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FINAL
Record of Decision

Operable Unit 3
Schofield Barracks
Island of Oahu, Hawaii

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1. DECLARATION

This Record of Decision (ROD) for Operable Unit (OU) 3 was prepared by Uribe and Associates (U&A) for the U.S. Army Environmental Center (USAEC) under Delivery Order 0001 (Task 01) of the Total Environmental Program Support (TEPS) Contract DAAA15-94-D-0009. This ROD documents the remedial action plan for OU 3 at Schofield Barracks (SB), Island of Oahu, Hawaii.

1.1 Site Name and Location

SB was established by the U.S. Department of the Army (U.S. Army) in 1908 and is the largest Army post outside the continental United States. SB is located in the north-central plateau of the Island of Oahu in the State of Hawaii (Figure 1-1). The SB installation is located approximately 22 miles northwest of the City of Honolulu. The closest municipality is Wahiawa. Most of the town of Wahiawa lies adjacent to and immediately north of the East Range Section of SB.

SB is divided into two sections by Interstate Highway H2 and the area occupied by Wheeler Army Airfield (not part of SB). The Main Post Section of SB is located west of Interstate Highway H2, and the East Range Section is located East of Wheeler Army Airfield and Interstate Highway H2 (Figure 1-2). SB encompasses a total area of approximately 27.7 square miles.

A Federal Facility Agreement (FFA) was signed by the U.S. Army on September 23, 1991, by the U.S. Environmental Protection Agency (U.S. EPA) on September 27, 1991, and by the Hawaii Department of Health on June 5, 1996. Four operable units were established under the auspices of the FFA. The following 34 sites, located in the Main Post and East Range sections of SB (Figures 1-3 and 1-4), were selected for investigation under OU 3.

- Site 21: Pest Control Shop, Buildings 368 and 368F
- Site 26: Car Care Center, Building 80
- Site 35: Optical Repair Building, Building 1054
- Site 46: Acid Pit
- Site 57: Pits (1942)
- Site 59: Two Trenches (1942)
- Site 61: Pits and Trenches (1953 - 1977)
- Site 63: Pits (1962)
- Site 64B: Pits (1962)
- Site 72B: Maintenance Area, Building 368
- Site 73: Motor Pool (1942)
- Site 74: Open Storage (1977)
- Site 80: Possible Trench (1953)
- Site 81B: Industrial Operation, Light-Toned Material, Open Storage, and Dark Stains (1942)
- Site 83: Open Storage/Motor Pool Area (1950 - 1970)
- Site 88: Motor Pool (1955 - 1978)
- Site 90: Motor Pool (1959 - 1969), and Dark Stains (1970)
- Site 93: Open Fire (1951) and Open Storage/Light Material/Dark Stains (1955)
- Site B: Maintenance Area, Building 940
- Site C: Maintenance Area, Building 955
- Site D: Maintenance Area, Building 968
- Site E: Maintenance Area, Building 986
- Site H: Maintenance Area, Building 1080
- Site I: Maintenance Area, Building 1124
- Site J: Maintenance Area, Building 1180
- Site K: Maintenance Area, Building 1611
- Site L: Maintenance Area, Building 1621
- Site 0: Maintenance Area, Building 2400
- Site P: Maintenance Area, Building 2420
- Site R: Maintenance Area, Building 2460
- Site S: Maintenance Area, Building 2480
- Site U: Maintenance Area, Building 2600
- Site V: Maintenance Area, Building 2620
- Site W: Maintenance Area, Building 2640

1.2 Statement of Basis and Purpose

This ROD presents a response action for OU 3, which consists of the 34 sites listed in Section 1.1. These sites were selected in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This ROD explains the basis for selecting the response action for the 34 sites comprising OU 3. Information supporting the selected response action is contained in the Administrative Record for SB. The U.S. EPA and the State of Hawaii concur with the selected response action (remedy).

1.3 Description of the Selected Remedy

On the basis of data collected at the OU 3 sites, no response action is necessary for the 34 sites included in OU 3 because these sites do not pose a threat to human health or the environment.

1.4 Declaration Statement

No response action is necessary to protect human health or the environment at the OU 3 sites. This "no remedial action" alternative was selected because no contaminants found at OU 3 were present at concentrations that pose an unacceptable risk to human health or the environment based on U.S. EPA risk guidelines.

The "no remedial action" alternative is protective of human health and the environment and complies with federal and State of Hawaii requirements that are legally applicable or relevant and appropriate to the remedial action. This action is a permanent solution to the maximum extent practicable or necessary for OU 3. Because this action will not result in hazardous substances remaining on Site exceeding unacceptable health-based levels, the five-year review will not apply to this action.

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2. DECISION SUMMARY

This SECTION provides an overview of the site-specific factors and analysis that led to the selection of the "no remedial action" decision for OU 3. The overview includes the following descriptions, histories, summaries, and conclusions:

- A general description of SB location and regional setting.
- A brief history of past operations at SB.
- A brief history of regulatory and enforcement actions that identified the purpose of OU 3.
- A brief summary of reasons for including specific sites in OU 3.
- A summary of characteristics for each site within OU 3 including a plan of facilities indicating potential sources of hazardous materials and potential pathways for released hazardous materials.
- A summary of target analytes that were considered potential constituents of concern (COCs) at each site during the remedial investigation of OU 3.
- A summary of the human health risk and ecological risk assessments of each site within OU 3.
- A summary of the selection of the "no remedial action" based on the risk assessment for each site within OU 3.
- A description of significant changes to the selected remedy.

Much of the information presented in this overview was derived from previous assessment and investigations performed by the U.S. Army, its contractors, and the U.S. EPA. Results and conclusions of these assessments and investigations are presented in greater detail in the Preliminary Assessment reports (HLA, 1993; EMS, 1993), Field Screening Sampling and Analysis Plan (FSSAP) (IMS, 1994), and Final Remedial Investigation Report (U&A, 1996).

2.1 Schofield Barracks Site Location and Description

SB is situated within the physiographic province known as the Schofield Plateau. The Schofield Plateau is bounded on the east by the Koolau Mountain Range and on the west by the Waianae Mountain Range (Figure 1-1). The surface topography of SB varies from nearly flat, near the central portion around Wheeler Army Airfield, to steeply sloping and dissected terrain that rises up the flanks of the Koolau and Waianae ranges. Surface elevations range from approximately 700 feet above the National Geodetic Vertical Datum of 1929 (NGVD), near the flat central portion, to approximately 3,700 feet above NGVD, near the western boundary of the Main Post in the Waianae Range (Figure 2-1).

The relatively flat Schofield Plateau was formed by lava flows from the ancient Koolau volcanoes that converged and overlapped the flank of the Waianae volcanoes in the central part of Oahu. The crest of this plateau runs roughly east-west through the center of the Main Post and forms the natural surface water drainage divide. North of this divide, watercourses flow to the north and discharge into Kaiaka Bay at the town of Haleiwa. South of this divide, watercourses flow south and discharge into the West Loch of Pearl Harbor. Narrow gulches dissect the plateau where streams have eroded the land surface. The steeper, deeper gulches generally originate in the Koolau Range where substantially more rain falls than in the Waianae Range. Although in-situ weathering of the basaltic bedrock has progressed to depths of 100 to 200 feet, erosion has only partially dissected the plateau surface, primarily along principal drainages.

Streams on the Schofield Plateau do not lose large volumes of water to groundwater, nor do they gain appreciably from groundwater. Figure 2-2 represents a portion of a stream hydrograph for the South Fork of Kaukonahua Stream near Wahiawa (Matsuoka and others, 1991), from October 1989 to September 1990. The hydrograph's data suggest abundant runoff but little baseflow from delayed discharge of groundwater to the stream. Except for areas below dams, streamflow is generally perennial, with little contribution from groundwater leakage (Dale and Takasaki, 1976). Streams near SB are also thought to provide little recharge to the groundwater. A water-balance calculation presented by Dale and Takasaki (1976) shows that leakage from Wahiawa Reservoir to the Schofield High-Level Water Body is small because of the low permeability of the clay-rich soil (saprolite) that underlies the reservoir.

The relatively flat Schofield Plateau was formed as basaltic lava flowed from the adjacent Koolau and Waianae volcanoes to the east and west, respectively. The upper 100 to 200 feet of the basaltic bedrock within the Schofield Plateau is weathered saprolite. The saprolite consists of soil (primarily fine-grained material including silt and clay) formed by in situ decomposition of the basaltic bedrock. The saprolite is underlain by relatively unweathered basaltic bedrock. Logs of wells constructed at SB indicate that basalt extends at least 1,000 feet below ground surface.

Three types of groundwater systems have been identified in central Oahu: the Schofield High-level Water Body, basal groundwater, and dike-impounded groundwater (Figures 2-3 and 2-4). The Schofield High-level Water Body is located beneath the Schofield Plateau, and therefore beneath OU 3. This water body is bound on the east and west sides by dike-impounded groundwater and on the north and south by basal groundwater. Lower permeable rocks (possibly volcanic dike and/or buried ridges) structurally separate these groundwater systems from one another. The Schofield High-level Water Body aquifer has a relatively high transmissivity and hydraulic conductivity. The depth to groundwater beneath SB is approximately 600 feet below ground surface.

Situated south of the Tropic of Cancer at approximately 21 degrees north latitude, SB has a climate characterized by moderate temperatures that remain relatively constant throughout the year. The average annual rainfall in the vicinity of SB is approximately 47 inches (Giambelluca and others, 1986). More than half of this amount occurs during the rainy season from November through February. High-pressure cells north of Oahu are responsible for most trade wind flow. These winds blow from the northeast at an average speed of 12 knots and prevail 70 percent of the time.

Because of the relatively large amounts of undeveloped land and a relatively large amount of vertical relief, SB is host to diverse and abundant flora and fauna. Undisturbed natural vegetation at SB is found primarily in the steep gulches on the south and west sides. These gulches support blocks of forestry plantings and dense growth of shrubbery. Birds are commonly

observed in the forested gully areas at SB where food sources and nesting sites are available.

2.2 Schofield Barracks Installation Operational History

SB was established in 1908 to provide a base for the U.S. Army's defense of Pearl Harbor and the island of Oahu. Initial construction of the post occurred between 1909 and 1917 when more than 250 buildings were erected. During the 1920s, expansion of SB continued when infantry, cavalry, and artillery regiments were joined by a regional battalion, an ordnance company, an ammunition team, a tank company, a medical regiment, a maintenance squadron, and chemical gas regiment units. These types of units continue to operate at SB.

SB became a supply base and command center during World War II temporarily housing more than 1,000,000 troops. It also served as a support and basic training center for troops bound for the Korean War and the Vietnam conflict. SB continues to be the largest and most-populated military installation outside the continental United States.

SB currently serves as headquarters for the 25th Infantry Division and 45th Support Group. The mission of SB is to provide administration, training, and housing facilities for these two units; it also provides depot and repair facilities, a medical facility, and community and housing support.

2.3 Enforcement and Regulatory History

Trichloroethylene, a commonly used cleaning solvent, was detected in the Schofield Barracks water-supply wells in 1985. The source of the trichloroethylene (TCE) contamination could not be identified. In September 1986, the U.S. Army installed air-stripping treatment units to remove TCE from the Schofield Barracks domestic water supply. In 1987, the EPA established a Maximum Contaminant Level (MCL) for TCE of 5 parts per billion in drinking water. TCE has not been detected in the Schofield Barracks' treated groundwater at concentrations greater than this U.S. EPA-established limit.

The FFA was negotiated between the U.S. EPA, the State of Hawaii, and the U.S. Army under CERCLA, Section 120. It was signed by the U.S. Army on September 23, 1991, by the U.S. EPA on September 27, 1991, and by the Hawaii Department of Health on June 5, 1996. The FFA identifies SB as a facility under the jurisdiction, custody, or control of the Department of Defense (DOD) and subject to the Defense Environmental Restoration Program (DERP).

There have been no enforcement actions at OU 3.

2.4 Operable Unit 3 Site Selection History

As part of the FFA, the U.S. Army and regulatory agencies agreed to divide the program into subunits called operable units to address potential areas of contamination at SB in an organized manner. OU 1 consists of sites suspected to be likely sources of TCE detected in the groundwater. OU 2 addresses basewide groundwater contamination.

Other potential sources of soil, surface water, or groundwater contamination at SB, excluding the SB landfill, were included in OU 3. OU 4 consists of the SB landfill. This ROD addresses OU 3.

The FFA initially identified 46 sites within OU 3. The preliminary assessment (PA) of these sites redefined a number of sites, dividing some sites into multiple sites, resulting in an increase in the number of sites from 46 to 63. The PA involved a site reconnaissance and extensive records searches to assess whether past or present activities at these sites could have resulted in contaminant releases. The PA recommended 18 sites for further remedial investigation (HLA, 1993).

U.S. EPA subsequently added 37 new sites to OU 3. These sites were identified by the Environmental Photographic Interpretation Center (EPIC) as possible sources of contamination based on interpretation of aerial photographs taken from 1942 to 1985. The preliminary assessment of these 37 new sites redefined a number of sites, increasing the number from 37 to 41 sites. The PA recommended 14 of the 41 sites for further remedial investigation (IMS, 1993). Two more sites were recommended for further remedial investigation after consultations between

the U.S. Army and U.S. EPA.

Based on the results of both preliminary assessments, further remedial investigations (Ris) were completed at the following 34 sites within OU 3:

- Site 21: Pest Control Shop, Buildings 368 and 368F
- Site 26: Car Care Center, Building 80
- Site 35: Optical Repair Building, Building 1054
- Site 46: Acid Pit
- Site 57: Pits (1942)
- Site 59: Two Trenches (1942)
- Site 61: Pits and Trenches (1953 - 1977)
- Site 63: Pits (1962)
- Site 64B: Pits (1962)
- Site 72B: Maintenance Area, Building 368
- Site 73: Motor Pool (1942)
- Site 74: Open Storage (1977)
- Site 80: Possible Trench (1953)
- Site 81B: Industrial Operation, Light-Toned Material, Open Storage, and Dark Stains (1942)
- Site 83: Open Storage/Motor Pool Area (1950 - 1970)
- Site 88: Motor Pool (1955 - 1978)
- Site 90: Motor Pool (1959 - 1969), and Dark Stains (1970)
- Site 93: Open Fire (1951) and Open Storage/Light Material/Dark Stains (1955)
- Site B: Maintenance Area, Building 940
- Site C: Maintenance Area, Building 955
- Site D: Maintenance Area, Building 968
- Site E: Maintenance Area, Building 986
- Site H: Maintenance Area, Building 1080
- Site I: Maintenance Area, Building 1124
- Site J: Maintenance Area, Building 1180
- Site K: Maintenance Area, Building 1611
- Site L: Maintenance Area, Building 1621
- Site O: Maintenance Area, Building 2400
- Site P: Maintenance Area, Building 2420
- Site R: Maintenance Area, Building 2460
- Site S: Maintenance Area, Building 2480
- Site U: Maintenance Area, Building 2600
- Site V: Maintenance Area, Building 2620
- Site W: Maintenance Area, Building 2640

RI field activities at the 34 OU 3 sites were conducted in phases from November 1994 to October 1995. The RI involved an extensive program of soil-gas, surface and subsurface soil, sediment, and/or surface water sampling. The results of the RI are presented in the Final Remedial Investigation Report, dated March, 1996. This report, along with reports of previous OU 3 assessments and investigations, is available in the Administrative Record for SB.

2.5 Highlights of Community Participation

In an effort to involve the public, the U.S. Army has undertaken several public and community awareness efforts including issuing employee bulletins and posting newspaper articles for SB employees, offering media interviews, issuing news releases, and holding meetings with local officials and neighborhood boards for offpost residents. In addition, the U.S. Army has held public meetings, issued fact sheets, and established a U.S. Army contact for the public at SB Public Affairs Office. Copies of work plans, technical reports, fact sheets, and other materials related to the project are available for public review at the following local repositories:

Mililani Public Library
95-450 Makaimoimo Street
Mililani, Hawaii 96879

Wahiawa Public Library
820 California Avenue
Wahiawa, Hawaii 96786

U.S. Army Garrison, Hawaii
Directorate of Public Works
Building 105
Wheeler Army Airfield, Hawaii 96786

State of Hawaii Department of Health
Environmental Quality Control Office
465 South King Street
Honolulu, Hawaii 96813

The U.S. Army prepared a Proposed Plan for OU 3 at SB for public review and comment. The plan was distributed on April 11, 1996. The Proposed Plan summarizes information collected during OU 3 PA and RI activities and identifies other documents in the Administrative Record for SB that are available at the local repositories.

Comments regarding the Proposed Plan were accepted during a 30-day public review and comment period that extended from April 11 to May 11, 1996. A public meeting was held on May 1, 1996, to provide the community an opportunity to discuss the plan with the U.S. Army, U.S. EPA, and the State of Hawaii Department of Health (HDOH). Responses by the U.S. Army to comments received during the public comment period were sent to the commentor and are included in the Responsiveness Summary of this ROD (Section 3-0). The public comment period is a continuation of the U.S. Army's commitment to community involvement in the Schofield Barracks Installation Restoration Program (IRP) and is required by CERCLA.

2.6 Scope and Role of Operable Unit 3

The role of OU 3 in the overall National Priorities List (NPL) program for SB is to identify and eliminate sources of contaminants not covered in OUs 1, 2, or 4 for SB. SB sites other than OU 3 sites that were suspected to be sources of TCE contamination were addressed in OU 1. Basewide groundwater contaminated with TCE is addressed under OU 2. OU 4 addresses contamination at the Former SB Landfill.

The objectives for the OU 3 program are to do the following:

- Assess the presence or absence of contaminants at the 34 sites.
- Assess the extent of contamination if contaminants are found at these sites.
- Assess the environmental and human health risks posed by this contamination, if present.
- Identify and evaluate remedial alternatives for site cleanup if contaminants are present in levels that endanger human health or the environment.
- Cleanup site contamination to levels that protect human health and the environment by implementing the preferred remedial alternative.

A PA and/or RI was performed for each of the initial 46 sites identified in the FFA, the 37 sites added after photographic interpretation by EPIC and the two sites added after discussions between the U.S. Army and U.S. EPA. Chemicals contained in petroleum hydrocarbons, oil and grease, solvents, battery fluids, pesticides, and polychlorinated biphenyls (PCBs) were the primary potential constituents of concern that were targeted for analysis in samples collected in OU 3 investigations. RI activities conducted at the OU 3 sites included surface geophysics, shallow and deep soil-gas sampling, surface soil sampling, deeper soil sampling, surface water sampling, and/or sediment sampling. The results of the investigations indicate that no current or potential threat to human health or the environment exists at OU 3. Therefore, no remedial action is necessary to protect human health and the environment at the OU 3 sites. For this reason, a feasibility study (FS) to evaluate alternatives for remediating the OU 3 sites was not performed.

2.7 Site Descriptions and Characteristics and Summary of Risk Assessment

The locations of the 34 sites investigated under the OU 3 RI are shown on Figures 1-3 and 1-4. Twenty-nine of the sites are located on the SB Main Post, and the remaining five sites are located within the East Range section of SB. Sections 2.7.1 through 2.7.34 summarize, on a site-by-site basis, site description information including facilities, past operations, potential sources of contaminants, and potential pathways for released contaminants; information on site characteristics including field investigation activities and results; and human health risk assessment findings. A brief overview of the approach and rationale used to conduct the field investigations and human health risk assessments for the OU 3 sites is provided in the paragraphs below.

Field Investigations

Field investigations conducted at each OU 3 site consisted of one or more of the following activities: geophysical surveying, soil-gas survey (SGS) sampling, soil-boring sampling, sediment sampling, and surface water sampling. The sampling program for each site was developed based on site information and PA results. SGS sampling was conducted at 26 OU 3 sites and used as a screening tool to identify areas within a site where volatile organic compounds (VOCs) may be present. Soil-gas data, information from the PA, and/or data from previous sampling was used to select shallow soil and deeper soil sampling locations. Soil boring samples were collected at 33 sites. Sediment sampling was conducted at 18 sites based on information gathered during the PA. At nine of the 18 sites, surface water samples were also collected at or near the sediment sample locations.

SGS samples were analyzed for total volatile hydrocarbons (TVH); fuel-related aromatic VOCs, including benzene, toluene, ethyl benzene, and total xylenes (BTEX); and solvents, including carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene (PCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-TCA, TCE, and vinyl chloride. Chemical analyses performed on soil boring, sediment, and surface water samples were selected based on historical site use and field judgment and included total petroleum hydrocarbons (TPH) as gasoline (TPH-G), TPH as diesel (TPH-D), TPH as oil (TPH-O), VOCs, semi-volatile organic compounds (SVOCs), metals and cyanide, and/or pesticides and polychlorinated biphenyls (PCBs). Specific laboratory analytical methods are identified in the Final OU 3 Remedial Investigation Report (U&A, 1996). Analytical results were evaluated using available information and regulatory guidance to identify analytes which appear to be naturally occurring and analytes representing potential COCS in soil, sediment, and/or surface water at each site. A detailed discussion of the data assessment and identification of potential COCs is provided in the OU 3 RI report.

TPH, VOCs, SVOCs, pesticides, and PCBs detected in the soil and sediment samples are not considered to be naturally occurring chemicals at SB. With the exception of TPH-G, TPH-D, and TPH-O, concentrations of these constituents that were detected were treated as organic potential COCs unless the laboratory reports indicated that the constituent was a likely laboratory contaminant. The presence of TPH-G, TPH-D, and/or TPH-O was important for tracing potential sources of contamination.

