4.0 BASELINE RISK ASSESSMENT FOR SITES 16 AND 17

The BRA for Sites 16 and 17 is presented in this section. Sites 16 and 17 comprise one RI site, including the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area study areas. This BRA follows the methodology presented in Section 2.0. Any deviations from the methods presented in Section 2.0 are specifically identified in the sections that follow.

4.1 Site Background

This section summarizes background information on the physical setting including geology and hydrogeology, on past and potential future land uses, and on the human populations near Sites 16 and 17. The site background is discussed in greater detail in the RI (Volume II), Sites 16 and 17, Section 1.0.

4.1.1 Physical Setting

Sites 16 and 17 are located in the former Main Garrison in the northwest portion of Fort Ord (Plate 1.1). Site 16 includes three discrete study areas identified in the RI: the DOL Maintenance Yard, Pete's Pond, and Pete's Pond Extension. Site 17 includes the 1400 Block Motor Pool complex, a baseball field, and an area along the east side of Fourth Avenue with several buildings. For this assessment, two study areas have been differentiated at Site 17: the Site 17 Disposal Area and Site 17 Other Areas. The Site 17 Disposal Area is located within the 1400 Block Motor Pool complex. The Site 17 Other Areas refers to all areas outside the Site 17 Disposal Area, as described in Volume II RI, Site 16 and 17, Section 1.1.2. Each of these areas within Sites 16 and 17 is shown on Plate 4.1. A description of the physical setting of each area follows.

DOL Maintenance Yard

The DOL Maintenance Yard occupies an area of approximately 4.5 acres on Eighth Street near the Fifth Avenue Cut-off on the Main Garrison. The northern portion (approximately half of the DOL Maintenance Yard) is paved; the southern portion is unpaved. The area is surrounded by a chain-link fence and is not easily accessible except through gates. Surface runoff from the unpaved area drains to the southeast onto the adjacent Pete's Pond Extension area.

Pete's Pond

Pete's Pond is a 3.3 acre triangular depression between Eighth Street, Fifth Avenue, and the Fifth Avenue Cut-off. The area is bordered on all sides by roadways and is vegetated with low-lying brush and grasses. Six storm drains discharge to Pete's Pond, as described in the *Draft Basewide Surface Water Outfall Investigation*, April 5, 1993. Runoff is received from sites 15, 16 and 17, as well as from other areas to the south and east of Pete's Pond (including Site 23, and housing areas on the Main Garrison). Although the depression is dry most of the year, it floods to depths of up to 5 feet during periods of heavy rainfall.

Pete's Pond Extension

Pete's Pond Extension is adjacent to and east of the Fifth Avenue Cut-off, between Pete's Pond and the DOL Maintenance Yard. The area of approximately 3.5 acres includes a vegetated hillside on the northeast and a relatively flat vegetated area on the southwest. The vegetation includes low-lying brush and trees. There are no buildings.

Site 17 Disposal Area and Other Areas

Site 17 is an area of approximately 56 acres in the Main Garrison west of Site 16 and consists of paved areas, buildings used for motor vehicle maintenance, several wash racks, and a baseball field. The area referred to as the Site 17 Disposal Area extends from the paved area of the motor pool complex along Fifth Avenue to the east of the baseball field. This disposal area covers approximately 8 acres and is mostly paved. The baseball field lies to the west of the 1400 Block Motor Pool and is relatively flat and vegetated. The buildings along Fourth Avenue are, or were, used for storage.

4.1.1.1 Geology

Sites 16 and 17 are underlain by generally fine to medium sands, silty sands, and clayey sand of the Older Sand Dunes. The upper 5 to 10 feet generally consists of silty sand; incinerated waste and unincinerated debris exist within the sand matrix up to 16 feet bgs in Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. The site geology is described in Volume II, Sites 16 and 17, Section 3.4.

4.1.1.2 Hydrogeology

Three aquifers are situated below Sites 16 and 17: the A-aquifer, the 180-foot aquifer, and the 400-foot aquifer. The A-aquifer is situated below Site 16 and the eastern portion of Site 17; depth to groundwater in this area ranges from 117 to 157 feet bgs. The 180-foot aquifer is separated from the A-aquifer by the Salinas Valley Aquiclude (SVA). On the western portion of Site 17, the A-aquifer and underlying 180-foot aquifer commingle into one aquifer because the SVA is not present there. The commingled aquifer is referred to as the Upper 180-foot aquifer in this area; depth to groundwater in the western portion of Site 17 is approximately 170 feet bgs. The 180-foot aquifer is divided into two units, the Upper 180-foot aquifer and the Lower 180-foot aquifer. The two units are separated by a silty aquitard. No wells at Site 16 or 17 are screened in the Lower 180-foot aquifer or the 400-foot aquifer.

The direction of groundwater flow in the A-aquifer beneath Site 16 and the eastern portion of Site 17 is west to northwest. The groundwater flow in the Upper 180-foot aquifer in the western portion of Site 17 is east to southeast. Apparently groundwater flows to the west in the A-aquifer over the SVA and then once commingled with the 180-foot aquifer flows eastward beneath the SVA. The hydrogeology of Sites 16 and 17 is described in detail in Volume II, Sites 16 and 17, Section 3.5.

4.1.2 Land Use

This section discusses both past and planned future land uses for Sites 16 and 17.

4.1.2.1 Site 16

The DOL Maintenance Yard at Site 16 has been used as a heavy equipment maintenance facility since the 1950s; it consists of several buildings, a wash rack, a paint shop, a steam cleaner shed, and an oil/water separator. Little was known about the Pete's Pond and Pete's Pond Extension areas before the RI. Evidence of past dumping has been found in both areas, as described in Volume II, Sites 16 and 17, Sections 1.2.2 and 4.1. Excavated material at Pete's Pond includes scrap metal, glass, wood, and a drum containing a clear gel-like substance. Materials encountered at Pete's Pond Extension include concrete, medical waste, glass, rusted ordnance, and other scrap metal.

For future land use planning, parts of Site 16 have been designated as part of polygon 2e (*FORG, 1994; COE, 1994*), which is comprised of approximately 40 acres. No other sites are in polygon 2e. This area will contain public agency corporation yards currently planned by the City of Marina, the county of Monterey, and the Monterey-Salinas Transit.

4.1.2.2 Site 17

Former land uses at Site 17 include the following:

- motor vehicle maintenance, storage, and service in the 1400 Motor Pool Complex
- storage of petroleum products and/or solvents and other chemicals in several buildings on the site
- incineration of medical waste at building 1442, which currently houses an autoclave to sterilize medical waste
- disposal of debris including incinerated and unincinerated medical waste, glass, cans, bottles, and scrap metal in the Site 17 Disposal Area.

For future land use planning, Site 17 has been designated as part of polygon 16, an area of approximately 500 acres that includes Sites 14, 15, part of 16, 17, 18, 23, 24, and 38 (*FORG, 1994; COE, 1994*). This area, proposed by California State University (CSU) as the site for its new Monterey Bay campus, includes mostly the developed lands of the former Main Garrison. Existing structures will be used for faculty and student housing, lecture/laboratory spaces, and university administrative offices. In addition, the CSU parcel will provide sites for new facilities, including additional residence halls, a permanent library building, and a science center, to eventually accommodate a 25,000 full-time-equivalent campus. Future land use for the Site 17 area includes removing pavement, installing decorative landscaping, and converting some existing buildings and/or possibly constructing new buildings for use as warehouses and artist studios.

4.1.3 Nearby Populations

U.S. Army personnel may be found at Sites 16 and 17 part time, but neither these sites nor adjacent areas are heavily used. The nearest resident populations currently are in the city of Marina, approximately 3 miles north of the site. No onsite residences are currently near the site, although many former army housing units are approximately 0.5 mile southeast, in the Main Garrison area of Fort Ord. In the future, people who may be present on or near Sites 16 and 17 include those expected to be associated with the California State University and nearby commercial workers.

4.2 Data Evaluation

HLA sampled soil and groundwater between January 1992 and March 1994 at Sites 16 and 17 as part of the RI site characterization. Additional surface soil samples were collected at Site 16 in May 1994 for the Basewide Ecological Risk Assessment (ERA). Previous investigations conducted in these areas for purposes other than the RI are discussed in Volume II, Sites 16 and 17, Section 1.3. Soil samples were collected from the five geographic areas shown in Plate 4.1: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, Site 17 Disposal Area, and Site 17 Other Areas. Groundwater samples were collected from three monitoring wells: MW-16-01-A in the northwest corner of Pete's Pond, and MW-17-01-A and MW-17-02-180 in the southern portion of Site 17. A detailed description of the sampling activities, including the complete analytical program for each area, is presented in Volume II, Sites 16 and 17, Section 2.0.

The methods used to evaluate analytical data and the dataset considered for this BRA are discussed in Section 2.1.1.5 and briefly summarized here. Soil data were segregated by the following depths for each area: surface soil data (0 to 2 feet bgs), subsurface soil data (greater than 2 to 10 feet bgs), subsurface soil data (0 to 10 feet bgs), and deep soil data (greater than 10 feet bgs). Summaries of statistical data for chemicals detected in soil at all areas are presented in Tables 4.1a through 4.5 and for chemicals detected in groundwater in Tables 4.6 and 4.7. Chlorinated dibenzodioxins (CDDs) and chlorodibenzofurans (CDFs) are reported on these statistical summary tables as TCDD-TE, and carcinogenic PAH are reported as total cPAH, as described in Section 2.2.7. For each detected chemical, the tables show the frequency of detection, minimum and maximum detected concentrations, arithmetic mean concentration, standard deviation of the arithmetic mean concentration, and 95 percent upper confidence limit of the arithmetic mean concentration. A brief summary of the analytical program and chemicals detected in soil and groundwater in each area is presented below. The subset of available data used in this BRA is also identified.

Forty-seven samples collected at Site 16 and 48 samples collected at Site 17 were analyzed for Cr VI; none was detected. Detected concentrations of total chromium at Sites 16 and 17 are therefore assumed to represent Cr III.

