to the property for the Air Force, EPA, and the State, and their respective officials, agents,

employees, contractors, and subcontractors for purposes consistent with the Air Force IRP or the Federal Facilities Agreement. The Air Force will provide such access to regulatory agencies prior to transfer.

The environmental restrictions are the basis for part of the CERCLA 120(h)(3) covenant that the United States is required to include in the deed for any property that has had hazardous substances stored for 1 year or more or are known to have been released or disposed of on the property.

For any deed (non-federal entity) or letter of transfer (federal entity) transferring all or part of any parcel containing the sites, ICs, in the form of land use restrictions, will be incorporated in the deed as a grantee covenant, in substantially the following language:

- Grantee covenants and agrees that it will not use the site for residential purposes, hospitals for human care, public or private schools for persons under 18 years of age, or day-care centers for children.
- With respect to risks that may be posed via indoor air contaminated by chemicals volatilizing from shallow soil gas (vapor intrusion), the Grantee covenants either to (a) design and construct structures intended for occupancy within 300 feet of the caps or CU in a manner that would mitigate unacceptable risk under CERCLA and the NCP (e.g., through installation of a vapor intrusion barrier or gas collection system); or (b) evaluate the potential for unacceptable risk prior to the erection of any new occupied structure in the same area, and include mitigation of the vapor intrusion in the design/construction of the structure prior to occupancy if an unacceptable risk is posed under CERCLA and the NCP. The Grantee will coordinate any and all evaluation and potential mitigation measures with EPA Region 9 and DTSC.
- Grantee covenants and agrees that it will not conduct or allow others to conduct activities that would cause disturbance of any equipment or systems associated with the sites such as the engineered cap, CU, soil vapor remediation, or monitoring.

The deed(s) will also include a condition that the transferee execute and record an SLUC, within 10 days of transfer, to address any State obligations pursuant to State law, including the substantive portions of Health and Safety Code Section 25355.5(a)(1)(C) and 22 CCR, Section 67391.1. The deeds and letters of transfer will include a condition that any future deeds include this requirement.

2.12.4.2 Notice of Institutional Control

The Air Force will include specific deed restriction language set forth in this ROD in the deed for any parcel that includes the sites for which restrictions are selected, and will provide a copy of the deed(s) containing the use restrictions to the regulatory agencies as soon as practicable after the transfer of fee title. The Air Force will inform the property owner(s) of these specific ICs in the draft deed(s). The signed deed(s) and/or transfer document(s) legally binding between the Air Force and transferee will also include these specific land use restrictions as well as a condition that the transferee execute and record a SLUC, within 10 days of transfer, to address any State obligations pursuant to State law, including Health and Safety Code Section 25355.5(a)(1)(C) and 22 CCR, Section 67391.1. Any letter of transfer (to a federal entity) will include a condition that future deeds include this requirement. Concurrent with the transfer of fee title from the Air Force to the transferee, the Finding of Suitability for Transfer or the

Finding of Suitability for Early Transfer, and the location of the AR file will be communicated in writing to the property owners and to appropriate state and local agencies (with a copy to EPA) with authority regarding any of the activities or entities addressed in the controls to ensure that such agencies can factor the information into their oversight, approval, and decision making activities regarding the property.

The Air Force will provide notice to EPA and DTSC at least six (6) months prior to any transfer or sale of property so that EPA and DTSC can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective ICs. If it is not possible for the facility to notify EPA and DTSC at least six (6) months prior to any transfer or sale, then the facility will notify EPA and DTSC as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. Additionally, the Air Force further agrees to provide EPA and DTSC with similar notice, within the same timeframes, as to federal-to-federal transfers of property.

2.12.4.3 Annual Evaluations/Monitoring

Prior to property transfer, the Air Force will conduct annual monitoring, provide annual reports describing whether property use has conformed to ICs or use restrictions, and undertake prompt action to address activity that is inconsistent with the IC objectives or use restrictions, or any action that may interfere with the effectiveness of the ICs. The monitoring results will be included in a separate report or as a section of another environmental report, if appropriate, and provided to EPA and DTSC. The annual monitoring reports will be used in preparation of the five-year review to evaluate the effectiveness of the remedy. Prior to transfer, the annual monitoring report submitted to the regulatory agencies by the Air Force will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed.

Following transfer of those sites which require active O&M (AOC 313, CS 010, CS 011 through CS 014, CS 022, PRL 008, and VZ), the Air Force will be responsible to conduct annual monitoring, provide annual reports describing whether property use has conformed to ICs or use restrictions, and undertake prompt action to address activity that is inconsistent with the IC objectives or use restrictions, or any action that may interfere with the effectiveness of the ICs. While the Air Force retains discretion to and may arrange for the transferee or a contractor to undertake these responsibilities, the Air Force will retain primary and direct responsibility to ensure these O&M obligations are fulfilled. The Air Force will notify EPA, DTSC (and CDPH where appropriate) as soon as practicable but no longer than ten days after discovery of any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the remedy. The Air Force will notify EPA, DTSC (and CDPH where appropriate) regarding how the Air Force has addressed or will address the breach within 10 days of sending EPA, DTSC (and CDPH where appropriate) notification of the breach. Any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the remedy will be addressed by the Air Force as soon as practicable, but in no case will the process be initiated later than 30 days after the Air Force becomes aware of the breach.

Upon the effective date of property conveyance of those sites which do not require active O&M (CS 024, and SAFR), the transferee (or other entity accepting such obligations [which may include, without limitation, subsequent transferees]) or subsequent property owner(s) will conduct annual physical inspections of the property to confirm continued compliance

with all IC objectives unless and until the ICs at the site are terminated. The transferee or subsequent property owner(s) will provide to the Air Force, EPA, and DTSC an annual monitoring report on the status of the ICs and how any IC deficiency or inconsistent uses have been addressed, whether use restrictions and controls were communicated in the deed(s) for any property transferred in the reporting period, and whether use of the property encompassing the area subject to ICs has conformed to such restrictions and controls. The Air Force will place these transferee obligations in the deed or other transfer documentation.

If a transferee fails to provide an annual monitoring report as described above to the Air Force, the Air Force will notify EPA and DTSC as soon as practicable. If EPA or DTSC does not receive the annual monitoring report from the transferee, it will notify the Air Force as soon as practicable. Within 30 days of the report's due date, the Air Force will take steps to determine whether ICs are effective and remain in place and advise the regulators of its efforts. In any event, within 90 days of the report's due date, the Air Force will determine the status of ICs and provide its written findings, with supporting evidence sufficient to confirm the reported status, based on the use restrictions/ICs and site conditions, to EPA and DTSC unless either EPA or DTSC, in its sole discretion, acts to confirm the status of the ICs independently.

The five-year reviews conducted by the Air Force will also address whether the ICs in the ROD were inserted in the deed, if property was transferred during the period covered; whether the owners and State and local agencies were notified of the ICs affecting the property; and whether use of the property has conformed to such ICs. Five-year reviews will make recommendations on the continuation, modification, or elimination of annual reports and IC monitoring frequencies. Five-year reviews are submitted by the Air Force to the regulatory agencies for review and comment.

Although the Air Force is transferring procedural responsibilities to the transferee and its successors by provisions to be included in the deed(s) transferring title to the FSS and may contractually arrange for third parties to perform any and all of the actions associated with the ICs, the Air Force is ultimately responsible for the remedy.

2.12.4.4 Response to Violations

Prior to property transfer, the Air Force will notify EPA and DTSC as soon as practicable but no longer than 10 days after discovery of any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. The Air Force will notify EPA and DTSC regarding how the Air Force has addressed or will address the breach within 10 days of sending EPA and DTSC notification of the breach.

Following transfer of those sites which require active O&M (AOC 313, CS 010, CS 011 through CS 014, CS 022, PRL 008, and VZ), any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the remedy will be addressed by the Air Force as soon as practicable, but in no case will the process be initiated later than 30 days after the Air Force becomes aware of the breach.

The deed(s) will require that post-transfer, the transferee will notify the Air Force, EPA, and DTSC of any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs, and will address such activity or condition as soon as practicable, but in no case will the process be initiated later than 10 days after the transferee becomes aware of the breach. Post-transfer, if the transferee fails to satisfy its

obligations pursuant to the SLUC, DTSC may enforce such obligations against the transferee. If there is failure of the selected remedy or a violation of selected remedy obligations (e.g., an activity inconsistent with IC objectives or use restrictions, or any action that may interfere with the effectiveness of the ICs), DTSC will notify the Air Force and EPA in writing of such failure as soon as practicable (but no longer than 14 days) upon discovery of the inconsistent activity or action that interferes with the effectiveness of the IC, and initially seek corrective action or other recourse from the transferee. If, after diligent efforts, DTSC is unable to enforce the obligations of the SLUC or remedy obligations against the transferee, within 21 days following DTSC's notification, the parties will confer to discuss re-implementation of the selected remedy or other necessary remedial actions to address the breach of the IC. Once DTSC reports that the transferee is unwilling or unable to undertake the remedial actions, the Air Force will within 10 days inform the other parties of measures it will take to address the breach.

2.12.4.5 Approval of Land Use Control Modification

Prior to transfer, the Air Force will not modify or terminate ICs or implementation actions, or modify land use or land use restrictions that are part of the selected remedy without approval by EPA and DTSC. The Air Force will seek prior concurrence before any anticipated action that may disrupt the effectiveness of the ICs or any action that may alter or negate the need for ICs.

Any grantee of property constrained by the ICs imposed through their transfer document(s) may request modification or termination of an IC. Modification or termination of an IC, except the SLUC (discussed below), requires Air Force, EPA, and DTSC approval.

2.12.4.6 State Land Use Covenant Modification

Any modification or termination of the SLUC must be undertaken in accordance with State law and will be the responsibility of the transferee or then-current owner or operator.

2.12.5 Summary of Estimated Remedy Costs

Costs associated with implementing Alternative 3 (Composite Cap) at CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site are summarized in Table 64. Capital costs for implementing the capping remedy at these seven sites include the costs for establishing ICs, designing the caps, constructing the caps and related infrastructure, and reporting. Annual costs include maintaining ICs, inspecting and maintaining the caps, and monitoring. The total present worth cost associated with implementing the capping remedy at these sites is approximately $21 million.

The cost with implementing Alternative 6R/6U (Excavation/Treatment/Consolidation) for CS 010, CS 024, and the SAFR is summarized in Table 64. Capital costs for implementing the excavation and consolidation remedy at these three sites include the costs for establishing ICs, designing and constructing the CU and related infrastructure[2], excavation of soil from all three sites, treatment (as required) of soil prior to disposal in the CU, and reporting. Annual costs include maintaining ICs, inspecting and maintaining the CU, and monitoring. The total present worth cost associated with implementing the excavation and consolidation remedy at CS 010, CS 024, and the SAFR is approximately $19 million.

[2] The cost for designing and constructing the CU is shared between both of alternatives that include consolidation (Alternative 6R/6U and Alternative 3 Modified). Likewise, the costs for inspecting and maintaining the CU are shared between these two alternatives.

Costs associated with implementing Alternative 3 Modified (Composite Cap with Restricted Land Use) at CS 022 are summarized in Table 64. Capital costs for implementing the remedy at CS 022 include the costs for establishing ICs, designing and constructing the CU and related infrastructure, excavation of soil from the site, treatment (as necessary) of the soil prior to consolidation, placement of the soil in the CU, designing the cap, constructing the cap and related infrastructure, and reporting. Annual costs include maintaining ICs, inspecting and maintaining the CU and cap, and monitoring. The total present worth cost associated with implementing Alternative 3 Modified at CS 022 is approximately $8 million. This results in a total present worth cost for all the selected remedies of approximately $48 million.

The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative. Major changes may be documented in the form of a memorandum in the AR file, an Explanation of Significant Differences (ESD), or a ROD amendment. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

2.12.6 Summary of the Rationale for the Selected Remedies

For AOC 313, CS 011, CS 012, CS 013, CS 014, PRL 008, and the VZ site, Alternative 3 (Composite Cap with Restricted Land Use) is the Air Force and EPA's selected remedy. Alternative 3 provides for the overall protection of human health and the environment at these sites by preventing exposure to contaminants with a cap, through ICs, and by reducing the threat of migration to groundwater and surface water; it complies with state and federal environmental requirements; it provides both long- and short-term effectiveness; and it is considered implementable. SVE has reduced, and at some sites will continue to reduce (under the VOC ROD), the toxicity, mobility, and volume of the VOCs. The composite cap will provide for containment of contaminants, and it will reduce the mobility of the contaminants. The Air Force believes that upon implementation of the remedy, the property will be suitable for reuse and transfer. Alternative 3 is also the most cost-effective alternative for these sites.

For CS 010 and CS 024, Alternative 6R (Excavation/Treatment/Consolidation Unit with Restricted Land Use) is the Air Force and EPA's selected remedy. For the SAFR, Alternative 6U (Excavation/Treatment/Consolidation Unit with Unrestricted Land Use) is the Air Force and EPA's selected remedy. Alternatives 6R and 6U include treatment of soil (as necessary) prior to being placed into the CU. Alternative 6R/6U provides for the overall protection of human health and the environment at these three sites by excavating contamination and preventing exposure to contaminants by treating contaminants (as necessary) to reduce their toxicity, mobility, and/or volume and placing the material in a CU with a cover and liner, and through ICs and monitoring. This alternative complies with state and federal environmental requirements, provides both long- and short-term effectiveness, and is considered implementable. The CU will provide for containment of contaminants, and it will reduce the mobility of the contaminants. With the exception of CS 024, Alternative 6R/6U is also the most cost-effective alternative and is considered to be compatible with planned industrial reuse of the sites. For CS 024, although the selected

remedy is not the most cost-effective remedy, the remedy for this site was selected by the Air Force based on public input and because the remedy is expected to better facilitate planned reuse of that site.

For CS 022, Alternative 3 Modified (Composite Cap with Restricted Land Use) is the Air Force and EPA's selected remedy. The alternative has been modified to include excavation and treatment (as necessary) and consolidation of the excavated material. The alternative was modified to better facilitate reuse of the site. Alternative 3 provides for the overall protection of human health and the environment at this site by preventing exposure to contaminants with a cap, through ICs, and by reducing the threat of migration to groundwater and surface water; it complies with state and federal environmental requirements; it provides both long- and short-term effectiveness; and it is considered implementable. Treatment of the excavated soil as well as ongoing SVE (under the VOC ROD) reduces the toxicity, mobility, and volume of contaminants. The composite cap provides for containment of contaminants and will reduce the mobility of the contaminants. The Air Force believes that upon implementation of the remedy, the property will be suitable for reuse and transfer.

In addition to the proposed remedies and in line with CERCLA, five-year reviews will be performed to ensure that the remedies are functioning as intended and are protective of human health and the environment.

2.12.7 Expected Outcomes

Following implementation of the remedy at CS 011 through CS 014, AOC 313, and PRL 008 (Alternative 3 – Composite Cap with Restricted Land Use), all wastes exceeding industrial cleanup levels would be contained and the resulting risk would be acceptable for industrial reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be a restriction on land use to industrial purposes only, with some additional possible limitations on building locations (certain types of buildings could not be constructed on top of the caps). However, because anticipated future land use at these sites is industrial in nature and may consist of a regional fire and rescue training facility or some other suitable facility, the restrictions and limitations are not inconsistent with the intended reuse. Industrial or commercial use of the entire property could be achieved within 2 to 3 years.

Following implementation of the remedy at the VZ site (Alternative 3 – Composite Cap with Restricted Land Use), all wastes exceeding industrial cleanup levels would be contained and the resulting risk would be acceptable for industrial reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be a restriction on land use to industrial purposes only, with some additional possible limitations on building locations (it is possible that certain types of buildings could not be constructed on top of the caps). However, because anticipated future land use at these sites is industrial in nature and consists of open storage, the restrictions and limitations are not inconsistent with the intended reuse. Industrial or commercial use of the entire property could be achieved within 2 to 3 years.

Following implementation of the remedy at CS 022 (Alternative 3 Modified – Composite Cap with Restricted Land Use), all wastes exceeding industrial cleanup levels would have

been removed or contained, and the resulting risk would be acceptable for industrial reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be a restriction on land use to industrial purposes only. Because the cap would be constructed below grade and have a final surface at grade, resulting in a relatively flat surface, a wider range of reuse options would be possible. However, there would be some additional possible limitations on building locations (it is possible that certain buildings may not be suitable for construction on top of the cap). Anticipated future land use at CS 022 is industrial, including light industrial, warehousing, and open storage activities. Because anticipated land use at the site is for industrial and/or commercial purposes, the industrial land use restriction is not inconsistent with the intended reuse. However, restrictions on the placement of certain buildings on top of the cap would limit some beneficial reuse of the property. Industrial or commercial use of the entire property could be achieved within 2 to 3 years.

The selected remedy for CS 024 is Alternative 6R, which consists of the excavation of contaminated soil from CS 024, treatment (as necessary), and consolidation of this material at the CS 010 site. Following implementation of the remedy at CS 024, all wastes exceeding industrial cleanup levels (or unrestricted cleanup levels for radionuclides) will have been removed, and the resulting risk would be acceptable for industrial reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be a restriction on land use to industrial purposes only. Anticipated future land use at CS 024 is light industrial or an intermodal rail facility. Because anticipated land use at the site is for industrial and/or commercial purposes, the industrial land use restriction is not inconsistent with the intended reuse. Industrial or commercial use of the entire property could be achieved within 2 to 3 years.

The selected remedy for the SAFR is Alternative 6U, which consists of the excavation of contaminated soil from the SAFR, treatment (as necessary), and consolidation of this material at the CS 010 site. Following implementation of the remedy at the SAFR, all wastes exceeding unrestricted cleanup levels would have been removed, and the resulting risk would be acceptable for unrestricted reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be unrestricted land use. However, because the current use of the site consists of continued use as a firing range by local law enforcement personnel, the real estate lot containing the SAFR may contain a restriction against residential and other sensitive uses. Reuse of the entire property could be achieved within 2 to 3 years.

The selected remedy for CS 010 is Alternative 6R, which consists of the excavation, treatment (as necessary), and consolidation of contaminated soil from CS 010 (along with contaminated soil from CS 024, the SAFR, and a portion of the soil from CS 022) into a CU to be located at the CS 010 site. There may also be future consolidation of contaminated soils from other McClellan IRP sites (e.g., the Small Volume, Ecological, or Follow-on Strategic Sites). Following implementation of the remedy at CS 010, all wastes exceeding industrial cleanup levels (or to unrestricted levels for radionuclides) would be contained within the CU, and the resulting risk would be acceptable for industrial reuse of the property. Potential threats to groundwater and surface water would also be mitigated. The expected outcome would be a restriction on land use to industrial purposes only, with some additional possible limitations on building locations (it is possible that certain types of buildings could

not be constructed on top of the CU). However, because anticipated future land use at this site is industrial in nature and may consist of a regional fire and rescue training facility, the restrictions and limitations are not inconsistent with the intended reuse. A portion of the property is currently being used for fire and rescue training. Reuse of the entire property could be achieved within 5 to 10 years.

The selected remedies at CS 010 and CS 022 will result in radionuclides being present in excess of background. It is possible that radionuclides will be present in excess of background at CS 011 through CS 014 and PRL 008 as well. Capping has been selected as the most appropriate remedy at CS 011 through CS 014, CS 022, and PRL 008 in part because of uncertainties concerning the precise nature of the wastes in the pits. Disposal pits are inherently heterogeneous, and intrusive sampling within disposal pits runs the risk of exposing workers and/or spreading contamination thereby increasing risks to human health and the environment. When the extent of contamination can be determined, as is the case at these sites, it is appropriate to cap the waste in place in order to prevent exposure of humans and ecological receptors and to prevent migration of the contamination. At each site, all radionuclides exceeding unrestricted use cleanup levels would be contained, and the resulting risk from radionuclides would be acceptable for unrestricted reuse of the surface of the property. Potential threats to groundwater and surface water would also be mitigated. California Executive Order (E.O.) D-62-02 establishes a moratorium in the State of California on the disposal of decommissioned materials into Class III landfills and unclassified waste management units. By its terms, E.O. D-62-02 applies only to "decommissioned materials," that is, materials from the decommissioning of licensed sites, and does not apply to the radionuclides being placed in the CU that are not from the decommissioning of licensed sites. The design, construction, and operation of the CU are consistent with the objectives of the E.O. because it can be demonstrated that there is no hydrogeologic pathway whereby any agricultural of drinking water source could be contaminated with radioactive waste to such an extent as to harm public health or the environment (i.e., exceeding MCLs). There is no evidence of radiological material migrating from CS 011 through CS 014, CS 022, and PRL 008 to the groundwater. The selected remedy for these sites is outside the scope of the E.O. because no new waste will be discharged at these sites. Rather these sites are areas where waste has been previously discharged, and the moratorium does not address such sites.

It is the position of the State of California that the continuing presence of radionuclides in excess of background at capped sites would require non-federal owners of such sites to obtain a radioactive materials license or an exemption from licensing requirements. The required application for license or exemption would be filed by the property owner with the California Department of Public Health's Radiologic Health Branch (CDPH/RHB). CDPH/RHB is the state agency charged with administering and enforcing the Radiation Control Law, including the provisions of Health and Safety Code Section 115261. The State therefore asserts that CDPH/RHB's interpretation of the applicable provisions of the Radiation Control Law is entitled to deference. CDPH/RHB's position is that under state law regarding the licensing of low-level radioactive waste disposal facilities, neither a license nor an exemption could be granted to potential future non-federal owners of the CS 010/CU site. While the Air Force disagrees with the positions of the State on the requirement for a radioactive materials license or exemption once such land is transferred to a non-federal owner, and the ineligibility of CS 010/CU site for either a license or

exemption, the Air Force will cooperate with the property owners and the State in preparing applications, and would provide all technical data, designs, and O&M data needed to support exemption requests for capped sites and demonstrate the effectiveness and protectiveness of the CERCLA capped-in-place remedy. For capped-in-place sites, a radioactive materials license exemption could be granted if after application review CDPH/RHB is able to determine that there is a reasonable and adequate assurance that the criteria listed in 17 CCR 30104 have been met. Non-federal transferees of capped-in-place sites with ICs in place to ensure the proper O&M of the caps, and to protect the integrity of the caps from activities of future land owners, would be able to apply for an exemption from radioactive materials licensing requirements. Because anticipated land use at the capped-in-place sites is for industrial and/or commercial purposes, the industrial remedies are not inconsistent with the intended reuse. However, restrictions on disturbing the caps would limit some beneficial reuse of the properties. Industrial or commercial use of these properties might be achieved within 2 to 3 years.

2.13 Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost effective, and use permanent solutions and treatment or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against offbase disposal of untreated wastes. The following sections discuss how the selected remedies meet these statutory requirements.

2.13.1 Protection of Human Health and the Environment

Protection of human health and the environment for the FSS would be achieved and maintained by preventing exposure to contaminants through institutional and engineered controls.

Under Alternative 3 (CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site), the composite cap would provide protection of human health and the environment by eliminating direct exposure, minimizing the potential for migration of contaminants to groundwater, and preventing offsite transport of contaminants via the surface water pathway. In addition, SVE (under the VOC ROD) has reduced and at some sites would continue to reduce VOC and some SVOC concentrations, thereby providing for additional protection of human health and the environment and further minimizing the potential for migration of these contaminants to groundwater.

Under Alternative 6R/6U (CS 010, CS 024, and SAFR), excavation, treatment (as necessary), and placement of contaminated media within the CU would provide protection of human health and the environment by reducing the volume, toxicity, and/or mobility of the contaminants, eliminating direct exposure, and minimizing the potential for migration of contaminants to groundwater.

Under Alternative 3 Modified (CS 022), excavation, treatment (as necessary), and placement of the excavated portion of contaminated media within the CU would provide protection of

human health and the environment by reducing the volume, toxicity, and/or mobility of the contaminants and eliminating direct exposure to this material. The composite cap would provide protection of human health and the environment by eliminating direct exposure to remaining contamination and minimizing the potential for migration of remaining contaminants to groundwater. In addition, ongoing SVE (under the VOC ROD) would act to reduce VOC and some SVOC concentrations, thereby providing for additional protection of human health and the environment and further minimizing the potential for migration of these contaminants to groundwater.

2.13.2 Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedies of composite caps, treatment, excavation, and construction of a CU comply with all ARARs. The action-, chemical-, and location-specific ARARs are presented in Appendix C.

Alternative 3 would comply with ARARs for protection of human health and the environment. Primary ARARs associated with Alternative 3 include CCR Titles 22 and 27 landfill closure, groundwater monitoring, landfill gas control, land use covenant requirements, and 40 CFR stormwater management requirements.

Alternative 6R/6U would comply with ARARs for protection of human health and the environment. The CU constructed under Alternative 6R/6U would comply with the requirements of CCR Title 22, Sections 66264.550 through 66264.552. These requirements include specifications for the design of the unit and for treatment of material to be placed into the unit. For this alternative, the CU will be constructed to meet RCRA Subtitle C standards in 40 CFR 264.301 (c) per CCR Title 22 Section 66264.552. Other primary ARARs associated with Alternative 6R/6U include CCR Titles 22, 23, and 27 landfill design and operation, landfill closure, groundwater monitoring, landfill gas control, and land use covenant requirements; 10 CFR 20.2002 radioactive waste disposal requirements; and 40 CFR stormwater management requirements.

Modified Alternative 3 would comply with ARARs for protection of human health and the environment. Primary ARARs associated with Alternative 3 include CCR Title 22 66264.552 treatment requirements; CCR Titles 22 and 27 landfill closure, groundwater monitoring, landfill gas control, and land use covenant requirements; and 40 CFR stormwater management requirements.

2.13.3 Use of Permanent Solution and Alternative Treatment to the Maximum Extent Practicable

The Air Force has determined that the selected remedies represent the maximum extent to which permanent solutions and alternative treatment technologies can be used in a practicable manner at the sites. The soil treatment component of modified Alternative 3 and Alternative 6R/6U will permanently reduce the volume, toxicity, and/or mobility of contaminants. SVE operations at sites with VOCs have achieved significant reduction in concentrations of contamination in the vadose zone. SVE systems under the VOC ROD will effectively reduce the mobility and volume of VOCs remaining onsite.

2.13.4 Preference for Treatment as a Principal Element

The treatment component of modified Alternative 3 and Alternative 6R/6U will irreversibly reduce the volume, toxicity, and/or mobility of contaminants, meeting the statutory preference for treatment as a principal element. In addition, by removing VOCs and some SVOCs in soil gas using SVE under the VOC ROD, the selected remedy addresses soil gas contamination at the sites through the use of treatment technologies. Both the mobility and volume of VOC contamination would be irreversibly reduced, meeting the statutory preference for treatment as a principal element.

2.13.5 Requirements for Five-year Reviews

Because all the remedies (except for Alternative 6U) would result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory five-year review will be required. Other remedies implemented at McClellan AFB under other RODs also require five-year reviews. All of the five-year reviews at McClellan AFB are performed on the same schedule and documented in a single base-wide report. The FSS will be included in the base-wide five-year review. The next review will occur in 2014 and every 5 years thereafter to ensure that the remedies are, or will be, protective of human health and the environment.

2.13.6 Cost-effectiveness

The selected remedies are all cost effective. This was determined by comparing the overall effectiveness of each remedy to the cost for that remedy. Overall effectiveness is determined by evaluating long-term effectiveness and permanence; reduction in toxicity, mobility, and volume; and short term effectiveness (balancing criteria 3, 4, and 5). The remedy costs are summarized in Table 64. Based on this comparison, the costs are proportional to overall effectiveness for each remedy. Although CERCLA does not require that the most cost-effective remedy be chosen, the most cost-effective remedy was selected for all sites except CS 022 where community acceptance (modifying criterion 9) caused a more costly remedy to be selected.

Alternative 3 is the most cost-effective remedy for CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site that meets the CERCLA threshold criteria and is the Air Force and EPA's selected remedy for these sites. The present worth cost associated with Alternative 3 for these seven sites is approximately $21 million, which is less than the estimated costs for the other alternatives considered for these sites.

Alternative 6R/6U (Excavation/Treatment/Consolidation) is the Air Force and EPA's selected remedy for CS 010, CS 024, and the SAFR. With the exception of CS 024, Alternative 6R/6U is also the most cost-effective alternative that meets the CERCLA threshold criteria for these sites. For CS 024, although Alternative 6R is not the most cost-effective remedy, the Air Force selected this remedy based on public input and because it would better facilitate planned reuse of the site. The overall present worth cost associated with Alternative 6R/6U for these three sites is approximately $19 million, which is less than the estimated costs for the other alternatives considered for these three sites.

Alternative 3 Modified is the Air Force and EPA's selected remedy for CS 022. Although Alternative 3 Modified is not the most cost-effective remedy, the Air Force selected this

remedy based on public input and because it would better facilitate planned reuse of the site. The overall present worth cost associated with Alternative 3 Modified for CS 022 is approximately $8 million.

2.13.7 Restrictions on Offsite Disposal

CERCLA and the NCP state that offsite land disposal without treatment is the least preferred alternative (42 USC § 9621 [b] [1] and 40 CFR § 300.430 [f] [1] [ii] [E]). Alternative 3 (Composite Cap with Restricted Land Use), which was selected for CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and the VZ site, does not include offsite disposal as a component of the remedy. Alternative 6R/6U (Excavation/Ex Situ Treatment/Consolidation Unit with Restricted Land Use), which was selected for CS 010, CS 024, and the SAFR, and Alternative 3 Modified (Partial Excavation, and Composite Cap with Restricted Land Use), which was selected for CS 022, include offsite disposal only for wastes that are incompatible with the CU. None of the waste from CS 010 and the SAFR is expected to be disposed offsite. A fraction of the waste from CS 022 and CS 024 might be sent offsite for disposal. This will be limited to wastes that are incompatible with the CU such as drums, containers, and saturated wastes/sludges. Waste sent offsite will be subject to the treatment requirements of the receiving facility. The selected remedies comply with the bias against offsite disposal without treatment by limiting the amount of waste that will be sent offsite and by treating waste sent offsite to the extent required by the receiving facility.

CERCLA and the NCP restrict the facilities that can be used for offsite disposal and authorize EPA to determine the acceptability of any facility selected for the treatment, storage, or disposal of CERCLA waste (42 USC § 9621(d)(3) and 40 CFR § 300.440). Waste sent offsite under Alternative 6R/6U or Alternative 3 Modified will only be sent to EPA-authorized facilities.

2.14 Documentation of Significant Changes

The Air Force issued a final Proposed Plan (AFRPA, 2006) for these 11 FSS on October 30, 2006, for public comment. The public comment period was held from October 30 through December 8, 2006. A public meeting was held on November 9, 2006, to give the community another opportunity to provide comments. In addition, the Air Force agreed to extend the comment period for this Proposed Plan to January 16, 2007, because of requests from the RAB members during the December 5, 2006, RAB meeting. Responses to comments received are provided in Section 3. As a result of public comments and to better address community concerns, the Air Force changed the remedy as presented in the Proposed Plan for CS 024 from Alternative 3 (Composite Cap; Restricted Land Use) to Alternative 6R (Excavation/Treatment/Consolidation Unit; Restricted Land Use).

Based on comments received from the regulatory agencies on the draft version of this ROD, the Air Force also chose Alternative 6R/6U for CS 010, CS 024, and the SAFR, as the treatment aspect of this remedy is needed to meet CAMU requirements and increase the protectiveness of this remedy over Alternative 5. The Air Force also modified Alternative 3 for CS 022 to include excavation of surface soil and treatment (as necessary) of the soil prior to its placement in the CU. This modification was made to better facilitate industrial reuse of the CS 022 site and to increase the protectiveness of the remedy for this site. In addition, the

Air Force added Alternative 6U for the SAFR site to now achieve unrestricted cleanup levels as a cost-effective remedy that will eliminate the need for ICs and five-year reviews of this site.

Finally, the Air Force modified a portion of the VZ site remedy to include possible excavation and consolidation of some contamination located beyond the current cap, instead of extending the existing cap over this area of the site. This is another cost-effective change that eliminates the need for more cap construction at this site and additional area requiring long-term inspection and maintenance. These changes to the remedies presented in the Proposed Plan could have been reasonably anticipated by the public; in fact, the changes were implemented by the Air Force to incorporate public input and increase the protectiveness of the remedies. These changes are reflected in this FSS ROD.

In addition, subsequent to the submittal of the Final FSS FS, the risk-based concentrations used as screening levels were updated to reflect changes in toxicity criteria and to be consistent with Air Force policy regarding the selection of toxicity criteria. In addition, the soil screening levels for the industrial use scenario were re-calculated using a method consistent with the residential use screening levels rather than using EPA Region 9 PRGs as the soil screening levels for the industrial use scenario. Shallow soil gas screening levels for the vapor intrusion/indoor air pathway were calculated using methodology derived from discussions between Air Force representatives, EPA headquarters, and EPA Region 9. The shallow soil gas screening levels were presented to the regulatory agencies (including EPA Region 9 and the State) in meetings held in 2007 as part of the Initial Parcel ROD 2 development process. The shallow soil gas screening levels used in this ROD were calculated using the same methodology, but have been updated to reflect current toxicity criteria.

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SECTION 3

Responsiveness Summary

3.1 Background of Community Involvement

A proposed plan and public comment period are key parts of the decision making process because the Air Force uses community input when making cleanup decisions. The FSS Proposed Plan for this ROD was available for review during a public comment period from October 30 through December 8, 2006. Based on a request from one of the RAB members, the public comment period was subsequently extended to January 16, 2007. A public notice announced the start of the public comment period and a postcard was later sent out to notify the public that the comment period had been extended.

The FSS Proposed Plan was available for review at the McClellan Administrative Record, which is contained in the Information Repository and on the AFRPA Web site. In addition, a public meeting was held on November 9, 2006, to explain the Proposed Plan and to solicit comments from the public. Prior to the meeting, a fact sheet was distributed to the entire mailing list, which summarized the Proposed Plan. The public was encouraged to review the document and provide comments, either verbally or in writing, about the cleanup alternatives presented in the Proposed Plan.

3.2 Summary of Significant Comments Received

The Air Force received 12 comments from members of the public or representatives from various stakeholder groups during the public comment period. Their comments and the Air Force responses are provided below. Five people commented at the public meeting and seven provided written comments during the public comment period. There were two primary general concerns expressed during the public comment period: (1) protectiveness of the selected remedies, and (2) negative impact on redevelopment if Sites CS 022 and CS 024 are capped. Specific comments and Air Force responses are provided below. The public comments resulted in a modification of the preferred cleanup alternatives presented in the Proposed Plan. For Site CS 024, the remedy has been changed from capping to excavation and consolidation to better facilitate planned re-development of the site.

3.2.1 Comments Received during the November 9, 2006, Public Meeting and Air Force Responses[3]

Mr. Roy Zattiero*: My name is Roy D. Zattiero, and I live here right off of Ascot, Rio Linda. And I was stationed here at McClellan back in the 50's and 60's. And I was also stationed at McClellan and at Vandenburg Air Force where you tried to cap construction on some of our missile sites. It didn't work. You also tried it down at Castle Air Force Base. It didn't work. You are still trying a cap down there. You just had one break on the last rain. And with all due respect, because*

[3] These comments and the original Air Force responses date from 2006. Where specific changes in remedy or approach have occurred due to public and regulatory input, revisions to the original responses have been made to reflect this change. The Air Force's current position is reflected in this final version of the ROD. These comments and Air Force responses have been retained to document the dialogue that occurred between the Air Force and the public.

I got more time with the Air Force than anybody in here, between the Air Force and NASA and now the Veterans Administration, and I'm telling you, the cap, you put a lot of money into it, and I know you are trying, and I really respect what you are doing in your job, but I'll tell you, what they are doing in a condensed area that you are working in and with the contamination on not only the water but the soil itself and who is going to be exposed to it, the gentleman that brought up the points were -- they were right on line. And, like I said, all due respect, but the Air Force is going to be gone; and you are going to say, well, in five years we'll come back and inspect it. Have you ever tried to get the Air Force to come back and do something, or the government, or even the VA? I mean, we have a hard time even getting our fire department to come back out for inspections they have done sometimes. And so -- and I see the one gentleman smiling because he knows who I'm talking about. But, seriously, it's -- and with all due respect to the Air Force, believe me, I like my pension every month, but it's just -- it's not going to work at McClellan the way that it's being planned out right now. And you are going to say, oh, wait a minute, I know it's going to probably go to a class-action suit or something else; and we are all the sons of lawyers, so everybody will get rich off it, it's not the way to go. And some of the sites can't be capped. But some of them -- I mean, I was at site ten. I buried some of that crap there. I was on orders. But it isn't going to come out. And some of that mercury, you guys -- I -- you know, we use it for our switches and our gauges, it still can't be found. And some of that plutonium, I'm telling you, I've got it under my fingers, that's melanoma. I've got the leukemia from it. And I don't want my kids or my grandkids to get it either. And I'm telling you, you think you got an answer to it, it's not going to happen. So God bless you for it, you are trying, you know. And I know you don't want to go the expensive route, but it ought to be excavated. It ought to be taken out and shipped. And I wouldn't even put it to -- you know, I wouldn't live in Idaho or Utah if you were going to put it there.

Air Force Response: With respect to the landfill cap at Castle, an area of the landfill cap eroded because of a lack of preventative maintenance on behalf of the contractor responsible for O&M of the landfill. The design of the cap selected for the McClellan sites (Alternative 3) is a composite cap consisting of multiple layers and is several feet thick.

Two of the sites addressed in the Proposed Plan (October 2006), CS 010 and the SAFR, have been or will be excavated and consolidated in an engineered CU at CS 010. As a result of feedback from the community on the Proposed Plan, it was decided to also excavate and consolidate CS 024 into the CU. The remedy selected for CS 024 as outlined in the Proposed Plan was Alternative 3 (Engineered Cap). However, the remedial alternative now selected for CS 024 is Alternative 6R (Excavation/Treatment/Consolidation at CS 010). For CS 022, the capping remedy has been modified to now include a partial excavation of the site, removing contaminated surface soils down to a maximum depth of 7 feet bgs. A composite cap will be constructed below grade (beginning at 7 feet bgs) with 3 feet of clean soil forming the surface layer. The excavated soils will be treated (as necessary) and placed in the CU. For the remaining sites, the capping alternative has been selected. A detailed analysis was conducted as part of the FS, which determined that the capping alternative was protective of human health and significantly less expensive than excavation.

Furthermore, the Air Force has the responsibility for inspecting and maintaining the cap. The Air Force has successfully maintained a composite cap at OU D for 26 years with no failures. This same construction approach will be used for the newly installed caps. In addition, ICs will be in place long-term at all of the sites to ensure that the remedy is properly monitored and maintained and to prevent exposure to contamination left in place. ICs are administrative or legal mechanisms, and include, but are not limited to, permits, zoning, and deed restrictions. The purpose of the ICs is to protect property users and the

public from existing contamination that continues to be present during use of a site. The Air Force is responsible for implementing, maintaining, and monitoring the ICs until the property is transferred. Even upon transfer, the State of California requires a SLUC with the new property owner, which imposes property-use restrictions. In other words, the ICs remain in effect indefinitely and both the Air Force and the regulatory agencies work together to ensure the ICs are effective. If there is a violation, the regulators will be informed, and they will enforce the ICs. In addition, a five-year review will be conducted in 2014 and every 5 years thereafter to make sure the remedies are and will continue to be protective of human health and the environment.

***Mr. Gary Collier**: Oh, God, three minutes, oh, boy. Gary Collier, Sacramento. I do not trust this situation where you are going to cap it. And, I mean, there's no other way to say it, I don't trust it, because you are capping something that polluted the water beneath us. And I got grandkids. They are going to have kids, and I just don't trust it. And I try to be objective, but there's nothing objective that I can find in what you are proposing that is going to be protective. Because there's better things you can do, more you can do. Water is not just stationary, it moves, and it's going to come up, it's going to go down, it's going to go sideways. You got to protect us. And this is not protective. And I forgot exactly what I was going to say otherwise. I wish I would have taken some notes. But, by God, this is not going to work. And we've got a lot of things happening with the changes in the department of defense, and I hope somebody gets put in there that is going to have a little different common sense to see that this is not working. You need to consolidate it somewhere, hopefully off base. But if you do not have something that's going to contain it, then there's no sense doing anything. And it just doesn't make any sense to just put a cap over it. Because we know in the case of the DRMO, that cap isn't worth squat because there's always somebody poking a forklift through it or doing something and it's leaking. They say, oh, well, it's still satisfactory. I don't buy it. Because if there's something coming out of that cap, then it's not working. Asphalt is permeable. And that's -- there's nothing you can say about it except it's permeable. And water is going to go down through it, maybe not as fast as you'd like. You need to use high-density concrete along with a vinyl barrier or rubber barrier on both sides of it. And all sides, not just the bottom and the top. Now, you guys can do what you want to do, but I'm going to fight you tooth and nail. If you want to make one place consolidated, I'll go along with it. But you are going to have to make sure what are you going to do as far as protecting our community with enhanced water testing. The City of Sacramento is grossly negligent in not testing the water in a proper manner. They claim, oh, we are doing everything we are required by law. Testing the water every couple of years, maybe three or four years, and skipping testing does not suffice. We have a landfill you are proposing to put within a mile of my drinking water well and you don't want to enhance our testing by federal laws, then there's a problem; and the problem is going to be that you are going to get a lion storm of protests over this if you guys don't find a way of protecting our water supply. Thank you very much.*

Air Force Response: The proposed alternatives for the FSS are protective of human health and the environment and reduce, if not eliminate, impacts to groundwater by minimizing both migration of contaminants and infiltration of rainwater through the contamination. The composite cap will consist of multiple layers, several feet in thickness, which prevents the public and workers from coming in contact with the waste, eliminating the exposure pathway. Additionally, the cap is designed with a protective layer of soil above the cap itself, which eliminates breaches of the cap. The current cap at the former Defense Reutilization and Marketing Office (DRMO) facility (OU B1) is an interim action and consists of a simple 2-inch asphalt layer. The final remedy for that site is being addressed in the 62-acre Privatized Cleanup. Under privatization, McClellan Business Park has removed

and treated the contaminated soils to meet industrial cleanup standards and inspects on a quarterly basis the offsite/downstream drainage system and associated sediment traps.

In addition, both SVE and groundwater extraction wells are in place at these landfill sites. The SVE wells will continue to operate and remove contaminants from the vadose zone to reduce further contamination of groundwater by VOCs. The groundwater extraction wells and treatment system at McClellan capture and treat the contaminated groundwater. The groundwater at McClellan is not used for drinking water. Groundwater monitoring is being conducted on a regular basis, ranging from once per quarter to once every 5 years, depending on the area being tested and the type of contaminant. The groundwater monitoring events produce reports that compile and evaluate the data, which are reviewed by state and federal regulatory agencies. Groundwater monitoring is part of the capping remedy. This long-term monitoring is required to ensure that the capping remedy effectively isolates the buried waste and prevents it from migrating to groundwater. Additionally, the five-year reviews (the next one will be completed in 2014) ensure that the remedies the Air Force undertakes are protective of human health and the environment.

***Mr. Alan Hersh**: Good evening. Alan Hersh with McClellan Park. We have submitted comments in writing. We'll submit some additional comments in writing. A couple things I wanted to say tonight pertaining mainly to site CS 24, CS 22, and the OU-D cap. First of all, the -- if -- and let me just go on the record saying, we do not -- we strongly do not support caps on CS 22 and 24. On OU-D, I think given the nature of it, that there may be some solution there that is not -- that involves a cap -- that involves a cap. As you design the cap, I think it's critical that the finished product integrate into it the future intended use, that it's not a clay cap or a grass field, that if in fact it's an industrial park, that it's a cap that supports the industrial use, such as a parking lot or a storage area, that type of thing. In addition, the caps, as you stated, will create soil gas; and it's imperative that in the engineering costs that the government has they include the cost to retrofit existing buildings and new buildings with a ventilation system to make sure the buildings themselves don't have indoor gas and indoor soil gas. I'd like the Air Force to address how the cap design works with the active rail next to it. It just seems like the continued activity and motion from the rail, the rail is extremely active, doesn't work well with the cap. As you design it, I think you need to consider that. You mentioned the ICs and the costs of those. I want it to be clear that the intended property recipients, the people that will get this property from the Air Force, and I guess McClellan Park or the fire department, don't have the fund – the discussions we had with as far as pending oversight costs of the state, the only discussions we've had are that we would pay the costs associated with our use of the property, with our activity. In other words, saying we are using this building as an office building. As it relates to those costs with someone coming out and monitoring, someone doing a repair, someone writing a five-year report, someone making sure the utility company didn't do something, or somebody having a plan in place to answer questions on that, that's entirely the government's costs. Where there is a benign solution, where it's really just a land use control, it doesn't involve an active engineered control, that's where we have said we would in fact entertain the idea of signing this SLUC and paying those costs. Where you have an engineering solution, that's a very active solution, I just don't think it's a practical idea to expect a private party to bear any costs of that or to have any responsibility for the oversight and maintenance of that. Some of the items in there, such as, I guess, radium, has a half life of -- I don't know – 1400 years or something like that. Pretty ridiculous to expect anybody other than a government entity on a landfill to be responsible for maintaining that. It just doesn't make sense. As I said, the rest of the comments we'll put in writing to you. Thank you for having the meeting tonight. Something I haven't seen the Air Force consider is -- is -- I understand your objective for cost savings, to take your proposed cost of $400 million and to drive it as low as you can. What you haven't looked at is you said – you said about a $13 million on the CS 24 from*

capping it as opposed to excavating it and consolidating it. I think if you looked at a blended rate of some of the possible modifications of all of the different -- what did you say -- 12 or 13 landfills and perhaps take into account the comments you've heard, the county's comments on 22 and 24, and so maybe having a total budget of $50 million, it goes to $70 million, but it's more supportive of the seven or nine criteria that are there and still achieve your objective where you have about a 400 percent cost savings in -- I'm just -- would like some insight as to who is driving this cost savings so hard that you are doing things that the community believes are not safe for the environment and the public.

Air Force Response: As a result of feedback from various stakeholders and the community on the Proposed Plan, it was decided to excavate and consolidate CS 024 into the CU at CS 010 rather than proceed with the capping alternative. The remedial alternative now selected for CS 024 is Alternative 6R (Excavation/Treatment/Consolidation at CS 010). For CS 022, the capping remedy has been modified to now include a partial excavation of the site, removing contaminated surface soils down to a maximum depth of 7 feet bgs. A composite cap will be constructed below grade (beginning at 7 feet bgs) with 3 feet of clean soil forming the surface layer. This will result in a relatively flat (on-grade) working surface free of any radiological impacts from contaminated surface soils. The excavated soils will be treated (as necessary) and placed in the CU. For the SAFR site, the remedy has been revised to now clean up the impacted soils to unrestricted cleanup levels. This is a cost-effective change, which will eliminate the long-term monitoring and five-year reporting requirement for this site.

The Air Force agrees that the final design should integrate the future intended use and has therefore met with McClellan Business Park on several occasions to discuss the conceptual design of the caps and to identify issues that need to be considered. End uses such as parking or storage could be constructed on top of the caps.

The conceptual design specifies for vapor barriers to be installed in future buildings constructed within approximately 300 feet of the cap in order to limit potential migration of VOCs and methane gas into indoor air, unless the potential for vapor intrusion is mitigated or sampling and analysis has demonstrated acceptable risk. In addition, SVE will continue to operate until the threat from soil gas has been mitigated. There are no existing enclosed occupied buildings on or adjacent to these proposed capped sites.

The Air Force is responsible for implementing, maintaining, and monitoring the remedial actions, including ICs. Monitoring will be conducted at a frequency agreed upon with the regulatory agencies. For the chosen alternatives, the ICs will remain in effect indefinitely. After property transfer, the State requires a SLUC with the new property owner. The Air Force accepts the long-term costs for conducting the monitoring and maintenance associated with the treatment systems (groundwater and SVE) and the caps, as well as the five-year reviews. The property owner, however, will bear the costs for the ICs associated with the SLUC.

***Mr. Charles Yarbrough**: Charles Yarbrough. I would concur with Gary Collier here. If you are going to -- if McClellan field is just going to be allowed to -- these different sites are going to be capped and nothing done in the future to clean up the sites and they are just going to be buried as is, I think that's a rotten way to go about it and should not be allowed. The idea of excavating it and consolidating it is -- if you were to clean the stuff, treat the soil for the contamination in that, and consolidate it and have a cap, a liner covering the sides and the bottom that would be acceptable if it was treated properly. But the idea of just capping it, leaving it in place, and entombed forever, doesn't cut it. The other thing is area D, the commitment that was made to go back in there when I was the community co- chair in the restoration advisory board should be adhered to. One thing I didn't hear anything about as far as soil vapor goes, soil vapor gases coming up in those buildings that could be constructed by the cap, that should be addressed. That has been a problem in the past here at McClellan field. So, I concur with Gary Collier, I think you ought to be doing something better than just leaving it in place forever. Thank you.*

Air Force Response: Please see the responses above provide to Mr. Zattiero and Mr. Hersh describing how modifications to the proposed remedies have been made based on public input.

The selected alternatives in the Proposed Plan are protective of human health and the environment, and numerous treatment systems are in place to continue soil gas and groundwater cleanup at these sites. Additionally, monitoring and maintenance will be in place to ensure the remedies continue to be protective.

In 1985, a cap was constructed over the disposal pits at the VZ site in OU D. Inspections and maintenance are conducted on a quarterly basis to make sure the cap continues to meet its objectives. In 1986, a groundwater treatment system was installed through the cap to clean up the groundwater beneath the site. The contaminated groundwater is being captured and treated. An SVE system began operation in 1992 and is cleaning contaminated soil gas in the area. There are no buildings in the area of the VZ site cap that are occupied and that are impacted by soil vapor intrusion.

Regarding vapor intrusion into buildings, for the proposed caps, new buildings constructed within 300 feet of the cap will have vapor barriers, and existing buildings will be evaluated for vapor intrusion. Existing SVE systems will continue to operate, and long-term monitoring will be required to verify effectiveness of the cap.

***Ms. Kathy Broderick**: I'm Kathy Broderick, and I'm with the Sacramento County Department of Economic Development at McClellan. Our department is also the designated local reuse authority for both Mather and McClellan. I would first like to say that Sacramento County is committed to working together with all of the McClellan stakeholders to promote property transfer and appropriate reuse of McClellan, while ensuring protection of human health and the environment. As we develop the reuse and McClellan continues to flourish, we are faced with even more difficult challenges such as the focused strategic sites. According to the Air Force, Steve, you mentioned that these constitute about, what, 90 percent of the remaining contamination at McClellan in these 11 unlined burial pits. And some of them contain radiological waste. The county has communicated their concerns to the Air Force as to how these sites will be adequately managed in the long-term while protecting the community's interest and the future of McClellan. In the past, the Air Force was committed to cleaning up their environmental contamination. However, due to new Air Force policies, that no longer appears to be the case. We have evaluated the Air Force's proposed remedial alternatives, and it appears that the selection of a cap for nine of these sites was strongly based on initial Air Force costs and does not consider the true long-term costs. We believe that the proposed plan does not adequately*

take into account all of the redevelopment costs associated with land use restrictions or the relocation of utilities, roadways, and drainage systems or the disruption to tenants and businesses already located here. Furthermore, future property owners will be burdened with ongoing indoor air concerns and become responsible for implementing and oversight of the state land use covenant requirements. As a result, the County of Sacramento strongly opposes the Air Force's preferred remedial alternative number three, the composite cap, at the two critical McClellan redevelopment sites, CS 22 and CS 24. CS 22 is located within the light industrial subdistrict of McClellan. Although this area is proposed for industrial reuse, remedial alternative three could severely inhibit any type of development or construction in that prime undeveloped area. CS 24 is located within the south McClellan district, and its proposed redevelopment includes mixed commercial uses, not just industrial. The south McClellan district represents one of the largest redevelopment efforts at McClellan and includes over $20 million in public and private investment, as well as the construction of over 500,000 square feet of new building space. In addition, the surrounding area serves as a main thoroughfare through the park and is an active transportation corridor. The selection of a cap would severely inhibit redevelopment efforts in this area. It does not appear that selection of alternative three for CS 22 and 24 considers all of the adverse implications associated with a landfill or a burial pit remaining at McClellan. The inability to redevelop these properties could cause them to become idle, thus making them targets for graffiti, vandalism, illegal dumping, and other increased crime. Therefore, the county again requests that the Air Force live up to their commitment and their obligation in cleaning up these landfills. At a nonradiological landfill at the former Mather Air Force Base, post closure maintenance costs for the landfill were grossly underestimated by over $1.5 million. Once again, accurate cost estimate was considered at Mather. The Air Force changed their selected alternative and decided to excavate and remove these wastes. As radiological wastes are identified, some of the landfills here at McClellan, we feel that additional cost considerations should also be included. The Air Force proposed plan of conveying the responsibilities and costs associated with left-behind waste and owners' land use restrictions to future property owners would greatly undermine the tremendous success that we have achieved here at McClellan. Again, the County of Sacramento remains concerned with the health and safety of the surrounding McClellan community as well as the protection of the environment. Therefore, Sacramento County does not accept the Air Force's selection of alternative three and respectfully requests that they reconsider the proposed remedial alternative at CS 22 and CS 24 to excavation and disposal. The Sacramento County Office of Economic Development at McClellan appreciates the opportunity to provide our comments to the strategic sites proposed plan. Thank you.

Air Force Response: This comment addresses several related issues.

The Air Force is still committed to selecting cleanup alternatives that meet the threshold criteria of being protective of human health and the environment and complying with state and federal environmental requirements, while considering all other criteria, including cost effectiveness. The alternative cost estimates do consider long-term costs and are sufficiently accurate for remedy selection under the requirements of CERCLA (+50 percent/-30 percent).

The Air Force has considerable experience with long-term maintenance of caps at McClellan. The asphalt cap at OU B1 and the composite cap at the VZ site have been in place and maintained for more than 10 and 20 years, respectively. Cost estimates for O&M of the caps were based on this experience ($50,000 per cap, per year). Also, an additional 2 percent of the capital cost at each site was included annually to account for significant repairs and maintenance that might be required through time, including cap replacement (FSS FS, Appendix D, Table D-1).

The costs for ICs and long-term O&M incurred in perpetuity are considered in the cost evaluation. As stated in Section 5.1.7 (of the FSS FS document), present worth (as opposed to total cost) is used to estimate expenditures, such as construction and O&M that occur over different lengths of time. This allows costs for remedial alternatives to be compared by discounting all costs to the year that the alternative is implemented. For the FSS FS, the present worth cost is calculated for a period of 30 years. This is generally considered sufficient to compare costs among the alternatives. As described in Sections 5.2.4.7 (of the FSS FS document) (Alternative 3) and 5.2.5.7 (Alternative 5), an additional evaluation was conducted for periods longer than 30 years to further evaluate the impact of long-term costs. Using CS 014 as an example site, the present worth cost for Alternative 3 at 30 years ($3,686,000) would be 77 percent of the cost at 1,000 years ($4,795,000). The present worth cost would be nearly constant after 160 years. For Alternative 5, the present worth cost at 30 years ($17,680,000) would be 95 percent of the cost at 1,000 years ($18,611,000). The present worth cost would be nearly constant after 145 years. Even using a period of 1,000 years, the present worth cost for Alternative 5 is still significantly greater than the present worth cost for Alternative 3.

Note that the annual O&M costs for the engineered cap under Alternative 3 include 2 percent of the initial capital cost (in addition to $50,000 for regular inspection and maintenance). This would allow the cap to be replaced every 50 years. Two percent of the initial capital cost (in addition to $150,000 for regular inspection and maintenance) is also included in the annual O&M costs for Alternative 5 to account for major repairs or full replacement of the CU.

Based on available data, landfill gas is not expected to be a significant issue at these sites. However, inhalation of VOCs in indoor air is a concern. Therefore, the cost estimate for Alternative 3 includes remediation and mitigation of soil gas contamination with O&M of the existing SVE systems and installation of vapor barriers in new construction surrounding the caps (FSS FS, Appendix D, Table D-2).

The Air Force will be responsible for the capital costs and the annual O&M costs associated with the caps. Capital costs for the remedy include relocation of utilities, roads, and drainages as necessary for construction of the caps.

Per Air Force policy, the recipient of the property will be responsible for costs associated with implementation and oversight of the SLUC. These costs are also included in the cost estimate for Alternative 3.

The Proposed Plan does acknowledge the implications on reuse of capped sites if Alternative 3 is selected (4th paragraph of Section I). The property at CS 022 is vacant at this time; therefore, disruption to tenants and businesses already located there would not present an issue. The Air Force will coordinate with the anticipated property recipient to facilitate end use of the property. For these reasons, the Air Force does not anticipate that the cap at CS 022 would inhibit redevelopment efforts.

Based on public comments, the Air Force has revised the remedy for CS 024 from Alternative 3 (Composite Cap with Restricted Land Use) to Alternative 6R (Excavation/Treatment/Consolidation Unit with Restricted Land Use). Although the revised remedy may be more costly, the change was made to better facilitate planned re-development of that site. For CS 022, the capping remedy has been modified to now

include a partial excavation of the site, removing contaminated surface soils down to a maximum depth of 7 feet bgs. A composite cap will be constructed below grade (beginning at 7 feet bgs) with 3 feet of clean soil forming the surface layer. This will result in a relatively flat (on-grade) working surface free of any radiological impacts from contaminated surface soils. The excavated soils will be treated (as necessary) and placed in the CU. For the SAFR site, the remedy has been revised to now clean up the impacted soils to unrestricted cleanup levels. This is a cost-effective change that will eliminate the long-term monitoring and five-year review reporting requirement for this site.

3.2.2 Written Comments Received during the Public Comment Period and Air Force Responses[4]

Ms. Kris Escarda: *Thank you for providing an opportunity for the public to comment on the Air Force's Focused Strategic Sites Proposed Plan.*

In the economic analysis of the proposed alternatives, the Air Force should strongly consider using more than 30 years. I believe it is necessary to determine the cost of maintaining these alternatives in perpetuity, as this is what the proposed remedy calls for. It is possible to use calculus to do this using various interest rates, although I cannot remember how. Additionally, using 30 years to calculate the maintenance costs of the proposed remedies (composite caps and extraction/CU for various sites) does not take into account the eventual failure of the caps nor the lining of the consolidation unit. The CU is proposed to be designed to the highest standards, similar to that of a hazardous waste landfill. I am confident that the Air Force will be able to, with DTSC, RWQCB, and US EPA oversight design and build solid structures. Breakthrough of either the caps or the CU's liner may not occur for 50, 100, 150 years, or more. However, this will eventually happen and the potential significant cost to future generations needs to be fully considered before making a decision. Will the very long-term eventual cost of maintaining and possibly rebuilding these structures (caps and CUs A.K.A. hazardous waste landfill) be greater than gradually, over a period of many years, excavating and disposing (off-site) the contaminants in each of the eleven focused strategic sites (or another alternative).

Also, sites CS-22 and CS-24 are located in areas of commercial development. Are the very long term costs of maintaining the composite caps greater than removing the contents? Perhaps not, but this should be evaluated well beyond 30 years. As for the other sites, can we in 2006 predict with any certainty what the land use needs will be in 2056, 2106, 2156, etc?

I understand and appreciate the enormity of the expense some of the alternatives considered for this cleanup action involve. The Air Force and regulators do not have an easy choice here.

Air Force Response: Please see the response above where we describe the revised remedies for CS 022, CS 024, and the SAFR. The Air Force is committed to selecting cleanup alternatives that meet the threshold criteria of being protective of human health and the environment and complying with state and federal environmental requirements, while considering all other criteria, including cost effectiveness.

The costs for ICs and long-term O&M incurred in perpetuity are considered in the cost evaluation. As stated in Section 5.1.7 (of the FSS FS document), present worth (as opposed to

[4] These comments and the original Air Force responses date from late 2006 and early 2007. Where specific changes in remedy or approach have occurred due to public and regulatory input, revisions to the original responses have been made to reflect this change. The Air Force's current position is reflected in this final version of the ROD. These comments and Air Force responses document the dialogue that occurred between the Air Force, regulatory agencies, stakeholders, and the public.

total cost) is used to estimate expenditures, such as construction and O&M that occur over different lengths of time. This allows costs for remedial alternatives to be compared by discounting all costs to the year that the alternative is implemented. For the FSS FS, the present worth cost is calculated for a period of 30 years. This is generally considered sufficient to compare costs among the alternatives. As described in Sections 5.2.4.7 (Alternative 3) and 5.2.5.7 (Alternative 5), an additional evaluation was conducted for periods longer than 30 years to further evaluate the impact of long-term costs. Using CS 014 as an example site, the present worth cost for Alternative 3 at 30 years ($3,686,000) would be 77 percent of the cost at 1,000 years ($4,795,000). The present worth cost would be nearly constant after 160 years. For Alternative 6, the present worth cost at 30 years ($17,680,000) would be 95 percent of the cost at 1,000 years ($18,611,000). The present worth cost would be nearly constant after 145 years. Even using a period of 1,000 years, the present worth cost for Alternative 5 is still significantly greater than the present worth cost for Alternative 3.

Note that the annual O&M costs for the engineered cap under Alternative 3 include 2 percent of the initial capital cost (in addition to $50,000 for regular inspection and maintenance). This would allow the cap to be replaced every 50 years. Two percent of the initial capital cost (in addition to $150,000 for regular inspection and maintenance) is also included in the annual O&M costs for Alternative 6 to account for major repairs or full replacement of the CU.

***Mr. Roy Zattiero**: Two hour prep talk far too repetitive, three minutes too short for response. USAF (not us) Plan to "cap" unacceptable to all – off site testing not conducted. Water run off concern stated incorrectly, "not important" or covered, creek and environmental concerns must be addressed properly.*

Air Force Response: Please see the response above where we describe the revised remedies for CS 022, CS 024, and the SAFR.

The 3-minute limit during public meeting comment period is designed to focus the comments and provide everyone an opportunity to express comments verbally. While this time period was limited, the public was also encouraged to provide comments in writing, with no limit being imposed. In response to community feedback, the Air Force also extended the public comment period to help ensure that members of the public had ample opportunity to provide written comments.

The proposed caps are protective of human health and the environment. They are designed to consist of multiple layers, are several feet thick, and reduce, if not eliminate, impacts to groundwater by minimizing both migration of contaminants and infiltration of rainwater through the contamination. Ongoing groundwater extraction, treatment, and monitoring ensure that the remedies are protective of human health and the environment. ICs will be in place at these sites to ensure maintenance and prevent exposure to contamination left behind.

The Proposed Plan addresses impacts on the environment. None of the 11 FSS sites provide significant ecological habitat; however, there are three vernal pools adjacent to the SAFR and PRL 008, and there are other vernal pools and creeks adjacent to several of the FSS in OU C and OU D. Potential remedies for the vernal pools and creeks were evaluated in the Ecological Sites FS, and the selected remedies will be identified in the Ecological Sites ROD.

***Mr. Dale Codde**: Prefer cleanup option 5; a site would be excavated and the contaminated soil would be transported to an off base landfill for disposal.*

Air Force Response: Please see the response above where we describe the revised remedies for CS 022, CS 024, and the SAFR.

The Air Force appreciates the comment. The selected alternatives were a result of balancing multiple criteria, including costs. The selected alternatives are protective of human health and the environment. The cap proposed at the FSS will consist of multiple layers, several feet in thickness, which reduce, if not eliminate, impacts to groundwater by minimizing both migration of contaminants and infiltration of rainwater through the contamination. The cap also prevents the type of radiation present at McClellan from passing through it. Additionally, the cap is designed to prevent exposure to the buried waste for the public and workers and minimize settlement.

***Mr. George McCurdy:** For over 20 years we have heard of nothing but 'surveys and studies and so called 'proposes' and the only thing anyone has seen is forcing the local people living far away from the 'so called' contaminated area to be put on public water pumping the same water that everyone uses). That's 20 years of what $100,000 a year, $1,000,000, 50,000,000 and not a shovel of dirt moved other than for landscaping? I guess it's a nice cushy job for someone at tax payers expense. WHERE IS THE END???????? And now you want to dig up and dump contaminated soil in an area close to private residents and an area that is not contaminated? I guess then the people forced onto public water will be living in a contaminated area, RIGHT? I have been to too many of these meetings to hear the same thing "We're spend the money."*

Air Force Response: Please see the response above where we describe the revised remedies for CS 022, CS 024, and the SAFR.

The groundwater contaminated from VOCs at McClellan is not used for drinking water. The Air Force paid to have homes on the western side of the Base hooked up to municipal water supplies in the mid-1980s as a precaution and protective measure. The combination of the Air Force's treatment systems and the City and County ordinances ensures that this water is not being used for consumption.

The selected alternatives at CS 010, SAFR, and now CS 024 consist of a CU, which is proposed to be constructed at CS 010. The location of the future CU is within the CS 010 footprint and not close to a residential area. CS 010 is an area of contamination where material has been excavated and stockpiled. The CU will be engineered with a bottom liner and leachate collection system, and protective composite cap and monitoring will be in place as well as inspection and maintenance of the cap to ensure long-term effectiveness.

For the remaining eight sites, composite caps will be installed, which will prevent exposure to contaminants and reduce the threat of migration to groundwater and surface water.

***Mr. Jerome Borden**: What is the extent of the "vadose" zone? Does it really "stop" at the western edge of the base? Also, not shown in your map, there was ground pollution discovered next to the housing area north of the base and east of Watt Ave. What is the status of the area and is anything being done about it?*

Air Force Response: The VZ site is a group of 11 former disposal pits. All of the disposal pits were located onbase; however, contaminated groundwater and soil gas have migrated off Base boundaries. A groundwater extraction and treatment system has been in operation since 1987 and effectively controls and contains the contaminated groundwater. Additionally, 14 SVE systems exist to-date that treat contaminated soil gas at McClellan.

The housing area known as Capehart Housing has been transferred. There was soil contamination in a small area within Capehart Housing, which was caused by a gas station, used when McClellan was an active facility. The Air Force conducted sampling in that area and installed cleanup systems to remove the contamination at Capehart. The Air Force and regulatory agencies have concurred that cleanup of this site is complete. Remedial actions and closure activities at Capehart Housing are not related to this ROD.

***Mr. Gary Collier**: I would like to thank the Air Force Real Property Administration (AFRPA) for their exemplary candor and forthright exposure of the risks and hazards associated with the proposed cleanup of the Strategic Sites.*

The AFRPA readily admits that there is a substantial likelihood that a variety of radioactive waste, including plutonium, are buried within these large volume sites which were operated since the early beginnings of the nuclear era.

I find it troubling that a Federal agency can spend untold millions of dollars for over twenty years to analyze risks associated with the contaminants of concern, to come the conclusion that it's too expensive to eliminate hazards to the community.

It is ironic and inexcusable that the AFRPA can propose to forgo complete characterization of these sites when one site, CS10, has previously been give a "time critical" status as a result of the presence of plutonium.

The AFRPA's proposed cleanup option fails to protect the interests of the public and utterly fails to eliminate potential health risks associated with the likely predicted presence of plutonium, cesium, and other contaminants of concern.

The AFRPA appears intent on pursuing a public policy of abject neglect of their responsibilities of true cleanup. The AFRPA should pay for an ongoing independent testing of adjunct municipal and agricultural water supplies.

The current water testing program as implemented by the City of Sacramento is grossly inadequate to protect the community from adverse risk. The city fails to conduct testing of water on a quarterly basis as the Air Force did when the base was active. In addition, the city does not test for all contaminants of concern.

I believe it is incumbent upon the EPA to preclude the AFRPA and the Department of Defense from adopting their perverted "cleanup" option. If the EPA adopts the proposed cleanup, it will set an unprecedented example of what major municipalities will experience when an urban terrorist explodes a dirty bomb (nuclear). According to the Air Force scenario and reduction in contamination is "cleanup." A reduction of exposure is not an elimination of exposure, and our community deserves better.

In weighing these issues, the EPA should consider heavily the facts in the AR wherein the AFRPA never had a permit or governmental approval to tip liquid wastes. The AFRPA should not be rewarded for their abject malfeasance in the distant past nor for their intransigence. If the Air Force had obeyed environmental laws rather than assuming they were above the law then cost would not be an issue.

I would also like to point out that the cost estimates for the inferior "cover up" cleanup appears to neglect the enormous potential cost to the treating for medical treatment for health impacts as a result of a failure to perform due diligence in cleanup of these sites.

The inferior "cover up" cleanup option will be instead a protracted blighting influence in perpetuity for this community. This community was promised a cleanup yet this option will cast a negative economic image of the surrounding community. This proposed plan is not true cleanup but a sorry excuse for governmental failure.

Thank you for your consideration.

Air Force Response: Disposal pits are heterogeneous by nature and complete characterization cannot reasonably or practically be achieved. Even though a level of uncertainty exists, CS 010 was fully characterized upon excavation. A plutonium source was found in a sealed vial when CS 010 was excavated; however, plutonium was found in soil at CS 010 in only 1 out of 900 samples that were collected during excavation. Because of the time period in which CS 010 was in operation and received wastes, it is considered to represent a reasonable worst-case scenario for radionuclides. The presence of plutonium at the other disposal pits is possible, but unlikely. The Air Force has selected a remedy assuming a reasonable worst-case scenario. The remedy is a result of balancing multiple criteria, including costs.

The proposed cap is designed to be several feet thick and will not allow for the type of radiation present at McClellan to penetrate the engineered layers. The cap prevents exposure to human and ecological receptors at the surface. The cap reduces, if not eliminates, impacts to groundwater by minimizing migration of contaminants and infiltration of rainwater. The extent of the groundwater contamination as a result of the disposal pits is well defined. Radionuclides have not been detected in groundwater. The groundwater contamination from McClellan (and the disposal pits) does not extend to city wells. Groundwater is not used as a source of drinking water. The contaminated groundwater at McClellan is being treated and contained, and the Air Force has an ongoing groundwater monitoring program, which will continue in the future.

The release of contaminants at McClellan preceded today's environmental laws, CERCLA and RCRA; however, the Air Force is committed to selecting cleanup alternatives that are protective of human health and the environment and comply with state and federal environmental requirements, while considering all other criteria, including cost effectiveness. The Air Force is also obligated to select a cost-effective remedy that is protective of human health and the environment and complies with environmental laws. The Air Force is working with future anticipated property owners to facilitate use of the proposed capped sites.

California Fire and Rescue Training Authority (CFRTA)/Joint Powers Authority (JPA):

Background

The California Fire and Rescue Training Authority (CFRTA) is a Joint Powers Authority (JPA) that includes three member agencies:

1. Sacramento City Fire Department (SFD)
2. Sacramento Metropolitan Fire District (SMED)
3. Governor's Office of Emergency Services, Fire and Rescue Branch (California OES)

The initial purpose of this JPA was to develop and manage a Regional Training facility on approximately 90 acres of property. During the Base Realignment and Closure Act process at the former McClellan AFB, the US Air Force met with the JPA and agreed to provide them with a 40-acre property as part of the reuse efforts.

In November 1995, the first strategic plan for the JPA's redevelopment of this property was created. The training facility was anticipated to reach complete build- out in 2001.

Fiscal Impact

Some 11 years has passed and the California Fire and Rescue Training Authority (CFRTA) has yet to achieve any significant progress in our plans for a State-of-the-art Training Facility. After the expenditure of hundreds of thousands of dollars in construction plans, consultant fees, and architectural drawings — we are not much further along than we were 11 years ago.

In 2005, the CFRTA received a lease agreement from the Air Force. The lease included an odd-shaped 18-acre parcel, located in the middle of the most environmentally contaminated sites at McClellan — known in part as the Focused Strategic Sites. In an attempt to build site improvements in this leased area, the JPA has been forced to address unforeseen construction impediments and consider expensive development alternatives. For much of 2006, the CFRTA has been in a plan review process with the Air Force and County of Sacramento for permits to begin construction on our leased site. However, in light of the Air Force's proposed cleanup plan for the Focused Strategic. Sites, we are reluctant to continue with our pans to utilize this property.

The California Fire and Rescue Training Authority View of the Air Force Plan

The ramifications of the Air Force's plans for remediation are critical to the existence of the California Fire and Rescue Training Authority. Here is a list of some (but not all) of our concerns with the Air Force proposal for remediation at the Focused Strategic Sites:

1. *What will be the timeframe for cleanup? We have seen an estimated completion date of 2011.*
2. *What will be the priorities? Which sites come first?*
3. *The plan calls for a composite cap of most sites and a consolidation at CS10. What will be the depth of the caps? (Finished elevation relative to existing grade)*
4. *What will be the ability to excavate through the cap — what depth, if at all?*
5. *What will be the size and type of structures allowed in and around the capped area?*
6. *What will be the property-use restrictions? (Controls or limits?)*
7. *There are existing buildings and training props in the area — some in potential capped areas. Will there be compensation if removal or relocation of buildings and/or props is required?*

8. *The CFRTA has spent more than $200,000 to date on plans and fees to develop about 9 acres of our 18-acre leased area. Those plans are on hold arid our expenditures may be lost pending the outcome of the Air Force cleanup plan. Will the JPA be compensated?*

9. *The CFRTA is concurrently moving forward to mitigate vernal and wetland areas (less than ¼ acre) in the northern end of our 18-acre leased area. The process will be completed by January 2007. The estimated total cost for this mitigation is approximately: $400,000. Located directly below this wetland area is contaminated site: PRL 033. The CFRTA is paying to mitigate the wetlands located over PRL 033. Will the Air Force compensate the CFRTA for the wetland mitigation expenses?*

10. *Will the cap incorporate a drainage plan that will allow for the appropriate flow of water off the site? (For example; Fire Department Training evolutions)*

11. *WiIl the cap include a final paved surface (concrete or asphalt), capable of supporting fire fighting apparatus?*

12. *Who will be responsible for the long-term management and regulatory agency oversight of the capped sites? Will the management and oversight associated with these sites be in perpetuity?*

13. *Will the infrastructure in the final capping plan include utilities (water, sewer, storm drains, communications conduits), which will prevent or minimize future breaches in the final cap?*

14. *A statement was made at the public forum that caps may need to be replaced on a "conservative 50-year cycle". Is there a plan for that inevitability?*

15. *Who will sign and be responsible for "State Land Use Covenant"?*

16. *When the cleanup process is complete, who will hold title to the land?*

17. *Will the CFRTA be allowed to participate in the planning process (for capping) to help insure that our input and needs are addressed as requested?*

The California Fire and Rescue Training Authority supports the Air Force Proposed Cleanup Plan as long as the above items are addressed to our satisfaction. The JPA has been a patient and cooperative partner in the long process that began for us in 1995. We look forward to a partnership with the Air Force through the cleanup process and develop a useable site for our Training Facility. The JPA appreciates this opportunity to provide comment and suggestions as the process continues.

Air Force Response: Responses to specific comments are provided below.

1. Currently, the design of the remedy is scheduled to begin in 2012, and construction would occur from 2013 to 2014.

2. Within the CFRTA area, the only currently identified priorities are the removal of the clean soil from on top of PRL 008 and construction of the CU at CS 010. The Air Force is willing to discuss this issue with CFRTA with the goal of developing a priorities list that best accommodates both parties.

3. The high point for the caps to be constructed over CS 010 through CS 014 and PRL 008 is anticipated to be approximately 6 to 8 feet above the surrounding grade. The high point will be in the middle of the cap, and the height of the caps will taper off to the sides at approximately a 3 percent slope. At the sides of the caps, the height will only be about 1 foot above the surrounding grade. Additional details on slopes and finished elevations

can be found in the Focused Strategic Sites Conceptual Design Technical Memorandum. If the cap height and/or slope are a concern to CFRTA, it is possible that the design of the cap could be altered to provide a lower and/or flatter working surface.

4. Excavation through the cap would be possible, but difficult. It would require detailed planning, approval, and close supervision by the Air Force and the regulatory agencies, and reconstruction of all elements of the cap (i.e., cover layer, drainage layer, liner) following excavation. Ideally, the Air Force would prefer to work with the CFRTA during the design phase to identify areas where subsurface infrastructure (e.g., utility corridors) may be required and incorporate installation of that infrastructure into the design and construction of the caps. Hopefully, this approach would negate or minimize the need for any future excavation within the caps.

5. From an engineering standpoint, any size and type of structure could be accommodated on top of a cap, provided that the cap and building are designed appropriately and in coordination with one another, and that sufficient time and funds are available. The Air Force is committed to working with the CFRTA to ensure that to the extent practicable the design and implementation of the remedies support CFRTA's planned future use of the area. Based on the plans (McClellan Regional Fire and Rescue Training Facility, Multi-year Development Plan, May 1998) provided to the Air Force by CFRTA, it appears that the size and type of buildings planned for the area could be accommodated. Close coordination between the Air Force and CFRTA during the design process would be necessary to integrate CFRTA's requirements into the cap design.

6. Property use restrictions will consist of no residential development, no subsurface excavation without approval, and no disturbance or removal of remedy components (e.g., the cap, monitoring wells). CFRTA will also be required to provide the Air Force and regulatory agencies access to the site for inspection, monitoring, and maintenance purposes.

7. The existing firefighting training tower located at the northern end of CS 012 is the only structure of any significance that is currently located within an area that may need to be capped. It is unclear whether CS 012 actually extends as far north as the tower. Additional investigation is planned for this area to better define the extent of CS 012. If waste associated with CS 012 does extend near or under the existing tower, the tower may have to be moved or demolished. If the tower needed to be moved, it would be at the expense of the Air Force. Likewise, if the tower needed to be demolished, replacement of the tower (at either the existing location or a new location) would be at the expense of the Air Force.

8. No. However, it is the Air Force's intent to move forward with the remedy identified in the Proposed Plan (and to be finalized in the ROD). The Air Force will continue to work with CFRTA to integrate the remedial action with CFRTA's development and future use of the site.

9. PRL 033 is not one of the FSS addressed by the FSS Proposed Plan and ROD. However, a review of the existing data for PRL 033 indicates that the remedy for this site would be limited to ICs. No excavation or soil removal by the Air Force is required, and the Air Force would not need to disturb the existing wetlands. Therefore, at this time, the

Air Force does not anticipate compensating CFRTA for any wetland mitigation expenses.

10. The design of the cap will incorporate a drainage plan to ensure that precipitation-derived surface water is properly removed from the capped area. It is the Air Force's understanding that firefighting training exercises conducted by CFRTA using water for fire suppression would be conducted in contained areas that would collect and recycle the water. If the discharge of large volumes of water is envisioned, additional drainage features may need to be designed and installed. The Air Force is willing to discuss this situation with CFRTA.

11. The finished surface of the caps would typically consist of a vegetated surface (i.e., grass). However, some paved roads and parking areas would be required to facilitate access for monitoring and inspection. The Air Force is committed to working with the CFRTA to ensure that to the extent practicable the design of the remedy supports CFRTA's planned future use of the area. To that end, the Air Force is willing to consider making paved areas of sufficient strength to support firefighting apparatus and/or incorporating some additional areas of pavement into the final design to better facilitate CFRTA's use of the property. Coordination between the Air Force and CFRTA during the design process would help to facilitate meeting the needs of both parties.

12. The Air Force will retain the responsibility for maintaining and monitoring the remedy. CFRTA would be responsible for implementing and signing the SLUC in coordination with the DTSC. CFRTA would be responsible for paying DTSC's oversight costs. Management and oversight would continue in perpetuity.

13. To the extent practicable, the Air Force would like to incorporate these features into the original design. Please see Response to Comment No. 4.

14. The conservative cost estimates developed during the FS assumed a 50-year replacement cycle for the caps. This was a conservative estimate for costing purposes only. The actual lifespan of the caps is expected to be much greater than 50 years. However, if a cap or a portion of a cap requires replacement at some time in the future, the Air Force would retain the responsibility for replacement, including restoration of the surface to pre-replacement conditions.

15. CFRTA would be responsible for implementing and signing the SLUC in coordination with the DTSC.

16. Following completion of the remedy (i.e., construction of the caps and CU), the Air Force intends to transfer the title to the property to CFRTA.

17. As indicated in previous responses, the Air Force is committed to working with the CFRTA to ensure that to the extent practicable the design and implementation of the remedies support CFRTA's planned future use of the area. Close coordination between the Air Force and CFRTA during the planning process would be necessary to facilitate this objective; therefore, the Air Force would welcome CFRTA's participation in the planning process.

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TABLE 1
Previous Investigations at CS 010
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at sites CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. The analytical methods used are unknown, and no quality assurance/quality control (QA/QC) data are available for this investigation.
1989, Radian Corporation	Landfill gas sampling was conducted at sites CS 010 through CS 014 as part of Phase 1 solid waste assessment test (SWAT). Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected in samples from all five sites. The maximum concentration of 56,000 parts per billion by volume (ppbv) of vinyl chloride was detected in CS 012. Methane gas was detected at percent levels in samples from CS 011, CS 012, and CS 013.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples collected from creeks that flow past sites CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and to identify sources of contamination. Surface and subsurface soils were scanned for gamma radiation.	A geophysical investigation indicated buried metal beneath CS 010, including buried drums (some with radiation placards). Surface scanning of CS 010 showed readings greater than the established investigation level over a broad area. Analysis of soil samples collected at CS 010 showed radium 226, halogenated volatile organic compounds (HVOCs), dioxins, PCBs, pesticides, metal greater than background, and TPH. Analysis of soil gas samples showed VOCs at less than 600 ppbv and TPH at concentrations less than 50,000 ppbv. Analysis of groundwater samples beneath IC 19 showed VOCs greater than MCLs.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	CS 010 consists entirely of bare ground and therefore lacks habitat. CS 010 was recommended for No Further Ecological Investigation (NFEI).
1999, URS Corporation	Data Gap Investigation conducted to define extent of disposal pit, to determine presence and concentration of landfill gases, and to determine the presence, type, and concentrations of radiological contamination.	Soil gas samples were analyzed for fixed gases and VOCs. Soil samples were analyzed for radionuclides (gamma spectroscopy). The disposal pit was found to be larger than previously mapped.
2000, URS Group, Inc.	Non-TCRA to reduce the risk posed by drums discovered to be buried at CS 010.	The non-TCRA was halted when a 20-gallon drum containing vials of plutonium was discovered.
2001-2003, URS Group, Inc.	TCRA to excavate and dispose of waste materials and contaminated soil from CS 010.	Soil samples were collected for soil screening and disposal profiling. A total of 51,273 cy of soil and debris was excavated. A total of 27,864 cy was shipped to disposal facilities. Currently, 23,409 cy of soil and debris remains stockpiled at the site under the weatherization tent.

TABLE 2
Previous Investigations at CS 011
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at sites CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. The analytical methods used are unknown, and no QA/QC data are available for this investigation.
1989, Radian Corporation	Landfill gas sampling conducted at sites CS 010 through CS 014 as part of Phase 1 SWAT. Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected in samples from all five sites. The maximum concentration of 56,000 ppbv of vinyl chloride was detected in CS 012. Methane gas was detected at percent levels in samples from CS 011, 012, and 013.
1989, Radian Corporation	Basewide investigation of surface soil vapor for potential organic contamination. The five sites in IC 19 were investigated together.	Maximum HNu® results were 100 ppbv; maximum organic vapor analyzer (OVA) results were 205 ppmv. Both high results were in the CS 012 area; however, both were near the Contaminated Soils Holding Area.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples collected from creeks that flow past sites CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and identify sources of contamination.	The RI document identified a disposal pit source area that includes sites CS 011 through CS 014. It is currently assumed that both the disposal pits and the FTA contribute to the VOC contamination. The VOCs in this area have migrated from the disposal pits into the soil gas and groundwater. The VOCs include vinyl chloride, 1,1-DCE, PCE, TCE, cis-1,2-DCE, and Freon 12. Each pit also contains soil contamination, including detectable concentrations of dioxins/furans, PCBs, and TPH and concentrations of inorganic species greater than background.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	CS 011 consists entirely of bare ground and therefore lacks habitat. CS 011 was recommended for NFEI.
1996, Shura and Fuller	Radiological surface scanning.	No anomalous surface radioactivity was found in the scanned portion.
1998, Radian International	Data Gap Investigation to determine the extent of the disposal pits, the presence and concentration of decomposition gases, and the presence and type of radioactive contamination.	The pit boundaries have not been defined. The top of the buried waste material within the disposal pits is deeper than originally anticipated. The cover material is not clean soil, but is fill interspersed with waste material. Layers of fuel-contaminated soil and Purple K fire retardant were widespread in shallow soils above the disposal pits throughout IC 19. Landfill gases and vinyl chloride are present and do not appear to be affected by the IC 19 SVE system. Radionuclides are present only at low concentrations roughly consistent with background. However, like all disposal pits at McClellan, these sites are considered suspect for radiation.

TABLE 3
Previous Investigations at CS 012
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at sites CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. The analytical methods used are unknown, and no QA/QC data are available for this investigation.
1989, Radian Corporation	Landfill gas sampling conducted at sites CS 010 through CS 014 as part of Phase 1 SWAT. Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected at all five sites. The maximum concentration of 56,000 ppbv of vinyl chloride was detected in CS 012. Methane gas was detected at percent levels in samples from CS 011, CS 012, and CS 013.
1989, Radian Corporation	Basewide investigation of surface soil vapor for potential organic contamination. The five sites in IC 19 were investigated together.	Maximum HNu® results were 100 ppbv; maximum OVA results were 205 ppmv. Both high results were in the CS 012 area; however, both were near the Contaminated Soils Holding Area.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples that were collected from creeks that flow past sites CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1993, CH2M HILL	Phase 2 SWAT included collecting 12 surface emission samples at CS 012.	Very low levels of VOCs (maximum of 0.75 ppbv) were detected; methane was detected at about 2,000 ppbv.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and to identify sources of contamination.	The RI document identified a disposal pit source area that includes sites CS 011 through CS 014. It is currently assumed that both the disposal pits and the FTA contribute to the VOC contamination. The VOCs in this area have migrated from the disposal pits into the soil gas and groundwater. The VOCs include vinyl chloride, 1,1-DCE, PCE, TCE, cis-1,2-DCE, and Freon 12. Each pit also contains soil contamination, including detectable concentrations of dioxins/furans, PCBs, and TPH and concentrations of inorganic species greater than background.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	CS 012 consists entirely of bare ground and therefore lacks habitat. CS 012 was recommended for NFEI.
1996, Shura and Fuller	Radiological surface scanning.	No “anomalous” surface radioactivity was found in the scanned portion.
1998, Radian International	Data Gap Investigation to determine the extent of the disposal pits, the presence and concentration of decomposition gases, and the presence and type of radioactive contamination.	The pit boundaries have not been defined. The top of the buried waste material within the disposal pits is deeper than originally anticipated. The cover material is not clean soil, but is fill interspersed with waste material. Layers of fuel-contaminated soil and Purple K fire retardant were widespread in shallow soils above the disposal pits throughout IC 19. Landfill gases and vinyl chloride are present and do not appear to be affected by the IC 19 SVE system. Radionuclides are present only at low concentrations roughly consistent with background. However, like all disposal pits at McClellan, these sites are considered suspect for radiation.

TABLE 4
Previous Investigations at CS 013
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. No QA/QC data are available for this investigation, and the analytical methods used are unknown.
1989, Radian Corporation	Landfill gas sampling conducted at sites CS 010 through CS 014 as part of Phase 1 SWAT. Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected at all five locations. The maximum concentration of 56,000 ppbv of vinyl chloride was detected in CS 012. Methane gas was detected at percent levels in samples from sites CS 011 through CS 013.
1989, Radian Corporation	Basewide investigation of surface soil vapor for potential organic contamination. The five sites in IC 19 were investigated together.	Maximum HNu® results were 100 ppbv; maximum OVA results were 205 ppmv. Both high results were in the CS 012 area; however, both were near the Contaminated Soils Holding Area.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples collected from creeks that flow past CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1993, CH2M HILL	Phase 2 SWAT included collecting 12 surface emission samples at CS 012.	Very low levels of VOCs (maximum of 0.75 ppbv) were detected; methane was detected at about 2,000 ppbv.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and to identify sources of contamination.	The RI document identified a disposal pit source area that includes sites CS 011 through CS 014. It is assumed that both the disposal pits and the FTA contribute to the VOC contamination. The VOCs in this area have migrated from the disposal pits into the soil gas and groundwater. The VOCs include vinyl chloride, 1,1-DCE, PCE, TCE, cis-1,2-DCE, and Freon 12. Each pit also contains soil contamination, including detectable concentrations of dioxins/furans, PCBs, and TPH and concentrations of inorganic species greater than background.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	CS 013 consists entirely of bare ground and therefore lacks habitat. CS 013 was recommended for NFEI.
1996, Shura and Fuller	Radiological surface scanning.	No “anomalous” surface radioactivity was found in the scanned portion.
1997, Radian International	Radiation Summary Report.	Recommendation of possible investigation of CS 013 to determine the presence or absence of subsurface radionuclides.

TABLE 4
Previous Investigations at CS 013
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1998, Radian International	Data Gap Investigation to determine the extent of the disposal pits, the presence and concentration of decomposition gases, and the presence and type of radioactive contamination.	The pit boundaries have not been defined. The top of the buried waste material within the disposal pits is deeper than originally anticipated. The cover material is not clean soil, but is fill interspersed with waste material. Layers of fuel-contaminated soil and Purple K fire retardant were widespread in shallow soils above the disposal pits throughout IC 19. Landfill gases and vinyl chloride are present and do not appear to be affected by the IC 19 SVE system. Radionuclides are present only at low concentrations roughly consistent with background. However, like all disposal pits at McClellan, these sites are considered suspect for radiation.

TABLE 5
Previous Investigations at CS 014
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. No QA/QC data are available for this investigation.
1989, Radian Corporation	Landfill gas sampling conducted at sites CS 010 through CS 014 as part of Phase 1 SWAT. Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected at all five locations. The maximum concentration of 56,000 ppbv of vinyl chloride was detected in CS 012. Methane gas was detected at percent levels in samples from sites CS 011 through CS 013.
1989, Radian Corporation	Basewide investigation of surface soil vapor for potential organic contamination. The five sites in IC 19 were investigated together.	Maximum HNu® results were 100 ppbv; maximum OVA results were 205 ppmv. Both high results were in the CS 012 area; however, both were near the Contaminated Soils Holding Area.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples collected from creeks that flow past CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and to identify sources of contamination.	The RI document identified a disposal pit source area that includes sites CS 011 through CS 014. It is currently assumed that both the disposal pits and the FTA contribute to the VOC contamination. The VOCs in this area have migrated from the disposal pits into the soil gas and groundwater. The VOCs include vinyl chloride, 1,1-DCE, PCE, TCE, cis-1,2-DCE, and Freon 12. Each pit also contains soil contamination, including detectable concentrations of dioxins/furans, PCBs, and TPH and concentrations of inorganic species greater than background.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	CS 014 consists entirely of bare ground and therefore lacks habitat. CS 014 was recommended for NFEI.
1996, Shura and Fuller	Radiological surface scanning.	No “anomalous” surface radioactivity was found in the scanned portion.
1998, Radian International	Data Gap Investigation to determine the extent of the disposal pits, the presence and concentration of decomposition gases, and the presence and type of radioactive contamination.	The pit boundaries have not been defined. The top of the buried waste material within the disposal pits is deeper than originally anticipated. The cover material is not clean soil, but is fill interspersed with waste material. Layers of fuel-contaminated soil and Purple K fire retardant were widespread in shallow soils above the disposal pits throughout IC 19. Landfill gases and vinyl chloride are present and do not appear to be affected by the IC 19 SVE system. Radionuclides are present only at low concentrations roughly consistent with background. However, like all disposal pits at McClellan, these sites are considered suspect for radiation.

TABLE 6
Previous Investigations at the FTA (AOC 313)
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Investigation of potential contamination at sites CS 010 through CS 014. Ground-penetrating radar surveys were conducted at all five sites, and 64 borings were drilled.	Samples were analyzed for VOCs, PCBs, pesticides, metals, and SVOCs. No QA/QC data are available for this investigation.
1989, Radian Corporation	Landfill gas sampling conducted at sites CS 010 through CS 014 as part of Phase 1 SWAT. Seventeen soil gas probes were driven to depths between 2 and 8 feet bgs.	VOCs (including vinyl chloride) were detected at all five locations. The maximum concentration of 56,000 ppbv of vinyl chloride was detected in CS 012. Methane gas was detected at percent level in samples from sites CS 011 through CS 013.
1989, Radian Corporation	Basewide investigation of surface soil vapor for potential organic contamination. The five sites in IC 19 were investigated together.	Maximum HNu® results were 100 ppbv; maximum OVA results were 205 ppmv. Both high results were in the CS 012 area; however, both were near the Contaminated Soils Holding Area.
1990, Radian Corporation	Basewide investigation of stream water and sediments for potential organic and metal contamination.	Sediment samples collected from creeks that flow past CS 010 and CS 013 contained phenol and oil and grease. However, these results cannot be associated definitively with IC 19.
1994-1996, Radian Corporation	RI of IC 19 to investigate and identify the nature and extent of contamination within the disposal pits and identify sources of contamination.	The RI document identified a disposal pit source area that includes sites CS 011 through CS 014. It is currently assumed that both the disposal pits and the FTA contribute to the VOC contamination. The VOCs in this area have migrated from the disposal pits into the soil gas and groundwater. The VOCs include vinyl chloride, 1,1-DCE, PCE, TCE, cis-1,2-DCE, and Freon 12. Each pit also contains soil contamination, including detectable concentrations of dioxins/furans, PCBs, and TPH and concentrations of inorganic species greater than background.
1995, Jacobs Engineering Group, Inc.	Basewide Ecological Risk Assessment, Scoping Summary Status Report.	The FTA consists entirely of bare ground and therefore lacks habitat. The FTA was recommended for NFEI.
1996, Shura and Fuller	Radiological surface scanning.	No “anomalous” surface radioactivity was found in the scanned portion.
1998, Radian International	Data Gap Investigation to determine the extent of the disposal pits, the presence and concentration of decomposition gases, and the presence and type of radioactive contamination.	The pit boundaries have not been defined. The top of the buried waste material within the disposal pits is deeper than originally anticipated. The cover material is not clean soil, but is fill interspersed with waste material. Layers of fuel-contaminated soil and Purple K fire retardant were widespread in shallow soils above the disposal pits throughout IC 19. Landfill gases and vinyl chloride are present and do not appear to be affected by the IC 19 SVE system. Radionuclides are present only at low concentrations roughly consistent with background. However, like all disposal pits at McClellan, these sites are considered suspect for radiation.