In conjunction with an RI of the OU 1 sites conducted in 1993 and 1994, Harding Lawson Associates (HLA) collected a series of surface and subsurface soil samples to serve as background samples (HLA, 1995) for establishing concentrations of inorganic analytes in native soils. HLA collected samples from a total of 16 locations (Figure 1-2) within the Main Post and East Range Areas of SB. The background sampling points were selected in areas where there was no apparent evidence of past or present agricultural, military, industrial, or commercial activities. The data from these samples were used to assess whether the concentrations of inorganic constituents detected at SB were representative of natural conditions.

Tables 2-1 through 2-5 summarize the range of concentrations for organic constituents detected at each site that are not naturally occurring and summarize the range of concentrations for inorganic constituents detected at each site that are potential COCs for human health. Figures are used to show the location of each sample relative to potential sources.

Human Health Risk Assessment

Table 2-6 presents the risks calculated for OU 3 on a site-by-site basis. Two HI and cancer

risk values are given for each site in the table. The off-base values were calculated for residential exposure in the communities adjacent to SB. The on-site values were calculated for people living or working at each individual site. HI and cancer risk values are not reported for Site 74 or Site 83, because no potential COCs were identified at these sites. All of the HI and cancer risk values in Table 2-6 are within or below the acceptable range. Sections 2.7.1 through 2.7.34 describe the potential COCs, any uncertainties in the identification of potential COCs, the environmental media used in the risk assessment, and the exposed population for each individual site. A detailed site-by-site risk assessment for the 34 sites within OU 3, including the approach and rationale used in the risk assessment, is presented in the RI Report in Section 2.4 and Appendix H. Results of the risk assessment are in the site-by-site discussions in Sections 3.2 through 3.35 of the RI Report.

2.7.1 Site 21: Pest Control Shop, Buildings 368 and 368F

Site Description

Site 21, Figure 2-5, consists of the pesticide mixing area west of Building 368 and the bare soil south of the area. The asphaltic paving comprising the mixing area is broken, and soil is exposed beneath the mixing area. A shallow drainage swale exists south of Building 368F and is included in Site 21. Site 21 is adjacent to and shares some of the features of Site 72B. The storm drain and sewer lines in the vicinity of Sites 21 and 72B were investigated separately after consultation between the U.S. Army and regulatory agencies.

The mixing area was used from 1969 to 1984, and the area is no longer used to prepare mixtures of pesticides (HLA, 1993; IMS, 1994). Pesticides are still stored in Buildings 368, 368F, and 380.

The potential sources of contamination identified were the mixing area and Building 368F. The potential migration pathways identified were the shallow drainage swales leading northwest and south of the paved mixing area.

Site Characteristics

Eleven soil boring samples were collected from 3 locations at Site 21 (Figure 2-5). The samples were analyzed for pesticides and PCBs. The analytical results are summarized in Table 2-1 and on Figure 2-5. PCBs were not detected in any of the soil boring samples collected at the site. Pesticides were found at each of the three soil borings. Pesticides that were identified as potential COCs are listed in the human health risk summary below.

The distribution of the analytes appears consistent with a release of pesticides at the former mixing area and/or its associated storage shed (Building 368F) and with the migration of these compounds off site. The migration has probably been caused by runoff and extends between 70 and 90 feet away from the mixing area. The distribution of the pesticides also indicates subsurface migration of a number of the compounds to at least 19.5 feet bgs, attenuated with depth in both the number of detected compounds and their concentrations. For example, aldrin was detected in the four samples collected from boring #1 at concentrations that decline steadily from 0.00644 mg/kg at 0.5 feet bgs to 0.00114 mg/kg at 19.5 feet bgs. Attenuation of aldrin with depth is also observed in the samples collected from borings #2 and #3.

Past surface spills, surface runoff, and water damage to containers are the suspected sources and/or causes of the releases of the pesticides. Poorly maintained surfacing at the site, including broken asphalt and bare soil, is suspected to have contributed to the migration of these analytes into the subsurface.

Summary of Human Health Risks

Site 21 is currently an industrial site, but future plans call for the construction of barracks at this site. Therefore, on-site risk was assessed for both residential and industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 21 included alpha-benzene hexachloride, alpha-chlordane, aldrin, beta-HCH, dieldrin, endosulfan II, endrin aldehyde, gamma-chlordane, heptachlor, heptachlor epoxide, lindane, methoxychlor, rhothane, 2-bis(p-chlorophenyl)-1,1-dichloroethene (DDE), and 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane (DDT). The risk assessment indicates that the

potential COCs identified at Site 21 do not present an unacceptable risk to human health.

2.7.2 Site 26: Car Care Center, Building 80

Site Description

Site 26, Figure 2-6, is an active automobile fueling and servicing facility located on the Main Post. Site 26 currently includes a convenience store, automotive service bays, six underground fuel tanks, one pump island with four fuel dispensers, one underground service bay sump, and temporary storage for used batteries. Much of the site is paved, with landscaped areas around the perimeter of the paved areas.

Site 26 has stored and dispensed fuel products since 1957. The initial fueling facility was constructed in 1957 and replaced in 1986. No other uses for the site were reported during previous assessments and investigations.

Potential sources of contamination identified at Site 26 are the former drum storage area east of Building 80 outside the existing fencing, the former tank basin located in the vicinity of the former drum storage area, one 10,000-gallon gasoline underground storage tank (UST) found to be leaking in 1992, the existing service bay sump, and the temporary battery storage area. Potential pathways for releases from the site include the sanitary sewer and storm drain lines and unpaved drainage areas southwest of the fueling facility, particularly two stained soil areas.

Site Characteristics

SGS samples were collected at 18 locations, soil boring samples were collected from 13 locations, sediment samples were collected from two locations, and two surface water samples were collocated with the sediment samples (Figure 2-6).

Twenty-one SGS samples were collected from the 18 sampling locations. Concentrations of TVH and aromatic VOCs related to fuel products (ethyl benzene and total xylenes) were detected in a number of the SGS samples, ranging from 0.035 parts per million by volume (ppmv) to 9.3 ppmv. The highest concentrations of TVH were found in landscaped and unpaved areas to the southeast of the site's USTs.

Thirty soil boring and two sediment samples were collected at Site 26. Samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analysis results are summarized in Tables 2-2 and 2-3 and on Figure 2-6. TPH-G was not detected in any of the soil boring or sediment samples collected at the site. TPH-D was found at seven soil borings and in both sediment samples, with a maximum concentration of 1,780 mg/kg. Acetone was found at two soil borings, with a maximum concentration of 0.048 mg/kg. Ethyl benzene was found at one soil boring at 0.0011 mg/kg. Methylene chloride was found at four soil borings, with a maximum concentration of 0.004 mg/kg. The methylene chloride reported in the soil boring samples was considered to be a laboratory contaminant. Total xylenes were found at one soil boring at 0.0017 mg/kg. Bis(2-ethylhexyl) phthalate was found in one sediment sample at 0.503 mg/kg. Organic constituents selected as potential COCs are listed in the human health risk summary below. Lead was the only inorganic potential COC identified in soil boring and sediment samples at Site 26. Lead concentrations greater than background levels were found at two soil borings and in one sediment sample.

The two surface water samples were collocated with the sediment samples. Analysis results are summarized in Tables 2-4 and 2-5. TPH-D was found in one sample at 700 Ig/L. Cobalt, copper, cyanide, lead, nickel, and zinc were the inorganic potential COCs identified in the surface water samples.

Organic and inorganic potential COCs at Site 26 appear to be limited to one of the reported areas of soil discoloration in the southern part of the site, the area of the former USTs and drum storage in the east corner of the site, and the drainage ditches in the southwest portion of the site. Surface spills and runoff are the suspected sources of the TPH-D, acetone, ethyl benzene, and total xylenes found in the soil boring samples collected from these areas. Surface spills and runoff are also the suspected sources of the lead detected in the surface sample collected from boring #3, drilled in the area of soil discoloration.

Surface spills and runoff from the central portion of the site and the parking areas to the south and southwest of the fuel dispensers are the suspected sources of the TPH-D, bis(2-ethylhexyl) phthalate, and lead detected in the sediment samples. Surface spills and runoff are also the suspected sources of the TPH-D, cobalt, copper, cyanide, lead, nickel, and zinc detected in the surface water samples.

Summary of Human Health Risks

Site 26 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site 26 may flow to areas to which residential populations have access, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site 26 included methylene chloride, acetone, ethyl benzene, total xylenes, bis(2-ethylhexyl)phthalate, and lead. The potential COCs in surface water were cobalt, copper, cyanide, lead, nickel, and zinc. Based on the risk assessment, the potential COCs identified at Site 26 do not present an unacceptable risk to human health.

2.7.3 Site 35: Optical Repair Building, Building 1054

Site Description

Site 35, Figure 2-7, consists of Buildings 1054, 1054A, 1054C, 1054D, paved areas surrounding Building 1054, unpaved areas along the southwest and southeast sides of the site, and an unlined drainage ditch along the southwest side of the site. Historical records indicate that the buildings were built between 1942 and 1987.

Historical uses of the site include welding and machining, canvas repair, radiator repair, glass replacement, and vehicle body and fender repair (IMS, 1994). Vehicle maintenance was the primary operation from 1942 to 1950. Optical repair operations were added in 1950 and continued until 1987.

The potential sources of contamination that were identified in preliminary assessments (based primarily on the historical uses of the site) are listed below.

- Maintenance shops located inside Building 1054
- Miscellaneous non-hazardous storage areas inside Building 1054C
- Oil storage areas inside Building 1054D
- The steam wash rack south of Building 1054A
- The grease rack southeast of Building 1054
- The location of a former 750-gallon diesel fuel tank removed in 1992

The sanitary sewer and storm drain lines at the site were identified as potential pathways of contaminants released from the sources listed above. The potential sources and pathways identified for Site 35 were investigated in OU 3.

Site Characteristics

SGS samples were collected at 17 locations, soil boring samples were collected from 13 locations, sediment samples were collected from two locations, and a surface water sample was collocated with one of the sediment samples (Figure 2-7).

Nineteen SGS samples were collected from the 17 sampling locations. Concentrations of TVH, aromatic VOCs related to fuel products (benzene, toluene, ethyl benzene, and total xylenes), and a solvent (1,1,2-TCA) were detected in a number of the SGS samples, ranging from 0.027 ppmv to 50 ppmv. The highest concentrations of TVH were found in the paved area on the southwest side of Building 1054.

Thirty-nine soil boring and two sediment samples were collected at Site 35. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-7. TPH-G was found at three soil borings, with a maximum concentration of 261 mg/kg. TPH-D was found at five soil borings, with a maximum concentration of 1,450 mg/kg. Acetone was found at two soil borings, with a maximum concentration of 0.5 mg/kg. 2-Butanone was found at one soil boring at 0.093 mg/kg. Carbon

disulfide was found at two soil borings, with a maximum concentration of 0.003 mg/kg. PCE was found at three borings, with a maximum concentration of 0.0069 mg/kg. Methylene chloride was found at one soil boring, with a maximum concentration of 0.001 mg/kg. The methylene chloride reported in the soil boring samples was considered to be a laboratory contaminant. Anthracene and phenanthrene were found in one sediment sample at 0.111 mg/kg and 0.106 mg/kg, respectively. Organic constituents selected as potential COCs are listed in the human health risk summary below. Arsenic, barium, cadmium, chromium, copper, lead, silver, and zinc were the inorganic potential COCs identified in soil boring and sediment samples at Site 35. At 12 of the soil borings and in both sediment samples, one or more of these potential inorganic COCs were found at concentrations greater than their background levels. Lead concentrations greater than background levels were found at eight of the soil borings and in both sediment samples.

The one surface water sample was collocated with one of the sediment samples. The analytical results are summarized in Tables 2-4 and 2-5. Di-n-butyl phthalate was found in the sample at 1.3 Ig/L. Cyanide and zinc were the inorganic potential COCs identified in the surface water sample.

Surface spills and runoff from Site 35 and areas upstream of the site are the suspected sources of the organic constituents and potential inorganic COCs detected in the soil boring, sediment, and/or surface water samples collected from within the drainage ditch along the southwest side of the site, near the south corner of Building 1054, and near the grease rack to the southeast of Building 1054. However, lead was not detected in the surface water sample, and organic constituents were not detected in the downstream sediment sample collected from within the drainage ditch. The concentration of lead increased slightly in the downstream direction from sediment sample #1 to #2. Based on the distribution of organic constituents and potential inorganic COCs in surface water, sediment, and soil samples collected from within the drainage ditch, the impact to sediment and water quality downstream of Site 35 appears to be limited to lead.

A former waste-oil UST is the suspected source of the organic constituents (acetone, PCE, and carbon disulfide) detected in the soil samples collected from the borings drilled near the excavation of this former UST, located in the unpaved area between the drainage ditch and the fence that run along the southwest side of the site. However, the excavation of a former fuel UST near the northwest end of Building 1054A appears to have removed the contamination that was associated with it.

Summary of Human Health Risks

Site 35 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site 35 may flow to areas to which residential populations have access, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil identified at Site 35 included TPH-G, TPH-D, methylene chloride, acetone, carbon disulfide, 2-butanone, tetrachloroethene, anthracene, phenanthrene, arsenic, barium, cadmium, chromium, copper, lead, silver, and zinc. The potential COCs in surface water were di-n-butyl phthalate, cyanide, and zinc. The risk assessment indicates that the potential COCs identified at Site 35 do not present an unacceptable risk to human health.

2.7.4 Site 46: Acid Pit

Site Description

Site 46, Figure 2-8, is located on the main post adjacent to Site 88. These sites share a common area between Building 2138H and Building 2140. Site 46 includes paved and unpaved areas adjacent to the southeast side of Building 2138H, a portion of the concrete pad that is located at the foot of a concrete ramp on the southeast side of Building 2138H, and the open drainage ditch that runs along the northeast side of Site 46. The portion of the drainage ditch which lies southeast of Building 2138H is lined with concrete.

Batteries brought to Site 46 were drained onto the concrete pad or onto soil adjacent to the concrete pad. Acid that was drained onto the concrete pad was mixed with sodium bicarbonate and then washed into the drainage ditch or sanitary sewer. The estimated amount of battery acid discharged at Site 46 ranges from 150 liters per year to 2,000 liters per year (HLA, 1993).

Waste oil and solvents may also have been released at the site (HLA, 1993).

Potential sources of contaminants recommended for remedial investigation at Site 46, were the concrete pad and adjacent soils. Another potential source was a reported spill of oil/water mixture around the footing of a new drum storage rack under construction in 1995. Potential migration pathways recommended for remedial investigation at the site include the sanitary sewer, storm drain lines, and the portion of the open drainage ditch northeast of Building 2140.

Site Characteristics

Soil boring samples were collected at five locations, and sediment samples were collected at two locations (Figure 2-8).

Twenty-seven soil boring and two sediment samples were collected at Site 46. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-8. TPH-G was detected at one soil boring, at 57 mg/kg. TPH-D was detected at three soil borings and in both sediment samples, with a maximum concentration of 162 mg/kg. Methylene chloride was found at two soil borings and in one sediment sample. The methylene chloride reported in the soil boring and sediment samples was considered to be a laboratory contaminant. Concentrations of SVOCs were detected at two soil borings and in both sediment samples. The SVOCs included anthracene, benzo(a)anthracene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, bis(2-ethylhexyl)phthalate, chrysene, diethyl phthalate, di-n-butyl phthalate, fluoranthene, phenanthrene, and Pyrene. The di-n-butyl phthalate reported in the soil boring and sediment samples was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below.

Arsenic, barium, cadmium, lead, silver, and zinc were the inorganic potential COCs identified in the soil boring and sediment samples at Site 46. Concentrations greater than background levels of one or more of these potential inorganic COCs were found at the five soil borings and in both sediment samples. Lead concentrations greater than background levels were found at two soil borings and in both sediment samples. Zinc concentrations greater than background levels were found at one soil boring and in both sediment samples.

A storm drain line, damaged while excavating for a footing in the new POL storage area, is the suspected source of the TPH-G and TPH-D reported in the samples from borings #4 and #5. The line was repaired, and impacted soil was excavated and removed from Site 46 at the time the POL storage area was completed (DPW, 1996). The limited extent of the petroleum hydrocarbons detected in soil samples collected from within and near the footing excavation where the line was damaged suggests that the impact of the release from the line was not significant.

Surface spills and runoff are the suspected sources of the TPH-D, lead, zinc, and SVOCs detected in the other soil boring and sediment samples collected at Site 46. The distribution of the arsenic, barium, cadmium, silver, and zinc detected in the soil and sediment samples suggests that they are naturally occurring.

Based on the concentrations of potential COCs in soil boring and sediment samples collected from within the drainage ditch at Site 46, it appears that sediment quality downstream of sediment sample #2 may be impacted by site activities. However, the lack of complete characterization in the drainage ditch is not considered a concern. The area where sediment sample #2 was collected can reasonably be assumed to be more significantly impacted by site activities than areas further downstream. Because the risk assessment concluded that the concentrations of potential COCs detected at the site (including those in sediment sample #2) do not pose a significant health risk, lower concentrations of potential COCs that may extend beyond sediment sample #2 are not thought to pose a significant risk either.

The data do not suggest that the past disposal of battery acid has significantly impacted soil or sediment at Site 46.

Summary of Human Health Risks

Site 46 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 46 included phenanthrene,

anthracene, fluoranthene, pyrene, chrysene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, benzo(k)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, diethyl phthalate, arsenic, barium, cadmium, lead, silver, and zinc. The risk assessment indicates that the potential COCs identified at Site 46 do not present an unacceptable risk to human health.

2.7.5 Site 57: Pits (1942)

Site Description

Site 57, Figure 2-9, includes three limited areas that straddle the portion of the East Range access road situated to the north of Building 6027. Building 6027 is located near the intersection of the East Range access road and Santos-DuMont street. Aerial photographs of the site covering the years 1942 to 1985 indicated that four pits were located at the site in 1942. The pits were only observed in the 1942 photograph. The site remained undeveloped (IMS, 1993).

No evidence of hazardous waste disposal at the site was found searching historical records and interviews with personnel. A field investigation conducted during the PA of the area detected petroleum hydrocarbons, toluene, and methylene chloride in soil gas (IMS, 1994). Potential sources of contaminants recommended for further remedial investigation were five locations where petroleum hydrocarbons, toluene, and methylene chloride were found during the previous investigations.

Site Characteristics

Fourteen soil boring samples were collected from five locations at Site 57 (Figure 2-9). The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-9. TPH-G was detected at one soil boring, at 15 mg/kg. TPH-D, VOCs, and SVOCs were not detected in the soil borings samples collected at the site. No organic constituents were selected as potential COCs. Barium, cobalt, and copper were the inorganic potential COCs identified in the soil boring samples at Site 57. Barium and cobalt concentrations greater than background levels were found at one soil boring. Copper concentrations greater than background levels were found at three soil borings.

TPH-G and inorganic analytes found above background levels at Site 57 appear to be limited to two areas: the embankment below the north edge of the East Range access road and the portion of the access roadway within the suspected area of the pits. Vehicular traffic that uses the access road is suspected to be the source of the TPH-G found in the shallow soil sample collected from the embankment below the north edge of the road. Based on their distribution at the site, barium, cobalt, and copper appear to be naturally occurring.

Summary of Human Health Risks

Site 57 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 57 included barium, cobalt, and copper. The risk assessment indicates that the potential COCs identified at Site 57 do not present an unacceptable risk to human health.

2.7.6 Site 59: Two Trenches (1942)

Site Description

Site 59, Figure 2-10, is located at the Leilehua Golf Course on the East Range. Two trenches were located at the site in 1942 (IMS, 1993). The trench at 59A was located on the north side of the golf course, near Santos-DuMont street. The other trench at 59B was located within the middle of the golf course north of the clubhouse.

Searches of historical records and interviews with personnel did not find evidence of hazardous material disposal at the site. An field investigation conducted during the PA of the trenches detected petroleum hydrocarbons and toluene in the subsurface. These locations became suspected sources, and further remedial investigation was recommended at both locations (IMS, 1994).

Site Characteristics

Ten soil boring samples were collected from two locations at Site 59 (Figure 2-10). The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-10. TPH-G, TPH-D, VOCs, and SVOCs were not detected in the soil borings samples collected at the site. Antimony, arsenic, barium, cobalt, and copper were the inorganic potential COCs identified in the soil boring samples at Site 59. Antimony, barium, cobalt, and copper concentrations greater than background levels were found at one soil boring. An arsenic concentration greater than background was found at the second soil boring.

The investigation at Site 59 did not detect the petroleum hydrocarbons that had been suggested by the PA SGS in 1993 (TEG-H/IMS, 1993). The presence of inorganic potential COCs at the site appears to be limited to antimony, arsenic, barium, cobalt, and copper. Based on their presence at a golf course and their erratic distribution within the subsurface, these analytes appear to be naturally occurring.

Summary of Human Health Risks

Site 59 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 59 included antimony, arsenic, barium, cobalt, and copper. The risk assessment indicates that the potential COCs identified at Site 59 do not present an unacceptable risk to human health.