4.2.1 DOL Maintenance Yard

Soil samples were collected from 15 soil borings and 12 test pits at the DOL Maintenance Yard as part of the RI. One to three samples from each boring or test pit were collected, for a total of 57 soil samples, at depths of 2.5 to 20.5 feet bgs. No surface soil samples were collected as part of the RI. A total of 21 samples were analyzed for VOCs, BTEX, and priority pollutant metals including hexavalent chromium. Nine samples were analyzed for SOCs. As part of the Basewide ERA, three surface soil samples were collected and analyzed for pesticides/PCBs, SOCs, CDDs, CDFs, and priority pollutant metals. The following chemicals were detected at the DOL yard:

- Surface soil (0 to 2 feet bgs): B(a)P-TE, TCDD-TE, total cPAH, antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc
- Subsurface soil (2 to 10 feet bgs): acetone, methyl ethyl ketone, di-n-butylphthalate, dibenzofuran, bis(2-ethylhexyl)phthalate, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, arsenic, beryllium, chromium (total), copper, lead, nickel, and zinc
- Subsurface soil (0 to 10 feet bgs): acetone, antimony, arsenic, B(a)P-TE, beryllium, bis(2-ethylhexyl)phthalate, cadmium, chromium, copper, di-n-butylphthalate, dibenzofuran, fluorene, lead, mercury, methyl ethyl ketone, 2-methylnaphthalene, naphthalene, nickel, phenanthrene, TCDD-TE, total cPAH, and zinc
- Deep soil (greater than 10 feet bgs): arsenic, beryllium, chromium (total), copper, lead, nickel, and zinc.

Summaries of statistical data for chemicals detected in soil at the DOL Maintenance Yard are presented in Tables 4.1a through 4.1d for surface, subsurface, and deep soils.

Data for tentatively identified compounds (TICs) were available for samples analyzed by EPA Test Methods 8240 and 8270. Nineteen compounds were identified as TICs in the DOL dataset, in addition to several "unknown compounds." A review of data for this area indicated that the TICs were either hydrocarbon-related or naturally occurring compounds (i.e., biological compounds such as fatty acids). Petroleum hydrocarbons were considered to be fully characterized in the SOC analysis (EPA Method 8270), and potential exposure to hydrocarbons was evaluated in this BRA using SOC data. TICs identified as naturally occurring were not evaluated in this BRA because they were detected at low concentrations and low frequency, and because other chemicals with known toxicity were detected in this area. Therefore, TIC data were not evaluated further in this BRA.

4.2.2 Pete's Pond

Soil samples were collected from eight soil borings and six test pits at Pete's Pond. One to three samples were collected from each boring or test pit, for a total of 47 soil samples, at depths of 1.5 to 40.5 feet bgs. In addition, three very deep soil samples were collected during the installation of MW-16-01-A, at depths of 30.5 to 110.5 feet bgs, and 11 soil samples were collected near surface water outfalls as part of HLA's *Draft Basewide Surface Water Outfall Investigation*, April 15, 1993. Fifty-three samples were analyzed for VOCs and priority pollutant metals, 42 for hexavalent chromium, 21 for SOCs, 17 for PCBs, and 1 for CDDs and CDFs. As part of the Basewide ERA, four surface soil samples were collected and analyzed for pesticides/PCBs, SOCs, CDDs, CDFs, and priority pollutant metals. The following chemicals were detected at Pete's Pond:

- Surface soil (0 to 2 feet bgs): acetone, B(a)P-TE, chlordane, 4,4'-DDT, methylene chloride, total cPAH, TCDD-TE, antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, and zinc
- Subsurface soil (2 to 10 feet bgs): acetone, methylene chloride, methyl ethyl ketone, arsenic, beryllium, cadmium, chromium (total), copper, lead, nickel, and zinc
- Subsurface soil (0 to 10 feet bgs): acetone, B(a)P-TE, chlordane, 4,4'-DDT, methyl ethyl ketone, methylene chloride, TCDD-TE, total cPAH, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, and zinc
- Deep soil (greater than 10 feet bgs): acetone, antimony, arsenic, beryllium, chromium

(total), copper, lead, mercury, nickel, and zinc.

Summaries of statistical data for chemicals detected in soil at Pete's Pond are presented in Tables 4.2a through 4.2d for surface, subsurface, and deep soils.

TIC data were available for samples analyzed by EPA Test Method's 8240 and 8270. All TICs identified in the Pete's Pond dataset were "unknown compounds." Therefore, TIC data could not be evaluated further in this BRA.

4.2.3 Pete's Pond Extension

Soil samples were collected from 5 soil borings and 22 test pits at Pete's Pond Extension. One to three samples were collected from each boring or test pit, for a total of 45 soil samples, at depths of 0.5 to 42.25 feet bgs. Forty-two samples were analyzed for VOCs, 16 for SOCs, 39 for priority pollutant metals including hexavalent chromium, and 6 for CDDs and CDFs. As part of the Basewide ERA, three surface soil samples were collected and analyzed for pesticides/PCBs, SOCs, CDD, CDFs, and priority pollutant metals. The following chemicals were detected at Pete's Pond Extension:

- Surface soil (0 to 2 feet bgs): benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, chlordane, 4,4'-DDD, 4,4'-DDT, TCDD-TE, trichloroethene, antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, silver, and zinc

- Subsurface soil (2 to 10 feet bgs): tetrachloroethene, toluene, trichloroethene, bis(2-ethylhexyl)phthalate, pentachlorophenol, TCDD-TE, antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, nickel, and zinc

- Subsurface soil (0 to 10 feet bgs): benzo(g,h,i)perylene, bis(2-ethylhexyl)phthalate, chlordane, 4,4'-DDD, 4,4'-DDT, pentachlorophenol, TCDD-TE, tetrachloroethene, toluene, trichloroethene, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc

- Deep soil (greater than 10 feet bgs): acetone, tetrachloroethene, toluene, trichloroethene, bis(2-ethylhexyl)phthalate, pentachlorophenol, antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, thallium, and zinc.

Summaries of statistical data for chemicals detected in soil at Pete's Pond Extension are presented in Tables 4.3a through 4.3d for surface, subsurface, and deep soils. It should be noted that one sample, TR-16-28, was assigned a depth of 15.5 feet bgs; the actual depth for this sample is 5.5 feet bgs. Data for this sample were reviewed to determine if results of the BRA would be impacted by this error. Because results of the BRA are not impacted by the exclusion of data for sample TR-16-28 from the surface soil dataset, no changes were made to the BRA dataset.

TIC data were available for samples analyzed by EPA Test Methods 8240 and 8270. Five compounds were identified as TICs in the Pete's Pond Extension dataset, in addition to several "unknown compounds." A review of data for this area indicated that the TICs identified in the dataset were either hydrocarbon-related or naturally occurring compounds. Therefore, TIC data were not evaluated further in this BRA.

4.2.4 Site 17 Disposal Area

Soil samples were collected from 10 soil borings and 17 test pits at the Site 17 Disposal Area. One to three samples were collected from each boring or test pit, for a total of 60 soil samples, at depths of 1.0 to 31.25 feet bgs. Fifty-six samples were analyzed for VOCs and priority pollutant metals, 44 including hexavalent chromium. Thirty-four samples were analyzed for SOCs, 18 for PCBs, and 13 for CDDs and CDFs. The following chemicals were detected at the Site 17 Disposal Area:

- Surface soil (0 to 2 feet bgs): acetone, TCDD-TE, antimony, arsenic, beryllium, chromium (total), copper, lead, mercury, nickel, and zinc

- Subsurface soil (2 to 10 feet bgs): acetone, methylene chloride, bis(2-ethylhexyl)phthalate, TCDD-TE, antimony, arsenic, beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, silver, and zinc

- Subsurface soil (o to 10 feet bgs): acetone, bis(2-ethylhexyl)phthalate, methylene chloride,TCDD-TE, antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc

- Deep soil (greater than 10 feet bgs): acetone, bis(2-ethylhexyl)phthalate, TCDD-TE, antimony, arsenic, beryllium, chromium (total), copper, lead, mercury, nickel, and zinc.

Summaries of statistical data for chemicals detected in soil at the Site 17 Disposal Area are presented in Tables 4.4a through 4.4d for surface, subsurface, and deep soils.

TIC data were available for samples analyzed by EPA Test Methods 8240 and 8270. Fifteen compounds were identified as TICs in the Site 17 Disposal Area dataset, in addition to several "unknown compounds." Five PCB congeners detected in one soil sample are the only TICs at Site 17 that are neither hydrocarbon-related nor naturally occurring compounds. EPA Test Method 8270 (SOCs) is not designed to specifically analyze for PCBs, and subsequent sampling and analysis of soil samples by EPA Method 8080 did not confirm the presence of PCBs in soil in this area. Therefore, TIC data were not evaluated further in the BRA.

4.2.5 Site 17 "Other Areas"

Sampling activities were conducted in areas outside the Site 17 Disposal Area (referred to as the "Site 17 Other Areas"). These are discussed in Volume II, Sites 16 and 17, Section 2.0 and include the following:

- Collection of six soil samples from two borings in the southern portion of the site and analysis of samples for priority pollutant metals and BTEX

- Collection of two soil samples each from MW-17-01-A and MW-17-02-180 and analysis for priority pollutant metals and BTEX

- Collection of 14 soil samples from two test pits in the southern portion of the site as part of HLA's *Draft Basewide Storm Drain and Sanitary Sewer Investigation*, dated July 6, 1992, and analysis for priority pollutant metals, and VOCs.

Further assessment of data for the Site 17 Other Areas was not necessary because few chemicals were detected (one VOC, acetone, and nine metals), no potential source areas were defined, and almost all detected concentrations of metals were below background. Summaries of statistical data for chemicals detected in soil at the Site 17 Other Areas are in Table 4.5. Because these data were not considered further in this BRA, it was unnecessary to segregate them by depth.

4.2.6 Groundwater

Groundwater samples have been collected since March 1992 from the three monitoring wells on Sites 16 and 17. MW-16-01-A and MW-17-01-A are in the A-aquifer; MW-17-02-180 is in the Upper 180-foot aquifer. In this BRA, data for the A-aquifer and the Upper 180-foot aquifer were treated as separate datasets. Data were reviewed to select a dataset representative of current groundwater conditions. Detected concentrations of carbon tetrachloride in MW-17-02-180 have exceeded the California MCL of 0.5 μg/l in three of five samples collected since March 1992. However, concentrations do not appear to be consistent and may be decreasing over time. Similarly, detected concentrations of tetrachloroethene in MW-17-01-A and MW-17-02-180 exceeded the California and Federal MCL of 5 μg/l in samples collected in March 1992. Detected concentrations of PCE in all subsequent samples have been below the MCL.

Six groundwater sampling events took place at Sites 16 and 17 between March 1992 and February 1994: March, May, and June 1992;

August/September and December 1993; and February 1994. No groundwater samples were collected between June 1992 and September 1993. Data collected after September 1993 were considered to be more representative of current groundwater conditions than samples collected prior to June 1992 and were therefore included in this BRA.

