Draft

Operable Unit Carbon Tetrachloride Plume Groundwater Remedial Investigation/ Feasibility Study Former Fort Ord, California

Volume II: Human Health Risk Assessment

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ACRONYMS AND ABBREVIATIONS

ADD	average daily dose
AE	average exposure
ARAR	acceptable or relevant and appropriate requirement
AT	averaging time
BW	body weight
Cal/EPA	California Protection Agency
CF	conversion factor
COPC	chemical of potential concern
CSEM	conceptual site exposure model
CT	carbon tetrachloride
DAD	dermally absorbed dose
DA_{event}	dermally absorbed dose per event
1,2-DCA	1,2-dichloroethane
DI	daily intake
DTSC	Department of Toxic Substances Control
ECLR	excess lifetime cancer risk
ED	exposure duration
EF	exposure frequency
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ET	exposure time
EV	event frequency
FOD	frequency of detection
GI	gastrointestinal
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
IR_{ing}	ingestion rate
IR_{inh}	inhalation rate
IRIS	Integrated Risk Information System
IUR	inhalation unit risk
LADD	lifetime average daily dose
LOAEL	lowest-observed-adverse-effect level
mg/kg-day	milligrams per kilogram per day
mg/m^3	milligrams per cubic meter
MACTEC	MACTEC Engineering and Consulting, Inc.
MCL	maximum contamination level
MCWD	Marina Coast Water District
MDL	method detection limit
MEK	methyl ethyl ketone
MTBE	methyl tert-butyl ether
NCEA	National Center for Environmental Assessment
NOAEL	no-observed-adverse-effect level
OEHHA	Office of Environmental Health Hazard Assessment
OUCTP	operable unit carbon tetrachloride plume
PCE	tetrachloroethene

PPRTV	provisional peer review toxicity values
PRG	Preliminary Remediation Goal
PVC	polyvinchloride
QC	quality control
R	rejected
REL	reference exposure level
RfC	reference concentration
RfD	reference dose
RI	remedial investigation
RME	reasonable maximum exposure
SA	skin surface area
SAP	Sampling and Analysis Plan
SF	slope factor
TCE	trichloroethene
UCL	upper confidence limit
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
USACE	U.S. Army Corps of Engineers
VC	vinyl chloride
VOC	volatile organic compound

1.0 HUMAN HEALTH RISK ASSESSMENT

This human health risk assessment (HHRA) was conducted to evaluate potential human health risks from exposure to contaminants in the operable unit carbon tetrachloride plume (OUCTP) using groundwater data collected at the site. This HHRA was conducted in accordance with U.S. Environmental Protection Agency (EPA), California Environmental Protection Agency (Cal/EPA)-Department of Toxic Substances Control (DTSC), and U.S. Army Corps of Engineers (USACE) guidance.

2.0 DATA EVALUATION AND CHEMICALS OF POTENTIAL CONCERN

In this section, the HHRA data sets are described, the groundwater data are evaluated to determine their usability in the HHRA, and the chemicals evaluated in the HHRA are selected. The complete list of groundwater samples used in the HHRA is presented in Tables 1 through 4. The sample locations are presented on Plate 3 in Volume I.

2.1 Selection of HHRA Data Sets

A detailed evaluation of the available groundwater data was conducted to identify data applicable to the HHRA. The following criteria were used to select appropriate and representative data for inclusion in the HHRA: (1) sample location, (2) sample date, (3) sample depth, (4) analyte, and (5) data validation and assigned qualifiers. Results of this evaluation are provided in the following text.

1. Sample location. Samples collected from all wells that are monitored within the OUCTP network were included in the HHRA data set, except for Westbay monitoring wells MP-BW-41 and MP-BW-42. Samples from these two wells were not included in the HHRA data set because groundwater from these wells is being captured and treated by the OU 2 treatment system.

2. Sample date. The OUCTP groundwater has been monitored since 1992 (Section 2.8.2 of Volume I). The most recent groundwater data are considered most representative of current and future concentrations. Therefore, this HHRA focused on groundwater monitoring data from the most recent sampling events from August 2003 to September 2004. Typically, five monitoring events have been conducted per well from August 2003 to September 2004. This is consistent with EPA's guidance requiring data from at least two quarters but preferring four quarters of data in order to account for the impact of seasonal variations (*EPA, 1993*).

3. Sample depth. Groundwater data were collected from four different aquifer zones: A-Aquifer, upper 180 foot, lower 180 – 400 foot, and 400 foot (Section 2.8.1 of Volume I). The groundwater data were divided into four data sets, A-Aquifer, upper 180 foot, lower 180 – 400 foot, and 400 foot, and evaluated separately in the HHRA.

   Samples that were collected at different depths within an aquifer from one well during a sampling event were considered one sample. For the multiple depths results, the following criteria were used to select the result to be applied in the HHRA:

- Where all results were reported as non-detect, the most conservative (i.e., highest) reporting limit was used in the HHRA;
- Where all results were reported as detected, the highest of the results was used in the HHRA; and
- Where there were both detected and non-detected results, the highest detected result was used in the HHRA.

4. Analyte. The OUCTP is monitored for volatile organic compounds (VOCs) by EPA test methods 524.2, 8260, and/or 8260B. The chemicals of potential concern (COPCs) selected for quantitative evaluation in this HHRA are discussed in Section 2.2 below.

5. Data validation and assigned qualifiers. Groundwater data collected from the OUCTP are routinely validated in accordance with the 2002 Draft Basewide Sampling and Analysis Plan (*SAP; Harding ESE, 2002*). Data that were used in the HHRA included acceptable validated data without qualifiers or with the following qualifiers:

   - J – The reported concentration of the constituent was below the reporting limit but above the method detection limit (MDL) and the result was qualified as an estimated value;
   - U – The constituent was analyzed but not detected at or above the reporting limit and was qualified as non-detect;
   - UJ – The chemical was analyzed but not detected at or above the reporting limit, and the reporting limit is an estimated quantity; and
   - Data qualified with an R (rejected) were not used in the HHRA. The R qualifier indicates that quality control (QC) criteria were not met and the resulting values are unusable for the associated sample and chemical.

Tables 1 through 4 present the data sets for the aquifer zones evaluated in this HHRA.

2.2 Selection of Chemicals of Potential Concern

COPCs are the chemicals in groundwater that, based on concentration and toxicity, are most likely to contribute significantly to risks calculated for the exposure pathways evaluated in this HHRA (*EPA, 1989*). A screening process was used in this HHRA to select the COPCs that were further evaluated for each data set.

For each data set (or aquifer), a chemical was selected as a COPC if the frequency of detection (FOD) was greater than 2.5% in the HHRA data set (*EPA, 1989*). This criterion was used for COPC selection so that chemicals that have either been routinely detected in each aquifer and/or recently detected within the last year would be evaluated in the HHRA. The COPC screening process based on the FOD criterion is detailed in Table 5.

Although the FOD was greater than 2.5% for acetone, methyl ethyl ketone (MEK), and vinyl chloride (VC) in some data sets, these chemicals were excluded as COPCs from the HHRA evaluation due to suspect results (Table 5). Acetone and MEK have been identified as false positives because they appear to be related to passive diffusion bags and associated hardware (Section 4.2.1 of Volume I). All VC detections within the lower 180 – 400 foot and 400 foot aquifers were associated with samples collected from Westbay monitoring wells. The sampling technique from the Westbay wells leads to biased VC detections because it is believed that the polyvinyl chloride (PVC) material comprising the monitoring well casing is the source of VC (Section 4.2.3 of Volume I). VC has never been detected in the only three non-Westbay monitoring wells screened within the lower 180 – 400 foot aquifer (MCWD Well No. 8a, Mini-Storage, and Airfield). The fact that these non-Westbay monitoring wells are located adjacent to or are surrounded by VC detections derived from Westbay wells strongly suggests that the presence of VC is not formational but rather is an artifact of well construction and sampling technique (Section 4.2.3 of Volume I). For this reason, VC detections within the lower 180-400 foot and 400 foot aquifers are considered to be false positives and not related to OUCTP contamination; therefore, VC is not selected as COPC within these two aquifers.

Based on the COPC screening process described above and shown in Table 5, the following chemicals were selected as COPCs for each data set (or aquifer) and further evaluated in this HHRA:

- A-aquifer COPCs are bromodichloromethane, carbon tetrachloride (CT), chloroform, dibromochloromethane, tetrachloroethene (PCE), and trichloroethene (TCE).
- Upper 180 foot aquifer COPCs are CT, chloroform, and chloromethane.
- Lower 180 – 400 foot aquifer COPCs are 1,2-dichloroethane (1,2-DCA), CT, chloroform, and toluene.

No COPCs were selected for the 400 foot aquifer. Therefore, this aquifer was not quantitatively evaluated in the HHRA.

3.0 EXPOSURE ASSESSMENT

Exposure is defined in the EPA risk assessment guidelines as the contact of a receptor with a chemical or physical agent (*EPA, 1989*). The goal of the exposure assessment is to identify and quantify complete and potentially complete exposure pathways under current and future land use conditions. In this section, the potential receptors and exposure pathways selected for quantitative risk characterization in the HHRA are described. Exposure assumptions (or factors), equations used to estimate dose for the selected receptors, and methods used to derive exposure point concentrations (EPCs) are also described.

3.1 Conceptual Site Exposure Model

A conceptual site exposure model (CSEM) was developed to facilitate the analysis of potentially complete exposure pathways within the OUCTP and surrounding areas. The CSEM schematically represents the relationship between chemical sources and receptors at a site, and identifies potentially complete and significant pathways through which receptors may be exposed to the COPCs. The CSEM is presented in Plate 1.

The EPA (*1989*) describes a complete exposure pathway in terms of four components:

- A source and mechanism of chemical release (e.g., release to the subsurface)
- A retention or transport medium (e.g., groundwater)
- A receptor at a point of potential exposure to a contaminated medium (e.g., resident)
- An exposure route at the exposure point (e.g., ingestion of groundwater).

If any of these four components are not present, then a potential exposure pathway is considered incomplete and is not evaluated further. If all four components are present, a pathway is considered complete. In addition to the distinction between complete and incomplete pathways, complete exposure pathways can be further delineated into those expected to be insignificant and those that may be significant. The two types of potentially complete pathways are discussed below:

- <u>Potentially Complete but Insignificant Exposure Pathways</u>. Exposure pathways in this category meet all four requirements to be considered complete. However, these pathways are not expected to contribute significantly to the overall exposure for a receptor, due to the nature of the particular fate and transport mechanisms that comprise the pathway. For this reason, the potential health impacts associated with these types of pathways are evaluated qualitatively but not usually quantified in risk assessments.

- Potentially Complete and Significant Exposure Pathways. A potentially complete and significant exposure pathway is comprised of fate and transport mechanisms and exposure characteristics that tend to result in more substantial exposures than complete but insignificant pathways. These pathways comprise the majority of exposure, and as such potential health effects associated with these pathways are typically quantified in risk assessments.

The potential receptors and potentially complete exposure pathways for the site are discussed in the sections below.

3.1.1 Potential Receptors

Groundwater within the OUCTP currently is not used domestically by residents within the Fort Ord area. Drinking water in the Fort Ord area is provided by the Marina Coast Water District (MCWD) and is pumped from wells that are located in the City of Marina. The groundwater from these drinking water wells is then blended together and treated with chlorine before it reaches housing and facilities on former Fort Ord (*MCWD, 2003*). Based on groundwater monitoring data and data provided by the MCWD, these drinking water wells have not been impacted by contaminants related to the OUCTP (*MCWD, 2003*). Groundwater within the OUCTP is located in a “prohibition zone.” According to Section 3, Subsection D of Section 15.08.140 of Chapter 15.08 of Title 15, of the Monterey County Code, a prohibition zone is an area overlying or adjacent to a contaminant plume where water well construction is prohibited and applications for water supply wells will not be accepted. Therefore, direct contact groundwater exposure pathways for residents potentially exposed to groundwater within the OUCTP are currently incomplete and are expected to remain so in the future. For the evaluation of potential future conditions, it is assumed in this HHRA that the OUCTP groundwater is used by child and adult residents in the area.

3.1.2 Exposure Pathways

This HHRA assumes that future residents within the Fort Ord area use groundwater for domestic purposes that is directly pumped from the aquifers within the OUCTP. Direct groundwater exposure pathways (i.e., ingestion, dermal contact, and indoor inhalation of vapors during domestic use) for future resident receptors are considered complete and potentially significant and are quantitatively evaluated in this HHRA.

It is unlikely that residents would be exposed significantly to indoor air vapors from VOCs migrating from groundwater through the building foundation into indoor air (i.e., passive vapor intrusion pathway).

Actively pumping and heating groundwater for domestic use, such as showering, is likely to generate greater indoor air concentrations, hence greater exposures, than passive vapor intrusion from the subsurface. Therefore, the majority of domestic vapor exposure would likely be associated with a domestic use scenario. Also, passive vapor intrusion from the subsurface to indoor air was previously evaluated by collecting indoor air and soil gas data overlying the OUCTP, as reported in the *Draft Final Report, March 2004 Indoor Air Sampling, Lexington Court, Former Fort Ord, California* (*Shaw, 2004b*). Concentrations of VOCs in indoor air were found to be within the range of concentrations detected in ambient air (i.e., background), suggesting that subsurface vapors from the OUCTP are not contributing significantly to VOCs in indoor air in residences in the vicinity of the OUCTP (*Shaw, 2004a,b*).

In summary, the following potentially exposed populations and potentially complete and significant exposure pathways are identified and evaluated in this HHRA (Plate 1):

- Future onsite resident receptors (adult and child):
    - Ingestion of groundwater;
    - Dermal contact with groundwater during domestic use; and
    - Inhalation of vapors from groundwater in indoor air (during showering and domestic water use).

3.2 Exposure Point Concentrations

The EPA defines EPCs as the representative chemical concentrations a receptor may contact at an exposure area over the exposure period (*EPA, 1989*). The typical concept of human exposure at a site or within a defined exposure area is that individuals contact the contaminated medium on a periodic and random basis. Because of the repeated nature of such contact, the human exposure does not really occur at a fixed point but rather at a variety of points at random and with equal likelihood that any given point within the exposure area will be the contact location on any given day. Thus, the EPCs should be the arithmetic averages of the chemical concentrations at various points within the exposure area.

For this HHRA, two types of EPCs were estimated. Groundwater EPCs were calculated to evaluate the ingestion and dermal contact exposure pathways. Air EPCs for groundwater vapors while showering were calculated from the groundwater EPCs.

3.2.1 Groundwater Exposure Point Concentrations

The EPA (*1989*) recommends using an estimate of the upper confidence limit (UCL) on the mean as an EPC for prolonged exposures where it is appropriate to group data. Three types of 95% UCLs were calculated in this HHRA for each COPC within each data set (Table 6): (1) arithmetic 95% UCL on the mean (*Gilbert, 1987*); (2) 95% UCL by Land's method (*Gilbert, 1987*); and (3) bootstrap estimate of the 95% UCL (*Manly, 1997*). The equations are provided below for each method. More detailed information on these methods can be found on EPA's website at:
http://www.epa.gov/superfund/programs/risk/ragsa/ucl.pdf.

Arithmetic 95% UCL (*Gilbert, 1987*) for a Normal Distribution

Arithmetic 95% UCL = mean + $t_{(alpha,\ n-1)}$*SD/sqrt(n)

Where:

mean =	sample mean
$t_{(alpha,\ n-1)}$ =	t score for alpha level (alpha and degrees of freedom = n-1), from table published in Gilbert (*1987*)
SD =	sample standard deviation
n =	number of samples
sqrt( ) =	square root function

95% UCL by Land's method (*Gilbert, 1987*) for a Lognormal Distribution

Land's 95% UCL = exp(mean + 0.5*sy^2 + (sy*H/sqrt(n-1)))

Where:

exp( ) =	exponential function
mean =	minimum variance unbiased estimator of the sample mean
sy =	minimum variance unbiased estimator of the sample variance
H =	H value, determined from a table derived by Land and published in Gilbert (*1987*)
n =	number of samples
sqrt( ) =	square root function

Bootstrap Estimate of the 95% UCL (*Manly, 1997*) for a Non-Parametric Distribution

The boostrap-t method cannot be explained by an equation, but is rather a process used to derive the 95% UCL using an advanced computer program. A detailed explanation of the bootstrap-t can be found in Section 4.9.5 of Appendix A of *ProUCL Version 3.0 User Guide*, EPA/600/R04/079 (*EPA, 2004a*), available on-line at:
http://www.epa.gov/nerlesd1/tsc/images/proucl3apr04.pdf. The bootstrap method is used for non-parametric data sets (i.e., data sets which do not fit a normal or log-normal distribution). A

bootstrap-t, also known as a bootstrap-pivot algorithm, was used to estimate the bootstrap 95% UCL in accordance with the following four steps: 1) The data set was randomly re-sampled with replacement to create a synthetic sample of the same size as the original data set; 2) The arithmetic mean, standard error and "T" value for the synthetic data set were calculated according to Section 3.6 of Manly (*1997*); 3) Steps 1 and 2 were performed 500,000 times and the resulting "T" values were ranked; and 4) The 95th percentile value of the 500,000 "T" values created during Step 3 was selected and used in Equation 3.12 of Manly (*1997*) to derive the bootstrap estimate of the 95% UCL on the mean of the original data set.

In accordance with EPA risk assessment guidance (*EPA, 1989*), for non-detect samples, a concentration equal to one-half of the sample-specific reporting limit was used in the 95% UCL calculations.

The Shapiro-Wilk W-test (*Algorithm R94, Appl. Statist., 1995*) was conducted for each COPC within each data set to determine if the data set was normally or log-normally distributed with 95% confidence. Based on the results of the W-test, the EPC for each COPC within each data set was derived as follows:

- If the W-test for normality did not fail, the data set was assumed to be normally distributed. The EPC was selected as the lesser of the arithmetic 95% UCL on the mean and the maximum detected value.
- If the W-test for normality failed and the W-test for log-normality did not fail, the data set was assumed to be log-normally distributed. The EPC was selected as the lesser of the Land's 95% UCL on the mean and the maximum detected value.
- If both the W-test for normality and the W-test for log-normality failed, the data set was assumed to be neither normally nor log-normally distributed. The EPC was selected as the lesser of the bootstrap estimate of the 95% UCL on the mean and the maximum detected value.

Table 6 provides the results of the W-test, the estimated 95% UCLs, and the EPC for each COPC and data set for groundwater.

3.2.2 Air Exposure Point Concentrations

To estimate EPCs in air from groundwater vapors while showering, a transfer factor, which is an estimate the ratio of the chemical concentration in indoor air in the bathroom from bathroom water use to the chemical concentration in groundwater, was calculated using the McKone and Bogen equation (*McKone and Bogen, 1992*) as described in Cal/EPA's *CalTOX, A Multimedia Total Exposure Model for Hazardous Waste Sites; Part III: The Multiple Pathway Exposure Model* (*Cal/EPA, 1993*). The transfer factor was multiplied by the groundwater EPC in order to calculate the air EPC. The transfer factor was calculated using the following equation:

$$TF(q \rightarrow bathair) = f_q \times \frac{W_{bath} \times \phi_x(bath)}{VR_{bath}}$$

where:

TF(q→bathair)	=	The ratio of chemical concentration in indoor air in the bathroom from bathroom water use to the chemical concentration in groundwater liter per cubic meter; (L/m^3);
f_q	=	The fraction of tap water provided by groundwater (unitless);
W_{bath}	=	Water use rate for showering/bathing (rate at which water enters the shower; L/hour);
VR_{bath}	=	Average bathroom ventilation rate (rate at which air leaves the bathroom; cubic meter per hour; m^3/hour); and,
$\phi_x(bath)$	=	The mass transfer efficiency of a chemical from water to air in the bathroom (unitless).