2.7.7 Site 61: Pits and Trenches (1953 - 1977)

Site Description

Site 61, Figure 2-11, is located south of the East Range access road. Several pits and trenches were reported to have existed at the site from 1953 to 1977 (RAS, 1994). The field investigation conducted during the PA detected petroleum hydrocarbons in subsurface (TEG-H/IMS, 1993). Therefore, further remedial investigation was recommended at Site 61.

Site Characteristics

Seventeen soil boring samples were collected from five locations at Site 61 (Figure 2-11). The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-11. TPH-G, TPH-D, and VOCs were not detected in the soil borings samples collected at the site. Di-n-butyl phthalate was found at one soil boring, at 0.014 mg/kg. The di-n-butyl phthalate reported in the soil boring sample was considered to be a laboratory contaminant. Chromium, copper, and mercury were the inorganic potential COCs identified in the soil boring samples at Site 61. A concentration of chromium above background was found at one soil boring, and a concentration of mercury above background was found at another soil boring. Concentrations of copper greater than background levels were found at four soil borings.

The investigation at Site 61 did not detect the petroleum hydrocarbons suggested by the PA SGS in 1993 (TEG/IMS, 1993). The presence of potential COCs at the site appears to be limited to chromium, copper, and mercury. Based on their distribution within the subsurface, it appears that these analytes are naturally occurring at the site.

Summary of Human Health Risks

Site 61 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 61 included chromium, copper, and mercury. The risk assessment indicates that the potential COCs identified at Site 61 do not present an unacceptable risk to human health.

2.7.8 Site 63: Pits (1962)

Site Description

Site 63, Figure 2-12, is also located south of the East Range access road. Three pits were reported to have existed at the site in 1962 (IMS, 1994). The field investigation conducted during the PA detected petroleum hydrocarbons in subsurface soil gas (TEG-H/IMS, 1993).

Therefore, further remedial investigation was recommended at Site 63.

Site Characteristics

Twenty-three soil boring samples were collected from six locations at Site 63 (Figure 2-12). The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-12. TPH-G, VOCs, and SVOCs were not detected in any of the soil boring samples collected at the site. TPH-D was found at one soil boring, at 11 mg/kg. TPH-D was not selected as a potential COC. Copper and mercury were the inorganic potential COCs identified in the soil boring samples at Site 63. Concentrations of copper above background levels were found at each of the six soil borings. Concentrations of mercury above background levels were found at two soil borings.

The investigation at Site 63 confirmed the presence of petroleum hydrocarbons as had been suggested by the PA SGS in 1993 (TEG-H/IMS, 1993). Although the source of the TPH-D is unknown, vehicular traffic on the nearby side roads to the East Range access road is the suspected source, rather than the pits that were the subject of the investigation of Site 63.

The presence of inorganic potential COCs at the site appears to be limited to copper and mercury. Based on the distribution of copper and mercury concentrations detected at the site, these analytes appear to be naturally occurring.

Summary of Human Health Risks

Site 63 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 63 included copper and mercury. Based on the risk assessment, the potential COCs identified at Site 63 do not present an unacceptable risk to human health.

2.7.9 Site 64B: Pits (1962)

Site Description

Site 64B, Figure 2-13, is also located south of the East Range access road. Two pits were reported to have existed at the site in 1962 (IMS, 1994). The field investigation conducted during the PA detected petroleum hydrocarbons in subsurface soil gas (TEG-H/IMS, 1993). Therefore, further remedial investigation was recommended at Site 64B.

Site Characteristics

Eight soil boring samples were collected from three locations at Site 64B (Figure 2-13). The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-13. TPH-G was not detected in any of the soil boring samples collected at the site. TPH-D was found at one soil boring, with a maximum concentration of 512 mg/kg. Toluene was found at one soil boring, with a maximum concentration of 0.024 mg/kg. Di-n-butyl phthalate was found at one soil boring, at 0.00652 mg/kg. The di-n-butyl phthalate reported in the soil boring sample was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Copper and mercury were the inorganic potential COCs identified in the soil boring samples at Site 64B. Concentrations of copper above background levels were found at two soil borings. A concentration of mercury above background was found at one soil boring.

The results of the investigation at Site 64B confirmed the presence of petroleum hydrocarbons as suggested by the PA SGS in 1993 (TEG-H/IMS, 1993). However, the source of the TPH-D and toluene is not known, and they appear limited in extent. Vehicular traffic on the nearby unpaved East Range access road is the suspected source of the TPH-D and toluene detected in the soil boring samples collected at the site. The access road is used extensively by U.S. Army vehicles in support of training exercises conducted in the East Range.

The presence of inorganic potential COCs at the site appears to be limited to copper and mercury. The distribution of these analytes within the subsurface suggests that they are naturally occurring at Site 64B.

Summary of Human Health Risks

Site 64B is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 64B included toluene, copper, and mercury. The risk assessment indicates that the potential COCs identified at Site 64B do not present an unacceptable risk to human health.

2.7.10 Site 72B: Maintenance Area, Building 368

Site Description

Site 72B, Figure 2-14, is located adjacent to and east of Site 21. Facilities included in Site 72B include Buildings 368, 368A, 368C, 369, 369B, and 369C; a hazardous materials storage area south of Building 368; a Petroleum, Oil, and Lubricants (POL) drum storage shed attached to Building 368B; and a wash rack east of Building 368. Four USTs are used within the site. Some areas around the buildings area are paved with asphalt.

Vehicle and equipment maintenance and repair has been performed continuously at the location since the 1940s (IMS, 1994). POL, waste oil, and diesel have been used or stored at the site. No spills or leaks were reported for the site.

Potential sources of contamination were identified during preliminary assessments and reconnaissance of the site. Those potential sources recommended for further remedial investigation are listed below.

- Building 369B and its attached drum storage shed
- Unpaved areas surrounding Buildings 368 and 369B, excluding the area west of Building 368 that was included in Site 21
- The wash rack and associated water supply shed 368C east of Building 368
- The location of a former UST north of Building 368
- A large oil-stained area north of the service bays located inside Building 368
- The area surrounding two existing waste oil USTs south of Building 368
- The site's vehicle and heavy equipment parking area along the eastern portion of the site

Site Characteristics

SGS samples were collected at 11 locations, and soil boring samples were collected from 15 locations at Site 72B (Figure 2-14).

Twelve SGS samples were collected from the 11 sampling locations. Concentrations of TVH and aromatic VOCs related to fuel products (ethyl benzene and total xylenes) and solvents (methylene chloride, PCE, and TCE) were detected in a number of the SGS samples, ranging from 0.021 ppmv to 32 ppmv. The highest concentration of TVH was found near the south end of Building 369B.

Thirty soil boring samples were collected at Site 72B. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-14. TPH-G was detected at one soil boring, at 132 mg/kg. TPH-D was detected at four soil borings, with a maximum concentration of 253 mg/kg. Concentrations of VOCs were detected at 12 soil borings, ranging from 0.00045 mg/kg to 5.9 mg/kg. Detected VOC constituents included methylene chloride, PCE, TCE, 1,1,2,2-tetrachlroethane, toluene, 1,1,2-trichlorethane, and total xylenes. The methylene chloride and toluene reported in the soil boring samples were considered to be laboratory contaminants. Concentrations of SVOCs were detected at four soil borings, ranging from 0.0114 mg/kg to 0.0296 mg/kg. Detected SVOC constituents included bis(2-ethylhexyl) phthalate and di-n-butyl phthalate. The bis(2 ethylhexyl) phthalate and di-n-butyl phthalate reported in the soil boring samples were considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Barium and lead were the inorganic potential COCs identified in the soil boring samples at Site 72B. Concentrations of barium above background levels were found at three soil borings. Concentrations of lead above background levels were also found at three soil borings.

The investigation of Site 72B appears to confirm that storage and use of fuels, POLs, waste oil,

solvents, and hazardous materials at the site has introduced organic constituents and lead into the subsurface. With the exception of boring #2, surface spills and runoff are the suspected sources of the organic analytes and lead detected in the soil samples collected at Site 72B. The existing waste-oil USTs are the suspected source of the TPH-D found in a sample from boring #2, drilled near the location of these tanks. Although it is possible that a former UST is the source of the TCE found in a boring drilled near the location of the former tank, the similarity of TCE concentrations detected in this boring to TCE concentrations in samples from borings that were drilled in areas away from the former UST suggests that the TCE is also the result of surface spills and runoff.

The distribution of barium detected in shallow soil samples collected from the borings drilled at Site 72B suggests that it is naturally occurring at the site.

The data do not suggest that the wash rack and its associated pressurized water supply shed, the site's vehicle and heavy equipment parking area, or the overhead tank have significantly impacted soil at Site 72B.

Summary of Human Health Risks

Site 72B is currently an industrial site, but future plans call for the construction of barracks at this site. Therefore, on-site risk was assessed for both residential and industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 72B included trichloroethene, tetrachloroethene, 1,1,2,2-tetrachloroethane, total xylenes, barium, and lead. The risk assessment indicates that the potential COCs identified at Site 72B do not present an unacceptable risk to human health.

2.7.11 Site 73: Motor Pool (1942)

Site Description

Site 73, Figure 2-15, is located on the Main Post and includes the former locations of three demolished buildings that were part of a motor pool and vehicle maintenance area from approximately 1942 to 1950 (IMS, 1994). The site now includes paved and unpaved areas where the former buildings were located and an unlined drainage ditch that runs along the south side of Kolekole Avenue.

A search of historical records and interviews with SB personnel indicated that waste oil, solvents, and wastewater from wash racks were routinely discharged into storm drainage ditches during the 1940s and 1950s at most of the SB maintenance locations (IMS, 1993). Therefore, it is assumed that this practice occurred at Site 73 while the facilities were in operation. However, a site reconnaissance conducted during the preliminary assessment did not locate any visible signs of contamination (IMS, 1993).

The U.S. Army agreed to further investigate the unlined storm ditch at the site after consultation with U.S. EPA.

Site Characteristics

SGS samples were collected at 17 locations, and soil boring samples were collected from one location at Site 73B (Figure 2-15).

Twenty three SGS samples were collected from the 17 sampling locations. Concentrations of TVH and aromatic VOCs related to fuel products (ethyl benzene, toluene, and total xylenes) were detected in a number of the SGS samples, ranging from 0.025 ppmv to 45 ppmv. The highest concentration of TVH was found to the east of Building 2091, near the entry to the site's parking area.

Six soil boring samples were collected at Site 73. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-15. TPH-G, TPH-D, VOCs, and SVOCs were not detected in any of the soil boring samples collected at the site. Arsenic, barium, and copper were the inorganic potential COCs identified in the soil samples collected from the one soil boring at Site 73.

The SGS results at Site 73 do not support the presence of the potential contaminants discussed in the PA (IMS, 1993). The VOCs that were detected in most of the SGS samples appear to be caused by vehicular traffic in the site's parking area and along Kolekole Avenue, as well as by runoff from these areas. The source of the VOCs detected in the SGS samples collected from the area of the golf course is not known.

No organic constituents were detected in the soil boring samples collected at Site 73. This is consistent with the lack of correlation between low-level SGS concentrations and detected organic compounds in soil samples observed at other OU 3 sites.

The presence of inorganic potential COCs at the site is limited to arsenic, barium, and copper. The distribution of these analytes within the site's subsurface suggests that they are naturally occurring.

Summary of Human Health Risks

Site 73 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 73 included arsenic, barium, and copper. Based on the risk assessment, the potential COCs identified at Site 73 do not present an unacceptable risk to human health.

2.7.12 Site 74: Open Storage (1977)

Site Description

Site 74, Figure 2-16, is located on the Main Post. The site includes Building 3004 and the portion of the Waikele Stream ravine and stream bed that is situated to the south of Building 3004. Open storage of unspecified materials was observed at the site in 1977 (IMS, 1994), and two empty rusty drums marked "fog oil" were observed during a site reconnaissance as part of a preliminary assessment (IMS, 1993). Therefore, the PA recommended further remedial investigation in the ravine (IMS, 1994).

Site Characteristics

One SGS sample was collected at each of four locations at Site 74 (Figure 2-16). Concentrations of TVH were detected in three of the SGS samples, ranging from 2.3 ppmv to 4 ppmv. The highest concentration of TVH was found at the most downstream of the locations within the Waikele Stream Ravine.

The results of the SGS at Site 74 indicate that the potential contamination identified in the IMS PA (IMS, 1993) is not present at the site. The source of the TVH that was detected at the site is not known. Discussions with personnel from the contractor that conducted the SGS indicate that the TVH may be methane generated by decaying organic matter.

Summary of Human Health Risks

Site 74 is an industrial site. No potential COCs were identified at this site. Therefore, this site does not present a risk to human health or the environment.

2.7.13 Site 80: Possible Trench (1953)

Site Description

Site 80, Figure 2-17, is a rectangular area adjacent to Moyer Street and Building 4112. Preliminary assessment of the site (IMS, 1993) revealed that it was part of a maintenance area from 1942 to 1958 and that a trench was observed at the site in 1953. However, no record of hazardous waste disposal into the trench was found during the PA. An SGS conducted as part of the PA (TEG-H/IMS, 1993) detected TPH concentrations at five locations scattered throughout Site 80. Further remedial investigation was recommended for these five locations.

Site Characteristics

Twelve soil boring samples were collected from two locations at Site 80 (Figure 2-17). The

samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-17. TPH-G, TPH-D, and SVOCs were not detected in the soil borings samples collected at the site. Concentrations of methylene chloride were found at both soil borings, with a maximum concentration of 0.0018 mg/kg. The methylene chloride reported in the soil boring samples was considered to be a laboratory contaminant. Barium, copper, and lead were the inorganic potential COCs identified in the soil boring samples at Site 80. Concentrations of barium greater than background levels were found at both soil borings. Concentrations of copper greater than background levels were found at one soil boring. A lead concentration greater than background was found at one soil boring.

The investigation at Site 80 did not detect the petroleum hydrocarbons that had been suggested by the PA SGS in 1993 (TEG/IMS, 1993). The presence of inorganic potential COCs at the site appears limited to barium, copper, and lead. Except for the lead found in the surface sample from boring #1, the distribution of the these analytes within the subsurface suggests that they occur naturally at Site 80. Surface runoff from nearby Moyer Street is a suspected source of the lead detected in the surface sample from boring #1. Other suspected sources of the lead include past construction practices and/or renovation of the nearby residential housing.

Summary of Human Health Risks

Site 80 is a residential site, and on-site risk was assessed for residential populations based on exposure to potential COCs in site soils. The potential COCs at Site 80 included barium, copper, and lead. Based on the risk assessment, the potential COCs identified at Site 80 do not present an unacceptable risk to human health.

2.7.14 Site 81B: Industrial Operation, Light-Toned Material, Open Storage, and Dark Stains (1942)

Site Description

Site 81B, Figure 2-18, includes paved areas surrounding Buildings 754C and 758, as well as a drainage ditch that runs along the southeast side of the site, adjacent to Butner Road. A search of SB records, aerial photographs, and interviews with military personnel conducted during the PA (IMS, 1993) indicate that a maintenance and repair facility occupied the site from the early 1950s to mid 1970s. The PA also indicated that washrack wastewater, which may have contained oil and solvents, was routinely discharged into storm drainage ditches at most SB maintenance sites. Therefore, similar disposal activities may have taken place at Site 81B (IMS, 1994). However, the exact location of past wastewater releases at the site, if any occurred, is unknown. The records search and site visit conducted by IMS did not reveal evidence of contamination at the site. After discussions with the U.S. EPA, the U.S. Army also agreed to evaluate the sewer system/storm drain (SS/SD) lines at Site 81B as possible sources of COCs.

Site Characteristics

SGS samples were collected at eight locations, and soil boring samples were collected from two locations at Site 81B (Figure 2-18).

One SGS sample was collected from each of the eight sampling locations. Concentrations of TVH and aromatic VOCs related to fuel products (ethyl benzene, toluene, and total xylenes) were detected in a number of the SGS samples, ranging from 0.028 ppmv to 16 ppmv. The highest concentration of TVH was found to the southeast of Building 754C.

Nine soil boring samples were collected at Site 81B. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-18. TPH-G, TPH-D, and VOCs were not detected in any of the soil boring samples collected at the site. Bis(2-ethylhexyl) phthalate was found at one soil boring, at 0.0158 mg/kg. The bis(2-ethylhexyl) phthalate reported in the soil boring sample was considered to be a laboratory contaminant. Barium, chromium, cobalt, copper, nickel, and thallium were the inorganic potential COCs identified in the soil samples collected at Site 81B. Concentrations of barium, chromium, and nickel greater than background levels were found at both borings. Concentrations of copper greater than background were found at one boring. A concentration of thallium greater than background was found at one boring.

Analysis of the soil samples collected at the site did not confirm the presence of the VOCs suggested by the SGS data. Organic constituents associated with the possible releases of waste oil, solvents, and wastewater discussed in the Field Screening Sampling and Analysis Plan (FSSAP) (IMS, 1994) were not detected in the soil samples.

The inorganic potential COCs at Site 81B appear limited to barium, chromium, cobalt, copper, nickel, and thallium. However, their distribution within the subsurface suggests that they occur naturally and are not contaminants.

Summary of Human Health Risks

Site 81B is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 81B included barium, cobalt, and copper. Thallium was originally included as a COC because a single sample collected at a depth of 9.5 feet passed the screening criteria. However, exposure to soils at this depth is unlikely. Therefore, thallium was removed as a COC at Site 81B. Nickel was originally included as a COC based on two samples collected at depths of 10 feet or greater. All other nickel concentrations were within the range of naturally occurring concentrations reported in the soil quality literature for Oahu. In addition, exposure to soils at this depth is unlikely; therefore, nickel was also removed as a COC at Site 81B. Based on the risk assessment, the potential COCs identified at Site 81B do not present an unacceptable risk to human health.

2.7.15 Site 83: Open Storage/Motor Pool Area (1950 - 1970)

Site Description

Site 83, Figure 2-19, is occupied by five warehouses and a battery storage and maintenance shed. Site 83 is bordered by Site H on the northeast. A search of SB records conducted during the IMS PA (1993) indicated that warehouses and maintenance and repair facilities occupied the site from 1950 to 1970. An interview with SB personnel conducted during the PA indicated that wastewater from vehicle steam cleaning may have been discharged directly onto the ground at the site in the past. The wastewater may have contained oil and solvents, and could have flowed into the drainage ditch along McMahon Road. However, the exact location at the site where past steam cleaning operations may have discharged wastewater is unknown.

The locations where discharges of wastewater likely occurred were recommended for further remedial investigation (IMS, 1994). In addition, sanitary sewer and storm drain lines were recommended for further remedial investigation.

Site Characteristics

SGS samples were collected at seven locations, and soil boring samples were collected from one location at Site 83 (Figure 2-19).

Ten SGS samples were collected from the seven sampling locations. Concentrations of TVH were detected in a number of the SGS samples, ranging from 1.1 ppmv to 4.2 ppmv. The highest concentration of TVH was found near the east corner of the site.

Four soil boring samples were collected at Site 83. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-19. TPH-G, TPH-D, VOCs, and SVOCs were not detected in any of the soil boring samples collected at the site. No inorganic potential COCs were identified in the soil samples collected at Site 83.

The source of the TVH detected in the SGS samples is not known. However, the TVH at Site 83 may be methane generated from decaying organic matter.

The results of the investigation at Site 83 indicate that the site and the drainage ditch in the north corner of the site were not significantly contaminated by the steam cleaning reported by IMS (1994).

Summary of Human Health Risks

Site 83 is an industrial site. No potential COCs were identified at this site. Therefore, this site does not present a risk to human health or the environment.

2.7.16 Site 88: Motor Pool (1955 - 1978)

Site Description

Site 88, Figure 2-20, has operated as a maintenance facility since 1950. Drums of hazardous waste and POL were stored on a paved area northeast of Building 2140. Fuel was stored in a 12,000-gallon UST outside the site's main gate from 1946 to 1991. However, the tanks and impacted soil were removed in 1991 (Rubeck Engineering, 1992). Wastewater generated from vehicle steam cleaning was discharged to drainage ditches adjacent to the site (IMS, 1994).

Potential sources of contaminants at the site were identified for further remedial investigation (IMS, 1994). These included the drainage ditch near the site's entrance from Lyman Road on the southeast side, the drainage ditch near the east corner of the site, the oil/water separator and drum storage area northeast of Building 2140, and the paved areas near the site's entrance and west and southwest of Building 2138. In addition, the sanitary sewer and storm drain lines were identified as potential sources that required further remedial investigation.

Site Characteristics

SGS samples were collected at four locations and soil boring samples were collected from two locations at Site 88 (Figure 2-20).

Five SGS samples were collected from the four sampling locations. Concentrations of TVH and/or other VOCs were not detected in any of the SGS samples collected at the site.

Eleven soil boring samples were collected at Site 88. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-20. TPH-G and TPH-D were not detected in any of the soil boring samples collected at the site. Methylene chloride was found at two soil borings, with a maximum concentration of 0.0022 mg/kg. The methylene chloride reported in the soil boring samples was considered to be a laboratory contaminant. Diethyl phthalate was found at one soil boring, at 0.00246 mg/kg. Di-n-butyl phthalate was found at one soil boring, at 0.249 mg/kg. Di-n-butyl phthalate was also found in other samples from two soil borings. The di-n-butyl phthalate in these samples was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Barium and copper were the inorganic potential COCs identified in the soil samples collected at Site 88. Concentrations of barium greater than background levels were found at two borings. Concentrations of copper greater than background were found at one boring.