TABLE 7
Previous Investigations at CS 022
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1984-1986, McLaren	Investigation of Area C contamination. Three waste sample borings (22WSB01 through 22WSB03), one cased waste sample boring (22CWS01), three soil sample borings (22SSB01 through 22SSB03), and five DAP borings (22DAP01 through 22DAP05) were completed.	VOCs, oil and grease, and priority pollutant metals were detected in soil.
1989, Radian Corporation	Preliminary Groundwater Operable Unit RI.	Results indicate that CS 022 is a potential source of groundwater contamination.
1991, Jacobs Engineering Group, Inc.	OU C Preliminary Stratigraphic Investigation in conjunction with CH2M HILL for borings in CS 022.	Four borings (22TBR1 through 22TBR4) were drilled. Evaluated the implementability of in situ solidification/stabilization at CS 022. Preliminary determination of stratigraphy of the site and delineation of contamination.
1991–present, Radian Corporation	Groundwater Sampling and Analysis Program.	Results indicate that CS 022 is a potential source of groundwater contamination.
1993, CH2M HILL	Steam Injection Vapor Extraction Treatability Study; installed three piezometers, two temperature wells, two vapor wells, and one groundwater monitoring well.	Evaluated the feasibility of steam-injection vapor extraction.
1995, Jacobs Engineering Group, Inc.	RI for CS 022.	Burn disposal pit was not fully delineated or characterized.
1996, Shura and Faller	Investigation for Gamma Radiation at Former McClellan AFB.	Surface scanning for gamma radionuclides showed a need for more complete investigation.
1998-1999, URS Corp.	Data Gap Investigation at CS 022.	Data gaps related to the speciation of chromium, the presence of landfill gases, and the presence of radionuclides were filled. Data gaps regarding vertical extent of contamination and eastern and southern extents of the pit were partially filled.
2007, Cabrera Services	Radiological Survey of the Rock Crusher Yard.	Gross-gamma walkover survey and MicroRem survey. In situ gamma measurements at 33 locations and soil samples at 8 locations. Elevated radiation was identified at several locations within the Rock Crusher Yard.

TABLE 8
Previous Investigations at CS 024
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren	Five DAPs to 60 feet bgs; two WSBs to 22 feet bgs; one cased waste boring to 80 feet bgs; and four SSBs to 70 feet bgs.	One sample was submitted from each boring. Buried waste was encountered between 6 to 20 feet bgs. Chloroethane to 28 parts per billion (ppb) in 24WSB01 at 8 to18 feet bgs. Ethylbenzene to 270 ppb in 24WSB02 at 20 feet bgs. Toluene to 340 ppb in 24CWS01 at 21 feet bgs. Xylenes to 760 ppb in 24WSB01 at 8 to18 feet bgs. Pentachlorphenol to 1,700 ppb in 24WSB01 at 8 to18 feet bgs. Di(2-ethylhexyl)phthalate to 26,000 ppb in 24WSB01 at 8 to 18 feet bgs. N-nitrosodiphenylamine to 1,800 ppb in 24WSB01 at 8 to 18 feet bgs.
1987, Radian International	Six soil gas probes were installed (2 to 8 feet bgs) as part of a landfill evaluation program.	Analysis was accomplished by a vehicle-mounted field gas chromatograph (GC) with either a thermal conductivity detector or a photoionization detector in series with an electron capture detector. Methyl chloroform at 200 ppbv and TCE at 80 ppbv were reported in shallow soil gas. Methane was not detected. Carbon dioxide was reported at concentrations ranging from not detected to 1.2 percent. Oxygen was reported at concentrations ranging from 6.9 to 20 percent. Nitrogen was reported at concentrations ranging from 69 to 76 percent.
1989, Radian International	Ground surface soil gas screening 3 inches above unpaved surfaces.	Photoionization detector = 7 ppmv background upwind 15 ppmv maximum on traverse OVA = 1.5 ppmv background upwind 1.8 ppmv maximum on traverse
1990, Radian International	Thirty-two soil gas probes installed (4 to 6 feet bgs).	Analysis by field GC. p-Xylene in six probe samples up to 511,000 ppbv in 24P08; trans-1,2-DCE up to 114 ppbv in 24P32; chloroform and 1,1,1-TCA up to 111 ppbv in 24P24; and TCE up to 2,280 ppbv in 24P21.
1990, Radian International	Four soil borings (24B01 through 24B04) to 80 feet bgs.	Five samples from each boring were analyzed for VOCs; one sample from each boring was analyzed for metals, dioxins, and dibenzofurans; downhole soil and soil gas samples were collected and analyzed. Results: • Chlorobenzene to 930 ppb in 24B01 at 24 feet bgs • Trans-1,2-DCE to 720 ppb in 24B01 at 64 feet bgs • TCE to 280 ppbv in 24B04 at 70 feet bgs • Heptachlordibenzodioxin to 3.8 ppb in 24B01 at 15 feet bgs • Hexachlorodibenzodioxin to 0.86 ppb in 24B01 at 15 feet bgs • Octachlorodibenzodioxin and TCDD to 0.86 ppb in 24B01 at 15 feet bgs • 4,4'-DDE to 1.1 ppb in 24B01 at 9.5 feet bgs • 186,000 ppbv TCE in 24B04 at 61 feet bgs • 8,990 ppbv benzene in 24B01 at 24 feet bgs • 8,365 ppbv toluene in 24B01 at 24 feet bgs • 358,425 ppbv total xylenes in 24B01 at 24 feet bgs

TABLE 9
Previous Investigations at PRL 008
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1985, McLaren Environmental Engineering	Two ground-penetrating radar transects (total length 250 feet) completed inside PRL 008 berms. Trenching performed north and south of the landfill.	Determined the northern and southern boundaries of the disposal pit.
1986, McLaren Environmental Engineering, Inc.	Investigation of potential contamination. Eighteen soil borings were drilled.	Samples were analyzed for VOCs, SVOCs, pesticides, and metals. Maximum concentrations detected were VOCs at 320 mg/kg, oil and grease at 6,170 mg/kg, and SVOCs at 1,300 µg/kg. Debris included wood, plastic, glass, and metal.
1988, McClellan AFB-EM	Nine soil borings were collected from fill material to backfill the pit at PRL 008.	Low levels of VOCs, SVOCs, and metals were detected in fill material. Cadmium, mercury, lead, and selenium were the only metals reported greater than subsurface background concentrations.
1989, Radian Corporation	Phase 1 SWAT. Ten probes were driven to 2 to 8 feet bgs.	Maximum concentrations detected in soil gas were VOCs at 120,000 ppbv in samples.
1992, Radian Corporation	Preliminary groundwater OU RI to determine hydrogeologic characteristics beneath Former McClellan AFB. MWs 188, 189, and 190 were installed.	VOCs below MCLs were detected in groundwater.
1992, CH2M HILL	Phase 2 SWAT included collecting 12 surface emission samples at PRL 008.	Very low levels (<2 ppbv) of TCE, PCE, and carbon tetrachloride were detected, as well as methane at approximately 2,000 ppbv.
1994-1997, Radian International	RI of PRL 008.	VOCs were reported in soil gas and groundwater; dioxins, PCBs, pesticides, and metals were reported in soil, and TPH was reported in soil and soil gas.

TABLE 10
Previous Investigations at SAFR
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1993, CH2M HILL	Conducted preliminary assessment of sites and locations in OU C.	Identified the soil pile as contaminated but recommended a quick fix to remove and dispose of the soil pile to eliminate the threat of contamination.
1994, Radian Corporation	Phase 1 RI conducted to evaluate the nature and extent of contamination.	Identified lead and copper in sediments at levels exceeding the PRGs. Lead, copper, and other metals were identified above background in the soil pile and backstop areas. Lead and copper also exceeded the total threshold limit concentration. The extent of contamination was not determined.
1998, Radian International	Data Gap Investigation FSP recommended additional sampling to fill data gaps.	Initial data gap investigation was conducted; the extent of contamination was greater than expected, and additional step-out locations were recommended.
2000, URS	Additional step-out samples collected to complete the Data Gap Investigation.	The nature and extent of metals contamination were defined.
2001, URS	Soil pile was removed for use in the soil washing technology demonstration.	No samples were collected following the soil removal. The remaining extent and location of contaminated soil in the soil pile area are undefined.

TABLE 11
Previous Investigations at the Vadose Zone
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Year, Contractor	Scope of Investigation	Key Findings
1984, CH2M HILL	Shallow Exploration Investigation.	The highest total VOC masses, 10,599 and 3,688 kg, were identified within CS 002 and CS 005, respectively, indicating that the highest VOC concentration is in the middle of the site. The highest VOC reading was reported in the northern CS T disposal pit. The areas with the highest concentrations of SVOCs are the CS 002 and CS 005 disposal pits with the highest level of SVOCs detected under the CS T disposal pit. The highest total metal concentrations were reported beneath the CS 002 disposal pit and beneath the CS 005 disposal pit. The contaminant concentrations appear to decrease with depth. The contaminants encountered at 50 to 60 feet bgs are believed to be part of the smear zone.
1984-1994, CH2M HILL	RI.	Soil, soil gas, and groundwater samples were collected throughout OU D. Based on the findings, a protective cap was placed on adjacent disposal pits, and groundwater extraction and soil gas treatments were implemented.
1991, CH2M HILL	Soil gas investigation to determine the lateral extent of VOC contamination.	A field photoionization detector was used to determine the lateral extent of VOC contamination. The highest concentrations were reported beneath CS 002 and CS 005.
1996, EPA	A radiological scan of the Former McClellan AFB to identify locations with anomalous gamma radiation intensities.	No “anomalous” surface radioactivity was found in the area. The EPA scan results were not used to classify the sites.

TABLE 12a

CS 010 Site Characterization Summary Table - Non-VOCs in Stockpiled Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]	Screening Levels[b]			
					Protection of Human Health	
			Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
Metals[c]						
Arsenic	mg/kg	**107**	**5.8E-01**	**3.3E+00**	**9.3E-02**	**1.4E+00**
Barium	mg/kg	2,671	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Cadmium	mg/kg	**990**	**2.2E+00**	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium	mg/kg	1,328	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Lead	mg/kg	**153,827**	**2.9E+01**	**4.3E+03**	**1.5E+02**	**8.0E+02**
Selenium	mg/kg	82	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	**629**	**2.3E+01**	3.5E+03	**1.7E+02**	4.6E+03
Radionuclides						
Americium 241	pCi/g	--	4.8E+02	1.5E+03	1.9E+00	5.7E+00
Cesium 137[d]	pCi/g	**3**	6.4E+03	2.0E+04	**2.8E-01**	**2.8E-01**
Radium 226	pCi/g	**7,084**	**1.6E+02**	**5.0E+02**	**1.1E+00**	**1.1E+00**
Summary of COCs						
silver, arsenic, cadmium, lead, radium 226						

[a]Maximum concentrations detected during the TCRA.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

137) has been removed from the site and transported offsite for disposal. Cesium 137 is no longer considered a COC for CS 010.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 12b

CS 011 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Benzo(a)anthracene	mg/kg	--	--	0.16	1.4E-01	1.3E+01	8.8E-02	8.8E-01
Benzo(b)fluoranthene	mg/kg	--	**0.25J**	0.63	1.4E-01	2.9E+00	**1.1E-01**	8.8E-01
Benzoic acid	mg/kg	--	--	45	9.0E+05	> 1.0E+06	1.4E+03	> 1.0E+06
Benzyl alcohol	mg/kg	--	0.18	--	NA	1.8E+05	6.1E+01	2.4E+05
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	--	**86**	50	5.8E+01	2.5E+02	**1.2E+01**	9.6E+01
Butylbenzylphthalate (BBP)	mg/kg	--	0.12	--	9.6E+01	1.2E+05	3.1E+01	7.0E+02
Chlordane, gamma	mg/kg	--	0.0019	--	1.8E-02	6.5E+00	4.3E-01	5.2E+00
DDT	mg/kg	--	0.0012	--	1.9E-02	7.0E+00	4.7E-01	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	6	0.93	7.7E+02	4.1E+03	1.9E+02	3.9E+03
1,3-Dichlorobenzene	mg/kg	--	1.9	0.27	1.3E+04	2.1E+03	7.6E+01	1.9E+03
1,4-Dichlorobenzene	mg/kg	--	**4.2**	0.49	1.6E+02	5.2E+02	**1.5E-02**	**1.5E-01**
Dieldrin	mg/kg	--	**0.0067**	--	4.5E-03	1.1E-01	**5.8E-03**	1.1E-01
Diethylphthalate (DEPH)	mg/kg	--	0.14	0.14	9.6E+01	4.9E+05	6.1E+02	3.8E+05
2,4-Dimethylphenol	mg/kg	--	1.4	2	1.3E+04	1.2E+04	1.3E+01	9.6E+03
Dimethylphthalate (DMPH)	mg/kg	--	0.34	--	9.6E+01	> 1.0E+06	2.4E+03	> 1.0E+06
Di-n-butylphthalate (DNBP)	mg/kg	--	0.21	3.1	9.6E+01	6.2E+04	9.3E+02	4.8E+04
Endosulfan I	mg/kg	--	0.02	--	1.8E+00	3.7E+03	3.4E+01	3.9E+03
Endrin aldehyde	mg/kg	--	0.001	--	1.2E+00	1.8E+02	4.2E+00	2.0E+02
Fluoranthene	mg/kg	--	0.67J	2.9	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Fluorene	mg/kg	--	--	0.24	4.2E+04	2.6E+04	2.4E+02	1.3E+04
2-Methylnaphthalene	mg/kg	--	0.62	0.81	NA	1.9E+02	1.6E+01	1.7E+02
2-Methylphenol	mg/kg	--	0.23	0.87	1.1E+03	3.1E+04	2.0E+01	2.4E+04
4-Methylphenol	mg/kg	--	**45**	1.2	NA	3.1E+03	**1.9E+00**	2.4E+03
Naphthalene	mg/kg	--	0.61J	0.34	6.7E+02	6.4E+01	4.7E-02	6.0E-01
N-nitrosodiphenylamine (NNSPH)	mg/kg	--	0.4	0.19	1.6E+02	3.5E+02	1.8E+00	2.7E+02
PCB-1260	mg/kg	--	**0.15**	1.7	5.4E-03	1.5E+02	**6.3E-02**	5.3E-01
Pentachlorophenol	mg/kg	--	0.47	--	9.0E+00	9.0E+00	5.9E-01	6.2E+00
Phenanthrene	mg/kg	--	0.11	0.92	NA	2.9E+04	2.6E+03	1.1E+05
Phenol	mg/kg	--	0.54	--	6.7E+04	1.8E+05	6.1E+01	1.4E+05
Pyrene	mg/kg	--	--	0.24	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	--	0.000318	--	4.2E-04	3.4E+00	1.3E-03	1.6E-02
1,2,4-Trichlorobenzene	mg/kg	--	0.27	0.24	3.1E+02	2.2E+02	6.9E+00	2.4E+02
TPH								
TPH-G	mg/kg	--	**1,400**	1	1.0E+01	**1.0E+01**	NA	NA
TPH-D	mg/kg	--	**580**	**3,000**	1.0E+02	**1.0E+02**	NA	NA
Metals[c]								
Antimony	mg/kg	--	**160**	77	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Arsenic	mg/kg	--	--	**27**	5.8E-01	**3.3E+00**	9.3E-02	1.4E+00
Barium	mg/kg	--	--	530	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Cadmium	mg/kg	--	**33**	91	2.2E+00	9.6E+01	**6.2E+00**	1.0E+03
Chromium, Total	mg/kg	--	330	1,400	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Cobalt	mg/kg	--	--	20	1.6E+03	4.7E+04	1.0E+01	2.7E+02
Copper	mg/kg	--	440	4,000	1.3E+02	2.5E+05	1.4E+03	3.7E+04
Iron	mg/kg	--	--	**110,000**	9.6E+03	**9.1E+04**	2.4E+04	6.4E+05
Lead	mg/kg	--	**520**	**4,400**	2.9E+01	**4.3E+03**	**1.5E+02**	8.0E+02
Mercury	mg/kg	--	--	15	1.6E+00	1.2E+02	3.5E+00	1.5E+02
Molybdenum	mg/kg	--	--	16	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	--	110	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Silver	mg/kg	--	--	80	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Thallium	mg/kg	--	**61**	--	5.4E+01	**1.4E+01**	**2.3E+00**	6.1E+01
Vanadium	mg/kg	--	--	86	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	--	--	4,800	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
Actinium 228	pCi/g	--	--	1.22	7.7E+02	2.4E+03	7.3E+02	1.2E+03
Cesium 137	pCi/g	--	--	0.299	6.4E+03	2.0E+04	2.8E-01	2.8E-01
Lead 214[d]	pCi/g	--	--	1.1	4.5E+03	1.4E+04	4.6E+04	7.6E+04
Potassium 40	pCi/g	--	--	19.9	6.1E+01	1.9E+02	1.9E+01	1.9E+01
Radium 226	pCi/g	--	--	1.54	1.6E+02	5.0E+02	1.1E+00	1.1E+00
Summary of COCs								
4-methylphenol, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate, 1,4-dichlorobenzene, dieldrin, PCB-1260, TPH-D, TPH-G, antimony, arsenic, cadmium, iron, lead, thallium								

[a]Maximum concentrations detected during the Shallow Exploration Program, RI, and Data Gap Investigation.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] Lead 214 was used by the laboratory to quantify Radium 226 and Thorium 232. Lead 214 is not a contaminant of potential concern.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 13

CS 011 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
Landfill monitoring gases						
Carbon dioxide	Percent	6.1	--	--	NA	NA
Ethane	Percent	0.006J	--	--	NA	NA
Methane	Percent	20	--	--	NA	NA
Nitrogen	Percent	73	--	--	NA	NA
Oxygen	Percent	0.93J	--	--	NA	NA
VOCs in soil gas						
Acetone	ppbv	--	1,600	4,400	1.3E+05	1.9E+06
Benzene	ppbv	**180**	2,400	26,000	**9.8E+00**	**1.6E+02**
1,3-Butadiene	ppbv	--	900	--	3.5E+00	5.9E+01
Carbon tetrachloride	ppbv	--	12,000	34,000	2.6E+00	4.4E+01
Chlorobenzene	ppbv	1,700	56,000J	25,000J	1.1E+03	1.6E+04
Chloroethane	ppbv	**17,000J**	30,000	--	**1.1E+02**	1.9E+03
Chloroform	ppbv	--	3,600	19,000	2.1E+00	3.6E+01
Cyclohexane	ppbv	2,100	21,000	--	1.7E+05	2.5E+06
1,2-Dichlorobenzene	ppbv	170J	2,000	--	3.3E+03	4.8E+04
1,3-Dichlorobenzene	ppbv	140J	240	--	1.7E+03	2.5E+04
1,4-Dichlorobenzene	ppbv	220	2,400	--	3.5E+00	5.8E+01
Dichlorodifluoromethane (Freon® 12)	ppbv	--	7,400	71,000	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**400**	74	--	**3.7E+01**	6.2E+02
1,2-Dichloroethane	ppbv	**150J**	--	--	**2.3E+00**	3.9E+01
1,1-Dichloroethene	ppbv	--	29000	120,000	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	91	5,300	3,800	8.8E+02	1.3E+04
cis-1,3-Dimethylcyclohexane	ppbv	--	12,000J	--	NA	NA
trans-1,2-Dimethylcyclopentane	ppbv	--	9,000J	--	NA	NA
3,4-Dimethyloctane	ppbv	--	9,700J	--	NA	NA
2,4-Dimethylpentane	ppbv	540	--	--	NA	NA
Ethylbenzene	ppbv	**470**	1,200	--	**2.2E+01**	**3.7E+02**
Heptane	ppbv	3,100	13,000J	--	1.7E+04	2.5E+05
Hexane	ppbv	2,100	--	--	2.0E+04	2.9E+05
Methylcyclohexane	ppbv	--	53,000J	--	NA	NA
Methylcyclopentane	ppbv	--	11,000J	--	NA	NA
4-Methyldecane	ppbv	--	9,600J	--	NA	NA
Methylene chloride (dichloromethane)	ppbv	**200**	560	--	**1.5E+02**	2.5E+03
3-Methylhexane	ppbv	--	21,000J	--	NA	NA
2-Methylnonane	ppbv	--	1,600J	--	NA	NA
(2-Methylpropyl)cyclohexane	ppbv	--	2,700J	--	NA	NA
Octane	ppbv	--	3,300	--	NA	NA
Propylene	ppbv	--	8,800	--	1.7E+05	2.5E+05
Tetrachloroethene (PCE)	ppbv	--	6,000	5,300	5.8E+00	9.8E+01
Toluene	ppbv	1,000	6,600	7,100	1.3E+05	1.9E+06
Total non-methane hydrocarbons as hexane	ppbv	**180,000**	--	--	**2.0E+04**	2.9E+05
TPH	ppbv	--	640,000J	360,000J	NA	NA
Trichloro, 1,1,2- ,trifluoroethane, 1,2,2- (Freon® 113)	ppbv	--	1,800	1,300	3.9E+05	5.6E+06
1,1,1-Trichloroethane	ppbv	--	21	24,000	9.4E+04	1.4E+06
Trichloroethene (TCE)	ppbv	**66**	19,000	20,000	**2.3E+01**	3.8E+02
Trichlorofluoromethane (Freon® 11)	ppbv	--	660	14,000	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	**380J**	810	--	**1.4E+02**	2.1E+03
1,3,5-Trimethylbenzene	ppbv	**170J**	320	--	**1.2E+02**	1.8E+03
1,2,3-Trimethylcyclopentane	ppbv	--	12000	--	NA	NA
1,2,4-Trimethylcyclopentane	ppbv	--	8,800J	--	NA	NA
2,2,4-Trimethylpentane	ppbv	1,500	--	--	NA	NA
2,3,4-Trimethylpentane	ppbv	1,500J	--	--	NA	NA
Vinyl chloride	ppbv	**14,000**	29,000	55,000	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	900	3,800	1,100	2.2E+03	3.2E+04
Xylene, o-	ppbv	360	3,000	800	2.2E+03	3.2E+04
Summary of COCs						
benzene, 1,1-dichloroethane, 1,2-dichloroethane, chloroethane, ethylbenzene, hexane, methylene chloride, trichloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride						

[a]Maximum concentrations detected during the RI and Data Gap Investigation.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

-- = not detected

TABLE 14
CS 012 Site Characterization Summary Table - Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Acenaphthene	mg/kg	--	3.2*	--	6.4E+02	2.9E+04	2.9E+02	1.6E+04
Anthracene	mg/kg	--	5.9*	--	3.1E+05	2.4E+05	2.3E+03	1.0E+05
Benzo(a)anthracene	mg/kg	--	**13***	--	1.4E-01	1.3E+01	**8.8E-02**	**8.8E-01**
Benzo(a)pyrene	mg/kg	--	**0.096**	--	1.4E-01	9.5E-01	**1.8E-02**	1.4E-01
Benzo(b)fluoranthene	mg/kg	--	0.055	--	1.4E-01	2.9E+00	1.1E-01	8.8E-01
Benzo(g,h,i)perylene	mg/kg	--	4.1*	--	NA	2.9E+04	7.5E+02	1.1E+04
Benzoic acid	mg/kg	--	0.35*	--	9.0E+05	> 1.0E+06	1.4E+03	> 1.0E+06
Benzyl alcohol	mg/kg	--	0.15*	--	NA	1.8E+05	6.1E+01	2.4E+05
BHC, beta	mg/kg	--	0.0007	--	4.5E-01	1.3E+00	1.1E-02	1.0E+00
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	--	10*	0.65	5.8E+01	2.5E+02	1.2E+01	9.6E+01
Bisphenol-A	mg/kg	--	--	4.9	1.1E+04	3.1E+04	1.1E+02	2.4E+04
Butylbenzylphthalate (BBP)	mg/kg	--	0.74*	0.5	9.6E+01	1.2E+05	3.1E+01	7.0E+02
Chrysene	mg/kg	--	**12***	--	1.4E-01	2.1E+02	**8.8E-01**	**8.7E+00**
DDE	mg/kg	--	0.016	0.024	1.9E-02	7.0E+00	4.9E-01	5.4E+00
DDT	mg/kg	--	0.0046	--	1.9E-02	7.0E+00	4.7E-01	5.4E+00
Dibenzo(a,h)anthracene	mg/kg	--	**1.2***	--	1.4E-01	1.2E+00	**3.8E-02**	**2.6E-01**
1,2-Dichlorobenzene	mg/kg	--	2.8*	--	7.7E+02	4.1E+03	1.9E+02	3.9E+03
1,3-Dichlorobenzene	mg/kg	--	--	0.56	1.3E+04	2.1E+03	7.6E+01	1.9E+03
1,4-Dichlorobenzene	mg/kg	--	**1.4***	--	1.6E+02	5.2E+02	**1.5E-02**	**1.5E-01**
Dieldrin	mg/kg	--	**0.006**	--	4.5E-03	1.1E-01	**5.8E-03**	1.1E-01
Diethylphthalate (DEPH)	mg/kg	--	0.26*	--	9.6E+01	4.9E+05	6.1E+02	3.8E+05
Dimethylphthalate (DMPH)	mg/kg	--	0.18*	--	9.6E+01	> 1.0E+06	2.4E+03	> 1.0E+06
Di-n-butylphthalate (DNBP)	mg/kg	--	3.4*	0.31	9.6E+01	6.2E+04	9.3E+02	4.8E+04
2,4-Dinitrotoluene	mg/kg	--	**0.20***	--	1.6E+00	2.5E+00	**6.3E-03**	4.3E+00
2,6-Dinitrotoluene	mg/kg	--	**0.42***	--	1.6E+00	2.5E+00	**2.4E-03**	2.0E+00
Endosulfan I	mg/kg	--	0.04*	--	1.8E+00	3.7E+03	3.4E+01	3.9E+03
Endosulfan sulfate	mg/kg	--	0.67*	--	1.8E+00	3.7E+03	2.0E+01	3.9E+03
Fluoranthene	mg/kg	--	28*	--	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Fluorene	mg/kg	--	5.4*	--	4.2E+04	2.6E+04	2.4E+02	1.3E+04
Hexachloroethane	mg/kg	--	0.15*	--	2.2E+01	1.2E+02	1.7E+00	9.6E+01
Indeno(1,2,3-cd)pyrene	mg/kg	--	**4.8***	--	1.4E-01	4.8E+00	**1.2E-01**	**8.8E-01**
2-Methylnaphthalene	mg/kg	--	0.74*	--	NA	1.9E+02	1.6E+01	1.7E+02
4-Methylphenol	mg/kg	--	0.26*	--	NA	3.1E+03	1.9E+00	2.4E+03
Naphthalene	mg/kg	--	**1.2**	0.89	6.7E+02	6.4E+01	**4.7E-02**	**6.0E-01**
4-Nitrophenol	mg/kg	--	3.3*	--	NA	3.3E+00	NA	NA
N-nitrosodiphenylamine (NNSPH)	mg/kg	--	0.11	0.59	1.6E+02	3.5E+02	1.8E+00	2.7E+02
PCB-1260	mg/kg	--	**1.6**	0.14	5.4E-03	1.5E+02	**6.3E-02**	**5.3E-01**
Phenanthrene	mg/kg	--	34*	3.4J	NA	2.9E+04	2.6E+03	1.1E+05
Phenol	mg/kg	--	0.26*	--	6.7E+04	1.8E+05	6.1E+01	1.4E+05
Pyrene	mg/kg	--	0.16	--	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	--	0.0000263	1.58	4.2E-04	3.4E+00	1.3E-03	1.6E-02
TPH								
TPH-G	mg/kg	--	0.18	**1,600J**	1.0E+01	**1.0E+01**	NA	NA
TPH-D	mg/kg	--	28	**840**	1.0E+02	**1.0E+02**	NA	NA
Metals[c]								
Antimony	mg/kg	--	**210***	75	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Arsenic	mg/kg	--	--	**25**	5.8E-01	**3.3E+00**	9.3E-02	1.4E+00
Barium	mg/kg	--	--	440	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Cadmium	mg/kg	--	**52***	**130**	2.2E+00	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium, Total	mg/kg	--	--	230	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Cobalt	mg/kg	--	--	19	1.6E+03	4.7E+04	1.0E+01	2.7E+02
Copper	mg/kg	--	1,200*	2,200J	1.3E+02	2.5E+05	1.4E+03	3.7E+04
Iron	mg/kg	--	--	**120,000**	9.6E+03	**9.1E+04**	2.4E+04	6.4E+05
Lead	mg/kg	--	**620***	3,800	2.9E+01	4.3E+03	**1.5E+02**	8.0E+02
Manganese	mg/kg	--	--	4,100J	1.6E+03	2.8E+04	8.3E+02	2.2E+04
Mercury	mg/kg	--	--	22J	1.6E+00	1.2E+02	3.5E+00	1.5E+02
Molybdenum	mg/kg	--	--	11	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	--	99	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Silver	mg/kg	--	--	60	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Thallium	mg/kg	--	**51***	--	5.4E+01	**1.4E+01**	**2.3E+00**	6.1E+01
Vanadium	mg/kg	--	--	84	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	--	2,700*	11,000J	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
--[d]								
Summary of COCs								
2,4-dinitrotoluene, 2,6-dinitrotoluene, 1,4-dichlorobenzene, benzo(a)anthracene, benzo(a)pyrene, chrysene, naphthalene, dibenzo(a,h)anthracene, dieldrin, indeno(1,2,3-cd)pyrene, PCB-1260, TPH-G, TPH-D, antimony, arsenic, cadmium, iron, lead, thallium								

[a]Maximum concentrations detected during the Shallow Exploration Program, RI, and Data Gap Investigation.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).
[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).
[d] No radionuclides were reported greater than background levels.
Notes:
J = Analyte was detected but quantification is an estimate.
BOLD = indicates compound in excess of screening levels.
NA = Not Available (no PCG has been established for this compound)
*Samples collected between 9.5 - 25.0 feet

TABLE 15

CS 012 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
VOCs in soil gas						
1,1,1-Trichloroethane	ppbv	--	--	94,000	9.4E+04	1.4E+06
1,1-Dichloroethene	ppbv	--	18,000	840,000	5.0E+03	7.3E+04
Acetone	ppbv	--	1,600	5,000	1.3E+05	1.9E+06
Benzene	ppbv	--	1,900	4,600	9.8E+00	1.6E+02
Carbon tetrachloride	ppbv	**980**	12,000	25,000	**2.6E+00**	4.4E+01
Chlorobenzene	ppbv	--	--	320,000J	1.1E+03	1.6E+04
Chloroform	ppbv	--	6,700	21,000	2.1E+00	3.6E+01
cis-1,2-Dichloroethene	ppbv	--	120,000	120,000	8.8E+02	1.3E+04
Dichlorodifluoromethane (Freon® 12)	ppbv	--	13,000	130,000	4.0E+03	5.9E+04
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	--	--	3,300	3.9E+05	5.6E+06
Xylene, m, p-	ppbv	**3,900**	8,600	5,400	**2.2E+03**	3.2E+04
Xylene, o-	ppbv	1,900	--	3,600	2.2E+03	3.2E+04
Tetrachloroethene (PCE)	ppbv	**1,400**	102,000	180,000	**5.8E+00**	**9.8E+01**
Toluene	ppbv	6,800	2,200	6,000	1.3E+05	1.9E+06
TPH	ppbv	600,000J	600,000	790,000J	NA	NA
Trichloroethene (TCE)	ppbv	**1,400**	63,000	500,000	**2.3E+01**	**3.8E+02**
Trichlorofluoromethane (Freon® 11)	ppbv	--	1,300	13,000	1.2E+04	1.8E+05
Vinyl chloride	ppbv	**12,000**	320,000	920,000	**1.1E+01**	**1.8E+02**
Summary of COCs						
carbon tetrachloride, m,p-xylene, tetrachloroethene, trichloroethene, vinyl chloride						

[a] Maximum concentrations detected during the RI and Data Gap Investigation.

[b] Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

-- = not detected

TABLE 16

CS 013 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Acenaphthene	mg/kg	--	0.1	--	6.4E+02	2.9E+04	2.9E+02	1.6E+04
Benzoic acid	mg/kg	--	0.2	--	9.0E+05	> 1.0E+06	1.4E+03	> 1.0E+06
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	--	**18**	2.2	5.8E+01	2.5E+02	**1.2E+01**	9.6E+01
Chlordane	mg/kg	--	**0.72**	--	1.8E-02	6.5E+00	**4.3E-01**	5.2E+00
4-Chloroaniline	mg/kg	--	0.27	--	9.0E+02	2.7E-01	1.3E+00	1.9E+03
Chrysene	mg/kg	--	0.17	--	1.4E-01	2.1E+02	8.8E-01	8.7E+00
4,4'-DDE	mg/kg	--	**0.51**	--	1.9E-02	7.0E+00	**4.9E-01**	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	0.36	--	7.7E+02	4.1E+03	1.9E+02	3.9E+03
1,4-Dichlorobenzene	mg/kg	--	**0.12**	--	1.6E+02	5.2E+02	**1.5E-02**	1.5E-01
Diethylphthalate (DEPH)	mg/kg	--	0.17	--	9.6E+01	4.9E+05	6.1E+02	3.8E+05
2,4-Dimethylphenol	mg/kg	--	0.4	--	1.3E+04	1.2E+04	1.3E+01	9.6E+03
Di-n-butylphthalate (DNBP)	mg/kg	--	0.42	0.35	9.6E+01	6.2E+04	9.3E+02	4.8E+04
2,6-Dinitrotoluene	mg/kg	--	**1.7**	--	1.6E+00	2.5E+00	**2.4E-03**	2.0E+00
Endosulfan II	mg/kg	--	0.11	--	1.8E+00	3.7E+03	3.4E+01	3.9E+03
Fluoranthene	mg/kg	--	2.3	0.075	9.6E+03	2.2E+04	4.9E+02	1.5E+04
2-Methylnaphthalene	mg/kg	--	0.25	--	NA	1.9E+02	1.6E+01	1.7E+02
2-Methylphenol	mg/kg	--	0.35	--	1.1E+03	3.1E+04	2.0E+01	2.4E+04
4-Methylphenol	mg/kg	--	0.95	--	NA	3.1E+03	1.9E+00	2.4E+03
Naphthalene	mg/kg	--	**1.1**	--	6.7E+02	6.4E+01	**4.7E-02**	**6.0E-01**
N-nitroso-di-n-propylamine	mg/kg	--	**0.95**	--	1.6E-01	9.5E-01	**1.2E-04**	**1.9E-01**
N-nitrosodiphenylamine (NNSPH)	mg/kg	--	0.22	--	1.6E+02	3.5E+02	1.8E+00	2.7E+02
PCB-1260	mg/kg	--	**17**	--	5.4E-03	1.5E+02	**6.3E-02**	**5.3E-01**
Pentachlorophenol	mg/kg	--	0.34	--	9.0E+00	9.0E+00	5.9E-01	6.2E+00
Phenanthrene	mg/kg	--	1.2	0.14	NA	2.9E+04	2.6E+03	1.1E+05
Phenol	mg/kg	--	0.22	--	6.7E+04	1.8E+05	6.1E+01	1.4E+05
Pyrene	mg/kg	--	0.15	--	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	--	**0.0348**	--	4.2E-04	3.4E+00	**1.3E-03**	**1.6E-02**
TPH								
TPH-G	mg/kg	--	**2,600J**	0.256	1.0E+01	**1.0E+01**	NA	NA
TPH-D	mg/kg	--	**41,000**	36	1.0E+02	**1.0E+02**	NA	NA
Metals[c]								
Antimony	mg/kg	--	**35**	--	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Arsenic	mg/kg	--	**8.9**	**50**	5.8E-01	**3.3E+00**	**9.3E-02**	**1.4E+00**
Barium	mg/kg	--	830	--	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Cadmium	mg/kg	--	**210**	5.4	2.2E+00	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium, Total	mg/kg	--	2,100	--	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Copper	mg/kg	--	**5,300**	--	1.3E+02	2.5E+05	**1.4E+03**	3.7E+04
Iron	mg/kg	--	**66,000**	41,000	9.6E+03	9.1E+04	**2.4E+04**	6.4E+05
Lead	mg/kg	--	**3,700**	--	2.9E+01	4.3E+03	**1.5E+02**	**8.0E+02**
Manganese	mg/kg	--	--	3,300	1.6E+03	2.8E+04	8.3E+02	2.2E+04
Mercury	mg/kg	--	3.3	--	1.6E+00	1.2E+02	3.5E+00	1.5E+02
Molybdenum	mg/kg	--	14	--	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	330	--	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Selenium	mg/kg	--	1.5	--	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	--	**220**	--	2.3E+01	3.5E+03	**1.7E+02**	4.6E+03
Vanadium	mg/kg	--	120	100	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	--	**5,400**	--	1.7E+03	1.4E+05	**3.1E+03**	2.8E+05
Cyanide	mg/kg	--	9.4	--	1.7E+02	NA	6.9E+02	1.8E+04
Radionuclides								
--[d]	pCi/g							
Summary of COCs								
2,6-dinitrotoluene, 1,4-dichlorobenzene, naphthalene, 4,4'-DDE, bis(2-ethylhexyl)phthalate, chlordane, n-nitroso-di-n-propylamine, PCB-1260, 2,3,7,8-TCDD, TPH-G, TPH-D, antimony, arsenic, cadmium, copper, iron, lead, silver, zinc								

[a]Maximum concentrations detected during the Shallow Exploration Program, RI, and Data Gap Investigation.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] No radionuclides were reported greater than background levels.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 17
CS 013 Site Characterization Summary Table - VOCs in Soil Gas
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
Landfill monitoring gases						
Carbon dioxide	Percent	27	--	--	NA	NA
Ethane	Percent	0.1J	--	--	NA	NA
Methane	Percent	23	--	--	NA	NA
Nitrogen	Percent	68	--	--	NA	NA
Oxygen	Percent	0.95J	--	--	NA	NA
VOCs in soil gas						
1-Ethyl-2,4-dimethylbenzene	ppbv	--	--	62J	NA	NA
1-Methyl-4-propylbenzene	ppbv	--	--	55J	NA	NA
2-Ethyl-1,3-dimethylbenzene	ppbv	--	--	50J	NA	NA
Acetone	ppbv	--	67,000	14,000	1.3E+05	1.9E+06
Benzene	ppbv	**2,300J**	5,000	14,000	**9.8E+00**	**1.6E+02**
1,3-Butadiene	ppbv	--	70	--	3.5E+00	5.9E+01
Carbon Tetrachloride	ppbv	--	6,500	7,500	2.6E+00	4.4E+01
Chlorobenzene	ppbv	**6,200J**	450	--	**1.1E+03**	1.6E+04
Chloroethane	ppbv	**3,800J**	12	--	**1.1E+02**	**1.9E+03**
Chloroform	ppbv	--	4	12,000	2.1E+00	3.6E+01
Chloromethane	ppbv	--	1.2	--	6.5E+01	1.1E+03
Cyclobutane	ppbv	--	170J	--	NA	NA
Cyclohexane	ppbv	4,100J	64	--	1.7E+05	2.5E+06
1,2-Dichlorobenzene	ppbv	1,000J	--	70	3.3E+03	4.8E+04
1,3-Dichlorobenzene	ppbv	140J	--	6.2	1.7E+03	2.5E+04
1,4-Dichlorobenzene	ppbv	**370J**	--	18	**3.5E+00**	**5.8E+01**
Dichlorodifluoromethane (Freon® 12)	ppbv	190	1,400	99,000	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**800J**	--	--	**3.7E+01**	**6.2E+02**
1,1-Dichloroethene	ppbv	--	72	120,000	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	60J	11,000	2,400,000	8.8E+02	1.3E+04
Dichloro-trifluoroethane	ppbv	--	58J	--	NA	NA
cis-1,4-Dimethylcyclohexane	ppbv	--	58	--	NA	NA
3,4-Dimethylhexane	ppbv	--	58	58	NA	NA
2,4-Dimethylpentane	ppbv	980J	--	--	NA	NA
Ethylbenzene	ppbv	**12,000J**	5.5	--	**2.2E+01**	**3.7E+02**
Heptane	ppbv	7,800J	--	--	1.7E+04	2.5E+05
Hexane	ppbv	5,400J	--	--	2.0E+04	2.9E+05
4-Methyldecane	ppbv	--	--	92J	NA	NA
Methylene chloride (dichloromethane)	ppbv	73J	2.2	--	1.5E+02	2.5E+03
2-Methylpentane	ppbv	--	100	100	NA	NA
Octane	ppbv	--	12	--	NA	NA
Propylene	ppbv	--	990	--	1.7E+05	2.5E+05
Styrene	ppbv	--	2.3	--	2.4E+04	3.6E+05
Tetrachloroethene (PCE)	ppbv	--	3,400	160,000	5.8E+00	9.8E+01
Toluene	ppbv	840J	1,300	18,000	1.3E+05	1.9E+06
TPH	ppbv	--	240,000	7,000,000J	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon®113)	ppbv	--	8.3	600	3.9E+05	5.6E+06
1,1,1-Trichloroethane	ppbv	--	2.6	1500	9.4E+04	1.4E+06
Trichloroethene (TCE)	ppbv	**53J**	7,800	107,000	**2.3E+01**	3.8E+02
Trichlorofluoromethane (Freon® 11)	ppbv	110J	4.3	2,200	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	**5,400J**	3	28	**1.4E+02**	**2.1E+03**
1,3,5-Trimethylbenzene	ppbv	100J	--	6.3	1.2E+02	1.8E+03
1,1,3-Trimethylcyclohexane	ppbv	--	89J	--	NA	NA
2,2,3-Trimethylpentane	ppbv	--	65	65	NA	NA
Vinyl Chloride	ppbv	**13,000**	42,000	1,200,000	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	**5,500J**	4,900	11,000	**2.2E+03**	3.2E+04
Xylene, o-	ppbv	310J	4.1	29,000	2.2E+03	3.2E+04
Summary of COCs						
chlorobenzene, chloroethane, 1,4-dichlorobenzene, 1,1-dichloroethane, benzene, ethylbenzene, trichloroethene, 1,2,4-trimethylbenzene, vinyl chloride, m,p-xylene						

[a]Maximum concentrations detected during the RI and Data Gap Investigation.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = not available (no PCG has been established for this compound)

-- = not detected

TABLE 18

CS 014 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Acenaphthene	mg/kg	--	--	0.21	6.4E+02	2.9E+04	2.9E+02	1.6E+04
Anthracene	mg/kg	--	--	0.15	3.1E+05	2.4E+05	2.3E+03	1.0E+05
Benzyl alcohol	mg/kg	--	--	0.1	NA	1.8E+05	6.1E+01	2.4E+05
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	--	11*	10	5.8E+01	2.5E+02	1.2E+01	9.6E+01
Butylbenzylphthalate (BBP)	mg/kg	--	0.37*	1.1J	9.6E+01	1.2E+05	3.1E+01	7.0E+02
DDD	mg/kg	--	0.084	0.034	2.7E-02	1.0E+01	5.0E-01	7.6E+00
DDE	mg/kg	--	0.017	0.037	1.9E-02	7.0E+00	4.9E-01	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	0.84*	--	7.7E+02	4.1E+03	1.9E+02	3.9E+03
1,4-Dichlorobenzene	mg/kg	--	**0.61***	--	1.6E+02	5.2E+02	**1.5E-02**	**1.5E-01**
Diethylphthalate (DEPH)	mg/kg	--	0.30*	0.23	9.6E+01	4.9E+05	6.1E+02	3.8E+05
Dimethylphthalate (DMPH)	mg/kg	--	0.22*	0.88	9.6E+01	> 1.0E+06	2.4E+03	> 1.0E+06
Di-n-butylphthalate (DNBP)	mg/kg	--	1.3*	0.45	9.6E+01	6.2E+04	9.3E+02	4.8E+04
2,6-Dinitrotoluene	mg/kg	--	--	0.1	1.6E+00	2.5E+00	2.4E-03	2.0E+00
Di-n-octylphthalate	mg/kg	--	0.16*	--	9.6E+01	2.5E+04	1.2E+03	1.9E+04
Fluoranthene	mg/kg	--	--	0.43	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Fluorene	mg/kg	--	--	0.3	4.2E+04	2.6E+04	2.4E+02	1.3E+04
2-Methylnaphthalene	mg/kg	--	--	0.18	NA	1.9E+02	1.6E+01	1.7E+02
Naphthalene	mg/kg	--	**0.22***	0.21	6.7E+02	6.4E+01	**4.7E-02**	6.0E-01
N-nitrosodiphenylamine (NNSPH)	mg/kg	--	0.66**	1.4	1.6E+02	3.5E+02	1.8E+00	2.7E+02
Phenanthrene	mg/kg	--	0.20*	1.3	NA	2.9E+04	2.6E+03	1.1E+05
Phenol	mg/kg	--	--	0.13	6.7E+04	1.8E+05	6.1E+01	1.4E+05
Pyrene	mg/kg	--	--	0.24	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	--	**0.00443**	0.117	4.2E-04	3.4E+00	**1.3E-03**	1.6E-02
TPH								
TPH-G	mg/kg	--	3.5	1.5	1.0E+01	1.0E+01	NA	NA
TPH-D	mg/kg	--	87	**230**	1.0E+02	**1.0E+02**	NA	NA
Metals[c]								
Antimony	mg/kg	--	**310***	220	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Arsenic	mg/kg	--	--	**47**	5.8E-01	**3.3E+00**	9.3E-02	1.4E+00
Cadmium	mg/kg	--	**49****	70	2.2E+00	9.6E+01	**6.2E+00**	1.0E+03
Chromium, Total	mg/kg	--	--	270	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Cobalt	mg/kg	--	**18**	49	1.6E+03	4.7E+04	**1.0E+01**	2.7E+02
Copper	mg/kg	--	730**	400	1.3E+02	2.5E+05	1.4E+03	3.7E+04
Iron	mg/kg	--	--	**110,000**	9.6E+03	**9.1E+04**	2.4E+04	6.4E+05
Lead	mg/kg	--	**970****	580	2.9E+01	4.3E+03	**1.5E+02**	**8.0E+02**
Mercury	mg/kg	--	--	29	1.6E+00	1.2E+02	3.5E+00	1.5E+02
Molybdenum	mg/kg	--	--	8.1	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	--	67	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Thallium	mg/kg		**71***	**81**	5.4E+01	**1.4E+01**	**2.3E+00**	**6.1E+01**
Zinc	mg/kg	--	3,100**	1,100	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
Lead 214[d]	pCi/g	--	1.31	1.01	4.48E+03	1.4E+04	4.6E+04	7.6E+04
Radium 226	pCi/g	--	**1.19J**	--	1.60E+02	5.0E+02	**1.1E+00**	**1.1E+00**
Summary of COCs								
2,3,7,8-TCDD, 1,4-dichlorobenzene, naphthalene, TPH-D, antimony, arsenic, cadmium, cobalt, iron, lead, radium 226, thallium								

[a]Maximum concentrations detected during the Shallow Exploration Program, RI, and Data Gap Investigation.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] Lead 214 was used by the laboratory to quantify Radium 226 and Thorium 232. Lead 214 is not a contaminant of potential concern.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

*Samples collected between 9.5 - 20.5 feet

**Samples collected between 12.0 - 28.0 feet

TABLE 19

CS 014 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
Landfill monitoring gases						
Carbon dioxide	Percent	19	--	--	NA	NA
Methane	Percent	13	--	--	NA	NA
Nitrogen	Percent	75	--	--	NA	NA
Oxygen	Percent	1.1J	--	--	NA	NA
VOCs in soil gas						
Acetone	ppbv	--	110,000	7,100	1.3E+05	1.9E+06
Benzene	ppbv	**200J**	--	8,300	**9.8E+00**	**1.6E+02**
1,3-Butadiene	ppbv	--		6.1	3.5E+00	5.9E+01
Carbon Tetrachloride	ppbv	--	900	2,900	2.6E+00	4.4E+01
Chlorobenzene	ppbv	240J	--	--	1.1E+03	1.6E+04
Chloroethane	ppbv	**440J**	--	--	**1.1E+02**	1.9E+03
Chloroform	ppbv	--	--	620	2.1E+00	3.6E+01
Cyclohexane	ppbv	710J	--	4.3	1.7E+05	2.5E+06
Dichlorodifluoromethane (Freon® 12)	ppbv	1,300J	--	20,000	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**120J**	--	--	**3.7E+01**	6.2E+02
1,2-Dichloroethane	ppbv	**100J**	--	--	**2.3E+00**	**3.9E+01**
1,1-Dichloroethene	ppbv	--	--	17,000	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	240	630	120,000	8.8E+02	1.3E+04
2,4-Dimethylpentane	ppbv	410J	--	--	NA	NA
Ethylbenzene	ppbv	**300**	--	2.2	**2.2E+01**	3.7E+02
Heptane	ppbv	4,600	--	--	1.7E+04	2.5E+05
Hexane	ppbv	970	--	--	2.0E+04	2.9E+05
Methyl ethyl ketone (2-butanone)	ppbv	--	--	20J	1.7E+05	2.5E+06
Methylene Chloride	ppbv	--	--	2.8	1.5E+02	2.5E+03
2-Methylpentane	ppbv	--	--	16J	NA	NA
Propylene	ppbv	--	--	57	1.7E+05	2.5E+05
Tetrachloroethene (PCE)	ppbv	--	910	71,000	5.8E+00	9.8E+01
Toluene	ppbv	230	970	2,700	1.3E+05	1.9E+06
TPH	ppbv	--	270,000J	300,000J	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	280	--	--	3.9E+05	5.6E+06
Trichloroethene (TCE)	ppbv	**94J**	2,200	21,000	**2.3E+01**	3.8E+02
Trichlorofluoromethane (Freon® 11)	ppbv	310J	78,000	5,300	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	67J	--	2.8	1.4E+02	2.1E+03
1,3,5-Trimethylbenzene	ppbv	--	--	0.95J	1.2E+02	1.8E+03
Vinyl Chloride	ppbv	**14,000J**	18,000	270,000	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	180J	1,900	1,200	2.2E+03	3.2E+04
Xylene, o-	ppbv	--	800	660	2.2E+03	3.2E+04
Summary of COCs						
benzene, chloroethane, 1,1-dichloroethane, 1,2-dichloroethane, ethylbenzene, trichloroethene, vinyl chloride						

[a]Maximum concentrations detected during the RI and Data Gap Investigation.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 20

AOC 313 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Anthracene	mg/kg	--	0.14	--	3.1E+05	2.4E+05	2.3E+03	1.0E+05
Benzo(a)anthracene	mg/kg	--	**0.56**	--	1.4E-01	1.3E+01	**8.8E-02**	8.8E-01
Benzo(a)pyrene	mg/kg	--	**0.95**	--	1.4E-01	9.5E-01	**1.8E-02**	**1.4E-01**
Benzo(b)fluoranthene	mg/kg	--	**0.86**	--	1.4E-01	2.9E+00	**1.1E-01**	8.8E-01
Benzo(g,h,i)perylene	mg/kg	--	0.6	--	NA	2.9E+04	7.5E+02	1.1E+04
Benzo(k)fluoranthene	mg/kg	--	**0.4**	--	1.4E-01	2.1E+01	**1.1E-01**	8.8E-01
Butylbenzylphthalate (BBP)	mg/kg	--	1.5	--	9.6E+01	1.2E+05	3.1E+01	7.0E+02
Chrysene	mg/kg	--	0.21	--	1.4E-01	2.1E+02	8.8E-01	8.7E+00
Dieldrin	mg/kg	--	**0.01**	--	4.5E-03	1.1E-01	**5.8E-03**	1.1E-01
Endosulfan II	mg/kg	--	0.001	--	1.8E+00	3.7E+03	3.4E+01	3.9E+03
Fluoranthene	mg/kg	--	0.9	--	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Indeno(1,2,3-cd)pyrene	mg/kg	--	**0.75**	--	1.4E-01	4.8E+00	**1.2E-01**	8.8E-01
PCB-1260	mg/kg	--	**0.12**	--	5.4E-03	1.5E+02	**6.3E-02**	5.3E-01
Phenanthrene	mg/kg	--	0.24	--	NA	2.9E+04	2.6E+03	1.1E+05
Pyrene	mg/kg	--	2	--	3.1E+04	2.9E+04	3.5E+02	1.1E+04
TPH								
TPH-D	mg/kg	--	60	--	100	100	NA	NA
Metals[c]								
Cadmium	mg/kg	--	5.8	--	2.2E+00	9.6E+01	6.2E+00	1.0E+03
Summary of COCs								
Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluroanthene, dieldrin, indeno(1,2,3-cd)pyrene, PCB-1260								

[a]Maximum concentrations from data collected during the RI.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 feet bgs. Protection of human health applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 21

AOC 313 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
VOCs in soil gas						
Acetone	ppbv	--	3,500	7,400	130,000	1,900,000
Benzene	ppbv	--	140	880	9.8	160
1,3-Butadiene	ppbv	--	78	--	4	59
(E)-2-Butene	ppbv	--	380J	--	NA	NA
Carbon Tetrachloride	ppbv	--	680	2,200	3	44
Chlorobenzene	ppbv	--	2,700	--	1,100	16,000
Chlorodifluoromethane	ppbv	--	360J	--	NA	NA
Chloroethane	ppbv	--	120	--	110	1,900
Chloroform	ppbv	--	--	680	2.1	36
Cyclohexane	ppbv	--	140	--	170000	2500000
1,2-Dichlorobenzene	ppbv	--	5,400	--	3,300	48,000
1,3-Dichlorobenzene	ppbv	--	900	--	1,700	25,000
1,4-Dichlorobenzene	ppbv	--	1,600	--	4	58
Dichlorodifluoromethane (Freon® 12)	ppbv	1,200	7,400	120,000	4,000	59,000
1,1-Dichloroethane	ppbv	--	19,000	56,000	37	620
1,2-Dichloroethane	ppbv	--	--	864	2.3	39
1,1-Dichloroethene	ppbv	--	140,000	2,600,000	5,000	73,000
cis-1,2-Dichloroethene	ppbv	--	38,000	110,000	880	13,000
Ethanol	ppbv	--	240J	--	NA	NA
3-Methyl-5-propylnonane	ppbv	--	420J	--	NA	NA
Methylene Chloride (Dichloromethane)	ppbv	--	99	10500	150	2,500
Propylene	ppbv	--	870	--	170,000	250,000
Tetrachloroethene (PCE)	ppbv	--	6,300	31,000	6	98
Toluene	ppbv	--	1,400	1,100	130,000	1,900,000
TPH	ppbv	--	500,000	190,000	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	--	--	1,700	390,000	5,600,000
1,1,1-Trichloroethane	ppbv	--	--	30,000	94,000	1,400,000
Trichloroethene (TCE)	ppbv	--	39,000	890,000	23	380
Trichlorofluoromethane (Freon® 11)	ppbv	--	5,500	8,400	12,000	180,000
1,2,4-Trimethylbenzene	ppbv	--	30	--	140	2,100
Vinyl Chloride	ppbv	**3,000**	200,000	140,000	**11**	**180**
Xylene, m, p-	ppbv	--	2,600	1,100	2,200	32,000
Xylene, o-	ppbv	--	3,200	6,200	2,200	32,000
Summary of COCs						
vinyl chloride						

[a]Maximum concentrations from data collected during the RI.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 22

CS 010 through CS 014 and AOC 313 Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
EW-379	3Q05	A	1,1-Dichloroethene	7.3	6
			1,2-Dichloroethane	0.97	0.5
			Tetrachloroethene	7.9	5
			Trichloroethene	22	5
			cis-1,2-Dichloroethene	12	6
EW-380	3Q05	A	1,2-Dichloroethane	0.64	0.5
			Tetrachloroethene	7.6	5
			Trichloroethene	12	5
MW-353	3Q05	A	Nickel	320	100
			Tetrachloroethene	140	5
			Trichloroethene	5.2	5
MW-354	3Q05	A	1,1-Dichloroethane	9.8	5
			1,2-Dichloroethane	0.96	0.5
			Tetrachloroethene	47	5
			Trichloroethene	43	5
			cis-1,2-Dichloroethene	120	6
MW-355	3Q05	A	Chromium	110	50
			Nickel	110	100
			1,1-Dichloroethane	11	5
			1,1-Dichloroethene	45	6
			1,2-Dichloroethane	10	0.5
			Trichloroethene	25	5
MW-356	3Q05	A	Nickel	120	100
MW-357	3Q05	A	Carbon Tetrachloride	0.83	0.5
MW-385	3Q05	B	Nickel	190	100
MW-386	3Q05	A	1,1-Dichloroethane	6.1	5
			1,1-Dichloroethene	6.7	6
			1,2-Dichloroethane	1.9	0.5
			Carbon Tetrachloride	0.64	0.5
			Tetrachloroethene	47	5
			Trichloroethene	40	5
			cis-1,2-Dichloroethene	81	6
MW-387	3Q05	A	Nickel	150	100
			1,1-Dichloroethane	6.5	5
			1,2-Dichloroethane	29	0.5
			Tetrachloroethene	160	5
			Trichloroethene	12	5
MW-388	3Q05	A	Trichloroethene	20	5
MW-389	3Q05	A	1,2-Dichloroethane	1.1	0.5
			Trichloroethene	14	5
			cis-1,2-Dichloroethene	21	6

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

Notes:

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

ug/L = micrograms per liter

TABLE 23
CS 022 Site Characterization Summary Table - Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]		Screening Levels[b]			
						Protection of Human Health	
		0-1 ft bgs	1-60 ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs							
Benzo(a)anthracene	mg/kg	**0.39**	**0.62**	**1.4E-01**	1.3E+01	**8.8E-02**	8.8E-01
Benzo(a)pyrene	mg/kg	**0.41**	**0.66**	**1.4E-01**	9.5E-01	**1.8E-02**	**1.4E-01**
Benzo(b)fluoranthene	mg/kg	**0.52**	**0.81**	**1.4E-01**	2.9E+00	**1.1E-01**	8.8E-01
Benzo(g,h,i)perylene	mg/kg	--	0.43	NA	2.9E+04	7.5E+02	1.1E+04
Benzo(k)fluoranthene	mg/kg	**0.28**	**0.4**	**1.4E-01**	2.1E+01	**1.1E-01**	8.8E-01
BHC, gamma	mg/kg	--	0.01	6.1E-01	1.7E+00	1.6E-02	1.7E+00
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	0.61	2	5.8E+01	2.5E+02	1.2E+01	9.6E+01
Chrysene	mg/kg	**0.43**	0.71	**1.4E-01**	2.1E+02	8.8E-01	8.7E+00
DDD	mg/kg	**0.093**	0.09	**2.7E-02**	1.0E+01	5.0E-01	7.6E+00
DDE	mg/kg	0.0089	0.05	1.9E-02	7.0E+00	4.9E-01	5.4E+00
DDT	mg/kg	**0.14**	0.03	**1.9E-02**	7.0E+00	4.7E-01	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	**430**	7.7E+02	4.1E+03	**1.9E+02**	3.9E+03
1,4-Dichlorobenzene	mg/kg	--	**130**	1.6E+02	5.2E+02	**1.5E-02**	**1.5E-01**
2,4-Dimethylphenol	mg/kg	--	**16**	1.3E+04	1.2E+04	**1.3E+01**	9.6E+03
Di-n-butylphthalate (DNBP)	mg/kg	--	1.3	9.6E+01	6.2E+04	9.3E+02	4.8E+04
Fluoranthene	mg/kg	0.72	0.84	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Indeno(1,2,3-cd)pyrene	mg/kg	--	**0.43**	1.4E-01	4.8E+00	**1.2E-01**	8.8E-01
Isophorone	mg/kg	--	0.9	2.69E+02	5.1E+02	1.4E+00	1.4E+03
2-Methylnaphthalene	mg/kg	--	6	NA	1.9E+02	1.6E+01	1.7E+02
2-Methylphenol	mg/kg	--	0.3	1.1E+03	3.1E+04	2.0E+01	2.4E+04
4-Methylphenol	mg/kg	--	0.85	NA	3.1E+03	1.9E+00	2.4E+03
Naphthalene	mg/kg	--	**17**	6.7E+02	6.4E+01	**4.7E-02**	**6.0E-01**
PCB-1254	mg/kg	--	**3**	5.4E-03	1.5E+02	**6.3E-02**	**5.3E-01**
PCB-1260	mg/kg	**0.4**	**11.9**	**5.4E-03**	1.5E+02	**6.3E-02**	**5.3E-01**
Phenanthrene	mg/kg	0.3	0.75	NA	2.9E+04	2.6E+03	1.1E+05
Pyrene	mg/kg	0.88	2	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	0.00016	**3.4052**	4.2E-04	3.4E+00	**1.3E-03**	**1.6E-02**
TPH							
TPH-G	mg/kg	--	--	1.0E+01	1.0E+01	NA	NA
TPH-D	mg/kg	--	**11,000**	1.0E+02	**1.0E+02**	NA	NA
Metals[c]							
Aluminum	mg/kg	--	31,000	2.8E+03	8.4E+04	3.5E+04	9.1E+05
Antimony	mg/kg	--	**110**	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Arsenic	mg/kg	--	**19**	5.8E-01	**3.3E+00**	**9.3E-02**	**1.4E+00**
Barium	mg/kg	470	1,700	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Beryllium	mg/kg	0.45	0.71	1.3E+02	3.6E+02	6.9E+01	1.8E+03
Cadmium	mg/kg	**14**	**100**	**2.2E+00**	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium, Hexavalent	mg/kg	0.21	--	3.5E+02	2.1E+02	1.1E+02	3.0E+03
Chromium, Total	mg/kg	52	300	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Cobalt	mg/kg	--	**19**	1.6E+03	4.7E+04	**1.0E+01**	2.7E+02
Copper	mg/kg	**770**	**5,600**	**1.3E+02**	2.5E+05	**1.4E+03**	3.7E+04
Cyanide	mg/kg	--	1.9	1.7E+02	NA	6.9E+02	1.8E+04
Iron	mg/kg	--	**83,000**	9.6E+03	9.1E+04	**2.4E+04**	6.4E+05
Lead	mg/kg	**220**	**6,300**	**2.9E+01**	**4.3E+03**	**1.5E+02**	**8.0E+02**
Mercury	mg/kg	0.13	1.4	1.6E+00	1.2E+02	3.5E+00	1.5E+02
Molybdenum	mg/kg	--	12	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	120	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Selenium	mg/kg	--	26	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	23	65	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Thallium	mg/kg	--	**11**	5.4E+01	1.4E+01	**2.3E+00**	6.1E+01
Vanadium	mg/kg	--	84	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	170	**4,600**	1.7E+03	1.4E+05	**3.1E+03**	2.8E+05

TABLE 23

CS 022 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]		Screening Levels[b]			
						Protection of Human Health	
		0-1 ft bgs	1-60 ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
Radionuclides							
Lead 214[d]	pCi/g	52.1	9.66	4.5E+03	1.4E+04	4.6E+04	7.6E+04
Radium 226	pCi/g	**30,700**	**516**	**1.6E+02**	**5.0E+02**	**1.1E+00**	**1.1E+00**
Thorium 232	pCi/g	--	**4.58**	4.8E+02	1.5E+03	**3.1E+00**	1.9E+01
Summary of COCs							
benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dimethylphenol, DDD, DDT, indeno(1,2,3-cd)pyrene, naphthalene, PCB-1254, PCB-1260, 2,3,7,8-TCDD, antimony, arsenic, cadmium, cobalt, copper, iron, lead, thallium, zinc, radium 226, thorium 232 and TPH-D							

[a]Maximum concentrations detected during the RI and Data Gap Investigation.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs) but were applied to all values between 1 and 60 feet bgs. Because of data limitations, maximum concentrations were not determined specifically for the 1 to 15 feet bgs range.

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] Lead 214 was used by the laboratory to quantify Radium 226 and Thorium 232. Lead 214 is not a contaminant of potential concern.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 24

CS 022 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-60 ft bgs[b]	60+ ft bgs[b]	0-15 ft bgs	Unrestricted Use	Industrial Use
Landfill monitoring gases						
Carbon dioxide	percent	9.5	--	--	NA	NA
Methane	percent	1.8	--	--	NA	NA
Nitrogen	percent	87	--	--	NA	NA
Oxygen	percent	1.7	--	--	NA	NA
VOCs in soil gas						
Acetone	ppbv	3,700	5,400	--	1.3E+05	1.9E+06
Benzene	ppbv	**5,500**	12,000	--	**9.8E+00**	**1.6E+02**
1,3-Butadiene	ppbv	--	82	--	3.5E+00	5.9E+01
Chlorobenzene	ppbv	**28,000**	5,300	--	**1.1E+03**	**1.6E+04**
Chloroform	ppbv	--	140	--	2.1E+00	3.6E+01
Cyclohexane	ppbv	**690,000**	430,000	--	**1.7E+05**	2.5E+06
1,2-Dichlorobenzene	ppbv	**130,000**	58,000	--	**3.3E+03**	**4.8E+04**
1,3-Dichlorobenzene	ppbv	**5,700**	260	--	**1.7E+03**	2.5E+04
1,4-Dichlorobenzene	ppbv	**60,000**	11,000	--	**3.5E+00**	**5.8E+01**
Dichlorodifluoromethane (Freon® 12)	ppbv	89	200	--	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**1,900**	1,700	--	**3.7E+01**	**6.2E+02**
1,2-Dichloroethane	ppbv	--	2,500	--	2.3E+00	3.9E+01
1,1-Dichloroethene	ppbv	2,100	4,000	--	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	**54,000**	140,000	--	**8.8E+02**	**1.3E+04**
2,4-Dimethylpentane	ppbv	49,000	--	--	NA	NA
Ethylbenzene	ppbv	**5,300**	12,000	--	**2.2E+01**	**3.7E+02**
Heptane	ppbv	**110,000**	--	--	**1.7E+04**	2.5E+05
Hexane	ppbv	**51,000**	--	--	**2.0E+04**	2.9E+05
Total Non-Methane Hydrocarbon as Hexane	ppbv	**4,600,000**	--	--	**2.0E+04**	**2.9E+05**
Methylene Chloride (Dichloromethane)	ppbv	**3,100**	--	--	**1.5E+02**	**2.5E+03**
Octane	ppbv	40,000	91,000	--	NA	NA
Propylene	ppbv	1,000	150	--	1.7E+05	2.5E+05
Tetrachloroethene (PCE)	ppbv	**340**	83	--	**5.8E+00**	**9.8E+01**
Toluene	ppbv	28,000	49,000	--	1.3E+05	1.9E+06
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	10	--	--	3.9E+05	5.6E+06
1,1,1-Trichloroethane	ppbv	210	--	--	9.4E+04	1.4E+06
Trichloroethene (TCE)	ppbv	**53,000**	280,000	--	**2.3E+01**	**3.8E+02**
Trichlorofluoromethane (Freon® 11)	ppbv	--	16	--	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	**60,000**	18,000	--	**1.4E+02**	**2.1E+03**
1,3,5-Trimethylbenzene	ppbv	**23,000**	9,400	--	**1.2E+02**	**1.8E+03**
2,2,4-Trimethylpentane	ppbv	92,000	--	--	NA	NA
2,3,4-Trimethylpentane	ppbv	47,000	--	--	NA	NA
Vinyl chloride	ppbv	**70,000**	80,000	--	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	**20,000**	23,000	--	**2.2E+03**	3.2E+04
Xylene, o-	ppbv	**14,000**	16,000	--	**2.2E+03**	3.2E+04
Summary of COCs						
benzene, chlorobenzene, cyclohexane, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, 1,1-dichloroethane, cis-1,2-dichloroethene, ethylbenzene, heptane, hexane, methylene chloride, tetrachloroethene, trichloroethene, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, vinyl chloride, m,p-xylene, o-xylene						

[a]Maximum concentrations detected during the RI and Data Gap Investigation.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 25

CS 022 Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
EW-144[c]	2Q05	A/B	1,4-Dioxane	9.5	6.1[d]
			Trichloroethene	8.7	5
MW-75	2Q05	A	Trichloroethene	63	5
MW-129[c]	2Q05	A	1,4-Dioxane	16	6.1[d]
			Trichloroethene	29	5

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

[c] Well is located downgradient from CS 022

[d] EPA Region 9 PRG for tap water

Notes:

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

PRG = preliminary remediation goal

ug/L = micrograms per liter

TABLE 26

CS 024 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	0.2J	0.6	0.51	5.8E+01	2.5E+02	1.2E+01	9.6E+01
DDD	mg/kg	--	0.0036	0.011NJ	2.7E-02	1.0E+01	5.0E-01	7.6E+00
DDE	mg/kg	--	0.015J	0.0026J	1.9E-02	7.0E+00	4.9E-01	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	--	130	7.7E+02	4.1E+03	1.9E+02	3.9E+03
1,3-Dichlorobenzene	mg/kg	--	--	64	1.3E+04	2.1E+03	7.6E+01	1.9E+03
1,4-Dichlorobenzene	mg/kg	--	--	71	1.6E+02	5.2E+02	1.5E-02	1.5E-01
Endosulfan, beta	mg/kg	--	--	0.01NJ	1.8E+00	3.7E+03	3.4E+01	3.9E+03
2-Methylnaphthalene	mg/kg	--	--	9	NA	1.9E+02	1.6E+01	1.7E+02
Naphthalene	mg/kg	--	--	11	6.7E+02	6.4E+01	4.7E-02	6.0E-01
PCB-1260	mg/kg	**0.036**	**0.47**	0.06N	**5.4E-03**	1.5E+02	**6.3E-02**	5.3E-01
2,3,7,8-TCDD	ng/g	0.000046	**0.07549**	2.34995	4.2E-04	3.4E+00	**1.3E-03**	**1.6E-02**
Metals[c]								
Aluminum	mg/kg	--	33,000	36,000	2.8E+03	8.4E+04	3.5E+04	9.1E+05
Barium	mg/kg	418J	650J	380	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Beryllium	mg/kg	--	0.79J	0.73J	1.3E+02	3.6E+02	6.9E+01	1.8E+03
Cadmium	mg/kg	0.98J	**43**	27	2.2E+00	9.6E+01	**6.2E+00**	1.0E+03
Chromium, total	mg/kg	--	89J	100	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Chromium, hexavalent	mg/kg	0.11	0.056J	0.054J	3.5E+02	2.1E+02	1.1E+02	3.0E+03
Cobalt	mg/kg	--	**35**	25	1.6E+03	4.7E+04	**1.0E+01**	2.7E+02
Copper	mg/kg	--	**2,300J**	190J	1.3E+02	2.5E+05	**1.4E+03**	3.7E+04
Iron	mg/kg	--	**65,000**	45,000	9.6E+03	9.1E+04	**2.4E+04**	6.4E+05
Lead	mg/kg	--	**850**	170J	2.9E+01	4.3E+03	**1.5E+02**	**8.0E+02**
Manganese	mg/kg	--	**2,000**	6,200	1.6E+03	2.8E+04	**8.3E+02**	2.2E+04
Molybdenum	mg/kg	--	13	--	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	--	72	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Selenium	mg/kg	--	31J	30J	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	--	32	--	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Thallium	mg/kg	**13.9J**	**13.5J**	**14.8J**	5.4E+01	**1.4E+01**	**2.3E+00**	6.1E+01
Vanadium	mg/kg	--	--	140	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	--	3,100	--	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
Lead 214[d]	pCi/g	--	--	0.964	4.48E+03	1.4E+04	4.6E+04	7.6E+04
Protactinium 231	pCi/g	**0.588**	--	--	4.80E+02	1.5E+03	**4.6E-01**	1.4E+00
Summary of COCs								
PCB-1260, 2,3,7,8-TCDD, cadmium, cobalt, copper, iron, lead, manganese, thallium								

[a]Maximum concentrations detected during the RI and Data Gap Investigations.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs.

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] Lead 214 was used by the laboratory to quantify Radium 226 and Thorium 232. Lead 214 is not a contaminant of potential concern.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 27

CS 024 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
Landfill monitoring gases						
Carbon dioxide	ppbv	150,000,000	--	--	NA	NA
Methane	ppbv	7,900,000	--	--	NA	NA
Nitrogen	ppbv	840,000,000	--	--	NA	NA
Oxygen	ppbv	110,000,000	--	--	NA	NA
VOCs in soil gas						
Acetone	ppbv	84J	150J	6,100	1.3E+05	1.9E+06
Benzene	ppbv	**65J**	650NJ	760	**9.8E+00**	1.6E+02
Bromoform	ppbv	--	--	5,500	NA	NA
Carbon Tetrachloride	ppbv	--	96N	--	2.6E+00	4.4E+01
Chlorobenzene	ppbv	620	53,000	13,000	1.1E+03	1.6E+04
Chloroethane	ppbv	**140**	6,500J	--	**1.1E+02**	1.9E+03
Chloroform	ppbv	--	92	1,300N	2.1E+00	3.6E+01
Chloromethane	ppbv	--	--	6J	6.5E+01	1.1E+03
3-Chloropropene	ppbv	58	--	--	NA	NA
Cyclohexane	ppbv	560	2,300J	230J	1.7E+05	2.5E+06
1,2-Dichlorobenzene	ppbv	22	1,400J	11,000	3.3E+03	4.8E+04
1,3-Dichlorobenzene	ppbv	28	750J	5,600	1.7E+03	2.5E+04
1,4-Dichlorobenzene	ppbv	**77**	12,000	7,900	**3.5E+00**	**5.8E+01**
Dichlorodifluoromethane (Freon® 12)	ppbv	28	81N	1,300N or 200	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**73J**	660	13,000	**3.7E+01**	6.2E+02
1,2-Dichloroethane	ppbv	**5**	1,200J	1,200	**2.3E+00**	3.9E+01
1,1-Dichloroethene	ppbv	8.4	4,200	8,000	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	73	6,300	250,000N	8.8E+02	1.3E+04
trans-1,2-Dichloroethene	ppbv	5.5J	270NJ	4,600NJ	1.5E+03	2.2E+04
2,4-Dimethylpentane	ppbv	110J	550J	4.6J	NA	NA
Ethylbenzene	ppbv	**25**	1,900J	970	**2.2E+01**	3.7E+02
Heptane	ppbv	2,700	16,000J	--	1.7E+04	2.5E+05
Hexane	ppbv	650	660J	11,000	2.0E+04	2.9E+05
Total Non-Methane Hydrocarbon as Hexane	ppbv	**74,000**	2,300,000	--	**2.0E+04**	2.9E+05
Methyl ethyl ketone (2-butanone)	ppbv	--	19	--	1.7E+05	2.5E+06
Methyl tert-butyl ether (MTBE)	ppbv	--	4.6J	1,300N	2.6E+02	4.4E+03
Methylene Chloride (Dichloromethane)	ppbv	--	73J	--	1.5E+02	2.5E+03
Octane	ppbv	--	6,300J	350J	NA	NA
Styrene	ppbv	--	--	14	2.4E+04	3.6E+05
Tetrachloroethene (PCE)	ppbv	--	190N	860N	5.8E+00	9.8E+01
Toluene	ppbv	72	3,000J	120J	1.3E+05	1.9E+06
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	--	45NJ	340NJ	3.9E+05	5.6E+06
1,1,1-Trichloroethane	ppbv	1J	--	--	9.4E+04	1.4E+06
Trichloroethene (TCE)	ppbv	**1,900**	37,000	340,000	**2.3E+01**	**3.8E+02**
Trichlorofluoromethane (Freon® 11)	ppbv	0.83J	0.5J	--	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	62J	14,000J	2,000J	1.4E+02	2.1E+03
1,3,5-Trimethylbenzene	ppbv	7.8	3,700J	820J	1.2E+02	1.8E+03
2,2,4-Trimethylpentane	ppbv	430J	4,800J	--	NA	NA
2,3,4-Trimethylpentane	ppbv	450J	--	--	NA	NA
Vinyl chloride	ppbv	**14,000**	19,000	110,000NJ	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	110J	4,200NJ	11,000	2.2E+03	3.2E+04
Xylene, o-	ppbv	95J	4,600J	14,000N	2.2E+03	3.2E+04
Summary of COCs						
benzene, chloroethane, 1,4-dichlorobenzene, 1,1-dichloroethane, 1,2-dichloroethane, ethylbenzene, hexane, trichloroethene, vinyl chloride						

[a]Maximum concentrations detected during the RI and Data Gap Investigations.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = not available (no PCG has been established for this compound)

TABLE 28

CS 024 Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
EW-302	3Q05	A/B	1,2-Dichloroethane	0.6	0.5
			Trichloroethene	180	5
			cis-1,2-Dichloroethene	24	6
EW-412	3Q05	A/B	1,2-Dichloroethane	0.5	0.5
			Trichloroethene	160	5
			cis-1,2-Dichloroethene	10	6
EW-424	3Q05	A/B	Trichloroethene	57	5
MW-243	3Q05	A	--	--	--
MW-244	3Q05	A	Nickel	300	100
			Trichloroethene	250	5
			cis-1,2-Dichloroethene	6.1	6

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

Notes:

-- = no compounds were detected at concentrations greater than a screening level during the most recent sampling event.

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

ug/L = micrograms per liter

TABLE 29

PRL 008 Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Benzo(a)pyrene	mg/kg	**0.0436**	--	--	1.4E-01	9.5E-01	**1.8E-02**	1.4E-01
Bis(2-ethylhexyl)phthalate (DEHP)	mg/kg	0.178	0.201	1.08	5.8E+01	2.5E+02	1.2E+01	9.6E+01
Chlordane, alpha	mg/kg	--	0.042	--	1.8E-02	6.5E+00	4.3E-01	5.2E+00
Chlordane, gamma	mg/kg	--	0.096	0.046	1.8E-02	6.5E+00	4.3E-01	5.2E+00
DDE	mg/kg	--	0.095	0.038	1.9E-02	7.0E+00	4.9E-01	5.4E+00
Diethylphthalate	mg/kg	--	0.0921	0.905	9.6E+01	4.9E+05	6.1E+02	3.8E+05
Endosulfan II	mg/kg	--	0.041	--	1.8E+00	3.7E+03	3.4E+01	3.9E+03
PCB-1260	mg/kg	--	**1.3**	0.017	5.4E-03	1.5E+02	**6.3E-02**	**5.3E-01**
2,3,7,8-TCDD	ng/g	--	**0.0104**	0.047	4.2E-04	3.4E+00	**1.3E-03**	**1.6E-02**
TPH								
TPH-G	mg/kg	--	--	3.1	10	10	NA	NA
TPH-D	mg/kg	**193**	**332**	**2300**	**100**	**100**	NA	NA
Metals[c]								
Aluminum	mg/kg	--	--	37,000	2.8E+03	8.4E+04	3.5E+04	9.1E+05
Antimony	mg/kg	--	--	12	1.9E+02	6.0E+02	1.4E+01	3.7E+02
Arsenic	mg/kg	--	**6.12**	**9.2**	5.8E-01	**3.3E+00**	**9.3E-02**	**1.4E+00**
Barium		--	458	--	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Beryllium	mg/kg	--	0.518	0.77	1.3E+02	3.6E+02	6.9E+01	1.8E+03
Cadmium	mg/kg	**140**	**41.9**	21*	**2.2E+00**	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium, Total	mg/kg	**2,740**	1,810	210	**1.6E+03**	8.1E+04	**2.6E+03**	5.5E+03
Cobalt	mg/kg	--	--	18	1.6E+03	4.7E+04	1.0E+01	2.7E+02
Copper	mg/kg	**558**	160	40	**1.3E+02**	2.5E+05	1.4E+03	3.7E+04
Cyanide	mg/kg	--	2	1.2	1.7E+02	NA	6.9E+02	1.8E+04
Iron	mg/kg	**29,100**	**32,000**	48,000	**9.6E+03**	9.1E+04	**2.4E+04**	6.4E+05
Lead	mg/kg	**332**	**665**	300	**2.9E+01**	4.3E+03	**1.5E+02**	8.0E+02
Mercury	mg/kg	--	**3.8**	0.49	1.6E+00	1.2E+02	**3.5E+00**	1.5E+02
Molybdenum	mg/kg	15.2	5.39	--	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	267	113	--	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Selenium	mg/kg	--	0.68	--	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	**115**	**242**	7.3	**2.3E+01**	3.5E+03	**1.7E+02**	4.6E+03
Vanadium	mg/kg	--	86.4	100	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	474	460	--	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
Actinium 228	pCi/g	--	0.7	1.65	7.68E+02	2.4E+03	7.3E+02	1.2E+03
Lead 214[d]	pCi/g	--	2.93	1.16	4.48E+03	1.4E+04	4.6E+04	7.6E+04
Lead 212[d]	pCi/g	--	0.8	0.86	6.08E+01	1.9E+02	3.6E+03	6.1E+03
Radium 226	pCi/g	--	**2.61**	--	1.60E+02	5.0E+02	**1.1E+00**	**1.1E+00**
Thallium 208	pCi/g	--	0.281	0.279	NA	NA	2.3E+04	3.7E+04
Summary of COCs								
benzo(a)pyrene, PCB-1260, 2,3,7,8-TCDD, TPH-D, arsenic, cadmium, chromium, copper, iron, lead, mercury, silver, radium 226								

[a]Maximum concentrations detected during the RI and Data Gap Investigation and IC 19 SVE Expansion Project.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs. Protection of human health levels applicable only to shallow soils (0 to 15 feet bgs).

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[d] Lead 212 and Lead 214 were used by the laboratory to quantify Radium 226 and Thorium 232. Lead 212 and Lead 214 are not contaminants of potential concern.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

* Cd analyzed with SW6010. Highest concentration with SW7131 is 2.09 mg/kg.

TABLE 30

PRL 008 Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration[a]			Screening Levels[b] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
VOCs in soil gas						
Acetone	ppbv	--	990	2,100	1.3E+05	1.9E+06
Benzene	ppbv	**24,000**	29,000	8,700	**9.8E+00**	**1.6E+02**
Chlorobenzene	ppbv	2,500J	--	2,800J	1.2E+05	9.2E+05
Chloroform	ppbv	--	--	210	2.1E+00	3.6E+01
Chloromethane	ppbv	2,400J	--	830	1.4E+04	1.1E+05
Dichlorodifluoromethane (Freon® 12)	ppbv	--	260	33,000	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	--	11,000	2,000	3.7E+01	6.2E+02
1,1-Dichloroethene	ppbv	--	1,600	4,200	5.0E+03	7.3E+04
cis-1,2-Dichloroethene	ppbv	**20,000**	1,600	9,400	**8.8E+02**	**1.3E+04**
Ethylbenzene	ppbv	**15,000**	24,000	8,700	**5.4E+03**	4.5E+04
Hexane	ppbv	--	--	2,600	2.0E+04	2.9E+05
Methane	ppbv	--	32,000	--	NA	NA
Methyl ethyl ketone (2-Butanone)	ppbv	--	130	--	1.7E+05	2.5E+06
Tetrachloroethene (PCE)	ppbv	**680**	6,200	92,000	**5.8E+00**	**9.8E+01**
Toluene	ppbv	**760,000**	530,000	380,000	**1.3E+05**	1.9E+06
TPH	ppbv	--	1,800	1,600,000	NA	NA
TPH-G	ppbv	--	--	8,300,000	NA	NA
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	--	160	1,200	3.9E+05	5.6E+06
Trichlorofluoromethane (Freon® 11)	ppbv	--	320	8,100	1.2E+04	1.8E+05
Trichloroethene (TCE)	ppbv	--	4,200	4,200	2.3E+01	3.8E+02
1,1,1-Trichloroethane	ppbv	--	--	3,200	3.1E+06	1.8E+07
2,2,4-Trimethylpentane	ppbv	370	--	--	NA	NA
Vinyl chloride	ppbv	**6,300**	4,800	29,000	**1.1E+01**	**1.8E+02**
Xylene, m, p-	ppbv	**26,000**	37,000	14,000	**2.2E+03**	3.2E+04
Xylene, o-	ppbv	**5,500**	90,000	2,800J	**2.2E+03**	3.2E+04
Summary of COCs						
benzene, cis-1,2-dichloroethene, ethylbenzene, tetrachloroethene, toluene, vinyl chloride, m,p-xylene, o-xylene						

[a]Maximum concentrations detected during the RI and Data Gap Investigation and the IC 19 SVE Expansion Project.

[b]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 31

PRL 008 Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
EW-445[c]	3Q05	A	Tetrachloroethene	160	5
MW-188[c]	3Q05	A	Tetrachloroethene	170	5
			Trichloroethene	6	5
MW-353[c]	3Q05	A	Nickel	320	100
			Tetrachloroethene	140	5
			Trichloroethene	5.2	5

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

[c] Well is located downgradient from PRL 008

Notes:

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

ug/L = micrograms per liter

TABLE 32

SAFR Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

		Maximum Concentration[a]			Screening Levels[b]			
							Protection of Human Health	
Analyte	**Units**	**0-1 ft bgs**	**1-15 ft bgs**	**15+ ft bgs**	**Protection of surface water**	**Protection of groundwater**	**Unrestricted Use**	**Industrial Use**
TPH								
TPH-D	mg/kg	--	16	**--**	100	100	--	--
Metals[c]								
Antimony	mg/kg	**16**	**39**	--	1.9E+02	6.0E+02	**1.4E+01**	3.7E+02
Cadmium	mg/kg	**2.5**	2.2	--	**2.2E+00**	9.6E+01	6.2E+00	1.0E+03
Chromium, Total	mg/kg	66	50	--	1.6E+03	8.1E+04	2.6E+03	5.5E+03
Cobalt	mg/kg	**19.7**	**31.3**	--	1.6E+03	4.7E+04	**1.0E+01**	2.7E+02
Copper	mg/kg	**3,120**	**6,770**	--	**1.3E+02**	2.5E+05	**1.4E+03**	3.7E+04
Lead	mg/kg	**64,800**	**5,900**	--	**2.9E+01**	**4.3E+03**	**1.48E+02**	**8.0E+02**
Nickel	mg/kg	67	60.5	--	7.7E+02	5.8E+03	4.3E+02	1.8E+04
Silver	mg/kg	4.02	6.71	--	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Zinc	mg/kg	326	659	--	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Summary of COCs								
antimony, cadmium, cobalt, copper, lead								

[a]Maximum concentrations listed were detected in the soil at the SAFR during the RI and Data Gap Investigation. Sediment samples collected in the vicinity of the site are not included.

[b]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs.

[c]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 33

SAFR Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
MW-351	1Q05	A	Nickel	300	100

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

Notes:

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

ug/L = micrograms per liter

TABLE 34

VZ Site Characterization Summary Table - Non-VOCs in Soil

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration			Screening Levels[a]			
							Protection of Human Health	
		0-1 ft bgs	1-15 ft bgs	15+ ft bgs	Protection of surface water	Protection of groundwater	Unrestricted Use	Industrial Use
SVOCs								
Aldrin	mg/kg		**0.012**	0.006	4.1E-03	1.0E-01	**9.2E-03**	1.1E-01
Anthracene	mg/kg	--	0.44	--	3.1E+05	2.4E+05	2.3E+03	1.0E+05
Benzo(a)anthracene	mg/kg	--	**0.37**	--	1.4E-01	1.3E+01	**8.8E-02**	8.8E-01
Benzo(k)fluoranthene	mg/kg	--	**2.9**	--	1.4E-01	2.1E+01	**1.1E-01**	**8.8E-01**
Benzo(b)fluoranthene	mg/kg	--	**2.9**	--	1.4E-01	2.9E+00	**1.1E-01**	**8.8E-01**
Benzoic acid	mg/kg	--	--	0.17	9.0E+05	> 1.0E+06	1.4E+03	> 1.0E+06
Benzyl alcohol	mg/kg	--	49	10	NA	1.8E+05	6.1E+01	2.4E+05
bis(2-Ethylhexyl)phthalate (DEHP)	mg/kg	--	**250**	7.4	5.8E+01	2.5E+02	**1.2E+01**	**9.6E+01**
Butylbenzylphthalate (BBP)	mg/kg	--	2	0.39	9.6E+01	1.2E+05	3.1E+01	7.0E+02
Chrysene	mg/kg	--	0.76	--	1.4E-01	2.1E+02	8.8E-01	8.7E+00
DDD	mg/kg	--	--	0.17	2.7E-02	1.0E+01	5.0E-01	7.6E+00
DDE	mg/kg	--	--	0.003	1.9E-02	7.0E+00	4.9E-01	5.4E+00
1,2-Dichlorobenzene	mg/kg	--	**290**	380	7.7E+02	4.1E+03	**1.9E+02**	3.9E+03
1,3-Dichlorobenzene	mg/kg	--	42	12	1.3E+04	2.1E+03	7.6E+01	1.9E+03
1,4-Dichlorobenzene	mg/kg	--	**520**	46	1.6E+02	5.2E+02	**1.5E-02**	**1.5E-01**
2,4-Dimethylphenol	mg/kg	--	**15**	0.62	1.3E+04	1.2E+04	**1.3E+01**	9.6E+03
Di-n-butylphthalate	mg/kg	--	19	0.55	9.6E+01	6.2E+04	9.3E+02	4.8E+04
Endrin	mg/kg	--	--	0.004	1.2E+00	1.8E+02	4.2E+00	2.0E+02
Fluoranthene	mg/kg	--	1.8	0.47	9.6E+03	2.2E+04	4.9E+02	1.5E+04
Fluorene	mg/kg	--	0.17	0.38	4.2E+04	2.6E+04	2.4E+02	1.3E+04
Heptachlor	mg/kg	--	--	0.0011	6.7E-03	3.8E-01	3.2E-02	4.1E-01
2-Methylnaphthalene	mg/kg	--	8.8	6.8	NA	1.9E+02	1.6E+01	1.7E+02
2-Methylphenol	mg/kg	--	--	0.065	1.1E+03	3.1E+04	2.0E+01	2.4E+04
4-Methylphenol	mg/kg	--	**76**	0.78	NA	3.1E+03	**1.9E+00**	2.4E+03
Naphthalene	mg/kg	--	**64**	8.5	6.7E+02	6.4E+01	**4.7E-02**	**6.0E-01**
PCB-1254	mg/kg	--	--	2.4	5.4E-03	1.5E+02	6.3E-02	5.3E-01
PCB-1260	mg/kg	--	**3.1**	2.7	5.4E-03	1.5E+02	**6.3E-02**	**5.3E-01**
Phenanthrene	mg/kg	--	2	0.5	NA	2.9E+04	2.6E+03	1.1E+05
Phenol	mg/kg	--	13	0.92	6.7E+04	1.8E+05	6.1E+01	1.4E+05
Pyrene	mg/kg	--	2	--	3.1E+04	2.9E+04	3.5E+02	1.1E+04
2,3,7,8-TCDD	ng/g	--	**0.192**	0.00602	4.2E-04	3.4E+00	**1.3E-03**	**1.6E-02**
1,2,4-Trichlorobenzene	mg/kg	--	4.9	--	3.1E+02	2.2E+02	6.9E+00	2.4E+02
2,4,5-Trichlorophenol	mg/kg	--	--	0.5	2.2E+04	6.2E+04	4.4E+02	4.8E+04
TPH*								
TPH-G	mg/kg	--	--	--	1.0E+01	1.0E+01	NA	NA
TPH-D	mg/kg	--	**4,400**	**7,750**	1.0E+02	**1.0E+02**	NA	NA
TPH	mg/kg	--	11,000	25,000	NA	NA	NA	NA
Metals[b]								
Aluminum	mg/kg	--	19,500	42,500	2.8E+03	8.4E+04	3.5E+04	9.1E+05
Antimony	mg/kg	--	--	4.7	1.9E+02	6.0E+02	1.4E+01	3.7E+02
Arsenic	mg/kg	--	**20**	**24**	5.8E-01	**3.3E+00**	**9.3E-02**	**1.4E+00**
Barium	mg/kg	--	457	784	3.2E+03	7.8E+03	6.9E+03	1.8E+05
Beryllium	mg/kg	--	0.84	2.1	1.3E+02	3.6E+02	6.9E+01	1.8E+03
Cadmium	mg/kg	--	**170**	89	2.2E+00	**9.6E+01**	**6.2E+00**	1.0E+03
Chromium, hexavalent	mg/kg	--	--	4.4	3.5E+02	2.1E+02	1.1E+02	3.0E+03
Chromium, total	mg/kg	--	**31,000**	33,000	1.6E+03	8.1E+04	**2.6E+03**	**5.5E+03**
Cobalt	mg/kg	--	**21**	45	1.6E+03	4.7E+04	**1.0E+01**	2.7E+02
Copper	mg/kg	--	**4,200**	197	1.3E+02	2.5E+05	**1.4E+03**	3.7E+04
Cyanide	mg/kg	--	100	58	1.7E+02	NA	6.9E+02	1.8E+04
Iron	mg/kg	--	**25,800**	51,500	9.6E+03	9.1E+04	**2.4E+04**	6.4E+05
Lead	mg/kg	--	**4,500**	400	2.9E+01	**4.3E+03**	**1.5E+02**	**8.0E+02**
Manganese	mg/kg	--	735	4,400	1.6E+03	2.8E+04	8.3E+02	2.2E+04
Mercury	mg/kg	--	**6.5**	17.2	1.6E+00	1.2E+02	**3.5E+00**	1.5E+02
Molybdenum	mg/kg	--	13	66	3.2E+02	1.0E+03	1.7E+02	4.6E+03
Nickel	mg/kg	--	**590**	120	7.7E+02	5.8E+03	**4.3E+02**	1.8E+04
Selenium	mg/kg	--	--	15.3	1.6E+02	2.0E+03	1.1E+02	4.6E+03
Silver	mg/kg	--	35	4.3	2.3E+01	3.5E+03	1.7E+02	4.6E+03
Thallium	mg/kg	--	0.21	0.68	5.4E+01	1.4E+01	2.3E+00	6.1E+01
Vanadium	mg/kg	--	--	127	1.6E+03	1.3E+04	1.7E+02	4.6E+03
Zinc	mg/kg	--	1,400	540	1.7E+03	1.4E+05	3.1E+03	2.8E+05
Radionuclides								
Americium 241	pCi/g	0.231	--	--	4.80E+02	1.5E+03	1.9E+00	5.7E+00
Summary of COCs								
aldrin, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 2,4-dimethylphenol, 4-methylphenol, naphthalene, PCB-1260, 2,3,7,8-TCDD, TPH-D, arsenic, cadmium, chromium, cobalt, copper, iron, lead, mercury, nickel								

[a]Protection of surface water levels applicable only to samples collected from 0 to 1 ft bgs.

[b]Metals listed exceed "combined" background levels defined in General Framework Document (URS, 2002).

