# PRELIMINARY CLOSE OUT REPORT
# FOR THE
# DEFENSE DISTRIBUTION DEPOT SAN JOAQUIN CALIFORNIA
# TRACY SITE
# TRACY, CALFORNIA

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September 26, 2012

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**Figure 7.** Dieldrin Reported in the Upper Hydrologic Zone, 2011

**ATTACHMENT B**

**Table 1.** No Further Action Sites at Tracy

## LIST OF ACRONYMS

| | |
|---|---|
| ACL | Aquifer cleanup level |
| BERA | Baseline Ecological Risk Assessment |
| bgs | Below ground surface |
| BRA | Baseline Risk Assessment |
| BTEX | Benzene, toluene, xylenes (total), ethylbenzene |
| Cal/EPA | California Environmental Protection Agency |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| COC | Contaminant of concern |
| CQCP | Construction quality control plan |
| DCE | Dichloroethene |
| DDD | 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane |
| DDE | 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene |
| DDT | 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane |
| DDX | Total DDT, DDD and DDE |
| DDJC | Defense Distribution Depot San Joaquin California |
| DI WET | De-ionized water waste extraction test |
| DLA | Defense Logistics Agency |
| DoD | Department of Defense |
| DSERTS | Defense Site Environmental Reporting and Tracking System |
| DTSC | California Department of Toxic Substances Control |
| EE/CA | Engineering Evaluation/Cost Assessment |
| EPA | Environmental Protection Agency |
| ESD | Explanation of Significant Differences |
| FFA | Federal Facility Agreement |
| FS | Feasibility Study |
| ft | feet |
| GAC | Granular activated carbon |
| gpm | gallons per minute |
| IC | Institutional control |
| IMP | Installation Master Plan |
| IRM | Interim Remedial Measure |
| IRP | Installation Restoration Program |
| MCL | Maximum contaminant level |
| MCPA | 2-(4-chloro-2-methylphenoxy) acetic acid |
| MEK | Methyl ethyl ketone; 2-butanone |

| | |
|---|---|
| msl | mean sea level |
| ug/kg | Micrograms per kilogram |
| ug/L | Micrograms per liter |
| mg/kg | Milligrams per kilogram |
| MW | Monitoring well |
| | |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NFA | No further action |
| NFRAP | No further response action planned |
| ng/kg | Nanograms per kilogram |
| NPL | National Priorities List |
| | |
| O&M | Operation and maintenance |
| OSWER | Office of Solid Waste and Emergency Response |
| OU | Operable Unit |
| | |
| PAH | Polycyclic aromatic hydrocarbon |
| ppbv | parts per billion by volume |
| PCB | Polychlorinated biphenyl |
| PCE | Tetrachloroethene |
| PCOR | Preliminary Close Out Report |
| PCP | Pentachlorophenol |
| PEF | Potency equivalency factor |
| PEL | Permissible exposure limit |
| PRG | Preliminary remediation goal |
| | |
| QA | Quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | Quality control |
| | |
| RA | Remedial action |
| RAO | Remedial Action Objective |
| RAR | Remedial Action Report |
| RCRA | Resource Conservation and Recovery Act |
| RD | Remedial design |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RPM | Remedial Project Manager |
| RWQCB | Regional Water Quality Control Board |
| | |
| SARA | Superfund Amendments and Reauthorization Act |
| SVE | Soil vapor extraction |
| SVOC | Semivolatile organic compounds |
| SWMU | Solid Waste Management Unit |

| | |
|---|---|
| TCE | Trichloroethene |
| TPH | Total petroleum hydrocarbons |
| TPHD | Total petroleum hydrocarbons as diesel |
| TPHG | Total petroleum hydrocarbons as gasoline |
| TPHMO | Total petroleum hydrocarbons as motor oil |
| | |
| USEPA | United States Environmental Protection Agency |
| UST | Underground storage tank |
| USATHAMA | U.S. Army Toxics and Hazardous Materials Agency |
| | |
| VGAC | Vapor-phase granular activated carbon |
| VOCs | Volatile organic compounds |
| | |
| WDRs | Waste Discharge Requirements |
| | |
| ºF | degrees Fahrenheit |
| 2,4-D | dichlorophenoxy acetic acid |
| 2,4,5-T | trichlorophenoxy acetic acid |

# PRELIMINARY CLOSE OUT REPORT
# FOR THE
# DEFENSE DISTRIBUTION DEPOT SAN JOAQUIN, CALIFORNIA - TRACY SITE
# TRACY, CALFORNIA

## 1.0 INTRODUCTION

This Preliminary Close Out Report (PCOR) documents the successful completion of all cleanup activities or Construction Completion (CC) for the Defense Distribution Depot San Joaquin California Tracy Site (Tracy Site or Tracy) and is prepared in accordance with Close Out Procedures for National Priorities List Sites (OSWER Directive 9320.2-22, May 2011). In accordance with Closeout Procedures, the U.S. Environmental Protection Agency (EPA) conducted a Pre-Final Inspection of the final removal action at the Area 1/Building 237 Site on July 18 and 19, 2012, and previously on January 23, 2012, inspected the remedial actions at Solid Waste Management Unit (SWMU) 20 and the Northwestern Corner Operable Unit (NWC OU). DLA has certified in the Remedial Action Reports that all remedial actions have been constructed consistent with the plans and specifications documented in the Records of Decisions (RODs), other Decision Documents, and Remedial Design/Remedial Action (RD/RA) Work Plans.

The achievement of this CC/PCOR milestone for the Tracy Site is a major accomplishment for the team represented by the Defense Logistics Agency (DLA), U.S. Environmental Protection Agency (EPA), and the State of California Department of Toxic Substances Control (DTSC) and Regional Water Quality Control Board - Central Valley Region (RWQCB). In 2009, an issue with the Remedial Investigation/Feasibility Study (RI/FS) at the Northwestern Corner Dieldrin Plume Site (NWC Site) resulted in a revised CC planned completion date of Fiscal Year (FY) 2012. However in early 2010, by the conclusion of a formal dispute on a June 2009 Draft Final FS for the NWC Site, DLA had identified two additional sites where supplemental remedial actions would also be required: Warehouse 10/SWMU 20 and Area 1/Building 237 Sites. To the credit of the team, all three critical remedies at these remaining Tracy sites (i.e., the NWC Site, Warehouse 10/SWMU 20 Site, and Area 1/ Building 237 Site) have been successfully constructed or remedial action completed as documented below and as a result all cleanup activities have been conducted, and the Tracy Site has achieved Construction Completion.

## 2.0 SUMMARY OF SITE CONDITIONS

### 2.1 Background

The Tracy Site is primarily a storage and distribution depot for various supplies common to U.S. military services in the western U.S. and throughout the Pacific and has provided vital military logistic support in past military conflicts and currently supports military actions in Afghanistan and the Middle East (Figure 1). DLA is responsible for managing regional and local environmental programs at the Tracy Site, including the Installation Restoration Program (IRP).

### 2.1.1 Site History

The DLA has operated the Tracy Site since 1942. In 1993, DLA acquired an agricultural area north of the operating portion of the facility, identified as the Tracy Annex, in order to better address groundwater contamination. The operating portion of the Tracy Site covers a 448-acre triangular parcel, and the Tracy Annex consists of approximately 460 acres (Figure 2). The mission of the Tracy Site has, in general, remained unchanged over the years and the facility continues to function primarily as a shipping and receiving operation used for the storage and distribution of food, medical supplies and equipment, construction materials, clothing, and electrical, industrial, and general supplies common to military services located within the western U.S. and throughout the Pacific.

The IRP was established by the Department of Defense (DoD) in approximately 1979. Initial assessments were conducted at Tracy in early 1980 by the U.S. Army Toxics and Hazardous Materials Agency (USATHAMA). Soil and groundwater contamination were first detected at Tracy in 1985 (Radian, 1998a). Subsequent RI work indicated that an Operable Unit (OU) 1 contaminated groundwater plume was migrating from Tracy, threatening off-site groundwater and groundwater receptors. Chemicals of concern (COCs) detected in groundwater have included volatile organic compounds (VOCs), pesticides, and metals. COCs detected in Tracy soils included VOCs, SVOCs, pesticides, PCBs, and metals (as well as non-CERCLA total petroleum hydrocarbons).

In 1990, the Tracy Site was listed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) as a Superfund site. In June of 1991, DLA, EPA, DTSC, and the RWQCB finalized and signed the FFA that was developed specifically for the Tracy Site. As described in the FFA, authority for IRP decision making rests with a team of Remedial Project Managers (RPMs) from DLA, EPA, DTSC, and RWQCB. The DLA is the lead agency responsible for funding and implementing remedial actions. The EPA has provided final approval for decisions regarding remedial actions taken at Tracy.

The OU 1 RI/FS that focused on VOC-contaminated groundwater was finalized in 1992 (WCC, 1992). The OU 1 Record of Decision (ROD) was signed in 1993 (WCC, 1993). An Explanation of Significant Differences (ESD) was signed in 1996(Montgomery Watson, 1996b), followed by the Site-Wide Comprehensive ROD for Tracy, signed in February 1998 (Radian, 1998a) (Comprehensive ROD). The ESD and the Comprehensive ROD modified the remedy for OU 1 groundwater and addressed other areas of soil contamination at the depot. Subsequent to the publication of the Comprehensive ROD, three Explanation of Significant Differences (ESD) documents (URS, 2001b, URS 2004b, and HDR, 2011a), one ROD amendment (URS, 2003), one ROD (URS, 2011), and one Action Memorandum (HDR, 2012a) were completed to modify the selected Soils and Groundwater remedies at Tracy as detailed in Section 2.2.

### 2.1.2 Physical Conditions

The operating portion of Tracy covers a 448-acre triangular parcel, and the Tracy Annex, acquired in 1993, covers an additional 460 acres of agricultural land north of the operating portion of the facility for a Tracy Site total of approximately 908 acres. The topography at Tracy slopes gently downward to the north-northwest from an elevation of about 115 feet above mean sea level (msl) at the southern corner to an elevation of 45 feet above msl at the northern edge of the Tracy Annex. South Chrisman Road borders the western edge of the installation, Banta Road borders the east, and Eleventh Street borders the north (Figure 3). About 75% of the operating portion is covered with buildings (primarily warehouses), asphalt, or concrete. Numerous smaller buildings in the northwestern corner of the depot house administration and operations. The only landscaped area is in the northwestern corner, near Building 100. All other unpaved surfaces are sparsely vegetated.

A large storm water pond and two sewage percolation ponds are currently located in the northwestern portion of the Tracy Site. The storm water pond receives runoff from the on-site storm drain system and the sewage ponds receive treated wastewater from the Tracy domestic wastewater treatment plant. Historically, DLA also discharged industrial wastewater generated from facility operations into a set of percolation ponds subsequently closed at the northern portion of the facility.

The uppermost sedimentary deposits at Tracy consist of the Tulare Formation and the overlying alluvium. The top of the Tulare Formation is eroded and overlain by essentially horizontal sandy and gravelly Pleistocene and Recent alluvium. The Tulare Formation is separated into three roughly horizontal zones: The Lower and Upper Tulare and the Corcoran Clay layers. The relatively impermeable Corcoran Clay separates (and forms an aquitard between) the poorly sorted alluvial and fluvial sediments in the Lower and Upper Tulare. The Upper Tulare and Lower Tulare layers are primary sources of fresh, inexpensive groundwater in the San Joaquin Valley, so they will hereafter be called the Upper and Lower Tulare aquifers.

The Upper Tulare aquifer has been the primary focus of remedial investigations at Tracy. The water table lies approximately 10 feet (ft) below ground surface (bgs) in the northern portion of the Annex and 45 ft bgs in the southern corner of the depot. The potentiometric surface (water table elevation) slopes gently toward the north-northeast. Generally, the average linear velocity of groundwater in the aquifer is estimated at 15 to 500 ft/year toward the north-northeast. The Upper Tulare Aquifer is approximately 200 feet thick at the Tracy Site and contains fresh water under semi-confined and unconfined conditions.

## 2.2 Remedial Actions

This section describes the remedial or removal actions taken for the Groundwater OUs, Soil sites, Institutional Control (IC) sites, and No Further Action (NFA) sites, and the current status of each. In response to perceived significant soil and groundwater contamination, DLA organized its initial environmental response program into two phases. In the first phase, shallow OU1 groundwater on and off-site was addressed pursuant to the 1993 Tracy ROD (WCC, 1993) (1993

ROD). In the second phase, the Comprehensive ROD was developed and approved for addressing what was believed to be all remaining CERCLA issues (Radian, 1998a).

### 2.2.1 OU 1 Groundwater Remedial Action

**2.2.1.1 ROD Requirements and Remedy Description:** Remedial actions at Tracy were taken because groundwater was contaminated with trichloroethene (TCE), tetrachloroethene (PCE), 1,1-dichloroethene (1,1-DCE), and dieldrin at concentrations above the aquifer cleanup standards. The impact to a residential drinking water well and the potential impact to on-site potable supply wells by TCE and PCE were the principal threats posed by the groundwater contamination and the reason for the remedial actions.
The 1993 OU 1 ROD states the remedial action for OU 1 will remediate "hot spots", minimize plume migration, and clean up the plume to federal maximum contaminant levels (MCLs) for TCE and PCE and the California MCL for 1,1-DCE. The remedy specified in the Comprehensive ROD was groundwater extraction and treatment to restore groundwater, with long term monitoring to assess the progress of the remedy.

The Comprehensive ROD allowed for the discharge of treated water to surface water, percolation ponds, and injection facilities. Air stripping was specified for treatment of VOCs and granular activated carbon (GAC) for treatment of pesticides (Radian, 1998a). Prior to finalizing the Comprehensive ROD, a 1995 Explanation of Significant Differences (ESD) was signed that incorporated "Dispersion" into the OU1 groundwater remedy for a specific portion of the TCE and PCE plume, east of Banta Road.

The aquifer cleanup standards for groundwater are 5 micrograms per liter (ug/L) for TCE and PCE based on federal MCLs and 6 ug/L for 1,1-DCE based on the California MCL. The aquifer cleanup standards for TCE, PCE and 1,1-DCE were established in the OU 1 ROD (WCC, 1993). The cleanup standard for dieldrin in OU1 Groundwater is 0.05 ug/L based on a California Action Level and was established in the Comprehensive ROD. Following establishment of the Comprehensive ROD, the OU1 groundwater remedy remained generally unchanged until approximately 2005, when an isolated plume was identified that exceeded the 0.05 ug/l cleanup level for dieldrin (URS, 2006A). By 2010, this plume had been officially designated as the Northwestern Corner Plume Operable Unit or NWC Site, the second Groundwater OU for Tracy. The NWC Site is described in Section 2.2.2. Table 1 summarizes the remedy status for OU 1.