The investigation at Site 88 did not find potential contaminants in the drainage ditches or in the areas in which vehicles may have been steam cleaned in the past.

The source of the inorganic potential COCs at Site 88 is not known, but their distribution and consistent concentrations suggest that they are naturally occurring at Site 88.

Summary of Human Health Risks

Site 88 is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site 88 included diethyl phthalate, di-n-butyl phthalate, barium, and copper. The risk assessment indicated that the potential COCs identified at Site 88 do not present an unacceptable risk to human health.

2.7.17 Site 90: Motor Pool (1959 - 1969), and Dark Stains (1970)

Site Description

Site 90, Figure 2-21, is an irregularly-shaped site situated near the intersection of Hendrickson Street and Mokihana Loop. Site 90 was occupied by a motor pool from about 1950 to 1969 (IMS, 1993). An aerial photograph taken in 1970 showed a large stain to the northeast of the water storage tank that is located in the southwest corner of the site. However, no

evidence of releases of hazardous materials at the site was found during the IMS PA, and the cause of the stain is unknown.

Because the site was previously used as a motor pool, the stain may have been caused by activities associated with the fueling and/or maintenance of vehicles. Therefore, further remedial investigation was recommended for the area of the stain (IMS, 1994).

Site Characteristics

SGS samples were collected at four locations, and soil boring samples were collected from two locations at Site 90 (Figure 2-21).

Five SGS samples were collected from the four sampling locations. Concentrations of TVH and aromatic VOCs related to fuel products (ethyl benzene, toluene, and total xylenes) were detected in a number of the SGS samples, ranging from 0.047 ppmv to 11.2 ppmv. The highest concentration of TVH was found near the northeast corner of Building 4544.

Nine soil boring samples were collected at Site 90. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-21. TPH-G, TPH-D, and VOCs were not detected in any of the soil boring samples collected at the site. Di-n-butyl phthalate was found at one soil boring, at 0.00268 mg/kg. The di-n-butyl phthalate reported in the soil boring sample was considered to be a laboratory contaminant. Barium, cobalt, and vanadium were the inorganic potential COCs identified in the soil samples collected at Site 90. Concentrations of barium greater than background levels were found at both borings. A concentration of copper greater than background was found at one boring. A concentration of vanadium greater than background was found at one boring.

The investigation at Site 90 did not detect organic constituents in the area of the soil stain documented in a 1970 aerial photograph of the site (HLA, 1993a).

The presence of inorganic potential COCs at the site appears limited to barium, copper, and vanadium. The distribution of these analytes within the subsurface suggests that they are naturally occurring at Site 90.

Summary of Human Health Risks

Site 90 is a residential site, and on-site risk was assessed for residential populations based on exposure to potential COCs in site soils. The potential COCs at Site 90 included barium, copper, and vanadium. The risk assessment indicated that the potential COCs identified at Site 90 do not present an unacceptable risk to human health.

2.7.18 Site 93: Open Fire (1951) and Open Storage/Light Material/Dark Stains (1955)

Site Description

Site 93, Figure 2-22, is an irregularly-shaped site situated between McCornack Road and Trimble Road. Site 93 was open land from 1950 to 1959 (IMS, 1993). An aerial photograph taken in 1955 showed that the site was possibly associated with a former maintenance facility, located on the north side of McCornack Road, and that a large stain was present in the eastern part of Site 93. However, no evidence of releases of hazardous materials at the site was found during the IMS PA, and the cause of the stain is unknown.

Because the site may have been associated with the former maintenance facility, the stain may have been caused by a spill of POL or by activities associated with vehicle maintenance. Therefore, further remedial investigation (discussed below) was recommended for the area of the stain (IMS, 1994).

Site Characteristics

SGS samples were collected at three locations, and soil boring samples were collected from one location at Site 93 (Figure 2-22).

One SGS sample was collected from the each of the three sampling locations. A concentration of toluene was detected in one of the SGS samples, at 0.030 ppmv. The toluene was found near the northeast end of Building 4317.

Six soil boring samples were collected at Site 93. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-22. TPH-G, TPH-D, VOCs, and SVOCs were not detected in any of the soil boring samples collected at the site. Arsenic, barium, chromium, copper, mercury, and vanadium were the inorganic potential COCs identified in the soil samples collected from the one soil boring at Site 93.

The investigation at Site 93 did not detect organic contaminants in the area of the soil stain documented in a 1955 aerial photograph of the site (HLA, 1993a).

The presence of inorganic potential COCs at the site appears limited to arsenic, barium, chromium, copper, mercury, and vanadium. The distribution of these analytes within the subsurface suggests that they are naturally occurring at Site 93.

Summary of Human Health Risks

Site 93 is a residential site, and on-site risk was assessed for residential populations based on exposure to potential COCs in site soils. The potential COCs at Site 93 included arsenic, barium, copper, mercury, and vanadium. Chromium was originally included as a potential COC because a single sample collected at a depth of 10 feet exceeded the screening criteria. Other reported chromium concentrations were detected below local background values. In addition, exposure to soils at this depth is unlikely; therefore, chromium was removed as a COC at Site 93. The risk assessment indicated that the potential COCs identified at Site 93 do not present an unacceptable risk to human health.

2.7.19 Site B: Maintenance Area, Building 940

Site Description

Site B, Figure 2-23, borders Site D on the southeast. Since the early 1960s, the site has been used for vehicle and armament maintenance and storage. Site B includes a number of support buildings; POL storage; a hazmat storage area; a concrete-lined wash rack, with associated weir-type oil skimmer and separate waste-oil UST; a grease rack, with associated waste-oil UST; and a fueling facility. Two former grease racks located near the southwest entrance to the site were removed in late 1985 (HLA, 1993).

Two fuel USTs are known to have been installed at the site. The locations of these two former fuel USTs are unknown, but they are likely to have been at or near the site's fueling facility, located northwest of Building 940. One of the fuel USTs, a 20,000-gallon diesel tank that was suspected of leaking, was removed in late 1991. The second fuel UST, a 20,000-gallon gasoline tank, was removed in 1993 for unknown reasons. Based on gas chromatography testing conducted prior to removing the diesel UST, TCE was suspected to be present in the vicinity of the tank. However, the presence of TCE in soil was not confirmed.

Potential environmental concerns identified by HLA (1993) are based on past and current uses and storage of POL and hazardous materials, the possibility of leakage from the former diesel UST and the existing wash rack waste-oil UST, overflow from the wash rack oil-water separator, and evidence of leakage and/or spills in the POL storage area. In addition, the existing SS/SD lines at Site B were identified as possible sources of COCs.

Site Characteristics

At Site B, SGS samples were collected at 43 locations, soil boring samples were collected from nine locations, and sediment samples were collected from four locations (Figures 2 23 and 2-24).

Forty-eight SGS samples were collected from the 43 sampling locations. Concentrations of TVH and/or BTEX were detected in SGS samples from six locations, ranging from 0.023 ppmv 19.7 ppmv. The highest concentrations of TVH were reported in samples collected from paved areas near the west corner of the site.

Nineteen soil boring and five sediment samples were collected at the site. Analyses performed on samples included TPH-G, TPH-D, VOCs, and SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figures 2-23 and 2-24. TPH-G was detected at one sediment sample location at a concentration of 93 mg/kg. TPH-D was detected in three soil borings and one sediment sample location, with a maximum concentration of 121 mg/kg found in the sediment sample. VOCs were not detected in soil boring or sediment samples. Diethyl phthalate, anthracene, butyl benzyl phthalate, and bis(2-ethylhexyl) phthalate were detected at three soil boring/sediment sample locations at concentrations up to 0.774 mg/kg. Di-n-butyl phthalate was reported in one boring; this constituent was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 13 soil boring and sediment sample locations at concentrations above background and/or naturally occurring levels. The potential COCs included barium, cadmium, chromium, cobalt, copper, lead, mercury, and zinc.

Potential organic COCs at Site B appear to be limited to three areas: the grease rack UST, the wash rack UST, and the drainage ditch that borders the site on the northeast. The grease rack and wash rack waste-oil USTs are suspected to be the sources of the TPH-D found in the soil boring samples collected at 5 feet bgs. The extent of TPH-D at these locations appears to be limited to the shallow subsoil on the basis of data from deeper samples in the associated borings.

Surface spills and runoff are the suspected sources of the TPH-G, TPH-D, anthracene, bis(2-ethylhexyl)phthalate, butyl benzyl phthalate, and diethyl phthalate found in the surface, shallow soil, and sediment samples collected in the drainage ditch.

Surface spills and runoff are also suspected to be the sources of the lead concentrations detected in the surface soil and sediment samples collected from within the drainage ditch. The erratic distribution of the remaining inorganic potential COCs detected in the soil boring and sediment samples suggests that they are naturally occurring.

The data do not suggest that the other potential sources identified at Site B have significantly impacted soil or sediment at the site.

Summary of Human Health Risks

Site B is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site B included diethyl phthalate, anthracene, butyl benzyl phthalate, bis(2-ethylhexyl)phthalate, barium, cadmium, chromium, cobalt, copper, lead, mercury, and zinc. The risk assessment indicates that the potential COCs identified at Site B do not present an unacceptable risk to human health.

2.7.20 Site C: Maintenance Area, Building 955

Site Description

Site C, Figure 2-25, is a vehicle and armament maintenance and storage area, located southeast of Site D. Aerial photographs indicate that Site C was occupied by an oval race track from 1942 to 1955 and was used for vehicle storage from 1959 to 1985 (HLA, 1993). The current maintenance and storage area was completed in 1985.

A visit to the site during the PA (HLA, 1993) indicated that the oil sump at the southwest end of Building 955 overflowed during heavy rains. Visible evidence of overflows from the oil sump at Building 955 was noted during the HLA site visit.

Potential environmental concerns at Site C identified in the PA Report (HLA, 1993) are based on past and current uses and storage of hazardous materials, overflow of waste oil from the sump at Building 955, malfunction of the wash rack oil-water separator, and a lack of documentation that the two waste-oil USTs had been leak tested. After discussions with the U.S. EPA, the U.S. Army also agreed to evaluate the SS/SD lines at Site C as possible sources of contamination.

Site Characteristics

SGS samples were collected at 33 locations, soil boring samples were collected from 11

locations, and sediment samples were collected from two locations (Figure 2-25).

Thirty-six SGS samples were collected from the 33 sampling locations. TVH and/or BTEX were detected at eight SGS sampling locations, at concentrations that ranged from 0.055 to 16.1 ppmv. The concentration of TVH was highest at the paved area near the south corner of the site.

Twenty-eight soil boring and two sediment samples were collected at the site. Analyses performed on samples included TPH-G, TPH-D, VOCs, and SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-25. TPH-G was not detected at soil boring/sediment sample locations. TPH-D was detected in three soil boring/sediment sample locations, with a maximum concentration of 291 mg/kg found in sediment sample #1. PCE, TCE, and methylene chloride were detected in five soil borings, with maximum concentrations of 0.00062 mg/kg, 0.00096 mg/kg, and 0.0019 mg/kg, respectively. The methylene chloride is suspected to be a laboratory contaminant. Bis(2-ethylhexyl) phthalate, di-n-octyl phthalate, and di-n-butyl phthalate were detected at three soil boring/sediment sample locations at concentrations up to 4.16 mg/kg. Di-n-butyl phthalate is considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at nine soil boring and sediment sample locations at concentration above background and/or naturally occurring levels. The potential COCs included antimony, barium, cadmium, chromium, cobalt, copper, lead, mercury, and zinc.

Potential organic COCs at Site C appear to be limited to four areas: the grease rack waste-oil UST; the POL and/or hazardous materials (hazmat) storage west of the wash rack; the satellite storage point (SSP) near the east corner of the site; and the drainage ditch at the west corner of the site. The grease rack waste-oil UST and the wash rack are suspected to be the sources of the TPH-D found in the soil samples collected at 20 feet and 3.5 feet bgs, respectively. The SSP is the suspected source of the TCE detected in the sample collected at 3 feet bgs.

Runoff from upstream Site D and/or Site B is the suspected source of the TPH-D, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, PCE, and lead found in the surface, shallow soil, and sediment samples collected in and near the drainage ditch at the west corner of Site C.

The distribution of the remaining potential COCs detected in the soil boring and sediment samples collected at Site C suggests that they are naturally occurring. The data also indicate that the other potential sources of contamination identified at Site C have not significantly impacted soil or sediment at the site.

Summary of Human Health Risks

Site C is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site C included methylene chloride, trichloroethene, tetrachloroethene, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, antimony, barium, cadmium, chromium, cobalt, copper, lead, mercury, and zinc. The risk assessment indicated that the potential COCs identified at Site C do not present an unacceptable risk to human health.

2.7.21 Site D: Maintenance Area, Building 968

Site Description

Site D, Figure 2-26 is situated between Reiley and Wright-Smith Avenues, between Sites B and C. Site D has been used since 1987 for vehicle and armament maintenance and storage (HLA, 1993). According to aerial photographs reviewed during the PA, residences had been present at the site in 1951, but had been replaced by warehouses by 1960. A temporary grease rack visible in a 1970 aerial photograph may indicate that the site had by then become a vehicle maintenance area. By 1978, two permanent grease racks were on site, but there is only one grease rack currently at the site. Building 968 was in place by 1985.

Potential environmental concerns identified by HLA (1993) are based on past and current uses and storage of POL and hazardous materials, the possibility of releases from the grease rack and its waste-oil UST, overflow from the wash rack oil-water separator, observed evidence of leakage

and/or spills in POL and hazmat storage areas, and aerial photographic evidence of a stain at the former grease rack on the southeast side of Building 968. After discussions with the U.S. EPA, the U.S. Army also agreed to evaluate the SS/SD lines at Site D as possible sources of contaminants.

Site Characteristics

At Site D, SGS samples were collected at 37 locations, soil boring samples were collected from 17 locations, and sediment samples were collected from two locations (Figure 2-26).

Forty-two SGS samples were collected from the 36 sampling locations. Concentrations of TVH and/or BTEX were detected in SGS samples from nine locations, ranging from 0.036 to 552 ppmv. The highest concentrations of TVH were found in paved areas to the southwest and east of Building 968.

Forty-three soil boring and two sediment samples were collected at the site. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-26. TPH-G was not detected in soil boring or sediment samples. TPH-D was detected at seven soil boring/sediment sample locations, with a maximum concentration of 3,750 mg/kg. Acetone was found at one boring location at a concentration of 0.024 mg/kg. Carbon disulfide and PCE were each found at one boring location at a concentration of 0.0007 mg/kg and 0.00069 mg/kg respectively. Methylene chloride was found at six soil boring /sediment sample locations, with a maximum concentration of 0.0023 mg/kg. The methylene chloride reported in the samples was suspected to be a laboratory contaminant. Fluoranthene and benzo(a) pyrene were both detected in two soil borings, with maximum concentrations of 0.22 mg/kg and 0.2 mg/kg, respectively.

Concentrations of chrysene (0.1 mg/kg), bis(2-ethylhexyl) phthalate (8 mg/kg), di-n-octyl phthalate (2 mg/kg), and benzo(g,h,i) perylene (0.3 mg/kg) were found at one sediment sample location. Di-n-butyl phthalate and bis(2-ethylhexyl) phthalate were found in one soil boring at 0.0162 mg/kg and 0.0166 mg/kg, respectively. These two constituents identified in the soil boring were considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs included antimony, arsenic, barium, cadmium, chromium, cobalt, lead, silver, thallium, and zinc. Concentrations of one or more inorganic potential COCs were greater than background and/or naturally occurring levels in ten soil borings and both sediment samples.

Potential organic COCs at Site D appear to be limited to the paved area near and to the southeast of Building 968; the paved area to the northwest of Building 977; the drainage ditch on the southwest side of the site; and the paved area near the east corner of the site. Data from deeper soil samples in the associated borings indicates that the extent of the potential organic COCs at these locations is limited to the shallow subsurface. Surface spills and runoff are the suspected sources of the TPH-D found in the surface and shallow soil samples collected in these areas.

Runoff from Site D is the suspected source of the potential COCs detected in the sediment samples collected at Sites D and C. These samples typically contain the highest concentrations of potential COCs that were found in samples collected in and near the drainage ditch. The downstream extent of these potential COCs appears limited to portions of the drainage ditch immediately adjacent to Site C. The upstream extent of most of these potential COCs appears limited to the southeast of Site D's boring #6. However, lead and zinc do not extend further upstream and were detected in Site D's sediment sample #1.

Summary of Human Health Risks

Site D is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site D included TPH-D, methylene chloride, acetone, carbon disulfide, tetrachloroethene, fluoranthene, chrysene, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, benzo(a)pyrene, benzo(g,h,i)perylene, antimony, arsenic, barium, cadmium, chromium, cobalt, lead, silver, thallium, and zinc. The risk assessment indicated that the potential COCs identified at Site D do not present an unacceptable risk to human health.

2.7.22 Site E: Maintenance Area, Building 986

Site Description

Site E, Figure 2-27, is a vehicle and armament maintenance and storage area that is located on Capron Avenue. Sites C and D are located to the northeast of Site E, across Reiley avenue. The structures presently on the site were reportedly built in 1970 (HLA, 1993). According to SB records, Motor Pool No. 6 occupied the site as early as 1960, and warehouses may have occupied the site prior to 1960. Three wash racks and one grease rack were removed from the site in 1969. These former structures did not have associated waste-oil USTs. The locations of these former structures is not known. From 1970 to 1986, the existing grease racks did not have associated waste-oil USTs. These grease racks are currently connected to oil-water separators.

Several potential environmental concerns were identified by HLA (1993). These concerns include:

- Past and current uses and storage of POL and hazardous materials
- The lack of containment or waste-oil tanks associated with the former wash racks and grease rack
- The failed leak test of the existing 1,000-gallon waste-oil UST
- The absence of waste-oil USTs associated with the current grease racks from 1970 to 1986
- The direct discharge of wastewater to surface drainage at the existing wash rack
- The reported overfilling of a UST
- Aerial photographic evidence of areas of stains or soil discoloration at the site.

Site Characteristics

SGS samples were collected at 45 locations, soil boring samples were collected from 15 locations, sediment samples were collected from two locations, and a surface water sample was collected from one location (Figure 2-27).

Forty-eight SGS samples were collected at the 45 sampling locations. TVH was detected at 12 locations and concentrations ranged from 1.3 to 42,700 ppmv. The concentration of TVH was highest to the east of Building 985.

Thirty-seven soil boring and two sediment samples were collected at Site E. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figures 2-27 and 2-28. TPH-G was detected in one soil boring, with a maximum concentration of 7,200 mg/kg. TPH-D was detected at five locations and the highest concentration was 19,000 mg/kg. VOCs were detected at five soil boring and sediment sample locations. Detected constituents included methylene chloride, acetone, carbon disulfide, 1,2-dichloroethane (1,2-DCA), 2-butanone, TCE, benzene, toluene, ethyl benzene, and total xylenes, at concentrations up to 8,000 mg/kg. Methylene chloride is a suspected laboratory contaminant. SVOCs were detected at six locations. Detected constituents included isophorone, naphthalene, 2-methylnaphthalene, dibenzofuran, fluorene, diethyl phthalate, phenanthrene, anthracene, di-n-butyl phthalate, fluoranthene, pyrene, butyl benzyl phthalate, chrysene, benzo(a) anthracene, bis(2-ethylhexyl) phthalate, benzo(a) pyrene, and benzo(g,h,i) perylene, at concentrations up to 80 mg/kg. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 14 soil boring and sediment sample locations at concentrations above background and/or naturally occurring concentrations. The potential COCs included antimony, barium, cobalt, and lead.

One surface water sample was collected at the site. Analytical results are summarized in Tables 2-4 and 2-5. No organic constituents or inorganic constituents identified as potential COCs were detected at the surface water sample location.

Organic potential COCs at Site E appear to be limited to the paved area near the northeast end of the wash rack, paved areas near the center and north corner of the site, the east corner of the grease rack area, west of the fueling facility, and the area of the fueling facility and its USTs. The data from soil boring samples suggest that the extent of the organic potential COCs at the locations other than the fueling facility and its USTs is limited to the shallow subsurface. Surface spills and runoff are the suspected sources of the TPH-D, acetone,

2-butanone, carbon disulfide, and isophorone found in the surface and shallow soil samples collected in these other areas.

Leaking fuel UST(s) and/or fuel line(s) at the fueling facility are the suspected sources of the TPH-G, TPH-D, lead, and other organic analytes detected in the soil samples collected from borings drilled in that area. Although the risk assessment concluded that the potential COCs detected in this area do not pose a significant threat to human health, the concentrations of TPH-D and TPH-G that were detected are above HDOH clean-up criteria. Further investigation and cleanup of this area was undertaken as part of the installation's UST compliance program in April, 1996. At. that time, the UST and adjacent contaminated soil were removed.

Surface spills and runoff are also the suspected sources of the organic potential COCs and lead detected in the sediment samples collected at Site E.

The distribution of the barium, cobalt, and lead detected in the soil samples collected from the borings drilled at Site E in areas other than the wash rack and fueling facility suggests that they are naturally occurring. Detection of barium in the surface soil boring sample and the sediment sample collected from within the drainage ditch suggests it also occurs naturally at Site E.

No organic constituents or inorganic potential COCs were detected in the surface water sample collected at Site E.