The seven samples evaluated were analyzed for priority pollutant metals, halogenated VOCs (EPA Method 8010), aromatic VOCs (EPA Method 8020), and SOCs. Chemicals detected in the A-aquifer include tetrachloroethene, toluene, trichloroethene, antimony, zinc, and sodium. Chemicals detected in the Upper 180-aquifer include carbon tetrachloride, tetrachloroethene, toluene, and trichloroethene. The summaries of statistical data for the chemicals detected in groundwater are presented in Tables 4.6 and 4.7 for the A-aquifer and the Upper 180-foot aquifer.

4.3 Selection of Chemicals of Potential Concern (COPCs)

This section describes the selection of COPCs in soil and groundwater at Sites 16 and 17. COPCs in soil were selected separately for each area evaluated in the BRA, as defined in Section 4.2: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and Site 17 Disposal Area. Data for surface soil samples (0 to 2 feet bgs) and subsurface soil samples (0 to 10 feet bgs) were considered separately in this BRA; therefore, COPCs were identified for each of these depth intervals in areas where potential receptors were assumed to contact surface and/or subsurface soil.

COPCs in groundwater were selected separately for the A-aquifer and the Upper 180-foot aquifer. Chemicals detected in soil and groundwater in each area were evaluated using the COPC selection criteria described in Section 2.1.2. For comparison of detected soil concentrations to site-specific background concentrations, Fort Ord NQTP soil background concentrations were used, as described in Section 2.1.2.1. Results of the COPC selection for Sites 16 and 17 are presented below.

4.3.1 DOL Maintenance Yard

The COPC selection for the DOL Maintenance Yard is summarized in Tables 4.8a and 4.8b for surface and subsurface (0 to 10 feet bgs) soil. Separate discussions for surface and subsurface soil follow.

4.3.1.1 Surface Soil

Eleven chemicals were detected in surface soil at the DOL Maintenance Yard. The first step of COPC selection, the elimination of metals for which the maximum detected concentration is less than the background concentration, eliminated chromium and nickel. In the next step, lead was eliminated as a COPC because its maximum concentration is less than the HBSL of 240 mg/kg.

The eight chemicals not eliminated in previous steps were evaluated using a toxicity screen, as described in Section 2.1.2.2 and Appendix C. Results of the toxicity screen are presented in Table C4 in Appendix C. Chemicals with a screening cancer risk less than 1×10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated five chemicals: antimony, B(a)P-TE, copper, mercury, and total cPAH. The screening cancer risks for arsenic, cadmium, and TCDD-TE exceed 1×10^{-8}; the screening HQ for arsenic exceeds 0.01. These three chemicals are therefore retained as COPCs.

4.3.1.2 Subsurface Soil

Twenty-two chemicals were detected in subsurface soil (0 to 10 feet bgs) at the DOL Maintenance Yard. The first step in the COPC selection was to eliminate metals for which the maximum detected concentration is less than the background concentration. Fort Ord background concentrations are available for two depth strata: 0 to 2 feet bgs and greater than 2 feet bgs. To conduct the COPC selection process, the maximum detected concentration in each depth strata was compared to the appropriate background concentration to identify any exceedances of background. This step eliminated beryllium, chromium, nickel, and zinc as COPCs. Because this step eliminated zinc (the only essential nutrient at the DOL Yard), an evaluation of essential nutrients was not necessary. In the third step, lead was eliminated as a COPC because its maximum concentration is less than the HBSL of 240 mg/kg.

The seventeen chemicals not eliminated in previous steps were then evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C4 in Appendix C. Chemicals with a screening cancer risk less than 1 x 10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated all but four of the remaining chemicals: arsenic, bis(2-ethylhexyl)phthalate, cadmium, and TCDD-TE. The screening cancer risk for each of these chemicals exceeds 1 x 10^{-8}; the screening HQ for arsenic exceeds 0.01. These four chemicals are therefore retained as COPCs.

Two Group A carcinogens were detected at the DOL yard: arsenic and nickel. Nickel was eliminated as a COPCs because the maximum detected concentration is less than the background concentration. Arsenic was retained as a COPC as described above.

4.3.2 Pete's Pond

The COPC selection for Pete's Pond is summarized in Tables 4.9a and 4.9b for surface and subsurface (0 to 10 feet bgs) soils. Separate discussion for surface and subsurface soil follow.

4.3.2.1 Surface Soil

Seventeen chemicals were detected in surface soil at the Pete's Pond. The first step in the COPC selection was to eliminate metals for which the maximum detected concentration is less than the background concentration. This step eliminated chromium, lead, and nickel. In the second step, evaluation of essential nutrients, zinc was eliminated because the calculated EDD of 0.35 mg/day is well below the RDA of 5 to 10 mg/day (see Appendix B). In the third step, lead was eliminated as a COPC because its maximum concentration is less than the HBSL of 240 mg/kg.

The twelve chemicals not eliminated in previous steps were then evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C5 in Appendix C. Chemicals with a screening cancer risk less than 1 x 10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated all but five of the remaining chemicals: arsenic, beryllium, cadmium, chlordane, and TCDD-TE. The screening cancer risk for each of these chemicals exceeds 1 x 10^{-8}; the screening HQs for arsenic and cadmium exceed 0.01. These five chemicals are therefore retained as COPCs.

Two Group A carcinogens were detected in surface soils at Pete's Pond: arsenic and nickel. Nickel was eliminated as a COPC because the maximum detected concentration is less than the background concentration. Arsenic was retained as a COPC, as described above. Mercury and lead are identified by California Proposition 65 as developmental toxicants; lead is also identified as a reproductive toxicant. Lead was eliminated as a COPC because the maximum detected concentration is less than the HBSL of 240 mg/kg. Mercury was eliminated as a COPC because the screening HQ is less than 0.01.

4.3.2.2 Subsurface Soil

Eighteen chemicals were detected in subsurface soil (0 to 10 feet bgs) at Pete's Pond. The first step in the COPC selection was to eliminate metals for which the maximum detected concentration is less than the background concentration. The maximum detected concentration in each depth strata was compared to the appropriate background concentration to identify any exceedances of background, as described in Section 4.3.1.2. This step eliminated chromium and nickel as COPCs. In the next step, evaluation of essential nutrients, zinc was eliminated because the calculated EDD of 0.35 mg/day is well below the RDA of 5 to 10 mg/day (see Appendix B). In the third step, lead was eliminated as a COPC because its maximum concentration is less than the HBSL of 240 mg/kg.

The fourteen chemicals not eliminated in previous steps were then evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C5 in Appendix C. Chemicals with a screening cancer risk less than 1 x 10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated all but five of the remaining chemicals: arsenic, beryllium, cadmium, chlordane, and TCDD-TE. The screening cancer risk for each of these chemicals exceeds 1×10^{-8}; the screening HQs for arsenic and cadmium exceed 0.01. These five chemicals are therefore retained as COPCs.

Two Group A carcinogens were detected in subsurface soils at Pete's Pond: arsenic and nickel. Nickel was eliminated as a COPC because the maximum detected concentration is less than the background concentration. Arsenic was retained as a COPC, as described above. One chemical, lead, is identified as both a developmental toxicant and reproductive toxicant by California Proposition 65. Lead was eliminated as a COPC because its maximum detected concentration is less than the HBSL of 240 mg/kg.

4.3.3 Pete's Pond Extension

The COPC selection for Pete's Pond Extension is summarized in Tables 4.10a and 4.10b for surface and subsurface (0 to 10 feet bgs) soils. Separate discussions for surface and subsurface soil follow.

4.3.3.1 Surface Soil

Eighteen chemicals were detected in surface soil at Pete's Pond Extension. The first step in the COPC selection was to eliminate metals for which the maximum detected concentration is less than the background concentration. This step eliminated beryllium, chromium, and nickel as COPCs. In the next step, evaluation of essential nutrients, zinc was eliminated because the calculated EDD of 0.21 mg/day is well below the RDA of 5 to 10 mg/day (see Appendix B). In the third step, lead was retained as a COPC because its maximum concentration exceeds the HBSL of 240 mg/kg.

The thirteen chemicals not eliminated or retained in previous steps were evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C6 in Appendix C. Chemicals with a screening cancer risk less than 1×10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated all but seven of the remaining chemicals: antimony, arsenic, cadmium, chlordane, copper, 4,4'-DDT, and TCDD-TE. The screening cancer risks for arsenic, cadmium, chlordane, 4,4'-DDT, and TCDD-TE exceed 1×10^{-8}; the screening HQs for antimony, arsenic, and copper, exceed 0.01. These seven chemicals, and lead, are therefore retained as COPCs.

Two Group A carcinogens were detected in surface soils at Pete's Pond Extension: arsenic and nickel. Arsenic was retained as a COPC, as described above. Nickel was eliminated as a COPC because the maximum detected concentration is less than the background concentration. Mercury and lead are identified by California Proposition 65 as developmental toxicants; lead is also identified as a reproductive toxicant. Lead was retained as a COPC because the maximum detected concentration exceeded the HBSL of 240 mg/kg. Mercury was eliminated as a COPC because the screening HQ is less than 0.01.

4.3.3.2 Subsurface Soil

Twenty-one chemicals were detected in subsurface soil (0 to 10 feet bgs) at Pete's Pond Extension. The first step in the COPC selection was to eliminate metals for which the maximum detected concentration is less than the background concentration. The maximum detected concentration in each depth strata was compared to the appropriate background concentration to identify any exceedances of background, as described in Section 4.3.1.2. This step eliminated beryllium as a COPC. In the next step, evaluation of essential nutrients, zinc was eliminated because the calculated EDD of 0.21 mg/day is well below the RDA of 5 to 10 mg/day (see Appendix B). In the third step, lead was retained as a COPC because its maximum concentration exceeds the HBSL of 240 mg/kg.

The nineteen chemicals not eliminated or retained in previous steps were evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C6 in Appendix C. Chemicals with a screening cancer risk less than 1×10^{-8} or a screening HQ less than 0.01 were eliminated as COPCs. This step eliminated all but eight of the remaining chemicals: antimony, arsenic, cadmium, chlordane, copper, 4,4'-DDT, nickel, and TCDD-TE. The screening cancer risks for arsenic, cadmium, chlordane, 4,4'-DDT, nickel, and TCDD-TE exceed 1 x 10^{-8}; the screening HQs for antimony, arsenic, and copper exceed 0.01. These eight chemicals, and lead, are therefore retained as COPCs.