The mass transfer efficiency indicates how readily the chemical becomes airborne from running water according to McKone's (*1987*) equation as described in Cal/EPA (*1993*). The mass transfer efficiency was calculated using the following equation.

$$\phi(bath) = 0.6 \times \frac{3 \times 10^6 (m^2/s)^{-2/3}}{\frac{2.5}{D_l^{\,2/3}} + \frac{RT}{H \times D_a^{\,2/3}}}$$

where:

D_l	=	contaminant diffusion coefficient in water (meters squared per second; m^2/s);
D_a	=	contaminant diffusion coefficient in air (m^2/s);
R	=	universal gas constant (pascals liter per mole kelvin; Pa-L/mol-k);
T	=	temperature (kelvin); and,
H	=	Henry's law constant (Pa-L/mol).

Table 7 shows the derivation of air EPCs for each COPC in each data set. Default values from Cal/EPA's CalTOX Model were used for all input values, with the exception of temperature. The water temperature was assumed to be 40^{o} Celsius or 313.15 kelvin.

3.3 Intake Estimates

EPA and Cal/EPA-DTSC recommended procedures and exposure assumptions were used to estimate the daily intake (DI), or average daily dose, for each groundwater pathway evaluated in the HHRA (*EPA 1991a, 1997a; Cal/EPA, 1992*). A DI represents an estimate of a chemical dose that a receptor might receive on a daily basis. Standard exposure factors recommended by EPA (*1989, 1991a; 1997a*) and Cal/EPA (*1992*) were used to estimate the DIs.

Two exposure scenarios were evaluated in this HHRA: a reasonable maximum exposure (RME) and an average exposure (AE). RME, as defined by EPA, is the "highest exposure that is reasonably expected to occur" and is estimated using a combination of average and upper-bound values for human exposure assumptions (*EPA, 1989*). For the RME scenario, it was assumed that residents would be exposed to VOCs in groundwater for 350 days per year for a total duration of 30 years. These are very conservative assumptions considering that residents do not typically reside at one place for a total of 30 years and spend the entire time at home. For the AE scenario, exposure durations of 9 and 6 years were assumed for adult and child residents, respectively.

3.3.1 Intake Estimates for Ingestion of Groundwater

The chronic DI for the ingestion of groundwater exposure pathway was calculated according to the following equation:

$$LADD\ or\ ADD = \frac{EPC \times CF \times IR_{ing} \times EF \times ED}{BW \times (AT_c\ or\ AT_{nc})}$$

where:

LADD	=	Lifetime average daily dose for cancer risk (milligrams per kilogram per day [mg/kg-day]);
ADD	=	Average daily dose for noncancer effects (mg/kg-day);
EPC	=	Exposure point concentration of chemical in groundwater (µg/L);
CF	=	Conversion factor (mg/µg);
IR_{ing}	=	Ingestion rate (liter/day);
EF	=	Exposure frequency (days/year);
ED	=	Exposure duration (years);
BW	=	Body weight (kilograms);
AT_c	=	Averaging time (days; toxic effect assessment-determined variable, equal to 70 years or 25,550 days for cancer risk); and
AT_{nc}	=	Averaging time (days; toxic effect assessment-determined variable, equal to ED for noncancer effects).

Table 8 presents the exposure assumptions used in the equation. The estimated DIs for groundwater ingestion for each COPC and data set are presented in Tables 12 and 13.

3.3.2 Intake Estimates for Dermal Exposure to Groundwater

EPA recommended procedures and exposure assumptions were used to estimate the dermally absorbed dose (DAD), or average daily dose, via dermal exposure to groundwater (*EPA, 2004b*). A DAD represents an estimate of a chemical dose that a receptor might receive on a daily basis during showering or bathing. The dermally absorbed dose per event (DA_{event}), an estimate of the total dose dissolved in the skin at the end of exposure, was calculated using the following equation:

$$If\ t_{event} \le t^*,\ then: DA_{event} = 2 \times FA \times K_p \times EPC\sqrt{\frac{6 \times \tau \times t_{event}}{\pi}}$$

$$If\ t_{event} > t^*,\ then: DA_{event} = FA \times K_p \times EPC\left[\frac{t_{event}}{1+B} + 2 \times \tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

where:

t_{event}	=	Event duration (hr/event);
t^*	=	Time to reach steady-state (hr) = 2.4τ;
DA_{event}	=	Dermally absorbed dose per event milligram per centimeter squared per event; (mg/cm^2-event);
FA	=	Fraction absorbed water (dimensionless);
K_p	=	Dermal permeability coefficient of compound in water centimeter per hour; (cm/hr);
EPC	=	Exposure point concentration of chemical in groundwater milligram per cubic centimeter; (mg/cm^3);
τ	=	Lag time per event (hr/event); and
B	=	Dimensionless ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis (ve) (dimensionless).

Table 9 provides the derivation of the DA_{event} for each COPC and data set. According to EPA (*2004b*), several of the COPCs evaluated in this HHRA do not need to be assessed via the dermal route because the ratio of groundwater dermal exposure is expected to be 10% or less than the groundwater ingestion exposure and therefore, would not contribute significantly to the estimated cumulative risks. These COPCs are 1,2-DCA, bromodichloromethane, chloroform, chloromethane, and dibromochloromethane. For this HHRA, however, all COPCs were conservatively evaluated for the dermal exposure route (Table 9).

The chronic DAD for the dermal exposure to groundwater pathway was calculated according to the following equation:

$$DAD = \frac{DA_{event} \times EV \times ED \times EF \times SA}{BW \times (AT_c\ or\ AT_{nc}\ )}$$

where:

DAD	=	Dermally absorbed dose (mg/kg-day);
DA_{event}	=	Dermally absorbed dose per event (mg/cm^2-event);
EV	=	Event frequency (events/day);
EF	=	Exposure frequency (days/year);
ED	=	Exposure duration (years);

SA	=	Skin surface area centimeter squared; (cm^2);
BW	=	Body weight (kilograms);
AT_c	=	Averaging time (days; toxic effect assessment-determined variable, equal to 70 years or 25,550 days for cancer risk); and
AT_{nc}	=	Averaging time (days; toxic effect assessment-determined variable, equal to ED for noncancer effects).

Table 8 presents the exposure assumptions used in the equation. The estimated DADs for each COPC and data set are presented in Tables 14 and 15.

3.3.3 Intake Estimates for Inhalation of Groundwater Vapors While Showering

The chronic DI for the inhalation of groundwater vapors while showering exposure pathway was calculated according to the following equation:

$$LADD\ or\ ADD = \frac{C_{air} \times CF \times IR_{inh} \times EF \times ET \times ED}{BW \times (AT_c\ or\ AT_{nc})}$$

where:

LADD	=	Lifetime average daily dose for cancer risk mg/kg-day;
ADD	=	Average daily dose for noncancer effects (mg/kg-day);
EPC_{air}	=	Exposure Point Concentration of contaminant in air (µg/m^3);
CF	=	Conversion factor (mg/µg);
IR_{inh}	=	Inhalation rate (m^3/hour):
EF	=	Exposure frequency (days/year);
ED	=	Exposure duration (years);
ET	=	Exposure time (hours/day);
BW	=	Body weight (kilograms);
AT_c	=	Averaging time (days; toxic effect assessment-determined variable, equal to 70 years or 25,550 days for cancer risk); and
AT_{nc}	=	Averaging time (days; toxic effect assessment-determined variable, equal to ED for noncancer effects).

Table 8 presents the exposure assumptions used in the equation. The estimated DIs for inhalation of groundwater vapors for each COPC and data set are presented in Tables 16 and 17.

4.0 TOXICITY ASSESSMENT

Toxicity assessment is the process of using the existing toxicity information from human and/or animal studies to identify potential health risks at various dose levels in exposure populations (*EPA, 1989*). To estimate these potential health risks, the relationship between exposure to a chemical (in terms of chronic DI for individuals) and an adverse effect (in terms of bodily response to a specific intake dose level) must be quantified. The methodologies used to develop toxicity factors differ, depending on whether the COPC is a potential carcinogen (i.e., has the potential to cause cancer) and/or has noncancer adverse effects.

Both California and EPA-derived toxicity values were compiled for the HHRA. For California, the Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) online toxicity database (*Cal/EPA, 2004*) and chronic Reference Exposure Level (REL) tables (*Cal/EPA, 2003*) were consulted. The EPA values were compiled from EPA's Integrated Risk Information System (IRIS), an online database (*EPA, 2004d*), the National Center for Environmental Assessment (NCEA), provided in EPA's preliminary remediation goal (PRG) tables (*EPA, 2004c*), and the provisional peer review toxicity values (PPRTVs), provided in EPA's PRG tables (*EPA, 2004c*). These sources are updated regularly based on toxicity and exposure studies. If a toxicity value was not available in any of these sources, EPA's Health Effects Assessment Summary Tables (HEAST; *EPA, 1997b*) were consulted; however, HEAST has not been updated since 1997.

The toxicity values for the COPCs are discussed below and presented in Tables 10 and 11. The uncertainty associated with use of toxicity factors in this assessment is discussed in Section 6.3.

4.1 Cancer Dose-Response Assessment Methodology and Toxicity Criteria

Some chemicals have been shown, and many more are assumed to be, potential human carcinogens. To be health protective, the EPA (*1989*) assumes that a relatively small number of molecular events can elicit changes in a cell, ultimately resulting in uncontrolled cell proliferation and cancer. Based on this theory, the EPA uses a two-part process in evaluating the potential cancer risk of contaminants: (1) assigning a weight-of-evidence classification and (2) calculating a cancer slope factor (SF) for oral exposures and/or inhalation unit risk (IUR) for inhalation exposures.

The EPA (*1986*) weight-of-evidence classification system for carcinogenicity is as follows:

- A Known human carcinogen;
- B1 or B2 Probable human carcinogen;
- C Possible human carcinogen;
- D Not classifiable as to human carcinogenicity; and
- E Evidence of noncarcinogenicity in humans.

The weight-of-evidence classification is based on the source of the data (human epidemiology study or animal bioassay) and whether cancer has been observed in more than one animal species. These alphanumeric classifications are currently being phased out by EPA as toxicity data are reviewed and revised under the *Guidelines for Carcinogenic Risk Assessment* (*EPA, 1999*). Under the revised guidelines, a greater emphasis is placed on the conditions under which the observed effects may be expressed, such as whether the potential for carcinogenicity appears limited to a specific route of exposure, or whether carcinogenic activity may be secondary to another toxic effect. The current weight-of-evidence system is a narrative classification, as follows (*EPA, 1999; EPA, 2003*):

- Carcinogenic to humans;
- Likely to be carcinogenic to humans;
- Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential;
- Data are inadequate for an assessment of human carcinogenic potential; and
- Not likely to be carcinogenic to humans.

Tables 10 and 11 present the EPA (*1986*) alphanumeric classification system for the COPCs, as well as the revised EPA (*1999 and 2003*) narrative classification for the COPCs that have been reassessed under the revised Guidelines for Carcinogenic Risk Assessment.

In general, SFs and/or IURs have been calculated and are available for potential carcinogens in Groups A, B1, and B2, but are calculated only on a case-by-case basis for Group C (*EPA, 1989*). The SF is defined as a plausible upper-bound estimate on the probability of a response per unit intake of a chemical over a lifetime, and is based on an assumption of continuous exposure and a linear nonthreshold extrapolation model. The SF is expressed as risk per mg/kg-day, or $(\text{mg/kg-day})^{-1}$. Because the SF is often an upper 95^{th} percentile confidence limit on the probability of response based on experimental animal data used in the linearized multistage model, the cancer risk estimate will generally be an upper-bound estimate. Thus, one can be reasonably confident that the true risk will not exceed the risk estimate derived using this model. Instead, the EPA has stated that the true risk is likely to be less than what was predicted or may even be zero (*EPA, 1989*). The IUR is used to evaluate inhalation exposure and is considered an upper-bound excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration of 1 micrograms per cubic meter ($\mu g/m^3$) in air; the IURs can be converted to SFs for risk calculation purposes. IURs have been developed for known, likely, or suggestive evidence carcinogens for which inhalation assessments have been conducted and reviewed by EPA.

The oral SFs complied for the COPCs are presented in Table 10. In the absence of dermal toxicity factors, EPA recommends using oral SFs with no adjustment to evaluate the dermal exposure pathways for the COPCs evaluated in this HHRA. This is because organic chemicals are generally well absorbed (>50%) across the gastrointestinal (GI) tract (*EPA, 2004b*). A cutoff of 50% GI absorption is recommended by EPA (*2004b*) to reflect the intrinsic variability in the analysis of absorption studies. This cutoff level obviates the need to make comparatively small adjustments in the toxicity value that would otherwise impart on the process a level of accuracy that is not supported by the scientific literature (*EPA, 2004b*).

The Cal/EPA-OEHHA inhalation SFs and the EPA IURs for the COPCs are presented in Table 11. The EPA IURs were converted to inhalation SFs for risk calculation purposes (the equation and assumptions are provided in Table 11).

The most conservative (i.e., highest) of the Cal/EPA-OEHHA and EPA SFs were selected for use in the HHRA. For dibromochloromethane, an inhalation SF was not available in the literature. In this case, the oral SF was used as a surrogate value.

4.2 Noncancer Dose-Response Assessment Methodology and Toxicity Criteria

Chemically caused toxic endpoints other than cancer and gene mutations are health effects pertaining to the function of various organ systems, and are referred to as systemic or noncancer effects. Based on the scientific understanding of homeostatic and adaptive mechanisms, systemic or noncarcinogenic toxicity is assumed to have an identifiable threshold for both the individual and the population, which means that the organisms or receptors can tolerate a range of exposures without adverse effects. The benchmark value for this threshold for inhalation exposure is the Cal-EPA-OEHHA's chronic REL expressed in units of $\mu g/m^3$ or EPA's inhalation reference concentration (RfC) in units of milligrams per cubic meter (mg/m^3) and for oral exposure is the EPA's chronic reference dose (RfD) in units of mg/kg-day. The REL or RfC is the estimated daily concentration that is considered to pose no appreciable risk of deleterious effects to humans, including sensitive subgroups. The RfD is a numerical estimate of a daily oral exposure or intake to the human population, including sensitive subgroups such as children, that is not likely to cause harmful effects during a lifetime. Typically, the REL or RfC and RfD are derived from the no-observed-adverse-effect level (NOAEL), which is the highest experimental dose of a chemical at which there is no statistical or biologically significant increase in frequency or severity of adverse effects between the exposed population and its appropriate control. For a limited number of chemicals, RELs or RfCs and RfDs are derived based on observations of toxic endpoints in humans that have been exposed in a non-experimental setting. Standard uncertainty factors and modifying factors are applied to the NOAEL to address variation in interspecies sensitivity, sensitive subpopulations, using data from a subchronic rather than a chronic study, or using a lowest-observed-adverse-effect level (LOAEL) rather than a NOAEL. Use of these uncertainty and modifying factors add conservatism into the derivation of the REL or RfC and RfD.

The oral RfDs complied for the COPCs are presented in Table 10. In the absence of dermal toxicity factors, EPA recommends using oral RfDs with no adjustment to evaluate the dermal exposure pathways for the COPCs evaluated in this HHRA (similar to that described above in Section 4.1). Therefore, oral RfDs were used to evaluate both oral and dermal exposures in this HHRA.

Cal-EPA-OEHHA's chronic inhalation RELs and EPA's chronic inhalation RfCs are presented in Table 11. The chronic REL and RfC were converted to the inhalation RfD, expressed as mg/kg-day, for risk calculation purposes (the equation and assumptions are provided in Table 11).

The most conservative (i.e., lowest) of the Cal/EPA-OEHHA and EPA RfDs were selected for used in the HHRA. For bromodichloromethane and dibromochloromethane, inhalation RfDs were not available in the literature. In these cases, the oral RfDs were used as surrogate values. Similarly, an inhalation RfD was used for chloromethane which lacks an oral RfD.

5.0 RISK CHARACTERIZATION

The risk characterization integrates the COPC selection, exposure assessment, and toxicity assessment to describe the risks to individuals in terms of the nature and likelihood of potential adverse health risks to occur. The risk characterization process involved integrating the exposure intakes and toxicity values to estimate both cancer risk and noncancer hazards to potential residential receptors from exposure to COPCs in groundwater at the site. Because cancer risk and noncancer effects are quantified differently, separate methods were used to evaluate these effects, as described below.

5.1 Cancer Risk Characterization Methodology

Cancer risk is expressed as an increased probability of developing cancer as a result of lifetime exposure. Cancer risk characterization methodology is predicated on the regulatory assumption that cancer induction does not have a threshold, and any dose, no matter how small, is associated with some incremental or excess cancer risk.

For a given COPC and data set, the excess lifetime cancer risk (ECLR) associated with exposure to the COPC in groundwater was estimated per pathway by multiplying the DI by the SF, according to the following equation (*EPA, 1989*):

$$\text{ECLR} = (\text{LADD or DAD}) \text{ x SF}$$

where:

ECLR	=	Excess lifetime cancer risk (unitless);
LADD	=	Lifetime average daily dose, averaged over a lifetime of 70 years (mg/kg-day);
DAD	=	Dermally absorbed dose (mg/kg-day); and
SF	=	Cancer slope factor $(\text{mg/kg-day})^{-1}$; oral SF used for oral and dermal exposures and inhalation SF used for inhalation exposure.

The ECLR values are expressed in terms such as one-in-ten-thousand (1E-04) or one-in-one-million (1E-06). An excess cancer risk of 1E-06 means that an exposed individual may have an added one-in-one-million chance of developing cancer greater than an unexposed individual.

To address exposure to multiple chemicals and exposure pathways within each data set, chemical-specific and pathway specific risks were summed to provide a total theoretical excess risk. To evaluate risks potentially associated with a residential RME scenario, risks for child and adult residents were summed to account for a total exposure duration of 30 years (i.e., 6 years as a child and 24 years as an adult). For the

AE scenario, child and adult cancer risks were evaluated separately because the total exposure duration was assumed to be 9 years as an adult or 6 years as a child.

The chemical- and pathway-specific ECLR estimates for the data sets are presented in Tables 12 through 17. Table 18 summarizes the cumulative ECLR estimates from all exposure pathways for each data set. The cancer risk estimates are discussed below in Section 5.3

5.2 Noncancer Effects Characterization Methodology

The potential for noncancer effects was evaluated by comparing the average daily dose with the chronic RfD to arrive at a ratio called the hazard quotient (HQ). For a given COPC and data set, the HQ associated with exposure to the COPC in groundwater was estimated by dividing the DI by the RfD, according to the following equation (*EPA, 1989*):

$$HQ = \frac{(ADD \text{ or } DAD)}{RfD}$$

where:

HQ	=	Hazard quotient (unitless);
ADD	=	Average daily dose (mg/kg-day);
DAD	=	Dermally absorbed dose (mg/kg-day); and
RfD	=	Chronic reference dose (mg/kg-day); oral RfD used for oral and dermal exposures and inhalation RfD used for inhalation exposure.

This ratio is termed the HQ, or in other words, the HQ is the ratio of the exposure level to the noncancer toxicity factor. The HQ approach assumes that there is a level of exposure (e.g., RfD) below which it is unlikely that even sensitive populations would experience adverse health effects. If the exposure level exceeds the threshold (i.e., if HQ exceeds one or unity), there may be concern for potential noncancer effects.

The potential additivity of noncancer hazard due to exposure to multiple substances is quantified as a hazard index (HI), which is the sum of all possible chemical-specific HQs for the data set (*EPA, 1989*). Usually, if the total HI is greater than unity or one, meaning the exposure level exceeds the threshold RfD, a potential for adverse noncancer health effects may exist. If the HI is equal to or less than one, exposures to the COPCs are not expected to result in a systemic toxic response. It should be noted that HQs and HIs are not statistical probabilities, such as excess cancer risks, and the level of concern does not increase linearly as the RfD is approached or exceeded. If the route-specific or cumulative exposure HI is greater than one, segregation of the HI, based on the type of effects, target organ specificity, or mechanisms of action, can be considered (*EPA, 1989*).

The chemical- and pathway-specific HQs and HI estimates for the data sets are presented in Tables 12 through 17. Table 18 summarizes the cumulative HI estimates from all exposure pathways for each data set. The noncancer HI estimates are discussed below in Section 5.3.