The data indicate that the other potential sources identified at Site E have not significantly impacted soil or sediment at the site.

Summary of Human Health Risks

Site E is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site E included acetone, carbon disulfide, 1,2-dichloroethane, 2-butanone, trichloroethene, benzene, toluene, ethyl benzene, total xylenes, isophorone, naphthalene, 2-methylnaphthalene, dibenzofuran, fluorene, diethyl phthalate, phenanthrene, anthracene, fluoranthene, pyrene, butyl benzyl phthalate, chrysene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, benzo(g,h,i)perylene, antimony, barium, cobalt, and lead. The risk assessment indicates that the potential COCs identified at Site E do not present an unacceptable risk to human health.

2.7.23 Site H: Maintenance Area, Building 1080

Site Description

Site H, Figure 2-29, is a vehicle maintenance and storage area that is located at the intersection of McMahon Road and an access road. Two drainage ditches border Site H. The current facility was built in 1982, and two USTs were installed in the same year. Historical records indicate that the site has been used for vehicle storage since about 1950 and that it may have been part of a larger motor pool by 1978.

A 1985 aerial photograph indicated surface discoloration near the grease rack. During a site visit by HLA, no evidence of spills or releases was observed around the four shipping containers used to store paint, solvents, and POL located near the site's fence to the southeast of Building 1080. However, HLA personnel observed soil discoloration in the drainage ditch adjacent to McMahon Road (HLA, 1993).

Potential environmental concerns identified by HLA (1993) are based on past and current uses and storage of the hazardous materials mentioned above, the surface discoloration observed in an aerial photograph that suggests possible unauthorized releases of hazardous materials, and observation of an oily discoloration in the drainage ditch downstream of the site. In addition, the existing SS/SD lines at Site H were identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 36 locations, soil boring samples were collected from 8 locations, sediment samples were collected from three locations, and surface water samples were collected

from four locations (Figure 2-29).

Thirty-nine SGS samples were collected from the 36 sampling locations. TVH and/or BTEX was detected at 15 locations, and concentrations ranged from 0.027 to 53 ppmv. The concentration of TVH was highest to the northwest of Building 1080.

Twenty-five soil boring and five sediment samples were collected at Site H. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-29. TPH-G was not detected in soil boring/sediment samples. TPH-D was detected at four soil boring/sediment sample locations, with a maximum concentration of 218 mg/kg. Methylene chloride and acetone were detected at three soil boring and sediment sample locations, with maximum concentrations of 0.002 mg/kg and 0.11 mg/kg, respectively. Dimethyl phthalate, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate were detected at two soil boring and sediment sample locations, at concentrations up to 28.4 mg/kg. Di-n-butyl phthalate was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 10 soil boring and sediment sample locations at concentrations above background and/or naturally occurring levels. The potential COCs included barium, cobalt, lead, and zinc.

Four surface water samples were collected at the site. Analytical results are summarized in Tables 2-4 and 2-5. No organic constituents were detected in surface water samples. Inorganic constituents identified as potential COCs were detected at surface water sample location #1 only. These potential COCs included copper, lead, nickel, and zinc.

Organic and inorganic analytes found above screening criteria at Site H appear to be limited to two areas: the grease rack and the drainage ditches that border the site.

Surface spills are suspected to be the source of the low concentrations of TPH-D found in the shallow soil samples collected at the grease rack. The grease rack's waste-oil tank is suspected to be the source of the low concentrations of TPH-D and acetone found in one deeper soil sample. The extent of TPH-D and acetone appears limited.

Sites upstream from Site H are suspected to be the source of the TPH-D, dimethyl phthalate, bis(2-ethylhexyl)phthalate, barium, copper, lead, and zinc detected in the sediment samples.

Summary of Human Health Risks

Site H is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site H may flow to areas accessible to residential populations, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site H included dimethyl phthalate, bis(2-ethylhexyl)phthalate, barium, cobalt, lead, and zinc. The potential COCs in surface water were copper, lead, nickel, and zinc. The risk assessment indicates that the potential COCs identified at Site H do not present an unacceptable risk to human health.

2.7.24 Site I: Maintenance Area, Building 1124

Site Description

Site I, Figure 2-30, is located in the west-central portion of the main post at the southeast corner of Oahu Street and Beaver Road. Most of Site I is unpaved. Waikoloa Gulch, an ephemeral stream, which is not a manmade drainage structure, borders Site I to the southeast. A smaller drainage ditch runs along the east side of the site and discharges to Waikoloa Gulch.

Most of the structures at Site I are unoccupied at this time. Since 1975, portions of the site have been used intermittently by grounds maintenance personnel. Historical records indicate that this site has been used as a motor pool and vehicle storage yard since 1960. A firing range may also have operated on the site from 1942 to 1955.

Potential environmental concerns have been identified based on the following situations:

- There is an oil stain of unknown origin at the east side of the site, possibly associated with 23 unauthorized drums removed from the site in early 1992
- There is no evidence of any measures taken to minimize the release of oil and cleaning chemicals associated with a wash rack
- 55-gallon drums of hazardous waste were stored on site for an unknown period (HLA, 1993). The condition and contents of the drums were unknown.

In addition, aerial photographs showed areas of soil discoloration in 1970, 1981, and 1985, and a 1969 aerial photograph indicates that the entire area may have been sprayed with oil. The existing SS/SD lines at Site I were also included as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 59 locations, soil boring samples were collected from 17 locations, and sediment samples were collected from two locations (Figure 2-30).

Sixty-five SGS samples were collected from the 59 locations. TVH and/or BTEX were detected at 19 SGS sampling locations, at concentrations that ranged from 0.039 to 5.4 ppmv. The concentrations of TVH were highest near the central and northern area of the site.

Forty-four soil boring and two sediment samples were collected at Site I. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-30. TPH-G was detected at two soil boring/sediment sample locations, with a maximum concentration of 73 mg/kg. TPH-D was detected at four soil boring/sediment sample locations, with a maximum concentration of 74 mg/kg. Methylene chloride was detected at 12 soil boring locations, with a maximum concentration of 0.0019 mg/kg. The methylene chloride reported was considered to be a laboratory contaminant. Concentrations of 4-methylphenol, diethyl phthalate, and di-n-butyl phthalate were detected at six soil boring/sediment sample locations at up to 0.31 mg/kg. The diethyl phthalate and di-n-butyl phthalate reported were considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 17 soil boring and sediment sample locations at concentrations above background and/or naturally occurring levels. The potential COCs included arsenic, barium, cobalt, copper, lead, and silver.

Organic analytes at Site I appear to be limited to the area associated with the former wash rack in the northeastern portion of the site and the former grease rack and wash rack locations in the southern portions of the site. The TPH-D and TPH-G present in the drainage ditch may also have originated from these sources or may represent more generalized site runoff from surface spills. The presence of 4-methylphenol in a single sediment sample also is likely to represent runoff from surface releases in the vicinity of the former grease racks. The extent of TPH-D, TPH-G, and 4-methylphenol in the site soils appears to be limited.

Surface spills and runoff are the likely sources of lead at borings #2, #3, #4, #14, and sediment sample #2. The erratic and widespread distribution of the remaining potential inorganic COCs detected in soil boring and sediment samples suggests that these inorganics are naturally occurring, since each of these analytes was found at concentrations above their respective detection limits in most of the samples collected at Site I. Based on the risk assessment, the potential COCs identified at Site I do not present an unacceptable risk to human health or the environment.

Summary of Human Health Risks

Site I is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site I included 4-methyl phenol, barium, cobalt, copper, lead, and silver. The risk assessment indicates that the potential COCs identified at Site I do not present an unacceptable risk to human health.

2.7.25 Site J: Maintenance Area, Building 1180

Site Description

Site J, Figure 2-31, is a maintenance, repair, and storage area for construction and power

equipment, including heavy vehicles. SB records and aerial photographs indicate that the site was unused open space before 1950. Most of Site J is unpaved.

A separately fenced area of Site J extends from the northwest corner of the main site. This part of Site J includes a wash rack, with an associated oil-water separator and sanitary sewer connection; a sandblasting area (Building 1180F); and a wrecked-vehicle and scrap yard.

Potential environmental concerns were identified at Site J based on indications that a UST, which was removed without soil remediation in 1991, was found to be leaking; on the absence of an oil-water separator between the wash rack and discharge to Waikoloa Gulch; on the presence of discolored soil in the unpaved POL dispensing area; on the use of an unpaved area south of Building 1180 to store approximately 100 used batteries; and on possible solvent use at the paint booth (HLA, 1993). In addition, the existing SS/SD lines at Site J were identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 32 locations, soil boring samples were collected from 17 locations, and sediment samples were collected from two locations (Figure 2-31).

Forty SGS samples were collected from the 32 sampling locations. TVH and/or BTEX were detected at 10 SGS sampling locations, at concentrations ranging from 0.027 to 9.8 ppmv. The concentration of TVH was highest to the south of Building C.

Forty-five soil boring and two sediment samples were collected at Site J. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-31. TPH-G was detected at one sediment sample location at 67 mg/kg. TPH-D was detected at three soil boring/sediment sample locations, with a maximum concentration of 26.6 mg/kg. Methylene chloride was detected at 10 soil boring locations, with a maximum concentration of 0.0019 mg/kg. The methylene chloride reported was considered to be a laboratory contaminant. Bis(2-ethylhexyl) phthalate, diethyl phthalate, and di-n-butyl phthalate were detected in six soil borings, at concentrations up to 0.22 mg/kg. The diethyl phthalate and di-n-butyl phthalate reported were considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 16 soil boring and sediment sample locations at concentrations above background and/or naturally occurring levels. The potential COCs included arsenic, barium, cadmium, cobalt, copper, lead, and silver.

TPH-G and/or TPH-D in boring #10 and in both sediment samples and lead in sediment sample #2 appear to be limited to two areas: the hazardous materials storage point southwest of Building 1180C and the drainage area downstream from the washrack in the northwest portion of the site. The absence of lateral or vertical distribution beyond these isolated points is consistent with small surface releases of contaminants and/or site runoff. The distribution of inorganic potential COCs suggests that they are naturally occurring, due to their presence in samples from a number of depths at consistent concentrations. Therefore, based on the analytical results of soil and sediment samples from Site J, it does not appear that potential sources of contaminants at this site are significantly impacting site soil or sediment quality.

Summary of Human Health Risks

Site J is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site J included bis(2 ethylhexyl)phthalate, arsenic, barium, cadmium, cobalt, copper, lead, and silver. The risk assessment indicates that the potential COCs identified at Site J do not present an unacceptable risk to human health.

2.7.26 Site K: Maintenance Area, Building 1611

Site Description

Site K, Figure 2-32, is located at the intersection of Lyman and Mellichamp Roads. Site K is used as a tactical equipment maintenance facility and a vehicle storage and maintenance area.

The site has been used for these purposes since the early 1960s. Records indicate that Motor Pool No. 4 occupied the site from 1962 to 1979 (HLA, 1993). The main buildings on the site are Buildings 1611 and 1602, which are maintenance shops, and Building 1604, which is a fueling facility with four fuel USTs.

Potential environmental concerns at this site include two spills at Site K, including diesel from a tractor in 1990 and a waste-oil tank overflow at the grease rack located at Building 1609 in 1991; areas of pavement and soil discoloration seen in aerial photographs taken in 1970; waste oil UST 1609-1 which failed a leak test in November 1991; and possible releases of POL or solvents from the wash rack and a grease rack (HLA, 1993). Also, the existing SS/SD lines at Site K were identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 29 locations, soil boring samples were collected from 12 locations, sediment samples were collected from two locations, and surface water samples were collected from two locations (Figure 2-32).

Twenty-nine SGS samples were collected from the 29 sampling locations. TVH and/or BTEX was detected at 17 locations, and concentrations ranged from 0.032 to 340 ppmv. PCE was detected at 2 locations at up to 0.161 ppmv. The concentration of TVH was highest at the stained soil area to the north of Building 1611.

Thirty soil boring and four sediment samples were collected at Site K. Chemical analyses of samples included TPH-G, TPH-D, TPH-O, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-32. TPH-G was detected in one sediment sample at 52 mg/kg. TPH-D was detected in three soil borings ad the highest concentration was 54.8 mg/kg. TPH-O was detected in one soil boring at 7.4 mg/kg. Acetone, chloroform, 2-butanone, TCE, and methylene chloride were detected at four soil boring/sediment sample locations, at concentrations up to 0.059 mg/kg. The methylene chloride reported was considered to be a laboratory contaminant. Diethyl phthalate, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate were found at four soil boring/sediment sample locations, at concentrations up to 0.089 mg/kg. Bis(2-ethylhexyl) phthalate was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 4 soil boring locations at concentrations above background and/or naturally occurring levels

The two surface water samples were collocated with the sediment samples. Analytical results are summarized in Tables 2-4 and 2-5. Di-n-butyl phthalate was detected at 1.03 Ig/L at surface water sample location #2. Inorganic constituents identified as potential COCs were detected at both surface water sample locations. These potential COCs included cyanide and zinc.

Organic analytes found above screening criteria in samples collected from soil and sediment borings at Site K appear to be limited to areas of known or suspected releases of chemical constituents to the drainage swale to the south of the site. This swale is the likely destination for chemicals released to the surface elsewhere on the site.

Inorganic analytes present in soil and sediment samples collected at Site K include arsenic, barium, beryllium, cadmium, cobalt, and copper. The distribution of these potential COCs suggests that they are naturally occurring, due to their presence in samples from a number of depths at consistent concentrations.

Although di-n-butyl phthalate was detected in one surface water sample, it is probably a laboratory contaminant, rather than an organic COC. The potential inorganic COCs zinc and cyanide were present in both of the water samples collected from the drainage swale at Site K. Barium was also present in surface water samples collected at Site K. Since the inorganic constituents were present in samples from both upgradient and downgradient locations, an off-site source of these contaminants is likely.

TPH levels were below 100 mg/kg, and the maximum detected concentration of lead was 32 mg/kg. Based on the concentrations of potential COCs detected in surface water, sediment, and soil samples collected from Site K, it does not appear that there have been significant releases of contaminants at Site K. Numerous small releases over the operating history of the site and

runoff from current site operations are the suspected sources of the contaminants found in the drainage ditch and in the areas of the wash rack, the unused grease rack, and the POL storage area.

Summary of Human Health Risks

Site K is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site K may flow to areas accessible to residential populations, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site K included methylene chloride, acetone, chloroform, 2-butanone, trichloroethene, diethyl phthalate, di-n-butyl phthalate, bis(2-ethylhexyl)phthalate, arsenic, barium, beryllium, cadmium, cobalt, and copper. The potential COCs in surface water were cyanide and zinc. The risk assessment indicates that the potential COCs identified at Site K do not present an unacceptable risk to human health.

2.7.27 Site L: Maintenance Area, Building 1621

Site Description

Site L, Figure 2-33, is bordered by Site K along its western and southern edges and by Trimble Road along its northwestern edge. Site L has been used for vehicle storage and maintenance since the early 1960s (HLA, 1993). Records indicate that Motor Pool No. 4 once occupied the site.

Potential sources of contaminants were identified during investigations that resulted in Site L being included in OU 3. SB records report a diesel fuel leak from a tractor in 1991 (HLA, 1993). A site visit revealed additional areas of concern, including discoloration along the boundary shared with Site K and a grassy area, located between Site L and Trimble Road, where used oil overflowed during a rainy period. Six inactive USTs had not been leak tested and therefore were identified as potential sources for the release of POLs to the environment. Releases of oily waste from the wash rack to the storm drainage system were also considered possible. A hazardous waste storage point is present on site where hazardous wastes are stored in metal sheds that are covered by a tarp and bermed with sandbags (HLA, 1993). In addition, the existing SS/SD lines at Site L were identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 25 locations, soil boring samples were collected from six locations, and sediment samples were collected from two locations (Figure 2-33).

Twenty-one SGS samples were collected from the 25 sampling locations. TVH and/or aromatic VOCs (toluene and total xylenes) were detected at 18 SGS sampling locations, and concentrations ranged from 0.026 to 5,000 ppmv. The concentration of TVH was highest at the paved area east of Building 1624.

Fifteen soil boring and two sediment samples were collected at Site L. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-33. TPH-G was detected at two soil boring/sediment sample locations, and the highest concentration was 12 mg/kg. TPH-D was detected in three soil borings, with a maximum concentration of 51 mg/kg. Concentrations of acetone (0.017 mg/kg), benzene (0.014 mg/kg), toluene (up to 0.073 mg/kg), ethyl benzene (0.020 mg/kg), and total xylenes (up to 0.056 mg/kg) were detected in four soil borings. Butyl benzyl phthalate and di-n-butyl phthalate were detected in sediment samples at up to 0.0683 mg/kg. Di-n-butyl phthalate was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected in one soil sample at concentrations above background levels. The potential COCs included barium and copper.

Organic analytes present above screening criteria at Site L appear to derive from historic vehicle maintenance operations at this site, including the wash rack, two grease racks and an associated waste-oil UST, and, potentially, the waste storage point near the southern site boundary. Only Boring #5, placed in the area of SGS sampling point #8, found no evidence of potential organic COCs. However, the potential organic COCs detected at Site L are limited in

both their vertical and lateral distribution, reflecting a pattern of minor surface releases, rather than major spills or leaks. Based on the concentrations and distribution of potential COCs in shallow soil and sediment samples collected at this site, Site L does not appear to be significantly impacting sediment quality.

The inorganic potential COC barium was present above screening levels at samples from boring #1 and #4 at concentrations that do not show a consistent pattern with depth. Copper exceeded the screening level in a single sample collected from boring #1 at a depth of 10 feet bgs. The presence and distribution of these analytes does not appear to relate to past activities at Site L and is not consistent with a release.

Summary of Human Health Risks

Site L is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site L included acetone, benzene, ethyl benzene, toluene, total xylenes, butyl benzyl phthalate, barium, and copper. The risk assessment indicates that the potential COCs identified at Site L do not present an unacceptable risk to human health.

2.7.28 Site O: Maintenance Area, Building 2400

Site Description

Site O, Figure 2-34, is located at the intersection of Road A and Lyman Road, on the north side of Lyman Road near Lyman Gate. Site O is used for vehicle storage and tactical equipment maintenance. The site was occupied by warehouses during the 1940s and was part of Motor Pool No. 1 from the early 1950s to 1966 (HLA, 1993). The current facility replaced Motor Pool No. 1 in 1966. The site appears to be unpaved in aerial photographs taken in 1978. In aerial photographs taken in 1985, the site appears to have been paved.

The areas of potential environmental concern identified by HLA (1993) at Site O include the oil/water separators at wash racks taken out of service in 1984, which may have discharged oil, grease, and/or solvents into drainage ditches; discolored soil near the fuel UST fill area; stressed vegetation near the east side of the site; and potential past releases of solvents and POL from clogging and overspill at the oil-water separator that services the grease racks. The HLA PA (1993) indicated that the coral-type gravel that covered the site before it was paved could increase the likelihood of lateral and vertical migration of surface spills (HLA, 1993). The existing SS/SD lines at Site O were also identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 21 locations, soil boring samples were collected from 12 locations, sediment samples were collected from two locations, and a surface water sample was collected from one location (Figure 2-34).

Twenty-two SGS samples were collected from the 21 sampling locations. TVH and/or aromatic hydrocarbons (ethyl benzene, toluene, and total xylenes) were detected at 17 SGS sampling locations. Concentrations ranged from 0.017 to 730 ppmv. The concentration of TVH was highest in the paved area to the north/northeast of Building 2408.

Twenty-six soil boring and two sediment samples were collected at Site O. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-34. TPH-G was detected in two soil borings, and the highest concentration was 51 mg/kg. TPH-D was detected at three soil boring/sediment sample locations, with a maximum concentration of 246 mg/kg. VOCs including acetone, carbon disulfide, 2-butanone, and toluene were detected at one soil boring location at up to 0.2 mg/kg. SVOCs were detected at six soil boring and sediment sample locations. Maximum concentrations of detected SVOCs included di-n-butyl phthalate (0.00333 mg/kg), fluoranthene (0-26 mg/kg), chrysene (0.078 mg/kg), bis(2-ethythexyl) phthalate (0.759 mg/kg), and benzo(a) pyrene (0.046 mg/kg). Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at 8 soil boring and sediment sample locations at concentrations above background and/or naturally occurring levels. The potential COCs included arsenic, barium, cadmium, cobalt, copper, lead,

and mercury.

The one surface water sample was collocated with sediment sample #1. Analytical results are summarized in Tables 2-4 and 2-5. No organic or inorganic constituents identified as potential COCs were detected in the surface water sample.

Organic and inorganic analytes found above screening criteria at Site O show no clear pattern of contaminant distribution, with the exception of organics and inorganics present in the sediment samples and soil boring #8, which was placed in the drainage ditch near sediment sample #2. It is likely that these constituents are caused by runoff from the site over its years of industrial use. The presence of TPH-D, TPH-G, and other organics in samples from near surface soil borings are also likely to be related to small releases of materials over the long-term use of the site for vehicle maintenance purposes, rather than to specific major releases of hazardous materials.

Summary of Human Health Risks

Site O is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site O included acetone, carbon disulfide, 2-butanone, toluene, fluoranthene, chrysene, bis(2-ethylhexyl)phthalate, di-n-butyl phthalate, arsenic, barium, cadmium, cobalt, copper, lead, and mercury. The risk assessment indicates that the potential COCs identified at Site O do not present an unacceptable risk to human health.