Two Group A carcinogens were detected in subsurface soils at Pete's Pond Extension: arsenic and nickel. Both chemicals were retained as COPCs, as described above. One chemical, lead, is identified as both a developmental toxicant and reproductive toxicant by California Proposition 65. Lead was retained as a COPC because the maximum detected concentration exceeds the HBSL of 240 mg/kg.

4.3.4 Site 17 Disposal Area

The COPC selection for the Site 17 Disposal Area is summarized in Tables 4.11a and 4.11b for surface and subsurface (0 to 10 feet bgs) soil. Separate discussions for surface and subsurface soil follow.

4.3.4.1 Surface Soil

Eleven chemicals were detected in surface soil at the Site 17 Disposal Area (Table 4.11a). The first step, elimination of metals for which the maximum detected concentration was less than the background concentration, eliminated arsenic, beryllium, chromium, copper, lead, nickel, and zinc. Because this step eliminated zinc (the only essential nutrient detected in the area), an evaluation of essential nutrients was not necessary. Because this step also eliminated lead, comparison of the maximum lead concentration of 29.0 mg/kg to the HBSL of 240 mg/kg was not necessary.

The four chemicals not eliminated in previous steps were evaluated using a toxicity screen, as described in Section 2.1.2.2 and Appendix C. Results of the toxicity screen are presented in Table C7 in Appendix C. Of these chemicals, acetone, antimony, and mercury were eliminated as COPCs because the maximum concentration is less than the screening HQ of 0.01. Screening cancer risks for TCDD-TE exceed 1 x 10^{-8}; TCDD-TE was therefore retained as a COPC.

Two Group A carcinogens were detected in surface soils in this area: arsenic and nickel. Both of these chemicals were eliminated as COPCs because the maximum detected concentration for each was less than the background concentration. Mercury and lead are identified by California Proposition 65 as developmental toxicants; lead is also identified as a reproductive toxicant. Lead is eliminated as a COPC because the maximum detected concentration is less than the background concentration. Mercury is eliminated as a COPC because the screening HQ is less than 0.01.

4.3.4.2 Subsurface Soil

Sixteen chemicals were detected in subsurface soil at the Site 17 Disposal Area (Table 4.11b). The first step, elimination of metals for which the maximum detected concentration was less than the background concentration, eliminated beryllium. The second step, evaluation of essential nutrients, eliminated zinc, the only essential nutrient detected at the site. The calculated EDD for zinc is 0.13 mg/day, which is well below the RDA of 5 to 10 mg/day (see Appendix B). In the next step, lead was retained as a COPC because its maximum concentration exceeds the HBSL of 240 mg/kg.

The 13 chemicals not eliminated or retained in previous steps were evaluated using a toxicity screen. Results of the toxicity screen are presented in Table C7 in Appendix C. This step eliminated all but seven of the remaining chemicals: antimony, arsenic, cadmium, copper, mercury, nickel, and TCDD-TE. The screening cancer risks for arsenic, cadmium, nickel, and TCDD-TE exceed 1 x 10^{-8}; the screening HQs for antimony, arsenic, copper, mercury, and nickel exceed 0.01. These seven chemicals, and lead, are therefore retained as COPCs.

Two Group A carcinogens were detected in subsurface soils at the Site 17 Disposal area: arsenic and nickel. Both were retained as COPCs. One chemical, lead, was identified as both a developmental toxicant and reproductive toxicant by California Proposition 65. Lead was retained as a COPC because the maximum detected concentration exceeds the HBSL of 240 mg/kg.

4.3.5 Groundwater

Five chemicals were detected in groundwater in the A-aquifer (Table 4.12). The first step of the groundwater COPC selection process, evaluation of essential nutrients, eliminated zinc as a COPC. The calculated EDD for zinc is 0.040 mg/day, which is well below the RDA of 5 to 10 mg/day (Appendix B). The four remaining chemicals, tetrachloroethene, toluene, trichloroethene, and antimony, were evaluated using a toxicity screen as described in Section 2.1.2.2 and presented in Table C8 in Appendix C. Because the screening HQ exceeds 0.01, antimony was retained as a COPC in groundwater for the A-aquifer. The screening cancer risk for tetrachloroethene and trichloroethene exceed the 1×10^{-8} screening criteria; these chemicals were therefore retained as COPCs. The three COPCs evaluated for groundwater in the A-aquifer are antimony, tetrachloroethene, and trichloroethene.

Four chemicals were detected in groundwater in the Upper 180-foot aquifer (Table 4.13). None of the chemicals detected in this aquifer are essential nutrients; therefore no chemicals were eliminated on this basis. The four chemicals detected in the Upper 180-foot aquifer were evaluated using a toxicity screen, as described in Section 2.1.2.2 and Table C8 in Appendix C. Because the screening HQ exceeds 0.01 and the screening cancer risk exceeds 1×10^{-8} for carbon tetrachloride, this chemical was retained as a COPC. Tetrachloroethene and trichloroethene were retained as COPCs because the screening cancer risk exceeds 1×10^{-8}. The three COPCs evaluated for groundwater in the Upper 180-foot aquifer are carbon tetrachloride, tetrachloroethene, and trichloroethene.

4.4 Exposure Assessment

The methods used to identify potential exposure scenarios for the sites evaluated in this BRA were described in Section 2.2. This section discusses the nature and degree of potential exposure to the COPCs that may occur at Sites 16 and 17. Section 4.4.1 presents an assessment of the potential chemical sources and potential chemical migration pathways for the COPCs. Section 4.4.2 discusses the potential hypothetical receptors and pathways, and identifies the receptors and pathways selected for quantitative evaluation. Section 4.4.3 describes the exposure scenarios for estimating potential exposures and risks. Section 4.4.4 presents the exposure point concentrations. Section 4.4.5 addresses the methods used to estimate exposure (dose) for all receptors assumed to be exposed to COPCs.

As described in Section 4.1.2, buried debris has been observed in Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. Medical wastes observed in the Site 17 Disposal Area and Pete's Pond Extension, and rusted ordnance observed in Pete's Pond Extension, may present physical hazards. Potential exposure to this buried debris and possible hazards associated with exposure are not evaluated in the BRA.

4.4.1 Chemical Source and Migration Analysis

Section 3.0 of the Introduction to the RI (Volume II) discusses chemical fate and transport for chemicals detected at the five RI sites. Section 3.0 of the Introduction to the RI also includes a table of physical and chemical properties pertaining to environmental fate and transport of these chemicals and a discussion of potential chemical migration pathways. Section 5.0 of the Sites 16 and 17 RI (Volume II) presents a site-specific discussion of chemical fate and transport and identifies potential chemical migration pathways at Sites 16 and 17; the potential migration pathways discussed in that section are addressed below.

The following potential source areas (i.e., retention media) at Sites 16 and 17 were identified:

- Soil at Pete's Pond, as a result of historical dumping of refuse and as a result of surface water outfalls releasing runoff and sediments from surrounding areas (as described in Section 4.1.1)
- Soils at Pete's Pond Extension, as a result of historic dumping of refuse
- Soils at the Site 17 Disposal Area, as a result of historic dumping of refuse

- Groundwater in the A-aquifer and the Upper 180-foot aquifer, beneath the sites.

Release of chemicals from soil can potentially occur via volatilization of chemicals, wind erosion, stormwater runoff, or downward migration of chemicals into groundwater. The following sections discuss these potential release mechanisms for COPCs in soil at Sites 16 and 17.

4.4.1.1 Chemical Vapors

The volatilization of certain chemicals from soil can result in the release of these chemicals in a vapor phase. As indicated in Section 4.2, the COPCs detected in soil at Sites 16 and 17 include CDDs, CDFs, SOCs, and metals. The CDDs, CDFs, and SOCs generally have either a high molecular weight (greater than 200) or low to moderate vapor pressures and Henry's Law constants (Table 2a, Introduction to Volume II); chemicals with either of these properties generally are unlikely to volatilize to air. In addition, these chemicals have moderate to high organic carbon partition coefficients (K_{oc}) (Table 2a, Introduction to Volume II), indicating that they tend to sorb readily to soil, further reducing the potential for volatilization. Metals are generally present in the environment either in their pure elemental form or as inorganic salts, both of which are essentially nonvolatile. For these reasons the volatilization of COPCs was not considered a viable migration pathway; vapor emissions from soil to air were therefore not evaluated in this BRA.

Volatilization of chemicals from groundwater can result in the release of chemicals in groundwater to soil gas, with subsequent migration of chemical vapors through soil gas to ambient air. As indicated in Section 4.3.5, the COPCs detected in groundwater at the sites include carbon tetrachloride, tetrachloroethene, trichloroethene, and antimony. Depth to groundwater in this area ranges from approximately 117 to 170 feet bgs. Although carbon tetrachloride, tetrachloroethene, and trichloroethene might volatilize, the low concentrations detected in groundwater and the depth of soil cover in this area indicate that release of vapors from groundwater is unlikely; antimony is essentially nonvolatile. Potential volatilization of chemicals in groundwater to soil gas and migration to ambient air is therefore not a likely migration pathway and was not evaluated in this BRA.

4.4.1.2 Fugitive Dust

Wind or mechanical erosion can lead to the release of chemicals in soil by generation of dust. The same physicochemical properties that limit the migration of COPCs from soil via volatilization result in the tendency of these chemicals to sorb to soil particles; these particles may then become entrained in the air as fugitive dust as a result of wind erosion. This potential migration pathway could possibly result in human exposures to the COPCs via inhalation of dust. Although much of Sites 16 and 17 is paved, it was conservatively assumed that existing pavement might be removed, allowing for generation of dust from surface soil with detectable concentrations of chemicals. Therefore, this chemical migration route was quantitatively evaluated in the risk assessment.

4.4.1.3 Stormwater Runoff

Runoff from Sites 16 and 17 is discharged into Pete's Pond via six surface water outfalls, as discussed in Section 4.1.1. The extent to which chemicals are transported in stormwater runoff depends on the physical and chemical characteristics of the chemicals, the soil type, and the magnitude of the storm. The organic COPCs present in onsite soil have limited water solubilities but high soil sorption tendencies; they may therefore be transported via sorption to soil particles carried by runoff to onsite or offsite soil or surface water bodies. The metal COPCs detected at these sites are expected to sorb moderately strongly to site soils and might therefore be transported by runoff. However, soil in the area of Sites 16 and 17 is sandy and it is likely that rainwater will be rapidly absorbed by the soil. The runoff potential is therefore expected to be low at Sites 16 and 17, and stormwater runoff was not evaluated in this BRA.