Table 1. Operable Unit 1 Groundwater Remedy Status

| Remedy Component | Status |
|---|---|
| Groundwater Treatment | Remedial Action in Operation |
| Dispersion East of Banta Road | Remedial Action in Operation |
| Institutional Controls | Remedial Action in Operation |

**2.2.1.2 Treatment System Descriptions:** The OU 1 remedy was constructed in phases beginning in 1990. The first groundwater Treatment Plant (formerly the Interim Remedial Measure [IRM] system, later Treatment Plant #1) was constructed on the active portion of the installation and began operation in 1992 prior to the signing of first ROD. In 1994, in accordance with the 1993 signed OU 1 ROD, the IRM system was expanded. Treatment Plant #2 began operation in 1998 on the Annex property as part of the full-scale groundwater remediation system for OU 1. Prior to 2003, both Treatment Plants treated groundwater contaminated with VOCs using an air stripping tower. In 2003, Treatment Plant #1 was converted from an air stripper system to granular activated carbon in order to provide treatment for pesticides and VOCs. The Comprehensive ROD allowed for the discharge of treated water to surface water, percolation ponds, and injection facilities. In 2006, Treatment Plant #1 was shut down when its capacity and LGAC treatment system were no longer needed. The groundwater was redirected to Treatment Plant #2 for VOC removal, and pesticide wellhead treatment (LGAC) systems were installed as needed. Currently Treatment Plant #2 is operational for VOC removal. Selected wells that were transferred from Treatment Plant #1 to Treatment Plant #2 for VOC removal also have wellhead treatment for pesticides (Figure 3). As of July 25, 2012, DLA has reported to EPA and the State that Treatment Plant #2 has been operational for a majority (96% uptime) of the past quarter (April - June, 2012) with seventeen (17) operating extraction wells for a combined total extraction rate of approximately 228 gallons per minute (gpm). The OU 1 ROD estimated 30 years to achieve remedial action cleanup levels at Tracy. As documented in the 2011 Annual Monitoring Report, TCE (Figure 5) and PCE (Figure 6) concentrations in groundwater continue to decline and confirm satisfactory treatment progress (HDR, 2012b).

**2.2.1.3** In order to address OU1 mixed plumes that contain VOCs and dieldrin, DLA in approximately 2005 began installing liquid-phase activated carbon (LGAC) systems to individual wells or well clusters in order to actively treat dieldrin. As detailed in the Tracy July 2012 Final Annual Monitoring Report, Extraction Wells EW047AU, EW048AU (LGAC-1), EW028B and EW044AU (LGAC-2), and EW042AU (LGAC-3) continue to operate and ensure compliance with discharge requirements.

### 2.2.2 Northwestern Corner OU Groundwater Remedial Action

The NWC Groundwater OU (NWC Site) was created in the 1990s by the use of 3 groundwater injection wells installed for the disposal of what DLA believed was VOC - treated groundwater from extraction wells to the north and northeast of the NWC Site per the 1993 ROD. Subsequent site characterization documented that shallow groundwater containing dieldrin up to 0.26 ug/l existed at the NWC site as a result of reinjection (Figure 4).

In early 2008, DLA, EPA and State managers had agreed to conduct additional assessment at the NWC site, due to the detected dieldrin in groundwater. These assessments, including two aquifer pumping tests, were subsequently conducted and presented in a December 2008 Draft FS for the NWC site. Despite informal discussions on the Draft FS, the State of California initiated informal dispute on the June 2009 Draft Final FS, pursuant to provisions of the Tracy FFA, due

to concerns with the FS analysis of alternatives and pumping tests results. Due to the inability of the parties to settle the dispute informally, EPA, on October 13, 2009, invoked formal dispute on the Draft Final FS. The formal dispute on the June 2009 Draft Final FS was resolved by the FFA parties as documented in an April 14, 2010, Formal Dispute Resolution Agreement (Agreement). The Agreement documented that the NWC FS would have an additional remedial action alternative similar to the pump and treat remedy detailed in the Draft Final FS, but with much fewer extraction wells (4 versus approximately 80) and an established pumping duration (3 years versus achievement of ACL). Following resolution of the FS dispute for the NWC Site, subsequent CERCLA documents were prepared including the NWC Final FS (URS, 2010a), Proposed Plan (Final Proposed Plan dated October 19, 2010; Public Meeting held on November 3, 2010), Record of Decision (Final dated July 2011, approved by EPA on September 30, 2011)(URS, 2011), Remedial Design (Final RD/RA Work Plan dated August 1, 2011)(HDR, 2011b), and Remedial Action Report (Final July 30, 2012, Draft RAR approved by EPA on May 31, 2012 )(HDR, 2012c), were all scoped, developed, finalized, and approved pursuant to the applicable document guidance and requirements. The NWC ROD established a cleanup goal for dieldrin of 0.05 ug/l, which is different than the 0.05 ug/l dieldrin cleanup level in OU1 groundwater. The NWC site uses a 0.05 ug/l dieldrin cleanup goal because the NWC plume contains dieldrin only (and is much less susceptible to active pumping, as opposed to the OU1 VOC/dieldrin plumes) and is separate from the OU1 plumes.

Site mobilization for remedial construction activities at the NWC Site occurred on September 26, 2011, with the initiation of extraction well drilling. Completion of the extraction well installations occurred on October 6, and from October 4 through December 14, DLA trenched and installed conveyance piping and electrical, installed well vaults, installed LGAC at Treatment Plant -1, installed pumps in the extraction wells, and established electrical power to the treatment system. On January 3, 2012, DLA collected baseline groundwater samples from NWC extraction and monitoring wells, and on January 4, systems start up and operations check occurred (Figure 7).

### 2.2.3 Soils Sites Group A, B and C Remedial Action

The Comprehensive ROD designated 4 Group A Soil sites for further action as a result of VOC contamination, primarily by TCE and PCE, 9 Group B sites for further action as a result of contamination by multiple COCs, 2 Group C sites for further action as a result of contamination by multiple COCs, and 21 sites for No Further Action (NFA) (Radian, 1998a). Descriptions of the sites within each Group are provided below:

**2.2.3.1 Group A Soil Remedial Actions** The Comprehensive ROD identified four sites where VOCs in soil and soil gas were a potential threat to groundwater: Solid Waste Management Unit (SWMU) 1/Area 2, Area 1/Building 237, Area 3, and SWMU 20 (also referred to as Warehouse 10/SWMU 20 in this PCOR) (Figure 4). The Group A sites do not pose potential risks to human health under the depot worker or construction worker exposure scenarios. No risks to ecological receptors have been identified. Vadose zone modeling and groundwater data in the 1990s suggested that that the Group A sites were continuing sources of VOCs to groundwater that would require the OU 1 treatment system to operate beyond 30 years. The Comprehensive ROD

established Soil Vapor Extraction (SVE) as the active soil remedy for VOC contamination at the four listed Soil Sites. The Comprehensive ROD specified cleanup standards for PCE and TCE concentrations in soil gas are 5.4 ug/l (780 parts per billion by volume [ppbv]) and 1.9 ug/l (350 ppbv), respectively.

The Comprehensive ROD included the following requirements to demonstrate vadose zone cleanup:

1. The concentrations of TCE and PCE present in soil gas are equal to or less than the cleanup standard.
2. It is demonstrated that the remaining TCE and PCE can no longer cause leachate concentrations to exceed the aquifer cleanup standards.
3. TCE and PCE have been removed to the extent technically and economically feasible.

ROD specifications required installation of an SVE system, including a treatment pad and piping to connect the wells to a mobile blower system, at each Group A site. The ROD also required vapor-phase GAC (VGAC) for treatment before discharge to the atmosphere. The SVE systems were installed in 2000 in compliance with the Tracy Remedial Action Documents and the ROD.

SVE prove-out operations began at the three SVE sites in November 2000. Initially, each unit was operated continuously on a circuit of multiple extraction wells until inlet concentrations were below cleanup standards (typically four to eight weeks per circuit). Operation was then changed so that each SVE circuit was operated for several intermittent phases, also referred to as pulsing, until the influent concentrations were below the COC cleanup standards.

Site optimization sampling was performed in September 2002, which indicated that the remediation effort was ready to proceed to focused operations, with these sites moving toward complete site restoration. System operations were suspended in August 2003 to evaluate potential rebound effects from the COCs. Closure/confirmation sampling was conducted to assess whether remediation was complete. SVE was restarted in January 2004 based on the evaluation of residual concentrations exceeding the ROD cleanup goals and on considerations for additional mass removal. The site was shut down in June 2004 for rebound analysis. A second round of closure /confirmation sampling was conducted in August 2004 to assess whether remediation was complete. The second round of closure sampling revealed only limited sampling points that exceeded the ROD soil gas cleanup standards at the Area 1/Building 237 Site and Area 3. DLA documented the cleanup status in the report entitled, "Remedy Enhancement Decisions at SVE Sites Area 1/Building 237, SWMU 2/Area 2, and Area 3" (URS, 2009).

In September 2011, DLA, EPA, and the State signed the Final ESD (2011 ESD) for SWMU 1/Area 2, Area 1/Building 237, Area 3, and Warehouse 10/ SWMU 20 VOC Soil Sites (HDR, 2011a). The 2011 ESD expanded the Remedial Action Objectives (RAOs) to include protection of human health and modified the Comprehensive ROD specified soil gas cleanup levels and SVE termination methodology at the four VOC Sites, incorporated new or modified LUC requirements, and selected SVE for the SWMU 20. With the approval of the 2011 ESD, the team resolved the outstanding SVE remedy termination issue with the SWMU 1/Area 2, Area 3, and Area 1/Building 237 Sites. Also, upon finalization of the 2011 ESD, DLA was able to

quickly proceed with implementation of the Warehouse 10/SWMU 20 Remedial Action, having developed and finalized the SWMU 20 Remedial Design/Remedial Action Work Plan (RD/RA Work Plan) on July 21, 2010, during the development of the ESD (HDR, 2010). Additional discussion of SWMU 20, a Group B Soil Site, is provided below.

**2.2.3.2 Group B Soil Remedial Actions** The Comprehensive ROD identified nine SWMUs with multiple COCs that pose threats to groundwater or risks to human or ecological receptors. The Group B sites which required remedial actions were: SWMUs 4, 6, 7, 8, 20, 24, 27, Building 30 Drum Storage Area, and the Northern Depots Soils Area (Figure 4). Since approximately 2006, remedial actions for the Group B Soil sites have been considered complete. Included below are site-specific remedy summaries for the 9 Group B Soil sites:

**SWMU 4** was an unlined storm water detention pond that reportedly received rinse water from former paint stripping, degreasing, and steam cleaning operations. Selenium, lead, 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane (DDT), 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene (DDE), and 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane (DDD) were identified as COCs in the Comprehensive ROD (Radian, 1998a). The Comprehensive ROD identified excavation and disposal as the selected remedy for SWMU 4, but also identified uncertainties (data gaps) in the ecological risk assessment. A revised Baseline Ecological Risk Assessment (BERA) was prepared after subsequent investigations to address the data gaps at the site (URS, 2001d). The remedy was modified in the 2004 ROD Amendment (URS, 2003), based on the results of the BERA. The ROD Amendment eliminated the cleanup standards for SWMU 4 and modified the remedy to include continued groundwater monitoring, installation of an overflow weir to prevent potentially contaminated sediment from being discharged from the pond (the weir enables the pond to function as a sediment trap), and storm water monitoring to ensure the overflow weir is effective. The ROD also required groundwater sampling for semi-volatile organic compounds (SVOCs) and pesticides/herbicides as part of the Well Monitoring Program to evaluate the effectiveness of the selected remedy. Threshold concentrations of COCs were identified in the ROD as requiring evaluation in the Well Monitoring Program Annual Monitoring Reports. The risk to human health was not considered significant under either the depot worker or construction worker scenario. The ROD stated that cleanup standards to protect groundwater quality were not necessary for SWMU 4 because the surface sediment, subsurface soil, soil leachate, and groundwater results indicated that SWMU 4 was not then, and was not likely to be in the future, a source of groundwater contamination. Neither the ROD nor the remedial action objectives (RAOs) addressed potential risks under the residential-use scenario. Institutional controls were added in the 2004 ESD (URS, 2004b) to address this deficiency. All sites with land use controls are restricted from use for residential development. In addition, the 2004 ESD requires the following land use controls:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the notification procedure
- Follow defined procedures in the event of a change in land use.

Construction of the overflow weir to prevent the discharge of potentially contaminated sediment from SWMU 4 is documented in the Remedial Action Report (Shaw, 2004a). Remedial activities included the following:

- Pumping water remaining in the drainage into the sewage lagoons in preparation for construction
- Clearing and grubbing adjacent to the existing inlet structure
- Retrofitting the existing concrete structure to raise the intake for the discharge pumps by approximately 2.5 feet
- Placing riprap material around the new outlet structure to reduce erosion

Approximately 14 tons of soil were removed during modification to the outlet structure and were disposed of at the Allied Waste Company's Forward Landfill in Manteca, California.

Land use controls have been implemented at SWMU 4. The 2004 ESD (URS, 2004b) includes an appendix to the IMP documenting the SWMU 4 land use control requirements. All remedial actions specified in the Comprehensive ROD, the ROD Amendment and the ESD have been completed at SWMU 4. Groundwater monitoring and O&M are ongoing.

**SWMU 6** was a 250 gallon concrete sump on the western side of Building 28; this building was used to repackage materials from damaged containers. Wastes from this recoup operation were collected in the concrete sump, pumped into 55 gallon drums and then removed to a Class I or other disposal site. The sump was removed in 1977. Cleanup standards for SWMU 6 were developed from vadose zone modeling (Montgomery Watson, 1996), which identified potential threats to background groundwater quality at this site. The cleanup standards were developed to protect groundwater quality consistent with Water Quality Goals (CVRWQCB, 1993). The cleanup standards for the site are dicamba 10 micrograms per kilogram (ug/kg), dieldrin 3 ug/kg, endrin 3 ug/kg, heptachlor 1.5 ug/kg, lindane 1.7 ug/kg, and trichlorophenoxy acetic acid (2,4,5-T) 5 ug/kg. The Comprehensive ROD also required groundwater sampling for SVOCs and pesticides/herbicides as part of the Well Monitoring Program to evaluate the effectiveness of the selected remedy (Radian, 1998a). The 2004 ESD (URS, 2004b), as discussed above, added ICs to the selected remedy to address the risk from residual contamination under the construction and residential-use scenarios. Land use controls for the site include the following:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the notification procedure
- Follow defined procedures in the event of a change in land use.

Excavation activities at SWMU 6 began on June 22, 1999 within the proposed excavation footprint (10 feet by 15 feet). The base of the initial excavation was 18 feet bgs, as required by the ROD. Following the completion of this excavation, six initial soil samples were collected,

including one from each of the four excavation sidewalls and two from the excavation bottom. Analytical results for three of the initial confirmation sample showed concentrations of COCs exceeding ROD-specified cleanup standards. Additional contaminated soil was removed from the northern bottom and southern sidewall of the excavation. Additional excavation was not conducted for the western sidewall at location DP0038 because an in-service, 48-inch storm drain line is adjacent to the excavation. The final excavation was approximately 19 ft bgs. Backfilling of the excavation and waste off-hauling were completed in September 9, 1999, and the surface restored to its pre-construction condition, including asphalt paving. Approximately 245 cubic yards of soil (more than double the volume anticipated in the ROD) were excavated, transported and disposed of off site at a Class II disposal facility.

