Final

U.S. Army BRAC 2005 Environmental Condition of Property Phase I Report Riverbank Army Ammunition Plant Riverbank, California

Prepared for

United States Army

November 17, 2006

CH2MHILL

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Acronyms and Abbreviations

°C	Celsius
°F	Fahrenheit
µg/L	micrograms per liter
ACM	asbestos-containing materials
AGSC	Ahtna Government Services Corporation
ALCOA	Aluminum Corporation of America
AOC	Area of Concern
AR	U.S. Army Regulation
ASCS	Agricultural Stabilization and Conservation Service
ASR	Archive Search Reports
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AUTODIN	Automated Digital Information Network
Bgs	below ground surface
BRAC	Base Realignment and Closure
BRACD	BRAC Division
BTEX	benzene, toluene, ethyl benzene, and total xylenes
Btu	British thermal unit
CA	California
CA EPA	California Environmental Protection Agency
CACA	Corrective Action Consent Agreement
CCRs	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
Cfs	cubic feet per second
CHPPM	Army's Center for Health Promotion and Preventive Medicine
Cm	centimeters
CO	carbon monoxide
CORRACTS	RCRA Corrective Action Sites
Cortese list	CA DTSC Hazardous Waste and Substances Sites List
DLM	Designated Level Methodology
DMM	discarded military munitions
DNT	dinitrotoluene
DoD	Department of Defense
DTSC	Department of Toxic Substances Control

EA	Environmental Assessment
E/P	Evaporation/Percolation
EBS	Environmental Baseline Study
ECP	Environmental Condition of Property
EPIC	Environmental Photographic Interpretation Center
EQR	Environmental Quality Report
FFPR	Firm Fixed Priced Remediation
FID	Facility Inventory Database
FS	Feasibility Study
FY	fiscal year
GOCO	Government-Owned, Contractor-Operated
Gpm	gallon per minute
GPR	ground-penetrating radar
GWTP	Groundwater Treatment Plant
GWTS	Groundwater Treatment System
HAZNET	Hazardous Waste Information System, a database that contains information on facilities that ship hazardous wastes by obtaining data from hazardous waste manifests received each year by the DTSC
HIST UST	historical inventory of UST sites
HRR	Historical Records Review
HRS	Hazard Ranking System
IC	institutional control
IGWTS	Interim Groundwater Treatment System
IPMP	Installation Pest Management Plan
IPRG	industrial preliminary remediation goals
IRP	Installation Restoration Program
IWCS	Industrial Wastewater Collection System
IWTP	Industrial Wastewater Treatment Plant
Kg	Kilograms
kW	Kilowatt
LBP	lead-based paint
LPG	Liquefied petroleum gas
LTM	long-term management
LUST	leaking underground storage tank
MC	munitions constituents
MCL	maximum contaminant level
MEC	munitions and explosives of concern
Mg/kg	milligrams per kilogram

Mg/L	milligrams per liter
Mm	millimeter
MMRP	Military Munitions Response Program
MR	Munitions Response
MTBE	Methyl tert-butyl ether
NARA	National Archives and Records Administration
NC	nitrocellulose
NEPA	National Environmental Policy Act
NFA	No Further Action
NFRAP	No Further Remedial Action Planned
NG	nitroglycerine
NI Industries	NI Industries, Inc.
NOV	Notice of Violation
NO_x	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NTNC	nontransient, noncommunity
NW	Northwest
O&M	operations and maintenance
OID	Oakdale Irrigation District
PA	Preliminary Assessment
PBC	Performance-Based Contract
PCB	polychlorinated biphenyl
PETN	pentaerythritoltetranitrate
POC	Point of Compliance
POTW	publicly owned treatment works
PM_{10}	Particulate matter of 10 microns in diameter or smaller
Ppb	parts per billion
Ppm	parts per million
PRG	preliminary remediation goals
Psi	pounds per square inch
PVC	polyvinyl chloride
RA	Remedial Action
RAO	Remedial Action Objective
RBAAP	Riverbank Army Ammunition Plant
RC	Response Complete
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
REC	Recognized Environmental Condition
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision

RQ	reportable quantity
RWQCB	California Regional Water Quality Control Board
SE	Southeast
SO_x	sulfur oxide
SPCCP	Oil Spill Prevention Control and Countermeasure Plan
SVOC	semivolatile organic compound
SWEEPS UST	Statewide Environmental Evaluation and Planning System UST site listing
SWMU	solid waste management unit
SWPPP	Storm Water Pollution Prevention Plan
TPH	total petroleum hydrocarbon
TRPH	total recoverable petroleum hydrocarbons
TSD	Treatment Storage and Disposal
UF	ultrafiltration
U.S.	United States
USACE	U.S. Army Corps of Engineers
USAEC	U.S. Army Environmental Center
USAMC	U. S. Army Material Command
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	underground storage tank
UXO	unexploded ordnance
VOC	volatile organic compound
VSI	visual site inspections
WDR	Waste Discharge Requirements
WDS	Waste Discharge System

Executive Summary

The U. S. Army Corps of Engineers (USACE) Louisville District has prepared this Environmental Condition of Property (ECP) report for the Riverbank Army Ammunition Plant (RBAAP). RBAAP is located in Stanislaus County, California, approximately 5 miles northeast of the city of Modesto. The study area for this ECP consists of two noncontiguous areas represented by the main plant area and the Evaporation/Percolation (E/P) Ponds, (hereafter referred to jointly as the "Property"). The E/P Ponds are located approximately 1.5 miles north of the RBAAP boundary along the Stanislaus River.

This ECP report was prepared to support the Department of Defense (DoD) mission to dispose of Base Realignment and Closure (BRAC) 2005 real property in a timely manner. Prior to outgrant or transfer, a reliable assessment of the current environmental condition of the real property must be completed. The assessment is in accordance with United States (U.S.) Army Regulation (AR) 200-1, Environmental Protection and Enhancement. As part of the report preparation, the Property and adjacent properties were inspected between June 19 and June 23, 2006.

This Executive Summary briefly describes the current and former uses of the Property, the areas of potential environmental concern that were evaluated during the ECP process, and the DoD Environmental ECP category for this Property.

Site Description and Historical Use

The RBAAP facility is located at 5300 Claus Road, Riverbank, Stanislaus County, California, 1 mile south of the Stanislaus-San Joaquin County border. The plant lies in the San Joaquin Valley in central California to the west of the Sierra Nevada Mountains (CH2M HILL, 2005a). The main plant area of RBAAP occupies a total of 146 acres and the E/P Ponds occupy 27 acres. The four E/P Ponds receive treated water from the Industrial Wastewater Treatment Plant (IWTP) and the Groundwater Treatment Plant (GWTP). In general, the plant production area is mostly paved and consists of seven production lines, process water/groundwater treatment facilities and various buildings used for maintenance, administration, and storage.

The RBAAP is bordered on the north, west, and south by sparse residential areas, with the densest housing community lying west of the plant. The RBAAP is bordered on the east by pastureland.

The plant was originally constructed under authority of the Defense Plant Corporation in 1942 by Aluminum Corporation of America (ALCOA) as an aluminum reduction plant. Until the government acquired the property, the land was used for agricultural purposes.

Methodology

Methods employed in conducting the ECP assessment were as follows:

- Specific study sections were developed for presentation of data in the body of this report and for the appropriate category designation in the conclusion of this report.
- A visual site inspection (VSI) of the Property was performed from June 19 through June 23, 2006.
- A summary of past aerial photographs was reviewed and incorporated into the findings of this report.
- Relevant environmental records and investigations were reviewed and the findings incorporated into this report.
- A search of local, state, and federal environmental databases was undertaken for the Property for listed facilities within standard search distances.
- Key past and current facility employees—identified by the U.S. Army Environmental Center (USAEC) and the Louisville District U.S. Army Corps of Engineers (USACE)—and RBAAP personnel were interviewed.
- A record was maintained of the documents reviewed and individuals contacted.

Property Categorization

Based on analysis of the available data, the Property was classified into one of seven categories:

- **Category 1:** Areas where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
- **Category 2:** Areas where only release or disposal of petroleum products has occurred
- **Category 3**: Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response
- **Category 4**: Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken
- **Category 5:** Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions that have not yet been taken
- **Category 6:** Areas where release, disposal, and/or migration of hazardous substances has occurred, but where required actions have not yet been implemented
- **Category 7:** Areas that are not evaluated or that require additional evaluation

Buildings or areas in this ECP that are designated as Category 7 sites, where further investigation is warranted, are also considered a **recognized environmental condition (REC)** as defined by ASTM D6008-96 (2005).

Findings of this ECP report were based on readily available environmental information; interviews with site personnel; review of previous environmental records and

investigations; and review of federal and state file information related to the closure of underground storage tanks located at the Property. Results were also based on visual observations of the site and adjacent properties.

Table ES-1 provides the approximate acreage for each of the property categories. Figure ES-1 at the end of this section provides a map of the ECP categories at the Property.

TABLE ES-1
ECP Property Category Acreage Summary
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Property Category	Acreage[1]
1	45.710
2	0.026
3	56.012
4	28.233
5	37.004
6	0.000
7	5.568
Total Acreage[1]	172.543

Note: [1] These acreages are generated using Geographic Information System mapping and are approximated. This acreage includes the E/P Ponds.

Category 1 Property

All parcels listed as a Category 1 are considered "uncontaminated property" (as amended by the Fiscal Year 1997 Defense Authorization Act) where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas). The Community Environmental Response Facilitation Act (CERFA) Section 120[h] (4)(iii) and (iv) and amendment to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980(CERCLA, Section 120[h]) was enacted to facilitate the rapid return of uncontaminated properties identified during the BRAC process to the local communities. The following parcels have been classified as Category 1 properties:

- **AOC 9B Vertical ASTs – Fire Sprinkler Storage Tank**: This tank has only contained water for the fire sprinkler system and the high-pressure water distribution system.
- **AOC 10, Former Solid Waste Pile (Southeast Corner):** No known wastes have been stored at this site. There are no reported releases or spills at this site.
- **Buildings** 138, 139, and 188.
- **Open Areas:** Open Land, North Railroad Area, South Parking, Southeast Utilities, South Open Storage.

Category 2 Property

Areas in which only release or disposal of petroleum products has occurred include:

- **SWMU 25, Former UST:** The underground storage tank T137 was removed and was given the regulatory status of no further action.
- **AOC 11B, Loading Racks – Fire Sprinkler Pumping Station**: Category 2 based on small lens of petroleum contaminated soil remaining beneath Building 137, associated with UST T137.
- **Building 4, Sump 4-11:** Elevated levels of oil and grease were found in a soil sample below the sump. The potential for migration in the soil is limited because of the relatively low concentration of residual oil and grease that remains in this area and because the area is beneath the concrete foundation of the building and crane support (Norris-Riverbank. 1998j).
- **Building 10, Soil Samples:** Surface samples collected outside Building 10 along the southwest and northwest fenced perimeters indicated levels of oil and grease at 1,400 mg/kg (above the regulatory limits of 1,000 mg/kg). The location of this sample was in an area historically used to store hydrocarbons.
- **Building 137:** Based on the removal of UST T137, a small lens of petroleum contaminated soil remains beneath Building 137.

Category 3 Property

Areas in which release, disposal, or migration of hazardous substances has occurred in concentrations that do not require a removal or other remedial response are listed below. Groundwater in certain areas of RBAAP has been shown to have levels of chromium and cyanide that are currently below maximum contaminant levels (MCLs). As a result, the entire area lying above the generalized area defined as contaminated groundwater is designated as Category 3.

- **RBAAP-02, Waste Salt Disposal Pit; Solid Waste Management Unit (SWMU) 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit), Facility 161:** The waste salt disposal pit was never used for its intended purpose, or for any other purpose. Sampling was not conducted at the site based on this information, and it is considered response complete under the IRP.
- **RBAAP-04, IWTP Effluent Sewer Line Break; SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main):** An unknown amount of treated wastewater leaked from the pipe. Subsequent sampling of the soil in the vicinity of the line break identified no contamination. The IRP investigation has been completed.
- **RBAAP-05, Building 13, Chromium Pretreatment; SWMU 5, Chromium Reduction Unit (Building 13):** The system was installed in 1978 as part of an upgrade to the IWTP, but a groundwater investigation concluded that the major source of chromium contamination was the leaking tanks of the IWTP and that it had occurred prior to the system upgrade. There were no releases, and the site is considered response complete under the IRP.
- **RBAAP-07, Building 13 Phosphoric Acid Spill; AOC 7, Phosphoric Acid Spill Area (1978):** The contaminants of concern identified in the groundwater investigations included chromium and cyanide, neither of which were associated with the phosphoric

acid spill. The spill was contained inside the building and to the sewer system. The IRP investigation has been completed.

- **RBAAP-09, NW Storm Reservoir; SWMU 20, NW Storm Reservoir, Facility 127:** Analysis of two sediment samples taken at the reservoir indicated that the reservoir is not a source of groundwater contamination. The IRP investigation has been completed.
- **RBAAP-10, Sewage Treatment Plant/Sludge Beds; SWMU 22, Sanitary Wastewater Settling Ponds:** Sampling at the sludge beds concluded that the area did not contain chromium or cyanide above background levels. The IRP investigation has been completed.
- **SWMU 5, Chromium Reduction Unit (Buildings 13):** The unit consists of a 1,200-gallon stainless steel tank. Sodium metabisulfide was added to chromic acid solution to reduce hexavalent chromium to a trivalent state in a batch process. The wastewater was then piped to the IWTP for further treatment. No evidence was found that any releases occurred from this unit.
- **SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main):** A break in the effluent sewer line that runs from the IWTP to the E/P Ponds occurred in 1972. Sampling was conducted in this area. A status of no further action was applied to this unit.
- **SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit):** The waste salt disposal pit originally was constructed in 1969 for use as an evaporation basin for wash water from a nitrate molten salt annealing process. However, the pit never was used for this or any other purpose. It was determined that no further action was required at the Former Sludge Desiccating Pit.
- **SWMU 20 – Northwest Storm Reservoir:** The NW Storm Reservoir is located in the northern portion of the site. The reservoir receives stormwater from most of the installation and from the SE Storm Reservoir. It was determined that no further action was required at the NW Storm Reservoir.
- **SWMU 22, Sanitary Wastewater Settling Ponds:** The sanitary sewage beds (also known as the sanitary wastewater settling ponds) located at the northern portion of the facility were in operation from 1944 to approximately 1987 when the plant was connected to the City of Riverbank sewage system. Investigations did not indicate constituent concentrations above background and no releases were reported from this unit. It was determined that no further action was required at the Sanitary Wastewater Settling Ponds.
- **SWMU 25, Former USTs:** Underground storage tanks 11A, 24, 25, 26, 27, 28, 29, 30, 31, and 32 were removed or closed in-place and were given the regulatory status of no further action.
- **AOC 1, Mortar Line Accumulation Area (Building 4**): Previous investigations at this AOC 1 did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 5, Former Windrowed Area:** This site was used as an area for collection and burning of vegetation growth collected from other areas of the Property. Based on

available information, no hazardous materials or wastes were stored or used in this area, and there have been no known spills or releases reported in this area.

- **AOC 7, Phosphoric Acid Spill Area (1978):** The phosphoric acid spill area was in the phosphate coating area, upstairs in the southern end of Building 13. The 100-gallon spill occurred near a process unit for the zinc-phosphate coating of M42 Grenade casings. Because the spill was contained inside the building and in the sewer system, it was determined that no further action was required for this AOC.
- **AOC 9A Vertical ASTs – Fuel Oil Storage Tanks**: These two tanks were originally used for fuel oil storage and were converted to temporary storage of treated groundwater in 1991. Prior to this use, the tanks were cleaned and inspected. The integrity of the associated piping was reported to be good. There have been no reported releases from these tanks.
- **AOC 12, IWCS:** There have been no releases or spills reported at the IWCS. A pipeline video survey and subsurface sampling completed in 2004 indicated that no significant leaks had occurred and that contaminants did not exceed industrial PRGs. No further action was recommended in the Final RFI (CH2M HILL. 2005a). Additional soil sampling may be required when the IWTP undergoes closure.
- **AOC 14, Zinc-Cyanide Wastewater Collection System**: No known releases were reported from the system. A pipeline video survey was attempted, but all entry and exit points along the former line had been sealed. A soil boring advanced along the line in 2004 did not indicate contamination. This result, coupled with the waste line's limited operation (the waste line was in use from 1954 to1958), suggest the probability of significant releases of contamination is low.
- **AOC 15, Building 13 Temporary Wastewater Line:** There have been no reported releases associated with this wastewater line. The line has been removed from the building and capped on the outside.
- **Structure 54, Substation No. 13: D**uring CH2M HILL's visual site inspection on June 22, 2006, oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 32 ppm and 40 ppm, respectively. Because the integrity of the concrete appeared to be good and there were no nearby unpaved areas, the potential for PCBs to have impacted the soil is considered low. Therefore, further investigation at this site does not appear to be warranted.
- **Structure 96, Substation No. 2:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 8.4 ppm and 2.7 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soils in this unpaved area.
- **Building 117, Former Cooling Tower:** Building 117 was the main cooling tower for the production lines. The cooling water in the tower used Dearborn 533 as a corrosion inhibitor that contained 44.3 percent chromate as CrO_4. The report indicated that 9.8 kg of Dearborn 533 was added per day to the cooling tower water. The chemical might

have been used from the time the tower was built in the 1950s through the late 1980s. Based on this information, there is a potential for low concentrations (i.e., below industrial PRGs) of chromate to have impacted the unpaved areas surrounding Building 117 as a result of water droplet drift from the cooling tower operations.

- **Building 145, Substation No. 18:** During CH2M HILL's visual site inspection on June 22, 2006, oil staining was observed on concrete at the base of one transformer with a PCB concentration of approximately 30,000 ppm. Because the integrity of the concrete appeared to be good and there were no nearby unpaved areas, the potential for PCBs to have impacted the soil is considered low. Therefore, further investigation at this site does not appear to be warranted.

Category 4 Property

Areas in which release, disposal, or migration of hazardous substances has occurred, but all removal or other remedial actions necessary to protect human health and the environment have been taken include:

- **RBAAP-08, SE Storm Reservoir; SWMU 21, SE Storm Reservoir, Facility 135:** PCBs were detected at concentrations above industrial PRGs in soil samples taken in 2003. In 2004, approximately 15 cubic yards were excavated and disposed of at an offsite Class I landfill. Confirmation samples were nondetect, and no further action was recommended in the Final RFI.

- **RBAAP-11, E/P Ponds (Stanislaus); SWMU 23, E/P Ponds:** Zinc-contaminated soil was excavated and disposed of during a 1993 removal action. Confirmation samples taken during the removal indicated that remaining soils did not exceed the established action levels. The IRP investigation has been completed.

- **SWMU 21, Southeast Storm Reservoir:** The SE Storm Reservoir is located at the southeastern corner of the production area. This reservoir receives stormwater from the southeastern area of the facility. Collected stormwater is pumped to the NW Storm Reservoir for ultimate discharge offsite. It was determined that no further action was required at the SE Storm Reservoir.

- **SWMU 24, Industrial Waste Pipe Leak:** Wastewater leaked in 1990 from a pipe that led from the chromium reduction unit in Building 13 to the IWTP. Norris Industries excavated the soil in the area to repair the break, and disposed of the soil through a qualified waste hauler. Confirmation sampling indicated that elevated levels of inorganics were not present, and DTSC agreed that no further action is required at this site.

- **AOC 16, Substation 5 and Storm Drain Discharge Basin:** PCBs were detected in soil at Substation 5 in 2001. In 2003, more samples were taken at this location and at the SE Storm Reservoir, which also revealed PCB contamination. In 2004, approximately 60 cubic yards of gravel and soil were excavated from Substation 5, and 15 cubic yards of soil were removed from the SE Storm Reservoir. Confirmation sampling of Substation 5 indicated that all of the impacted soil had been removed and the excavation was backfilled with clean soil and gravel. Confirmation sampling of the SE Storm

Reservoir came back nondetect, and the AOC was recommended for no further action in the Final RFI.

Category 5 Property

Areas in which release, disposal, or migration of hazardous substances has occurred, and removal or other remedial actions are under way, but all required actions have not yet been taken are listed below. Groundwater in certain areas of RBAAP has been shown to have concentrations of chromium and cyanide above MCLs. As a result, the entire area lying above the generalized area defined as contaminated groundwater is designated as category 5. (See Figure 5-1 later in this report).

- **RBAAP-01, Landfill; SWMU 10, Landfill (Southern Portion); SWMU 11, Landfill (Northern Portion)**: The source of groundwater contamination has been depleted at the landfill. The RBAAP has installed a clay cap, which will be maintained, and this site will be subject to long-term management (LTM). The remedy is protective of human health and the environment.
- **RBAAP-03, Contaminated Groundwater:** The expansion of the GWTP is a response action to groundwater contamination from the IWTP. The IWTP is a source of chromium and cyanide contamination in groundwater. The former redwood tanks have been replaced with concrete tanks. LTM and operations of RBAAP-03 will continue and the remedy is protective of human health and the environment.
- **SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility):** This is a storage facility only, and there have been no releases reported at this location.
- **SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area), Building 20:** Although no releases have been reported for this site, this area was suspected as a potential source of contamination. Based on this information, soil and soil gas samples were taken during the Remedial Investigation (RI). Soil results did not indicate inorganics above background levels, and soil gas results indicated the site was an unlikely source of VOC contamination.
- **SWMU 6, Chromium Reduction Unit (Building 1):** There is no evidence of any release reported for this unit.
- **SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area):** There have been no releases reported at this facility. Rinse water from drums containing hazardous materials are collected in a sump, pumped to an oil/water separator, and pumped to the IWTP for treatment.
- **SWMUs 10 and 11, Landfill (Southern and Northern Portions): T**he landfill underwent formal closure, which was completed in 1996. No further action is required for the landfill.
- **SWMU 13, Incinerator (Building 123):** There have been no reported releases at this facility.
- **SWMU 14, Incinerator (Building 163):** There have been no reported releases at this facility.

- **SWMU 15, Pesticide Storage Area (West of Building 11):** There have been no reported releases at this site. Previous investigations reported no evidence of floor stains at this building.
- **SWMU 16, Pesticide Storage Area (Building 165):** No releases have been reported for this unit. The building is not watertight, and a hose was periodically used to wash the unit out. Recent soil sampling confirmed the presence of chlordane, but at levels that did require cleanup. No further action was recommended.
- **SWMU 17, Pesticide Storage Area (Building 170):** The building was equipped with a concrete sump, which was taken offline and removed. A soil sample taken during the removal contained chlordane, and approximately 20 yards of soil were excavated for disposal. The sump was in good condition (without cracks or stains) upon removal and DTSC concurred with a recommendation of no further action at this facility.
- **SWMU 25, Former USTs:** Underground storage tanks 1, 6, 12, 12A, 12B, 15A, 15B, 23, 36, 37, and T77 were removed or closed in-place and were given the regulatory status of No Further Action.
- **AOC 2, Machine Shop Accumulation Area (Building 9):** Previous investigations did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 3, Vehicle Maintenance Accumulation Area (Building 15):** Previous investigations at this site did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 4, Grenade Line Accumulation Area:** Previous investigations at this site did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 8A, Horizontal ASTs – Propane Storage Tanks:** There have been no known releases or spills in this area, and the nature of propane would be to vaporize if a release did occur.
- **AOC 8B, Horizontal ASTs - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System):** Elevated levels of PCBs were detected in the bermed area where the tanks were formerly located. Contaminant levels slightly above the industrial PRGs were detected along the main distribution line, and levels below the PRGs were detected adjacent to the former transformer pads. The transformer oil storage tanks were cleaned, tested, and removed. All transformers associated with this system had been removed previously. The floor of building 85 has been decontaminated (stains of unknown origin were found). The pipelines have been cleaned and encapsulated with cement grout. The 1997 pipeline pressure test concluded that three of the five sections are unlikely to have caused a leak. The other two sections showed evidence of air pressure losses; however, these were small and not indicative of a liquid transformer oil loss. In 2004, over 120 cubic yards of soil were excavated from the bermed area, and confirmation samples were nondetect. Two additional sampling locations were selected to delineate the extent of contamination along the distribution system, and results confirm that significant releases did not occur along the distribution

system. No further action was recommended in the Final RCRA Facility Investigation (RFI) (CH2M HILL. 2005a).

- **AOC 11A, Loading Racks – Propane Farm Loading/Unloading**: There are no releases or spills that have been reported at this site.
- **AOC 13, Draw Lube System (Building 178):** Contamination was found in 1993, with elevated oil and grease concentrations in soil samples. Approximately 13 cubic yards were excavated as part of a soil removal action. Following the removal action, a downgradient well was sampled several times over 3 years for oil and grease with all results being nondetect. DTSC concurred that no further action is required for this site.
- **Building 169, Paint Spraying Facility:** Sampling that was conducted at Building 169 included surface soil samples on the north, south, and east building walls. These samples were analyzed for oil and grease, hexavalent chromium, zinc and total chromium, lead, VOCs, SVOCs, and pH. Analytical results indicated elevated levels of benzene, toluene, ethyl benzene, xylenes (up to 905 mg/kg). The EBS completed for this site recommended a Phase II assessment to determine the extent of benzene, toluene, ethyl benzene, and total xylenes (BTEX) contamination.
- **E/P Pond Soil Staining Area:** Oil-saturated soil was observed at the foot of a retaining wall on RBAAP E/P Pond property. The source of the oil stains is apparently a waste oil tank located on Parcel No. 062-008-011. Preliminary soil samples on the RBAAP E/P Pond property indicate indicated levels of motor oil at concentrations of 276,000 mg/kg. The U.S. Army and USACE office in Sacramento is investigating and pursuing clean-up efforts for the site.

Category 6 Property

The area in which release, disposal, or migration of hazardous substances has occurred, but required remedial actions have not yet been implemented. No category 6 sites were identified.

Category 7 Property

Areas that have not been evaluated or require additional evaluation include:

- **RBAAP-001-R-01, Former Pistol Range:** An interviewee mentioned that the levies surrounding the reservoir, used as a backstop for this former range, were torn down in 1980 and reconstructed. The Historical Records Review indicated that there is potential for the presence of nitrocellulose (NC), nitroglycerine (NG), dinitrotoluene (DNT), lead styphnate, barium nitrate, antimony sulfide, aluminum powder, pentaerythritoltetranitrate (PETN), copper, zinc, lead, and iron at the firing line, and copper, zinc, iron, lead, and antimony to remain at this site.
- **RBAAP-06, IWTP H2SO4 Spill; AOC 6, Sulfuric Acid Spill Area (1956):** Contamination levels of sulfuric acid that would adversely impact human health or the environment were not found in the IWTP area. The IRP investigation has been completed. This site is located within the boundary of SWMU 1.

- **SWMU 1, IWTP:** The IWTP is a source of chromium and cyanide contamination in groundwater. The former redwood tanks that leaked have been replaced with concrete tanks. The entire IWTP area is now covered with impermeable concrete or asphalt. Concrete drainage trenches capture spills and overflow and then drain to a secondary containment sump. A limited soil investigation was performed in the IWTP consisting of two soil borings. Additional characterization of the soil is required at the site.
- **SWMU 4, Drum Staging Area (at the IWTP):** Past spillage of drum contents consisting of various wastes has occurred at this site onto a concrete area with an epoxy sealant. There is no indication that spillage has penetrated through the impermeable surface. No further action was recommended, with DTSC concurrence. This site is located within the boundary of SWMU 1.
- **SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration [UF] Unit):** There have been no releases reported at this unit. Previous investigations reported no evidence of spills outside the containment area. A small collection sump at the unit was steam cleaned and visually inspected for cracks or holes in the concrete. The integrity of the sump was reported to be in good condition. This site is located within the boundary of SWMU 1.
- **SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank):** There have been no releases reported for the current 6,000-gallon waste oil tank. Previous investigations reported that no evidence of leaks from the former 30,000-gallon waste oil tank were observed at the time of removal. This site is located within the boundary of SWMU 1.
- **SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks**: These neutralizing tanks were reported to have been also used for waste oil storage. Consequently, these tanks were also given the designation of SWMU 8. Previous investigations reported no evidence that a release occurred from this unit (the cyanide equalization tank and the cyanide reaction tank). This site is located within the boundary of SWMU 1.
- **SWMU 25, Former USTs** Underground storage tanks 22 and 33 were removed or closed in-place and were given the regulatory status of no further action. These tanks are Category 7 based on their location within a Category 7 building (i.e., Buildings 1 and 6).
- **AOC 6, Sulfuric Acid Spill Area (1956):** The 1956 sulfuric acid spill occurred in the area of the sulfuric acid feed system adjacent to the redwood equalization tanks. This is north of Building 173, next to the existing 80-foot clarifier. The sulfuric acid spill was reportedly 500 gallons of concentrated sulfuric acid. Based on investigations in this area, it was determined that no further action was required for this AOC. This site is located within the boundary of SWMU 1.
- **Building 6, Zinc Plater Cyanide Sump:** Upon removal of the Zinc Plater Cyanide sump, the soil beneath the concrete sump was investigated for possible contamination. Results of the investigation indicated that the soil was contaminated with cyanide and zinc. The walls and floor of the sump and 30 cubic yards of soil were excavated in 1997 and confirmatory samples collected. Results of the confirmatory sampling indicated that cyanide levels were nondetect, and zinc levels were found to be consistent with background levels. This feature is Category 7 based on its location within a Category 7 building (i.e., Building 6).