4.4.1.4 Leaching

The potential for chemicals to leach from soil to groundwater depends on the physical and chemical properties of the chemicals, the chemical concentration, soil type, pH (for metals), and other site-specific conditions. For example, metals in soil with a low pH (i.e., acidic) generally have a tendency to leach downward through the soil column. The soil pH measured at Site 16 and 17 ranges from 4.4 to 6.6, with an average pH of approximately 5.8, indicating that there is little potential for metals to leach to groundwater. The CDDs and CDFs and the COPC metals detected at the site are expected to sorb strongly to soil particles. In addition, the depth to groundwater at Sites 16 and 17 ranges from approximately 117 to 170 feet bgs, as discussed in Section 4.1.1.2. For these reasons, chemical migration of the COPCs to groundwater at this site is considered unlikely and was not quantitatively evaluated in this BRA. The results of soil leaching modeling conducted for Sites 16 and 17 are discussed in Volume II, Sites 16 and 17 Remedial Investigation, Section 4.6.

4.4.1.5 Summary of Chemical Source and Migration Analysis

To summarize, the emission of fugitive dust was considered the only likely chemical migration pathway and was therefore quantitatively evaluated in the risk assessment for Sites 16 and 17.

4.4.2 Potential Receptors and Exposure Pathways

This section identifies the hypothetical receptors who might be exposed to COPCs at each of the areas at Sites 16 and 17 and defines the potential exposure pathways through which the receptors could contact COPCs. The general methods used to identify receptors were discussed in Sections 2.2, 2.2.2, and 2.2.3. Section 4.1 describes the general site topography, current and possible future land uses, and current and possible future demographics of the sites, and forms the basis of the exposure assessment for this site. Because the site is essentially inactive, there are no likely current receptors. Therefore, only possible future receptors at the sites are considered in this BRA.

Projected future land use is different for Sites 16 and 17, as discussed in Section 4.1.2, and four distinct areas have been defined within Sites 16 and 17, as discussed in Section 4.1.1. Therefore, possible future receptors are identified separately for each of the four areas at Sites 16 and 17: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. For receptors potentially exposed to soil, the following exposure pathways were evaluated in this BRA: ingestion of soil, dermal contact with soil, and inhalation of airborne dust. For receptors potentially exposed to groundwater, exposure via ingestion of groundwater and inhalation of vapors during domestic use of groundwater were evaluated in this BRA. Discussions of the possible receptors for each area follow.

4.4.2.1 DOL Maintenance Yard

Possible future receptors who may be exposed to chemicals in soil from 0 to 2 feet bgs at the DOL Maintenance Yard include:

- Commercial workers
- Nearby offsite residents

Possible future receptors who may be exposed to chemicals in soil from 0 to 10 feet bgs include:

- Onsite construction workers
- Onsite utility workers

Exposure of possible future receptors to soil greater than 10 feet bgs is not expected.

As discussed in Section 4.1.2, future land use plans indicate that public agency corporation yards will be developed in the area, including the DOL Maintenance Yard. Due to the size, location, and topography of the DOL Maintenance Yard, it is possible that offices, warehouses, garages, or other buildings associated with the corporation yards may be developed in this immediate area. Commercial workers may therefore be present. Offsite residents might be exposed to chemicals in soil at the DOL Maintenance Yard via inhalation of dust. However, due to the limited area of contamination and the presence of partial pavement and light vegetative cover, significant dust emission from this area is considered unlikely.

Onsite construction and utility workers might be exposed to subsurface soil (0 to 10 feet bgs) during work activities. Utility workers are likely to be present onsite for shorter periods of time than construction workers, so the construction worker is likely to have higher exposures and higher potential risks.

Based on the information provided above, the following receptors were quantitatively evaluated in the BRA at the DOL Maintenance Yard:

- Future onsite commercial worker exposed to chemicals in surface soil (0 to 2 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust

- Future onsite construction worker exposed to chemicals in subsurface soil (0 to 10 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust

4.4.2.2 Pete's Pond

Possible future receptors who may be exposed to chemicals at Pete's Pond in soil from 0 to 2 feet bgs include:

- Commercial workers
- Trespassers
- Nearby offsite residents.

Possible future receptors who may be exposed to chemicals in soil from 0 to 10 feet bgs include:

- Onsite construction workers
- Onsite utility workers.

Exposure of possible future receptors to soil greater than 10 feet bgs is not expected.

As discussed in Section 4.1.2, public agency corporation yards are to be developed in the area of Fort Ord that includes Site 16. The Pete's Pond area of Site 16 is unlikely to be developed due to the very limited size, location, and presence of storm drain outfalls, as described in Section 4.1.1. Therefore, commercial workers are not expected to be present at Pete's Pond. ~~Trespassers could possibly enter this area. For this BRA, the hypothetical trespasser was assumed to live nearby~~. As described in Section 4.4.2.4, a potential student resident may be present at the Site 17 Disposal Area. Exposures from potential trespassing on Pete's Pond are evaluated for the nearby student resident.

The hypothetical offsite resident and commercial worker might be exposed to chemicals in soil at Pete's Pond via inhalation of dust. However, due to its limited size and the vegetative cover, significant dust emission from this area was considered unlikely. An onsite construction worker is not likely to be present at Pete's Pond because construction activities are unlikely to occur on this small, vegetated, seasonally flooded area. However, development of areas near Pete's Pond may require installation and maintenance of utility lines along adjacent roadways by utility workers. Therefore, the following receptors were quantitatively evaluated at Pete's Pond:

- Nearby ~~student resident~~/trespasser exposed to chemicals in surface soil (0 to 2 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust

- Future onsite utility worker exposed to chemicals in subsurface soil (0 to 10 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust.

4.4.2.3 Pete's Pond Extension

Possible future receptors at Pete's Pond Extension who may be exposed to chemicals in soil from 0 to 2 feet bgs include:

- Commercial workers
- Trespassers
- Nearby offsite residents.

Text Revisions
Volume III, Sites 16 and 17
Page 47

In Volume III, Sites 16 and 17 delete third and fourth sentences of the first paragraph, second column of page 47 and replace with:

> *Exposures from potential trespassing on Pete's Pond are evaluated for a student or faculty member at the proposed CSU Monterey Bay Campus.*

In Volume III, Sites 16 and 17 first bullet, second column of page 47, replace "*student resident*" **with** "*student/faculty.*"

Text Revisions
Volume III, Sites 16 and 17
Page 48

In Volume III, Sites 16 and 17, fifth sentence, first paragraph, first column of page 48, delete: "*resident, as discussed in Section 4.4.2.2*" **and replace with:** "*or faculty member at the proposed CSU Monterey Bay Campus.*"

In Volume III, Sites 16 and 17, third bullet, first column of page 48, delete "*resident*" **and replace with** "*or faculty.*"

Text Revisions
Volume III, Sites 16 and 17
Page 48 and 49

In Volume III, Sites 16 and 17, fourth sentence, last paragraph, second column of page 48 (and first column of page 49), delete remainder of paragraph starting with "*Although*", to the end of the paragraph (which continues on to the top of page 49).

Replace with:

> *For this BRA it is assumed that students and faculty would be working in the artists' studios. Although other student/faculty or visitors may be present in the area, the student/faculty working in the studios would have the highest exposure.*

Possible future receptors who may be exposed to chemicals in soil from 0 to 10 feet bgs include:

- Onsite construction workers
- Utility workers.

Exposure of possible future receptors to soils greater than 10 feet bgs is not expected.

As discussed in Section 4.1.2, public agency corporation yards are to be developed in the area of Fort Ord which includes Site 16. The Pete's Pond Extension area of Site 16 is also unlikely to be developed due to its limited size and location, as described in Section 4.1.1. Therefore, commercial workers are not expected to be present at or near Pete's Pond Extension. Trespassers could potentially enter this area. The hypothetical trespasser was assumed to be a nearby student [redacted] The offsite resident and commercial worker might be exposed to chemicals in soil at Pete's Pond Extension via inhalation of dust. However, due to its substantial vegetative cover and limited size, significant dust emission from this area is considered unlikely. An onsite construction worker receptor is not likely to be present at Pete's Pond Extension because construction activities are unlikely to occur on this relatively small, vegetated, and sloped area. However, development in areas near Pete's Pond Extension may require installation and maintenance of utility lines along adjacent roadways by utility workers. Therefore, the following receptors are selected for quantitative evaluation at Pete's Pond Extension:

- Nearby student [redacted]/trespasser exposed to chemicals in surface soil (0 to 2 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust
- Future onsite utility worker exposed to chemicals in subsurface soil (0 to 10 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust.

4.4.2.4 Site 17 Disposal Area

Possible future onsite receptors who may be exposed to chemicals in soil from 0 to 2 feet bgs at the Site 17 Disposal Area include:

- Students at the proposed California State University campus
- Faculty at the proposed California State University campus
- Administrative staff at the proposed California State University
- Visitors to the proposed California State University
- Nearby offsite commercial workers
- Nearby offsite residents.

Possible future receptors who may be exposed to chemicals in soil from 0 to 10 feet bgs include:

- Onsite construction workers
- Onsite utility workers.

Exposure of possible future receptors to soils greater than 10 feet bgs is not expected.

Most soils in the Site 17 Disposal Area are currently covered by asphalt or concrete pavement. For this BRA, it was assumed that pavement might be removed in the future and that no clean soil cover would be placed over exposed soils.

As discussed in Section 4.1.2, the proposed California State University Monterey Bay Campus is to be built in an area of Fort Ord of which Site 17 is a part. Student housing, lecture facilities, and other future buildings will most likely be built in areas already developed (i.e., existing buildings on the Main Garrison east of Site 17). Current land use plans indicate than the Site 17 area will be landscaped and will have artist studios and warehouses. [redacted] the Site 17 Disposal Area. Students, faculty, administrative staff, and other visitors might be present in this area. Student residents are likely to be on campus more frequently and for longer periods of time (years) than other potential receptors; therefore, exposure of the student resident to COPCs is quantitatively evaluated in the BRA.

Potential exposure of nearby offsite receptors via inhalation of dust would be significantly lower than potential exposure of onsite receptors via inhalation of dust as well as via ingestion of and dermal contact with soil. Therefore, offsite receptors were not quantitatively evaluated.

Onsite construction and utility workers might be exposed to subsurface soils (0 to 10 feet bgs) during work. Utility workers are likely to be present for shorter periods of time than construction workers; therefore, the construction worker is likely to have higher exposures and greater potential risks.