Analytical results for the final round of confirmation sampling showed that residual contamination from dieldrin (up to 160 ug/kg), lindane (4 ug/kg), and 2,4,5-T (12 ug/kg) remains in the eastern and western sidewalls of the southern over-excavation at sample locations DP0038, DP0093 and DP0094. Additional excavation could not be conducted because of the proximity to Building 28 to the east and the 48-inch storm drain line to the west. Cleanup standards for lindane (5 ug/kg) and 2,4,5-T (13 ug/kg) were modified in the 2004 ESD (URS Group, 2004b) based on modeling that showed no threat to groundwater (no human health risks were identified). However, dieldrin remaining in the vicinity of the storm drain line and under Building 28 may pose a risk to construction workers or future residents. The 2004 ESD added land use controls to address this risk. All other contaminants were cleaned up to cleanup standards in the ROD.

**SWMU 7** consists of seven reported pits that were operated before the construction of Buildings 19 and 21. The pits were used for the disposal of medical supplies, narcotics, general pharmaceuticals, radiological supplies, and electron tubes. Vadose zone modeling results indicate that total petroleum hydrocarbons as diesel (TPHD) in Pit D, VOCs in Pit F, SVOCs in Pit C, and pesticides and herbicides (dichlorophenoxy acetic acid [2,4-D], linuron, dieldrin, and simazine) detected in SWMU 7 soils may pose a threat to background groundwater quality. Because the pits are currently covered by buildings and groundwater contamination is not present at the site, ICs were the selected remedy. The RAOs for SWMU 7 are to prevent the migration of the following COCs in the soil that could cause groundwater contamination: pesticides and herbicides (2,4-D, linuron, dieldrin, and simazine), SVOCs (bis[2-ethylhexyl]phthalate), VOCs (1,2-DCE and TCE) and TPHD. The selected remedy for SWMU 7 includes:

- Land use controls for Buildings 19 and 21 to maintain the existing cover and protect the underlying groundwater until it can be demonstrated that the contaminants with cleanup standards do not pose a threat to groundwater quality
- Two additional monitoring wells installed downgradient from SWMU 7
- Groundwater monitoring for as long as contaminants remain in place with concentrations that could threaten groundwater quality, or until it can be demonstrated that no further threat to groundwater quality exists. Monitoring results will be evaluated in the Annual Well Monitoring Reports and in the Five-Year Review to ensure protectiveness.

Land use controls for SWMU 7 were further defined in the 2004 ESD (URS Group, 2004b):

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the existing cover or notification procedure
- Follow defined procedures in the event of a change in land use.
- Install warning signs
- Ensure controls are restored following construction activities

The additional monitoring wells (LM166AU and LM176AU) required by the ROD were completed in February 1998. Four warning signs were posted at Buildings 19 and 21 in April 1999. An Addendum to Future Development Report (Radian, 1998b) initially documented land use controls for the site. Land use controls were further defined in the 2004 ESD (URS, 2004b) that included an appendix to the IMP.

**SWMU 8** is a former burn pit that was approximately 16 feet deep, 250 feet long, and 30 feet wide. Phthalates, polycyclic aromatic hydrocarbons (PAHs), pesticides, petroleum hydrocarbons, dioxin/furans and metals were released to the soil from disposal activities associated with SWMU 8. The RAOs for SWMU 8 are:

- Prevent future construction workers from being exposed to the following COCs in the soil that would cause an excess cancer risk greater than $10^{-6}$ or a hazard index greater than 1.0:
  - Pesticides (total DDT, DDD, and DDE (DDX) and dieldrin)

- Prevent the migration of the following COCs in the soil that could cause groundwater contamination:
  - Pesticides and herbicides (chlordane, 2,4-D, DDT, DDD, dieldrin, lindane, linuron, 2-(4-chloro-2-methylphenoxy) acetic acid (MCPA) and simazine
  - Petroleum hydrocarbons (TPHD, TPH as motor oil [TPHMO], and TPH as gasoline [TPHG])
  - SVOCs (diethylphthalate, bis[2-ethylhexyl]phthalate, 2,4-dinitrotoluene, and naphthalene).

The selected remedy was excavation of approximately 8,000 cubic yards of contaminated soil and debris from the burn pit. The remedy included excavation to the approximate depth of the water table. Clean soil imported from off site was required to backfill the excavated areas.

The Comprehensive ROD also required the installation of one new monitoring well. The new well and two existing wells (LM097AUA and LM119A) near the site were identified in the groundwater monitoring program specified in the ROD for monitoring organochlorine pesticides over four quarters as well as monitoring for dioxins/furans semiannually for one year.

Groundwater sampling for SVOCs and pesticides/herbicides was also required by the Comprehensive ROD to evaluate the effectiveness of the selected remedy.

Mobilization of remedial activities at SWMU 8 occurred on September 23, 2002 with excavation commencing on October 8, 2002. Based on the design data collection effort performed at SWMU 8, the area of the excavation was extended approximately 20 feet to the southeast because chlordane and dieldrin were detected outside of the ROD-specified excavation boundary. The base excavation and initial overexcavation were completed between October 8, 2002 and November 14, 2002. The depth along the center of the excavation was approximately 20 ft bgs, which was below the seasonal high level for the groundwater table.

Initial confirmation sample results from the sidewalls and bases (benches and bottoms) of the excavation indicated that additional excavation was needed to remove additional soil with contaminants exceeding cleanup standards. Fourteen step-out excavations were performed and confirmation soil samples were collected following the completion of each step-out. Additional excavation was not performed at sample locations with contaminants exceeding cleanup standards at depths below the groundwater table, in accordance with the ROD. All excavation and confirmation sampling activities were completed November 21, 2002. Backfilling of the excavation and waste disposal activities were completed on December 18, 2002. Over 17,000 cubic yards of material were excavated, transported, and disposed of off-site.

Installation of the ROD-specified new monitoring well (LM168AU) was completed downgradient from the excavation in November 1997. A second monitoring well (LM178AU) was installed in February 2003. LM097AU, which was abandoned because of its location within the excavation area, was replaced with LM097AUA on February 24, 2003 (Shaw, 2004b).

The 2004 ESD (URS, 2004b) included an evaluation of potential risks to human health and potential impacts to groundwater quality for the residual contamination at the site. There are no completed pathways for exposure to ecological receptors. Residual concentrations of contaminants were reduced well below the risk-based cleanup limits established in the ROD. Residual concentrations were compared to EPA Region 9 PRGs for industrial use and found to be below those values. The deionized water waste extraction test (DI WET) analysis, seasonal soil compartment model (SESOIL), and VLEACH modeling performed on soil samples collected at the site indicated that the residual contamination does not pose a threat to groundwater quality. The cleanup standards and RAOs are therefore considered protective of human health and the environment. Groundwater monitoring is still ongoing.

**SWMU 20 (also referred to as Warehouse 10/SWMU 20)** includes a floor drain at Building 26, an aboveground solvent tank in Warehouse 10, a 4 foot by 5 foot sump (at Manhole W-1) outside of the northwestern corner of Building 10, and a 2 foot by 3 foot sump (at Manhole W-3) outside of the northeastern corner of Building 10. Results from the 1990s indicated that SWMU 20 did not pose potential risks to human health under either the current depot worker or the future construction worker exposure scenarios; however, the site did pose a potential risk under the future resident scenario. Vadose zone modeling shows that VOCs, SVOCs, TPHD, and

pesticides/herbicides could pose a threat to groundwater at the site. The RAOs detailed in the Comprehensive ROD for SWMU 20 were:

- Prevent the migration of the following COCs in the soil that could cause groundwater contamination that exceeds appropriate regulatory standards and health-based concentrations:
  - VOCs (TCE, ethylbenzene, and xylenes)
  - SVOCs (diethylphthalate, 2,4-dinitrophenol, pentachlorophenol [PCP], and 2,4,5-trichlorophenol)
  - Pesticides and herbicides (dieldrin, methiocarb, MCPA, and linuron)
  - TPHD

The Comprehensive ROD required groundwater sampling for VOCs, SVOCs, and pesticides/herbicides as part of the Well Monitoring Program to evaluate the effectiveness of the selected remedy. The selected remedy includes the excavation and disposal of the two sumps and the underlying soil (at manholes W-1 and W-3) in the vicinity of Warehouse 10 and the floor drain at Building 26. The Comprehensive ROD also required disposal of the excavated soil at a Class I or other off-site disposal facility. Clean soil imported from off site was required to backfill the excavated areas. Additional soil gas investigations performed in 2004 did not detect TCE within the area of suspected vadose zone contamination. As a result of the 2004 sampling results, the 2004 ESD (URS, 2004b) deleted SVE from the remedy.

The 2004 ESD (URS, 2004b) added LUCs to the remedy for SWMU 20 to address potential future risk under the residential-use scenario that was not accounted for in the Comprehensive ROD. The LUCs also are designed to address soil contamination under the foundation of Building 10. The LUCs for SWMU 20 are:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the existing cover or notification procedure
- Follow defined procedures in the event of a change in land use.
- Ensure controls are restored following construction activities

Unexpected field conditions resulted in two phases of excavation at SWMU 20. The first phase occurred between September 1997 and July 1998. Sumps in the vicinity of manhole W-3 and a sump adjacent to boring SB204 near Building 10 were first pressure washed to remove residual sludge and then demolished. A concrete slab discovered during the preconstruction sampling effort for SB204 at 9 ft bgs turned out to be the foundation for a former UST. This former tank and slab were not identified during the RI/FS but apparent leaks from the tank and removing the slab significantly increased the cost of the remedy. Soil samples collected in the vicinity of SB204 below the Warehouse 10 concrete foundation had TPH concentrations between 15,000 and 100,000 ug/kg. The remediation contractor installed sheet-pile shoring and proceeded to perform excavations at both SB204 and manhole W-3. Approximately 27 cubic yards of soil were removed during this phase of the excavation. Soil samples collected from the base and

sidewalls of the SB204 excavation exceeded the Comprehensive ROD cleanup standards for dieldrin, TCE, ethylbenzene, and TPH. The first phase was halted when further excavation could not be performed safely without a new shoring design. The excavation was filled with control density fill and the contractor demobilized (Shaw, 2004a).

In June 1999, a second phase of excavation was performed at SWMU 20. An additional 305 cubic yards of soil were excavated at this time, resulting in a total excavation of approximately 332 cubic yards. Based on the results of confirmation sampling, soil containing TPH at concentrations greater than cleanup standards still remains at SWMU 20. Analytical results showed residual TPH contamination immediately adjacent to Building 10 at 48,000 ug/kg. The LUCs described previously address the residual contamination at SWMU 20. DI WET analysis was performed on the confirmation soil sample and the extracted concentration (<0.2 ug/kg) was below the ROD-specified TPH concentration requiring further evaluation (100 ug/kg). Other COCs have been removed to ROD cleanup standards (Shaw, 2004a). From approximately 2004 until 2007, the Warehouse 10/SWMU 20 site remedy relied on LUCs to control potential exposure to COCs beneath a barrier created by Warehouse 10.

In December 2007, in response to a planned development of the Warehouse 10/SWMU 20 Site, the United States Army Corps of Engineers (USACE) conducted an investigation beneath Warehouse 10 and along portions of the former IWPL. Eight soil borings were completed inside Warehouse 10, and samples were collected at depths of 4 to 5 feet below the surface of the warehouse floor. Two soil samples were collected adjacent to the former IWPL on the west side of the building. Five soil samples collected near the former solvent tank and floor drains contained TCE concentrations ranging from 28 to 260 milligrams per kilogram (mg/kg). Pesticides and motor oil were also detected in one soil sample collected near the floor grate (USACE, 2008).

In 2008, three field investigations were conducted at SWMU 20 to determine lateral and vertical extent of chemicals of concern (COC) in the soil, soil gas, and groundwater beneath the northeastern portion of Warehouse 10/SWMU 20. The results from this investigation indicate the presence of TCE in soil and soil gas above cleanup standards presented in the Comprehensive ROD. The concentrations of TCE that remained in soil and soil gas at SWMU 20 and the resulting risk necessitated the development of another FS for the Warehouse 10/SWMU 20 Site. Seven remedial alternatives were evaluated and recommendations were presented in the T*racy Solid Waste Management Unit 20 Feasibility Study* (URS Group, Inc. [URS], 2009b). The 2009 FS recommended SVE enhanced with pneumatic fracturing as the preferred remedial action for TCE in SWMU 20 subsurface soil.

The *2011 Explanation of Significant Differences* (2011 ESD) (HDR, 2011) modified the Comprehensive ROD and 2004 ESD with respect to SWMU 20 by incorporating SVE enhanced with pneumatic fracturing to address SWMU 20 VOC vadose zone impacts. The 2011 ESD modified the RAOs and the ROD-specified criteria used to determine when vadose zone cleanup has been achieved. The 2011 ESD also modified the previous LUCs to address human health risks associated with the COCs. Residual TCE or PCE soil gas concentrations remaining in the vadose zone above the acceptable human health risk levels will be mitigated through LUCs.

Site mobilization for remedial construction activities at Warehouse 10/SWMU 20 occurred in June of 2011. On June 7, DLA representatives conducted underground utility and site surveys, and from June 8-28, DLA representatives completed 37 pneumatic fracture borings and installed 9 Vapor Extraction Wells and 6 nested Vapor Monitoring Wells (for a total of 12 monitoring points). From approximately July 2 – August 2, the conveyance piping was installed. Following a short 2 month delay in remedy construction to allow for finalization and signature of the ESD, construction resumed in early October 2011, with delivery of the SVE system and carbon vessels. On October 24, 2011, the SWMU 20 SVE system officially started. On October 28, DLA conducted a post-installation inspection and on December 1, 2011, all punch list deficiencies that were noted in the October inspection were addressed. DLA submitted a Draft Remedial Action Report (RAR) on January 27, 2012 (reviewed by EPA in letter dated February 27, 2011). DLA submitted a Draft Final RAR for SWMU 20 on March 5, 2011, and this draft final was approved by EPA in our letter dated April 18, 2011 (HDR, 2012d).

**SWMU 24** is the site of a former 500-gallon underground storage tank (UST) that was used to store petroleum wastes from materials testing in Building 247 from 1961 to 1998. The UST was removed in 1988, and visibly contaminated soil from the excavation was disposed of offsite. The Baseline Risk Assessment (BRA) (Montgomery Watson, 1996; Appendix R, Volume V) results indicate that there is a potential health threat to future depot workers or residents at SWMU 24. The hazard index associated with indoor air for depot workers is presently 0.7; however, if a building with poor ventilation were constructed over the contamination, the hazard index could exceed 1.0. Vadose zone modeling results prior to remediation for SWMU 24 showed that VOCs, SVOCs, petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and pesticides pose a threat to background water quality. The following are RAOs for SWMU 24:

- Prevent future depot workers from being exposed to toluene in the soil that would cause a hazard index greater than 1.0
- Prevent the migration of the following COCs in the soil that could cause groundwater contamination that exceeds appropriate regulatory standards and health-based concentrations:
  - VOCs (acetone, 2-butanone [MEK], ethylbenzene, 2-hexanone, 4-methyl-2-pentanone, toluene, and xylenes)
  - SVOCs (2,4-dimethylphenol, fluoranthene, 2-methylphenol, naphthalene, phenanthrene, phenol, and pyrene
  - Pesticides (carbofuran, lindane, phorate, and ronnell)
  - TPHD and TPHG

Cleanup standards for SWMU 24 were developed using vadose zone modeling. The cleanup standards developed to protect background groundwater quality are consistent with Water Quality Goals (CVRWQCB, 1993) and the Tri-Regional Board Guidelines (RWQCB, 1990).