5.3 Summary of Estimated Cancer Risks and Noncancer Hazards

This section provides a summary and discussion of the estimated cancer risks and noncancer hazards with respect to groundwater-related risk and regulatory guidance. EPA's cancer risk management range is 1E-06 (one in one million) to 1E-04 (one in ten thousand). According to EPA, where the cumulative carcinogenic site risk to an individual is less than 1E-04, remedial action is generally not warranted unless there are other adverse environmental impacts or an applicable or relevant and appropriate requirement (ARAR) is exceeded. On a case by case basis, action may be recommended for sites within the 1E-06 to 1E-04 risk range (*EPA, 1991b*). Additionally, the Cal/EPA-DTSC's point of departure for risk management is 1E-06, but Cal/EPA-DTSC also considers risks within the risk management range of 1E-06 to 1E-04 on a site-specific basis. In general, further action is not warranted if the risk is below 1E-06. If the risk exceeds 1E-06, Cal/EPA generally requires further evaluation or discussion of the risk so that management decisions can be made. For regulatory purposes, an HI of one or less is considered to be an acceptable noncancer hazard level (*EPA, 1989*).

5.3.1 Summary of Estimated Cancer Risks

Table 18 summarizes the total cancer risks estimated by aquifer for all exposure pathways evaluated in the HHRA (i.e., groundwater ingestion, groundwater dermal contact, and inhalation of groundwater vapors while showering). The following table also summarizes the total cancer risk estimates by aquifer.

Summary of Total Estimated Cancer Risks [(1)]

Aquifer	Total Adult + Child RME Risk (30 Year Exposure)	Adult AE Risk (9 Year Exposure)	Child AE Risk (6 Year Exposure)
A-Aquifer	1.3E-05	2.2E-06	3.4E-06
Upper 180 Foot	3.5E-06	5.7E-07	9.0E-07
Lower 180-400 Foot	2.2E-06	3.6E-07	5.8E-07

(1) From Table 18.

As shown above and in Table 18, the total adult and child resident RME risks estimated for the aquifers ranged from 2.2E-06 to 1.3E-05. Under AE conditions, the maximum risks decreased to 2.2E-06 and 3.4E-06 for the adult and child resident, respectively. The A-Aquifer was associated with the highest risk, followed by the Upper 180 Foot-Aquifer and then the Lower 180-400 Foot-Aquifer. These cumulative risk estimates for groundwater exposure are within the EPA and Cal/EPA-DTSC cancer risk management range of 1E-06 to 1E-04 and are above Cal/EPA-DTSC's point of departure for risk management of 1E-06.

The exposure pathway contributing to the greatest amount of risk was groundwater ingestion, which contributed approximately 76 to 83% of the total risk (Table 18). The dermal contact pathway contributed approximately 17 to 24% of the risk. The total contribution from vapor inhalation during showering was less than 0.1%.

The total risks by COPC and pathway for each aquifer are presented in Tables 12 through 17. For the groundwater ingestion pathway, the following COPCs were the risk drivers (i.e., those COPCs contributing to 10% or greater of the total risk):

- A-Aquifer: CT (63%) and PCE (22%)
- Upper 180 Foot-Aquifer: CT (96%)
- Lower 180-400 Foot-Aquifer: 1,2-DCA (21%) and CT (73%), though the ingestion risk from 1,2-DCA was below 1E-06.

For the dermal contact pathway, the risk drivers were similar:

- A-Aquifer: CT (54%) and PCE (42%)
- Upper 180 Foot-Aquifer: CT (98%), though the total dermal risk was below 1E-06
- Lower 180-400 Foot-Aquifer: CT (92%), though the total dermal risk was below 1E-06.

It is also noted that although TCE was not a risk driver in this HHRA, TCE has been detected above the Federal and California maximum contamination level (MCL) of 5 µg/L in A-Aquifer well MW-BW-53-A.

5.3.2 Summary of Estimated Noncancer Hazards

Table 18 summarizes the total noncancer hazards estimated by aquifer for all exposure pathways evaluated in the HHRA (i.e., groundwater ingestion, groundwater dermal contact, and inhalation of groundwater vapors while showering). The following table also summarizes the total noncancer hazard estimates by aquifer.

Summary of Total Estimated Noncancer Hazards [(1)]

Aquifer	Adult RME Hazard (24 Year Exposure)	Child RME Hazard (6 Year Exposure)	Adult AE Hazard (9 Year Exposure)	Child AE Hazard (6 Year Exposure)
A-Aquifer	0.2	0.5	0.2	0.4
Upper 180 Foot	0.06	0.1	0.04	0.1
Lower 180-400 Foot	0.03	0.07	0.02	0.05

(1) From Table 18.

As shown in Table 18, the total RME hazards estimated for the aquifers ranged from 0.03 to 0.2 for the adult resident and 0.07 to 0.5 for the child resident. Under AE conditions, the hazards for the aquifers decreased to 0.02 to 0.2 for the adult resident and 0.05 to 0.4 for the child resident. These cumulative noncancer hazard estimates for groundwater exposure are well below the acceptable noncancer HI value of one or unity for regulatory purposes.

6.0 UNCERTAINTY ANALYSIS

Uncertainty is inherent in many aspects of the risk assessment process. All HHRAs involve the use of assumptions, judgments, and incomplete data to varying degrees that may contribute to the uncertainty associated with the final risk estimates. Uncertainties may result from both the use of assumptions or models in lieu of actual data and from the error inherent in the estimation of exposure parameters. These uncertainties may result in the potential over-or underestimation of risks. However, because direct measurements are not available for many of the criteria upon which the risk estimates are dependent, conservative assumptions and methodologies are generally employed to eliminate the possibility of underestimating risk.

Consideration of the uncertainty associated with the components of the risk assessment process allows for a more meaningful interpretation of the results and a better understanding of the potential for adverse effects on human health. Some of the major potential uncertainties and the effects of these uncertainties on the HHRA risk estimates are discussed below.

6.1 Data Sets and COPC Selection

This section discusses the uncertainties associated with the data used in the HHRA and COPC selection process.

6.1.1 Groundwater Data Sets

The groundwater data were divided into four aquifer zones: A-aquifer, upper-180 foot, lower 180 – 400 foot, and 400 foot. The most recent sampling events that occurred from August 2003 to September 2004 were evaluated in this HHRA. The use of the most current groundwater monitoring events from August 2003 to September 2004 is considered most representative of current site conditions (*EPA, 1993*). Using the most current groundwater monitoring events from August 2003 to September 2004 may result in overestimation or underestimation in risk. An overestimation in risk can result from using groundwater data where the chemicals have not been regularly detected. However, the FOD criterion of 2.5% in the COPC selection process was used to account for this potential overestimation of risk by eliminating chemicals that have not been detected frequently in the OUCTP. An underestimation of risk can result if chemicals were not detected recently in the OUCTP plume, but are present currently in groundwater; however, this underestimation is unlikely given that CT and its expected breakdown products, chloromethane and chloroform, were detected in most aquifers and evaluated in the HHRA.

6.1.2 Analytical Methods

Error in chemical analyses may result from several sources including errors inherent in the sampling and analytical procedures. Analytical accuracy or sampling errors can result in the rejection of data, which decreases the available data for use in the HHRA, or in the qualification of data, which increases the uncertainty in the detected chemical concentrations.

6.1.3 COPC Selection

A COPC selection process was used to focus the HHRA on the chemicals in groundwater that, based on concentration and toxicity, are most likely to contribute significantly to risks. Chemicals with a FOD greater than 2.5% were selected as COPCs. This criterion was used to select the chemicals that would be most representative of current and future groundwater exposure conditions. Acetone, MEK, and VC were excluded from the data sets in cases where the FOD was greater than 2.5% because the results are suspect, as described in Section 2.2.

6.2 Exposure Assessment

Exposure assessment is a single step in the HHRA process that uses a wide array of information sources and techniques. In the absence of reliable sources of data, assumptions and inferences are often made that lead to varying degrees of uncertainties, mostly on the conservative side of the HHRA. Sources of uncertainty in exposure assessment include the degrees of completeness and confidence in (1) chemical concentration estimation (related to field measurement and modeling parameter estimation); (2) time of contact identification (for example, exposure scenario characterization, target population identification, and population stability over time); and (3) the methodology for chemical intake calculation. Variability or heterogeneity in exposure routes and exposure dynamics, such as age, gender, behavior, genetic constitution, state of health, and random movement of the potentially exposed populations, also contribute to the uncertainty of the exposure estimates.

6.2.1 Source of Exposure

This HHRA assumed that residents directly pump the groundwater from the OUCTP aquifers for domestic use. However, domestic water supply in the Fort Ord area is provided by the MCWD. MCWD groundwater is pumped from wells that are located in the City of Marina and not have been impacted by contaminants related to the OUCTP. Groundwater within the OUCTP is located in a “prohibition zone,” which is an area overlying or adjacent to a contaminant plume where water well construction is prohibited and applications for water supply wells will not be accepted. However, it was conservatively assumed in this HHRA that current and future residents would be exposed to groundwater within the OUCTP during domestic use.

6.2.2 Exposure Point Concentrations

For this HHRA, 95% UCL concentrations were calculated and used as EPCs in the risk calculations if they were less than the maximum detected value of the data set. The use of 95% UCL concentrations (which are upper-bound estimates of averages) as EPCs was considered to be appropriate because it accounts for the likelihood that human receptors will contact various points throughout the exposure area, rather than a fixed point. This is considered representative of groundwater exposure because, if used for domestic purposes, the groundwater would be blended before being supplied to residences in the area.

When a chemical-specific result was reported at a concentration below the reporting limit, but above the MDL, the result was qualified as J, or estimated. The uncertainty associated with J-qualified values generally is not great, because the MDL and reporting limits differed by less than three-fold. Results were only reported as U, or non-detect, when the result was reported below the MDL. While the concentration may be highly uncertain for substances below the MDL, it does not necessarily mean that the concentration is zero (*EPA, 1989*). In this HHRA, a simple substitution method was used to address non-detect data, and the non-detected values were assigned a proxy value of one-half the reporting limit. The substitution approach of one-half the reporting limit may result in under- or overestimation of the expected true mean concentrations and, therefore, under- or overestimation of risk.

Because direct measurements were not available for shower air, a modeling approach was used to estimate air EPCs. The shower model was used to predict shower air EPCs from groundwater EPCs under assumed exposure conditions. The majority of input parameters in the model were chemical-specific parameters which are measured values and have a low degree of error. Exposure assumptions used in the model, including water use rate and bathroom inhalation rate, and the assumption of transfer efficiency in the model itself, may have resulted in an underestimation or overestimation of risk.

6.2.3 Exposure Assumptions and Intake Estimates

The goal of characterizing the time of contact is to develop estimates of contact rate and frequency and duration of exposure. This was done indirectly by use of national demographic data and behavior observation, which is, in some instances, not site-specific and may lead to over- or underestimation of exposure. For this HHRA, most of the exposure assumptions were selected to be conservative and health protective. For example, for the RME scenario, it was assumed that residents would be exposed to VOCs in groundwater for 350 days per year for 30 years. This is conservative given that most humans are not likely to reside at one location for a total of 30 years.

6.3 Toxicity Criteria

Risks and HIs were calculated using Cal/EPA and EPA-derived dose-response criteria. These health effects criteria are conservative and designed to be protective of sensitive subpopulations, such as children and the elderly. The health criteria used in the evaluation of chronic or long-term exposures, such as RfDs and SFs, are based on concepts and assumptions that may bias an evaluation and potentially result in the overestimation of risks and HIs. As stated by EPA (*1986*):

> *There are major uncertainties in extrapolating both from animals to humans and from high to low doses. There are important species differences in uptake, metabolism, and organ distribution of carcinogens, as well as species and strain differences in target site susceptibility. Human populations are variable with respect to genetic constitution, diet, occupational and home environment, activity patterns, and other cultural factors.*

Basing the SFs on the slope of the 95% UCL low dose response curve and using uncertainty factors for RfDs address these concerns. The assumptions used in this HHRA provide a plausible estimate of the upper limit of risk. In other words, it is not likely that the true risk would be much higher than the estimated risk but could very well be considerably lower, even approaching zero. More refined modeling in the area of dose-response calculation (i.e., using maximum likelihood dose-response values rather than the 95% UCL) would be expected to substantially lower the risk estimates.

There are varying degrees of confidence in the weight-of-evidence of carcinogenicity of a given chemical. EPA's weight-of-evidence classification provides information that can indicate the level of confidence or uncertainty in the data obtained from studies in humans or experimental animals. Cancer SFs were available and applied in the HHRA for all chemicals considered to be Class A, B2, or C carcinogens.

For several chemicals, route-to-route extrapolation was used where route-specific toxicity values were unavailable (i.e., oral toxicity values were applied as inhalation toxicity values and inhalation toxicity values were applied as oral toxicity values). This could have resulted in an under- or overestimation of risks for these chemicals because the assumed toxicity criterion may under- or overestimate the toxic potential for the compound. However, it is noted that for the cancer risk driving pathways (oral and dermal), no route-to-route extrapolation was used for oral SFs; therefore, significant under- or overestimation of risk due to route-to-route extrapolation is unlikely.

7.0 SUMMARY AND CONCLUSIONS

This HHRA for the OUCTP was conducted to evaluate potential risks to residents based on exposure to VOCs detected in groundwater from the OUCTP using groundwater data collected at the site. This evaluation was accomplished by reviewing the groundwater data collected at the site, identifying COPCs in groundwater, selecting appropriate exposure assumptions and toxicity criteria, and estimating human health risks and hazards. Child and adult residents were evaluated assuming that they could potentially inhale chemical vapors while showering, contact the groundwater dermally while showering, and ingest the groundwater. As part of the toxicity assessment, cancer and noncancer toxicity values were compiled for each COPC for use in the risk characterization process.

The risk characterization step combined results from the exposure and toxicity assessments to evaluate cancer risks and noncancer hazards. The risks and hazards were calculated for two exposure scenarios. For the RME scenario, it was assumed that an onsite resident would be exposed to VOCs in groundwater 350 days per year for a total duration of 30 years. These are very conservative assumptions considering that residents do not typically reside at one place for a total of 30 years. For the AE scenario, it was assumed that adult and child residents would be exposed for a total duration of 9 and 6 years, respectively.

The following conclusions were drawn from the risk characterization:

- The cumulative adult and child resident RME and AE cancer risks estimated for the aquifers were within the EPA and Cal/EPA-DTSC cancer risk management range of 1E-06 to 1E-04 and exceeded Cal/EPA-DTSC's point of departure for risk management of 1E-06.
- The A-Aquifer was associated with the highest cancer risk, followed by, the Upper 180 Foot-Aquifer and then the Lower 180-400 Foot-Aquifer.
- The groundwater ingestion pathway contributed the greatest amount of excess cancer risk, followed by dermal groundwater exposure. The cancer risk calculated for inhalation of groundwater vapors during showering was negligible.
- The following COPCs were cancer risk drivers: CT and PCE in the A-Aquifer; CT in the Upper 180 Foot-Aquifer; and 1,2-DCA and CT in the 180-400 Foot-Aquifer.
- Although not a risk driver in this HHRA, TCE has been detected above the Federal and California MCL of 5 µg/L in A-Aquifer well MW-BW-53-A.
- The cumulative noncancer hazards did not exceed the acceptable noncancer HI of one or unity for regulatory purposes.

Because groundwater from the OUCTP is not currently supplied for domestic use and soil gas has previously been evaluated and determined not to pose a threat, residents are likely to have minimal risk from exposure to the COPCs within the OUCTP.

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TABLES

Table 1
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - A-Aquifer *
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Acetone	Bromo-dichloromethane	Bromoform	Carbon tetrachloride	Chloroform	Chloromethane	Dibromochloromethane	Methyl ethyl ketone (MEK)	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride
MP-BW-46-080	8/25/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	0.25	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-46-080	12/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-46-080	3/4/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-46-080	6/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-46-080	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-46-095	8/25/2003	NA	< 0.5	< 0.5	7.9	0.8	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.96	< 0.5
MP-BW-46-095	12/9/2003	NA	< 0.5	< 0.5	12	0.77	< 0.5	< 0.5	< 10	< 0.5	< 0.5	1.2	< 0.5
MP-BW-46-095	3/4/2004	NA	< 0.5	< 0.5	8.2	0.75	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.92	< 0.5
MP-BW-46-095	6/3/2004	NA	< 0.5	< 0.5	7.1	0.6	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.75	< 0.5
MP-BW-46-095	9/15/2004	NA	< 0.5	< 0.5	5.5	0.6	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.61	< 0.5
MP-BW-48-133	8/26/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-48-133	12/11/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-48-133	3/9/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-48-133	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-48-133	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-11-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	0.76	< 0.5	< 0.5
MW-B-12-A	9/9/2003	NA	< 0.5	< 0.5	4.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-12-A	12/2/2003	NA	< 0.5	< 0.5	4.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-12-A	3/4/2004	NA	< 0.5	< 0.5	2.8	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-12-A	5/27/2004	NA	< 0.5	< 0.5	6.5	0.28	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-12-A	9/14/2004	NA	< 0.5	< 0.5	3.9	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-14-A	9/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	13	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-14-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-14-A	3/5/2004	NA	< 0.5	< 0.5	0.42	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-14-A	5/27/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-B-14-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-15-A	9/8/2003	NA	< 0.5	< 0.5	11	0.82	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.9	< 0.5
MW-BW-15-A	12/2/2003	NA	< 0.5	< 0.5	11	0.84	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.96	< 0.5
MW-BW-15-A	3/5/2004	NA	< 0.5	< 0.5	8.6	0.75	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.94	< 0.5
MW-BW-15-A	5/27/2004	NA	< 0.5	< 0.5	11	0.78	< 0.5	< 0.5	< 10	< 0.5	< 0.5	1.1	< 0.5
MW-BW-15-A	9/14/2004	NA	< 0.5	< 0.5	15	1	< 0.5	< 0.5	< 10	< 0.5	< 0.5	1.4	< 0.5
MW-BW-16-A	9/5/2003	NA	1.7	< 0.5	1.4	1.3	< 0.5	0.63	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-16-A	12/2/2003	NA	1.6	< 0.5	0.97	1.1	< 0.5	0.83	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-16-A	3/5/2004	NA	1.5	< 0.5	1	1.1	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-16-A	6/1/2004	NA	1.7	< 0.5	1.3	1.2	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-16-A	9/15/2004	NA	1.9	< 0.5	1.3	1.2	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-17-A	9/9/2003	NA	< 0.5	< 0.5	3.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.68	< 0.5
MW-BW-17-A	12/4/2003	NA	< 0.5	< 0.5	3.3	< 0.5	< 0.5	< 0.5	6	< 0.5	< 0.5	0.57	< 0.5
MW-BW-17-A	3/4/2004	NA	< 0.5	< 0.5	3.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.63	< 0.5
MW-BW-17-A	5/26/2004	NA	< 0.5	< 0.5	3.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.66	< 0.5
MW-BW-17-A	9/13/2004	NA	< 0.5	< 0.5	3.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.52	< 0.5
MW-BW-23-A	9/10/2003	NA	< 0.5	< 0.5	9.6	1.2	< 0.5	< 0.5	17	0.25	< 0.5	3.8	< 0.5
MW-BW-23-A	12/3/2003	NA	< 0.5	< 0.5	7	0.87	< 0.5	< 0.5	< 10	< 0.5	< 0.5	2.5	< 0.5
MW-BW-23-A	3/8/2004	NA	< 0.5	< 0.5	6.2	0.69	< 0.5	< 0.5	< 10	< 0.5	< 0.5	2.3	< 0.5
MW-BW-23-A	4/13/2004	NA	NA	NA	6.1	0.83	< 0.5	NA	NA	NA	NA	NA	NA
MW-BW-23-A	5/28/2004	NA	< 0.5	< 0.5	5.4	0.58	< 0.5	< 0.5	< 10	< 0.5	< 0.5	1.9	< 0.5
MW-BW-23-A	7/13/2004	350	NA	NA	4.8	0.48	< 0.5	NA	NA	NA	NA	NA	NA
MW-BW-23-A	9/13/2004	NA	< 0.5	< 0.5	2.6	0.35	< 0.5	< 0.5	13	< 0.5	< 0.5	1	< 0.5
MW-BW-24-A	9/10/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-24-A	12/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-24-A	3/8/2004	NA	< 0.5	< 0.5	0.29	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-24-A	5/28/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-24-A	9/13/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-25-A	9/9/2003	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	7.3	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-25-A	12/3/2003	NA	< 0.5	< 0.5	0.92	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-25-A	3/3/2004	NA	< 0.5	< 0.5	1.3	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-25-A	5/25/2004	NA	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-25-A	9/13/2004	NA	< 0.5	< 0.5	1.6	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-26-A	9/9/2003	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	6.9	< 0.5	< 0.5	0.35	< 0.5