Based on the information provided above, the following receptors were quantitatively evaluated in the BRA at the Site 17 Disposal Area:

- Future onsite student resident exposed to chemicals in surface soil (0 to 2 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust

- Future onsite construction worker, exposed to chemicals in subsurface soil (0 to 10 feet bgs) via ingestion of and dermal contact with soil, and inhalation of dust.

4.4.2.5 Groundwater

No groundwater wells other than three monitoring wells (Volume II, Sites 16 and 17, Plates 2 through 6) installed as part of the RI are now at Sites 16 or 17. For this BRA, it was assumed that a domestic supply well might be placed in this area in the future. This BRA does not evaluate potential exposures of offsite receptors to onsite groundwater; it does evaluate onsite receptors as described below.

Possible future onsite receptors who may be exposed to groundwater beneath Sites 16 and 17 include student residents, faculty, and staff of the proposed university. The hypothetical student resident receptor is expected to be exposed to onsite groundwater for a longer period than the other potential receptors considered. Therefore, potential risks from ingestion of groundwater and inhalation of VOCs from groundwater during domestic use (i.e., showering) are quantitatively evaluated in this BRA for the student receptor.

For this BRA, potential future exposure to COPCs in groundwater in the A-aquifer and the Upper 180-foot aquifer were evaluated separately. It was assumed that hypothetical future wells would be screened in either the A-aquifer or the Upper 180-foot aquifer, and that exposure would therefore occur to groundwater in one aquifer but not both. Exposure to COPCs in both the Upper 180-foot aquifer and the A-aquifer are quantitatively evaluated and discussed further in Section 4.6.

4.4.3 Exposure Scenarios

This section discusses site-specific conditions used to quantitatively evaluate exposure of the potential future receptors defined in Section 4.4.2: a hypothetical future student resident/trespasser, utility worker, and construction worker. Both average and RME exposure scenarios are presented, as discussed in Section 2.2.3. Section 2.2.5 discusses exposure assumptions (e.g., soil contact rates) common to receptors considered for this and the other sites evaluated in this BRA. Section 2.2.5 contains the general definitions of the exposure duration (ED), exposure frequency (EF), exposure time (ET) and fraction of intake (FI). The following sections present the assumed values for these terms for each of the potential future receptors evaluated at Sites 16 and 17. Because the topography, access, and other physical conditions differ for Pete's Pond, Pete's Pond Extension, the DOL Maintenance Yard, and the Site 17 Disposal Area, some exposure assumptions for these areas differ and will be separately addressed for relevant receptors. The assumed exposures of the hypothetical student resident/trespasser, utility worker, construction worker, and commercial worker receptors are described in Sections 4.4.3.1 through 4.4.3.4.

Text Revisions
Volume III, Sites 16 and 17
Page 49

In Volume III, Sites 16 and 17 first bullet of the first column of page 49 delete, *"onsite student resident"* **and replace with,** *"faculty/student at the artists studios."*

In Volume III, Sites 16 and 17, second sentence, first paragraph, second column of page 49, delete "resident" **and insert** *"/faculty artist"* **immediately after** *"The hypothetical student."*

Text Revisions
Volume III, Sites 16 and 17
Page 50

In Volume III, Sites 16 and 17, Section 4.4.3.1 heading on page 50, replace "*Student Resident*" **with** "*Student/Faculty Artist.*"

In Volume III, Sites 16 and 17, first sentence, first paragraph, first column of page 50, replace "*student resident*" **with** "*student/faculty artist*", **and replace** "*student resident/trespasser*" **with** "*student/faculty trespasser*".

In Volume III, Sites 16 and 17, first and fourth bullets of the first column of page 50, replace "*Student resident*" **with** "*Student/faculty artist.*"

In Volume III, Sites 16 and 17 second and third bullets of the first column of page 50, replace "*Student resident/trespasser,*" **with** "*Student/faculty trespasser.*"

In Volume III, Sites 16 and 17 first sentence, of the second paragraph of the first column of page 50, replace "*the student resident*" **and** "*student resident/trespasser*" **with** "*the student/faculty artist*" **and** "*student/faculty trespasser,*" **respectively.**

In Volume III, Sites 16 and 17 delete completely the third paragraph of the first column of page 50 and insert:

Future artist's studios at the proposed university campus were assumed to be constructed in the Site 17 Disposal Area. The student/faculty artist was assumed to have a studio on campus an average of 5 years (average ED = 5 years) and a maximum of 25 years (RME ED = 25 years). Based on an average two-semester school year, the student/faculty artist was assumed to be at CSU 7 days per week for approximately 33 weeks (average EF = 230 days per year). If the student/faculty artist remains on campus for an additional 10-week summer semester, total time at CSU would be approximately 43 weeks, 7 days per week (RME EF = 300 days per year).

In Volume III, Sites 16 and 17, first sentence, first paragraph, second column of page 50, replace "*students*" **with** "*students/faculty.*"

In Volume III, Sites 16 and 17, first bullet, second column of page 50, replace "*Twenty*" **with** "*Sixteen.*"

4.4.3.1 Student Resident

The hypothetical student resident and student resident/trespasser receptors are included for quantitative evaluation in the following areas at Sites 16 and 17.

- Student resident exposed to soil at the Site 17 Disposal Area
- Student resident/trespasser exposed to soil at Pete's Pond
- Student resident/trespasser exposed to soil at Pete's Pond Extension
- Student resident exposed to groundwater beneath Sites 16 and 17.

For this BRA, the student resident and student resident/trespasser receptors were assumed to be the same receptor, and potential exposures were combined for all areas to represent a single, maximally exposed receptor. This future hypothetical receptor is hereafter referred to as the student resident receptor.

Future student housing at the proposed university campus was assumed to be constructed in the Site 17 Disposal Area. As discussed in Section 4.1.2, student housing is more likely to be located east of Site 17 in the developed areas of the Main Garrison, but it is conservatively assumed that dormitories might be constructed on Site 17 in the future. The student resident was assumed to live on campus an average of 3 years (average ED = 3 years) and to spend a maximum of 5 years in residence (RME ED = 5 years) in the dormitories on Site 17. Based on an average two-semester school year, the student resident was assumed to be in residence 7 days per week for approximately 33 weeks (average EF = 230 days per year). If the student remains on campus for an additional 10-week summer semester, total time in residence would be approximately 43 weeks, 7 days per week (RME EF = 300 days per year). These are considered conservative estimates given that dormitories are likely to be located in areas other than Site 17 and that students are likely to reside in off-campus residences for part of their time of attendance at the university.

Although precise future land use for the Pete's Pond and Pete's Pond Extension areas are unknown, students might be present in these areas for such activities as waiting at a bus stop or walking through on their way to other areas of campus. Therefore, it was assumed that 0.25 hours might be spent at both the Pete's Pond and Pete's Pond Extension areas. The following ETs were therefore used to evaluate potential exposures:

- Twenty hours per day at the Site 17 Disposal Area, for both the average and RME scenarios
- One-half hour per day at Pete's Pond and Pete's Pond Extension (i.e., 15 minutes each), for the average and RME scenarios.

The remaining 3.5 hours per day was assumed to be spent off site.

The FI term is used to evaluate exposure to soil via ingestion and dermal contact; this term accounts for the fact that the time the receptor spends outdoors is divided among the three areas evaluated here and other areas offsite where the receptor contacts soil. To estimate the RME FI at each area, the receptor was conservatively assumed to receive 100 percent of his or her daily exposure to soil via ingestion or dermal contact while at Sites 16 and 17. It was also necessary to identify the FI for each of the three areas where the student might be exposed to soil. Because the student was assumed to spend a maximum of 15 minutes per day at both Pete's Pond and Pete's Pond Extension, it was assumed that a relatively small proportion of total exposures to soil would occur at either of these areas. An FI of 0.1 was assumed for both Pete's Pond and Pete's Pond Extension. Therefore, it was assumed that 80 percent of the daily exposure to soil would occur at the Site 17 Disposal Area (FI = 0.8), 10 percent of the daily exposure would occur at Pete's Pond (FI = 0.1), and 10 percent would occur at Pete's Pond Extension (FI = 0.1). For the average scenario, the receptor was assumed to receive 50 percent of his or her daily exposure to soil via ingestion or dermal contact while at Sites 16 and 17. The average FI was therefore assumed to be one-half the RME FI for each area. The average FI for the Site 17 Disposal Area was assumed to be 0.4, and the average FI for Pete's Pond and Pete's Pond Extension were each assumed to be 0.05.

The site-specific exposure assumptions used in the risk assessment for the student resident receptor are summarized in Table 4.14.

4.4.3.2 Utility Worker

For the average scenario, the hypothetical future utility worker receptors at Pete's Pond and Pete's Pond Extension were assumed to work onsite for a one time event lasting 20 days (4 weeks x 5 days per week; average ED = 1 year, average EF = 20 days). For the RME scenario, the utility worker might reasonably be expected to spend a maximum of 30 days working in an area the size of Pete's Pond or Pete's Pond Extension (6 weeks x 5 days per week; RME ED = 1 year, RME EF = 30 days). The utility worker receptor was assumed to be present onsite 8 hours per day for both the average and RME scenarios (ET = 8 hours per day).

To estimate the RME FI, the utility worker receptor was conservatively assumed to receive 100 percent of his or her daily exposure to soil via ingestion or dermal contact while working at Pete's Pond or Pete's Pond Extension (RME FI = 1). For the average scenario, the receptor was assumed to receive 50 percent of his or her daily exposure to soil via ingestion or dermal contact while working onsite (average FI = 0.5).

The site-specific exposure assumptions used in the risk assessment for the utility worker receptor are summarized in Table 4.14.

4.4.3.3 Construction Worker

For the average scenario, the hypothetical future construction worker receptors at the Site 17 Disposal Area and the DOL Maintenance Yard were assumed to work onsite for a one time event lasting 30 days (6 weeks x 5 days per week; average ED = 1 year, average EF = 30 days). For the RME scenario, the construction worker might reasonably be expected to spend a maximum of 250 days working onsite (50 weeks x 5 days per week; RME ED = 1 year, RME EF = 45 days). The construction worker receptor was assumed to be present onsite 8 hours per day for both the average and RME scenarios (ET = 8 hours per day).

To estimate the RME FI, the construction worker receptor was conservatively assumed to receive 100 percent of his or her daily exposure to soil via ingestion or dermal contact while working onsite (RME FI = 1). For the average scenario, the receptor was assumed to receive 50 percent of his or her daily exposure to soil via ingestion or dermal contact while working onsite (average FI = 0.5).