The selected remedy in the ROD for SWMU 24 was bioventing. The 2004 ESD (URS, 2004b) added ICs to address the risk under the residential use scenario in the event of a land use change. The ROD anticipated that bioventing would biodegrade the COCs that pose the greatest threat to groundwater. The recommended alternative reduces the potential for migration of soil

constituents to the groundwater and is protective of beneficial uses. The ROD required groundwater monitoring for PCBs and pesticides to assess the remaining threat to groundwater. Soil gas action levels also were established in the ROD in the event that chlorinated hydrocarbons were detected at this site so that SVE could be implemented before bioventing, but SVE was not needed.

Institutional controls added in the 2004 ESD (URS, 2004b) to address health risks under the residential use scenario include the following:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the existing cover or notification procedure
- Follow defined procedures in the event of a change in land use.

The ROD required groundwater sampling for VOCs, SVOCs, and pesticides/herbicides as part of the Well Monitoring Program to evaluate the effectiveness of the selected remedy. The selected remedy for SWMU 24 also included the quarterly monitoring of well LM118A for TPHD and TPHG for at least three quarters. The purpose of this monitoring was to assess the natural attenuation of petroleum hydrocarbons in groundwater (Radian, 1998a).

The bioventing system at SWMU 24 was located on the southern side of Building 247. The system consisted of one air injection well (VW001) and three vapor monitoring wells (MP001 to MP003). The air injection flow rate ranged from 5 to 10 cubic feet per minute (cfm) and typically averaged 6 cfm. The bioventing system was brought online on December 26, 2000 and operated through the third quarter of 2003 (URS, 2005d).

Monthly monitoring data for carbon dioxide, oxygen and TPH concentrations were reported in the Annual Well Monitoring Reports. A decreasing trend in oxygen and a simultaneous increasing trend of carbon dioxide indicated biological activity was occurring within the vadose zone. The monitoring data indicated that bioventing was continuing to reduce TPH contamination at SMWU 24. Low levels of TPH concentrations detected at the site suggested that the remediation of the site COCs had occurred. The bioventing system was taken offline during October 2003, followed by closure/confirmation sampling in November 2003. Soil samples at several locations and depths were collected. Results indicated that additional bioventing was required to meet the substantive requirements of the Site-Wide ROD.

Indoor air monitoring at Building 247 was conducted in June 2004, at the recommendation and request of DTSC and CVRWQCB. The sampling results indicated that indoor air quality was generally consistent with the activities conducted within the building and that the 15 detected contaminants that had Federal and California OSHA permissible exposure limits (PELs) for worker exposure were well below PELs (URS, 2005d).

A test was conducted in January 2005 to determine whether the bioventing system could remediate the remaining contaminants at the site. SVE extraction rates at the site are too low for

SVE to be effective. To make the SVE more effective, air flow through the subsurface would have to be increased. This would be difficult to implement because the majority of remaining contamination appears to be trapped under the concrete slab floor of Building 247. The site is currently under LUCs to prevent exposure to acetone, aluminum, manganese, PCBs, PAHs, and toluene (URS Group, 2005a).

**SWMU 27** consists of the former Building 206, the former service pit, the former waste oil sump, and the former floor drain in Building 206. Herbicides, SVOCs, PCBs, petroleum hydrocarbons, and metals have been released to soils as a result of activities associated with SWMU 27. The distribution of these constituents is confined primarily to the area within Building 206, mainly around the former service pit, the former waste oil sump, and the former floor drain in Building 206. Building 206 was demolished in April 1995.

The BRA results indicated a cancer risk greater than $1 \times 10^{-6}$ under the depot worker and construction worker scenarios. The cancer risk was based upon exposures to PAHs and PCBs (Montgomery Watson, 1996a). The selected remedy was excavation, which was designed to reduce these risks to $1 \times 10^{-6}$ by excavating contaminated soils to the specified cleanup standards for total PAHs and Arochlor 1260. TCE, 2,4-D, MCPA, 2,4,5-T, and TPHMO were potential threats to groundwater quality (Radian, 1998a).

The following RAOs apply to SWMU 27:

- Prevent future depot workers from being exposed to the following COCs in the soil that would cause an excess cancer risk greater than $1 \times 10^{-6}$
  - PAHs (benzo[a]pyrene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, and ideno[1,2,3-cd]pyrene)
  - PCBs (Arochlor 1260)
- Prevent the migration of the following COCs in the soil that could cause groundwater contamination that exceeds appropriate regulatory standards and health-based concentrations
  - VOCs (TCE)
  - Herbicides (2,4-D, MCPA, and 2,4,5-T)
  - TPHMO

The selected remedy in the Comprehensive ROD required excavation of the former waste oil sump; excavating soil contaminated with PAHs, PCBs, petroleum hydrocarbons, and herbicides (2,4-D, MCPA, and 2,4,5-T) from beneath the railroad tracks (between SB471 and SB470); and excavating soil contaminated with MPCA at SB469. The Comprehensive ROD required the use of clean soil, imported from off-depot, for use as backfill to replace the excavated material. The former service pit was not recommended for excavation and disposal because contaminated sludge was previously removed from the pit and the pit was filled with concrete.

The Comprehensive ROD required groundwater sampling for VOCs, SVOCs, and herbicides as part of the Well Monitoring Program to evaluate the effectiveness of the selected remedy.

Approximately 601 tons of TPHD contaminated soil were excavated from SWMU 27 and disposed of at Allied Waste Company's Forward Landfill in Manteca, California. Remediation activities were performed between June 21, 1999 and September 1, 1999. Soil was excavated within the limits of the excavation footprint at the floor drain and locomotive pit location to a depth of 5 ft bgs. The waste oil sump was excavated to a depth of approximately 19 ft bgs. Based on analytical results from confirmation samples, additional excavation was performed at the northern sidewall of the railroad track excavation and the western sidewall of the waste oil sump excavation. An exposed oil standpipe sump was discovered during excavation. This sump was removed along with its associated piping. In addition to the soil transported to Forward Landfill, approximately 27 tons of petroleum contaminated debris were transported to Kettleman Hills Landfill for disposal, and 40 gallons of waste oil from the oil standpipe sump were transferred to Evergreen Oil in Newark, California for recycling.

Soil containing TPH above the ROD-specified cleanup standard remained at one location. TPHMO was reported at 15 mg/kg (cleanup standard is 10 mg/kg) at DP0102. It was determined that this contamination was part of the groundwater petroleum plume associated with UST 7d, instead of with SWMU 27. All other confirmation samples were below the ROD-specified cleanup standards (Shaw, 2003).

Well Monitoring Program Annual Monitoring Reports were reviewed from the years 1999 through 2004 to evaluate the likelihood of residual contamination impacting groundwater quality. Although not included as a target analyte by the ROD, bis(2-ethylhexyl)phthalate, a common laboratory contaminant, has been reported twice in groundwater samples from LM117AU at concentrations up to 14 ug/L (California MCL is 4 ug/L), most recently in Third Quarter 2000. None of the compounds targeted in the ROD have been detected to date.

**Defense Site Environmental Reporting and Tracking System (DSERTS) 67**, also known as the northern depot soils area, is north of the storm drain and sewage lagoons. The RAO for DSERTS 67 is to prevent future grader operators or construction workers from being exposed to concentrations of arsenic and manganese in the surface and near-surface soils that would result in a hazard index greater than 1.0. The remedy selected in the Comprehensive ROD consisted of installing an asphalt cover over the soils that have elevated levels of arsenic or manganese. The 2001 ESD (URS, 2001b) amended the cleanup standards for arsenic and manganese, and modified the remedy to an aggregate cover, rather than asphalt. The 2004 ESD (URS, 2004b) updated the land use control requirements for DSERTS 67, including monitoring requirements, to ensure that the appropriate land use controls are being implemented.

**DSERTS 72**, the northern depot soils stockpiles, was identified after the Comprehensive ROD was signed in 1998. A new storm drain and catch basin were installed west of SWMUs 2 and 3 in DSERTS 72, soil excavated during the installation was stockpiled and sampled. The sample results indicated the presence of dieldrin, selenium, chlordane, endrin, DDD, DDE, DDT and TPHMO. Further sampling was performed to determine the extent of contamination and the potential impact of COCs to groundwater. The health risk in the No Further Response Action Planned (NFRAP) document (URS, 2001a) used the light industrial worker and construction

worker exposure scenarios. Because the health risk assessment did not address the residential use scenario, land use controls were added for DSERTS 72 in the 2004 ESD (URS, 2004b).

The **Building 30 Drum Storage Area** is in the southern portion of the depot. Vadose zone modeling identified potential threats to background groundwater quality at this site from benzyl alcohol and phthalates. Groundwater data was not available for use as a basis for selecting the remedy at the time of the Comprehensive ROD. The remedy included the installation of one monitoring well down-gradient from the site. Four rounds of monitoring for pesticides was agreed upon as a substitute for extending the RI. ICs were selected as the remedy in the ROD, since maintaining paved areas was expected to reduce infiltration and migration of contaminants to groundwater. Additional clarification of the institutional control requirements for the Building 30 Drum Storage Area was provided in the 2001 ESD (URS, 2001b) and in the 2004 ESD (URS, 2004b). Monitoring well LM169A was installed according to ROD requirements in November 1997. Two warning signs were posted at Building 30 in April 1999.

The **Eastern Depot Soils Area** is the non-vegetated area on the eastern side of the depot historically used for grader training exercises. COCs include aluminum, arsenic, chlordane, dieldrin, DDX, and PCBs. A risk assessment performed on the site concluded that the health risk was acceptable under the current land use scenario, and the Comprehensive ROD did not address the Eastern Depot Soils Area as explained in Section 2.2.3 below. However, under the future resident scenario the cancer risk was estimated at $6x10^{-5}$, and the hazard index was estimated at 3, so land use controls were added to the 2004 ESD (URS, 2004b) to address potential health risks in the event of a land use change.

The **Southern Depot Soils Area** is the non-vegetated area on the southern side of the depot historically used for grader training exercises. Dieldrin is the COC. A risk assessment performed on the site concluded that the health risk was acceptable under the current land use scenario, and the Comprehensive ROD did not address the Southern Depot Soils Area as explained in Section 2.2.5 below. However, under the future resident scenario the cancer risk was estimated at $2x10^{-5}$, and the hazard index was estimated at 3, so land use controls were added to the 2004 ESD (URS, 2004b) to address potential health risks in the event of a land use change.

**2.2.3.3 Group C Soil Remedial Actions.** The Comprehensive ROD (Radian, 1998a) identified nine SWMUs with multiple COCs that pose threats to groundwater or risks to human or ecological receptors. The Group C sites which required remedial actions were: SWMU 33 and SWMUs 2/3.

**SWMU 33** is the industrial waste pipeline at the Tracy Site. In 1972, an existing pipeline and storm drain were interconnected to the former industrial waste line. Aldrin, dieldrin, diethylphthalate, and di-n-butylphthalate left in place following completion of the removal action were identified as potential threats to groundwater. The ROD acknowledged that aldrin, dieldrin, diethylphthalate, and di-n-butylphthalate were left in place at SWMU 33 at concentrations above cleanup standards. These contaminants are generally located below buildings or other paved areas, so that the threat of migration to groundwater was considered low. The selected remedy supplemented the grouting and excavation that occurred during the removal action with

groundwater monitoring and ICs. Land use control requirements are documented in the 2004 ESD (URS, 2004b) and include pre-notification requirements for actions that would compromise the ability of the existing cover to reduce infiltration. Land use controls at SWMU 33 restrict actions that would disturb the subsurface or existing pavement and buildings.

**SWMU 2 (Sewage Lagoons) and SWMU 3 (Industrial Lagoons)** are in the northern part of the depot, west of and adjacent to the Sewage Treatment Plant. An EE/CA was prepared to evaluate alternatives and select excavation and disposal as a non-time-critical removal action for SWMUs 2 and 3. The removal action was adopted as the selected remedy for SWMUs 2/3 in the Comprehensive ROD. The RAO for SWMUs 2 and 3 is to prevent the migration of DDT, DDD, DDE, di-n-butylphthalate, and bis(2-ethylhexyl)phthalate in post-removal-action soil that could cause groundwater contamination to exceed appropriate regulatory standards and health-based concentrations. The cleanup standards for SWMUs 2 and 3 were based on the existing industrial scenario. Neither the Comprehensive ROD nor the RAOs addressed potential risks under the residential scenario. Institutional controls were added in the 2004 ESD (URS, 2004b) to address this deficiency in the protectiveness of the remedy. The 2004 ESD requires the following land use controls:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the existing cover or notification procedure
- Follow defined procedures in the event of a change in land use.

Following completion of the removal action, all cleanup standards presented in the ROD, as modified by the ESD, were attained (URS, 2002).

### 2.2.4 Institutional Control/Land Use Control Sites

**2.2.4.1** An IC remedial component was added to the OU 1 groundwater remedy in 2004 to provide additional protectiveness (URS, 2004b). These controls, which are also referred to as Land Use Controls (LUCs) at Federal Facility sites, will be maintained until the concentrations of hazardous substances allow for unlimited use and unrestricted exposure. The required groundwater use controls are listed below:

- Prevent domestic use of contaminated groundwater (untreated)
- Protect infrastructure associated with OU 1 groundwater monitoring, extraction, treatment and disposal
- Establish notification procedure for construction activities or land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual review to ensure compliance with controls and to correct any deficiencies in the notification procedure
- Follow defined procedures in the event of a change in land use

**2.2.4.2 Land use controls** were implemented as a remedial component at several soils sites due to the elevated levels of risk to human health from exposure to VOCs, SVOCs, metals and pesticides/herbicides that were left in place (Figure 4). These soils sites were SWMU 1/Area 2,

SWMUs 2/3, 4, 6, 7, 20, 24, 33, DSERTS 72, Building 30 Drum Storage Area, the Eastern Depot Soils Area, and the Southern Depot Soils Area. The following ICs were added in the 2004 ESD (URS, 2004b) for these sites:

- Description of specific LUC requirements in an appendix to the IMP
- Establish notification procedure for land use changes in the IMP
- Maintain administrative controls (i.e., IMP appendix and notification procedures)
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the notification procedure
- Perform annual reviews to ensure compliance with controls and to correct any deficiencies in the existing cover or notification procedure
- Follow defined procedures in the event of a change in land use.
- Conduct annual site inspections to look for evidence of burrows, erosions, or excavation.
- Install warning signs
- Ensure controls are restored following construction activities

### 2.2.5 No Further Action Sites

Twenty-one sites were recommended for NFA in the Comprehensive ROD (Radian, 1998a). A table summarizing these NFA sites from the 2005 Five-Year Review (URS, 2005a) is presented in Appendix B (Table 1). Four sites described in greater detail above had COC concentrations that posed unacceptable levels of risk to human health in a residential use scenario, but they did not pose an unacceptable risk in the industrial use scenario. These sites are SWMU 1/Area 2, SWMU 24, Eastern Depot Soils Area, and the Southern Depot Soils Area, and they were not classified as either NFA or remedial action sites in the ROD. This oversight in the Comprehensive ROD is addressed by the IC requirements in the 2004 ESD (URS, 2004b).