- **Building 11, Paint and Oil Storage:** Soil samples revealed motor oil in two samples taken from the south side of the building at 22 and 47 mg/kg. Aroclor-1260 was identified in all five sample results, in concentrations ranging from 0.4 mg/kg to 1 mg/kg (above the Industrial PRG of 0.74 mg/kg).
- **Buildings 1, 6, and 8, Production Area Sumps and Pits:** Pits and sumps associated with the production line equipment and presses are located inside Buildings 1, 6, and 8 remain in place and have not been investigated for possible cracks and/or potential soil contamination. Based on information from previous investigations that have been performed on former pits and sumps (e.g., Sump 4-11 in Building 4 and the Zinc Plater Sump in Building 6), there is a potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
- **Building 8, Production Line – Press Room and 4500 Ton Press Pit:** An investigation of this pit showed no detectible evidence of cracks or avenues of conveyance for the migration of oil to underlying soils. The report prepared for this pit determined that no additional investigation was warranted. The Press Room and 4500 Ton Press Pit are located within Building 8, which is Category 7 due to other pits and sumps that have not been investigated.
- **Building 12, Boiler House:** Oil and grease were found in two near-surface soil samples at concentrations of 660 mg/kg and 410 mg/kg. Arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium, and zinc were present in concentrations consistent with background levels, with the exception of one sample for chromium (144 mg/kg) and one sample for lead (215 mg/kg).
- **Structure 95, Substation No. 1:** Oil staining was observed on the concrete at the base of one transformer with a PCB concentration of 106 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 97, Substation No. 3:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 64 ppm and 33 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 101, Substation Spare:** Oil staining was observed on the concrete at the base of one inactive transformer with an unknown PCB concentration during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 109, Main Transformer Substations No. 2 and 3:** Oil staining was observed on the concrete at the base of transformers with an unknown PCB concentration during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on

these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.

- **Structure 145, Substation No. 17:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 28 ppm and 134 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to indicate minor cracking. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area. Additionally, because of the cracking observed in the concrete pad, there is a potential for the PCBs to have impacted the soil beneath the concrete pad.

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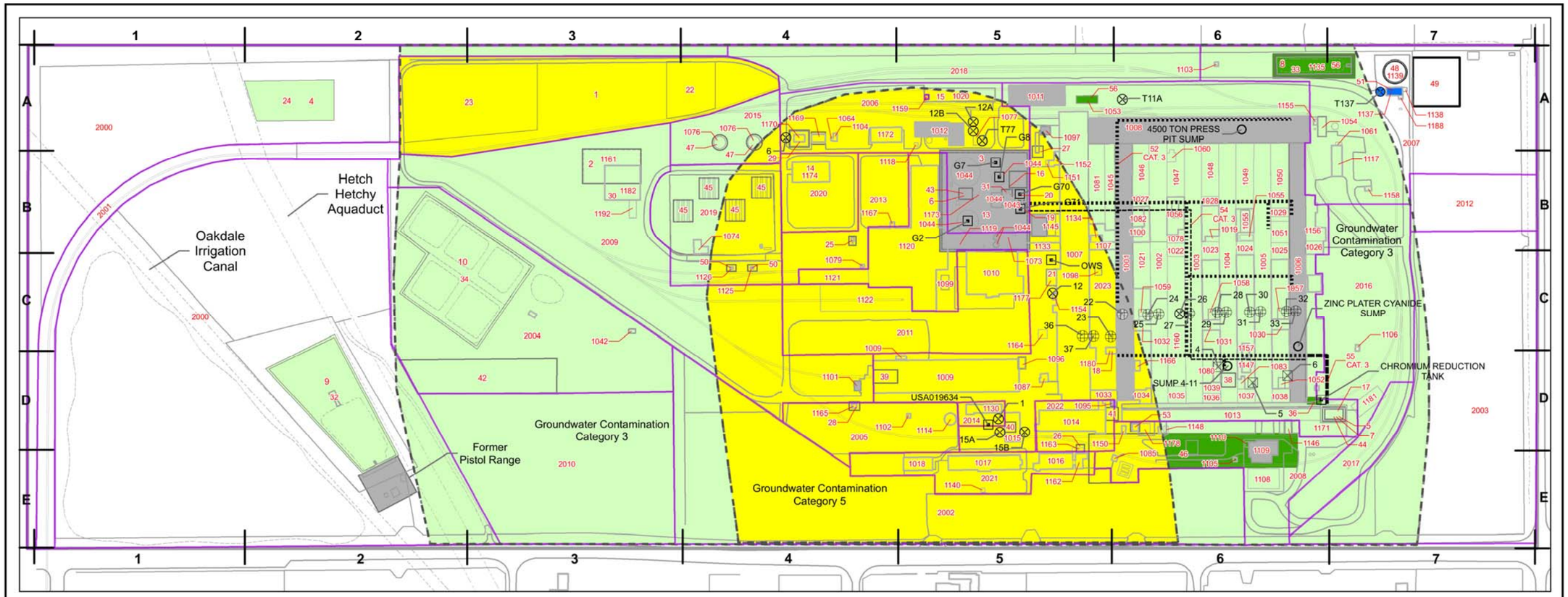

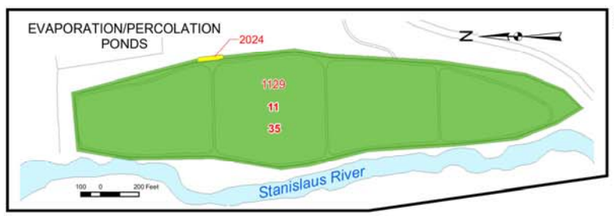

Study Section	Figure Coordinates	Area Name
1	A3	RBAAP-01, Landfill
2	B3	RBAAP-02, Waste Salt Disposal Pit
3	D5	RBAAP-03, Groundwater Contamination
4	A2	RBAAP-04, IWTP Effluent Sewer Line Break
5	D7	RBAAP-05, Building 13, Chromium Pretreatment
6	B5	RBAAP-06, IWTP H2SO4 Spill
7	D7	RBAAP-07, Building 13 Phosphate Spill
8	A6	RBAAP-08, Southeast Storm Reservoir
9	D2	RBAAP-09, Northwest Storm Reservoir
10	C2	RBAAP-10, Sewage Treatment Plant/Sludge Beds
11	N/A	RBAAP-11, Evaporation/Percolation Ponds (Stanislaus)
12	E2	RBAAP-001-R-01, Pistol Range
13	B5	SWMU 1, Industrial Wastewater Treatment Plant (IWTP)
14	B4	SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility)
15	A5	SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area)
16	B5	SWMU 4, Drum Staging Area (at the IWTP)
17	D7	SWMU 5, Chromium Reduction Unit (Building 13)
18	C5	SWMU 6, Chromium Reduction Unit (Building 1)
19	B5	SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration Unit)
20	B5	SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank)
21	C5	SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area)
22	A4	SWMU 10, Landfill (Southern Portion)
23	A3	SWMU 11, Landfill (Northern Portion)
24	A2	SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main)
25	B4	SWMU 13, Incinerator (Building 123)
26	D5	SWMU 14, Incinerator (Building 163)
27	A5	SWMU 15, Pesticide Storage Area (West of Building 11)
28	D4	SWMU 16, Pesticide Storage Area (Building 165)
29	A4	SWMU 17, Pesticide Storage Area (Building 170)
30	B3	SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit)
31	B5	SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks
32	D2	SWMU 20, Northwest Storm Reservoir
33	A6	SWMU 21, Southeast Storm Reservoir
34	C2	SWMU 22, Sanitary Wastewater Settling Ponds
35	N/A	SWMU 23, E/P Ponds
36	D6	SWMU 24, Industrial Waste Pipe Leak
37	N/A	SWMU 25, Underground Storage Tanks
38	D6	AOC 1, Mortar Line Accumulation Area (Building 4)
39	D4	AOC 2, Machine Shop Accumulation Area (Building 9)
40	D5	AOC 3, Vehicle Maintenance Accumulation Area (Building 15)
41	D5	AOC 4, Grenade Line Accumulation Area
42	D3	AOC 5, Former Windrows Area
43	B5	AOC 6, Sulfuric Acid Spill Area (1956)
44	D7	AOC 7, Phosphoric Acid Spill Area (1978)
45	B4	AOC 8A, Horizontal Aboveground Storage Tanks - Propane Storage Tanks
46	D6	AOC 8B, Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)
47	A4	AOC 9A, Vertical Aboveground Storage Tanks - Fuel Oil Storage Tanks
48	A7	AOC 9B, Vertical Aboveground Storage Tanks - Fire Sprinkler Storage Tank
49	A7	AOC 10, Former Solid Waste Pile (Southeast Corner)
50	C4	AOC 11A, Loading Racks - Propane Farm Loading/Unloading
51	A7	AOC 11B, Loading Racks - Fire Sprinkler Pumping Station
52	B6	AOC 12, Industriel Wastewater Collection System
53	D6	AOC 13, Draw Lube System (Building 178)
54	B6	AOC 14, Zinc-Cyanide Wastewater Collection System
55	D6	AOC 15, Building 13 Temporary Wastewater Line
56	A6	AOC 16, Substation 5 and Storm Drain Discharge Basin
1001	C6	Production Line
1002	C6	Production Line
1003	C6	Production Line
1004	C6	Production Line
1005	C6	Production Line
1006	C6	Production Line
1007	C5	Production Line
1008	A6	Production Line - Press Room
1009	D5	Machine Shop/Offices
1010	C5	Crib/Warehouse/Offices, Former National Guard
1011	A5	Paint & Oil Storage, Oil Recycling and Transport
1012	A5	Boiler House
1013	D6	Production Line
1014	D5	Dispensary/Locker Rooms, Security Office
1015	E2	Equipment Maintenance (Vehicles)
1016	E5	Offices & Gate House
1017	E5	Administrative Offices
1018	E5	Cafeteriar Oil Pump Building
1019	C6	Production Restrooms
1020	A5	Empty Barrel Storage (No longer present)
1021	C6	Plant Cafeteria
1022	C6	Aisleway & Office
1023	C6	Aisleway & Office
1024	C5	Aisleway & Gage Laboratory
1025	C6	Aisleway & Acctg Storage Area
1026	C6	Aisleway & Instrument Storage Area
1027	B6	Restroom & Passage
1028	B6	Restroom & Passage
1029	B6	Restroom
1030	C6	Restroom & Passage
1031	C6	Restroom & Passage
1032	C6	Restroom & Passage
1033	D6	Passage & Distribution PNL - S.S.#1
1034	D6	Passage & Office
1035	D6	Passage & Emerg. Gen #7
1036	D6	Passage
1037	D6	Passage & Office
1038	D6	Restroom
1039	D6	Central Salvage Area
1042	C3	Sewage Disposal Plant
1043	B5	Acid Neut & Cyanide Destruction Laboratory
1044	B5	Acid Neut & Cyanide Destruction
1045	B6	Production Line
1046	B6	Production Line
1047	B6	Production Line & Emerg. Gen #2 (Generator Removed)
1048	B6	Production Line & Office
1049	B6	Production Line & Emerg. Gen #4 & 5
1050	B6	Production Line & Emerg. Gen #6
1051	B6	Laboratory, Chemical & Metallurgical
1052	A6	Transformer Area - Substation No. 10
1053	A5	Transformer Area - Substation No. 5
1054	A6	Transformer Area - Substation No. 13
1055	B6	Transformer Area - Substation No. 9
1056	B6	Transformer Area - Substation No. 7
1057	C6	Transformer Area - Substation No. 12
1058	C6	Transformer Area - Substation No. 8
1059	C6	Transformer Area -Substation No. 6
1060	B6	Transformer Area - Substation No. 11
1061	A7	Cooling Tower Control House
1062	N/A	Facilities Eng. Store House
1064	A4	Fuel Oil Unloading Serv. Bldg.
1073	B5	Hose Cart House No. 1, Storage
1074	B4	Compressor House, Propane Stor. Area
1075	B4	Propane Storage Area, 75A, 75B, 75C
1076	A4	Fuel Oil Storage Area, Water Tank
1077	A5	Sulfuric Acid & Caustic Soda Storage
1078	B6	Oil Room Building
1079	C4	Scale House (Demolished)
1080	D6	Varnish Stripping Building
1081	B6	Production Line
1082	B6	Tocco Generator & Emerg. Gen No. 9
1083	D6	Plating Rack Repair Area
1084	N/A	Loading Dock with Canopy
1085	E6	Transformer Oil Pump Building
1087	D5	Storage Building
1095	D5	Transformer Area - Substation No. 1
1096	D5	Transformer Area - Substation No. 2
1097	A5	Transformer Area - Substation No. 3
1098	C6	Transformer Area - Substation No. 4
1099	C5	Transformer Area - Substation No. 14
1100	B6	Transformer Area - Substation No. 15
1101	D4	Transformer Area - Substation Spare
1102	D5	Water Well No. 1
1103	N/A	Water Well No. 2
1104	A4	Water Well No. 3
1105	E6	Water Well No. 4
1106	C7	Water Well No. 5
1107	C6	Covered Passage
1108	D5	Main Transformer Subst. No. 1
1109	E6	Main Transformer Subst. No. 2 & 3
1110	D6	Terminal House
1114	D5	Tank, Water, Storage, 100,000 Gallons
1117	B7	Cooling Tower, Main Plant
1118	A5	Cooling Tower, Boiler House
1119	B5	Cooling Tower, Steel Plant
1120	C5	Steel Plant & Emerg. Gen. No. 10
1121	C4	Loading Dock, Steel Plant
1122	C4	Crane Runway & Steel Storage Area
1125	C4	Unloading Station No. 1 - Propane
1126	C4	Unloading Station No. 1 - Propane
1127	E2	Storage Sewage Disposal Plant
1129	C2	Process Waste Water Percolation Beds
1130	D5	Garage
1131	A7	Process Water Tank and System
1133	B5	Aisleway from Bldg. 10 to Line 7
1134	C6	Restroom at Line 7
1135	A6	Storm Drain Station
1137	A7	Pump House - Sprinkler System
1138	A7	Transformer Substation No. 16
1139	A7	Tank, Water, Storage, 1,000,000 Gallons
1140	E5	Flagpole
1145	B5	Transformer Substation No. 17
1146	D6	Transformer Substation No. 18
1147	D6	Transformer Substation No. 19
1148	D6	Cooling Tower, Building 13
1150	D6	Compressor, Air
1151	B5	Compressor, Air
1152	B5	Motor Generator Housing
1154	C5	Compressor, Air
1155	A6	Compressor, Air
1156	B6	Production Building - Heat Treat
1157	C6	Compressor, Air
1158	B7	Water Well No. 6
1159	A5	Sandblast Building
1160	C6	Covered Storage Warehouse
1161	B3	Sludge Desiccating Pit (Never Used)
1162	E5	Autodin A.B. Terminal Bldg-Training Rm
1163	D5	Incinerator
1164	D5	Paint Pumping Building
1165	D4	Shed, Former Pesticide Storage
1166	D6	Paint Pumping Building
1167	B4	Air Compressor No. 8
1168	N/A	Security Lighting Emerg. Generator
1169	A4	Paint Spraying Facility
1170	A4	Pesticide Facility
1171	D6	Austemper Facility - Furnace Room
1172	A4	Former Fire Department
1173	B5	Environmental Test Facility
1174	B4	Hazardous Waste Storage Area
1175	N/A	Generator Building
1176	N/A	Switching Station (Electrical)
1177	C5	Equipment Wash Facility
1178	D6	Lubrication System Facility
1180	C5	Chrome Reduction Facility
1181	D7	Phosphate Facility
1182	B3	Ground Water Treatment Facility
1184	D5	Flammable Storage Warehouse
1185	N/A	Air Compressor Building
1186	B5	Haz-Bin Storage Containment Structure
1187	D5	Haz-Bin Storage Containment Structure
1188	D5	Haz-Bin Storage Containment Structure
1189	D5	Land Vehicle Fuel Disp Sta Gas/Diesel
1190	D5	Land Vehicle Fuel Disp Sta Propane
1192	B3	Ground Water Treatment Plant Office
1193	N/A	Vehicle Scale
1195	C5	Transformer Substation No. 20
1196	B5	Transformer Substation No. 21
2000	C1	Open Land
2001	B2	North Railroad Area
2002	E3	West Parking
2003	E7	South Parking
2004	C3	North Utilities
2005	D4	West Utilities
2006	A4	East Utilities
2007	A7	Southeast Utilities
2008	E6	South Utilities
2009	C3	North Open Storage
2010	E3	West Open Storage
2011	C5	Central Storage
2012	B7	South Open Storage
2013	B4	North Warehouse Storage
2014	D5	West Warehouse Storage
2015	A4	Water Storage
2016	C7	South Warehouse Storage
2017	E7	West Railroad Storage
2018	A4	East Railroad Storage
2019	B4	Fuel Storage
2020	B4	Hazardous Waste Storage
2021	E5	Administration Open Area
2022	D5	Medical Open Area
2023	C5	Production Open Area
2024	N/A	E/P Ponds Soil Staining Area

LEGEND

- UNDERGROUND STORAGE TANKS (CLOSED IN PLACE)
- UNDERGROUND STORAGE TANKS (REMOVED)
- ABOVEGROUND STORAGE TANKS (ACTIVE)
- ABOVEGROUND STORAGE TANKS (REMOVED)
- AOC 12 (PIPELINE)
- AOC 14 (PIPELINE)
- AOC 15 (PIPELINE)
- ECP STUDY SECTION BOUNDARY

CATEGORY 1
Areas in which no release or disposal of hazardous substances or petroleum products has occurred, and to which there has been no migration of such substances from adjacent areas.

CATEGORY 2
Areas in which only release or disposal of petroleum products has occurred.

CATEGORY 3
Areas in which release, disposal, or migration of hazardous substances has occurred, but in concentrations that do not require a removal or other remedial response.

CATEGORY 4
Areas in which release, disposal, or migration of hazardous substances has occurred, but all removal or other remedial actions necessary to protect human health and the environment have been taken.

CATEGORY 5
Areas in which release, disposal, or migration of hazardous substances has occurred, and removal or other remedial actions are under way, but all required actions have not yet been taken.

CATEGORY 6
Areas in which release, disposal, or migration of hazardous substances has occurred, but required remedial actions have not yet been implemented.

CATEGORY 7
Areas that have not been evaluated or require additional evaluation.

NOTES:

Category 3 Groundwater Contamination – The groundwater contamination area shown as Category 3 is an approximation of the area at RBAAP that has detected levels of chromium or cyanide. Buildings/land within this area are designated Category 3.

Category 5 Groundwater Contamination – The groundwater contamination area shown as Category 5 is an approximation of the area at RBAAP that has groundwater concentrations of chromium or cyanide above MCLs. Buildings/land within this area are designated Category 5.

SWMU 25 Addresses all former underground storage tank sites at RBAAP

FIGURE ES-1
PROPERTY CATEGORIZATION MAP
Riverbank Army Ammunition Plant
Riverbank, California

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1. Purpose

As a result of the 2005 Base Realignment and Closure (BRAC) recommendations, the Riverbank Army Ammunition Plant (RBAAP) was selected for closure and property transfer. As required by United States (U.S.) Army Regulation (AR) 200-1, an Environmental Condition of Property (ECP) must be prepared for locations that are being considered for acquisition, out-grants, or disposal. This process formerly was referred to as an Environmental Baseline Survey (EBS). The ECP will allow the U.S. Army to meet its obligation under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), 42 United Sates Code (U.S.C.) Section 9620(h), as amended by the Community Environmental Response Facilitation Act (Public Law 102-426).

1.1 Overview of Purpose

The BRAC 2005 Property for RBAAP includes the associated Evaporation/Percolation Ponds located to the north of the plant. Throughout this report, when "RBAAP" is discussed, the information applies to Riverbank Army Ammunition Plant as a whole, including the Evaporation/Percolation Ponds.

The primary purpose of this Environmental Condition of Property (ECP) is to describe the environmental condition of the property at RBAAP for use in determining suitability for out-grant or transfer. This ECP Report meets the Department of Defense (DoD) requirements under Title 40, Code of Federal Regulations (CFR), Part 373, Section 373.1, and the BRAC Supplement to U.S. Army Regulation (AR) 200-1, Environmental Protection and Enhancement. The purpose of the ECP includes the following:

- Provide the Military Department with information to make disposal decisions regarding the property.
- Provide the public with information relative to the environmental condition of the property.
- Assist in community planning for the reuse of BRAC property.
- Assist federal agencies during the property screening process.
- Provide information for prospective buyers.
- Assist prospective new owners in meeting the requirements under the United States Environmental Protection Agency (USEPA) "All Appropriate Inquiry" regulations when they become final.
- Provide information about completed remedial and corrective actions at the property.
- Assist in determining appropriate responsibilities, asset valuation and livability with other parties to a transaction.

The ECP contains the information required to comply with the provisions of 40 CFR, Part 373, which require a notice accompanying contracts for the sale of, and deeds entered into for the transfer of, federal property on which hazardous substances might have been stored, released, or disposed. CERCLA Section 120(h) stipulates that a notice is required if certain quantities of designated hazardous substances have been stored on the property for 1 year or more. Specifically, this includes quantities exceeding 1,000 kilograms (kg) or the reportable quantity (RQ), whichever is greater, of the substances specified in 40 CFR 302.4; or 1 kilogram of acutely hazardous waste as defined in 40 CFR 261.5 and 261.30. A notice also is required if hazardous substances have been disposed of or released on the property in an amount greater than or equal to the RQ. AR 200-1 requires that an ECP address asbestos-containing material (AR 200-1, Chapter 8), lead-based paint (AR 200, Chapter 4-6), radon (AR 200-1, Chapter 9), and other substances potentially hazardous to health.

The ECP report is not prepared to satisfy a real property purchaser's duty to conduct “all appropriate inquiry” to establish an “innocent purchaser defense” to CERCLA 107 liability. Any such use of the ECP report by any party is outside the control of the U.S. Army and beyond the scope of the ECP. The U.S. Army, its officers, employees, or contractors make no warranties or representations that any ECP report satisfies any such requirements for any party.

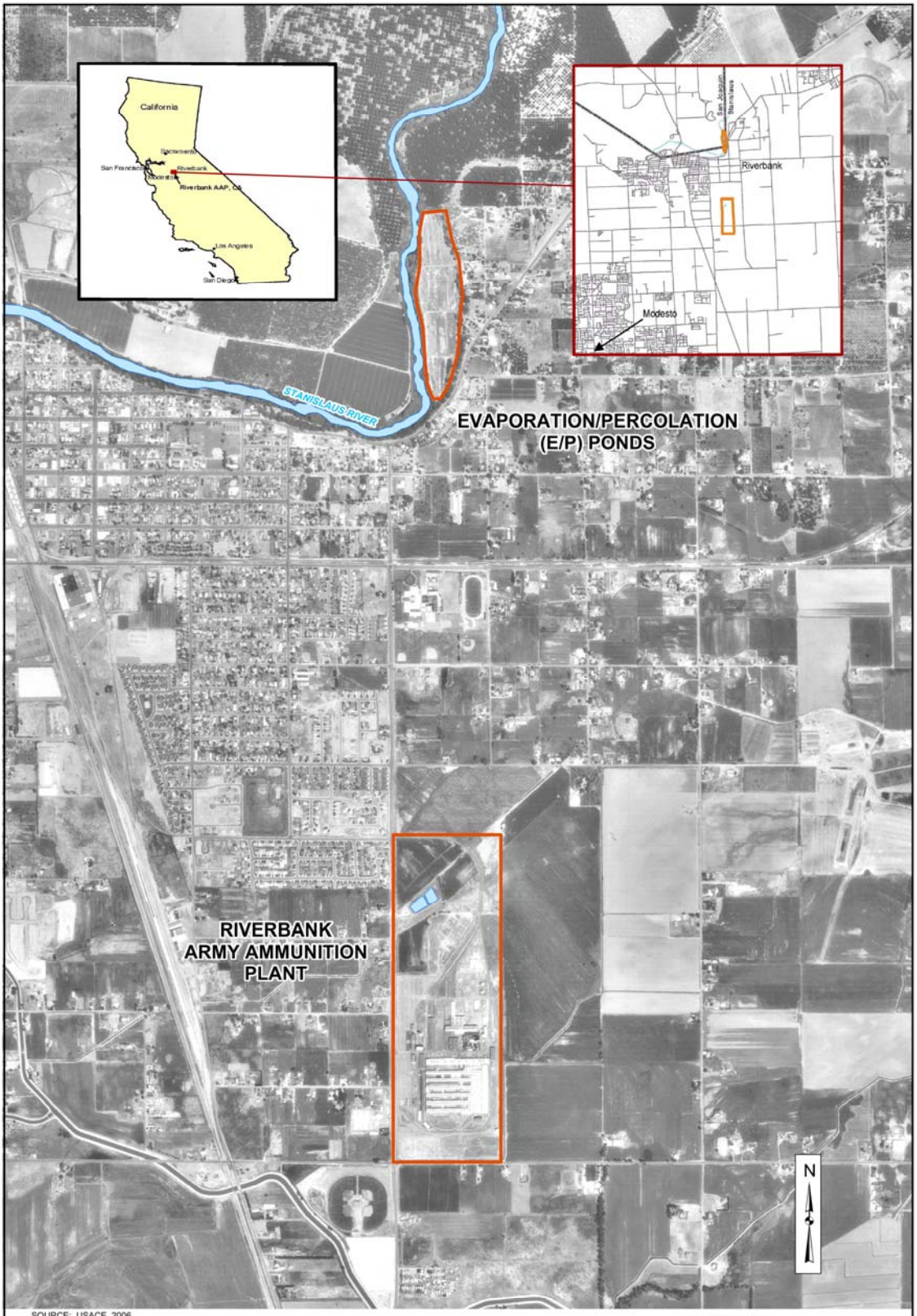
1.2 Scope

The scope of work for this ECP was performed in general conformance with Army Regulation “Environmental Quality, Environmental Protection and Enhancements, AR 200-1 (paragraph 15-6), dated February 21, 1997, and CERCLA 120.

The ECP covers the 173-acre RBAAP, Stanislaus County, California. The property is located approximately 10 miles northeast of the City of Modesto in a primarily rural area. Figure 1-1 is a vicinity map for the RBAAP. The RBAAP consists of two noncontiguous areas represented by the main plant area (approximately 146 acres) and the Evaporation/ Percolation (E/P) Ponds (27 acres). The main plant area is bounded by grazing land and railroad tracks on the north, Claus Road on the west, Claribel Road on the south, and grazing land to the east. The E/P Ponds are located approximately 1.5 miles north of the RBAAP and are bounded by the Stanislaus River on the west and private property on all other sides. Site location maps for the RBAAP and the E/P Ponds are provided in Figures 1-2a and 1-2b, respectively. A description of the property is provided in Section 4.1. Locations of the tenants that lease portions of the RBAAP are shown in Figure 1-3.

1.3 Assumptions

This ECP Report was prepared to formulate an opinion of the environmental condition of the subject property. Opinions on the environmental conditions at the site are based on observations made during visual site inspections (VSI), interviews, and by reviewing readily available information. New information or changes in property use could require a review and possibly changes to the findings and conclusions in this report.



SOURCE: USACE, 2006

0 600 1,200 1,800 Feet

FIGURE 1-1
VICINITY MAP
Riverbank Army Ammunition Plant
Riverbank, California

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RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_1_1_VICMAP.MXD FIG_1_1_VICMAP.PDF 9/22/2006 10:17:45

The information obtained from the Army, the Army's representatives, individuals interviewed, and prior environmental reports was considered to be accurate unless our reasonable inquiries indicated otherwise. Conditions observed were considered representative of areas that were not accessible unless otherwise indicated.

The conclusions drawn in this document are based in part on the following assumption: If a historical document reached the conclusion of "No Further Remedial Action" but the supporting documentation was unavailable for review during this ECP, the "No Further Remedial Action" conclusion was carried forward and not critically reviewed in this report.

1.4 Limitations

This ECP Report presents a summary of readily available information on the environmental conditions of, and concerns relative to, the land, facilities, and real property assets at the RBAAP. Its findings are based on a record search, a thorough review of documents, and a VSI conducted between June 19, 2006, and June 23, 2006. Extensive environmental investigations and reports and site historical documents were reviewed in support of this ECP. Information obtained from these studies is reflected within this ECP by reference. A complete list of references is provided in Section 7.