[c]OCDD Using SW8290

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

TABLE 35

VZ Site Characterization Summary Table - VOCs in Soil Gas

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Units	Maximum Concentration			Screening Levels[a] Protection of Human Health	
		0-15 ft bgs	15-25 ft bgs	25+ ft bgs	Unrestricted Use	Industrial Use
VOCs in soil gas						
Benzene	ppbv	**35**	--	583	**9.8E+00**	1.6E+02
Carbon tetrachloride	ppbv	**38**	--	--	**2.6E+00**	4.4E+01
Chlorobenzene	ppbv	94	235	784	1.1E+03	1.6E+04
Chloroform	ppbv	**37**	--	--	**2.1E+00**	**3.6E+01**
1,2-Dichlorobenzene	ppbv	104	304	2,966	3.3E+03	4.8E+04
Dichlorodifluoromethane (Freon® 12)	ppbv	18	--	--	4.0E+03	5.9E+04
1,1-Dichloroethane	ppbv	**129**	--	21,043	**3.7E+01**	6.2E+02
1,2-Dichloroethane	ppbv	**74**	--	--	**2.3E+00**	**3.9E+01**
1,1-Dichloroethene	ppbv	**90,984**	21,046	3,373,731	**5.0E+03**	**7.3E+04**
cis-1,2-Dichloroethene	ppbv	164	--	6,162	8.8E+02	1.3E+04
trans-1,2-Dichloroethene	ppbv	5	--	--	1.5E+03	2.2E+04
Ethylbenzene	ppbv	**32**	169	1,273	**2.2E+01**	3.7E+02
Methylene Chloride (Dichloromethane)	ppbv	35	--	68,212	1.5E+02	2.5E+03
Styrene	ppbv	2	--	--	2.4E+04	3.6E+05
Tetrachloroethene (PCE)	ppbv	**55**	--	--	**5.8E+00**	9.8E+01
Toluene	ppbv	1,451	1,287	5,155	1.3E+05	1.9E+06
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	ppbv	47,070	--	--	3.9E+05	5.6E+06
1,1,1-Trichloroethane	ppbv	114	--	135,023	9.4E+04	1.4E+06
Trichloroethene (TCE)	ppbv	**634**	6,266	267,965	**2.3E+01**	**3.8E+02**
Trichlorofluoromethane (Freon® 11)	ppbv	268	11,608	26,803	1.2E+04	1.8E+05
1,2,4-Trimethylbenzene	ppbv	**199**	341	13,960	**1.4E+02**	2.1E+03
1,3,5-Trimethylbenzene	ppbv	6	--	--	1.2E+02	1.8E+03
Vinyl chloride	ppbv	--	--	1,894	1.1E+01	1.8E+02
Xylene, m, p-	ppbv	136	382	8,247	2.2E+03	3.2E+04
Xylene, o-	ppbv	200	389	14,069	2.2E+03	3.2E+04
Summary of COCs						
benzene, carbon tetrachloride, chloroform, 1,1-dichloroethane, 1,2-dichloroethane, 1,1-dichloroethene, ethylbenzene, tetrachloroethene, trichloroethene, 1,2,4-trimethylbenzene						

[a]Protection of human health levels for VOCs are applicable only to shallow (0 to 15 ft bgs) soil gas.

Notes:

J = Analyte was detected but quantification is an estimate.

BOLD = indicates compound in excess of screening levels.

NA = Not Available (no PCG has been established for this compound)

Data from OU D, Remedial Investigation Report, June 1994, Volume 2,

Appendix B (Table B1-1 - AR# 2346 175), Appendix B2 (Table 1 - AR# 2346 193) and Appendix C (Table C1-1 - AR# 2346 245)

TABLE 36

VZ Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
EW-73	1Q05	A/B	1,1-Dichloroethene	26	6
EW-83	1Q05	A/B	1,1-Dichloroethene	120	6
			Trichloroethene	130	5
EW-84	1Q05	A/B	1,4-Dioxane	140	6.1[c]
			1,1-Dichloroethane	73	5
			1,1-Dichloroethene	100	6
			1,2-Dichloroethane	20	0.5
			Trichloroethene	93	5
			Vinyl Chloride	28	0.5
			cis-1,2-Dichloroethene	16	6
EW-85	1Q05	A/B	1,4-Dioxane	7	6.1[c]
			Lead	22	15
			1,1-Dichloroethene	31	6
			1,2-Dichloroethane	6.6	0.5
			Trichloroethene	46	5
EW-86	1Q05	A/B	--	--	--
EW-87	3Q05	A/B	--	--	--
MW-10	1Q05	A	1,4-Dioxane	60	6.1[c]
			1,1-Dichloroethane	6.6	5
			1,1-Dichloroethene	13	6
			1,2-Dichloroethane	47	0.5
			Trichloroethene	46	5
			cis-1,2-Dichloroethene	9.1	6
MW-11	1Q05	A	1,4-Dioxane	25	6.1[c]
			1,1-Dichloroethene	240	6
			1,2-Dichloroethane	0.9	0.5
			Trichloroethene	27	5
MW-12	1Q05	A	1,1-Dichloroethene	21	6
			Trichloroethene	34	5
MW-14	1Q05	A	1,1-Dichloroethene	7.9	6
			1,2-Dichloroethane	0.56	0.5
			Trichloroethene	12	5
MW-15	1Q05	A	1,1-Dichloroethene	120	6
			Trichloroethene	82	5
MW-38D	1Q05	A	1,4-Dioxane	9.8	6.1[c]
			1,1-Dichloroethane	7.8	5
			1,2-Dichloroethane	2.8	0.5
			Vinyl Chloride	52	0.5
MW-51	1Q05	B	--	--	--
MW-52	1Q05	B	--	--	--
MW-53	1Q05	A	--	--	--
MW-54	1Q05	B	1,4-Dioxane	9.6	6.1[c]
			1,1-Dichloroethene	27	6
			1,2-Dichloroethane	1.7	0.5
			Trichloroethene	8.2	5
			Vinyl Chloride	9	0.5

TABLE 36

VZ Site Characterization Summary Table - Groundwater

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Groundwater Well	Most Recent Sampling Event	Monitoring Zone	Contaminant[a]	Concentration (ug/L)	Screening Levels[b] (ug/L)
MW-55	1Q05	A	--	--	--
MW-70	1Q05	A	--	--	--
MW-72	1Q05	A	1,4-Dioxane	25	6.1[c]
			1,2-Dichloroethane	5.7	0.5
			Trichloroethene	12	5
MW-74	1Q05	A	--	--	--
MW-89	1Q05	A	--	--	--
MW-91	1Q05	A	--	--	--
MW-241	1Q05	A	1,2-Dichloroethane	0.65	0.5
MW-242	1Q05	A	1,2-Dichloroethane	3.5	0.5

[a] Hexavalent chromium was not detected greater than screening levels in groundwater wells at the site during the most recent sampling event under the GWMP. However, historically hexavalent chromium has been reported at concentrations greater than screening levels and is therefore considered a COC.

[b] Screening levels are California Primary MCLs unless noted otherwise.

[c] EPA Region 9 PRG for tap water

Notes:

-- = no compounds were detected at concentrations greater than a screening level during the most recent sampling event.

COC = contaminant of concern

GWMP = Groundwater Monitoring Program

MCL = maximum contaminant level

PRG = preliminary remediation goal

ug/L = micrograms per liter

TABLE 37
Risk Summary Table for CS 010
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

							AFRPA Preliminary Cleanup Goals (PCGs)		Estimated Risk Based on AFRPA PCGs	
Analyte	**Frequency of Detection**	**Units**	**Minimum Detected Concentration**	**Maximum Detected Concentration**	**EPC**	**EPC Basis**	**Cancer Target Risk = 1.0 x 10-6**	**Non-Cancer Target HI = 1**	**Carcinogenic Risk**	**Non-carcinogenic Risk**
Unrestricted Use Scenario										
Metals										
Arsenic	8	mg/kg	70	107	107	Max Concentration	9.3E-02	7.6E+00	1.15E-03	1.41E+01
Barium	4,384	mg/kg	26	6,115	6,115	Max Concentration	NA	6.9E+03	NA	8.86E-01
Cadmium	3,137	mg/kg	5	990	990	Max Concentration	1.7E+04	6.2E+00	5.82E-08	1.60E+02
Chromium	4,369	mg/kg	10	1,328	1,328	Max Concentration	2.6E+03	NA	5.11E-07	NA
Lead	3,737	mg/kg	25	153,827	153,827	Max Concentration	NA	NA	NA	NA
Selenium	12	mg/kg	24	80	80	Max Concentration	NA	1.1E+02	NA	7.27E-01
Silver	1,143	mg/kg	10	629	629	Max Concentration	NA	1.7E+02	NA	3.70E+00
Industrial Use Scenario										
Metals										
Arsenic	8	mg/kg	70	107	107	Max Concentration	1.40E+00	2.30E+02	7.64E-05	4.65E-01
Barium	4,384	mg/kg	26	6,115	6,115	Max Concentration	NA	1.80E+05	NA	3.40E-02
Cadmium	3,137	mg/kg	5	990	990	Max Concentration	3.60E+04	1.00E+03	2.75E-08	9.90E-01
Chromium	4,369	mg/kg	10	1,328	1,328	Max Concentration	5.50E+03	NA	2.41E-07	NA
Lead	3,737	mg/kg	25	153,827	153,827	Max Concentration	NA	NA	NA	NA
Selenium	12	mg/kg	24	80	80	Max Concentration	NA	4.60E+03	NA	1.74E-02
Silver	1,143	mg/kg	10	629	629	Max Concentration	NA	4.60E+03	NA	1.37E-01

TABLE 38

Radiological Risk Summary Table for CS 010

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Scenario	Radionuclide	EPC* (pCi/g)	Total Carcinogenic Risk	Background Risk	Incremental Risk
Resident	Radium 226 (+D)	12	1.6E-03	1.5E-04	1.5E-03
	Total		**2E-03**	**1E-04**	**1E-03**
Indoor Occupational Worker	Radium 226 (+D)	12	2.3E-04	2.1E-05	2.1E-04
	Total		**2E-04**	**2E-05**	**2E-04**
Outdoor Occupational Worker	Radium 226 (+D)	12	5.8E-04	5.3E-05	5.3E-04
	Total		**6E-04**	**5E-05**	**5E-04**

* EPC for CS 010 is the average concentration of the remaining stockpiled soil.

TABLE 39

Combined Risk Summary Table for CS 011 - CS 014, Unrestricted Use Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Antimony	9/15	mg/kg	1	310	310	Max Concentration	NA	1.4E+01	NA	2.2E+01
Arsenic	10/14	mg/kg	1	22	22	Max Concentration	9.3E-02	7.6E+00	2.4E-04	2.9E+00
Barium	12/12	mg/kg	84	1,100	1,100	Max Concentration	NA	6.9E+03	NA	1.6E-01
Beryllium	7/7	mg/kg	0.13	0.88	0.88	Max Concentration	1.3E+04	6.9E+01	6.8E-11	1.3E-02
Cadmium	20/20	mg/kg	1.1	210	210	Max Concentration	1.7E+04	6.2E+00	1.2E-08	3.4E+01
Chromium, total	8/8	mg/kg	14	2,100	2,100	Max Concentration	2.6E+03	NA	8.1E-07	NA
Cobalt	8/8	mg/kg	5.9	42	42	Max Concentration	3.4E+03	1.0E+01	1.2E-08	4.2E+00
Copper	15/15	mg/kg	7	5,300	5,300	Max Concentration	NA	1.4E+03	NA	3.8E+00
Iron	3/3	mg/kg	14,000	66,000	66,000	Max Concentration	NA	2.4E+04	NA	2.8E+00
Lead	14/15	mg/kg	8.5	3700	3700	Max Concentration	NA	NA	NA	NA
Mercury	10/10	mg/kg	0.13	3.3	3.3	Max Concentration	NA	3.5E+00	NA	9.4E-01
Molybdenum	11/15	mg/kg	0.62	18	18	Max Concentration	NA	1.7E+02	NA	1.1E-01
Nickel	8/8	mg/kg	14	330	330	Max Concentration	1.2E+05	4.3E+02	2.8E-09	7.7E-01
Selenium	9/9	mg/kg	0.1	1.5	1.5	Max Concentration	NA	1.1E+02	NA	1.4E-02
Silver	11/15	mg/kg	0.92	220	220	Max Concentration	NA	1.7E+02	NA	1.3E+00
Thallium	3/8	mg/kg	10	51	51	Max Concentration	NA	2.3E+00	NA	2.2E+01
Vanadium	14/14	mg/kg	24	120	120	Max Concentration	NA	1.7E+02	NA	7.1E-01
Zinc	15/15	mg/kg	16	5,400	5,400	Max Concentration	NA	3.1E+03	NA	1.7E+00
SVOCs										
Acenaphthene	3/16	mg/kg	0.1	3.2	3.2	Max Concentration	NA	2.9E+02	NA	1.1E-02
Anthracene	1/9	mg/kg	5.9	5.9	5.9	Max Concentration	NA	2.3E+03	NA	2.6E-03
Benzo(a)anthracene	2/9	mg/kg	0.065	13	13	Max Concentration	8.8E-02	5.7E+02	1.5E-04	2.3E-02
Benzo(a)pyrene	1/9	mg/kg	0.096	0.096	0.096	Max Concentration	1.8E-02	6.8E+02	5.3E-06	1.4E-04
Benzo(b)fluoranthene	2/17	mg/kg	0.055	0.25	0.25	Max Concentration	1.1E-01	6.8E+02	2.3E-06	3.7E-04
Benzo(g,h,i)perylene	1/9	mg/kg	4.1	4.1	4.1	Max Concentration	NA	7.5E+02	NA	5.5E-03
Benzoic Acid	2/7	mg/kg	0.2	0.35	0.35	Max Concentration	NA	1.4E+03	NA	2.5E-04
Benzyl alcohol	1/3	mg/kg	0.15	0.15	0.15	Max Concentration	NA	6.1E+01	NA	2.5E-03
BHC, beta	1/8	mg/kg	0.0007	0.0007	0.0007	Max Concentration	1.1E-02	NA	6.4E-08	NA
Bis(2-ethylhexyl)phthalate (DEHP)	9/26	mg/kg	0.51	86	86	Max Concentration	1.2E+01	5.8E+02	7.2E-06	1.5E-01
Butylbenzylphthalate (BBP)	2/10	mg/kg	0.37	0.74	0.74	Max Concentration	3.1E+01	2.3E+03	2.4E-08	3.2E-04
Gamma Chlordane	1/8	mg/kg	0.0019	0.0019	0.0019	Max Concentration	4.3E-01	1.3E+01	4.4E-09	1.5E-04
4-Chloroaniline	1/8	mg/kg	0.27	0.27	0.27	Max Concentration	NA	1.3E+00	NA	2.1E-01
Chrysene	2/16	mg/kg	0.17	12	12	Max Concentration	8.8E-01	5.7E+02	1.4E-05	2.1E-02
DDE	2/19	mg/kg	0.016	0.51	0.51	Max Concentration	4.9E-01	1.4E+01	1.0E-06	3.6E-02
DDT	2/19	mg/kg	0.0012	0.0046	0.0046	Max Concentration	4.7E-01	1.4E+01	9.8E-09	3.3E-04
Dibenzo(a,h)anthracene	1/9	mg/kg	1.2	1.2	1.2	Max Concentration	3.8E-02	7.9E+02	3.2E-05	1.5E-03
1,2-Dichlorobenzene	1/3	mg/kg	2.8	2.8	2.8	Max Concentration	NA	1.9E+02	NA	1.5E-02
1,4-Dichlorobenzene[e]	1/3	mg/kg	1.4	1.4	1.4	Max Concentration	1.5E-02	5.4E+01	9.3E-05	2.6E-02
Dieldrin	5/19	mg/kg	0.0009	0.0067	0.0067	Max Concentration	5.8E-03	8.7E-01	1.2E-06	7.7E-03
Diethylphthalate (DEPH)	5/18	mg/kg	0.11	0.17	0.17	Max Concentration	NA	6.1E+02	NA	2.8E-04
2,4-Dimethylphenol	1/8	mg/kg	0.4	0.4	0.4	Max Concentration	NA	1.3E+01	NA	3.1E-02
Dimethylphthalate (DMPH)	2/10	mg/kg	0.18	0.18	0.18	Max Concentration	NA	2.4E+03	NA	7.5E-05
Di-n-butylphthalate (DNBP)	6/18	mg/kg	0.24	0.42	0.42	Max Concentration	NA	9.3E+02	NA	4.5E-04
2,4-Dinitrotoluene	1/9	mg/kg	0.2	0.2	0.2	Max Concentration	6.3E-03	8.2E-01	3.2E-05	2.4E-01
2,6-Dinitrotoluene	2/17	mg/kg	0.42	1.7	1.7	Max Concentration	2.4E-03	3.4E-01	7.1E-04	5.0E+00
Di-n-octyl phthalate	1/1	mg/kg	0.16	0.16	0.16	Max Concentration	NA	1.2E+03	NA	1.3E-04
Endosulfan I	2/11	mg/kg	0.02	0.04	0.04	Max Concentration	NA	3.4E+01	NA	1.2E-03
Endosulfan II	1/8	mg/kg	0.1	0.1	0.1	Max Concentration	NA	3.4E+01	NA	2.9E-03
Endosulfan sulfate	1/11	mg/kg	0.67	0.67	0.67	Max Concentration	NA	2.0E+01	NA	3.4E-02
Endrin aldehyde	1/8	mg/kg	0.001	0.001	0.001	Max Concentration	NA	4.2E+00	NA	2.4E-04
Fluoranthene	5/24	mg/kg	0.13	28	28	Max Concentration	NA	4.9E+02	NA	5.7E-02
Fluorene	1/9	mg/kg	5.4	5.4	5.4	Max Concentration	NA	2.4E+02	NA	2.3E-02
Indeno(1,2,3-c,d)pyrene	2/9	mg/kg	0.065	4.8	4.8	Max Concentration	1.2E-01	7.6E+02	4.0E-05	6.3E-03
2-Methylnapthalene	6/17	mg/kg	0.14	0.74	0.74	Max Concentration	NA	1.6E+01	NA	4.6E-02
2-Methylphenol	1/8	mg/kg	0.35	0.35	0.35	Max Concentration	NA	2.0E+01	NA	1.8E-02
4-Methylphenol	3/25	mg/kg	0.26	45	45	Max Concentration	NA	1.9E+00	NA	2.4E+01
Naphthalene[e]	7/25	mg/kg	0.15	1.5	1.5	Max Concentration	4.7E-02	2.0E+00	3.2E-05	7.5E-01
4-Nitrophenol	1/9	mg/kg	3.3	3.3	3.3	Max Concentration	NA	NA	NA	NA
N-nitrosodi-n-propylamine	1/8	mg/kg	0.95	0.95	0.95	Max Concentration	1.2E-04	NA	7.9E-03	NA
N-nitrosodiphenylamine (NNSPH)	5/17	mg/kg	0.1	22	22	Max Concentration	1.8E+00	3.6E+01	1.2E-05	6.1E-01
PCB-1260	9/27	mg/kg	0.042	17	17	Max Concentration	6.3E-02	4.4E-01	2.7E-04	3.9E+01
Pentachlorophenol	1/8	mg/kg	0.34	0.34	0.34	Max Concentration	5.9E-01	4.0E+02	5.8E-07	8.5E-04
Phenanthrene	5/17	mg/kg	0.19	34	34	Max Concentration	NA	2.6E+03	NA	1.3E-02
Phenol	2/17	mg/kg	0.22	0.26	0.26	Max Concentration	NA	6.1E+01	NA	4.3E-03
Pyrene	2/16	mg/kg	0.15	0.16	0.16	Max Concentration	NA	3.5E+02	NA	4.6E-04
2,3,7,8-TCDD	4/16	ng/g	0.0000263	0.03475	0.03475	Max Concentration	1.3E-03	3.0E-01	2.7E-05	1.2E-01
TPH										
TPH-D	14/20	mg/kg	14	41,000	41,000	Max Concentration	NA	NA	NA	NA
TPH-G	5/13	mg/kg	0.18	2,600	2,600	Max Concentration	NA	NA	NA	NA
Subtotal for Soil									**9.6E-03**	**1.7E+02**
Soil Gas (0 to 15 ft bgs)[c]										
Benzene	5/5	ppbv	180	2,300	2,300	Max Concentration	9.8E+00	9.4E+02	2.3E-04	2.4E+00
Carbon tetrachloride	1/1	ppbv	980	980	980	Max Concentration	2.6E+00	6.5E+02	3.8E-04	1.5E+00
Chlorobenzene	4/5	ppbv	240	6,200	6,200	Max Concentration	NA	1.1E+03	NA	5.6E+00
Chloroethane	4/5	ppbv	440	17,000	17,000	Max Concentration	1.1E+02	3.8E+05	1.5E-04	4.5E-02
Cyclohexane[d]	5/5	ppbv	280	4,100	4,100	Max Concentration	NA	2.0E+04	NA	2.1E-01
1,2-Dichlorobenzene	3/3	ppbv	100	1,000	1,000	Max Concentration	NA	3.3E+03	NA	3.0E-01
1,3-Dichlorobenzene	3/3	ppbv	69	140	140	Max Concentration	NA	1.7E+03	NA	8.2E-02
1,4-Dichlorobenzene	3/3	ppbv	170	370	370	Max Concentration	3.5E+00	1.3E+04	1.1E-04	2.8E-02
Dichlorodifluoromethane (Freon® 12)	4/4	ppbv	73	1,300	1,300	Max Concentration	NA	4.0E+03	NA	3.3E-01
1,1-Dichloroethane	4/5	ppbv	120	800	800	Max Concentration	3.7E+01	NA	2.2E-05	NA
1,2-Dichloroethane	2/3	ppbv	100	150	150	Max Concentration	2.3E+00	9.9E+03	6.5E-05	1.5E-02
cis-1,2-Dichloroethene	4/5	ppbv	60	240	240	Max Concentration	NA	8.8E+02	NA	2.7E-01
2,4-Dimethylpentane[d]	4/5	ppbv	410	980	980	Max Concentration	NA	2.0E+04	NA	4.9E-02
Ethylbenzene	5/5	ppbv	150	12,000	12,000	Max Concentration	2.2E+01	2.2E+04	5.5E-04	5.5E-01
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	1/2	ppbv	280	280	280	Max Concentration	NA	3.9E+05	NA	7.2E-04
Heptane[d]	5/5	ppbv	1,900	7,800	7,800	Max Concentration	NA	2.0E+04	NA	3.9E-01
Hexane	4/5	ppbv	970	5,400	5,400	Max Concentration	NA	2.0E+04	NA	2.7E-01
Total non-methane hydrocarbons as hexane [d]	5/5	ppbv	90,000	770,000	770,000	Max Concentration	NA	2.0E+04	NA	3.9E+01
Methylene chloride (dichloromethane)	2/3	ppbv	73	200	200	Max Concentration	1.5E+02	1.2E+04	1.3E-06	1.7E-02
Tetrachloroethene (PCE)	1/1	ppbv	1,400	1,400	1,400	Max Concentration	5.8E+00	5.0E+02	2.4E-04	2.8E+00
Toluene	5/5	ppbv	170	1,000	1,000	Max Concentration	NA	1.3E+05	NA	7.7E-03
Trichloroethene (TCE)	4/5	ppbv	53	94	94	Max Concentration	2.3E+01	1.1E+04	4.1E-06	8.5E-03
Trichlorofluoromethane (Freon® 11)	3/4	ppbv	110	310	310	Max Concentration	NA	1.2E+04	NA	2.6E-02
1,2,4-Trimethylbenzene	4/5	ppbv	67	5,400	5,400	Max Concentration	NA	1.4E+02	NA	3.9E+01
1,3,5-Trimethylbenzene	2/3	ppbv	82	170	170	Max Concentration	NA	1.2E+02	NA	1.4E+00
2,2,4-Trimethylpentane	2/2	ppbv	1,500	1,500	1,500	Max Concentration	NA	NA	NA	NA
Vinyl chloride	4/5	ppbv	2,200	14,000	14,000	Max Concentration	1.1E+01	3.9E+03	1.3E-03	3.6E+00
o-Xylene	3/3	ppbv	180	360	360	Max Concentration	NA	2.2E+03	NA	1.6E-01
m,p-Xylenes	5/5	ppbv	100	5,500	5,500	Max Concentration	NA	2.2E+03	NA	2.5E+00
Subtotal for Soil Gas									**3.0E-03**	**1.0E+02**
Total									**1.3E-02**	**2.7E+02**

[a] Maximum concentrations were used in risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] VOCs in soil gas were detected at the site during 1994 RI investigations. These data may not be representative of current conditions because the IC 19 SVE system has been in operation at the site since 1997.

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

[e] The risk-based soil screening levels protective of indoor air were used in the risk estimation.

NA=Not Available.

TABLE 40

Combined Risk Summary Table for CS 011 - CS 014, Industrial Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Antimony	9/15	mg/kg	1	310	310	Max Concentration	NA	3.7E+02	NA	8.4E-01
Arsenic	10/14	mg/kg	1	22	22	Max Concentration	1.4E+00	2.3E+02	1.6E-05	9.6E-02
Barium	12/12	mg/kg	84	1,100	1,100	Max Concentration	NA	1.8E+05	NA	6.1E-03
Beryllium	7/7	mg/kg	0.13	0.88	0.88	Max Concentration	2.7E+04	1.8E+03	3.3E-11	4.9E-04
Cadmium	20/20	mg/kg	1.1	210	210	Max Concentration	3.6E+04	1.0E+03	5.8E-09	2.1E-01
Chromium, total	8/8	mg/kg	14	2,100	2,100	Max Concentration	5.5E+03	NA	3.8E-07	NA
Cobalt	8/8	mg/kg	5.9	42	42	Max Concentration	7.3E+03	2.7E+02	5.8E-09	1.6E-01
Copper	15/15	mg/kg	7	5,300	5,300	Max Concentration	NA	3.7E+04	NA	1.4E-01
Iron	3/3	mg/kg	14,000	66,000	66,000	Max Concentration	NA	6.4E+05	NA	1.0E-01
Lead	14/15	mg/kg	8.5	3,700	3,700	Max Concentration	NA	NA	NA	NA
Mercury	10/10	mg/kg	0.13	3.3	3.3	Max Concentration	NA	1.5E+02	NA	2.2E-02
Molybdenum	11/15	mg/kg	0.62	18	18	Max Concentration	NA	4.6E+03	NA	3.9E-03
Nickel	8/8	mg/kg	14	330	330	Max Concentration	2.5E+05	1.8E+04	1.3E-09	1.8E-02
Selenium	9/9	mg/kg	0.1	1.5	1.5	Max Concentration	NA	4.6E+03	NA	3.3E-04
Silver	11/15	mg/kg	0.92	220	220	Max Concentration	NA	4.6E+03	NA	4.8E-02
Thallium	3/8	mg/kg	10	51	51	Max Concentration	NA	6.1E+01	NA	8.4E-01
Vanadium	14/14	mg/kg	24	120	120	Max Concentration	NA	4.6E+03	NA	2.6E-02
Zinc	15/15	mg/kg	16	5,400	5,400	Max Concentration	NA	2.8E+05	NA	1.9E-02
SVOCs										
Acenaphthene	3/16	mg/kg	0.1	3.2	3.2	Max Concentration	NA	1.6E+04	NA	2.0E-04
Anthracene	1/9	mg/kg	5.9	5.9	5.9	Max Concentration	NA	1.0E+05	NA	5.9E-05
Benzo(a)anthracene	2/9	mg/kg	0.065	13	13	Max Concentration	8.8E-01	1.1E+04	1.5E-05	1.2E-03
Benzo(a)pyrene	1/9	mg/kg	0.096	0.096	0.096	Max Concentration	1.4E-01	1.1E+04	6.9E-07	8.7E-06
Benzo(b)fluoranthene	2/17	mg/kg	0.055	0.25	0.25	Max Concentration	8.8E-01	1.1E+04	2.8E-07	2.3E-05
Benzo(g,h,i)perylene	1/9	mg/kg	4.1	4.1	4.1	Max Concentration	NA	1.1E+04	NA	3.7E-04
Benzoic Acid	2/7	mg/kg	0.2	0.35	0.35	Max Concentration	NA	2.5E+06	NA	1.4E-07
Benzyl alcohol	1/3	mg/kg	0.15	0.15	0.15	Max Concentration	NA	2.4E+05	NA	6.3E-07
BHC, beta	1/8	mg/kg	0.0007	0.0007	0.0007	Max Concentration	1.0E+00	NA	7.0E-10	NA
Bis(2-ethylhexyl)phthalate (DEHP)	9/26	mg/kg	0.51	86	86	Max Concentration	9.6E+01	9.6E+03	9.0E-07	9.0E-03
Butylbenzylphthalate (BBP)	2/10	mg/kg	0.37	0.74	0.74	Max Concentration	7.0E+02	9.6E+04	1.1E-09	7.7E-06
Gamma Chlordane	1/8	mg/kg	0.0019	0.0019	0.0019	Max Concentration	5.2E+00	3.3E+02	3.7E-10	5.8E-06
4-Chloroaniline	1/8	mg/kg	0.27	0.27	0.27	Max Concentration	NA	1.9E+03	NA	1.4E-04
Chrysene	2/16	mg/kg	0.17	12	12	Max Concentration	8.7E+00	1.1E+04	1.4E-06	1.1E-03
DDE	2/19	mg/kg	0.016	0.51	0.51	Max Concentration	5.4E+00	3.3E+02	9.4E-08	1.5E-03
DDT	2/19	mg/kg	0.0012	0.0046	0.0046	Max Concentration	5.4E+00	3.3E+02	8.5E-10	1.4E-05
Dibenzo(a,h)anthracene	1/9	mg/kg	1.2	1.2	1.2	Max Concentration	2.6E-01	1.1E+04	4.6E-06	1.1E-04
1,2-Dichlorobenzene	1/3	mg/kg	2.8	2.8	2.8	Max Concentration	NA	3.9E+03	NA	7.2E-04
1,4-Dichlorobenzene[e]	1/3	mg/kg	1.4	1.4	1.4	Max Concentration	1.5E-01	4.8E+02	9.3E-06	2.9E-03
Dieldrin	5/19	mg/kg	0.0009	0.0067	0.0067	Max Concentration	1.1E-01	3.3E+01	6.1E-08	2.0E-04
Diethylphthalate (DEPH)	5/18	mg/kg	0.11	0.17	0.17	Max Concentration	NA	3.8E+05	NA	4.5E-07
2,4-Dimethylphenol	1/8	mg/kg	0.4	0.4	0.4	Max Concentration	NA	9.6E+03	NA	4.2E-05
Dimethylphthalate (DMPH)	2/10	mg/kg	0.18	0.18	0.18	Max Concentration	NA	6.2E+06	NA	2.9E-08
Di-n-butylphthalate (DNBP)	6/18	mg/kg	0.24	0.42	0.42	Max Concentration	NA	4.8E+04	NA	8.8E-06
2,4-Dinitrotoluene	1/9	mg/kg	0.2	0.2	0.2	Max Concentration	4.3E+00	9.6E+02	4.7E-08	2.1E-04
2,6-Dinitrotoluene	2/17	mg/kg	0.42	1.7	1.7	Max Concentration	2.0E+00	4.8E+02	8.5E-07	3.5E-03
Di-n-octyl phthalate	1/1	mg/kg	0.16	0.16	0.16	Max Concentration	NA	1.9E+04	NA	8.4E-06
Endosulfan I	2/11	mg/kg	0.02	0.04	0.04	Max Concentration	NA	3.9E+03	NA	1.0E-05
Endosulfan II	1/8	mg/kg	0.1	0.1	0.1	Max Concentration	NA	3.9E+03	NA	2.6E-05
Endosulfan sulfate	1/11	mg/kg	0.67	0.67	0.67	Max Concentration	NA	3.9E+03	NA	1.7E-04
Endrin aldehyde	1/8	mg/kg	0.001	0.001	0.001	Max Concentration	NA	2.0E+02	NA	5.0E-06
Fluoranthene	5/24	mg/kg	0.13	28	28	Max Concentration	NA	1.5E+04	NA	1.9E-03
Fluorene	1/9	mg/kg	5.4	5.4	5.4	Max Concentration	NA	1.3E+04	NA	4.2E-04
Indeno(1,2,3-c,d)pyrene	2/9	mg/kg	0.065	4.8	4.8	Max Concentration	8.8E-01	1.1E+04	5.5E-06	4.4E-04
2-Methylnapthalene	6/17	mg/kg	0.14	0.74	0.74	Max Concentration	NA	1.7E+02	NA	4.4E-03
2-Methylphenol	1/8	mg/kg	0.35	0.35	0.35	Max Concentration	NA	2.4E+04	NA	1.5E-05
4-Methylphenol	3/25	mg/kg	0.26	45	45	Max Concentration	NA	2.4E+03	NA	1.9E-02
Naphthalene[e]	7/25	mg/kg	0.15	1.5	1.5	Max Concentration	6.0E-01	2.2E+01	2.5E-06	6.8E-02
4-Nitrophenol	1/9	mg/kg	3.3	3.3	3.3	Max Concentration	NA	NA	NA	NA
N-nitrosodi-n-propylamine	1/8	mg/kg	0.95	0.95	0.95	Max Concentration	1.9E-01	NA	5.0E-06	NA
N-nitrosodiphenylamine (NNSPH)	5/17	mg/kg	0.1	22	22	Max Concentration	2.7E+02	9.6E+03	8.1E-08	2.3E-03
PCB-1260	9/27	mg/kg	0.042	17	17	Max Concentration	5.3E-01	7.5E+00	3.2E-05	2.3E+00
Pentachlorophenol	1/8	mg/kg	0.34	0.34	0.34	Max Concentration	6.2E+00	8.0E+03	5.5E-08	4.3E-05
Phenanthrene	5/17	mg/kg	0.19	34	34	Max Concentration	NA	1.1E+05	NA	3.1E-04
Phenol	2/17	mg/kg	0.22	0.26	0.26	Max Concentration	NA	1.4E+05	NA	1.9E-06
Pyrene	2/16	mg/kg	0.15	0.16	0.16	Max Concentration	NA	1.1E+04	NA	1.5E-05
2,3,7,8-TCDD	4/16	ng/g	0.0000263	0.03475	0.03475	Max Concentration	1.6E-02	7.6E+00	2.2E-06	4.6E-03
TPH					0	Max Concentration				
TPH-D	14/20	mg/kg	14	41,000	41,000	Max Concentration	NA	NA	NA	NA
TPH-G	5/13	mg/kg	0	2,600	2,600	Max Concentration	NA	NA	NA	NA
Subtotal for Soil									**9.6E-05**	**4.9E+00**
Soil Gas (0 to 15 ft bgs)[c]										
Benzene	5/5	ppbv	180	2,300	2,300	Max Concentration	1.6E+02	1.4E+04	1.4E-05	1.6E-01
Carbon tetrachloride	1/1	ppbv	980	980	980	Max Concentration	4.4E+01	9.5E+03	2.2E-05	1.0E-01
Chlorobenzene	4/5	ppbv	240	6,200	6,200	Max Concentration	NA	1.6E+04	NA	3.9E-01
Chloroethane	4/5	ppbv	440	17,000	17,000	Max Concentration	1.9E+03	5.5E+06	8.9E-06	3.1E-03
Cyclohexane[d]	5/5	ppbv	280	4,100	4,100	Max Concentration	NA	2.9E+05	NA	1.4E-02
1,2-Dichlorobenzene	3/3	ppbv	100	1,000	1,000	Max Concentration	NA	4.8E+04	NA	2.1E-02
1,3-Dichlorobenzene	3/3	ppbv	69	140	140	Max Concentration	NA	2.5E+04	NA	5.6E-03
1,4-Dichlorobenzene	3/3	ppbv	170	370	370	Max Concentration	5.8E+01	1.9E+05	6.4E-06	1.9E-03
Dichlorodifluoromethane (Freon® 12)	4/4	ppbv	73	1,300	1,300	Max Concentration	NA	5.9E+04	NA	2.2E-02
1,1-Dichloroethane	4/5	ppbv	120	800	800	Max Concentration	6.2E+02	NA	1.3E-06	NA
1,2-Dichloroethane	2/3	ppbv	100	150	150	Max Concentration	3.9E+01	1.4E+05	3.8E-06	1.1E-03
cis-1,2-Dichloroethene	4/5	ppbv	60	240	240	Max Concentration	NA	1.3E+04	NA	1.8E-02
2,4-Dimethylpentane[d]	4/5	ppbv	410	980	980	Max Concentration	NA	2.9E+05	NA	3.4E-03
Ethylbenzene	5/5	ppbv	150	12,000	12,000	Max Concentration	3.7E+02	3.2E+05	3.2E-05	3.8E-02
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	1/2	ppbv	280	280	280	Max Concentration	NA	5.6E+06	NA	5.0E-05
Heptane[d]	5/5	ppbv	1,900	7,800	7,800	Max Concentration	NA	2.9E+05	NA	2.7E-02
Hexane	4/5	ppbv	970	5,400	5,400	Max Concentration	NA	2.9E+05	NA	1.9E-02
Total non-methane hydrocarbons as hexane [d]	5/5	ppbv	90,000	770,000	770,000	Max Concentration	NA	2.9E+05	NA	2.7E+00
Methylene chloride (dichloromethane)	2/3	ppbv	73	200	200	Max Concentration	2.5E+03	1.7E+05	8.0E-08	1.2E-03
Tetrachloroethene (PCE)	1/1	ppbv	1,400	1,400	1,400	Max Concentration	9.8E+01	7.3E+03	1.4E-05	1.9E-01
Toluene	5/5	ppbv	170	1,000	1,000	Max Concentration	NA	1.9E+06	NA	5.3E-04
Trichloroethene (TCE)	4/5	ppbv	53	94	94	Max Concentration	3.8E+02	1.6E+05	2.5E-07	5.9E-04
Trichlorofluoromethane (Freon® 11)	3/4	ppbv	110	310	310	Max Concentration	NA	1.8E+05	NA	1.7E-03
1,2,4-Trimethylbenzene	4/5	ppbv	67	5,400	5,400	Max Concentration	NA	2.1E+03	NA	2.6E+00
1,3,5-Trimethylbenzene	2/3	ppbv	82	170	170	Max Concentration	NA	1.8E+03	NA	9.4E-02
2,2,4-Trimethylpentane	2/2	ppbv	1,500	1,500	1,500	Max Concentration	NA	NA	NA	NA
Vinyl chloride	4/5	ppbv	2,200	14,000	14,000	Max Concentration	1.8E+02	5.7E+04	7.8E-05	2.5E-01
o-Xylene	3/3	ppbv	180	360	360	Max Concentration	NA	3.2E+04	NA	1.1E-02
m,p-Xylenes	5/5	ppbv	100	5,500	5,500	Max Concentration	NA	3.2E+04	NA	1.7E-01
Subtotal for Soil Gas									**1.8E-04**	**6.8E+00**
Total									**2.8E-04**	**1.2E+01**

[a] Maximum concentrations were used in risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] VOCs in soil gas were detected at the site during 1994 RI investigations. These data may not be representative of current conditions because the IC 19 SVE system has been in operation at the site since 1997.

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

[e] The risk-based soil screening levels protective of indoor air were used in the risk estimation.

NA=Not Available.

TABLE 41

Radiological Risk Summary Table for CS 011

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Scenario	Radionuclide	EPC (pCi/g)	Total Carcinogenic Risk	Background Risk	Incremental Risk
Resident	Actinium 228	1.68	1.0E-04	--	1.0E-04
	Cesium 137 (+D)	0.299	1.1E-05	1.0E-05	6.8E-07
	Radium 226 (+D)	1.54	2.1E-04	1.5E-04	5.9E-05
	Total		**3E-04**	**2E-04**	**2E-04**
Indoor Occupational Worker	Actinium 228	1.68	1.7E-05	--	1.7E-05
	Cesium 137 (+D)	0.299	1.7E-06	1.6E-06	1.1E-07
	Radium 226 (+D)	1.54	3.0E-05	2.1E-05	8.5E-06
	Total		**5E-05**	**2E-05**	**3E-05**
Outdoor Occupational Worker	Actinium 228	1.68	4.3E-05	--	4.3E-05
	Cesium 137 (+D)	0.299	4.3E-06	4.0E-06	2.7E-07
	Radium 226 (+D)	1.54	7.4E-05	5.3E-05	2.1E-05
	Total		**1E-04**	**6E-05**	**6E-05**

TABLE 42

Radiological Risk Summary Table for CS 014

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Scenario	Radionuclide	EPC (pCi/g)	Total Carcinogenic Risk	Background Risk	Incremental Risk
Resident	Radium 226 (+D)	1.19	1.6E-04	1.5E-04	1.2E-05
	Total		**2E-04**	**1E-04**	**1E-05**
Indoor Occupational Worker	Radium 226 (+D)	1.19	2.3E-05	2.1E-05	1.7E-06
	Total		**2E-05**	**2E-05**	**2E-06**
Outdoor Occupational Worker	Radium 226 (+D)	1.19	5.7E-05	5.3E-05	4.3E-06
	Total		**6E-05**	**5E-05**	**4E-06**

TABLE 43

Risk Summary Table for CS 022, Unrestricted Use Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units[a]	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 15 ft bgs)										
Metals										
Antimony	1/22	mg/kg	110	110	110	Max Concentration	NA	1.4E+01	NA	7.9E+00
Arsenic	20/22	mg/kg	0.97	9.7	9.7	Max Concentration	9.3E-02	7.6E+00	1.0E-04	1.3E+00
Barium	22/22	mg/kg	46	1,700	1,700	Max Concentration	NA	6.9E+03	NA	2.5E-01
Cadmium	19/22	mg/kg	0.6	100	100	Max Concentration	1.7E+04	6.2E+00	5.9E-09	1.6E+01
Chromium, total	22/22	mg/kg	12	220	220	Max Concentration	2.6E+03	NA	8.5E-08	NA
Chromium, hexavalent	1/1	mg/kg	0.21	0.21	0.21	Max Concentration	2.6E+03	1.1E+02	8.1E-11	1.9E-03
Cobalt	22/22	mg/kg	2.2	19	19	Max Concentration	3.4E+03	1.0E+01	5.6E-09	1.9E+00
Copper	22/22	mg/kg	6.2	5,600	5,600	Max Concentration	NA	1.4E+03	NA	4.0E+00
Iron	22/22	mg/kg	3700	83,000	83,000	Max Concentration	NA	2.4E+04	NA	3.5E+00
Lead	23/23	mg/kg	2.7	2,600	2,600	Max Concentration	NA	NA	NA	NA
Mercury	3/22	mg/kg	0.12	0.17	0.17	Max Concentration	NA	3.5E+00	NA	4.9E-02
Molybdenum	1/22	mg/kg	12	12	12	Max Concentration	NA	1.7E+02	NA	7.1E-02
Nickel	22/22	mg/kg	6.2	120	120	Max Concentration	1.2E+05	4.3E+02	1.0E-09	2.8E-01
Selenium	1/22	mg/kg	26	26	26	Max Concentration	NA	1.1E+02	NA	2.4E-01
Silver	13/22	mg/kg	0.2	65	65	Max Concentration	NA	1.7E+02	NA	3.8E-01
Thallium	1/22	mg/kg	10	10	10	Max Concentration	NA	2.3E+00	NA	4.3E+00
Zinc	22/22	mg/kg	13	4,600	4,600	Max Concentration	NA	3.1E+03	NA	1.5E+00
SVOCs										
Benzo(a)anthracene	3/18	mg/kg	0.39	0.62	0.62	Max Concentration	8.8E-02	5.7E+02	7.0E-06	1.1E-03
Benzo(a)pyrene	3/18	mg/kg	0.41	0.66	0.66	Max Concentration	1.8E-02	6.8E+02	3.7E-05	9.7E-04
Benzo(b)fluoranthene	3/18	mg/kg	0.52	0.81	0.81	Max Concentration	1.1E-01	6.8E+02	7.4E-06	1.2E-03
Benzo(g,h,i)perylene	1/18	mg/kg	0.43	0.43	0.43	Max Concentration	NA	7.5E+02	NA	5.7E-04
Benzo(k)fluoranthene	2/18	mg/kg	0.28	0.4	0.4	Max Concentration	1.1E-01	6.7E+02	3.6E-06	6.0E-04
Bis(2-ethylhexyl)phthalate (DEHP)	4/18	mg/kg	0.34	2	2	Max Concentration	1.2E+01	5.8E+02	1.7E-07	3.4E-03
Chrysene	3/18	mg/kg	0.43	0.71	0.71	Max Concentration	8.8E-01	5.7E+02	8.1E-07	1.2E-03
DDD	9/16	mg/kg	0.0011	0.093	0.093	Max Concentration	5.0E-01	1.1E+01	1.9E-07	8.5E-03
DDE	7/16	mg/kg	0.0014	0.0077	0.0077	Max Concentration	4.9E-01	1.4E+01	1.6E-08	5.5E-04
DDT	8/16	mg/kg	0.0037	0.14	0.14	Max Concentration	4.7E-01	1.4E+01	3.0E-07	1.0E-02
1,2-Dichlorobenzene	1/18	mg/kg	420	420	420	Max Concentration	NA	1.9E+02	NA	2.2E+00
1,4-Dichlorobenzene[e]	1/18	mg/kg	130	130	130	Max Concentration	1.5E-02	5.4E+01	8.7E-03	2.4E+00
Fluoranthene	4/18	mg/kg	0.28	0.84	0.84	Max Concentration	NA	4.9E+02	NA	1.7E-03
Indeno(1,2,3-c,d)pyrene	1/18	mg/kg	0.43	0.43	0.43	Max Concentration	1.2E-01	7.6E+02	3.6E-06	5.7E-04
PCB-1260	8/18	mg/kg	0.036	11.9	11.9	Max Concentration	6.3E-02	4.4E-01	1.9E-04	2.7E+01
Phenanthrene	3/18	mg/kg	0.3	0.75	0.75	Max Concentration	NA	2.6E+03	NA	2.9E-04
Pyrene	4/18	mg/kg	0.23	2	2	Max Concentration	NA	3.5E+02	NA	5.7E-03
2,3,7,8-TCDD	6/8	ng/g	0.00016	2.0875	2.0875	Max Concentration	1.3E-03	3.0E-01	1.6E-03	7.0E+00
Subtotal for Soil									**1.1E-02**	**8.0E+01**
Soil Gas (2.5 to 59.9 ft bgs)										
Acetone	5/14	ppbv	760	3,600	3,600	Max Concentration	NA	1.3E+05	NA	2.8E-02
Benzene	10/14	ppbv	740	5,000	5,000	Max Concentration	9.8E+00	9.4E+02	5.1E-04	5.3E+00
Chlorobenzene	10/14	ppbv	1,600	28,000	28,000	Max Concentration	NA	1.1E+03	NA	2.5E+01
Cyclohexane[d]	11/14	ppbv	24,000	690,000	690,000	Max Concentration	NA	2.0E+04	NA	3.5E+01
1,2-Dichlorobenzene	9/14	ppbv	9,200	70,000	70,000	Max Concentration	NA	3.3E+03	NA	2.1E+01
1,3-Dichlorobenzene	7/14	ppbv	1,000	5,700	5,700	Max Concentration	NA	1.7E+03	NA	3.4E+00
1,4-Dichlorobenzene	10/14	ppbv	1,600	60,000	60,000	Max Concentration	3.5E+00	1.3E+04	1.7E-02	4.6E+00
Dichlorodifluoromethane (Freon® 12)	3/14	ppbv	13	89	89	Max Concentration	NA	4.0E+03	NA	2.2E-02
1,1-Dichloroethane	2/13	ppbv	1,900	1,900	1,900	Max Concentration	3.7E+01	NA	5.1E-05	NA
1,1-Dichloroethene	4/13	ppbv	910	2,100	2,100	Max Concentration	NA	5.0E+03	NA	4.2E-01
cis-1,2-Dichloroethene	12/14	ppbv	1,800	54,000	54,000	Max Concentration	NA	8.8E+02	NA	6.1E+01
2,4-Dimethylpentane[d]	1/1	ppbv	49,000	49,000	49,000	Max Concentration	NA	2.0E+04	NA	2.5E+00
Ethylbenzene	10/14	ppbv	420	4,200	4,200	Max Concentration	2.2E+01	2.2E+04	1.9E-04	1.9E-01
Heptane[d]	1/1	ppbv	97,000	97,000	97,000	Max Concentration	NA	2.0E+04	NA	4.9E+00
Hexane	1/1	ppbv	45,000	45,000	45,000	Max Concentration	NA	2.0E+04	NA	2.3E+00
Total Non-Methane Hydrocarbon as Hexane[d]	1/1	ppbv	3,400,000	3,400,000	3,400,000	Max Concentration	NA	2.0E+04	NA	1.7E+02
Methylene chloride (dichloromethane)	5/14	ppbv	340	2,500	2,500	Max Concentration	1.5E+02	1.2E+04	1.7E-05	2.1E-01
Octane[d]	9/14	ppbv	5,400	40,000	40,000	Max Concentration	NA	2.0E+04	NA	2.0E+00
Propylene	1/14	ppbv	1,000	1,000	1,000	Max Concentration	NA	1.7E+05	NA	5.9E-03
Tetrachloroethene (PCE)	1/14	ppbv	340	340	340	Max Concentration	5.8E+00	5.0E+02	5.9E-05	6.8E-01
Toluene	10/14	ppbv	690	24,000	24,000	Max Concentration	NA	1.3E+05	NA	1.8E-01
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	1/13	ppbv	10	10	10	Max Concentration	NA	3.9E+05	NA	2.6E-05
1,1,1-Trichloroethane	1/13	ppbv	210	210	210	Max Concentration	NA	9.4E+04	NA	2.2E-03
Trichloroethene (TCE)	11/14	ppbv	520	53,000	53,000	Max Concentration	2.3E+01	1.1E+04	2.3E-03	4.8E+00
1,2,4-Trimethylbenzene	9/14	ppbv	1,200	39,000	39,000	Max Concentration	NA	1.4E+02	NA	2.8E+02
1,3,5-Trimethylbenzene	10/14	ppbv	790	16,000	16,000	Max Concentration	NA	1.2E+02	NA	1.3E+02
2,2,4-Trimethylpentane	1/1	ppbv	79,000	79,000	79,000	Max Concentration	NA	NA	NA	NA
2,3,4-Trimethylpentane	1/1	ppbv	42,000	42,000	42,000	Max Concentration	NA	NA	NA	NA
Vinyl chloride	10/14	ppbv	9,400	70,000	70,000	Max Concentration	1.1E+01	3.9E+03	6.4E-03	1.8E+01
o-Xylene	9/14	ppbv	1,400	10,000	10,000	Max Concentration	NA	2.2E+03	NA	4.5E+00
m,p-Xylenes	10/14	ppbv	460	16,000	16,000	Max Concentration	NA	2.2E+03	NA	7.3E+00
Subtotal for Soil Gas									**2.7E-02**	**7.9E+02**
Total									**3.7.E-02**	**8.7.E+02**

[a]Data from Remedial Investigation Report, April 1995

[b] Maximum concentrations were used in risk ratio calculations.

[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

[e] The risk-based soil screening levels protective of indoor air were used in the risk estimation.

NA=Not Available.

TABLE 44

Risk Summary Table for CS 022, Industrial Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units[a]	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 15 ft bgs)										
Metals										
Antimony	1/22	mg/kg	110	110	110	Max Concentration	NA	3.7E+02	NA	3.0E-01
Arsenic	20/22	mg/kg	0.97	9.7	9.7	Max Concentration	1.4E+00	2.3E+02	6.9E-06	4.2E-02
Barium	22/22	mg/kg	46	1,700	1,700	Max Concentration	NA	1.8E+05	NA	9.4E-03
Cadmium	19/22	mg/kg	0.6	100	100	Max Concentration	3.6E+04	1.0E+03	2.8E-09	1.0E-01
Chromium, total	22/22	mg/kg	12	220	220	Max Concentration	5.5E+03	NA	4.0E-08	NA
Chromium, hexavalent	1/1	mg/kg	0.21	0.21	0.21	Max Concentration	5.5E+03	3.0E+03	3.8E-11	7.0E-05
Cobalt	22/22	mg/kg	2.2	19	19	Max Concentration	7.3E+03	2.7E+02	2.6E-09	7.0E-02
Copper	22/22	mg/kg	6.2	5,600	5,600	Max Concentration	NA	3.7E+04	NA	1.5E-01
Iron	22/22	mg/kg	3700	83,000	83,000	Max Concentration	NA	6.4E+05	NA	1.3E-01
Lead	23/23	mg/kg	2.7	2,600	2,600	Max Concentration	NA	NA	NA	NA
Mercury	3/22	mg/kg	0.12	0.17	0.17	Max Concentration	NA	1.5E+02	NA	1.1E-03
Molybdenum	1/22	mg/kg	12	12	12	Max Concentration	NA	4.6E+03	NA	2.6E-03
Nickel	22/22	mg/kg	6.2	120	120	Max Concentration	2.5E+05	1.8E+04	4.8E-10	6.7E-03
Selenium	1/22	mg/kg	26	26	26	Max Concentration	NA	4.6E+03	NA	5.7E-03
Silver	13/22	mg/kg	0.2	65	65	Max Concentration	NA	4.6E+03	NA	1.4E-02
Thallium	1/22	mg/kg	10	10	10	Max Concentration	NA	6.1E+01	NA	1.6E-01
Zinc	22/22	mg/kg	13	4,600	4,600	Max Concentration	NA	2.8E+05	NA	1.6E-02
SVOCs										
Benzo(a)anthracene	3/18	mg/kg	0.39	0.62	0.62	Max Concentration	8.8E-01	1.1E+04	7.0E-07	5.6E-05
Benzo(a)pyrene	3/18	mg/kg	0.41	0.66	0.66	Max Concentration	1.4E-01	1.1E+04	4.7E-06	6.0E-05
Benzo(b)fluoranthene	3/18	mg/kg	0.52	0.81	0.81	Max Concentration	8.8E-01	1.1E+04	9.2E-07	7.4E-05
Benzo(g,h,i)perylene	1/18	mg/kg	0.43	0.43	0.43	Max Concentration	NA	1.1E+04	NA	3.9E-05
Benzo(k)fluoranthene	2/18	mg/kg	0.28	0.4	0.4	Max Concentration	8.8E-01	1.1E+04	4.5E-07	3.6E-05
Bis(2-ethylhexyl)phthalate (DEHP)	4/18	mg/kg	0.34	2	2	Max Concentration	9.6E+01	9.6E+03	2.1E-08	2.1E-04
Chrysene	3/18	mg/kg	0.43	0.71	0.71	Max Concentration	8.7E+00	1.1E+04	8.2E-08	6.5E-05
DDD	9/16	mg/kg	0.0011	0.093	0.093	Max Concentration	7.6E+00	3.3E+02	1.2E-08	2.8E-04
DDE	7/16	mg/kg	0.0014	0.0077	0.0077	Max Concentration	5.4E+00	3.3E+02	1.4E-09	2.3E-05
DDT	8/16	mg/kg	0.0037	0.14	0.14	Max Concentration	5.4E+00	3.3E+02	2.6E-08	4.2E-04
1,2-Dichlorobenzene	1/18	mg/kg	420	420	420	Max Concentration	NA	3.9E+03	NA	1.1E-01
1,4-Dichlorobenzene[e]	1/18	mg/kg	130	130	130	Max Concentration	1.5E-01	4.8E+02	8.7E-04	2.7E-01
Fluoranthene	4/18	mg/kg	0.28	0.84	0.84	Max Concentration	NA	1.5E+04	NA	5.6E-05
Indeno(1,2,3-c,d)pyrene	1/18	mg/kg	0.43	0.43	0.43	Max Concentration	8.8E-01	1.1E+04	4.9E-07	3.9E-05
PCB-1260	8/18	mg/kg	0.036	11.9	11.9	Max Concentration	5.3E-01	7.5E+00	2.2E-05	1.6E+00
Phenanthrene	3/18	mg/kg	0.3	0.75	0.75	Max Concentration	NA	1.1E+05	NA	6.8E-06
Pyrene	4/18	mg/kg	0.23	2	2	Max Concentration	NA	1.1E+04	NA	1.8E-04
2,3,7,8-TCDD	6/8	ng/g	0.00016	2.0875	2.0875	Max Concentration	1.6E-02	7.6E+00	1.3E-04	2.7E-01
Subtotal for Soil									**1.0E-03**	**3.3E+00**
Soil Gas (2.5 to 59.9 ft bgs)										
Acetone	5/14	ppbv	760	3,600	3,600	Max Concentration	NA	1.9E+06	NA	1.9E-03
Benzene	10/14	ppbv	740	5,000	5,000	Max Concentration	1.6E+02	1.4E+04	3.1E-05	3.6E-01
Chlorobenzene	10/14	ppbv	1,600	28,000	28,000	Max Concentration	NA	1.6E+04	NA	1.8E+00
Cyclohexane[d]	11/14	ppbv	24,000	690,000	690,000	Max Concentration	NA	2.9E+05	NA	2.4E+00
1,2-Dichlorobenzene	9/14	ppbv	9,200	70,000	70,000	Max Concentration	NA	4.8E+04	NA	1.5E+00
1,3-Dichlorobenzene	7/14	ppbv	1,000	5,700	5,700	Max Concentration	NA	2.5E+04	NA	2.3E-01
1,4-Dichlorobenzene	10/14	ppbv	1,600	60,000	60,000	Max Concentration	5.8E+01	1.9E+05	1.0E-03	3.2E-01
Dichlorodifluoromethane (Freon® 12)	3/14	ppbv	13	89	89	Max Concentration	NA	5.9E+04	NA	1.5E-03
1,1-Dichloroethane	2/13	ppbv	1,900	1,900	1,900	Max Concentration	6.2E+02	NA	3.1E-06	NA
1,1-Dichloroethene	4/13	ppbv	910	2,100	2,100	Max Concentration	NA	7.3E+04	NA	2.9E-02
cis-1,2-Dichloroethene	12/14	ppbv	1,800	54,000	54,000	Max Concentration	NA	1.3E+04	NA	4.2E+00
2,4-Dimethylpentane[d]	1/1	ppbv	49,000	49,000	49,000	Max Concentration	NA	2.9E+05	NA	1.7E-01
Ethylbenzene	10/14	ppbv	420	4,200	4,200	Max Concentration	3.7E+02	3.2E+05	1.1E-05	1.3E-02
Heptane[d]	1/1	ppbv	97,000	97,000	97,000	Max Concentration	NA	2.9E+05	NA	3.3E-01
Hexane	1/1	ppbv	45,000	45,000	45,000	Max Concentration	NA	2.9E+05	NA	1.6E-01
Total Non-Methane Hydrocarbon as Hexane[d]	1/1	ppbv	3,400,000	3,400,000	3,400,000	Max Concentration	NA	2.9E+05	NA	1.2E+01
Methylene chloride (dichloromethane)	5/14	ppbv	340	2,500	2,500	Max Concentration	2.5E+03	1.7E+05	1.0E-06	1.5E-02
Octane[d]	9/14	ppbv	5,400	40,000	40,000	Max Concentration	NA	2.9E+05	NA	1.4E-01
Propylene	1/14	ppbv	1,000	1,000	1,000	Max Concentration	NA	2.5E+05	NA	4.0E-03
Tetrachloroethene (PCE)	1/14	ppbv	340	340	340	Max Concentration	9.8E+01	7.3E+03	3.5E-06	4.7E-02
Toluene	10/14	ppbv	690	24,000	24,000	Max Concentration	NA	1.9E+06	NA	1.3E-02
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	1/13	ppbv	10	10	10	Max Concentration	NA	5.6E+06	NA	1.8E-06
1,1,1-Trichloroethane	1/13	ppbv	210	210	210	Max Concentration	NA	1.4E+06	NA	1.5E-04
Trichloroethene (TCE)	11/14	ppbv	520	53,000	53,000	Max Concentration	3.8E+02	1.6E+05	1.4E-04	3.3E-01
1,2,4-Trimethylbenzene	9/14	ppbv	1,200	39,000	39,000	Max Concentration	NA	2.1E+03	NA	1.9E+01
1,3,5-Trimethylbenzene	10/14	ppbv	790	16,000	16,000	Max Concentration	NA	1.8E+03	NA	8.9E+00
2,2,4-Trimethylpentane	1/1	ppbv	79,000	79,000	79,000	Max Concentration	NA	NA	NA	NA
2,3,4-Trimethylpentane	1/1	ppbv	42,000	42,000	42,000	Max Concentration	NA	NA	NA	NA
Vinyl chloride	10/14	ppbv	9,400	70,000	70,000	Max Concentration	1.8E+02	5.7E+04	3.9E-04	1.2E+00
o-Xylene	9/14	ppbv	1,400	10,000	10,000	Max Concentration	NA	3.2E+04	NA	3.1E-01
m,p-Xylenes	10/14	ppbv	460	16,000	16,000	Max Concentration	NA	3.2E+04	NA	5.0E-01
Subtotal for Soil Gas									**1.6E-03**	**5.3E+01**
Total									**2.6.E-03**	**5.6.E+01**

[a] Data from Remedial Investigation Report, April 1995

[b] Maximum concentrations were used in risk ratio calculations.

[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

[e] The risk-based soil screening levels protective of indoor air were used in the risk estimation.

NA=Not Available.

TABLE 45

Radiological Risk Summary Table for CS 022

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Scenario	Radionuclide	EPC (pCi/g)	Total Carcinogenic Risk	Background Risk	Incremental Risk
Resident	Radium 226 (+D)	516	6.9E-02	1.5E-04	6.9E-02
	Total		**7E-02**	**1E-04**	**7E-02**
Indoor Occupational Worker	Radium 226 (+D)	516	1.0E-02	2.1E-05	9.9E-03
	Total		**1E-02**	**2E-05**	**1E-02**
Outdoor Occupational Worker	Radium 226 (+D)	516	2.5E-02	5.3E-05	2.5E-02
	Total		**2E-02**	**5E-05**	**2E-02**

TABLE 46

Risk Summary Table for CS 024, Unrestricted Use Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Barium	35/37	mg/kg	47	650	650	Max Concentration	NA	6.9E+03	NA	9.4E-02
Beryllium	34/37	mg/kg	0.19	0.79	0.79	Max Concentration	1.3E+04	6.9E+01	6.1E-11	1.1E-02
Cadmium[c]	24/37	mg/kg	0.016	28	28	Max Concentration	1.7E+04	6.2E+00	1.6E-09	4.5E+00
Chromium, total	4/8	mg/kg	0.056	0.11	0.11	Max Concentration	2.6E+03	NA	4.2E-11	NA
Chromium, hexavalent	34/37	mg/kg	4.5	36	36	Max Concentration	2.6E+03	1.1E+02	1.4E-08	3.3E-01
Cobalt	34/37	mg/kg	0.024	35	35	Max Concentration	3.4E+03	1.0E+01	1.0E-08	3.5E+00
Copper	35/37	mg/kg	39	184	184	Max Concentration	NA	1.4E+03	NA	1.3E-01
Selenium	1/37	mg/kg	31	31	31	Max Concentration	NA	1.1E+02	NA	2.8E-01
Thallium	10/37	mg/kg	6.6	13.9	13.9	Max Concentration	NA	2.3E+00	NA	6.0E+00
SVOCs										
PCB-1260	3/28	mg/kg	0.036	0.1	0.1	Max Concentration	6.3E-02	4.4E-01	1.6E-06	2.3E-01
2,3,7,8-TCDD	4/16	ng/g	0.00001	0.02222	0.02222	Max Concentration	1.3E-03	3.0E-01	1.7E-05	7.4E-02
Subtotal for Soil									**1.9E-05**	**1.5E+01**
Soil Gas (0 to 15 ft bgs)										
Acetone	1/4	ppbv	56	56	56	Max Concentration	NA	1.3E+05	NA	4.3E-04
Benzene	2/4	ppbv	45	65	65	Max Concentration	9.8E+00	9.4E+02	6.6E-06	6.9E-02
Chlorobenzene	3/4	ppbv	6.3	620	620	Max Concentration	NA	1.1E+03	NA	5.6E-01
Chloroethane	1/4	ppbv	140	140	140	Max Concentration	1.1E+02	3.8E+05	1.3E-06	3.7E-04
3-Chloropropene	1/4	ppbv	58	58	58	Max Concentration	NA	NA	NA	NA
Cyclohexane[d]	4/4	ppbv	4.1	560	560	Max Concentration	NA	2.0E+04	NA	2.8E-02
1,2-Dichlorobenzene	2/4	ppbv	4.3	22	22	Max Concentration	NA	3.3E+03	NA	6.7E-03
1,3-Dichlorobenzene	2/4	ppbv	8.9	28	28	Max Concentration	NA	1.7E+03	NA	1.6E-02
1,4-Dichlorobenzene	2/4	ppbv	8.2	77	77	Max Concentration	3.5E+00	1.3E+04	2.2E-05	5.9E-03
Dichlorodifluoromethane (Freon® 12)	3/4	ppbv	7.5	28	28	Max Concentration	NA	4.0E+03	NA	7.0E-03
1,1-Dichloroethane	3/4	ppbv	22	73	73	Max Concentration	3.7E+01	NA	2.0E-06	NA
1,2-Dichloroethane	1/4	ppbv	4.6	4.6	4.6	Max Concentration	2.3E+00	9.9E+03	2.0E-06	4.6E-04
1,1-Dichloroethene	1/4	ppbv	8.4	8.4	8.4	Max Concentration	NA	5.0E+03	NA	1.7E-03
cis-1,2-Dichloroethene	3/4	ppbv	3.1	73	73	Max Concentration	NA	8.8E+02	NA	8.3E-02
trans-1,2-Dichloroethene	1/4	ppbv	5.5	5.5	5.5	Max Concentration	NA	1.5E+03	NA	3.7E-03
2,4-Dimethylpentane[d]	1/4	ppbv	100	100	100	Max Concentration	NA	2.0E+04	NA	5.0E-03
Ethylbenzene	2/4	ppbv	0.99	25	25	Max Concentration	2.2E+01	2.2E+04	1.1E-06	1.1E-03
Heptane[d]	2/4	ppbv	310	2,700	2,700	Max Concentration	NA	2.0E+04	NA	1.4E-01
Hexane	2/4	ppbv	33	650	650	Max Concentration	NA	2.0E+04	NA	3.3E-02
Total non-methane hydrocarbon as hexane[d]	2/4	ppbv	66,000	74,000	74,000	Max Concentration	NA	2.0E+04	NA	3.7E+00
Toluene	1/4	ppbv	72	72	72	Max Concentration	NA	1.3E+05	NA	5.5E-04
1,1,1-Trichloroethane	1/4	ppbv	1	1	1	Max Concentration	NA	9.4E+04	NA	1.1E-05
Trichloroethene (TCE)	2/4	ppbv	27	30	30	Max Concentration	2.3E+01	1.1E+04	1.3E-06	2.7E-03
Trichlorofluoromethane (Freon® 11)	1/4	ppbv	0.83	0.83	0.83	Max Concentration	NA	1.2E+04	NA	6.9E-05
1,2,4-Trimethylbenzene	2/4	ppbv	18	62	62	Max Concentration	NA	1.4E+02	NA	4.4E-01
1,3,5-Trimethylbenzene	1/4	ppbv	7.8	7.8	7.8	Max Concentration	NA	1.2E+02	NA	6.5E-02
2,2,4-Trimethylpentane	2/4	ppbv	48	430	430	Max Concentration	NA	NA	NA	NA
2,3,4-Trimethylpentane	1/5	ppbv	32	32	32	Max Concentration	NA	NA	NA	NA
Vinyl chloride	4/4	ppbv	57	14,000	14,000	Max Concentration	1.1E+01	3.9E+03	1.3E-03	3.6E+00
o-Xylene	3/4	ppbv	3.1	95	95	Max Concentration	NA	2.2E+03	NA	4.3E-02
m,p-Xylenes	3/4	ppbv	5.1	110	110	Max Concentration	NA	2.2E+03	NA	5.0E-02
Subtotal for Soil Gas									**1.3E-03**	**8.9E+00**
Total									**1.3.E-03**	**2.4.E+01**

[a] Maximum concentrations detected during the RI and Data Gap Investigations were used in the risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] Cadmium analyzed by SW6010 and SW7131

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

NA=Not Available.

TABLE 47

Risk Summary Table for CS 024, Industrial Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Barium	35/37	mg/kg	47	650	650	Max Concentration	NA	1.8E+05	NA	3.6E-03
Beryllium	34/37	mg/kg	0.19	0.79	0.79	Max Concentration	2.7E+04	1.8E+03	2.9E-11	4.4E-04
Cadmiumc	24/37	mg/kg	0.016	28	28	Max Concentration	3.6E+04	1.0E+03	7.8E-10	2.8E-02
Chromium, total	4/8	mg/kg	0.056	0.11	0.11	Max Concentration	5.5E+03	NA	2.0E-11	NA
Chromium, hexavalent	34/37	mg/kg	4.5	36	36	Max Concentration	5.5E+03	3.0E+03	6.5E-09	1.2E-02
Cobalt	34/37	mg/kg	0.024	35	35	Max Concentration	7.3E+03	2.7E+02	4.8E-09	1.3E-01
Copper	35/37	mg/kg	39	184	184	Max Concentration	NA	3.7E+04	NA	5.0E-03
Selenium	1/37	mg/kg	31	31	31	Max Concentration	NA	4.6E+03	NA	6.7E-03
Thallium	10/37	mg/kg	6.6	13.9	13.9	Max Concentration	NA	6.1E+01	NA	2.3E-01
SVOCs										
PCB-1260	3/28	mg/kg	0.036	0.1	0.1	Max Concentration	5.3E-01	7.5E+00	1.9E-07	1.3E-02
2,3,7,8-TCDD	4/16	ng/g	0.00001	0.02222	0.02222	Max Concentration	1.6E-02	7.6E+00	1.4E-06	2.9E-03
Subtotal for Soil									**1.6E-06**	**4.3E-01**
Soil Gas (0 to 15 ft bgs)										
Acetone	1/4	ppbv	56	56	56	Max Concentration	NA	1.9E+06	NA	2.9E-05
Benzene	2/4	ppbv	45	65	65	Max Concentration	1.6E+02	1.4E+04	4.1E-07	4.6E-03
Chlorobenzene	3/4	ppbv	6.3	620	620	Max Concentration	NA	1.6E+04	NA	3.9E-02
Chloroethane	1/4	ppbv	140	140	140	Max Concentration	1.9E+03	5.5E+06	7.4E-08	2.5E-05
3-Chloropropene	1/4	ppbv	58	58	58	Max Concentration	NA	NA	NA	NA
Cyclohexane[d]	4/4	ppbv	4.1	560	560	Max Concentration	NA	2.9E+05	NA	1.9E-03
1,2-Dichlorobenzene	2/4	ppbv	4.3	22	22	Max Concentration	NA	4.8E+04	NA	4.6E-04
1,3-Dichlorobenzene	2/4	ppbv	8.9	28	28	Max Concentration	NA	2.5E+04	NA	1.1E-03
1,4-Dichlorobenzene	2/4	ppbv	8.2	77	77	Max Concentration	5.8E+01	1.9E+05	1.3E-06	4.1E-04
Dichlorodifluoromethane (Freon® 12)	3/4	ppbv	7.5	28	28	Max Concentration	NA	5.9E+04	NA	4.7E-04
1,1-Dichloroethane	3/4	ppbv	22	73	73	Max Concentration	6.2E+02	NA	1.2E-07	NA
1,2-Dichloroethane	1/4	ppbv	4.6	4.6	4.6	Max Concentration	3.9E+01	1.4E+05	1.2E-07	3.3E-05
1,1-Dichloroethene	1/4	ppbv	8.4	8.4	8.4	Max Concentration	NA	7.3E+04	NA	1.2E-04
cis-1,2-Dichloroethene	3/4	ppbv	3.1	73	73	Max Concentration	NA	1.3E+04	NA	5.6E-03
trans-1,2-Dichloroethene	1/4	ppbv	5.5	5.5	5.5	Max Concentration	NA	2.2E+04	NA	2.5E-04
2,4-Dimethylpentane[d]	1/4	ppbv	100	100	100	Max Concentration	NA	2.9E+05	NA	3.4E-04
Ethylbenzene	2/4	ppbv	0.99	25	25	Max Concentration	3.7E+02	3.2E+05	6.8E-08	7.8E-05
Heptane[d]	2/4	ppbv	310	2,700	2,700	Max Concentration	NA	2.9E+05	NA	9.3E-03
Hexane	2/4	ppbv	33	650	650	Max Concentration	NA	2.9E+05	NA	2.2E-03
Total non-methane hydrocarbon as hexane[d]	2/4	ppbv	66,000	74,000	74,000	Max Concentration	NA	2.9E+05	NA	2.6E-01
Toluene	1/4	ppbv	72	72	72	Max Concentration	NA	1.9E+06	NA	3.8E-05
1,1,1-Trichloroethane	1/4	ppbv	1	1	1	Max Concentration	NA	1.4E+06	NA	7.1E-07
Trichloroethene (TCE)	2/4	ppbv	27	30	30	Max Concentration	3.8E+02	1.6E+05	7.9E-08	1.9E-04
Trichlorofluoromethane (Freon® 11)	1/4	ppbv	0.83	0.83	0.83	Max Concentration	NA	1.8E+05	NA	4.6E-06
1,2,4-Trimethylbenzene	2/4	ppbv	18	62	62	Max Concentration	NA	2.1E+03	NA	3.0E-02
1,3,5-Trimethylbenzene	1/4	ppbv	7.8	7.8	7.8	Max Concentration	NA	1.8E+03	NA	4.3E-03
2,2,4-Trimethylpentane	2/4	ppbv	48	430	430	Max Concentration	NA	NA	NA	NA
2,3,4-Trimethylpentane	1/5	ppbv	32	32	32	Max Concentration	NA	NA	NA	NA
Vinyl chloride	4/4	ppbv	57	14,000	14,000	Max Concentration	1.8E+02	5.7E+04	7.8E-05	2.5E-01
o-Xylene	3/4	ppbv	3.1	95	95	Max Concentration	NA	3.2E+04	NA	3.0E-03
m,p-Xylenes	3/4	ppbv	5.1	110	110	Max Concentration	NA	3.2E+04	NA	3.4E-03
Subtotal for Soil Gas									**8.0E-05**	**6.1E-01**
Total									**8.2E-05**	**1.0E+00**

[a] Maximum concentrations detected during the RI and Data Gap Investigations were used in the risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] Cadmium analyzed by SW6010 and SW7131

[d] The risk-based screening levels for hexane were used as a surrogate in the risk estimation.

NA=Not Available.

TABLE 48

Risk Summary Table for PRL 008, Unrestricted Use Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Arsenic	29/35	mg/kg	1.02	3.16	3.16	Max Concentration	9.3E-02	7.6E+00	3.4E-05	4.2E-01
Barium	35/35	mg/kg	9.98	260	260	Max Concentration	NA	6.9E+03	NA	3.8E-02
Beryllium	33/35	mg/kg	0.15	0.518	0.518	Max Concentration	1.3E+04	6.9E+01	4.0E-11	7.5E-03
Cadmium	35/35	mg/kg	0.0803	140	140	Max Concentration	1.7E+04	6.2E+00	8.2E-09	2.3E+01
Chromium, total	35/35	mg/kg	11	2,740	2,740	Max Concentration	2.6E+03	NA	1.1E-06	NA
Copper	35/35	mg/kg	4.7	558	558	Max Concentration	NA	1.4E+03	NA	4.0E-01
Iron	35/35	mg/kg	7,000	32,000	32,000	Max Concentration	NA	2.4E+04	NA	1.3E+00
Lead	30/35	mg/kg	2.99	665	665	Max Concentration	NA	NA	NA	NA
Molybdenum	5/35	mg/kg	0.873	15.2	15.2	Max Concentration	NA	1.7E+02	NA	8.9E-02
Nickel	35/35	mg/kg	4.9	267	267	Max Concentration	1.2E+05	4.3E+02	2.2E-09	6.2E-01
Silver	5/35	mg/kg	1.67	242	242	Max Concentration	NA	1.7E+02	NA	1.4E+00
Vanadium	35/35	mg/kg	22.5	77	77	Max Concentration	NA	1.7E+02	NA	4.5E-01
Zinc	35/35	mg/kg	9.6	474	474	Max Concentration	NA	3.1E+03	NA	1.5E-01
SVOCs										
Benzo(a)pyrene	1/29	mg/kg	0.0436	0.0436	0.0436	Max Concentration	1.8E-02	6.8E+02	2.4E-06	6.4E-05
Bis(2-ethylhexyl)phthalate (DEHP)	3/29	mg/kg	0.142	0.201	0.201	Max Concentration	1.2E+01	5.8E+02	1.7E-08	3.5E-04
TPH										
TPH-D	3/51	mg/kg	63	332	332	Max Concentration	NA	NA	NA	NA
Subtotal for Soil									**3.7E-05**	**2.8E+01**
Soil Gas (0 to 15 ft bgs)										
cis-1,2-Dichloroethene	3/42	ppbv	420	20,000	20,000	Max Concentration	NA	8.8E+02	NA	2.3E+01
Benzene	3/42	ppbv	12,000	24,000	24,000	Max Concentration	9.8E+00	9.4E+02	2.4E-03	2.6E+01
Chlorobenzene	2/42	ppbv	1,400	2,500	2,500	Max Concentration	NA	1.1E+03	NA	2.3E+00
Chloromethane	1/42	ppbv	2,400	2,400	2,400	Max Concentration	6.5E+01	4.4E+03	3.7E-05	5.5E-01
Ethylbenzene	2/42	ppbv	1,000	15,000	15,000	Max Concentration	2.2E+01	2.2E+04	6.8E-04	6.8E-01
Tetrachloroethene (PCE)	1/42	ppbv	680	680	680	Max Concentration	5.8E+00	5.0E+02	1.2E-04	1.4E+00
Toluene	3/42	ppbv	230	760,000	760,000	Max Concentration	NA	1.3E+05	NA	5.8E+00
2,2,4-Trimethylpentane	1/42	ppbv	370	370	370	Max Concentration	NA	NA	NA	NA
m,p-Xylenes	2/42	ppbv	6,400	26,000	26,000	Max Concentration	NA	2.2E+03	NA	1.2E+01
o-Xylenes	2/42	ppbv	550	5,500	5,500	Max Concentration	NA	2.2E+03	NA	2.5E+00
Vinyl chloride	3/42	ppbv	2,800	6,300	6,300	Max Concentration	1.1E+01	3.9E+03	5.7E-04	1.6E+00
Subtotal for Soil Gas									**3.9E-03**	**7.5E+01**
Total									**3.9E-03**	**1.0E+02**

[a] The data used to perform the risk screening includes concentrations detected during the RI and Data Gap Investigations and data collected during the IC 19 SVE Expansion project.

[b] Maximum concentrations were used in the risk ratio calculations.

[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS (* CH2M HILL, 2010).

NA=Not Available.

TABLE 49

Risk Summary Table for PRL 008, Industrial Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Arsenic	29/35	mg/kg	1.02	3.16	3.16	Max Concentration	1.4E+00	2.3E+02	2.3E-06	1.4E-02
Barium	35/35	mg/kg	9.98	260	260	Max Concentration	NA	1.8E+05	NA	1.4E-03
Beryllium	33/35	mg/kg	0.15	0.518	0.518	Max Concentration	2.7E+04	1.8E+03	1.9E-11	2.9E-04
Cadmium	35/35	mg/kg	0.0803	140	140	Max Concentration	3.6E+04	1.0E+03	3.9E-09	1.4E-01
Chromium, total	35/35	mg/kg	11	2740	2740	Max Concentration	5.5E+03	NA	5.0E-07	NA
Copper	35/35	mg/kg	4.7	558	558	Max Concentration	NA	3.7E+04	NA	1.5E-02
Iron	35/35	mg/kg	7,000	32,000	32,000	Max Concentration	NA	6.4E+05	NA	5.0E-02
Lead	30/35	mg/kg	2.99	665	665	Max Concentration	NA	NA	NA	NA
Molybdenum	5/35	mg/kg	0.873	15.2	15.2	Max Concentration	NA	4.6E+03	NA	3.3E-03
Nickel	35/35	mg/kg	4.9	267	267	Max Concentration	2.5E+05	1.8E+04	1.1E-09	1.5E-02
Silver	5/35	mg/kg	1.67	242	242	Max Concentration	NA	4.6E+03	NA	5.3E-02
Vanadium	35/35	mg/kg	22.5	77	77	Max Concentration	NA	4.6E+03	NA	1.7E-02
Zinc	35/35	mg/kg	9.6	474	474	Max Concentration	NA	2.8E+05	NA	1.7E-03
SVOCs										
Benzo(a)pyrene	1/29	mg/kg	0.0436	0.0436	0.0436	Max Concentration	1.4E-01	1.1E+04	3.1E-07	4.0E-06
Bis(2-ethylhexyl)phthalate (DEHP)	3/29	mg/kg	0.142	0.201	0.201	Max Concentration	9.6E+01	9.6E+03	2.1E-09	2.1E-05
TPH										
TPH-D	3/51	mg/kg	63	332	332	Max Concentration	NA	NA	NA	NA
Subtotal for Soil									**3.1E-06**	**3.1E-01**
Soil Gas (0 to 15 ft bgs)										
cis-1,2-Dichloroethene	3/42	ppbv	420	20,000	20,000	Max Concentration	NA	1.3E+04	NA	1.5E+00
Benzene	3/42	ppbv	12,000	24,000	24000	Max Concentration	1.6E+02	1.4E+04	1.5E-04	1.7E+00
Chlorobenzene	2/42	ppbv	1,400	2,500	2,500	Max Concentration	NA	1.6E+04	NA	1.6E-01
Chloromethane	1/42	ppbv	2,400	2,400	2,400	Max Concentration	1.1E+03	6.4E+04	2.2E-06	3.8E-02
Ethylbenzene	2/42	ppbv	1,000	15,000	15,000	Max Concentration	3.7E+02	3.2E+05	4.1E-05	4.7E-02
Tetrachloroethene	1/42	ppbv	680	680	680	Max Concentration	9.8E+01	7.3E+03	6.9E-06	9.3E-02
Toluene	3/42	ppbv	230	760,000	760,000	Max Concentration	NA	1.9E+06	NA	4.0E-01
2,2,4-Trimethylpentane	1/42	ppbv	370	370	370	Max Concentration	NA	NA	NA	NA
m,p-Xylenes	2/42	ppbv	6,400	26,000	26,000	Max Concentration	NA	3.2E+04	NA	8.1E-01
o-Xylenes	2/42	ppbv	550	5,500	5,500	Max Concentration	NA	3.2E+04	NA	1.7E-01
Vinyl chloride	3/42	ppbv	2,800	6,300	6,300	Max Concentration	1.8E+02	5.7E+04	3.5E-05	1.1E-01
Subtotal for Soil Gas									**2.3E-04**	**5.1E+00**
Total									**2.4E-04**	**5.4E+00**

[a] The data used to perform the risk screening includes concentrations detected during the RI and Data Gap Investigations and data collected during the IC 19 SVE Expansion project.

[b] Maximum concentrations were used in the risk ratio calculations.

[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS (* CH2M HILL, 2010).

NA=Not Available.

TABLE 50

Radiological Risk Summary Table for PRL 008

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Scenario	Radionuclide	EPC (pCi/g)	Total Carcinogenic Risk	Background Risk	Incremental Risk
Resident	Radium 226 (+D)	2.61	3.5E-04	1.5E-04	2.0E-04
	Total		**3E-04**	**1E-04**	**2E-04**
Indoor Occupational Worker	Radium 226 (+D)	2.61	5.0E-05	2.1E-05	2.9E-05
	Total		**5E-05**	**2E-05**	**3E-05**
Outdoor Occupational Worker	Radium 226 (+D)	2.61	1.3E-04	5.3E-05	7.3E-05
	Total		**1E-04**	**5E-05**	**7E-05**

TABLE 51

Risk Summary Table for the SAFR, Unrestricted Use Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Antimony	3/10	mg/kg	16	39	39	Max Concentration	NA	1.4E+01	NA	2.8E+00
Beryllium	105/105	mg/kg	0.18	0.79	0.79	Max Concentration	1.3E+04	6.9E+01	6.1E-11	1.1E-02
Cadmium	10/10	mg/kg	0.97	2.5	2.5	Max Concentration	1.7E+04	6.2E+00	1.5E-10	4.0E-01
Chromium, total	105/105	mg/kg	12.7	66	66	Max Concentration	2.6E+03	NA	2.5E-08	NA
Cobalt	105/105	mg/kg	2.79	31.3	31.3	Max Concentration	3.4E+03	1.0E+01	9.2E-09	3.1E+00
Copper	122/122	mg/kg	7.48	6,770	6,770	Max Concentration	NA	1.4E+03	NA	4.8E+00
Lead	114/123	mg/kg	2.79	64,800	64,800	Max Concentration	NA	NA	NA	NA
Nickel	105/105	mg/kg	6.22	67	67	Max Concentration	1.2E+05	4.3E+02	5.6E-10	1.6E-01
Silver	15/96	mg/kg	0.14	6.71	6.71	Max Concentration	NA	1.7E+02	NA	3.9E-02
Zinc	105/105	mg/kg	13.2	659	659	Max Concentration	NA	3.1E+03	NA	2.1E-01
TPH										
TPH-D	1/1	mg/kg	16	16	16	Max Concentration	NA	NA	NA	NA
Soil Gas (0 to 15 ft bgs)										
--[c]	--	ppbv	--	--	--	--	--	--	--	--
Total									**3.5E-08**	**1.2E+01**

[a] Maximum concentrations detected during the RI and Data Gap Investigation were used in risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] No VOCs have been detected in shallow soil gas samples (collected between 0 and 15 feet bgs) at the SAFR.

NA=Not Available.

TABLE 52

Risk Summary Table for the SAFR, Industrial Scenario

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection	Units	Minimum Detected Concentration	Maximum Detected Concentration	EPC[a]	EPC basis[a]	AFRPA Preliminary Cleanup Goals (PCGs)[b]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Antimony	3/10	mg/kg	16	39	39	Max Concentration	NA	3.7E+02	NA	1.1E-01
Beryllium	105/105	mg/kg	0.18	0.79	0.79	Max Concentration	2.7E+04	1.8E+03	2.9E-11	4.4E-04
Cadmium	10/10	mg/kg	0.97	2.5	2.5	Max Concentration	3.6E+04	1.0E+03	6.9E-11	2.5E-03
Chromium, total	105/105	mg/kg	12.7	66	66	Max Concentration	5.5E+03	NA	1.2E-08	NA
Cobalt	105/105	mg/kg	2.79	31.3	31.3	Max Concentration	7.3E+03	2.7E+02	4.3E-09	1.2E-01
Copper	122/122	mg/kg	7.48	6,770	6,770	Max Concentration	NA	3.7E+04	NA	1.8E-01
Lead	114/123	mg/kg	2.79	64,800	64,800	Max Concentration	NA	NA	NA	NA
Nickel	105/105	mg/kg	6.22	67	67	Max Concentration	2.5E+05	1.8E+04	2.7E-10	3.7E-03
Silver	15/96	mg/kg	0.14	6.71	6.71	Max Concentration	NA	4.6E+03	NA	1.5E-03
Zinc	105/105	mg/kg	13.2	659	659	Max Concentration	NA	2.8E+05	NA	2.4E-03
TPH										
TPH-D	1/1	mg/kg	16	16	16	Max Concentration	NA	NA	NA	NA
Soil Gas (0 to 15 ft bgs)										
--[c]	NA	ppbv	NA	NA	NA	NA	NA	NA	NA	NA
Total									**1.7E-08**	**4.1E-01**

[a] Maximum concentrations detected during the RI and Data Gap Investigation were used in risk ratio calculations.

[b] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).

[c] No VOCs have been detected in shallow soil gas samples (collected between 0 and 15 feet bgs) at the SAFR.

NA=Not Available. No PCG has been established for this compound.

TABLE 53
Risk Summary Table for VZ, Unrestricted Use Scenario
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Arsenic	18/22	mg/kg	5.2	24	24	Max Concentration	9.3E-02	7.6E+00	2.6E-04	3.2E+00
Cadmium	17/21	mg/kg	1.2	170	170	Max Concentration	1.7E+04	6.2E+00	1.0E-08	2.7E+01
Cobalt	20/22	mg/kg	3.6	21	21	Max Concentration	3.4E+03	1.0E+01	6.2E-09	2.1E+00
Chromium, total	20/22	mg/kg	11	31,000	31,000	Max Concentration	2.6E+03	NA	1.2E-05	NA
Copper	20/22	mg/kg	7.3	1,400	1,400	Max Concentration	NA	1.4E+03	NA	1.0E+00
Cyanide	14/21	mg/kg	1.1	50	50	Max Concentration	NA	6.9E+02	NA	7.2E-02
Lead	17/22	mg/kg	6.5	2,100	2,100	Max Concentration	NA	NA	NA	NA
Mercury	16/22	mg/kg	0.05	4.2	4.2	Max Concentration	NA	3.5E+00	NA	1.2E+00
Molybdenum	6/22	mg/kg	5.8	13	13	Max Concentration	NA	1.7E+02	NA	7.6E-02
NIckel	14/22	mg/kg	4.1	590	590	Max Concentration	1.2E+05	4.3E+02	4.9E-09	1.4E+00
Silver	3/22	mg/kg	1.2	2.4	2.4	Max Concentration	NA	1.7E+02	NA	1.4E-02
Thallium	1/24	mg/kg	0.21	0.21	0.21	Max Concentration	NA	2.3E+00	NA	9.1E-02
Zinc	16/22	mg/kg	15.1	1,400	1,400	Max Concentration	NA	3.1E+03	NA	4.5E-01
SVOCs										
Anthracene	1/22	mg/kg	0.44	0.44	0.44	Max Concentration	NA	2.3E+03	NA	1.9E-04
Benzo(a)anthracene	1/22	mg/kg	0.37	0.37	0.37	Max Concentration	8.8E-02	5.7E+02	4.2E-06	6.5E-04
Benzo(k)fluoranthene	1/22	mg/kg	2.9	2.9	2.9	Max Concentration	1.1E-01	6.7E+02	2.6E-05	4.3E-03
Bis(2-ethylhexyl)phthalate (DEHP)	15/22	mg/kg	0.094	250	250	Max Concentration	1.2E+01	5.8E+02	2.1E-05	4.3E-01
Chrysene	2/22	mg/kg	0.22	0.76	0.76	Max Concentration	8.8E-01	5.7E+02	8.6E-07	1.3E-03
1,2-Dichlorobenzene	6/22	mg/kg	0.38	290	290	Max Concentration	NA	1.9E+02	NA	1.5E+00
1,3-Dichlorobenzene	5/22	mg/kg	3	42	42	Max Concentration	NA	7.6E+01	NA	5.5E-01
1,4-Dichlorobenzene[d]	6/22	mg/kg	0.18	520	520	Max Concentration	1.5E-02	5.4E+01	3.5E-02	9.6E+00
2,4-Dimethylphenol	1/22	mg/kg	15	15	15	Max Concentration	NA	1.3E+01	NA	1.2E+00
Di-n-butylphthalate (DNBP)	1/22	mg/kg	19	19	19	Max Concentration	NA	9.3E+02	NA	2.0E-02
Fluoranthene	3/22	mg/kg	0.12	1.8	1.8	Max Concentration	NA	4.9E+02	NA	3.7E-03
Fluorene	1/22	mg/kg	0.17	0.17	0.17	Max Concentration	NA	2.4E+02	NA	7.1E-04
4-Methylphenol	1/22	mg/kg	76	76	76	Max Concentration	NA	1.9E+00	NA	4.0E+01
Naphthalene[d]	10/22	mg/kg	0.025	64	64	Max Concentration	4.7E-02	2.0E+00	1.4E-03	3.2E+01
Phenanthrene	5/22	mg/kg	0.13	1.6	1.6	Max Concentration	NA	2.6E+03	NA	6.2E-04
Phenol	1/22	mg/kg	13	13	13	Max Concentration	NA	6.1E+01	NA	2.1E-01
Pyrene	2/22	mg/kg	0.15	2	2	Max Concentration	NA	3.5E+02	NA	5.7E-03
2,3,7,8-TCDD	1/1	ng/g	0.0154	0.0154	0.0154	Max Concentration	1.3E-03	3.0E-01	1.2E-05	5.1E-02
1,2,4-Trichlorobenzene	3/22	mg/kg	1.7	4.9	4.9	Max Concentration	6.9E+00	3.0E+01	7.1E-07	1.6E-01
Subtotal for Soil									**3.6E-02**	**1.2E+02**
Soil Gas (0 to 15 ft bgs)										
Benzene	100	ppbv	3	35	35	Max Concentration	9.8E+00	9.4E+02	3.5E-06	3.7E-02
Carbon tetrachloride	91	ppbv	2	38	38	Max Concentration	2.6E+00	6.5E+02	1.5E-05	5.9E-02
Chlorobenzene	13	ppbv	31	94	94	Max Concentration	NA	1.1E+03	NA	8.6E-02
Chloroform	91	ppbv	2	37	37	Max Concentration	2.1E+00	6.1E+03	1.8E-05	6.1E-03
1,2-Dichlorobenzene	13	ppbv	87	104	104	Max Concentration	NA	3.3E+03	NA	3.2E-02
Dichlorodifluoromethane (Freon® 12)	100	ppbv	2	18	18	Max Concentration	NA	4.0E+03	NA	4.6E-03
1,1-Dichloroethane	100	ppbv	2	129	129	Max Concentration	3.7E+01	NA	3.5E-06	NA
1,2-Dichloroethane	91	ppbv	2	74	74	Max Concentration	2.3E+00	9.9E+03	3.2E-05	7.5E-03
1,1-Dichloroethene	100	ppbv	3	90,984	90,984	Max Concentration	NA	5.0E+03	NA	1.8E+01
cis-1,2-Dichloroethene	100	ppbv	3	164	164	Max Concentration	NA	8.8E+02	NA	1.9E-01
trans-1,2-Dichloroethene	91	ppbv	3	5	5	Max Concentration	NA	1.5E+03	NA	3.3E-03
Ethylbenzene	100	ppbv	2	32	32	Max Concentration	2.2E+01	2.2E+04	1.5E-06	1.5E-03
Methylene chloride (dichloromethane)	100	ppbv	3	35	35	Max Concentration	1.5E+02	1.2E+04	2.3E-07	2.9E-03
Styrene	4	ppbv	2	2	2	Max Concentration	NA	2.4E+04	NA	9.8E-05
Tetrachloroethene (PCE)	100	ppbv	1	55	55	Max Concentration	5.8E+00	5.0E+02	9.4E-06	1.1E-01
Toluene	100	ppbv	3	1,451	1,451	Max Concentration	NA	1.3E+05	NA	1.1E-02
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	91	ppbv	1	47,070	47,070	Max Concentration	NA	3.9E+05	NA	1.2E-01
1,1,1-Trichloroethane	11/100	ppbv	2	114	114	Max Concentration	NA	9.4E+04	NA	1.2E-03
Trichloroethene (TCE)	100	ppbv	2	634	634	Max Concentration	2.3E+01	1.1E+04	2.8E-05	5.8E-02
Trichlorofluoromethane (Freon® 11)	100	ppbv	2	268	268	Max Concentration	NA	1.2E+04	NA	2.2E-02
1,2,4-Trimethylbenzene	100	ppbv	2	199	199	Max Concentration	NA	1.4E+02	NA	1.4E+00
1,3,5-Trimethylbenzene	4	ppbv	6	6	6	Max Concentration	NA	1.2E+02	NA	5.1E-02
o-Xylene	100	ppbv	2	200	200	Max Concentration	NA	2.2E+03	NA	9.1E-02
m,p-Xylenes	100	ppbv	2	136	136	Max Concentration	NA	2.2E+03	NA	6.2E-02
Subtotal for Soil Gas									**1.1E-04**	**2.1E+01**
Total									**3.6.E-02**	**1.4.E+02**

[a] Data from the OU D RI (1994) and OU D RI Addendum (2000) were used.
[b] Maximum concentrations were used in risk ratio calculations.
[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).
NA=Not Available.