Soil from the Day Care Center was excavated, disposed off-site and replaced with clean fill as part of a time-critical removal action at DDJC-Tracy in 1995 to reduce the potential cancer risk posed by organochlorine pesticides, lead and PAHs at the site. The removal action was completed at the Day Care Center and selected as the remedial response in the Site-Wide ROD, but based on an evaluation of historical data, land use controls were recommended to address residual contamination beneath the clean fill. This Day Care Center issue has been resolved and the Site is considered a No Further Action site. Further discussion of this determination is provided in Section 6.0 summarizing the Five Year Review.

## 2.3 Removal Action

**2.3.1 Area 1/Building 237** As previously described in Section 1.0 and Section 2.2.3.1, the Area 1/Building 237 Site had previously been investigated and had conducted remedial actions, pursuant to the Comprehensive ROD, to address VOC soil contamination and protection of groundwater. The 2011 ESD modified the Comprehensive ROD soil gas cleanup levels for VOC Soil Sites, allowing for the Area 1/Building 237 Site SVE system that was turned off in 2004 to be permanently shut-down, and established LUCs (restricting residential reuse) for residual VOC soil and soil gas contamination (HDR, 2011a). However in 2009, DLA raised a potential concern with pesticide contamination at the Area 1/Building 237 Site. In 2010, after the planned

PCOR/CC completion date was reset for FY2012, the parties understood that pesticide contamination at the Area 1/Building 237 Site existed and required further CERCLA investigation. In order to expedite the completion of supplemental actions at the Area 1/Building 237 Site, EPA advised DLA to utilize its removal action authority under CERCLA to conduct actions in a timely manner and meet the FY12 PCOR completion date. In response, DLA changed its CERCLA strategy from remedial to removal and utilized the data collected from the implemented January 2011 Final RI Work Plan (HDR, 2011c) to prepare an Area 1/Building 237 EE/CA (HDR, 2012e), described below.

As described in the Area 1/Building 237 2011 EE/CA, COCs pertinent to the removal action consist of pesticides (4,4-dichlorodiphenyldichloroethane [4,4-DDD], 4,4-dichloro-diphenyldichloroethylene [4,4-DDE], 4,4-dichlorodiphenyltrichloroethane [4,4-DDT], and dieldrin). These contaminants are believed to have originated from the use of former Building 236 (that was adjacent to existing Building 237) as a pesticide mixing and storage site (HDR, 2011c).

In 2011, a two part supplemental investigation for pesticides was conducted (HDR, 2012c). The first investigation (conducted on February 8 and 9, 2011) and the second (conducted on March 26, 2011) found elevated detections of pesticides mainly on the north side of Building 237. Pesticides were found at high levels in a localized area near HA0109 and SB0992 to a sample depth of 5 ft below ground surface (bgs). Samples were analyzed at 10 and 15 ft bgs at SB0992 and there were only low concentrations of pesticides at these depths. A Streamlined Risk Evaluation (SRE) was performed in support of a non-time critical removal action. In accordance with U.S. EPA guidance (U.S. EPA, 1993), the SRE is limited to the scope of removal activity being considered in the EE/CA. Therefore, it is limited to those exposure scenarios related to pesticides in soil.

Based on the comparison of the four removal alternatives in the EE/CA, it was recommended that Alternative 2 (excavation and backfilling) be used as the removal action for the soils at Area 1/ Building 237. The results of the SRE for Alternative 2 for an industrial worker exposure indicate an order of magnitude cancer risk reduction (i.e., excess lifetime cancer risk [ELCR] drop from 3.84x10-4 to 1.57x10-5) and even greater noncancer effect reduction (from an hazard index [HI] of 3.37 to 0.0597) as compared to the "No Action" Alternative 1. Both the cancer risk and HI will be below the human health industrial thresholds of 1 X10-4 and 1, respectively. Under Alternative 2, the cancer risk is anticipated to exceed the 1 x10-6 point of departure for unrestricted residential reuse (SRE, Appendix G). By excavating and removing contaminants as well as through the use of LUCs, human health and the environment will be protected at Area 1/Building 237.

As documented in the Final Area 1/Building 237 Action Memorandum/ Removal Action Work Plan, the selected action included limited removal action targeting the areas with the highest pesticide concentrations to reduce risk to a cumulative risk management range of between $1x10^{-4}$ and $1x10^{-6}$ for industrial re-use of the Site; and offsite disposal of excavated material. The areal extent of the removal action is an area approximately 40-feet by 40-feet. The limits of excavation are defined by the mid-points with adjacent lateral and vertical sample points. This

action would remove approximately 418 cubic yards of soil at depths varying from 3 to 7.5 ft bgs. The excavation will be backfilled with non-contaminated, compacted soil and the ground surface will be paved with asphalt. The soil analytical results indicate that the excavated soil will require disposal as a hazardous waste (HDR, 2012a).

On July 18, 2012, per the Area 1/Building 237 Action Memorandum/Removal Action Work Plan, excavation activities commenced (HDR, 2012a). Twelve trucks were loaded with soil and left the site for disposal at the U.S. Ecology landfill in Beatty, Nevada. Approximately 278.7 tons of soil were removed during the first day of excavation. On July 19, 2012, the second half of the excavation was completed. Eight trucks were loaded with excavated soil and left the site for disposal. Approximately 180.4 tons of soil was removed during the second day of excavation for a total of 459.1 tons of soil removed during Phase I of the removal action. On August 3, DLA, EPA, DTSC, and RWQCB representatives discussed preliminary confirmation sampling results from the Area 1/Building 237 removal. EPA requested that DLA conduct one additional removal lift of approximately 15 cubic yards of contaminated soils from the southeastern corner of the excavation where one confirmation sampling result exceeded the target level; DLA agreed and an additional lift was conducted.

On August 6, 2012, the second phase of removal at the Area 1/Building 237 Site was initiated and completed. One truck was loaded with soil and left the site for disposal at the U.S. Ecology landfill in Beatty, Nevada. Approximately 19.9 tons of soil was removed. The dimensions of the Phase II excavation measure approximately 9 feet wide by 16 feet long by 3 feet deep. The total weight of contamination soil removed for this site is approximately 479 tons.

As described in the Removal Action Report, post-excavation sampling and analysis of 15 endpoints was conducted on the Phase I removal. The results of the initial post-NTCRA SRE indicated that the total risk estimates were protective, with an Excess Lifetime Cancer Risk (ELCR) of 8.9E-05 and a hazard index (HI) of 3.6E-01. Although the calculated risks from the removal action met the clean-up goals, EPA raised a concern regarding variation in the chemical concentrations between one soil sample/duplicate pair taken at location 15. So, as discussed above, EPA requested the Phase II excavation be performed due to the uncertainty introduced by this variation in analytical results. On August 6, 2012, after the additional excavation, another set of three endpoints were collected. This final excavation resulted in a calculated risk value that was more protective and less than the clean-up goal, with an ELCR of 2.05E-05 and a HI of 7.35E-02 (HDR, 2012f).

## 3.0 DEMONSTRATION OF CLEANUP ACTIVITY QUALITY ASSURANCE AND QUALITY CONTROL

### 3.1 OU 1 Groundwater Remedial Action

As specified in the OU 1 ROD, the function of the OU 1 remedy is to remediate hot spots, minimize contaminant transport off depot, minimize migration and clean up to aquifer cleanup levels (ACLs). The Tracy well monitoring program and its associated quality assurance (QA) plan are used to continually assess the effectiveness of the containment and aquifer remediation.

The EPA, DTSC and Central Valley RWQCB have provided program review and oversight throughout the design, construction, and operational activities.

The remedy for OU 1 groundwater has been implemented in phases. Treatment Plant 1 (formerly the IRM system) was constructed on the active portion of the installation in 1992, followed by Treatment Plant 2 being constructed on the Annex property in 1998. However, in January 2006, Treatment Plant 1 was shut down and groundwater redirected to Treatment Plant 2. The treatment system performance, monitoring, and sampling activities are documented in the Well Monitoring Program Annual Monitoring Reports.

Construction quality control (QC) was implemented during the construction of the full-scale groundwater remediation system to ensure the remedy would be consistent with the requirements of the OU 1 ROD (WCC, 1993).

As part of the pre-commissioning phase, comprehensive inspections and tests were performed on all defined systems and system components. The testing assured that all components of a system were functional prior to the introduction of water to the system. This comprehensive pre-commissioning testing program met or exceeded normal construction quality assurance/quality control (QA/QC) testing requirements by looking at the entire system, not just the individual components (URS, 2001c).

Ongoing activities to optimize the performance of the OU 1 remedial action include: adjustment of well controls, shutdown of extraction wells that do not contribute to plume containment, installation of new extraction wells to enhance plume containment and remediation, addition of chemical sequestrants to control inorganic scale, preventive maintenance of groundwater extraction and treatment systems, groundwater modeling, and evaluation of primary or supplemental alternative technologies.

Effluent monitoring is performed weekly (VOCs, specific conductivity, pH, temperature and TPH), quarterly (pesticides) and annually (metals) by compliance sampling at the point of compliance (air stripper effluent sampling port) for Treatment Plant #2, and was performed for both treatment plants prior to January 2006. RWQCB-Central Valley Order No. 98-053 established the Waste Discharge Requirement Compliance for Interim Remedial Measure groundwater treatment system effluent limits (WDRs) for discharge to injection wells, infiltration galleries, the stormwater detention pond, sewage lagoons and overland flow plots. The sampling and monitoring activities follow the general procedures, specifications, and requirements described in the *DDJC-Sharpe/Tracy Comprehensive Field Work Plan,* Version 4.0 (URS, 2004a). This document is supplemented by an annual Well Monitoring Program Field Work Plan that defines the monitoring requirements for the Tracy Site. The Well Monitoring Program Annual Monitoring Reports summarize the results from groundwater monitoring in quarterly sampling events. The Well Monitoring Program Annual Monitoring Reports also provide updates in the extent of contamination, hydrogeological properties, effectiveness of the groundwater extraction and treatment system, and proposed changes.

Analytical methods, associated reporting limits, QA/QC objectives for analytical measurements, and data validation methods are provided in the Quality Assurance Project Plan (QAPP), which is included in the Comprehensive Field Work Plan, Version 4.0 (URS, 2004a).

The EPA, DTSC, and Central Valley RWQCB have provided oversight and review of the analytical performance standards and the Well Monitoring Program Annual Monitoring Reports. Each Well Monitoring Program Annual Monitoring Report includes a discussion of the quality of the analytical data collected the previous year, including QA/QC procedures followed and a comparison of the analytical data with data quality objectives (HDR, 2012b).

The OU 1 ROD does not specify the duration for operating treatment systems. The well arrays have been modified to capture contaminated groundwater as it migrates within the depot boundaries, and for the plumes beyond the depot boundaries. The only planned additional wells are two guard wells to be installed at the down-gradient end of the Banta Road Plume. Once these guard wells are installed they will be included in the groundwater monitoring program. The time frame to achieve remedial action cleanup levels was estimated to be 30 years in the OU 1 ROD.

### 3.2 Soil Remedial Actions

The EPA and the State reviewed the remedial actions and construction activities for compliance with quality assurance and quality control (QA/QC) protocols. Remediation activities at the Tracy Site were determined to be consistent with the Site-Wide ROD and RD plans and specifications. Draft work plans and reports were reviewed by the EPA and the State and comments on the reports and work plans were addressed by the DLA. The results of monitoring and the progress of site cleanup activities were also reviewed during quarterly RPM meetings.

The remedial contractor adhered to the approved construction quality control plan (CQCP). The CQCP incorporated all of the EPA requirements. All confirmatory inspections, independent testing, audits and evaluations of materials and workmanship were performed in accordance with the construction drawings, technical specifications and CQCP. Construction QA was performed by the DLA. Deviations or non-adherence to QA/QC protocols, drawings, or specifications were properly documented.

The QAPP incorporated all EPA and State procedures and protocol. EPA analytical methods were used for all confirmation and monitoring samples during remedial action (RA) activities. Extensive soil, soil gas, sediment and groundwater sampling was performed at DDJC-Tracy. EPA and the State determined that the analytical results were accurate to the degree needed to assure satisfactory execution of the remedial action.

### 3.3 Institutional Controls/Land Use Control Sites

Land use controls were implemented as part of the selected remedy for OU 1 Groundwater and for various contaminated soil sites at Tracy. Institutional controls are required to ensure that land and groundwater use restrictions are maintained and disturbances do not occur without the

necessary environmental review. To ensure that these sites will not be inappropriately used, an appendix to the Tracy IMP was developed that identifies and describes all land use controls (URS, 2004b). The DLA is responsible for implementing, monitoring, and enforcing the identified controls to limit exposure to residual hazardous substances.

An IMP Project Approval Form must be filed and approved before the start of any building project at DDJC-Tracy. The approval of the IMP Project Approval Form is used to compare the building site with the constraints outlined in the IMP appendix. Notification of the proposed activities to all signatories to the ROD is required if the activities are within the sites requiring land use controls. The project approval form serves as the document for communicating construction constraints to the appropriate offices. Any components of the proposed project that are inconsistent with the constraints at the site will result in disapproval unless the requester makes appropriate modifications. The DDJC-Tracy Facility Engineer is responsible for the final approval of building projects through this review process. Furthermore, DLA will notify EPA and State of California as soon as practicable, but no later than 15 days after discovery of a violation with the institutional control objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. The DLA will notify EPA and State of California regarding how the DLA has addressed or will address the breach within 15 days of sending EPA and State of California notification of the breach.

DLA will submit an Annual Monitoring Report to EPA and State of California. The Annual Monitoring Report will review the status of land use controls and/or other remedial actions, including the operation, maintenance, and monitoring thereof, and how any land use control deficiencies or inconsistent uses have been addressed. The report on the status of land use controls and other remedial actions will be included as a section in the Tracy Well Monitoring Program Annual Monitoring Report, and will be filed in the Information Repository.

Requirements for any changes in land use of properties with associated land use controls are specified in the *Tracy Explanation of Significant Differences to Sitewide Comprehensive ROD* (URS, 2004b). No changes in land use are anticipated at Tracy in the near future.

## 4.0 ACTIVITIES AND SCHEDULE FOR SITE COMPLETION

**4.1** All remedial actions on DDJC-Tracy have been constructed.

**4.2** For OU 1 Groundwater, extraction systems and the treatment system are in place and operating. The system is expected to continue operation until aquifer cleanup levels are attained. Future adjustments are expected to include well replacements or shutdowns to optimize the operation of the extraction system as the VOC and pesticide plumes are reduced in size. Continuing activities include monitoring of the groundwater wells and maintenance of LUCs. DLA plans to install 2 guard wells at the down-gradient end of the Banta Road Plume and is securing access from an off-site property owner. If groundwater data from the guard wells indicates that plume migration is occurring, the ESD (Montgomery Watson, 1996b) provides a contingency that DLA expand the pump and treat remedy to the eastern portion of the Banta Road plume, stating that, "[s]hould the contaminant levels in the uncaptured portion of the

plume fail to decrease as predicted by the current computer model, [DLA] will exercise its option to actively remediate the uncaptured portion of the plume."

**4.3** All remedial actions have been completed for the Group A, B and C sites at the Tracy Site, with the exception of ongoing SVE at SWMU 20. The Final Closeout Report will be prepared once this SVE and the OU1 groundwater cleanup levels are attained.

Table 2 identifies the activities remaining and their estimated completion dates.