1.5 Report Organization

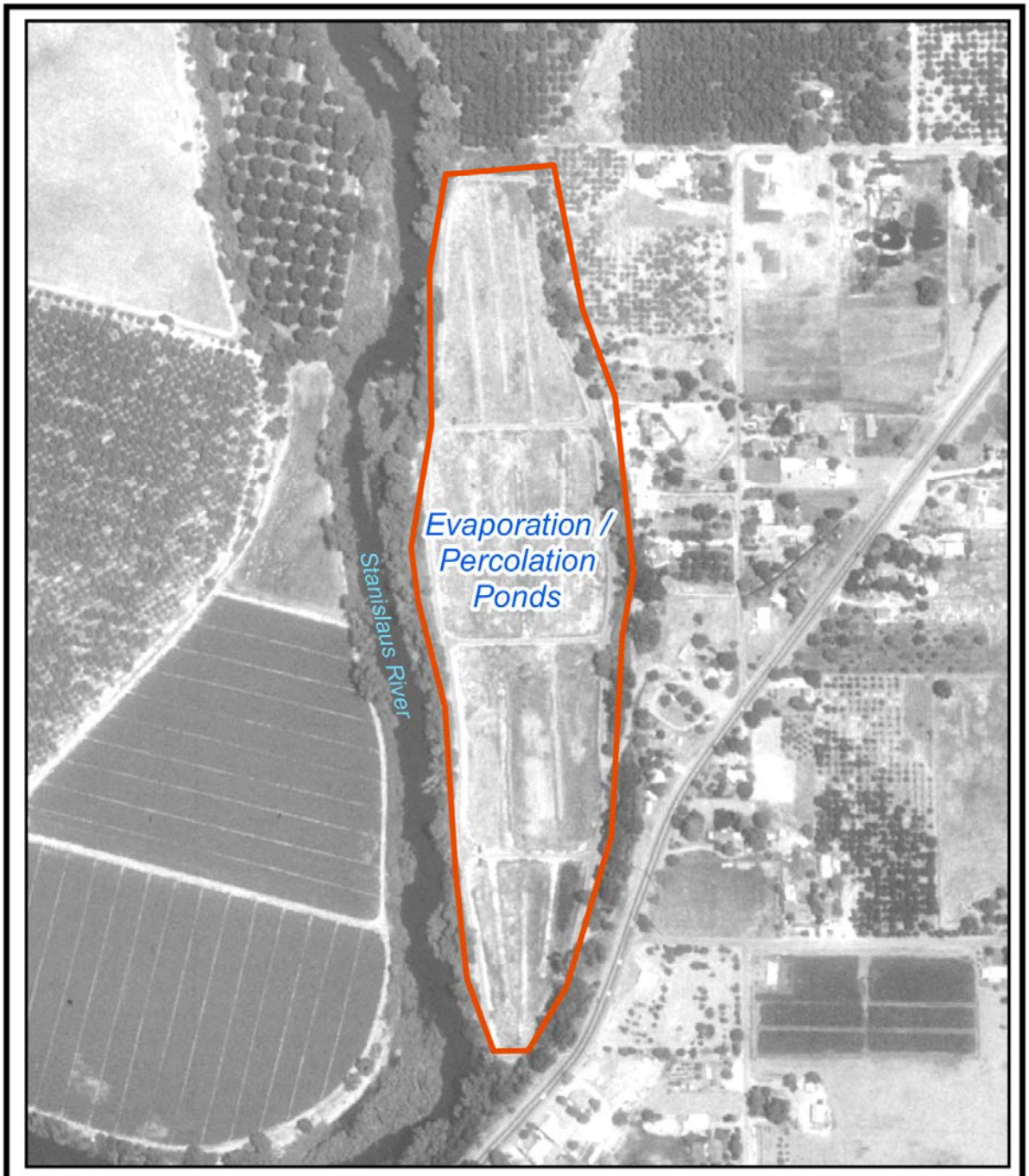
This ECP Report is organized as follows:

- Section 2 describes the methods used to conduct the ECP.
- Section 3 provides an overview of the RBAAP facility operations and history, a description of the installation utilities, and of the environmental setting.
- Section 4 presents ECP findings organized by relevant environmental "issues" (for example, contaminant, contamination matrix, facility, or operation), and provides a summary of previous environmental investigations.
- Section 5 includes a summary of findings for the buildings and real property.
- Section 6 provides certification of the ECP.
- Section 7 lists the reference material used in the preparation of the ECP.

The appendixes to this document include the following:

- Appendix A contains Site Photographs.
- Appendix B presents historical aerial photographs and includes the complete narrative from the 1981 and 1987 Photographic Analysis for the RBAAP.
- Appendix C includes the results from a search of state and federal environmental databases for the RBAAP and any listed sites within standard search distances.
- Appendix D provides a report that documents the historic use of the property, by review of recorded deeds, leases, mortgages, easements, and other appropriate documents.
- Appendix E provides a tabulation of hazardous substances used, stored, disposed, or released at the RBAAP.
- Appendix F includes interview reports and questionnaire forms.
- Appendix G contains various environmental documentation including underground storage tank (UST) closure letters.

Figure 1-2a redacted.



EDR, 2006d

N

0 200 400 Feet

FIGURE 1-2b
EVAPORATION / PERCOLATION PONDS
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_1_2B_PONDS.MXD FIG_1_2B_PONDS.PDF 9/26/2006 09:56:23

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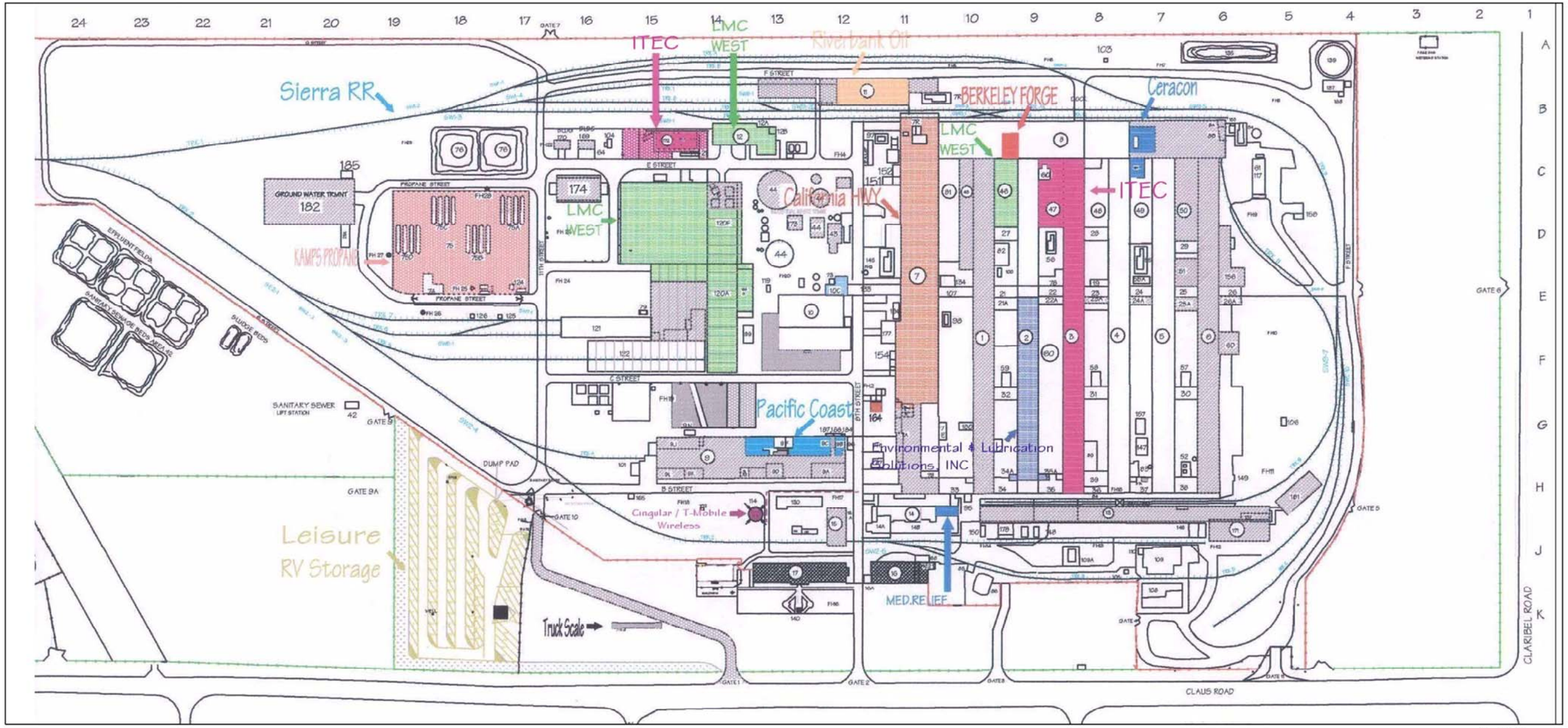

NI, 2006c

TENANT	Space Type (Adm, mfg, storage, etc)	Bldg #
Berkeley Forge	Storage	8
Ceracon	Manufacturing	8, 49
LMC West	Manufacturing	120 a, g & h
Personal Care Industries (Med Relief)	Storage	14 east
Kamp's Propane	Storage & Distribution	area 75, b74, 125, 126
Leisure RV Storage	Storage	north of pkgn lot
Cingular/T-Mobile Wireless	Service	114 (water tower)
Riverbank Oil Transfer	Transfer Station	11
Sierra Northern Railway	Service	4.5 Mi/Track
California Highway Tech	Manufacturing	b7 col 1-36
Environmental & Lubrication Solutions, Inc.	Storage & Distribution	b2 col 17-39
ITEC Environmental Group, Inc	Manufacturing	b3, 47, 172

N

0 100 200 Feet

FIGURE 1-3
RBAAP TENANTS
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_1_3_TENANTS.MXD FIG_1_3_TENANTS.PDF 9/28/2006 11:43:28

2. Survey Methodology

This section describes the methodology used to prepare this ECP.

2.1 Development of Study Sections

To aid in completing this report, the property was organized into study sections. Each building and associated environmental feature (for example, UST location) constitutes a study section. This high level of "granularity" will allow for maximum differentiation between properties suitable for transfer and properties not suitable for transfer. Each of the Installation Restoration Program (IRP) Sites, Solid Waste Management Units (SWMUs), and Areas of Concern (AOCs), also constitute a study section. In addition, the areas located at RBAAP that are open areas are assigned a study section number. The delineation of the ECP study sections that were developed for RBAAP are shown in Figure 2-1.

Table 2-1 lists the study section associated with each building series.

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
1	RBAAP-01, Landfill
2	161/RBAAP-02, Waste Salt Disposal Pit
3	RBAAP-03, Groundwater Treatment Plant (GWTP)
4	RBAAP-04, IWTP Effluent Sewer Line Break
5	RBAAP-05, Building 13, Chromium Pretreatment
6	RBAAP-06, IWTP H_2SO_4 Spill
7	RBAAP-07, Building 13 Phosphate Spill
8	135/ RBAAP-08, Southeast Storm Reservoir
9	127/ RBAAP-09, Northwest Storm Reservoir
10	42/ RBAAP-10, Sewage Treatment Plant/Sludge Beds
11	RBAAP-11, Percolation/Evaporation Ponds (Stanislaus)
12	RBAAP-001-R-01, Pistol Range
13	SWMU 1, Industrial Wastewater Treatment Plant (IWTP)
14	174/ SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility)
15	20/ SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area)
16	SWMU 4, Drum Staging Area (at the IWTP)
17	SWMU 5, Chromium Reduction Unit (Building 13)
18	SWMU 6, Chromium Reduction Unit (Building 1)
19	SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration Unit)
20	SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank)
21	SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area)
22	SWMU 10, Landfill (Southern Portion)
23	SWMU 11, Landfill (Northern Portion)

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
24	SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main)
25	SWMU 13, Incinerator (Building 123)
26	SWMU 14, Incinerator (Building 163)
27	SWMU 15, Pesticide Storage Area (West of Building 11)
28	SWMU 16, Pesticide Storage Area (Building 165)
29	SWMU 17, Pesticide Storage Area (Building 170)
30	SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit)
31	SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks
32	SWMU 20, Northwest Storm Reservoir
33	SWMU 21, Southeast Storm Reservoir
34	SWMU 22, Sanitary Wastewater Settling Ponds
35	SWMU 23, E/P Ponds
36	SWMU 24, Industrial Waste Pipe Leak
37	SWMU 25, Underground Storage Tanks
38	AOC 1, Mortar Line Accumulation Area (Building 4)
39	AOC 2, Machine Shop Accumulation Area (Building 9)
40	AOC 3, Vehicle Maintenance Accumulation Area (Building 15)
41	AOC 4, Grenade Line Accumulation Area
42	AOC 5, Former Windrowed Area
43	AOC 6, Sulfuric Acid Spill Area (1956)
44	AOC 7, Phosphoric Acid Spill Area (1978)
45	AOC 8A, Horizontal Aboveground Storage Tanks - Propane Storage Tanks
46	AOC 8B, Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)
47	AOC 9A, Vertical Aboveground Storage Tanks – Fuel Oil Storage Tanks
48	AOC 9B, Vertical Aboveground Storage Tanks - Fire Sprinkler Storage Tank
49	AOC 10, Former Solid Waste Pile (Southeast Corner)
50	AOC 11A, Loading Racks – Propane Farm Loading/Unloading
51	AOC 11B, Loading Racks – Fire Sprinkler Pumping Station
52	AOC 12, Industrial Wastewater Collection System
53	AOC 13, Draw Lube System (Building 178)
54	AOC 14, Zinc-Cyanide Wastewater Collection System
55	AOC 15, Building 13 Temporary Wastewater Line
56	AOC 16, Substation 5 and Storm Drain Discharge Basin
1001	1/ Production Line
1002	2/ Production Line
1003	3/ Production Line
1004	4/Production Line
1005	5/ Production Line
1006	6/ Production Line

Figure 2-1 redacted.

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
1007	7/ Production Line
1008	8/ Production Line – Press Room
1009	9/ Machine Shop/Offices
1010	10/ Crib/Warehouse/Offices, Former National Guard
1011	11/ Paint and Oil Storage, Oil Recycling and Transport
1012	12/ Boiler House
1013	13/ Production Line
1014	14/ Dispensary/Locker Rooms, Security Office
1015	15/ Equipment Maintenance (Vehicles)
1016	16/ Offices and Gate House
1017	17/ Administrative Offices
1018	18/ Cafeteria and Offices
1019	19/ Production Restrooms
1020	20/ Empty Barrel Storage (No longer present)
1021	21/ Plant Cafeteria
1022	22/ Aisleway and Office
1023	23/ Aisleway and Office
1024	24/ Aisleway and Gage Laboratory
1025	25/ Aisleway and Acctg Storage Area
1026	26/ Aisleway and Instrument Storage Area
1027	27/ Restroom and Passage
1028	28/ Restroom and Passage
1029	29/ Restroom
1030	30/ Restroom and Passage
1031	31/ Restroom and Passage
1032	32/ Restroom and Passage
1033	33/ Passage and Distribution PNL – S.S. No. 1
1034	34/ Passage and Office
1035	35/ Passage and Emerg. Gen No. 7
1036	36/ Passage
1037	37/ Passage and Office
1038	38/ Passage
1039	39/ Central Salvage Area
1042	42/ Sewage Disposal Plant
1043	43/ Acid Neut and Cyanide Destruction Laboratory
1044	44/ Acid Neut and Cyanide Destruction
1045	45/ Production Line
1046	46/ Production Line
1047	47/ Production Line and Emergency Generator No. 2 (Generator Removed)
1048	48/ Production Line and Office

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
1049	49/ Production Line and Emergency Generators No. 4 and No. 5
1050	50/ Production Line and Emergency Generator No. 6
1051	51/ Laboratory, Chemical and Metallurgical
1052	52/ Transformer Area – Substation No. 10
1053	53/ Transformer Area – Substation No. 5
1054	54/ Transformer Area – Substation No. 13
1055	55/ Transformer Area – Substation No. 9
1056	56/ Transformer Area – Substation No. 7
1057	57/ Transformer Area – Substation No. 12
1058	58/ Transformer Area – Substation No. 8
1059	59/ Transformer Area –Substation No. 6
1060	60/ Transformer Area – Substation No. 11
1061	61/ Cooling Tower Control House
1062	62/ Facilities Eng. Storehouse
1064	64/ Fuel Oil Unloading Service Bldg.
1073	73/ Hose Cart House No. 1, Storage
1074	74/ Compressor House, Propane Storage Area
1075	75/ Propane Storage Area, 75A, 75B, 75C
1076	76/ Fuel Oil Storage Area, Water Tank
1077	77/ Sulfuric Acid and Caustic Soda Storage
1078	78/ Oil Room Building
1079	79/ Scale House (Demolished)
1080	80/ Varnish Stripping Building
1081	81/ Production Line
1082	82/ Tocco Generator and Emergency Generator No. 9
1083	83/ Plating Rack Repair Area
1084	84/ Loading Dock with Canopy
1085	85/ Transformer Oil Pump Building
1087	87/ Storage Building
1095	95/ Transformer Area – Substation No. 1
1096	96/ Transformer Area – Substation No. 2
1097	97/ Transformer Area – Substation No. 3
1098	98/ Transformer Area – Substation No. 4
1099	99/ Transformer Area – Substation No. 14
1100	100/ Transformer Area – Substation No. 15
1101	101/ Transformer Area – Substation Spare
1102	102/ Water Well No. 1
1103	103/ Water Well No. 2
1104	104/ Water Well No. 3
1105	105/ Water Well No. 4

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
1106	106/ Water Well No. 5
1107	107/ Covered Passage
1108	108/ Main Transformer Substation No. 1
1109	109/ Main Transformer Substation No. 2 and No. 3
1110	110/ Terminal House
1114	114/ Tank, Water Storage, 100,000 Gallons
1117	117/ Cooling Tower, Main Plant
1118	118/ Cooling Tower, Boiler House
1119	119/ Cooling Tower, Steel Plant
1120	120/ Steel Plant and Emergency Generator No. 10
1121	121/ Loading Dock, Steel Plant
1122	122/ Crane Runway and Steel Storage Area
1125	125/ Unloading Station No. 1 – Propane
1126	126/ Unloading Station No. 1 – Propane
1127	127/ Storage Sewage Disposal Plant
1129	129/ Process Waste Water Percolation Beds
1130	130/ Garage
1131	131/ Process Water Tank and System
1133	133/ Aisleway from Building. 10 to Line 7
1134	134/ Restroom at Line 7
1135	135/ Storm Drain Station
1137	137/ Pump House – Sprinkler System
1138	138/ Transformer Substation No. 16
1139	139/ Tank, Water, Storage, 1,000,000 Gallons
1140	140/ Flagpole
1145	145/ Transformer Substation No. 17
1146	146/ Transformer Substation No. 18
1147	147/ Transformer Substation No. 19
1148	148/ Cooling Tower, Building 13
1150	150/ Compressor, Air
1151	151/ Compressor, Air
1152	152/ Motor Generator Housing
1154	154/ Compressor, Air
1155	155/ Compressor, Air
1156	156/ Production Building – Heat Treat
1157	157/ Compressor, Air
1158	158/ Water Well No. 6
1159	159/ Sandblast Building
1160	160/ Covered Storage Warehouse
1161	161/ Sludge Desiccating Pit (Never Used)

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
1162	162/ Autodin A.B. Terminal Building-Training Room
1163	163/ Incinerator
1164	164/ Paint Pumping Building
1165	165/ Shed, Former Pesticide Storage
1166	166/ Paint Pumping Building
1167	167/ Air Compressor No. 8
1168	168/ Security Lighting Emergency Generator
1169	169/ Paint Spraying Facility
1170	170/ Pesticide Facility
1171	171/ Austemper Facility – Furnace Room
1172	172/ Former Fire Department
1173	173/ Environmental Test Facility
1174	174/ Hazardous Waste Storage Area
1175	175/ Generator Building
1176	176/ Switching Station (Electrical)
1177	177/ Equipment Wash Facility
1178	178/ Lubrication System Facility
1180	180/ Chrome Reduction Facility
1181	181/ Phosphate Facility
1182	182/ Groundwater Treatment Facility
1184	184/ Flammable Storage Warehouse
1185	185/ Air Compressor Building
1186	186/ Haz-Bin Storage Containment Structure
1187	187/ Haz-Bin Storage Containment Structure
1188	188/ Haz-Bin Storage Containment Structure
1189	189/ Land Vehicle Fuel Disp Sta Gas/Diesel
1190	190/ Land Vehicle Fuel Disp Sta Propane
1192	192/ Ground Water Treatment Plant Office
1193	193/ Vehicle Scale
1195	195/ Transformer Substation No. 20
1196	196/ Transformer Substation No. 21
2000	Open Land
2001	North Railroad Area
2002	West Parking
2003	South Parking
2004	North Utilities
2005	West Utilities
2006	East Utilities
2007	Southeast Utilities
2008	South Utilities

TABLE 2-1
Study Sections
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Study Section	Building Number/Area Name
2009	North Open Storage
2010	West Open Storage
2011	Central Storage
2012	South Open Storage
2012	North Warehouse Storage
2013	West Warehouse Storage
2014	Water Storage
2015	South Warehouse Storage
2016	West Railroad Storage
2017	East Railroad Storage
2018	Fuel Storage
2019	Hazardous Waste Storage
2020	Administration Open Area
2021	Medical Open Area
2022	Production Open Area

2.2 Visual Site Inspection

A VSI was conducted between June 19 and June 23, 2006, to field verify information produced in the document review and to identify potential environmental concerns. The VSI included a systematic survey and walk-through of accessible areas of buildings and facilities, as well as areas around the site. One primary objective of the VSI was to note signs of contamination sources, including leaks, spills, and any other evidence of releases. A representative from Norris Industries (also known as NI Industries, the operating contractor at the RBAAP for the U.S. Army) accompanied CH2M HILL staff on the VSI. During VSI activities, information was recorded on forms detailing issues related specifically to the building visited. Environmental conditions observed during the VSI are incorporated into Section 4, Environmental Conditions, of this report.

A VSI of adjacent properties was conducted on June 23, 2006, to evaluate uses of adjacent property that could contribute to any environmental contamination detected onsite. The field team drove on roadways along the perimeter of the subject property where possible and inspected the northern portion of the site on foot.

2.3 Aerial Photography Analysis

Photographs depicting areas surrounding the RBAAP for the period from 1950 to 1967 were obtained from the imagery libraries of the U.S. Geological Survey (USGS) and the Agricultural Stabilization and Conservation Service (ASCS). The historical aerial photograph interpretations that have been conducted by Environmental Photographic

Interpretation Center (EPIC) are summarized below. In general, the analysis identified areas that have been either addressed under the IRP cleanup program or under Resource Conservation and Recovery Act (RCRA). The CH2M HILL scope for this ECP did not include a historical aerial photograph review.

2.3.1 1981 Historical Aerial Photograph Analysis

As part of this analysis by EPIC, black and white historical aerial photographs of the RBAAP from 1950, 1957, 1963, and 1967, acquired from the imagery libraries of the USGS and the ASCS, as well as color infrared photographs from 1981 were analyzed by EPIC to determine detectable and potential environmental impacts of activities during present and past installation operations. The imagery ranged in scale from approximately 1:11,400 to 1:22,000 and was of good to very good quality.

In the 1950 black and white aerial photograph, the production area at the RBAAP appears to be at a low level of activity. A large barren area, likely in preparation for the construction of buildings, is visible to the north of the production area. East of the northwest storm drain reservoir is a small bare area with no discernible purpose. Pipelines connecting most of the buildings are visible. A landfill and four sanitary sewage beds also are present at the installation. Imagery of the E/P Ponds was not provided for 1950, but it is likely that the ponds did not exist because the Industrial Wastewater Treatment Plant (IWTP) had not been constructed (EPIC, 1981).

The 1957 black and white aerial photograph shows the construction of new buildings and more items in open storage, indicating an increase in activity. The IWTP had been constructed, as well as the propane storage area, with the addition of 16 propane storage tanks. Two fuel storage tanks sit to the east of the propane tanks and are connected to Building 12 by pipelines. Four storage tanks had been added to the production area, which largely was built-in or covered. Another storm drain reservoir had been added to the southeast corner of the plant. An underground sewer line now connected the IWTP to four large E/P Ponds located approximately 1 mile north of the plant along the Stanislaus River (EPIC, 1981).

The 1963 black and white aerial photograph shows little change from the 1957 photograph. The production area was less active with less volume in the open storage areas, and two small tanks had been added to the propane tank area (EPIC, 1981).

The 1967 black and white aerial photograph shows another increase in activity at the RBAAP with more inventory in open storage, and an unpaved parking lot in the southern part of the property. Little else changed from the 1963 photograph (EPIC, 1981).

The 1981 color infrared aerial photograph shows an additional reservoir at the eastern end of the northwest storm drain reservoir connected by a spillway. Two more sanitary sewage beds were constructed to the west of the existing sewage beds, and new treatment tanks had been added to the IWTP. Several other liquid storage tanks had been installed at the RBAAP as well. The photograph of the E/P Ponds shows probable stressed vegetation along the perimeter of the ponds, likely the effects of herbicide treatment to prevent plant growth (EPIC, 1981).

2.3.2 1987 Historical Aerial Photograph Analysis

An analysis of historical aerial photographs was performed by EPIC in 1987 for the RBAAP. This analysis was designed to augment the previous 1981 analysis with the analysis of Off-Post Study Areas. Low-altitude color aerial photography dated July 8, 1987, with a scale ranging from 1:24,000 to 1:8,000, was used for this analysis.

The 1987 color aerial photograph of the main plant area is similar to the 1981 color infrared aerial photograph. Many drums and crates are noted in open storage, and probable ground stains are visible to the southwest of the storage area, as well as at the IWTP. The photograph of the E/P Ponds shows vegetation in three of the ponds, with signs of grading in two of them. The vegetation along the perimeter of the E/P Ponds appears stressed, as it was in the 1981 photograph also. Approximately 300 drums are visible immediately south of the E/P Ponds, in a possible disposal and industrial storage area. An auto junkyard containing approximately 125 junk vehicles and debris is located southwest of the E/P Ponds along Route 108. The Off-Post Study Area is located adjacent to the western boundary of the RBAAP, bounded by Townsend Avenue on the north, Claus Road on the east, Claribel Road on the south, and Terminal Avenue on the west. The area includes several agricultural and commercial parcels, as well as a residential community of approximately 70 homes. Two probable agricultural storage and disposal sites are located at intersections—one at Claus Road and Van Dusen Road and the second at Terminal Avenue and Minnear Road. These sites contained drums and dark-toned material. Staining, vehicles, tanks, or other debris also marked these sites. An agricultural equipment and vehicle storage facility was noted at the southeast corner of the Off-Post Study Area, and an empty, fenced possible lagoon was noted at the northwest corner. An auto junkyard was identified in the northeast portion of the area, and near the intersection of Claus Road and Davis Road is a fenced, possible auto repair facility (EPIC, 1987).

2.4 Records Review

Relevant primary documents that were reviewed and used for this ECP are presented in Table 2-2. A complete list of references is included in Section 7.