TABLE 54
Risk Summary Table for VZ, Industrial Scenario
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Analyte	Frequency of Detection[a]	Units	Minimum Detected Concentration[a]	Maximum Detected Concentration[a]	EPC[b]	EPC basis[b]	AFRPA Preliminary Cleanup Goals (PCGs)[c]		Estimated Risk Based on AFRPA PCGs	
							Cancer Target Risk = 1.0x10-6	Non-Cancer Target HI =1	Carcinogenic Risk	Non-carcinogenic risk
Soil (0 to 10 ft bgs)										
Metals										
Arsenic	18/22	mg/kg	5.2	24	24	Max Concentration	1.4E+00	2.3E+02	1.7E-05	1.0E-01
Cadmium	17/21	mg/kg	1.2	170	170	Max Concentration	3.6E+04	1.0E+03	4.7E-09	1.7E-01
Cobalt	20/22	mg/kg	3.6	21	21	Max Concentration	7.3E+03	2.7E+02	2.9E-09	7.8E-02
Chromium, total	20/22	mg/kg	11.4	31,000	31,000	Max Concentration	5.5E+03	NA	5.6E-06	NA
Copper	20/22	mg/kg	7.3	1,400	1,400	Max Concentration	NA	3.7E+04	NA	3.8E-02
Cyanide	14/21	mg/kg	1.1	50	50	Max Concentration	NA	1.8E+04	NA	2.8E-03
Lead	17/22	mg/kg	6.5	2,100	2,100	Max Concentration	NA	NA	NA	NA
Mercury	16/22	mg/kg	0.05	4.2	4.2	Max Concentration	NA	1.5E+02	NA	2.8E-02
Molybdenum	6/22	mg/kg	5.8	13	13	Max Concentration	NA	4.6E+03	NA	2.8E-03
NIckel	14/22	mg/kg	4.1	590	590	Max Concentration	2.5E+05	1.8E+04	2.4E-09	3.3E-02
Silver	3/22	mg/kg	1.2	2.4	2.4	Max Concentration	NA	4.6E+03	NA	5.2E-04
Thallium	1/24	mg/kg	0.21	0.21	0.21	Max Concentration	NA	6.1E+01	NA	3.4E-03
Zinc	16/22	mg/kg	15.1	1,400	1,400	Max Concentration	NA	2.8E+05	NA	5.0E-03
SVOCs										
Anthracene	1/22	mg/kg	0.44	0.44	0.44	Max Concentration	NA	1.0E+05	NA	4.4E-06
Benzo(a)anthracene	1/22	mg/kg	0.37	0.37	0.37	Max Concentration	8.8E-01	1.1E+04	4.2E-07	3.4E-05
Benzo(k)fluoranthene	1/22	mg/kg	2.9	2.9	2.9	Max Concentration	8.8E-01	1.1E+04	3.3E-06	2.6E-04
Bis(2-ethylhexyl)phthalate (DEHP)	15/22	mg/kg	0.094	250	250	Max Concentration	9.6E+01	9.6E+03	2.6E-06	2.6E-02
Chrysene	2/22	mg/kg	0.22	0.76	0.76	Max Concentration	8.7E+00	1.1E+04	8.7E-08	6.9E-05
1,2-Dichlorobenzene	6/22	mg/kg	0.38	290	290	Max Concentration	NA	3.9E+03	NA	7.4E-02
1,3-Dichlorobenzene	5/22	mg/kg	3	42	42	Max Concentration	NA	1.9E+03	NA	2.2E-02
1,4-Dichlorobenzene[d]	6/22	mg/kg	0.18	520	520	Max Concentration	1.5E-01	4.8E+02	3.5E-03	1.1E+00
2,4-Dimethylphenol	1/22	mg/kg	15	15	15	Max Concentration	NA	9.6E+03	NA	1.6E-03
Di-n-butylphthalate (DNBP)	1/22	mg/kg	19	19	19	Max Concentration	NA	4.8E+04	NA	4.0E-04
Fluoranthene	3/22	mg/kg	0.12	1.8	1.8	Max Concentration	NA	1.5E+04	NA	1.2E-04
Fluorene	1/22	mg/kg	0.17	0.17	0.17	Max Concentration	NA	1.3E+04	NA	1.3E-05
4-Methylphenol	1/22	mg/kg	76	76	76	Max Concentration	NA	2.4E+03	NA	3.2E-02
Naphthalene[d]	10/22	mg/kg	0.025	64	64	Max Concentration	6.0E-01	2.2E+01	1.1E-04	2.9E+00
Phenanthrene	5/22	mg/kg	0.13	1.6	1.6	Max Concentration	NA	1.1E+05	NA	1.5E-05
Phenol	1/22	mg/kg	13	13	13	Max Concentration	NA	1.4E+05	NA	9.3E-05
Pyrene	2/22	mg/kg	0.15	2	2	Max Concentration	NA	1.1E+04	NA	1.8E-04
2,3,7,8-TCDD	1/1	ng/g	0.0154	0.0154	0.0154	Max Concentration	1.6E-02	7.6E+00	9.6E-07	2.0E-03
1,2,4-Trichlorobenzene	3/22	mg/kg	1.7	4.9	4.9	Max Concentration	3.7E+02	2.4E+02	1.3E-08	2.0E-02
Subtotal for Soil									**3.6E-03**	**4.6E+00**
Soil Gas (0 to 15 ft bgs)										
Benzene	100	ppbv	3	35	35	Max Concentration	1.6E+02	1.4E+04	2.2E-07	2.5E-03
Carbon tetrachloride	91	ppbv	2	38	38	Max Concentration	4.4E+01	9.5E+03	8.7E-07	4.0E-03
Chlorobenzene	13	ppbv	31	94	94	Max Concentration	NA	1.6E+04	NA	5.9E-03
Chloroform	91	ppbv	2	37	37	Max Concentration	3.6E+01	8.9E+04	1.0E-06	4.2E-04
1,2-Dichlorobenzene	13	ppbv	87	104	104	Max Concentration	NA	4.8E+04	NA	2.2E-03
Dichlorodifluoromethane (Freon® 12)	100	ppbv	2	18	18	Max Concentration	NA	5.9E+04	NA	3.1E-04
1,1-Dichloroethane	100	ppbv	2	129	129	Max Concentration	6.2E+02	NA	2.1E-07	NA
1,2-Dichloroethane	91	ppbv	2	74	74	Max Concentration	3.9E+01	1.4E+05	1.9E-06	5.3E-04
1,1-Dichloroethene	100	ppbv	3	90,984	90,984	Max Concentration	NA	7.3E+04	NA	1.2E+00
cis-1,2-Dichloroethene	100	ppbv	3	164	164	Max Concentration	NA	1.3E+04	NA	1.3E-02
trans-1,2-Dichloroethene	91	ppbv	3	5	5	Max Concentration	NA	2.2E+04	NA	2.3E-04
Ethylbenzene	100	ppbv	2	32	32	Max Concentration	3.7E+02	3.2E+05	8.7E-08	1.0E-04
Methylene chloride (dichloromethane)	100	ppbv	3	35	35	Max Concentration	2.5E+03	1.7E+05	1.4E-08	2.0E-04
Styrene	4	ppbv	2	2	2	Max Concentration	NA	3.6E+05	NA	6.5E-06
Tetrachloroethene (PCE)	100	ppbv	1	55	55	Max Concentration	9.8E+01	7.3E+03	5.6E-07	7.5E-03
Toluene	100	ppbv	3	1,451	1,451	Max Concentration	NA	1.9E+06	NA	7.6E-04
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	91	ppbv	1	47,070	47,070	Max Concentration	NA	5.6E+06	NA	8.4E-03
1,1,1-Trichloroethane	11/100	ppbv	2	114	114	Max Concentration	NA	1.4E+06	NA	8.1E-05
Trichloroethene (TCE)	100	ppbv	2	634	634	Max Concentration	3.8E+02	1.6E+05	1.7E-06	4.0E-03
Trichlorofluoromethane (Freon® 11)	100	ppbv	2	268	268	Max Concentration	NA	1.8E+05	NA	1.5E-03
1,2,4-Trimethylbenzene	100	ppbv	2	199	199	Max Concentration	NA	2.1E+03	NA	9.5E-02
1,3,5-Trimethylbenzene	4	ppbv	6	6	6	Max Concentration	NA	1.8E+03	NA	3.4E-03
o-Xylene	100	ppbv	2	200	200	Max Concentration	NA	3.2E+04	NA	6.3E-03
m,p-Xylenes	100	ppbv	2	136	136	Max Concentration	NA	3.2E+04	NA	4.3E-03
Subtotal for Soil Gas									**6.5E-06**	**1.4E+00**
Total									**3.6.E-03**	**6.0.E+00**

[a] Data from the OU D RI (1994) and OU D RI Addendum (2000) were used.
[b] Maximum concentrations were used in risk ratio calculations.
[c] Development of AFRPA PCGs is described in the *Small Volume Sites RICS Addenda and FS* (CH2M HILL, 2010).
NA=Not Available.

TABLE 55
Industrial Use Cleanup Levels for Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Metals (mg/kg)						
Antimony	1.9E+02	Protection of surface water	3.7E+02	Protection of human health[a]	6.0E+02	Protection of groundwater
Arsenic	5.8E+00	Surface soil background	4.9E+00	Combined background	4.9E+00	Combined background
Cadmium	4.1E+00	Surface soil background	9.6E+01	Protection of groundwater	9.6E+01	Protection of groundwater
Chromium, hexavalent	2.1E+02	Protection of groundwater	2.1E+02	Protection of groundwater	2.1E+02	Protection of groundwater
Chromium, total	1.6E+03	Protection of surface water	5.5E+03	Protection of human health[b]	8.1E+04	Protection of groundwater
Cobalt	2.7E+02	Protection of human health[a]	2.7E+02	Protection of human health[a]	4.7E+04	Protection of groundwater
Copper	1.3E+02	Protection of surface water	3.7E+04	Protection of human health[a]	2.5E+05	Protection of groundwater
Iron	2.4E+04	Surface soil background	9.1E+04	Protection of groundwater	9.1E+04	Protection of groundwater
Lead	1.4E+02	Surface soil background	3.2E+02	Protection of human health	4.3E+03	Protection of groundwater
Manganese	1.6E+03	Protection of surface water	2.2E+04	Protection of human health[a]	2.8E+04	Protection of groundwater
Mercury	1.6E+00	Protection of surface water	1.2E+02	Protection of groundwater	1.2E+02	Protection of groundwater
Nickel	7.7E+02	Protection of surface water	5.8E+03	Protection of groundwater	5.8E+03	Protection of groundwater
Silver	2.3E+01	Protection of surface water	3.5E+03	Protection of groundwater	3.5E+03	Protection of groundwater
Thallium	1.4E+01	Protection of groundwater	1.4E+01	Protection of groundwater	1.4E+01	Protection of groundwater
Zinc	1.7E+03	Protection of surface water	1.4E+05	Protection of groundwater	1.4E+05	Protection of groundwater
SVOCs (mg/kg)						
1,2-Dichlorobenzene[c]	7.7E+02	Protection of surface water	3.9E+03	Protection of human health[a]	4.1E+03	Protection of groundwater
1,4-Dichlorobenzene	4.5E+00	Protection of human health[b]	4.5E+00	Protection of human health[b]	5.2E+02	Protection of groundwater
1,4-Dioxane	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater
2,3,7,8-TCDD	4.2E-07	Protection of surface water	1.6E-05	Protection of human health[b]	3.4E-03	Protection of groundwater
2,4-Dimethylphenol	9.6E+03	Protection of human health[a]	9.6E+03	Protection of human health[a]	1.2E+04	Protection of groundwater
2,4-Dinitrotoluene	1.6E+00	Protection of surface water	2.5E+00	Protection of groundwater	2.5E+00	Protection of groundwater
2,6-Dinitrotoluene	1.6E+00	Protection of surface water	2.0E+00	Protection of human health[b]	2.5E+00	Protection of groundwater
4-Methylphenol	2.4E+03	Protection of human health[a]	2.4E+03	Protection of human health[a]	3.1E+03	Protection of groundwater
Aldrin	4.1E-03	Protection of surface water	1.0E-01	Protection of groundwater	1.0E-01	Protection of groundwater

TABLE 55
Industrial Use Cleanup Levels for Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Benzo(a)anthracene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	1.3E+01	Protection of groundwater
Benzo(a)pyrene	1.4E-01	Protection of human health[b]	1.4E-01	Protection of human health[b]	9.5E-01	Protection of groundwater
Benzo(b)fluoranthene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.9E+00	Protection of groundwater
Benzo(k)fluoranthene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.1E+01	Protection of groundwater
Bis(2-ethylhexyl)phthalate	5.8E+01	Protection of surface water	9.6E+01	Protection of human health[b]	2.5E+02	Protection of groundwater
Chlordane	1.8E-02	Protection of surface water	5.2E+00	Protection of human health[b]	6.5E+00	Protection of groundwater
Chrysene	1.4E-01	Protection of surface water	8.7E+00	Protection of human health[b]	2.1E+02	Protection of groundwater
DDD	2.7E-02	Protection of surface water	7.6E+00	Protection of human health[b]	1.0E+01	Protection of groundwater
DDE	1.9E-02	Protection of surface water	5.4E+00	Protection of human health[b]	7.0E+00	Protection of groundwater
DDT	1.9E-02	Protection of surface water	5.4E+00	Protection of human health[b]	7.0E+00	Protection of groundwater
Dibenzo(a,h)anthracene	1.4E-01	Protection of surface water	2.6E-01	Protection of human health[b]	1.2E+00	Protection of groundwater
Dieldrin	4.5E-03	Protection of surface water	1.1E-01	Protection of human health[b]	1.1E-01	Protection of groundwater
Indeno(1,2,3-cd)pyrene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	4.8E+00	Protection of groundwater
Naphthalene	6.0E-01	Protection of human health[b]	6.0E-01	Protection of human health[b]	6.4E+01	Protection of groundwater
N-nitroso-di-n-propylamine	1.6E-01	Protection of surface water	1.9E-01	Protection of human health[b]	9.5E-01	Protection of groundwater
PCB	5.4E-03	Protection of surface water	5.3E-01	Protection of human health[b]	1.5E+02	Protection of groundwater
TPH (mg/kg)						
TPH-D	3.2E+03	Protection of surface water	3.9E+03	Protection of groundwater	3.9E+03	Protection of groundwater
TPH-G	1.6E+02	Protection of surface water	2.2E+02	Protection of groundwater	2.2E+02	Protection of groundwater
Radionuclides (pCi/g)[d]						
Cesium 137	1.1E+01	Protection of human health[e]	1.1E+01	Protection of human health[e]	2.0E+04	Protection of groundwater
Plutonium 239	4.8E+02	Protection of surface water	1.4E+03	Protection of human health[e]	1.5E+03	Protection of groundwater
Radium 226	2.0E+00	Protection of human health[e]	2.0E+00	Protection of human health[e]	5.0E+02	Protection of groundwater
Thorium 232	4.8E+02	Protection of surface water	1.5E+03	Protection of groundwater	1.5E+03	Protection of groundwater
Uranium 238DHP	1.8E+02	Protection of human health[e]	1.8E+02	Protection of human health[e]	2.0E+03	Protection of groundwater

TABLE 55
Industrial Use Cleanup Levels for Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

[a]Protection of human health cleanup level is based on an HI of 1.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]The cleanup levels for 1,2-dichlorobenzene in soil exceed the estimated soil saturation concentration of 380 mg/kg.

[d]Cleanup levels for radionuclides are inclusive of background.

[e]Protection of human health cleanup level is based on an incremental carcinogenic risk (i.e., risk in excess of background) of 1×10^{-4}.

Notes:

bgs = below ground surface
DDD = dichlorodiphenyldichloroethane
DDE = dichlorodiphenyldichloroethylene
DDT = dichlorodiphenyltrichloroethane
mg/kg = milligram(s) per kilogram
PCB = polychlorinated biphenyl
pCi/g = picocurie(s) per gram
SVOC = semivolatile organic compound
TCDD = tetrachlorodibenzodioxin
TPH-D = total petroleum hydrocarbon as diesel
TPH-G = total petroleum hydrocarbon as gasoline
VOC = volatile organic compound

TABLE 56
Industrial Use Cleanup Levels for VOCs in Shallow Soil Gas (0 to 15 feet bgs)
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Contaminant of Concern	Cleanup Level (ppbv)[a]
1,1-Dichloroethane[b]	6.2E+02
1,1-Dichloroethene[c]	7.3E+04
1,2,4-Trimethylbenzene[c]	2.1E+03
1,2-Dichlorobenzene[c]	4.8E+04
1,2-Dichloroethane[b]	3.9E+01
1,3,5-Trimethylbenzene[c]	1.8E+03
1,3-Dichlorobenzene[c]	2.5E+04
1,4-Dichlorobenzene[b]	5.8E+01
Benzene[b]	1.6E+02
Carbon tetrachloride[b]	4.4E+01
Chlorobenzene[c]	1.6E+04
Chloroethane[b]	1.9E+03
Chloroform[b]	3.6E+01
cis-1,2-Dichloroethene[c]	1.3E+04
Cyclohexane[c]	2.5E+06
Ethylbenzene[b]	3.7E+02
Heptane[c]	2.5E+05
Hexane[c]	2.9E+05
Methylene chloride (dichloromethane)[b]	2.5E+03
Naphthalene[b]	2.3E+01
PCE[b]	9.8E+01
TCE[b,d]	3.8E+02
Vinyl chloride[b,e]	1.8E+02
Xylene, m-[c]	3.2E+04
Xylene, o-[c]	3.2E+04
Xylene, p-[c]	3.2E+04

[a]Cleanup levels for VOCs in soil gas are based on protection of human health (including the indoor air pathway) and are applicable from 0 to 15 feet bgs.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Protection of human health cleanup level is based on an HI of 1.

[d]The cleanup level for TCE represents a slightly higher carcinogenic risk (i.e., 3×10^{-6}) due to a recent revision to the EPA IRIS value for TCE.

[e]The vinyl chloride cleanup value (180 ppbv) is not considered protective by the State of California. Vinyl chloride contamination falling between 20 and 180 ppbv may not be suitable for industrial reuse without additional institutional controls.

TABLE 57
Unrestricted Use Cleanup Levels for Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Metals (mg/kg)						
Antimony	1.4E+01	Protection of human health[a]	1.4E+01	Protection of human health[a]	6.0E+02	Protection of groundwater
Arsenic	5.8E+00	Surface soil background	4.9E+00	Combined background	4.9E+00	Combined background
Cadmium	4.1E+00	Surface soil background	6.2E+00	Protection of human health[a]	9.6E+01	Protection of groundwater
Chromium, total	1.6E+03	Protection of surface water	2.6E+03	Protection of human health[b]	8.1E+04	Protection of groundwater
Cobalt	1.6E+01	Surface soil background	1.7E+01	Combined background	4.7E+04	Protection of groundwater
Copper	1.3E+02	Protection of surface water	1.4E+03	Protection of human health[a]	2.5E+05	Protection of groundwater
Iron	2.4E+04	Surface soil background	4.0E+04	Combined background	9.1E+04	Protection of groundwater
Lead	1.4E+02	Surface soil background	8.0E+01	Protection of human health	4.3E+03	Protection of groundwater
Manganese	8.3E+02	Protection of human health	1.6E+03	Combined background	2.8E+04	Protection of groundwater
Mercury	1.6E+00	Protection of surface water	3.5E+00	Protection of human health[a]	1.2E+02	Protection of groundwater
Silver	2.3E+01	Protection of surface water	1.7E+02	Protection of human health[a]	3.5E+03	Protection of groundwater
Thallium	2.3E+00	Protection of human health	2.3E+00	Protection of human health[a]	1.4E+01	Protection of groundwater
Zinc	1.7E+03	Protection of surface water	3.1E+03	Protection of human health[a]	1.4E+05	Protection of groundwater
SVOCs (mg/kg)						
1,2-Dichlorobenzene	1.9E+02	Protection of human health[a]	1.9E+02	Protection of human health[a]	4.1E+03	Protection of groundwater
1,4-Dichlorobenzene	1.5E-02	Protection of human health[b]	1.5E-02	Protection of human health[b]	5.2E+02	Protection of groundwater
1,4-Dioxane	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater	1.5E-03	Protection of groundwater
2,3,7,8-TCDD	4.2E-07	Protection of surface water	1.3E-06	Protection of human health[b]	3.4E-03	Protection of groundwater
2,4-Dimethylphenol	1.3E+01	Protection of human health[a]	1.3E+01	Protection of human health[a]	1.2E+04	Protection of groundwater
2,4-Dinitrotoluene	6.3E-03	Protection of human health[b]	6.3E-03	Protection of human health[b]	2.5E+00	Protection of groundwater
2,6-Dinitrotoluene	2.4E-03	Protection of human health[b]	2.4E-03	Protection of human health[b]	2.5E+00	Protection of groundwater
4-Methylphenol	1.9E+00	Protection of human health[a]	1.9E+00	Protection of human health[a]	3.1E+03	Protection of groundwater
Benzo(a)anthracene	8.8E-02	Protection of human health[b]	8.8E-02	Protection of human health[b]	1.3E+01	Protection of groundwater
Benzo(a)pyrene	1.8E-02	Protection of human health[b]	1.8E-02	Protection of human health[b]	9.5E-01	Protection of groundwater
Benzo(b)fluoranthene	1.1E-01	Protection of human health[b]	1.1E-01	Protection of human health[b]	2.9E+00	Protection of groundwater

TABLE 57
Unrestricted Use Cleanup Levels for Non-VOCs in Soil
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

	0 to 1 foot bgs		1 to 15 feet bgs		15 to 30 feet bgs	
Contaminant of Concern	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**	**Cleanup Level**	**Basis for Cleanup Level**
Benzo(k)fluoranthene	1.1E-01	Protection of human health[b]	1.1E-01	Protection of human health[b]	2.1E+01	Protection of groundwater
Bis(2-ethylhexyl)phthalate	1.2E+01	Protection of human health[b]	1.2E+01	Protection of human health[b]	2.5E+02	Protection of groundwater
Chlordane	1.8E-02	Protection of surface water	4.3-01	Protection of human health[b]	6.5E+00	Protection of groundwater
Chrysene	1.4E-01	Protection of surface water	8.8E-01	Protection of human health[b]	2.1E+02	Protection of groundwater
DDD	2.7E-02	Protection of surface water	5.0E-01	Protection of human health[b]	1.0E+01	Protection of groundwater
DDE	1.9E-02	Protection of surface water	4.9E-01	Protection of human health[b]	7.0E+00	Protection of groundwater
DDT	1.9E-02	Protection of surface water	4.7E-01	Protection of human health[b]	7.0E+00	Protection of groundwater
Dibenzo(a,h)anthracene	3.8E-02	Protection of human health	3.8E-02	Protection of human health[b]	1.2E+00	Protection of groundwater
Dieldrin	4.5E-03	Protection of surface water	5.8E-03	Protection of human health[b]	1.1E-01	Protection of groundwater
Indeno(1,2,3-cd)pyrene	1.2E-01	Protection of human health[b]	1.2E-01	Protection of human health[b]	4.8E+00	Protection of groundwater
Naphthalene	4.7E-02	Protection of human health[b]	4.7E-02	Protection of human health[b]	6.4E+01	Protection of groundwater
N-nitroso-di-n-propylamine	1.2E-04	Protection of human health[b]	1.2E-04	Protection of human health[b]	9.5E-01	Protection of groundwater
PCB	5.4E-03	Protection of surface water	6.3E-02	Protection of human health[b]	1.5E+02	Protection of groundwater
Radionuclides (pCi/g)[c]						
Cesium 137	6.0E+00	Protection of human health[d]	6.0E+00	Protection of human health[d]	2.0E+04	Protection of groundwater
Plutonium 239	2.6E+02	Protection of human health[d]	2.6E+02	Protection of human health[d]	1.5E+03	Protection of groundwater
Radium 226	2.0E+00	Protection of human health[d]	2.0E+00	Protection of human health[d]	2.0E+00	Protection of human health
Thorium 232	3.1E+02	Protection of human health[d]	3.1E+02	Protection of human health[d]	1.5E+03	Protection of groundwater
Uranium 238DHP	7.7E+01	Protection of human health[d]	7.7E+01	Protection of human health[d]	2.0E+03	Protection of groundwater

[a]Protection of human health cleanup level is based on an HI of 1.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Cleanup levels for radionuclides are inclusive of background.

[d]Protection of human health cleanup level is based on an incremental carcinogenic risk (i.e., risk in excess of background) of 1×10^{-4}.

TABLE 58
Unrestricted Use Cleanup Levels for VOCs in Shallow Soil Gas (0 to 15 feet bgs)
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Contaminant of Concern	Cleanup Level (ppbv)[a]
1,1-Dichloroethane	3.7E+01[b]
1,1-Dichloroethene	5.0E+03[c]
1,2,4-Trimethylbenzene	1.4E+02[c]
1,2-Dichlorobenzene	3.3E+03[c]
1,2-Dichloroethane	2.3E+00[b]
1,3,5-Trimethylbenzene	1.2E+02[c]
1,3-Dichlorobenzene	1.7E+03[c]
1,4-Dichlorobenzene	3.5E+00[b]
Benzene	9.8E+00[b]
Carbon tetrachloride	2.6E+00[b]
Chlorobenzene	1.1E+03[c]
Chloroethane	1.1E+02[b]
Chloroform	2.1E+00[b]
cis-1,2-Dichloroethene	8.8E+02[c]
Cyclohexane	1.7E+05[c]
Ethylbenzene	2.2E+01[b]
Heptane	1.7E+04[c]
Hexane	2.0E+04[c]
Methylene chloride (dichloromethane)	1.5E+02[b]
Naphthalene	1.4E+00[b]
PCE	5.8E+00[b]
TCE[d]	2.3E+01[b]
Vinyl chloride	1.1E+01[b]
Xylene, m-	2.2E+03[c]
Xylene, o-	2.2E+03[c]
Xylene, p-	2.2E+03[c]

[a]Cleanup levels for VOCs in soil gas are based on protection of human health (including the indoor air pathway) and are applicable from 0 to 15 feet bgs.

[b]Protection of human health cleanup level is based on a carcinogenic risk of 1×10^{-6}.

[c]Protection of human health cleanup level is based on an HI of 1.

[d]The cleanup level for TCE represents a slightly higher carcinogenic risk (i.e., 3×10^{-6}) due to a recent revision to the EPA IRIS value for TCE.

TABLE 59
Summary of Remedial Alternatives
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Alternative		Description
1	No Action	No remedial activities will take place under this alternative; therefore, contamination is not reduced. Under this alternative, the Air Force would take no further action to address soil contamination problems or to minimize further contaminant releases from the sites. Any reduction in contaminant concentrations would be a result of natural degradation.
3	Composite Cap (Restricted Land Use)	An individual FSS with contaminated soil and debris that constitute principal threats would be covered with an engineered cap to eliminate human and ecological receptor exposure pathways, reduce infiltration of precipitation, and minimize potential for contaminants to leach to groundwater. This alternative also includes pre-design sampling, vapor barriers, landfill gas controls, institutional controls (i.e., deed restrictions and land use covenants), cap inspections and maintenance (mowing, erosion, subsidence, and burrowing animal control), sampling/monitoring (i.e., groundwater and soil gas), reporting, and enforcement. Existing SVE systems would continue to operate as a component of, or in conjunction with, the implementation of this alternative. Alternative 3 is compatible with intended site reuse. Industrial/commercial use of the property could be achieved within 2 to 3 years. Alternative 3 was not evaluated for CS 010 because the remaining contaminated soil has already been excavated and is stockpiled onsite. Alternative 3 was also not evaluated for the SAFR because of the relatively small size of the SAFR site (and correspondingly small volume of contaminated soil) and because of limitations associated with the physical configuration of the site.
5	Excavation/Consolidation Unit (Restricted Land Use)	Alternative 5 consists of individual site excavation and subsequent consolidation of soil and debris that constitute the principal threats from multiple sites into an onbase consolidation unit. Institutional controls in the form of deed restrictions and land use covenants would be required during implementation, and the controls would continue after implementation because of the residual levels of contaminants remaining at the site. Pre-design sampling would be performed to ensure that all soil containing contaminants at concentrations above cleanup levels can be readily excavated from the site(s) under this alternative. Because waste materials would be consolidated at the consolidation unit, future land use would be restricted at this facility and long-term institutional controls would be required. Annual IC compliance inspections are a part of this remedy ensuring there are no breeches of the ICs and deed restrictions at both the remediated sites and the CU. Engineered controls such as signs, fences, and alarms would also be used to restrict access to the consolidation unit as necessary. Cap inspections and maintenance (mowing, erosion, subsidence, and burrowing animal control), long-term sampling/ monitoring (i.e., groundwater and soil gas) would be required to verify the continued effectiveness of the consolidation unit at containing the contamination. Existing SVE systems would continue to operate in conjunction with the implementation of this alternative. Alternative 5 is compatible with intended site reuse. Industrial/ commercial use of the property could be achieved within 2 to 3 years.

TABLE 59
Summary of Remedial Alternatives
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Alternative		Description
6U	Excavation/Ex Situ Treatment/ Consolidation Unit (Unrestricted Land Use)	Alternative 6U consists of individual site excavation of soil and debris that constitute the principal threats, ex situ treatment of the excavated soil (as necessary), and subsequent consolidation of soil into an onbase consolidation unit. Similar to Alternative 5, institutional controls in the form of deed restrictions and land use covenants would be required during implementation, however the controls would not continue after implementation because the cleanup at the site is to unrestricted use levels. Because waste materials would be consolidated at the consolidation unit, future land use would be restricted at this facility and long-term institutional controls would be required. Annual IC compliance inspections are a part of this remedy ensuring there are no breeches of the ICs and deed restrictions at the CU. Engineered controls such as signs, fences, and alarms would also be used to restrict access to the consolidation unit as necessary. Cap inspections and maintenance (mowing, erosion, subsidence, and burrowing animal control), long-term sampling/monitoring (i.e., groundwater and soil gas) would be required to verify the continued effectiveness of the consolidation unit at containing the contamination. Existing SVE systems would continue to operate in conjunction with the implementation of this alternative. Alternative 6U is compatible with intended site reuse. Unrestricted use of the remediated property could be achieved within 2 to 3 years.
6R	Excavation/Ex Situ Treatment/ Consolidation Unit (Restricted Land Use)	Alternative 6R consists of individual site excavation of soil and debris that constitute the principal threats, ex situ treatment of the excavated soil (as necessary), and subsequent consolidation of soil from multiple sites into an onbase consolidation unit. Similar to Alternative 5, institutional controls in the form of deed restrictions and land use covenants would be required during implementation, and the controls would continue after implementation because of the residual levels of contaminants remaining at the site. Because waste materials would be consolidated at the consolidation unit, future land use would be restricted at this facility and long-term institutional controls would be required. Annual IC compliance inspections are a part of this remedy ensuring there are no breeches of the ICs and deed restrictions at both the remediated sites and the CU. Engineered controls such as signs, fences, and alarms would also be used to restrict access to the consolidation unit as necessary. Cap inspections and maintenance (mowing, erosion, subsidence, and burrowing animal control), long-term sampling/monitoring (i.e., groundwater and soil gas) would be required to verify the continued effectiveness of the consolidation unit at containing the contamination. Existing SVE systems would continue to operate in conjunction with the implementation of this alternative. Alternative 6R is compatible with intended site reuse. Industrial/commercial use of the remediated property could be achieved within 2 to 3 years.

TABLE 59
Summary of Remedial Alternatives
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Alternative		Description
7U	Excavation/Disposal (Unrestricted Land Use)	Under Alternative 7U, sites with contaminated soil and/or debris that constitute the principal threats would be excavated and then transported to an offbase landfill for disposal. Existing SVE systems would continue to operate in conjunction with the implementation of this alternative. Alternative 7U uses a lower set of cleanup levels (unrestricted use) compared to Alternative 7R (industrial use). Under Alternative 7U the resulting land use is unrestricted. Short-term institutional controls in the form of deed restrictions and land use covenants would be implemented until the remedial action is completed; however, after completion of the remedial action, the site would be cleaned up to levels supportive of unrestricted use. No long-term institutional controls would be required. Alternative 7U would facilitate unrestricted reuse of the property and provide additional flexibility in reuse options. Unrestricted use of the property could be achieved within 2 to 3 years.
7R	Excavation/Disposal (Restricted Land Use)	Under Alternative 7R, sites with contaminated soil and/or debris that constitute the principal threats would be excavated and then transported to an offbase landfill for disposal. Existing SVE systems would continue to operate in conjunction with the implementation of this alternative. Alternative 7R uses a higher set of cleanup levels (industrial use) as compared with Alternative 7U (residential use). Under Alternative 7R, the resulting land use is restricted. Long-term institutional controls in the form of deed restrictions and land use covenants would continue because of the residual levels of contaminants remaining at the site. Annual IC compliance inspections are a part of this remedy ensuring there are no breeches of the ICs and deed restrictions at the remediated sites. Alternative 7R is compatible with intended site reuse. Industrial/commercial use of the property could be achieved within 2 to 3 years.

TABLE 60
Comparative Analysis Summary for the Focused Strategic Sites*
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Criteria*	Alternative 1: No Action	Alternative 3: Composite Cap	Alternative 5: Excavation/Consolidation	Alternative 6R: Excavation/Ex Situ Treatment/Consolidation	Alternative 6U: Excavation/Ex Situ Treatment/Consolidation	Alternative 7R: Excavation/Disposal	Alternative 7U: Excavation/Disposal
	All Sites	All Sites Except CS 010 and SAFR	All Sites	All Sites	All Sites	All Sites	All Sites
		Restricted Land Use	Restricted Land Use	Restricted Land Use	Unrestricted Land Use	Restricted Land Use	Unrestricted Land Use
Protection of Human Health and Environment	No. Would not reduce risk to human health or the environment.	Essentially eliminates direct exposure to contamination, but contamination is left in place; therefore, some potential for direct contact and impacts to groundwater remains. Institutional controls are necessary to ensure protection.	Provides higher level of protection compared with Alternative 3 because contamination is removed and consolidated into an engineered facility; however, some risk remains at the consolidation facility.	Provides higher level of protection compared with Alternative 5 because contamination is removed, treated, and consolidated into an engineered facility; however, some risk remains at the site (because of residual contamination left in place) and at the consolidation facility.	Provides higher level of protection compared with Alternative 6R because contamination is removed to unrestricted use levels, and Alternative 5 because contamination is removed, treated, and consolidated into an engineered facility; however, some risk remains at the consolidation facility.	Provides higher level of protection compared with Alternative 6 because contamination is removed and transported to an engineered facility; however, some risk remains at the disposal facility and at the site that is excavated to industrial cleanup levels.	Provides highest level of protection because contamination is removed to unrestricted use levels and transported to an engineered facility; however, some risk remains at the disposal facility.
Compliance with ARARs	Does not comply with ARARs.	Compliant.	Compliant.	Compliant.	Compliant.	Compliant.	Compliant.
Long-term Effectiveness and Permanence	Does not provide long-term effectiveness or permanence.	Provides lower degree of long-term protectiveness and permanence; is dependent on proper maintenance of cap and institutional controls. SVE and vapor barriers provide very good long-term protectiveness and permanence with respect to shallow soil gas.	Provides higher degree of long-term protectiveness and permanence compared with Alternative 3; is dependent on proper maintenance of consolidation unit and institutional controls at site (residual contamination is left in place) and at consolidation unit. SVE provides very good long-term protectiveness and permanence with respect to shallow soil gas.	Provides higher degree of long-term protectiveness and permanence compared with Alternative 5 because soil is treated; is dependent on proper maintenance of consolidation unit and institutional controls at site (residual contamination is left in place) and at consolidation unit. SVE provides very good long-term protectiveness and permanence with respect to shallow soil gas.	Provides higher degree of long-term protectiveness and permanence compared with Alternative 5 because soil is treated (this is dependent on proper maintenance of consolidation unit) and higher degree of long-term protectiveness and permanence compared with Alternative 6R because contamination is removed to unrestricted levels. SVE provides very good long-term protectiveness and permanence with respect to shallow soil gas.	Provides higher degree of long-term protectiveness and permanence compared with Alternative 6; is dependent on institutional controls at the site because residual contamination is left in place. SVE provides very good long-term protectiveness and permanence with respect to shallow soil gas.	Provides highest degree of long-term protectiveness and permanence; is not dependent on institutional controls. SVE provides very good long-term protectiveness and permanence with respect to shallow soil gas.
Reduction in Toxicity, Mobility, and Volume	Would not actively reduce toxicity, mobility, or volume. Reduction by natural degradation processes only.	Mobility is reduced because the cap will minimize infiltration, but it will not be eliminated. SVE will reduce the toxicity, mobility, and volume of VOCs and some SVOCs.	Mobility is significantly reduced because contaminated material is placed into an engineered consolidation unit with cap, liner, and leachate collection. SVE will reduce the toxicity, mobility, and volume of VOCs and some SVOCs at the sites.	Mobility is significantly reduced because treated soil is placed into an engineered consolidation unit with cap, liner, and leachate collection. Treatment will also reduce the toxicity, mobility, and volume of some contaminants. SVE will reduce the toxicity, mobility, and volume of VOCs and some SVOCs at the sites.	Mobility is significantly reduced because treated soil is placed into an engineered consolidation unit with cap, liner, and leachate collection. Treatment will also reduce the toxicity, mobility, and volume of some contaminants. SVE will reduce the toxicity, mobility, and volume of VOCs and some SVOCs at the sites.	Mobility is significantly reduced at the sites because contaminants are physically removed, but volume and toxicity are not reduced except to the extent that treatment is required prior to land disposal.	Mobility is significantly reduced at the sites because contaminants are physically removed, but volume and toxicity are not reduced except to the extent that treatment is required prior to land disposal.
Short-term Effectiveness	Not applicable for no action.	Minimal (if any) disturbance of contaminated material. Cap could be constructed relatively rapidly, and institutional controls would provide immediate protection of human health and surface water.	Consolidation unit could be constructed relatively rapidly. Short-term risks during excavation, transport, and consolidation could be managed.	Consolidation unit could be constructed relatively rapidly. Short-term risks during excavation, transport, and consolidation could be managed. Ex situ treatment would create additional short-term risks that could be managed.	Consolidation unit could be constructed relatively rapidly. Short-term risks during excavation, transport, and consolidation could be managed. Ex situ treatment would create additional short-term risks that could be managed.	Excavation could be completed relatively rapidly. Short-term risks during excavation, loading, and transport could be managed.	Excavation could be completed relatively rapidly. Short-term risks during excavation, loading, and transport could be managed.

TABLE 60
Comparative Analysis Summary for the Focused Strategic Sites*
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Criteria*	Alternative 1: No Action	Alternative 3: Composite Cap	Alternative 5: Excavation/Consolidation	Alternative 6R: Excavation/Ex Situ Treatment/Consolidation	Alternative 6U: Excavation/Ex Situ Treatment/Consolidation	Alternative 7R: Excavation/Disposal	Alternative 7U: Excavation/Disposal
	All Sites	All Sites Except CS 010 and SAFR	All Sites	All Sites	All Sites	All Sites	All Sites
		Restricted Land Use	Restricted Land Use	Restricted Land Use	Unrestricted Land Use	Restricted Land Use	Unrestricted Land Use
Implementability (Technical)	Not applicable for no action.	Readily implementable; technical services and equipment are readily available to construct cap, vapor barriers, and expand SVE.	Readily implementable; technical services and equipment are readily available for excavation and to construct the consolidation unit and expand SVE.	Technical services and equipment are readily available for excavation and to construct the consolidation unit and SVE. Implementability of ex situ treatment is uncertain because of the heterogeneity of the waste; however, stabilization is a proven industry standard.	Technical services and equipment are readily available for excavation and to construct the consolidation unit and SVE. Implementability of ex situ treatment is uncertain because of the heterogeneity of the waste; however, stabilization is a proven industry standard.	Readily implementable; technical services and equipment are readily available for excavation and expansion of SVE.	Readily implementable; technical services and equipment are readily available for excavation and expansion of SVE.
Implementability (Administrative)	Not applicable for no action.	Implementable with coordination with regulatory agencies.	Implementable with coordination with regulatory agencies. Additionally, the State must waive the treatment standards under RCRA. Implementation of this alternative could facilitate remediation of subsequent Former McClellan AFB sites by accepting additional contaminated soil into the consolidation unit.	Implementable with coordination with regulatory agencies. Additionally, the State may need to approve an adjustment of the treatment standards under RCRA. Implementation of this alternative could facilitate remediation of subsequent Former McClellan AFB sites by accepting additional contaminated soil into the consolidation unit.	Implementable with coordination with regulatory agencies. Additionally, the State may need to approve an adjustment of the treatment standards under RCRA. Implementation of this alternative could facilitate remediation of subsequent Former McClellan AFB sites by accepting additional contaminated soil into the consolidation unit.	Disposal of some classes of contaminants (i.e., radionuclides with dioxins/furans) may not be possible.	Disposal of some classes of contaminants (i.e., radionuclides with dioxins/furans) may not be possible.
Cost	Not applicable for no action.	The cost for this alternative is the lowest. The site-specific costs for implementing this alternative are provided below.	The site-specific costs for implementing this alternative are provided below. Assumes soil from all 11 of the sites is consolidated within the consolidation unit. Site-specific costs associated with construction of the consolidation unit will increase as the total volume of consolidated soil decreases.	The site-specific costs for implementing this alternative are provided below. A moderate level of uncertainty is associated with these costs because it is unclear how much treatment will be required. Assumes soil from all 11 of the sites is consolidated within the consolidation unit. Site-specific costs associated with construction of the consolidation unit will increase as the total volume of consolidated soil decreases.	The site-specific costs for implementing this alternative are provided below. A moderate level of uncertainty is associated with these costs because it is unclear how much treatment will be required. Assumes soil from all 11 of the sites is consolidated within the consolidation unit. Site-specific costs associated with construction of the consolidation unit will increase as the total volume of consolidated soil decreases.	The site-specific costs for implementing this alternative are provided below. A high level of uncertainty is associated with these costs because the disposal costs for each class of contaminants vary significantly ($150 to $50,000 per cubic yard) and the actual mix of contaminants is unknown.	The site-specific costs for implementing this alternative are provided below. A high level of uncertainty is associated with these costs because the disposal costs for each class of contaminants vary significantly ($150 to $50,000 per cubic yard) and the actual mix of contaminants is unknown.
CS 010 (PW_{30})	$0	—	$4,092,000	$12,719,000	$13,991,000	$18,967,000	$18,804,000
CS 011 (PW_{30})	$0	$2,486,000	$9,405,000	$22,325,000	$24,559,000	$27,093,000	$26,931,000
CS 012 (PW_{30})	$0	$3,080,000	$13,924,000	$33,331,000	$36,664,000	$40,576,000	$40,414,000
CS 013 (PW_{30})	$0	$3,367,000	$21,067,000	$50,833,000	$55,916,000	$62,045,000	$62,883,000
CS 014 (PW_{30})	$0	$3,405,000	$17,399,000	$41,661,000	$45,827,000	$50,760,000	$50,597,000
CS 022 (PW_{30})	$0	$3,140,000	$10,748,000	$25,273,000	$27,800,000	$57,854,000	$57,691,000

TABLE 60
Comparative Analysis Summary for the Focused Strategic Sites*
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

	Alternative 1: No Action	**Alternative 3: Composite Cap**	**Alternative 5: Excavation/Consolidation**	**Alternative 6R: Excavation/Ex Situ Treatment/Consolidation**	**Alternative 6U: Excavation/Ex Situ Treatment/Consolidation**	**Alternative 7R: Excavation/Disposal**	**Alternative 7U: Excavation/Disposal**
	All Sites	**All Sites Except CS 010 and SAFR**	**All Sites**	**All Sites**	**All Sites**	**All Sites**	**All Sites**
Criteria*		**Restricted Land Use**	**Restricted Land Use**	**Restricted Land Use**	**Unrestricted Land Use**	**Restricted Land Use**	**Unrestricted Land Use**
CS 024 (PW_{30})	$0	$2,722,000	$8,831,000	$20,817,000	$22,899,000	$25,241,000	$25,705,000
AOC 313 (PW_{30})	$0	$1,888,000	$2,899,000	$6,519,000	$7,171,000	$7,737,000	$7,575,000
PRL 008 (PW_{30})	$0	$2,977,000	$11,752,000	$27,998,000	$80,798,000	$34,041,000	$33,878,000
SAFR (PW_{30})	$0	—	$1,667,000	$2,842,000	$3,126,000	$4,170,000	$5,278,000
VZ (PW_{30})	**$0**	**$3,056,000**	**$25,720,000**	**$59,618,000**	**$65,580,000**	**$110,392,000**	**$110,229,000**
Total	**$0**	**$26,121,000**	**$127,504,000**	**$303,936,000**	**$334,330,000**	**$438,876,000**	**$438,985,000**
State Acceptance	Not acceptable	Acceptable, with reservations	Acceptable, with reservations	Acceptable	Acceptable	Acceptable	Acceptable
Community Acceptance	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)	See Responsiveness Summary (Section 3)

*Please note that SVE is not a component of the remedies presented in this ROD, but SVE will continue to be addressed under the VOC ROD (AFRPA, 2007).

Note:

The costs presented in this table are from the 2006 Feasibility Study.

TABLE 61
Acceptance Criteria for Placement of FSS Soil into Consolidation Unit
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound[a]	Maximum Concentration	Site at Which Maximum Concentration Was Detected	Industrial Use Scenario: Non-carcinogenic HQ = 10 (mg/kg)	Industrial Use Scenario: Carcinogenic Risk (1×10^{-3}) (mg/kg)	Acceptance Screening Criteria (mg/kg)	Treatment Standard: 90 Percent Reduction	Treatment Standard: or 10 × UTS	Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment according to 22 CCR 66264.552
Radionuclides										
Radium 226[b]	7,084 pCi/g	CS 010	N/A	N/A	600 (pCi/g)	N/A	N/A	None[c]	None[c]	Technical impracticability[h]
Cesium 137[b]	0.39 pCi/g	CS 010	N/A	N/A	6 (pCi/g)	N/A	N/A	None[c]	None[c]	Technical impracticability[h]
Metals										
Lead[d]	153,827 mg/kg	CS 010	3,200[e]	–	3,200[e]	Variable[f]	7.5 mg/L	Stabilization	–	–
SVOCs										
Benzo(a)pyrene	0.66 mg/kg	CS 022	110,000	140	140	Variable[f]	34 mg/kg	None[g]	Stabilization	Long-term protection offered by consolidation unit[i]
1,4-Dichlorobenzene	130 mg/kg	CS 022	74,000	4,500	4,500	Variable[f]	60 mg/kg	None[g]	Stabilization	Long-term protection offered by consolidation unit[i]
Naphthalene	17 mg/kg	CS 022	1,800	5,100	1,800	Variable[f]	56 mg/kg	None[g]	Stabilization	Long-term protection offered by consolidation unit[i]
PCBs (total)	14.9 mg/kg	CS 022	75	530	75	Variable[f]	100 mg/kg	None[g]	Stabilization	Long-term protection offered by consolidation unit[i]
2,3,7,8-TCDD	0.0034 mg/kg	CS 022	0.076	0.016	0.016	Variable[f]	0.01 mg/kg	None[g]	Stabilization	Long-term protection offered by consolidation unit[i]
VOCs										
PCE	N/A[j]	–	1,269	1,021	1,021	Variable[f]	60 mg/kg	Ex situ SVE	–	–
TCE	N/A[j]	–	1,364	6,258	1,364	Variable[f]	60 mg/kg	Ex situ SVE	–	–

[a]This table includes only those compounds previously identified at the FSS sites to be consolidated and considered to be possible principal hazardous constituents; a complete list of compounds and treatment requirements is provided in Table 62).

[b]Radium 226 was a COC at two of the Focused Strategic Sites: CS 010 and CS 022. Cesium 137 is a COC at CS 010. Although radium 226 and Cesium 137 are not RCRA contaminants, these radionuclides were included here for completeness.

[c]There is no treatment technology available to reduce the toxicity of radium 226; therefore, treatment is impracticable and will not be performed pursuant to 22 CCR 66264.552 (e)(4)(E)(1).

[d]Lead is the only principal hazardous constituent currently identified, and it was only found at CS 010 and the SAFR at concentrations that exceeded the acceptance criteria.

[e]The value for lead is based on the State of California CHHSL of 320 mg/kg for industrial land use.

[f]The value for 90 percent reduction is dependent on the initial concentration of the constituent in the waste.

[g]Available primary treatment technologies for SVOCs consist of combustion; EPA does not believe that combustion technologies are capable of meeting the required treatment standards (Federal Register Vol. 67, No. 14; Tuesday, January 22, 2002; page 2985).

[h]According to 22 CCR 66264.552 (e)(4)(E)(1).

[i]According to 22 CCR 66264.552 (e)(4)(E)(5)(c).

[j]No data are currently available for VOCs in soil.

TABLE 62

Screening Levels for Soil Acceptance into Consolidation Unit

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound	Industrial Use Scenario		Acceptance Screening Criteria (mg/kg)	Treatment Standard			Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment per 22 CCR 66264.552
	Non-carcinogenic HQ=10 (mg/kg)	Carcinogenic Risk (1×10^{-3}) (mg/kg)		90% Reduction	or	10 × UTS			
Radionuclides									
Radium 226[a]	N/A	N/A	600 (pCi/g)	N/A		N/A	None[a]	None[a]	Technical impracticability[b]
Cesium 137[a]	N/A	N/A	6 (pCi/g)	N/A		N/A	None[a]	None[a]	Technical impracticability[b]
Metals									
Aluminum	> 100,000	--	> 100,000	Variable[c]		N/A	Stabilization	-	-
Antimony	3,700	--	3,700	Variable[c]		11.5 mg/L	Stabilization	-	-
Arsenic	2,300	1,400	1,400	Variable[c]		50 mg/L	Stabilization	-	-
Barium	> 100,000	--	> 100,000	Variable[c]		210 mg/L	Stabilization	-	-
Beryllium	18,000	> 100,000	18,000	Variable[c]		12.2 mg/L	Stabilization	-	-
Cadmium	10,000	> 100,000	10,000	Variable[c]		1.1 mg/L	Stabilization	-	-
Chromium, hexavalent	30,000	> 100,000	30,000	Variable[c]		N/A	Stabilization	-	-
Chromium, total	--	> 100,000	> 100,000	Variable[c]		6 mg/L	Stabilization	-	-
Cobalt	2,700	> 100,000	2,700	Variable[c]		N/A	Stabilization	-	-
Copper	370,000	--	370,000	Variable[c]		N/A	Stabilization	-	-
Cyanide	180,000	--	180,000	Variable[c]		5,900 mg/kg	Stabilization	-	-
Iron	> 100,000	--	> 100,000	Variable[c]		N/A	Stabilization	-	-
Lead	3,200[d]	--	3,200[d]	Variable[c]		7.5 mg/L	Stabilization	-	-
Manganese	220,000	--	220,000	Variable[c]		N/A	Stabilization	-	-
Mercury	1,500	--	1,500	Variable[c]		0.25 mg/L	Stabilization	-	-
Molybdenum	46,000	--	46,000	Variable[c]		N/A	Stabilization	-	-
Nickel	180,000	> 100,000	180,000	Variable[c]		110 mg/L	Stabilization	-	-
Selenium	46,000	--	46,000	Variable[c]		57 mg/L	Stabilization	-	-
Silver	46,000	--	46,000	Variable[c]		1.4 mg/L	Stabilization	-	-
Thallium	610	--	610	Variable[c]		2 mg/L	Stabilization	-	-
Vanadium	46,000	--	46,000	Variable[c]		16 mg/L	Stabilization	-	-
Zinc	> 100,000	--	> 100,000	Variable[c]		43 mg/L	Stabilization	-	-
SVOCs									
Acenapthene	160,000	--	160,000	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Aldrin	200	110	110	Variable[c]		0.66 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Anthracene	1,000,000	--	1,000,000	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzo(a)anthracene	110,000	880	880	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzo(a)pyrene	110,000	140	140	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzo(b)fluoranthene	110,000	880	880	Variable[c]		68 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]

TABLE 62

Screening Levels for Soil Acceptance into Consolidation Unit

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound	Industrial Use Scenario		Acceptance Screening Criteria (mg/kg)	Treatment Standard			Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment per 22 CCR 66264.552
	Non-carcinogenic HQ=10 (mg/kg)	Carcinogenic Risk (1×10^{-3}) (mg/kg)		90% Reduction	or	10 × UTS			
Benzo(g,h,i)perylene	110,000	--	110,000	Variable[c]		18 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzo(k)fluoranthene	110,000	880	880	Variable[c]		68 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzoic acid	> 100,000	--	> 100,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Benzyl alcohol	> 100,000	--	> 100,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
BHC, beta	--	1,000	1,000	Variable[c]		0.66 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
BHC, gamma	2,000	1,740	1,740	Variable[c]		0.66 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
bis (2-ethylhexyl)phthalate (DEHP)	96,000	96,000	96,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Bisphenol-A	240,000	--	240,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Butylbenzylphthalate (BBP)	960,000	700,000	700,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Chlordane	3,300	5,200	3,300	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Chlordane, alpha	3,300	5,200	3,300	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Chlordane, gamma	3,300	5,200	3,300	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
4-Chloroaniline	19,000	--	19,000	Variable[c]		160 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Chrysene	110,000	8,700	8,700	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
DDD	3,300	7,600	3,300	Variable[c]		0.87 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
DDE	3,300	5,400	3,300	Variable[c]		0.87 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
DDT	3,300	5,400	3,300	Variable[c]		0.87 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Dibenzo(a,h)anthracene	110,000	260	260	Variable[c]		82 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
1,2-Dichlorobenzene	39,000	--	39,000	Variable[c]		60 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
1,3-Dichlorobenzene	19,000	--	19,000	Variable[c]		60 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
1,4-Dichlorobenzene	74,000	4,500	4,500	Variable[c]		60 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Dieldrin	330	110	110	Variable[c]		1.3 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Diethylphthalate (DEPH)	> 100,000	--	> 100,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2,4-Dimethylphenol	96,000	--	96,000	Variable[c]		140 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Dimethylphthalate (DMPH)	> 100,000	--	> 100,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Di-n-butylphthalate (DNBP)	480,000	--	480,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2,4-Dinitrotoluene	9,600	4,300	4,300	Variable[c]		1,400 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2,6-Dinitrotoluene	4,800	2,000	2,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Di-n-octylphthalate	190,000	--	190,000	Variable[c]		280 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
1,4-Dioxane	> 100,000	120,000	120,000	Variable[c]		1,700 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Endosulfan	39,000	--	39,000	Variable[c]		0.66 mg/kg[h]	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Endosulfan sulfate	39,000	--	39,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Endrin	2,000	--	2,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]

TABLE 62

Screening Levels for Soil Acceptance into Consolidation Unit

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound	Industrial Use Scenario		Acceptance Screening Criteria (mg/kg)	Treatment Standard			Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment per 22 CCR 66264.552
	Non-carcinogenic HQ=10 (mg/kg)	Carcinogenic Risk (1×10^{-3}) (mg/kg)		90% Reduction	or	10 × UTS			
Endrin aldehyde	2,000	--	2,000	Variable[c]		1.3 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Fluoranthene	150,000	--	150,000	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Fluorene	130,000	--	130,000	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Heptachlor	3,300	410	410	Variable[c]		0.66 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Hexachloroethane	4,800	96,000	4,800	Variable[c]		300 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Indeno(1,2,3-cd)pyrene	110,000	880	880	Variable[c]		34 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Isophorone	960,000	> 100,000	960,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2-Methylnaphthalene	1,700	--	1,700	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2-Methylphenol	240,000	--	240,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
4-Methylphenol	24,000	--	24,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Naphthalene	1,800	5,100	1,800	Variable[c]		56 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
4-Nitrophenol	--	--	--	Variable[c]		290 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
N-nitroso-di-n-propylamine	--	190	190	Variable[c]		140 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
N-nitrosodiphenylamine (NNSPH)	96,000	270,000	96,000	Variable[c]		130 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
PCBs (total)	75	530	75	Variable[c]		100 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Pentachlorophenol	80,000	6,200	6,200	Variable[c]		74 m/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Phenanthrene	> 100,000	--	> 100,000	Variable[c]		N/A	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Phenol	> 100,000	--	> 100,000	Variable[c]		62 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
Pyrene	110,000	--	110,000	Variable[c]		82 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2,3,7,8-TCDD	0	0	0	Variable[c]		0.01 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
1,2,4-Trichlorobenzene	2,400	370,000	2,400	Variable[c]		190 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
2,4,5-Trichlorophenol	480,000	--	480,000	Variable[c]		74 mg/kg	None[e]	None[f]	Long-term protection offered by consolidation unit[g]
VOCs									
1,1,1-Trichloroethane	158,931	--	158,931	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,1,2,2-Tetrachloroethane	2,505	865	865	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	685,791	--	685,791	Variable[c]		300 mg/kg	Ex situ SVE	-	-
1,1,2-Trichloroethane	1,240	1,549	1,240	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,1-Dichloroethane	955,140	5,928	5,928	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,1-Dichloroethene	4,095	--	4,095	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,2-Dibromo-3-chloropropane (DBCP)	118	31	31	Variable[c]		150 mg/kg	Ex situ SVE	-	-
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)	685,791	--	685,791	Variable[c]		N/A	Ex situ SVE	-	-
1,2-Dichloroethane	18,441	591	591	Variable[c]		60 mg/kg	Ex situ SVE	-	-
1,2-Dichloropropane	202	1,374	202	Variable[c]		180 mg/kg	Ex situ SVE	-	-

TABLE 62

Screening Levels for Soil Acceptance into Consolidation Unit

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound	Industrial Use Scenario		Acceptance Screening Criteria (mg/kg)	Treatment Standard			Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment per 22 CCR 66264.552
	Non-carcinogenic HQ=10 (mg/kg)	Carcinogenic Risk (1×10^{-3}) (mg/kg)		90% Reduction	or	10 × UTS			
1,3-Butadiene	28	95	28	Variable[c]		N/A	Ex situ SVE	-	-
2-Chlorotoluene	5,430	--	5,430	Variable[c]		N/A	Ex situ SVE	-	-
Acetone	508,971	--	508,971	Variable[c]		1,600 mg/kg	Ex situ SVE	-	-
Allyl chloride (3-chloropropene)	1,364	63,676	1,364	Variable[c]		300 mg/kg	Ex situ SVE	-	-
Benzene	1,130	1,353	1,130	Variable[c]		100 mg/kg	Ex situ SVE	-	-
Bromodichloromethane	7,756	872	872	Variable[c]		150 mg/kg	Ex situ SVE	-	-
Bromoform	13,962	44,004	13,962	Variable[c]		150 mg/kg	Ex situ SVE	-	-
Bromomethane	129	--	129	Variable[c]		150 mg/kg	Ex situ SVE	-	-
Carbon tetrachloride	887	534	534	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Chlorobenzene	4,371	--	4,371	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Chlorodifluoromethane	747,432	--	747,432	Variable[c]		N/A	Ex situ SVE	-	-
Chloroethane	175,444	6,437	6,437	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Chloromethane	1,547	2,610	1,547	Variable[c]		300 mg/kg	Ex situ SVE	-	-
Chlororform	9,366	465	465	Variable[c]		60 mg/kg	Ex situ SVE	-	-
cis-1,2-Dichloroethene	1,440	--	1,440	Variable[c]		N/A	Ex situ SVE	-	-
cis-1,3-Dichloropropene	535	1,649	535	Variable[c]		N/A	Ex situ SVE	-	-
Cyclohexane	94,445	--	94,445	Variable[c]		N/A	Ex situ SVE	-	-
Dichlorodifluoromethane (Freon® 12)	3,075	--	3,075	Variable[c]		72 mg/kg	Ex situ SVE	-	-
Ethylbenzene	67,689	8,271	8,271	Variable[c]		100 mg/kg	Ex situ SVE	-	-
Ethylene dibromide (1,2-dibromomethane)	1,398	67	67	Variable[c]		150 mg/kg	Ex situ SVE	-	-
Heptane	14,308	--	14,308	Variable[c]		N/A	Ex situ SVE	-	-
Hexachlorobutadiene	4,776	17,143	4,776	Variable[c]		56 mg/kg	Ex situ SVE	-	-
Hexane	13,628	--	13,628	Variable[c]		N/A	Ex situ SVE	-	-
Isopropylbenzene	20,553	--	20,553	Variable[c]		N/A	Ex situ SVE	-	-
m,p-Xylene	8,834	--	8,834	Variable[c]		N/A[i]	Ex situ SVE	-	-
Methyl ethyl ketone (2-butanone)	935,236	--	935,236	Variable[c]		360 mg/kg	Ex situ SVE	-	-
Methyl isobutyl ketone (4-methyl 2-pentanone)	283,221	--	283,221	Variable[c]		330 mg/kg	Ex situ SVE	-	-
Methyl tert-butyl ether (MTBE)	195,621	67,098	67,098	Variable[c]		N/A	Ex situ SVE	-	-
Methylcyclohexane	86,185	--	86,185	Variable[c]		N/A	Ex situ SVE	-	-
Methylene chloride	13,861	19,340	13,861	Variable[c]		300 mg/kg	Ex situ SVE	-	-
n-Butylbenzene	20,116	--	20,116	Variable[c]		N/A	Ex situ SVE	-	-
n-Propylbenzene	20,116	--	20,116	Variable[c]		N/A	Ex situ SVE	-	-
o-Xylene (1,2-dimethyl benzene)	8,834	--	8,834	Variable[c]		N/A[i]	Ex situ SVE	-	-

TABLE 62

Screening Levels for Soil Acceptance into Consolidation Unit

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Compound	Industrial Use Scenario		Acceptance Screening Criteria (mg/kg)	Treatment Standard			Primary Treatment Method	Secondary Treatment Method	Adjustment Factor for Treatment per 22 CCR 66264.552
	Non-carcinogenic HQ=10 (mg/kg)	Carcinogenic Risk (1×10^{-3}) (mg/kg)		90% Reduction	or	10 × UTS			
sec-Butylbenzene	16,289	--	16,289	Variable[c]		N/A	Ex situ SVE	-	-
Styrene	162,570	--	162,570	Variable[c]		N/A	Ex situ SVE	-	-
Tetrachloroethene (PCE)	1,269	1,021	1,021	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Toluene	165,114	--	165,114	Variable[c]		100 mg/kg	Ex situ SVE	-	-
trans-1,2-Dichloroethene	1,994	--	1,994	Variable[c]		300 mg/kg	Ex situ SVE	-	-
trans-1,3-Dichloropropene	535	1,649	535	Variable[c]		N/A	Ex situ SVE	-	-
Trichloroethene (TCE)	1,364	6,258	1,364	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Trichlorofluoromethane (Freon® 11)	12,700	--	12,700	Variable[c]		300 mg/kg	Ex situ SVE	-	-
Vinyl chloride	1,371	311	311	Variable[c]		60 mg/kg	Ex situ SVE	-	-
Xylenes, total	8,834	--	8,834	Variable[c]		300 mg/kg	Ex situ SVE	-	-

[a] There is no treatment technology available to reduce the toxicity of radium 226 and cesium 137; therefore, treatment is impracticable and will not be performed pursuant to 22 CCR 66264.552 (e)(4)(E)(1).

[b] Per 22 CCR 66264.552 (e)(4)(E)(1).

[c] The value for 90 percent reduction is dependent on the initial concentration of the constituent in the waste.

[d] The value for lead is based on the State of California CHHSL of 320 mg/kg for industrial land use.

[e] Available primary treatment technologies for SVOCs consist of combustion; the EPA does not believe that combustion technologies are capable of meeting the required treament standards (Federal Register Vol. 67, No. 14 ; Tuesday, January 22, 2002; page 2985).

[f] Stabilization is the secondary treatment technology for SVOCs. Stabilization does not reduce the concentration of contaminants, only the mobility. Because SVOCs have low mobility and soil will be placed in a RCRA Subtitle C facility, stabilization does not significantly increase protectiveness.

[g] Per 22 CCR 66264.552 (e)(4)(E)(5)(c).

[h] The UTS value for Endosulfan II was used.

[I] These compounds are addressed under Total Xylenes.

TABLE 63

Acceptance Criteria for Cap Foundation Material

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Soil Concentration Protective of Groundwater (mg/kg)	Title 22 Limit for Hazardous Waste TTLC (mkg/kg)	Acceptance Criteria for Cap Foundation Material (mg/kg)[d]
Metals[a]					
Aluminum	2.0E+02	Secondary MCL	8.4E+04		8.4E+04
Antimony	6.0E+00	Primary MCL	6.0E+02	5.0E+02	5.0E+02
Arsenic	2.3E-02	Cal/EPA Cancer Potency Factor	9.9E+02	5.0E+02	5.0E+02
Barium	4.9E+02	EPA IRIS RfD	7.8E+03	1.0E+04	7.8E+03
Beryllium	4.0E+00	Primary MCL	3.6E+02	7.5E+01	7.5E+01
Cadmium	7.0E-02	Public Health Goal	1.4E+03	1.0E+02	1.0E+02
Chromium, total	5.0E+01	Primary MCL	8.1E+04	5.0E+02	5.0E+02
Chromium, hexavalent	2.1E+01	EPA IRIS RfD	2.1E+02		2.1E+02
Cobalt	5.0E+01	Agricultural Use	4.7E+04	8.0E+03	8.0E+03
Copper	1.7E+02	Public Health Goal	2.5E+05	2.5E+03	2.5E+03
Iron	3.0E+02	Secondary MCL	1.3E+05		1.3E+05
Lead	2.0E+00	Public Health Goal	4.3E+03	3.5E+02	3.5E+02
Manganese	5.0E+01	Secondary MCL	1.1E+05		1.1E+05
Mercury	1.2E+00	Public Health Goal	1.2E+02	2.0E+01	2.0E+01
Molybdenum	1.0E+01	Agricultural Use	1.0E+03	3.5E+03	1.0E+03
Nickel	1.2E+01	Public Health Goal	9.5E+03	2.0E+03	2.0E+03
Perchlorate	4.0E-03	California Action Level	4.0E+01		4.0E+01
Selenium	2.0E+01	Agricultural Use	2.0E+03	1.0E+02	1.0E+02
Silver	3.5E+01	EPA IRIS RfD	3.5E+03	5.0E+02	5.0E+02
Thallium	1.0E-01	Public Health Goal	1.4E+02	7.0E+02	1.4E+02
Vanadium	5.0E+01	DHS Action Level	1.3E+04	2.4E+03	2.4E+03
Zinc	2.0E+03	Agricultural Use and EPA Health Advisory A	1.4E+05	5.0E+03	5.0E+03

TABLE 63

Acceptance Criteria for Cap Foundation Material

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Soil Concentration Protective of Groundwater (mg/kg)	Title 22 Limit for Hazardous Waste TTLC (mkg/kg)	Acceptance Criteria for Cap Foundation Material (mg/kg)[d]
SVOCs[b]					
Acenaphthene	2.0E+01	Taste and Odor	2.9E+04		2.9E+04
Acenaphthylene	NA	NA	2.0E+00		2.0E+00
Aldrin	2.1E-03	Cal/EPA cancer potency factor	1.1E-01	1.4E+00	1.1E-01
Anthracene	2.1E+03	EPA RfD	2.4E+05		2.4E+05
Benzo(a)anthracene	4.0E-02	Cal/EPA cancer potency factor	2.1E+01		2.1E+01
Benzo(a)pyrene	4.0E-03	Public Health Goal	3.7E+01		3.7E+01
Benzo(b)fluoranthene	4.0E-02	Cal/EPA cancer potency factor	4.0E+01		4.0E+01
Benzo(g,h,i)perylene	NA	NA	2.9E+04		2.9E+04
Benzo(k)fluoranthene	4.0E-02	Cal/EPA cancer potency factor	2.1E+01		2.1E+01
Benzoic Acid	2.8E+04	EPA RfD	2.5E+06		2.5E+06
Benzyl Alcohol	NA	NA	2.4E+05		2.4E+05
BHC, beta	2.5E-02	DHS Action Level	1.3E+00		1.3E+00
BHC, delta	NA	NA	2.0E+02		2.0E+02
BHC, gamma (lindane)	3.2E-02	Public Health Goal	1.7E+00	4.0E+00	1.7E+00
Bis(2-chloroethyl)ether	1.4E-02	Cal/EPA cancer potency factor	4.6E-01		4.6E-01
Bis(2-ethylhexyl)phthalate (DEHP)	4.0E+00	California MCL	2.5E+02		2.5E+02
Bisphenol-A	3.5E+02	EPA RfD	3.1E+04		3.1E+04
Butylbenzylphthalate (BBP)	1.4E+02	California MCL	1.2E+05		1.2E+05
Chlordane	3.0E-02	Public Health Goal	6.5E+00	2.5E+00	2.5E+00
Chlordane, alpha	3.0E-02	Public Health Goal	6.5E+00		6.5E+00
Chlordane, gamma	3.0E-02	Public Health Goal	6.5E+00		6.5E+00
4-Chloroaniline	2.8E+01	EPA RfD	1.9E+03		1.9E+03

TABLE 63

Acceptance Criteria for Cap Foundation Material

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Soil Concentration Protective of Groundwater (mg/kg)	Title 22 Limit for Hazardous Waste TTLC (mkg/kg)	Acceptance Criteria for Cap Foundation Material (mg/kg)[d]
Chrysene	4.0E-01	Cal/EPA cancer potency factor	2.1E+02		2.1E+02
DDD	1.5E-01	Cal/EPA cancer potency factor	1.0E+01	1.0E+00	1.0E+00
DDE	1.0E-01	Cal/EPA cancer potency factor	7.0E+00	1.0E+00	1.0E+00
DDT	1.0E-01	Cal/EPA cancer potency factor	7.0E+00	1.0E+00	1.0E+00
Dibenzo(a,h)anthracene	8.5E-03	Cal/EPA cancer potency factor	7.9E+00		7.9E+00
Dibenzofuran	NA	NA	1.2E+00		1.2E+00
1,2-Dichlorobenzene	2.4E+01	Taste and Odor	4.1E+03		4.1E+03
1,3-Dichlorobenzene	6.0E+02	DHS Action Level	2.1E+03		2.1E+03
1,4-Dichlorobenzene	5.0E+00	California MCL	5.2E+02		5.2E+02
Dieldrin	2.2E-03	Cal/EPA cancer potency factor	8.4E-01	8.0E+00	8.4E-01
Diethylphthalate (DEPH)	5.6E+03	EPA RfD	4.9E+05		4.9E+05
2,4-Dimethylphenol	1.0E+02	DHS action level	1.2E+04		1.2E+04
Dimethylphthalate (DMPH)	NA	NA	6.2E+06		6.2E+06
Di-n-butylphthalate (DNBP)	7.0E+02	EPA RfD	6.2E+04		6.2E+04
2,4-Dinitrotoluene	1.1E-01	Cal/EPA cancer potency factor	4.3E+00		4.3E+00
2,6-Dinitrotoluene	5.0E-02	EPA Cancer potency factor	2.5E+00		2.5E+00
Di-n-octylphthalate	NA	NA	2.5E+04		2.5E+04
1,4-Dioxane	1.3E+00	Region 9 Tap Water PRG	1.5E-03		1.5E-03
Endosulfan	4.2E+01	EPA RfD	3.7E+03		3.7E+03
Endosulfan Sulfate	NA	NA	3.9E+03		3.9E+03
Endrin	1.8E+00	Public Health Goal	2.0E+02	2.0E-01	2.0E-01
Endrin aldehyde	1.8E+00	Public Health Goal	2.0E+02		2.0E+02
Fluoranthene	2.8E+02	EPA RfD	2.2E+04		2.2E+04

TABLE 63

Acceptance Criteria for Cap Foundation Material

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Soil Concentration Protective of Groundwater (mg/kg)	Title 22 Limit for Hazardous Waste TTLC (mkg/kg)	Acceptance Criteria for Cap Foundation Material (mg/kg)[d]
Fluorene	2.8E+02	EPA RfD	2.6E+04		2.6E+04
Heptachlor	8.0E-03	Public Health Goal	4.1E-01	4.7E+00	4.1E-01
Heptachlor epoxide	6.0E-03	Public Health Goal	2.0E-01		2.0E-01
Hexachloroethane	7.0E-01	EPA RfD	1.2E+02		1.2E+02
Indeno(1,2,3-c,d)pyrene	4.0E-02	Public Health Goal	2.2E+01		2.2E+01
Isophorone	1.4E+02	EPA RfD	1.4E+03		1.4E+03
Methoxychlor	3.0E+01	California MCL	2.4E+03	1.0E+02	1.0E+02
1-Methylnaphthalene	NA	NA	2.1E+02		2.1E+02
2-Methylnaphthalene	NA	NA	3.3E+02		3.3E+02
2-Methylphenol	3.5E+01	EPA RfD	3.1E+04		3.1E+04
4-Methylphenol	NA	NA	3.1E+03		3.1E+03
Naphthalene	2.1E+01	Taste and Odor	1.1E+03		1.1E+03
Nitrobenzene	3.5E+00	EPA RfD	1.6E+00		1.6E+00
2-Nitrophenol	NA	NA	6.3E-01		6.3E-01
4-Nitrophenol	NA	NA	1.3E+01		1.3E+01
N-nitroso-di-n-propylamine	5.0E-03	EPA RfD	3.4E+00		3.4E+00
N-nitrosodinphenylamine (NNSPH)	3.9E+00	Cal/EPA cancer potency factor	3.5E+02		3.5E+02
PCB	7.0E-03	Cal/EPA cancer potency factor	1.5E+02	5.0E+01	5.0E+01
Pentachlorophenol	4.0E-01	Public Health Goal	1.3E+01	1.7E+01	1.3E+01
Phenanthrene	NA	NA	1.1E+05		1.1E+05
Phenol	2.1E+03	EPA RfD	1.8E+05		1.8E+05
Pyrene	2.1E+02	EPA RfD	2.9E+04		2.9E+04
2,3,7,8-TCDD	2.7E-07	Cal/EPA cancer potency factor	3.4E-03	1.0E-02	3.4E-03

TABLE 63

Acceptance Criteria for Cap Foundation Material

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Soil Concentration Protective of Groundwater (mg/kg)	Title 22 Limit for Hazardous Waste TTLC (mkg/kg)	Acceptance Criteria for Cap Foundation Material (mg/kg)[d]
1,2,4-Trichlorobenzene	5.0E+00	California MCL	2.4E+02		2.4E+02
2,4,5-Trichlorophenol	7.0E+02	EPA RfD	6.2E+04		6.2E+04
TPH[c]					
TPH-D	1.0E+02	Taste and Odor	3.9E+03		3.9E+03
TPH-G	5.0E+00	Taste and Odor	2.2E+02		2.2E+02

[a] Soil concentrations protective of groundwater for metals are based on the DLM. The value presented for each metal is the greater of the TDL calculated using the limiting WQL and the TDL calculated using the background concentration in groundwater.

[b] Soil concentrations protective of groundwater for SVOCs are based on a screening-level evaluation performed using vadose zone and groundwater mixing cell models to determine the impacts to groundwater resulting from SVOCs in soil. The greater of the industrial use screening level or the maximum reported concentration of each SVOC detected in surface, shallow, or deep soil at McClellan sites (including FSS, SVS, FOSS, IP #3, and Skeet Range) was used for the evaluation.

[c] Soil concentrations protective of groundwater for TPH are based on the DLM. The values presented are the TDLs calculated using the limiting WQL.

[d] Acceptance criteria for cap foundation material are the lesser of the soil concentrations protective of groundwater and the Title 22 limits for hazardous waste (TTLC) as available. To be used as cap foundation material, concentrations of individual analytes in the soil should be **less than** the specified acceptance criteria.

TABLE 64
Selected Remedy Costs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Description	Quantity	Unit	Unit Cost	Total Cost	PW_{30} Cost
Alternative 3 (Composite Cap) for CS 011, CS 012, CS 013, CS 014, AOC 313, PRL 008, and Vadose Zone					
Capital Costs					
1 Institutional Controls (Year 0)	7	Site	$1,000	$7,000	$7,000
2 Remedial Design Sampling (Year 1)					
Work Plan	246	Boring	$500	$123,000	$119,000
Angle Borings	49	Boring	$1,956	$96,000	$93,000
Shallow Borings	197	Boring	$784	$154,000	$149,000
Sample Analyses	1,131	Sample	$2,210	$2,500,000	$2,425,000
Final Report	246	Boring	$500	$123,000	$119,000
3 Engineered Cap and Engineered Controls (Year 2)					
Earthwork	11.33	Acre	$109,000	$1,235,000	$1,162,000
Final Cover System	11.33	Acre	$163,000	$1,847,000	$1,738,000
Drainage Control Facilities	11.33	Acre	$78,100	$885,000	$833,000
Landfill Gas Controls - Passive Venting System	11.33	Acre	$21,200	$240,000	$226,000
Revegetation	11.33	Acre	$4,500	$51,000	$48,000
Mobilization and Demobilization	1	LS	$212,900	$213,000	$200,000
Engineering/Construction Oversight	1	LS	$638,700	$639,000	$601,000
Contingency	1	LS	$638,700	$639,000	$601,000
Offsite Disposal	4,486	Ton	$155	$695,000	$654,000
Fencing	9,526	LF	$31	$300,000	$282,000
Vapor Barrier	7	Site	$54,926	$384,000	$361,000
4 Vapor Well Installation (Year 2)					
Monitoring Well Installation	15	Well	$2,767	$41,000	$39,000
Extraction Well Installation	6	Well	$4,767	$29,000	$27,000
5 Groundwater Monitoring Well Installation (Year 2)					
Monitoring Well Installation	12	Well	$7,520	$90,000	$85,000
6 Reports					
Work Plan	7	Site	$50,000	$350,000	$350,000
RACR	7	Site	$25,000	$175,000	$175,000
Total Capital Cost				$10,816,000	$10,294,000
Annual Costs					
1 Institutional Controls	30	Year	$27,300	$819,000	$539,000
2 Engineered Cap O&M					
Inspections and Maintenance	29	Year	$350,000	$10,150,000	$6,632,000
Repair/Replacement Cost	29	Year	$114,980	$3,334,000	$2,179,000
3 Groundwater Monitoring	30	Year	$63,960	$1,919,000	$1,262,000
Total Annual O&M Cost			$556,240	$16,222,000	$10,612,000
Total Cost				**$27,038,000**	**$20,906,000**

TABLE 64
Selected Remedy Costs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Description	Quantity	Unit	Unit Cost	Total Cost	PW_{30} Cost
Alternative 6R/6U (Excavation/Treatment as Needed/Consolidation Unit) for CS 010, CS 024, and SAFR					
Capital Costs					
1 Institutional Controls (Year 0)	3	Site	$1,000	$3,000	$3,000
2 Remedial Design Sampling (Year 1)					
Work Plan	22	Boring	$500	$11,000	$11,000
Angle Borings	4	Boring	$1,956	$8,000	$8,000
Shallow Borings	18	Boring	$784	$14,000	$14,000
Sample Analyses	100	Sample	$2,210	$221,000	$214,000
Final Report	22	Boring	$500	$11,000	$11,000
3 Excavation and Backfill (Year 2)	78,230	CY	$140	$10,958,000	$10,309,000
4 Consolidation Unit (Year 1)					
Earthwork	83,119	CY	$9.16	$761,000	$738,000
Containment System	83,119	CY	$4.48	$372,000	$361,000
Final Cover System	83,119	CY	$3.67	$305,000	$296,000
Drainage Control Facilities	83,119	CY	$1.02	$85,000	$82,000
Landfill Gas Controls - Passive Venting System	83,119	CY	$0.37	$31,000	$30,000
Revegetation	83,119	CY	$0.11	$9,000	$9,000
Mobilization and Demobilization	1	LS	$78,150	$78,000	$76,000
Engineering/Construction Oversight	1	LS	$234,450	$234,000	$227,000
Contingency	1	LS	$234,450	$234,000	$227,000
Offsite Disposal	1,911	Ton	$155	$296,000	$287,000
4 Treatment - Solidification/Stabilization (Year 2)	32,964	Ton	$61	$2,015,000	$1,896,000
5 Vapor Well Installation (Year 2)					
Monitoring Well Installation	2	Well	$2,767	$6,000	$6,000
Extraction Well Installation	1	Well	$4,767	$5,000	$5,000
6 Groundwater Monitoring Well Installation (Year 2)					
Monitoring Well Installation	4	Well	$7,520	$30,000	$28,000
7 Reports					
Work Plan	3	Site	$50,000	$150,000	$150,000
RACR	3	Site	$25,000	$75,000	$75,000
Total Capital Cost				$15,912,000	$15,063,000
Annual Costs					
1 Institutional Controls	30	Year	$11,700	$351,000	$231,000
2 Consolidation Unit O&M	30	Year	$169,000	$5,070,000	$3,270,000
3 Groundwater Monitoring	30	Year	$24,600	$738,000	$486,000
Total Annual O&M Cost			$205,300	$6,159,000	$3,987,000
Total Cost				**$22,071,000**	**$19,050,000**

TABLE 64
Selected Remedy Costs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Description	Quantity	Unit	Unit Cost	Total Cost	PW_{30} Cost
Modified Alternative 3 (Partial Excavation and Consolidation Unit, Composite Cap) for CS 022					
Capital Costs					
1 Institutional Controls (Year 0)	1	Site	$1,000	$1,000	$1,000
2 Remedial Design Sampling (Year 1)					
Work Plan	28	Boring	$500	$14,000	$14,000
Angle Borings	4	Boring	$1,956	$8,000	$8,000
Shallow Borings	24	Boring	$784	$19,000	$18,000
Sample Analyses	124	Sample	$2,210	$274,000	$266,000
Final Report	28	Boring	$500	$14,000	$14,000
3 Excavation and Backfill (Year 2)					
Excavation	22,780	CY	$146	$3,319,000	$3,122,000
Backfill	11,230	CY	$37	$415,500	$391,000
4 Engineered Cap and Engineered Controls (Year 2)					
Earthwork	1.1	Acre	$109,000	$119,000	$112,000
Final Cover System	1.1	Acre	$163,000	$178,000	$167,000
Drainage Control Facilities	1.1	Acre	$78,100	$85,000	$80,000
Landfill Gas Controls - Passive Venting System	1.1	Acre	$21,200	$23,000	$22,000
Revegetation	1.1	Acre	$4,500	$5,000	$5,000
Mobilization and Demobilization	1	LS	$20,500	$21,000	$20,000
Engineering/Construction Oversight	1	LS	$61,500	$62,000	$58,000
Contingency	1	LS	$61,500	$62,000	$58,000
Offsite Disposal	1,089	Ton	$155	$169,000	$159,000
Fencing	2,057	LF	$31	$65,000	$61,000
Vapor Barrier	1	Site	$54,926	$55,000	$52,000
5 Consolidation Unit (Year 1)					
Earthwork	24,204	CY	$9.16	$222,000	$215,000
Containment System	24,204	CY	$4.48	$108,000	$105,000
Final Cover System	24,204	CY	$3.67	$89,000	$86,000
Drainage Control Facilities	24,204	CY	$1.02	$25,000	$24,000
Landfill Gas Controls (Passive Venting System)	24,204	CY	$0.37	$9,000	$9,000
Revegetation	24,204	CY	$0.11	$3,000	$3,000
Mobilization and Demobilization	1	LS	$22,800	$23,000	$22,000
Engineering/Construction Oversight	1	LS	$68,400	$68,000	$66,000
Contingency	1	LS	$68,400	$68,000	$66,000
6 Treatment - Solidification/Stabilization (Year 2)	9,610	Ton	$61	$587,000	$552,000
7 Vapor Well Installation (Year 2)					
Monitoring Well Installation	2	Well	$2,767	$6,000	$6,000
Extraction Well Installation	1	Well	$4,767	$5,000	$5,000
8 Groundwater Monitoring Well Installation (Year 2)					
Monitoring Well Installation	4	Well	$7,520	$30,000	$28,000
9 Reports					
Work Plan	1	Site	$50,000	$50,000	$50,000
RACR	1	Site	$25,000	$25,000	$25,000
Total Capital Cost				$6,226,500	$5,890,000
Annual Costs					
1 Institutional Controls	30	Year	$3,900	$117,000	$77,000
2 Engineered Cap O&M					
Inspections and Maintenance	29	Year	$50,000	$1,450,000	$947,000
Repair/Replacement Cost	29	Year	$11,100	$322,000	$210,000
3 Consolidation Unit O&M	30	Year	$47,000	$1,410,000	$909,000
4 Groundwater Monitoring	30	Year	$14,760	$443,000	$291,000
Total Annual O&M Cost			$126,760	$3,742,000	$2,434,000
Total Cost				**$9,968,500**	**$8,324,000**
Total Cost for Selected Remedies				**$59,077,500**	**$48,280,000**

Note: A discount rate of 3.1 was used for the cost calculations. This discount rate was taken from Appendix C of the Office of Management and Budget Circular A-94 (January 2005) for real discount rates over a 30-year period.