**Table 2. Schedule for Remaining DLA Activities**

| Site Identification | Task to Complete | Reason for Task | Estimated Completion |
|---|---|---|---|
| **OU 1 Groundwater** | | | |
| | Five-year review | Statutory requirement | 2015 |
| | Groundwater monitoring | FFA/ROD requirement | Attainment of ACLs; 2029 |
| | Final Close Out Report* | Necessary for closure | Attainment of ACLs; 2030 |
| **NWC Groundwater** | Five-Year Review | Statutory requirement | 2015 |
| | Groundwater Monitoring | FFA/ROD Requirement | 2015 |
| **Soils and Soil Gas** | | | |
| Group A | Five-Year Review | Statutory requirement | 2015 |
| Group B | Five-Year Review | Statutory requirement | 2015 |
| | SWMU 20 close out | | 2014 |
| Group C | Five-Year Review | Statutory requirement | 2015 |
| **Installation** | Deletion from NPL* | IRP and CERCLA goal | 2031 |

ACL = aquifer cleanup level
CERCLA= Comprehensive Environmental Response, Compensation, and Liability Act
FFA = Federal Facility Agreement
NPL = National Priorities List
IRP = Installation Restoration Program
O&M = Operation and Maintenance
OU = Operable Unit
SVE = Soil Vapor Extraction
* = Prepared/conducted by EPA

## 5.0 SUMMARY OF REMEDIATION COSTS

Cost estimates for the remedial action construction and O&M through 2012 are summarized in Table 3.

## Table 3. Cost Estimates for Remedial Actions

| Site Identification | Cost Item | Site-Wide ROD Estimate | Construction Contract and O&M Expenditures* |
|---|---|---|---|
| **OU 1 Groundwater**** | | | |
| | Capital and O&M | $9,512,500 | Not in IRAR (Capital)<br>$8,949,320 (O&M) |
| **NWC Groundwater** | Capital and O&M | (URS, 2011) | $2,170,000 |
| **Group A Sites** | | | |
| SWMU 1/Area 2 | Capital and O&M | $266,000 | a |
| Area 1/Building | Capital and O&M | $140,000 | b |
| Area 3 | Capital and O&M | $242,000 | c |
| | **Total Costs** | $648,000 | $1,577,246 |
| **Group B Sites** | | | |
| SWMU7, SWMU 33, The Building 30 Drum Storage Area, and the Northern Depot Soils Area | Implementation of ICs | N/A | $26,700 |
| DSERTS 67 | Capital and O&M, RAR document preparation | $504,000 | $340,583 |
| SWMU 8 | Capital and O&M, RAR document preparation | $2,823,000 | $2,184,244 |
| SWMU 6 | Capital and O&M, RAR document preparation | $45,000 | $427,344 |
| SWMU 20 | Capital and O&M, RAR document preparation | $235,750 | $402,471 |
| SWMU 4 | Capital and O&M, RAR document preparation | $855,520 | $149,945 |
| SWMU 27 | Capital and O&M, RAR document preparation | $112,000 | $334,553 |
| **Group C Sites** | | | |
| SWMU 2 and SWMU 3 | Capital and O&M, RAR document preparation | $2,200,000 | $5,700,000 |
| SWMU 33 | Capital and O&M, RAR document preparation | $242,600 | $379,000 |

IC = Institutional Controls
N/A = not applicable
O&M = operations and maintenance
OU = Operable Unit
SWMU = solid waste management unit
RAR = Remedial Action Report
ROD = Record of Decision
a, b, c = These costs were included in the total costs for Group A Sites
* = Actual cost estimates taken from respective RARs
** = O&M costs taken from URS 2005c

## 6.0 Five-Year Reviews

### 6.1 First Five-Year Review (September 2005)

The first Five-Year Review was completed September 2005. The Five-Year Review Report (URS, 2005a) concluded that the remedies at DDJC-Tracy are expected to be protective upon completion; in the interim, exposure pathways that could result in unacceptable risks are being controlled. Remedial actions completed at SWMU 2/3, SWMU 4, SWMU 6, SWMU 8, SWMU 27, SWMU 33, and DSERTS 67 are considered protective of human health and the environment. Remedial actions are still ongoing at OU 1 (groundwater extraction and treatment) and the Group A Sites (SVE at SWMU 1/Area 2, Area 1 Building 237, and Area 3).

### 6.1 Second Five-Year Review (September 2010)

The Second Five-Year Review reviewed the remedies at OU 1 (Groundwater) and at soil sites with LUCs (Area 1/Building 237, SWMU 1/Area 2, SWMU 2/3, SWMU 4, SWMU 6, SWMU 7, SWMU 20, SWMU 24, SWMU 33, DSERTS 67, DSERTS 72, Building 30 Drum Storage Area, Eastern Depot Soils Area and Southern Depot Soils Area). Due to EPA concerns with the Tracy August 27, 2010, Draft Second Five-Year Review, EPA deferred a Protectiveness Determination for Soils Sites until DLA submitted supplemental information. DLA subsequently provided an August 10, 2012, Second Five-Year Review Addendum, which EPA provided written concurrence on September, 21, 2012. As concluded in the August 2012 Five Year Review Addendum, the Soils Sites are protective in the long and short term and for the Groundwater OUs, the remedy is protective in the short-term. The next scheduled Five-Year Review will be in September 2015.

## 7.0 REFERENCES


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# Attachment A

# Figures

# Figure 1. Tracy Site Location Map

**Taken from Tracy Well Monitoring Program – 2011 Annual Monitoring Report (HDR, 2012b)**

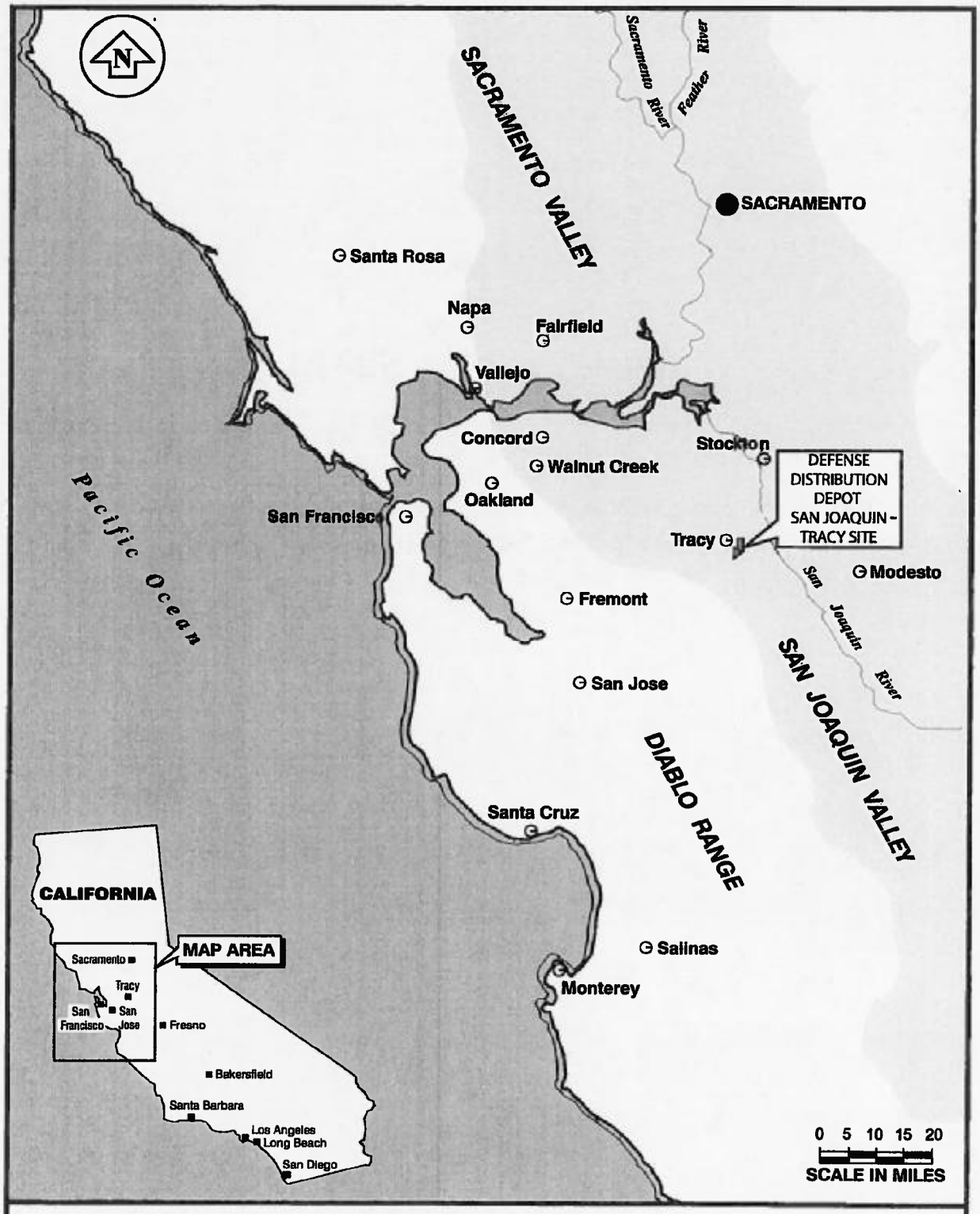


**Figure 1.1-1 Location of Defense Distribution Depot San Joaquin - Tracy Site**

# Figure 2. Tracy Site Map

**Taken from the Tracy Site 2004 Explanation of Significant Differences to the Comprehensive ROD (URS, 2004b)**

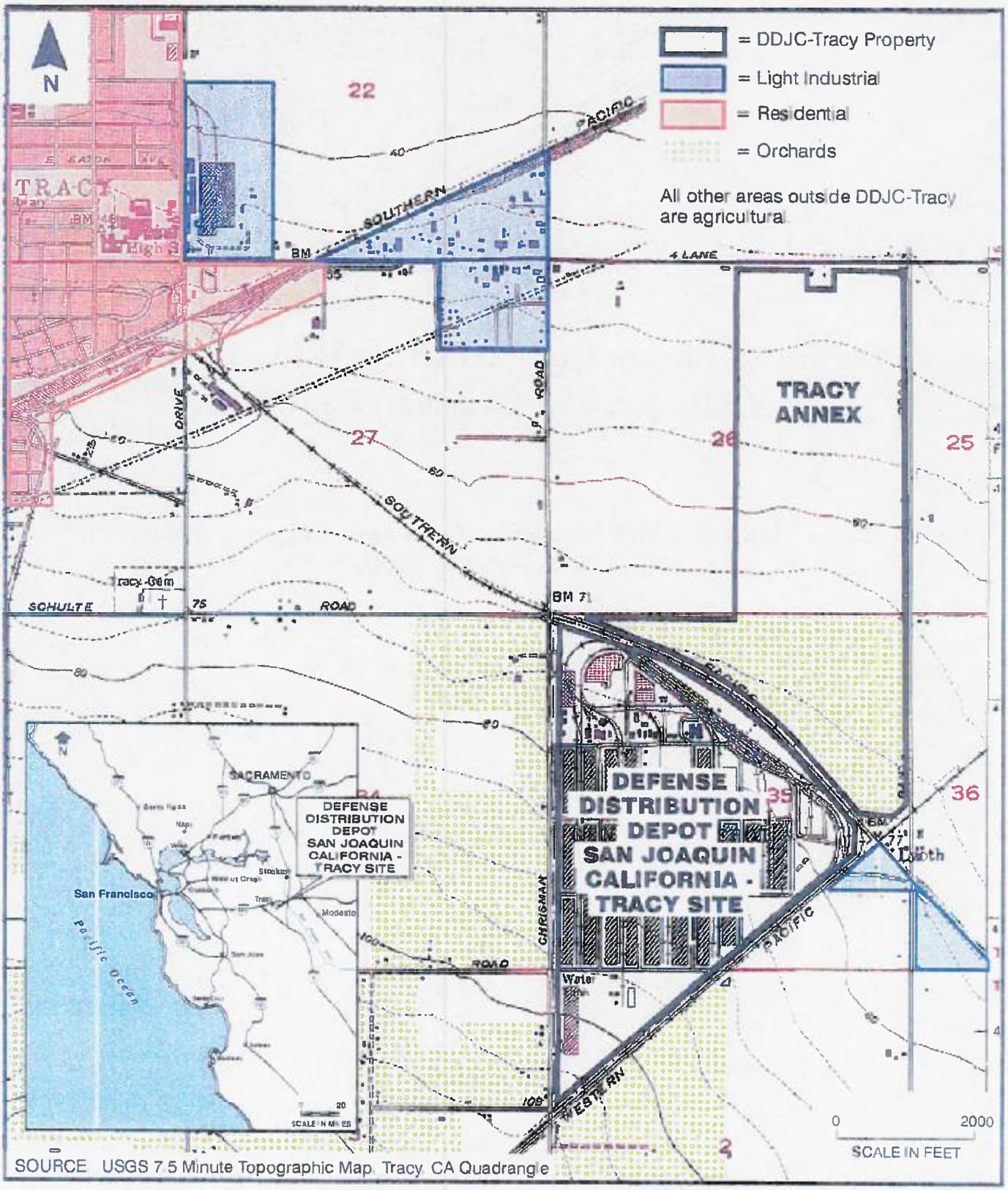


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**Figure 1-2. Site Map, DDJC-Tracy**