2.7.29 Site P: Maintenance Area, Building 2420

Site Description

Site P, Figure 2-35, is located on the north side of Lyman Road. Site O is to the east of Site P and Site Q is to the west of the site. Site P is used for vehicle storage and tactical equipment maintenance. The site was occupied by a warehouse and shooting range during the 1940s and 1950s and was open space from the 1950s to 1966 (HLA, 1993). Most of the current improvements at the storage and maintenance facility were in place by late 1985.

The areas of potential environmental concern originally identified at Site P (HLA, 1993) included possible leaks from the two waste-oil USTs, possible releases from past POL and solvent use due to the extended period of time the site has been used as a maintenance area, and areas of soil discoloration near the wash rack and fueling facility that are visible in 1985 aerial photographs. In addition, the existing SS/SD lines at Site P were identified as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 24 locations, soil boring samples were collected from 6 locations, sediment samples were collected from two locations, and surface water samples were collected from two locations (Figure 2-35).

Twenty six SGS samples were collected from the 24 sampling locations. TVH was detected at 22 locations, and concentrations ranged from 1.2 to 9,100 ppmv. At seven sampling locations where TVH was detected, carbon tetrachloride, TCA, and/or TCE were also detected. The concentrations of TVH were highest at the paved area near the northwest corner of the site.

Fourteen soil boring and two sediment samples were collected at Site P. Chemical analyses of samples included TPH-G, TPH-D, and TPH-O, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-35. TPH-G was not detected in any of the soil boring or sediment samples. TPH-D was found at four soil boring/sediment sample locations, with a maximum concentration of 197 mg/kg. TPH-O was found in one soil boring at 20.1 mg/kg. TCE was found in one soil boring at 0.0022 mg/kg. Maximum concentrations of chrysene (0.087 mg/kg), benzo(a) anthracene (0.02 mg/kg), bis(2-ethylhexyl) phthalate (0.28 mg/kg), benzo(a) pyrene (0.014 mg/kg), and di-ni-butyl phthalate (0.12 mg/kg) were found in one soil boring. Di-n-butyl phthalate was considered to be a laboratory contaminant. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs were detected at concentrations above

background and/or naturally occurring levels at eight soil boring locations. The potential COCs included barium, cadmium, copper, lead, mercury, silver, vanadium, and zinc.

The two surface water samples were collocated with the sediment samples. Analytical results are summarized in Tables 2-4 and 2-5. TPH-G was detected at one surface water sample location at 2,500 Ig/L. Inorganic constituents identified as potential COCs were detected at both surface water sample locations. These potential COCs included nickel and zinc, with maximum concentrations of 8 Ig/L and 40 Ig/L, respectively.

Organic analytes found above screening criteria at Site P appear to be associated with minor surface spills of POL at several locations on this site. The TPH-D detected in sediment sample #2 in the southwest portion of the drainage ditch may have been released from the wash rack at Site P. Activities upstream from Site P are suspected to be the source of lead detected in the sediment sample taken from the southeast portion of the drainage ditch. Activities upstream of Site P may also be the source of TPH present in the northwest corner of the site. Based on the distribution of potential COCs in surface water, sediment, and soil samples collected from within the drainage ditches, Site P does not appear to be significantly impacting water or sediment quality.

Summary of Human Health Risks

Site P is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site P may flow to areas accessible to residential populations, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site P included trichloroethene, fluoranthene, chrysene, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene, barium, cadmium, copper, lead, mercury, silver, vanadium, and zinc. The potential COCs in surface water were nickel and zinc. The risk assessment indicates that the potential COCs identified at Site P do not present an unacceptable risk to human health.

2.7.30 Site R: Maintenance Area, Building 2460

Site Description

Site R, Figure 2-36, is located to the west of Site P, on the north side of Lyman Road. Site R is used as a consolidated vehicle storage and maintenance area. The site was used for warehouses during the 1940s. Later, it was used for vehicle storage. Motor Pool No. 2B occupied the site until demolition of the facility in the mid-1960s (HLA, 1993). The present facility was constructed in 1982.

Potential environmental concerns originally identified at Site R (HLA, 1993) were based on information indicating a possible leak from two fuel USTs, possible overflow of POL or solvents from a wash rack oil-water separator to a nearby drainage ditch, and possible releases from past POL and solvent use. In addition, the existing SS/SD lines at Site R were investigated as possible sources of contaminants.

Site Characteristics

SGS samples were collected at 30 locations, soil boring samples were collected from 10 locations, sediment samples were collected from two locations, and surface water samples were collected from three locations. (Figure 2-36).

Thirty-one SGS samples were collected from the 30 sampling locations. Concentrations of TVH and toluene were detected in a number of the SGS samples, ranging from 0.039 ppmv to 2,500 ppmv. The highest concentrations of TVH were found in paved areas near the southwest corner of Building 2460 and to the east of Building 2460, between the building and the grease racks.

Twenty soil boring and two sediment samples were collected at Site R. The samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-2 and 2-3 and on Figure 2-36. TPH-G was not detected in any of the soil boring or sediment samples collected at the site. TPH-D was found at four soil borings, with a maximum concentration of 56 mg/kg. 2-Butanone was found at two soil borings, with a maximum concentration of 0.024 mg/kg. TCE was found at one soil boring, with a maximum concentration of

0.0041 mg/kg. Bis(2-ethythexyl) phthalate was found at one soil borings, at 0.086 mg/kg. Di-n-butyl phthalate was found at two soil borings, with a maximum concentration of 0.1 mg/kg. Organic constituents selected as potential COCs are listed in the human health risk summary below.

Barium, cadmium, copper, lead, mercury, silver, and vanadium were the inorganic potential COCs identified in the soil boring and sediment samples collected at Site R. Concentrations of barium greater than background levels were found at eight soil borings and in one sediment sample. A concentration of cadmium greater than background was found at one soil boring. Concentrations of copper greater than background were found at one soil boring. Concentrations of lead greater than background were found at one soil boring. A concentration of mercury greater than background was found at one soil boring. Concentrations of silver greater than background were found at one soil boring. A concentration of vanadium greater than background was found at one soil boring.

The three surface water samples were analyzed for TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. The analytical results are summarized in Tables 2-4 and 2-5 and on Figure 2-36. TPH-G, TPH-D, VOCs, and SVOCs were not detected in the surface water samples collected at the site. Zinc was the inorganic potential COC identified in the surface water samples collected at Site R. Concentrations of zinc were found in each of the surface water samples.

Organic constituents found in soil borings at Site R appear to be limited to the area around the grease rack, near Building 2460, and in the drainage ditch downstream from the hazardous materials storage point (HMSP). Zinc concentrations in two surface water samples exceeded the HDOH acute water quality standard for freshwater. Other potential inorganic COCs found in soil boring and sediment samples appear to be naturally occurring.

Based on the distribution and concentrations of organic constituents and inorganic potential COCs in surface water, sediment, and soil boring samples collected from within the drainage ditches, Site R does not appear to be significantly impacting water or sediment quality.

Summary of Human Health Risks

Site R is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site R may flow to areas accessible to residential populations, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site R included acetone, 2-butanone, trichloroethene, di-n-butyl phthalate, bis(2-ethylhexyl)phthalate, barium, cadmium, copper, lead, mercury, silver, and vanadium. The only COC in surface water was zinc. The risk assessment indicates that the potential COCs identified at Site R do not present an unacceptable risk to human health.

2.7.31 Site S: Maintenance Area, Building 2480

Site Description

Site S, Figure 2-37, is located to the west of Site R, on the north side of Lyman Road. Site S is used as a vehicle maintenance area. The site was open space until the early-1950s (HLA, 1993). By the mid-1950s, the site had become a vehicle storage yard. This motor pool was renovated between 1966 and 1969 to provide for its current use. The main drainage ditch that runs along the north side of Lyman Road runs along the south side of Site S.

Potential environmental concerns originally identified at Site S (HLA, 1993) were based on information indicating possible leaks from two former waste-oil tanks as well as the four current waste-oil and fuel USTs. Further, the potential for fuel spills near the fill points for two fuel USTs; possible overflow of POL or solvents from a wash rack oil water separator to the nearby drainage ditch; discoloration near two grease racks, which was visible in a 1978 aerial photograph; and discoloration in the northwest corner of the site, which was visible in a 1985 aerial photograph, led to further remedial investigation of Site S. The existing SS/SD lines at Site S were also identified as possible sources of contaminants.

Site Characteristics

At Site S, SGS samples were collected at 32 locations, soil boring samples were collected from 11 locations, sediment samples were collected from three locations, and surface water samples were collected from two locations (Figure 2-37).

Thirty-seven SGS samples were collected from the 32 locations. PCE was detected at two sampling locations at concentrations ranging from 0.026 to 0.029 ppmv. TVH and/or BTEX were detected at 25 locations at concentrations ranging from 0.03 to 1,200 ppmv. The highest concentrations of TVH were found in the west central portion of the site and were not related to any of the suspected contaminant sources at this site.

Twenty-six soil boring and three sediment samples were collected at the site. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-37. TPH-G was detected at two locations, with a maximum concentration of 3,945 mg/kg. TPH-D was detected at seven locations, with a maximum concentration of 1,800 mg/kg. Acetone was detected at three locations, with a maximum concentration of 0.23 mg/kg. 2-Butanone and 2-Hexanone were each detected at one location, with maximum concentrations of 0.026 mg/kg and 0.0078 mg/kg, respectively. Ethyl benzene was detected at two locations, with a maximum concentration of 0.0044 mg/kg. Methylene chloride was reported at three soil boring locations. However, the methylene chloride in these samples is considered to be a laboratory contaminant. 4-Methyl-2-pentanone and Naphthalene were each detected at two locations, with maximum concentrations 0.018 mg/kg and 13 mg/kg, respectively. Toluene and total xylenes were each detected at three locations, with maximum concentrations of 17.5 mg/kg and 21.4 mg/kg, respectively. TCE was detected at two locations, with a maximum concentration of 0.009 mg/kg. Di-n-octyl phthalate was reported for one of the sediment sample locations, at 0.252 mg/kg, and bis(2-ethylhexyl) phthalate and di-n-butyl phthalate were reported at both sediment locations, at concentrations of up to 0.411 mg/kg. However, the reported concentrations of these phthalate species are considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs included barium, chromium, copper, lead, thallium, and zinc. Concentrations of one or more inorganic potential COCs were greater than background and/or naturally occurring levels at five soil boring locations and two sediment sample locations.

Three surface water samples were collected at the site. Analysis results are summarized in Tables 2-4 and 2-5. No organic constituents were detected in the surface water samples collected at Site S. Cyanide and zinc were the inorganic potential COCs identified in the surface water samples.

Petroleum hydrocarbons at Site S appear to be limited to the west-central portion of the site (southwest of Building 2480); the source of these hydrocarbons is not known. Surface spills of fuels, POLs, and solvents; flow from the wash rack to the drainage ditch near the southeast corner of the site; and runoff from precipitation and/or wash water appear to be the sources of the organic constituents detected in the soil boring and sediment samples collected from the drainage ditches on the south side of the site. The sites upstream of Site S may also have contributed to the levels of lead and zinc found in the drainage ditch on the south side of the site.

Summary of Human Health Risks

Site S is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. Because surface water run-off from Site S may flow to areas accessible to residential populations, risk was also assessed for residential exposure to potential COCs in surface water. The potential COCs in soil at Site S included acetone, 2-butanone, trichloroethene, 2-hexanone, toluene, ethyl benzene, 4-methyl-2-pentanone, total xylenes, naphthalene, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, barium, chromium, copper, lead, mercury, thallium, and zinc. The potential COCs in surface water were cyanide and zinc. The risk assessment indicates that the potential COCs identified at Site S do not present an unacceptable risk to human health.

2.7.32 Site U: Maintenance Area, Building 2600

Site Description

Site U, Figure 2-38, is located immediately to the north of Sites O and P, near the intersection of Foote Avenue and Road A. Site U is used as a vehicle maintenance and storage area. The site was used primarily as a vehicle storage area between 1953 and 1969 (HLA, 1993). Before 1953, warehouses and related structures occupied the site. The south side, west side, and most of the north side of the site are bordered by unlined drainage ditches. The drainage ditch that runs along the south side of the site lies between Site U and Sites O and P.

Several potential environmental concerns were identified at Site U, and further remedial investigation was recommended for these locations. The concerns included possible leaks from the four current waste-oil and fuel USTs; possible overflow of POL or solvents from the wash rack oil-water separator to the nearby drainage ditch, possible releases from past POL and solvent use, particularly near the hazardous waste storage area in the northwest corner of the site; and soil discoloration in the area surrounding the storm drain inlet near the center of the site (based on aerial photographs taken in 1978) (HLA, 1993). These locations were investigated in addition to the existing SS/SD lines at Site U.

Site Characteristics

At Site U, SGS samples were collected at 39 locations, soil boring samples were collected from 13 locations, and sediment samples were collected from three locations (Figure 2-38).

Forty-two SGS samples were collected from the 39 locations. PCE was detected at one sampling location at 0.031 ppmv. TVH and/or BTEX were detected at 22 locations at concentrations ranging from 0.003 to 24 ppmv. The highest concentrations of TVH were found near the fueling facility at the east end of the site and the wash rack in the southwest corner of the site.

Twenty-nine soil boring and three sediment samples were collected at the site. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-38. TPH-G was not detected in the soil boring or sediment samples. TPH-D was detected at one soil boring location and at one sediment sample location, with a maximum concentration of 141 mg/kg. Methylene chloride was reported at five soil boring locations, but the methylene chloride in these samples is considered to be a laboratory contaminant. Bis(2-ethylhexyl) phthalate was reported for two sediment samples, and di-n-butyl phthalate was reported for one soil boring location and all three sediment locations, but the reported concentrations of these phthalate species are considered to be laboratory contaminants. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs included barium, cobalt, lead, thallium, and zinc. Concentrations of one or more inorganic potential COCs were greater than background and/or naturally occurring levels at four soil boring locations and two sediment sample locations.

Petroleum hydrocarbons at Site U appear to be limited to TPH-D in the area near the wash rack and in the drainage ditches that border the site. Surface spills are suspected to be the source of the low concentrations of TPH-D found in the shallow soil samples collected in both areas. Sites upstream from Site U are suspected to be the source of the lead and TPH-D in the sediment sample collected from the northwest portion of the drainage ditch.

Summary of Human Health Risks

Site U is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site U included bis(2-ethylhexyl)phthalate barium, cobalt, lead, thallium, and zinc. The risk assessment indicates that the potential COCs identified at Site U do not present an unacceptable risk to human health.

2.7.33 Site V: Maintenance Area, Building 2620

Site Description

Site V, Figure 2-39, is located immediately west of Site U. Site V has been used since 1991 as a vehicle storage area. The site's existing structures were constructed in 1975 and are situated in the southern end of the site (HLA, 1993). Although vehicle maintenance operations are not currently performed at Site V, the presence of a grease rack indicates that such

operations may have been performed there in the past.

Several potential environmental concerns were identified at Site V (HLA, 1993), and further remedial investigation was recommended for these locations. The concerns included a possible release at the storage point in the south central portion of the site, as suggested by distressed vegetation that was observed during the PA site visit, and areas of staining observed under the grease rack in aerial photographs from 1978 and 1985. These locations were investigated in addition to the existing SS/SD lines at Site V.

Site Characteristics

At Site V, SGS samples were collected at 12 locations, and soil boring samples were collected from 3 locations (Figure 2-39).

Fourteen SGS samples were collected from the 12 locations. TVH and/or BTEX were detected at five locations at concentrations ranging from 0.038 to 2.8 ppmv.

Seven soil boring samples were collected at the site. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are summarized in Tables 2-2 and 2-3 and in Figure 2-39. Methylene chloride was reported in a field duplicate sample, but the methylene chloride in this sample is considered to be a laboratory contaminant. No other organic constituents were detected in the soil boring samples collected at Site V. Inorganic constituents identified as potential COCs included antimony, cadmium, chromium, and copper. Concentrations of the four inorganic potential COCs were greater than background and/or naturally occurring levels at one soil boring location.

Based on the data from the field investigation, soils at the site have not been significantly impacted by U.S. Army activities.

Summary of Human Health Risks

Site V is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site V included antimony, cadmium, chromium, and copper. The risk assessment indicates that the potential COCs identified at Site V do not present an unacceptable risk to human health.

2.7.34 Site W: Maintenance Area, Building 2640

Site Description

Site W, Figure 2-40, is located immediately to the west of Site V. Site W is used primarily as a vehicle storage area. The site was occupied by warehouses from before 1941 through the 1950s (HLA, 1993). By 1969, the warehouses had been removed and replaced by vehicle storage areas.

Several potential environmental concerns were identified based primarily on historical uses at Site W (HLA, 1993), and further remedial investigation was recommended for these locations. The concerns included possible contamination near the abandoned fuel dispenser islands, possible overflow of POL or solvents from the wash rack to the nearby drainage ditch, possible releases from past POL and solvent use and storage, and possible releases of POLs and solvents in and around the grease rack. These locations were investigated in addition to the existing SS/SD lines at Site W.

Site Characteristics

At Site W, SGS samples were collected at 37 locations, soil boring samples were collected from 13 locations, and sediment samples were collected from two locations (Figure 2-40).

Forty-one SGS samples were collected from the 37 locations. TVH and/or BTEX were detected at 13 locations at concentrations ranging from 0.024 to 11 ppmv. The highest concentrations of TVH were found near the former fueling facility in the northeast corner of the site.

Twenty-five soil boring and two sediment samples were collected at the site. Chemical analyses of samples included TPH-G, TPH-D, VOCs, SVOCs, and metals and cyanide. Analytical results are

summarized in Tables 2-2 and 2-3 and in Figure 2-40. TPH-G was detected at one soil boring location at 14 mg/kg and in one sediment sample at 30 mg/kg. TPH-D was detected at five soil boring locations and at one sediment sample location, with a maximum concentration of 410 mg/kg. Acetone was reported at two sampling locations, with a maximum concentration of 0.044 mg/kg. Methylene chloride was reported at three soil boring locations, but the methylene chloride in these samples is considered to be a laboratory contaminant. Bis(2-ethylhexyl) phthalate was reported for one soil boring location, and di-n-butyl phthalate was reported for two soil boring locations and both sediment locations, but the reported concentrations of these phthalate species are considered to be laboratory contaminants. The polynuclear aromatic hydrocarbon (PAH) compounds acenapthene, anthracene, fluoranthene, phenanthrene, and pyrene were detected at one sediment sample location at 0.0302 mg/kg, 0.0652 mg/kg, 0.22 mg/kg, 0.221 mg/kg, and 0.374 mg/kg, respectively. Organic constituents selected as potential COCs are listed in the human health risk summary below. Inorganic constituents identified as potential COCs included antimony, barium, lead, mercury, and zinc. Concentrations of one or more inorganic potential COCs were greater than background and/or naturally occurring levels at eight soil boring locations and one sediment sample location.

The grease rack in the southwest corner of the site is the suspected source of the TPH-D, TPH-G, acetone, and lead in the southwest corner of the site, since the rack has no pavement or other method of containment beneath it. The source of the TPH-D in the southeast corner of the site may be the POL storage shed in that area. Surface spills from the wash rack in the southern portion of the site are the suspected sources of the PAHs and lead found in the drainage swale, downstream of the washrack. The TPH-G and TPH-D in the southeast end of the drainage swale may not have originated from Site W, since they were detected in the upstream end of the swale relative to Site W.

Summary of Human Health Risks

Site W is an industrial site, and on-site risk was assessed for industrial populations based on exposure to potential COCs in site soils. The potential COCs at Site W included TPH-D, methylene chloride, acetone, acenaphthene, phenanthrene, anthracene, di-n-butyl phthalate, fluoranthene, pyrene, antimony, barium, lead, mercury, and zinc. The risk assessment indicates that the potential COCs identified at Site W do not present an unacceptable risk to human health.

2.8 Summary of Ecological Risks

An Ecological Risk Assessment was performed to qualitatively evaluate the potential for significant ecological harm from potential constituents of concern identified at the OU 3 sites. This risk assessment is presented in Section 3.37 of the RI.

There are no designated wilderness areas, wildlife refuges, or scenic rivers within the confines of OU 3 at SB. In addition, sensitive and endangered species do not inhabit areas proximal to OU 3, and the extensive development of the OU 3 area has virtually eliminated native flora and fauna.

Within the developed portion of the base, vegetation and animal life consists of introduced species (non-native to Hawaii, such as small terrestrial animals and birds) (U.S. Army, 1993). These types of animals may, therefore, come in contact with potential constituents of concern in OU 3 soils. The results of the qualitative evaluation of risk indicated that it is unlikely that these animals will ingest a sufficient amount of contaminated soil to be adversely affected. Therefore, there is no ecological risk to these animals.

There are no perennial streams located within OU 3 and thus, no sustained freshwater aquatic life. Waikakalaua Stream, which is located approximately one mile from SB, is the first perennial stream located downstream of SB that has the potential to be impacted by surface runoff from OU 3. Based on detected constituent concentrations in surface runoff collected at OU 3 and dilution factors that estimate the downstream concentrations of site runoff after mixing with off-site runoff, concentrations of potential constituents of concern that enter Waikakalaua Stream will meet the Hawaii Department of Health's Standards for freshwater aquatic life. Therefore no ecological risk was determined to exist for runoff from OU 3 sites.