TABLE 2-2
Primary Documents Reviewed for Environmental Condition of Property
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Document Title	Author	Date
Installation Assessment of Riverbank Army Ammunition Plant	U.S. Army Toxic and Hazardous Materials Agency	January 1980
Installation Assessment, Riverbank Army Ammunition Plant	Environmental Photographic Interpretation Center (EPIC)	September 1981
Technical Plan for the Environmental Contamination Survey of the Riverbank Army Ammunition Plant	Envirodyne Engineers, Inc (EEI)	March 1986
Remedial Investigation of the Riverbank Army Ammunition Plant	EEI	April 1987
Site Analysis, RBAAP	EPIC	September 1987

TABLE 2-2
Primary Documents Reviewed for Environmental Condition of Property
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Document Title	Author	Date
An Archeological Overview and Management Plan for the Riverbank Army Ammunition Plant	WIRTH Environmental Services	February 10, 1988
Riverbank Army Ammunition Plant Remedial Investigation Report. Addendum	Roy F. Weston, Inc.	1991
Riverbank Army Ammunition Plant Remedial Investigation Report	Roy F. Weston, Inc.	July 1991
Remedial Investigation (RI) Report – Riverbank Army Ammunition Plant	Roy F. Weston, Inc.	February 1992
Riverbank Army Ammunition Plant Remedial Investigation Report. Addendum	Roy F. Weston, Inc.	April 1992
Action Memorandum for the E/P Ponds Removal Action	U.S. Army Environmental Center (USAEC)	August 1993
Feasibility Study (FS) Report	Roy F. Weston, Inc.	June 1993
Record of Decision	USAEC	March 1994
Memo Re: UST Closure Report for Riverbank Army Ammunition Plant	Stanislaus County, Department of Environmental Resources, Hazardous Materials Division	April 28, 1995
Riverbank Army Ammunition Plant Landfill Closure – Final Closure Report	U.S. Army Corps of Engineers (USACE), Sacramento District	January 30, 1996
Environmental Assessment Riverbank Army Ammunition Plant, LMC West – Tenant Placement	NI Industries, Inc.	April 2, 1996
Environmental Baseline Survey, Phase I Environmental Assessment Report, LMC West, Building 120, Sections A, Furnace Room West, a Portion of Section B, and the Atmosphere Generating Room.	Norris-Riverbank	April 15, 1996
Environmental Assessment, Riverbank Army Ammunition Plant, Ceracon – Tenant Placement	NI Industries, Inc.	November 7, 1996
Environmental Baseline Survey, Phase I Environmental Assessment Report, Ceracon, Buildings 8 and 153	Norris-Riverbank	November 7, 1996
Preliminary Close Out Report	U.S. Environmental Protection Agency (EPA)	January 1997
O&M Manual, Riverbank Army Ammunition Plant, Groundwater Treatment System (GWTS)	CH2M HILL	September 1997
Supplement to Design Documentation for the Groundwater Extraction and Monitoring Network, Interim GWTS, GWTS, and IWTP	CH2M HILL	September 23, 1997
Final Extraction System Design and Monitoring Plan with System Operating Procedures, Riverbank Army Ammunition Plant	CH2M HILL	September 24, 1997
Environmental Baseline Survey, Phase I Environmental Assessment Report, Line 3 West of Broadway, Business Development Center	Norris-Riverbank	October 7, 1997

TABLE 2-2
Primary Documents Reviewed for Environmental Condition of Property
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Document Title	Author	Date
Environmental Baseline Survey, Phase I Environmental Assessment Report, Harbor Oil, Building 11	Norris-Riverbank	January 12, 1998
Environmental Assessment, Riverbank Army Ammunition Plant, D & M Hancock, Inc – Tenant Placement	NI Industries, Inc.	January 28, 1998
Environmental Assessment, Riverbank Army Ammunition Plant, Asbestos Program	NI Industries, Inc.	March 3, 1998
Line 3 East of Broadway, 4 and 5 Corrective Action Report	Norris-Riverbank	May 7, 1998
Environmental Assessment, Riverbank Army Ammunition Plant, Cartridge Case Line	NI Industries, Inc.	June 25, 1998
Environmental Baseline Survey, Phase I Environmental Assessment Report, LMC, Building 12	Norris-Riverbank	July 2, 1998
Environmental Baseline Survey, Phase I Environmental Assessment Report, Water Tower (Building 114)	Norris-Riverbank	July 16, 1998
Environmental Baseline Survey, Phase I Environmental Assessment Report, Building 192	Norris-Riverbank	November 5, 1998
Environmental Baseline Survey, Phase I Environmental Assessment Report, Building 14	Norris-Riverbank	November 11, 1998
Environmental Baseline Survey, Phase I Environmental Assessment Report, Building 130	Norris-Riverbank	November 23, 1998
Closure of Three Cyanide Tanks at Building 4, 5, and 6 Report, Riverbank Army Ammunition Plant	Norris-Riverbank	November 25, 1998
Final Tank Disposal for Tank T02	MasoTech	February 23, 1999
June 22, 1999, Meeting with Dr. Henry Crain (transmittal of radon monitoring data for Building 162). Riverbank Army Ammunition Plant	MascoTech	June 23, 1999
First 5-Year Review Report for Riverbank Army Ammunition Plant	U.S. Army	February 20, 2001
Notice of Adoption of Updated Waste Discharge Requirements for United States Department of the Army and NI Industries – Waste Discharge Requirements Order, Riverbank Army Ammunitions Plant	State of California, California Regional Water Quality Control Board, Central Valley Region (RWQCB)	August 1, 2001
Corrective Action Consent Agreement, Riverbank Army Ammunition Plant	State of California, Environmental Protection Agency, Department of Toxic Substances Control (DTSC)	2002
Corrective Action Consent Agreement – Health and Safety Code Section 23157. Riverbank Army Ammunition Plant	DTSC	June, 21, 2002
RCRA Facility Investigation Current Conditions Report, Riverbank Army Ammunition Plant	CH2M HILL	October 2002

TABLE 2-2
Primary Documents Reviewed for Environmental Condition of Property
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Document Title	Author	Date
Closed Transferring and Transferred Range/Site Inventory Report, Riverbank AAP	U. S. Army Material Command (USAMC)	March 2003
Storm Water Pollution Prevention Plan (2003 SWPPP), Riverbank Army Ammunition Plant	NI Industries, Inc.	March 3, 2003
Oil Spill Prevention Control and Countermeasure Plan (SPCCP), Riverbank Army Ammunition Plant	NI Industries, Inc.	March 20, 2003
Asbestos Management Plan and Survey, Riverbank Army Ammunition Plant	NI Industries, Inc.	March 30, 2004
Domestic Water Supply Permit Issued to Riverbank Army Ammunition Plant	State of California	May 14, 2003
Applicability of Federally Mandated Operating Permits (Title V) Facility ID No. N-2138	San Joaquin Valley Air Pollution Control District	August 7, 2003
Annual Inspection of the Riverbank Army Ammunition Plant Water System, System No. 5000211	State of California, Department of Health Services	March 8, 2004
Installation Pest Management Plan (IPMP) Submission for FY 2004	NI Industries, Inc.	March 29, 2004
Project Management Plan, Operation and Maintenance of Groundwater Treatment Plant	Ahtna Government Services Corporation (AGSC)	July 13, 2004
RCRA Part B Permit, Sections 8 and 13	NI Industries, Inc.	November 2004
Quarterly Groundwater monitoring Report, RBAAP Groundwater Monitoring Program, 2005 – First	CH2M HILL	2005
Lead Compliance Plan and Survey	NI Industries, Inc.	2005
RCRA Facility Investigation Report	CH2M HILL	February 4, 2005
2004 Permit Renewal and Emission Inventory Questionnaire for Riverbank Army Ammunition Plant	NI Industries, Inc.	March 9, 2005
Monthly Operations and Water Discharge Summary	AGSC	June 2005
Survey of Radiological points of compliance (POCs) concerning radiological use at BRAC 2005 Installations	USAMC	June 2005
State of California, State Water Resources Control Board Annual Report for Stormwater Discharges Associated with Industrial Activities	NI Industries, Inc.	June 27, 2005
2006 Installation Action Plan, Riverbank Army Ammunition Plant	USAEC	July, 2005
Continuation of Expiring Hazardous Waste Storage and Treatment Permit, RBAAP	DTSC	July 29, 2005
ECP Workshop Meeting held 8/10/05, Riverbank Army Ammunition Plant	USAEC	August 2005
Quarterly Groundwater Monitoring Report, RBAAP Groundwater Monitoring Program, 2005 – Fourth Quarter	CH2M HILL	2006

TABLE 2-2
Primary Documents Reviewed for Environmental Condition of Property
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Document Title	Author	Date
Historical Records Review, Riverbank Army Ammunition Plant, Final	USACE, Sacramento District	January 2006
Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-010	U.S. Army, Management and Disposal Branch	February 13, 2006
Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-005	U.S. Army, Management and Disposal Branch	February 13, 2006
Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-007	U.S. Army, Management and Disposal Branch	February 13, 2006
Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-011	U.S. Army, Management and Disposal Branch	February 22, 2006
Hazardous Waste Facility Permit	DTSC	April 16, 2006
Draft Second 5-Year Review Report for Riverbank Army Ammunition Plant	AGSC	July, 2006
Draft Second 5-Year Review Report for Riverbank Army Ammunition Plant	AGSC	July 2006

2.4.1 Standard Environmental Record Sources

A search of state and federal environmental databases was undertaken for the RBAAP Main Plant Area and the Riverbank E/P Ponds area for any listed sites within standard search distances. The findings of the search are summarized in Table 2-3 below, and the complete search results are provided as Appendix C.

TABLE 2-3
Summary of Environmental Database Search
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

	RBAAP		RBAAP E/P Ponds	
Record(s) Source	Number of Sites	ASTM E1527-05 Minimum Search Distance (miles)	Number of Sites	ASTM E1527-05 Minimum Search Distance (miles)
Federal NPL Sites	0	1.000	0	1.125
Federal CERCLIS List	0	0.500	0	0.625
Federal CERCLIS NFRAP List	0	0.500	0	0.625
Federal RCRA CORRACTS Facilities list	0	1.000	0	1.125

TABLE 2-3
Summary of Environmental Database Search
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

	RBAAP		RBAAP E/P Ponds	
Record(s) Source	**Number of Sites**	**ASTM E1527-05 Minimum Search Distance (miles)**	**Number of Sites**	**ASTM E1527-05 Minimum Search Distance (miles)**
Federal RCRA non-CORRACTS TSD Facilities List	0	0.500	0	0.625
Federal RCRA Generators List	0	0.250	0	0.375
Federal ROD list	0	1.000	1	0.125
CA WDS	0	Target Property	1	0.125
CA Cortese list	0	0.500	2	0.625
CA State Landfill	0	0.500	0	0.625
CA LUST lists	0	0.500	2	0.625
CA FID UST	0	0.250	1	0.375
CA HIST UST	0	0.250	1	0.375
CA SWEEPS UST	0	0.250	1	0.375
CA HAZNET	0	Target Property	1	0.125

Reference: EDR, 2006a, 2006c

CA	California
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CORRACTS	RCRA Corrective Action Sites
Cortese list	CA DTSC Hazardous Waste and Substances Sites List
FID	Facility Inventory Database
HAZNET	Hazardous Waste Information System, a database contains information on facilities that ship hazardous wastes by obtaining data from hazardous waste manifests received each year by the DTSC
HIST UST	Historical inventory of UST sites
LUST	Leaking underground storage tank
NFRAP	No Further Remedial Action Planned
NPL	National Priorities List
ROD	Record of Decision
SWEEPS UST	Statewide Environmental Evaluation and Planning System UST Site Listing
TSD	Treatment Storage and Disposal
WDS	Waste Discharge System

The EDR report identified no sites located within 1 mile of the RBAAP site; however, a wood treating plant (Thunderbolt Wood Treating Co., Inc.) is located approximately 1 mile to the northwest of the RBAAP. A groundwater monitoring report completed for this site during the first quarter of 2006 identified chromium in onsite monitoring wells. The report summarizes that chromium has migrated onto the site from an offsite source (Thunderbolt, 2006).

Four sites were identified within 1 mile of the E/P Ponds as described below.

Riverside Truck Salvage & Tow

The Riverside Truck Salvage & Tow facility is located less than 0.125 mile south-southwest of the RBAAP E/P Ponds. This facility is considered active with continuous or seasonal

discharge is under Waste Discharge Requirements and is on the California Waste Discharge System (WDS) list. Because the site is located approximately 0.125 mile away, in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to affect the E/P Ponds.

Underground Storage Tank (Private Farm)

An active UST is located on a farm less than 0.25 mile south of the RBAAP E/P Ponds. The facility is listed on the CA Facility Inventory Database (FID) UST, Statewide Environmental Evaluation and Planning System (SWEEPS) UST listing, and Hazardous Substance Storage Container Database (HIST) UST. Because this site is located approximately 0.25 mile away in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to impact the E/P Ponds. See Section 4.15 for additional detail on this site.

Stop-N-Save No. 5

Stop-N-Save No. 5, a commercial business, is located less than 0.5 mile west-southwest of the RBAAP E/P Ponds. The disposal methods included recycling and the use of a transfer station. This facility is listed on the HAZNET database, Leaking UST (LUST) list, and "Cortese" Hazardous Waste and Substance Sites List (Cortese) and may pose a threat to the site. Because this site is located approximately 0.5 mile away in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to affect the E/P Ponds. See Section 4.15 for additional detail on this site.

U-Gas

U-Gas, a gasoline station, is located less than 0.5 mile west-southwest of the RBAAP E/P Ponds. This facility is listed on the LUST list, Cortese, CA UST, HIST UST, and SWEEPS UST. Because this site is located approximately 0.5 mile away, in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, the site is considered to have a low potential to affect the E/P Ponds. See Section 4.15 for additional detail on this site.

2.4.2 Additional Record Sources

A review of reasonably accessible Army environmental documents, state records, and aerial photographs interpretations from previous investigations at the property were reviewed as part of this ECP for the Property. Available information on past land uses and their potential impacts was assessed. Other documents and resources of historical importance that were used include:

- A Chain-of-Title summary, prepared to document the historic use of the property. This inquiry reviewed recorded deeds, leases, mortgages, easements, and other appropriate documents. A copy of the Chain-of-Title report is presented in Appendix D. The ownership history of the site is provided in Section 3.2.2.
- A review by U.S. Army Environmental Center (USAEC) of the Army Center for Health Promotion and Preventive Medicine (CHPPM) for documents addressing human health matters.
- Environmental documents, files, and Notices of Violation (NOV) were provided by USAEC.

2.5 Interviews

Interviews of key past and current facility employees were conducted to aid in identifying environmental conditions at the installation. The interviews included topics of general environmental interest and specific areas of interest identified during the records review and VSI. Interview questionnaires completed by these past and current facility employees are included in Appendix F.

2.6 Data Management

The reference documents used in developing the ECP have been placed in the administrative record, which is maintained by U.S. Army Commander's Representative at RBAAP.

3. Property Description

3.1 Installation Location and Description

The RBAAP facility is located at 5300 Claus Road, Riverbank, Stanislaus County, California, 1 mile south of the Stanislaus-San Joaquin County border and approximately 5 miles northeast of the city of Modesto. The plant lies in the San Joaquin Valley in central California to the west of the Sierra Nevada Mountains (CH2M HILL, 2005a). The RBAAP occupies a total of 173 acres of land and consists of two noncontiguous areas represented by the Main Plant Area (approximately 146 acres) and the E/P Ponds (27 acres), which are located approximately 1.5 miles north of the RBAAP boundary along the Stanislaus River. The four E/P Ponds receive treated water from the IWTP and the GWTP. The effluent discharged to the bermed ponds evaporates or percolates through the existing sediments to groundwater. In general, the Plant Production Area is mostly paved. The area consists of seven production lines, process water/groundwater treatment facilities and various buildings used for maintenance, administration, and storage. A complete list of buildings and structures at the RBAAP is provided in Table 3-1 (CH2M HILL, 2002). Approximately 155 buildings are at RBAAP. Some of the large buildings, such as the Main Production Area, have been subdivided into smaller internal buildings. The approximate total square footage of roofed areas at RBAAP is 924,514 square feet.

The general classification of the RBAAP land includes:

- 99 acres used for RBAAP production
- 37 acres used as open land
- 10 acres covered by roads, rights-of-way, and easements
- 27 acres occupied by the E/P Ponds located 1.5 miles north of the plant

The RBAAP is bordered on the north, west, and south by sparse residential areas, with the densest housing community lying west of the plant. The RBAAP is bordered on the east by pastureland (CH2M HILL, 2002). The population of the City of Riverbank is 16,400; and the nearest large community is Modesto, which is located 5 miles southwest of the installation and has a population of 210,000 (USAEC, 2005a).

TABLE 3-1
Riverbank Army Ammunition Plant Buildings and Structures
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Building or Structure Number	Building Description	Size (Square Feet)	Year Built
1	Former Production Line Area (NI Industries)	34,201	1951
2	Former Production Line Area(Leased)	34,201	1951
3	Former Production Line Area(Leased)	34,201	1951
4	Former Production Line Area	34,201	1951
5	Former Production Line Area	34,201	1951
6	Production Line (NI Industries)	34,201	1951

TABLE 3-1
Riverbank Army Ammunition Plant Buildings and Structures
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Building or Structure Number	Building Description	Size (Square Feet)	Year Built
7	Former Production Line Area(Leased)	71,622	1951
8	Production Line – Press Room	48,225	1951
9	Machine Shop/Offices	37,800	1951
10	Crib/Warehouse/Offices, Former National Guard	20,338	1951
11	Paint and Oil Storage, Oil Recycling and Transport, and Temporary Storage and Packaging of Radium Dials	12,451	1951
12	Boiler House	6,240	1951
13	Production Line	38,000	1951
14	Dispensary/Locker Rooms, Security Office	10,888	1951
15	Equipment Maintenance (Vehicles)	3,200	1951
16	Offices and Gate House	3,740	1951
17	Administrative Offices	7,308	1951
18	Cafeteria and Offices	2,819	1951
19	Production Restrooms	501	1951
20	Empty Barrel Storage (no longer present)	14,800	1951
21	Plant Cafeteria	6,916	1951
22	Aisleway and Office	1,976	1951
23	Aisleway and Office	2,652	1951
24	Aisleway and Gage Laboratory	1,976	1952
25	Aisleway and Accounting Storage Area	2,652	1952
26	Aisleway and Instrument Storage Area	1,976	1951
27	Restroom and Passage	1,053	1951
28	Restroom and Passage	1,053	1951
29	Restroom	1,053	1951
30	Restroom and Passage	1,053	1951
31	Restroom and Passage	1,053	1951
32	Restroom and Passage	1,053	1951
33	Passage and Distribution PNL – S.S.No. 1	1,520	1951
34	Passage and Office	1,539	1952
35	Passage and Emergency Generator No. 7	1,539	1952
36	Passage	1,053	1952
37	Passage and Office	1,539	1952
38	Passage	1,539	1951
39	Central Salvage Area	2,112	1952
42	Sewage Disposal Plant	42,875	1951
43	Acid Neutralization and Cyanide Destruction Laboratory	1,558	1952
44	Acid Neutralization and Cyanide Destruction	12,240	1952
45	Production Line	7,293	1952
46	Production Line	8,200	1952

TABLE 3-1
Riverbank Army Ammunition Plant Buildings and Structures
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Building or Structure Number	Building Description	Size (Square Feet)	Year Built
47	Production Line and Emergency Generator No. 2 (Generator Removed)	8,360	1952
48	Production Line and Office	8,400	1952
49	Production Line and Emergency Generators No. 4 and 5	10,548	1952
50	Production Line and Emergency Generator No. 6	10,420	1952
51	Laboratory, Chemical and Metallurgical	3,800	1952
52	Transformer Area – Substation No. 10	700	1951
53	Transformer Area – Substation No. 5	1,200	1952
54	Transformer Area – Substation No. 13	1,200	1952
55	Transformer Area – Substation No. 9	1,868	1952
56	Transformer Area – Substation No. 7	600	1952
57	Transformer Area – Substation No. 12	600	1952
58	Transformer Area – Substation No. 8	600	1952
59	Transformer Area –Substation No. 6	600	1952
60	Transformer Area – Substation No. 11	564	1952
61	Cooling Tower Control House	300	1952
62	Facilities Engineering Store House	30	1951
64	Fuel Oil Unloading Service Building	30	1951
73	Hose Cart House No. 1, Storage	117	1951
74	Compressor House, Propane Storage Area	1,240	1952
75	Propane Storage Area	83,400	1952
76	Fuel Oil Storage Area, Water Tank	1,600	1951
77	Sulfuric Acid and Caustic Soda Storage	1,591	1952
78	Oil Room Building	1,100	1951
79	Scale House	66	1952
80	Varnish Stripping Building	2,211	1952
81	Production Line	11,001	1953
82	Tocco Generator and Emergency Generator No. 9	1,638	1953
83	Plating Rack Repair Area	714	1953
84	Loading Dock with Canopy	764	1952
85	Transformer Oil Pump Building	169	1951
87	Storage Building	270	1951
95	Transformer Area – Substation No. 1	280	1951
96	Transformer Area – Substation No. 2	540	1951
97	Transformer Area – Substation No. 3	1,050	1951
98	Transformer Area – Substation No. 4	400	1953
99	Transformer Area – Substation No. 14	600	1953
100	Transformer Area – Substation No. 15	600	1952
101	Transformer Area – Substation Spare	600	1953

TABLE 3-1
Riverbank Army Ammunition Plant Buildings and Structures
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Building or Structure Number	Building Description	Size (Square Feet)	Year Built
102	Water Well No. 1	64	1951
103	Water Well No. 2	64	1951
104	Water Well No. 3	152	1951
105	Water Well No. 4	64	1951
106	Water Well No. 5	199	1951
107	Covered Passage	178	1951
108	Main Transformer Substation No. 1	8,050	1951
109	Main Transformer Substations Nos. 2 and 3	9,650	1951
110	Terminal House	270	1951
114	Tank, Water, Storage, 100,000 Gallons	N/A	1951
117	Cooling Tower, Main Plant	N/A	1952
118	Cooling Tower, Boiler House	6	1952
119	Cooling Tower, Steel Plant	400	1953
120	Steel Plant and Emergency Generator No. 10	58,066	1953
121	Loading Dock, Steel Plant	420	1953
122	Crane Runway and Steel Storage Area	18,332	1953
125	Unloading Station No. 1 – Propane	8	1951
126	Unloading Station No. 1 – Propane	48	1951
127	Storage Sewage Disposal Plant	160	1951
129	Process Waste Water Percolation Beds	N/A	1952
130	Garage	2,280	1954
131	Process Water Tank and System	441	1953
133	Aisleway from Building. 10 to Line 7	183	1951
134	Restroom at Line 7	82	1953
135	Storm Drain Station	108	1953
137	Pump House – Sprinkler System	400	1956
138	Transformer Substation No. 16	120	1956
139	Tank, Water Storage, 1,000,000 Gallons	2,739	1952
140	Flagpole	N/A	1951
145	Transformer Substation No. 17	1,321	1967
146	Transformer Substation No. 18	406	1967
147	Transformer Substation No. 19	960	1967
148	Cooling Tower, Building 13	368	1966
150	Compressor, Air	150	1969
151	Compressor, Air	150	1969
152	Motor Generator Housing	636	1967
154	Compressor, Air	168	1969
155	Compressor, Air	150	1969
156	Production Building – Heat Treat	5,286	1970

TABLE 3-1
Riverbank Army Ammunition Plant Buildings and Structures
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Building or Structure Number	Building Description	Size (Square Feet)	Year Built
157	Compressor, Air	725	1969
158	Water Well No. 6	240	1969
159	Sandblast Building	144	1972
160	Covered Storage Warehouse	21,033	1969
161	Sludge Desiccating Pit (Never Used)	17,600	1970
162	Autodin A.B. Terminal Bldg-Training Room	1,036	1971
163	Incinerator	27	1971
164	Paint Pumping Building	506	1974
165	Shed, Former Pesticide Storage	196	1975
166	Paint Pumping Building	480	1976
167	Air Compressor No. 8	198	1974
168	Security Lighting Emergency Generator	176	1978
169	Paint Spraying Facility	800	1978
170	Pesticide Facility	600	1978
171	Austemper Facility – Furnace Room	5,376	1978
172	Former Fire Department	3,600	1982
173	Environmental Test Facility	992	1982
174	Hazardous Waste Storage Area	6,600	1983
175	Generator Building	187	1984
176	Switching Station (Electrical)	90	1985
177	Equipment Wash Facility	1440	1985
178	Lubrication System Facility	389	1985
180	Chrome Reduction Facility	576	1991
181	Phosphate Facility	4,000	1992
182	Groundwater Treatment Facility	10,000	1992
184	Flammable Storage Warehouse	144	1992
185	Air Compressor Building	104	1994
186	Haz-Bin Storage Containment Structure	172	1995
187	Haz-Bin Storage Containment Structure	172	1995
188	Haz-Bin Storage Containment Structure	172	1995
189	Vehicle Fueling Station Gas/Diesel	104	1995
190	Vehicle Fueling Station Propane	63	1995
192	Groundwater Treatment Plant Office	1027	1996
193	Vehicle Scale	880	1996
195	Transformer Substation No. 20	N/A	UNK
196	Transformer Substation No. 21	N/A	UNK

Reference: NI Industries, 2005e

3.2 Historic and Current Land Use

3.2.1 Historic Land Use

The plant was originally constructed under authority of the Defense Plant Corporation in 1942 by Aluminum Corporation of America (ALCOA) as an aluminum reduction plant. Until the government acquired the property, the land was used for agricultural purposes (CH2M HILL, 2002). Based on historical aerial photograph dated 1937, the area where the E/P Ponds are located was formerly used as an agricultural area.

3.2.2 Facility History

According to the title search for RBAAP, Parcels 062-031-007 and 062-031-006 were acquired by the Defense Plant Corporation in 1942. These parcels were later transferred to the United States of America (USA) in 1948. An additional Parcel 062-08-009 was purchased in 1955 by the USA. The E/P Ponds (Parcel 062-031-005) was purchased by USA in 1948.

The RBAAP is a Government-Owned, Contractor-Operated (GOCO) industrial installation under the jurisdiction of the U.S. Army Joint Munitions Command. The current operating contractor, NI Industries, Inc., has operated the facility since early 1952.

The plant was built in 1942 and production of aluminum began in May 1943. When the ALCOA plant was constructed in 1942, it was designed to produce 44,000 tons of aluminum per year. The plant was closed by order of the War Production Board on August 7, 1944, due to the reduced need for aluminum by the military in World War II. During the period of operation by ALCOA, cyanide-containing wastes were generated and disposed of in the southern section of the landfill located in the northeastern portion of the main plant area (CH2M HILL, 2002, and USAEC, 2005a).

After August 1944, the plant was used for the storage of all types of government surplus materials, including corn and grain. Early in 1949, the title was transferred from the Defense Plant Corporation to the Federal Works Administration. In 1951, a decision was made by the Ordnance Corps to convert to the manufacture of steel cartridge cases for joint Army and Navy use. The RBAAP was assigned to the Army on June 1, 1951. The Norris Thermador Corporation of Los Angeles, California, was awarded a contract for the conversion and operation of the RBAAP. The contract was executed on January 30, 1952 (Envirodyne, 1987).

Manufacturing Lines 1, 2, 3, and 4 produced 105-millimeter (mm) cartridge cases; Lines 5 and 6 produced the 3-inch/59, 5-inch/38, and 5-inch/54 naval cartridge cases; and Line 7 supplied additional quantities of 105-mm cases. One week after the completion of a preliminary lot on September 17, 1952, full production began and continued until May 1954, when the plant was placed on a limited-production schedule. The manufacture of 105-mm cartridge cases, however, continued until 1958. Production ceased following the Korean War, and the plant was placed on layaway status until 1963. The plant, unsuccessfully marketed by the General Services Administration, was withdrawn from the sales market and placed on standby status until 1966. A decision was then made to reactivate the facility based on the support requirements of the Vietnam War (Envirodyne, 1987).

A contract was issued on June 30, 1966, to Norris Thermador Corporation (later changed to Norris Industries, Inc., then to NI Industries) by the U.S. Army Ammunition Procurement and

Supply Agency. This contract provided for: (1) the reactivation of existing facilities to produce 105-mm cartridge cases, and (2) the acquisition and installation of necessary facilities to concurrently produce 60-mm and 81-mm mortar projectiles. The final production contract for 81-mm mortar projectiles was completed in September 1975. Plant activities during the remainder of 1975 and through 1976 were limited to modernization and expansion of Line 1, layaway of idle facilities, limited manufacturing methods and technology updates, and maintenance and protection of the overall plant (Envirodyne, 1987).

During the period of operation by NI Industries, the industrial wastewater was disposed of by treatment (different techniques throughout the period of operation) and pumping to the E/P Ponds. There was no outfall designed for these ponds. Disposal of the wastewater was strictly through evaporation and percolation (Envirodyne, 1987).

From 1977 through 1990, only grenade casing and mortar casing production lines were operational. The grenade casing production ceased in June 1990. Currently, RBAAP activities are limited to the operation of the cartridge case production line (in Building 6, the southern portion of Building 8, and Building 120), layaway of idle facilities, limited manufacturing and technology updates, and maintenance and protection of the overall plant. In addition, buildings at the plant have been leased to private businesses that conduct a variety of light to heavy industrial activities (CH2M HILL, 2002).

In 1990, the RBAAP was proposed for inclusion on the National Priorities List (NPL) with a Hazard Ranking System (HRS) score of 63.94 and was officially named to the NPL on February 16, 1990. Subsequently, an Interagency Agreement was signed by the Army, USEPA Region IX, California Environmental Protection Agency (CA EPA) Department of Toxic Substances Control (DTSC), and California Regional Water Quality Control Board. The Interagency Agreement became effective in June 1990. A Record of Decision (ROD) was finalized in March 1994 and construction of the Groundwater Treatment System (GWTS) expansion was completed in September 1997 (USAEC, 2005a). A description of the ROD in provided in Section 4.1.1.

Areas of the Production Area that are leased include portions of Building 2 (Environmental & Lubrication Solutions, Inc.); Buildings 3 and 47 (ITEC); Buildings 8 (Berkeley Forge); Buildings 8 and 49 (Ceracon); and Building 48 (LMC West).

Process Descriptions (Industrial Facilities Only)

From 1943 to 1944, ALCOA operated the site, which was used for aluminum production. This resulted in aluminum reduction waste including large amounts of cyanide waste (CH2M HILL, 2002).

NI Industries has operated the RBAAP from 1951 to the present producing U.S. Army and Navy cartridge cases. Industrial wastewaters including phosphate, nitrate, sulfate, chloride, zinc, iron, lead, copper, manganese, chromium, nickel, mercury, cyanide, sulfuric acid, and chromic acid have resulted from these processes. Cyanide-based plating solutions might have been used prior to 1975 but have not been used since then (NI, 2005e).

The following chemicals, lubricants and cleaners were used at the RBAAP:

- Water with emulsion cleaner and sulfuric acid
- Water and zinc phosphate

- Water and trisodium phosphate
- Kerosene based emulsion cleaner
- Soap
- Phosphoric acid

Emulsion cleaners, kerosene-based cleaners and trisodium phosphate have not been used since 1975. (NI, 2005e)

The following chemicals, lubricants and cleaners have been used since 1979 (NI, 2005e):

- Drawing compounds
- Chlorinated and nonchlorinated solvents
- Sulfuric acid
- Phosphoric acid
- Zinc phosphate
- Sodium stearate soap
- Zinc stearate soap
- Alkaline cleaners
- Sodium chloride/potassium chloride salt (molten)
- Sodium nitrate/sodium hydroxide salt (molten)
- Sodium nitrate/potassium nitrate/sodium hydroxide salt (molten)
- Sodium nitrate/potassium nitrate/sodium nitrite salt (molten)
- Sodium nitrate/potassium nitrate salt (molten)
- Electrolytic alkaline cleaner
- Sodium hydroxide
- Zinc bars
- Hexavalent chromium sealer
- Zinc chromate primer
- Iron oxide primer
- Lacquer and enamel paints
- Cosmoline
- Hydraulic oils
- Transformer oil
- Mineral spirit-based degreasing solvent
- Water-soluble coolants

Occupancy, Lease, and Easement History

Various buildings at the facility have been leased to private businesses that conduct a variety of light to heavy industrial activities. Current leaseholders at the RBAAP are listed in Table 3-2.

TABLE 3-2
Riverbank Army Ammunition Plant Tenant Data
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Tenant	No. of Employees	Industry	Contract Term	Date of Occupancy
Ceracon	4	R and D/Powdered Metal Mfg	Month to Month	Feb-96
Berkeley Forge	1	Tooling	Month to Month	Feb-00
Louis M. Clark (LMC) West	59	Sheet Manufacturing	June 2007 w/ options to 2013	Nov-95
Medical Relief Foundation	8	Warehousing	Month to Month	Not available
Wholesale Services, Inc	15	Propane Storage and Distribution	Lease to December 2007	Apr-97
Leisure RV Storage	1	RV Storage	Month to Month	Dec-96
Cingular/T-Mobile Wireless	2	Telecom	July 2008 w/ options to 2018	May-98
Riverbank Oil Transfer	4	Oil Transfer Station	Month to Month	Nov-97
Sierra Northern Railway	25	Rail Switching Service	Contract negotiations in process	Apr-00
California Highway Tech	29	Construction Materials, Rebar	September 2006 w/	Jul-00
Environmental & Lubrication Solutions, Inc.	6	Lubricant and Absorbents Distributor	December 2006 w/ options to 2008	Dec-03
ITEC Environmental Group, Inc	20	Plastic Recycling	May 2009 w/ options to 2014	May-03

Reference: NI Industries, 2005e

Approximately 30 acres of open land located on the north end of the plant are being leased agriculture. The open land is located north of the Hetch Hetchy underground water pipe aqueduct that transports water to San Francisco. The RBAAP uses a rental-free easement to Stanislaus County associated with the Hetch Hetchy line, which diagonally crosses the northern end of the plant (Roy F. Weston, 1993b).