# Figure 3. Location of Extraction Wells, Infiltration Galleries, and Overland Flow Areas

**Taken from Tracy Well Monitoring Program – 2011 Annual Monitoring Report (HDR, 2012b)**

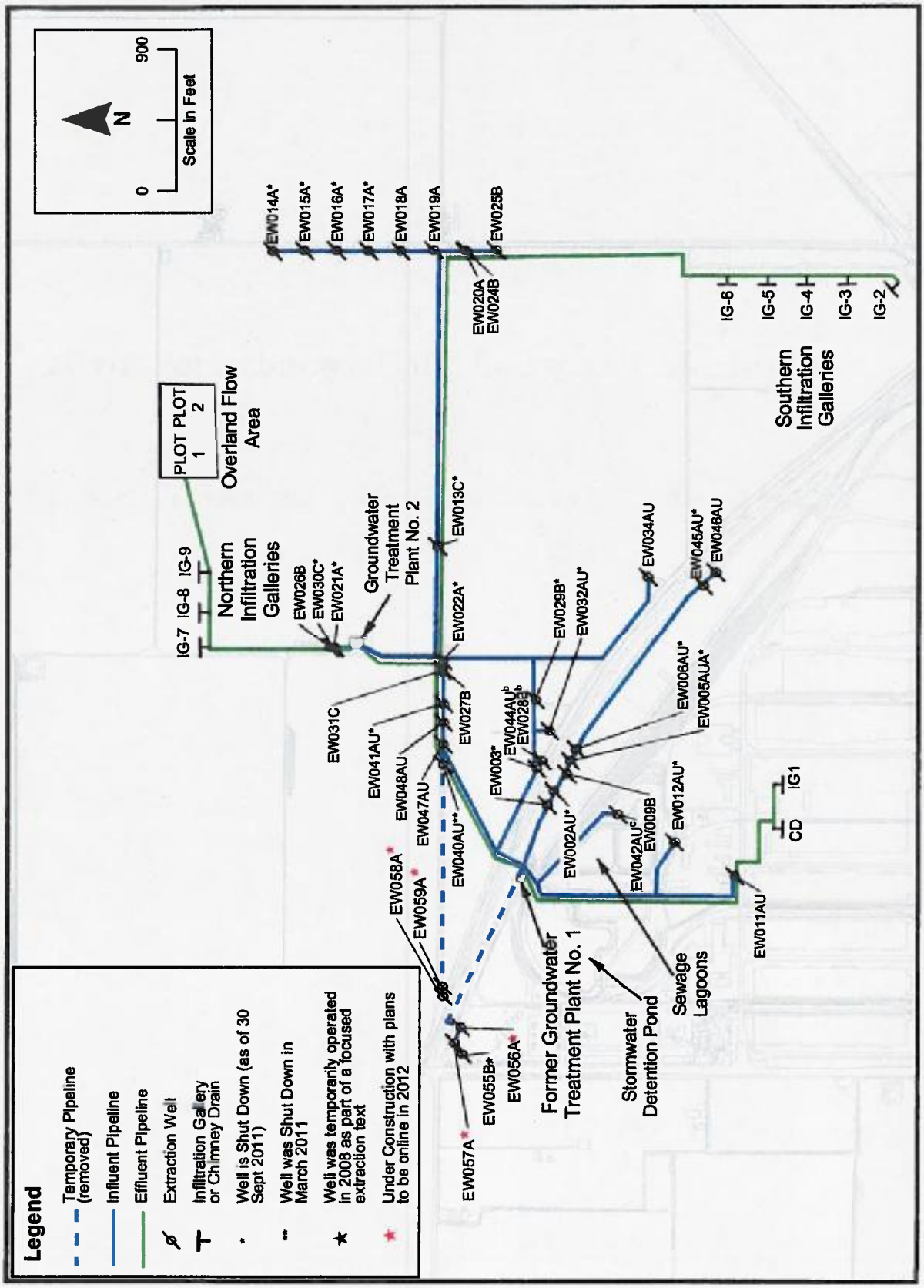


**Figure 5.2-1. Location of Extraction Wells, Infiltration Galleries, and Overland Flow Area, Tracy Site and Annex**

# Figure 4. Tracy Soil and Groundwater Areas

**Taken from the Tracy Five-Year Review - Addendum (URS, 2012)**

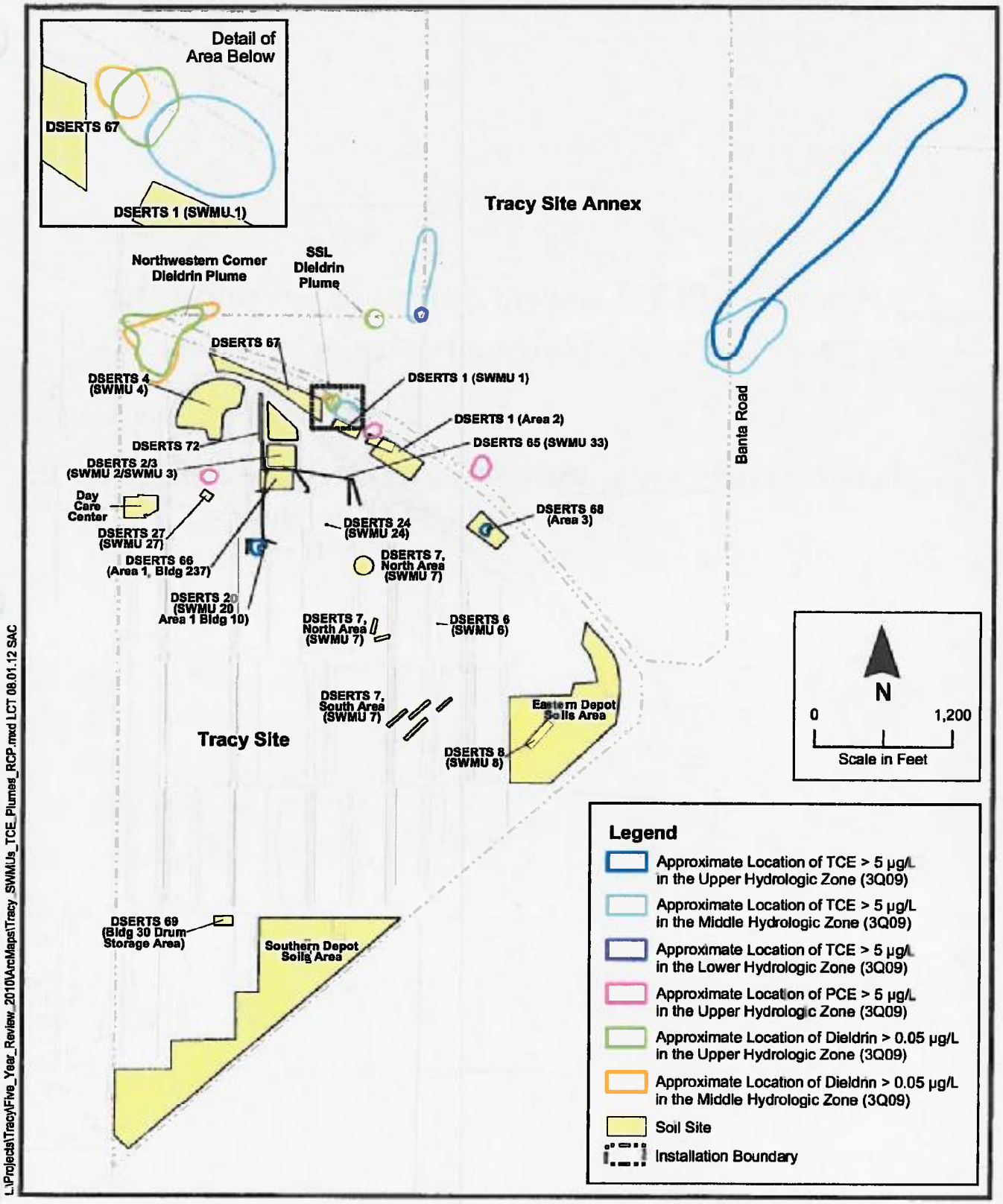


**Figure 1-1. Soil Sites and Groundwater Plumes, Tracy Site**

# Figure 5. TCE Concentrations in Groundwater Upper, Middle, and Lower Hydrologic Zones, 2011

**Taken from Tracy Well Monitoring Program – 2011 Annual Monitoring Report (HDR, 2012b)**

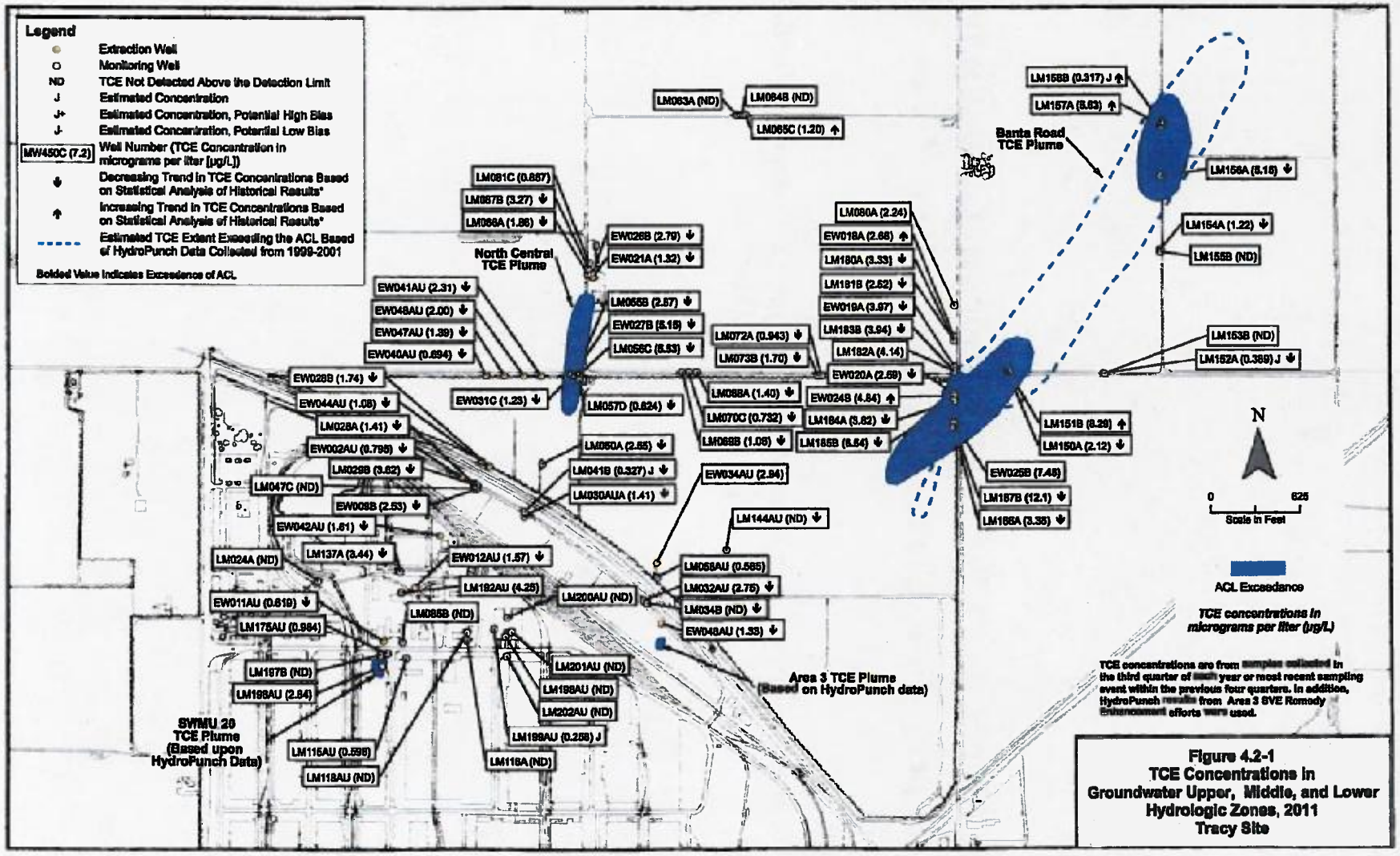


**Figure 4.2-1**
**TCE Concentrations in Groundwater Upper, Middle, and Lower Hydrologic Zones, 2011**
**Tracy Site**

# Figure 6. PCE Concentrations in Groundwater Upper, Middle, and Lower Hydrologic Zones, 2011

**Taken from Tracy Well Monitoring Program – 2011 Annual Monitoring Report (HDR, 2012b)**

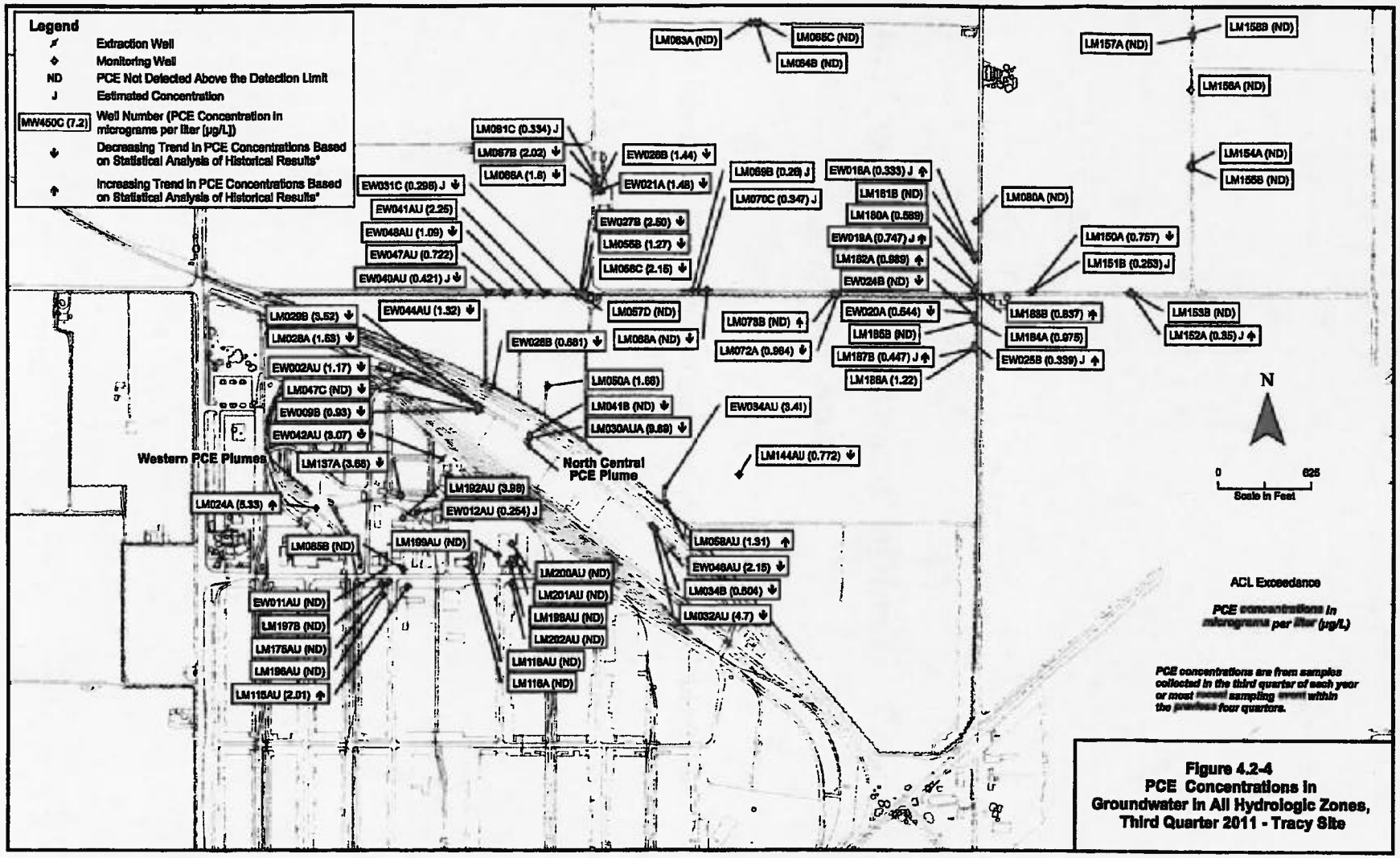


**Figure 4.2-4**
**PCE Concentrations in Groundwater in All Hydrologic Zones, Third Quarter 2011 - Tracy Site**

# Figure 7. Dieldrin Reported in the Upper Hydrologic Zone, 2011

**Taken from Tracy Well Monitoring Program – 2011 Annual Monitoring Report (HDR, 2012b)**

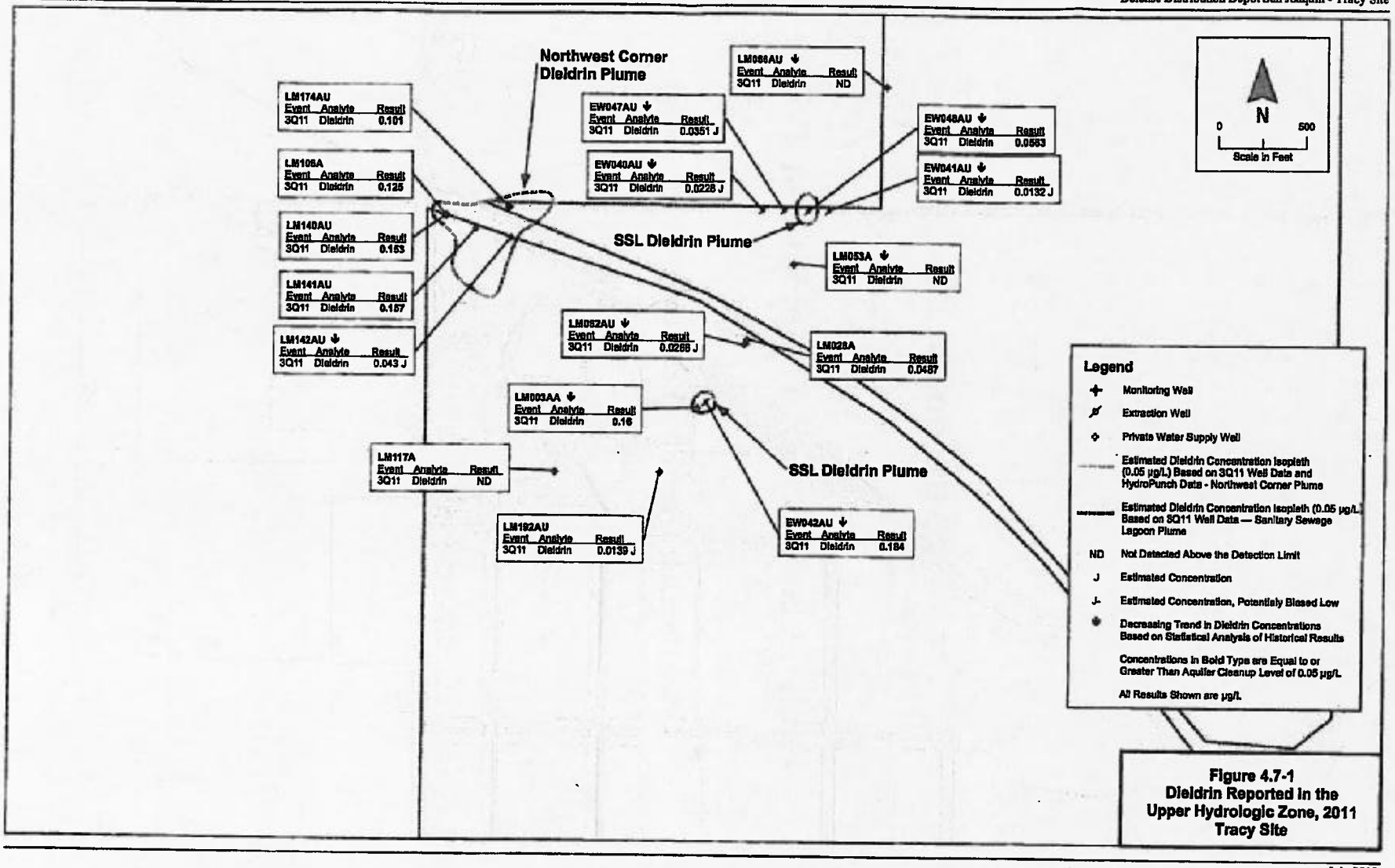


**Figure 4.7-1**
**Dieldrin Reported in the Upper Hydrologic Zone, 2011**
**Tracy Site**

# Attachment B

## Table 1. No Further Action Sites at Tracy

**Taken from the Tracy Five-Year Review (URS, 2005a)**

**Table 21-1. No Further Action Sites**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| SWMU 5 | Old Industrial Lagoon | VOCs, SVOCs, pesticides, petroleum hydrocarbons, and metals have not been released to the soil from disposal activities. The Phase I WQSA showed that concentrations of metals in site soils do not pose a threat to background water quality or beneficial uses of groundwater at SWMU 5. Low concentrations of TCE are present in groundwater downgradient from SWMU 5, but the concentrations of TCE are probably from another source. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 5 are migrating to groundwater or threatening human health or the environment. |
| SWMU 9 | Subsistence Waste Pit | No evidence of any buried disposal pit has been found. Metals were detected in site soils at concentrations that exceeded background thresholds slightly. However, the Phase I WQSA showed that concentrations of metals in site soils do not pose a possible threat to background water quality or beneficial uses of groundwater. Samples from monitoring wells adjacent to SWMU 9 do not indicate any groundwater contamination originates from the site.<br><br>Very little information is available concerning disposal activities at SWMU 9, and it is possible that the suspected subsistence waste pit reported at this site may instead be the disposal area identified at SWMU 8. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 9 are migrating to groundwater or threatening human health or the environment. |
| SWMU 10 | Medical Waste Burial Pit | No release of contaminants to soil or groundwater is associated with SWMU 10. No evidence of any subsurface disposal feature was found. No evidence of disposal or backfilling was observed during trenching and soil boring activities. The Phase I and Phase II WQSA showed that concentrations of metals in site soils do not pose a possible threat to background water quality or beneficial uses of groundwater. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 10 are migrating to groundwater or threatening human health or the environment. |
| SWMU 10A | Possible Medical Waste Burial Pit | SWMU 10A is recommended for NFA because there is no adverse human health risk posed by COPCs in site soils, and the COPCs that have been released to site soils (bis[2-ethylhexyl]phthalate, dieldrin, and metals) were seldom detected in soil samples and have not been detected in groundwater above background levels. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 10A are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| SWMU 11 | Lime/Foot Bath Burial | No disposal activities have been identified at SWMU 11. In addition, no potential source of soil or groundwater contamination has been identified at this site. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 11 are migrating to groundwater or threatening human health or the environment. |
| SWMU 12 | Embalming Fluid Dump | No contaminants have been released to the soil or groundwater from the disposal activities at SWMU 12. None of the soil and groundwater samples had detectable concentrations of formaldehyde or methanol. Results of the Phase I WQSA indicated that concentrations of metals in site soils do not pose a possible threat to background water quality or beneficial uses of groundwater at SWMU 12. COPC concentrations at SWMU 12 pose a cancer risk below $1 \times 10^{-6}$ and a hazard index of less than 1 for the construction worker. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 12 are migrating to groundwater or threatening human health or the environment. |
| SWMU 14 | Lubrication Oil Dump | SVOCs, pesticides, petroleum hydrocarbons, and metals have been released to vadose zone soils at SWMU 14. COPCs at SWMU 14 do not pose a threat to background groundwater quality based on the WQSA and analytical modeling. Monitoring results demonstrate that groundwater has not been impacted by activities at SWMU 14. COPCs at SWMU 14 result in a cancer risk that is below $1 \times 10^{-6}$ and a hazard index of less than 1 for the construction worker. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 14 are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| SWMU 15 | Pesticide Waste Trench | There has not been a release of contaminants from the former pesticide waste trench to the soil and groundwater. During drilling activities, no subsurface evidence of a disposal area was identified. The presence of DDT in one soil sample at a low concentration is most likely related to a minor isolated spill or routine use of pesticides in the vicinity of DDJC-Tracy and, therefore, is not interpreted as indicative of a single identifiable contaminant source. The presence of two metals in one sample at concentrations only slightly exceeding background may result from inherent natural variability in the environment and not be evidence of a contaminant source. The results of the Phase I WQSA showed that concentrations of metals in site soils do not pose a possible threat to background water quality or beneficial uses of groundwater. Based on the results of the analytical modeling, the constituents detected in site soils at SWMU 15 do not pose a threat to groundwater. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 15 are migrating to groundwater or threatening human health or the environment. |
| SWMU 16 | Possible Hazardous Waste Storage Area | There was no evidence of a disposal area at SWMU 16 based on the results of the Phase I RI sampling and field observations made during drilling. Metals were detected at concentrations only slightly greater than DDJC-Tracy background levels in deep soil samples, and only beryllium was detected at a concentration greater than two times its background threshold value. The metals exceeding background levels may result from inherent natural variability in the environment. All metals concentrations are less than the range of background values compiled for California and the San Joaquin Valley. The low levels of OC pesticides, dioxins, and radionuclides are limited in occurrence and are likely to represent background conditions at DDJC-Tracy. Results of the WQSA and analytical modeling performed indicate that constituents detected in site soils do not pose a threat to groundwater. COPCs at SWMU 16 pose a cancer risk that is below $1 \times 10^{-6}$ and a hazard index of less than 1 for the construction worker. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 16 are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| SWMU 21 | Battery Acid Dump | No contaminants have been released to the soil and groundwater from the battery shop activities at SWMU 21. The isolated detection of beryllium in soil at a concentration only slightly above the background reference levels is attributed to the natural variability in the environment. Although total barium and iron were detected at concentrations slightly above background in groundwater, these metals were not detected in site soils above background levels. It was determined that beryllium in soil is unlikely to reach the groundwater within 100 years. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 21 are migrating to groundwater or threatening human health or the environment. |