Table 1
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - A-Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Acetone	Bromo-dichloromethane	Bromoform	Carbon tetrachloride	Chloroform	Chloromethane	Dibromochloromethane	Methyl ethyl ketone (MEK)	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride
MW-BW-26-A	12/2/2003	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-26-A	3/4/2004	NA	< 0.5	< 0.5	0.96	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.31	< 0.5
MW-BW-26-A	5/26/2004	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.32	< 0.5
MW-BW-26-A	9/13/2004	NA	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.29	< 0.5
MW-BW-27-A	9/8/2003	NA	< 0.5	< 0.5	3.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-27-A	12/2/2003	NA	< 0.5	< 0.5	3.4	0.31	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-27-A	3/5/2004	NA	< 0.5	< 0.5	4.2	0.26	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.27	< 0.5
MW-BW-27-A	5/27/2004	NA	< 0.5	< 0.5	5	0.31	< 0.5	< 0.5	< 10	< 0.5	< 0.5	0.3	< 0.5
MW-BW-27-A	9/14/2004	NA	< 0.5	< 0.5	4.4	0.3	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-28-A	9/8/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	6.9	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-28-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-28-A	3/5/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-28-A	5/27/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-28-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-30-A	9/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-30-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-30-A	3/5/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-30-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-30-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-31-A	9/8/2003	NA	< 0.5	< 0.5	0.35	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-31-A	12/2/2003	NA	< 0.5	< 0.5	0.62	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-31-A	3/4/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-31-A	5/27/2004	NA	< 0.5	< 0.5	0.35	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-31-A	9/14/2004	NA	< 0.5	< 0.5	0.3	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-32-A	9/27/2003	NA	< 0.5	< 0.5	0.98	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-32-A	12/2/2003	NA	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-32-A	3/5/2004	NA	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-32-A	5/27/2004	NA	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-32-A	9/14/2004	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-34-A	9/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-34-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-34-A	3/4/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-34-A	5/27/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-34-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-35-A	9/8/2003	NA	< 0.5	< 0.5	1.1	0.28	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-35-A	12/2/2003	NA	< 0.5	< 0.5	0.87	0.26	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-35-A	3/4/2004	NA	< 0.5	< 0.5	0.66	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-35-A	5/27/2004	NA	< 0.5	< 0.5	0.97	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-35-A	9/14/2004	NA	< 0.5	< 0.5	0.68	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-36-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	0.41	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-36-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	0.42	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-36-A	3/4/2004	NA	< 0.5	< 0.5	< 0.5	0.4	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-36-A	5/27/2004	NA	< 0.5	< 0.5	< 0.5	0.42	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-36-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	0.41	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-38-A	9/27/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-38-A	12/2/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-38-A	3/4/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-38-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-38-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-39-A	3/4/2004	NA	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-39-A	5/27/2004	NA	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-39-A	9/14/2004	NA	< 0.5	< 0.5	0.49	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-42-A	9/9/2003	NA	< 0.5	< 0.5	3.4	< 0.5	< 0.5	< 0.5	7.2	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-42-A	12/2/2003	NA	< 0.5	< 0.5	3.2	< 0.5	< 0.5	< 0.5	6.6	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-42-A	3/4/2004	NA	< 0.5	< 0.5	2.8	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-42-A	5/27/2004	NA	< 0.5	< 0.5	2.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-42-A	9/14/2004	NA	< 0.5	< 0.5	2.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-43-A	9/9/2003	NA	< 0.5	< 0.5	0.57	< 0.5	< 0.5	< 0.5	6.9	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-43-A	12/2/2003	NA	< 0.5	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5

Table 1
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - A-Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Acetone	Bromo-dichloromethane	Bromoform	Carbon tetrachloride	Chloroform	Chloromethane	Dibromochloromethane	Methyl ethyl ketone (MEK)	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride
MW-BW-43-A	3/4/2004	NA	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-43-A	5/27/2004	NA	< 0.5	< 0.5	2	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-43-A	9/14/2004	NA	< 0.5	< 0.5	2.8	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-44-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	12	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-44-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-45-A	9/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-45-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-46-A	9/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-46-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-47-A	9/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-47-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-48-A	9/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-48-A	9/15/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-49-A	9/4/2003	NA	< 0.5	< 0.5	2.1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-49-A	12/2/2003	NA	< 0.5	< 0.5	2.8	0.29	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-49-A	3/4/2004	NA	< 0.5	< 0.5	1.8	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-49-A	5/26/2004	NA	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-49-A	9/15/2004	NA	< 0.5	< 0.5	4	0.27	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-50-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	0.86	< 0.5	< 0.5	< 0.5
MW-BW-50-A	12/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	0.95	< 0.5	< 0.5	< 0.5
MW-BW-50-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	0.65	< 0.5	< 0.5	< 0.5
MW-BW-50-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	0.83	< 0.5	< 0.5	< 0.5
MW-BW-50-A	9/9/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	0.87	< 0.5	< 0.5	< 0.5
MW-BW-51-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-51-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-51-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-51-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-51-A	9/9/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-52-A	9/9/2003	NA	< 0.5	< 0.5	0.88	0.37	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-52-A	12/4/2003	NA	< 0.5	< 0.5	1.1	0.36	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-52-A	3/3/2004	NA	< 0.5	< 0.5	1.4	0.37	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-52-A	5/26/2004	NA	< 0.5	< 0.5	1.2	0.33	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-52-A	9/9/2004	NA	< 0.5	< 0.5	1.3	0.33	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-53-A	9/10/2003	NA	< 0.5	< 0.5	15	1.8	< 0.5	< 0.5	13	< 0.5	< 0.5	6.4	< 0.5
MW-BW-53-A	12/3/2003	NA	< 0.5	< 0.5	13	1.6	< 0.5	< 0.5	< 10	< 0.5	< 0.5	4.7	< 0.5
MW-BW-53-A	3/8/2004	NA	< 0.5	< 0.5	12	1.8	< 0.5	< 0.5	< 10	< 0.5	< 0.5	4.9	< 0.5
MW-BW-53-A	5/28/2004	NA	< 0.5	< 0.5	14	1.7	< 0.5	< 0.5	< 10	< 0.5	< 0.5	5.3	< 0.5
MW-BW-53-A	9/9/2004	NA	< 0.5	< 0.5	13	1.6	< 0.5	< 0.5	< 10	< 0.5	< 0.5	4.9	< 0.5
MW-BW-54-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-54-A	9/9/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-55-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-55-A	12/4/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-55-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-55-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-55-A	9/10/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-56-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	12	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-56-A	12/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-56-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-56-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.34	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-56-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-57-A	9/9/2003	NA	2.4	6.7	0.76	0.95	< 0.5	5.6	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-57-A	12/5/2003	NA	2.7	9.3	0.88	0.94	< 0.5	7.9	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-57-A	3/3/2004	NA	2.5	3.3	0.76	0.9	< 0.5	4.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-57-A	5/25/2004	NA	2.4	0.72	0.64	0.82	< 0.5	1.9	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-57-A	9/14/2004	NA	2.6	< 0.5	0.85	1.1	< 0.5	0.89	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-58-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	9.3	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-58-A	12/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-58-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-58-A	5/26/2004	NA	0.36	< 0.5	< 0.5	0.26	< 0.5	0.51	< 10	< 0.5	< 0.5	< 0.5	< 0.5

Table 1
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - A-Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Acetone	Bromo-dichloromethane	Bromoform	Carbon tetrachloride	Chloroform	Chloromethane	Dibromochloromethane	Methyl ethyl ketone (MEK)	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride
MW-BW-58-A	9/15/2004	NA	0.49	< 0.5	< 0.5	0.42	< 0.5	0.77	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-59-A	9/9/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-59-A	12/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-59-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-59-A	5/25/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-59-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-60-A	9/10/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-60-A	12/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-60-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-60-A	5/25/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-60-A	9/14/2004	NA	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-61-A	9/18/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-61-A	12/3/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	0.43
MW-BW-61-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-61-A	5/26/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-61-A	9/13/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-62-A	9/18/2003	NA	< 0.5	< 0.5	0.26	0.28	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-62-A	12/4/2003	NA	< 0.5	< 0.5	0.43	0.34	< 0.5	< 0.5	< 10	0.3	< 0.5	< 0.5	< 0.5
MW-BW-62-A	3/2/2004	NA	< 0.5	< 0.5	0.45	0.27	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-62-A	7/28/2004	470	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	22	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-62-A	9/7/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-63-A	9/18/2003	NA	< 0.5	< 0.5	1	0.3	< 0.5	< 0.5	< 10	0.43	< 0.5	< 0.5	< 0.5
MW-BW-63-A	12/4/2003	NA	< 0.5	< 0.5	1.3	0.34	< 0.5	< 0.5	< 10	0.67	< 0.5	< 0.5	< 0.5
MW-BW-63-A	3/2/2004	NA	< 0.5	< 0.5	0.96	< 0.5	< 0.5	< 0.5	< 10	0.45	< 0.5	< 0.5	< 0.5
MW-BW-63-A	7/28/2004	260	< 0.5	< 0.5	1.3	0.27	< 0.5	< 0.5	18	0.61	< 0.5	< 0.5	< 0.5
MW-BW-63-A	9/7/2004	NA	< 0.5	< 0.5	0.95	< 0.5	< 0.5	< 0.5	< 10	0.67	< 0.5	< 0.5	< 0.5
MW-BW-64-A	9/5/2003	NA	< 0.5	< 0.5	1	0.42	0.32	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-64-A	12/4/2003	NA	< 0.5	< 0.5	1.1	0.43	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-64-A	3/8/2004	NA	< 0.5	< 0.5	0.8	0.37	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-64-A	5/28/2004	NA	< 0.5	< 0.5	0.84	0.37	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-64-A	9/10/2004	NA	< 0.5	< 0.5	0.77	0.41	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-65-A	9/5/2003	NA	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-65-A	12/2/2003	NA	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-65-A	3/4/2004	NA	< 0.5	< 0.5	0.66	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-65-A	5/26/2004	NA	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-65-A	9/15/2004	NA	< 0.5	< 0.5	1	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-66-A	9/5/2003	NA	< 0.5	< 0.5	3.1	0.82	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-66-A	12/3/2003	NA	< 0.5	< 0.5	1.9	0.65	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-66-A	3/3/2004	NA	< 0.5	< 0.5	1.8	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-66-A	5/27/2004	NA	< 0.5	< 0.5	3.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-66-A	9/14/2004	NA	< 0.5	< 0.5	4.4	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-67-A	9/5/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	8.7	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-67-A	12/3/2003	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-67-A	3/3/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-67-A	5/27/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-67-A	9/14/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-71-A	9/17/2004	NA	< 0.5	< 0.5	1.9	0.64	< 0.5	0.41	< 10	< 0.5	< 0.5	0.39	< 0.5
MW-BW-73-A	9/17/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-74-A	9/17/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-75-A	9/17/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 12	< 0.5	< 0.5	< 0.5	< 0.5
MW-BW-76-A	9/17/2004	NA	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 12	< 0.5	< 0.5	< 0.5	< 0.5
PS-CT-01	9/17/2003	NA	< 0.5	0.64	4.6	0.52	< 0.5	< 0.5	NA	< 0.5	< 0.5	1.2	< 0.5
PS-CT-01	10/31/2003	NA	< 0.5	< 0.5	4.6	0.58	< 0.5	< 0.5	NA	< 0.5	< 0.5	0.71	< 0.5
PS-CT-01	4/12/2004	NA	NA	NA	4.1	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-01	6/2/2004	NA	NA	NA	4.3	0.4	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-01	7/13/2004	150	NA	NA	4.5	0.42	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-02	10/31/2003	NA	< 0.5	< 0.5	4.6	< 0.5	< 0.5	< 0.5	NA	< 0.5	< 0.5	1.5	< 0.5
PS-CT-02	4/12/2004	NA	NA	NA	4	0.55	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-02	6/2/2004	NA	NA	NA	5.3	1.3	< 0.5	NA	NA	NA	NA	NA	NA

Table 1
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - A-Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Acetone	Bromo-dichloromethane	Bromoform	Carbon tetrachloride	Chloroform	Chloromethane	Dibromochloromethane	Methyl ethyl ketone (MEK)	Tetrachloroethene	Toluene	Trichloroethene	Vinyl chloride
PS-CT-02	7/13/2004	120	NA	NA	4.8	0.87	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-03	10/31/2003	NA	< 0.5	< 0.5	11	1.5	< 0.5	< 0.5	NA	< 0.5	< 0.5	3.3	< 0.5
PS-CT-03	4/12/2004	NA	NA	NA	10	1.4	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-03	6/2/2004	NA	NA	NA	8.6	1.1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-03	7/13/2004	190	NA	NA	11	1.4	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-04	10/31/2003	NA	< 0.5	0.85	7	0.87	< 0.5	< 0.5	NA	< 0.5	< 0.5	2	< 0.5
PS-CT-04	4/12/2004	NA	NA	NA	7.7	0.94	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-04	6/2/2004	NA	NA	NA	8.2	0.82	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-04	7/13/2004	120	NA	NA	10	1.9	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-05	10/31/2003	NA	< 0.5	< 0.5	8.3	1	< 0.5	< 0.5	NA	< 0.5	< 0.5	2.5	< 0.5
PS-CT-05	4/12/2004	NA	NA	NA	7.6	1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-05	6/2/2004	NA	NA	NA	7.2	0.92	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-05	7/13/2004	210	NA	NA	9.5	1.7	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-06	10/31/2003	NA	< 0.5	< 0.5	7.7	1	< 0.5	< 0.5	NA	< 0.5	< 0.5	2.3	< 0.5
PS-CT-06	4/12/2004	NA	NA	NA	6.6	1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-06	6/2/2004	NA	NA	NA	7.9	1.1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-06	7/13/2004	130	NA	NA	8	1.1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-07	10/31/2003	NA	< 0.5	< 0.5	10	1.1	< 0.5	< 0.5	NA	< 0.5	< 0.5	3.1	< 0.5
PS-CT-07	4/12/2004	NA	NA	NA	7.9	1.2	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-07	6/2/2004	NA	NA	NA	9.4	1.2	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-07	7/13/2004	130	NA	NA	8.3	1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-08	10/31/2003	NA	< 0.5	< 0.5	12	1.3	< 0.5	< 0.5	NA	< 0.5	< 0.5	4.1	< 0.5
PS-CT-08	4/12/2004	NA	NA	NA	12	1.4	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-08	6/2/2004	NA	NA	NA	11	1.3	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-08	7/13/2004	72	NA	NA	9.9	1.2	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-09	10/31/2003	NA	< 0.5	< 0.5	10	1.3	< 0.5	< 0.5	NA	< 0.5	< 0.5	3.8	< 0.5
PS-CT-09	4/12/2004	NA	NA	NA	8.3	1	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-09	6/2/2004	NA	NA	NA	5.7	0.67	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-09	7/13/2004	220	NA	NA	3.7	0.36	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-IW	10/31/2003	NA	< 0.5	< 0.5	3.5	< 0.5	< 0.5	< 0.5	NA	< 0.5	< 0.5	0.66	< 0.5
PS-CT-IW	4/12/2004	NA	NA	NA	4.4	0.54	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-IW	6/2/2004	NA	NA	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA
PS-CT-IW	7/13/2004	110	NA	NA	< 0.5	< 0.5	< 0.5	NA	NA	NA	NA	NA	NA

Abbreviations:
ND(#) = Not detected above reporting limit.
NA = Not analyzed.

Footnotes:
[a] All analytes in micrograms per liter (ug/L). Samples were analyzed by United States Environmental Protection Agency (EPA) Method 8260B. Only Detected analytes listed.

Checked: AHM

Approved: GD

Table 2
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - Upper 180 Foot Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	1,2-DCA	Carbon tetrachloride	Chloroform	Chloro methane	MEK	Vinyl chloride	Xylenes
MP-BW-37-178	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-178	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-178	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-178	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-178	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-193	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-193	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-193	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-193	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-37-193	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-170	8/25/2003	< 0.5	2	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-170	12/9/2003	< 0.5	1	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-170	3/4/2004	< 0.5	1.1	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-170	6/3/2004	< 0.5	1.7	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-170	9/15/2004	< 0.5	2.4	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-185	8/25/2003	< 0.5	1.2	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-185	12/9/2003	< 0.5	2.3	0.26	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-185	3/4/2004	< 0.5	2.1	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-185	6/3/2004	< 0.5	1.6	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-185	9/15/2004	< 0.5	0.74	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-200	8/25/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-200	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-200	3/4/2004	< 0.5	0.86	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-200	6/3/2004	< 0.5	0.79	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-200	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-215	8/25/2003	< 0.5	0.65	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-215	12/9/2003	< 0.5	0.38	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-215	3/4/2004	< 0.5	0.43	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-215	6/3/2004	< 0.5	0.53	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MP-BW-46-215	9/15/2004	< 0.5	0.41	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-B-13-180	9/5/2003	< 0.5	3.2	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-B-13-180	5/27/2004	< 0.5	2.9	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-B-13-180	9/14/2004	< 0.5	2.7	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-19-180R	9/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-19-180R	12/2/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-19-180R	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-19-180R	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-19-180R	9/17/2004	< 0.5	< 0.5	< 0.5	< 0.5	NA	< 0.5	< 0.5
MW-BW-21-180	9/5/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-21-180	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-22-180	9/9/2003	< 0.5	3.3	0.28	< 0.5	< 10	< 0.5	< 0.5
MW-BW-22-180	12/4/2003	< 0.5	3.4	0.28	< 0.5	< 10	< 0.5	< 0.5
MW-BW-22-180	3/4/2004	< 0.5	3	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-22-180	5/26/2004	< 0.5	4.1	0.26	< 0.5	< 10	< 0.5	< 0.5
MW-BW-22-180	9/13/2004	< 0.5	3.2	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-25-180	9/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-25-180	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-26-180	9/9/2003	< 0.5	3.7	0.37	< 0.5	5.5	< 0.5	< 0.5
MW-BW-26-180	12/2/2003	< 0.5	3.2	0.29	< 0.5	< 10	< 0.5	< 0.5
MW-BW-26-180	3/4/2004	< 0.5	2.7	0.28	< 0.5	< 10	< 0.5	< 0.5
MW-BW-26-180	5/26/2004	< 0.5	2.9	0.27	< 0.5	< 10	< 0.5	< 0.5
MW-BW-26-180	9/13/2004	< 0.5	2.3	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-29-180	9/8/2003	0.28	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-29-180	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-43-180	9/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	5.7	< 0.5	< 0.5
MW-BW-43-180	12/3/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-43-180	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-43-180	5/25/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-43-180	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-44-180	9/10/2003	< 0.5	0.75	< 0.5	< 0.5	5.9	< 0.5	< 0.5
MW-BW-44-180	12/3/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-44-180	3/3/2004	< 0.5	0.46	< 0.5	< 0.5	< 10	< 0.5	0.71
MW-BW-44-180	5/25/2004	< 0.5	0.72	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-44-180	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-47-180	9/10/2003	< 0.5	0.68	< 0.5	< 0.5	6.5	< 0.5	< 0.5
MW-BW-47-180	12/3/2003	< 0.5	1.2	0.25	< 0.5	< 10	< 0.5	< 0.5
MW-BW-47-180	3/3/2004	< 0.5	0.57	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-47-180	5/26/2004	< 0.5	0.55	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-47-180	9/10/2004	< 0.5	0.47	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-49-180	9/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5

Table 2

Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - Upper 180 Foot Aquifer [a]

Volume II: Human Health Risk Assessment

Operable Unit Carbon Tetrachloride Plume

Fort Ord, California

Location	Date	1,2-DCA	Carbon tetrachloride	Chloroform	Chloro methane	MEK	Vinyl chloride	Xylenes
MW-BW-49-180	12/3/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-49-180	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	21	< 0.5	< 0.5
MW-BW-50-180	8/5/2003	< 0.5	< 0.5	< 0.5	< 0.5	NA	< 0.5	< 0.5
MW-BW-50-180	9/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	8.2	< 0.5	< 0.5
MW-BW-50-180	12/3/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-50-180	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-50-180	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-50-180	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-51-180	9/10/2003	< 0.5	6.2	0.34	< 0.5	5.4	< 0.5	< 0.5
MW-BW-51-180	12/3/2003	< 0.5	1.7	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-51-180	3/8/2004	< 0.5	0.96	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-51-180	5/28/2004	< 0.5	0.71	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-51-180	9/9/2004	< 0.5	0.29	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-52-180	9/10/2003	< 0.5	2.2	0.42	< 0.5	6.1	< 0.5	< 0.5
MW-BW-52-180	12/3/2003	< 0.5	3.3	0.38	< 0.5	< 10	< 0.5	< 0.5
MW-BW-52-180	3/8/2004	< 0.5	3.7	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-52-180	5/28/2004	< 0.5	4.4	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-52-180	9/10/2004	< 0.5	3.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-53-180	9/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	7.7	< 0.5	< 0.5
MW-BW-53-180	12/3/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-53-180	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-53-180	5/28/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-53-180	9/10/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-54-180	8/5/2003	< 0.5	< 0.5	< 0.5	0.28	NA	< 0.5	< 0.5
MW-BW-54-180	9/8/2003	< 0.5	< 0.5	< 0.5	0.25	7.9	0.37	< 0.5
MW-BW-54-180	12/4/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-54-180	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-54-180	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-54-180	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-55-180	8/5/2003	< 0.5	< 0.5	< 0.5	0.27	NA	< 0.5	< 0.5
MW-BW-55-180	9/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	9.6	< 0.5	< 0.5
MW-BW-55-180	12/4/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-55-180	3/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-55-180	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-55-180	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-56-180	8/5/2003	< 0.5	1.1	< 0.5	< 0.5	NA	< 0.5	< 0.5
MW-BW-56-180	9/11/2003	< 0.5	1.3	< 0.5	< 0.5	10	< 0.5	< 0.5
MW-BW-56-180	12/4/2003	< 0.5	0.92	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-56-180	3/9/2004	< 0.5	0.47	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-56-180	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 10	< 0.5	< 0.5
MW-BW-56-180	9/10/2004	< 0.5	1.1	< 0.5	< 0.5	< 10	< 0.5	< 0.5

Abbreviations:

ND(#) = Not detected above reporting limit.