Previous Lease Information

Previous leases at RBAAP have included: D.M. Hancock, Inc. (7/1997 through 11/2001); Pacific Coast Machining and Manufacturing (3/1997 through 4/2005); and American Office Products (2/2001 through 6/2003) (NI, 2006e). Other leases have included the Internal Revenue Service and C&N Machining Inc., which operated a machine shop (AGSC, 2006; U.S. Army, 1980).

Range Operations

Operational ranges are not currently found at the RBAAP. Historically, one pistol range had been used and is described in Section 4.3.3 (USACE, 2006).

3.3 Installation Utilities (Historic and Current)

3.3.1 Water Systems

The RBAAP operates a water system that serves the distribution facility located at 5300 Claus Road approximately 1 mile south of the city of Riverbank in Stanislaus County. Although the RBAAP is owned by the federal government, much of the facility is leased to private companies. The system is classified as a nontransient, noncommunity (NTNC) water system that serves approximately 230 people who work for the various companies situated on the plant property. The system has 26 service connections and obtains its water supply from three active wells located on the plant property (Well 5 with capacity of 1,100 gallons per minute [gpm] and Well 6 with capacity of 1,500 gpm). A detailed description of the production wells onsite including the permits for these wells is provided in Section 4.2.5. The water system in its current form has been in existence for many years and no immediate changes are proposed. The system operates under the State of California Domestic Water Supply Permit (State of California, 2003).

In addition to the wells, the water distribution facilities include one 100,000-gallon elevated storage tank and a distribution system (Building 114). The plant chlorinates at the well sites all of the water it produces (State of California, 2003).

The Department of Health Services, Department of Drinking Water and Environmental Management Branch assumed regulatory oversight of drinking water system at the RBAAP in 2003. Prior to 2003, Stanislaus County had regulatory responsibility of the system. The Drinking Water Program is not aware of any past enforcement actions against the RBAAP (State of California, 2003).

3.3.2 Industrial and Sanitary Sewers and Treatment Plants

The IWTP at the RBAAP treats all of the industrial wastewater generated at the installation. Effluent from the IWTP is batch discharged through an underground pipe to the E/P Ponds. Main feeds to the IWTP are wastewaters directly associated with metal finishing operations of the projectile, cartridge case, and grenade casing production processes, including rinse waters, spent alkaline and acid solutions, alkaline cleaner, and zinc phosphate solution. It also receives pretreated wastewater from the Chromium Reduction units, wastewater from the Coolant Recovery Unit, and the water effluent from the Equipment Wash Facility. In addition, minimum amounts of suitable spent and waste chemicals also are discharged into the IWTP that are not part of the regular process because of maintenance and cleaning (State of California, 2005). The industrial wastewater outfall discharge points and capacities are shown in Table 3-3.

TABLE 3-3
Water Treatment Plant Outflow Capacities
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Name (System Identifier)	Peak Monthly Outflow/Treated Million Gallons per Month	Maximum Peak Daily Outflow/ Treated Million Gallons per Day	Permitted Daily Treatment/ System Capacity Million Gallons per Day	Maximum Daily Treatment/ System Capacity (Design) Million Gallons per Day
Outfall 003 (300 Area Production Line)	0.04541	0.0137	0.0073	0.0288
Outfall 007 (700 Area Production Line)	0.004	0.004	0.0024	0.0072
Outfall 009 (900 Area production Line)	0	0	0.0096	0.0288
Outfall 010 (1000 Area Production Line)	0	0	0.0096	0.0288
Outfall 011 (1100 Area Production Line)	0.098982	0.043601	0.0288	0.0864

Reference: NI, 2005e

The IWTP processes consist of equalization, coagulation, clarification, particulate filtration, granular activated carbon adsorption, ion exchange treatment, effluent pH adjustment, sludge thickening and sludge dewatering. Industrial wastewater is discharged directly to either the equalization tank or the reactor clarifier of the IWTP. The reactor clarifier is a single-tank treatment system that can be used for treatment of separated wastewater streams (State of California, 2005). Tanks associated with the IWTP are listed in Table 3-4.

TABLE 3-4
Industrial Wastewater Treatment Plant Tanks, Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Tank (No. of Tanks)	Capacity (gallons)	Tank (No. of Tanks)	Capacity (gallons)
Scum Tank	940	Equalization Basin	678,800
Flush Tank	12,375	Effluent Basin	80,000
Collection Sump	30,000	Clarifier Tank	432,400
Sludge Thickener	112,850	Lime Slurry Tank	8,060
Reactor Clarifier	40,600	Transfer Tank	1,300
Demineralization Tank (2)	4,100	Sand Filter Sump	14,000
Charcoal Filter Tanks (5)	791	Sand Filter Tanks (4)	200
Flocculation Tanks (2)	8,500		

Reference: CH2M HILL HILL HILL, 2002

The industrial wastewater is treated sequentially through the following processes (State of California, 2005):

- Mixing with coagulants/flocculants for the removal of dissolved solids via pH adjustment and chemical precipitation
- Clarification
- Filtration through sand media
- Absorption through activated carbon
- Treatment through an ion exchange system
- Neutralization with carbon dioxide

The IWTP process is piped to allow unnecessary process steps to be bypassed or required process steps to be repeated if necessary. The piping includes provisions for direct discharge of influent wastewater to the equalization tank, for subsequent routing of equalized flow to the reactor clarifier, and also for routing of the influent wastewater directly to the reactor clarifier. This piping scheme provides optimal blending of influent wastewater in the equalization tank under normal operating conditions, as well as enabling the reactor clarifier to be operated without the equalization tank online. The transfer tank is used to collect wastewater from the reactor clarifier, sludge thickener, sand filter and activated carbon units. Containers in the Hazardous Waste Accumulation Area that have liquids that can be treated in the IWTP are also pumped into the transfer tank. The wastewater collected in the transfer tank is then pumped to the equalization basin for treatment through the IWTP (State of California, 2005).

Once the wastewater has been treated, it is discharged into the effluent basin. The effluent is sampled for compliance with effluent discharge limitations in accordance with the sampling frequency specified in the Waste Discharge Requirements (WDR) permit. The effluent is batch discharged through an underground pipe to the E/P Ponds (State of California, 2005). The IWTP wastewater pipeline is shown in Figure 3-1.

Sludge formed by the chemical precipitation of the dissolved metals settles to the bottom of the clarifier or the reactor clarifier and is pumped to the sludge thickener. Scum that forms on top of the clarifier is skimmed off and sent to the scum tank, where the contents are periodically pumped into the sludge thickener. From the sludge thickener, the sludge is pumped to the filter press for dewatering. The dewatered sludge is collected in roll-off boxes for transport to an offsite disposal facility. Liquid effluents from the sludge thickener and the filter press are directed back to the transfer tank for treatment through the IWTP (State of California, 2005).

All underground waste conveyance lines leading from process generation points to the IWTP, including vitrified clay piping, floor sumps, floor drains, trenches, and manifolds, have been deactivated and are discussed under the section below, Former Industrial Wastewater Collection System (IWCS). The waste conveyance lines from the production processes have been redesigned to run aboveground, and are double-walled and equipped with leak detection (NI, 2004d).

Former Industrial Wastewater Collection System (IWCS)

The IWCS was a system of underground piping and waste sumps that historically collected industrial wastewater from the production plant and transferred it to the IWTP. The system was built after the Army acquired the production plant in 1951 and began converting the plant to a steel cartridge case manufacturing facility (CH2M HILL, 2002).

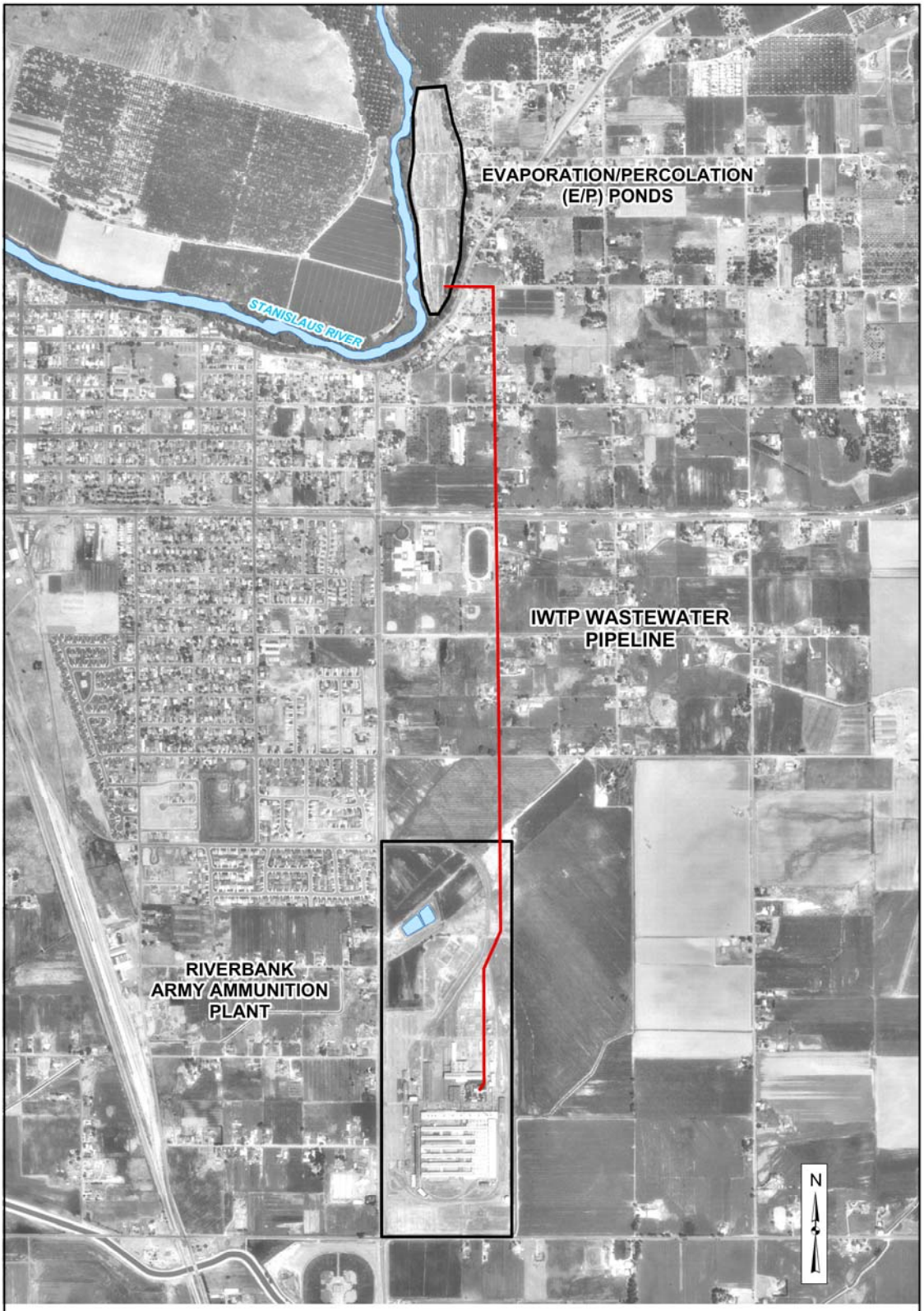

FIGURE 3-1
IWTP WASTEWATER PIPELINE TO THE E/P PONDS
Riverbank Army Ammunition Plant
Riverbank, California

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_3_1_PIPE.MXD FIG_3_1_PIPE.PDF 9/26/2006 11:03:58

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Currently, a new collection system is completely abovegrade to transmit wastewater from the active production areas to the IWTP. The IWCS was replaced by the new abovegrade pressurized system in 1999. The former IWCS was flushed, cleaned, drained, and abandoned in place. Abandonment consisted of filling large sections of the discharge end of the IWCS with concrete, disconnecting wastewater inlets, and welding or capping various other inlets and cleanouts (CH2M HILL, 2005a).

The former IWCS (piping still in place) is routed throughout the production area and was designed to feed the collected wastewater by gravity to the IWTP. The abandoned system consists of an estimated 3,500 to 4,000 linear feet of vitrified clay and cast iron pipe ranging from 4 inches to 21 inches in diameter. The sumps that historically were connected to the system, which have been filled with concrete, were constructed of brick or concrete (CH2M HILL, 2002).

Industrial wastewater historically was generated during the cartridge-case, mortar-projectile, and grenade-casing manufacturing processes. The metal finishing wastes consisted of rinse water, spent caustic solution, spent alkaline solution, spent phosphoric acid, spent chromic acid, spent nitric acid, spent sulfuric acid, and spent coolant oil. These wastes contained fugitive metals and other compounds; but mainly chromium, molybdenum, nickel, and zinc. Fugitive organic compounds also were present (CH2M HILL, 2002).

Former Zinc-Cyanide Wastewater Collection System

This system was designed and built in 1952 to collect all cyanide waste streams throughout the Production Plant. This system apparently operated from 1954 to 1958. The system consisted of various underground pipes that once conveyed cyanide wastewater to a separate treatment unit at the IWTP. This system was isolated from the normal IWTP to handle only cyanide wastewater. The separate treatment system has since been removed from the IWTP to accommodate other improvements. This system was last used in 1958, and information pertaining to the methods used to monitor chemical parameters (e.g., pH levels) is not available. The underground pipeline collection system remains in place. (CH2M HILL, 2002).

The majority of the individual production lines was not used for zinc cyanide coating and thus did not generate cyanide wastewater. In some cases, minor cyanide waste was noted in the waste collection system connection and the lowest point of the cyanide sump, because its design allowed water to backup in the system. The cyanide sump at the IWTP was decontaminated and converted into the sand filter sump (CH2M HILL, 2002).

The Cyanide Wastewater Collection System is located primarily along the west side of the Production Plant and consists of approximately 1,400 to 1,500 feet of 4-inch- to 6-inch-diameter iron or vitrified-clay pipe. Use was discontinued due to production process change. The Cyanide Wastewater Collection System has been disconnected from the production plant, and the collection sumps were filled with concrete in the late 1990s.

The Cyanide Wastewater Collection System contained spent cyanide in wastewater from the zinc plating operation of Production Lines 5 and 6 and wastes associated with metal finishing processes including spent caustic solutions, coolant oils, and trace metals (CH2M HILL, 2002).

Although no known releases were reported from the unit, the potential exists for historical releases from the pipelines to have occurred undetected, resulting in soil contamination beneath the system. However, given the relatively short period of operation for this system (1954 to 1958), the potential for leaks or releases due to pipeline corrosion is relatively low (CH2M HILL, 2002).

Sanitary Sewer

The installation formerly maintained its own closed-loop sanitary waste disposal system. Waste was collected at the source, transferred for treatment through an Imhoff tank, and then evaporated in holding ponds on the main part of the installation. Currently, the RBAAP is connected to the City of Riverbank sanitary sewer system. If a spill entered the sanitary sewer, containment would be difficult or impossible to contain until it reached the sanitary wastewater treatment plant (NI, 2003b, 2003d). Brine solution and rinse water from regeneration of the ion-exchange columns at the IWTP are discharged to the City of Riverbank publicly owned treatment works (POTW) under Industrial Wastewater Discharge Permit 05-001. Actual discharges are close to the maximum yearly permitted levels (NI, 2006e).

Groundwater Treatment System

The current GWTS consists of the previous Interim GWTS (IGWTS) and the upgraded system referred to as the GWTS. These systems, which are collocated and work in tandem, are designed to provide full capture of the chromium and cyanide groundwater contamination located on- and off-post. This system meets the requirements of the groundwater remedy described in the 1994 ROD. The extraction system currently includes eight groundwater extraction wells with two of the extraction wells located on post and the others located off post, west of the facility. As reported in the June 2005 Monthly Operations and Water Discharge Summary, the monthly effluent discharged from the plant was 6,867,278 gallons (AGSC, 2005c). The treatment facility is located in Building 182, and the current operating mode uses ion exchange only. The plant currently is configured to operate in the following manner:

- Untreated water enters from the headworks and influent tank.
- Water from the IGWTS secondary influent tank then is transmitted to two sand filters.
- Water from the GWTS secondary influent tank then is transmitted to one of the two multimedia filters.
- Water from the IGWTS sand filters is then transmitted through the IGWTS ion-exchange column, and water from the GWTS is then transmitted through the GWTS ion-exchange column.
- Treated water flows to storage tanks via transfer pumps, and the storage tank contents are tested before they are sent to the IWTP for further treatment, if necessary. If the treated water does not require further treatment, it is discharged to the E/P Ponds.

Each ion exchange unit is regenerated on a weekly basis. Water is used to flush the solids from the sand filters and the ion-exchange units. The concentrated regenerant is

concentrated and stored in a 6,000-gallon tank until it is shipped offsite to an approved waste management facility.

3.3.3 Stormwater System

The RBAAP is relatively level with localized small changes in elevation. Stormwater drains and channels are located in the production and general plant areas. Stormwater drains are not located in undeveloped areas toward the north of the plant area (NI, 2003b).

Storm runoff from the plant is diverted to an underground and/or aboveground drainage system. These stormwater drains convey the collected water from the production area and nearby environs to an onsite storm drain holding pond, located at the southeast corner of the facility (the Southeast [SE] Storm Reservoir). Dimensions of the SE Storm Reservoir are approximately 200 feet x 50 feet. Stormwater collected in the rest of the general plant area is transported to a smaller collection station. This collection station has lift pumps that transfer all stormwater to the Northwest (NW) Storm Reservoir. Dimensions of the NW Storm Reservoir on each of the four sides are about 400 feet, 240 feet, 400 feet and 180 feet, respectively (trapezoid shaped). All stormwater runoff collected from the main plant area is directed through a 36-inch stormwater drain pipe to the NW Storm Reservoir. In addition to a permanent reservoir, the reservoir is used to settle particulate and to remove floatable materials. Overflow water from the north stormwater pond drains to the Oakdale Irrigation District (OID) drainage system during the rainy season. This stormwater then discharges to the Stanislaus River (NI, 2003b, 2003d).

The RBAAP has a stormwater sump that allows all runoff that flows into the stormwater drainage system to be diverted to the IWTP and then to the E/P Ponds. The diversion system consists of a 13,000-gallon sump with a 600- gpm pump. Additionally, the sump is equipped with a high-limit flow switch to activate the pump. Sludge and other debris are removed from the sump periodically. If a spill were to reach the storm drain system, the storm drain would be diverted to the IWTP. The contaminated material could then be contained and/or treated at the IWTP (NI, 2003b, 2003d).

The RBAAP is not located in a 100-year floodplain. The installation storm drain system has been designed to withstand capacity hydrostatic and hydrodynamic loads resulting from a 24-hour probable maximum precipitation storm. There are two large-volume evaporatory reservoirs located on the plant property. The main reservoir (NW Storm Reservoir) with a capacity of 2,500,000 gallons is in the northwest corner of the main installation. The second reservoir with a capacity of 378,000 gallons is in the southeast corner of the main installation (SE Storm Reservoir) (NI, 2005d).

If the stormwater reservoirs and the storm drain system were dry, the system could hold a 24-hour rainfall event of about 1.78 inches. If the main stormwater reservoir exceeds the maximum capacity, the excess rainwater will flow into the OID canal. A 24-hour rainfall event of 1.91 inches occurred on February 3, 1998, when the stormwater reservoirs were already at or near capacity. While some neighboring parcels and streets were flooded, the storm drain system continued removing stormwater from the facility and diverting it into the OID canal. The probability of a 24-hour rainfall event at 2.00 inches is low. Based upon 73 years of rainfall data, only 5 days in the year have even a 1 percent probability of such an event (NI, 2005d).

3.3.4 Electrical System

The RBAAP owns its utility distribution lines and facilities, which includes 200,000 linear feet of overhead electrical lines (U.S. Army, 2006e). In addition, emergency electrical generating equipment is onsite and available for essential operations during a power failure (11 standby generators). The two diesel-fueled emergency generators have aboveground fuel tanks integral with the engine-generator set. These tanks are refueled by truck delivery. A 450-gallon diesel aboveground storage tank (AST) located north of Building 15 could be used as a supplemental source if necessary. The four liquefied petroleum gas (LPG)-fueled emergency generators have aboveground fuel tanks located near the engines. The 2005 annual emission data for the six engines combined are: nitrogen oxide (NO_X), 4 to 3 pounds; carbon monoxide (CO), 223 pounds; particulate matter of 10 microns or smaller (PM_{10}), 7 pounds; sulfur oxide (SO_X), 29 pounds; and volatile organic compounds (VOCs), 20 pounds.

Electricity is supplied to the installation by Hetch Hetchy Water & Power. The RBAAP electrical capacity and load are shown in Table 3-5.

TABLE 3-5
Riverbank Army Ammunition Plant Electrical System
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Utility	Electrical Supply (kW)	Steam (Btu)
On Base Daily Capacity	0	539398000
Off Base Daily Capacity	1982	0
Normal Steady State Daily Load	1720	475000000
Peak Daily Demand for FY03	1982	539398000
Peak Daily Demand for FY00 to FY03	1782	500935

Source: USAEC, 2006a
kW kilowatt
Btu British Thermal Unit
FY Fiscal Year

3.4 Environmental Setting – Natural and Physical Environment

The following sections discuss the natural and physical environment of the RBAAP, including climate, topography, hydrology, geology, and hydrogeology.

3.4.1 Climate

The Riverbank, California, climate is warm and generally dry. The rainy season generally extends from December to April, with a distinct dry season from May to October. The annual average rainfall is about 11 inches, with monthly averages ranging from 0.05 inch in July and August to 2.8 inches in January.

Winter air temperatures are mild, with a January average minimum temperature of 34 degrees Fahrenheit (°F) (1.1 Celsius [°C]) and a 17-year record minimum of 15°F

(-9.4 °C). Summer air temperatures are very warm, with the highest monthly average maximum of 96°F (35.6°C), and the 17-year record high temperature of 110°F (43°C) (CH2M HILL, 2002).

3.4.2 Topography

The topography of the RBAAP and the surrounding area can be described as flat valley land. The RBAAP topography is featureless and the gradient of the land surface deviates from the normal in that the terrain within the plant slopes southwestward at a rate of 25 feet per mile. The average elevation of the plant is 135 feet above mean sea level (CH2M HILL, 2002).

3.4.3 Surface Water Hydrology

Runoff from the generally flat area is relatively slow. Much of the incident precipitation is absorbed by the soil, and very little runoff occurs from the agricultural lands except during unusually heavy rains. Runoff from paved areas generally is discharged either to local irrigation canals/ditches or to the Stanislaus River. Flow within the Stanislaus River is controlled by a series of reservoirs. There is no gauging station on the Stanislaus River at Riverbank. The closest upstream gauging station is about 20 miles away near Knights Ferry. At this point, the drainage area is 986 square miles, and the average discharge is about 740 cubic feet per second (cfs). The record maximum discharge was 40,200 cfs, and the minimum 0.3 cfs. The downstream gauging station is at Ripon, approximately 14 miles from the RBAAP, and approximately 15 miles upstream from its confluence with the San Joaquin River. At this point, the drainage area is 1,075 square miles, and the average discharge is 1,035 cfs. The record maximum discharge is 62,500 cfs, and the minimum is 151 cfs (CH2M HILL, 2002).

3.4.4 Geology

The San Joaquin-Madera Association comprises the soils near the RBAAP site. These two soil series are sometimes intimately associated and cannot be separated (CH2M HILL, 2002).

The San Joaquin Series is composed of moderately coarse, well-drained soils with silica-iron hardpans. The color of the soils is reddish-brown to brown, and the soils are slightly to moderately acidic. Resting on the indurated hardpan at a depth between 41 and 76 centimeters (cm) is the red to reddish-brown clayey subsoil (CH2M HILL, 2002).

The Madera Series is composed of medium to moderately coarse, well-drained soils with hardpans. The surface soil is usually neutral to brown loam or sandy loam; whereas, the subsoil is reddish-brown to brown sandy clay and is underlain by indurated hardpan (iron and silica with seams of lime). The material underlying the hardpan is generally compact, stratified sandy loam that is cemented weakly in spots (CH2M HILL, 2002).

RBAAP Geology

The surficial geology at the RBAAP consists of unconsolidated Pleistocene nonmarine sedimentary deposits. These deposits are locally called the Riverbank Formation and Aromas Red Sands and consist of gray to brown and yellow to red sands that are cross-bedded. These sands are also locally pebbly with minor percentages of clay and silt (CH2M HILL, 2002).

The shallow subsurface geology consists of similar material. The fluvial depositional environment has resulted in the deposition of hundreds of feet of interlayered sands, clays, and gravels. Locally, substantial clay layers have been observed in the subsurface (CH2M HILL, 2002).

Substantial relatively continuous clay strata are present at elevation intervals of approximately 100 to 110 feet, 70 to 80 feet, and 10 to 40 feet (CH2M HILL, 2002).

E/P Ponds Geology

The *RBAAP E/P Ponds Characterization Report* (Weston, 2003) includes geologic cross sections of the E/P Ponds. These cross-sections reveal a layer of predominately silts and clays with pockets of predominately sands and silty sands from the bottom of the pond to 10 feet below the bottom of the pond. Ten feet to 20 feet below the bottom of the pond is predominately sands and silty sands. Groundwater flow in the vicinity of the E/P Ponds is predominantly west toward the Stanislaus River.

3.4.5 Hydrogeology

The hydrostratigraphy at the RBAAP has been investigated through several remedial investigation phases and subsequent design phases. Results of these investigations are presented in the Remedial Investigation (RI) Report (Weston, 1991) and the Field Data Report from 1996 by CH2M HILL (CH2M HILL, 1996). Five aquifer zones—A, A′, B, C, and D—were identified in the RI based on depth and stratigraphy. Groundwater elevation contours at RBAAP and the E/P Ponds are shown in Figure 3-2. Subsequent pump testing indicated strong interaction between the A′, B, and C zones. Despite the evidence that these zones are not hydraulically separated aquifer zones, the same nomenclature has been maintained for the sake of consistency to describe the hydrogeology of the site (CH2M HILL, 2002). These aquifer zones are summarized as follows:

- **A** - An unsaturated upper sand zone; average depth from 29 to 60 feet below ground surface (bgs)
- **A′** - A partially to fully saturated, well-graded silty sand; average depth from 60 to 90 feet bgs; approximately 30-feet thick
- **B** - Saturated, semicontinuous sand units interbedded with thin silt and clay layers; average depth from 90 to 120 feet bgs; approximately 30-feet thick
- **C** - Saturated sand zone; average depth from 120 to 150 feet bgs; approximately 30-feet thick
- **D** - Saturated coarse sand and gravel with volcanic material; between 150 and 220 feet bgs; approximately 70-feet thick.

The aquifer zones defined above are connected hydraulically. The presence of discontinuous fine-grained sediment layers creates the potential for a complex flow pattern in the subsurface. Aquifer testing indicates hydraulic connection between the A′, B, and C aquifer zones (CH2M HILL, 2002).

3.4.6 Groundwater Movement

Locally, the groundwater flow direction beneath the site is westerly. Groundwater head contours in individual zones were plotted and reveal that the lateral component of the groundwater flow is toward the west with a small component toward the north. Vertical gradients between Zones A′, B, and C are generally very small. There are strong downward gradients from the C-zone down towards the D-zone attributed to the increased deep, regional pumping for agricultural and domestic uses during late summer (CH2M HILL, 2002).

A range of estimated hydraulic conductivity (K) values for the A and A′ zones was taken from the RI Report (Weston, 1991) and the MicroFem groundwater flow model developed for the RBAAP vicinity (the conductivity values in the model are based on extensive, large-scale aquifer tests at the facility). The flushing rate is equivalent to "slug" flow in which a mass of water (including dissolved constituents) moves downgradient as a whole. Small portions of a given mass of groundwater migrate at rates faster than the flushing rate, at rates determined by the linear velocity. Linear velocity (also referred to as maximum or breakthrough velocity) is calculated by dividing the flushing rate by effective porosity (a conservative value of 15 percent was used). Transport rates (ranging from 38 to 550 feet per year) calculated for the range of A/A′-zone (see Table 3-6).

TABLE 3-6
Riverbank Army Ammunition Plant Groundwater Flow Rates
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

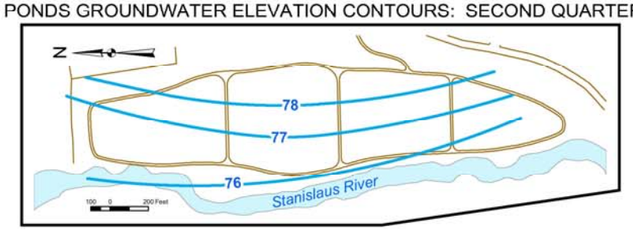
Flow Rate Calculations: A/A'-Zone			
K (feet per second)	**Gradient (–)**	**Flushing Rate (feet per year)**	**Linear Velocity (feet per year)**
1.1×10^{-4}	0.00164	6	38
1.6×10^{-3}	0.00164	83	550

3.4.7 Demography and Land Use

The predominant land use in the direct vicinity of the RBAAP is agricultural. Most farmland adjacent to the plant is used for cattle and horse grazing. Some vineyards and orchards are also nearby. Most of the land to the north, west, and south, of the plant is characterized by sparse residential areas. To the east of RBAAP is primarily pastureland. Riverbank, the closest town, has a population of 16,400 and the nearest large community is Modesto, California, located approximately 5 miles southwest of the installation with a population of 210,000 (Envirodyne, 1987; USAEC, 2005a).

The other major land use adjacent to the RBAAP is residential area located to the west. This residential area is fairly light in density with about 150 homes per square mile (60 homes per square kilometer). Only a small percentage of the nearby land is in commercial use (Envirodyne, 1987).