2.9 Selection of No Action Alternative Based on Risk Evaluation

Risk evaluations performed on the RI data for the OU 3 sites indicate that chemicals detected in the surface soil, subsurface soil, and surface water and sediment at the OU 3 sites do not pose a threat to human health and the environment because (1) estimated risks are within ranges considered acceptable by the U.S. EPA; (2) chemical concentrations are representative of background conditions; and/or (3) a route of exposure does not exist. Therefore, no remedial actions at the OU 3 sites are necessary to protect human health and the environment.

2.10 Documentation of Significant Changes

As described in the Responsive Summary (Section 3-0), the Proposed Plan was released for public comment on April 11, 1996 and a public meeting was held on May 1, 1996. This proposed Plan identified "no action" as the selected response action for the OU 3 sites investigated. Comments were collected over the 30-day public review period between April 11 and May 11, 1996.

3. RESPONSIVENESS SUMMARY

3.1 Overview

This section will provide a summary of the public comments and concerns regarding the Proposed Plan at SB, Island of Oahu, Hawaii. At this time, the U.S. Army has selected the "no remedial action" preferred alternative for the OU 3 sites.

3.2 Background on Community Involvement

The U.S. Army has implemented a progressive public relations and involvement program for environmental activities at SB. A Technical Review Committee, comprised of representatives from the U.S. Army, the U.S. EPA, the State of Hawaii Department of Health, U&A, and members of the general public, has been established and meets periodically to involve the public in decisions regarding investigation results, proposed work, and potential remedial options. The U.S. Army has also presented RI plans and results at public meetings conducted on February 25,1993, and on September 13 and 14, 1994. Prior to each of these public meetings, the U.S. Army distributed over 50 copies of a fact sheet to interested parties and to the information repositories (Section 2.4). These fact sheets described the installation restoration program at SB, and included a discussion of how the public could get more information and get involved in the program. A synopsis of community relations activities conducted by the U.S. Army is presented in Appendix A.

The U.S. Army held a public comment period on the OU 3 no action preferred alternative from April 11 through May 11, 1996. Copies of the Proposed Plan were placed in the above discussed repositories (Section 2.4) and were mailed to the public for review and comment. The Proposed Plan also invited readers to a public meeting to voice their concerns. This public meeting was held to discuss the selected "no remedial action" preferred alternative. The meeting was held on May 1, 1996, at 7:00 p.m., in the Hale Koa at Wahiawa District Park, Wahiawa, Hawaii. Comments received during the public comment period are addressed below.

3.3 Summary of Comments Received During Public Comment

Period and Department of the U.S. Army Responses

No written comments were received from the public regarding the OU 3 Proposed Plan.

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5. ABBREVIATIONS / ACRONYMS

U.S. Army	U.S. Department of U.S. Army
BTEX	benzene, toluene, ethyl benzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
COC	constituent of concern
CPF	cancer potency factor, (mg/[kg body mass]/day) -1.
DCA	dichloroethane
DDE	2,2-bis(p-chlorophenyl)-1,1-dichloroethene
DDT	2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane
DERP	Defense Environment Restoration Program
DOD	Department of Defense
DPW	Directorate of Public Works (SB)
EPA	Environmental Protection Agency
EPIC	Environmental Photographic Interpretation Center
FFA	Federal Facilities Agreement
FS	Feasibility Study
FSSAP	Field Screening Sampling and Analysis Plan
HDOH	State of Hawaii, Department of Health
HI	Hazard Index
HMSP	hazardous materials storage point
HQ	Hazard Quotient
IMS	IMS Engineers-Architects, P.C.
IRP	Installation Restoration Program
MCL	maximum contaminant level
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyls
PCE	tetrachloroethylene/tetrachloroethene
POL	Petroleum, Oil, and Lubricants
ppmv	parts per million by volume
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Acts
SB	Schofield Barracks
SGS	Soil-Gas Survey
SI	Site Investigation
SS/SD	sewer system /storm drain
SSP	satellite storage point
SVOC	semi-volatile organic compound
TCA	(1,1,1-; 1,1,2-) trichloroethane
TCE	trichloroethylene/trichloroethene
TEG	Transglobal Environmental Geochemistry
TEG-H	Transglobal Environmental Geochemistry, Hawaii
TEPS	Total Environmental Program Support
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons, as diesel
TPH-G	total petroleum hydrocarbons, as gasoline
TPH-O	total petroleum hydrocarbons, as oil
TVH	total volatile hydrocarbons
U&A	Uribe and Associates
USAEC	United States U.S. Army Environmental Center
U.S. EPA	U.S. Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound

APPENDIX A

Appendix A: Synopsis of Community Relations Activities

May 1985 - Schofield Barracks issued a press release regarding the detection of Trichloroethylene (TCE) in the Schofield Barracks Supply wells and the temporary switch to city an county water supplies.

August 1990 - Schofield Barracks issued a press release regarding the placement of installation on the National Priorities List (NPL).

October 1990 - Schofield Barracks Public Affairs Office and Environmental Office addressed the Wahiawa Neighborhood Board regarding Army plans to conduct investigations on Schofield Barracks to identify sources of TCE.

January 1992 - Schofield Barracks and U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) submitted press releases requesting public involvement in locating the source(s) of TCE contamination in and around Schofield Barracks.

January 1992 - Schofield Barracks and USATHAMA conducted interviews with twenty local residents to assist in the development of a Community Relations Plan for the Schofield Barracks Installation Restoration Program (IRP).

June 1992 - The Army finalized the Community Relations Plan for Schofield Barracks and placed copies in the newly established information repositories located in the Mililani Public Library, the Wahiawa Public Library, the Hawaii Department of Health, and the Directorate of Public Works in Building 300 of Wheeler Army Airfield.

February 25, 1993 - Schofield Barracks and the Army Environmental Center (AEC) conducted a public meeting at the Hale Koa at Wahiawa District Park in Wahiawa to provide the public with an update on the IRP and the results of the first phase of the investigations.

February 1993 - In conjunction with the public meeting, the Army published and distributed a fact sheet that provided an update on the IRP and initial investigative results.

September 13 and 14, 1994 - Schofield Barracks and the AEC conducted public availability sessions at the Hale Koa at Wahiawa District Park (September 13) and at the Schofield Barracks Post Library (September 14) to provide an update on the IRP.

September 13 and 14, 1994 - In conjunction with the public availability sessions, the Army solicited interest in the formation of a Restoration Advisory Board (RAB) comprised of local citizen representatives, Army representatives, and regulatory agency representatives that would oversee the conduct of the Army's IRP at Schofield Barracks.

September 12 through 14, 1994 - The Army presented a poster display that summarized installation restoration efforts and plans for the Schofield Barracks at the 1st Hawaii National Technologies Conference sponsored by the Hawaii Department of Health.

September 1994 - In conjunction with the public availability session, the Army published and distributed a fact sheet that provided an update on the IRP and initial investigative results.

April 11 to May 11, 1996 - Schofield Barracks conducted a public review period for the Proposed Plan for Operable Unit 3.

May 1, 1996 - Schofield Barracks and the AEC conducted a public meeting to present the Operable Unit 3 Proposed Plan and solicit public comments.

FIGURES

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TABLES

Table 2-1
Summary of Concentration Ranges
for Pesticides in Soil/Sediment-1995, Site 21
Schofield Barracks, Operable Unit 3

Analyte	Range of Concentrations 1 (mg/kg)
alpha-benzene hexachloride	0.000943 - < 0.002
alpha-chlordane	< 0.002 - 0.21
endosulfan I	< 0.002
aldrin	0.000501 - 0.00644
beta-benzene hexachloride	0.000427 - < 0.002 2
endosulfan II	0.000694 - < 0.002
delta-benzene hexachloride	< 0.002
dieldrin	0.000405 - 0.47
endrin	< 0.002
endrin aldehyde	0.000802 - 0.0245
endosulfan sulfate	0.00122 - 0.00446
gamma-chlordane	< 0.002 - 0.24
heptachlor	0.00112 - 0.00319
heptachlor epoxide	0.00112 - 0.0222
lindane	0.000617 - 0.00801
methoxychlor	0.00561 - < 0.02
aroclor 1016	< 0.02
aroclor 1221	< 0.02
aroclor 1232	< 0.02
aroclor 1242	< 0.02
aroclor 1248	< 0.02
aroclor 1254	< 0.02
aroclor 1260	< 0.02
rhothane	0.000483 - 0.38
2,2-bis(p-chlorophenyl)-1,1-dichloroethene	0.000793 - 0.58
2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane	0.00141 - 0.69
toxaphene	< 0.1

Notes

mg/kg is an abbreviation for milligrams per kilogram

1 Range of analyte concentrations reported for samples from lowest reported concentration or method detection limit to highest reported concentration or method detection limit. Where no concentration was reported, only the highest method detection limit is listed.

2 Range includes concentrations reported by the laboratory that were less than the method detection limit.

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 26	Site 35	Site 46	Site 57
Total Petroleum Hydrocarbons				
Gasoline	<20	<1 - 261	<1 - 57	15 - <20
Diesel	<10 - 1780	<10 - 1450	<10 - 162	<20
Volatile Organic Compounds				
Methylene chloride	0.00078 - <0.01 2	0.00072 - <0.01 2	0.0015 - <0.01 2	nr
Acetone	0.017 - 0.048	0.018-0.5	<0.01	nr
Carbon disulfide	<0.01	0.0028 - <0.01 2	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01	<0.01 - 0.093	<0.01	nr
Trichloroethene	<0.01	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	<0.01	<0.01	<0.01	nr
Tetrachloroethene	<0.01	0.00094 - <0.01 2	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	0.0011 - <0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01	<0.01	<0.01	nr
Total Xylenes	0.0017 - 0.01	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.33	<0.66	<0.33
Isophorone	<0.33	<0.33	<0.66	<0.33
Naphthalene	<0.66	<0.66	<0.66	<0.33
2-Methylnaphthalene	<0.33	<0.33	<0.66	<0.33
Dimethyl phthalate	<0.33	<0.33	<0.66	<0.33
Acenaphthene	<0.66	<0.66	<0.66	<0.33
Dibenzofuran	<0.33	<0.33	<0.66	<0.33
Fluorene	<0.33	<0.33	<0.66	<0.33
Diethyl phthalate	<0.33	<0.33	0.00234 - <0.66 2	<0.33
Phenanthrene	<0.33	0.106 - <0.33	0.159 - 3	<0.33
Anthracene	<0.33	0.111 - <0.33	0.165 - <0.66 2	<0.33
Di-n-butyl phthalate	0.0316 - <0.33	<0.33	0.00504 - <0.66 2	<0.33
Fluoranthene	<0.66	<0.33	0.186-3	<0.33
Pyrene	<0.33	<0.33	0.253-4	<0.33
Butyl benzyl phthalate	<0.33	<0.33	<0.66	<0.33
Chrysene	<0.33	<0.33	<0.33 - 2	<0.33
Benzo(a)anthracene	<0.33	<0.33	<0.33 - 2	<0.33
bis (2-Ethylhexyl)phthalate	<0.33 - 0.503	<0.33	<0.33 - 1	<0.33
Di-n-octyl phthalate	<0.33	<0.33	<0.66	<0.33
Benzo(k)fluoranthene	<0.33	<0.33	<0.33 - 1	<0.33
Benzo(a)pyrene	<0.66	<0.33	<0.33 - 1	<0.33
Benzo(g,h,i)perylene	<0.33	<0.33	<0.33 - 0.8	<0.33

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 59	Site 61	Site 63	Site 64B
Total Petroleum Hydrocarbons				
Gasoline	<20	<20	<20	<20
Diesel	<20	<20	11 - <20	<20 - 512
Volatile Organic Compounds				
Methylene chloride	0.0018	nr	nr	nr
Acetone	<0.02	nr	nr	nr
Carbon disulfide	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01	nr	nr	nr
Trichloroethene	<0.01	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	<0.01	nr	nr	nr
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01 - 0.024
Ethyl benzene	<0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01	nr	nr	nr
Total Xylenes	<0.01	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.33	<0.33	<0.33
Isophorone	<0.33	<0.33	<0.33	<0.33
Naphthalene	<0.33	<0.33	<0.33	<0.33
2-Methylnaphthalene	<0.33	<0.33	<0.33	<0.33
Dimethyl phthalate	<0.33	<0.33	<0.33	<0.33
Acenaphthene	<0.33	<0.33	<0.33	<0.33
Dibenzofuran	<0.33	<0.33	<0.33	<0.33
Fluorene	<0.33	<0.33	<0.33	<0.33
Diethyl phthalate	<0.33	<0.33	<0.33	<0.33
Phenanthrene	<0.33	<0.33	<0.33	<0.33
Anthracene	<0.33	<0.33	<0.33	<0.33
Di-n-butyl phthalate	<0.33	0.014 - <0.33	<0.33	0.00652 - <0.33
Fluoranthene	<0.33	<0.33	<0.33	<0.33
Pyrene	<0.33	<0.33	<0.33	<0.33
Butyl benzyl phthalate	<0.33	<0.33	<0.33	<0.33
Chrysene	<0.33	<0.33	<0.33	<0.33
Benzo(a)anthracene	<0.33	<0.33	<0.33	<0.33
bis(2-Ethylhexyl)phthalate	<0.33	<0.33	<0.33	<0.33
Di-n-octyl phthalate	<0.33	<0.33	<0.33	<0.33
Benzo(k)fluoranthene	<0.33	<0.33	<0.33	<0.33
Benzo(a)pyrene	<0.33	<0.33	<0.33	<0.33
Benzo(g,h,i)perylene	<0.33	<0.33	<0.33	<0.33

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 72B	Site 73	Site 80	Site 81B
Total Petroleum Hydrocarbons				
Gasoline	<20 - 132	<20	<20	<20
Diesel	10-253	<20	<20	<20
Volatile Organic Compounds				
Methylene chloride	0.0017 - 0.18	<0.01	0.0016 - 0.0018	<0.01
Acetone	<0.02	<0.02	<0.02	<0.02
Carbon disulfide	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01	<0.01	<0.01	<0.01
Trichloroethene	0.00096 - 0.2	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	0.00064 - <0.01 2	<0.01	<0.01	<0.01
2-Hexanone	<0.01	<0.01	<0.01	<0.01
Tetrachloroethene	0.00049 - <0.01 2	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	0.0012-5.9	<0.01	<0.01	<0.01
Toluene	0.00045 - <0.01	<0.01	<0.01	<0.01
Ethyl benzene	<0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01	<0.01	<0.01	<0.01
Total Xylenes	0.001 - <0.01 2	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.33	<0.33	<0.66
Isophorone	<0.33	<0.33	<0.33	<0.66
Naphthalene	<0.33	<0.33	<0.33	<0.66
2-Methylnaphthalene	<0.33	<0.33	<0.33	<0.66
Dimethyl phthalate	<0.33	<0.33	<0.33	<0.66
Acenaphthene	<0.33	<0.33	<0.33	<0.66
Dibenzofuran	<0.33	<0.33	<0.33	<0.66
Fluorene	<0.33	<0.33	<0.33	<0.66
Diethyl phthalate	<0.33	<0.33	<0.33	<0.66
Phenanthrene	<0.33	<0.33	<0.33	<0.66
Anthracene	<0.33	<0.33	<0.33	<0.66
Di-n-butyl phthalate	0.0114 - <0.33 2	<0.33	<0.33	<0.66
Fluoranthene	<0.33	<0.33	<0.33	<0.66
Pyrene	<0.33	<0.33	<0.33	<0.66
Butyl benzyl phthalate	<0.33	<0.33	<0.33	<0.66
Chrysene	<0.33	<0.33	<0.33	<0.66
Benzo(a)anthracene	<0.33	<0.33	<0.33	<0.66
bis(2-Ethylhexyl)phthalate	0.0296 - <033	<0.33	<0.33	0.0158 - <0.66
Di-n-octyl phthalate	<0.33	<0.33	<0.33	<0.66
Benzo(k)fluoranthene	<0.33	<0.33	<0.33	<0.66
Benzo(a)pyrene	<0.33	<0.33	<0.33	<0.66
Benzo(g,h,i)perylene	<0.33	<0.33	<0.33	<0.66

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 83	Site 88	Site 90	Site 93
Total Petroleum Hydrocarbons				
Gasoline	<20	<20	<20	<20
Diesel	<20	<20	<20	<20
Volatile Organic Compounds				
Methylene chloride	nr	0.0017 - 0.0022	<0.01	<0.01
Acetone	nr	<0.02	<0.02	<0.02
Carbon disulfide	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	nr	<0.01	<0.01	<0.01
Trichloroethene	<0.01	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	nr	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	<0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	nr	<0.01	<0.01	<0.01
Total Xylenes	<0.01	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.66	<0.66	<0.33
Isophorone	<0.33	<0.66	<0.66	<0.33
Naphthalene	<0.33	<0.66	<0.66	<0.33
2-Methylnaphthalene	<0.33	<0.66	<0.66	<0.33
Dimethyl phthalate	<0.33	<0.66	<0.66	<0.33
Acenaphthene	<0.33	<0.66	<0.66	<0.33
Dibenzofuran	<0.33	<0.66	<0.66	<0.33
Fluorene	<0.33	<0.66	<0.66	<0.33
Diethyl phthalate	<0.33	0.00246 - <0.66	<0.66	<0.33
Phenanthrene	<0.33	<0.66	<0.66	<0.33
Anthracene	<0.33	<0.66	<0.66	<0.33
Di-n-butyl phthalate	<0.33	0.00554 - <0.66 2	<0.66	<0.33
Fluoranthene	<0.33	<0.66	<0.66	<0.33
Pyrene	<0.33	<0.66	<0.66	<0.33
Butyl benzyl phthalate	<0.33	<0.66	<0.66	<0.33
Chrysene	<0.33	<0.66	<0.66	<0.33
Benzo(a)anthracene	<0.33	<0.66	<0.66	<0.33
bis(2- Ethylhexyl)phthalate	<0.33	<0.66	<0.66	<0.33
Di-n-octyl phthalate	<0.33	<0.66	<0.66	<0.33
Benzo(k)fluoranthene	<0.33	<0.66	<0.66	<0.33
Benzo(a)pyrene	<0.33	<0.66	<0.66	<0.33
Benzo(g,h,i)peryene	<0.33	<0.66	<0.66	<0.33

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site B	Site C	Site D	Site E
Total Petroleum Hydrocarbons				
Gasoline	<20 - 93	<20	<20	<1 - 7200
Diesel	15 - 121	<10 - 291	<10 - 3750	<10 - 19000
Volatile Organic Compounds				
Methylene chloride	nr	0.00082 - <0.01 2	0.00068 - <0.01 2	0.0017 - 0.0018
Acetone	nr	<0.02	<0.02 - 0.024	<0.02 - 8.9
Carbon disulfide	<0.01	<0.01	0.0007 - <0.01	0.0032 - <0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01 - 2
2-Butanone	nr	<0.01	<0.01	<0.01 - 0.016
Trichloroethene	<0.01	0.00096 - <0.01	<0.01	<0.01 - 20
Benzene	<0.01	<0.01	<0.01	<0.01 - 100
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	nr	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	0.00062 - <0.01	0.00069 - <0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01 - 2000
Ethyl benzene	<0.01	<0.01	<0.01	<0.01 - 700
4-Methyl-2-pentanone	nr	<0.01	<0.01	<0.01
Total Xylenes	<0.01	<0.01	<0.01	<0.01 - 8000
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.66	<0.33	<0.66
Isophorone	<0.33	<0.66	<0.33	0.0136 - <0.66 2
Naphthalene	<0.33	<0.66	<0.66	<0.33 - 80
2-Methylnaphthalene	<0.33	<0.66	<0.33	<0-33 - 60
Dimethyl phthalate	<0.33	<0.66	<0.33	<0.66
Acenaphthene	<0.33	<0.66	<0.66	<0.66
Dibenzofuran	<0.33	<0.66	<0.33	0.05 - <0.66
Fluorene	<0.33	<0.66	<0.33	<0.33 - 0.72
Diethyl phthalate	0.06 - <0.33 2	<0.66	<0.33	0.00102 - <0.66
Phenanthrene	<0.33	<0.66	<0.33	<0.33 - 1.4
Anthracene	0.0917 - <0.33	<0.66	<0.33	0.16 - <0.66 2
Di-n-butyl phthalate	0.0131 - <0.33	0.072 - <0.33 2	0.0162 - <0.33	0.00848 - <0.66 2
Fluoranthene	<0.33	<0.66	0.1 - <0.66	0.119 - <0.66 2
Pyrene	<0.33	<0.66	<0.33	0.0794 - <0.66 2
Butyl benzyl phthalate	0.00158 - <0.33 2	<0.66	<0.33	0.026 - <0.66 2
Chrysene	<0.33	<0.66	0.1 - <0.33	0.026 - <0.66 2
Benzo(a)anthracene	<0.33	<0.66	<0.33	0.026 - <0.66 2
bis(2-Ethylhexyl)phthalate	0.0241 - 0.774	<0.33 - 4.16	0.0166 - 8	<0.33 - 1.1
Di-n-octyl phthalate	<0.33	<0.33 - 1.38	<0.33 - 2	<0.66
Benzo(k)fluoranthene	<0.33	<0.66	<0.33	<0.66
Benzo(a)pyrene	<0.33	<0.66	0.086 - <0.66	0.0196 - <0.66 2
Benzo(g,h,i)perylene	<0.33	<0.66	0.3 - <0.33	0.059 - <0.66 2