NA = Not analyzed.

Checked: [signature]

Footnotes:

[a] All analytes in micrograms per liter (ug/L). Samples were analyzed by United States Environmental Protection Agency (EPA) Method 8260B. Only Detected analytes listed.

Approved: [signature]

Table 3

Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - Lower 180 - 400 Foot Aquifer [a]

Volume II: Human Health Risk Assessment

Operable Unit Carbon Tetrachloride Plume

Fort Ord, California

Location	Date	1,2-DCA	Bromo dichloromethane	Carbon tetrachloride	Chloroethane	Chloroform	Ethylbenzene		PCE	Toluene	Vinyl chloride	Xylenes
Airfield	9/8/2003	< 0.5	< 0.5	1.6	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Airfield	12/4/2003	< 0.5	< 0.5	2.1	< 0.5	0.45	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Airfield	3/24/2004	< 0.5	< 0.5	1.8	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Airfield	9/14/2004	< 0.5	< 0.5	1.7	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MCWD-08A	9/5/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MCWD-08A	12/2/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MCWD-08A	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MCWD-08A	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MCWD-08A	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Mini-Storage	9/9/2003	< 0.5	< 0.5	3.7	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Mini-Storage	12/10/2003	< 0.5	< 0.5	4	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Mini-Storage	3/10/2004	< 0.5	< 0.5	4	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Mini-Storage	6/3/2004	< 0.5	< 0.5	4.4	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
Mini-Storage	9/15/2004	< 0.5	< 0.5	3.6	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-317	8/20/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-317	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-342	8/20/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-342	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-397	8/20/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-30-397	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-292	8/19/2003	< 0.5	< 0.5	0.47	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-292	12/8/2003	< 0.5	< 0.5	0.25	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-292	3/3/2004	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-292	5/26/2004	< 0.5	< 0.5	1.2	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-292	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-332	8/19/2003	< 0.5	< 0.5	1.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-332	12/8/2003	< 0.5	< 0.5	2.1	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-332	3/3/2004	< 0.5	< 0.5	1.7	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-332	5/26/2004	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-332	9/14/2004	< 0.5	< 0.5	1.4	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-362	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-362	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-362	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-362	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-362	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-407	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-407	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-407	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-407	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-31-407	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-332	8/18/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-332	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-332	3/3/2004	< 0.5	< 0.5	0.27	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-332	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-332	9/17/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-366	8/18/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-366	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-366	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-366	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-366	9/17/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-412	8/18/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-412	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-412	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-412	5/26/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-32-412	9/17/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-33-317	8/20/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-33-317	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-33-352	8/20/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-33-352	9/15/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-33-397	8/20/2003	< 0.5	< 0.5	< 0.5	0.37	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.47	< 0.5
MP-BW-33-397	9/15/2004	< 0.5	< 0.5	< 0.5	0.8	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-292	8/21/2003	< 0.5	< 0.5	0.41	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-292	12/9/2003	< 0.5	< 0.5	0.25	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-292	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-292	6/1/2004	< 0.5	< 0.5	0.44	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-292	9/13/2004	< 0.5	< 0.5	0.38	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-357	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-357	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-357	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-357	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-357	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-422	8/21/2003	< 0.5	< 0.5	0.28	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-422	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-422	3/3/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-422	6/1/2004	< 0.5	< 0.5	0.39	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-34-422	9/13/2004	< 0.5	< 0.5	0.31	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-312	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-312	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5

Table 3

Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - Lower 180 - 400 Foot Aquifer [a]

Volume II: Human Health Risk Assessment

Operable Unit Carbon Tetrachloride Plume

Fort Ord, California

Location	Date	1,2-DCA	Bromo dichloromethane	Carbon tetrachloride	Chloroethane	Chloroform	Ethylbenzene		PCE	Toluene	Vinyl chloride	Xylenes
MP-BW-35-312	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-312	5/28/2004	< 0.5	< 0.5	< 0.5	< 1	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-312	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-366	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-366	12/10/2003	< 0.5	< 0.5	0.33	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-366	3/4/2004	< 0.5	< 0.5	0.31	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-366	5/28/2004	< 0.5	< 0.5	0.71	< 1	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-366	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-402	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-402	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-402	3/4/2004	< 0.5	< 0.5	0.32	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-402	5/28/2004	< 0.5	< 0.5	0.28	< 1	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-402	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-467	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-35-467	9/13/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-303	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-303	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	0.25	< 0.5	< 0.5	< 0.5
MP-BW-37-303	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	0.51	< 0.5	0.61	0.55
MP-BW-37-303	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-303	9/14/2004	< 0.5	< 0.5	0.41	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-328	8/19/2003	< 0.5	< 0.5	3.1	< 0.5	0.36	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-328	12/8/2003	< 0.5	< 0.5	2.6	< 0.5	0.42	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-328	3/4/2004	< 0.5	< 0.5	2.2	< 0.5	0.51	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-328	5/27/2004	< 0.5	0.26	2.8	< 0.5	0.43	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-328	9/14/2004	< 0.5	< 0.5	3	< 0.5	0.4	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-368	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-368	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-368	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.3	< 0.5
MP-BW-37-368	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-368	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-398	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-398	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-398	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-398	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-398	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-460	8/19/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.38	< 0.5	< 0.5
MP-BW-37-460	12/8/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-460	3/4/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-460	5/27/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-37-460	9/14/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-327	8/25/2003	1.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.27	1.3	< 0.5
MP-BW-38-327	12/10/2003	0.31	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.64	< 0.5
MP-BW-38-327	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.54	< 0.5
MP-BW-38-327	6/2/2004	0.41	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.59	< 0.5
MP-BW-38-327	9/9/2004	1.2	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.95	< 0.5
MP-BW-38-341	8/25/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.35	0.37	< 0.5
MP-BW-38-341	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.66	< 0.5
MP-BW-38-341	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.35	< 0.5
MP-BW-38-341	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.33	< 0.5
MP-BW-38-341	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.55	< 0.5
MP-BW-38-353	8/25/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.25	0.25	< 0.5
MP-BW-38-353	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.51	1.9	< 0.5
MP-BW-38-353	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.43	< 0.5
MP-BW-38-353	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.25	< 0.5
MP-BW-38-353	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.27	< 0.5
MP-BW-38-368	8/25/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	1.2	< 0.5	0.32
MP-BW-38-368	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-368	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-368	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.28	< 0.5	< 0.5
MP-BW-38-368	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-418	8/25/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-418	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.26	< 0.5
MP-BW-38-418	3/5/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.31	< 0.5
MP-BW-38-418	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-38-418	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-310	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-310	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-310	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-310	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.35	< 0.5
MP-BW-39-310	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-330	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.38	< 0.5
MP-BW-39-330	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.34	< 0.5
MP-BW-39-330	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.29	< 0.5
MP-BW-39-330	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-330	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-350	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.36	< 0.5
MP-BW-39-350	12/9/2003	0.38	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.75	< 0.5
MP-BW-39-350	3/8/2004	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.73	< 0.5

Table 3
Risk Assessment Data Set of Volatile Organic Compounds (VOCs) in Groundwater - Lower 180 - 400 Foot Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	1,2-DCA	Bromo dichloromethane	Carbon tetrachloride	Chloroethane	Chloroform	Ethylbenzene		PCE	Toluene	Vinyl chloride	Xylenes
MP-BW-39-350	6/1/2004	0.25	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.4	< 0.5
MP-BW-39-350	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.6	< 0.5
MP-BW-39-395	8/21/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.48	< 0.5
MP-BW-39-395	12/9/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.28	< 0.5
MP-BW-39-395	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	0.34	0.3	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-395	6/1/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-39-395	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.32	< 0.5
MP-BW-40-333	8/22/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	0.48	0.39	< 0.5
MP-BW-40-333	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.43	< 0.5
MP-BW-40-333	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.32	< 0.5
MP-BW-40-333	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.3	< 0.5
MP-BW-40-333	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	0.47	< 0.5
MP-BW-40-353	8/22/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-353	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-353	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-353	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-353	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-375	8/22/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-375	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-375	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-375	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-375	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-400	8/22/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-400	12/10/2003	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-400	3/8/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-400	6/2/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5
MP-BW-40-400	9/9/2004	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	ND	< 0.5	< 0.5	< 0.5	< 0.5

Abbreviations:
ND(#) = Not detected above reporting limit.
NA = Not analyzed.

Footnotes:
[a] All analytes in micrograms per liter (ug/L).
Samples were analyzed by United States
Environmental Protection Agency (EPA)
Method 8260B. Only Detected analytes listed.

Checked: DM

Approved: GB

Table 4
Risk Assessment Data Set of Volatile Organic Compounds (VOCs)
in Groundwater - 400 Foot Aquifer [a]
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Location	Date	Vinyl chloride
MP-BW-30-467	8/20/2003	0.33
MP-BW-30-467	9/15/2004	0.48
MP-BW-30-537	8/20/2003	< 0.5
MP-BW-30-537	9/15/2004	< 0.5
MP-BW-31-457	8/19/2003	< 0.5
MP-BW-31-457	9/14/2004	< 0.5
MP-BW-31-522	8/19/2003	< 0.5
MP-BW-31-522	9/14/2004	< 0.5
MP-BW-32-472	8/18/2003	< 0.5
MP-BW-32-472	9/17/2004	< 0.5
MP-BW-32-522	8/18/2003	< 0.5
MP-BW-32-522	9/17/2004	< 0.5
MP-BW-34-492	8/21/2003	0.25
MP-BW-34-492	9/13/2004	0.29
MP-BW-34-537	8/21/2003	< 0.5
MP-BW-34-537	9/13/2004	< 0.5
MP-BW-35-527	8/21/2003	< 0.5
MP-BW-35-527	9/13/2004	< 0.5
MP-BW-35-562	8/21/2003	< 0.5
MP-BW-35-562	9/13/2004	< 0.5

Abbreviations:

ND(#) = Not detected above reporting limit.

NA = Not analyzed.

Footnotes:

[a] All analytes in micrograms per liter (ug/L). Samples were analyzed by United States Environmental Protection Agency (EPA) Method 8260B. Only Detected analytes listed.

Checked: ______

Approved:

Table 5
Selection of Chemicals of Potential Concern (COPCs) for Groundwater
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Analytes	Minimum Detected Value (µg/L)	Maximum Detected Value (µg/L)	Number of Detections	Number of Analyses	Frequency of Detection (FOD) (%)	Is the Frequency of Detection Greater than 2.5%?	Is the Chemical Selected As a COPC?
A-Aquifer							
1,2-Dichloroethane	--	--	--	--	--	--	--
Acetone [a]	7.2E+01	4.7E+02	13	13	100.0%	Yes	No
Bromodichloromethane	**3.6E-01**	**2.7E+00**	**12**	**242**	**5.0%**	**Yes**	**Yes**
Bromoform	6.4E-01	9.3E+00	5	242	2.1%	No	No
Carbon Tetrachloride	**2.6E-01**	**1.5E+01**	**161**	**274**	**58.8%**	**Yes**	**Yes**
Chloroethane	--	--	--	--	--	--	--
Chloroform	**2.5E-01**	**1.9E+00**	**101**	**274**	**36.9%**	**Yes**	**Yes**
Chloromethane	2.5E-01	3.2E-01	2	274	0.7%	No	No
Dibromochloromethane	**3.4E-01**	**7.9E+00**	**10**	**242**	**4.1%**	**Yes**	**Yes**
Ethylbenzene	--	--	--	--	--	--	--
Methyl Ethyl Ketone (MEK) [b]	6.0E+00	2.2E+01	17	231	7.4%	Yes	No
Tetrachloroethene	**2.5E-01**	**9.5E-01**	**12**	**242**	**5.0%**	**Yes**	**Yes**
Toluene	7.6E-01	7.6E-01	1	242	0.4%	No	No
Trichloroethene	**2.7E-01**	**6.4E+00**	**41**	**242**	**16.9%**	**Yes**	**Yes**
Vinyl Chloride	4.3E-01	4.3E-01	1	242	0.4%	No	No
Xylenes	--	--	--	--	--	--	--
Upper 180 Foot - Aquifer							
1,2-Dichloroethane	2.8E-01	2.8E-01	1	111	0.9%	No	No
Acetone	--	--	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	--	--
Bromoform	--	--	--	--	--	--	--
Carbon Tetrachloride	**2.9E-01**	**6.2E+00**	**53**	**111**	**47.7%**	**Yes**	**Yes**
Chloroethane	--	--	--	--	--	--	--
Chloroform	**2.5E-01**	**4.2E-01**	**12**	**111**	**10.8%**	**Yes**	**Yes**
Chloromethane	**2.5E-01**	**2.8E-01**	**3**	**111**	**2.7%**	**Yes**	**Yes**
Dibromochloromethane	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--
Methyl Ethyl Ketone (MEK) [b]	5.4E+00	2.1E+01	12	106	11.3%	Yes	No
Tetrachloroethene	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--
Trichloroethene	--	--	--	--	--	--	--
Vinyl Chloride	3.7E-01	3.7E-01	1	111	0.9%	No	No
Xylenes	7.1E-01	7.1E-01	1	111	0.9%	No	No
Lower 180 - 400 Foot - Aquifer							
1,2-Dichloroethane	**2.5E-01**	**1.7E+00**	**7**	**183**	**3.8%**	**Yes**	**Yes**
Acetone	--	--	--	--	--	--	--
Bromodichloromethane	2.6E-01	2.6E-01	1	183	0.5%	No	No
Bromoform	--	--	--	--	--	--	--
Carbon Tetrachloride	**2.5E-01**	**4.4E+00**	**37**	**183**	**20.2%**	**Yes**	**Yes**
Chloroethane	3.7E-01	8.0E-01	2	183	1.1%	No	No
Chloroform	**3.6E-01**	**5.1E-01**	**5**	**183**	**2.7%**	**Yes**	**Yes**
Chloromethane	--	--	--	--	--	--	--
Dibromochloromethane	--	--	--	--	--	--	--
Ethylbenzene	3.4E-01	3.4E-01	1	183	0.5%	No	No
Methyl Ethyl Ketone (MEK)	--	--	--	--	--	--	--
Tetrachloroethene	2.5E-01	5.1E-01	2	183	1.1%	No	No
Toluene	**2.5E-01**	**1.2E+00**	**8**	**183**	**4.4%**	**Yes**	**Yes**
Trichloroethene	--	--	--	--	--	--	--
Vinyl Chloride [c]	2.5E-01	1.9E+00	37	183	20.2%	Yes	No
Xylenes	3.2E-01	5.5E-01	2	183	1.1%	No	No
400 Foot-Aquifer							
1,2-Dichloroethane	--	--	--	--	--	--	--
Acetone	--	--	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	--	--
Bromoform	--	--	--	--	--	--	--
Carbon Tetrachloride	--	--	--	--	--	--	--
Chloroethane	--	--	--	--	--	--	--
Chloroform	--	--	--	--	--	--	--
Chloromethane	--	--	--	--	--	--	--
Dibromochloromethane	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--
Methyl Ethyl Ketone (MEK)	--	--	--	--	--	--	--
Tetrachloroethene	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	--
Trichloroethene	--	--	--	--	--	--	--
Vinyl Chloride [c]	2.5E-01	4.8E-01	4	20	20.0%	No	No
Xylenes	--	--	--	--	--	--	--

Abbreviations:
µg/L = Micrograms per liter.
-- = Not applicable.
Bold analytes are chemicals of potential concern and further evaluated.

Checked:

Footnotes:

[a] Acetone is considered a false positive and appears to be from the passive diffusion bags (Section 2.2).

[b] MEK is considered a false positive and appears to be from the hardware used to collect the samples (Section 2.2).

[c] Vinyl chloride is only detected in Westbay wells within the Lower 180-400 Foot-Aquifer and 400 Foot-Aquifer. The Westbay well detections are believed to be associated with the off-gassing of the PVC casing (Section 2.2).