E/P PONDS GROUNDWATER ELEVATION CONTOURS: SECOND QUARTER 2004



LEGEND

—80— GROUNDWATER ELEVATION CONTOUR

- - 80 - - APPROXIMATE GROUNDWATER ELEVATION CONTOUR

NOTES

1. Groundwater contours represent the elevation of the water surface above mean sea level.
2. In some instances where the A-zone wells were not sampled this quarter, the contours are based on results from prior quarters.

N

0 150 300 Feet

FIGURE 3-2
GROUNDWATER ELEVATION CONTOURS
FIRST QUARTER 2006
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_3_2_WAT_CON.MXD FIG_3_2_WAT_CON.PDF 11/9/2006 16:52:37

3.5 Biological and Cultural Resources

The following sections discuss the biological and cultural resources found at the RBAAP.

3.5.1 Biological Resources

The terrain of the RBAAP is flat valley land. Developed and irrigated pastureland, small farms, and rural residential areas (to the west) surround the facility. The cultivated land in the RBAAP vicinity is primarily planted in field crops (for example, alfalfa), row crops (for example, tomatoes), and orchards (for example, almonds). Irrigation canals are used extensively in the area for agricultural water supply. The RBAAP is predominantly composed of developed, industrial land. However, the northern portion (37 acres) of RBAAP is comprised of vacant land (CH2M HILL, 2002).

The Army also owns the E/P Ponds, located on 27 acres immediately adjacent to the Stanislaus River in the floodplain. The land surrounding the E/P Ponds is abundant with water oak, willow, wild berries, and various weeds and shrubs. As documented in the Installation Assessment, the Stanislaus River adjacent to the E/P Ponds has populations of warm-water fish, including large and small mouth bass, white and channel catfish, black and white crappie, bluegill and rock bass. Migrating king salmon pass through the waters adjacent to the ponds on their way upstream to spawn (U.S. Army, 1980; CH2M HILL, 2002).

Mammals inhabiting the RBAAP area include the raccoon, opossum, skunk, muskrat, ground squirrel, long-tailed weasel, meadow mouse, gopher, black-tailed jackrabbit, cottontail rabbit, fox, and occasional coyotes. No big game populations are near RBAAP, although deer occasionally might be found along the river near the E/P Ponds (CH2M HILL, 2002).

A variety of songbirds and raptors use the open land and E/P Pond areas. These include the English sparrow, house finch, brown towee, Oregon junco, yellow warbler, American goldfinch, vireo, Brewer's and red-winged blackbirds, cowbird, flycatcher, flicker, woodpecker, crow, robin, hawk, and owl. The E/P Pond area offers good cover for quail and doves. A few wading birds such as the great blue heron and American egret use the river area. Some waterfowl use the open land and the river for feeding and resting areas (CH2M HILL, 2002).

Endangered Species

No federally endangered or threatened species are known to inhabit RBAAP. The American peregrine falcon, southern bald eagle, and the Aleutian Canada goose are endangered species found in the vicinity of RBAAP (CH2M HILL, 2002). Based upon recommendations by the California Fish and Wildlife Service, a Habitat Suitability Assessment should be conducted in the area of the E/P Ponds in order to determine if the following three endangered species are present: the Valley Elderberry Longhorn Beetle, the Riparian Brush Rabbit, the White Riparian Wood Rat, (USACE, 2005).

Wetlands

No wetlands are located on the main portion of RBAAP (USAEC, 2005b). At the E/P Ponds, a wetland area is shown in the EDR Report (see Appendix C) that parallels the Stanislaus River. This wetland area adjacent to the Stanislaus River also encompasses the western

portion of the E/P Ponds. In addition, based on the EDR map (see Appendix C), a small wetlands area is located offsite, approximately 1/4 mile southeast of the main plant boundary (CH2M HILL, 2002).

3.5.2 Cultural Resources

An investigation of significant historical archeological sites at the RBAAP was conducted in 1988. As there were no previous investigations, assessments conducted in 1988 were restricted to potential sites, identified by a brief tour of the installation, and archival research. An Archeological Overview and Management Plan was prepared for the RBAAP in 1988. According to this document, there are no areas at the RBAAP identified as sacred sites, Traditional Cultural Properties, or burial sites by Native People or others. This document also recommended that a modest research program should survey undisturbed land at the RBAAP to locate prehistoric and historic resources (WIRTH, 1988).

Prehistoric Resources

Archeological material relating to prehistoric habitation has not been found at the RBAAP. Because the E/P Ponds area is in the woodlands, and near a permanent source of water, permanently occupied sites would be expected in the area, and it is the location of highest potential for prehistoric sites (WIRTH, 1988).

Five potentially identifiable but not presently recorded historic archeological resources were discussed in an Archeological Overview and Management Plan. Three sites are included in the farmstead category, with two being unidentifiable historic structures that appeared on a 1942 15-minute quadrangle of the area. An agricultural or domestic function seems likely, and it is possible that they are a house and barn built by Daniel Grubb in 1874 or 1875. The other site included in this category is a homestead and ranch built by George Squire. He settled and resided in the area in the 1870s and 1880s. Since the historical setting of these sites has been destroyed, the sociocultural value of these sites is low (WIRTH, 1988).

The E/P Ponds area has a steep bluff on which a stone masonry retaining wall was observed. This site probably dates to the expansion of Riverbank, post-1910, and is not likely to have a sufficient research or sociocultural value to be included on the National Register (WIRTH, 1988).

A dump site was also observed at the E/P Ponds area, likely dating to the late nineteenth century. Since dumps are often some distance from residences, it may have been from Riverbank's refuse collection system, and would have sociocultural value in context to Riverbank itself, and relative to dump sites in nearby towns (WIRTH, 1988).

Buildings/Structures

As part of the NEPA-planned actions for RBAAP, a requirement was identified by the USACE Mobile District to conduct an update of the 1984 Historic Properties Report. This report provides an overview of the historic property survey conducted at RBAAP. The report describes the premilitary land use, and activities at RBAAP during the periods of World War II, the Korean War, Vietnam War, and recent developments. The report concludes that no historic buildings or structures are located at the RBAAP or the E/P Ponds (NI, 2006a; MacDonald and Mack, 1984).

4. Environmental Conditions

This section provides a summary of the environmental conditions for the RBAAP. The RBAAP is a NPL site and is currently responsible for CERCLA Actions as specified in the 1994 ROD. In addition, the RBAAP holds a RCRA Part B Hazardous Waste Facility Permit and has been required under the permit to conduct a RCRA Facility Investigation (RFI) for the SWMUs and AOCs identified.

4.1 Overview of CERCLA and RCRA Actions at Riverbank Army Ammunition Plant

The following sections discuss the CERCLA and RCRA actions that have been and are being taken at the RBAAP.

4.1.1 CERCLA Activities

The RBAAP currently operates a GWTS and conducts groundwater monitoring and landfill cap monitoring/maintenance activities as final CERCLA Remedial Actions specified in the 1994 ROD. Both actions are covered under the U.S. Army IRP as sites RBAAP-01 (landfill) and RBAAP-03 (GWTS). The USEPA added the RBAAP onto the NPL on February 21, 1990, primarily due to the presence of groundwater contamination (cyanide and chromium) detected on-post and off-post. Groundwater samples from six wells located west of the RBAAP showed levels of chromium in excess of 50 micrograms per liter (µg/L) (drinking water standard), which resulted in the provision of bottled drinking water to those affected residents followed by the extension of the Riverbank City water system, which connected services to all potentially affected residents. In March 1994, the USEPA, DTSC, California Regional Water Quality Control Board (RWQCB), and the Army signed the ROD for the RBAAP. The sitewide ROD contains two response actions that address the media of concern at RBAAP. The two response actions, both of which have been implemented, were a groundwater response action and a landfill response action. See Section 4.3.1 for further details on the landfill and groundwater contamination. The ROD also described two "post-ROD" potential actions that, although not part of the remedy, might need to be addressed based on future site conditions or findings (USAEC, 1994). These potential actions include:

- Investigation of the IWTP
- Recharge of the A-zone.

4.1.2 RCRA Activities

On July 30, 1995, DTSC issued the RCRA Part B Hazardous Waste Facility Permit for the RBAAP. In addition to monitoring and reporting requirements for the facility, the permit required the Army to conduct an RFI for the SWMUs and AOCs identified at the RBAAP. In June 2002, the Army and DTSC signed a Corrective Action Consent Agreement (CACA) that required the Army to perform investigation at a limited number of AOCs (State of California, 2002). Although DTSC identified 25 SWMUs and 16 AOCs in the CACA,

additional investigation was required at only 5 of the listed sites (CH2M HILL, 2002, 2005a). See Section 4.3.2 for additional details on the RCRA activities.

4.2 Environmental Permits/Licenses

The following sections discuss the status of various environmental permits and licenses held by the RBAAP.

4.2.1 Resource Conservation and Recovery Act (RCRA) Status

On July 30, 1995, DTSC issued the RCRA Part B Hazardous Waste Facility Permit for the RBAAP. The RBAAP currently holds a RCRA Part B permit for a hazardous waste RCRA TSD facility that requires daily and weekly inspections of all RCRA storage and treatment facilities at the RBAAP. The renewed permit (05-SAC-06) became effective on May 6, 2006, and expires May 6, 2016 (State of California, 2006).

4.2.2 Solid Waste Permits

The RBAAP does not maintain a Solid Waste Permit.

4.2.3 Underground Storage Tank/Aboveground Storage Tanks Permits

Based on information provided by NI Industries, all USTs have been removed or closed in place (USAEC, 2005a). Available information concerning former USTs and associated closures is described in Section 4.4.2 (NI, 2006b).

4.2.4 National Pollutant Discharge Elimination System (NPDES) Permits

The RBAAP holds one NPDES General Permit for discharges of stormwater associated with industrial activities, CAS 000001, Order No. 97-03-DWQ. RWQCB, Central Valley Region issued the permit, which has no expiration date, on April 17, 1997 (NI, 2006). Discharge of treated effluent from the IWTP and GWTP to the E/P Pond area is via a 3.5-mile underground pipeline. Groundwater monitoring is conducted in the E/P Pond area in accordance with applicable Waste Discharge Requirements (WDRs) as discussed in Sections 4.2.8, Other Permits/Licenses and Section 4.3.2, SWMU 23.

4.2.5 Drinking Water Permits

The RBAAP holds the following Drinking Water Permit:

State:	CA
Permit No.:	03-10-03P-005
Agency:	State of California, Department of Health Services, Division of Drinking Water and Environmental Management Branch
Issuance Date:	05/14/03
Permit Amendment No.	03-10-05PA-004
Agency:	State of California, Department of Health Services, Division of Drinking Water and Environmental Management Branch
Issuance Date of Original Permit:	05/14/03
Effective Date of Permit Amendment:	04/15/05

The Permit Amendment stipulates that Well No. 1 was changed from Active to Standby status. The only sources approved for potable water supply for the RBAAP are listed in Table 4-1:

TABLE 4-1
Riverbank Army Ammunition Plant Drinking Water Wells
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Name	Status	Station Code	Well Depth (feet)
Well 01	Standby Raw	5000211-001	372
Well 05	Active Raw	5000211-004	90
Well 06	Active Raw	5000211-003	185
Well 01 – Treated	Standby Treated	5000211-00701TC	430
Well 05 – Treated	Active Treated	5000211-00505TC	710
Well 06 – Treated	Active Treated	5000211-00606TC	605

Reference: State of California, 2003

4.2.6 Air Permits

The RBAAP holds 22 air permits listed in Table 4-2 (NI, 2005b). RBAAP is located in the San Joaquin Valley Air Basin in Stanislaus County and is under the jurisdiction of the San Joaquin Valley Unified Air Pollution Control District. Renewal of air permits issued by the San Joaquin Valley Unified Air Pollution Control District occurs every 5 years. However, as long as the permit conditions are maintained and the fees paid, renewal of the permit is automatic (NI, 2006e).

4.2.7 Nuclear Regulatory Commission Licenses

Based on records reviews conducted by the RBAAP point of contact regarding radioactivity, Mr. Dale Clemens, no licensed radioactive material has been in use at the RBAAP (USAMC, 2005). This information was further supported by the participants at the August 2005 ECP Workshop, although according to the former Commanders Representative Mr. Gansel, one temporary activity involving the packaging of instruments and gauges was known to contain radium (USAEC, 2005b). See Section 4.8 for further details.

4.2.8 Other Permits/Licenses

On July 27, 2001, the RWQCB, Central Valley Region, adopted the Updated WDRs for the U.S. Dept of the Army and NI Industries, RBAAP (State of California, 2001b). The WDRs permit the discharge of treated effluent from the GWTP and IWTP to the E/P Ponds. The discharge flow quantity and maximum concentration levels allowed in the effluent are identified. The maximum combined flow is 1.25 mgd (State of California, 2001b). The WDRs also describe groundwater monitoring requirements.

Within RBAAP, Building 11 operates as Riverbank Oil Transfer Facility. This operation has a permit to operate from the DTSC, under the Hazardous Waste Facility Permit (05-SAC-06). Building 11 stores used oil, waste antifreeze, and non-RCRA oily wastewater.

TABLE 4-2
Riverbank Army Ammunition Plant Air Permits
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Permit ID	Permit No.	Permitted Unit	Issue Date	Expiration Date
4891	N-2138-2-0	Confined abrasive blasting operation	1-Oct-97	30-Sep-11
4903	N-2138-16-1	Propane-fired emergency IC engine	1-Oct-97	30-Sep-11
4899	N-2138-11-0	Storage silo for lime	1-Oct-97	30-Sep-11
4895	N-2138-6-0	Metal parts and product coating operation	1-Oct-97	30-Sep-11
4893	N-2138-4-1	Corrosion-preventive coating served by paint sprayer	1-Oct-97	30-Sep-11
4892	N-2138-3-0	Paint stripe line and associated equipment	1-Oct-97	30-Sep-11
7403	N-2138-18-0	Metal parts and products coating operation	1-Oct-97	30-Sep-11
7402	N-2138-10-0	Bayco Model R-2B-150 incinerator	1-Oct-97	30-Sep-11
4908	N-2138-0-0	Facilitywide requirements	1-Oct-97	30-Sep-11
4907	N-2138-1-2	450-gallon Convault AST	17-Oct-97	30-Sep-11
7406	N2138-21-0	Annealing and lubrication operation	30-Sep-99	30-Sep-11
7405	N-2138-20-0	7.2-MMBTU/HR spheriodizing heat treat furnace	30-Sep-99	30-Sep-11
7404	N-2138-19-0	Confined abrasive blasting operation	30-Sep-99	30-Sep-11
8032	N-2138-23-1	Zinc plating operation	10-Jan-01	30-Sep-11
8031	N-2138-22-1	Heat treating and soap coating line	10-Jan-01	30-Sep-11
8033	N-2138-26-0	Diesel-fired emergency IC engine	13-Mar-01	30-Sep-11
9745	N-2138-28-0	Diesel-fired emergency IC engine	10-Aug-03	30-Sep-11
8206	N-2138-25-0	8.583-MMBTU/HR Boiler	2-Jul-04	30-Sep-11
8205	N-2138-24-1	8.583-MMBTU/HR Natural Gas Boiler	2-Jul-04	30-Sep-11
4902	N-2138-15-1	195-HP Propane-fired engine	16-Jul-04	30-Sep-11
4901	N-2138-14-1	195-HP Propane-fired engine	16-Jul-04	30-Sep-11
9744	N-2138-27-0	Propane-fired emergency IC engine	16-Jul-04	30-Sep-11

Reference: NI Industries, 2005b

4.3 Environmental Cleanup

The following sections discuss the environmental cleanup activities that have taken place at the RBAAP.

4.3.1 Installation Restoration Program

The Army's cleanup program under the Defense Environmental Restoration Program (DERP) is the Installation Restoration Program (IRP). The goal of the IRP is to clean up previously contaminated lands to an acceptable level of risk on active installations. The sites at RBAAP described in this section represent the currently active and completed IRP sites. Under the Army IRP, currently only two active sites are at the RBAAP: RBAAP-001 (Landfill- Long-Term Management [LTM]) and RBAAP-003 (Groundwater Contamination). A list of the IRP sites, including the sites where the response action has been documented as complete, are provided in Table 4-3 and described further in this section of the ECP

(USAEC, 2005a). Other sites at RBAAP that have been identified as AOCs or SWMUs as part of the RCRA program are discussed in Section 4.3.2 of this document. The locations of the IRP Sites, AOCs, and SWMUs located at RBAAP are shown in Figure 4-1.

TABLE 4-3
Riverbank Army Ammunition Plant California Installation Restoration Program Sites and Status
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

IRP Site ID	Site Name	Contaminants of Concern	Media	Status/ Completion Date
		Active Sites		
RBAAP-01	Landfill (same as SWMUs 10 and 11)	Cyanide, Hexavalent Chromium	Soil, groundwater	LTM/2015
RBAAP-03	Groundwater Contamination	Cyanide, Hexavalent Chromium	Soil, groundwater	RAO/2008, LTM/2023
		Response Complete Sites		
RBAAP-02	Waste Salt Disposal Pit (same as SWMU 18)	None	None	RC/1993
RBAAP-04	IWTP Effluent Sewer Line Break (same as SWMU 12)	None	None	RC/1993
RBAAP-05	Building 13, Chromium Treatment (same as SWMU 5)	None	None	RC/1993
RBAAP-06	IWTP H2SO4 Spill	None	None	RC/1993
RBAAP-07	Building 13 Phosphate Spill	None	None	RC/1993
RBAAP-08	SE Storm Reservoir (same as SWMU 21)	None	None	RC/1993
RBAAP-09	NW Storm Reservoir (same as SWMU 20)	None	None	RC/1993
RBAAP-10	Sewage Treatment Plant/Sludge Beds (same as SWMU 22)	None	None	RC/1993
RBAAP-11	Percolation/Evaporation Ponds (Stanislaus) (same as SWMU 23)	Zinc	Soil, groundwater	RC/1993

Source: USAEC, 2006a.
LTM – Long-Term Management
RA(O) – Remedial Action Operations
RC – Response Complete

History of Installation Restoration Program at the Riverbank Army Ammunition Plant

The IRP activities at the RBAAP began in 1979 with an Installation Assessment. The Assessment concluded that areas of the RBAAP and the waste disposal ponds located offsite were potentially contaminated with heavy metals and other chemicals as a result of procedures used in past manufacturing operations and waste disposal practices. The assessment also indicated the potential for migration of the contaminants into the subsurface soils and waters (USAEC, 2005a). Extensive characterization of the E/P Ponds was completed during the RI phase, and based on the RI findings a removal action was completed in 1993 to address zinc-contaminated soil. The 1994 sitewide ROD, which addressed groundwater contamination and the landfill, also documented the E/P Pond

removal action in detail and concluded that no further action was necessary at the ponds (USAEC, 1994).

USEPA initially proposed the RBAAP for inclusion on the NPL on June 24, 1988, and added it to the final list on February 21, 1990. A Federal Facilities Agreement was signed on April 5, 1990. Under this agreement, the Army agreed to complete the RI/FS and, eventually, perform the Remedial Design (RD) and implement the Remedial Action (RA) to address the environmental contamination at RBAAP.

In addition to the onsite RBAAP RI activities, an offsite residential well sampling program was established in September 1985. The residential well sampling program consisted of the quarterly sampling of approximately 70 wells located west of the RBAAP boundary. Wells located at RBAAP and to the west of RBAAP are shown in Figure 4-2. Water samples from six wells located west of the RBAAP showed levels of chromium in excess of 50 µg/L (drinking water standard). The initial response included the provision of bottled drinking water to those affected residents followed by the installation of deep replacement wells. This action was followed in 1992 with the extension of the Riverbank City water system, which connected services to all potentially affected residents.

1994 Record of Decision

The RI/FS work, which addressed the investigation of the sites, was completed in 1993 (Weston, 1991, 1992, 1993b). In March 1994, the USEPA, DTSC, RWQCB, and the Army signed the ROD for the RBAAP (USAEC, 1994). The sitewide ROD contained two response actions that address the media of concern at the RBAAP and documents that no further action is required at the remaining sites. The two response actions were a groundwater response action (IRP Site RBAAP-003) and a landfill response action (IRP Site RBAAP-001). The groundwater response action requires containment of the chromium plumes contamination in excess of 50 µg/L and cyanide contamination in excess of 200 µg/L and LTM. The landfill response action required installation of an appropriate final cover for the landfill and LTM.

The potential "post-ROD" actions that might need to be addressed based on future site conditions or findings include (USAEC, 1994):

- Investigation of the IWTP
- Recharge of the A-zone.

In September 1997, the USEPA, DTSC, RWQCB, and the Army signed the Preliminary Closeout Report for construction of the RAs required in the 1994 ROD (USEPA, 1997), (CH2M HILL, 1997a, 1997b, 1997c). The agencies and Army concurred that the sitewide response actions had achieved "construction complete" status and that the remedy was entering the operations and maintenance (O&M) phase.

The Army prepared the first 5-year review report in 2001 to determine whether the remedial actions remain protective of human health and the environment and to assess whether the actions are functioning as designed and are operated and maintained in an appropriate manner. The report concluded that the remedy remained protective of human health and the environment and would remain so through completion (U.S. Army, 2001). A few minor

Figure 4-1 redacted.

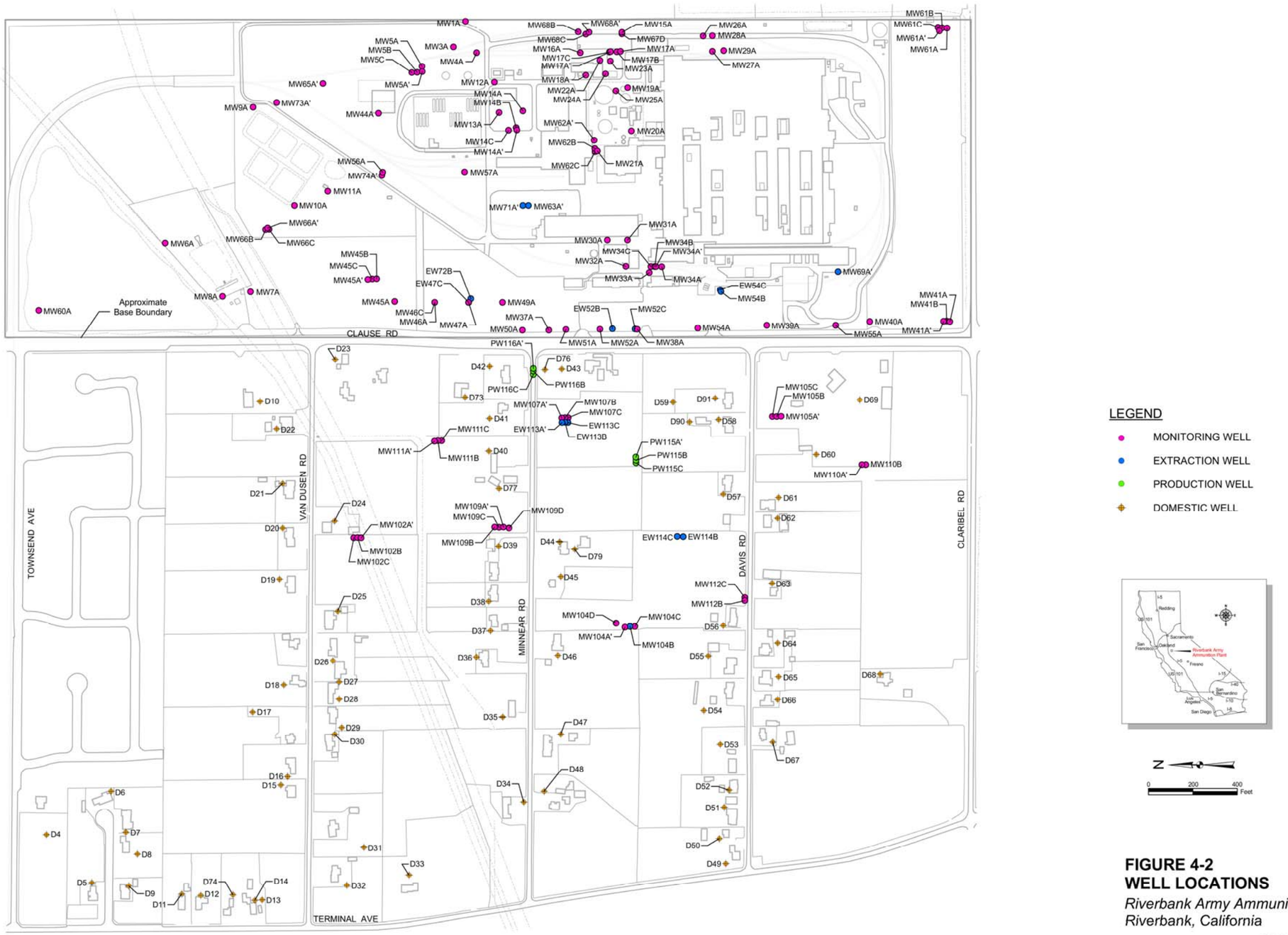


FIGURE 4-2
WELL LOCATIONS
Riverbank Army Ammunition Plant
Riverbank, California

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deficiencies that do not immediately affect the protectiveness of the remedy were noted in the report. USEPA concurred with the 5-year review report in September 2001.

The Army prepared the *Draft Second Five-Year Review Report* in 2005 and concluded that the groundwater extraction and treatment system and landfill cover remedial actions are functioning as designed and are operated and maintained in an appropriate manner. A few issues that do not currently affect the protectiveness of the remedy were noted in the report. The landfill remedy is currently protective of human health and the environment, but deed restrictions are required for the remedy to remain protective in the long term. The groundwater remedial action is currently protective of human health and environment, but some form of institutional control (IC) is needed to prevent inappropriate use of the contaminated groundwater while the groundwater remediation is occurring (AGSC, 2006).

Installation Restoration Program Site Descriptions

The following site descriptions are provided for the active and completed IRP sites at RBAAP. The phases and dates are taken from the *2006 Installation Action Plan* conducted in FY06 to plan for FY07 program requirements (USAEC, 2005a).

Active IRP Sites

The active IRP sites located at RBAAP include RBAAP-01 and RBAAP-03 as follows:

Site: RBAAP-01, Landfill		
Phases:	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/Feasibility Study	October 1985	June 1993
Remedial Design	September 1987	February 1995
Interim Remedial Action	October 1989	September 1990
RA(C) Remedial Action (Construction)	June1995	September 1995
Remedial Action (Operation)	September 1995	September 2001
Long-Term Management.	March 2002	September 2015

Response Complete: September 1995

RBAAP-01 Landfill. This landfill encompasses approximately 4.3 acres in the northern section of the main plant near the eastern boundary (see Figure 4-1). Although the term "landfill" has been used to describe RBAAP-01, the entire area was not used for disposal activities, and the disposal operations did not involve typical landfill operations but rather consisted of two discrete disposal trenches and a surface disturbance area. Apparently, during the 15 months of operation by ALCOA (1943-1944) general refuse, including pot-liner material (a by-product of aluminum production) was placed in the southern end of the landfill. Although ALCOA was in operation only for a short time, the aluminum-reduction process used at that time typically generated large volumes of cyanide waste. Spent pot-liner material is a listed RCRA hazardous waste, with a corresponding listing number of K088. This material is thought to be the source of cyanide contamination from the landfill. After the plant was converted to a cartridge and projectile manufacturing operation by the Army in 1952, the landfill area was reportedly used for incineration and disposal of a variety of industrial sludges and solid waste, including paper, dunnage, oils, grease,

solvents, hospital wastes, and construction debris. Burning the combustible wastes was performed routinely. In 1966, onsite disposal operations were discontinued, and the burning pits and disposal trenches were filled with construction rubble and soil. There was no documented disposal in this area after that time. However, review of a 1967 aerial photograph noted a new trench in the central portion of the landfill (USAEC, 1994).

Wells placed downgradient of the landfill have indicated that the landfill was a possible source of cyanide and chromium contamination in groundwater. Most of the potliner was removed during previous rubble removal efforts. Chromium contamination has been traced to construction rubble that contained chromium contaminated bricks. These were also removed from the site during a 1987 rubble cleanup effort. Although the landfill was concluded to be a source of groundwater contamination, the source is believed to have been depleted, yet some elevated cyanide concentrations remain in several wells downgradient of the landfill (MW14A-4630 parts per billion [ppb] in 2002, MW13A-5960 ppb in 2001, and MW21A-938 ppb in 2001).

The landfill response action described in the 1994 ROD called for installing a final cover and maintaining it for 20 years. The final cover was to be constructed in accordance with the substantive provisions of California Code of Regulations (CCRs), Title 23, Chapter 15, Articles 5 and 8, Corrective Action and Closure Requirements. The landfill cover requirements outlined in the ROD include the following:

- A foundation soil layer of sufficient stability to be provided by grading and compacting existing landfill soils.
- A 1-foot-thick clay layer with a design permeability of 1×10^{-6} centimeters per second.
- A minimum of 1 foot of clean topsoil to be placed over the clay layer to provide an adequate rooting depth for vegetative cover and to protect the clay layer.
- Grading to provide a minimum of 2 percent slope to minimize ponding of precipitation and allow for adequate drainage.
- The final cover should be designed with the objective of minimizing maintenance requirement.
- The 5-year review should evaluate whether continued maintenance of the cover is necessary to protect human health and the environment, including water quality.
- Two additional monitoring wells were required downgradient of the landfill.

Implementation of the landfill remedial action began in June 1995, and initial work was completed in October 1995. Additional seeding was performed in 1996, and the final construction was complete on October 3, 1996. The final landfill cover included, from top to bottom, a 2-foot-thick vegetative cover layer, a 0.25-inch-thick geosynthetic liner, and a 2-foot-thick foundation layer. The landfill cap was designed and constructed to drain rainfall off and away from the landfill. After installation of the cap and associated drainage and final grading, the cover was hydroseeded with native grass. Some isolated damage to the landfill cover was caused in 1997 by construction activity on the adjoining railroad tracks. This was noted in the first 5-year review, and repairs were made. The Draft Second Five-Year Review, completed in 2005, concluded that the landfill remedy is currently

protective of human health and the environment. However, for the remedy to remain protective in the long term, deed restrictions that prevent inappropriate use of the landfill need to be implemented (AGSC, 2006).