Figures

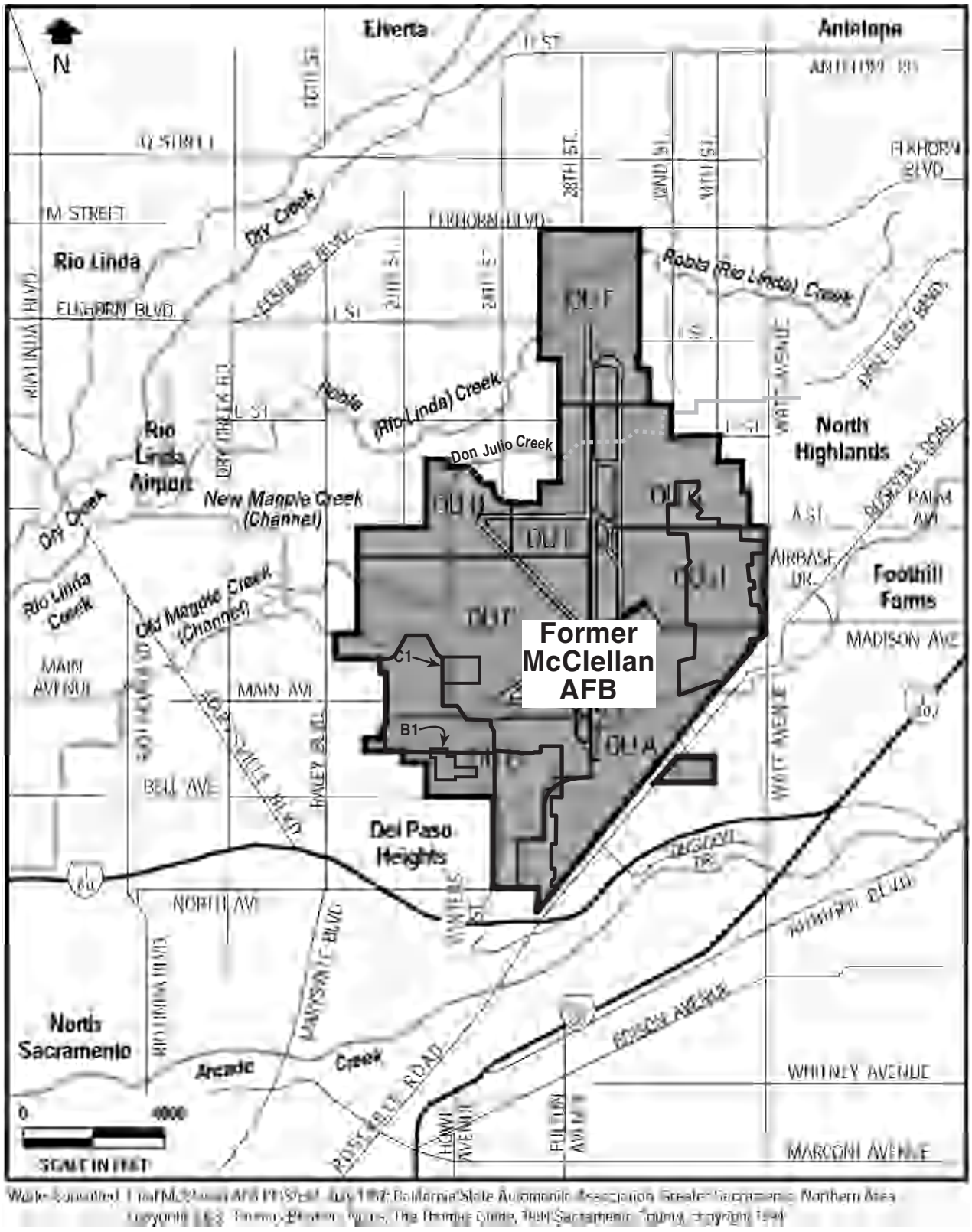

FIGURE 1
LOCATION OF FORMER McCLELLAN AIR FORCE BASE
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

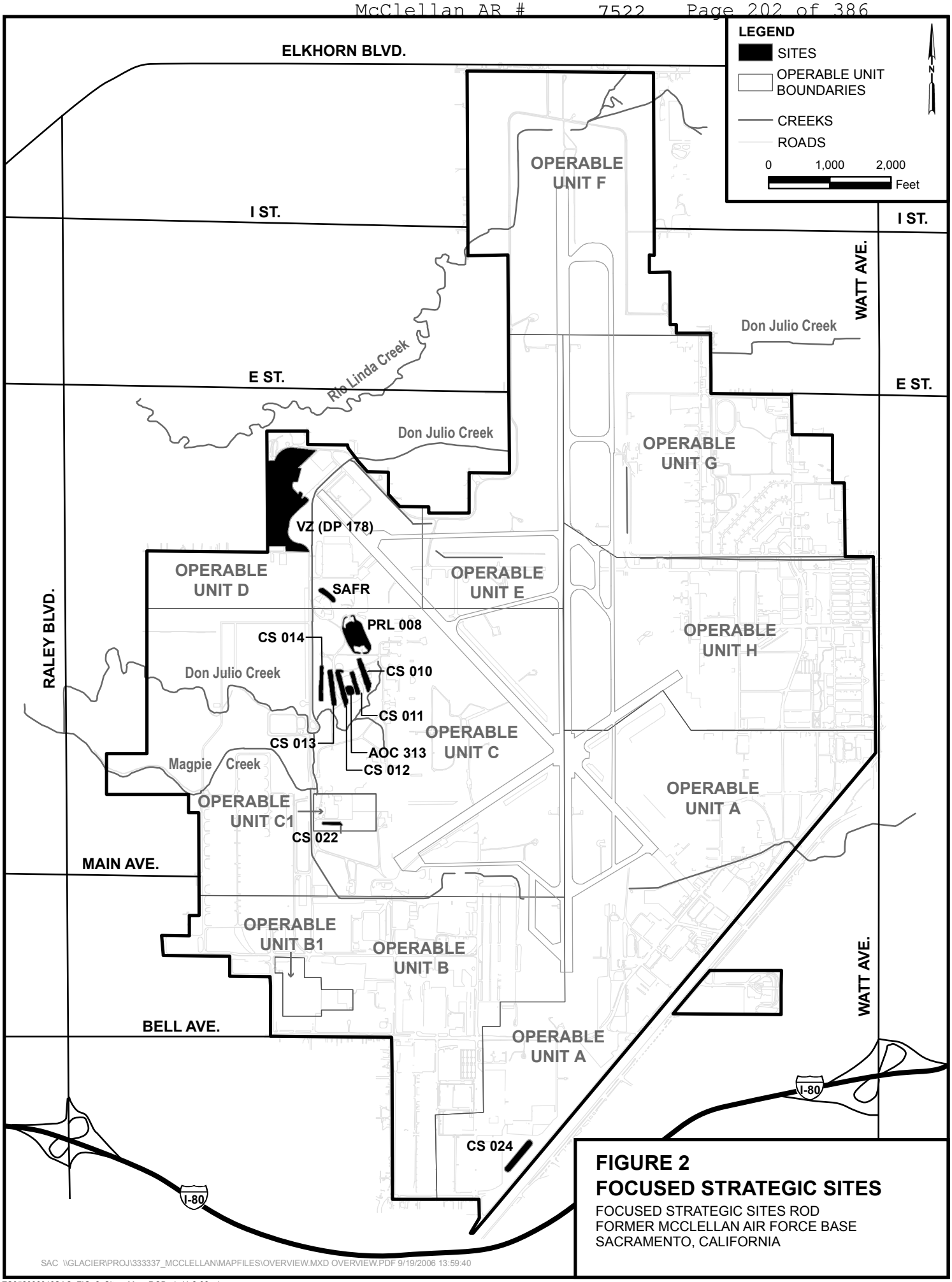

FIGURE 2
FOCUSED STRATEGIC SITES
FOCUSED STRATEGIC SITES ROD
FORMER MCCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

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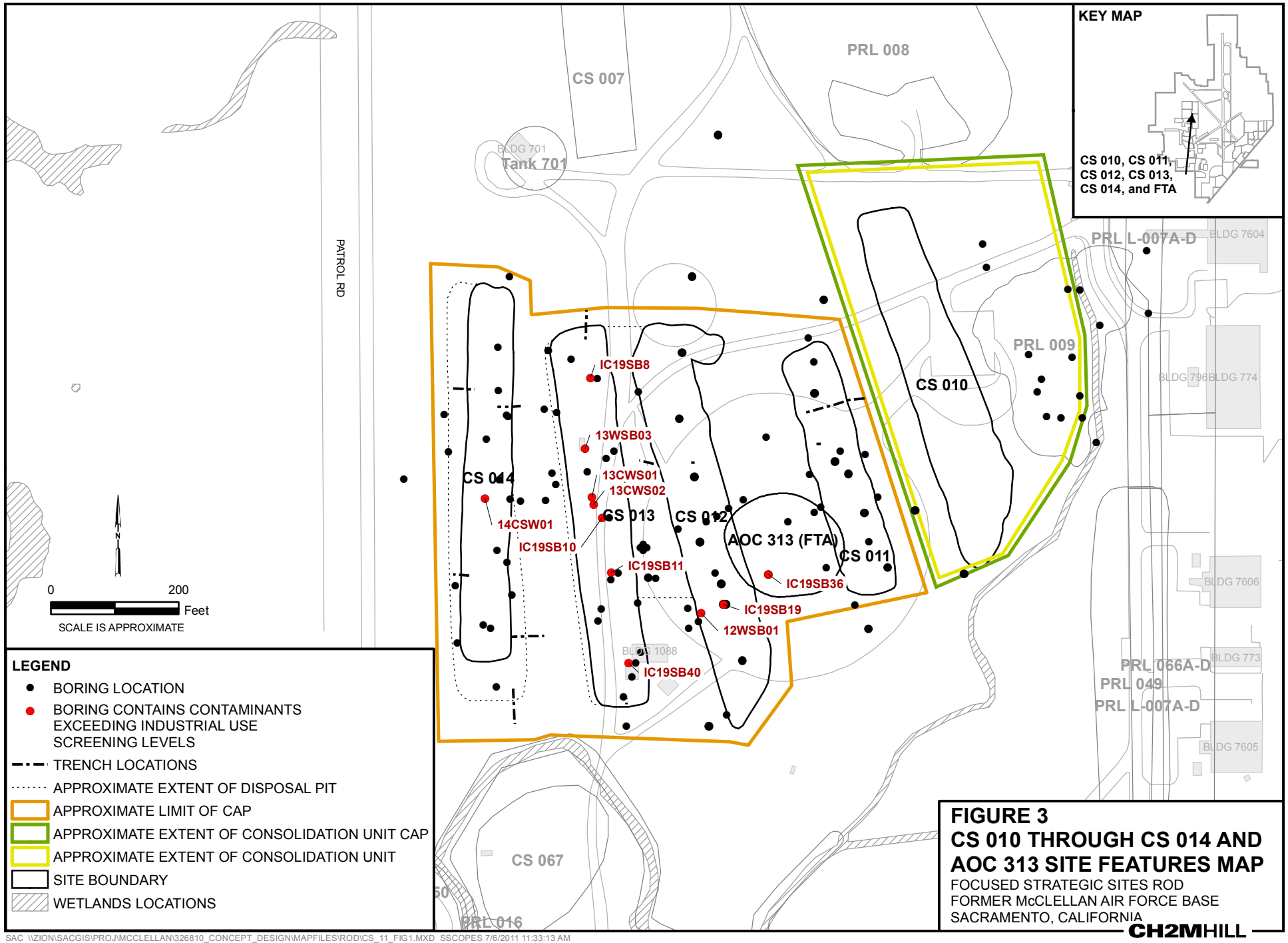

KEY MAP
CS 010, CS 011, CS 012, CS 013, CS 014, and FTA
PRL 008
CS 007
BLDG 701
Tank 701
PATROL RD
PRL L-007A-D
BLDG 7604
PRL 009
BLDG 796
BLDG 774
CS 010
IC19SB8
13WSB03
13CWS01
13CWS02
CS 014
CS 013
CS 012
14CSW01
IC19SB10
AOC 313 (FTA)
CS 011
IC19SB11
IC19SB36
IC19SB19
12WSB01
BLDG 1088
IC19SB40
BLDG 7606
BLDG 773
PRL 066A-D
PRL 049
PRL L-007A-D
BLDG 7605
CS 067
PRL 016
0
200
Feet
SCALE IS APPROXIMATE
LEGEND
BORING LOCATION
BORING CONTAINS CONTAMINANTS EXCEEDING INDUSTRIAL USE SCREENING LEVELS
TRENCH LOCATIONS
APPROXIMATE EXTENT OF DISPOSAL PIT
APPROXIMATE LIMIT OF CAP
APPROXIMATE EXTENT OF CONSOLIDATION UNIT CAP
APPROXIMATE EXTENT OF CONSOLIDATION UNIT
SITE BOUNDARY
WETLANDS LOCATIONS
FIGURE 3
CS 010 THROUGH CS 014 AND AOC 313 SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA
CH2MHILL
SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_11_FIG1.MXD SSCOPES 7/6/2011 11:33:13 AM

CS 011, CS 012, CS 013, CS 104, and FTA (AOC 313)

Beginning Depth of Sample (feet bgs)

Boring ID[a]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
CS 011																														
PZ-594 (5-25)																														
11CWS01																														
11WSB01																														
11WSB02																														
IC19SB22																														
IC19SB23																														
IC19SB24																														
IC19SB25																														
IC19SB26																														
CS11SB001																														
CS 012																														
12CWS01																														
12WSB01																														
12WSB02																														
12WSB20																														
IC19SB14																														
IC19SB15																														
IC19SB16																														
IC19SB17																														
IC19SB18																														
IC19SB19																														
IC19SB21																														
IC19SB41																														
CS12SB002																														
PZ-299 (10-12)																														
PZ-326 (7-9)																														
PZ-329 (12-14)																														
CS 013																														
13CWS01																														
13CWS02																														
13WSB02																														
13WSB03																														
IC19SB08																														
IC19SB09																														
IC19SB10																														
IC19SB11																														
IC19SB12																														
IC19SB13																														
IC19SB40																														
CS13HA001																														
CS13HA002																														
CS13HA003																														
CS13HA004																														
CS13HA005																														
CS13HA006																														
CS13SB001																														
CS13SB002																														
PZ-595 (5-20)																														
PZ-596 (5-15)																														
CS 014																														
14CSW01																														
14WSB01																														
14WSB02																														
CS14SB0001																														
IC19MC01																														
IC19SB01																														
IC19SB02																														
IC19SB03																														
IC19SB04																														
IC19SB05																														
IC19SB06																														
IC19SB07																														
CS14SB001																														
CS14SB002																														
PZ-597 (5-25)																														
PZ-598 (5-35)																														
FTA (AOC 313)																														
IC19SB34																														
IC19SB35																														
IC19SB36																														
IC19SB37																														

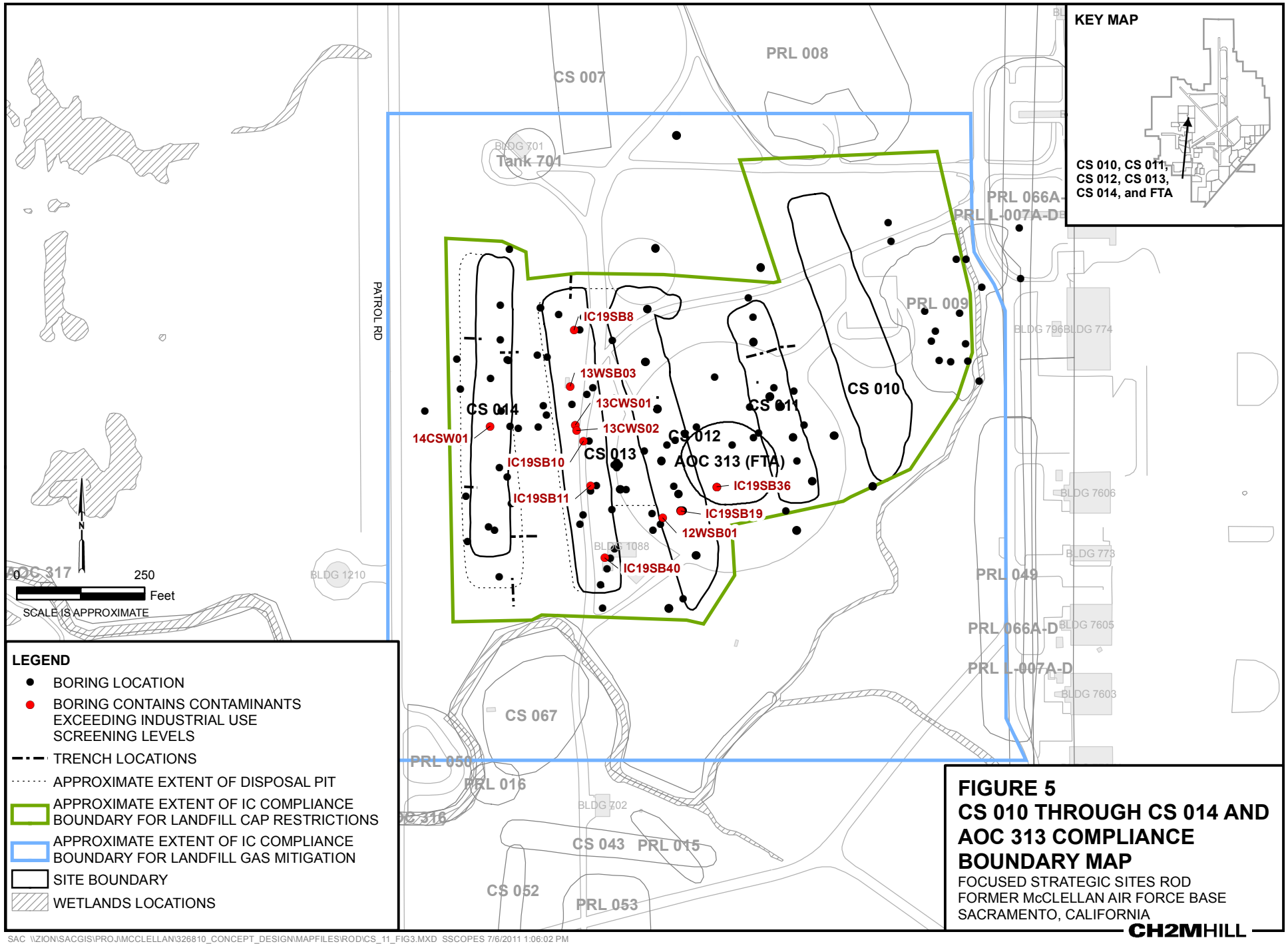
= VOCs exceed Industrial Use[b]
= Non-VOCs exceed Industrial Use
= All contaminants less than industrial use screening levels

[a]Only soil borings with soil gas or soil samples collected between 0 and 29 feet bgs or piezometers with screen intervals beginning at less than 29 feet bgs are shown. Screen intervals for the piezometers are shown in (), in feet bgs.
[b] Only post-SVE data from the piezometers were used in this evaluation

FIGURE 4
CS 010 THROUGH CS 014 AND AOC 313 CONTAMINANT DEPTH PROFILE

FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL


KEY MAP
CS 010, CS 011, CS 012, CS 013, CS 014, and FTA
PRL 008
CS 007
BLDG 701
Tank 701
PRL 066A-D
PRL L-007A-D
PRL 009
BLDG 796
BLDG 774
PATROL RD
IC19SB8
13WSB03
13CWS01
13CWS02
14CSW01
CS 014
CS 013
CS 012
CS 011
CS 010
AOC 313 (FTA)
IC19SB10
IC19SB11
IC19SB36
IC19SB19
12WSB01
IC19SB40
BLDG 1088
BLDG 7606
BLDG 773
PRL 049
PRL 066A-D
BLDG 7605
PRL L-007A-D
BLDG 7603
AOC 317
BLDG 1210
N
0
250
Feet
SCALE IS APPROXIMATE
CS 067
PRL 050
PRL 016
BLDG 702
AOC 316
CS 043
PRL 015
CS 052
PRL 053
LEGEND
BORING LOCATION
BORING CONTAINS CONTAMINANTS EXCEEDING INDUSTRIAL USE SCREENING LEVELS
TRENCH LOCATIONS
APPROXIMATE EXTENT OF DISPOSAL PIT
APPROXIMATE EXTENT OF IC COMPLIANCE BOUNDARY FOR LANDFILL CAP RESTRICTIONS
APPROXIMATE EXTENT OF IC COMPLIANCE BOUNDARY FOR LANDFILL GAS MITIGATION
SITE BOUNDARY
WETLANDS LOCATIONS
FIGURE 5
CS 010 THROUGH CS 014 AND AOC 313 COMPLIANCE BOUNDARY MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA
CH2MHILL
SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_11_FIG3.MXD SSCOPES 7/6/2011 1:06:02 PM

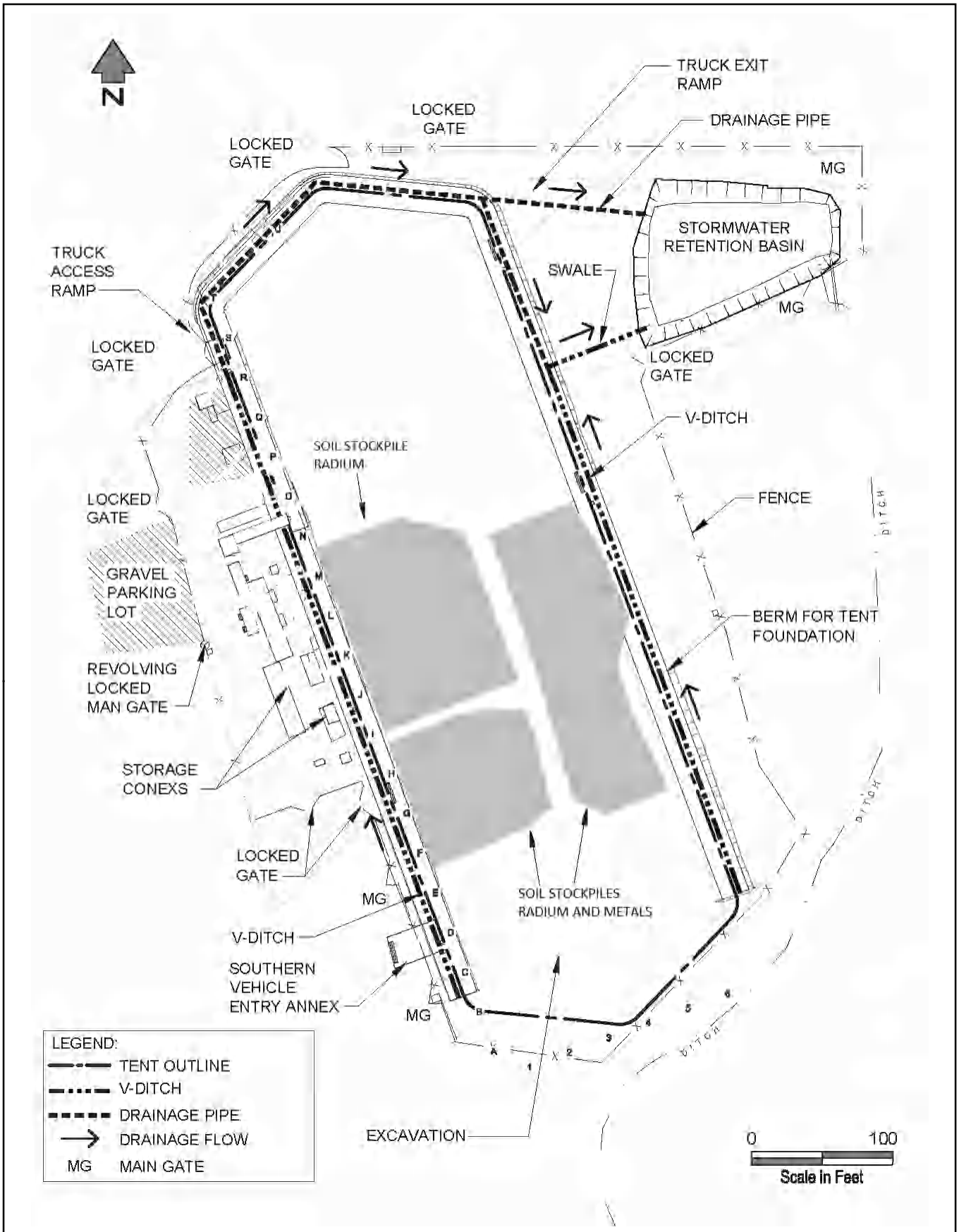


FIGURE 6
CS 010 CURRENT CONDITIONS MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

ES070611022849SAC Figure_6.ai 07.07.2011 tdaus

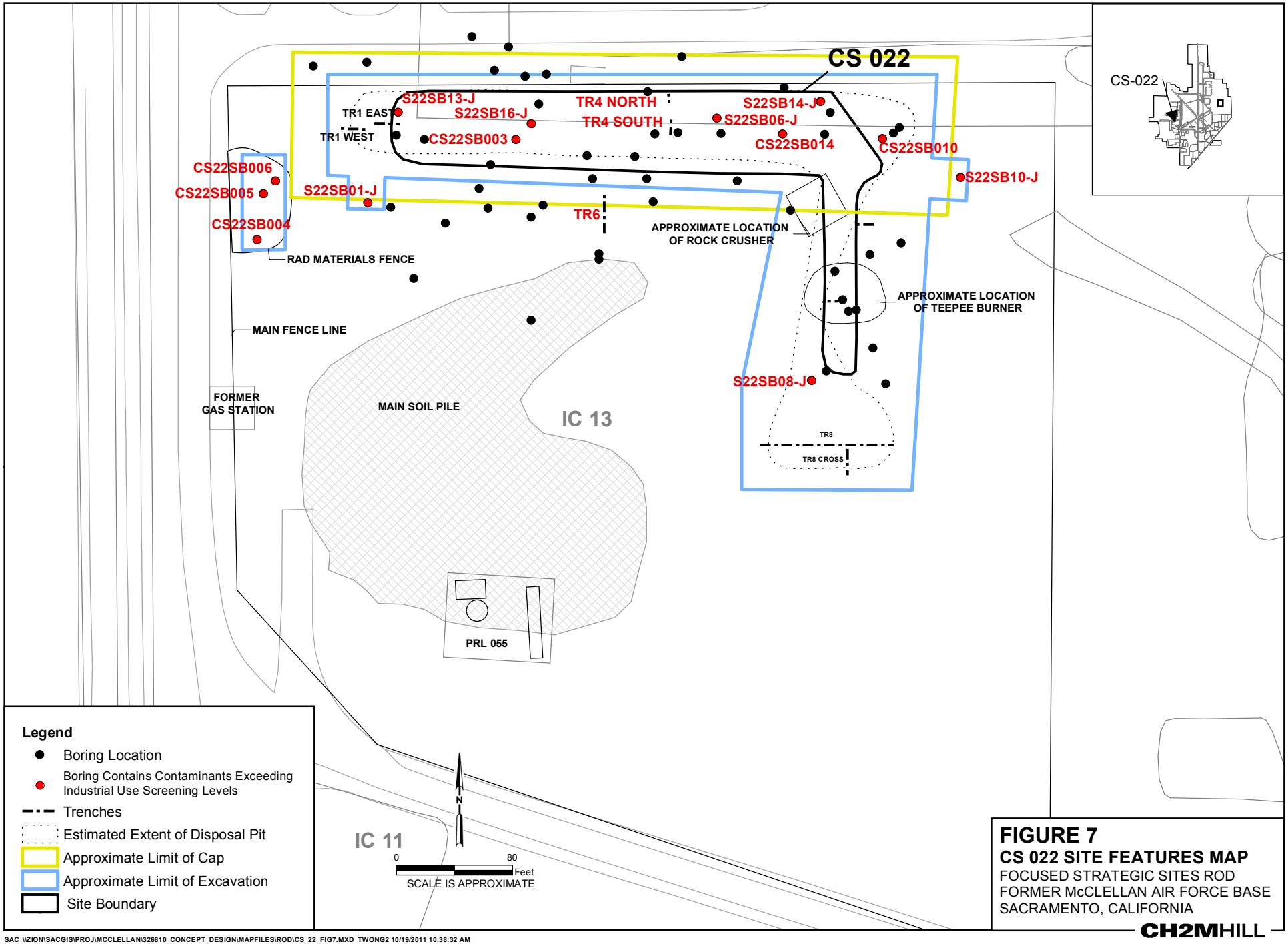


FIGURE 7
CS 022 SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_22_FIG7.MXD TWONG2 10/19/2011 10:38:32 AM

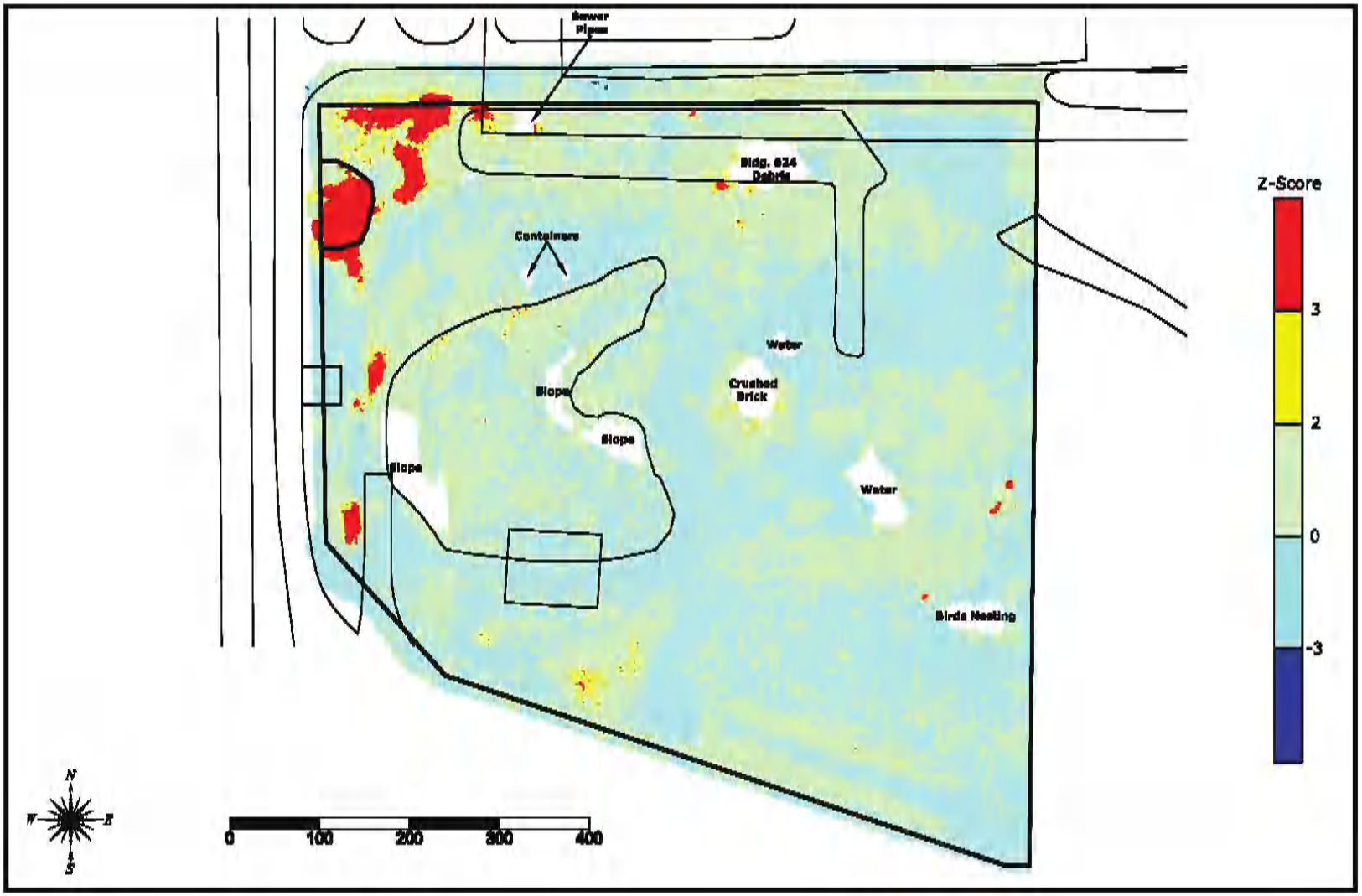


FIGURE 8
CS 022 RADIOLOGICAL SURFACE SCAN
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

From: Summary of Radiological Survey Data Collected at Area Designated "Rock Crusher Yard", Cabrera Services, 2007

CH2MHILL

ES070611022849SAC Figure_8.ai 07.06.2011 tdaus

CS 022 — **Beginning Depth of Sample (feet bgs)**

Boring ID[a]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
S22SB01-J																														
S22SB02-J																														
S22SB03-J																														
S22SB04-J																														
S22SB05-J																														
S22SB06-J																														
S22SB07-J																														
S22SB08-J																														
S22SB09-J																														
S22SB10-J																														
S22SB11-J																														
S22SB12A-J																														
S22SB13-J																														
S22SB14-J																														
S22SB15-J																														
S22SB16-J																														
CS22SB001																														
CS22SB002																														
CS22SB003																														
CS22SB004																														
CS22SB005																														
CS22SB006																														
CS22SB007																														
CS22SB008																														
CS22SB009																														
CS22SB010																														
CS22SB011																														
CS22SB012																														
CS22SB013																														
CS22SB014																														
CS22SS001																														
CS22SS002																														
CS22SS003																														
CS22SS004																														
CS22SS005																														
CS22SS006																														
CS22SS007																														
CS22SS008																														
CS22SS009																														
CS22SS010																														
CS22SS011																														
CS22SS012																														
CS22SS013																														
CS22SS014																														
CS22SS015																														
CS22SS016																														
CS22SS017																														
CS22SS018																														
CS22SS019																														
CS22SS020																														
CS22TR4001																														
CS22TR4002																														
CS22TR6001																														
CS22TR6002																														
PZ-672 (10-12)																														

= VOCs exceed Industrial Use[b]
= Non-VOCs exceed Industrial Use
= All contaminants less than industrial use screening levels

[a]Only soil borings with soil gas or soil samples collected between 0 and 29 feet bgs or piezometers with screen intervals beginning at less than 29 feet bgs are shown. Screen intervals for the piezometers are shown in (), in feet bgs.

[b]Only post-SVE data from the piezometers were used in this evaluation.

FIGURE 9
CS 022 CONTAMINANT DEPTH PROFILE

FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

ES070611022849SAC Figure_9.ai 07.06.2011 tdaus

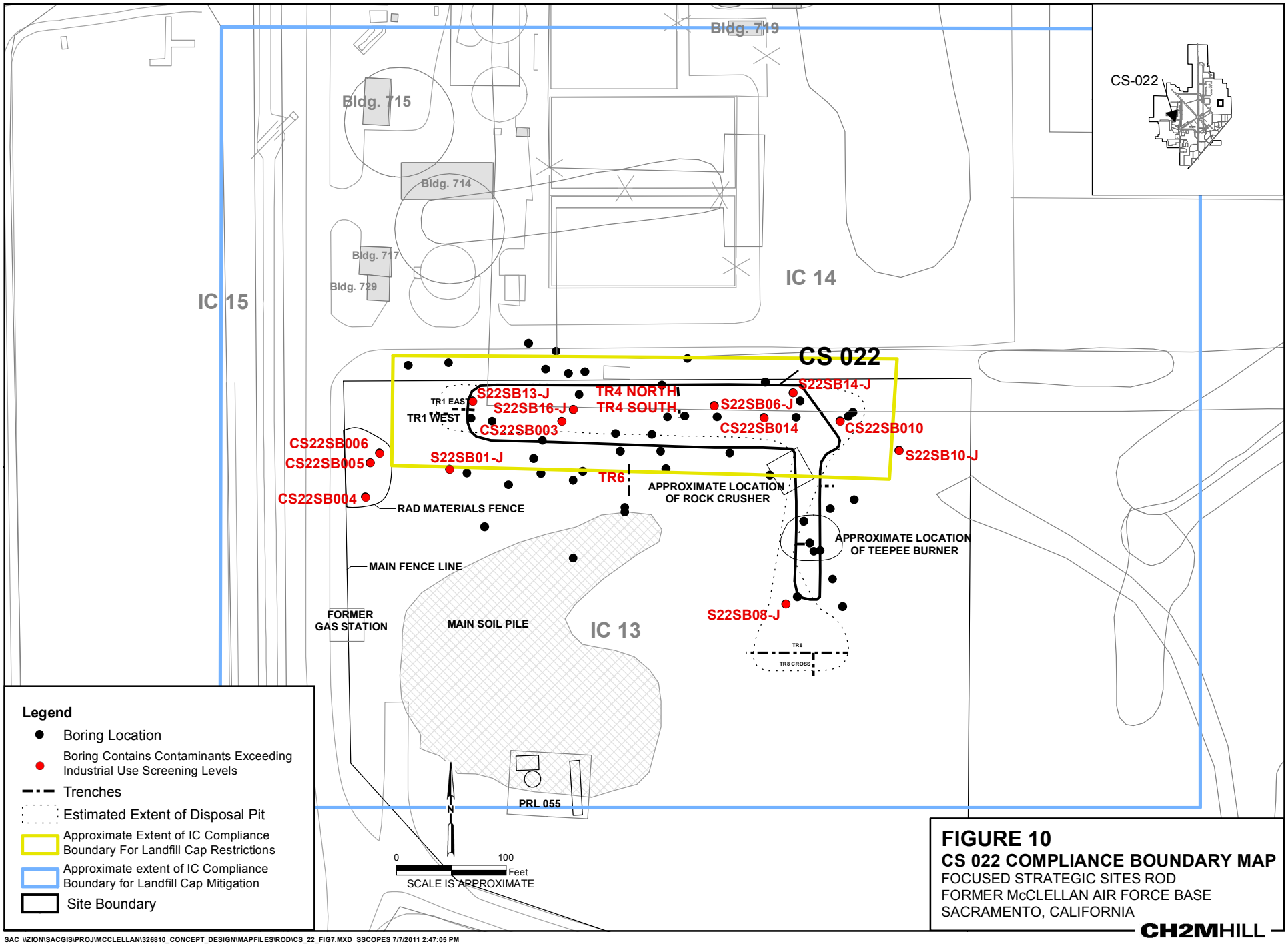


FIGURE 10
CS 022 COMPLIANCE BOUNDARY MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_22_FIG7.MXD SSCOPES 7/7/2011 2:47:05 PM

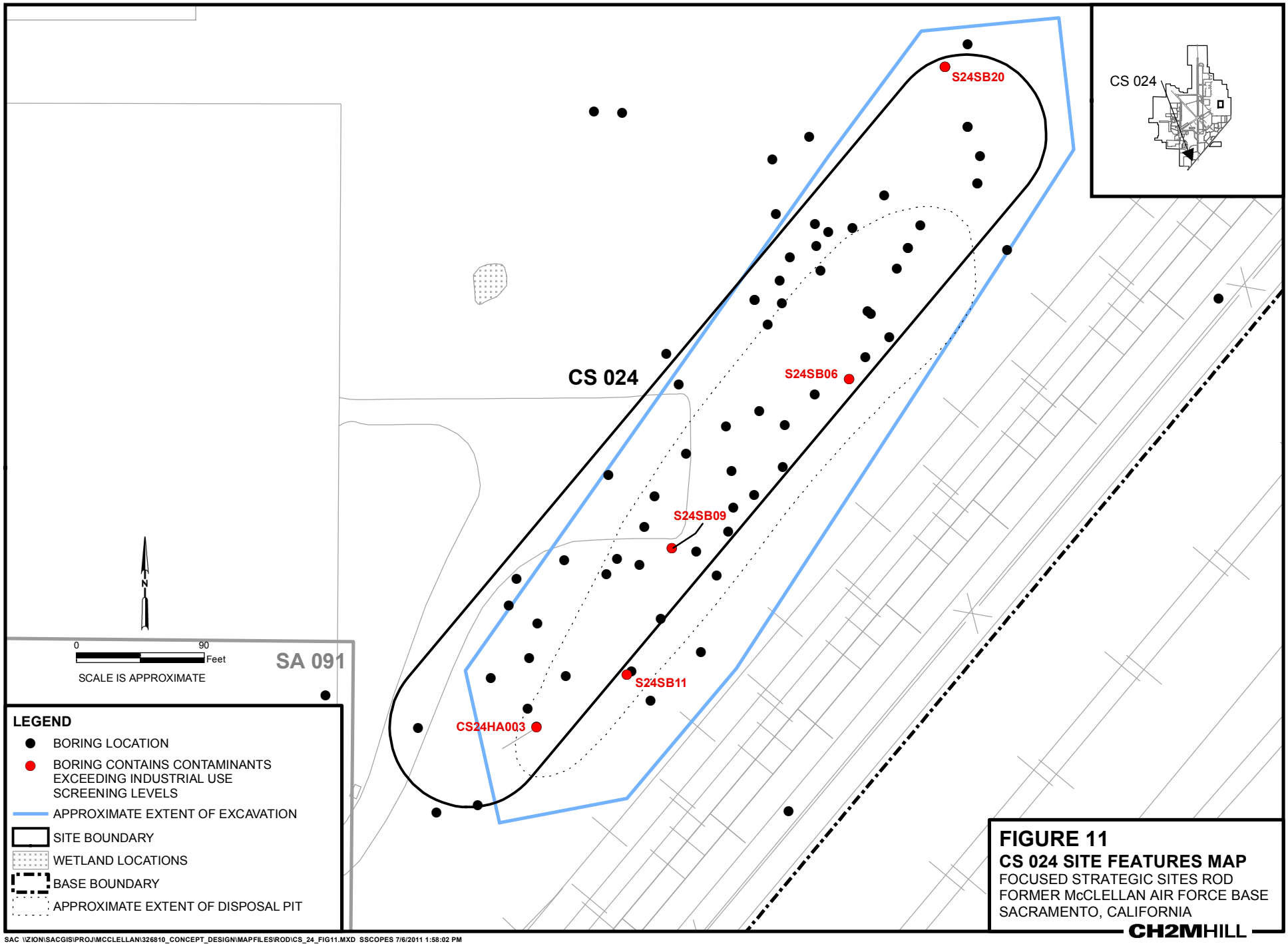


FIGURE 11
CS 024 SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_24_FIG11.MXD SSCOPES 7/6/2011 1:58:02 PM

CS 024

Beginning Depth of Sample (feet bgs)

Boring ID[a]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
CS24SB001/PZ-583																														
CS24SB002/PZ-584																														
CS24SS001																														
CS24SS002																														
CS24SS003																														
CS24SS004																														
CS24SS005																														
CS24SS006																														
CS24SS007																														
CS24SS008																														
CS24SS009																														
CS24SS010																														
CS24SS011																														
CS24SS012																														
CS24SS013																														
CS24SS014																														
CS24SS015																														
CS24SS016																														
CS24SS017																														
CS24SS018																														
CS24SS019																														
CS24SS020																														
CS24HA001																														
CS24HA002																														
CS24HA003																														
CS24HA004																														
CS24SB21																														
CS24SB22																														
CS24SB23																														
CS24SB24																														
CS24SB25																														
CS24SB26/MW1085																														
CS24SB27/MW1086																														
CS24SB28																														
CS24SB29																														
CS24SB30																														
CS24SB31																														
S24HP57																														
S24HP58																														
S24HP59																														
S24MW1075																														
S24MW243																														
S24MW244																														
S24MW289																														
S24MW290																														
S24MW291																														
S24MW292																														
CS24HA001																														
CS24HA002																														
CS24HA003																														
CS24HA004																														
S24SB01																														
S24SB02																														
S24SB03																														
S24SB04																														
S24SB05																														
S24SB06																														
S24SB07																														
S24SB08																														
S24SB09																														
S24SB10																														
S24SB11																														
S24SB12																														
S24SB13																														
S24SB14																														
S24SB15																														
S24SB16																														
S24SB17																														
S24SB18																														
S24SB19																														
S24SB20																														

= VOCs exceed Industrial Use[b]
= Non-VOCs exceed Industrial Use
= All contaminants less than industrial use screening levels

[a]Only soil borings with recent soil gas or soil samples collected between 0 and 29 feet bgs or piezometers with screen intervals beginning at less than 29 feet bgs are shown. Screen intervals for the piezometers are shown in (), in feet bgs.
[b] Only post-SVE data from the piezometers were used in this evaluation

FIGURE 12
CS 024 CONTAMINANT DEPTH PROFILE

FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

ES070611022849SAC Figure_12.ai 07.06.2011 tdaus

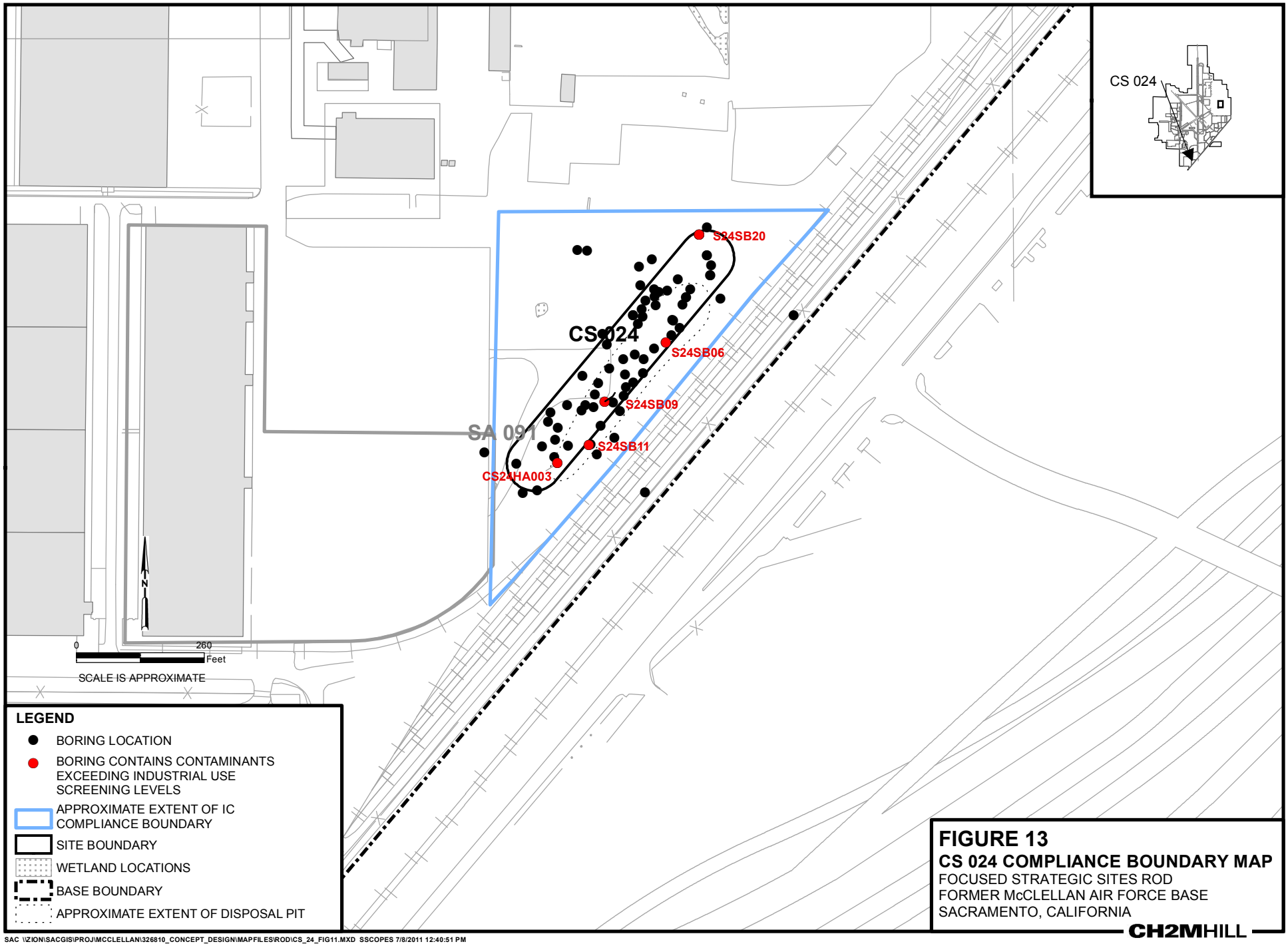


FIGURE 13
CS 024 COMPLIANCE BOUNDARY MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\CS_24_FIG11.MXD SSCOPES 7/8/2011 12:40:51 PM

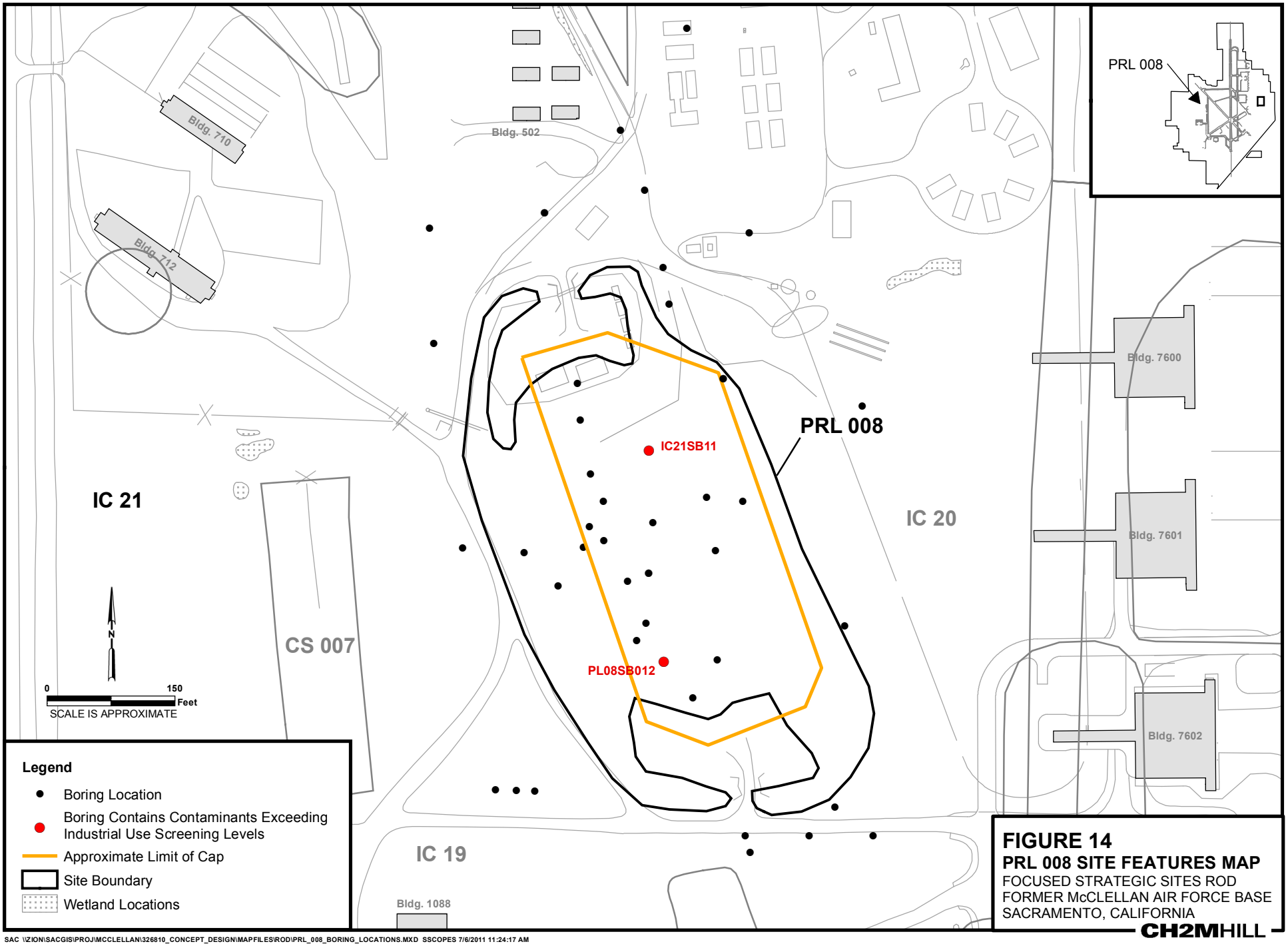


FIGURE 14
PRL 008 SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\PRL_008_BORING_LOCATIONS.MXD SSCOPES 7/6/2011 11:24:17 AM

PRL 008

Beginning Depth of Sample (feet bgs)

Boring ID[a]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
IC21SB03/MW-353																														
IC21SB10																														
IC21SB11																														
IC21SB12																														
IC21SB13																														
IC21SB14																														
IC21HA06																														
IC21HA07																														
IC21HA08																														
PL08SB001C																														
PL08SB003																														
PL08SB004																														
PL08SB005																														
PL08SB006																														
PL08SB007																														
PL08SB008																														
PL08SB009																														
PL08SB010																														
PL08SB011																														
PL08SB012																														
PL08SB013																														
PL08SB014																														
PL08SB015																														
PL08SB016																														
PL08SB017																														
PL08SB018																														
PL08SB019																														
PZ-305 (10.25-12.25)																														
PZ-308 (13.7-15.7)																														
PZ-311 (10-12)																														
PZ-314 (10-12)																														

= VOCs exceed Industrial Use[b]
= Non-VOCs exceed Industrial Use
= All contaminants less than industrial use screening levels

[a]Only soil borings with recent soil gas or soil samples collected between 0 and 29 feet bgs or piezometers with screen intervals beginning at less than 29 feet bgs are shown. Screen intervals for the piezometers are shown in (), in feet bgs.

[b] Only post-SVE data from the piezometers were used in this evaluation

FIGURE 15
PRL 008 CONTAMINANT DEPTH PROFILE
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

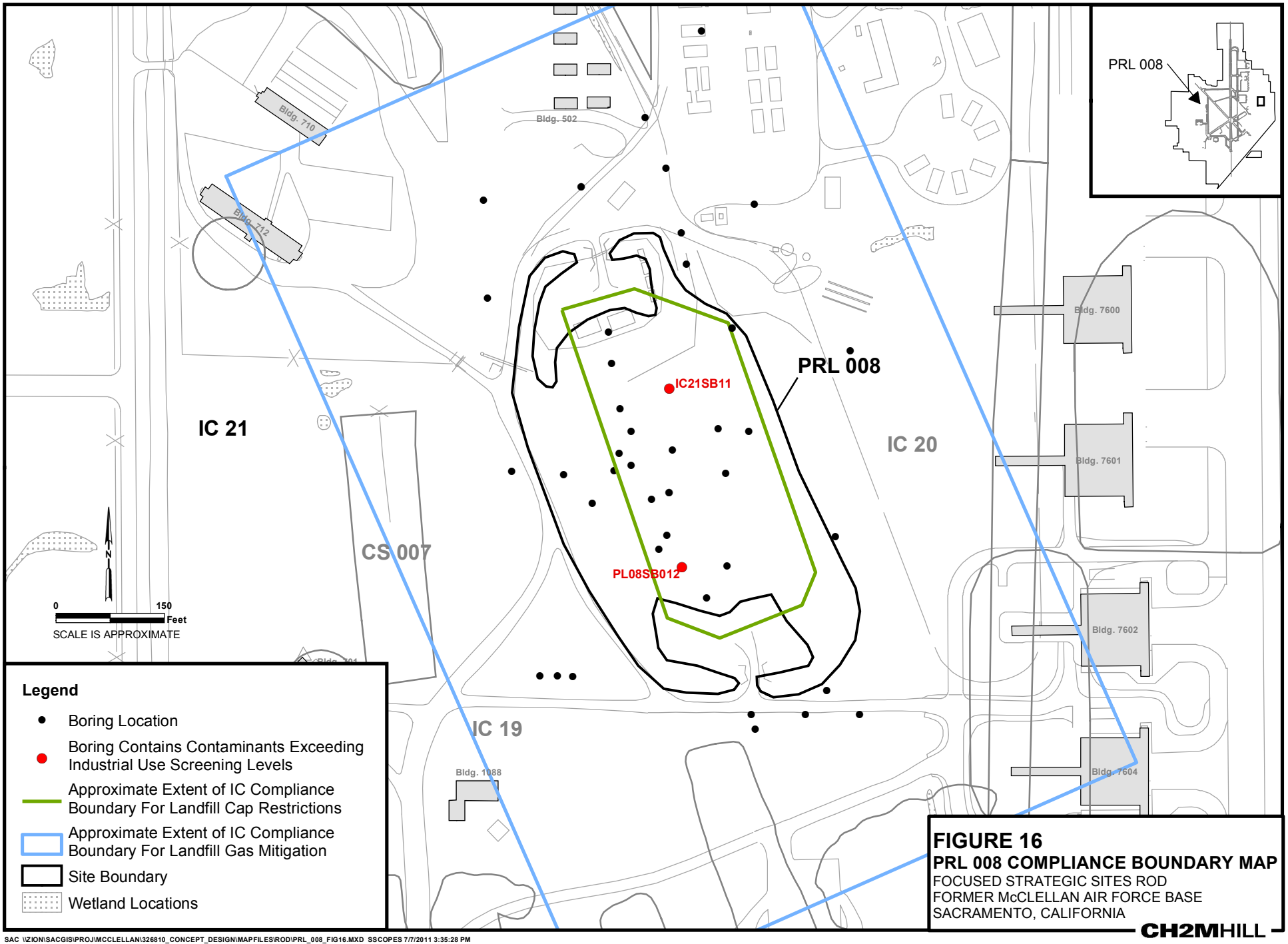


FIGURE 16
PRL 008 COMPLIANCE BOUNDARY MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\PRL_008_FIG16.MXD SSCOPES 7/7/2011 3:35:28 PM

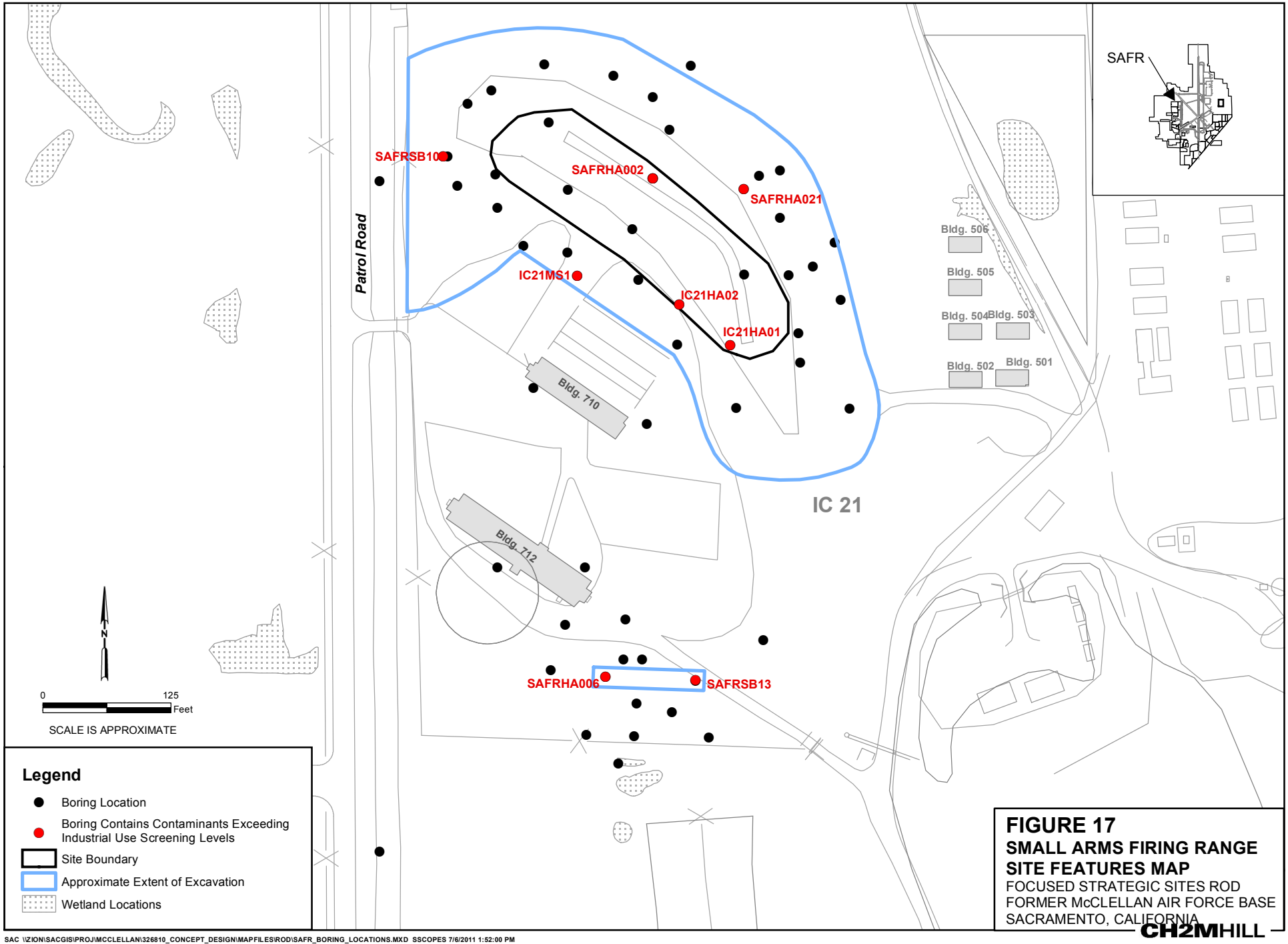


FIGURE 17
SMALL ARMS FIRING RANGE SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\SAFR_BORING_LOCATIONS.MXD SSCOPES 7/6/2011 1:52:00 PM

SAFR

Beginning Depth of Sample (feet bgs)

Boring ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
IC21HA01																														
IC21HA02																														
IC21HA03																														
IC21HA04																														
IC21HA05																														
IC21MC1																														
IC21MC2																														
IC21MS1																														
SAFRHA001																														
SAFRHA002																														
SAFRHA003																														
SAFRHA004																														
SAFRHA005																														
SAFRHA006																														
SAFRHA007																														
SAFRHA008																														
SAFRHA010																														
SAFRHA011																														
SAFRHA015																														
SAFRHA016																														
SAFRHA018																														
SAFRHA019																														
SAFRHA020																														
SAFRHA021																														
SAFRHA022																														
SAFRHA023																														
SAFRHA024																														
SAFRHA025																														
SAFRHA026																														
SAFRHA027																														
SAFRHA028																														
SAFRHA029																														
SAFRHA030																														
SAFRHA031																														
SAFRSB01																														
SAFRSB02																														
SAFRSB03																														
SAFRSB04																														
SAFRSB05																														
SAFRSB06																														
SAFRSB07																														
SAFRSB08																														
SAFRSB09																														
SAFRSB10																														
SAFRSB11																														
SAFRSB12																														
SAFRSB13																														
SAFRSB14																														
SAFRSB15																														
SAFRSB16																														
SAFRSB17																														
SAFRSB18																														
SAFRSB19																														
SAFRSS001																														

Note: Data includes only Cu and Pb

= Non-VOCs exceed Industrial Use

= All contaminants less than industrial use screening levels

FIGURE 18
SAFR CONTAMINANT DEPTH PROFILE
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

ES070611022849SAC Figure_18.ai 07.06.2011 tdaus

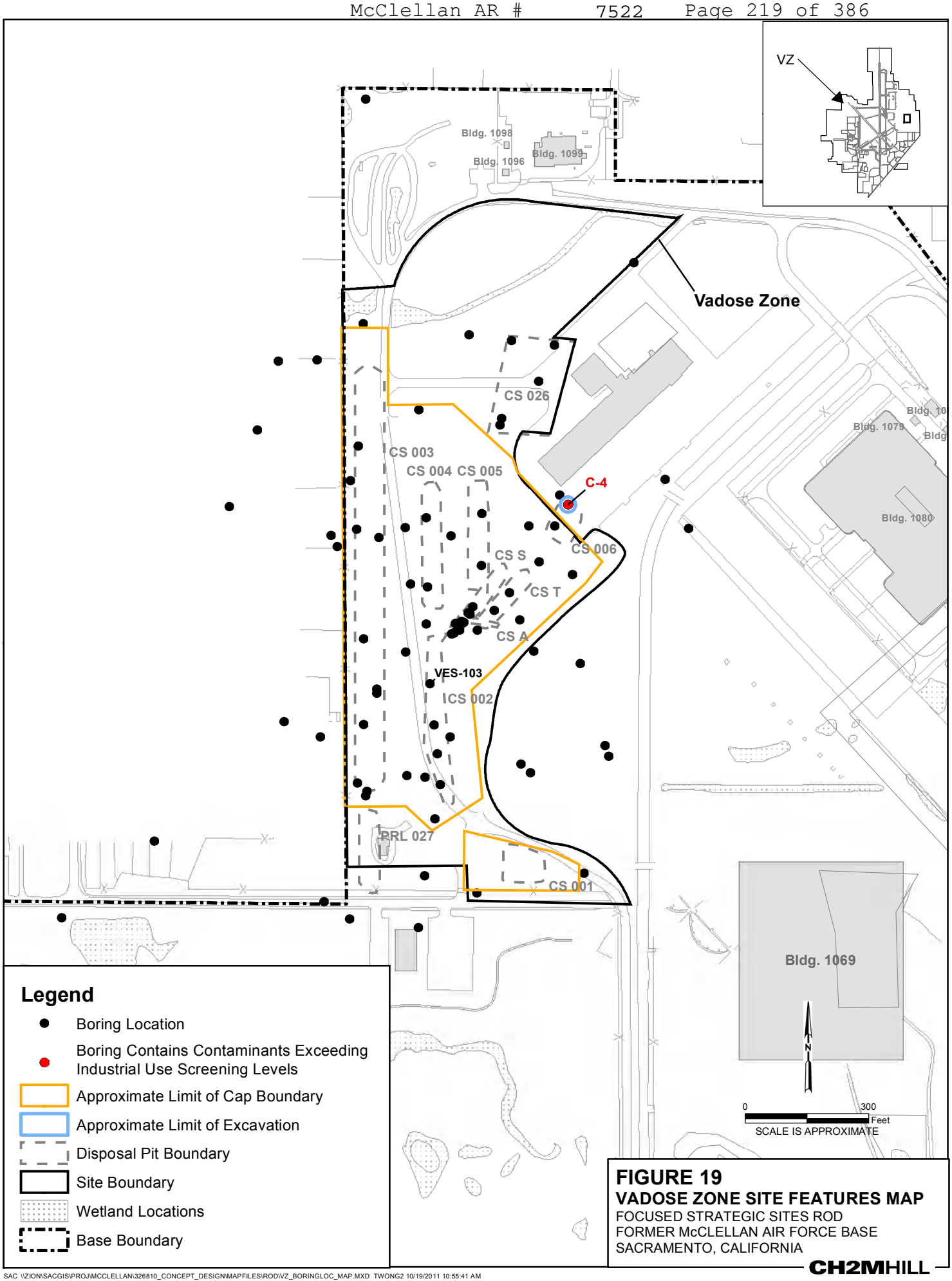


FIGURE 19
VADOSE ZONE SITE FEATURES MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\VZ_BORINGLOC_MAP.MXD TWONG2 10/19/2011 10:55:41 AM

Vadose Zone

Beginning Depth of Sample (feet bgs)

Boring ID[a]	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
C4																														
SVDMW-6 (10-13)																														
SVDMW-9 (12-15)																														

= VOCs exceed Industrial Use[b]
= Non-VOCs exceed Industrial Use
= All contaminants less than industrial use screening levels

[a]Only soil borings with soil gas or soil samples collected between 0 and 29 feet bgs or piezometers with screen intervals beginning at less than 29 feet bgs are shown. Screen intervals for the piezometers are shown in (), in feet bgs. Only data from borings located outside the cap with contaminant concentrations exceeding industrial use screening levels were used in this evaluation.

[b] Only post-SVE data from the piezometers located outside the cap were used in this evaluation

FIGURE 20
VADOSE ZONE CONTAMINANT DEPTH PROFILE
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

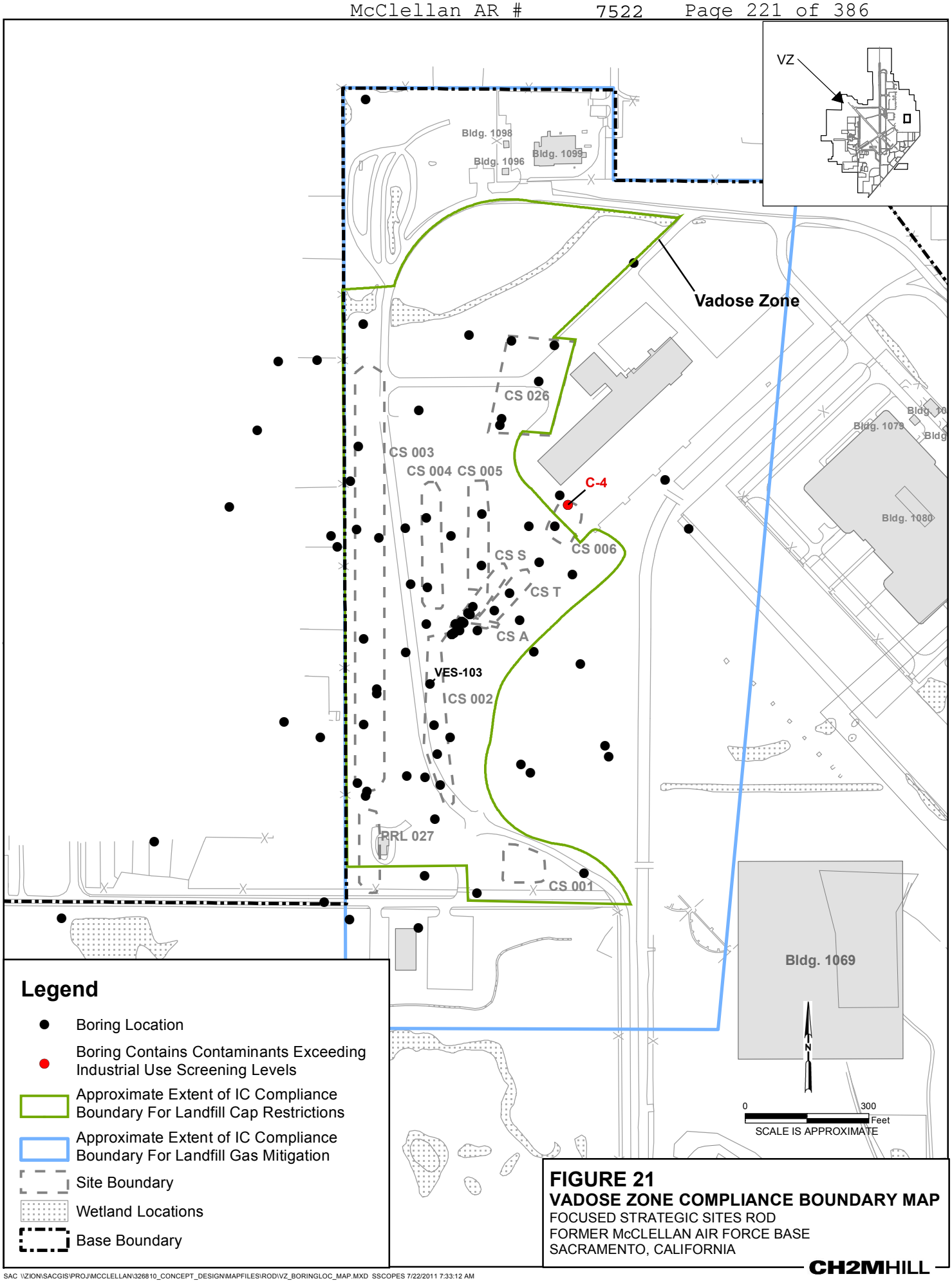
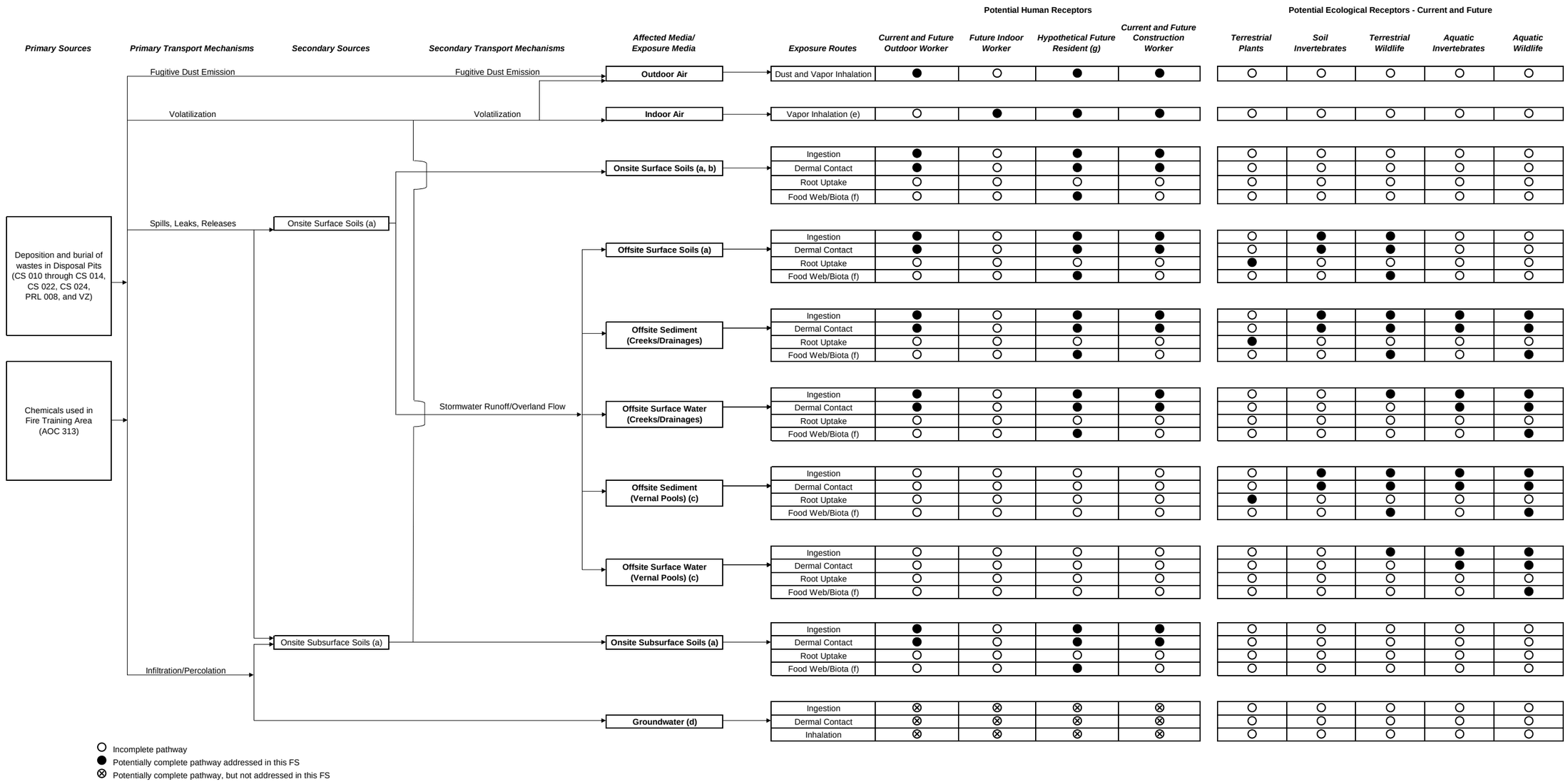


FIGURE 21
VADOSE ZONE COMPLIANCE BOUNDARY MAP
FOCUSED STRATEGIC SITES ROD
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

CH2MHILL

SAC \\ZION\SACGIS\PROJ\MCCLELLAN\326810_CONCEPT_DESIGN\MAPFILES\ROD\VZ_BORINGLOC_MAP.MXD SSCOPES 7/22/2011 7:33:12 AM



Notes:

(a) For this CSM surface soil is defined as 0 to 1 ft bgs and subsurface soil is defined as 1 to 15 ft bgs.

(b) Pathways for onsite ecological receptors are considered incomplete because no significant ecological habitat exists onsite under current and anticipated future industrial land use.

(c) Vernal pools are assumed to support terrestrial habitat during the dry season and aquatic habitat during the wet season.

(d) Groundwater-related pathways, such as potable water supply use, are not addressed in for the FSS. Vapor intrusion from groundwater to indoor air is considered incomplete due to depth to groundwater (>100 ft bgs).

(e) The vapor inhalation pathway is incomplete under current conditions because no permanent occupied structures are present. It is potentially complete if buildings and structures are constructed in the future.

(f) Food Web/ Biota includes consumption of homegrown produce or prey that may have bioaccumulated chemicals.

(g) The McClellan Reuse Plan (EDAW 2000) indicates that current industrial land use will continue into the foreseeable future. Onsite residential land use is included only as a hypothetical scenario for evaluation of unrestricted land use. Default exposure depths for residents assumed to be 15 ft bgs. It is assumed that industrial and residential land use will not occur in vernal pools; therefore, pathways to human receptors are incomplete for vernal pool areas.

FIGURE 22
EXPOSURE PATHWAY ANALYSIS AND CONCEPTUAL SITE MODEL
DISPOSAL PITS AND AOC 313
FOCUSED STRATEGIC SITES RECORD OF DECISION
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

Primary Sources	Primary Transport Mechanisms	Secondary Sources	Secondary Transport Mechanisms	Affected Media/ Exposure Media	Exposure Routes	Potential Human Receptors: Current and Future Outdoor Worker	Future Indoor Worker	Hypothetical Future Resident (g)	Current and Future Construction Worker	Potential Ecological Receptors - Current and Future: Terrestrial Plants	Soil Invertebrates	Terrestrial Wildlife	Aquatic Invertebrates	Aquatic Wildlife
Discharge of casings and slugs from shooting range activities	Surface Release	Onsite Surface Soils (a)	Fugitive Dust Emission	Outdoor Air	Dust Inhalation (e)	●	○	●	●	○	○	○	○	○
			Stormwater Runoff	Onsite Surface Soils (a, b)	Ingestion	●	○	●	●	○	○	○	○	○
					Dermal Contact	●	○	●	●	○	○	○	○	○
					Root Uptake	○	○	○	○	○	○	○	○	○
					Food Web/Biota (f)	○	○	●	○	○	○	○	○	○
				Offsite Surface Soils	Ingestion	●	○	●	●	○	●	●	○	○
					Dermal Contact	●	○	●	●	○	●	●	○	○
					Root Uptake	○	○	○	○	●	○	○	○	○
					Food Web/Biota (f)	○	○	●	○	○	○	●	○	○
				Offsite Sediments (Creeks/Drainages)	Ingestion	●	○	●	●	○	●	●	●	●
					Dermal Contact	●	○	●	●	○	●	●	●	●
					Root Uptake	○	○	○	○	●	○	○	○	○
					Food Web/Biota (f)	○	○	●	○	○	○	●	○	●
				Offsite Surface Water (Creeks/Drainages)	Ingestion	●	○	●	●	○	○	●	●	●
					Dermal Contact	●	○	●	●	○	○	○	●	●
					Root Uptake	○	○	○	○	○	○	○	○	○
					Food Web/Biota (f)	○	○	●	○	○	○	○	○	●
				Offsite Sediments (Vernal Pools) (c)	Ingestion	○	○	○	○	○	●	●	●	●
					Dermal Contact	○	○	○	○	○	●	●	●	●
					Root Uptake	○	○	○	○	●	○	○	○	○
					Food Web/Biota (f)	○	○	○	○	○	○	●	○	●
				Offsite Surface Water (Vernal Pools) (c)	Ingestion	○	○	○	○	○	○	●	●	●
					Dermal Contact	○	○	○	○	○	○	○	●	●
					Root Uptake	○	○	○	○	○	○	○	○	○
					Food Web/Biota (f)	○	○	○	○	○	○	○	○	●
			Leaching	Onsite Subsurface Soils	Ingestion	●	○	●	●	○	○	○	○	○
					Dermal Contact	●	○	●	●	○	○	○	○	○
					Root Uptake	○	○	○	○	○	○	○	○	○
					Food Web/Biota (f)	○	○	●	○	○	○	○	○	○
				Groundwater (d)	Ingestion	⊗	⊗	⊗	⊗	○	○	○	○	○
					Dermal Contact	⊗	⊗	⊗	⊗	○	○	○	○	○
					Inhalation	⊗	⊗	⊗	⊗	○	○	○	○	○

○ Incomplete pathway
● Potentially complete pathway addressed in this FS
⊗ Potentially complete pathway, but not addressed in this FS

Notes:

(a) For this CSM surface soil is defined as 0 to 1 ft bgs and subsurface soil is defined as 1 to 15 ft bgs.
(b) Pathways for onsite ecological receptors are considered incomplete because no significant ecological habitat exists onsite under current and anticipated future industrial land use.
(c) Vernal pools are assumed to support terrestrial habitat during the dry season and aquatic habitat during the wet season.
(d) Groundwater-related pathways, such as potable water supply use, are not addressed in for the FSS.
(e) Vapor inhalation pathway is not included because COCs at this site do not include volatile organic chemicals (VOCs).
(f) Food Web/ Biota includes consumption of homegrown produce or prey that may have bioaccumulated chemicals.
(g) The McClellan Reuse Plan (EDAW 2000) indicates that current industrial land use will continue into the foreseeable future. Onsite residential land use is included only as a hypothetical scenario for evaluation of unrestricted land use. Default exposure depths for residents assumed to be 15 ft bgs. It is assumed that industrial and residential land use will not occur in vernal pools; therefore, pathways to human receptors are incomplete for vernal pool areas.

FIGURE 23
EXPOSURE PATHWAY ANALYSIS AND CONCEPTUAL SITE MODEL
SAFR
FOCUSED STRATEGIC SITES RECORD OF DECISION
FORMER McCLELLAN AIR FORCE BASE
SACRAMENTO, CALIFORNIA

Appendix A
Administrative Record Index

APPENDIX A

Administrative Record Index

AOC 313 Fire Training Area

Document Date	Subject or Title	Author / Corporate Affiliation	File Name
	Various Documents from the McClellan Tank Files for the UST Associated with the FTA		
01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Jul 1993	PA, Report, Vol. I of III, Summary and Overview, OU C	CH2M HILL	MCCLN_AR_2151.pdf
01 Jul 1993	PA, Report, Vol. II of III, Technical Memorandums, OU C	CH2M HILL	MCCLN_AR_2152.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.2.pdf
01 Mar 1995	Final Scoping Report, Basewide Ecological Risk Assessment, OU C	Jacobs Engineering Group, Inc.	MCCLN_AR_2566.pdf
01 May 1995	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2C, Vol. I of III, OU C	Radian Corp.	MCCLN_AR_2801.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2C, Vol. II of III, Appendices, OU C	Radian Corp.	MCCLN_AR_2801.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2C, Vol. III of III, Appendices, OU C	Radian Corp.	MCCLN_AR_2803.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
29 Jan 1997	Final SVE, EE/CA, IC 19	Jacobs Engineering Group, Inc.	MCCLN_AR_3251.pdf
01 Feb 1997	Final Removal Action Work Plan, Addendum, IC 19	URS Consultants, Inc.	MCCLN_AR_3254.pdf
01 Mar 1997	Final Removal Action Work Plan, SVE, IC 19	URS Consultants, Inc.	MCCLN_AR_3285.pdf
12 Jun 1997	Final RAB Relative Risk Ranking Committee Meeting Minutes, 12 Jun 97	Radian Corp.	MCCLN_AR_3393.pdf
17 Jul 1997	Final RAB, Reuse and Technical Report Review Committees Meeting Minutes, 17 Jul 97	Radian Corp.	MCCLN_AR_3389.pdf
31 Jul 1997	Technical Memorandum, Demonstration of Screening Survey, IC 19	SM-ALC/EMR	MCCLN_AR_3419.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Aug 1997	Removal Action Report, SVE, IC 19	URS Greiner, Inc.	MCCLN_AR_3410.pdf
01 Oct 1997	Fact Sheet, Environmental Action Update, UST Program Finishes Phase I	SM-ALC/PA	MCCLN_AR_3472.pdf
01 Oct 1997	Final Work Implementation Plan, Demonstration of Intrinsic Remediation of Chlorinated Solvents, IC 17, IC 19, IC 21	Parsons Engineering Science, Inc.	MCCLN_AR_3455.pdf
01 Nov 1997	Final BRAC Cleanup Plan (BCP)	CH2M HILL	MCCLN_AR_3477.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.2.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. III of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2454.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.1.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.2.pdf
01 Oct 1998	Final Technology Demonstration Application Analysis Report, Intrinsic Remediation of Chlorinated Solvents, IC 17, IC 19, IC 21	Parsons Engineering Science, Inc.	MCCLN_AR_959.pdf
21 Apr 1999	RAB Meeting Transcript, 21 Apr 99	Radian Corp.	MCCLN_AR_942.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. I of III	CH2M HILL	MCCLN_AR_3721.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
17 Dec 2003	RE: Air Force Cleanup Efforts Associated with the Firing Range and Fire Training Area	Brunner, Paul G. / AFRPA	MCCLN_AR_5096.pdf
25 Jun 2004	Final Addendum to the 1999 McClellan Air Force Base Basewide Volatile Organic Compound Feasibility Study (VOC FS)	Brunner, Paul G. / AFRPA	MCCLN_AR_5487.pdf
12 Nov 2004	Addendum to the Basewide SVE Removal Action Work Plan	Graff, Paul / Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_5489.pdf
28 Jan 2005	Final Groundwater Monitoring Program (GWMP) Quarterly Report, Third Quarter 2004 (DSR# 590-1)	Shulters, Jacqueline; Stephanie Benedict / URS Group, Inc.	MCCLN_AR_5772.1.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
28 Jan 2005	Final Groundwater Monitoring Program (GWMP) Quarterly Report, Third Quarter 2004 (DSR# 590-1)	Shulters, Jacqueline; Stephanie Benedict / URS Group, Inc.	MCCLN_AR_5772.2.pdf
31 Jan 2005	Restoration Advisory Board Meeting Minutes, 17 August 2004	Brunner, Paul G. / AFRPA	MCCLN_AR_5582.pdf
28 Feb 2005	Soil vapor extraction removal action quarterly vadose zone monitoring report for October through December 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5652.pdf
18 Mar 2005	Final Breakout Shallow Soil Gas Feasibility Study	CH2M HILL	MCCLN_AR_6014.pdf
30 Mar 2005	Final Fire Training Area UST Removal Report, Former McClellan AFB	Geo-Marine Incorporated	MCCLN_AR_5780.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.1.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.2.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.3.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.4.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.5.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.6.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.7.pdf
07 Jul 2005	Future Plans for Use and Transfer of the “Fire Training Area,” Located on the Western Portion of the Former McClellan AFB	Brunner, Paul G. / AFRPA	MCCLN_AR_5765.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
29 Jul 2005	Quarterly Groundwater Monitoring Program Report, First Quarter 2005, Final	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6016.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
31 Aug 2005	SVE Vadose Zone Quarterly Monitoring Report, April through June 2005	Graff, Paul; Benedict, Stephanie K. / URS Group, Inc.	MCCLN_AR_5657.pdf
28 Oct 2005	Groundwater Monitoring Program, Quarterly Report, Second Quarter 2005	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6133.pdf
28 Oct 2005	Groundwater Monitoring Program, Quarterly Report, Second Quarter 2005	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6133.1.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6362.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.1.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.2.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.3.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.1.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.2.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.3.pdf
27 Apr 2006	Groundwater Monitoring program, Quarterly Report, Fourth Quarter 2005	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6135.pdf
27 Apr 2006	Groundwater Monitoring program, Quarterly Report, Fourth Quarter 2005	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6135.1.pdf
27 Apr 2006	Groundwater Monitoring program, Quarterly Report, Fourth Quarter 2005	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6135.2.pdf
25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
30 May 2006	SVE Vadose Zone quarterly Monitoring Report, Jan - mar 2006 (First Quarter 2006)	Paul Graff / URS Group, Inc.	MCCLN_AR_6124.pdf
28 Jul 2006	Groundwater Monitoring Program, Quarterly Report, First Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6136.pdf
28 Jul 2006	Groundwater Monitoring Program, Quarterly Report, First Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6136.1.pdf
30 Aug 2006	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report April - June 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6119.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf
02 Oct 2006	Proposed Plan Fact Sheet - Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
26 Oct 2006	Groundwater Monitoring Program, Quarterly Report, Second Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6132.pdf
26 Oct 2006	Groundwater Monitoring Program, Quarterly Report, Second Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6132.1.pdf
02 Nov 2006	Final, Focused Strategic Sites Proposed Plan	Andy Cramer / CH2M HILL	MCCLN_AR_6033.pdf
30 Nov 2006	Soil Vapor Extraction Removal Action quarterly Vadose Zone Monitoring Report, Jul - Sep 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6241.pdf
19 Jan 2007	Groundwater Monitoring Program, Quarterly Report, Third Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6240.pdf
01 Mar 2007	Restoration Advisory Board Meeting Minutes, 15 August 2006	Steven Mayer / AFRPA	MCCLN_AR_6279.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.1.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.2.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.3.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.4.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.5.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.6.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.7.pdf
18 Apr 2007	Restoration Advisory Board Meeting Minutes, 5 December 2006	Joe Clark / CH2M HILL	MCCLN_AR_6407.pdf
27 Apr 2007	Groundwater Monitoring Program Quarterly Report Fourth Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6420.pdf
27 Apr 2007	Groundwater Monitoring Program Quarterly Report Fourth Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6420.1.pdf
27 Apr 2007	Groundwater Monitoring Program Quarterly Report Fourth Quarter 2006	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6420.2.pdf
04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled “Toxic-pits cleanup dropped”	Phil Mook / AFRPA	MCCLN_AR_6490.pdf
16 Jul 2007	Quarterly Report First Quarter 2007, Groundwater Monitoring Program	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6499.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.1.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
01 Apr 1986	Technical Memorandum Report, Shallow Investigation Program, Part IV, OU A, OU B	McLaren Environmental Engineering	MCCLN_AR_707.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Vol. I of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_708.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.1.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.2.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.1.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.2.pdf
01 Jun 1986	FS and RA Plan, Source Control, Area C	McLaren Environmental Engineering	MCCLN_AR_1009.pdf
01 Jul 1993	PA, Report, Vol. I of III, Summary and Overview, OU C	CH2M HILL	MCCLN_AR_2151.pdf
01 Jul 1993	PA, Report, Vol. II of III, Technical Memorandums, OU C	CH2M HILL	MCCLN_AR_2152.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.2.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.2.pdf
01 Mar 1994	RI, Draft Final SAP, OU C	Radian Corp.	MCCLN_AR_2268.pdf
01 May 1994	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Mar 1995	Final Scoping Report, Basewide Ecological Risk Assessment, OU C	Jacobs Engineering Group, Inc.	MCCLN_AR_2566.pdf
01 Jul 1995	Final Surface Soil Radiological Characterization Report, OU C	Radian Corp.	MCCLN_AR_3518.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
29 Jan 1997	Final SVE, EE/CA, IC 19	Jacobs Engineering Group, Inc.	MCCLN_AR_3251.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. I of IV, OU C	Radian Corp.	MCCLN_AR_3404.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. II of IV, OU C	Radian Corp.	MCCLN_AR_3405.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.1.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.2.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. IV of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3407.pdf
01 Aug 1997	Removal Action Report, SVE, IC 19	URS Greiner, Inc.	MCCLN_AR_3410.pdf
01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.2.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. III of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2454.pdf
01 Sep 1999	Final EE/CA, CS 010, PRL 032	Radian Corp.	MCCLN_AR_2919.pdf
01 Sep 1999	Final Data Gap FSP 4	Radian Corp.	MCCLN_AR_2920.pdf
01 May 2000	Removal Action Memorandum, Soil Removal, CS 010, PRL 032	Radian Corp.	MCCLN_AR_3822.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Jul 2000	Final Removal Action Work Plan, PRL 032, CS 010	Radian Corp.	MCCLN_AR_3865.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
07 Nov 2000	Decision Document, Action Memorandum, CS 010	Albert F. Lowas, Jr. / Air Force Conversion Agency	MCCLN_AR_4078.pdf
01 Jul 2001	RA, Work Plan, CS 010	URS Group, Inc.	MCCLN_AR_4217.pdf
13 Jul 2001	Delineation of Wetlands and Other Jurisdictional Waters of the United States at McClellan Air Force Base, California	RMI	MCCLN_AR_6235.pdf
01 Sep 2001	Final Removal Action Completion Report, Non-Time Critical, CS 010	URS Group, Inc.	MCCLN_AR_4276.pdf
01 Oct 2001	Final, Basewide Removal Action Work Plan, SVE	URSG-Laidlaw	MCCLN_AR_4293.pdf
01 Dec 2001	Removal Action, Final Work Plan Addendum, CS 010	URS Group, Inc.	MCCLN_AR_4348.pdf
01 Jan 2002	Final Radiological FSP, Groundwater Monitoring Program	URS Group, Inc.	MCCLN_AR_4367.pdf
01 Feb 2002	Fact Sheet, CS 010 Disposal Site Cleanup, No 2-01	AFBCA/DM McClellan	MCCLN_AR_4380.pdf
01 Jul 2002	Environmental Action Update, Quarterly Newsletter About Environmental Activities at McClellan	Young, Dawn / AFBCA	MCCLN_AR_4789.pdf
01 Sep 2002	Fact Sheet, CS 010 Transportation	Young, Dawn / AFBCA	MCCLN_AR_4788.pdf
13 Nov 2002	Public Meeting, Change to the Confirmed Site 10 Time Critical Removal Action, Reporter's Transcripts	Hale, Jacqueline / Northern California Court Reporters	MCCLN_AR_4832.pdf
22 Nov 2002	Removal Action Work Plan for CS 010 Time Critical Removal Action	Lidstrom, Ray; Smarkel, Ken / URS Group, Inc.	MCCLN_AR_4820.pdf
12 Dec 2002	McClellan Restoration Advisory Board Meeting Minutes, December 12, 2002	Roxanne Yonn / URS Group, Inc.	MCCLN_AR_6403.pdf
01 Jan 2003	CS 010 TCRA, Quarterly Status Report, Third Quarter 2002 (July through September)	URS Group, Inc.	MCCLN_AR_5000.pdf
08 May 2003	Submission of Deliverable (BOOS, BOO6, BOO7) – 25 February 2003 Meeting Minutes for Environmental Restoration Advisory Board (RAB) on Contract F41624-97-D-802O D.O. 0137	Bjers, Traci; Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_4609.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.2.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.pdf
20 Aug 2003	CS 010 TCRA Quarterly Status Report First Quarter 2003 (January through March)	Lidstrom, Ray; Smarkel, Ken / URS Group, Inc.	MCCLN_AR_4943.pdf
01 Oct 2003	Environmental Action Update, July – September 2003	Brunner, Paul G. / AFRPA	MCCLN_AR_5277.pdf
01 Jan 2004	A Quarterly Newsletter About Environmental Activities at McClellan January – May 2004	AFRPA	MCCLN_AR_5455.pdf
03 Feb 2004	CS 010 TCRA Quarterly Status Report Second Quarter 2003 (April through June)	URS Group, Inc.	MCCLN_AR_5207.pdf
20 Apr 2004	Disposal Pits Treatment Evaluation Study Approach Technical Memorandum	Benedict, Stephanie / Lawrence, Jeff / URS Group, Inc.	MCCLN_AR_5399.pdf
21 Apr 2004	Long Term Monitoring at Confirmed Site 10	Brunner, Paul G. / AFRPA	MCCLN_AR_5382.pdf
22 Apr 2004	Final Five-Year Review Report for McClellan	MWH Americas, Inc.	MCCLN_AR_5402.pdf
01 Oct 2004	IRP, Interim Data Summary Report, CS 010, Time Critical Removal Action, Final	Lidstrom, Ray; Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_5685.pdf
01 Oct 2004	IRP, Interim Data Summary Report, CS 010, Time Critical Removal Action, Final	Lidstrom, Ray; Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_5685.1.pdf
20 Jan 2005	CS 010 TCRA Fourth Quarter 2003 Quarterly Status Report	Benedict, Stephanie / Lidstrom, Ray / URS Group, Inc.	MCCLN_AR_5583.pdf
31 Jan 2005	Restoration Advisory Board Meeting Minutes, 17 August 2004	Brunner, Paul G. / AFRPA	MCCLN_AR_5582.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf

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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.1.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.2.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.3.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.4.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.7.pdf
12 May 2005	Final LRA Initial Parcel Feasibility Study #2	CH2M HILL	MCCLN_AR_5660.pdf
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
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22 Sep 2005	Former McClellan AFB Interim Basewide Remedial Investigation Report, Part 1, General Framework Revision 2, Final (DSR# 381-7)	Mitretek Systems, Inc.	MCCLN_AR_5934.pdf
31 Dec 2005	Final Radiological Historical Site Assessment for the Former McClellan AFB (DSR# 908-3) and Radiological Historical Site Assessment for Buildings (DSR# 1581-3)	Mitretek Systems, Inc.; Cabrera Services	MCCLN_AR_5942.pdf

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25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf
02 Oct 2006	Proposed Plan Fact Sheet - Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
02 Nov 2006	Final, Focused Strategic Sites Proposed Plan	Andy Cramer / CH2M HILL	MCCLN_AR_6033.pdf
01 Mar 2007	Restoration Advisory Board Meeting Minutes, 15 August 2006	Steven Mayer / AFRPA	MCCLN_AR_6279.pdf
18 Apr 2007	Restoration Advisory Board Meeting Minutes, 5 December 2006	Joe Clark / CH2M HILL	MCCLN_AR_6407.pdf
22 May 2007	Request for Determination of NRC Regulatory Jurisdiction for Material at Confirmed Site 10 (CS 010)	Mark Wrobel / Office of the Surgeon General	MCCLN_AR_6411.pdf
04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled Toxic-pits cleanup dropped	Phil Mook / AFRPA	MCCLN_AR_6490.pdf
17 Jul 2007	Memo on Lines of Evidence Supporting the Discontinuation of Groundwater Sampling for Uranium 238 for CS 010, CS 024, PRL 32 and PRL S-020	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6488.pdf

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01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.1.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
01 Apr 1986	Technical Memorandum Report, Shallow Investigation Program, Part IV, OU A, OU B	McLaren Environmental Engineering	MCCLN_AR_707.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Vol. I of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_708.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.1.pdf
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01 Jul 1993	PA, Report, Vol. I of III, Summary and Overview, OU C	CH2M HILL	MCCLN_AR_2151.pdf
01 Jul 1993	PA, Report, Vol. II of III, Technical Memorandums, OU C	CH2M HILL	MCCLN_AR_2152.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.2.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.2.pdf
01 Mar 1994	RI, Draft Final SAP, OU C	Radian Corp.	MCCLN_AR_2268.pdf
01 May 1994	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf

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01 Mar 1995	Final Scoping Report, Basewide Ecological Risk Assessment, OU C	Jacobs Engineering Group, Inc.	MCCLN_AR_2566.pdf
01 Jul 1995	Final Surface Soil Radiological Characterization Report, OU C	Radian Corp.	MCCLN_AR_3518.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
29 Jan 1997	Final SVE, EE/CA, IC 19	Jacobs Engineering Group, Inc.	MCCLN_AR_3251.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. I of IV, OU C	Radian Corp.	MCCLN_AR_3404.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. II of IV, OU C	Radian Corp.	MCCLN_AR_3405.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.1.pdf
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01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. IV of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3407.pdf
01 Aug 1997	Removal Action Report, SVE, IC 19	URS Greiner, Inc.	MCCLN_AR_3410.pdf
01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.2.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. III of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2454.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.1.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.2.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.3.pdf
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01 Dec 1999	FS, Report, Final Basewide VOC, Vol. I of III	CH2M HILL	MCCLN_AR_3721.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
01 Oct 2001	Final, Basewide Removal Action Work Plan, SVE	URSG-Laidlaw	MCCLN_AR_4293.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.2.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.4.pdf
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15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
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15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
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01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf
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04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled Toxic-pits cleanup dropped	Phil Mook / AFRPA	MCCLN_AR_6490.pdf

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Document Date	Subject or Title	Author / Corporate Affiliation	File Name
01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.1.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
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01 Aug 1997	Removal Action Report, SVE, IC 19	URS Greiner, Inc.	MCCLN_AR_3410.pdf
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01 Jul 1995	Final Surface Soil Radiological Characterization Report, OU C	Radian Corp.	MCCLN_AR_3518.pdf
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29 Jan 1997	Final SVE, EE/CA, IC 19	Jacobs Engineering Group, Inc.	MCCLN_AR_3251.pdf
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01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
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01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
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01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.1.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.1.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.7.pdf
12 May 2005	Final LRA Initial Parcel Feasibility Study #2	CH2M HILL	MCCLN_AR_5660.pdf
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
31 Dec 2005	Final Radiological Historical Site Assessment for the Former McClellan AFB (DSR# 908-3) and Radiological Historical Site Assessment for Buildings (DSR# 1581-3)	Mitretek Systems, Inc.; Cabrera Services	MCCLN_AR_5942.pdf
25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
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02 Oct 2006	Proposed Plan Fact Sheet – Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
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15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
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01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
01 Apr 1986	Technical Memorandum Report, Shallow Investigation Program, Part IV, OU A, OU B	McLaren Environmental Engineering	MCCLN_AR_707.pdf
01 Apr 1986	Contamination Report, OU A	McLaren Environmental Engineering	MCCLN_AR_721.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Vol. I of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_708.pdf
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01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.2.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.1.pdf
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01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.2.pdf

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01 Mar 1994	RI, Draft Final SAP, OU C	Radian Corp.	MCCLN_AR_2268.pdf
01 May 1994	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf
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01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2602.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2603.1.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2603.2.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2603.3.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix B, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2604.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix C, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2605.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Appendix D, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2606.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, Vol. I of IV, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2607.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, Vol. II of IV, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2608.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, Vol. III of IV, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2609.1.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, Vol. III of IV, Appendix A, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2609.2.pdf
01 Apr 1995	RI, Interim Basewide Final Report, Characterization Summaries, Part 2C1, Vol. IV of IV, Appendices B-D, OU C1	Jacobs Engineering Group, Inc.	MCCLN_AR_2610.pdf
01 Jul 1995	Final Surface Soil Radiological Characterization Report, OU C	Radian Corp.	MCCLN_AR_3518.pdf