Approved:

Table 6
Exposure Point Concentrations for Groundwater
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemicals of Concern	Minimum Detected Value (µg/L)	Maximum Detected Value (µg/L)	Number of Detections	Number of Analyses	Frequency of Detection (FOD) (%)	Arithmetic Average (µg/L)	Standard Deviation (µg/L)	W-test for Normality (µg/L)	W-test for Log-normality (µg/L)	Arithmetic 95% UCL on the mean (µg/L)	95% UCL by Land's Method (µg/L)	Bootstrap Estimate of the 95% UCL (µg/L)	Exposure Point Concentration (EPC)[a] (µg/L)	Basis for EPC
A-Aquifer														
Bromodichloromethane	3.6E-01	2.7E+00	12	242	5.0%	3.3E-01	3.8E-01	Failed	Failed	3.7E-01	3.1E-01	3.6E-01	3.6E-01	Bootstrap 95%UCL
Carbon Tetrachloride	2.6E-01	1.5E+01	161	274	58.8%	2.6E+00	3.5E+00	Failed	Failed	2.9E+00	3.2E+00	2.9E+00	2.9E+00	Bootstrap 95%UCL
Chloroform	2.5E-01	1.9E+00	101	274	36.9%	4.6E-01	3.7E-01	Failed	Failed	4.9E-01	4.7E-01	4.9E-01	4.9E-01	Bootstrap 95%UCL
Dibromochloromethane	3.4E-01	7.9E+00	10	242	4.1%	3.4E-01	6.7E-01	Failed	Failed	4.1E-01	3.1E-01	3.9E-01	3.9E-01	Bootstrap 95%UCL
Tetrachloroethene	2.5E-01	9.5E-01	12	242	5.0%	2.7E-01	9.6E-02	Failed	Failed	2.8E-01	2.7E-01	2.8E-01	2.8E-01	Bootstrap 95%UCL
Trichloroethene	2.7E-01	6.4E+00	41	242	16.9%	5.3E-01	9.1E-01	Failed	Failed	6.3E-01	4.7E-01	6.1E-01	6.1E-01	Bootstrap 95%UCL
Upper 180 Foot - Aquifer														
Carbon Tetrachloride	2.9E-01	6.2E+00	53	111	47.7%	1.0E+00	1.2E+00	Failed	Failed	1.2E+00	1.2E+00	1.2E+00	1.2E+00	Bootstrap 95%UCL
Chloroform	2.5E-01	4.2E-01	12	111	10.8%	2.6E-01	2.5E-02	Failed	Failed	2.6E-01	2.6E-01	2.6E-01	2.6E-01	Bootstrap 95%UCL
Chloromethane	2.5E-01	2.8E-01	3	111	2.7%	2.5E-01	3.4E-03	Failed	Failed	2.5E-01	2.5E-01	1.0E+35	2.8E-01	Maximum
Lower 180 - 400 Foot - Aquifer														
1,2-Dichloroethane	2.5E-01	1.7E+00	7	183	3.8%	2.7E-01	1.3E-01	Failed	Failed	2.8E-01	2.7E-01	2.8E-01	2.8E-01	Bootstrap 95%UCL
Carbon Tetrachloride	2.5E-01	4.4E+00	37	183	20.2%	5.1E-01	7.8E-01	Failed	Failed	6.1E-01	4.7E-01	6.0E-01	6.0E-01	Bootstrap 95%UCL
Chloroform	3.6E-01	5.1E-01	5	183	2.7%	2.6E-01	3.3E-02	Failed	Failed	2.6E-01	2.6E-01	2.6E-01	2.6E-01	Bootstrap 95%UCL
Toluene	2.5E-01	1.2E+00	8	183	4.4%	2.6E-01	7.5E-02	Failed	Failed	2.7E-01	2.6E-01	2.7E-01	2.7E-01	Bootstrap 95%UCL

Abbreviations:
µg/L = Microgams per liter.
95% UCL = 95 Percent upper confidence limit.

Footnotes:
[a] EPC selected as follows:
- If W-test for normality did not fail, data set assumed to be normally distributed. EPC is the lesser of the Arithmetic 95% UCL and the maximum detected value.
- If W-test for normality failed and W-test for log-normality did not fail, data set assumed to be log-normally distributed. EPC is the lesser of the Land's 95% UCL and the maximum detected value.
- If both the W-test for normality failed and W-test for log-normality failed, data set assumed to be neither normally nor log-normally distributed. EPC is the lesser of the Bootstrap 95% UCL and the maximum detected value.

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Table 7
Concentration of Contaminant in Air While Showering
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemicals of Potential Concern (COPCs)	Henry's law constant [a] (Pa-L/mol) H	diffusion coefficient in pure air (m2/d) D_{air}	Diffusion Coefficient In Pure Air [a] (m^2/sec) D_{air}	Diffusion Coefficient In Pure Water [a] (m^2/sec) D_{water}	Universal Gas Constant (Pa-L/mol-K) R	Temperature [b] (Kelvin) T	Mass Transfer Efficiency [c] (unitless) ϕ(bath)	Fraction of Tap Water from groundwater [a] (unitless) fq	Water Use Rate [a] (L/hour) W_{bath}	Ventilation Rate [a] (m^3/hour) VR_{bath}	Transfer Factor [d] (L/m^3) TF	Groundwater Exposure Point Concentration [e] (µg/L) EPC_{gw}	Air Exposure Point Concentration Adjusted [f] (µg/m^3) EPC_{air}
A-Aquifer													
Bromodichloromethane	1.8E+05	2.6E-01	3.0E-06	1.1E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.7E-11	3.6E-01	2.8E-11
Carbon tetrachloride	2.7E+06	6.7E-01	7.8E-06	1.0E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.4E-11	2.9E+00	2.1E-10
Chloroform	4.3E+05	9.0E-01	1.0E-05	1.1E-09	8.3E+03	3.1E+02	1.3E-11	0.8	480	60	8.0E-11	4.9E-01	3.9E-11
Dibromochloroethane	--	2.3E-03	2.6E-08	1.4E-11	8.3E+03	3.1E+02	--	0.8	480	60	--	3.9E-01	--
Tetrachloroethene	1.5E+06	6.6E-01	7.6E-06	1.0E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.5E-11	2.8E-01	2.1E-11
Trichloroethene	8.9E+05	6.8E-01	7.9E-06	1.0E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.6E-11	6.1E-01	4.6E-11
Upper 180 Foot - Aquifer													
Carbon tetrachloride	2.7E+06	6.7E-01	7.8E-06	1.0E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.4E-11	1.2E+00	8.8E-11
Chloroform	4.3E+05	9.0E-01	1.0E-05	1.1E-09	8.3E+03	3.1E+02	1.3E-11	0.8	480	60	8.0E-11	2.6E-01	2.1E-11
Chloromethane	8.3E+05	1.1E+00	1.3E-05	1.6E-09	8.3E+03	3.1E+02	1.6E-11	0.8	480	60	1.0E-10	2.8E-01	2.9E-11
Lower 180 - 400 Foot - Aquifer													
1,2-Dichloroethane	1.2E+05	7.4E-01	8.6E-06	1.1E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.8E-11	2.8E-01	2.2E-11
Carbon tetrachloride	2.7E+06	6.7E-01	7.8E-06	1.0E-09	8.3E+03	3.1E+02	1.2E-11	0.8	480	60	7.4E-11	6.0E-01	4.4E-11
Chloroform	4.3E+05	9.0E-01	1.0E-05	1.1E-09	8.3E+03	3.1E+02	1.3E-11	0.8	480	60	8.0E-11	2.6E-01	2.1E-11
Toluene	6.6E+05	7.5E-01	8.7E-06	9.8E-10	8.3E+03	3.1E+02	1.1E-11	0.8	480	60	7.3E-11	2.7E-01	1.9E-11

Abbreviations:
Pa-L/mol = Pascals-liter per mole.
m^2/sec = Meters squared per second.
Pa-L/mol-kelvin= Pascals-liter per moles kelvin.
L/hour = Liters per hour.
m^3/hour = Cubic meters per hour.
L/m^3 = Liters per cubic meter.
µg/L = Micrograms per liter.
µg/m^3 = Micrograms per cubic meter.

Footnotes:
[a] Values from CalEPA, 1993.
[b] Temperature based on a shower/bathing water at 40 degrees Celsius.
[c] $\phi(bath) = 0.6 \times ((3E10^{4}(m^2/s)^{-2/3})/((2.5/D_l^{2/3})+((R \times T)/(h \times D_a^{2/3}))))$
[d] TF (q→ $bath_{air}$) = $f_q \times ((W_{bath} \times \phi_s(bath))/VR_{bath})$
[e] From Table 6.
[f] EPC_{air} = TF x EPC_{gw}

References:
California Environmental Protection Agency (CalEPA). 1993. CalTOX, A Multimedia Total Exposure Model For Hazardous Waste Sites; Part III: The Multiple Pathway Exposure Model. Department of Toxic Substance Control. December.

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Table 8
Exposure Parameters
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Exposure Parameter	Adult Resident	Source	Child Resident	Source
Inhalation Pathway				
EPC = Exposure point concentration in air ($\mu g/m^3$)	chemical specific	Tables 7	chemical specific	Tables 7
CF = Conversion factor (mg/µg)	0.001	--	0.001	--
IR_{inh} = Inhalation Rate (m^3/hour)	0.83	Adult: EPA, 1991a; CalEPA, 1992	0.42	Average child aged 6-8 years (EPA, 1997a)
ET = Exposure Time (hours/day)	0.58	RME scenario; EPA, 2004b	1	RME scenario; EPA, 2004b
	0.25	AE scenario; EPA, 2004b	0.33	AE scenario; EPA, 2004b
EF = Exposure Frequency (days/year)	350	EPA 1991a; CalEPA, 1992	350	EPA 1991a; CalEPA, 1992
ED = Exposure Duration (years)	24	RME scenario; EPA, 1991a; CalEPA, 1992	6	RME scenario; EPA, 1991a; CalEPA, 1992
	9	AE scenario; EPA, 2004b	6	AE scenario
BW = Body Weight (kilograms)	70	EPA, 1989; CalEPA, 1992	15	EPA, 1991a; CalEPA, 1992
AT = Averaging Time (days)				
- AT_{nc} for noncarcinogens	8,760	RME scenario (24 years x 365 days/year)	2,190	RME scenario (6 years x 365 days/year)
	3,285	AE scenario (9 years x 365 days/year)	2,190	AE scenario (6 years x 365 days/year)
- AT_c for carcinogens	25,550	(70 years x 365 days/year)	25,550	(70 years x 365 days/year)
Ingestion Pathway				
EPC = Exposure point concentration in groundwater (µg/L)	chemical specific	Tables 6	chemical specific	Tables 6
CF = Conversion factor (mg/µg)	0.001	--	0.001	--
IR_{ing} = Ingestion Rate (L/day)	2.0	RME scenario; EPA, 1989	1.0	RME scenario; EPA, 1989
	1.4	AE scenario; EPA, 1997a	0.74	AE scenario; EPA, 1997a
EF = Exposure Frequency (days/year)	350	EPA 1991a; CalEPA, 1992	350	EPA 1991a; CalEPA, 1992
ED = Exposure Duration (years)	24	RME scenario; EPA, 1991a; CalEPA, 1992	6	RME scenario; EPA, 1991a; CalEPA, 1992
	9	AE scenario; EPA, 2004b	6	AE scenario
BW = Body Weight (kilograms)	70	EPA, 1989; CalEPA, 1992	15	EPA, 1989; CalEPA, 1992
AT = Averaging Time (days)				
- AT_{nc} for noncarcinogens	8,760	RME scenario (24 years x 365 days/year)	2,190	RME scenario (6 years x 365 days/year)
	3,285	AE scenario (9 years x 365 days/year)	2,190	AE scenario (6 years x 365 days/year)
- AT_c for carcinogens	25,550	(70 years x 365 days/year)	25,550	(70 years x 365 days/year)
Dermal Pathway				
EPC = Exposure point concentration in groundwater (µg/L)	chemical specific	Tables 6	chemical specific	Tables 6
CF = Conversion factor (mg/µg)	0.001	--	0.001	--
CF = Conversion factor (L/cm^3)	0.001	--	0.001	--
SA = Surface Area (cm^2)	18,000	EPA, 2004b	6,600	EPA, 2004b
t_{event} = Event duration (hr/event)	0.58	RME scenario; EPA, 2004b	1	RME scenario; EPA, 2004b
	0.25	AE scenario; EPA, 2004b	0.33	AE scenario; EPA, 2004b
EV = Event Frequency (events/day)	1	EPA, 2004b	1	EPA, 2004b
EF = Exposure Frequency (days/year)	350	USEPA 1991a; CalEPA, 1992	350	USEPA 1991a; CalEPA, 1992
ED = Exposure Duration (years)	24	RME scenario; EPA, 2004b	6	RME scenario; EPA, 2004b
	9	AE scenario; EPA, 2004b	6	AE scenario; EPA, 2004b
BW = Body Weight (kilograms)	70	USEPA, 1989; CalEPA, 1992	15	USEPA, 1989; CalEPA, 1992
AT = Averaging Time (days)				
- AT_{nc} for noncarcinogens	8,760	RME scenario (24 years x 365 days/year)	2,190	RME scenario (6 years x 365 days/year)
	3,285	AE scenario (9 years x 365 days/year)	2,190	AE scenario (6 years x 365 days/year)
- AT_c for carcinogens	25,550	(70 years x 365 days/year)	25,550	(70 years x 365 days/year)

Abbreviations:
$\mu g/m^3$ = Micrograms per cubic meter.
mg/µg = Milligrams per micrograms.
-- = Not applicable.
m^3/hour = Cubic meter per hour.
RME = Reasonable maximum exposure.
AE = Average exposure.
µg/L = Micrograms per liter.
L/year = Liter per year.
L/cm^3 = Liter per cubic centimeter.
cm^2 = Centimeter squared.
cm/hr = Centimeter per hour.
hr/event = Hour per event.

References:

California Environmental Protection Agency (CalEPA), 1992. Supplemental Guidance for Human Health Multimedia Risk Assessment of Hazardous Sites and Permitted Facilities. Department of Toxic Substance Control.
U.S. Environmental Protection Agency (EPA), 1989. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). Office of Emergency and Remedial Response. EPA/54071-89/002.
U.S. Environmental Protection Agency (EPA), 1991a. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Publication 9285.6-03. Office of Emergency and Remedial Response. NTIS PB91-921314.
U.S. Environmental Protection Agency (EPA), 1997a. Exposure Factors Handbook. Office of Research and Development. EPA/600/P-95/002FA.
U.S. Environmental Protection Agency (EPA), 2004b. Risk Assessment Guidance for Superfund VolumeI: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final. EPA/540/R/99/005. July.

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Table 9
Absorbed Dose per Event (DA_{event}) for Dermal Pathway
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemicals Of Potential Concern	EPC [a]		K_p [b]	B [b]	τ [b]	t* [b]	FA [b]	DA_{event} [c]			
								AE Scenario		RME Scenario	
								Adult	Child	Adult	Child
	µg/L	mg/cm³	cm/hr	Dimensionless	hr/event	hour	Dimensionless	mg/cm²-event	mg/cm²-event	mg/cm²-event	mg/cm²-event
A Aquifer											
Bromodichloromethane	3.6E-01	3.6E-07	4.6E-03	0	0.88	2.12	1	2.2E-09	2.5E-09	3.3E-09	4.3E-09
Carbon Tetrachloride	2.9E+00	2.9E-06	1.6E-02	0.1	0.78	1.86	1	5.6E-08	6.5E-08	8.6E-08	1.1E-07
Chloroform	4.9E-01	4.9E-07	6.8E-03	0	0.5	1.19	1	3.3E-09	3.7E-09	5.0E-09	6.5E-09
Dibromochloromethane	3.9E-01	3.9E-07	3.2E-03	0	1.57	3.77	1	2.2E-09	2.5E-09	3.3E-09	4.4E-09
Tetrachloroethene	2.8E-01	2.8E-07	3.3E-02	0.2	0.91	2.18	1	1.2E-08	1.4E-08	1.8E-08	2.4E-08
Trichloroethene	6.1E-01	6.1E-07	1.2E-02	0.1	0.58	1.39	1	7.7E-09	8.9E-09	1.2E-08	1.5E-08
Upper 180 Foot - Aquifer											
Carbon Tetrachloride	1.2E+00	1.2E-06	1.6E-02	0.1	0.78	1.86	1	2.3E-08	2.7E-08	3.5E-08	4.7E-08
Chloroform	2.6E-01	2.6E-07	6.8E-03	0	0.5	1.19	1	1.7E-09	2.0E-09	2.6E-09	3.4E-09
Chloromethane	2.8E-01	2.8E-07	3.3E-03	0	0.2	0.49	1	5.7E-10	6.6E-10	9.1E-10	1.3E-09
Lower 180 - 400 Foot - Aquifer											
1,2-Dichloroethane	2.8E-01	2.8E-07	4.2E-03	0	0.38	0.92	1	1.0E-09	1.1E-09	1.5E-09	2.1E-09
Carbon Tetrachloride	6.0E-01	6.0E-07	1.6E-02	0.1	0.78	1.86	1	1.2E-08	1.3E-08	1.8E-08	2.3E-08
Chloroform	2.6E-01	2.6E-07	6.8E-03	0	0.5	1.19	1	1.7E-09	2.0E-09	2.6E-09	3.4E-09
Toluene	2.7E-01	2.7E-07	3.1E-02	0.1	0.35	0.84	1	6.7E-09	7.7E-09	1.0E-08	1.4E-08

Abbreviations:
EPC = Exposure point concentrations.
K_p = Dermal permeability coefficent of compound in water.
B = Dimensionless ratio of the stratum corneum relative to its permeability coefficient across viable epidermis.
τ = Lag time per event.
t* = Time to reach steady-state.
FA = Fration absorbed water.
t_{event} = Event duration.
µg/L = Micrograms per liter.
mg/cm³ = Milligrams per cubic centimeter.
cm/hr = Centimeter per hour.
hr/event = Hour per event.
mg/cm²-event = Milligrams per centimeter squared per event.
NA = Not available.
-- = Not available.

Footnotes:
[a] From Table 6.
[b] From EPA, 2004b.
[c] DA_{event} is calculated for organic compounds as follows:
If $t_{event} \leq t^*$, then: $DA_{event} = 2 \times FA \times K_p \times EPC \times \sqrt{(6 \times \tau \times t_{event})/PI)}$
If $t_{event} > t^*$, then: $DA_{event} = FA \times K_p \times EPC \times (((t_{event}/(1 + B)) + 2 \times \tau \times ((1+ 3B + 3B^2)/(1 + B)^2))$

References:
U.S. Environmental Protection Agency (EPA), 2004b. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). Final. EPA/540/R/99/005. July.

Checked: DJM

Approved: GB

Table 10
Oral Toxicity Values for Chemicals of Potential Concern (COPCs)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

COPCs	Noncancer Oral Toxicity Values				Cancer Oral Toxicity Values					
	California Chronic Oral RfD [a] (mg/kg-day)	EPA		Selected Chronic Oral RfD [c] (mg/kg-day)	California Oral SF [a] $(mg/kg\text{-}day)^{-1}$	EPA		Selected Oral SF [d] $(mg/kg\text{-}day)^{-1}$	Weight of Evidence Classification	
		Chronic Oral RfD (mg/kg-day)	Source [b]			Oral SF $(mg/kg\text{-}day)^{-1}$	Source [b]		[e]	[f]
1,2-Dichloroethane	--	2.0E-02	(n)	2.0E-02	4.7E-02	9.1E-02	(i)	9.1E-02	B2	--
Bromodichloromethane	--	2.0E-02	(i)	2.0E-02	1.3E-01	6.2E-02	(i)	1.3E-01	B2	--
Carbon Tetrachloride	--	7.0E-04	(i)	7.0E-04	1.5E-01	1.3E-01	(i)	1.5E-01	B2	--
Chloroform	--	1.0E-02	(i)	1.0E-02	3.1E-02	--		3.1E-02	B2	Likely
Chloromethane	--	2.6E-02	(i) - inhalation	2.6E-02	--	--		--	D	Cannot be determined
Dibromochloromethane	--	2.0E-02	(i)	2.0E-02	--	8.4E-02	(i)	8.4E-02	C	--
Tetrachloroethene	--	1.0E-02	(i)	1.0E-02	5.4E-01	--		5.4E-01	--	--
Toluene	--	2.0E-01	(i)	2.0E-01	--	--		--	D	--
Trichloroethene	--	3.0E-04	(n)	3.0E-04	1.3E-02	--	(n)	1.3E-02	--	--

Abbreviations:
RfD = Reference dose.
USEPA = United States Environmental Protection Agency.
SF = Slope factor.
mg/kg-day = milligrams per kilograms per day.
-- = Not available.

Footnotes:
[a] From CalEPA, 2004.
[b] EPA values compiled from the following sources:
(i) - Integrated Risk Information System (IRIS) online database (EPA, 2004d)
(n) - National Center for Environmental Assessment (NCEA), provided in EPA, 2004c.
(h) - Health Effects Assessment Summary Tables (HEAST), provided in EPA, 2004c.
(cal) - California EPA Toxicity Values (California), provided in EPA, 2004ca.
[c] Most stringent (i.e., lowest) of the California and EPA Oral RfDs selected.
[d] Most stringent (i.e., highest) of the California and EPA Oral SFs selected.
[e] Weight of evidence classification:
A - Known human carcinogen.
B - Probable human carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans).
C - Possible human carcinogen.
D - Not classifiable as to human carcinogenicity.
E - Evidence of noncarcinogenicity for humans.
[f] Weight of evidence classification from EPA's Review Draft Guidelines for Carcinogen Risk Assessment (EPA, 2003) as listed in IRIS.