Cleanup Strategy. LTM will continue until 2015 in accordance with the terms of the ROD. The completed landfill cap will be maintained. Annual surveys to assure stability and annual management of a pesticide program to prevent damage to the completed landfill cap are planned.

Site: RBAAP-03, Groundwater Contamination		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/Feasibility Study	October 1985	June 1993
Remedial Design	September 1987	April 1995
Interim Remedial Action	October 1989	December 1990
RA(C) Remedial Action (Construction)	September 1996	September 1998
Remedial Action (Operation)	September 1996	September 2008
Long-Term Management.	October 2008	September 2023

Response Complete: September 2008

Site RBAAP-03. This site is located in the central part of the Main Plant Area and represents the RA (GWTS) installed to contain all sources of groundwater contamination, including the source area related to historical IWTP operations (see Figure 4-1). The IWTP at the RBAAP was constructed to treat the wastewaters generated from the electroplating, cleaning and metal finishing processes that are operated onsite and includes facilities for flocculation, clarification, sludge thickening, sludge/liquid separation, and nitrate salt removal. The original storage and equalization tanks used for the IWTP were made of redwood, which would leak. During periods of low flow to the IWTP the redwood would desiccate, causing gaps between the timbers. Upon filling, fluid would leak through the gaps to the ground until the timbers swelled once again and closed the gaps. From 1973 to 1980 the IWTP was upgraded and the redwood tanks were replaced with concrete tanks. Based on groundwater contamination both onsite and offsite, the IWTP area was identified as a primary source of chromium contamination in the groundwater.

Prior to the 1994 ROD, the Army installed an interim groundwater treatment system and provided alternative drinking water sources to all affected offsite residences. In 1992, the Army completed the extension of the Riverbank City water system, which connected services to all potentially affected residents.

The final sitewide ROD signed in March 1994 required expansion of the IGWTS to fully capture groundwater contamination. The expanded system began operation in 1997 and is now capturing all contaminated groundwater and removing contamination from the extracted water by the requirements of the groundwater remedy described in the 1994 ROD as described below:

- Groundwater extraction from wells located onsite and offsite, with an estimated minimum extraction rate of 120 gpm (actual extraction and treatment rates were to be determined during remedial design).
- The extraction system needs to capture chromium plumes above 50 µg/L and cyanide plumes above 200 µg/L. Full plume capture will be demonstrated by an adequate monitoring well network.
- Treatment for chromium and cyanide using ion exchange.
- Discharge of treated water to either the OID Canal or the E/P Ponds. Discharge limits were to be less than 50 µg/L for chromium and 5.2 µg/L for cyanide for the E/P Ponds or less than 11 µg/L for chromium and 5.2 µg/L for cyanide for the OID canal.

The ROD also described two "post-ROD" potential actions that, although not part of the remedy, might need to be addressed based on future site conditions or findings. These potential actions include:

- Investigation of the IWTP
- Recharge of the A-zone

The IWTP remains an active unit treating waste under a RCRA Part B Permit identified as (SWMU 1), and the DTSC has indicated that additional sampling of soil will be required under each unit at the IWTP when this system goes through Base closure. The second post-ROD action consists of continued monitoring of the A-zone to assess whether it recharges, and if it does recharge, investigation of the extent of contamination. If groundwater cleanup levels are exceeded, the A-zone groundwater would likely need to be remediated. Groundwater is currently monitored on a quarterly basis.

Current Status: The extraction system, which has operated since 1997, currently includes eight groundwater extraction wells with two of the extraction wells located onsite and the others located offsite, west of the facility. It is projected that the system will be operated until 2008 but it may require more years of operation beyond 2008 if the planned system optimization and in-situ treatment efforts discussed below do not accelerate cleanup. As reported in the June 2005 Monthly Operations and Water Discharge Summary, the monthly effluent discharged from the plant was 6,867,278 gallons (AGSC, 2005a). The treatment consists of ion exchange only. RBAAP currently has a monitoring well network of 131 wells screened in the various aquifer zones (A', A, B, C and D). Four groundwater monitoring events occur throughout the year; two quarterly, one semiannual and one annual that include specific sets of wells completed in the various A', A, B, C, and D portions of the aquifer. Samples are analyzed for dissolved chromium and/or free cyanide and groundwater elevation data is collected and reported. The Army prepared the first 5-year review report in 2001 to determine whether the remedial actions remain protective of human health and the environment and to assess whether the actions are functioning as designed and are operated and maintained in an appropriate manner. The report concluded that the remedy remained protective of human health and the environment and would remain so through completion (U.S. Army, 2001). The draft second 5-year review, completed in 2005, concluded that the groundwater remedy is currently protective of human health and the environment. However, for the remedy to remain protective in the long term, some

form of institutional control is needed to prevent inappropriate use of the contaminated groundwater while the groundwater remediation is occurring (AGSC, 2006).

In general, the contaminated areas are much smaller now then they were in 1997 when the system began operation, and significantly smaller than in 2001, when the first 5-year review was performed. Historically, the highest concentrations of chromium and cyanide have been observed in the A Zone at 1,300 and 22,600 µg/L, respectively. Although concentrations of these chemicals in groundwater have declined dramatically during the period of operation of the GWTS, the falling water table apparently has left significant residual chromium and cyanide in currently unsaturated soils (i.e., in the stratigraphic layer identified as the A Zone) primarily in the vicinity of the IWTP and the landfill. During the last annual monitoring event (second quarter of 2005), all active monitoring locations are sampled. Figures 4-3a, 4-3b, and 4-3c, show chromium and cyanide concentrations in the A/A', B, and C aquifer zones, respectively, for the first quarter of 2006. During this event, the maximum concentrations of chromium and cyanide observed in groundwater were 235 and 241 µg/L, respectively, in the A/A' Zones, and 145 and 74.9 µg/L in the B Zone wells (CH2M HILL, 2005b). These contaminants rarely have been detected in the C Zone at concentrations exceeding the cleanup levels since 2003. Chromium concentrations at some locations have fluctuated near the cleanup levels at some wells and exceeded the level in one C Zone well during the fourth quarter 2004 event. Cyanide has never been detected in any of the D Zone wells. Chromium concentrations in the D Zone are at apparent regional background levels.

Results from the most recent monitoring event (first quarter 2006) are similar to those of the previous annual event. Chromium concentrations ranged from nondetect to 279 µg/L (cleanup level of 50 µg/L) and cyanide levels ranging from nondetect to 363 µg/L (cleanup level of 200 µg/L) (CH2M HILL, 2006). Of the wells sampled, only seven wells had concentrations of chromium exceeding cleanup levels and only one well, which is located onsite, exceeded the cyanide cleanup level. Only one offsite well (PW115A) contained a chromium concentration (70.6 ppb) exceeding the cleanup level of 50 ppb. Based on the spatial distribution of the wells showing contamination, it appears that there is no longer a continuous definable plume of groundwater contamination no longer exists; contamination is more accurately characterized as smaller, discontinuous zones.

The target extraction rate has been reduced from 282 gpm in 1997 to the current 110 gpm, based on system optimizations and a decreasing area requiring capture and current modeling shows essentially complete capture of the target contaminant areas identified as exceeding the cleanup levels (CH2M HILL, 2006). Although the GWTS has effectively contained contaminated groundwater and reduced the mass of chromium and cyanide at the site, current groundwater concentration trends indicate that the GWTS may be required to operate for many years to achieve the site cleanup levels (maximum contaminant levels [MCLs]). Both chromium and cyanide sorb to aquifer materials, and will subsequently desorb into the groundwater as the aquifer concentrations decrease resulting in slow mass transfer and relatively long time periods for the operation of groundwater extraction remedies. In addition, the potential exists for local groundwater conditions to change (e.g., the A Zone could recharge) leading to the potential need for additional remedial action.

As a result of the slow mass transfer and projected time required using only a pump and treatment approach, the Army has been evaluating various in-situ technologies along with re-evaluation of the extraction configuration. As part of this evaluation, the Army has initiated a series of in-situ treatments using injection of sodium dithionite (reducing agent used to reduce hexavalent chromium to trivalent chromium) into residual source zone areas identified at the bottom of the unsaturated-aquifer A Zone clay and silt. These efforts, supported by treatability studies conducted by Lawrence Livermore National Laboratory, are targeted at reduction of residual chromium in the unsaturated zone which could act as a significant source of contamination in the future in the event that the aquifer A Zone recharges. Other variations of in-situ treatment specifically to address hot spots in the saturated portions of the aquifer are currently under evaluation.

Cleanup Strategy. LTM and operations of the GWTS will continue based on the results of 5-year reviews. As discussed above, active evaluation of in-situ treatment is underway and additional in-situ treatment and extraction configuration modifications are anticipated to accelerate the cleanup process. In the interim, the Army will continue to evaluate the efficiencies of the current operation and monitoring actions and, where appropriate, propose reductions to these actions as the site moves towards cleanup. A strategy for GWTS and LTM ramp down, as well as NPL delisting also will be developed as the site moves toward cleanup. As previously noted, additional characterization of the IWTP is precluded until permit closure due to the presence of existing system components.

A Firm Fixed Priced Remediation (FFPR) approach under a Performance-Based Contract (PBC) was awarded on April 29, 2004, to Ahtna Government Services Corporation (AGSC) (AGSC, 2004). The period of performance on this contract is 4 years. In addition, draft versions of GWTS and LTM ramp-down strategies and a draft of the second 5-year review have been developed (AGSC, 2005a, 2005b, 2006).

Completed IRP Sites

The completed IRP sites located at RBAAP include RBAAP-02, RBAAP-04, RBAAP-05, RBAAP-6, RBAAP-07, RBAAP-08, RBAAP-09, RBAAP-10, and RBAAP-11 as described below.

Site: RBAAP-02, Waste Salt Disposal Pit		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	September 1980	September 1985
Remedial Investigation/ Feasibility Study	September 1985	September 1992

Response Complete: June 1993

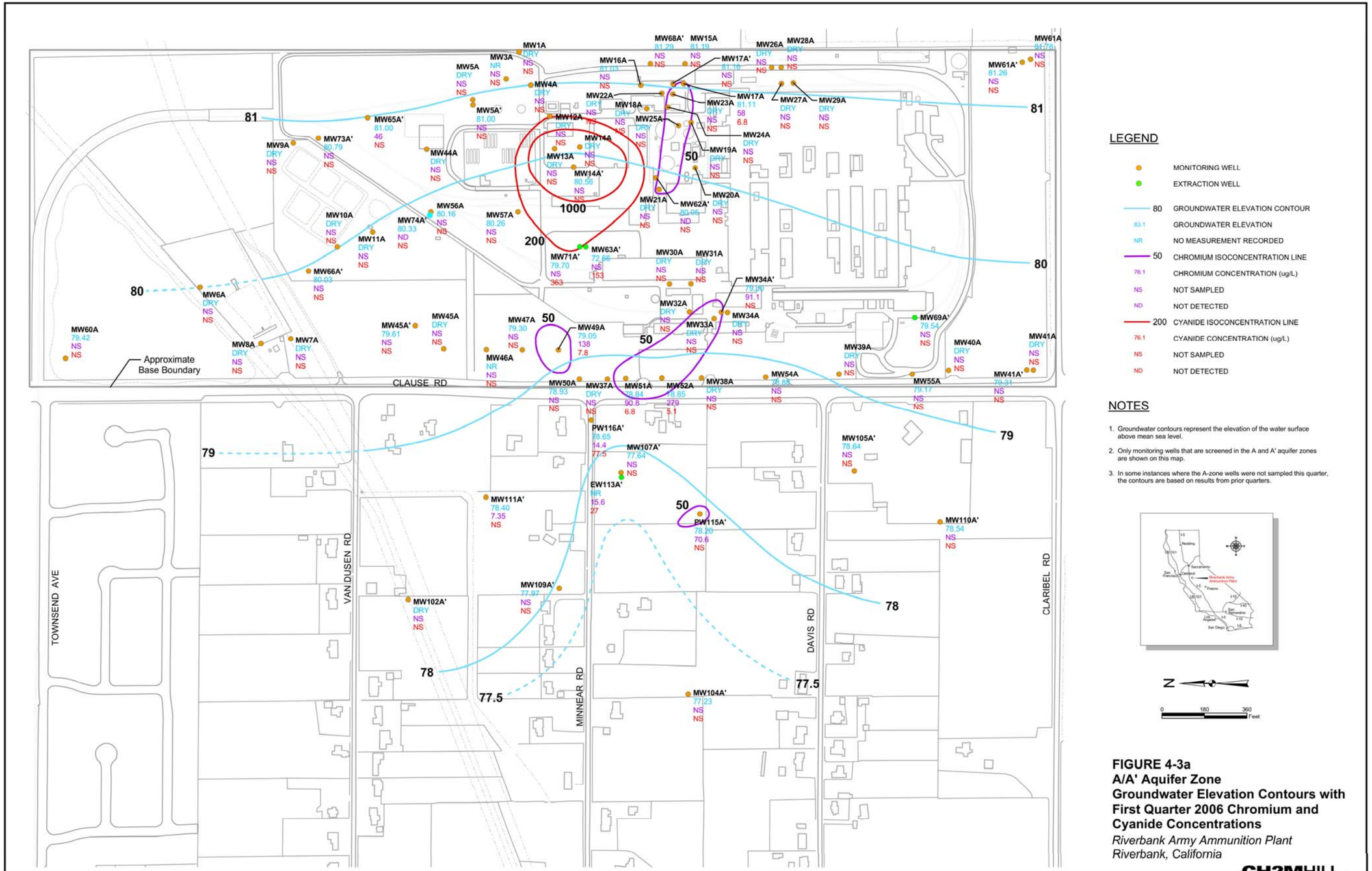

FIGURE 4-3a
A/A' Aquifer Zone
Groundwater Elevation Contours with First Quarter 2006 Chromium and Cyanide Concentrations
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

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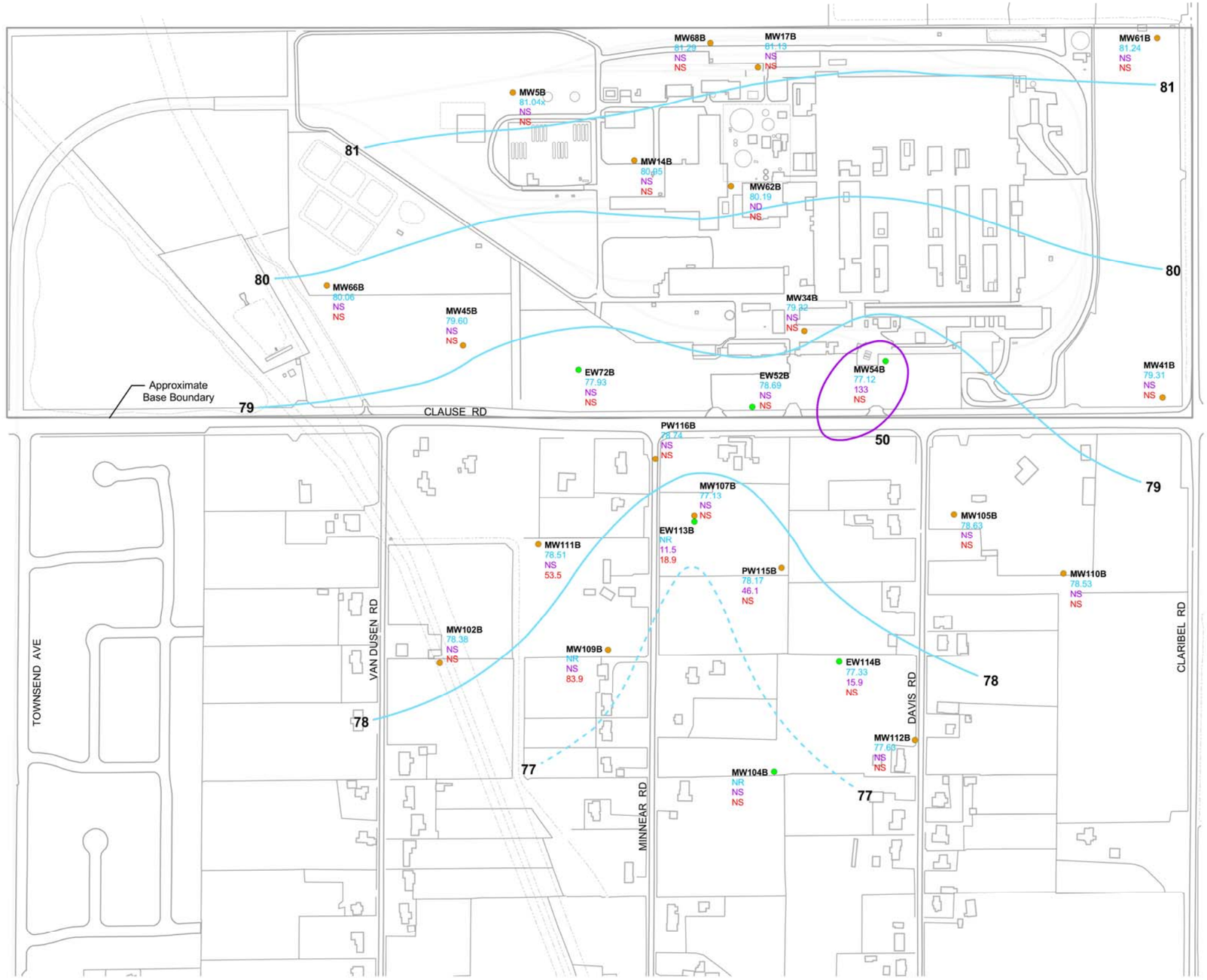

LEGEND

- MONITORING WELL
- EXTRACTION WELL
- 80 GROUNDWATER ELEVATION CONTOUR (Dashed Where Approximate)
- 83.1 GROUNDWATER ELEVATION
- NR NO MEASUREMENT RECORDED
- 50 CHROMIUM ISOCONCENTRATION LINE
- 76.1 CHROMIUM CONCENTRATION (ug/L)
- NS NOT SAMPLED
- ND NOT DETECTED

- 76.1 CYANIDE CONCENTRATION (ug/L)
- NS NOT SAMPLED
- ND NOT DETECTED

NOTES

1. Groundwater contours represent the elevation of the water surface above mean sea level.
2. Only monitoring wells that are screened in the B aquifer zone are shown on this map.

N

0 180 360 Feet

FIGURE 4-3b
B Aquifer Zone
Groundwater Elevation Contours with First Quarter 2006 Chromium and Cyanide Concentrations
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

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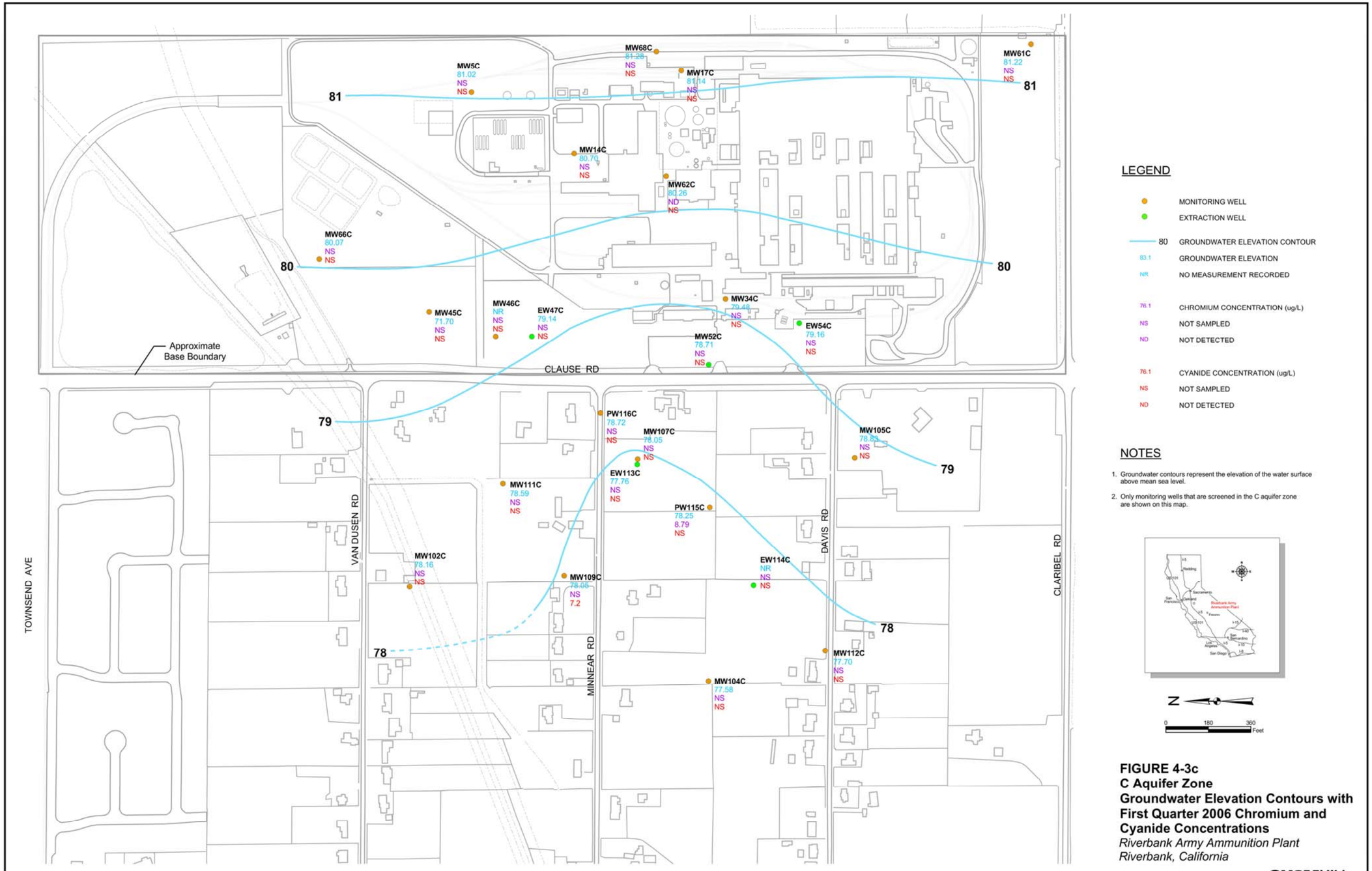

FIGURE 4-3c
C Aquifer Zone
Groundwater Elevation Contours with First Quarter 2006 Chromium and Cyanide Concentrations
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

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RBAAP-02 is located adjacent to the former landfill to the west (see Figure 4-1). The waste salt pond was constructed for use as an evaporation basin for wash water from the nitrate molten salt annealing process. Completed in 1969, it was never used for this purpose because anticipated orders were never received. The Installation Assessment incorrectly stated that the pond was used to desiccate sludge from the IWTP in 1975 and that the sludge was eventually removed and taken to a sanitary landfill. According to plant officials, the waste salt pond was not used for any disposal operations. Sampling of the pond was not conducted based on this information. The FS recommended no further action for this site, as is documented in the final sitewide ROD.

This site is Response Complete under the IRP.

Site: RBAAP-04, IWTP Effluent Sewer Line Break		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	October 1992

Response Complete: June 1993

In 1972, a major leak was detected in the IWTP effluent pipe, which carries treated water to the E/P -Ponds, at the location of the pipe intersection with the Hetch Hetchy Aqueduct (see Figure 4-1). The leak was not discovered for 7 days, during which time approximately 1 million gallons per day of wastewater was being discharged through the pipe. The sewer line at the leak was a force drain, and the force of the liquid caused erosion around the pipe, resulting in water pooling at the ground surface. An unknown amount of treated wastewater leaked from the pipe. During the Confirmatory Phase of the Contamination Survey, an investigation was conducted in the vicinity of the pipe leak. Four investigative borings and one background boring were completed and samples were analyzed for California Title 22 metals. Only concentrations of total chromium, copper, and fluoride were found to be close to or more than three times the background sample values. Therefore, the soil in the vicinity of the IWTP line break is not considered to be contaminated. The FS recommended no further action for this site, as is documented in the final site-wide ROD.

This site is Response Complete under the IRP.

Site: RBAAP-05, Building 13, Chromium Pretreatment		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	October 1992

Response Complete: June 1993

Site RBAAP-05. This site is located in the southern end of Building 13 on the southwestern part of the main installation (see Figure 4-1). The chromium pretreatment system was installed in 1978 as part of the upgrades to the IWTP to pretreat the waste stream from the zinc chromate dip solution used on the production lines prior to discharge to the IWTP. The treatment system reduced the chromium from a hexavalent state to a trivalent state, which

could then be precipitated prior to discharge of the waste stream to the IWTP. No direct sampling was conducted around this system because it is an operating facility. However, the groundwater investigation concluded that the major source of chromium contamination was the leaking tanks of the IWTP prior to the system upgrade. The FS recommended no further action for this site, as is documented in the final sitewide ROD.

This site is Response Complete under the IRP.

Site: RBAAP-06, Industrial Wastewater Treatment Plant Sulfuric Acid (H_2SO_4) Spill		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	October 1992

Response Complete: 199306

Site RBAAP-06. This is the site of a sulfuric acid spill that occurred in 1956 in the area of the Sulfuric Acid Feed System adjacent to the redwood equalization tanks (see Figure 4-1). This is north of Building 173, next to the existing 80-foot clarifier. The sulfuric acid spill was reportedly 500 gallons of concentrated sulfuric acid. No information has been found concerning the general dimensions of the spill or the exact location of the spill. The spill occurred adjacent to the former redwood equalization tanks and emanated from a pipe fed from the sulfuric acid storage tank east of the IWTP area. No placement of waste was documented in the area. The only known waste is the sulfuric acid spill, a 500-gallon release from a pipe break that reportedly was neutralized immediately with lime.

Downgradient monitoring wells NI-20, NI-21 and MW-62A, B, and C were analyzed for inorganic compounds during the Phase IA and Phase II portions of the RI. The groundwater pH levels, an indicator of acidic or alkaline condition, were found to be essentially neutral in groundwater both upgradient and downgradient of the spill area (upgradient average pH was 6.9, downgradient average pH was 6.84). Groundwater pH in the area of the sulfuric acid spill does not indicate an acidic condition.

Sulfate Contamination in Groundwater. Sulfate can be a by-product of sulfuric acid. Historically, sulfate concentrations in groundwater in the IWTP area were present at levels slightly above the secondary MCL of 250 milligrams per liter (mg/L). Monitoring well NI-20, downgradient of the spill area, identified sulfate at concentrations of 450 mg/L during Exploratory Phase 1B sampling in 1985. The groundwater table receded thereafter, and NI-20 could no longer be sampled. Monitoring wells MW-62A, MW-62B and MW-62C were installed north of NI-20 and downgradient of the IWTP. In 1990, sulfate concentration was detected at 23.3 mg/L in the shallow groundwater zone A′ and is no longer considered a groundwater concern in the IWTP area. It is unknown if the slightly elevated sulfate concentration found during the Exploratory Phase 1B was the result of the 1956 sulfuric acid spill.

The groundwater extraction system would capture any sulfate contamination in groundwater. Effluent from the GWTP is monitored for sulfate under the NPDES permit. Sulfate in groundwater is no longer a concern in the IWTP area because monitoring

conducted after the detection of slightly elevated levels in 1985 did not identify concentrations in excess of the secondary MCL.

In a letter dated July 27, 1998, DTSC concurred with the position of the Army (as detailed in the February 1998 Revision 4 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

This site is Response Complete under the IRP.

Site: RBAAP-07, Building 13 Phosphoric Acid Spill		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	October 1992

Response Complete: 199306

Site RBAAP-07. This was the site of a phosphoric acid spill in 1978 in the Phosphate Coating Area, upstairs in the southern end of Building 13 (see Figure 4-1). The 100-gallon spill occurred near a process unit for the zinc-phosphate coating of the M42 Grenade casing. The phosphoric acid was used to clean parts prior to coating and was stored in a 160-gallon tank containing 15 to 25 percent strength phosphoric acid.

The zinc-phosphate machine was operated from 1978 to 1981 and 1983 to 1990. The spill occurred during the first year of operations. This AOC did not contain any waste, only the product (phosphoric acid). The phosphoric acid spill resulted in approximately 100 gallons of phosphoric acid being released onto the second story concrete floor. The acid was washed down the industrial sewer drain, did not leave the building, and did not contact any soil or groundwater. Because the spill was contained inside the building, then in the sewer system, there is no further action required in this area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

This site is Response Complete under the IRP.

Site: RBAAP-08, Southeast Storm Reservoir		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	June 1993

Response Complete: June 1993

Site RBAAP-08. This site is located in the southeastern part of the main installation near the eastern boundary (see Figure 4-1). The SE Storm Reservoir collects stormwater from the southeast portion of the site, and the water from this reservoir is pumped to the NW Storm Reservoir for ultimate discharge offsite. The SE Storm Reservoir is 230-feet long and 44 feet wide. The total storage capacity is 430,000 gallons. The SE Storm Reservoir originally was constructed in 1954 and has been in use ever since. Stormwater runoff is the only known

source to the reservoir. Based on the reported presence of heavy metals in a water sample from the NW Storm Reservoir, an investigation of the SE Storm Reservoir was conducted during the Phase I RI efforts. One sediment sample was collected and analyzed for total and hexavalent chromium; total and free cyanide; 1,1-dichloroethylene; and the organic persistent and bioaccumulative toxic substances listed in California Title 22 CCR. Analysis showed the reservoir indicated no contamination above background levels. The FS recommended no further action for this site, as is documented in the final sitewide ROD, which concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required at the SE Storm Reservoir (CH2M HILL, 2002). More recently, a sample was collected in this reservoir for polychlorinated biphenyl (PCB) analysis (associated with the investigation of AOC 16). PCBs were detected at 4.5 milligrams per kilogram (mg/kg) and additional sampling was conducted as part of the 2004 RFI under AOC 16. Based on the sampling results and removal action, no further action is recommended at this SWMU (CH2M HIL, 2005a).