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01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. I of IV, OU C	Radian Corp.	MCCLN_AR_3404.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. II of IV, OU C	Radian Corp.	MCCLN_AR_3405.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.1.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.2.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. IV of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3407.pdf
01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.2.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. III of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2454.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.1.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.2.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
07 Sep 2000	Final Technical Memorandum, Non-VOC Bench Scale Soil Treatment, SA 012, CS 013, CS 022	CH2M HILL	MCCLN_AR_3901.pdf
01 Jun 2001	RI, Final Interim Basewide Report, Characterization Summaries and Addenda, Part 2C1, Vol. I of III, OU C1	URS Group, Inc.	MCCLN_AR_4193.pdf

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01 Jun 2001	RI, Final Interim Basewide Report, Characterization Summaries and Addenda, Part 2C1, Appendices A, B, C, E, F, G, Vol. II of III, OU C1	URS Group, Inc.	MCCLN_AR_4194.1.pdf
01 Jun 2001	RI, Final Interim Basewide Report, Characterization Summaries and Addenda, Part 2C1, Appendices A, B, C, E, F, G, Vol. II of III, OU C1	URS Group, Inc.	MCCLN_AR_4194.2.pdf
01 Jun 2001	RI, Final Interim Basewide Report, Characterization Summaries and Addenda, Part 2C1, Appendix D, Vol. III of III, OU C1	URS Group, Inc.	MCCLN_AR_4195.pdf
01 Oct 2001	Final, Basewide Removal Action Work Plan, SVE	URSG-Laidlaw	MCCLN_AR_4293.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.2.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.pdf
12 May 2005	Final LRA Initial Parcel Feasibility Study #2	CH2M HILL	MCCLN_AR_5660.pdf
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf

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02 Oct 2006	Proposed Plan Fact Sheet - Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
02 Nov 2006	Final, Focused Strategic Sites Proposed Plan	Andy Cramer / CH2M HILL	MCCLN_AR_6033.pdf
01 Mar 2007	Restoration Advisory Board Meeting Minutes, 15 August 2006	Steven Mayer / AFRPA	MCCLN_AR_6279.pdf
18 Apr 2007	Restoration Advisory Board Meeting Minutes, 5 December 2006	Joe Clark / CH2M HILL	MCCLN_AR_6407.pdf
04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled Toxic-pits cleanup dropped	Phil Mook / AFRPA	MCCLN_AR_6490.pdf

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01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.1.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
01 Apr 1986	Technical Memorandum Report, Shallow Investigation Program, Part IV, OU A, OU B	McLaren Environmental Engineering	MCCLN_AR_707.pdf
01 Apr 1986	Contamination Report, OU A	McLaren Environmental Engineering	MCCLN_AR_721.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Vol. I of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_708.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.1.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.2.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.1.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.2.pdf
01 Feb 1991	Installation Restoration Program (IRP) Stage 3 Operable Unit A Preliminary Assessment Summary Report Volume 1: Text and Plates	Radian Corporation	MCCLN_AR_4987.pdf
01 Feb 1991	Installation Restoration Program(IRP) Stage 3 Operable Unit A Preliminary Assessment Summary Report Volume II: Appendix A and Appendix B (Part 1)	Radian Corporation	MCCLN_AR_4988.pdf
01 Feb 1991	Installation Restoration Program (IRP) Stage 3 Operable Unit A Preliminary Assessment Summary Report Volume III: Appendix B (Part 2)	Radian Corporation	MCCLN_AR_4989.pdf

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01 Feb 1991	Installation Restoration Program (IRP) Stage # Operable Unit A Preliminary Assessment Summary Report Volume IV: Appendix B (Part 3) and Appendices C, D, and E.	Radian Corporation	MCCLN_AR_4990.pdf
01 Sep 1992	RI, Final SAP, Vol. I, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_1883.pdf
01 Sep 1992	PA/SI, Final Technical Summary Report	Radian Corp.	MCCLN_AR_2427.pdf
01 Apr 1994	Draft Final Summary Report, LF-024, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2294.pdf
01 Oct 1994	Basewide Ecological Risk Assessment Final Scoping Report, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2472.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. I of VI, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2795.1.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. I of VI, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2795.2.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. II of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2796.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. III of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2797.1.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. III of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2797.2.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. IV of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2798.1.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. IV of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2798.2.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. V of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2799.1.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. V of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2799.2.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. V of VI, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2799.3.pdf
01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. VI of VI, Appendices B-D, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2800.1.pdf

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01 Nov 1995	RI, Interim Basewide Final Report, Site Characterization Summary and FSP, Part 2A, Vol. VI of VI, Appendices B-D, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_2800.2.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
13 Dec 1995	Multiple Decision Documents	CH2M HILL	MCCLN_AR_2843.pdf
01 Jun 1997	RI, Final Interim Basewide Report, Part 1, Vol. I of II, Revision 1	Radian Corp.	MCCLN_AR_3355.pdf
01 Jun 1997	RI, Final Interim Basewide Report, Part 1, Vol. II of II, Appendices, Revision 1	Radian Corp.	MCCLN_AR_3356.pdf
01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.1.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.2.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.1.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.2.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.3.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.4.pdf
01 Mar 1999	Final Basewide Data Gap FSP 3, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_3609.1.pdf
01 Mar 1999	Final Basewide Data Gap FSP 3, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_3609.2.pdf
01 Mar 1999	Update Pages, Final Basewide Data Gap, FSP 3	Jacobs Engineering Group, Inc.	MCCLN_AR_929.pdf
01 Jun 1999	Final, EE/CA, SVE, IC 42	URS Greiner Woodward Clyde, Inc.	MCCLN_AR_932.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. I of III	CH2M HILL	MCCLN_AR_3721.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Dec 1999	Final Supplemental Environmental Baseline Survey (EBS), Facilities and Associated Properties, Group 1	Radian Corp.	MCCLN_AR_3724.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
01 Nov 2000	RA, Report, SVE, IC 41, IC 42, IC 43	Radian Corp.	MCCLN_AR_3951.pdf

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01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. I of XIV, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4262.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. II of XIV, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4263.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. III of XIV, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4264.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. IV of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4265.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. IV of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4265.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. V of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4266.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. V of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4266.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VI of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4267.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VI of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4267.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VII of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4268.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VII of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4268.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VIII of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4269.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. VIII of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4269.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. IX of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4270.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. IX of XIV, Appendix A, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4270.2.pdf

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01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. X of XIV, Appendix B, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4271.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. X of XIV, Appendix B, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4271.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XI of XIV, Appendix C1-C10, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4272.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XI of XIV, Appendix C1-C10, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4272.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XI of XIV, Appendix C1-C10, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4272.3.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XII of XIV, Appendix D1-D4, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4273.1.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XII of XIV, Appendix D1-D4, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4273.2.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XIII of XIV, Appendix D4-D6, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4274.pdf
01 Sep 2001	RI, Final Interim Basewide Characterization Summaries Report, Part 2A, Vol. XIV of XIV, Appendix D6-D7, OU A	Jacobs Engineering Group, Inc.	MCCLN_AR_4275.pdf
01 Jan 2002	Final Radiological FSP, Groundwater Monitoring Program	URS Group, Inc.	MCCLN_AR_4367.pdf
01 Sep 2002	Installation Restoration Program McClellan Air Force Base Radiation Health and Safety Survey of Disposal Pits Field Sampling Plan Part 1 —Technical Approach	Jacobs Engineering	MCCLN_AR_4979.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.2.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1 Data Item Nos. A008, A012, A023A, A023B, A024A, A024B, A039, A040, A044	CH2M HILL	MCCLN_AR_4942.pdf

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01 Sep 2003	Installation Restoration Program Former McClellan Air Force Base Radiation Health and Safety Survey of Disposal Pits Report of Findings	Jacobs Engineering	MCCLN_AR_4950.pdf
18 Mar 2004	Final Work Plan for an Enhanced Anaerobic Bioremediation Pilot Study at Former McClellan Air Force Base, California	Guest, Peter / Griffiths, Daniel / Wolff, Linda McGlochlin / Parsons	MCCLN_AR_5391.pdf
25 Mar 2004	Installation Restoration Program Former McClellan Air Force Base Interview Database Summary 2003	Brajkovich, Laurie / Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_5411.pdf
30 Jun 2004	LRA Initial Parcel Record of Decision #1 (7 Sites) For Soil at PRL S-014, PRL S-033, PRL S-040, SA 003, SA 035, SA 041, SA 091	CH2M HILL	MCCLN_AR_5488.pdf
12 May 2005	Final LRA Initial Parcel Feasibility Study #2	CH2M HILL	MCCLN_AR_5660.pdf
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
31 Dec 2005	Final Radiological Historical Site Assessment for the Former McClellan AFB (DSR# 908-3) and Radiological Historical Site Assessment for Buildings (DSR# 1581-3)	Mitretek Systems, Inc.; Cabrera Services	MCCLN_AR_5942.pdf
25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf
02 Oct 2006	Proposed Plan Fact Sheet - Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
02 Nov 2006	Final, Focused Strategic Sites Proposed Plan	Andy Cramer / CH2M HILL	MCCLN_AR_6033.pdf
01 Mar 2007	Restoration Advisory Board Meeting Minutes, 15 August 2006	Steven Mayer / AFRPA	MCCLN_AR_6279.pdf
18 Apr 2007	Restoration Advisory Board Meeting Minutes, 5 December 2006	Joe Clark / CH2M HILL	MCCLN_AR_6407.pdf

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04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled Toxic-pits cleanup dropped	Phil Mook / AFRPA	MCCLN_AR_6490.pdf
17 Jul 2007	Memo on Lines of Evidence Supporting the Discontinuation of Groundwater Sampling for Uranium 238 for CS 010, CS 024, PRL 32 and PRL S-020	Jacqueline Shulters / URS Group, Inc.	MCCLN_AR_6488.pdf

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01 Jul 1981	Records Search Report	CH2M HILL	MCCLN_AR_41.pdf
01 Oct 1984	Phase III and IV, Site Characterization Study, Technical Memorandum No 2, Shallow Exploration Program, OU D	CH2M HILL	MCCLN_AR_461.pdf
01 Mar 1985	Base Level Report, Site Characterization, OU A, OU B, OU C, OU D	McLaren Environmental Engineering	MCCLN_AR_570.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.1.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part I, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_704.2.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part II, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_705.pdf
01 Feb 1986	Technical Memorandum Report, Shallow Investigation Program, Part III, OU A, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_706.pdf
01 Apr 1986	Technical Memorandum Report, Shallow Investigation Program, Part IV, OU A, OU B	McLaren Environmental Engineering	MCCLN_AR_707.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Vol. I of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_708.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.1.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendix 1, Vol. II of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_709.2.pdf
01 May 1986	Technical Memorandum Report, Shallow Investigation Program, Part V, Appendices 2 and 3, Vol. III of III, OU B, OU C	McLaren Environmental Engineering	MCCLN_AR_710.1.pdf
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01 Jan 1986	Technical Report No 2, Monitoring/Extraction System, OU D	McLaren Environmental Engineering	MCCLN_AR_688.pdf
01 Jul 1993	PA, Report, Vol. I of III, Summary and Overview, OU C	CH2M HILL	MCCLN_AR_2151.pdf
01 Jul 1993	PA, Report, Vol. II of III, Technical Memorandums, OU C	CH2M HILL	MCCLN_AR_2152.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix A1, OU C	CH2M HILL	MCCLN_AR_2153.2.pdf

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01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.1.pdf
01 Jul 1993	PA, Report, Vol. III of III, Appendix B, OU C	CH2M HILL	MCCLN_AR_2155.2.pdf
01 Aug 1993	Final Work Plan, Field Investigation, OU D	CH2M HILL	MCCLN_AR_2176.pdf
06 Aug 1993	ROD, NFA, PA Final, OU D	CH2M HILL	MCCLN_AR_2180.pdf
01 Mar 1994	RI, Draft Final SAP, OU C	Radian Corp.	MCCLN_AR_2268.pdf
01 May 1994	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf
09 May 1994	Final Consensus Statement, Borehole Conversion to SVE Wells or Vadose Zone Monitoring Wells, OU D	CH2M HILL	MCCLN_AR_3507.pdf
01 Jun 1994	RI, Final Report, Vol. I of III, OU D	CH2M HILL	MCCLN_AR_2345.pdf
01 Jun 1994	RI, Final Report, Vol. II of III, OU D	CH2M HILL	MCCLN_AR_2346.pdf
01 Jun 1994	RI, Final Report, Vol. III of III, OU D	CH2M HILL	MCCLN_AR_2347.pdf
13 Nov 1995	Special Status Species Monitoring Report	Jacobs Engineering Group, Inc.	MCCLN_AR_2812.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
01 Dec 1995	Final FSP, Vadose Zone Model Validation, WP-092	Radian Corp.	MCCLN_AR_2841.pdf
01 Jan 1996	Vadose Zone Monitoring Well Letter Report, Soil Gas Investigation, OU D	CH2M HILL	MCCLN_AR_2868.pdf
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01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. II of IV, OU C	Radian Corp.	MCCLN_AR_3405.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.1.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. III of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3406.2.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. IV of IV, Appendices, OU C	Radian Corp.	MCCLN_AR_3407.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. I of III, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2452.pdf

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01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.1.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. II of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2453.2.pdf
01 Jan 1998	RI, Final Interim Basewide Report, Characterization Summary, Part 2c, Vol. III of III, Appendices, IC 17, IC 19, IC 21	Radian Corp.	MCCLN_AR_2454.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.1.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.2.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.3.pdf
01 Sep 1998	Final Data Gap FSP 2	Radian Corp.	MCCLN_AR_898.4.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. I of III	CH2M HILL	MCCLN_AR_3721.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Feb 2000	Final Work Plan, Remedial Process Optimization Evaluation, OU D	Parsons Engineering Science, Inc.	MCCLN_AR_4050.pdf
01 Apr 2000	RI, Final Report, Addenda, Vol. I of V, OU D	Radian Corp.	MCCLN_AR_3801.pdf
01 Apr 2000	Update Pages, RI Final Report, Addenda, Vol. II of V, OU D	Radian Corp.	MCCLN_AR_3802.pdf
01 Apr 2000	Update Pages, RI Final Report, Addenda, Vol. III of V, OU D	Radian Corp.	MCCLN_AR_3803.pdf
01 Apr 2000	RI, Final Report, Addenda, Vol. IV of V, Appendices A-C, OU D	Radian Corp.	MCCLN_AR_3804.pdf
01 Apr 2000	RI, Final Report, Addenda, Vol. V of V, OU D	Radian Corp.	MCCLN_AR_3805.1.pdf
01 Apr 2000	RI, Final Report, Addenda, Vol. V of V, OU D	Radian Corp.	MCCLN_AR_3805.2.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
13 Jul 2001	Delineation of Wetlands and Other Jurisdictional Waters of the United States at McClellan Air Force Base, California	RMI	MCCLN_AR_6235.pdf
01 Jan 2002	RA, Annual Landfill Cap Inspection and Maintenance Report, Vadose Zone, OU D, DP-178	Cape Environmental Management, Inc.	MCCLN_AR_4364.pdf
01 Sep 2002	Installation Restoration Program McClellan Air Force Base Radiation Health and Safety Survey of Disposal Pits Field Sampling Plan Part 1 —Technical Approach	Jacobs Engineering	MCCLN_AR_4979.pdf

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24 Sep 2002	IRP Sites/(WIMS #): CS 001 (LFOO1), CS 002 (LFOO2), CS 003 (LFOO3),CS 004 (DPOO4), CS 005 (DP005), CS 006 (DPOO6), CS 026 (LF026),PRL 027 (DP027), CS A (DP151), CS S (DP152), CS T(DP153), and Vadose Zone Site (DP178)	Brunner, Paul G. / AFRPA	MCCLN_AR_4784.pdf
01 May 2003	Full-Service Remedial Action Annual Landfill Cap Inspections and Maintenance Report Site DP 178 (Vadose Zone in Operable Unit D) at Former McClellan Air Force Base, California PRJY 2002-7254 Contract F41 624-01-D-855	Cape Environmental Management, Inc.	MCCLN_AR_4603.pdf
01 Sep 2003	Installation Restoration Program Former McClellan Air Force Base Radiation Health and Safety Survey of Disposal Pits Report of Findings	Jacobs Engineering	MCCLN_AR_4950.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 2	CH2M HILL	MCCLN_AR_4942.2.pdf
20 Apr 2004	Disposal Pits Treatment Evaluation Study Approach Technical Memorandum	Benedict, Stephanie / Lawrence, Jeff / URS, Group, Inc.	MCCLN_AR_5399.pdf
30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS, Group, Inc.	MCCLN_AR_5651.pdf
30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS, Group, Inc.	MCCLN_AR_5651.1.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.1.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.2.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.3.pdf

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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.4.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.5.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.6.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.7.pdf
12 May 2005	Final LRA Initial Parcel Feasibility Study #2	CH2M HILL	MCCLN_AR_5660.pdf
19 May 2005	Basewide Vernal Pool Scoping Level/Tier 1 Ecological Risk Assessment	Parsons	MCCLN_AR_6236.pdf
31 May 2005	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report January through March 2005	Benedict, Stephanie / Graff, Paul / URS Group, Inc.	MCCLN_AR_5653.pdf
15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
15 Aug 2005	Soil Cleanup For 23 Sites Proposed Plan Public Meeting Minutes	Paul Brunner / AFRPA	MCCLN_AR_5898.pdf
31 Aug 2005	SVE Vadose Zone Quarterly Monitoring Report, April through June 2005	Graff, Paul; Benedict, Stephanie K. / URS Group, Inc.	MCCLN_AR_5657.pdf
22 Sep 2005	Former McClellan AFB Interim Basewide Remedial Investigation Report, Part 1, General Framework Revision 2, Final (DSR# 381-7)	Mitretek Systems, Inc.	MCCLN_AR_5934.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6362.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.1.pdf
30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.2.pdf

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30 Nov 2005	SVE Removal Action Quarterly Vadose Zone Monitoring Report July through Sep 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6022.3.pdf
31 Dec 2005	Final Radiological Historical Site Assessment for the Former McClellan AFB (DSR# 908-3) and Radiological Historical Site Assessment for Buildings (DSR# 1581-3)	Mitretek Systems, Inc.; Cabrera Services	MCCLN_AR_5942.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.1.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.2.pdf
02 Mar 2006	SVE Removal Action Quarterly Vadose Zone Monitoring Report Oct through Dec 2005	Paul Graff / URS Group, Inc.	MCCLN_AR_6019.3.pdf
25 May 2006	Final Focused Strategic Sites Feasibility Study	CH2M HILL	MCCLN_AR_6010.pdf
30 May 2006	SVE Vadose Zone quarterly Monitoring Report, Jan - mar 2006 (First Quarter 2006)	Paul Graff / URS Group, Inc.	MCCLN_AR_6124.pdf
30 Aug 2006	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report April - June 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6119.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
01 Sep 2006	Restoration Advisory Board (RAB) Meeting minutes, 16 February 2006	Steven Mayer / AFRPA	MCCLN_AR_6140.pdf
01 Sep 2006	Restoration Advisory board (RAB) Meeting Minutes, 18 May 2006	Steven Mayer / AFRPA	MCCLN_AR_6141.pdf
02 Oct 2006	Proposed Plan Fact Sheet - Focused Strategic Sites	AFRPA	MCCLN_AR_6237.pdf
02 Nov 2006	Final, Focused Strategic Sites Proposed Plan	Andy Cramer / CH2M HILL	MCCLN_AR_6033.pdf
30 Nov 2006	Soil Vapor Extraction Removal Action quarterly Vadose Zone Monitoring Report, Jul - Sep 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6241.pdf
01 Mar 2007	Restoration Advisory Board Meeting Minutes, 15 August 2006	Steven Mayer / AFRPA	MCCLN_AR_6279.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.1.pdf

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02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.2.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.3.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.4.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.5.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.6.pdf
02 Mar 2007	Soil Vapor Extraction Removal Action Annual Vadose Zone Monitoring Report Jan through Dec 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6421.7.pdf
18 Apr 2007	Restoration Advisory Board Meeting Minutes, 5 December 2006	Joe Clark / CH2M HILL	MCCLN_AR_6407.pdf
04 Jun 2007	DTSC Responses to Air Force Preliminary Responses to DHS Comments on Final Focused Strategic Sites Proposed Plan	Kevin Depies / DTSC	MCCLN_AR_6442.pdf
15 Jun 2007	Sacramento Bee article titled Toxic-pits cleanup dropped	Phil Mook / AFRPA	MCCLN_AR_6490.pdf

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01 Oct 1984	Phase III and IV, Site Characterization Study, Technical Memorandum No 2, Shallow Exploration Program, OU D	CH2M HILL	MCCLN_AR_461.pdf
01 Mar 1985	Base Level Report, Site Characterization, OU A, OU B, OU C, OU D	McLaren Environmental Engineering	MCCLN_AR_570.pdf
01 Jan 1986	Technical Report No 2, Monitoring/ Extraction System, OU D	McLaren Environmental Engineering	MCCLN_AR_688.pdf
01 Aug 1993	Final Work Plan, Field Investigation, OU D	CH2M HILL	MCCLN_AR_2176.pdf
06 Aug 1993	ROD, NFA, PA Final, OU D	CH2M HILL	MCCLN_AR_2180.pdf
01 May 1994	RI/FS, Final Report, SAP, OU C	Radian Corp.	MCCLN_AR_2314.pdf
09 May 1994	Final Consensus Statement, Borehole Conversion to SVE Wells or Vadose Zone Monitoring Wells, OU D	CH2M HILL	MCCLN_AR_3507.pdf
01 Jun 1994	RI, Final Report, Vol. I of III, OU D	CH2M HILL	MCCLN_AR_2345.pdf
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01 Jun 1994	RI, Final Report, Vol. III of III, OU D	CH2M HILL	MCCLN_AR_2347.pdf
02 Dec 1994	CDTSC Letter to Base Concerning Comments on FS Draft Report for Basewide Vadose Zone	Malinowski, Mark / DTSC	MCCLN_AR_2503.pdf
12 Jul 1995	FS, Final Report, Basewide Vadose Zone	CH2M HILL	MCCLN_AR_2688.pdf
13 Nov 1995	Special Status Species Monitoring Report	Jacobs Engineering Group, Inc.	MCCLN_AR_2812.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
01 Dec 1995	Final FSP, Vadose Zone Model Validation, WP-092	Radian Corp.	MCCLN_AR_2841.pdf
01 Jan 1996	Vadose Zone Monitoring Well Letter Report, Soil Gas Investigation, OU D	CH2M HILL	MCCLN_AR_2868.pdf
16 Jan 1996	Base Letter to the Central Valley Water Board Concerning Basis for Agreement for Groundwater and Vadose Zone Cleanup	Brunner, Paul G / AFRPA	MCCLN_AR_3012.pdf
01 Apr 1996	Vadose Zone Monitoring Well Letter Report, Soil Gas Investigation, OU D	CH2M HILL	MCCLN_AR_3064.pdf
31 Oct 1996	Vadose Zone Monitoring System Installation Report	Lawrence Berkeley National Laboratory	MCCLN_AR_3194.pdf
01 Aug 1997	RI, Final Interim Basewide Report, Characterization Summary, FSP, Part 2c, Vol. I of IV, OU C	Radian Corp.	MCCLN_AR_3404.pdf

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05 Jan 1998	Annual Report, Data Analysis for Preliminary Conceptual Model Design, Vadose Zone Monitoring System, 97	Ernest Orlando / Lawrence Berkeley National Laboratory	MCCLN_AR_4034.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.1.pdf
01 Aug 1998	Final Data Gap FSP 1	Radian Corp.	MCCLN_AR_894.2.pdf
01 Jun 1999	First Quarter 99 Final Report, Groundwater Monitoring Program, OU D	Radian Corp.	MCCLN_AR_2883.pdf
15 Jun 1999	Semi-Annual Report, VOC Transport Modeling for Vadose Zone Monitoring System, WP-092	Lawrence Berkeley National Laboratory	MCCLN_AR_946.pdf
01 Sep 1999	Final Report, Vadose Zone Monitoring System, S-7	Lawrence Berkeley National Laboratory	MCCLN_AR_3659.pdf
01 Feb 2000	Final Work Plan, Remedial Process Optimization Evaluation, OU D	Parsons Engineering Science, Inc.	MCCLN_AR_4050.pdf
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01 Apr 2000	RI, Final Report, Addenda, Vol. V of V, OU D	Radian Corp.	MCCLN_AR_3805.2.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.2.pdf
13 Jul 2001	Delineation of Wetlands and Other Jurisdictional Waters of the United States at McClellan Air Force Base, California	RMI	MCCLN_AR_6235.pdf
14 Nov 2001	Treatability Study Results, Small Arms Firing Range, PRLS-004	Brice Environmental Services Corp.	MCCLN_AR_4476.pdf
01 Jan 2002	RA, Annual Landfill Cap Inspection and Maintenance Report, Vadose Zone, OU D, DP-178	Cape Environmental Management, Inc.	MCCLN_AR_4364.pdf
01 Jan 2002	Final Work Implementation Plan, Soil Washing and Solidification/Stabilization, Revision 1	URS Corp.	MCCLN_AR_4477.pdf
15 Jan 2002	Addendum, Treatability Study Results, Small Arms Firing Range, PRLS-004	Brice Environmental Services Corp.	MCCLN_AR_4478.pdf
24 Sep 2002	IRP Sites/(WIMS #): CS 001 (LFOO1), CS 002 (LFOO2), CS 003 (LFOO3),CS 004 (DPOO4), CS 005 (DP005), CS 006 (DPOO6), CS 026 (LF026),PRL 027 (DP027), CS A (DP151), CS S (DP152), CS T(DP153), and Vadose Zone Site (DP178)	Brunner, Paul G. / AFRPA	MCCLN_AR_4784.pdf
01 Apr 2003	Soil Washing And Stabilization Technology Application and Analysis Report	URS Group, Inc.	MCCLN_AR_4999.pdf
01 May 2003	Full-Service Remedial Action Annual Landfill Cap Inspections and Maintenance Report Site DP 178 (Vadose Zone in Operable Unit D) at Former McClellan Air Force Base, California PRJY 2002-7254 Contract F41 624-01-D-855	Cape Environmental Management, Inc.	MCCLN_AR_4603.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 1	CH2M HILL	MCCLN_AR_4942.1.pdf
01 Aug 2003	Final LRA Initial Parcel Feasibility Study #1 (7 Sites) Volume 2	CH2M HILL	MCCLN_AR_4942.2.pdf
20 Apr 2004	Disposal Pits Treatment Evaluation Study Approach Technical Memorandum	Benedict, Stephanie / Lawrence, Jeff / URS Group, Inc.	MCCLN_AR_5399.pdf
30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5651.pdf

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30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5651.1.pdf
31 Jan 2005	Restoration Advisory Board Meeting Minutes, 17 August 2004	Brunner, Paul G. / AFRPA	MCCLN_AR_5582.pdf
28 Feb 2005	Soil vapor extraction removal action quarterly vadose zone monitoring report for October through December 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5652.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.2.pdf
02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.3.pdf
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31 May 2005	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report January through March 2005	Benedict, Stephanie / Graff, Paul. / URS Group, Inc.	MCCLN_AR_5653.pdf

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15 Jul 2005	Focused Strategic Sites Feasibility Study Consolidation Unit Alternative	Brunner, Paul G. / AFRPA	MCCLN_AR_5764.pdf
15 Aug 2005	Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Tawney, Desiree C. / Northern California Court Reporters	MCCLN_AR_5654.pdf
15 Aug 2005	Public Meeting, Proposed Plan for Soil Cleanup at 23 Sites (Initial Parcel Proposed Plan #2)	Sytsma, Brian / AFRPA	MCCLN_AR_5656.pdf
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31 Aug 2005	SVE Vadose Zone Quarterly Monitoring Report, April through June 2005	Graff, Paul; Benedict, Stephanie K. / URS Group, Inc.	MCCLN_AR_5657.pdf
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30 Aug 2006	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report April - June 2006	Paul Graff / URS Group, Inc.	MCCLN_AR_6119.pdf
30 Aug 2006	AFRPA Base Realignment and Closure Master Plan (BRAC Master Plan)	AFRPA	MCCLN_AR_6395.pdf
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11 May 1984	Fact Sheet, FS, OU D	2852 ABG/CEV	MCCLN_AR_351.pdf
01 Oct 1984	Phase III and IV, Site Characterization Study, Technical Memorandum No 2, Shallow Exploration Program, OU D	CH2M HILL	MCCLN_AR_461.pdf
01 Feb 1985	Phase III and IV, Final Report, OU D	CH2M HILL	MCCLN_AR_558.pdf
01 Mar 1985	Base Level Report, Site Characterization, OU A, OU B, OU C, OU D	McLaren Environmental Engineering	MCCLN_AR_570.pdf
01 Jan 1986	Technical Report No 2, Monitoring/ Extraction System, OU D	McLaren Environmental Engineering	MCCLN_AR_688.pdf
01 Aug 1987	Work Plan, Site Characterization Assessment, Final Report Task No. 1, Area D	IT Corp.	MCCLN_AR_1147.pdf
01 Mar 1991	ROD, RI/FS, Stage 7, Final Cap, OU D	Radian Corp.	MCCLN_AR_1661.pdf
01 Jul 1991	Draft SAP, SVE Treatability Investigation, Site S, OU D	CH2M HILL	MCCLN_AR_1727.pdf
05 Sep 1991	Fact Sheet, The Facts, Soil Vapor Treatment Study Begins in OU D	SM-ALC/PA	MCCLN_AR_1777.pdf
01 Jan 1992	Final Soil Vapor Date Summary Report, Volume 1 and 2	CH2M HILL	MCCLN_AR_6234.pdf
14 Apr 1992	Final Site Characterization Technical Memorandum, SVE Treatability Investigation, DP-152	CH2M HILL	MCCLN_AR_1898.pdf
01 Sep 1992	Phase II, Phase III, Final Work Plan, SVE Treatability Investigation, Site S, DP-152	CH2M HILL	MCCLN_AR_2007.pdf
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01 Aug 1993	Final Work Plan, Field Investigation, OU D	CH2M HILL	MCCLN_AR_2176.pdf
06 Aug 1993	ROD, NFA, PA Final, OU D	CH2M HILL	MCCLN_AR_2180.pdf
01 Nov 1993	Final Basewide EE/CA, SVE Report	Mitre Corp.	MCCLN_AR_2222.pdf
09 May 1994	Final Consensus Statement, Borehole Conversion to SVE Wells or Vadose Zone Monitoring Wells, OU D	CH2M HILL	MCCLN_AR_3507.pdf
01 Jun 1994	RI, Final Report, Vol. I of III, OU D	CH2M HILL	MCCLN_AR_2345.pdf
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12 Jul 1995	FS, Final Report, Basewide Vadose Zone	CH2M HILL	MCCLN_AR_2688.pdf
13 Nov 1995	Special Status Species Monitoring Report	Jacobs Engineering Group, Inc.	MCCLN_AR_2812.pdf
01 Dec 1995	Basewide Ecological Risk Assessment, Technical Memorandum, Final Scoping Summary Status Report, OU A, OU B, OU C, OU D	Jacobs Engineering Group, Inc.	MCCLN_AR_2838.pdf
01 Dec 1995	Final FSP, Vadose Zone Model Validation, WP-092	Radian Corp.	MCCLN_AR_2841.pdf
01 Jan 1996	Vadose Zone Monitoring Well Letter Report, Soil Gas Investigation, OU D	CH2M HILL	MCCLN_AR_2868.pdf
16 Jan 1996	Base Letter to the Central Valley Water Board Concerning Basis for Agreement for Groundwater and Vadose Zone Cleanup	Brunner, Paul G / AFRPA	MCCLN_AR_3012.pdf
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31 Oct 1996	Vadose Zone Monitoring System Installation Report	Lawrence Berkeley National Laboratory	MCCLN_AR_3194.pdf
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01 Nov 1997	Final Radiation Summary Report	Radian Corp.	MCCLN_AR_3476.pdf
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01 Jun 1999	First Quarter 99 Final Report, Groundwater Monitoring Program, OU D	Radian Corp.	MCCLN_AR_2883.pdf
15 Jun 1999	Semi-Annual Report, VOC Transport Modeling for Vadose Zone Monitoring System, WP-092	Lawrence Berkeley National Laboratory	MCCLN_AR_946.pdf
01 Sep 1999	Final Report, Vadose Zone Monitoring System, S-7	Lawrence Berkeley National Laboratory	MCCLN_AR_3659.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. I of III	CH2M HILL	MCCLN_AR_3721.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. II of III	CH2M HILL	MCCLN_AR_3722.pdf
01 Dec 1999	FS, Report, Final Basewide VOC, Vol. III of III	CH2M HILL	MCCLN_AR_3723.pdf
01 Feb 2000	Final Work Plan, Remedial Process Optimization Evaluation, OU D	Parsons Engineering Science, Inc.	MCCLN_AR_4050.pdf
01 Apr 2000	RI, Final Report, Addenda, Vol. I of V, OU D	Radian Corp.	MCCLN_AR_3801.pdf
01 Apr 2000	Update Pages, RI Final Report, Addenda, Vol. II of V, OU D	Radian Corp.	MCCLN_AR_3802.pdf
01 Apr 2000	Update Pages, RI Final Report, Addenda, Vol. III of V, OU D	Radian Corp.	MCCLN_AR_3803.pdf
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01 Apr 2000	RI, Final Report, Addenda, Vol. V of V, OU D	Radian Corp.	MCCLN_AR_3805.2.pdf
01 Aug 2000	FS, Draft, Non-VOC and Landfill	CH2M HILL	MCCLN_AR_3884.1.pdf
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13 Jul 2001	Delineation of Wetlands and Other Jurisdictional Waters of the United States at McClellan Air Force Base, California	RMI	MCCLN_AR_6235.pdf
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01 Sep 2003	Installation Restoration Program Former McClellan Air Force Base Radiation Health and Safety Survey of Disposal Pits Report of Findings	Jacobs Engineering	MCCLN_AR_4950.pdf
01 Oct 2003	2003 Base Realignment and Closure Cleanup Plan	URS Group, Inc.	MCCLN_AR_4949.pdf
22 Apr 2004	Final Five-Year Review Report for McClellan	MWH Americas, Inc.	MCCLN_AR_5402.pdf
12 Nov 2004	Addendum to the Basewide SVE Removal Action Work Plan	Graff, Paul / Benedict, Stephanie / URS Group, Inc.	MCCLN_AR_5489.pdf
30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5651.pdf
30 Nov 2004	Soil vapor extraction removal action quarterly vadose zone monitoring report for July through September 2004	Graff, Paul / URS Group, Inc.	MCCLN_AR_5651.1.pdf
31 Jan 2005	Restoration Advisory Board Meeting Minutes, 17 August 2004	Brunner, Paul G. / AFRPA	MCCLN_AR_5582.pdf
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02 May 2005	McClellan Air Force Base, Interim Basewide Remedial Investigation Report, Operable Unit C – Remedial Investigation Characterization Summaries and Addenda	URS Group, Inc.	MCCLN_AR_6238.pdf
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31 May 2005	Soil Vapor Extraction Removal Action Quarterly Vadose Zone Monitoring Report January through March 2005	Benedict, Stephanie / Graff, Paul / URS Group, Inc.	MCCLN_AR_5653.pdf
15 Jun 2005	First Quarter 2005 Quarterly Cap Inspection Report for OU D, Final, Former McClellan AFB, California	Tarter, Ed / URS Group, Inc.	MCCLN_AR_5581.pdf
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31 Oct 2005	Submittal Of Third Quarter 2005 Cap Inspection Report For OU D, Final, Former McClellan AFB	Tarter, Ed / URS Group, Inc.	MCCLN_AR_5857.pdf
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12 Apr 2007	Fourth Quarter Annual 2006 Cap Inspection Report for OU D	Sean OBrien / e2M, Inc.	MCCLN_AR_6436.pdf
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Appendix B
Human Health Risk Assessment Tables

B1
Calculation of Screening Levels

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Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
°C	degrees Celsius
AFRPA	Air Force Real Property Agency
bgs	below ground surface
Cal/EPA	California Environmental Protection Agency
Central Valley Water Board	Central Valley Regional Water Quality Control Board
CS	Confirmed Site
DI-WET	deionized water extraction test
DLM	designated level methodology
DS	depth-specific
DTSC	Department of Toxic Substances Control
EAF	environmental attenuation factor
EPA	U.S. Environmental Protection Agency
FS	feasibility study
g/cm^3	gram(s) per cubic meter
HEAST	Health Effects Assessment Summary Table
HQ	hazard quotient
IP	Initial Parcel
IRIS	Integrated Risk Information System
m/s	meter(s) per second
MCL	maximum contaminant level
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
NCEA	National Center for Environmental Assessment
OU	operable unit
ppbv	part(s) per billion by volume
pCi/g	picocuries per gram

PEF	particulate emission factor
PRG	preliminary remediation goal
RBC	risk-based concentration
REL	reference exposure level
RfC	reference concentration
RfD	reference dose
RICS	remedial investigation characterization summaries
RSL	regional screening level
RUSLE	Revised Universal Soil Loss Equation
SVOC	semivolatile organic compound
SVS	small volume sites
TPH	total petroleum hydrocarbon
USAF	U.S. Air Force
USDA	U.S. Department of Agriculture
VF	volatilization factor
VOC	volatile organic compound
WQL	water quality limit

B1

Calculation of Screening Levels

B1.1 Introduction

This appendix presents the calculation of screening levels for soil and soil gas, and explains the assumptions and terms used to perform the calculations. Screening levels were developed for soil for protection of human health, groundwater, and surface water. Screening levels were also developed for shallow soil gas for the protection of human health and for all soil gas for the protection of groundwater.

The remainder of this appendix is organized as follows: Section B1.2 describes the basis for the screening levels. Section B1.3 summarizes the process of calculating the screening levels. Section B1.4 summarizes the final screening levels and background concentrations used to evaluate the site characterization data.

B1.2 Basis for the Screening Levels

This section presents the basis for screening levels for protection of human health, groundwater, and surface water by the categories of contaminants (metals, SVOCs, TPH, radionuclides, and VOCs) and soil horizon. For purposes of calculating screening levels for soil, vadose-zone soils were divided into the following horizons:

- Surface soil – Soil ranging in depth from the surface to 1 foot. This represents the soil that might affect surface water quality due to runoff and groundwater quality due to leaching of contaminants. This depth horizon also represents soil with which workers or residents could come into direct contact.
- Shallow soil – Soil ranging in depth from 1 to 15 feet bgs. This represents either undisturbed or excavated soil with which workers or residents could come into direct contact. Contaminants in soil in this horizon might also affect groundwater quality due to leaching.
- Deep soil – Soil ranging in depth from 15 feet to the water table (at approximately 110 feet bgs). Beyond a depth of 15 feet, it is assumed that direct human contact with contaminants in soil is unlikely. However, contaminants in soil at this depth could migrate to groundwater.

Screening levels have been developed to address the following soil horizons and receptors:

- Screening levels for protection of human health in surface and shallow soil (ground surface to 15 feet bgs combined) for both unrestricted use and industrial use are risk based. The risk-based screening levels are set at an excess lifetime cancer risk of 1×10^{-6} for each carcinogenic contaminant and a noncancer HQ of 1 for each non-carcinogenic contaminant. For contaminants that have both carcinogenic and non-carcinogenic effects, the more conservative of the two values was selected as the screening level.

For radionuclides, screening levels for protection of human health were developed using background distributions. The development of the screening levels is described in Section B1.3.1.

- Protection of groundwater from metals, SVOCs, TPH, and radionuclides in soil (0 to 30 feet bgs) was considered separately. To develop the screening levels for metals, perchlorate, and radionuclides, Total Designated Levels were calculated using the DLM (Central Valley Water Board, 1989) as described in Sections B1.3.3.1 and B1.3.3.2. For SVOCs, a screening level evaluation was performed to determine if contaminant concentrations detected in soil could significantly impact groundwater. Concentrations of SVOCs are compared with the modeled maximum concentrations shown to have no significant impacts on groundwater. Screening levels for protection of groundwater were adapted from Central Valley Water Board guidance (Central Valley Water Board, 1990) for TPH-D and TPH-G. Development of the TPH screening levels is presented in Section B1.3.3.4.
- Screening levels for protection of surface water were calculated for contaminants in runoff from surface soil (0 to 1 feet bgs) using a slight modification of the procedure proposed by Jacobs during the OUs E–H RICS 2 (Jacobs, 2000).

Screening levels for VOCs were calculated for shallow soil gas for the following scenarios:

- Direct contact with soil including incidental ingestion, inhalation of VOCs in ambient air, and dermal contact
- Exposure to VOCs that might volatilize from soil to indoor air

However, the final screening levels used for shallow soil gas are based on the indoor air scenario because the screening values for that scenario are more conservative than the screening levels based on the direct contact scenario.

Soil gas screening levels for protection of groundwater from VOCs have been developed as part of the Soil Vapor Extraction Program. These DS screening levels represent the minimum concentrations in soil gas that could potentially impact groundwater above MCLs. Calculation of the DS MCL screening levels is presented in Section B1.3.3.5.

B1.3 Calculation of Screening Levels

This section describes the assumptions and methodologies used in calculating the screening levels for soils and soil gas. The methods for calculating risk-based screening levels for protection of human health from contaminants in surface and shallow soil are described in Section B1.3.1. The methods for calculating screening levels for shallow soil gas are described in Section B1.3.2. The methods for calculating screening levels for protection of groundwater for metals, radionuclides, TPH, and SVOCs in surface, shallow, and deep soil and for VOCs in shallow and deep soil gas are described in Section B1.3.3. Finally, the calculation of screening levels for protection of surface water is presented in Section B1.3.4.

B1.3.1 Protection of Human Health – Surface and Shallow Soil

Land use at the SVS is primarily industrial. Although future land uses are not known with certainty, current plans for the sites include occupational and industrial land uses. Residential land use is not planned at this time; however, screening levels for protection of human health were developed for unrestricted land use (based on the residential exposure scenario) using inputs specific to McClellan. For comparison, screening levels for protection of human health for the industrial land use scenario are also provided. For radionuclides, screening levels for protection of human health are based on background concentrations.

The risk assessment assumptions and methodology used for calculating screening levels for protection of human health are consistent with the risk assessment procedures developed in the Final OU A RICS (Jacobs, 2001), the Initial Parcel FS #1 (CH2M HILL, 2003), the Initial Parcel FS #2 (CH2M HILL, 2005), the Focused Strategic Sites FS (CH2M HILL, 2006), the Initial Parcel FS #3 (CH2M HILL, 2008a), and the Soils Data Gap RICS Addenda (CH2M HILL, 2008b).The referenced documents provided descriptions of the procedures used to calculate and report risks in the remedial investigation process for McClellan.

B1.3.1.1 Basis for the Screening Levels for Protection of Human Health for Unrestricted Use

The screening levels for soil for unrestricted use (except radionuclides) correspond to a 1×10^{-6} excess lifetime cancer risk level for carcinogens and an HQ of 1 for non-carcinogens based on exposure via ingestion of soil, ingestion of homegrown produce, inhalation, and dermal contact. For contaminants that have both carcinogenic and non-carcinogenic effects, the more conservative of the two values was selected as the screening level.

Table B1-1 lists the human health toxicity values and other chemical-specific parameters used to calculate the screening levels for the unrestricted use scenario. An explanation of key terminology follows:

- Ingestion toxicity values: oral cancer slope factors and noncancer reference doses
- Inhalation toxicity values: inhalation slope factors and inhalation reference doses
- VF: based on model of volatilization from soil to ambient air
- Dermal absorption factors
- Soil partition coefficient from soil to aboveground plant parts (K_{ps})

The hierarchy of sources for toxicity values follows EPA and Air Force guidance (EPA, 2003a and USAF, 2006) and is listed below in order of preference:

1. EPA IRIS – online database (EPA, 2009)
2. EPA's Provisional Peer Reviewed Toxicity Values (as cited in the 2008 EPA RSL table [EPA, 2008])
3. Cal/EPA cancer potency factors and REL - online database (Cal/EPA, 2009a, b)
4. Other EPA sources (i.e., HEAST, NCEA provisional toxicity values, and route-extrapolated toxicity values as cited in the 2004 EPA Region 9 PRG table [EPA, 2004])

Table B1-2 presents the exposure parameters used to calculate the screening levels for unrestricted use. The calculations for the screening levels for unrestricted use are as follows:

Combined Exposures to Carcinogenic Contaminants in Residential Soil (Age-adjusted):

$$C(mg/kg) = \frac{TR \times AT_c}{EF_r\,[(\frac{IFS_{adj} \times CSF_o}{10^6\ mg/kg}) + (\frac{SFS_{adj} \times ABS \times CSF_o}{10^6\ mg/kg}) + (InhF_{adj} \times CSF_i \times (1/PEF)) + \frac{IFP_{adj}\,x(K_{ps}^{rain} + K_{ps})xCSF_o}{10^3\ g/kg}]}$$

Combined Exposure to Non-carcinogenic Contaminants in Residential Soil (Child only):

$$C(mg/kg) = \frac{THQ \times BW_c \times AT_n}{EF_r \times ED_c\,[(\frac{1}{RfD_o} \times \frac{IRS_c}{10^6\ mg/kg}) + (\frac{1}{RfD_o} \times \frac{SA_c \times AF \times ABS}{10^6 mg/kg}) + (\frac{1}{RfD_i} \times IRA_c \times (1/PEF)) + (\frac{1}{RfD_o}\,x\,\frac{IRP_c\,x(K_{ps}^{rain} + K_{ps})}{10^3\ g/kg})]}$$

Potential exposures for the residential scenario were calculated using age-adjusted factors (that is, assuming 6 years of exposure as a child and 24 years of exposure as an adult). Use of age-adjusted factors is especially important for soil ingestion exposures, which are higher during childhood and decrease with age. However, to combine exposures across pathways, additional age-adjusted factors were developed for inhalation and dermal exposures. These factors approximate the integrated exposure from 1 year of age until age 30 combining contact rates, body weights, and exposure durations for two age groups – small children and adults. Non-carcinogenic contaminants are evaluated for children separately from adults. No age-adjustment factor is used in this case. The focus on children is considered protective of the higher daily intake rates of soil by children and their lower body weight. To maintain consistency when evaluating soils, dermal and inhalation exposures are also based on childhood contact rates. The calculations for the age-adjusted factors for estimating cancer risk are as follows:

Soil ingestion ([mg•yr]/[kg•d]):

$$IFS_{adj} = \frac{ED_c \times IRS_c}{BW_c} + \frac{ED_a \times IRS_a}{BW_a}$$

Skin contact with soil ([mg•yr]/[kg•d]):

$$SFS_{adj} = \frac{ED_c \times AF \times SA_c}{BW_c} + \frac{ED_a \times AF \times SA_a}{BW_a}$$

Inhalation ([m³•yr]/[kg•d]):

$$InhF_{adj} = \frac{ED_c \times IRA_c}{BW_c} + \frac{ED_a \times IRA_a}{BW_a}$$

Homegrown produce ingestion ([g•yr]/[kg•d]):

$$IFP_{adj} = \frac{ED_c \times IRP_c}{BW_c} + \frac{ED_a \times IRP_a}{BW_a}$$

The calculations incorporate VFs for volatile contaminants and PEFs for nonvolatile contaminants to calculate concentrations in air associated with emissions from the soil. These factors relate soil contaminant concentrations to outdoor air contaminant

concentrations that might be inhaled onsite. (Note: In the equations shown above, for volatile contaminants, the 1/PEF factor is replaced by 1/VF in the screening level calculations.)

The VFs used for the screening level calculations are the values presented in the EPA Region 9 PRG table (EPA, 2004) and are based on EPA guidance (EPA, 1996a) for modeling volatilization of chemicals from soil to ambient air. This methodology differs from the emission modeling procedures used in the OUs A and E through H baseline risk assessments. The VF for naphthalene was used as a surrogate for 2-methylnaphthalene.

Inhalation of chemicals adsorbed to respirable particles was assessed using a PEF. This factor relates the contaminant concentration in soil with the concentration of respirable particles in the air caused by fugitive dust emissions from contaminated soils. The relationship is derived by Cowherd's (EPA, 1985) rapid assessment procedure for sites where the surface contamination is assumed to provide a relatively continuous and constant potential for emission over an extended period (for example, years). The PEF equation is as follows:

$$PEF\,\frac{m^3}{kg} = \frac{Q}{C} \times \frac{\frac{3{,}600s}{h}}{0.036 \times (1-V) \times \left(\frac{U_m}{U_t}\right)^3 \times F(x)}$$

Table B1-3 shows the parameters used to derive the PEF. Based on the methodology presented in the Final OU A RICS (Jacobs, 2001), site-specific parameters were used to develop the PEF for the residential scenario. The climate and dispersion data are for Fresno, California (EPA, 1996b). The mean wind speed of 3.7 m/s shown in Table B1-3 is a site-specific value for McClellan. The mean wind speed of 3.7 m/s is a correction to the value used in the Final OU A RICS (that is, 4.69 m/s).

B1.3.1.2 Basis of Screening Levels for Protection of Human Health for Industrial Use

The screening levels for soil for industrial use (except radionuclides) correspond to a 1×10^{-6} excess lifetime cancer risk level for carcinogens and an HQ of 1 for non-carcinogens based on exposure via ingestion of soil, inhalation, and dermal contact. For contaminants that have both carcinogenic and non-carcinogenic effects, the more conservative of the two values was selected as the screening level.

The toxicity values and VFs presented in Table B1-1 were used for the screening levels for industrial use. In addition, the PEF, as described in Section B1.3.1.1, was used for the industrial screening levels. Table B1-4 presents the exposure parameters used to calculate the screening levels for industrial use. The calculations for screening levels for industrial use are as follows:

Combined Exposures to Carcinogenic Contaminants in Industrial Soil:

$$C(mg/kg) = \frac{TR \times AT_c \times BW_a}{EF_i \times ED_i\left[\left(\frac{IRS_a \times CSF_o}{10^6\ mg/kg}\right) + \left(\frac{SA_a \times AF \times ABS \times CSF_o}{10^6\ mg/kg}\right) + \left(IRA_a \times CSF_i \times (1/PEF)\right)\right]}$$

Combined Exposure to Non-carcinogenic Contaminants in Industrial Soil:

$$C(mg/kg) = \frac{THQ \times BW_a \times AT_n}{EF_i \times EF_i \;\; [(\frac{1}{RfD_o} \times \frac{IRS_a}{10^6\, mg/kg}) + (\frac{1}{RfD_o} \times \frac{SA_a \times AF \times ABS}{10^6 mg/kg}) + (\frac{1}{RfD_i} \times IRA_a \times (1/PEF))]}$$

(Note: In the equations shown above, for volatile contaminants, the 1/PEF factor is replaced with 1/VF.)

B1.3.1.3 Summary of Screening Levels for Soil

Table B1-5 summarizes the carcinogenic and non-carcinogenic screening levels for contaminants in soil (including radionuclides) for both the unrestricted and industrial use scenarios. Screening values are included for total chromium and hexavalent chromium. For sites at which soil has not been analyzed for hexavalent chromium, EPA and HERD recommend using the current EPA Region 9 Unrestricted Use PRG for "total chromium" of 210 mg/kg. For hexavalent chromium in soil, EPA and HERD recommend using the noncancer screening level. However, the screening level for "total chromium" is different from the EPA Region 9 Unrestricted Use PRG because the screening level used in this RICS Addenda use a McClellan-specific PEF value (as described below in Section B1.3.1.4) where the EPA Region 9 Unrestricted Use PRG uses the default PEF value.

For radionuclides, screening levels were developed using background reference area distributions. Screening levels for cesium 137, plutonium 239, and uranium 235 were set at the upper bound of the representative matrix specific background distribution (that is, mean plus three standard deviations). The screening level for radium 226 was set at 0.78 pCi/g (based on 95th percentile of the background reference area data) (AFRPA, 2011). These values were selected to distinguish residual activity above background. Because no detectable concentrations of cobalt 60 were identified (Cabrera, 2004), the "background" concentration for cobalt 60 was set at a value that corresponds to an approximate dose of 1 millirem per year and an approximate risk of 3×10^{-6} (Cabrera, 2008). Background concentrations for radium 226, cesium 137, plutonium 239, and uranium 235 are derived from the *Final Revised Reference Area Final Status Survey Report* (Cabrera, 2004). Background concentrations for thorium 232 and cobalt 60 are derived from the *Radiological RI of Multiple CERCLA Sites, RICS Addendum* (Cabrera, 2008). These background concentrations are the most recently derived values and are considered to be the most comprehensive.

Screening levels for protection of human health were not developed for TPH-D and TPH-G. Analytical methods for petroleum hydrocarbons report the amount of hydrocarbons present as a single value; they do not give information as to the types of hydrocarbons or levels of individual constituents present in the samples (American Society for Testing and Materials, 1995). Additionally, different analytical methods for TPH measure different ranges of hydrocarbon components. Because the composition of petroleum products varies with different original crude oil, and because weathering and other fate-and-transport processes change the product composition through time, the same reported concentration of TPH might correspond to significantly different risks (Review of Properties of TPH, Heath et al., 1993; Guide for Risk-Based Corrective Action, American Society for Testing and Materials, 1995). Consequently, risk assessments use the concentrations and toxicity information of individual chemicals present in the petroleum materials to evaluate risk, instead of the total

petroleum hydrocarbon data. Therefore, risk-based cleanup levels are based on the concentrations of individual constituents (for example, polycyclic aromatic hydrocarbons and lead) rather than the concentrations of TPH-D and TPH-G. As described in subsequent sections of this appendix (B1.3.3.4 and B1.3.4), TPH concentrations are being used to screen sites for protection of groundwater and surface water.

B1.3.1.4 Uncertainties Associated with Risk-based Screening Levels for Soil

Various uncertainties are associated with the risk-based screening levels for soil presented in this appendix, including the following:

- Use of residential exposure assumptions – As noted previously, land use for the sites is primarily industrial. Use of screening levels based on residential exposure assumptions might result in chemicals being identified as COCs in the nature and extent of contamination evaluations for the SVS that would not be COCs using industrial exposure parameters.
- Particulate emission factor – The PEF used in the screening level calculations is based on site-specific wind speed data for McClellan and other climate and dispersion data for Fresno, California. Because climate differs between Fresno and McClellan, the PEF is not entirely specific to McClellan. The McClellan-specific PEF used for the residential screening levels and the industrial screening levels for total chromium and hexavalent chromium is less conservative than the PEF used for the USEPA Region 9 PRGs. The McClellan-specific PEF was used for these metals because the particulate inhalation pathway is a significant contributor to total exposure for these carcinogens by the inhalation pathway. Use of the PEF from the USEPA Region 9 PRGs would result in industrial screening levels that were inconsistent with (that is, lower than) the McClellan-specific unrestricted use screening levels.
- PEFs and VFs – There is some uncertainty introduced by using the assumption of a 0.5-acre site. Some of the SVS sites are larger and some are smaller than 0.5 acres. This results in some uncertainty regarding the estimates of screening levels associated with the inhalation of outdoor air.
- Homegrown produce pathway – Considerable uncertainty is associated with the soil partition coefficients that are used to model uptake of COCs by plants. Most of the K_{ps} values used to develop the screening levels are modeled values; they are not based on empirical data. For some metals, empirical data are available, but the range of available values spans more than an order of magnitude. For example, K_{ps} values for cadmium in EPA's Soil Screening Guidance document (EPA, 1996a) range from 0.004 to 0.36 for various types of produce. For arsenic, K_{ps} values range from 0.002 to 0.036 (EPA, 1996a). In addition, the Soil Screening Guidance document only includes K_{ps} values for six metals. Other K_{ps} values are available from various literature sources but are not as well defined as the Soil Screening Guidance values. On 7 August 2003, the regulatory agencies discussed this issue with Air Force Real Property Agency. Given the available information, it was collectively decided that the Soil Screening Guidance values were most applicable for McClellan. Therefore, for this document, plant root uptake of metals is only evaluated for the six metals in the Soil Screening Guidance document. The rain splash component of the plant uptake was included for all metals. Among soil exposure

pathways, ingestion of homegrown produce has the greatest effect on the magnitude of the risk-based screening concentrations for many/most of the non-volatile contaminants. Consequently, the uncertainties associated with the homegrown produce pathway input parameters result in uncertainties in the risk-based screening level values that incorporate this pathway.

- Route-to-route extrapolation for toxicity factors – For some chemicals, cancer slope factors or references doses have only been established for one exposure route in the IRIS database. However, on the basis of the Final OU A RICS (Jacobs, 2001), toxicity values were extrapolated across exposure routes (for example, oral toxicity values were used to evaluate inhalation exposure) for use in calculating the screening levels. Uncertainties are associated with this practice because the simple extrapolation method is based on the assumption that the route of administration is irrelevant to the dose delivered to a target organ. This assumption does not account for differences in port-of-entry effects or pharmacokinetic behavior of the chemicals in the body. Consequently, the contribution from the exposure route where the extrapolated toxicity factor was used might be overestimated or underestimated. In addition, the contribution from dermal exposure might be underestimated because no adjustment was made to the oral toxicity values used for the dermal route.

- The Cal/EPA oral cancer slope factor for trichloroethene was revised in July 2009 from 1.3E 02 per mg/kg-day to 5.9E-03 per mg/kg-day (www.oehha.ca.gov/water/phg/pdf/TCE_phg070909.pdf). Use of the revised oral slope factor would increase the risk-based screening level for TCE in soil by a factor of approximately 2. The USEPA recently released the external review draft document entitled, "Toxicological Review of Trichloroethylene: In Support of Summary Information on the Integrated Risk Information System (IRIS)" (EPA/635/R-09/011A) in which the proposed cancer slope factors for inhalation and oral exposures are more protective than those of the Cal/EPA (http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=215006). The proposed oral CSF for trichloroethene is 0.05 (mg/kg-day)-1. This value was derived from PBPK model-based route-to-route extrapolation of the inhalation unit risk estimate based on the human kidney cancer risks reported in Charbotel et al. (2006) and adjusted for potential risk for tumors at multiple sites. The proposed inhalation unit risk is 4E-06 (µg/m3)-1 and based on human kidney cancer risks reported by Charbotel et al. (2006) and adjusted for potential risk for tumors at multiple sites. The use of these proposed carcinogenic toxicity factors, if finalized, would result in lower, more conservative risk-based screening levels for TCE in soil.

Additional uncertainties associated with the assumptions used in the risk calculations are discussed in the Final OU A RICS (Appendix C, Section 8 – Jacobs, 2001).

B1.3.2 Protection of Human Health – Shallow Soil Gas for VOCs

Screening levels for VOCs were calculated for shallow soil gas by the AFRPA for the following two scenarios:

- Direct contact with VOCs in soil including incidental ingestion and inhalation of VOCs in ambient air
- Exposure to VOCs that might volatilize from soil to indoor air

The direct contact VOC screening levels exclude the indoor air pathway and were developed for an unrestricted land use (that is, residential exposure) scenario. For the indoor air pathway, screening levels were developed for residential (adult exposure) land use conditions and industrial land use conditions. The relatively higher exposures for children were not included in development of the residential screening levels. The basis for the development of both the direct contact pathway and the indoor air pathway are described separately below.

B1.3.2.1 Direct Contact Pathway Screening Levels

The screening levels for VOCs for the direct contact scenario were calculated first for soil using the methodology described in Section B1.3.1.1. The screening levels for VOCs in soil for the direct contact scenario correspond to a 1×10^{-6} excess lifetime cancer risk level for carcinogens and an HQ of 1 for noncarcinogens based on exposure via ingestion of soil, inhalation, and dermal contact. Consistent with the risk assessment procedures developed in the Final OU A RICS (Jacobs, 2001), the homegrown produce pathway was not included in the calculations for VOC screening levels. Table C1-1 provides a summary of the toxicity values and other chemical-specific values used in the calculation of screening levels for the direct contact scenario. VFs used in these calculations were obtained from the EPA Region 9 PRG table and are based on EPA guidance (EPA, 1996a) for modeling volatilization of chemicals from soil to ambient air. The Region 9 VFs that were used in these calculations are more conservative than VFs calculated using McClellan-specific input parameters.

Shallow soil gas screening levels for VOCs were then estimated from soil screening levels using the following formula:

$$C_{soil\ gas} = \frac{V_s \times H\ C_{soil}\ \rho_b}{MW\left(\theta_w + K_s\ \rho_b + H\ \theta_a\right)}$$

Where:

$C_{soil\ gas}$ = Concentration in shallow soil gas (ppmv)
MW = Molecular weight (chemical-specific) (g/mol)
H = Henry's law constant at average soil temperature (20°C) (unitless)
C_{soil} = Soil concentration (mg/kg)
ρ_b = Soil density (1.4 g/cm^3)
Vs = Molar volume at 20°C (m^3/mol)
Ks = Soil-water partition coefficient ($K_{OC} \times f_{OC}$ [0.00071]) (L/kg)
θw = Water-filled soil porosity (0.3) (unitless)
θa = Air-filled soil porosity (0.2) (unitless)

Various uncertainties are associated with the risk-based screening levels for shallow soil gas presented in this appendix. The discussions of uncertainties related to the residential exposure assumptions, and route-to-route extrapolation of toxicity factors presented in Section B1.3.1.4 for soil screening levels are also applicable to the shallow soil gas screening levels. In addition, there are uncertainties related to the partitioning equations used to estimate shallow soil gas screening levels from soil levels as described above.

Table B1-6 shows the screening levels for the direct contact scenario. As shown in Table B1-6, the indoor air screening levels for the unrestricted use scenario are more conservative than the screening levels based on the direct contact scenario for all VOCs evaluated. Therefore, the indoor air screening levels are used to evaluate the data in this document.

B1.3.2.2 Vapor Inhalation Pathway Screening Levels

The methodology for calculating screening levels for the vapor intrusion/indoor air pathway was updated for Initial Parcel #3 FS and has been used for the screening levels in this document. The SSG screening levels were used to evaluate soil gas data from 5 to 15 feet bgs. The methodology is based on discussions between representatives for the Air Force and EPA headquarters. Each of the steps of the methodology is described in detail below. Tables B1-7 and B1-8 present the SSG screening levels for commercial/industrial and residential land uses, respectively.

Step 1. Calculate Indoor Air Risk-Based Concentrations. The first step was to calculate RBCs for indoor air for VOCs of interest (i.e., VOCs detected in soil gas samples from IP #3) based on a target risk of 1×10^{-6} and/or HQ of 1. The methodology for calculating indoor air RBCs is based on EPA guidance (EPA, 2002a and 2003a). Indoor air RBCs were calculated for both the commercial/industrial and residential future land uses.

RBC for Carcinogenic Effects. The following formula was used to calculate the commercial/industrial RBCs based on carcinogenic effects:

$$\text{RBC } (\mu g/m^3) = (TR \times AT_c)/(EF \times ED \times URF)$$

Where:

TR = target risk (1×10^{-6})
AT_c = averaging time for carcinogens (70 years × 365 days/year = 25,550 days)
EF = exposure frequency (250 days/year)
ED = exposure duration (25 years)
URF = unit risk factor $(\mu g/m^3)^{-1}$

The following formula was used to calculate the residential RBCs based on carcinogenic effects:

$$\text{RBC } (\mu g/m^3) = (TR \times AT_c)/(EF \times ED \times URF)$$

Where:

TR = target risk (1×10^{-6})
AT_c = averaging time for carcinogens (70 years × 365 days/year = 25,550 days)
EF = exposure frequency (350 days/year)
ED = exposure duration (30 years)
URF = unit risk factor $(\mu g/m^3)^{-1}$

RBC for Noncarcinogenic Effects. The following formula was used to calculate the commercial/industrial RBCs based on noncarcinogenic effects:

$$RBC\ (\mu g/m^3) = (THQ \times RfC \times AT_{nc})/(EF \times ED)$$

Where:

THQ = target hazard quotient (1)
AT_{nc} = averaging time for noncarcinogens (25 years × 365 days/year = 9,125 days)
EF = exposure frequency (250 days/year)
ED = exposure duration (25 years)
RfC = reference concentration ($\mu g/m^3$)

The following formula was used to calculate the residential RBCs based on noncarcinogenic effects:

$$RBC\ (\mu g/m^3) = (THQ \times RfC)$$

Where:

THQ = target hazard quotient (1)
RfC = reference concentration

Unit risk factors and reference concentrations for the indoor air RBCs were selected based on the EPA hierarchy for human health toxicity values for Superfund risk assessments (EPA, 2003b). The sources used for the unit risk factors and reference concentrations are as described above in Section B.1.3.1.1.

The unit risk factors and reference concentrations used in the calculations are presented in Tables B1-7 and B1-8.

Step 2. Calculate SSG Screening Levels. The second step was to calculate SSG screening levels using attenuation factors based on discussions between representatives of the Air Force and EPA.

For shallow soil gas samples collected between 5 and 15 feet bgs, the SSG screening levels were calculated using the indoor air RBCs and an attenuation factor of 0.01 for residential land uses (Indoor air RBC/0.01 = Residential SSG screening level) and 0.001 for commercial/industrial land uses (Indoor air RBC/0.001 = Commercial/Industrial SSG screening level). The attenuation factor for the commercial/industrial land use scenario is from DTSC vapor intrusion guidance (DTSC, 2005).

Subslab samples (i.e., soil gas samples collected immediately below a building foundation) are not currently available for this RICS Addenda. If subslab samples are collected, a different attenuation factor will be applied to calculate screening levels for subslab soil vapor evaluations.

Potential pathways of exposure for humans to shallow soil gas include inhalation of VOCs emitted from soil into outdoor air and inhalation of VOCs in indoor air. Risk-based concentration goals for VOCs in shallow soil gas are generally higher for the outdoor inhalation scenario than for the indoor air inhalation scenario because indoor ventilation is

more limited. Therefore, screening levels presented for the vapor inhalation pathway will, in general, also be protective of the outdoor air inhalation exposure pathway.

For TCE, the current inhalation unit risk is 3E-05 $(\mu g/m^3)^{-1}$. The USEPA recently released the external review draft document entitled, "Toxicological Review of Trichloroethylene: In Support of Summary Information on the Integrated Risk Information System (IRIS)" (EPA/635/R-09/011A) in which the proposed cancer slope factors for inhalation and oral exposures are more protective than those of the Cal/EPA (http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=215006). The proposed inhalation unit risk is 4E-06 $(\mu g/m^3)^{-1}$ and based on human kidney cancer risks reported by Charbotel et al. (2006) and adjusted for potential risk for tumors at multiple sites. The use of these proposed carcinogenic toxicity factors, if finalized, would result in lower, more conservative risk-based screening levels for TCE in soil gas.

B1.3.3 Protection of Groundwater

Screening levels for protection of groundwater were developed for metals, perchlorate, radionuclides, and TPH in soil (0 to 30 feet bgs). In addition, a screening level evaluation was performed to determine if reported SVOC concentrations in soil will significantly impact groundwater. Soil gas screening levels for protection of groundwater from VOCs have been developed as part of the Soil Vapor Extraction Program and were used to evaluate the site characterization data.

In the following sections, the development of the screening levels for metals, perchlorate, radionuclides, TPH, VOCs, and the screening level evaluation for SVOCs are presented.

B1.3.3.1 Metals and Perchlorate

The basis for screening levels for protection of groundwater from metals in surface, shallow, and deep soil are either MCLs or WQLs. Some of the WQLs are not human health risk based, for example agricultural use values and Secondary MCLs. Metals concentrations in soil corresponding to impacts in groundwater equal to the MCLs or WQLs were calculated using the DLM developed by the Central Valley Water Board. The concentrations in soil are referred to as "Total Designated Levels." These values were used to screen the sites to determine potential impacts to groundwater and identify COCs.

Concentrations in soil corresponding to background concentrations in groundwater were also calculated using the DLM. For approximately one-half of the metals, the MCL or WQL value in groundwater is less than the maximum of the reported background concentrations in groundwater. Background concentrations in groundwater will be considered during the selection of PCGs in the FS.

The goal of the DLM is to determine concentrations of soluble constituents in the soil above which leachate would be able to carry them to groundwater in amounts that would cause water quality goals to be exceeded in those waters. Soil concentrations of constituents below the Total Designated Level would be predicted to impact groundwater at concentrations below WQLs. The Total Designated Level for a constituent of a solid waste is calculated by multiplying the WQL by the EAF and the leachability factor as shown below:

$$TDL\ (mg/kg) = WQL\ (mg/L) \times EAF \times LF$$

Where:

TDL = Total Designated Level for a constituent of a solid waste (mg/kg) of soils or solid waste)

WQL = Water quality limit (mg/L)

EAF = Environmental attenuation factor

LF = Leachability factor

The EAF is a measure of the degree of reduction in a concentration of solid waste as it migrates through the environment from the place of discharge to groundwater. For McClellan, an EAF of 1,000 is applied because it provides a high degree of water quality protection for constituents that are known to have a much greater than average degree of environmental attenuation (for example, free cyanide, copper, and zinc).

Leachability Factors for McClellan were determined on an OU-specific basis during the remedial investigation. Samples were collected in OU C (Southern) and analyzed by DI-WET to use in developing leachability factors. For some metals (arsenic, cadmium, chromium, lead, and thallium), OU A DI-WET results were also available from previous sampling. For those five metals, the data sets were combined to develop leachability factors (with the caveats noted below). The results are shown in Table B1-9.

The strategy for developing the leachability factors included using the OU C-developed factors for those metals that had not been analyzed by DI-WET in OU A, and combining the data sets for OU A and OU C when the larger data set was available. However, only chromium showed detectable concentrations from both OU A and OU C. Where all or all but one DI-WET result was nondetect from one or the other OU data set, only that portion of the data set (OU A or OU C) that had detectable DI-WET results was used to determine the leachability factor. Using leachability factors generated from total and soluble detected concentrations is a more quantitative approach than using one-half the detection limit. For cadmium and lead, the OU A results were used. For arsenic, the OU C results were used. (The total results overlap for both the OU A and OU C data sets. The differences in the DI-WET results could be differences in laboratories.) Note that arsenic and cadmium were analyzed by SW7000-series methods in both of the data sets; and chromium, lead, and thallium were analyzed by SW7000-series methods for OU A results only. Chromium, lead, and thallium in OU C were analyzed by SW6010. Historically, some differences in analytical results have been noted for the different methods, although not for these three metals.

For thallium, the default leachability factor was used. In this case, all of the DI-WET results were nondetect in both the OU A and OU C data sets. For five metals from the OU C data set that were analyzed after the DI-WET, the default leachability factors were used rather than any factors developed from the OU C data set. These exceptions are for antimony; only one total result exceeded the detection limit, and all the DI-WETs were nondetect (by SW6010). For silver, only one DI-WET exceeded the detection limit, and only two total results exceeded the detection limit. For molybdenum, the total results were an order of magnitude less than background, which is low, so the 100-fold default leachability factor presented in the DLM guidance was used. For mercury and selenium, no results were

available by the graphite furnace atomic absorption method to determine leachability factors (SW6010 is not reliable for these metals), and the 100-fold default values were used.

The perchlorate concentration in soil corresponding to impacts in groundwater equal to the WQL was also calculated using the DLM. For perchlorate, an EAF of 100 and the default leachability factor were used to calculate the Total Designated Level.

Table B1-10 presents the Total Designated Levels calculated using WQLs and background concentrations in groundwater. The Limiting WQLs and their sources, background concentrations in groundwater, and the EAFs and leachability factors used for the calculations are also presented. The Total Designated Levels calculated using the WQLs were used as screening levels to evaluate the site characterization data.

B1.3.3.2 Radionuclides

The basis for screening levels for protection of groundwater from radionuclides in surface, shallow, and deep soil are either MCLs or WQLs. Radionuclide concentrations in soil corresponding to impacts in groundwater equal to the MCLs or WQLs were calculated using the DLM developed by the Central Valley Water Board (see Section B1.3.3.1 for a discussion of this method and the equation used). The concentrations in soil are referred to as "Total Designated Levels." These values were used to screen the sites to determine potential impacts to groundwater and identify COCs.

As previously discussed, the Total Designated Level for a constituent of a solid waste is calculated by multiplying the WQL by the EAF and the leachability factor (see Section B1.3.3.1 for the equation). For McClellan, an EAF of 1,000 is applied because it provides a high degree of water quality protection. Leachability Factors for some radionuclides were developed using analytical data from samples collected from CS 010. Data were only available for cesium 137, radium 226, and uranium 238. Calculated leachability factors for these radionuclides ranged from 203 to 416. However, because these leachability factors were based on a limited data set, the default leachability factor for inorganics of 100 was used to be conservative. The default value of 100 was also used for all other radionuclides. The results are shown in Table B1-11.

Table B1-12 presents the Total Designated Levels calculated using MCLs and WQLs in groundwater. The Limiting WQLs and their sources, and the EAFs and leachability factors used for the calculations are also presented. The Total Designated Levels calculated using the WQLs were used as screening levels to evaluate the site characterization data.

B1.3.3.3 Semivolatile Organic Compounds

A screening level evaluation was performed using a vadose-zone and groundwater mixing-cell model to determine the impacts to groundwater resulting from the maximum reported concentrations of contaminants in soil at the SVS. The greater of the industrial use screening level for the protection of human health or the maximum reported concentration of each SVOC detected in surface, shallow, or deep soil at the SVS was used for the evaluation. For those compounds that degrade in the environment through anaerobic or aerobic processes, degradation was incorporated into the modeling to obtain more reasonable estimates of groundwater impacts. The screening level evaluation was

performed to determine if the maximum detected concentrations of SVOCs in soil would impact groundwater at concentrations above the selected WQL.

Limited WQLs are the basis for the screening level evaluation for SVOCs and were obtained in consultation with the Central Valley Water Board. Some of the SVOCs do not have identified WQLs. Some of the WQLs are not human health risk based, for example, Taste and Odor Thresholds.

Following are the procedures used to conduct the evaluation:

1. A worst-case scenario for the contaminant distribution for the sites was developed using the greater of the screening level for the protection of human health for industrial use or the maximum reported concentration of each SVOC in surface, shallow, or deep soil. For this scenario, it was assumed that the contaminant was present to depths of 30 feet bgs. One-tenth of the maximum concentration was used for the intervals from 5 to 15 feet bgs and from 21 to 30 feet bgs, and the maximum concentration was used from 16 to 20 feet bgs. This worst-case scenario is conservative because the site characterization data showed that the maximum detected concentrations of SVOCs were reported at depths less than 15 feet bgs and are limited in lateral and vertical extent. A vadose zone model (VLEACH) was used to determine the mass flux that potentially leaches from the vadose zone under the worst-case scenario for contaminant distribution. Contaminant impacts in groundwater were estimated using a groundwater mixing-cell model for each SVOC with the mass flux from the vadose-zone model. The contaminant impacts in groundwater were then compared to the Limiting WQLs for groundwater. Because of the strong partitioning of many SVOCs to soil, the predicted groundwater impact for most of the compounds was insignificant.

2. For those compounds for which potential groundwater impacts were predicted, the ability of the compound to degrade in the environment was considered. A degradation half-life was incorporated into the vadose-zone and groundwater mixing-cell modeling. With these processes incorporated into the worst-case contaminant distribution scenario, the impacts to groundwater were recalculated. After reviewing half-lives in soil and groundwater for aerobic and anaerobic processes provided in *The Handbook of Environmental Degradation Rates* (Howard et al., 1991), the most conservative (that is, longest) half-lives were selected. Selection of the most conservative value accounts for the range of conditions that might be present in the vadose zone at McClellan. After incorporating degradation, the predicted concentrations in leachate or groundwater did not exceed the Limiting WQLs for any SVOCs.

VLEACH, a one-dimensional finite difference model, was used to simulate the leaching of organic contaminants through the vadose zone. VLEACH models the following four main processes: liquid-phase advection due to infiltration, solid-phase sorption, vapor-phase diffusion, and three-phase equilibration (EPA, 1997a). VLEACH was selected to calculate the mass flux from the vadose zone because the model incorporates contaminant-specific properties. For example, compounds that do not partition strongly to soil (that is, those with low K_{OC} values) have the potential to move with soil moisture toward the water table. However, compounds that strongly partition to soil have a significantly lower potential to impact groundwater. Significant transport of the SVOC contaminants in the vapor phase is not expected; however, the model also incorporates this mechanism.

VLEACH simulates leaching in distinct geometric volumes (polygons). The polygon is assigned dimensions, homogeneous soil properties, recharge rates, depth to water, and an initial vertical VOC concentration profile for each simulation. The polygon is represented in the model by a vertical stack of cells, extending from the land surface to the water table. VLEACH simulates the partitioning of contaminants among three phases – aqueous solution, vapor, and sorbed to solid surfaces – within each cell. During each time step, aqueous contaminant is subject to downward advection, vapor-phase contaminant is subject to gas diffusion, and each cell is re-equilibrated according to the distribution coefficients. VLEACH calculates the overall mass flux to the groundwater for each time step.

Table B1-13 presents numeric inputs used for the modeling, and Table B1-14 presents the contaminant-specific parameters used for the modeling. As described previously, the greater of the maximum reported concentration in soil or the screening level for protection of human health was used to develop a worst-case scenario for contaminant distribution. A site with a width of 100 feet and length of 500 feet (1.15 acres) was assumed for these simulations. It is unlikely that the SVOC contaminants are present at any site at such elevated concentrations over such a large area.

The groundwater mixing-cell model was developed to estimate contaminant concentrations in the groundwater beneath a vadose-zone site with contamination. A similar mixing cell was used to evaluate impacts to groundwater from VOC contaminants and is documented in the VOC FS (CH2M HILL, 1999a) and the Draft *Technical and Economic Feasibility Analysis, Investigation Cluster 1* (CH2M HILL, 1999b).

A different groundwater mixing model is described in the *Interim Basewide Remedial Investigation Report–General Framework* (URS, 2002) to calculate average groundwater concentrations throughout a contaminant plume. The mixing-cell model used to calculate the screening levels for this effort is conservative compared to the mixing model described in the General Framework Document, because this mixing-cell model calculates contaminant concentrations directly beneath a vadose-zone site where concentrations will be greatest.

The mixing-cell model used for these simulations has the same dimensions as the worst-case vadose-zone site (that is, a width of 100 feet and a length of 500 feet). It was assumed that the groundwater flow direction was along the length of the site. Again, this is a conservative assumption and maximizes the groundwater impacts. The thickness of the groundwater cell is 10 feet because this represents the length of a potential receptor well screen.

Within the mixing-cell model, a flow balance and a mass balance are calculated for each daily time step. The model incorporates contaminant mass flux and infiltration from the vadose zone and groundwater flow from upgradient. It was assumed that the groundwater beneath the site is uncontaminated initially and that there are no contaminants in the upgradient groundwater entering the mixing cell. Mass leaves the cell by flowing downgradient in groundwater.

The mixing-cell model inputs include the mass flux from the vadose zone, retardation factors, and the lateral groundwater flux. The inputs are summarized in Table B1-15. Table B1-16 summarizes the predicted mass flux and concentration in leachate at the water table for each SVOC along with the corresponding maximum predicted concentrations in groundwater. The results presented in Table B1-16 indicate that known concentrations of

SVOCs in soil at sites do not result in impacts exceeding the MCL or WQL in leachate (that is, soil moisture) at the water table or in groundwater. During the data screening process, detected SVOC concentrations are compared with the maximum modeled soil concentrations for SVOCs for reference. All individual site SVOC concentrations are less than the modeled values; therefore, no impacts to groundwater are predicted.

B1.3.3.4 Total Petroleum Hydrocarbons

Screening levels for protection of groundwater were adapted from Central Valley Water Board guidance (Central Valley Water Board, 1990) for TPH-D and TPH-G, and were used to evaluate the site characterization data. The values are TPH-G at 10 mg/kg and TPH-D at 100 mg/kg.

B1.3.3.5 VOCs in Soil Gas

Soil gas screening levels for protection of groundwater from VOCs have been developed as part of the Soil Vapor Extraction Vadose Zone Monitoring Program. The DS MCL screening levels are back-calculated using VLEACH and McClellan parameters from the SVE RAWP Addendum (URS, 2004). They represent theoretical (modeled) soil gas concentrations in the specified depth interval that will cause the soil moisture (leachate) at 105 feet bgs (assumed groundwater depth) to exceed the drinking water MCL for that VOC within 100 years. The full use of these values in "VLEACH-L" screening is explained in the START FSP (Jacobs, 2003) and in the Initial Parcel #2 FS (CH2M HILL, 2005). A summary of the DS MCL screening levels is provided in Table B1-17.

B1.3.4 Protection of Surface Water

Screening levels for protection of surface water were developed and used to evaluate the site characterization data to determine if impacts to surface water are possible. The screening levels were calculated using a slight modification of the procedure proposed by Jacobs during the OUs E-H RICS2 (Jacobs, 2000). This procedure is intended as a screening tool to evaluate whether contaminants in soil could impact surface water at concentrations above the WQLs identified in consultation with the Central Valley Water Board.

Using this approach, the annual mass of eroded soil is calculated using the Revised Universal Soil Loss Equation (RUSLE). The screening levels were back-calculated as the average sitewide soil concentration that results in a surface water concentration at the site boundary equal to the Limiting WQL. The contaminants in soil are assumed to be present in the annual mass of eroded soil. The resulting annual mass of eroded contaminant is then assumed to be dissolved in the average rainfall incident on the site to calculate the concentration of the average annual discharge.

The annual mass of eroded soil is calculated using the developed by the Soil Conservation Service to estimate average annual soil loss, expressed as mass per unit area per year, resulting from erosion from a slope. The RUSLE was used to estimate annual soil loss from sites at McClellan. For the calculations, A is a function of R, K, LS, C, and P.

Where:

A = Computed soil loss (tons ac^{-1} yr^{-1})
R = Rainfall-runoff erosivity factor derived from local rainfall intensity

K = Soil erodibility factor empirically determined for soil classifications
LS = Slope-length factor empirically based on site length and slope
C = Cover and management factor
P = Support practice factor for use where contours, stripcropping, or terracing are used on slopes to reduce erosion

RUSLE 2, a Windows-based computer model, was used for the RUSLE calculations. The rainfall-runoff erosivity factor (R-factor) was taken directly from the isoerodent map of California provided in the *Agriculture Handbook 703* (USDA, 1996). The R-factor was estimated at 40 for McClellan and was input to the model. Based on the *Soil Survey of Sacramento County, California* (Soil Conservation Service, 1993), the dominant soil series at McClellan is the San Joaquin. The soil erodibility factor (K-factor) was input to the model as 0.32, and the hydrologic class was input as D (highest runoff potential) based on information provided for the San Joaquin fine sandy loam in the soil survey. The K-factor was adjusted monthly by the model to reflect monthly temperature and precipitation. Average monthly temperature and precipitation were input for Sacramento, California.

The slope-length factor was calculated by the model based on slope length and average slope steepness input by the user. The average slope was estimated as 1 percent. The slope length was calculated as the square root of the site area. A sensitivity analysis was conducted for slope lengths between 150 and 660 feet (corresponding to areas between 0.5 and 10 acres) to determine a range of computed soil loss values. The model was not sensitive to slope lengths in this range because of the low value of slope steepness (1 percent). A slope length of 210 feet, corresponding to an area of 1 acre, was used for the simulations.

The cover and management factor was calculated by the model based on a vegetative cover of fescue—low production and not harvested. Low-production fescue has a preset surface cover of 42 percent under optimum conditions. Normal-production fescue has a surface cover under optimum conditions of 89 percent. The low-production fescue was used to provide a conservative estimate of soil loss from sites at McClellan. No supporting practices were input in the model for the calculation of the support practice factor. The RUSLE model calculated the annual soil loss as 0.064 ton/acre (58 kg/acre).

The screening levels were calculated as the average site wide soil concentration that results in an annual discharge concentration equal to the Limiting WQL criteria. The following specific procedure is used:

1. The average annual discharge contaminant concentration is set equal to the Limiting WQL criteria. The average rainfall incident on the site (18 inches or 42.5 liter/foot^2) is used to convert the concentration into an annual eroded contaminant mass.

2. The annual mass of eroded soil is estimated by using the method described previously for an assumed site area equal to 1 acre.

3. The average contaminant soil concentration is calculated by dividing the annual mass of eroded contaminant by the annual mass of eroded soil.

Table B1-18 shows the screening levels for protection of surface water. These values were used to evaluate the site characterization data to determine if impacts to surface water were

possible. A point-by-point comparison was used for this screening rather than a site-wide average contaminant concentration.

B1.4 Summary of Screening Levels and Background Concentrations

A summary of the selected screening levels for soil is provided in Table B1-19. Shallow soil gas screening levels are presented in Tables B1-7 and B1-8.The site characterization data for all of the SVS were evaluated against these screening levels. In addition, metals data were compared against background values as reported in the *Interim Basewide Remedial Investigation Report–General Framework* (URS, 2002) (see Attachment B1-1). Radionuclide data were compared against background values based on the *Final Revised Reference Area Survey Report* (Cabrera, 2004) and the *Radiological Remedial Investigation of Multiple CERCLA Sites, Remedial Investigation Characterization Summaries Addendum, Initial Parcel #3* (Cabrera, 2008) (see Section B1.3.1.3).