References:
California Environmental Protection Agency (CalEPA). 2004. Toxicity Criteria Database. Office of Environmental Health Hazard Assessment (OEHHA). http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
U.S. Environmental Protection Agency (EPA). 2003. Draft Final Guidelines for Carcinogen Risk Assessment . EPA/630/P-03/001A. February.
U.S. Environmental Protection Agency (EPA). 2004c. Region 9 Preliminary Remediation Goals. San Francisco, California. October.
U.S. Environmental Protection Agency (EPA). 2004d. Integrated Risk Information System (IRIS). Http://www.epa.gov/iris

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Table 11
Inhalation Toxicity Values for Chemicals of Potential Concern (COPCs)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

COPCs	Noncancer Inhalation Toxicity Values						Cancer Inhalation Toxicity Values						
	California [a]		EPA [b]			Selected Chronic Inhalation RfD [f] (mg/kg-day)	California [a]	EPA [b]			Selected Inhalation SF [g] $(mg/kg\text{-}day)^{-1}$	Weight of Evidence Classification	
	Chronic Inhalation REL ($\mu g/m^3$)	Chronic Inhalation RfD [c] (mg/kg-day)	Chronic Inhalation RfC (mg/m^3)	Chronic Inhalation RfD [d] (mg/kg-day)	Source		Inhalation SF $(mg/kg\text{-}day)^{-1}$	IUR $(mg/m^3)^{-1}$	Inhalation SF [e] $(mg/kg\text{-}day)^{-1}$	Source		h	i
1,2-Dichloroethane	--	--	4.9E-03	1.4E-03	(n)	1.4E-03	7.2E-02	2.6E-02	9.1E-02	(i)	9.1E-02	B2	--
Bromodichloromethane	--	--	7.0E-02	2.0E-02	(i) - oral	2.0E-02	1.3E-01	--	--		1.3E-01	B2	--
Carbon Tetrachloride	4.0E+01	1.1E-02	--	--		1.1E-02	1.5E-01	1.5E-02	5.3E-02	(i)	1.5E-01	B2	NA
Chloroform	3.0E+02	8.6E-02	4.9E-02	1.4E-02	(n)	1.4E-02	1.9E-02	2.3E-02	8.1E-02	(i)	8.1E-02	B2	Likely
Chloromethane	--	--	9.0E-02	2.6E-02	(i)	2.6E-02	--	--	--		--	D	Cannot be determined
Dibromochloromethane	--	--	7.0E-02	2.0E-02	(i) - oral	2.0E-02	--	2.4E-02	8.4E-02	(i) - oral	8.4E-02	C	--
Tetrachloroethene	3.5E+01	1.0E-02	--	--		1.0E-02	2.1E-02	--	--		2.1E-02	B2	NA
Toluene	3.0E+02	8.6E-02	4.0E-01	1.1E-01	(i)	8.6E-02	--	--	--		--	D	--
Trichloroethene	6.0E+02	1.7E-01	--	--	(n)	1.7E-01	7.0E-03	--	--	(n)	7.0E-03	--	NA

Abbreviations:
USEPA = United States Environmental Protection Agency.
REL = Reference exposure level.
RfD = Reference dose.
RfC = Reference concentration.
SF = Slope factor.
IUR = Inhalation unit risk.
$\mu g/m^3$ = Micrograms per cubic meter.
mg/kg-day = milligrams per kilograms per day.
mg/m^3 = Milligrams per cubic meter.
-- = Not available.
oral = Oral toxicity value used if inhalation toxicity value is unavailable.

Footnotes:
[a] From CalEPA 2003 and 2004.
[b] EPA values compiled from the following sources:
(i) - Integrated Risk Information System (IRIS) online database (EPA, 2004d)
(n) - National Center for Environmental Assessment (NCEA), provided in EPA, 2004c.
(h) - Health Effects Assessment Summary Tables (HEAST), provided in EPA, 2004c.
(p) -Provisional Peer Review Toxicity Values (PPRTVs), provided in EPA, 2004c.
[c] Inhalation RfD (mg/kg-day) = [REL ($\mu g/m^3$) / 1000 ($\mu g/mg$)] * [20 (m^3/day) / 70 (kg)]
[d] Inhalation RfD (mg/kg-day) = [RfC (mg/m^3)] * [20 (m^3/day) / 70 (kg)]
[e] Inhalation SF $(mg/kg\text{-}day)^{-1}$ = [IUR $(mg/m^3)^{-1}$] * [70 (kg) / 20 (m^3/day)]
[f] Most stringent (i.e., lowest) of the California and EPA Inhalation RfDs selected. Oral RfDs used if inhalation RfDs are unavailable.
[g] Most stringent (i.e., highest) of the California and EPA Inhalation SFs selected. Oral SFs used if inhalation SFs are unavailable.
[h] Weight of evidence classification:
A - Known human carcinogen.
B - Probable human carcinogen (B1 - limited evidence of carcinogenicity in humans; B2 - sufficient evidence of carcinogenicity in animals with inadequate or lack of evidence in humans).
C - Possible human carcinogen.
D - Not classifiable as to human carcinogenicity.
E - Evidence of noncarcinogenicity for humans.
[i] Weight of evidence classification from EPA's Review Draft Guidelines for Carcinogen Risk Assessment (EPA, 2003) as listed in IRIS.

References:
California Environmental Protection Agency (CalEPA). 2003. Chronic Reference Exposure Level (REL) Table. Office of Environmental Health Hazard Assessment (OEHHA). Hhttp://www.oehha.ca.gov/air/chronic_rels/AllChrels.html. August.
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Checked:

Approved:

Table 12
Estimated Risks and Hazards for Groundwater Ingestion - Average Exposure (AE)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemical of Potential Concern (COPC)	EPC [a] (µg/L)	Cancer Risk Estimates							Noncancer Hazard Estimates					
		AE Adult Intake (Cancer) [b] (mg/kg-day)	AE Child Intake (Cancer) [b] (mg/kg-day)	Oral SF [c] (mg/kg-day)$^{-1}$	Adult AE Cancer Risk [d]	Percent Contribution to Total Adult Risk	Child AE Cancer Risk [d]	Percent Contribution to Total Child Risk	AE Adult Intake (Noncancer) [b] (mg/kg-day)	AE Child Intake (Noncancer) [b] (mg/kg-day)	Chronic Oral RfD [c] (mg/kg-day)	Adult AE Noncancer Hazard Index [e]	Child AE Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer														
Bromodichloromethane	3.6E-01	8.9E-07	1.5E-06	1.3E-01	1.2E-07	7%	1.9E-07	7%	7.0E-06	1.7E-05	2.0E-02	3.5E-04	8.6E-04	0%
Carbon Tetrachloride	2.9E+00	7.1E-06	1.2E-05	1.5E-01	1.1E-06	63%	1.8E-06	63%	5.5E-05	1.4E-04	7.0E-04	7.9E-02	1.9E-01	66%
Chloroform	4.9E-01	1.2E-06	2.0E-06	3.1E-02	3.7E-08	2%	6.2E-08	2%	9.4E-06	2.3E-05	1.0E-02	9.4E-04	2.3E-03	1%
Dibromochloromethane	3.9E-01	9.7E-07	1.6E-06	8.4E-02	8.2E-08	5%	1.3E-07	5%	7.6E-06	1.9E-05	2.0E-02	3.8E-04	9.3E-04	0%
Tetrachloroethene	2.8E-01	6.8E-07	1.1E-06	5.4E-01	3.7E-07	22%	6.1E-07	22%	5.3E-06	1.3E-05	1.0E-02	5.3E-04	1.3E-03	0%
Trichloroethene	6.1E-01	1.5E-06	2.5E-06	1.3E-02	2.0E-08	1%	3.2E-08	1%	1.2E-05	2.9E-05	3.0E-04	3.9E-02	9.7E-02	33%
A-Aquifer TOTAL					**1.7E-06**	100%	**2.8E-06**	100%				**1.2E-01**	**3.0E-01**	100%
Upper 180 Foot Aquifer														
Carbon Tetrachloride	1.2E+00	2.9E-06	4.8E-06	1.5E-01	4.4E-07	96%	7.2E-07	96%	2.3E-05	5.6E-05	7.0E-04	3.3E-02	8.1E-02	98%
Chloroform	2.6E-01	6.4E-07	1.1E-06	3.1E-02	2.0E-08	4%	3.3E-08	4%	5.0E-06	1.2E-05	1.0E-02	5.0E-04	1.2E-03	1%
Chloromethane	2.8E-01	6.9E-07	1.1E-06	--	--	--	--	--	5.4E-06	1.3E-05	2.6E-02	2.1E-04	5.1E-04	1%
Upper 180 Foot Aquifer TOTAL					**4.6E-07**	100%	**7.6E-07**	100%				**3.3E-02**	**8.2E-02**	100%
Lower 180 - 400 Foot Aquifer														
1,2-Dichloroethane	2.8E-01	6.9E-07	1.1E-06	9.1E-02	6.2E-08	21%	1.0E-07	21%	5.3E-06	1.3E-05	2.0E-02	2.7E-04	6.6E-04	2%
Carbon Tetrachloride	6.0E-01	1.5E-06	2.4E-06	1.5E-01	2.2E-07	73%	3.6E-07	73%	1.1E-05	2.8E-05	7.0E-04	1.6E-02	4.0E-02	95%
Chloroform	2.6E-01	6.4E-07	1.1E-06	3.1E-02	2.0E-08	7%	3.3E-08	7%	5.0E-06	1.2E-05	1.0E-02	5.0E-04	1.2E-03	3%
Toluene	2.7E-01	6.6E-07	1.1E-06	--	--	--	--	--	5.1E-06	1.3E-05	2.0E-01	2.6E-05	6.3E-05	0%
Lower 180 - 400 Foot Aquifer TOTAL					**3.0E-07**	100%	**5.0E-07**	100%				**1.7E-02**	**4.2E-02**	100%

Abbreviations:
EPC = Exposure point concentration.
µg/L = Micrograms per liter.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 6.
[b] From: Table 8.
Intake = (EPC x CF x IR_{ing} x EF x ED)/(BW x AT)
[c] From: Table 10.
[d] Cancer Risk = [Intake (mg/kg-day)] * [Oral SF (mg/kg-day)$^{-1}$]
[e] Noncancer Hazard = [Intake (mg/kg-day)] / [Oral RfD (mg/kg-day)]

Checked: AM

Approved" GB

Table 13
Estimated Risks and Hazards for Groundwater Ingestion - Reasonable Maximum Exposure (RME)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemical of Potential Concern (COPC)	EPC [a] (µg/L)	Cancer Risk Estimates							Noncancer Hazard Estimates					
		RME Adult Intake (Cancer) [b] (mg/kg-day)	RME Child Intake (Cancer) [b] (mg/kg-day)	Oral SF [c] (mg/kg-day)$^{-1}$	Adult RME Cancer Risk [d]	Child RME Cancer Risk [d]	Total Adult + Child RME Cancer Risk	Percent Contribution to Total Risk	RME Adult Intake (Noncancer) [b] (mg/kg-day)	RME Child Intake (Noncancer) [b] (mg/kg-day)	Chronic Oral RfD [c] (mg/kg-day)	Adult RME Noncancer Hazard Index [e]	Child RME Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer														
Bromodichloromethane	3.6E-01	3.4E-06	2.0E-06	1.3E-01	4.4E-07	2.6E-07	7.0E-07	7%	9.9E-06	2.3E-05	2.0E-02	5.0E-04	1.2E-03	0%
Carbon Tetrachloride	2.9E+00	2.7E-05	1.6E-05	1.5E-01	4.1E-06	2.4E-06	6.4E-06	63%	7.9E-05	1.8E-04	7.0E-04	1.1E-01	2.6E-01	66%
Chloroform	4.9E-01	4.6E-06	2.7E-06	3.1E-02	1.4E-07	8.3E-08	2.3E-07	2%	1.3E-05	3.1E-05	1.0E-02	1.3E-03	3.1E-03	1%
Dibromochloromethane	3.9E-01	3.7E-06	2.2E-06	8.4E-02	3.1E-07	1.8E-07	4.9E-07	5%	1.1E-05	2.5E-05	2.0E-02	5.4E-04	1.3E-03	0%
Tetrachloroethene	2.8E-01	2.6E-06	1.5E-06	5.4E-01	1.4E-06	8.2E-07	2.2E-06	22%	7.6E-06	1.8E-05	1.0E-02	7.6E-04	1.8E-03	0%
Trichloroethene	6.1E-01	5.8E-06	3.4E-06	1.3E-02	7.5E-08	4.4E-08	1.2E-07	1%	1.7E-05	3.9E-05	3.0E-04	5.6E-02	1.3E-01	33%
A-Aquifer TOTAL					**6.4E-06**	**3.8E-06**	**1.0E-05**	**100%**				**1.7E-01**	**4.0E-01**	**100%**
Upper 180 Foot Aquifer														
Carbon Tetrachloride	1.2E+00	1.1E-05	6.5E-06	1.5E-01	1.7E-06	9.8E-07	2.7E-06	96%	3.3E-05	7.6E-05	7.0E-04	4.7E-02	1.1E-01	98%
Chloroform	2.6E-01	2.4E-06	1.4E-06	3.1E-02	7.6E-08	4.4E-08	1.2E-07	4%	7.1E-06	1.7E-05	1.0E-02	7.1E-04	1.7E-03	1%
Chloromethane	2.8E-01	2.6E-06	1.5E-06	--	--	--	--	--	7.7E-06	1.8E-05	2.6E-02	3.0E-04	6.9E-04	1%
Upper 180 Foot Aquifer TOTAL					**1.8E-06**	**1.0E-06**	**2.8E-06**	**100%**				**4.8E-02**	**1.1E-01**	**100%**
Lower 180 - 400 Foot Aquifer														
1,2-Dichloroethane	2.8E-01	2.6E-06	1.5E-06	9.1E-02	2.4E-07	1.4E-07	3.8E-07	21%	7.6E-06	1.8E-05	2.0E-02	3.8E-04	8.9E-04	2%
Carbon Tetrachloride	6.0E-01	5.6E-06	3.3E-06	1.5E-01	8.4E-07	4.9E-07	1.3E-06	73%	1.6E-05	3.8E-05	7.0E-04	2.3E-02	5.4E-02	95%
Chloroform	2.6E-01	2.4E-06	1.4E-06	3.1E-02	7.5E-08	4.4E-08	1.2E-07	7%	7.1E-06	1.7E-05	1.0E-02	7.1E-04	1.7E-03	3%
Toluene	2.7E-01	2.5E-06	1.5E-06	--	--	--	--	--	7.3E-06	1.7E-05	2.0E-01	3.6E-05	8.5E-05	0%
Lower 180 - 400 Foot Aquifer TOTAL					**1.2E-06**	**6.7E-07**	**1.8E-06**	**100%**				**2.4E-02**	**5.7E-02**	**100%**

Abbreviations:
EPC = Exposure point concentration.
µg/L = Micrograms per liter.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 6.
[b] From: Table 8.
Intake = (EPC x CF x IR_{ing} x EF x ED)/(BW x AT)
[c] From: Table 10.
[d] Cancer Risk = [Intake (mg/kg-day)] * [Oral SF (mg/kg-day)$^{-1}$]
[e] Noncancer Hazard = [Intake (mg/kg-day)] / [Oral RfD (mg/kg-day)]

Checked: NM

Approved: GD

Table 14
Estimated Risks and Hazards for Dermally Absorbed Dose (DAD) from Groundwater - Average Exposure (AE)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

	DA_{event} [a]		Cancer Risk Estimates							Noncancer Hazard Estimates					
Chemical of Potential Concern (COPC)	Adult (mg/cm^2-event)	Child (mg/cm^2-event)	AE Adult DAD (Cancer) [b] (mg/kg-day)	AE Child DAD (Cancer) [b] (mg/kg-day)	Oral SF [c] $(mg/kg\text{-}day)^{-1}$	Adult AE Cancer Risk [d]	Percent Contribution to Total Adult Risk	Child AE Cancer Risk [d]	Percent Contribution to Total Child Risk	AE Adult DAD (Noncancer) [b] (mg/kg-day)	AE Child DAD (Noncancer) [b] (mg/kg-day)	Chronic Oral RfD [c] (mg/kg-day)	Adult AE Noncancer Hazard Index [e]	Child AE Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer															
Bromodichloromethane	2.2E-09	2.5E-09	6.9E-08	9.0E-08	1.3E-01	8.9E-09	2%	1.2E-08	2%	5.3E-07	1.0E-06	2.0E-02	2.7E-05	5.2E-05	0%
Carbon Tetrachloride	5.6E-08	6.5E-08	1.8E-06	2.3E-06	1.5E-01	2.7E-07	54%	3.5E-07	54%	1.4E-05	2.7E-05	7.0E-04	2.0E-02	3.9E-02	74%
Chloroform	3.3E-09	3.7E-09	1.0E-07	1.4E-07	3.1E-02	3.2E-09	1%	4.2E-09	1%	8.0E-07	1.6E-06	1.0E-02	8.0E-05	1.6E-04	0%
Dibromochloromethane	2.2E-09	2.5E-09	6.9E-08	9.1E-08	8.4E-02	5.8E-09	1%	7.6E-09	1%	5.4E-07	1.1E-06	2.0E-02	2.7E-05	5.3E-05	0%
Tetrachloroethene	1.2E-08	1.4E-08	3.8E-07	5.0E-07	5.4E-01	2.1E-07	42%	2.7E-07	42%	3.0E-06	5.8E-06	1.0E-02	3.0E-04	5.8E-04	1%
Trichloroethene	7.7E-09	8.9E-09	2.5E-07	3.2E-07	1.3E-02	3.2E-09	1%	4.2E-09	1%	1.9E-06	3.8E-06	3.0E-04	6.4E-03	1.3E-02	24%
A-Aquifer TOTAL						**5.0E-07**	100%	**6.5E-07**	100%				**2.7E-02**	**5.2E-02**	100%
Upper 180 Foot Aquifer															
Carbon Tetrachloride	2.3E-08	2.7E-08	7.4E-07	9.7E-07	1.5E-01	1.1E-07	98%	1.5E-07	98%	5.7E-06	1.1E-05	7.0E-04	8.2E-03	1.6E-02	99%
Chloroform	1.7E-09	2.0E-09	5.5E-08	7.2E-08	3.1E-02	1.7E-09	2%	2.2E-09	2%	4.2E-07	8.4E-07	1.0E-02	4.2E-05	8.4E-05	1%
Chloromethane	5.7E-10	6.6E-10	1.8E-08	2.4E-08	--	--	--	--	--	1.4E-07	2.8E-07	2.6E-02	5.4E-06	1.1E-05	0%
Upper 180 Foot Aquifer TOTAL						**1.1E-07**	100%	**1.5E-07**	100%				**8.2E-03**	**1.6E-02**	100%
Lower 180 - 400 Foot Aquifer															
1,2-Dichloroethane	1.0E-09	1.1E-09	3.2E-08	4.1E-08	9.1E-02	2.9E-09	5%	3.8E-09	5%	2.5E-07	4.8E-07	2.0E-02	1.2E-05	2.4E-05	0%
Carbon Tetrachloride	1.2E-08	1.3E-08	3.7E-07	4.8E-07	1.5E-01	5.5E-08	92%	7.2E-08	92%	2.9E-06	5.6E-06	7.0E-04	4.1E-03	8.1E-03	98%
Chloroform	1.7E-09	2.0E-09	5.5E-08	7.2E-08	3.1E-02	1.7E-09	3%	2.2E-09	3%	4.2E-07	8.3E-07	1.0E-02	4.2E-05	8.3E-05	1%
Toluene	6.7E-09	7.7E-09	2.1E-07	2.8E-07	--	--	--	--	--	1.7E-06	3.3E-06	2.0E-01	8.3E-06	1.6E-05	0%
Lower 180 - 400 Foot Aquifer TOTAL						**6.0E-08**	100%	**7.8E-08**	100%				**4.2E-03**	**8.2E-03**	100%

Abbreviations:
EPC = Exposure point concentration.
mg/cm2-event = Milligrams per centimeter squared per event.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 9.
[b] From: Table 8.
$DAD = (DA_{event} \times EV \times ED \times EF \times SA)/(BW \times AT)$
[c] From: Table 10.
[d] Cancer Risk = [DAD (mg/kg-day)] * [Oral SF $(mg/kg\text{-}day)^{-1}$]
[e] Noncancer Hazard = [DAD (mg/kg-day)] / [Oral RfD (mg/kg-day)]