The site-specific exposure assumptions used in the risk assessment for the construction worker receptor are summarized in Table 4.14.

4.4.3.4 Commercial Worker

For the average and RME scenarios, the hypothetical future commercial worker at the DOL Maintenance Yard was assumed to be present onsite 250 days per year (EF = 250 days per year), for 10 years and 25 years, respectively (ED = 10 and 25 years). This receptor was assumed to be present onsite 8 hours per day (ET = 8 hours per day) for both scenarios. To estimate the RME FI, the commercial worker was assumed to receive 100 percent of his or her daily exposure to soil via ingestion and dermal contact while working onsite (RME FI = 1). For the average scenario, this receptor was assumed to receive 50 percent of his or her daily exposure to soil via ingestion and dermal contact while working onsite (average FI = 0.5).

The site-specific exposure assumptions used in the risk assessment for the commercial worker receptor are summarized in Table 4.14.

4.4.4 Exposure Point Concentrations (EPCs)

Section 2.2.7 presents a detailed discussion of the methods used for developing EPCs. As discussed in Section 4.4.2, the soil exposure pathways quantitatively evaluated for the hypothetical receptors at Sites 16 and 17 include exposure to soil via ingestion, dermal contact, and inhalation of dust. Exposure to groundwater was quantitatively evaluated for the student

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Pages 51 and 52

In Volume III, Sites 16 and 17 last sentence of the sixth paragraph of the second column of pages 51 and 52, replace "*student resident receptor*" **with** "*student/faculty artist receptor.*"

Text Revisions
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Page 52

In Volume III, Sites 16 and 17, in the second sentence of the fourth paragraph of the first column of page 52 replace "*student resident*" **with** "*student/faculty artist.*"

In Volume III, Sites 16 and 17, in the first paragraph of Section 4.6 replace "*student resident*" **with** "*student/faculty artist.*"

In Volume III, Sites 16 and 17, in the Section 4.6.1.1 header of page 52 replace "*Student Resident*" **with** "*Student/Faculty Artist.*"

In Volume III, Sites 16 and 17, in first sentence of the sixth paragraph of the second column of page 52 replace "*student resident*" **with** "*student/faculty artist.*"

resident receptor. The EPCs used for evaluation of ingestion of soil, ingestion of groundwater, and dermal contact with soil were represented by the measured soil or groundwater concentrations of the COPCs, as defined in Section 2.2.7. The EPCs used to evaluate inhalation of dust were estimated by multiplying the soil concentrations of the COPCs by the site-specific PM_{10} value, as discussed in detail in Section 2.2.8. The soil and air EPCs are presented in Tables 4.15, 4.16, 4.17, and 4.18 for each area at Sites 16 and 17. Groundwater EPCs are presented in Table 4.19.

The student resident receptor was assumed to be exposed to chemicals detected at the soil surface in the Site 17 Disposal Area, Pete's Pond, and Pete's Pond Extension. This receptor was assumed not to engage in activities (e.g., digging) that would expose him or her to soil at depths greater than 2 feet. The EPCs used for the student receptor in these areas were, therefore, the COPC concentrations detected in soil at 0 to 2 feet bgs. The utility worker and construction worker receptors were assumed to engage in activities (e.g., digging) that would expose him or her to soil at greater depths. The EPCs used for the utility worker at Pete's Pond Extension and the construction worker at the Site 17 Disposal Area were, therefore, the COPC concentrations detected in soil at 0 to 10 feet bgs in these areas. The commercial worker receptor was assumed to be exposed to chemicals detected at the soil surface at the DOL Maintenance Yard. This receptor was assumed not to engage in activities (e.g., digging) that would expose him or her to soil at depths greater than 2 feet.

4.4.5 Estimation of Exposure (Dose)

The methods for estimating the potential dose associated with presumed exposure to all COPCs (except lead) are presented in detail in Section 2.2.4. Exposure (dose) is estimated with an EPC and site-, receptor-, and pathway-specific exposure assumptions. The EPCs for each area at Sites 16 and 17 are presented in Section 4.4.4. Section 2.2.5 presents the receptor- and pathway-specific exposure assumptions used for all the sites evaluated in this risk assessment; assumptions specific to Sites 16 and 17 are presented in Section 4.4.3. The equations used to estimate exposure dose are presented in Section 2.2.4. The dose calculations for each potential receptor at Sites 16 and 17 are presented in Appendix E.

Because of its unique toxicological properties, potential exposure to lead was evaluated for Sites 16 and 17 as described in Section 2.2.9. The results of the lead evaluation are discussed below in Section 4.6.

4.5 Toxicity Assessment

The methods used to evaluate the potential toxic effects of the COPCs at Sites 16 and 17 are presented in detail in Section 2.3. The toxicity values (RfDs and SFs) used to quantitatively evaluate the exposure pathways for Sites 16 and 17 are presented in Table 2.9.

4.6 Risk Characterization

The methods used to estimate potential adverse noncancer health effects and potential upper-bound cancer risks associated with exposure of the hypothetical receptors to the COPCs detected at Sites 16 and 17 are discussed in detail in Section 2.4. The following sections present the results of the risk characterization for the student resident, utility worker, construction worker, and commercial worker receptors at Sites 16 and 17. Possible noncancer health effects are presented in Section 4.6.1, followed by potential cancer risks in Section 4.6.2, and results of the lead exposure evaluation in Section 4.6.3.

4.6.1 Possible Noncancer Health Effects

Potential noncancer health effects are summarized below for each receptor.

4.6.1.1 Student Resident

Estimated hazard indices (HIs) for the student resident receptor are presented in Tables E8 - E15 in Appendix E; total HIs for each area and pathway are summarized in Table 4.20.

As discussed in Section 4.4.2.5, COPCs in the Upper 180-foot and the A-aquifers were evaluated separately. Therefore, total multipathway noncarcinogenic HIs for exposures to COPCs in the Upper 180-aquifer and the A-aquifer are presented separately in Table 4.20. The estimated multipathway HIs for exposures at Pete's Pond are 0.0002 and 0.03 for the average and RME scenarios, respectively. The multipathway HIs for exposures at Pete's Pond Extension are 0.0004 and 0.007 for the average and RME scenarios, respectively. The estimated multipathway HIs for exposures to groundwater in the Upper 180-foot aquifer and soil at the Site 17 Disposal Area are 0.02 and 0.08 for the average and RME scenarios, respectively. The estimated multipathway HIs for exposures to groundwater in the A-aquifer and soil at the Site 17 Disposal Area are 0.2 and 1 for the average and RME scenarios, respectively.

The estimated total multipathway HIs including exposures to groundwater in the Upper 180-foot aquifer plus soil at all three areas are 0.02 and 0.09 for the average and RME scenarios, respectively. The estimated total multipathway HIs including exposures to groundwater in the A-aquifer plus soil in all three areas are 0.2 and 1 for the average and RME scenarios, respectively. All estimated multipathway HIs are at or below the EPA's target HI of 1, indicating that noncarcinogenic adverse health effects are not expected for this receptor.

4.6.1.2 Utility Worker

Estimated HIs for the utility worker receptors are presented in Tables E16 through E19 in Appendix E; total HIs for each area and pathway are summarized in Table 4.21. The estimated multipathway HIs for the utility worker at Pete's Pond are 0.0001 and 0.009 for the average and RME scenarios, respectively. The estimated multipathway HIs for the utility worker at Pete's Pond Extension are 0.0003 and 0.02 for the average and RME scenarios, respectively. Estimated multipathway HIs are well below the EPA's target HI of 1, indicating that noncarcinogenic adverse health effects are not expected for the utility worker at either Pete's Pond or Pete's Pond Extension.

4.6.1.3 Construction Worker

Estimated HIs for the construction worker receptors are presented in Tables E20 through E23 in Appendix E; total HIs for each pathway are summarized in Table 4.22. The estimated multipathway noncarcinogenic HIs for the construction worker at the Site 17 Disposal Area are 0.0005 and 0.3 for the average and RME scenarios, respectively. The estimated multipathway HIs for the construction worker at the DOL Maintenance Yard are 0.0004 and 0.3 for the average and RME scenarios, respectively. Estimated multipathway HIs are well below the EPA's target HI of 1, indicating that noncarcinogenic adverse health effects are not expected for the construction worker at either the Site 17 Disposal Area or the DOL Maintenance Yard.

4.6.1.4 Commercial Worker

Estimated HIs for the commercial worker receptor at the DOL Maintenance Yard are presented in Tables E24 and E25 in Appendix E; total HIs for each pathway are summarized in Table 4.23. The estimated multipathway HIs for the commercial worker receptor are 0.009 and 0.08 for the average and RME scenarios. This indicates that noncarcinogenic adverse health effects are not expected for the commercial worker at the DOL Maintenance Yard.

4.6.2 Possible Cancer Risks

Estimated potential cancer risks associated with exposure to COPCs are summarized below for the student resident, utility worker, and construction worker receptors.

4.6.2.1 Student Resident

Possible cancer risks estimated for the student resident receptor are presented in Tables E8 through E17 in Appendix E. Total cancer risks for each area and pathway are summarized in Table 4.24.

As discussed in Section 4.4.2.5, COPCs in the Upper 180-foot Aquifer and the A-aquifer were evaluated separately. Therefore, total multipathway lifetime cancer risks for exposures

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In Volume III, Sites 16 and 17, in the Section 4.6.2.1 header of page 53 replace "*Student Resident*" with "*Student/Faculty Artist.*"

In Volume III, Sites 16 and 17, in the second full sentence of the first paragraph of the first column of page 53 replace "*0.03*" with "*0.003.*"

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Page 54

In Volume III, Sites 16 and 17, in the first sentence of the first full paragraph of the first column of page 54 replace "5×10^{-9}" **with** "8×10^{-9}."

In Volume III, Sites 16 and 17, in the first sentence of the first full paragraph of the first column of page 54 replace "1×10^{-7}" **with** "5×10^{-7}."

In Volume III, Sites 16 and 17, in the second sentence of the first full paragraph of the first column of page 54 replace "4×10^{-9}" **with** "7×10^{-9}."

In Volume III, Sites 16 and 17, in the second sentence of the first full paragraph of the first column of page 54 replace "1×10^{-7}" **with** "6×10^{-7}."

In Volume III, Sites 16 and 17, in the third sentence of the first full paragraph of the first column of page 54 replace "1×10^{-7}" **with** "2×10^{-7}."