B1.5 References

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Tables

TABLE B1-1

Toxicity Values,Volatilization Factors, Absorption Factors, and K_{ps} Values Used to Calculate Screening Levels and in HHRAs

Small Volume Sites RICS Addenda and FS, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
Perchlorate			7.00E-04	IRIS							1.00E-04	RAIS		calc from HSDB K_{ow}
Aluminum			1.00E+00	PPRTV			1.43E-03	PPRTV			1.00E-02	PEA		
Antimony			4.00E-04	IRIS							1.00E-02	PEA		
Arsenic	1.50E+00	IRIS	3.00E-04	IRIS	1.51E+01	IRIS	4.29E-06	Cal/EPA			3.00E-02	PEA	2.20E-03	SSG
Barium			2.00E-01	IRIS			1.43E-04	HEAST			1.00E-02	PEA		
Beryllium			2.00E-03	IRIS	8.40E+00	IRIS	5.71E-06	IRIS			1.00E-02	PEA		
Boron			2.00E-01	IRIS			5.71E-03	HEAST			1.00E-03	RAIS		
Cadmium			1.00E-03	IRIS	6.30E+00	IRIS	5.71E-06	Cal/EPA			1.00E-03	PEA	2.88E-02	SSG
Chromium, hexavalent			3.00E-03	IRIS	4.20E+01	IRIS	2.29E-06	IRIS				PEA		
Chromium, total					4.20E+01	IRIS					1.00E-02	PEA		
Chromium, trivalent			1.50E+00	IRIS			1.50E+00	ROUTE			1.00E-02	PEA		
Cobalt			3.00E-04	PPRTV	3.15E+01	PPRTV	1.71E-06	PPRTV			1.00E-02	PEA		
Copper			4.00E-02	HEAST			2.86E-02	Cal/EPA			1.00E-02	PEA		
Cyanide, reactive			2.00E-02	IRIS			8.57E-04	IRIS			1.00E-02	PEA		
Cyanide, total distilled			2.00E-02	IRIS							1.00E-02	PEA		
Iron			7.00E-01	PPRTV							1.00E-02	PEA		
Lead[k]	8.50E-03	Cal/EPA			4.20E-02	Cal/EPA					1.00E-02	PEA		
Manganese			2.40E-02	IRIS			1.43E-05	IRIS			1.00E-02	PEA		
Mercury and mercury compounds			1.60E-04	Cal/EPA			8.57E-05	IRIS			1.00E-02	PEA	3.60E-03	SSG
Mercury, elemental			1.60E-04	Cal/EPA			8.57E-05	IRIS			1.00E-02	PEA	3.60E-03	SSG
Molybdenum			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Nickel			2.00E-02	IRIS	9.10E-01	Cal/EPA	1.43E-05	Cal/EPA			1.00E-02	PEA	3.80E-03	SSG
Selenium			5.00E-03	IRIS			5.71E-03	Cal/EPA			1.00E-02	PEA	3.60E-03	SSG
Silver			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Thallium			6.60E-05	IRIS			6.60E-05	ROUTE			1.00E-02	PEA		
Vanadium			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Zinc			3.00E-01	IRIS			3.00E-01	ROUTE			1.00E-02	PEA	1.48E-02	SSG
1,2-Dichlorobenzene			9.00E-02	IRIS			5.71E-02	HEAST	1.46E+04	Region 9	1.00E-01	PEA	7.89E-02	calc from SSG K_{ow}
1,3-Dichlorobenzene			3.00E-02	NCEA			3.00E-02	ROUTE	1.46E+04	Region 9	1.00E-01	PEA	6.90E-02	calc from HSDB K_{ow}
1,4-Dichlorobenzene	5.40E-03	Cal/EPA	3.00E-02	NCEA	4.00E-02	Cal/EPA	2.30E-01	IRIS	1.29E+04	Region 9	1.00E-01	PEA	8.00E-02	calc from SSG K_{ow}
1,4-Dioxane (p-dioxane)	1.10E-02	IRIS			2.70E-02	Cal/EPA	8.57E-01	Cal/EPA			1.00E-01	PEA	1.10E+01	calc from RAIS K_{ow}
1-Methylnaphthalene	2.90E-02	PPRTV			2.90E-02	ROUTE					1.00E-01	PEA	4.38E-02	calc from RAIS K_{ow}
2,3,7,8-TCDD	1.30E+05	Cal/EPA	1.00E-08	Cal/EPA	1.30E+05	Cal/EPA	1.14E-08	Cal/EPA			3.00E-02	PEA	8.76E-04	calc from HSDB K_{ow}
2,4,5-Trichlorophenol			1.00E-01	IRIS			1.00E-01	ROUTE			1.00E-01	PEA	4.21E-02	calc from SSG K_{ow}
2,4,5-Trichlorophenoxypropionic acid			8.00E-03	IRIS			8.00E-03	ROUTE			1.00E-01	PEA	4.81E-02	
2,4-DB[l]			8.00E-03	IRIS			8.00E-03	ROUTE						
2,4-Dimethylphenol			2.00E-02	IRIS			2.00E-02	ROUTE			1.00E-01	PEA	3.29E-01	OU A RICS = blank
2,4-Dinitrophenol			2.00E-03	IRIS			2.00E-03	ROUTE						
2,4-Dinitrotoluene	3.10E-01	Cal/EPA	2.00E-03	IRIS	3.10E-01	Cal/EPA	2.00E-03	ROUTE			1.00E-01	PEA	5.26E-01	calc from SSG K_{ow}
2,6-Dinitrotoluene[a]	6.80E-01	IRIS	1.00E-03	PPRTV	6.80E-01	ROUTE	1.00E-03	ROUTE			1.00E-01	PEA	6.34E-01	calc from SSG K_{ow}
2-Methylnaphthalene[b]			4.00E-03	IRIS			8.60E-04	IRIS	4.30E+04	Region 9	1.50E-01	PEA	3.17E-02	OU A RICS
2-Methylphenol (o-cresol)			5.00E-02	IRIS			5.00E-02	ROUTE			1.00E-01	PEA	5.40E-01	calc from SSG K_{ow}
2-Nitrophenol											1.00E-01	PEA	6.01E-01	calc from RAIS K_{ow}
4-Chloroaniline			4.00E-03	IRIS			4.00E-03	ROUTE			1.00E-01	PEA	6.51E-01	calc from SSG K_{ow}
4-Methylphenol (p-cresol)			5.00E-03	HEAST			5.00E-03	ROUTE			1.00E-01	PEA	5.77E-01	calc from HSDB K_{ow}
4-Nitroaniline	2.10E-02	PPRTV	3.00E-03	PPRTV	2.10E-02	ROUTE	1.14E-03	PPRTV			1.00E-01	Region 9	6.36E+00	RAIS
4-Nitrophenol											1.00E-01	PEA	6.09E-01	calc from SSG K_{ow}
Acenaphthene			6.00E-02	IRIS			6.00E-02	ROUTE	1.82E+05	Region 9	1.50E-01	PEA	3.69E-02	OU A RICS
Acenaphthylene											1.50E-01	PEA	4.65E+00	calc from RAIS K_{ow}
Aldrin	1.70E+01	IRIS	3.00E-05	IRIS	1.72E+01	IRIS	3.00E-05	ROUTE			5.00E-02	PEA	1.31E-03	calc from SSG K_{ow}

TABLE B1-1

Toxicity Values,Volatilization Factors, Absorption Factors, and K_{ps} Values Used to Calculate Screening Levels and in HHRAs

Small Volume Sites RICS Addenda and FS, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
Allyl chloride (3-chloropropene)	2.10E-02	Cal/EPA	2.86E-04	ROUTE	2.10E-02	Cal/EPA	2.86E-04	IRIS			1.00E-01	PEA	1.06E+01	calc from HSDB K_{ow}
Alpha BHC (alpha hexachlorocyclohexane)	6.30E+00	IRIS	5.00E-04	NCEA	6.30E+00	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	4.81E-02	calc from SSG K_{ow}
Anthracene			3.00E-01	IRIS			3.00E-01	ROUTE	6.98E+05	Region 9	1.50E-01	PEA	2.02E-02	OU A RICS
Benzidine	2.30E+02	IRIS	3.00E-03	IRIS	2.30E+02	IRIS	3.00E-03	ROUTE			1.00E-01	PEA	1.29E+00	calc from HSDB K_{ow}
Benzo(a)anthracene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	4.02E-03	OU A RICS
Benzo(a)pyrene[c]	7.30E+00	IRIS	3.00E-02	IRIS	3.90E+00	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.23E-03	OU A RICS
Benzo(b)fluoranthene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.17E-03	OU A RICS
Benzo(g,h,i)perylene[c]			3.00E-02	IRIS			3.00E-02	ROUTE			1.50E-01	PEA	1.29E-03	OU A RICS
Benzo(k)fluoranthene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.35E-03	OU A RICS
Benzoic acid			4.00E+00	IRIS			4.00E+00	ROUTE			1.00E-01	PEA	6.34E-01	calc from SSG K_{ow}
Benzyl alcohol			5.00E-01	PPRTV			3.00E-01	ROUTE			1.00E-01	PEA	1.77E+00	OU A RICS
Benzyl butyl phthalate	1.90E-03	PPRTV	2.00E-01	IRIS	1.90E-03	ROUTE	2.00E-01	ROUTE			1.00E-01	PEA	1.20E-02	calc from SSG K_{ow}
Beta BHC (beta hexachlorocyclohexane)	1.80E+00	IRIS	2.00E-04	NCEA	1.86E+00	IRIS	2.00E-04	ROUTE			5.00E-02	PEA	4.75E-02	calc from SSG K_{ow}
bis(2-chloroethyl)ether	1.10E+00	IRIS			1.16E+00	IRIS			5.68E+04	Region 9	1.00E-01	PEA	1.37E+00	OU A RICS
bis(2-ethylhexyl)phthalate	1.40E-02	IRIS	2.00E-02	IRIS	8.40E-03	Cal/EPA	2.00E-02	ROUTE			1.00E-01	PEA	4.49E-04	calc from SSG K_{ow}
Bisphenol-A			5.00E-02	IRIS			5.00E-02	ROUTE			1.00E-01	PEA	9.14E-02	calc from SSG K_{ow}
Bromoform	7.90E-03	IRIS	2.00E-02	IRIS	3.85E-03	IRIS	2.00E-02	ROUTE	1.60E+04	dibromochloromethane = surrogate	1.00E-01	PEA	3.34E-01	calc from SSG K_{ow}
Chlordane (alpha)											5.00E-02	PEA	1.66E-03	calc from SSG K_{ow}
Chlordane (gamma)	3.50E-01	IRIS	5.00E-04	IRIS	3.50E-01	IRIS	2.00E-04	IRIS			5.00E-02	PEA	1.66E-03	calc from SSG K_{ow}
Chrysene[c]	1.20E-01	Cal/EPA	3.00E-02	IRIS	3.90E-02	Cal/EPA	3.00E-02	ROUTE	2.73E+06	Region 9	1.50E-01	PEA	4.02E-03	OU A RICS
Delta BHC (delta hexachlorocyclohexane)[d]			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	3.06E-02	calc from HSDB K_{ow}
Dibenz(a,h)anthracene[c]	4.10E+00	Cal/EPA	3.00E-02	IRIS	4.10E+00	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	8.76E-04	OU A RICS
Dibenzofuran									6.51E+05	Region 9	1.00E-01	PEA	3.14E-02	OU A RICS
Dieldrin	1.60E+01	IRIS	5.00E-05	IRIS	1.61E+01	IRIS	5.00E-05	ROUTE			5.00E-02	PEA	5.91E-03	calc from SSG K_{ow}
Diethyl phthalate			8.00E-01	IRIS			8.00E-01	ROUTE			1.00E-01	PEA	2.80E-01	OU A RICS
Dimethyl phthalate			1.00E+01	HEAST			1.00E+01	ROUTE			1.00E-01	PEA	9.09E-01	calc from HSDB K_{ow}
Dinoseb			1.00E-03	IRIS			1.00E-03	ROUTE						
Di-n-butylphthalate			1.00E-01	IRIS			1.00E-01	ROUTE			1.00E-01	PEA	1.63E-02	calc from SSG K_{ow}
Di-n-octylphthalate			4.00E-02	PPRTV			4.00E-02	ROUTE			1.00E-01	PEA	1.63E-04	calc from SSG K_{ow}
Endosulfan			6.00E-03	IRIS			6.00E-03	ROUTE			5.00E-02	PEA	3.22E-02	calc from SSG K_{ow}
Endosulfan sulfate[e]			6.00E-03	IRIS			6.00E-03	ROUTE			5.00E-02	PEA	5.80E-02	calc from Water9 K_{ow}
Endrin			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	8.95E-03	OU A RICS= blank
Endrin aldehyde[f]			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	8.95E-03	OU A RICS= blank
Fluoranthene			4.00E-02	IRIS			4.00E-02	ROUTE			1.50E-01	PEA	1.04E-02	OU A RICS
Fluorene			4.00E-02	IRIS			4.00E-02	ROUTE	3.60E+05	Region 9	1.50E-01	PEA	2.82E-02	OU A RICS
Gamma BHC (lindane)	1.10E+00	Cal/EPA	3.00E-04	IRIS	1.10E+00	Cal/EPA	3.00E-04	ROUTE			5.00E-02	PEA	5.29E-02	calc from SSG K_{ow}
Heptachlor	4.50E+00	IRIS	5.00E-04	IRIS	4.55E+00	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	1.80E-03	calc from SSG K_{ow}
Heptachlor epoxide	9.10E+00	IRIS	1.30E-05	IRIS	9.10E+00	IRIS	1.30E-05	ROUTE			5.00E-02	PEA	9.69E-03	calc from SSG K_{ow}
Hexachlorobutadiene	7.80E-02	IRIS	1.00E-03	PPRTV	7.70E-02	IRIS	1.00E-03	ROUTE			1.00E-01	PEA	1.25E-02	calc from SSG K_{ow}
Hexachloroethane	1.40E-02	IRIS	1.00E-03	IRIS	1.40E-02	IRIS	1.00E-03	ROUTE			1.00E-01	PEA	3.69E-02	calc from SSG K_{ow}
Indeno(1,2,3-c,d)pyrene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	1.18E-03	OU A RICS
Isophorone	9.50E-04	IRIS	2.00E-01	IRIS	9.50E-04	ROUTE	5.71E-01	Cal/EPA			1.00E-01	PEA	7.95E-01	calc from SSG K_{ow}
Isopropylbenzene (cumene)			1.00E-01	IRIS			1.14E-01	IRIS	3.59E+03	Region 9	1.00E-01	PEA	5.80E-02	calc from RAIS K_{ow}
MCPA[m]			5.00E-04	IRIS			5.00E-04	ROUTE						
Methanol			5.00E-01	IRIS			1.14E+00	Cal/EPA			1.00E-02	RAIS	2.15E+01	calc from RAIS and HSDB K_{ow}
Methoxychlor			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-01	PEA	1.49E-02	OU A RICS
Naphthalene			2.00E-02	IRIS	1.20E-01	Cal/EPA	8.57E-04	IRIS	4.30E+04	Region 9	1.50E-01	PEA	9.39E-02	OU A RICS
n-Nitrosodi-n-propylamine	7.00E+00	IRIS			7.00E+00	Cal/EPA					1.00E-01	PEA	1.19E+00	calc from SSG K_{ow}
n-Nitrosodiphenylamine	4.90E-03	IRIS	2.00E-02	PPRTV	9.00E-03	Cal/EPA	2.00E-02	ROUTE			1.00E-01	PEA	1.13E-01	OU A RICS = blank
p,p'-DDD[g]	2.40E-01	IRIS	5.00E-04	IRIS	2.40E-01	Cal/EPA	5.00E-04	ROUTE			5.00E-02	PEA	3.33E-03	OU A RICS

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Small Volume Sites RICS Addenda and FS, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
p,p'-DDE[g]	3.40E-01	IRIS	5.00E-04	IRIS	3.40E-01	Cal/EPA	5.00E-04	ROUTE			5.00E-02	PEA	9.24E-04	calc from SSG K_{ow}
p,p'-DDT	3.40E-01	IRIS	5.00E-04	IRIS	3.40E-01	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	1.26E-03	calc from SSG K_{ow}
PCB-1016 (Aroclor 1016)	7.00E-02	IRIS	7.00E-05	IRIS	7.00E-02	IRIS	7.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1221 (Aroclor 1221)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1232 (Aroclor 1232)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1248 (Aroclor 1248)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1254 (Aroclor 1254)	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1260 (Aroclor 1260)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCC-1242 (Aroclor 1242)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
p-Cymene (p-isopropyltoluene)											1.00E-01	PEA		
Pentachlorophenol	1.20E-01	IRIS	3.00E-02	IRIS	1.80E-02	Cal/EPA	3.00E-02	ROUTE			2.50E-01	PEA	8.26E-03	calc from HSDB K_{ow}
Phenanthrene[c]			3.00E-01	IRIS			3.00E-01	ROUTE			1.50E-01	PEA	1.72E-02	OU A RICS
Phenol			3.00E-01	IRIS			5.71E-02	Cal/EPA			1.00E-01	PEA	1.07E+00	calc from SSG K_{ow}
Pyrene			3.00E-02	IRIS			3.00E-02	ROUTE	3.80E+06	Region 9	1.50E-01	PEA	1.14E-02	OU A RICS
sec-Butylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	8.31E+03	Region 9	1.00E-01	PEA		
1,1,1-Trichloroethane			2.00E+00	IRIS			1.43E+00	IRIS	2.21E+03	Region 9	1.00E-01	PEA		
1,1,2,2-Tetrachloroethane	2.00E-01	IRIS	4.00E-03	PPRTV	2.03E-01	IRIS	4.00E-03	ROUTE	1.41E+04	Region 9	1.00E-01	PEA		
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon® 113)			3.00E+01	IRIS			8.57E+00	HEAST	1.57E+03	Region 9	1.00E-01	PEA		
1,1,2-Trichloroethane	5.70E-02	IRIS	4.00E-03	IRIS	5.60E-02	IRIS	4.00E-03	ROUTE	6.49E+03	Region 9	1.00E-01	PEA		
1,1-Dichloroethane	5.70E-03	Cal/EPA	2.00E-01	PPRTV	5.70E-03	Cal/EPA			2.42E+03	Region 9	1.00E-01	PEA		
1,1-Dichloroethene			5.00E-02	IRIS			5.70E-02	IRIS	1.43E+03	Region 9	1.00E-01	PEA		
1,2,4-Trichlorobenzene	3.60E-03	Cal/EPA	1.00E-02	IRIS			1.14E-03	PPRTV	4.32E+04	Region 9	1.00E-01	PEA	3.64E-02	calc from SSG K_{ow}
1,2,4-Trimethylbenzene							2.00E-03	PPRTV	1.97E+04	Region 9	1.00E-01	PEA		
1,2-Dibromo-3-chloropropane	8.00E-01	PPRTV	2.00E-04	PPRTV	2.10E+01	PPRTV	5.71E-05	IRIS	4.60E+04	Region 9	1.00E-01	PEA		
1,2-Dibromoethane (ethylene dibromide)	2.00E+00	IRIS	9.00E-03	IRIS	2.10E+00	IRIS	2.57E-03	IRIS	1.10E+04	Region 9	1.00E-01	PEA		
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)[i]			3.00E+01	IRIS			8.57E+00	HEAST	1.60E+03	Region 9 - Freon 113 = surrogate	1.00E-01	PEA		
1,2-Dichloroethane	9.10E-02	IRIS	2.00E-02	PPRTV	9.10E-02	IRIS	1.14E-01	Cal/EPA	3.91E+03	Region 9	1.00E-01	PEA		
1,2-Dichloropropane	3.60E-02	Cal/EPA	1.14E-03	ROUTE	3.60E-02	Cal/EPA	1.14E-03	IRIS	3.59E+03	Region 9	1.00E-01	PEA		
1,3,5-Trimethylbenzene			5.00E-02	PPRTV			1.70E-03	PPRTV	8.04E+03	Region 9	1.00E-01	PEA		
1,3-Butadiene	3.40E+00	Cal/EPA	5.70E-04	ROUTE	1.10E-01	IRIS	5.70E-04	IRIS	9.60E+02	Region 9	1.00E-01	PEA		
2,2,4-Trimethylpentane											1.00E-01	PEA		
2,3,4-Trimethylpentane											1.00E-01	PEA		
2,4-Dimethyl pentane											1.00E-01	PEA		
2-Chlorotoluene			2.00E-02	IRIS			2.00E-02	ROUTE	5.63E+03	Region 9	1.00E-01	PEA		
Acetone			9.00E-01	IRIS			9.00E-01	ROUTE	1.26E+04	Region 9	1.00E-01	PEA		
Benzene	5.50E-02	IRIS	4.00E-03	IRIS	2.73E-02	IRIS	8.60E-03	IRIS	2.73E+03	Region 9	1.00E-01	PEA		
Benzyl chloride	1.70E-01	IRIS	2.00E-03	PPRTV	1.70E-01	Cal/EPA	2.86E-04	PPRTV	2.95E+04	Region 9	1.00E-01	PEA		
Bromodichloromethane	6.20E-02	IRIS	2.00E-02	IRIS	1.30E-01	Cal/EPA	2.00E-02	ROUTE	8.26E+03	Region 9	1.00E-01	PEA		
Bromomethane			1.40E-03	IRIS			1.43E-03	IRIS	1.81E+03	Region 9	1.00E-01	PEA		
Carbon tetrachloride	1.30E-01	IRIS	7.00E-04	IRIS	5.25E-02	IRIS	1.14E-02	Cal/EPA	2.07E+03	Region 9	1.00E-01	PEA		
Chlorobenzene			2.00E-02	IRIS			1.43E-02	PPRTV	6.27E+03	Region 9	1.00E-01	PEA		
Chlorodifluoromethane			1.40E+01	ROUTE			1.40E+01	IRIS	1.06E+03	Region 9	1.00E-01	PEA		
Chloroethane	2.90E-03	NCEA	4.00E-01	NCEA	2.90E-03	ROUTE	2.86E+00	IRIS	1.32E+03	Region 9	1.00E-01	PEA		
Chloroform	3.10E-02	Cal/EPA	1.00E-02	IRIS	8.10E-02	IRIS	8.57E-02	Cal/EPA	2.66E+03	Region 9	1.00E-01	PEA		
Chloromethane	1.30E-02	HEAST	2.60E-02	ROUTE	6.30E-03	HEAST	2.60E-02	IRIS	1.18E+03	Region 9	1.00E-01	PEA		
cis-1,2-Dichloroethylene			1.00E-02	PPRTV			1.00E-02	ROUTE	2.90E+03	Region 9	1.00E-01	PEA		
cis-1,3-Dichloropropene	1.00E-01	IRIS	3.00E-02	IRIS	1.40E-02	IRIS	5.71E-03	IRIS	1.84E+03	Region 9	1.00E-01	PEA		
Cyclohexane			1.70E+00	ROUTE			1.70E+00	IRIS	1.10E+03	Region 9	1.00E-01	PEA		
Dichlorodifluoromethane			2.00E-01	IRIS			5.71E-02	HEAST	1.06E+03	Region 9	1.00E-01	PEA		
Ethylbenzene	1.10E-02	Cal/EPA	1.00E-01	IRIS	8.70E-03	Cal/EPA	2.86E-01	IRIS	5.40E+03	Region 9	1.00E-01	PEA		

TABLE B1-1

Toxicity Values,Volatilization Factors, Absorption Factors, and K_{ps} Values Used to Calculate Screening Levels and in HHRAs

Small Volume Sites RICS Addenda and FS, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
Heptane[j]							2.00E-01	IRIS	1.40E+03	Region 9	1.00E-01	PEA		
Hexane			6.00E-02	HEAST			2.00E-01	IRIS	1.40E+03	Region 9	1.00E-01	PEA		
Methyl ethyl ketone (2-butanone)			6.00E-01	IRIS			1.43E+00	IRIS	1.90E+04	Region 9	1.00E-01	PEA		
Methyl isobutyl ketone (4-methyl-2-pentanone)			8.00E-02	HEAST			8.57E-01	IRIS	2.50E+04	Region 9	1.00E-01	PEA		
Methyl tert-butyl ether	1.80E-03	Cal/EPA	8.57E-01	ROUTE	9.10E-04	Cal/EPA	8.57E-01	IRIS	4.69E+03	Region 9	1.00E-01	PEA		
Methylcyclohexane			8.60E-01	ROUTE			8.57E-01	HEAST	2.01E+03	Region 9	1.00E-01	PEA		
Methylene chloride	7.50E-03	IRIS	6.00E-02	IRIS	1.65E-03	IRIS	1.14E-01	Cal/EPA	2.49E+03	Region 9	1.00E-01	PEA		
n-Butylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	1.10E+04	Region 9	1.00E-01	PEA		
n-Propylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	1.10E+04	Region 9	1.00E-01	PEA		
o-xylene (1,2-dimethyl benzene)			2.00E-01	IRIS			2.86E-02	IRIS			1.00E-01	PEA		
Propylene							8.57E-01	Cal/EPA			1.00E-01	PEA		
Styrene			2.00E-01	IRIS			2.86E-01	IRIS	1.34E+04	Region 9	1.00E-01	PEA		
Tetrachloroethylene (PCE)	5.40E-01	Cal/EPA	1.00E-02	IRIS	2.10E-02	Cal/EPA	1.00E-02	Cal/EPA	2.55E+03	Region 9	1.00E-01	PEA		
Toluene			8.00E-02	IRIS			1.43E+00	IRIS	3.98E+03	Region 9	1.00E-01	PEA		
trans-1,2-Dichloroethene			2.00E-02	IRIS			1.71E-02	PPRTV	2.32E+03	Region 9	1.00E-01	PEA		
trans-1,3-Dichloropropene	1.00E-01	IRIS	3.00E-02	IRIS	1.40E-02	IRIS	5.71E-03	IRIS	1.84E+03	Region 9	1.00E-01	PEA		
Trichloroethylene (TCE)	1.30E-02	Cal/EPA	3.00E-04	NCEA	7.00E-03	Cal/EPA	1.71E-01	Cal/EPA	3.26E+03	Region 9	1.00E-01	PEA		
Trichlorofluoromethane			3.00E-01	IRIS			2.00E-01	HEAST	1.25E+03	Region 9	1.00E-01	PEA		
Vinyl chloride	1.50E+00	IRIS	3.00E-03	IRIS	3.10E-02	IRIS	2.86E-02	IRIS	1.04E+03	Region 9	1.00E-01	PEA		
Xylenes (o-xylene, m,p-xylene, total xylenes)			2.00E-01	IRIS			2.86E-02	IRIS	6.10E+03	Region 9	1.00E-01	PEA		

[a] Carcinogenic toxicity factors for dinitrotoluene mixture were applied to 2,6-dinitrotoluene.
[b] Toxicity factors for naphthalene were applied to 2-methylnaphthalene for the inhalation reference dose.
[c] Noncarcinogenic toxicity factors for pyrene were applied for PAHs and phenanthrene.
[d] Toxicity factors for gamma-BHC were applied for delta-BHC.
[e] Toxicity factors for Endosulfan were applied to Endosulfan sulfate.
[f] Toxicity factors for Endrin were applied to Endrin aldehyde.
[g] Noncarcinogenic toxicity factors for p,p'-DDT were applied for p,p'-DDD and p,p'-DDE.
[h] Toxicity factors for PCB-1254 were applied to PCB-1221, PCB-1232, PCB-1242, PCB-1248, and PCB-1260.
[i] Toxicity factors for Freon® 113 were applied to Freon® 114.
[j] Toxicity factors for hexane were applied to heptane.
[k] Screening levels for lead and assessment of lead risk are based on lead concentrations estimated to contribute to a total target blood lead concentration of 10 µg lead per deciliter blood (10 µg/dL).
[l] 4-(2,4 dichlorophenoxy)butyric acid
[m] 2-methyl-chlorophenoxy acetic acid

Notes:
The EPA hierarchy of toxicity criteria was used for development of the preliminary cleanup goals (PCGs).

References:
Cal/EPA = California Environmental Protection Agency (Slope factors from: Office of Environmental Health Hazard Assessment (OEHHA) Cancer Potency List, 2008; Inhalation reference dose calculated from: All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005)
HEAST = Health Effects Assessment Summary Tables (from Region 9 PRG, October 2004)
HSDB = Hazardous Substances Data Bank, 2004
IRIS = Integrated Risk Information System (IRIS) 2008
NCEA = National Center for Environmental Assessment (from Region 9 PRG, October 2004)
OU A RICS = McClellan AFB Interim Basewide RI Addendum, Jacobs, March 2002
PEA = Preliminary Endangerment Assessment Guidance Manual, 1994
PPRTV = Provisional peer-reviewed toxicity value
RAIS = Risk Assessment Information System, Oak Ridge National Laboratory, 2007
Region 9 = Region 9 PRG Table, EPA, 2004
ROUTE = Route extrapolated
SSG = Soil Screening Guidance: User's Guide, EPA, 1996b

TABLE B1-2
Exposure Parameters Used to Calculate Screening Levels for Unrestricted Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Exposure Parameters (Units)	Abbreviation	Values Used for Calculated Screening Levels
Target Cancer Risk	TR	1.00E-06
Target HQ	THQ	1
Body Weight, Adult (kg)	BW_a	70
Body Weight, Age 1 to 6 (kg)	BW_c	15
Default Skin Surface Area for Soil Contact, Adult (cm^2/d)	SA_a	5,700
Default Skin Surface Area for Soil Contact, Child (cm^2/d)	SA_c	2,900
Default Adherence Factor (soil adhered to exposed skin), Adult (mg/cm^2)	AF_a	0.07
Default Adherence Factor (soil adhered to exposed skin), Child (mg/cm^2)	AF_c	0.2
Averaging Time (years of life) – Carcinogenic	AT_c	70
Averaging Time (years of life) – Non-carcinogenic	AT_n	6
Air Breathed (m^3/d)	IRA_a IRA_c	20 10
Particulate Emission Factor* (m^3/kg)	PEF	1.60E+10
Soil Ingestion – Adult Resident (mg/d)	IRS_a	100
Soil Ingestion – Age 1 to 6 (mg/d)	IRS_c	200
Produce Ingestion – Adult Resident (g/d)	IRP_a	122
Produce Ingestion – Child Resident (g/d)	IRP_c	72
Exposure Frequency (d/yr)	EF	350
Exposure Duration, age 1 to 6 (yr)	ED_c	6
Exposure Duration, adult (yr)	ED_c	24
Age-adjusted Factors		
Ingestion Factor for Soils ([mg × yr] / [kg × d])	IFSadj	114
Skin Contact Factor for Soils ([mg × yr] / [kg × d])	SFSadj	361
Ingestion Factor for Produce ([g × yr] / [kg × d])	IFPadj	71
Inhalation Factor ([m^3 × yr] / [kg-d])	InhFadj	11
Plant-soil Partition Coefficient from Soil Due to Rain Splash	K_{ps}^{rain}	0.0034

*This particulate emission factor (PEF) differs from the value used for the Final OU A RICS. A correction was made to the mean wind speed based on site-specific data for McClellan for this PEF value.

TABLE B1-3
Exposure Parameters Used to Calculate Screening Levels for Industrial Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Exposure Parameters (Units)	Abbreviation	Values Used for Calculated Screening Levels
Target Cancer Risk	TR	1.00E-06
Target HQ	THQ	1
Body Weight, Adult (kg)	BW_a	70
Default Skin Surface Area for Soil Contact, Adult (cm^2/d)	SA_a	5,700
Default Adherence Factor (soil adhered to exposed skin), Adult (mg/cm^2)	AF_a	0.2
Averaging Time (years of life) – Carcinogenic	AT_c	70
Averaging Time (years of exposure) – Non-carcinogenic	ATn	25
Air Breathed (m^3/d)	IRA_a	20
Particulate Emission Factor* (m^3/kg)	PEF	1.60E+10
Soil Ingestion – Adult Worker (mg/d)	IRS_a	100
Exposure Frequency (d/yr)	EF	250
Exposure Duration, adult (yr)	ED_c	25

*This particulate emission factor (PEF) differs from the value used for the Final OU A RICS. A correction was made to the mean wind speed based on site-specific data for McClellan for this PEF value.

TABLE B1-4
Summary of Parameters Used to Derive Particulate Emission Factor
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Symbol	Definition (units)	Site Specific*
PEF	Particulate emission factor (m^3/kg)	1.60×10^{10}
Q/C	Inverse of the mean concentration at the center of a 0.5-acre-square source (g/m^2 - s per kg/m^3)	62.0
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual wind speed (m/s)	3.7
U_t	Equivalent threshold value of wind speed at 7 m (m/s)	11.32
F(x)	Function dependent on Um/Ut derived using EPA, 1985 (unitless)	2.22×10^{-2}

*Based on climate and dispersion data for Fresno, California, and mean wind speed for McClellan.

Notes:

The PEF considers only windborne dust emissions and does not consider dust emissions from traffic or other forms of mechanical disturbance.

TABLE B1-5

Screening Levels for Protection of Human Health in Surface and Shallow Soils

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Unrestricted Use Scenario		Industrial Use Scenario	
	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})
Inorganics (mg/kg)				
Aluminum[a]	3.5E+04		9.1E+05	
Antimony	1.4E+01		3.7E+02	
Arsenic	7.6E+00	9.3E-02	2.3E+02	1.4E+00
Barium[a]	6.9E+03		1.8E+05	
Beryllium	6.9E+01	1.3E+04	1.8E+03	2.7E+04
Boron	7.0E+03		2.0E+05	
Cadmium	6.2E+00	1.7E+04	1.0E+03	3.6E+04
Chromium, Hexavalent[b]	1.1E+02	2.6E+03	3.0E+03	5.5E+03
Chromium, Total[b]		2.6E+03		5.5E+03
Cobalt	1.0E+01	3.4E+03	2.7E+02	7.3E+03
Copper	1.4E+03		3.7E+04	
Cyanide	6.9E+02		1.8E+04	
Iron[a]	2.4E+04		6.4E+05	
Lead[c]		1.5E+02		8.0E+02
Manganese	8.3E+02		2.2E+04	
Mercury[d]	3.5E+00		1.5E+02	
Molybdenum	1.7E+02		4.6E+03	
Nickel	4.3E+02	1.2E+05	1.8E+04	2.5E+05
Perchlorate	2.5E+01		7.1E+02	
Selenium	1.1E+02		4.6E+03	
Silver	1.7E+02		4.6E+03	
Thallium	2.3E+00		6.1E+01	
Vanadium	1.7E+02		4.6E+03	
Zinc[a]	3.1E+03		2.8E+05	
SVOCs (mg/kg)				
1,2,4-Trichlorobenzene[e]	3.0E+01	6.9E+00	2.4E+02	3.7E+02
1,2,4-Trimethylbenzene	6.2E+01		2.0E+02	
1,2-Dichlorobenzene[h]	1.9E+02		3.9E+03	
1,3,5-Trimethylbenzene	2.1E+01		7.0E+01	
1,3-Dichlorobenzene[h]	7.6E+01		1.9E+03	
1,4-Dichlorobenzene[e,h]	7.4E+01	1.1E+00	7.4E+03	4.5E+00
1,4-Dioxane[g]	2.1E+10	8.5E-03	7.0E+10	1.2E+02
1-Methylnaphthalene		7.3E-01		8.9E+01
2,3,7,8-TCDD	3.0E-04	1.3E-06	7.6E-03	1.6E-05
2,4,5-Trichlorophenol	4.4E+02		4.8E+04	
2,4,5-Trichlorophenoxypropionic acid	3.2E+01		3.8E+03	
2,4-DB	2.3E+01		3.8E+03	
2,4-Dimethylphenol	1.3E+01		9.6E+03	
2,4-Dinitrophenol	5.2E-01		9.6E+02	
2,4-Dinitrotoluene	8.2E-01	6.3E-03	9.6E+02	4.3E+00
2,6-Dinitrotoluene	3.4E-01	2.4E-03	4.8E+02	2.0E+00
2-Methylnaphthalene[e]	1.6E+01		1.7E+02	
2-Methylphenol	2.0E+01		2.4E+04	
2-Nitrophenol				
4-Chloroaniline	1.3E+00		1.9E+03	
4-Methylphenol	1.9E+00		2.4E+03	
4-Nitroaniline	1.0E-01	7.7E-03	1.4E+03	6.4E+01
4-Nitrophenol				
Acenapthene[h]	2.9E+02		1.6E+04	
Acenapthylene				
Aldrin	8.3E-01	9.2E-03	2.0E+01	1.1E-01

TABLE B1-5
Screening Levels for Protection of Human Health in Surface and Shallow Soils
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	Unrestricted Use Scenario		Industrial Use Scenario	
Compound	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})
Anthracene[a,h]	2.3E+03		1.0E+05	
Benzidine	5.0E-01	3.5E-06	1.4E+03	5.8E-03
Benzo(a)anthracene	5.7E+02	8.8E-02	1.1E+04	8.8E-01
Benzo(a)pyrene	6.8E+02	1.8E-02	1.1E+04	1.4E-01
Benzo(b)fluoranthene	6.8E+02	1.1E-01	1.1E+04	8.8E-01
Benzo(g,h,i)perylene	7.5E+02		1.1E+04	
Benzo(k)fluoranthene	6.7E+02	1.1E-01	1.1E+04	8.8E-01
Benzoic acid[a,g]	1.4E+03		1.9E+06	
Benzyl alcohol[a]	6.1E+01		2.4E+05	
Benzyl chloride	1.2E+01	8.3E-01	4.1E+01	1.9E+00
BHC, alpha	2.0E+00	3.1E-03	3.3E+02	2.9E-01
BHC, beta		1.1E-02		1.0E+00
BHC, delta	1.8E+00		2.0E+02	
BHC, gamma	1.1E+00	1.6E-02	2.0E+02	1.7E+00
Bis(2-chloroethyl)ether		6.8E-04		4.4E-01
Bis(2-ethylhexyl)phthalate (DEHP)	5.8E+02	1.2E+01	9.6E+03	9.6E+01
Bisphenol-A	1.1E+02		2.4E+04	
Butylbenzylphthalate (BBP)	2.3E+03	3.1E+01	9.6E+04	7.0E+02
Chlordane	1.3E+01	4.3E-01	3.3E+02	5.2E+00
Chlordane, alpha	1.3E+01	4.3E-01	3.3E+02	5.2E+00
Chlordane, gamma	1.3E+01	4.3E-01	3.3E+02	5.2E+00
Chrysene[h]	5.7E+02	8.8E-01	1.1E+04	8.7E+00
DDD	1.1E+01	5.0E-01	3.3E+02	7.6E+00
DDE	1.4E+01	4.9E-01	3.3E+02	5.4E+00
DDT	1.4E+01	4.7E-01	3.3E+02	5.4E+00
Dibenz(a,h)anthracene	7.9E+02	3.8E-02	1.1E+04	2.6E-01
Dibenzofuran				
Dieldrin	8.7E-01	5.8E-03	3.3E+01	1.1E-01
Diethylphthalate (DEPH)[a]	6.1E+02		3.8E+05	
Dimethylphthalate (DMPH)[a,g]	2.4E+03		4.8E+06	
Di-n-butylphthalate (DNBP)	9.3E+02		4.8E+04	
Di-n-octylphthalate	1.2E+03		1.9E+04	
Dinoseb	3.0E+00		4.8E+02	
Endosulfan	3.4E+01		3.9E+03	
Endosulfan sulfate	2.0E+01		3.9E+03	
Endrin	4.2E+00		2.0E+02	
Endrin aldehyde	4.2E+00		2.0E+02	
Fluoranthene	4.9E+02		1.5E+04	
Fluorene[h]	2.4E+02		1.3E+04	
Heptachlor	1.3E+01	3.2E-02	3.3E+02	4.1E-01
Heptachlor epoxide	1.7E-01	7.6E-03	8.5E+00	2.0E-01
Hexachloroethane	5.0E+00	1.7E+00	4.8E+02	9.6E+01
Indeno(1,2,3-cd)pyrene	7.6E+02	1.2E-01	1.1E+04	8.8E-01
Isophorone[a]	5.4E+01	1.4E+00	9.6E+04	1.4E+03
MCPA	1.0E+00		2.4E+02	
Methanol[a]	5.0E+00		4.6E+05	
Methoxychlor	5.0E+01		2.4E+03	
Naphthalene[e]	2.5E+01	2.4E+00	1.8E+02	5.1E+00
N-nitroso-di-n-propylamine		1.2E-04		1.9E-01
N-nitrosodiphenylamine (NNSPH)	3.6E+01	1.8E+00	9.6E+03	2.7E+02
PCBs(1016)	1.6E+00	1.8E+00	2.6E+01	1.5E+01
PCBs(1254,1260,1221,1232,1242,1248)	4.4E-01	6.3E-02	7.5E+00	5.3E-01

TABLE B1-5
Screening Levels for Protection of Human Health in Surface and Shallow Soils
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Unrestricted Use Scenario		Industrial Use Scenario	
	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})	Non-carcinogenic (HQ = 1)	Carcinogenic Risk (1×10^{-6})
Pentachlorophenol	4.0E+02	5.9E-01	8.0E+03	6.2E+00
Phenanthrene	2.6E+03		1.1E+05	
Phenol[a]	6.1E+01		1.4E+05	
Pyrene[h]	3.5E+02		1.1E+04	
VOCs (mg/kg)				
1,1,1-Trichloroethane	4.8E+03		1.6E+04	
1,1,2,2-Tetrachloroethane	6.5E+01	3.9E-01	2.5E+02	8.7E-01
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)	2.1E+04		6.9E+04	
1,1,2-Trichloroethane	3.5E+01	7.1E-01	1.2E+02	1.5E+00
1,1-Dichloroethane	1.2E+04	2.8E+00	9.6E+04	5.9E+00
1,1-Dichloroethene	1.2E+02		4.1E+02	
1,2-Dibromo-3-chloropropane (DBCP)	3.1E+00	1.4E-02	1.2E+01	3.1E-02
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)	2.1E+04		6.9E+04	
1,2-Dichloroethane	4.4E+02	2.7E-01	1.8E+03	5.9E-01
1,2-Dichloropropane	5.9E+00	6.4E-01	2.0E+01	1.4E+00
1,3-Butadiene	8.3E-01	4.2E-02	2.8E+00	9.5E-02
2-Chlorotoluene	1.5E+02		5.4E+02	
Acetone	1.3E+04		5.1E+04	
Allyl chloride (3-chloropropene)	5.8E-03	4.6E-03	1.4E+02	6.4E+01
Benzene	3.2E+01	6.3E-01	1.1E+02	1.4E+00
Bromodichloromethane	2.1E+02	4.1E-01	7.8E+02	8.7E-01
Bromoform	1.2E+01	3.8E-01	1.4E+03	4.4E+01
Bromomethane	3.9E+00		1.3E+01	
Carbon tetrachloride	2.0E+01	2.5E-01	8.9E+01	5.3E-01
Chlorobenzene	1.3E+02		4.4E+02	
Chlorodifluoromethane	2.3E+04		7.5E+04	
Chloroethane	4.8E+03	3.0E+00	1.8E+04	6.4E+00
Chloromethane	4.7E+01	1.2E+00	1.5E+02	2.6E+00
Chlororform	2.2E+02	2.2E-01	9.4E+02	4.6E-01
cis-1,2-Dichloroethene	4.2E+01		1.4E+02	
cis-1,3-Dichloropropene	1.6E+01	7.5E-01	5.4E+01	1.6E+00
Cyclohexane	2.8E+03		9.4E+03	
Dichlorodifluoromethane (Freon® 12)	9.4E+01		3.1E+02	
Ethylbenzene	1.7E+03	3.8E+00	6.8E+03	8.3E+00
Ethylene dibromide (1,2-dibromomethane)	4.1E+01	3.1E-02	1.4E+02	6.7E-02
Heptane	4.4E+02		1.4E+03	
Hexachlorobutadiene	1.1E+01	7.3E-01	4.8E+02	1.7E+01
Hexane	3.9E+02		1.4E+03	
Isopropylbenzene	2.2E+02		2.1E+03	
m,p-Xylene	2.7E+02		8.8E+02	
Methyl ethyl ketone (2-butanone)	2.0E+04		9.4E+04	
Methyl isobutyl ketone (4-methyl 2-pentanone)	4.2E+03		2.8E+04	
Methyl tert-butyl ether (MTBE)	5.6E+03	3.1E+01	2.0E+04	6.7E+01
Methylcyclohexane	2.6E+03		8.6E+03	
Methylene chloride	4.0E+02	8.8E+00	1.4E+03	1.9E+01
n-Butylbenzene	5.4E+02		2.0E+03	
n-Propylbenzene	5.4E+02		2.0E+03	
o-Xylene (1,2-dimethyl benzene)	2.7E+02		8.8E+02	
sec-Butylbenzene	4.5E+02		1.6E+03	
Styrene	4.0E+03		1.6E+04	
Tetrachloroethene (PCE)	3.7E+01	4.3E-01	1.3E+02	1.0E+00
Toluene	3.1E+03		1.7E+04	

TABLE B1-5

Screening Levels for Protection of Human Health in Surface and Shallow Soils

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	Unrestricted Use Scenario		Industrial Use Scenario	
Compound	**Non-carcinogenic (HQ = 1)**	**Carcinogenic Risk (1×10^{-6})**	**Non-carcinogenic (HQ = 1)**	**Carcinogenic Risk (1×10^{-6})**
trans-1,2-Dichloroethene	5.9E+01		2.0E+02	
trans-1,3-Dichloropropene	1.6E+01	7.5E-01	5.4E+01	1.6E+00
Trichloroethene (TCE)	1.8E+01	2.9E+00	1.4E+02	6.3E+00
Trichlorofluoromethane (Freon® 11)	3.8E+02		1.3E+03	
Vinyl chloride	3.7E+01	1.3E-01	1.4E+02	3.1E-01
Xylenes, total	2.7E+02		8.8E+02	
Radionuclides (pCi/g)[f]				
Cobalt 60	--	1.0E-01	--	1.0E-01
Cesium 137	--	2.8E-01	--	2.8E-01
Plutonium 239	--	1.1E-02	--	1.1E-02
Radium 226	--	7.8E-01	--	7.8E-01
Thorium 232	--	1.6E+00	--	1.6E+00
Uranium 235	--	2.0E-01	--	2.0E-01

[a] US EPA Region 9 recommends that a "ceiling limit" of 1E+05 be used when the risk-based value is higher. Documentation accompanying the PRGs also acknowledges that this recommendation is not a universally accepted approach.

[b] If separate analyses have been performed for hexavalent chromium, the values for hexavalent and total chromium will be used as calculated. If hexavalent chromium analyses have not been performed, the EPA PRG for total chromium in residential soil (210 mg/kg) will be used as the unrestricted use screening level, and the EPA PRG for total chromium in industrial soil (450 mg/kg) will be used as the industrial use screening level. The screening levels shown in the table for total and hexavalent chromium have been calculated using the McClellan-specific PEF.

[c] Screening levels for lead and assessment of lead risk are based on lead concentrations estimated to contribute to a total target blood lead concentration of 10 µg lead per deciliter blood (10 µg/dL).

[d] The non-cancer risk-based screening level for elemental mercury is greater than 1.0E+06.

[e] The listed risk-based concentrations do not include the indoor air pathway. The values listed in Tables B1-7 and B1-8 account only for the indoor air pathway.

[f] The unrestricted and industrial screening levels for radionuclides are set as the respective background concentrations as described in Section B1.3.1.3.

[g] The non-cancer risk-based screening level for the industrial scenario exceeds 100 percent in soil.

[h] The listed risk-based concentrations exceed the soil saturation concentration (US EPA Region 9 default soil properties for PRGs) for acenapthene (1.3E+02 mg/kg), anthracene (6.1E+00 mg/kg), chrysene (3.8E+00 mg/kg), 1,2-dichlorobenzene (6.0E+02 mg/kg), 1,3-dichlorobenzene (6.0E+02 mg/kg), 1,4-dichlorobenzene (2.8E+02 mg/kg), fluorene (1.6E+02 mg/kg), pyrene (8.5E+01 mg/kg).

Note:

-- = not applicable

TABLE B1-6

Screening Levels for Protection of Human Health in Shallow Soil Gas (Direct Contact)

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Chemical	Soil Gas Concentration Protective of Direct Contact[a], Residential Scenario (ppmv) (Based on Region 9 VFs)		
	Non-Cancer (HI = 1)	Cancer (1×10^{-6})	Minimum (Risk Based)
(2-Methylpropyl)cyclohexane	NA	NA	NA
(E)-2-Butene	NA	NA	NA
1,1,1-Trichloroethane[b]	94,133	NC	94,133
1,1,2,2-Tetrachloroethane	204	1	0.6
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon® 113)[b,c]	385,988	NC	385,988
1,1,2-Trichloroethane	257	3	3
1,1,3-Trimethylcyclohexane	NA	NA	NA
1,1-Dichloroethane	NA	37	37
1,1-Dichloroethene	5,029	NC	5,029
1,2,3-Trimethylcyclopentane	NA	NA	NA
1,2,4-Trichlorobenzene	54	NC	54
1,2,4-Trimethylbenzene	143	NC	143
1,2,4-Trimethylcyclopentane	NA	NA	NA
1,2-Dichlorobenzene[b,c]	3,260	NC	3,260
1,2-Dichloroethane	9,883	2	2
1,2-Dichloropropane	87	5	5
1,3,5-Trimethylbenzene[d]	121	NC	121
1,3-Butadiene	90	3	3
1,3-Dichlorobenzene	1,712	NC	1,712
1,4-Dichlorobenzene	13,122	3	3
1-Ethyl-2,4-dimethylbenzene	NA	NA	NA
1-Methyl-4-propylbenzene	NA	NA	NA
2,2,3-Trimethylpentane	NA	NA	NA
2,2,4-Trimethylpentane	NA	NC	0
2,3,4-Trimethylpentane	NA	NC	0
2,4-Dimethylpentane	NA	NA	NA
2-Ethyl-1,3-dimethylbenzene	NA	NA	NA
2-Methylnapthalene	52	NC	52
2-Methylnonane	NA	NA	NA
2-Methylpentane	NA	NA	NA
3,4-Dimethylhexane	NA	NA	NA
3,4-Dimethyloctane	NA	NA	NA
3-Chloropropene	NA	NA	NA
3-Methyl-5-propylnonane	NA	NA	NA
3-Methylhexane	NA	NA	NA

TABLE B1-6

Screening Levels for Protection of Human Health in Shallow Soil Gas (Direct Contact)

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Chemical	Soil Gas Concentration Protective of Direct Contact[a], Residential Scenario (ppmv) (Based on Region 9 VFs)		
	Non-Cancer (HI = 1)	Cancer (1×10^{-6})	Minimum (Risk Based)
4-Methyldecane	NA	NA	NA
Acetone[b]	132,789	NC	132,789
Benzene	944	10	10
Benzyl chloride	19	1	1.0
Bromodichloromethane	NA	NA	NA
Bromoform	NA	NA	NA
Bromomethane (methyl bromide)	129	NC	129
Carbon tetrachloride	652	3	3
Chlorobenzene	1,112	NC	1,112
Chlorodifluoromethane[c]	NA	NA	NA
Chloroethane	378,985	111	111
Chloroform	6,113	2	2
Chloromethane	4,407	65	65
cis-1,2-Dichloroethene	882	NC	882
cis-1,3-Dichloropropene	441	13	13
cis-1,3-Dimethylcyclohexane	NA	NA	NA
cis-1,4-Dimethylcyclohexane	NA	NA	NA
Cyclobutane	NA	NA	NA
Cycloethane	NA	NA	NA
Cyclohexane	173,188	NC	173,188
Dichlorodifluoromethane (Freon® 12)	4,044	NC	4,044
Dichloro-trifluorethane	NA	NA	NA
Ethanol	NA	NA	NA
Ethylbenzene	22,250	22	22
Ethylene dibromide (1,2-dibromoethane)	117	0	0.05
Heptane	NA	NA	NA
Hexachloro-1,3-butadiene	33	1	1
Hexane[b]	19,901	NC	19,901
Methane	NA	NA	NA
Methyl ethyl ketone (2-butanone)	169,710	NC	169,710
Methyl isobutyl ketone (4-methyl-2-pentanone)[c]	73,220	NC	73,220
Methyl tert-butyl ether (MTBE)	83,197	260	260
Methylcyclohexane[c]	NA	NA	NA
Methylcyclopentane	NA	NA	NA
Methylene chloride (dichloromethane)	11,506	149	149

TABLE B1-6

Screening Levels for Protection of Human Health in Shallow Soil Gas (Direct Contact)

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Chemical	Soil Gas Concentration Protective of Direct Contact[a], Residential Scenario (ppmv) (Based on Region 9 VFs)		
	Non-Cancer (HI = 1)	Cancer (1×10^{-6})	Minimum (Risk Based)
Naphthalene	57	1	1
n-Butylbenzene[c]	2,550	NC	2,550
n-Propylbenzene	2,848	NC	2,848
Octane	NA	NA	NA
Propylene	174,309	NC	174,309
Styrene[b,c]	24,450	NC	24,450
Tetrachloroethene (PCE)	503	6	6
Toluene[b]	133,013	NC	133,013
TPH	NA	NA	NA
TPH-G	NA	NA	NA
trans-1,2-Dichloroethene[b]	1,513	NC	1,513
trans-1,2-Dimethylcyclopentane	NA	NA	NA
trans-1,3-Dichloropropene	441	13	13
Trichloroethene (TCE)	11,285	23	23
Trichlorofluoromethane (Freon® 11)[b]	12,459	NC	12,459
Vinyl chloride	3,885	11	11
Xylene, o- [b]	2,225	NC	2,225
Xylenes, m- [b]	2,225	NC	2,225
Xylenes, p- [b]	2,225	NC	2,225

[a] Risk-based screening levels represent cummulative risk from outdoor air inhalation and ingestion. Risk-based screening levels were calculated using the Region 9 VFs.

[b] The indicated screening levels exceed the breathing zone concentration considered to be Immediately Dangerous to Life and Health (IDLH; NIOSH 2004) for acetone (2,500,000 ppbv), 1,2-dichlorobenzene (200,000 ppbv), trans-1,2-dichloroethene (1,000,000 ppbv), hexane (1,000,000 ppbv), methyl isobutyl ketone (500,000 ppbv), styrene (700,000 ppbv), toluene (500,000 ppbv), 1,1,1-trichloroethane (700,000 ppbv), trichlorofluoromethane (2,000,000 ppbv), 1,1,2-trichloro-1,2,2-trifluoroethane (2,000,000 ppbv), and xylenes (900,000 ppbv).

[c] The listed risk-based concentration exceeds the soil vapor saturation concentration for chlorodifluoromethane (560,000 ppbv), 1,2-dichlorobenzene (1,400,000 ppbv), methylcyclohexane (12,000,000 ppbv), n-butylbenzene (140,000 ppbv), styrene (6,100,000 ppbv), 1,1,2-trichloro-1,2,2-trifluoroethane (360,000 ppbv), and 1,3,5-trimethylbenzene (70,000 ppbv).

[d] Non-cancer risk-based screening levels for the direct contact scenario exceed 100 percent in soil gas.

Notes:
ppbv = part(s) per billion by volume
HI = hazard index
NA = not available
NC = not a carcinogen

TABLE B1-7
Indoor Air Risk-Based Concentrations/Shallow Soil Gas Screening Levels - Commercial/Industrial Land Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Molecular Weight	Unit Risk ($\mu g/m^3)^{-1}$	Source	Reference Concentration ($\mu g/m^3$)	Source	Indoor Air RBC ($\mu g/m^3$)		Indoor Air RBC (ppbv)		Shallow Soil Gas RBC (ppbv)	
						Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic
1,1,1-Trichloroethane	130	NA	NA	5,005	IRIS	NA	7.3E+03	NA	1.4E+03	NA	1.4E+06
1,1,2,2-Tetrachloroethane	168	5.80E-05	IRIS	14	ROUTE	7.0E-02	2.0E+01	1.0E-02	3.0E+00	1.0E+01	3.0E+03
1,1,2-Trichloroethane	133	1.60E-05	IRIS	14	ROUTE	2.6E-01	2.0E+01	4.7E-02	3.7E+00	4.7E+01	3.7E+03
1,1,2-Trichlorotrifluoroethane	190	NA	NA	29,995	HEAST	NA	4.4E+04	NA	5.6E+03	NA	5.6E+06
1,1-Dichloroethane	99	1.63E-06	Cal/EPA	NA	NA	2.5E+00	NA	6.2E-01	NA	6.2E+02	NA
1,1-Dichloroethene	97	NA	NA	199.5	IRIS	NA	2.9E+02	NA	7.3E+01	NA	7.3E+04
1,2,4-Trichlorobenzene	181	NA	NA	3.99	PPRTV	NA	5.8E+00	NA	7.8E-01	NA	7.8E+02
1,2,4-Trimethylbenzene	120	NA	NA	7	PPRTV	NA	1.0E+01	NA	2.1E+00	NA	2.1E+03
1,2-Dibromoethane (ethylene dibromide)	188	6.00E-04	IRIS	9	IRIS	6.8E-03	1.3E+01	8.9E-04	1.7E+00	8.9E-01	1.7E+03
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)	171	NA	NA	29,995	HEAST	NA	4.4E+04	NA	6.3E+03	NA	6.3E+06
1,2-Dichlorobenzene	150	NA	NA	200	HEAST	NA	2.9E+02	NA	4.8E+01	NA	4.8E+04
1,2-Dichloroethane	99	2.60E-05	IRIS	400	Cal/EPA	1.6E-01	5.8E+02	3.9E-02	1.4E+02	3.9E+01	1.4E+05
1,2-Dichloroethene (total)	97	NA	NA	35	ROUTE	NA	5.1E+01	NA	1.3E+01	NA	1.3E+04
1,2-Dichloropropane	113	1.03E-05	Cal/EPA	4	IRIS	4.0E-01	5.8E+00	8.6E-02	1.3E+00	8.6E+01	1.3E+03
1,3,5-Trimethylbenzene	120	NA	NA	5.95	PPRTV	NA	8.7E+00	NA	1.8E+00	NA	1.8E+03
1,3-Butadiene	54	3.14E-05	IRIS	1.995	IRIS	1.3E-01	2.9E+00	5.9E-02	1.3E+00	5.9E+01	1.3E+03
1,3-Dichlorobenzene	150	NA	NA	105	ROUTE	NA	1.5E+02	NA	2.5E+01	NA	2.5E+04
1,4-Dichlorobenzene	150	1.14E-05	Cal/EPA	805	IRIS	3.6E-01	1.2E+03	5.8E-02	1.9E+02	5.8E+01	1.9E+05
2,2,4-Trimethylpentane	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4-Trimethylpentane	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylpentane	100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	142	NA	NA	3.01	IRIS	NA	4.4E+00	NA	7.6E-01	NA	7.6E+02
Acetone	58	NA	NA	3,150	ROUTE	NA	4.6E+03	NA	1.9E+03	NA	1.9E+06
Benzene	78	7.80E-06	IRIS	30	IRIS	5.2E-01	4.4E+01	1.6E-01	1.4E+01	1.6E+02	1.4E+04
Benzyl chloride	127	4.86E-05	Cal/EPA	1	PPRTV	8.4E-02	1.5E+00	1.6E-02	2.8E-01	1.6E+01	2.8E+02
Bromomethane	95	NA	NA	5	IRIS	NA	7.3E+00	NA	1.9E+00	NA	1.9E+03
Carbon dioxide	44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	150	1.50E-05	IRIS	40	Cal/EPA	2.7E-01	5.8E+01	4.4E-02	9.5E+00	4.4E+01	9.5E+03
Chlorobenzene	110	NA	NA	50	PPRTV	NA	7.3E+01	NA	1.6E+01	NA	1.6E+04
Chloroethane	65	8.29E-07	ROUTE	10,000	IRIS	4.9E+00	1.5E+04	1.9E+00	5.5E+03	1.9E+03	5.5E+06
Chloroform	120	2.31E-05	IRIS	300	Cal/EPA	1.8E-01	4.4E+02	3.6E-02	8.9E+01	3.6E+01	8.9E+04
Chloromethane	50	1.80E-06	HEAST	91	IRIS	2.3E+00	1.3E+02	1.1E+00	6.4E+01	1.1E+03	6.4E+04
cis-1,3-Dichloropropene	111	4.00E-06	IRIS	20	IRIS	1.0E+00	2.9E+01	2.3E-01	6.4E+00	2.3E+02	6.4E+03
Cyclohexane	84	NA	NA	5,950	IRIS	NA	8.7E+03	NA	2.5E+03	NA	2.5E+06
Dichlorodifluoromethane	121	NA	NA	200	HEAST	NA	2.9E+02	NA	5.9E+01	NA	5.9E+04
Ethylbenzene	110	2.49E-06	Cal/EPA	1,001	IRIS	1.6E+00	1.5E+03	3.7E-01	3.2E+02	3.7E+02	3.2E+05
Heptane	100	NA	NA	700	IRIS	NA	1.0E+03	NA	2.5E+02	NA	2.5E+05
Hexachlorobutadiene	261	2.20E-05	IRIS	3.5	ROUTE	1.9E-01	5.1E+00	1.7E-02	4.8E-01	1.7E+01	4.8E+02
Hexane	86	NA	NA	700	IRIS	NA	1.0E+03	NA	2.9E+02	NA	2.9E+05

TABLE B1-7
Indoor Air Risk-Based Concentrations/Shallow Soil Gas Screening Levels - Commercial/Industrial Land Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Molecular Weight	Unit Risk ($\mu g/m^3)^{-1}$	Source	Reference Concentration ($\mu g/m^3$)	Source	Indoor Air RBC ($\mu g/m^3$)		Indoor Air RBC (ppbv)		Shallow Soil Gas RBC (ppbv)	
						Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic
M,p-xylene (sum of isomers)	110	NA	NA	100.1	IRIS	NA	1.5E+02	NA	3.2E+01	NA	3.2E+04
Methanol	32	NA	NA	4,000	Cal/EPA	NA	5.8E+03	NA	4.5E+03	NA	4.5E+06
Methyl ethyl ketone (2-butanone)	72	NA	NA	5,005	IRIS	NA	7.3E+03	NA	2.5E+03	NA	2.5E+06
Methyl isobutyl ketone (4-methyl-2-pentanone)	100	NA	NA	2,999.50	IRIS	NA	4.4E+03	NA	1.1E+03	NA	1.1E+06
Methylene chloride	85	4.70E-07	IRIS	400	Cal/EPA	8.7E+00	5.8E+02	2.5E+00	1.7E+02	2.5E+03	1.7E+05
Naphthalene	128	3.43E-05	Cal/EPA	2.9995	IRIS	1.2E-01	4.4E+00	2.3E-02	8.4E-01	2.3E+01	8.4E+02
n-butylbenzene	134	NA	NA	140	ROUTE	NA	2.0E+02	NA	3.7E+01	NA	3.7E+04
Nitrogen	28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
N-Octane	114	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
n-Propylbenzene	120	NA	NA	140	ROUTE	NA	2.0E+02	NA	4.2E+01	NA	4.2E+04
Oxygen	32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
O-xylene (1,2-dimethyl benzene)	110	NA	NA	100	IRIS	NA	1.5E+02	NA	3.2E+01	NA	3.2E+04
Propylene	42	NA	NA	3,000	Cal/EPA	NA	4.4E+03	NA	2.5E+03	NA	2.5E+06
Styrene	100	NA	NA	1,000	IRIS	NA	1.5E+03	NA	3.6E+02	NA	3.6E+05
tert-butyl methyl ether	88	2.60E-07	Cal/EPA	2,999.50	IRIS	1.6E+01	4.4E+03	4.4E+00	1.2E+03	4.4E+03	1.2E+06
Tetrachloroethylene(PCE)	170	6.00E-06	Cal/EPA	35	Cal/EPA	6.8E-01	5.1E+01	9.8E-02	7.3E+00	9.8E+01	7.3E+03
Toluene	92	NA	NA	5,005	IRIS	NA	7.3E+03	NA	1.9E+03	NA	1.9E+06
trans-1,2-Dichloroethene	97	NA	NA	60.00	PPRTV	NA	8.8E+01	NA	2.2E+01	NA	2.2E+04
trans-1,3-Dichloropropene	111	4.00E-06	IRIS	20.0	IRIS	1.0E+00	2.9E+01	2.3E-01	6.4E+00	2.3E+02	6.4E+03
Trichloroethylene (TCE)	130	2.00E-06	Cal/EPA	600	Cal/EPA	2.0E+00	8.8E+02	3.8E-01	1.6E+02	3.8E+02	1.6E+05
Trichlorofluoromethane	137	NA	NA	700.0	HEAST	NA	1.0E+03	NA	1.8E+02	NA	1.8E+05
Vinyl chloride	63	8.86E-06	IRIS	100.1	IRIS	4.6E-01	1.5E+02	1.8E-01	5.7E+01	1.8E+02	5.7E+04

Notes:
$\mu g/m^3$ = microgram(s) per cubic meter
ppbv = part(s) per billion - volume
Cal/EPA = California Environmental Protection Agency
HEAST = USEPA Health Effects Assessment Summary Table
IRIS = Integrated Risk Information System
NCEA = National Center for Environmental Assessment
PPRTV = USEPA Provisional Peer-reviewed Toxicity Value

SURROGATES: cis-1,2-dichloroethene was used for trans-1,2-dichloropropene; hexane was used for heptane; Freon 114 was used for Freon 113; and naphthalene was used for 2-methylnaphthalene

TABLE B1-8
Indoor Air Risk-Based Concentrations/Shallow Soil Gas Screening Levels - Residential Land Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Molecular Weight	Unit Risk ($\mu g/m^3)^{-1}$	Source	Reference Concentration ($\mu g/m^3$)	Source	Indoor Air RBC ($\mu g/m^3$)		Indoor Air RBC (ppbv)		Shallow Soil Gas RBC (ppbv)	
						Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic
1,1,1-Trichloroethane	130	NA	NA	5,005	IRIS	NA	5.0E+03	NA	9.4E+02	NA	9.4E+04
1,1,2,2-Tetrachloroethane	167.8498	5.80E-05	IRIS	14	ROUTE	4.2E-02	1.4E+01	6.1E-03	2.0E+00	6.1E-01	2.0E+02
1,1,2-Trichloroethane	133.4047	1.60E-05	IRIS	14	ROUTE	1.5E-01	1.4E+01	2.8E-02	2.6E+00	2.8E+00	2.6E+02
1,1,2-Trichlorotrifluoroethane	190	NA	NA	29,995	HEAST	NA	3.0E+04	NA	3.9E+03	NA	3.9E+05
1,1-Dichloroethane	99	1.63E-06	Cal/EPA	NA	NCEA	1.5E+00	NA	3.7E-01	NA	3.7E+01	NA
1,1-Dichloroethene	97	NA	NA	199.5	IRIS	NA	2.0E+02	NA	5.0E+01	NA	5.0E+03
1,2,4-Trichlorobenzene	181.4487	NA	NA	3.99	PPRTV	NA	4.0E+00	NA	5.4E-01	NA	5.4E+01
1,2,4-Trimethylbenzene	120	NA	NA	7	PPRTV	NA	7.0E+00	NA	1.4E+00	NA	1.4E+02
1,2-Dibromoethane (ethylene dibromide)	187.8616	6.00E-04	IRIS	9	IRIS	4.1E-03	9.0E+00	5.3E-04	1.2E+00	5.3E-02	1.2E+02
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)	170.9216	NA	NA	29,995	HEAST	NA	3.0E+04	NA	4.3E+03	NA	4.3E+05
1,2-Dichlorobenzene	150	NA	NA	200	HEAST	NA	2.0E+02	NA	3.3E+01	NA	3.3E+03
1,2-Dichloroethane	98.9596	2.60E-05	IRIS	400	Cal/EPA	9.4E-02	4.0E+02	2.3E-02	9.9E+01	2.3E+00	9.9E+03
1,2-Dichloroethene (total)	97	NA	NA	35	ROUTE	NA	3.5E+01	NA	8.8E+00	NA	8.8E+02
1,2-Dichloropropane	112.9864	1.03E-05	Cal/EPA	4	IRIS	2.4E-01	4.0E+00	5.1E-02	8.7E-01	5.1E+00	8.7E+01
1,3,5-Trimethylbenzene	120	NA	NA	5.95	PPRTV	NA	6.0E+00	NA	1.2E+00	NA	1.2E+02
1,3-Butadiene	54	3.14E-05	IRIS	1.995	IRIS	7.7E-02	2.0E+00	3.5E-02	9.0E-01	3.5E+00	9.0E+01
1,3-Dichlorobenzene	150	NA	NA	105	ROUTE	NA	1.1E+02	NA	1.7E+01	NA	1.7E+03
1,4-Dichlorobenzene	150	1.14E-05	Cal/EPA	805	IRIS	2.1E-01	8.1E+02	3.5E-02	1.3E+02	3.5E+00	1.3E+04
2,2,4-Trimethylpentane	114.2285	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4-Trimethylpentane	114.2285	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylpentane	100	NA	NA	NA	N	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	142	NA	NA	3.01	IRIS	NA	3.0E+00	NA	5.2E-01	NA	5.2E+01
Acetone	58	NA	NA	3150	ROUTE	NA	3.2E+03	NA	1.3E+03	NA	1.3E+05
Benzene	78	7.80E-06	IRIS	30	IRIS	3.1E-01	3.0E+01	9.8E-02	9.4E+00	9.8E+00	9.4E+02
Benzyl chloride	127	4.86E-05	Cal/EPA	1	PPRTV	5.0E-02	1.0E+00	9.7E-03	1.9E-01	9.7E-01	1.9E+01
Bromomethane	95	NA	NA	5	IRIS	NA	5.0E+00	NA	1.3E+00	NA	1.3E+02
Carbon dioxide	44	NA	NA	NA	N	NA	NA	NA	NA	NA	NA
Carbon tetrachloride	150	1.50E-05	IRIS	40	Cal/EPA	1.6E-01	4.0E+01	2.6E-02	6.5E+00	2.6E+00	6.5E+02
Chlorobenzene	110	NA	NA	50.05	PPRTV	NA	5.0E+01	NA	1.1E+01	NA	1.1E+03
Chloroethane	65	8.29E-07	ROUTE	10,000	IRIS	2.9E+00	1.0E+04	1.1E+00	3.8E+03	1.1E+02	3.8E+05
Chloroform	120	2.31E-05	IRIS	300	Cal/EPA	1.1E-01	3.0E+02	2.1E-02	6.1E+01	2.1E+00	6.1E+03
Chloromethane	50	1.80E-06	HEAST	91	IRIS	1.4E+00	9.1E+01	6.5E-01	4.4E+01	6.5E+01	4.4E+03
cis-1,3-Dichloropropene	111	4.00E-06	IRIS	20	IRIS	6.1E-01	2.0E+01	1.3E-01	4.4E+00	1.3E+01	4.4E+02
Cyclohexane	84	NA	NA	5,950	IRIS	NA	6.0E+03	NA	1.7E+03	NA	1.7E+05
Dichlorodifluoromethane	121	NA	NA	200	HEAST	NA	2.0E+02	NA	4.0E+01	NA	4.0E+03
Ethylbenzene	110	2.49E-06	Cal/EPA	1,001	IRIS	9.8E-01	1.0E+03	2.2E-01	2.2E+02	2.2E+01	2.2E+04
Heptane	100	NA	NA	700	IRIS	NA	7.0E+02	NA	1.7E+02	NA	1.7E+04
Hexachlorobutadiene	261	2.20E-05	IRIS	3.5	ROUTE	1.1E-01	3.5E+00	1.0E-02	3.3E-01	1.0E+00	3.3E+01
Hexane	86	NA	NA	700	IRIS	NA	7.0E+02	NA	2.0E+02	NA	2.0E+04

TABLE B1-8
Indoor Air Risk-Based Concentrations/Shallow Soil Gas Screening Levels - Residential Land Use
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Molecular Weight	Unit Risk $(\mu g/m^3)^{-1}$	Source	Reference Concentration $(\mu g/m^3)$	Source	Indoor Air RBC $(\mu g/m^3)$		Indoor Air RBC (ppbv)		Shallow Soil Gas RBC (ppbv)	
						Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic	Carcinogenic	Non-carcinogenic
M,p-xylene (sum of isomers)	110	NA	NA	100.1	IRIS	NA	1.0E+02	NA	2.2E+01	NA	2.2E+03
Methanol	32	NA	NA	4,000	Cal/EPA	NA	4.0E+03	NA	3.1E+03	NA	3.1E+05
Methyl ethyl ketone (2-butanone)	72	NA	NA	5,005	IRIS	NA	5.0E+03	NA	1.7E+03	NA	1.7E+05
Methyl isobutyl ketone (4-methyl-2-pentanone)	100	NA	NA	2,999.50	IRIS	NA	3.0E+03	NA	7.3E+02	NA	7.3E+04
Methylene chloride	85	4.70E-07	IRIS	400	Cal/EPA	5.2E+00	4.0E+02	1.5E+00	1.2E+02	1.5E+02	1.2E+04
Naphthalene	128	3.43E-05	Cal/EPA	2.9995	IRIS	7.1E-02	3.0E+00	1.4E-02	5.7E-01	1.4E+00	5.7E+01
n-butylbenzene	134	NA	NA	140	ROUTE	NA	1.4E+02	NA	2.6E+01	NA	2.6E+03
Nitrogen	28	NA	NA	NA	N	NA	NA	NA	NA	NA	NA
N-Octane	114	NA	NA	NA	N	NA	NA	NA	NA	NA	NA
n-Propylbenzene	120	NA	NA	140	ROUTE	NA	1.4E+02	NA	2.8E+01	NA	2.8E+03
Oxygen	32	NA	NA	NA	N	NA	NA	NA	NA	NA	NA
O-xylene (1,2-dimethyl benzene)	110	NA	NA	100	IRIS	NA	1.0E+02	NA	2.2E+01	NA	2.2E+03
Propylene	42	NA	NA	3,000	Cal/EPA	NA	3.0E+03	NA	1.7E+03	NA	1.7E+05
Styrene	100	NA	NA	1,000	IRIS	NA	1.0E+03	NA	2.4E+02	NA	2.4E+04
tert-butyl methyl ether	88	2.60E-07	Cal/EPA	2,999.50	IRIS	9.4E+00	3.0E+03	2.6E+00	8.3E+02	2.6E+02	8.3E+04
Tetrachloroethylene(PCE)	170	6.00E-06	Cal/EPA	35	Cal/EPA	4.1E-01	3.5E+01	5.8E-02	5.0E+00	5.8E+00	5.0E+02
Toluene	92	NA	NA	5,005	IRIS	NA	5.0E+03	NA	1.3E+03	NA	1.3E+05
trans-1,2-Dichloroethene	97	NA	NA	60.00	PPRTV	NA	6.0E+01	NA	1.5E+01	NA	1.5E+03
trans-1,3-Dichloropropene	111	4.00E-06	IRIS	20.0	IRIS	6.1E-01	2.0E+01	1.3E-01	4.4E+00	1.3E+01	4.4E+02
Trichloroethylene (TCE)	130	2.00E-06	Cal/EPA	600	Cal/EPA	1.2E+00	6.0E+02	2.3E-01	1.1E+02	2.3E+01	1.1E+04
Trichlorofluoromethane	137	NA	NA	700.0	HEAST	NA	7.0E+02	NA	1.2E+02	NA	1.2E+04
Vinyl chloride	63	8.86E-06	IRIS	100.1	IRIS	2.7E-01	1.0E+02	1.1E-01	3.9E+01	1.1E+01	3.9E+03

Notes:
$\mu g/m^3$ = microgram(s) per cubic meter
ppbv = part(s) per billion - volume
Cal/EPA = California Environmental Protection Agency
HEAST = USEPA Health Effects Assessment Summary Table
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SURROGATES: cis-1,2-dichloroethene was used for trans-1,2-dichloropropene; hexane was used for heptane; Freon 114 was used for Freon 113; and naphthalene was used for 2-methylnaphthalene

TABLE B1-9
Designated Level Methodology Leachability Factors for Calculating Screening Levels
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	New Leachability Factor (used in PCG calculations)	Old Leachability Factor	No. of DI-WETs > Detection Limit	No. of DI-WETs Total	Rationale for Selection
Aluminum	418	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Antimony	100	100	0	5	All OU C DI-WET results were less than detection limit, and only one total result exceeded the detection limit; thus no reproducible data are available to develop leachability factor. Used the default.
Arsenic (by 7060)	145	85	4	5	All OU A DI-WETs were reported at the detection limit, and four of five DI-WETs from OU C were quantified; therefore, only the OU C data set was used to calculate the leachability factor.
Barium	16	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Beryllium	90	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Cadmium (7131)	1,367	1,367	2	5	Only the OU A DI-WET results exceeded detection limits, and all of the OU C data were nondetect; therefore, only OU A results were used. Note: Cadmium by 6010 has been found to be unreliable and should not be used.
Chromium, Total	1,624	2,913	5	5	All (10) data points from OU A and OU C were considered and used to calculate the leachability factor.
Cobalt	942	100	4	5	Four of five DI-WETs from OU C were quantified; thus, only the OU C data set was used to calculate the leachability factor.
Copper	1,494	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Iron	303	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Lead	2,172	2,172	0	5	All OU C DI-WET results were less than detection limit, so only OU A data were used.

TABLE B1-9
Designated Level Methodology Leachability Factors for Calculating Screening Levels
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	New Leachability Factor (used in PCG calculations)	Old Leachability Factor	No. of DI-WETs > Detection Limit	No. of DI-WETs Total	Rationale for Selection
Manganese	562	200	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used. The previous leachability factor (200) might have been a typographical error because the OU A data do not support this number.
Mercury (by 7470)	100	100	0	0	No mercury was reported in the OU C soil samples analyzed by SW7470; therefore, no data are available to use for calculations.
Molybdenum	100	100	3	5	Because total results were an order of magnitude less than background, the default value was used for the leachability factor.
Nickel	487	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Selenium (by 7740)	100	100	2	5	No selenium results by SW7740 exceeded detection limit; therefore, no data were available for calculation.
Silver	100	100	1	5	Only one DI-WET reported silver greater than the detection limit. It is recommended that the leachability factor not be based on the results of only one soil sample; therefore, the default value (100) should be used.
Thallium	141	141	0	5	All OU C DI-WET results were less than detection limit; thus, no reproducible data are available to develop leachability factor. The OU A leachability factor was used.
Vanadium	263	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.
Zinc	71	100	5	5	OU C data produced five DI-WETs greater than the detection limit; therefore, these data were used.

Source: General Framework Document (URS, 2002)

TABLE B1-10
Screening Levels for Metals for Protection of Groundwater in Surface, Shallow, and Deep Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Limiting WQL (µg/L)	Source	Proposed Background Concentration in Groundwater (µg/L)	Environmental Attenuation Factor	Leachabilty Factor	Total Designated Level using WQL (mg/kg)	Total Designated Level using Background (mg/kg)
Aluminum	200	Secondary MCL	17.8	1,000	418	8.4E+04	--
Antimony	6	Primary MCL	4.1	1,000	100	6.0E+02	--
Arsenic	0.023	Cal/EPA Cancer Potency Factor	6.8	1,000	145	3.3E+00	9.9E+02
Barium	490	EPA IRIS RfD	167	1,000	16	7.8E+03	2.7E+03
Beryllium	4	Primary MCL	1.0	1,000	90	3.6E+02	--
Cadmium	0.07	Public Health Goal	1.0	1,000	1,367	9.6E+01	1.4E+03
Chromium, total*	50	Primary MCL	16.8	1,000	1,624	8.1E+04	--
Chromium, hexavalent*	21	EPA IRIS RfD	16.2	100	100	2.1E+02	--
Cobalt	50	Agricultural Use	6.9	1,000	942	4.7E+04	--
Copper	170	Public Health Goal	7.3	1,000	1,494	2.5E+05	--
Iron	300	Secondary MCL	441.3	1,000	303	9.1E+04	1.3E+05
Lead	2	Public Health Goal	1.1	1,000	2,172	4.3E+03	--
Manganese	50	Secondary MCL	188.8	1,000	562	2.8E+04	1.1E+05
Mercury	1.2	Public Health Goal	0.2	1,000	100	1.2E+02	--
Molybdenum	10	Agricultural Use	10	1,000	100	1.0E+03	1.0E+03
Nickel	12	Public Health Goal	19.5	1,000	487	5.8E+03	9.5E+03
Perchlorate	0.004	California Action Level	None	100	100	4.0E+01	--
Selenium	20	Agricultural Use	1.0	1,000	100	2.0E+03	--
Silver	35	EPA IRIS RfD	1.0	1,000	100	3.5E+03	--
Thallium	0.1	Public Health Goal	1.0	1,000	141	1.4E+01	1.4E+02
Vanadium	50	Department of Health Services Action Level	32	1,000	263	1.3E+04	--
Zinc	2,000	Agricultural Use and EPA Health Advisory A	173	1,000	71	1.4E+05	--

* If chromium has been speciated, then the values for hexavalent and total chromium will be used as calculated. If chromium has not been speciated, then the screening level for hexavalent chromium (210 mg/kg) will be used as the screening level for protection of groundwater.

Notes:

WQLs are based on values obtained in consultation with RWQCB.

The proposed background concentrations in groundwater are from the Final *Non-VOCs in Groundwater Preliminary Assessment, Appendix G* (URS, 2005).

-- = Value not calculated because the WQL exceeds the maximum background concentration in groundwater.
RfD = reference dose.
NA = Not applicable. The resulting TDL is greater than a million parts per million.

TABLE B1-11
Designated Level Methodology Leachability Factors for Calculating Screening Levels for Radionuclides
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Analyte	Calculated Leachability Factor	Selected Leachability Factor (Used in PCG Calculations)	No. of TCLPs > Detection Limit	No. of TCLPs Total	Rationale for Selection
Cobalt 60	--	100	0	0	No data available; default value selected
Cesium 137	203	100	1	1	Minimal data; default value selected
Plutonium 239	--	100	0	0	No data available; default value selected
Radium 226	416	100	1	1	Minimal data; default value selected
Thorium 232	--	100	0	0	No data available; default value selected
Uranium 235	--	100	0	0	Minimal data; default value selected

TABLE B1-12
Screening Levels for Radionuclides for Protection of Groundwater in Surface, Shallow, and Deep Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	Limiting WQL (pCi/L)	Source	Environmental Attenuation Factor	Leachability Factor	Total Designated Level (pCi/g)
Cobalt 60	100	MCL*	1,000	100	10,000
Cesium 137	200	MCL*	1,000	100	20,000
Plutonium 239	15	MCL (alpha particle)	1,000	100	1,500
Radium 226	5	MCL (California and Federal)	1,000	100	500
Thorium 232	15	MCL (alpha particle)	1,000	100	1,500
Uranium 235	20	MCL (California)	1,000	100	2,000

*MCL is calculated based upon an annual dose equivalent for beta emitters of 4 mrem to the total body or any internal organ.

Notes:

MCL = maximum contaminant level
PRG = preliminary remediation goal

TABLE B1-13
Vadose Zone Model (VLEACH) Inputs for SVOCs
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Parameter	Units	Value
Computational Parameters		
Vertical Cell Spacing	ft	1.0
Simulation Time Step	yrs	0.1
Groundwater Recharge		
Rate	inches per yr	2.8
Contaminant Concentration	µg/L	0
Site Dimensions		
Length	ft	500
Width	ft	100
Depth to Groundwater	ft	110
Soil Properties		
Dry Bulk Density	kg/L	1.4
Total Effective Porosity	dimensionless	0.45
Water-filled Porosity	dimensionless	0.28
Fraction of Organic Carbon	dimensionless	0.0007
Initial Contaminant Distribution		
0 to 5 feet bgs	µg/kg	0
6 to 15 feet bgs	µg/kg	1/10 × Maximum concentration
16 to 20 feet bgs	µg/kg	Maximum concentration
21 to 30 feet bgs	µg/kg	1/10 × Maximum concentration
31 to 110 feet bgs	µg/kg	0

Note:
Boundary conditions are such that the soil surface and the water table are permeable to gas diffusion, although for the SVOCs evaluated, significant gas diffusion is not expected. A detailed discussion of the VLEACH inputs is provided in Section C1.3.3.3.

TABLE B1-14
Contaminant-specific Parameters for Vadose Zone (VLEACH) Modeling
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Organic Carbon Partitioning Coefficient [K_{oc}] (mL/g)	Henry's Law Constant [K_H] (dimensionless)	Aqueous Solubility (mg/L)	Free Air Diffusion Coefficient (m^2/d)	Degradation Half Life (years)
Acenaphthene	7,080	0.00636	4.24	0.364	--
Acenaphthylene	6,120	0.00511	16.1	0.38	--
Aldrin	48,400	0.0042	0.078	0.1123	--
Anthracene	29,500	0.00267	0.434	0.28	--
Benzo(a)anthracene	398,000	0.000137	0.0094	0.441	--
Benzo(a)pyrene	1,000,000	0.00000463	0.00162	0.371	--
Benzo(b)fluoranthene	1,230,000	0.0015	0.0046	0.195	--
Benzo(g,h,I)perylene	1,600,000	0.00000584	0.00026	0.449	--
Benzo(k)fluoranthene	550,000	0.0016	0.0043	0.458	--
Benzyl alcohol	10.3	0.0000126	4,000	0.69	--
BHC, beta	2,280	0.0000141	0.54	0.16	--
BHC, gamma	3,380	0.00021	8	0.12	--
BHC, delta	3,380	0.00021	8	0.12	--
Bis(2-ethylhexyl)phthalate (DEHP)	15,100,000	0.0000042	0.3	0.297	--
Butylbenzylphthalate (BBP)	34,000	0.0000775	2.58	0.147	--
Chlordane, alpha	51,300	0.0027	0.22	0.10	--
Chlordane, gamma	51,300	0.0027	0.22	0.10	--
4-Chloroaniline	41	0.0000476	3,360	0.41	0.26
Chrysene	398,000	0.00388	0.0016	0.214	--
DDD	86,400	0.00516	0.019	0.12	--
DDE	237,000	0.00223	0.003	0.12	--
DDT	84,900	0.000206	0.073	0.13	--
Dibenz(a,h)anthracene	3,800,000	0.0000006	0.00249	0.175	--
Dibenzofuran	11,300	0.00871	3.1	0.12	--
1,2-Dichlorobenzene	376	0.0813	125	0.60	1
1,3-Dichlorobenzene	1,700	0.163	123	0.65	1
1,4-Dichlorobenzene	516	0.122	73	0.60	1
Dieldrin	21,000	0.000691	0.195	0.108	--
Diethylphthalate (DEPH)	1,400	0.0000467	896	0.225	0.62
2,4-Dimethylphenol	126	0.000082	6,200	0.505	0.077
Dimethylphthalate (DMPH)	1,400	0.00000431	5,000	0.492	0.077
Di-n-butylphthalate (DNBP)	1,570	0.000058	10.8	0.38	--
2,4-Dinitrotoluene	51	0.00000598	285	1.73	--
Di-n-octylphthalate	98,000,000	0.0000311	3.0	0.130	--
Endosulfan	738	0.000961	0.23	0.1	--
Endrin	10,800	0.0000495	0.25	0.108	--

TABLE B1-14
Contaminant-specific Parameters for Vadose Zone (VLEACH) Modeling
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Organic Carbon Partitioning Coefficient [K_{oc}] (mL/g)	Henry's Law Constant [K_H] (dimensionless)	Aqueous Solubility (mg/L)	Free Air Diffusion Coefficient (m^2/d)	Degradation Half Life (years)
Endrin aldehyde	26,750	0.000000118	0.26	0.45	--
Fluoranthene	107,000	0.00066	0.265	0.255	--
Fluorene	13,800	0.00261	1.9	0.314	--
Heptachlor	52,400	0.0120	0.18	0.10	--
Heptachlor epoxide	7,240	0.00034	0.27	0.103	--
Indeno(1,2,3-cd)pyrene	4,360,000	0.000000197	0.011	0.164	--
Methoxychlor	42,600	0.0000083	0.1	0.13	--
1-Methylnaphthalene	3,040	0.021	25	0.41	--
2-Methylnaphthalene	2,460	0.0202	24.6	0.588	0.7*
2-Methylphenol	54	0.0000673	37,700	0.639	0.077
Naphthalene	2,000	0.020	31	0.5	0.7
Nitrobenzene	191	0.000981	2,090	0.66	--
N-nitrosodiphenylamine (NNSPH)	327	0.0002	35.1	0.269	2
PCB	4,420,000	0.0075	0.044	0.112	--
Pentachlorophenol	567	0.000577	13.4	0.48	4.2
Phenanthrene	14,000	0.00917	1.0	0.536	--
Phenol	22	0.0000242	90,800	0.71	0.27
Pyrene	105,000	0.00045	0.148	0.23	--
2,3,7,8-TCDD	146,000	0.00204	0.0002	0.12	--
1,2,4-Trichlorobenzene	1,540	0.122	30.7	0.26	1

* Value for naphthalene was used as a surrogate.

Notes:

Values from EPA, 1997b; *Technical Background Document for Soil Screening Guidance, Review Draft,* EPA, July 1994; and RAIS database.

-- = Degradation not incorporated into the screening level evaluation.

TABLE B1-15
Groundwater Mixing-cell Model Inputs
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Input Parameter	Description
Annual Mass Flux from Vadose Zone	From VLEACH model
Retardation Factors	Calculated using formula ($R = 1 + K_{oc} \times f_{oc} \times \rho_b / \Theta$)
	Where ρ_b is the bulk density (1.4 kg/L) and Θ is the total porosity of the saturated zone (0.50)
Lateral Groundwater Flux	Calculated as the product of the horizontal gradient (0.001 ft/ft) and the horizontal hydraulic conductivity (10 ft/d). The resulting groundwater flux is 0.01 ft^3 / ft^2 - d

TABLE B1-16

Results of Screening Level Evaluation for Protection of Groundwater for SVOCs Detected in Soil

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	In Groundwater		In Soil	At the Water Table		In Groundwater
Compound	**Limiting WQL (µg/L)**	**Source**	**Modeled Concentration (mg/kg)**	**Maximum Annual Flux (g/ft^2)**	**Maximum Leachate Concentration (µg/L)**	**Maximum Concentration (µg/L)**
Acenaphthene	20	Taste and Odor	16,000[b]	3.7E-05	5.5E+00	1.2E+00
Acenaphthylene	NA	NA	2[a]	6.1E-12	9.2E-07	2.2E-07
Aldrin	0.0021	Cal/EPA cancer potency factor	0.11[b]	2.2E-17	2.3E-12	1.4E-13
Anthracene	2,100	EPA RfD	100,000[b]	1.2E-02	1.8E+03	3.9E-03
Benzo(a)anthracene	0.04	Cal/EPA cancer potency factor	6.84[a]	5.1E-08	7.7E-03	1.8E-09
Benzo(a)pyrene	0.004	CA Public Health Goal	8.83[a]	2.6E-09	3.9E-04	3.5E-11
Benzo(b)fluoranthene	0.04	Cal/EPA cancer potency factor	6.97[a]	1.5E-10	2.3E-04	1.8E-12
Benzo(g,h,i)perylene	NA	NA	11,000[b]	2.1E-11	3.1E-06	8.8E-09
Benzo(k)fluoranthene	0.04	Cal/EPA cancer potency factor	5.4[a]	8.8E-12	1.3E-06	1.1E-08
Benzyl acohol	NA	NA	240,000[b]	3.1E+03	4.6E+08	2.1E+08
BHC, beta	0.025	DHS action level	1[b]	4.0E-13	6.0E-08	1.5E-08
BHC, delta	NA	NA	200[b]	8.9E-15	1.3E-09	2.8E-10
BHC, gamma	0.032	CA Public Health Goal	1.7[b]	7.6E-17	1.1E-11	2.4E-12
Bis(2-ethylhexyl)phthalate (DEHP)	4	California MCL	96[b]	2.8E-11	4.2E-06	2.6E-14
Butylbenzylphthalate (BBP)	140	California MCL	700[b]	5.2E-12	7.9E-07	8.2E-10
Chlordane, alpha	0.03	CA Public Health Goal	5.2[b]	8.0E-17	1.2E-11	7.6E-13
Chlordane, gamma	0.03	CA Public Health Goal	5.2[b]	8.0E-17	1.2E-11	7.6E-13
4-Chloroaniline[c]	28	EPA RfD	1,900[b]	9.2E-09	1.4E-03	2.1E-05
				2.2E+01	3.3E+06	1.9E+06
Chrysene	0.4	Cal/EPA cancer potency factor	9.11[a]	4.9E-09	7.5E-04	1.7E-10
DDD	0.15	Cal/EPA cancer potency factor	7.6[b]	9.0E-19	1.4E-13	5.6E-15
DDE	0.1	Cal/EPA cancer potency factor	5.4[b]	6.5E-20	9.8E-15	1.8E-16
DDT	0.1	Cal/EPA cancer potency factor	5.4[b]	3.9E-20	5.9E-15	2.8E-16
Dibenz(a,h)anthracene	0.0085	Cal/EPA cancer potency factor	7.89[a]	7.9E-15	1.2E-09	3.0E-17
Dibenzofuran	NA	NA	1.2[a]	9.0E-17	1.4E-11	1.5E-12

TABLE B1-16

Results of Screening Level Evaluation for Protection of Groundwater for SVOCs Detected in Soil

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	In Groundwater		In Soil	At the Water Table		In Groundwater
Compound	**Limiting WQL (µg/L)**	**Source**	**Modeled Concentration (mg/kg)**	**Maximum Annual Flux (g/ft^2)**	**Maximum Leachate Concentration (µg/L)**	**Maximum Concentration (µg/L)**
1,2-Dichlorobenzene[c]	24	Taste and Odor	3,900[b]	1.9E-03	2.8E+02	1.2E+01
				3.7E+00	5.6E+05	4.8E+05
1,3-Dichlorobenzene[c]	600	DHS action level	1,900[b]	6.6E-04	9.9E+01	7.7E-01
				7.6E-01	1.1E+05	1.2E+05
1,4-Dichlorobenzene[c]	5	California MCL	14.7[a]	9.3E-06	1.4E+00	6.0E-02
				1.3E-02	1.9E+03	1.6E+03
Dieldrin	0.0022	Cal/EPA cancer potency factor	0.84[a]	1.7E-12	2.5E-07	5.9E-13
Diethylphthalate (DEPH)[c]	5,600	EPA RfD	380,000[b]	3.4E-08	5.0E-03	1.1E-04
				2.9E+03	4.4E+08	2.6E+08
2,4-Dimethylphenol	100	DHS action level	9600[b]	1.5E-10	2.3E-05	2.1E-07
Dimethylphthalate (DMPH)[c]	NA	NA	4,800,000[b]	7.6E-09	1.2E-03	4.8E-06
				3.6E+04	5.6E+09	3.2E+09
Di-n-butylphthalate (DNBP)	700	EPA RfD	48,000[b]	1.3E-04	2.1E+01	7.2E+00
2,4-Dinitrotoluene[c]	0.11	Cal/EPA cancer potency factor	4.3[b]	2.7E-08	4.1E-03	1.3E-04
				4.5E-02	6.8E+03	3.5E+03
Di-n-octylphthalate	NA	NA	19,000[b]	2.5E-17	3.7E-12	1.8E-16
Endosulfan	42	EPA RfD	0.017[a]	2.8E-08	4.2E-03	8.0E-07
Endrin	1.8	Public Health Goal	200[b]	2.5E-17	3.8E-12	6.2E-13
Endrin aldehyde	1.8	Public Health Goal	200[b]	6.1E-14	2.1E-09	3.4E-10
Fluoranthene	280	EPA RfD	15,000[b]	2.9E-05	4.3E+00	3.7E-06
Fluorene	280	EPA RfD	13,000[b]	1.7E-02	2.6E+03	9.2E-03
Heptachlor	0.008	Public Health Goal	0.41[b]	5.6E-17	9.1E-12	4.0E-16
Heptachlor epoxide	0.006	CA Public Health Goal	0.2[b]	6.1E-17	9.7E-12	1.6E-12
Indeno(1,2,3-c,d)pyrene	0.04	Public Health Goal	1.75[a]	5.1E-21	7.7E-16	8.3E-19
Methoxychlor	30	California MCL	2,400[b]	3.1E-18	4.7E-13	4.1E-14

TABLE B1-16

Results of Screening Level Evaluation for Protection of Groundwater for SVOCs Detected in Soil

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

	In Groundwater		In Soil	At the Water Table		In Groundwater
Compound	**Limiting WQL (µg/L)**	**Source**	**Modeled Concentration (mg/kg)**	**Maximum Annual Flux (g/ft^2)**	**Maximum Leachate Concentration (µg/L)**	**Maximum Concentration (µg/L)**
1-Methylnaphthalene	NA	NA	209[a]	5.4E-07	8.1E-02	2.4E-02
2-Methylnaphthalene	NA	NA	334[a]	2.9E-06	4.4E-01	2.7E-04
2-Methylphenol[c]	35	EPA RfD	24,000[b]	4.3E-09	6.5E-04	3.1E-06
				2.5E+02	3.7E+07	1.9E+07
Naphthalene[c]	21	Taste and Odor	1,100[a]	4.1E-06	6.1E-01	3.5E-03
				2.8E-02	4.3E+03	1.7E+03
Nitrobenzene	3.5	EPA RfD	1.56[a]	8.1E-06	1.2E+00	8.4E-01
N-nitrosodinphenylamine (NNSPH)[c]	3.9	Cal/EPA cancer potency factor	270[b]	7.0E-10	1.1E-04	4.2E-06
				1.3E+00	1.9E+05	1.2E+05
PCB	0.007	Cal/EPA cancer potency factor	92[a]	9.5E-17	1.4E-11	1.5E-14
Pentachlorophenol[c]	0.4	CA Public Health Goal	6.2[b]	3.3E-09	4.9E-04	3.2E-05
				9.3E-04	1.4E+02	4.4E+01
Phenanthrene	NA	NA	110,000[b]	6.9E-04	1.1E+02	1.7E+01
Phenol[c]	2,100	EPA RfD	140,000[b]	1.1E-15	1.6E-10	3.0E-13
				1.7E+03	2.5E+08	1.2E+08
Pyrene	210	EPA RfD	11,000[b]	5.7E-06	8.5E-01	7.2E-07
2,3,7,8-TCDD	2.7E-07	Cal/EPA cancer potency factor	0.00045[a]	8.9E-20	1.8E-15	3.9E-19
1,2,4-Trichlorobenzene[c]	5	California MCL	240[b]	9.9E-08	1.5E-02	2.6E-04
				7.1E-02	1.1E+04	8.9E+03

[a] Maximum concentration detected in soil.

[b] Screening level for protection of human health for industrial use.

[c] Calculations include degradation in the vadose zone and groundwater. Values highlighted in gray are calculated without degradation.

Notes:

Screening levels for protection groundwater only presented for analytes detected at the Small Volume Sites.