| SWMU 22 | Previous Hazardous Material Storage Area | No release of contaminants to the soil from disposal activities is associated with SWMU 22. There are no historical data to suggest that metal-containing wastes were stored at this site, and the low concentrations of COPCs (beryllium, chromium, and molybdenum) detected are not distributed in any identifiable spatial pattern that would be indicative of an anthropogenic source. In addition, these three metals have not been detected above background in four quarters of groundwater monitoring of downgradient monitoring wells. Low levels of TCE and metals (copper and manganese) have been inconsistently detected in groundwater samples collected at SWMU 22; however, these constituents may be attributed to another source (SWMU 8) because they were not detected in soil above the background threshold at SWMU 22. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 22 are migrating to groundwater or threatening human health or the environment. |
| SWMU 23 | Building 26 Recoup Operations | Low levels of contaminants were detected in sludge. None of the contaminants was present above a concentration that would pose an unacceptable risk to human health, ecological receptors, or groundwater quality. The sludge has been removed. The floor drain connects into the IWPL, and contamination in the IWPL is being addressed under SWMU 20 and SWMU 33. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 23 are migrating to groundwater or threatening human health or the environment. |
| SWMU 25 | Boundary Roads | No release of contaminants to site soils is associated with SWMU 25 dust-control activities. OC pesticides were not detected above background threshold levels, and petroleum hydrocarbons in the form of TPHD and TPHG were not detected. In addition, the results of the Phase I WQSA showed that concentrations of metals in site soils do not pose a possible threat to background water quality or beneficial uses of groundwater at SWMU 25. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 25 are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| SWMU 29 | Used Motor Oil Disposal Pit | No potential source of soil and groundwater contamination was identified at SWMU 29. No other evidence indicates the presence or location of the used motor oil pit. Because no evidence of any disposal area or contamination was found within SWMU 29, no known risks to human health or the environment are caused by conditions at the site. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 29 are migrating to groundwater or threatening human health or the environment. |
| SWMU 30 | Salvage Area | Low levels of VOCs were detected in soil gas samples; however, no spatial pattern indicating a source area was observed. Isolated low concentrations of PAHs and phenols were detected in soil samples. The results of the Phase I WQSA showed that concentrations of metals in site soils do not pose a threat to background water quality or beneficial uses of groundwater at SWMU 30. Phenols and benzene pose a potential threat to groundwater at SWMU 30 based on the results of the analytical model. However, these constituents are not considered a threat to groundwater because the presence of phenols is not considered representative of current site conditions, and benzene was not detected in site soil samples. COPCs at SWMU 30 do not contribute to the human health risk calculated for the exposure unit associated with this site. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 30 are migrating to groundwater or threatening human health or the environment. |
| SWMU 31 | Wood Preservation Area | No contaminants have been released to the soil and groundwater from the wood preservation activities at SWMU 31. The occurrence of concentrations of nickel, manganese, and barium at concentrations only slightly above the background levels in two of four samples from one soil boring location are attributed to natural variability in the environment or minor spills. The results of the Phase I WQSA showed that concentrations of metals in site soils do not pose a threat to background water quality or beneficial uses of groundwater at SWMU 31. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 31 are migrating to groundwater or threatening human health or the environment. |
| SWMU 64 | Waste Oil Pit | The isolated occurrence of metals detected above background is not indicative of a contaminant source. The presence of metals at concentrations only slightly exceeding background may be caused by the variability of natural background concentrations. Based on the results of the Phase I RI activities, no contaminants have been released to the soil or groundwater from the former storage tank at SWMU 64. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at SWMU 64 are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| SWMU Number/ Site | Description | Basis for No Action Determination (Radian International, 1998a) | Assessment of No Further Action Determination |
|---|---|---|---|
| Area 1 Building 236 | Past Solvent Storage and Use | No release of contaminants is associated with solvent storage activities at Area 1 Building 236. Although methylene chloride was detected in site soils during previous investigations, the results of the Phase I investigation did not confirm the presence of methylene chloride contamination in the soil at Building 236. In addition, 23 soil borings were drilled during investigations near Building 236, and methylene chloride contamination in soil was not found. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at Area 1 Building 236 are migrating to groundwater or threatening human health or the environment. |
| Drum Storage Area Building 15 | Drum Storage Area | No VOC or SVOC constituents were detected in any of the soil samples collected in the vicinity of Building 15. Because no chemicals were detected in soil samples from the Drum Storage Area Building 15, no known risks are associated with this site. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at Drum Storage Area Building 15 are migrating to groundwater or threatening human health or the environment. |
| Drum Storage Area Building 22 | Drum Storage Area | No release of contaminants is associated with drum storage at Building 22. VOCs were not detected above the reporting limits in soil samples. Phthalate compounds were detected sporadically and attributed to field or laboratory contamination. VOC contamination in nearby wells is probably related to disposal activities at other sites. The results of the analytical modeling indicated that bis(2-ethylhexyl)phthalate posed a threat to groundwater; however, surface infiltration at the site is not sufficient to transport di-n-butyl phthalate to groundwater. Numerical modeling results from other sites that had similar site conditions and concentrations of phthalates were applied to Drum Storage Area Building 22 to further evaluate contaminant fate and transport. Based on this comparative assessment, bis(2-ethylhexyl)phthalate does not pose a threat to groundwater at Drum Storage Area Building 22. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at Drum Storage Area Building 22 are migrating to groundwater or threatening human health or the environment. |
| Building 23 | Storage Areas | There has not been a release of contaminants at Building 23. VOC concentrations above the reporting limit were not detected in soil samples. A phthalate compound was detected in one sample but was attributed to laboratory-related contamination. COPC concentrations detected at Building 23 impose a cancer risk that is below $1 \times 10^{-6}$ and a hazard index of less than 1 for the construction worker. | No findings from the Annual Monitoring Program suggest that any COPCs in soil at Building 23 are migrating to groundwater or threatening human health or the environment. |

**Table 21-1. (Continued)**

| | | |
|---|---|---|
| COPC | = | contaminant of potential concern |
| DDJC | = | Defense Distribution Depot San Joaquin California |
| DDT | = | dichlorodiphenyltrichloroethane |
| IWPL | = | industrial wastewater pipeline |
| NFA | = | no further action |
| OC | = | organochlorine |
| PAH | = | polycyclic aromatic hydrocarbon |
| RI | = | remedial investigation |
| SVOC | = | semivolatile organic compound |
| SWMU | = | Solid Waste Management Unit |
| TCE | = | trichloroethene |
| TPHD | = | total petroleum hydrocarbon as diesel |
| TPHG | = | total petroleum hydrocarbon as gasoline |
| VOC | = | volatile organic compound |
| WQSA | = | water quality site assessment |