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site H	Site I	Site J	Site K 3
Total Petroleum Hydrocarbons				
Gasoline	<20	<1 - 73	<1 - 67	<1 - 52
Diesel	<10 - 218	<10 - 74	<10 - 26.6	<10 - 54.8
Volatile Organic Compounds				
Methylene chloride	0.0016 - 0.002	0.0016 - 0.0019	0.0014 - 0.0019	0.00095 - <0.01
Acetone	<0.02 - 0.11	<0.02	<0.02	<0.02 - 0.059
Carbon disulfide	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	0.00081 - <0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01	<0.01	<0.01	0.0081 - <0.01
Trichloroethene	<0.01	<0.01	<0.01	0.00067 - <0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	<0.01	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	<0.01	<0.01	<0.01	<0.01
Ethyl benzene	<0.01	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01	<0.01	<0.01	<0.01
Total Xylenes	<0.01	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.66	0.308 - <0.66	<0.66	<0.66
Isophorone	<0.66	<0.66	<0.66	<0.66
Naphthalene	<0.66	<0.66	<0.66	<0.66
2-Methylnaphthalene	<0.66	<0.66	<0.66	<0.66
Dimethyl phthalate	0.0495 - <0.66	<0.66	<0.66	<0.66
Acenaphthene	<0.66	<0.66	<0.66	<0.66
Dibenzofuran	<0.66	<0.66	<0.66	<0.66
Fluorene	<0.66	<0.66	<0.66	<0.66
Diethyl phthalate	<0.66	0.25 - <0.66 2	0.13 - <0.66 2	0.00252 - <0.66
Phenanthrene	<0.66	<0.66	<0.66	<0.66
Anthracene	<0.66	<0.66	<0.66	<0.66
Di-n-butyl phthalate	0.066 - <0.66	0.066 - <0.66 2	0.072 - <0.66 2	0.058 - <0.66 2
Fluoranthene	<0.66	<0.66	<0.66	<0.66
Pyrene	<0.66	<0.66	<0.66	<0.66
Butyl benzyl phthalate	<0.66	<0.66	<0.66	<0.66
Chrysene	<0.66	<0.66	<0.66	<0.66
Benzo(a)anthracene	<0.66	<0.66	<0.66	<0.66
bis(2-Ethylhexyl)phthalate	<0.33 - 28.4	<0.66	0.0272 - <0.66 2	0.089 - <0.66 2
Di-n-octyl phthalate	<0.66	<0.66	<0.66	<0.66
Benzo(k)fiuoranthene	<0.66	<0.66	<0.66	<0.66
Benzo(a)pyrene	<0.66	<0.66	<0.66	<0.66
Benzo(g,h,i)perylene	<0.66	<0.66	<0.66	<0.66

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site L	Site O	Site P 4	Site R
Total Petroleum Hydrocarbons				
Gasoline	0.376 - <20 2	<1 - 51	<20	<20
Diesel	<10 - 51	<10 - 246	<10 - 197	<10 - 56
Volatile Organic Compounds				
Methyiene chloride	<0.01	<0.01	<0.01	<0.01
Acetone	0.017 - <0.02	<0.02 - 0.2	<0.01	<0.02 - 0.18
Carbon disulfide	<0.01	0.0071 - <0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01	<0.01 - 0.048	<0.01	<0.01 - 0.024
Trichloroethene	<0.01	<0.01	0.0022 - <0.01	0.00071 - <0.01 2
Benzene	<0.01 - 0.014	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	<0.01	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	0.0011 - 0.073	0.00067 - <0.01	<0.01	<0.01
Ethyl benzene	<0.01 - 0.02	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01	<0.01	<0.01	<0.01
Total Xylenes	<0.01 - 0.056	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.33	<0.66	<0.66	<0.66
Isophorone	<0-33	<0.66	<0.66	<0.66
Naphthalene	<0.33	<0.66	<0.66	<0.66
2-Methylnaphthalene	<0.33	<0.66	<0.66	<0.66
Dimethyl phthalate	<0.33	<0.66	<0.66	<0.66
Acenaphthene	<0.33	<0.66	<0.66	<0.66
Dibenzofuran	<0.33	<0.66	<0.66	<0.66
Fluorene	<0.33	<0.66	<0.66	<0.66
Diethyl phthalate	<0.33	<0.66	<0.66	<0.66
Phenanthrene	<0.33	<0.66	<0.66	<0.66
Anthracene	<0.33	<0.66	<0.66	<0.66
Di-n-butyl phthalate	0.0336 - <0.33 2	0.00238 - <0.66 2	0.082 - <0.66 2	0.057 - <0.66
Fluoranthene	<0.33	0.13 - <0.66 2	0.17 - <0.66 2	<0.66
Pyrene	<0.33	<0.66	<0.66	<0.66
Butyl benzyl phthalate	0.0683 - <0.33	<0.66	<0.66	<0.66
Chrysene	<0.33	0.078 - <0.66	0.087 - <0.66	<0.66
Benzo(a)anthracene	<0.33	<0.66	0.002 - <0.66	<0.66
bis(2-Ethylhexyl)phthalate	<0.33	0.2 - 0.7459	0.22 - <0.66 2	0.082 - <0.66 2
Di-n-octyl phthalate	<0.33	<0.66	<0.66	<0.66
Benzo(k)fluoranthene	<0.33	<0.66	<0.66	<0.66
Benzo(a)pyrene	<0.33	0.046 - <0.66	0.014 - <0.66	<0.66
Benzo(g,h,i)perylene	<0.33	<0.66	<0.66	<0.66

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site S	Site U	Site V	Site W
Total Petroleum Hydrocarbons				
Gasoline	<1 - 3945	<20	<20	<1 - 30
Diesel	<10 - 1800	10-141	<20	<10 - 410
Volatile Organic Compounds				
Methylene chloride	0.0007 - <0.01 2	0.0019 - 0.0041	0.0022	0.00093 - <0.01
Acetone	<0.02 - 0.23	<0.02	<0.02	<0.02 - 0.044
Carbon disulfide	<0.01	<0.01	<0.01	<0.01
Chloroform	<0.01	<0.01	<0.01	<0.01
1,2-Dichloroethane	<0.01	<0.01	<0.01	<0.01
2-Butanone	<0.01 - 0.026	<0.01	<0.01	<0.01
Trichloroethene	0.00091 - <0.01 2	<0.01	<0.01	<0.01
Benzene	<0.01	<0.01	<0.01	<0.01
1,1,2-Trichloroethane	<0.01	<0.01	<0.01	<0.01
2-Hexanone	0.0078 - 0.031	<0.01	<0.01	<0.01
Tetrachloroethene	<0.01	<0.01	<0.01	<0.01
1,1,2,2-Tetrachloroethane	<0.01	<0.01	<0.01	<0.01
Toluene	0.00086 - 17.5	<0.01	<0.01	<0.01
Ethyl benzene	0.00078 - <0.01 2	<0.01	<0.01	<0.01
4-Methyl-2-pentanone	<0.01 - 0.018	<0.01	<0.01	<0.01
Total Xylenes	<0.01 - 21.35	<0.01	<0.01	<0.01
Semi-Volatile Organic Compounds				
4-Methylphenol	<0.66	<0.33	--	<0.33
Isophorone	<0.66	<0.33	--	<0.33
Naphthalene	0.13 - <0.66 2	<0.33	--	<0.66
2-Methylnaphthalene	<0.66	<0.33	--	<0.33
Dimethyl phthalate	<0.66	<0.33	--	<0.33
Acenaphthene	<0.66	<0.33	--	0.302 - <0.66
Dibenzofuran	<0.66	<0.33	--	<0.33
Fluorene	<0.66	<0.33	--	<0.33
Diethyl phthalate	<0.66	<0.33	--	<0.33
Phenanthrene	<0.66	<0.33	--	0.211 - <0.33
Anthracene	<0.66	<0.33	--	0.0652 - <0.33
Di-n-butyl phthalate	0.00659 - <0.66 2	0.0187 - <0.33 2	--	0.00174 - <0.33 2
Fluoranthene	<0.66	<0.33	--	0.22 - <0.66
Pyrene	<0.66	<0.33	--	<0.33 - 0.347
Butyl benzyl phthalate	<0.66	<0.33	--	<0.33
Chrysene	<0.66	<0.33	--	<0.33
Benzo(a)anthracene	<0.66	<0.33	--	<0.33
bis(2-Ethylhexyl)phthalate	0.0112 - <0.66 2	0.287 - 0.489	--	0.00577 - <0.33
Di-n-octyl phthalate	0.252 - <0.66 2	<0.33	--	<0.33
Benzo(k)fluoranthene	<0.66	<0.33	–	<0.33
Benzo(a)pyrene	<0.66	<0.33	–	<0.66
Benzo(g,h,i)perylene	<0.66	<0.33	–	<0.33

Table 2-2
Concentration Ranges for Organic Compounds
Detected in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Notes:
<x = Not detected above detection limit x.

-- = Not analyzed for

nr = Not reported

1 - Range of analyte concentrations reported for samples from lowest reported concentration or method detection limit to highest reported concentration or method detection limit. Method detection limits varied by laboratory. Range does not include detection limits that were raised above the laboratory method detection limit due to interference or dilution. Where no concentrations were reported for an analyte, only the highest laboratory method detection limit is indicated.

2 - Range includes concentrations reported by the laboratory that were less than the method detection limit.

3 - Total petroleum hydrocarbons as oil was also analyzed for; the range of concentrations was <10 to 97.4 mg/kg.

4 - Total petroleum hydrocarbons as oil was also analyzed for; the range of reported concentrations was <10 to 20.1 mg/kg.

Table 2-3
Concentration Ranges for Inorganic Potential Constituents of Concern in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 26	Site 35	Site 46	Site 57	Site 59	Site 61	Site 63
Antimony	*	*	*	*	11.8 - <20	*	*
Arsenic	*	1.13 - <23.2	<05 - <23 2	*	<15 - 48.9	*	*
Barium	*	14.4 - 495	6.9 - 272	<3 - 159	<3 - 204	*	*
Beryllium	*	*	*	*	*	*	*
Cadmium	*	<2 - 41.5	<0.6 - 22	*	*	*	*
Chromium	*	93.5 - 650	*	*	*	41.8 - 482	*
Cobalt	*	*	*	<5 - 131	<5 - 93.4	*	*
Copper	*	<8 - 3280	*	<8 - 310	<8 - 160	10.8 - 456	190 - 483
Lead	<10 - 171	<1.08 - 2290	2 - 2000	*	*	*	*
Mercury	*	*	*	*	*	<0.01 - 0.7	<0.01 - 1.1
Nickel	*	*	*	*	*	*	*
Silver	*	0.745 - <15 2	<2 - <15	*	*	*	*
Thallium	*	*	*	*	*	*	*
Vanadium	*	*	*	*	*	*	*
Zinc	*	36.4 - 7280	8.5 - 1070	*	*	*	*

Table 2-3
Concentration Ranges for Inorganic Potential Constituents of Concern in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 64B	Site 72B	Site 73	Site 80	Site 81B	Site 83	Site 88
Antimony	*	*	*	*	*	*	*
Arsenic	*	*	3.37 - <23	*	*	*	*
Barium	*	12 - 573	24.9 - 662	251 - 1160	8.33 - 156	*	11.7 - 57.2
Beryllium	*	*	*	*	*	*	*
Cadmium	*	*	*	*	*	*	*
Chromium	*	*	*	*	<8 - 1330	*	*
Cobalt	*	*	*	*	<5 - 142	*	*
Copper	<8 - 394	*	9.6 - 170	<8 - 1040	<8 - 295	*	<8 - 136
Lead	*	<10 - 223	*	0.707 - 32.3	*	*	*
Mercury	<0.01 - 1.3	*	*	*	*	*	*
Nickel	*	*	*	*	129 - 1100	*	*
Silver	*	*	*	*	*	*	*
Thallium	*	*	*	*	10 - 81.2	*	*
Vanadium	*	*	*	*	*	*	*
Zinc	*	*	*	*	*	*	*

Table 2-3
Concentration Ranges for Inorganic Potential Constituents of Concern in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site 90	Site 93	Site B	Site C	Site D	Site E	Site H
Antimony	*	*	*	2.77 - <20 2	<20 - 58.4	<10 - <20 2	*
Arsenic	*	2.89 - <23	*	*	10 - <23	*	*
Barium	33 - 80.3	16.3 - 79.7	<3 - 268	<3 - 245	6.9 - 400	11.7 - 419	8.72 - 252
Beryllium	*	*	*	*	*	*	*
Cadmium	*	*	<3 - 43.1	0.43 - 40.2	<3 - 73	*	*
Chromium	*	115 - 600	<8 - 874	<8 - 920	132 - 1100	*	*
Cobalt	*	*	<5 - 329	<5 - 380	<5 - 392	<5 - 189	<5 - 432
Copper	<8 - 142	<8 - 150	<8 - 314	43.7 - 371	*	*	*
Lead	*	*	<10 - 415	7.71 - 212	<10 - 382	3.6 - 160	1.81 - 365
Mercury	*	<0.01 - 0.56	<0.01 - 0.75	<0.01 - 1.8	*	*	*
Nickel	*	*	*	*	*	*	*
Silver	*	*	*	*	0.783 - <15	*	*
Thallium	*	*	*	*	9.7 - 70.8	*	*
Vanadium	148 - 450	178 - 580	*	*	*	*	*
Zinc	*	*	26.9 - 957	35.1 - 495	24.5 - 737	*	55.4 - 403

Table 2-3
Concentration Ranges for Inorganic Potential Constituents of Concern in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site I	Site J	Site K	Site L	Site 0	Site P	Site R
Antimony	*	*	*	*	*	*	*
Arsenic	<0.5 - <23 2	0.333 - <23 2	2.49 - <23 2	*	0.684 - <23 2	*	*
Barium	9.92 - 393	35.3 - 138	25.8 - 79.2	17.9 - 155	9.1 - 199	<3 - 115	17.9 - 348
Beryllium	*	*	0.282 - <0.4 2	*	*	*	*
Cadmium	*	0.25 - <3 2	0.75 - <3 2	*	<2 - 8.3	0.58 - <3 2	0.79 - <3 2
Chromium	*	*	*	*	*	*	*
Cobalt	<5 - 167	<5 - 83.1	<5 - 131	*	17.2 - 171	*	*
Copper	<8 - 955	<8 - 403	<8 - 132	<8 - 179	<8 - 178	<8 - 136	<8 - 184
Lead	<2.5 - 220	3.8 - 256	*	*	8.3 - 226	1.01 - 531	<0.5 - 90.3
Mercury	*	*	*	*	<0.01 - 3.26	<0.01 - 0.66	<0.01 - 0.97
Nickel	*	*	*	*	*	*	*
Silver	0.354 - <15 2	0.376 - <15 2	*	*	*	0.731 - <15 2	0.853 - <15 2
Thallium	*	*	*	*	*	*	*
Vanadium	*	*	*	*	*	162 - 470	123 - 520
Zinc	*	*	*	*	*	51.3 - 677	*

Table 2-3
Concentration Ranges for Inorganic Potential Constituents of Concern in Soil/Sediment - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in milligrams per kilogram)

Analyte	Site S	Site U	Site V	Site W
Antimony	*	*	19.6 - <20	*
Arsenic	*	*	*	*
Barium	18.4 - 408	<3 - 426	*	8.9 - 277
Beryllium	*	*	*	*
Cadmium	*	*	1.46 - <3	*
Chromium	38.9 - 515	*	262 - 510	*
Cobalt	*	<5 - 130	*	*
Copper	<8 - 139	*	<8 - 167	*
Lead	1.11 - 164	<10 - 233	*	3.03 - 1040
Mercury	<0.01 - 1.63	*	*	<0.01 - 1.89
Nickel	*	*	*	*
Silver	*	*	*	*
Thallium	8.1 - 68	<23 - 43.7	*	*
Vanadium	*	*	*	*
Zinc	28.8 - 354	26.7 - 1140	*	38 - 728

Notes:
<x = Not detected above detection limit x.

* = This constituent was not identified as a potential constituent of concern for this site.
1 Range of analyte concentrations reported for samples from lowest reported concentration or method detection limit to highest reported concentration or method detection limit. Method detection limits varied by laboratory. Range does not include detection limits that were raised above the laboratory method detection limit due to interference or dilution.
2 Range includes concentrations reported by the laboratory that were less than the method detection limit.

Table 2-4
Concentration Ranges for Organic Compounds
Detected in Surface Water - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in micrograms per liter)

	Total Petroleum Hydrocarbons		Semi-Volatile Organic Compounds
Site ID	Gasoline	Diesel	Di-n-butyl pthalate
26	<2500	700 - <2500	<10
35	--	--	1.13 2
E	<2500	<2500	<10
H	<2500	<2500	<10
K	<2500	<2500	1.03 - <10
0	<2500	<2500	<16
P	<2500 - 2500	<2500	<10
R	<2500	<2500	<10
S	<2500	<2500	<10

Notes

- - indicates that this analysis was not performed on samples collected at this site.

1 Range of analyte concentrations reported for samples from lowest reported concentration or method detection limit to highest reported concentration or method detection limit. Where no concentrations were reported for any of the samples analyzed, only the highest method detection limit is reported.

2 No range provided because only one surface water sample was analyzed for this site.

Table 2-5
Concentration Ranges for Inorganic Potential Constituents of Concern in Surface Water - 1995 1
Schofield Barracks, Operable Unit 3
(Concentrations in micrograms per liter)

Site ID	Chromium	Cobalt	Copper	Cyanide	Lead	Nickel	Zinc
26	100 - 383	<5 - 162	<8 - 334	<50 - 350	<10 - 491	<-5 - 202	32 - 1380
35	*	*	*	350 2	*	*	80 2
E	*	*	*	*	*	*	*
H	*	*	<8 - 20	*	<10 - 215	<5 - 27	<5 - 54
K	*	*	*	250 - 400	*	*	41 - 129
0	*	*	*	*	*	*	*
P	*	*	*	*	*	<5 - 8	15 - 40
R	*	*	*	*	*	*	26 - 52
S	*	*	*	<50 - 150	*	*	5 - 8

Notes:

* indicates that this constituent was not identified as a potential constituent of concern for this site.

1 Range of analyte concentrations reported for samples from lowest reported concentration or method detection limit to highest reported concentration or method detection limit.

2 No range provided because only one surface water sample was analyzed for this site.

Table 2-6
Maximum Values of Calculated Hazard Indices (HI) and Cancer Risk Values
Schofield Barracks, Operable Unit 3

	Maximum HI Values		Maximum Cancer Risks	
Site ID	Off-Base Exposure 1	On-Site Exposure 2	Off-Base Exposure	On-Site Exposure
21	5.75E-07	8.52E-02	3.41E-11	9.06E-06
26	6.77E-10	1.05E-01	1.61E-14	2.39E-08
35	1.35E-06	1.10E-01	3.36E-10	2.03E-05
46	5.77E-07	6.25E-02	2.24E-10	4.57E-05
57	1.21E-05	4.85E-01	0 3	0
59	1.30E-05	2.91E-01	2.79E-09	1.56E-05
61	8.07E-07	2.86E-02	1.10E-08	1.28E-05
63	5.08E-07	1.13E-02	0	0
64B	5.56E-07	3.37E-02	0	0
72B	4.72E-08	2.56E-03	4.39E-15	4.30E-07
73	1.36E-06	5.84E-02	6.56E-10	8.20E-06
74	No constituents of concern identified at site.		No constituents of concern identified at site.	
80	2.90E-07	1.45E-01	0	0
81B	2.93E-05	7.05E-01	3.39E-08	5.42E-05
83	No constituents of concern identified at site.		No constituents of concern identified at site.	
88	5.21E-08	2.26E-03	0	0
90	7.05E-07	3.42E-01	0	0
93	1.76E-06	6.45E-01	1.39E-08	4.82E-06
B	1.55E-05	4.54E-01	2.68E-10	1.68E-05
C	3.89E-05	5.06E-01	2.20E-08	2.30E-05
D	1.39E-05	9.OOE.01	4.43E-10	4.28E-05
E	1.01E-05	4.09E-01	1.19E-15	6.19E-06
H	1.27E-05	3.55E-01	9.08E-13	3.68E-07
I	5.73E-06	2.49E-01	0	6.89E-06
J	3.73E-06	1.76E-01	2.95E-11	5.82E-06
K	8.04E-08	2.15E-01	3.60E-11	9.75E-06
L	1.06E-10	2.52E-03	8.83E-16	6.88E-10
0	4.81E-07	3.34E-01	7.75E-11	1.67E-05
P	5.05E-07	2.83E-02	5.58E-11	9.66E-06
R	8.76E-08	3.06E-02	1.05E-14	1.28E-08
S	5.18E-07	3.60E-01	1.31E-14	1.13E-05
U	2.89E-08	3.70E-01	1.56E-14	2.32E-08
V	1.87E-06	9.16E-02	1.17E-08	2.72E-05
W	1.04E-06	4.31E-02	1.10E-19	1.27E-10

Notes

1 Off-base exposure was calculated for populations living outside of Schofield Barracks.

2 On-site exposure was calculated for populations living or working at an individual site in OU 3.

3 A cancer risk of "0" indicates that carcinogenic constituents of concern were not present at the site.