Checked: AM

Approved: GB

Table 15
Estimated Risks and Hazards for Dermally Absorbed Dose (DAD) from Groundwater - Reasonable Maximum Exposure (RME)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemical of Potential Concern (COPC)	DA_{event} [a]		Cancer Risk Estimates							Noncancer Hazard Estimates					
	Adult (mg/cm²-event)	Child (mg/cm²-event)	RME Adult DAD (Cancer) [b] (mg/kg-day)	RME Child DAD (Cancer) [b] (mg/kg-day)	Oral SF [c] $(mg/kg\text{-}day)^{-1}$	Adult RME Cancer Risk [d]	Child RME Cancer Risk [d]	Total Adult + Child RME Cancer Risk	Percent Contribution to Total Risk	RME Adult DAD (Noncancer) [b] (mg/kg-day)	RME Child DAD (Noncancer) [b] (mg/kg-day)	Chronic Oral RfD [c] (mg/kg-day)	Adult RME Noncancer Hazard Index [e]	Child RME Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer															
Bromodichloromethane	3.3E-09	4.3E-09	2.8E-07	1.6E-07	1.3E-01	3.6E-08	2.0E-08	5.7E-08	2%	8.1E-07	1.8E-06	2.0E-02	4.1E-05	9.1E-05	0%
Carbon Tetrachloride	8.6E-08	1.1E-07	7.3E-06	4.1E-06	1.5E-01	1.1E-06	6.1E-07	1.7E-06	54%	2.1E-05	4.8E-05	7.0E-04	3.0E-02	6.8E-02	74%
Chloroform	5.0E-09	6.5E-09	4.2E-07	2.4E-07	3.1E-02	1.3E-08	7.3E-09	2.0E-08	1%	1.2E-06	2.8E-06	1.0E-02	1.2E-04	2.8E-04	0%
Dibromochloromethane	3.3E-09	4.4E-09	2.8E-07	1.6E-07	8.4E-02	2.4E-08	1.3E-08	3.7E-08	1%	8.2E-07	1.8E-06	2.0E-02	4.1E-05	9.2E-05	0%
Tetrachloroethene	1.8E-08	2.4E-08	1.6E-06	8.7E-07	5.4E-01	8.4E-07	4.7E-07	1.3E-06	42%	4.5E-06	1.0E-05	1.0E-02	4.5E-04	1.0E-03	1%
Trichloroethene	1.2E-08	1.5E-08	1.0E-06	5.6E-07	1.3E-02	1.3E-08	7.3E-09	2.0E-08	1%	2.9E-06	6.5E-06	3.0E-04	9.7E-03	2.2E-02	24%
A-Aquifer TOTAL						**2.0E-06**	**1.1E-06**	**3.1E-06**	100%				**4.1E-02**	**9.1E-02**	100%
Upper 180 Foot Aquifer															
Carbon Tetrachloride	3.5E-08	4.7E-08	3.0E-06	1.7E-06	1.5E-01	4.5E-07	2.5E-07	7.0E-07	98%	8.7E-06	2.0E-05	7.0E-04	1.2E-02	2.8E-02	99%
Chloroform	2.6E-09	3.4E-09	2.2E-07	1.2E-07	3.1E-02	6.9E-09	3.9E-09	1.1E-08	2%	6.5E-07	1.5E-06	1.0E-02	6.5E-05	1.5E-04	1%
Chloromethane	9.1E-10	1.3E-09	7.7E-08	4.7E-08	--	--	--	--	--	2.2E-07	5.5E-07	2.6E-02	8.6E-06	2.1E-05	0%
Upper 180 Foot Aquifer TOTAL						**4.6E-07**	**2.6E-07**	**7.1E-07**	100%				**1.3E-02**	**2.8E-02**	100%
Lower 180 - 400 Foot Aquifer															
1,2-Dichloroethane	1.5E-09	2.1E-09	1.3E-07	7.4E-08	9.1E-02	1.2E-08	6.8E-09	1.8E-08	5%	3.7E-07	8.7E-07	2.0E-02	1.9E-05	4.3E-05	0%
Carbon Tetrachloride	1.8E-08	2.3E-08	1.5E-06	8.4E-07	1.5E-01	2.2E-07	1.3E-07	3.5E-07	92%	4.4E-06	9.8E-06	7.0E-04	6.2E-03	1.4E-02	98%
Chloroform	2.6E-09	3.4E-09	2.2E-07	1.2E-07	3.1E-02	6.9E-09	3.9E-09	1.1E-08	3%	6.5E-07	1.5E-06	1.0E-02	6.5E-05	1.5E-04	1%
Toluene	1.0E-08	1.4E-08	8.7E-07	5.0E-07	--	--	--	--	--	2.5E-06	5.8E-06	2.0E-01	1.3E-05	2.9E-05	0%
Lower 180 - 400 Foot Aquifer TOTAL						**2.4E-07**	**1.4E-07**	**3.8E-07**	100%				**6.3E-03**	**1.4E-02**	100%

Abbreviations:
EPC = Exposure point concentration.
mg/cm2-event = Milligrams per centimeter squared per event.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 9.
[b] From: Table 8.
$DAD = (DA_{event} \times EV \times ED \times EF \times SA)/(BW \times AT)$
[c] From: Table 10.
[d] Cancer Risk = [DAD (mg/kg-day)] * [Oral SF $(mg/kg\text{-}day)^{-1}$]
[e] Noncancer Hazard = [DAD (mg/kg-day)] / [Oral RfD (mg/kg-day)]

Checked: AM

Approved: GB

Table 16
Estimated Risks and Hazards for Vapor Inhalation While Showering - Average Exposure (AE)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemical of Potential Concern (COPC)	EPC (µg/m3) [a]	Cancer Risk Estimates							Noncancer Hazard Estimates					
		AE Adult Intake (Cancer) [b] (mg/kg-day)	AE Child Intake (Cancer) [b] (mg/kg-day)	Inhalation SF [c] (mg/kg-day)$^{-1}$	Adult AE Cancer Risk [d]	Percent Contribution to Total Adult Risk	Child AE Cancer Risk [d]	Percent Contribution to Total Child Risk	AE Adult Intake (Noncancer) [b] (mg/kg-day)	AE Child Intake (Noncancer) [b] (mg/kg-day)	Chronic Inhalation RfD [c] (mg/kg-day)	Adult AE Noncancer Hazard Index [e]	Child AE Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer														
Bromodichloromethane	2.8E-11	1.0E-17	2.1E-17	1.3E-01	1.3E-18	9%	2.8E-18	9%	8.0E-17	2.5E-16	2.0E-02	4.0E-15	1.2E-14	6%
Carbon Tetrachloride	2.1E-10	7.8E-17	1.6E-16	1.5E-01	1.2E-17	81%	2.4E-17	81%	6.1E-16	1.9E-15	1.1E-02	5.3E-14	1.7E-13	74%
Chloroform	3.9E-11	1.4E-17	3.0E-17	8.1E-02	1.2E-18	8%	2.4E-18	8%	1.1E-16	3.5E-16	1.4E-02	8.0E-15	2.5E-14	11%
Dibromochloromethane	--	--	--	8.4E-02	--	--	--	--	--	--	2.0E-02	--	--	--
Tetrachloroethene	2.1E-11	7.6E-18	1.6E-17	2.1E-02	1.6E-19	1%	3.3E-19	1%	5.9E-17	1.8E-16	1.0E-02	5.9E-15	1.8E-14	8%
Trichloroethene	4.6E-11	1.7E-17	3.5E-17	7.0E-03	1.2E-19	1%	2.5E-19	1%	1.3E-16	4.1E-16	1.7E-01	7.7E-16	2.4E-15	1%
A-Aquifer TOTAL					**1.5E-17**	100%	**3.0E-17**	100%				**7.2E-14**	**2.2E-13**	100%
Upper 180 Foot Aquifer														
Carbon Tetrachloride	8.8E-11	3.2E-17	6.7E-17	1.5E-01	4.9E-18	89%	1.0E-17	89%	2.5E-16	7.8E-16	1.1E-02	2.2E-14	6.9E-14	75%
Chloroform	2.1E-11	7.6E-18	1.6E-17	8.1E-02	6.1E-19	11%	1.3E-18	11%	5.9E-17	1.8E-16	1.4E-02	4.2E-15	1.3E-14	14%
Chloromethane	2.9E-11	1.0E-17	2.2E-17	--	--	--	--	--	8.1E-17	2.5E-16	2.6E-02	3.2E-15	9.9E-15	11%
Upper 180 Foot Aquifer TOTAL					**5.5E-18**	100%	**1.1E-17**	100%				**2.9E-14**	**9.2E-14**	100%
Lower 180 - 400 Foot Aquifer														
1,2-Dichloroethane	2.2E-11	8.0E-18	1.7E-17	9.1E-02	7.2E-19	19%	1.5E-18	19%	6.2E-17	1.9E-16	1.4E-03	4.4E-14	1.4E-13	74%
Carbon Tetrachloride	4.4E-11	1.6E-17	3.4E-17	1.5E-01	2.4E-18	64%	5.0E-18	64%	1.3E-16	3.9E-16	1.1E-02	1.1E-14	3.4E-14	18%
Chloroform	2.1E-11	7.6E-18	1.6E-17	8.1E-02	6.1E-19	16%	1.3E-18	16%	5.9E-17	1.8E-16	1.4E-02	4.2E-15	1.3E-14	7%
Toluene	1.9E-11	7.1E-18	1.5E-17	--	--	--	--	--	5.5E-17	1.7E-16	8.6E-02	6.4E-16	2.0E-15	1%
Lower 180 - 400 Foot Aquifer TOTAL					**3.8E-18**	100%	**7.8E-18**	100%				**6.0E-14**	**1.9E-13**	100%

Abbreviations:
EPC = Exposure point concentration.
$\mu g/m^3$ = Micrograms per cubic meter.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 7.
[b] From: Table 8.
Intake = (EPC x CF x IR_{inh} x EF x ED)/(BW x AT)
[c] From: Table 11.
[d] Cancer Risk = [Intake (mg/kg-day)] * [Inhalation SF (mg/kg-day)$^{-1}$]
[e] Noncancer Hazard = [Intake (mg/kg-day)] / [Inhalation RfD (mg/kg-day)]

Checked: AM

Approved: GB

Table 17
Estimated Risks and Hazards for Vapor Inhalation While Showering - Reasonable Maximum Exposure (RME)
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

Chemical of Potential Concern (COPC)	EPC (µg/m3) [a]	Cancer Risk Estimates							Noncancer Hazard Estimates					
		RME Adult Intake (Cancer) [b] (mg/kg-day)	RME Child Intake (Cancer) [b] (mg/kg-day)	Inhalation SF [c] $(mg/kg\text{-}day)^{-1}$	Adult RME Cancer Risk [d]	Child RME Cancer Risk [d]	Total Adult + Child RME Cancer Risk	Percent Contribution to Total Risk	RME Adult Intake (Noncancer) [b] (mg/kg-day)	RME Child Intake (Noncancer) [b] (mg/kg-day)	Chronic Inhalation RfD [c] (mg/kg-day)	Adult RME Noncancer Hazard Index [e]	Child RME Noncancer Hazard Index [e]	Percent Contribution to Total Hazard
A-Aquifer														
Bromodichloromethane	2.8E-11	6.4E-17	6.5E-17	1.3E-01	8.3E-18	8.4E-18	1.7E-17	9%	1.9E-16	7.5E-16	2.0E-02	9.3E-15	3.8E-14	6%
Carbon Tetrachloride	2.1E-10	4.8E-16	4.9E-16	1.5E-01	7.3E-17	7.4E-17	1.5E-16	81%	1.4E-15	5.8E-15	1.1E-02	1.2E-13	5.0E-13	74%
Chloroform	3.9E-11	8.9E-17	9.1E-17	8.1E-02	7.2E-18	7.3E-18	1.4E-17	8%	2.6E-16	1.1E-15	1.4E-02	1.9E-14	7.6E-14	11%
Dibromochloromethane	--	--	--	8.4E-02	--	--	--	--	--	--	2.0E-02	--	--	--
Tetrachloroethene	2.1E-11	4.7E-17	4.8E-17	2.1E-02	9.8E-19	1.0E-18	2.0E-18	1%	1.4E-16	5.6E-16	1.0E-02	1.4E-14	5.6E-14	8%
Trichloroethene	4.6E-11	1.1E-16	1.1E-16	7.0E-03	7.4E-19	7.5E-19	1.5E-18	1%	3.1E-16	1.2E-15	1.7E-01	1.8E-15	7.3E-15	1%
A-Aquifer TOTAL					**9.0E-17**	**9.1E-17**	**1.8E-16**	**100%**				**1.7E-13**	**6.8E-13**	**100%**
Upper 180 Foot Aquifer														
Carbon Tetrachloride	8.8E-11	2.0E-16	2.0E-16	1.5E-01	3.0E-17	3.1E-17	6.1E-17	89%	5.8E-16	2.4E-15	1.1E-02	5.1E-14	2.1E-13	75%
Chloroform	2.1E-11	4.7E-17	4.8E-17	8.1E-02	3.8E-18	3.9E-18	7.6E-18	11%	1.4E-16	5.6E-16	1.4E-02	9.8E-15	4.0E-14	14%
Chloromethane	2.9E-11	6.5E-17	6.6E-17	--	--	--	--	--	1.9E-16	7.7E-16	2.6E-02	7.3E-15	3.0E-14	11%
Upper 180 Foot Aquifer TOTAL					**3.4E-17**	**3.4E-17**	**6.8E-17**	**100%**				**6.8E-14**	**2.8E-13**	**100%**
Lower 180 - 400 Foot Aquifer														
1,2-Dichloroethane	2.2E-11	4.9E-17	5.0E-17	9.1E-02	4.5E-18	4.6E-18	9.0E-18	19%	1.4E-16	5.8E-16	1.4E-03	1.0E-13	4.2E-13	74%
Carbon Tetrachloride	4.4E-11	1.0E-16	1.0E-16	1.5E-01	1.5E-17	1.5E-17	3.0E-17	64%	2.9E-16	1.2E-15	1.1E-02	2.6E-14	1.0E-13	18%
Chloroform	2.1E-11	4.7E-17	4.8E-17	8.1E-02	3.8E-18	3.9E-18	7.6E-18	16%	1.4E-16	5.6E-16	1.4E-02	9.8E-15	4.0E-14	7%
Toluene	1.9E-11	4.4E-17	4.5E-17	--	--	--	--	--	1.3E-16	5.2E-16	8.6E-02	1.5E-15	6.1E-15	1%
Lower 180 - 400 Foot Aquifer TOTAL					**2.3E-17**	**2.4E-17**	**4.7E-17**	**100%**				**1.4E-13**	**5.7E-13**	**100%**

Abbreviations:
EPC = Exposure point concentration.
$\mu g/m^3$ = Micrograms per cubic meter.
mg/kg-day = Milligrams per kilogram per day.

Footnotes:
[a] From: Table 7.
[b] From: Table 8.
Intake = (EPC x CF x IR_{inh} x EF x ED)/(BW x AT)
[c] From: Table 11.
[d] Cancer Risk = [Intake (mg/kg-day)] * [Inhalation SF $(mg/kg\text{-}day)^{-1}$]
[e] Noncancer Hazard = [Intake (mg/kg-day)] / [Inhalation RfD (mg/kg-day)]

Checked: RM

Approved: GB

Table 18
Risk Summary
Volume II: Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California

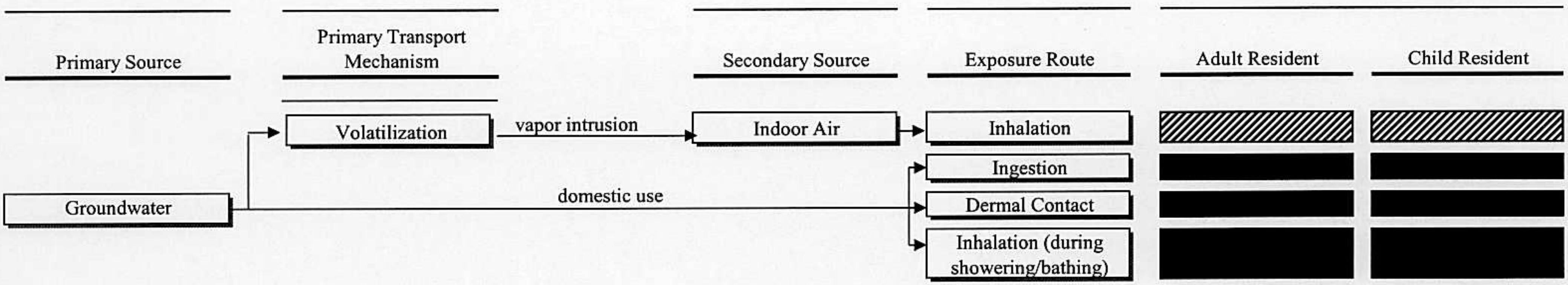
Pathway	Average Exposure				Reasonable Maximum Exposure				
	Noncancer Hazard Estimate		Cancer Risk Estimate		Noncancer Hazard Estimate		Cancer Risk Estimate		
	Child	Adult	Child	Adult	Child	Adult	Child	Adult	Total
A-Aquifer									
Showering	2.2E-13	7.2E-14	3.0E-17	1.5E-17	6.8E-13	1.7E-13	9.1E-17	9.0E-17	1.8E-16
Ingestion	3.0E-01	1.2E-01	2.8E-06	1.7E-06	4.0E-01	1.7E-01	3.8E-06	6.4E-06	1.0E-05
Dermal	5.2E-02	2.7E-02	6.5E-07	5.0E-07	9.1E-02	4.1E-02	1.1E-06	2.0E-06	3.1E-06
Total	**3.5E-01**	**1.5E-01**	**3.4E-06**	**2.2E-06**	**4.9E-01**	**2.1E-01**	**4.9E-06**	**8.5E-06**	**1.3E-05**
Upper-180									
Showering	9.2E-14	2.9E-14	1.1E-17	5.5E-18	2.8E-13	6.8E-14	3.4E-17	3.4E-17	6.8E-17
Ingestion	8.2E-02	3.3E-02	7.6E-07	4.6E-07	1.1E-01	4.8E-02	1.0E-06	1.8E-06	2.8E-06
Dermal	1.6E-02	8.2E-03	1.5E-07	1.1E-07	2.8E-02	1.3E-02	2.6E-07	4.6E-07	7.1E-07
Total	**9.8E-02**	**4.2E-02**	**9.0E-07**	**5.7E-07**	**1.4E-01**	**6.0E-02**	**1.3E-06**	**2.2E-06**	**3.5E-06**
Lower 180 - 400 feet									
Showering	1.9E-13	6.0E-14	7.8E-18	3.8E-18	5.7E-13	1.4E-13	2.4E-17	2.3E-17	4.7E-17
Ingestion	4.2E-02	1.7E-02	5.0E-07	3.0E-07	5.7E-02	2.4E-02	6.7E-07	1.2E-06	1.8E-06
Dermal	8.2E-03	4.2E-03	7.8E-08	6.0E-08	1.4E-02	6.3E-03	1.4E-07	2.4E-07	3.8E-07
Total	**5.0E-02**	**2.1E-02**	**5.8E-07**	**3.6E-07**	**7.1E-02**	**3.1E-02**	**8.1E-07**	**1.4E-06**	**2.2E-06**

Checked: AM

Approved: GD

PLATE

Plate 1
Conceptual Site Exposure Model Diagram
Human Health Risk Assessment
Operable Unit Carbon Tetrachloride Plume
Fort Ord, California



Receptor likely to be exposed via this route, so exposure pathway considered potentially complete and significant and quantitatively evaluated.

Receptor may be exposed via this route, so pathway is considered potentially complete. However, pathway is considered insignificant based on previous indoor air and soil gas data indicating that volatile organic compounds are not migrating into indoor air at the site (*Shaw, 2004a*). Pathway not quantitatively evaluated.

Checked:

Approved