In Volume III, Sites 16 and 17, in the third sentence of the first full paragraph of the first column of page 54 replace "7×10^{-7}" **with** "4×10^{-6}."

In Volume III, Sites 16 and 17, in the fourth sentence of the first full paragraph of the first column of page 54 replace "3×10^{-8}" **with** "4×10^{-8}."

In Volume III, Sites 16 and 17, in the fourth sentence of the first full paragraph of the first column of page 54 replace "4×10^{-7}" **with** "2×10^{-6}."

In Volume III, Sites 16 and 17 in the first sentence of the second full paragraph of the first column of page 54 replace "1×10^{-7}" **with** "2×10^{-7}."

In Volume III, Sites 16 and 17 in the first sentence of the second full paragraph of the first column of page 54 replace "9×10^{-7}" with "5×10^{-6}."

In Volume III, Sites 16 and 17, in the second sentence of the second full paragraph of the first column of page 54 replace "3×10^{-8}" **with** "4×10^{-8}."

In Volume III, Sites 16 and 17, in the second sentence of the second full paragraph of the first column of page 54 replace "7×10^{-7}" **with** "2×10^{-6}."

In Volume III, Sites 16 and 17, delete the third sentence of the second full paragraph of the first column of page 54 replace with:

> *All estimated lifetime cancer risks are either below or at the low end of the EPA target risk range of 1×10^{-6} to 1×10^{-4}, indicating that the total estimated cancer risks for the student/faculty artist receptors are at or below EPA-defined levels of concern.*

to the COPCs in the Upper 180-aquifer and the A-aquifer are presented separately in Table 4.24.

The estimated multipathway cancer risks for exposures at Pete's Pond are 5 x 10^{-9} and 1 x 10^{-7} for the average and RME scenarios, respectively. The estimated multipathway cancer risks for exposures at Pete's Pond Extension are 4 x 10^{-9} and 1 x 10^{-7} for the average and RME scenarios, respectively. The estimated multipathway cancer risks for exposures to groundwater in the Upper 180-foot aquifer and soil at the Site 17 Disposal Area are 1 x 10^{-7} and 7 x 10^{-7} for the average and RME scenarios, respectively. The estimated multipathway cancer risks for exposures to groundwater in the A-aquifer and soil at the Site 17 Disposal Area are 3 x 10^{-8} and 4 x 10^{-7} for the average and RME scenarios, respectively.

The estimated lifetime cancer risk resulting from exposure to groundwater in the Upper 180-foot aquifer plus soil at all three areas are 1 x 10^{-7} and 9 x 10^{-7} for the average and RME scenarios, respectively. The estimated lifetime cancer risk from exposure to groundwater in the A-aquifer plus soil in all three areas are 3 x 10^{-8} and 7 x 10^{-7} for the average and RME scenarios, respectively. All estimated lifetime cancer risks are below the EPA target risk range of 1 x 10^{-6} to 1 x 10^{-4}, indicating that the total estimated cancer risks for the student resident receptor are below EPA-defined levels of concern.

4.6.2.2 Utility Worker

Estimated cancer risks for the utility worker receptors are presented in Tables E16 through E19 in Appendix E. Total cancer risks for each area and pathway are summarized in Table 4.25. The estimated lifetime cancer risks for the utility worker at Pete's Pond are 1 x 10^{-9} and 7 x 10^{-8} for the average and RME scenarios, respectively. The estimated lifetime cancer risks for the utility worker at Pete's Pond Extension are 1 x 10^{-9} and 7 x 10^{-8} for the average and RME scenarios, respectively. All estimated lifetime cancer risks are below the EPA target risk range of 1 x 10^{-6} to 1 x 10^{-4}, indicating that the total estimated cancer risks for the utility worker receptors at Pete's Pond and Pete's Pond Extension are below EPA-defined levels of concern.

4.6.2.3 Construction Worker

Estimated cancer risks for the construction worker receptors are presented in Tables E20 through E23 in Appendix E. Total cancer risks for each area and pathway are summarized in Table 4.26.

The estimated lifetime cancer risks for the construction worker receptor at the Site 17 Disposal Area are 2 x 10^{-9} and 1 x 10^{-6} for the average and RME scenarios, respectively. Estimated cancer risks for this receptor are at or below the EPA target risk range of 1 x 10^{-6} to 1 x 10^{-4}, indicating that the total estimated cancer risks for this receptor worker are at or below EPA-defined levels of concern.

The estimated lifetime cancer risks for the construction worker receptor at the DOL Maintenance Yard are 3 x 10^{-9} and 2 x 10^{-6} for the average and RME scenarios, respectively. Approximately 98 percent of the total RME risk is due to arsenic in soil. Arsenic was detected above background in only 1 of 11 samples collected in soil 0 to 10 feet bgs. This sample was collected from near the fenceline in the northwest portions of the site, and does not appear to be representative of site-wide conditions. However, this data was included in the BRA, resulting in an RME arsenic concentration of 15.7 mg/kg. The background arsenic concentration for soil greater than 2 feet bgs is 4.5 mg/kg; therefore, approximately 29 percent of the risks due to arsenic may be attributed to background concentrations of arsenic in soil. The risk associated with the incremental arsenic concentration above background (i.e., 11.2 mg/kg) is 1 x 10^{-6}.

The estimated lifetime cancer risk for the RME scenarios are at the low end of the EPA target risk range of 1 x 10^{-6} to 1 x 10^{-4}, indicating that the total estimated cancer risks for the utility worker receptors at Pete's Pond and Pete's Pond Extension are at or below EPA-defined levels of concern.

4.6.2.4 Commercial Worker

Estimated cancer risks for the commercial worker receptor at the DOL Maintenance Yard are presented in Tables E24 and E25 in Appendix E. The total cancer risk for each pathway is summarized in Table 4.27. The estimated lifetime cancer risks for the commercial worker receptor are 7×10^{-7} and 1×10^{-5} for the average and RME scenarios, respectively. Estimated cancer risks for this receptor are within or below the EPA target risk range of 1×10^{-6} to 1×10^{-4}.

Approximately 99 percent of the total RME risk is due to arsenic in soil. Arsenic was detected above background in only 1 of 3 samples collected in soil 0 to 2 feet bgs. This sample was collected from near the fenceline in the northwest portion of the site, and does not appear to be representative of site-wide concentrations of 22.3 mg/kg. The background arsenic concentration for soil 0 to 2 feet bgs is 3.4 mg/kg; therefore, approximately 15 percent of the risks due to arsenic may be attributed to background concentrations of arsenic in soil. The risk associated with the background arsenic concentration is 2×10^{-6}; the risk associated with the incremental arsenic concentration above background (i.e., 18.9 mg/kg) is still 1×10^{-5}.

4.6.3 Results of Lead Exposure Evaluation

The methods for evaluating lead exposure are discussed in Section 2.2.9. The results of the LEADSPREAD modeling performed to evaluate possible lead exposure for the student resident, utility worker, and construction worker receptors are presented in Tables F5 through F10 in Appendix F and are summarized in Table 4.28. The 95th and 99th percentile average and RME blood-lead levels estimated for all receptors evaluated are well below the target 99th percentile blood-lead level of 10 μg/dl (Section 2.2.9) as shown in Table 4.24.

4.7 Uncertainty Analysis

Section 7.0 presents an analysis of the uncertainties and limitations common to the BRAs conducted for the four RI sites at Fort Ord. A specific uncertainty of this BRA for Sites 16 and 17 is the future land use. For of this BRA, Site 17 was considered to be part of the California State University parcel, and student dormitories were assumed to be located on Site 17 in the disposal area. Student dormitories are more likely to be built in the Main Garrison area of the California State University parcel, where buildings already exist.

4.8 Summary of Human Health Risk Assessment for Sites 16 and 17

This BRA was conducted as part of the Basewide RI/FS, Fort Ord, California. For the purposes of this evaluation, Sites 16 and 17 were subdivided into four areas: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. COPCs in soil were identified separately for each area; COPCs in groundwater beneath Sites 16 and 17 were also identified.

Four hypothetical future receptors were selected for quantitative evaluation: a student resident, a utility worker, a construction worker, and a commercial worker. This BRA quantitatively evaluated potential exposure of a hypothetical future student resident to COPCs in groundwater and to COPCs in soil at Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. Potential exposure of hypothetical utility workers to COPCs in soil at Pete's Pond and Pete's Pond Extension were quantitatively evaluated. Potential exposure of hypothetical construction workers to COPCs in soil at the DOL Maintenance Yard and the Site 17 Disposal Area; potential exposure of a commercial worker to COPCs in soil at the DOL Maintenance Yard were also quantitatively evaluated.

The hypothetical future receptors were assumed to be exposed to soil via incidental ingestion of and dermal contact with soil, and inhalation of dust. The student resident receptor was assumed to be exposed to groundwater via ingestion and inhalation of VOCs during domestic use of groundwater (i.e., showering).

For all receptors evaluated at Sites 16 and 17, the results of the BRA indicate that potential exposures to COPCs will result in multipathway

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In Volume III, Sites 16 and 17, in the first column in the paragraph under Section 4.6.3 of page 55, replace "*student resident*" with "*student/faculty artist.*"

Volume III, Sites 16 and 17, in the last sentence under Section 4.6.3 of page 55, replace "*Table 4.24*" with "*Table 4.28.*"

Volume III, Sites 16 and 17, in the first and second sentence of the third paragraph of the second column of page 55, replace "*student resident*" with "*student/faculty artist.*"

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Page 56

In Volume III, Sites 16 and 17, in the second full sentence of the only paragraph of page 56 replace "*student resident*" **with** "*student/faculty artist.*"

Volume III, Sites 16 and 17, delete the third full sentence of the only paragraph of page 56, and replace with:

> *RME cancer risks for the commercial worker (1 x 10^{-5}) and the student/faculty artist (5 x 10^{-6}) are within the EPA target risk range.*

noncancer HIs at or below the EPA target HI of 1. Therefore, adverse noncancer health effects are not expected for the receptors evaluated. For the student resident, construction worker, and utility worker receptors the results of the BRA indicate that potential exposures to COPCs will result in adjusted multipathway cancer risks at or below the EPA target range of 1×10^{-4} to 1×10^{-6}. For the commercial worker receptor, the estimated cancer risk for the RME scenario is 1×10^{-5}, which is within the EPA target risk range. In addition, the results indicate that all exposures to lead evaluated in this BRA result in blood-lead level estimates below EPA's 10 μg/dl threshold level of concern (*1990e*). Therefore, potential adverse health effects resulting from exposure to COPCs at Sites 16 and 17 are not expected.