NA = WQL not identified

TABLE B1-17

Screening Levels for Protection of Groundwater for VOCs Detected in Soil Gas

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Chemical	MCL (µg/L)	MCL Equivalent Concentration (ppmv) for Depth Interval (feet bgs)					
		0-10	10-30	30-50	50-70	70-90	90-105
Acetone		No MCL Established					
Bromomethane		No MCL Established					
Benzene	1.0E+00	2.6E+00	5.1E-01	3.2E-01	2.3E-01	1.4E-01	5.6E-02
Benzyl chloride	2.1E-01	8.0E-03	2.0E-03	1.5E-03	1.2E-03	9.0E-04	6.0E-04
Toluene	1.5E+02	4.1E+02	7.9E+01	4.9E+01	3.4E+01	2.0E+01	8.3E+00
Chlorobenzene	7.0E+01	5.9E+01	1.3E+01	8.7E+00	6.5E+00	4.0E+00	1.7E+00
Chloroethane		No MCL Established					
Chloromethane		No MCL Established					
Carbon tetrachloride	5.0E-01	5.7E+00	9.9E-01	5.4E-01	3.6E-01	2.0E-01	7.9E-02
1,1-Dichloroethane	5.0E+00	1.0E+01	2.0E+00	1.3E+00	9.2E-01	5.5E-01	2.3E-01
1,2-Dichloroethane	5.0E-01	7.0E-02	1.9E-02	1.5E-02	1.2E-02	8.0E-03	4.0E-03
1,2-Dichlorobenzene	6.0E+02	1.4E+03	1.5E+02	3.9E+01	1.8E+01	1.2E+01	5.5E+00
1,3-Dichlorobenzene		No MCL Established					
1,4-Dichlorobenzene	5.0E+00	9.0E+00	1.2E+00	3.7E-01	2.0E-01	1.3E-01	5.9E-02
1,1-Dichloroethene	6.0E+00	8.1E+01	1.4E+01	7.7E+00	5.1E+00	2.9E+00	1.1E+00
cis-1,2-Dichloroethene	6.0E+00	7.4E+00	1.6E+00	1.0E+00	7.7E-01	4.7E-01	2.0E-01
trans-1,2-Dichloroethene	1.0E+01	4.2E+01	7.9E+00	4.7E+00	3.3E+00	1.9E+00	7.9E-01
1,2-Dichloropropane	5.0E+00	2.8E+00	6.6E-01	4.6E-01	3.5E-01	2.2E-01	9.7E-02
Ethylbenzene	3.0E+02	8.3E+02	1.6E+02	9.7E+01	6.9E+01	4.1E+01	1.7E+01
1,2-Dibromoethane	5.0E-02	1.8E-03	5.0E-04	4.0E-04	4.0E-04	3.0E-04	1.0E-04
Trichlorofluoromethane (Freon 11)	1.5E+02	7.1E+03	1.2E+03	6.4E+02	4.1E+02	2.3E+02	8.9E+01
Freon 113	1.2E+03	2.0E+05	3.4E+04	1.8E+04	1.2E+04	6.5E+03	2.5E+03
Dichlorodifluoromethane		No MCL Established					
Hexachlorobutadiene		No MCL Established					
2-Butanone		No MCL Established					
4-Methyl-2-pentanone		No MCL Established					
Methylene chloride	5.0E+00	3.2E+00	7.3E-01	5.1E-01	3.9E-01	2.4E-01	1.1E-01
1,1,2,2-Tetrachloroethane	1.0E+00	3.4E-02	7.1E-03	4.4E-03	3.6E-03	2.6E-03	1.5E-03
Tetrachloroethene	5.0E+00	2.7E+01	4.9E+00	2.7E+00	1.9E+00	1.1E+00	4.2E-01
Styrene	1.0E+02	4.0E+02	4.8E+01	1.4E+01	7.0E+00	4.4E+00	2.0E+00
1,1,1-Trichloroethane	2.0E+02	1.3E+03	2.4E+02	1.3E+02	9.1E+01	5.2E+01	2.1E+01
1,1,2-Trichloroethane	5.0E+00	4.1E-01	1.2E-01	9.5E-02	7.5E-02	5.1E-02	2.6E-02
1,2,4-Trichlorobenzene	5.0E+00	2.7E+06	6.6E+03	3.8E+01	6.7E-01	5.8E-02	2.7E-02
Trichloroethene	5.0E+00	1.7E+01	3.2E+00	1.9E+00	1.3E+00	7.6E-01	3.1E-01
Chloroform	8.0E+01	8.3E+01	1.7E+01	1.1E+01	7.8E+00	4.7E+00	2.0E+00
1,2,4-Trimethylbenzene		No MCL Established					
1,3,5-Trimethylbenzene		No MCL Established					
Vinyl chloride	5.0E-01	1.4E+01	2.4E+00	1.3E+00	8.6E-01	4.9E-01	1.9E-01
m,p-Xylenes	1.8E+03	4.7E+03	9.0E+02	5.5E+02	3.9E+02	2.3E+02	9.4E+01
o-Xylene	1.8E+03	2.8E+03	5.5E+02	3.5E+02	2.5E+02	1.5E+02	6.3E+01

TABLE B1-18

Screening Levels for Protection of Surface Water

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Limiting WQL (mg/L)	Source	Screening Level for Protection of Surface Water (mg/kg)
Metals			
Aluminum	87	Ambient Water Quality	2.8E+03
Antimony	6	Primary MCL	1.9E+02
Arsenic	0.018	Ambient Water Quality	5.8E-01
Barium	100	Basin Plan Objective	3.2E+03
Beryllium	4	Primary MCL	1.3E+02
Cadmium	0.07	Public Health Goal	2.2E+00
Chromium, hexavalent*	11	California Toxics Rule (4-day average dissolved)	3.5E+02
Chromium, total*	50	Primary MCL	1.6E+03
Cobalt	50	Agriculture Water Quality	1.6E+03
Copper	4.1	California Toxics Rule	1.3E+02
Cyanide	5.2	California Toxics Rule	1.7E+02
Iron	300	Secondary MCL	9.6E+03
Lead	0.92	California Toxics Rule	2.9E+01
Manganese	50	Basin Plan Objective	1.6E+03
Mercury	0.05	California Toxics Rule	1.6E+00
Molybdenum	10	Agriculture Water Quality	3.2E+02
Nickel	24	California Toxics Rule	7.7E+02
Perchlorate	2	Public Health Goal	6.4E+01
Selenium	5	California Toxics Rule	1.6E+02
Silver	0.71	California Toxics Rule	2.3E+01
Thallium	1.7	National Toxics Rule	5.4E+01
Vanadium	50	DHS Drinking Water	1.6E+03
Zinc	54	California Toxics Rule	1.7E+03
SVOCs			
Acenaphthene	20	Taste and Odor	6.4E+02
Acenaphthylene	--	No criteria identified	--
Aldrin	0.00013	California Toxics Rule	4.1E-03
Anthracene	9,600	California Toxics Rule	3.1E+05
Benzo(a)anthracene	0.0044	California Toxics Rule	1.4E-01
Benzo(a)pyrene	0.0044	California Toxics Rule	1.4E-01
Benzo(b)fluoranthene	0.0044	California Toxics Rule	1.4E-01
Benzo(g,h,i)perylene	--	No criteria identified	--
Benzo(k)fluoranthene	0.0044	California Toxics Rule	1.4E-01
Benzoic acid	28,000	EPA RfD	9.0E+05
Benzyl alcohol	--	No criteria identified	--
BHC, beta	0.014	California Toxics Rule	4.5E-01
BHC, gamma	0.019	California Toxics Rule	6.1E-01
Bis(2-ehylhexyl)phthalate (DEHP)	1.8	National Toxics Rule	5.8E+01
Bisphenol-A	350	EPA IRIS	1.1E+04
Butylbenzylphthalate (BBP)	3	Aquatic Toxicity	9.6E+01
Chlordane	0.00057	California Toxics Rule	1.8E-02
Chlordane, alpha	0.00057	California Toxics Rule	1.8E-02
Chlordane, gamma	0.00057	California Toxics Rule	1.8E-02

TABLE B1-18

Screening Levels for Protection of Surface Water

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Limiting WQL (mg/L)	Source	Screening Level for Protection of Surface Water (mg/kg)
4-Chloroaniline	28	EPA RfD	9.0E+02
Chrysene	0.0044	California Toxics Rule	1.4E-01
DDD	0.00083	California Toxics Rule	2.7E-02
DDE	0.00059	California Toxics Rule	1.9E-02
DDT	0.00059	California Toxics Rule	1.9E-02
Dibenzo(a,h)anthracene	0.0044	California Toxics Rule	1.4E-01
1,2-Dichlorobenzene	24	Taste and Odor	7.7E+02
1,3-Dichlorobenzene	400	California Toxics Rule	1.3E+04
1,4-Dichlorobenzene	5	CA MCL	1.6E+02
Dieldrin	0.00014	California Toxics Rule	4.5E-03
Diethylphthalate (DEPH)	3	Aquatic Toxicity	9.6E+01
2,4-Dimethylphenol	400	Taste and Odor	1.3E+04
Dimethylphthalate (DMPH)	3	Aquatic Toxicity	9.6E+01
Di-n-butylphthalate (DNBP)	3	Aquatic Toxicity	9.6E+01
2,4-Dinitrotoluene	0.05	EPA IRIS	1.6E+00
2,6-Dinitrotoluene	0.05	EPA IRIS	1.6E+00
Di-n-octylphthalate	3	Aquatic Toxicity	9.6E+01
1,4-Dioxane	1.3	Cal/EPA cancer potency factor	4.2E+01
Endosulfan	0.056	National Toxics Rule	1.8E+00
Endosulfan Sulfate	0.056	Aquatic Toxicity	1.8E+00
Endrin	0.036	California Toxics Rule	1.2E+00
Endrin Aldehyde	0.036	California Toxics Rule	1.2E+00
Fluoranthene	300	California Toxics Rule	9.6E+03
Fluorene	1,300	California Toxics Rule	4.2E+04
Heptachlor	0.00021	California Toxics Rule	6.7E-03
Hexachloroethane	0.7	EPA RfD	2.2E+01
Indeno(1,2,3-c,d)pyrene	0.0044	California Toxics Rule	1.4E-01
Isophorone	8.4	California Toxics Rule	2.7E+02
1-Methylnaphthalene	--	No criteria identified	--
2-Methylnaphthalene	--	No criteria identified	--
2-Methylphenol	35	EPA RfD	1.1E+03
4-Methylphenol	--	No criteria identified	--
Naphthalene	21	Taste and Odor	6.7E+02
4-Nitrophenol	--	No criteria identified	--
N-nitroso-di-n-propylamine	0.005	California Toxics Rule	1.6E-01
N-nitrosodinphenylamine (NNSPH)	5.0	National Toxics Rule	1.6E+02
PCB	0.00017	California Toxics Rule	5.4E-03
Pentachlorophenol	0.28	California Toxics Rule	9.0E+00
Phenanthrene	--	No criteria identified	--
Phenol	2,100	EPA RfD	6.7E+04
Pyrene	960	California Toxics Rule	3.1E+04
2,3,7,8-TCDD	0.000000013	California Toxics Rule	4.2E-07
1,2,4-Trichlorobenzene	9.7	Cal/EPA cancer potency factor	3.1E+02
2,4,5-Trichlorophenol	700	EPA RfD	2.2E+04

TABLE B1-18

Screening Levels for Protection of Surface Water

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Compound	Limiting WQL (mg/L)	Source	Screening Level for Protection of Surface Water (mg/kg)
Radionuclides			
Cobalt 60	100	MCL	3.2E+03
Cesium 137	200	MCL	6.4E+03
Plutonium 239	15	MCL	4.8E+02
Radium 226	5	MCL	1.6E+02
Thorium 232	15	MCL	4.8E+02
Uranium 235	20	MCL	6.4E+02

TABLE B1-19
Screening Levels for Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Contaminant	Screening Levels for Protection of: Human Health, Unrestricted Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Human Health, Industrial Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Groundwater in Surface, Shallow, and Deep Soils (0 to 30 ft bgs)	Surface Water in Surface Soils (0 to 1 ft bgs)
Inorganics (mg/kg)				
Aluminum[a]	3.5E+04	9.1E+05	8.4E+04	2.8E+03
Antimony	1.4E+01	3.7E+02	6.0E+02	1.9E+02
Arsenic	9.3E-02	1.4E+00	3.3E+00	5.8E-01
Barium[a]	6.9E+03	1.8E+05	7.8E+03	3.2E+03
Beryllium	6.9E+01	1.8E+03	3.6E+02	1.3E+02
Boron	7.0E+03	2.0E+05	--	--
Cadmium	6.2E+00	1.0E+03	9.6E+01	2.2E+00
Chromium, Hexavalent[b]	1.1E+02	3.0E+03	2.1E+02	3.5E+02
Chromium, Total[b]	2.6E+03	5.5E+03	8.1E+04	1.6E+03
Cobalt	1.0E+01	2.7E+02	4.7E+04	1.6E+03
Copper	1.4E+03	3.7E+04	2.5E+05	1.3E+02
Cyanide	6.9E+02	1.8E+04	--	1.7E+02
Iron[a]	2.4E+04	6.4E+05	9.1E+04	9.6E+03
Lead	1.5E+02	8.0E+02	4.3E+03	2.9E+01
Manganese	8.3E+02	2.2E+04	2.8E+04	1.6E+03
Mercury	3.5E+00	1.5E+02	1.2E+02	1.6E+00
Molybdenum	1.7E+02	4.6E+03	1.0E+03	3.2E+02
Nickel	4.3E+02	1.8E+04	5.8E+03	7.7E+02
Perchlorate	2.5E+01	7.1E+02	4.0E+01	6.4E+01
Selenium	1.1E+02	4.6E+03	5.8E+03	1.6E+02
Silver	1.7E+02	4.6E+03	3.5E+03	2.3E+01
Thallium	2.3E+00	6.1E+01	1.4E+01	5.4E+01
Vanadium	1.7E+02	4.6E+03	1.3E+04	1.6E+03
Zinc[a]	3.1E+03	2.8E+05	1.4E+05	1.7E+03
SVOCs (mg/kg)				
1,2,4-Trichlorobenzene[c]	6.9E+00	2.4E+02	2.4E+02	3.1E+02
1,2,4-Trimethylbenzene	6.2E+01	2.0E+02	--	--
1,2-Dichlorobenzene[d]	1.9E+02	3.9E+03	3.9E+03	7.7E+02
1,3,5-Trimethylbenzene	2.1E+01	7.0E+01	--	--
1,3-Dichlorobenzene[d]	7.6E+01	1.9E+03	1.9E+03	1.3E+04
1,4-Dichlorobenzene[c]	1.1E+00	4.5E+00	1.5E+01	1.6E+02
1,4-Dioxane	8.5E-03	1.2E+02	--	4.2E+01
1-Methylnaphthalene	--	--	2.1E+02	--
2,3,7,8-TCDD	1.3E-06	1.6E-05	4.5E-04	4.2E-07
2,4,5-Trichlorophenol	4.4E+02	4.8E+04	--	2.2E+04
2,4,5-Trichlorophenoxypropionic acid	3.2E+01	3.8E+03	--	--
2,4-DB	2.3E+01	3.8E+03	--	--
2,4-Dimethylphenol	1.3E+01	9.6E+03	9.6E+03	1.3E+04
2,4-Dinitrophenol	5.2E-01	9.6E+02	--	--
2,4-Dinitrotoluene	6.3E-03	4.3E+00	4.3E+00	1.6E+00

TABLE B1-19
Screening Levels for Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Contaminant	Screening Levels for Protection of			
	Human Health, Unrestricted Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Human Health, Industrial Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Groundwater in Surface, Shallow, and Deep Soils (0 to 30 ft bgs)	Surface Water in Surface Soils (0 to 1 ft bgs)
2,6-Dinitrotoluene	2.4E-03	2.0E+00	--	1.6E+00
2-Methylnaphthalene[c]	1.6E+01	1.7E+02	3.3E+02	--
2-Methylphenol	2.0E+01	2.4E+04	2.4E+04	1.1E+03
2-Nitrophenol	--	--	--	--
4-Chloroaniline	1.3E+00	1.9E+03	1.9E+03	9.0E+02
4-Methylphenol	1.9E+00	2.4E+03	--	--
4-Nitroaniline	7.7E-03	6.4E+01	--	--
4-Nitrophenol	--	--	--	--
Acenaphthene[d]	2.9E+02	1.6E+04	1.6E+04	6.4E+02
Acenaphthylene	--	--	2.0E+00	--
Aldrin	9.2E-03	1.1E-01	1.1E-01	4.1E-03
Anthracene[a,d]	2.3E+03	1.0E+05	1.0E+05	3.1E+05
Benzidine	3.5E-06	5.8E-03	--	--
Benzo(a)anthracene	8.8E-02	8.8E-01	6.8E+00	1.4E-01
Benzo(a)pyrene	1.8E-02	1.4E-01	8.8E+00	1.4E-01
Benzo(b)fluoranthene	1.1E-01	8.8E-01	7.0E+00	1.4E-01
Benzo(g,h,i)perylene	7.5E+02	1.1E+04	1.1E+04	--
Benzo(k)fluoranthene	1.1E-01	8.8E-01	5.4E+00	1.4E-01
Benzoic acid[a,e]	1.4E+03	> 1.0E+06	--	9.0E+05
Benzyl alcohol[a]	6.1E+01	2.4E+05	2.4E+05	--
Benzyl chloride	8.3E-01	1.9E+00	--	--
BHC, alpha	3.1E-03	2.9E-01	--	--
BHC, beta	1.1E-02	1.0E+00	1.0E+00	4.5E-01
BHC, delta	1.8E+00	2.0E+02	2.0E+02	--
BHC, gamma	1.6E-02	1.7E+00	1.7E+00	6.1E-01
Bis(2-chloroethyl)ether	6.8E-04	4.4E-01	--	--
Bis(2-ethylhexyl)phthalate (DEHP)	1.2E+01	9.6E+01	9.6E+01	5.8E+01
Bisphenol-A	1.1E+02	2.4E+04	--	1.1E+04
Butylbenzylphthalate (BBP)[a]	3.1E+01	7.0E+02	7.0E+02	9.6E+01
Chlordane	4.3E-01	5.2E+00	--	1.8E-02
Chlordane, alpha	4.3E-01	5.2E+00	5.2E+00	1.8E-02
Chlordane, gamma	4.3E-01	5.2E+00	5.2E+00	1.8E-02
Chrysene[d]	8.8E-01	8.7E+00	9.1E+00	1.4E-01
DDD	5.0E-01	7.6E+00	7.6E+00	2.7E-02
DDE	4.9E-01	5.4E+00	5.4E+00	1.9E-02
DDT	4.7E-01	5.4E+00	5.4E+00	1.9E-02
Dibenzo(a,h)anthracene	3.8E-02	2.6E-01	7.9E+00	1.4E-01
Dibenzofuran	0.0E+00	0.0E+00	1.2E+00	--
Dieldrin	5.8E-03	1.1E-01	8.4E-01	4.5E-03
Diethylphthalate (DEPH)[a]	6.1E+02	3.8E+05	3.8E+05	9.6E+01
Dimethylphthalate (DMPH)[a,e]	2.4E+03	> 1.0E+06	> 1.0E+06	9.6E+01

TABLE B1-19
Screening Levels for Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Contaminant	Screening Levels for Protection of: Human Health, Unrestricted Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Human Health, Industrial Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Groundwater in Surface, Shallow, and Deep Soils (0 to 30 ft bgs)	Surface Water in Surface Soils (0 to 1 ft bgs)
Di-n-butylphthalate (DNBP)	9.3E+02	4.8E+04	4.8E+04	9.6E+01
Di-n-octylphthalate	1.2E+03	1.9E+04	1.9E+04	9.6E+01
Dinoseb	3.0E+00	4.8E+02	--	--
Endosulfan	3.4E+01	3.9E+03	1.7E-02	1.8E+00
Endosulfan sulfate	2.0E+01	3.9E+03	--	1.8E+00
Endrin	4.2E+00	2.0E+02	2.0E+02	1.2E+00
Endrin aldehyde	4.2E+00	2.0E+02	2.0E+02	1.2E+00
Fluoranthene	4.9E+02	1.5E+04	1.5E+04	9.6E+03
Fluorene[d]	2.4E+02	1.3E+04	1.3E+04	4.2E+04
Heptachlor	3.2E-02	4.1E-01	4.1E-01	6.7E-03
Heptachlor epoxide	7.6E-03	2.0E-01	2.0E-01	--
Hexachloroethane	1.7E+00	9.6E+01	--	2.2E+01
Indeno(1,2,3-cd)pyrene	1.2E-01	8.8E-01	1.8E+00	1.4E-01
Isophorone[a]	1.4E+00	1.4E+03	--	2.7E+02
MCPA	1.0E+00	2.4E+02	--	--
Methanol	5.0E+00	4.6E+05	--	--
Methoxychlor	5.0E+01	2.4E+03	2.4E+03	--
Naphthalene[c]	2.4E+00	5.1E+00	1.1E+03	6.7E+02
N-nitroso-di-n-propylamine	1.2E-04	1.9E-01	--	1.6E-01
N-nitrosodiphenylamine (NNSPH)	1.8E+00	2.7E+02	2.7E+02	1.6E+02
PCBs(1016)	1.6E+00	1.5E+01	9.2E+01	5.4E-03
PCBs(1254,1260,1221,1232,1242,1248)	6.3E-02	5.3E-01	9.2E+01	5.4E-03
Pentachlorophenol	5.9E-01	6.2E+00	6.2E+00	9.0E+00
Phenanthrene	2.6E+03	1.1E+05	1.1E+05	--
Phenol[a]	6.1E+01	1.4E+05	1.4E+05	6.7E+04
Pyrene[d]	3.5E+02	1.1E+04	1.1E+04	3.1E+04
TPH (mg/kg)				
TPH-D	--	--	100	100
TPH-G	--	--	10	10
VOCs (mg/kg)				
1,1,1-Trichloroethane	4.8E+03	1.6E+04	--	--
1,1,2,2-Tetrachloroethane	3.9E-01	8.7E-01	--	--
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon® 113)	2.1E+04	6.9E+04	--	--
1,1,2-Trichloroethane	7.1E-01	1.5E+00	--	--
1,1-Dichloroethane	2.8E+00	5.9E+00	--	--
1,1-Dichloroethene	1.2E+02	4.1E+02	--	--
1,2-Dibromo-3-chloropropane (DBCP)	1.4E-02	3.1E-02	--	--
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)	2.1E+04	6.9E+04	--	--
1,2-Dichloroethane	2.7E-01	5.9E-01	--	--
1,2-Dichloropropane	6.4E-01	1.4E+00	--	--
1,3-Butadiene	4.2E-02	9.5E-02	--	--

TABLE B1-19
Screening Levels for Soil
Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Contaminant	Screening Levels for Protection of			
	Human Health, Unrestricted Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Human Health, Industrial Use, in Surface and Shallow Soils (0 to 15 ft bgs)	Groundwater in Surface, Shallow, and Deep Soils (0 to 30 ft bgs)	Surface Water in Surface Soils (0 to 1 ft bgs)
2-Chlorotoluene	1.5E+02	5.4E+02	--	--
Acetone	1.3E+04	5.1E+04	--	--
Allyl chloride (3-chloropropene)	4.6E-03	6.4E+01	--	--
Benzene	6.3E-01	1.4E+00	--	--
Bromodichloromethane	4.1E-01	8.7E-01	--	--
Bromoform	3.8E-01	4.4E+01	--	--
Bromomethane	3.9E+00	1.3E+01	--	--
Carbon tetrachloride	2.5E-01	5.3E-01	--	--
Chlorobenzene	1.3E+02	4.4E+02	--	--
Chlorodifluoromethane	2.3E+04	7.5E+04	--	--
Chloroethane	3.0E+00	6.4E+00	--	--
Chloromethane	1.2E+00	2.6E+00	--	--
Chlororform	2.2E-01	4.6E-01	--	--
cis-1,2-Dichloroethene	4.2E+01	1.4E+02	--	--
cis-1,3-Dichloropropene	7.5E-01	1.6E+00	--	--
Cyclohexane	2.8E+03	9.4E+03	--	--
Dichlorodifluoromethane (Freon® 12)	9.4E+01	3.1E+02	--	--
Ethylbenzene	3.8E+00	8.3E+00	--	--
Ethylene dibromide (1,2-dibromomethane)	3.1E-02	6.7E-02	--	--
Heptane	4.4E+02	1.4E+03	--	--
Hexachlorobutadiene	7.3E-01	1.7E+01	--	--
Hexane	3.9E+02	1.4E+03	--	--
Isopropylbenzene	2.2E+02	2.1E+03	--	--
m,p-Xylene	2.7E+02	8.8E+02	--	--
Methyl ethyl ketone (2-butanone)	2.0E+04	9.4E+04	--	--
Methyl isobutyl ketone (4-methyl 2-pentanone)	4.2E+03	2.8E+04	--	--
Methyl tert-butyl ether (MTBE)	3.1E+01	6.7E+01	--	--
Methylcyclohexane	2.6E+03	8.6E+03	--	--
Methylene chloride	8.8E+00	1.9E+01	--	--
n-Butylbenzene	5.4E+02	2.0E+03	--	--
n-Propylbenzene	5.4E+02	2.0E+03	--	--
o-Xylene (1,2-dimethyl benzene)	2.7E+02	8.8E+02	--	--
sec-Butylbenzene	4.5E+02	1.6E+03	--	--
Styrene	4.0E+03	1.6E+04	--	--
Tetrachloroethene (PCE)	4.3E-01	1.0E+00	--	--
Toluene	3.1E+03	1.7E+04	--	--
trans-1,2-Dichloroethene	5.9E+01	2.0E+02	--	--
trans-1,3-Dichloropropene	7.5E-01	1.6E+00	--	--
Trichloroethene (TCE)	2.9E+00	6.3E+00	--	--
Trichlorofluoromethane (Freon® 11)	3.8E+02	1.3E+03	--	--
Vinyl chloride	1.3E-01	3.1E-01	--	--

TABLE B1-19

Screening Levels for Soil

Focused Strategic Sites ROD, Former McClellan Air Force Base, Sacramento, California

Contaminant	Screening Levels for Protection of			
	Human Health, Unrestricted Use, in Surface and Shallow Soils (0 to 15 ft bgs)	**Human Health, Industrial Use, in Surface and Shallow Soils (0 to 15 ft bgs)**	**Groundwater in Surface, Shallow, and Deep Soils (0 to 30 ft bgs)**	**Surface Water in Surface Soils (0 to 1 ft bgs)**
Xylenes, total	2.7E+02	8.8E+02	--	--
Radionuclides (pCi/g)				
Cobalt 60	1.0E-01	1.0E-01	1.0E+04	3.2E+03
Cesium 137	2.8E-01	2.8E-01	2.0E+04	6.4E+03
Plutonium 239	1.1E-02	1.1E-02	1.5E+03	4.8E+02
Radium 226	7.8E-01	7.8E-01	5.0E+02	1.6E+02
Thorium 232	1.6E+00	1.6E+00	1.5E+03	4.8E+02
Uranium 235	2.0E-01	2.0E-01	2.0E+03	6.4E+02

[a] US EPA Region 9 recommends that a “ceiling limit” of 1E+05 be used when the risk-based value is higher. Documentation accompanying the PRGs also acknowledges that this recommendation is not a universally accepted approach.

[b] If separate analyses have been performed for hexavalent chromium, the values for hexavalent and total chromium will be used as calculated. If hexavalent chromium analyses have not been performed, the EPA PRG for total chromium in residential soil (210 mg/kg) will be used as the unrestricted use screening level, and the EPA PRG for total chromium in industrial soil (450 mg/kg) will be used as the industrial use screening level. The screening levels shown in the table for total and hexavalent chromium have been calculated using the McClellan-specific PEF.

[c] For volatile SVOCs, the listed risk-based concentrations do not include the indoor air pathway. The values listed in Tables C1-7 and

[d] The listed risk-based concentrations exceed the soil saturation concentration (US EPA Region 9 default soil properties for PRGs) for acenapthene (1.3E+02 mg/kg), anthracene (6.1E+00 mg/kg), chrysene (3.8E+00 mg/kg), 1,2-dichlorobenzene (6.0E+02 mg/kg),

[e] The calculated risk-based screening level for the industrial scenario exceeds 100 percent in soil.

Notes:

mg/kg = milligram(s) per kilogram
ft bgs = feet below ground surface
-- = a screening level was not developed
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons
TPH-D = total petroleum hydrocarbons as diesel
TPH-G = total petroleum hydrocarbons as gasoline

Attachment B1-1
Background Values, Table 5-5, Interim Basewide Remedial Investigation Report, General Framework (URS, 2002)

Table 5-5. Subsurface Soil, Surface Soil, and Stream Sediment Background Levels

Analyte	Method	Residential PRGs (m/kg)	Surface Soils (mg/kg)(n=27)	Sediments (mg/kg)(n=15)	Silts and Clays (mg/kg)(n=69)	Sands (mg/kg)(n=51)	Combined (mg/kg)(n=162)
Aluminum	SW6010	78,000	14,599	17,549	34,004	23,596	29,313
Arsenic	SW7060	0.97 ca	5.8(I)/ 2.8(II,III,IV)	3.6	6.5	3.7	4.9
Antimony[b]	SW6010	31	10	10	20	20	10
Barium	SW6010	5,500	209	318	342	413	352
Beryllium[a]	SW6010	0.4 ca	0.6	0.8	0.7	0.6	0.7
Cadmium	SW6010	39	9.0(I,II)/ 11.5(III,IV)	11.5	0.4	0.4	—
	SW7131	39	0.5(I,II)/ 4.1(III,IV)	1.6	—	—	0.4
Calcium	SW6010	NE	4,372	8,170	7,017	6,082	6,681
Chromium	SW6010	NE (CrVI, 44 ca)	42.5	44.5	53.9	41.5	48.3
Cobalt	SW6010	NE	15.6	18.7	17.5	15.0	16.7
Copper	SW6010	2,900	23.6	45.4	41.4	26.7	36.5
Lead	SW7421	500	137	150	15.9	6.8	74.0
Iron	SW6010	NE	23,597	25,529	46,293	34,759	39,695
Magnesium	SW6010	NE	5,226(I)/ 3,730(II,III,IV)	5,448	12,660	8,954	10,885
Manganese	SW6010	7,800	729	1,216	1,355	2,176	1,596
Molybdenum[b]	SW6010	390	4.0	4.0	4.0	4.0	4.0
Mercury[b]	SW7471	23	0.1	0.1	0.2	0.2	0.1
Nickel	SW6010	1,600	34.8	35.7	60.6	52.2	53.4
Potassium	SW6010	NE	1,658	1,728	3,651	2,967	3,131
Selenium[b]	SW7740	390	0.4	0.4	0.5	0.5	0.4
Silver[b]	SW6010	390	1.0	1.0	1.0	1.0	1.0
Sodium	SW6010	NE	397(I)/ 150(II,III,IV)	635	727	882	744
Thallium[b]	SW7841	6.3–7.0[c]	0.2	0.2	NE	NE	0.2

Table 5-5. (Continued)

Analyte	Method	Residential PRGs (m/kg)	Surface Soils (mg/kg)(n=27)	Sediments (mg/kg)(n=15)	Silts and Clays (mg/kg)(n=69)	Sands (mg/kg)(n=51)	Combined (mg/kg)(n=162)
Vanadium	SW6010	550	61.7	71.2	80.5	75.7	75.7
Zinc	SW6010	23,000	159.0	374	85.8	58.6	156
Gross Alpha	SW9310	NE	17.6	14.1	15.8	12.6	15.2
Gross Beta	SW9310	NE	41.9	39.8	21.6	20.4	37.9
Potassium-40	E901.1	NE	20.0	18.1	20.2	17.7	19.2

[a] Background level > PRG
[b] Background established as reporting limit for this constituent.
[c] PRG range for thallium compounds

ca = Carcinogen
PRG = Preliminary Remedial Goal, EPA Region IX
n = Number of samples
NE = Not established

I, II, III, IV = Background study landscape types

All background levels calculated as the mean plus two times the standard deviation for the data set unless established as the reporting limit.

B2
Screening Human Health Risk Assessments

B2

Screening Human Health Risk Assessments

B2.1 Toxicity Assessment

The toxicity assessment in an human health risk assessment (HHRA) evaluates the relationship between the magnitude of exposure to a chemical and the likelihood of adverse health effects to potentially exposed populations. This assessment provides, where possible, a numerical estimate of the increased likelihood of adverse effects associated with chemical exposure (EPA, 1989). The toxicity assessment contains two steps: hazard characterization and dose-response evaluation. These two components are discussed in the following two subsections.

B2.1.1 Hazard Characterization

Hazard characterization identifies the types of toxic effects a chemical can exert. For the toxicity assessment, chemicals can be divided into two broad groups on the basis of their effects on human health: non-carcinogens and carcinogens. This classification has been selected because health risks are calculated differently for carcinogenic and non-carcinogenic effects, and separate toxicity values have been developed for them.

Carcinogens are those chemicals suspected of causing cancer following exposure; non-carcinogenic effects cover a wide variety of systemic effects, such as liver toxicity or developmental effects. Some chemicals (such as arsenic) are capable of eliciting both carcinogenic and non-carcinogenic responses; therefore, these carcinogens are also evaluated for systemic (non-carcinogenic) effects.

B2.1.2 Dose-response Evaluation

The magnitude of chemical toxicity depends on the dose to a receptor. Dose refers to exposure to a chemical concentration over a specified period of time. Human exposures are generally classified as acute (typically less than 2 weeks), subchronic (about 2 weeks to 7 years), or chronic (7 years to a lifetime). This HHRA specifically addresses chronic exposure. Acute exposures and risks are evaluated only when chronic exposure estimates pose a high risk. A dose-response curve describes the relationship between the degree of exposure (the dose) and the incidence of the adverse effects (the response) in the exposed population. EPA uses this dose-response information to establish toxicity values for particular chemicals, as described in the following paragraphs.

B2.1.3 Toxicity Values

The hierarchy of sources for toxicity values used for the risk-based screening levels (RBSLs) and HHRAs follows EPA and Air Force guidance (EPA, 2003; USAF, 2006) and is listed below in order of preference:

1. EPA IRIS online database (EPA, 2009)

2. EPA's Provisional Peer Reviewed Toxicity Values (as cited in the 2004 EPA Region 9 PRG table [EPA, 2004])
3. Cal/EPA cancer potency factors and REL online database (Cal/EPA, 2009)
4. Other EPA sources (i.e., HEAST, NCEA provisional toxicity values, and route-extrapolated toxicity values as cited in the 2004 EPA Region 9 PRG table [EPA, 2004]).

B2.1.3.1 Reference Doses for Noncancer Effects

The toxicity value describing the dose-response relationship for noncancer effects is the reference dose (RfD) value. For non-carcinogenic effects, the body's protective mechanisms must be overcome before an adverse effect is manifested. If exposure is high enough and these protective mechanisms (or thresholds) are exceeded, adverse health effects can occur. EPA attempts to identify the upper bound of this tolerance range in the development of noncancer toxicity values. EPA uses the apparent toxic threshold value, in conjunction with uncertainty factors based on the strength of the toxicological evidence, to derive an RfD. EPA defines an RfD as follows:

> In general, the RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD is generally expressed in units of mg/kg-day (EPA, 1989).

The RfDs used for the RBSLs and in the HHRAs are presented in Table B1-1. Some of the inhalation RfDs is derived from RfCs or RELs. EPA defines an RfC as follows:

> An estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from a NOAEL, LOAEL, or benchmark concentration, with uncertainty factors generally applied to reflect limitations of the data used (EPA, 2009).

B2.1.3.2 Slope Factors for Cancer Effects

The dose-response relationship for cancer effects is expressed as a cancer slope factor that converts estimated intake directly to excess lifetime cancer risk. Slope factors are presented in units of risk per level of exposure (or intake). The data used for estimating the dose-response relationship are taken from lifetime animal studies or human occupational or epidemiological studies where excess cancer risk has been associated with exposure to the chemical. However, because risk at low intake levels cannot be directly measured in animal or human epidemiological studies, a number of mathematical models and procedures have been developed to extrapolate from the high doses used in the studies to the low doses typically associated with environmental exposures. The model choice leads to uncertainty. EPA assumes linearity at low doses and uses the linearized multistage procedure when uncertainty exists about the mechanism of action of a carcinogen and when information suggesting nonlinearity is absent.

It is assumed, therefore, that if a cancer response occurs at the dose levels used in the study, then there is some probability that a response will occur at all lower exposure levels (i.e., a dose-response relationship with no threshold is assumed). Moreover, the dose-response slope chosen is usually the upper confidence level (UCL) on the dose-response curve observed in the laboratory studies. As a result, uncertainty and conservatism are built into the EPA risk extrapolation approach. EPA has stated that cancer risks estimated by this method produce estimates that "provide a rough but plausible upper limit of risk." In other words, it is not likely that the true risk would be much more than the estimated risk, but "the true value of the risk is unknown and may be as low as zero" (EPA, 1996). The cancer slope factors used for the RBSLs and in the HHRAs are summarized in Table B1-1. Some of the inhalation slope factors are derived from URFs. EPA defines a URF as the upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 $\mu g/m^3$ in air (EPA, 2009).

B2.2 References

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TABLE B2-1

Toxicity Values,Volatilization Factors, Absorption Factors, and K_{ps} Values Used to Calculate Screening Levels and in HHRAs

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
Perchlorate			7.00E-04	IRIS							1.00E-04	RAIS		calc from HSDB K_{ow}
Aluminum			1.00E+00	PPRTV			1.43E-03	PPRTV			1.00E-02	PEA		
Antimony			4.00E-04	IRIS							1.00E-02	PEA		
Arsenic	1.50E+00	IRIS	3.00E-04	IRIS	1.51E+01	IRIS	4.29E-06	Cal/EPA			3.00E-02	PEA	2.20E-03	SSG
Barium			2.00E-01	IRIS			1.43E-04	HEAST			1.00E-02	PEA		
Beryllium			2.00E-03	IRIS	8.40E+00	IRIS	5.71E-06	IRIS			1.00E-02	PEA		
Boron			2.00E-01	IRIS			5.71E-03	HEAST			1.00E-03	RAIS		
Cadmium			1.00E-03	IRIS	6.30E+00	IRIS	5.71E-06	Cal/EPA			1.00E-03	PEA	2.88E-02	SSG
Chromium, hexavalent			3.00E-03	IRIS	4.20E+01	IRIS	2.29E-06	IRIS				PEA		
Chromium, total					4.20E+01	IRIS					1.00E-02	PEA		
Chromium, trivalent			1.50E+00	IRIS			1.50E+00	ROUTE			1.00E-02	PEA		
Cobalt			3.00E-04	PPRTV	3.15E+01	PPRTV	1.71E-06	PPRTV			1.00E-02	PEA		
Copper			4.00E-02	HEAST			2.86E-02	Cal/EPA			1.00E-02	PEA		
Cyanide, reactive			2.00E-02	IRIS			8.57E-04	IRIS			1.00E-02	PEA		
Cyanide, total distilled			2.00E-02	IRIS							1.00E-02	PEA		
Iron			7.00E-01	PPRTV							1.00E-02	PEA		
Lead[k]	8.50E-03	Cal/EPA			4.20E-02	Cal/EPA					1.00E-02	PEA		
Manganese			2.40E-02	IRIS			1.43E-05	IRIS			1.00E-02	PEA		
Mercury and Mercury Compounds			1.60E-04	Cal/EPA			8.57E-05	IRIS			1.00E-02	PEA	3.60E-03	SSG
Mercury, elemental			1.60E-04	Cal/EPA			8.57E-05	IRIS			1.00E-02	PEA	3.60E-03	SSG
Molybdenum			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Nickel			2.00E-02	IRIS	9.10E-01	Cal/EPA	1.43E-05	Cal/EPA			1.00E-02	PEA	3.80E-03	SSG
Selenium			5.00E-03	IRIS			5.71E-03	Cal/EPA			1.00E-02	PEA	3.60E-03	SSG
Silver			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Thallium			6.60E-05	IRIS			6.60E-05	ROUTE			1.00E-02	PEA		
Vanadium			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-02	PEA		
Zinc			3.00E-01	IRIS			3.00E-01	ROUTE			1.00E-02	PEA	1.48E-02	SSG
1,2-Dichlorobenzene			9.00E-02	IRIS			5.71E-02	HEAST	1.46E+04	Region 9	1.00E-01	PEA	7.89E-02	calc from SSG K_{ow}
1,3-Dichlorobenzene			3.00E-02	NCEA			3.00E-02	ROUTE	1.46E+04	Region 9	1.00E-01	PEA	6.90E-02	calc from HSDB K_{ow}
1,4-Dichlorobenzene	5.40E-03	Cal/EPA	3.00E-02	NCEA	4.00E-02	Cal/EPA	2.30E-01	IRIS	1.29E+04	Region 9	1.00E-01	PEA	8.00E-02	calc from SSG K_{ow}
1,4-Dioxane (p-dioxane)	1.10E-02	IRIS			2.70E-02	Cal/EPA	8.57E-01	Cal/EPA			1.00E-01	PEA	1.10E+01	calc from RAIS K_{ow}
1-Methylnaphthalene	2.90E-02	PPRTV			2.90E-02	ROUTE					1.00E-01	PEA	4.38E-02	calc from RAIS K_{ow}
2,3,7,8-TCDD	1.30E+05	Cal/EPA	1.00E-08	Cal/EPA	1.30E+05	Cal/EPA	1.14E-08	Cal/EPA			3.00E-02	PEA	8.76E-04	calc from HSDB K_{ow}
2,4,5-Trichlorophenol			1.00E-01	IRIS			1.00E-01	ROUTE			1.00E-01	PEA	4.21E-02	calc from SSG K_{ow}
2,4,5-Trichlorophenoxypropionic acid			8.00E-03	IRIS			8.00E-03	ROUTE			1.00E-01	PEA	4.81E-02	
2,4-DB[l]			8.00E-03	IRIS			8.00E-03	ROUTE						
2,4-Dimethylphenol			2.00E-02	IRIS			2.00E-02	ROUTE			1.00E-01	PEA	3.29E-01	OU A RICS = blank
2,4-Dinitrophenol			2.00E-03	IRIS			2.00E-03	ROUTE						
2,4-Dinitrotoluene	3.10E-01	Cal/EPA	2.00E-03	IRIS	3.10E-01	Cal/EPA	2.00E-03	ROUTE			1.00E-01	PEA	5.26E-01	calc from SSG K_{ow}
2,6-Dinitrotoluene[a]	6.80E-01	IRIS	1.00E-03	PPRTV	6.80E-01	ROUTE	1.00E-03	ROUTE			1.00E-01	PEA	6.34E-01	calc from SSG K_{ow}
2-Methylnaphthalene[b]			4.00E-03	IRIS			8.60E-04	IRIS	4.30E+04	Region 9	1.50E-01	PEA	3.17E-02	OU A RICS
2-Methylphenol (o-cresol)			5.00E-02	IRIS			5.00E-02	ROUTE			1.00E-01	PEA	5.40E-01	calc from SSG K_{ow}
2-Nitrophenol											1.00E-01	PEA	6.01E-01	calc from RAIS K_{ow}
4-Chloroaniline			4.00E-03	IRIS			4.00E-03	ROUTE			1.00E-01	PEA	6.51E-01	calc from SSG K_{ow}
4-Methylphenol (p-cresol)			5.00E-03	HEAST			5.00E-03	ROUTE			1.00E-01	PEA	5.77E-01	calc from HSDB K_{ow}
4-Nitroaniline	2.10E-02	PPRTV	3.00E-03	PPRTV	2.10E-02	ROUTE	1.14E-03	PPRTV			1.00E-01	Region 9	6.36E+00	RAIS
4-Nitrophenol											1.00E-01	PEA	6.09E-01	calc from SSG K_{ow}
Acenaphthene			6.00E-02	IRIS			6.00E-02	ROUTE	1.82E+05	Region 9	1.50E-01	PEA	3.69E-02	OU A RICS
Acenaphthylene											1.50E-01	PEA	4.65E+00	calc from RAIS K_{ow}
Aldrin	1.70E+01	IRIS	3.00E-05	IRIS	1.72E+01	IRIS	3.00E-05	ROUTE			5.00E-02	PEA	1.31E-03	calc from SSG K_{ow}
Allyl chloride (3-chloropropene)	2.10E-02	Cal/EPA	2.86E-04	ROUTE	2.10E-02	Cal/EPA	2.86E-04	IRIS			1.00E-01	PEA	1.06E+01	calc from HSDB K_{ow}
Alpha BHC (alpha hexachlorocyclohexane)	6.30E+00	IRIS	5.00E-04	NCEA	6.30E+00	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	4.81E-02	calc from SSG K_{ow}
Anthracene			3.00E-01	IRIS			3.00E-01	ROUTE	6.98E+05	Region 9	1.50E-01	PEA	2.02E-02	OU A RICS
Benzidine	2.30E+02	IRIS	3.00E-03	IRIS	2.30E+02	IRIS	3.00E-03	ROUTE			1.00E-01	PEA	1.29E+00	calc from HSDB K_{ow}
Benzo(a)anthracene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	4.02E-03	OU A RICS
Benzo(a)pyrene[c]	7.30E+00	IRIS	3.00E-02	IRIS	3.90E+00	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.23E-03	OU A RICS
Benzo(b)fluoranthene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.17E-03	OU A RICS
Benzo(g,h,i)perylene[c]			3.00E-02	IRIS			3.00E-02	ROUTE			1.50E-01	PEA	1.29E-03	OU A RICS
Benzo(k)fluoranthene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	2.35E-03	OU A RICS
Benzoic acid			4.00E+00	IRIS			4.00E+00	ROUTE			1.00E-01	PEA	6.34E-01	calc from SSG K_{ow}
Benzyl alcohol			5.00E-01	PPRTV			3.00E-01	ROUTE			1.00E-01	PEA	1.77E+00	OU A RICS
Benzyl butyl phthalate	1.90E-03	PPRTV	2.00E-01	IRIS	1.90E-03	ROUTE	2.00E-01	ROUTE			1.00E-01	PEA	1.20E-02	calc from SSG K_{ow}
Beta BHC (beta hexachlorocyclohexane)	1.80E+00	IRIS	2.00E-04	NCEA	1.86E+00	IRIS	2.00E-04	ROUTE			5.00E-02	PEA	4.75E-02	calc from SSG K_{ow}
bis(2-chloroethyl)ether	1.10E+00	IRIS			1.16E+00	IRIS			5.68E+04	Region 9	1.00E-01	PEA	1.37E+00	OU A RICS
bis(2-ethylhexyl)phthalate	1.40E-02	IRIS	2.00E-02	IRIS	8.40E-03	Cal/EPA	2.00E-02	ROUTE			1.00E-01	PEA	4.49E-04	calc from SSG K_{ow}
Bisphenol-A			5.00E-02	IRIS			5.00E-02	ROUTE			1.00E-01	PEA	9.14E-02	calc from SSG K_{ow}
Bromoform	7.90E-03	IRIS	2.00E-02	IRIS	3.85E-03	IRIS	2.00E-02	ROUTE	1.60E+04	dibromochloromethane = surrogate	1.00E-01	PEA	3.34E-01	calc from SSG K_{ow}
Chlordane (alpha)											5.00E-02	PEA	1.66E-03	calc from SSG K_{ow}
Chlordane (gamma)	3.50E-01	IRIS	5.00E-04	IRIS	3.50E-01	IRIS	2.00E-04	IRIS			5.00E-02	PEA	1.66E-03	calc from SSG K_{ow}

TABLE B2-1

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Chrysene[c]	1.20E-01	Cal/EPA	3.00E-02	IRIS	3.90E-02	Cal/EPA	3.00E-02	ROUTE	2.73E+06	Region 9	1.50E-01	PEA	4.02E-03	OU A RICS
Delta BHC (delta hexachlorocyclohexane)[d]			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	3.06E-02	calc from HSDB K_{ow}
Dibenz(a,h)anthracene[c]	4.10E+00	Cal/EPA	3.00E-02	IRIS	4.10E+00	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	8.76E-04	OU A RICS
Dibenzofuran									6.51E+05	Region 9	1.00E-01	PEA	3.14E-02	OU A RICS
Dieldrin	1.60E+01	IRIS	5.00E-05	IRIS	1.61E+01	IRIS	5.00E-05	ROUTE			5.00E-02	PEA	5.91E-03	calc from SSG K_{ow}
Diethyl phthalate			8.00E-01	IRIS			8.00E-01	ROUTE			1.00E-01	PEA	2.80E-01	OU A RICS
Dimethyl phthalate			1.00E+01	HEAST			1.00E+01	ROUTE			1.00E-01	PEA	9.09E-01	calc from HSDB K_{ow}
Dinoseb			1.00E-03	IRIS			1.00E-03	ROUTE						
Di-n-butylphthalate			1.00E-01	IRIS			1.00E-01	ROUTE			1.00E-01	PEA	1.63E-02	calc from SSG K_{ow}
Di-n-octylphthalate			4.00E-02	PPRTV			4.00E-02	ROUTE			1.00E-01	PEA	1.63E-04	calc from SSG K_{ow}
Endosulfan			6.00E-03	IRIS			6.00E-03	ROUTE			5.00E-02	PEA	3.22E-02	calc from SSG K_{ow}
Endosulfan sulfate[e]			6.00E-03	IRIS			6.00E-03	ROUTE			5.00E-02	PEA	5.80E-02	calc from Water9 K_{ow}
Endrin			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	8.95E-03	OU A RICS= blank
Endrin aldehyde[f]			3.00E-04	IRIS			3.00E-04	ROUTE			5.00E-02	PEA	8.95E-03	OU A RICS= blank
Fluoranthene			4.00E-02	IRIS			4.00E-02	ROUTE			1.50E-01	PEA	1.04E-02	OU A RICS
Fluorene			4.00E-02	IRIS			4.00E-02	ROUTE	3.60E+05	Region 9	1.50E-01	PEA	2.82E-02	OU A RICS
Gamma BHC (lindane)	1.10E+00	Cal/EPA	3.00E-04	IRIS	1.10E+00	Cal/EPA	3.00E-04	ROUTE			5.00E-02	PEA	5.29E-02	calc from SSG K_{ow}
Heptachlor	4.50E+00	IRIS	5.00E-04	IRIS	4.55E+00	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	1.80E-03	calc from SSG K_{ow}
Heptachlor epoxide	9.10E+00	IRIS	1.30E-05	IRIS	9.10E+00	IRIS	1.30E-05	ROUTE			5.00E-02	PEA	9.69E-03	calc from SSG K_{ow}
Hexachlorobutadiene	7.80E-02	IRIS	1.00E-03	PPRTV	7.70E-02	IRIS	1.00E-03	ROUTE			1.00E-01	PEA	1.25E-02	calc from SSG K_{ow}
Hexachloroethane	1.40E-02	IRIS	1.00E-03	IRIS	1.40E-02	IRIS	1.00E-03	ROUTE			1.00E-01	PEA	3.69E-02	calc from SSG K_{ow}
Indeno(1,2,3-c,d)pyrene[c]	1.20E+00	Cal/EPA	3.00E-02	IRIS	3.90E-01	Cal/EPA	3.00E-02	ROUTE			1.50E-01	PEA	1.18E-03	OU A RICS
Isophorone	9.50E-04	IRIS	2.00E-01	IRIS	9.50E-04	ROUTE	5.71E-01	Cal/EPA			1.00E-01	PEA	7.95E-01	calc from SSG K_{ow}
Isopropylbenzene (cumene)			1.00E-01	IRIS			1.14E-01	IRIS	3.59E+03	Region 9	1.00E-01	PEA	5.80E-02	calc from RAIS K_{ow}
MCPA[m]			5.00E-04	IRIS			5.00E-04	ROUTE						
Methanol			5.00E-01	IRIS			1.14E+00	Cal/EPA			1.00E-02	RAIS	2.15E+01	calc from RAIS and HSDB K_{ow}
Methoxychlor			5.00E-03	IRIS			5.00E-03	ROUTE			1.00E-01	PEA	1.49E-02	OU A RICS
Naphthalene			2.00E-02	IRIS	1.20E-01	Cal/EPA	8.57E-04	IRIS	4.30E+04	Region 9	1.50E-01	PEA	9.39E-02	OU A RICS
n-Nitrosodi-n-propylamine	7.00E+00	IRIS			7.00E+00	Cal/EPA					1.00E-01	PEA	1.19E+00	calc from SSG K_{ow}
n-Nitrosodiphenylamine	4.90E-03	IRIS	2.00E-02	PPRTV	9.00E-03	Cal/EPA	2.00E-02	ROUTE			1.00E-01	PEA	1.13E-01	OU A RICS = blank
p,p'-DDD[g]	2.40E-01	IRIS	5.00E-04	IRIS	2.40E-01	Cal/EPA	5.00E-04	ROUTE			5.00E-02	PEA	3.33E-03	OU A RICS
p,p'-DDE[g]	3.40E-01	IRIS	5.00E-04	IRIS	3.40E-01	Cal/EPA	5.00E-04	ROUTE			5.00E-02	PEA	9.24E-04	calc from SSG K_{ow}
p,p'-DDT	3.40E-01	IRIS	5.00E-04	IRIS	3.40E-01	IRIS	5.00E-04	ROUTE			5.00E-02	PEA	1.26E-03	calc from SSG K_{ow}
PCB-1016 (Arochlor 1016)	7.00E-02	IRIS	7.00E-05	IRIS	7.00E-02	IRIS	7.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1221 (Arochlor 1221)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1232 (Arochlor 1232)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1248 (Arochlor 1248)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1254 (Arochlor 1254)	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCB-1260 (Arochlor 1260)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
PCC-1242 (Arochlor 1242)[h]	2.00E+00	IRIS	2.00E-05	IRIS	2.00E+00	IRIS	2.00E-05	ROUTE			1.50E-01	PEA	2.41E-03	OU A RICS
p-Cymene (p-isopropyltoluene)											1.00E-01	PEA		
Pentachlorophenol	1.20E-01	IRIS	3.00E-02	IRIS	1.80E-02	Cal/EPA	3.00E-02	ROUTE			2.50E-01	PEA	8.26E-03	calc from HSDB K_{ow}
Phenanthrene[c]			3.00E-01	IRIS			3.00E-01	ROUTE			1.50E-01	PEA	1.72E-02	OU A RICS
Phenol			3.00E-01	IRIS			5.71E-02	Cal/EPA			1.00E-01	PEA	1.07E+00	calc from SSG K_{ow}
Pyrene			3.00E-02	IRIS			3.00E-02	ROUTE	3.80E+06	Region 9	1.50E-01	PEA	1.14E-02	OU A RICS
sec-Butylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	8.31E+03	Region 9	1.00E-01	PEA		
1,1,1-Trichloroethane			2.00E+00	IRIS			1.43E+00	IRIS	2.21E+03	Region 9	1.00E-01	PEA		
1,1,2,2-Tetrachloroethane	2.00E-01	IRIS	4.00E-03	PPRTV	2.03E-01	IRIS	4.00E-03	ROUTE	1.41E+04	Region 9	1.00E-01	PEA		
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon® 113)			3.00E+01	IRIS			8.57E+00	HEAST	1.57E+03	Region 9	1.00E-01	PEA		
1,1,2-Trichloroethane	5.70E-02	IRIS	4.00E-03	IRIS	5.60E-02	IRIS	4.00E-03	ROUTE	6.49E+03	Region 9	1.00E-01	PEA		
1,1-Dichloroethane	5.70E-03	Cal/EPA	2.00E-01	PPRTV	5.70E-03	Cal/EPA			2.42E+03	Region 9	1.00E-01	PEA		
1,1-Dichloroethene			5.00E-02	IRIS			5.70E-02	IRIS	1.43E+03	Region 9	1.00E-01	PEA		
1,2,4-Trichlorobenzene	3.60E-03	Cal/EPA	1.00E-02	IRIS			1.14E-03	PPRTV	4.32E+04	Region 9	1.00E-01	PEA	3.64E-02	calc from SSG K_{ow}
1,2,4-Trimethylbenzene							2.00E-03	PPRTV	1.97E+04	Region 9	1.00E-01	PEA		
1,2-Dibromo-3-chloropropane	8.00E-01	PPRTV	2.00E-04	PPRTV	2.10E+01	PPRTV	5.71E-05	IRIS	4.60E+04	Region 9	1.00E-01	PEA		
1,2-Dibromoethane (ethylene dibromide)	2.00E+00	IRIS	9.00E-03	IRIS	2.10E+00	IRIS	2.57E-03	IRIS	1.10E+04	Region 9	1.00E-01	PEA		
1,2-Dichloro-1,1,2,2-tetrafluoroethane (Freon® 114)			3.00E+01	IRIS			8.57E+00	HEAST	1.60E+03	Region 9 - Freon 113 = surrogate	1.00E-01	PEA		
1,2-Dichloroethane	9.10E-02	IRIS	2.00E-02	PPRTV	9.10E-02	IRIS	1.14E-01	Cal/EPA	3.91E+03	Region 9	1.00E-01	PEA		
1,2-Dichloropropane	3.60E-02	Cal/EPA	1.14E-03	ROUTE	3.60E-02	Cal/EPA	1.14E-03	IRIS	3.59E+03	Region 9	1.00E-01	PEA		
1,3,5-Trimethylbenzene			5.00E-02	PPRTV			1.70E-03	PPRTV	8.04E+03	Region 9	1.00E-01	PEA		
1,3-Butadiene	3.40E+00	Cal/EPA	5.70E-04	ROUTE	1.10E-01	IRIS	5.70E-04	IRIS	9.60E+02	Region 9	1.00E-01	PEA		
2,2,4-Trimethylpentane											1.00E-01	PEA		
2,3,4-Trimethylpentane											1.00E-01	PEA		
2,4-Dimethyl Pentane											1.00E-01	PEA		
2-Chlorotoluene			2.00E-02	IRIS			2.00E-02	ROUTE	5.63E+03	Region 9	1.00E-01	PEA		
Acetone			9.00E-01	IRIS			9.00E-01	ROUTE	1.26E+04	Region 9	1.00E-01	PEA		
Benzene	5.50E-02	IRIS	4.00E-03	IRIS	2.73E-02	IRIS	8.60E-03	IRIS	2.73E+03	Region 9	1.00E-01	PEA		
Benzyl chloride	1.70E-01	IRIS	2.00E-03	PPRTV	1.70E-01	Cal/EPA	2.86E-04	PPRTV	2.95E+04	Region 9	1.00E-01	PEA		
Bromodichloromethane	6.20E-02	IRIS	2.00E-02	IRIS	1.30E-01	Cal/EPA	2.00E-02	ROUTE	8.26E+03	Region 9	1.00E-01	PEA		

TABLE B2-1

Toxicity Values,Volatilization Factors, Absorption Factors, and K_{ps} Values Used to Calculate Screening Levels and in HHRAs

Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Chemical	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Oral Slope Factor	Oral Reference Dose (mg/kg-d)	Reference for Oral Reference Dose	Inhalation Slope Factor $(mg/kg\text{-}d)^{-1}$	Reference for Inhalation Slope Factor	Inhalation Reference Dose (mg/kg-d)	Reference for Inhalation Reference Dose	Volatilization Factor (m^3/kg)	Reference for Volatilization Factor	Dermal Absorption Factor	Reference for Dermal Absorption Factor	K_{ps}	Reference for K_{ps}
Bromomethane			1.40E-03	IRIS			1.43E-03	IRIS	1.81E+03	Region 9	1.00E-01	PEA		
Carbon tetrachloride	1.30E-01	IRIS	7.00E-04	IRIS	5.25E-02	IRIS	1.14E-02	Cal/EPA	2.07E+03	Region 9	1.00E-01	PEA		
Chlorobenzene			2.00E-02	IRIS			1.43E-02	PPRTV	6.27E+03	Region 9	1.00E-01	PEA		
Chlorodifluoromethane			1.40E+01	ROUTE			1.40E+01	IRIS	1.06E+03	Region 9	1.00E-01	PEA		
Chloroethane	2.90E-03	NCEA	4.00E-01	NCEA	2.90E-03	ROUTE	2.86E+00	IRIS	1.32E+03	Region 9	1.00E-01	PEA		
Chloroform	3.10E-02	Cal/EPA	1.00E-02	IRIS	8.10E-02	IRIS	8.57E-02	Cal/EPA	2.66E+03	Region 9	1.00E-01	PEA		
Chloromethane	1.30E-02	HEAST	2.60E-02	ROUTE	6.30E-03	HEAST	2.60E-02	IRIS	1.18E+03	Region 9	1.00E-01	PEA		
cis-1,2-Dichloroethylene			1.00E-02	PPRTV			1.00E-02	ROUTE	2.90E+03	Region 9	1.00E-01	PEA		
cis-1,3-Dichloropropene	1.00E-01	IRIS	3.00E-02	IRIS	1.40E-02	IRIS	5.71E-03	IRIS	1.84E+03	Region 9	1.00E-01	PEA		
Cyclohexane			1.70E+00	ROUTE			1.70E+00	IRIS	1.10E+03	Region 9	1.00E-01	PEA		
Dichlorodifluoromethane			2.00E-01	IRIS			5.71E-02	HEAST	1.06E+03	Region 9	1.00E-01	PEA		
Ethylbenzene	1.10E-02	Cal/EPA	1.00E-01	IRIS	8.70E-03	Cal/EPA	2.86E-01	IRIS	5.40E+03	Region 9	1.00E-01	PEA		
Heptane[j]							2.00E-01	IRIS	1.40E+03	Region 9	1.00E-01	PEA		
Hexane			6.00E-02	HEAST			2.00E-01	IRIS	1.40E+03	Region 9	1.00E-01	PEA		
Methyl ethyl ketone (2-butanone)			6.00E-01	IRIS			1.43E+00	IRIS	1.90E+04	Region 9	1.00E-01	PEA		
Methyl isobutyl ketone (4-methyl-2-pentanone)			8.00E-02	HEAST			8.57E-01	IRIS	2.50E+04	Region 9	1.00E-01	PEA		
Methyl tert-butyl ether	1.80E-03	Cal/EPA	8.57E-01	ROUTE	9.10E-04	Cal/EPA	8.57E-01	IRIS	4.69E+03	Region 9	1.00E-01	PEA		
Methylcyclohexane			8.60E-01	ROUTE			8.57E-01	HEAST	2.01E+03	Region 9	1.00E-01	PEA		
Methylene chloride	7.50E-03	IRIS	6.00E-02	IRIS	1.65E-03	IRIS	1.14E-01	Cal/EPA	2.49E+03	Region 9	1.00E-01	PEA		
n-Butylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	1.10E+04	Region 9	1.00E-01	PEA		
n-Propylbenzene			4.00E-02	NCEA			4.00E-02	ROUTE	1.10E+04	Region 9	1.00E-01	PEA		
o-xylene (1,2-dimethyl benzene)			2.00E-01	IRIS			2.86E-02	IRIS			1.00E-01	PEA		
Propylene							8.57E-01	Cal/EPA			1.00E-01	PEA		
Styrene			2.00E-01	IRIS			2.86E-01	IRIS	1.34E+04	Region 9	1.00E-01	PEA		
Tetrachloroethylene (PCE)	5.40E-01	Cal/EPA	1.00E-02	IRIS	2.10E-02	Cal/EPA	1.00E-02	Cal/EPA	2.55E+03	Region 9	1.00E-01	PEA		
Toluene			8.00E-02	IRIS			1.43E+00	IRIS	3.98E+03	Region 9	1.00E-01	PEA		
trans-1,2-Dichloroethene			2.00E-02	IRIS			1.71E-02	PPRTV	2.32E+03	Region 9	1.00E-01	PEA		
trans-1,3-Dichloropropene	1.00E-01	IRIS	3.00E-02	IRIS	1.40E-02	IRIS	5.71E-03	IRIS	1.84E+03	Region 9	1.00E-01	PEA		
Trichloroethylene (TCE)	1.30E-02	Cal/EPA	3.00E-04	NCEA	7.00E-03	Cal/EPA	1.71E-01	Cal/EPA	3.26E+03	Region 9	1.00E-01	PEA		
Trichlorofluoromethane			3.00E-01	IRIS			2.00E-01	HEAST	1.25E+03	Region 9	1.00E-01	PEA		
Vinyl chloride	1.50E+00	IRIS	3.00E-03	IRIS	3.10E-02	IRIS	2.86E-02	IRIS	1.04E+03	Region 9	1.00E-01	PEA		
Xylenes (o-xylene, m,p-xylene, total xylenes)			2.00E-01	IRIS			2.86E-02	IRIS	6.10E+03	Region 9	1.00E-01	PEA		

[a] Carcinogenic toxicity factors for dinitrotoluene mixture were applied to 2,6-dinitrotoluene.
[b] Toxicity factors for naphthalene were applied to 2-methylnaphthalene for the inhalation reference dose.
[c] Noncarcinogenic toxicity factors for pyrene were applied for PAHs and phenanthrene.
[d] Toxicity factors for gamma-BHC were applied for delta-BHC.
[e] Toxicity factors for Endosulfan were applied to Endosulfan sulfate.
[f] Toxicity factors for Endrin were applied to Endrin aldehyde.
[g] Noncarcinogenic toxicity factors for p,p'-DDT were applied for p,p'-DDD and p,p'-DDE.
[h] Toxicity factors for PCB-1254 were applied to PCB-1221, PCB-1232, PCB-1242, PCB-1248, and PCB-1260.
[i] Toxicity factors for Freon® 113 were applied to Freon® 114.
[j] Toxicity factors for hexane were applied to heptane.
[k] Screening levels for lead and assessment of lead risk are based on lead concentrations estimated to contribute to a total target blood lead concentration of 10 µg lead per deciliter blood (10 µg/dl).
[l] 4-(2,4 dichlorophenoxy)butyric acid
[m] 2-methyl-chlorophenoxy acetic acid

Notes:
The EPA hierarchy of toxicity criteria was used for development of the preliminary cleanup goals (PCGs).

References:
Cal/EPA = California Environmental Protection Agency (Slope factors from: Office of Environmental Health Hazard Assessment (OEHHA) Cancer Potency List, 2008; Inhalation reference dose calculated from: All Chronic Reference Exposure Levels Adopted by OEHHA as of February 2005)
HEAST = Health Effects Assessment Summary Tables (from Region 9 PRG, October 2004)
HSDB = Hazardous Substances Data Bank, 2004
IRIS = Integrated Risk Information System (IRIS) 2008
NCEA = National Center for Environmental Assessment (from Region 9 PRG, October 2004)
OU A RICS = McClellan AFB Interim Basewide RI Addendum, Jacobs, March 2002
PEA = Preliminary Endangerment Assessment Guidance Manual, 1994
PPRTV = Provisional peer-reviewed toxicity value
RAIS = Risk Assessment Information System, Oak Ridge National Laboratory, 2007
Region 9 = Region 9 PRG Table, EPA, 2004
ROUTE = Route extrapolated
SSG = Soil Screening Guidance: User's Guide, EPA, 1996b

TABLE B2-2
Exposure Parameters Used to Calculate Screening Levels for Unrestricted Use
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Parameters (Units)	Abbreviation	Values Used for Calculated Screening Levels
Target cancer risk	TR	1.00E-06
Target HQ	THQ	1
Body weight, adult (kg)	BW_a	70
Body weight, age 1 to 6 (kg)	BW_c	15
Default skin surface area for soil contact, adult (cm^2/d)	SA_a	5,700
Default skin surface area for soil contact, child (cm^2/d)	SA_c	2,900
Default adherence factor (soil adhered to exposed skin), adult (mg/cm^2)	AF_a	0.07
Default adherence factor (soil adhered to exposed skin), child (mg/cm^2)	AF_c	0.2
Averaging time (years of life), carcinogenic	AT_c	70
Averaging time (years of life), non-carcinogenic	AT_n	6
Air breathed (m^3/d)	IRA_a IRA_c	20 10
Particulate emission factor* (m^3/kg)	PEF	1.60E+10
Soil ingestion, adult resident (mg/d)	IRS_a	100
Soil ingestion, age 1 to 6 (mg/d)	IRS_c	200
Produce ingestion, adult resident (g/d)	IRP_a	122
Produce ingestion, child resident (g/d)	IRP_c	72
Exposure frequency (d/yr)	EF	350
Exposure duration, age 1 to 6 (yr)	ED_c	6
Exposure duration, adult (yr)	ED_c	24
Age-adjusted factors		
Ingestion factor for soils ([mg × yr] / [kg × d])	IFSadj	114
Skin contact factor for soils ([mg × yr] / [kg × d])	SFSadj	361
Ingestion factor for produce ([g × yr] / kg × d])	IFPadj	71
Inhalation factor ([m^3 × yr] / [kg - d])	InhFadj	11
Plant-soil partition coefficient from soil due to rain splash	K_{ps}^{rain}	0.0034

*This particulate emission factor (PEF) differs from the value used for the Final OU A RICS. A correction was made to the mean wind speed based on site-specific data for McClellan for this PEF value.

TABLE B2-3
Exposure Parameters Used to Calculate Screening Levels for Industrial Use
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Exposure Parameters (Units)	Abbreviation	Values Used for Calculated Screening Levels
Target cancer risk	TR	1.00E-06
Target HQ	THQ	1
Body weight, adult (kg)	BW_a	70
Default skin surface area for soil contact, adult (cm^2/d)	SA_a	5,700
Default Adherence factor (soil adhered to exposed skin), adult (mg/cm^2)	AF_a	0.2
Averaging time (years of life), carcinogenic	AT_c	70
Averaging time (years of exposure), non-carcinogenic	ATn	25
Air breathed (m^3/d)	IRA_a	20
Particulate emission factor* (m^3/kg)	PEF	1.60E+10
Soil ingestion, adult worker (mg/d)	IRS_a	100
Exposure frequency (d/yr)	EF	250
Exposure duration, adult (yr)	ED_c	25

*This particulate emission factor (PEF) differs from the value used for the Final OU A RICS. A correction was made to the mean wind speed based on site-specific data for McClellan for this PEF value.

TABLE B2-4
Summary of Parameters Used to Derive Particulate Emission Factor
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Symbol	Definition (units)	Site Specific*
PEF	Particulate emission factor (m^3/kg)	1.60×10^{10}
Q/C	Inverse of the mean concentration at the center of a 0.5-acre-square source (g/m^2 - s per kg/m^3)	62.0
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual wind speed (m/s)	3.7
U_t	Equivalent threshold value of wind speed at 7 m (m/s)	11.32
F(x)	Function dependent on Um/Ut derived using EPA, 1985 (unitless)	2.22×10^{-2}

* Based on climate and dispersion data for Fresno, California, and mean wind speed for McClellan.

Note:

The PEF considers only windborne dust emissions and does not consider dust emissions from traffic or other forms of mechanical disturbance.

Appendix C
Applicable or Relevant and Appropriate Requirements

TABLE C-1
Chemical-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Hazardous Waste Determination	22 California CCR 66261.3 (a)(2)(C) and (F)	Applicable to RCRA or California hazardous waste	Provides specifications for determining whether a waste is a hazardous waste.	
California HWCL Hazardous Waste Determination	22 CCR 66261.21, 66261.22(a)(1), 66261.22(a)(2), 66261.23, and 66261.24(a)(1) or Article 4, Chapter 11	Applicable to RCRA or California hazardous waste	Specifies that a solid waste is considered a hazardous waste if it exhibits any of the characteristics of ignitability, corrosivity, reactivity, or toxicity, if it is listed as a hazardous waste.	TCLP limits will be used to determine whether excavated soil is hazardous.
California Hazardous Waste Determination	22 CCR 66261.24(a)(2)	Applicable to California hazardous waste	Specifies that wastes can be classified as non-RCRA, State-only hazardous wastes if they exceed the STLC or TTLC values. California hazardous wastes previously released into the environment are considered hazardous substances under California law. New California hazardous wastes generated in the course of the response action must be properly managed as hazardous wastes, including manifesting, storage, treatment, and/or disposal.	STLC and TTLC limits will be used to determine whether excavated soil is hazardous.
RCRA Hazardous Waste Determination	22 CCR 66261.100 and 66261.101 (a)(1) and (a)(2)	Applicable to RCRA hazardous waste	Provides specifications for determining whether a waste is a RCRA hazardous or RCRA non-hazardous waste.	
California Land Disposal Restrictions	22 CCR 66268.40	Applicable to RCRA or California hazardous waste	Establishes treatment standards for hazardous wastes prior to placement in a landfill.	

TABLE C-1
Chemical-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
California Land Disposal Restrictions (continued)	22 CCR 66268.48	Applicable to RCRA or California hazardous waste	Establishes numeric universal treatment standards by chemical constituent that may not be exceeded under the land disposal restrictions. Following excavation, contaminated soil determined to be hazardous waste in accordance with state and federal regulations may be subject to LDRs if placed on land in a waste management unit (other than a CAMU) outside of the Area of Contamination from which the waste was generated. Toxicity characteristic waste needs to be treated so that it (1) no longer exhibits the characteristic of toxicity, and (2) is treated to 10 × UTS or achieves 90 percent reduction, whichever is higher.	
California Toxics Rule	40 CFR Part 131	Relevant and appropriate	Establishes surface water quality.	
Minimum Standards for Health and Ecological Risk Assessments	Health and Safety Code Section 25356.1.5(b)	Not an ARAR. See comments .	Risk assessments for remedy selection must not only meet NCP requirements, but also must include the most current sound scientific methods, knowledge, and practices of public health and environmental professionals.	The EPA and the Air Force position is this is not an ARAR. The State position is this is an applicable requirement.

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Chemical-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
State Water Resources Control Board Resolution 92-49	State Water Resources Control Board Resolution 92-49	Section III.G is relevant and appropriate. See comments.	Section III.G of this Resolution states in part that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of background water quality or the best water quality that is reasonable if background levels cannot be restored.	The Air Force, U.S. EPA, and State disagree on the ARAR status of Resolution 92-49. EPA's position is that Resolution 92-49 Section III.G. is relevant and appropriate. The State's position is that Resolution 92-49 Section III.G is applicable. While the Air Force's position is that Resolution 92-49 Section III.G is not an ARAR, inasmuch as the identification of this Resolution as an ARAR will not impact FSS remedy designs and construction, and compliance with other more specific ARARs identified in these tables will achieve substantive compliance with this Resolution, this Resolution is identified by the Air Force as relevant and appropriate. The Air Force's acquiescence in this ROD to the identification of this Resolution as relevant and appropriate is without prejudice to its right to contest it subsequently in other McClellan actions and elsewhere in California. The Parties expressly reserve their respective positions, but expect that the selected remedial actions and compliance with other identified chemical- and action-specific ARARs will achieve substantive compliance with Resolution 92-49 Section III G.

TABLE C-1
Chemical-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Source	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
E.O. D-62-02 by the Governor of the State of California	27 CCR 20260 and 20230	TBC	Restricts the disposal of decommissioned waste in Class III landfills and unclassified waste management units.	As a TBC, the E.O. is not itself an enforceable legal requirement but is a statement of policy that may inform the decision process. Its objectives are to avoid the disposal of low level radiological waste in any setting where there is a potential for migration to ground or surface water. The CU will be consistent with that objective because it is neither a Class III landfill nor an unclassified waste management unit. The remedy for the capped sites is beyond the scope of the E.O.
Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination	EPA OSWER Directive 9200.4-18	TBC	Establishes EPA's position that the NRC's Radiological Criteria for License Termination (10 CFR 20, Subpart E) contains dose limits not protective enough for establishing PRGs and recommends that cleanup levels be more stringent than NRC dose limits. Recommends that cleanups should achieve risk levels in the 1×10^{-4} to 1×10^{-6} range, where ARARs are not available or are not sufficiently protective.	
Remediation Goals for Radioactively Contaminated Sites Using the Benchmark Dose Cleanup Criteria in 10 CFR 40 Appendix A, I, Criterion 6(6)	EPA OSWER Directive 9200.4-35P	To be considered	Provides clarification of the relationship between the soil standards under 40 CFR 192 and the radium benchmark approach under 10 CFR 40 Appendix A, I, Criterion 6(6) in setting remediation levels for soil and structures.	

TABLE C-1
Chemical-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Notes:

10 × UTS = 10 times the Universal Treatment Standard
ARAR = applicable or relevant and appropriate requirement
CAMU = corrective action management unit
CCR = California Code of Regulations
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR = Code of Federal Regulations
CU = Consolidation Unit
E.O. = Executive Order
EPA = U.S. Environmental Protection Agency
FSS = Focused Strategic Sites
HWCL = Hazardous Waste Control Law
LDR = land disposal restriction
NCP = National Oil and Hazardous Substances Pollution Contingency Plan
NRC = U.S. Nuclear Regulatory Commission
OSWER = Office of Solid Waste and Emergency Response
PHC = Principal Hazardous Constituent
PRG = preliminary remediation goal
RCRA = Resource Conservation and Recovery Act
STLC = Soluble Threshold Limit Concentration
TBC = to be considered
TCLP = Toxicity Characteristic Leaching Procedure
TTLC = Total Threshold Limit Concentration

TABLE C-2
State and Federal Location-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Location	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Endangered Species	50 CFR 222, 226, 227, and 402 Substantive portions of the Federal and California Endangered Species Act Substantive portions of the Native Plant Protection Act	Applicable	The remedial actions at McClellan may impact endangered or threatened species. All procedures must ensure that substantive regulatory requirements are followed to avoid or mitigate impacts.	Although no endangered/threatened wildlife species are known to occur on any of the Strategic Sites, some endangered /threatened wildlife species associated with vernal pools (e.g., fairy shrimp) are known to be present adjacent to some of the sites.
Wetlands	40 CFR 258.12	Relevant and Appropriate	New landfills or lateral expansions of existing landfills may not be located within wetlands unless it can be demonstrated that landfill construction and operation will not affect water quality, jeopardize endangered or threatened species, impact habitat, or contribute to significant degradation of wetlands.	Wetlands are located at McClellan, and some wetlands may lie near the sites addressed in this document. Endangered flora and wildlife species as well as species of concern have been identified onbase.
	33 CFR 330, Subsection C, Appendix A	Relevant and Appropriate	The following conditions/practices must be followed: any structure or fill shall be maintained, including maintenance to ensure public safety; erosion and siltation controls must be used and maintained during construction, and all fills must be permanently stabilized at the earliest practicable date; heavy equipment working in wetlands must be placed on mats, or other measures must be taken to minimize soil disturbances; no activity conducted under a nationwide permit must jeopardize the continued existence of a threatened or endangered species or a species proposed for designation.	Wetlands are located at McClellan, and some wetlands may lie near the sites addressed in this document. Endangered flora and wildlife species as well as species of concern have been identified onbase. Measures will be taken to minimize soil disturbances in wetland areas.
Remedial Action Sites	Migratory Bird Treaty Act, 50 CFR 10 and 20; California Fish and Game Code Section 3511; Title 14 CCR Section 460	Potentially Relevant and Appropriate	The Migratory Bird Treaty Act and California law and regulation prohibiting the “take” of certain species are of unquantifiable relevance to this action.	Preconstruction surveys will be conducted to determine whether species of concern are present and what actions will need to be taken to reduce the probability of adverse impact on individuals or species.

TABLE C-2
State and Federal Location-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Location	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Fault Zone	22 CCR 66264.18a	Applicable	Specifies that facilities where transfer, treatment, storage, or disposal of hazardous waste will be conducted shall not be located within 61 meters (200 feet) of a fault that has had displacement in Holocene time.	Applicable to CU and relevant and appropriate to sites that may be capped.
Floodplain	22 CCR 66264.18b	Applicable	A facility located in a 100-year floodplain or within the maximum high tide shall be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood or maximum high tide.	Applicable to CU and relevant and appropriate to sites that may be capped.

Notes:

CCR = California Code of Regulations
CFR = Code of Federal Regulations
CU = Consolidation Unit

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Waste Characterization	27 CCR 20200(c)	Applicable	Dischargers shall be responsible for accurate characterization of wastes, including determinations of whether or not wastes will be compatible with containment features and other wastes at a Unit and whether or not wastes are required to be managed as hazardous wastes under Chapter 11 of Division 4.5 of Title 22 of this code.	Applies to wastes that are excavated and disposed of onsite. Pertains to CS 010, CS 022, CS 024, and SAFR.
Hazardous Waste Determination	22 CCR 66262.11	Applicable	Defines the methods to be used to determine whether a waste is a hazardous waste.	
Pre-transportation Handling of Hazardous Waste	22 CCR 66262.30, 66262.31, 66262.32, 66262.33, and 66262.34	Applicable to RCRA or California Hazardous Waste	Defines pre-transport requirements for RCRA hazardous waste, including packaging, labeling, marking, placarding, and accumulation time limitations.	Applicable to RCRA or California hazardous waste that may be shipped offsite for disposal.
Remediation and Monitoring of Sites	27 CCR 20090(d) and 23 CCR 2511(d)	Applicable	Actions taken by or at the direction of public agencies to clean up or abate conditions of pollution or nuisance resulting from unintentional or unauthorized releases of waste or pollutants to the environment—provided that wastes, pollutants, or contaminated materials removed from the immediate place of release shall be discharged according to the SWRCB-promulgated sections of Article 2, Subchapter 2, Chapter 3, Subdivision 1 of this division (Section 20200 et seq.), and further provided that remedial actions intended to contain such wastes at the place of release shall implement applicable SWRCB-promulgated provisions of this division to the extent feasible.	Applicable to all the sites in this ROD.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Use and Management of Containers	22 CCR 66264.171, 66264.172, 66264.173, 66264,174, 66264.175(a) and (b), 66264.177, and 66264.178	Applicable	These regulations define the requirements for using and managing containers, including compatibility between wastes and containers, storage of containers, inspections for leakage/deterioration, containment of container transfer/storage areas, incompatible wastes, and containment system closure.	Applicable to sites requiring offsite disposal and for sites where various containers are used to transfer waste to the CU.
Waste Pile Closure	22 CCR 66264.258(a) and (b)	Applicable	Specifies decontamination and closure requirements for waste piles.	Applicable to areas used for the storage, handing, or treatment of stockpiled wastes generated during excavation of the disposal pits.
Liquids Management	22 CCR 66264.314	Applicable	Contains restrictions/prohibitions on the placement of bulk and containerized liquids into landfills.	
Container Disposal	22 CCR 66264.315	Applicable	Contains requirements for the disposal of containers in landfills.	
Temporary Unit Management	22 CCR 66264.553(b), (d), (e), and (f)	Applicable	Provides requirements for temporary tanks and container storage areas used for treatment or storage of hazardous remediation wastes during corrective action activities.	Applicable to temporary tanks and/or containers used during the treatment or storage of wastes removed from the disposal pits.
Landfill Design and Operation	27 CCR 20080	Applicable	Establishes a waste classification system and minimum waste management standards for discharges of waste to land for treatment, storage, and disposal.	Applies to wastes that are excavated and disposed of in the CU.
	27 CCR 20210	Applicable	Specifies that designated waste must be disposed of at a Class I or Class II landfill.	Applicable to designated waste material disposed of offsite or within the CU. The CU will be designed to meet RCRA subtitle C standards (Class I) as the most robust of designs. The combination of the robust design and treatment (as required) will meet the CAMU requirements and will result in a more protective overall remedy.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Landfill Design and Operation (continued)	23 CCR 2521	Applicable	Specifies that hazardous wastes shall be discharged only to Class I waste management units.	Applicable to hazardous wastes disposed of offsite or within the CU.
	27 CCR 20220	Applicable	Requires that nonhazardous solid waste be discharged to a classified waste management unit.	Nonhazardous wastes generated as part of the remedial action will need to be discharged to a classified unit (e.g., the CU or appropriate offsite landfill).
	27 CCR 21760 (b)	Applicable	Requires development of an operation plan for landfill activities.	Applicable to the CU.
	22 CCR 66264.51 and 66264.52	Applicable	These regulations require the development and implementation of a contingency plan to minimize hazards associated with accidents or unplanned releases and specify the required content of the plan.	Applicable to the CU.
	22 CCR 66264.14	Applicable	Contains standards for facility security.	Applicable to the CU and sites that may be capped.
	22 CCR 66264.19 and 66264.25 27 CCR 20260 (all)	Applicable	These regulations specify the general facility standards for landfills, including construction quality assurance program requirements, siting, and seismic and precipitation design standards.	Applicable to the CU and sites that may be capped.
	27 CCR 20310 (e)	Applicable[a]	Containment structures shall be designed by, and construction shall be supervised and certified by, a registered civil engineer or a certified engineering geologist. Units shall receive a final inspection and approval of the construction by Central Valley Water Board or SWRCB staff before use of the Unit commences.	Applicable to the CU. See footnote for clarification of the applicable portions.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Landfill Design and Operation (continued)	27 CCR 20320(a),(b), and (c)	Applicable	(a) Class II waste management units (Class II "Units") shall be designed and constructed to prevent migration of wastes from the Units to adjacent geologic materials, groundwater, or surface water during disposal operations, closure, and the post-closure maintenance period. Class II and Class III MSW landfills are also subject to any applicable waste containment system design requirements of SWRCB Resolution No. 93-62 to the extent that such requirements are more stringent than those applicable to a non-MSW Class II or Class III landfill under this subdivision. (b) Each Class II Unit shall be designed and constructed for the containment of the specific wastes that will be discharged. (c) Class III landfills shall have containment structures that are capable of preventing degradation of waters of the state as a result of waste discharges to the landfills if site characteristics are inadequate.	Applicable to the CU.
	22 CCR 66264.301	Applicable	Provides design and operation requirements for landfills, including liner and leachate collection specifications.	Applicable to the CU. Some requirements under the CAMU regulations in 22 CCR 66264.550 through 66264.553 are less stringent. However, the Air Force plans to design and construct the CU to meet RCRA subtitle C liner and leachate collection requirements in 40 CFR 264.301(c) and (d).
	27 CCR 20540, 20630, 20640, 20650, 20660, and 20730	Applicable	These regulations contain requirements for landfill operations, including the protection of roads, confined unloading specifications, spreading and compacting, grading of fill surfaces, stockpiling, and volume reduction and energy recovery.	Applicable to the CU during the active consolidation period.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Landfill Design and Operation (continued)	27 CCR 20700 and 20705	Applicable	These regulations contain specifications for intermediate cover and interim cover.	Applicable to the CU during the active consolidation period.
	27 CCR 21145	Applicable	Requires that the integrity of final slopes must be ensured.	Applicable to the CU and sites that may be capped.
Landfill Gas Control	27 CCR 20921, 20923, 20925, 20931, 20932, 20933, and 20937	Applicable	The regulations require landfill gas monitoring and control (including structures) and specify the requirements for the monitoring network, monitored parameters, and monitoring frequency. They also address reporting requirements and control of excessive gas concentrations.	Applicable to the CU and sites that may be capped.
Groundwater Monitoring	27 CCR 20390 and 20395 23 CCR 2550.2 and 2550.3	Applicable	Specifies water quality protection standards; requires the identification of contaminants of concern and the establishment of concentration limits.	Applicable to the CU and sites that will be capped (CS 011 through CS 014, CS 022, FTA, PRL 008, and VZ).
	27 CCR 20430 23 CCR 2550.10	Applicable	Requires the establishment of a corrective action program to address potential releases that impact groundwater.	Applicable to the CU and sites that will be capped (CS 011 through CS 014, CS 022, FTA, PRL 008, and VZ).
	22 CCR 66264.90, 66264.91, 66264.97, 66264.98, and 66264.99 23 CCR 2550.4 27 CCR 20400	Applicable	These regulations specify requirements for groundwater monitoring at landfills, including concentration limit establishment, monitoring systems, point of compliance, detection monitoring, and evaluation monitoring.	This ARAR is limited to the substantive provisions only. Applicable to the CU and sites that will be capped (CS 011 through CS 014, CS 022, FTA, PRL 008, and VZ).

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Landfill Closure	22 CCR 66264.112, 66264.117, 66264.118, 66264.119 (b), 66264.143, 66264.145, and 66264.310 27 CCR 20950(a), 27 CCR 21090(a)(3)(A), (b)(1)(A), (b)(1)(C), (b)(1)(E)[b],(b)(2), (c), (e), 21137, 21142, 21190, and 21769 (c)	Applicable	Specifies closure and post-closure care requirements, including closure and post-closure plan preparation, final cover and grades, cover integrity, precipitation and drainage control, security, structure removal, land use restrictions, adding notices/ restrictions to the deed, funding, and minimum time periods for monitoring and maintenance.	Applicable to the CU and sites that will be capped. Below grade caps will be constructed where practical (CS 022 in particular) to eliminate surface exposures, minimize surface mounding, and maximize the land reuse options. Slope and drainage standards will be met by additional lowering of the grade of the perimeter of the cap, with integrated drain piping and sump pumps (as required) to collect and divert surface water. Regarding Section 21190, note that for sites in this project, the 1,000-foot buffer space has been reduced to approximately 300 feet because of site conditions that do not generate methane gas and SVE systems that are extracting soil gas. During the landfill investigations in the mid 1990s shallow soil gas wells were installed to monitor landfill gas that had been detected in RI borings. PZ 299 through PZ 331 were installed in the area of sites PRL 008, CS 007, and CS 010 to CS 014. These wells had little to no methane at the last samplings in 1997 and 1998. Substantive compliance and protectiveness will be achieved by the boundary being 300 instead of 1,000 feet, considering that the SVE system will be removed and re-engineered after the cap is installed and that VOCs, rather than methane gas, are expected to be present in these landfills. Substantive compliance would also be achieved in any future onsite construction that does not meet the specified conditions required in this section by using an equivalent design that will prevent gas migration into the building.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Landfill Closure (continued)	27 CCR 21160	Applicable	Requires landfill gas and leachate control to be implemented and maintained during the closure and post-closure period. Leachate must be collected and controlled in a manner that prevents public contact.	Applicable to the CU.
	40 CFR 258.60(I)	Applicable	Following closure, a notification must be added to the deed or equivalent instrument to notify a purchaser that the property was used as a landfill.	Applicable to the CU and relevant and appropriate to sites that may be capped. Notification of the cap will be added to the transfer records.
Control of Air Emissions	Rule 403, Fugitive Dusts	Applicable	Limits visible particulate emissions to the property line.	Applicable to remedial actions that may result in the production of fugitive dust.
Corrective Action for Waste Management Units – Applicability of CAMU Regulations	22 CCR 66264.550	Applicable	Establishes applicability for various sections of the CAMU regulations. RCRA hazardous waste and combinations of RCRA and non-RCRA hazardous waste managed in the same unit are subject to 66264.552. CAMUs for non-RCRA hazardous waste only are subject to 66264.552.5. CAMUs approved prior to April 22, 2002, or for which applications were submitted to DTSC prior to November 20, 2000, are subject to requirements for grandfathered CAMUs in 66264.551.	These requirements will apply since a CU (CAMU) is being constructed at CS 010 for disposal of soil associated with CS 010, CS 022, CS 024, and SAFR.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Corrective Action for Waste Management Units for RCRA Hazardous Waste	22 CCR 66264.552	Applicable	Establishes criteria for determining whether waste is CAMU-eligible, criteria for the DTSC to designate a CAMU, minimum treatment requirements, adjusted standards (alternate treatment requirements), minimum design requirements, alternate design requirements, groundwater monitoring, closure and post-closure requirements. Defines CAMU-eligible waste as all solid and RCRA hazardous wastes and all media (including groundwater, surface water, soils, and sediments) and debris that are managed for implementing cleanup.	Waste that exceeds PHC levels will be treated prior to placement in the CU. Identified PHCs will be treated to 10 × UTS or to a 90 percent reduction, whichever is higher. If treatment standards cannot be achieved, the Air Force and the regulators will determine either that an adjustment criteria described in Table 61 is appropriate or that the material will be disposed of at an appropriate offsite facility. If any other contaminants are encountered at concentrations that could represent PHCs, the Air Force and the regulators will establish acceptance criteria and treat such material in a similar manner.
Corrective Action for Waste Management Units for Non-RCRA Hazardous Waste	22 CCR 66264.552.5	Applicable	Establishes criteria for designating a CAMU for non-RCRA hazardous waste.	Applicable to the CU if it is used for onsite disposal of non-RCRA hazardous waste.
Corrective Action (Temporary Units)	22 CCR 66264.553	Applicable	For temporary tanks and container storage areas used for treatment or storage of hazardous remediation waste during corrective action activities, it may be determined that a design, operating, or closure standard applicable to such units may be replaced by alternative requirements that are protective of human health or the environment. The temporary unit may be in place for 1 year with the possibility of a 1-year extension.	This provision would allow for temporary treatment or storage of hazardous waste that is excavated, stored, and treated at the former McClellan AFB.
Corrective Action (Staging Piles)	40 CFR 264.554	Applicable	During corrective action, remediation waste can be placed in piles without triggering LDRs or MTRs. Must not operate piles for more than 2 years and must be designated by appropriate agencies.	This provision would allow for temporary storage of remediation wastes characterized as hazardous before and/or after treatment.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Discharges of Stormwater from Industrial Areas	40 CFR Parts 122, 123, 124, NPDES, implemented by California Storm Water Permit for Industrial Activities, SWRCB Order 97-03-DWQ	Relevant and appropriate	Regulates pollutants in discharge of stormwater associated with hazardous waste treatment, storage, and disposal facilities, wastewater treatment plants, landfills, land application sites, and open dumps. Requirements ensure that stormwater discharges do not contribute to a violation of surface water quality standards. Includes measures to minimize and/or eliminate pollutants in stormwater discharges and includes monitoring to demonstrate compliance.	The CERCLA permit exemption applies to all discharges that are related to response actions and that are “onsite,” as that term is defined in the NCP. Remedies should meet the substantive requirements of the NPDES Program.
	40 CFR Parts 122, 123, 124, NPDES, implemented by California Storm Water Permit for Construction Activities, SWRCB Order 92-08-DWQ	Relevant and appropriate	Regulates pollutants in discharge of stormwater associated with construction activity (clearing, grading, or excavation) involving the disturbance of 1 acre or more. Requirements ensure that stormwater discharges do not contribute to a violation of surface water quality standards.	The CERCLA permit exemption applies to all discharges that are related to response actions and that are “onsite,” as that term is defined in the NCP. Remedies should meet the substantive requirements of the NPDES Program.
Land Use Covenant	CA Civil Code Section 1471(a)	Relevant and appropriate	Allows the State (as non-owners) to enter into restrictive land use covenants with landowners and their successors after determining that protection of present or future human health or safety or the environment is necessary. The covenants will run with the land if the affected land is described in the instrument of the covenant, the successive owners are expressly bound in the instrument of the covenant, each act in the covenant relates to use of the land and is reasonably necessary to protect present or future human health or safety or the environment, and the covenant is recorded with the county.	Permits the State to enter into an agreement to restrict land use with the property owner to protect human health or the environment and invalidates common-law impediments to the restriction running with the land.

TABLE C-3
Federal and State Action-specific ARARs
Focused Strategic Sites Record of Decision, Former McClellan Air Force Base, Sacramento, California

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Land Use Covenant (continued)	22 CCR, Section 67391.1	Relevant and appropriate	A land use covenant imposing appropriate limitations on land use shall be executed and recorded when facility closure, corrective action, remedial or removal action, or other response actions are undertaken and hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels that are not suitable for unrestricted use of the land.	The Air Force and EPA are selecting ICs for soil in this ROD. These requirements are ARARs for those ICs. Air Force and EPA agree that the substantive portions of the regulations referenced are ARARs. Air Force and EPA specifically considered Sections (a), (d), and (e) of CCR Title 22 Section 67393.1 to be ARARs for this ROD. DTSC's position is that all of the State regulation is an ARAR.
	California Health and Safety Code, Section 25202.5	Relevant and appropriate	Specifies that the State may enter into an agreement with the owner of a hazardous waste facility that requires the execution and recording of a written instrument that imposes an easement, covenant, restriction, or servitude upon the present and future uses of all or part of the land on which the hazardous waste facility is located and on any adjacent land held by the owners of the land on which the hazardous waste facility is located.	
Radioactive Waste Disposal	10 CFR 20.2002	Relevant and appropriate	Provides a method for obtaining approval of proposed disposal procedures for radioactive waste and the requirements for obtaining approval.	The substantive provisions of this section require that the AF demonstrate that the CU will achieve the dose-based requirements described elsewhere in the NRC regulation. To meet CERCLA's protectiveness requirement, the design construction and operation of the CU will achieve or exceed those requirements. The detailed design and associated O&M plan, which will include provisions for the replacement of the cap as required, are intended to assure that the cap and the other components of the CU remedy will remain effective in perpetuity.

TABLE C-3
Federal and State Action-specific ARARs
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Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
	AFI 40-201	TBC	Provides procedure and requirements for obtaining Air Force Radioisotope Committee approval of the method of disposal of radioactive waste.	Only the substantive portions of this instruction are TBC. Applies to CS 010, CS 022, and CS 024 if radioactive waste is discovered during excavation and consolidation activities.

TABLE C-3
Federal and State Action-specific ARARs
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[a]The Air Force and Central Valley Water Board agree that the following portion of 27 CCR Section 20310(e) is a substantive requirement that is an applicable requirement, namely that "Units shall receive a final inspection." The Air Force and Central Valley Water Board do not agree that the following portion of 27 CCR Section 20310(e), namely, that (1) "Containment structures shall be designed by, and construction shall be supervised and certified by, a registered civil engineer or a certified engineering geologist" and (2) "Units shall receive a final…approval of the construction by RWQCB or SWRCB staff before use of the Unit commences" is an ARAR. Despite a disagreement concerning the applicability of this state law as an ARAR, the Air Force will require, as part of RD/RA, that any containment structure will be designed by, and construction shall be supervised and certified by, a registered civil engineer or a certified engineering geologist. In addition, as part of RD/RA, the Air Force will include consultation with Central Valley Water Board staff as part of final approval of the construction of any containment structure during the CERCLA process.

[b]The Air Force and Central Valley Water Board do not agree that 27 CCR Section 21090(b)(1)(E) is an ARAR. This regulation requires the submittal of a construction-quality assurance plan in compliance with the initial construction of the final cover and any later repair work that involves the cover's low-hydraulic conductivity layer to be carried out in accordance with an approved Construction Quality Assurance Plan. Despite the disagreement, the Air Force agrees to submit a QA/QC Plan that will substantively comply with this requirement as part of its Remedial Action Work Plan during RD/RA.

Notes:

10 × UTS = 10 times the Universal Treatment Standard
AFB = Air Force Base
ARAR = applicable or relevant and appropriate requirement
CAMU = corrective action management unit
CCR = California Code of Regulations
Central Valley Water Board = Central Valley Regional Water Quality Control Board
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR = Code of Federal Regulations
CU = Consolidation Unit
DTSC = Department of Toxic Substances Control
FTA = Fire Training Area
LDR = land disposal restriction
MSW = municipal solid waste
MTR = minimum technical requirement
NCP = National Oil and Hazardous Substances Pollution Contingency Plan
NPDES = National Pollutant Discharge Elimination System
PHC = Principal Hazardous Constituent
QA/QC = quality assurance/quality control
RCRA = Resource Conservation and Recovery Act
RD/RA = remedial design and remedial action
ROD = Record of Decision
RWQCB = Regional Water Quality Control Board
SAFR = Small Arms Firing Range
SVE = soil vapor extraction
SWRCB = State Water Resources Control Board
TBC = to be considered
VZ = Vadose Zone (site)

FINAL PAGE

ADMINISTRATIVE RECORD

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