This site is Response Complete under the IRP.

Site: RBAAP-09, Northwest Storm Reservoir		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/Feasibility Study	October 1985	June 1993

Response Complete: June 1993

Site RBAAP-09. This site is located in the northwest section of the main installation just south of the grazing area (see Figure 4-1). The northwest storm reservoir collects stormwater from the majority of the main installation and is the discharge point for excess runoff from the southeast storm reservoir. Overflow from the northwest reservoir discharges to the Oakdale Irrigation Canal. The Installation Assessment referenced a 1974 Army Environmental Hygiene Agency report regarding industrial wastewater of the RBAAP. As noted in the Installation Assessment, one segment of the AEHA study examined the chemical analysis of a water sample from the northwest stormwater reservoir. The results indicated elevated levels of some heavy metals that were then cited as a possible source of contamination at the RBAAP. Sampling efforts were conducted during Phase I of the RI to verify the presence of sediment contamination in the reservoir and to determine the potential for contaminant migration. Two sediment samples were taken from the reservoir and analyzed for total and hexavalent chromium; total and free cyanide; 1,1-dichloroethylene; and the organic persistent and bioaccumulative toxic substances listed in California Title 22 CCR. Analysis showed the reservoir contained total chromium at levels greater than three times background levels; however, the reservoir is not considered a source of groundwater contamination based on California's Designated Level Methodology (DLM), which models the potential impact of contaminated soils on groundwater. In 1993, it was discovered that a cross-connection between the industrial sewer system and the stormwater sewer system was present in an in-line cistern leading to the NW Storm Reservoir. As a result, the 40,000-gallon cistern was pumped out and cleaned with a soap solution.

The FS recommended no further action for this site, as is documented in the final sitewide ROD, which concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required at the Northwest Storm Reservoir (CH2M HILL, 2002).

This site is Response Complete under the IRP.

Site: RBAAP-10, Sewage Treatment Plant/Sludge Beds		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1983	June 1993

Response Complete: June 1993

Site RBAAP-10. This site is located west of the northern portion of the former landfill area (see Figure 4-1). The sewage treatment plant consisted of a sewage pump station discharging into an Imhoff tank for treatment of the wastewater. Sludge was periodically drawn from the digestion chamber for drying in the sludge beds. Operation of the system was discontinued when the plant connected to the Riverbank sanitary sewer system in 1987. Sampling was conducted at the sewage beds in August 1991 under the RI addendum effort to meet requirements for addressing solid waste management units on the installation. The sampling effort concluded that the sludge beds did not contain chromium or cyanide above background levels. The FS recommended no further action for this site, as is documented in the final sitewide ROD.

This site is Response Complete under the IRP.

Site: RBAAP-11, Percolation/Evaporation Ponds (Stanislaus)		
Phases	**Start**	**End**
Preliminary Assessment	October 1979	September 1980
Site Inspection	October 1980	September 1985
Remedial Investigation/ Feasibility Study	October 1985	October 1993
Remedial Design	November 1993	November 1993
Remedial Action (Construction)	September 1993	December 1993

Response Complete: December 1993

Site RBAAP-11 occupies 27 acres on the banks of the Stanislaus River approximately 1.5 miles north of the main installation (see Figure 4-1). The E/P Ponds were constructed in 1952 for the disposal of treated effluent generated at the RBAAP. The four ponds are separated by a series of berms, which were raised in 1972 to increase capacity. Also berms were installed within each pond to act as baffles to reduce the potential for erosion.
The effluent flow is discharged into the first pond and overflow is sent to the second and so forth. The effluent discharged to the ponds evaporates and/or percolates through the pond bottom to the groundwater, thereby precipitating sediments into the bottom of the ponds. Figure 4-3d shows groundwater contamination levels in the vicinity of the E/P Ponds. A removal action was conducted in 1993 and included the excavation of 1,118.5 cubic yards of

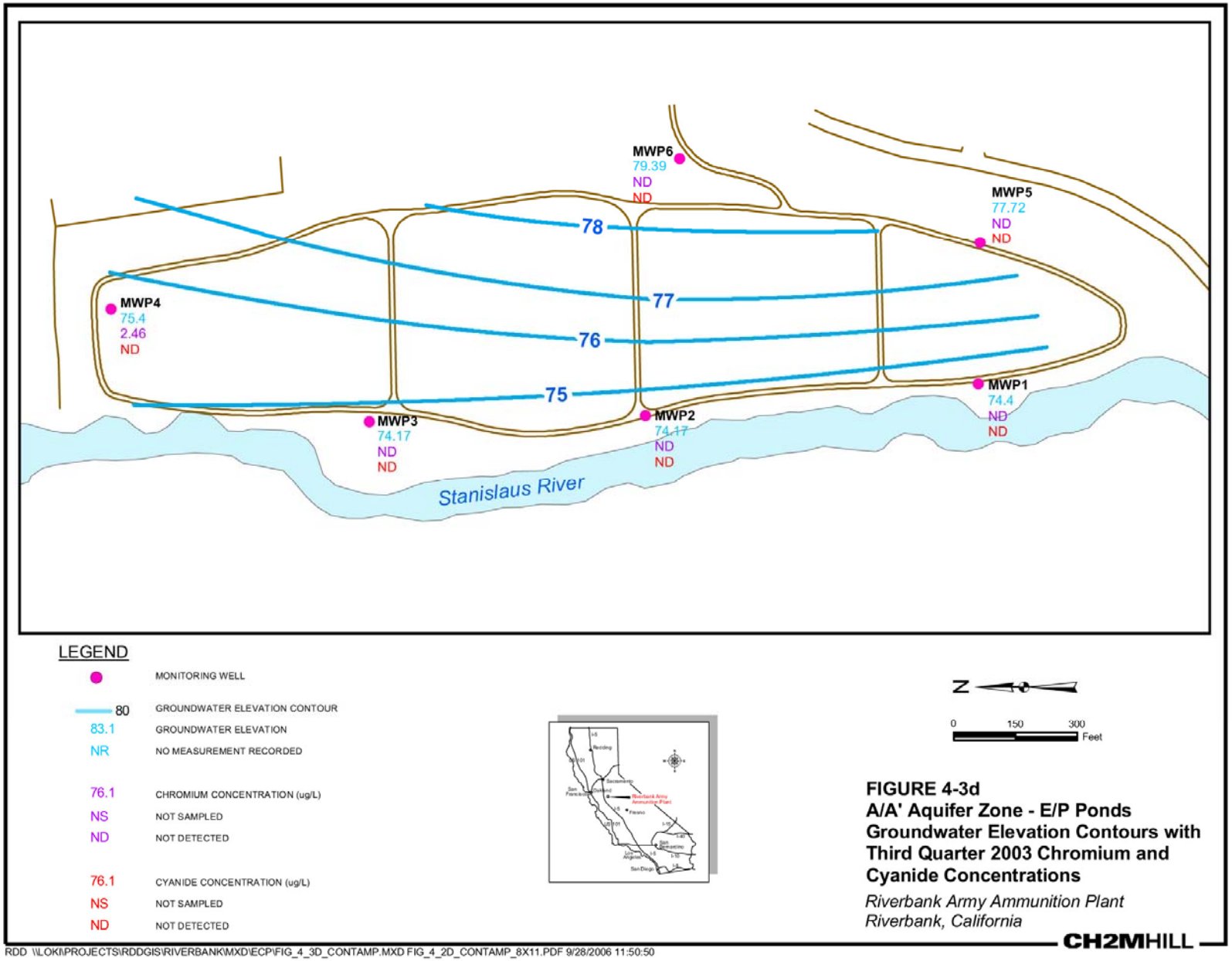


FIGURE 4-3d
A/A' Aquifer Zone - E/P Ponds Groundwater Elevation Contours with Third Quarter 2003 Chromium and Cyanide Concentrations

Riverbank Army Ammunition Plant
Riverbank, California

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_4_3D_CONTAMP.MXD FIG_4_2D_CONTAMP_8X11.PDF 9/28/2006 11:50:50

zinc-contaminated soil. Limited areas of total petroleum hydrocarbon (TPH) contamination were also excavated at this time and were disposed of with the zinc-contaminated soil at an approved offsite landfill. The final soil characterization report, completed in May 1994 following the removal action, concluded that no further action is warranted at the E/P Ponds. The final sitewide ROD documents this recommendation.

This site is Response Complete under the IRP.

4.3.2 Resource Conservation and Recovery Act Facility Investigation

The RCRA Permit required the Army to conduct a RFI. The first step in the process following the Permit was the development of an RFI Work Plan. The Army submitted its original RFI Work Plan to DTSC on October 30, 1995. After that initial submittal, there were five revisions to the RFI Work Plan submitted between 1996 and 1998. DTSC and the Army were unable to agree on the scope of work to be included in the RFI Work Plan. In June 2002, the Army and DTSC signed a CACA that identified 25 SWMUs and 16 AOCs listed below (State of California, 2002). The locations of the SWMUs and AOCs are shown in Figure 4-1.

Solid Waste Management Units

SWMU 1 – Industrial Wastewater Treatment Plant (IWTP)

SWMU 2 – Hazardous Waste Storage Area (Drum Storage Facility)

SWMU 3 – Empty Drum Storage Area (Railroad Car Off-Loading Area)

SWMU 4 – Drum Staging Area (IWTP)

SWMU 5 – Chromium Reduction Unit (Building 13) (Same as IRP-05)

SWMU 6 – Chromium Reduction Unit (Building 1)

SWMU 7 – Coolant Recovery Unit (at the IWTP) (Hyde Ultrafiltration Unit)

SWMU 8 – Waste Oil Accumulation Unit (Waste Oil Storage Tank)

SWMU 9 – Equipment Wash Facility (Building 177 Triple Rinse Area)

SWMU 10 – Landfill (Southern Portion) (The two landfill SWMUs are equivalent to IRP-01)

SWMU 11 – Landfill (Northern Portion)

SWMU 12 – IWTP Sewer Line Break Area (Effluent Force Main) (Same as IRP-04)

SWMU 13 – Incinerator (Building 123)

SWMU 14 – Incinerator (Building 163)

SWMU 15 – Pesticide Storage Area (West of Building 11)

SWMU 16 – Pesticide Storage Area (Building 165)

SWMU 17 – Pesticide Storage Area (Building 170)

SWMU 18 – Former Sludge Desiccating Pit (Waste Salt Disposal Pit) (Same as IRP-02)

SWMU 19 – Waste Zinc-Cyanide Solution Neutralizing Tanks

SWMU 20 – Northwest Storm Reservoir (Same as IRP-09)

SWMU 21 – Southeast Storm Reservoir (Same as IRP-08)

SWMU 22 – Sanitary Wastewater Settling Ponds (Same as IRP-10)

SWMU 23 – E/P Ponds (Same as IRP-11)

SWMU 24 – Industrial Waste Pipe Leak

SWMU 25 – Underground Storage Tanks

Areas of Concern

AOC 1 – Mortar Line Accumulation Area (Building 4)

AOC 2 – Machine Shop Accumulation Area (Building 9)

AOC 3 – Vehicle Maintenance Accumulation Area (Building 15)

AOC 4 – Grenade Line Accumulation Area

AOC 5 – Former Windrowed Area

AOC 6 – Sulfuric Acid Spill Area (1956) (Same as IRP-06)

AOC 7 – Phosphoric Acid Spill Area (1978) (Same as IRP-07)

AOC 8A – Horizontal Aboveground Storage Tanks - Propane Storage Tanks

AOC 8B - Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)

AOC 9A – Vertical Aboveground Storage Tanks - Fuel Oil Storage Tanks

AOC 9B – Vertical Aboveground Storage Tanks - Fire Sprinkler Storage Tank

AOC 10 – Former Solid Waste Pile (Southeast Corner)

AOC 11A – Loading Racks - Propane Farm Loading/Unloading

AOC 11B – Loading Racks - Fire Sprinkler Pumping Station

AOC 12 – Industrial Wastewater Collection System

AOC 13 – Draw Lube System (Building 178)

AOC 14 – Zinc-Cyanide Wastewater Collection System

AOC 15 – Building 13 Temporary Wastewater Line

AOC 16 – Substation 5

The CACA specifically described the need for additional investigation to determine the nature and extent of contamination at the five RBAAP sites listed below:

AOC 8B – Transformer Oil Storage Tanks and Distribution System

AOC 12 – Industrial Wastewater Collection System

AOC 14 – Zinc-Cyanide Wastewater Collection System

AOC 16 – Substation 5

SWMU 16 – Pesticide Storage Building

Additional investigation was performed at the five sites in 2003 as specified in the RFI Phase 1 Work Plan and the Phase 1 Work Plan Addendum (CH2M HILL, 2002 and CH2M HILL, 2003, respectively. Based on the 2003 RFI findings documented in the Final RCRA Facility Investigation Report, no further action is currently required at the RBAAP SWMUs and AOCs (CH2M HILL, 2005a). However, as stipulated by DTSC, further

sampling will be required at SWMU-1 (IWTP) in the future as part of the permit closure process.

It should be pointed out that the RFI used USEPA Region 9 industrial preliminary remediation goals (IPRGs) as screening levels for soil in industrial areas for data comparisons.

The following listing summarizes the current regulatory status of the SWMUs and AOCs as reported in the 2002 RCRA Current Conditions Report for the RBAAP and updated based on the Final RCRA Facility Investigation Report (CH2M HILL, 2002, 2005a). Notations about the need for further action, if any, reflect DTSC decisions that are documented in the record, except as otherwise noted. Additional characterization of the IWTP is precluded until permit closure due to the presence of existing system components.

SWMU 1 – Industrial Wastewater Treatment Plant *Future Action Required*

The IWTP is a treatment facility for industrial wastewater generated at the installation from electroplating, cleaning, and metal finishing processes. The primary treatment technologies are coagulation, flocculation, and clarification. The IWTP is located to the immediate north of the production plant at the installation. The IWTP is a system of tanks, sumps, filters, pipes, and other related equipment set up for treating facility wastewater. The IWTP is designed to treat facility wastewater, and includes facilities for coagulation, flocculation, clarification, sludge thickening, and sludge/liquid separation. Treated effluent water is discharged to the facility E/P Ponds.

The IWTP originally was built after the Army acquired the facility in 1951 and a decision was made to convert the plant to a steel cartridge case manufacturing facility. The configuration of the IWTP had remained nearly unchanged from the startup in 1952 until about 1972. It consisted of equalization tanks, constructed of redwood, and a pH adjustment system. During 1952 to 1954, production lines 5 and 6 produced zinc-plated shells for the Navy. Because the zinc was electroplated from a cyanide solution, a separate system was required to treat waste from this area. Cyanide solutions were diverted to a special tank in the IWTP where chlorine was added for neutralization. The neutralized cyanide waste joined the normally treated waste and both were transported to the E/P Ponds. The cyanide treatment tanks have not been in use since 1954.

Since 1972, numerous upgrades and improvements have been implemented at the IWTP. The redwood equalization tanks were replaced with a concrete equalization basin in 1980. Reportedly, when the water level in the redwood tanks was reduced for a period, the upper portion of the redwood tanks would dry out and the seams would open slightly. When the liquid level was later raised, the upper portion of the redwood tanks would leak and spill onto the adjacent ground, which was not paved at the time. This is believed to be the source of the chromium and cyanide contamination in the IWTP area. The entire IWTP area is now covered with concrete or asphalt. A series of concrete drainage trenches captures spills and overflows and drains to the former influent sump which is currently used as a secondary containment sump for the IWTP.

A Phase I RI Program was conducted between January 1987 and November 1998 (see Section 4.3.4). As part of the Phase I RI, two borings were advanced in the IWTP. Samples were analyzed for total and hexavalent chromium, total and free cyanide, and 1,1-DCE. Soil borings SB-14 and SB-15 were advanced to a depth of 50 feet bgs in the area where the

former redwood tanks were located. At SB-14, total chromium was detected at a concentration of 23.5 mg/kg. at 40 feet bgs, and 18.0 mg/kg at 50 feet bgs. At SB-15, total chromium was detected at a concentration of 22.15 mg/kg. at 40 feet bgs, and 55.83 mg/kg at 50 feet bgs (Weston, 1991).

Wastes associated with the IWTP include industrial wastewater from the production plant. Wastewater associated with the production plant has historically come from the production lines used to make ammunition casings, such as electroplating, cleaning, and metal finishing processes. Typical wastewater constituents included cyanide, chromium, trace metals, and caustic solutions. Prior to 1978, hexavalent chromium wastes from the zinc chromate solution on the production lines did not receive special treatment. However, in 1978 a chromium reduction pretreatment system was installed. The primary treatment process has been upgraded to lime coagulation.

The IWTP remains an active unit treating waste generated by Army operations at the RBAAP. DTSC (in a letter dated July 27, 1998) states that additional characterization of soil at the IWTP is precluded by existing equipment. Additional characterization of the IWTP is precluded until permit closure due to the presence of existing system components.

SWMU 2 – Hazardous Waste Storage Area (Drum Storage Facility): *No Further Action*

The Hazardous Waste Storage Area for the 55-gallon containers is located in Building 174, which is 100 feet long and 50 feet wide. The capacity of the facility is 300 drums. The area consists of a concrete slab with three 400-gallon sumps. The slab is sloped to give three segregated areas of storage: flammable, caustics, and acids. In each area, the floor slopes approximately 0.5 inch per foot toward a 400-gallon sump. The perimeter of the slab has 6-inch-high curbing for overall secondary containment and control of surface water run-on from outside the area. No known spills have been recorded in this facility.

The Hazardous Waste Storage Area is an active unit regulated under RCRA and has a Part B permit. It will eventually undergo RCRA closure when operations cease at this unit. DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required for this unit (CH2M HILL, 2002).

SWMU 3 – Empty Drum Storage Area (Railroad Car Off-Loading Area) *No Further Action*

The Empty Drum Storage Area is located to the north of Building 11. This area was a staging and storage area for empty vendor product drums and scrap storage. The drums were awaiting vendor pickup for reuse. The Empty Drum Storage Area and scrap storage area was constructed in July 1953 and is 200 feet long by 27 feet wide with a 6-inch-thick concrete pad capable of holding 1,350 55-gallon drums. The total surface area for storage is 5,400 square feet.

No known waste was stored in the Empty Drum Storage Area, only scrap materials such as scrap metal product drums and empty product drums awaiting return to the vendor. The types of products from drums that were used at the RBAAP include acids, bases, soaps, and cleaners. During the RI, this area was suspected as a potential source of contamination and underwent extensive investigation. This included soil and soil gas sampling. Soil sampling results for the area did not indicate concentrations of inorganic constituents above

background levels. Results of a soil gas survey in this area indicated that any sources of VOC contamination are not likely to exist in the area.

The ROD concluded that remedial action was not warranted in the Empty Drum Storage Area based on the RI findings. In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in Revision 2 of the RFI Phase 1 Work Plan [U.S. Army, 1996]) that no further action was required for this area (CH2M HILL, 2002).

SWMU 4 – Drum Staging Area (IWTP) *No Further Action*

The Drum Staging Area is a temporary holding area (up to 90 days) located in the southeastern corner of the IWTP. Drums of various wastes are brought to this staging area from the two waste accumulation areas located in the production plant. Each drum is tested and evaluated for final disposition. Secondary containment is provided through the IWTP trench system, which is connected to the influent tank. The IWTP Drum Staging Area consists of a 6-inch-thick concrete pad, 26 feet in length and 31-feet wide, coated with an epoxy sealant. The concrete pad is sloped towards a concrete-lined drainage trench that borders the Drum Staging Area on the north side. The drainage channel drains to the large sump that is used to contain aboveground spills or releases in the IWTP area. The total size of the Drum Staging Area is 806 square feet.

The IWTP Drum Staging Area was started in response to the RCRA Hazardous Waste Facility Permit Application and was designed as a temporary holding area for evaluation and testing of accumulated waste prior to final disposition. The IWTP Drum Staging Area was started in June 1990. Prior to the start of the Drum Staging Area, drums were accumulated elsewhere on site. No drum staging occurred in the current IWTP Drum Staging Area prior to installation of the concrete cover and epoxy sealant.

Past spillage has occurred in the Drum Staging Area onto the paved surface. The Drum Staging Area paved surface is inspected periodically for cracks or holes. No indication exists that past spillage has penetrated through the paved surface.

The Army, in Revision 4 of the RFI Phase 1 Work Plan dated February 1998, presented justification supporting a finding that no further action is recommended for this unit at this time (SOTA, 1998). DTSC (in a letter dated July 27, 1998) concurred with this recommendation (CH2M HILL, 2002).

SWMUs 5 and 6 – Chromium Reduction Units (Buildings 13 and 1) *No Further Action*

The chromium reduction units in Buildings 13 and 1 were installed in 1978. Each unit consists of a 1,200-gallon stainless steel tank. Sodium metabisulfide was added to chromic acid solution to reduce hexavalent chromium to a trivalent state in a batch process. The wastewater was then piped to the IWTP for further treatment. No evidence was found that any releases occurred from these units.

DTSC concurred with the position of the Army as detailed in the original version of the RFI Phase 1 Work Plan that no further action was required at the Chromium Reduction Units in Buildings 13 and 1 (CH2M HILL, 2002).

SWMU 7 – Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration Unit) *No Further Action*

The coolant recovery unit recovers usable coolant from waste machine coolant oil by separating the waste mixture into usable coolant (soluble oil), water, and thermally

degraded coolant. The usable coolant can be concentrated and reused throughout the plant. The coolant recovery unit consists of a Hyde Ultrafiltration (UF) System and an emulsion breaker designed by the RBAAP. The unit reduced the quantity of hazardous waste generated through coolant operation by 95 to 97 percent of the original volume. The unit is not currently in use. The coolant recovery unit was installed in 1989. Coolant recycling began in early 1991. Before that, contaminated and degraded coolant was shipped offsite for recycling. The unit operated only a few years and was shut down when production at the facility was discontinued in the early 1990s.

The coolant recovery unit is located on the south side of the IWTP area, immediately south of Building 43. The coolant recovery unit contains two tanks. The tanks and recovery unit are located on a concrete slab surrounded by a 6-inch concrete containment curb. The maximum volume of the containment pad is 2,500 gallons. The largest tank in the coolant recovery unit has a capacity of 1,200 gallons.

The concentrated coolant is stored in a holding tank. It is prepared for reuse in the plant by adding an appropriate amount of water to achieve the proper concentration. The water resulting from the UF process is discharged to the IWTP for further treatment. The skimmed oil (oil emulsion) is transported to the oil emulsion breaker in a 400-gallon transport tank. At the end of this operation, the waste contains very little water and the volume of waste oil to be disposed is greatly reduced. Currently, the waste oil is stored in the waste oil storage tank in the IWTP area.

The coolant recovery unit handled recyclable material within the definition of California Health and Safety Code Section 25121. Therefore, hazardous waste permitting for the unit is not applicable, and the unit is considered a hazardous waste generation point only. No offsite waste is accepted for treatment by the unit.

No releases from the coolant recovery unit have been documented. The unit has a solid concrete floor and spill containment barrier. The spill containment barrier contains a small sump with a pump that pumps spilled fluid back into a holding tank. No evidence of spills was observed outside the containment area. No cracks or holes are apparent in the containment area or sump. Based on inspection of the unit, a release is unlikely to have occurred.

In the RFI Phase 1 Work Plan Revision 4, it was proposed that the small collection sump should be steam cleaned and visually inspected for cracks or holes in the concrete. If no cracks or holes existed in the sump, closure with no further action was recommended. The steam cleaning was performed, and no cracks or holes were discovered. In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required for SWMU 7 (DTSC, 2006).

SWMU 8 – Waste Oil Accumulation Unit (Waste Oil Storage Tank) *No Further Action*

This unit consists of a 6,000-gallon aboveground waste oil storage tank that accumulates waste oil from the facility prior to eventual shipment for offsite disposal. The waste oil storage tank is located in the southern portion of the IWTP immediately east of the laboratory.

Existing 6,000-Gallon Waste Oil Tank. The waste oil tank, installed in 1994, is a 6,000-gallon, UL142 API650, approved, steel AST located on a 6-inch-thick reinforced

concrete slab. The tank is visible on all sides and the bottom. The secondary containment area, coated with an epoxy sealant coating, is approximately 30 feet by 20 feet by 3 feet. The 6-inch reinforced concrete containment area is in excellent condition with no observed cracks or holes. The epoxy sealant coating is intact and in good condition (CH2M HILL, 2002).

Former 30,000 Gallon Waste Oil Tank. Formerly, an upright, steel AST was used for storage of waste oil. The 30,000-gallon tank was first used to store waste oil in 1987. During a 1993 tank certification, the AST failed the certification because of advanced surface pitting. The former tank, situated in the same location as the existing waste oil tank, was retired in 1994. No evidence of leaks from this tank was identified at the time of retirement.

An average of 400 gallons of used oil per month was pumped into the waste oil storage tank during production operations. Approximately 60 percent of this volume (240 gallons per month) consisted of spent hydraulic oil and the remaining 40 percent (160 gallons per month) consisted of spent coolant/hydraulic oil recovered by the ultrafiltration and emulsion breaking units. The waste oil periodically is pumped out of the storage tank into commercial tanker trucks for shipment to an offsite oil recycling facility.

The Army, in Revision 4 of the RFI Phase 1 Work Plan dated February 1998, presented justification supporting a finding that no further action is recommended for the Waste Oil Accumulation Unit. DTSC (in a letter dated July 27, 1998) concurred with this recommendation (CH2M HILL, 2002).

SWMU 9 – Equipment Wash Facility (Building 177 Triple Rinse Area) *No Further Action*

The Equipment Wash Facility is used to triple-rinse drums that originally contained hazardous materials. The rinse waters are collected in a sump and pumped to an oil/water separator, then pumped to the IWTP for further treatment.

DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required for the Equipment Wash Facility (CH2M HILL, 2002).

SWMUs 10 and 11 – Landfill (Southern and Northern Portions) *No Further Action*

Historically, the term "landfill" has been used to describe the area. However, the entire area was not used for disposal activities. The disposal operations in this area did not involve typical landfill operations, but consisted of two discrete disposal trenches and a surface disturbance area, as described below. Therefore, the entire area is not a landfill. Nonetheless, the term "landfill" is used to avoid confusion with historical references.

According to records from 1942 to 1966, the landfill at the RBAAP was used for the incineration and disposal for paper, dunnage, oils, grease, solvents, hospital wastes, construction debris, and industrial sludges. In 1966, onsite disposal operations were discontinued, and the area was filled with dirt and construction rubble. In a series of aerial photographs interpreted by the EPIC, two trenches and one surface disturbance area were identified in the landfill. In the 1957 aerial photographs, EPIC noted a trench in the southern end of the landfill. In the 1967 aerial photograph, EPIC noted a former trench was evident in the central portion of the landfill.

During the RI/FS, the landfill itself was the focus of an extensive site investigation at the RBAAP. The RI Report concludes that the landfill is a major source of cyanide and a minor source of chromium contamination to the groundwater at RBAAP (Weston, 1992a). This contamination is being addressed under the ongoing groundwater cleanup action. As required by the ROD, the landfill underwent formal closure, which was completed in 1996.

A remedial action at the RBAAP landfill was a major component of the ROD and is addressed as part of the Army IRP. This remedial action was completed in 1996 and has been accepted by the regulatory agencies as part of the "Construction Complete" certification in September 1997. DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required for this unit under the RCRA RFI (CH2M HILL, 2002).

SWMU 12 – IWTP Sewer Line Break Area (Effluent Force Main) *No Further Action*

A break in the effluent sewer line that runs from the IWTP to the E/P Ponds occurred in 1972. This break was discovered approximately 7 days after the line ruptured in the northeast portion of the site, near the Hetch Hetchy Aqueduct, which traverses the site. Approximately 3,785,000 liters per day of effluent was being processed at this time. It is not known how much liquid was discharged through the break. Sampling conducted in this area during the RI did not indicate elevated levels of inorganic constituents. Therefore, no known contamination exists in this area.

The ROD concluded that remedial action was not warranted in the IWTP Sewer Line Break Area based on the RI findings. DTSC concurred with the position of the Army as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan that no further action was required for this unit (CH2M HILL, 2002).

SWMUs 13 and 14 – Incinerators (Buildings 123 and 163 *No Further Action*

Two small incinerators were used at the facility. The incinerator at Building 123 was in operation from 1948 through 1972. The incinerator at Building 163 has been in operation from 1974 through the present. The incinerators were used to burn paper and small combustible material, including classified documents. Some infectious material from the RBAAP dispensary could have been burned in these units as well. No reported releases have been identified in these areas.

DTSC concurred with the position of the Army as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan that no further action was required for the incinerators in Buildings 123 and 163 (CH2M HILL, 2002).

SWMU 15 – Pesticide Storage Area (West of Building 11) *No Further Action*

This pesticide storage area consists of a concrete aboveground bunker. The bunker is located in the southeast corner of the IWTP area and does not have a Building number. The bunker dimensions are approximately 9 feet by 15 feet. The floor, walls, and roof of this structure are constructed of concrete. The exact dates of pesticide storage are unknown; however, the replacement storage area (Building 165) was constructed in July 1975.

Historically, there were no known wastes stored in this building, only pesticide products. Visual inspection of the structure showed no signs of structural deterioration and no floor stains inside the building.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army as detailed in the April 15, 1996 Revision 2 of the RFI Phase 1 Work Plan that no further action was required in the Pesticide Storage Area west of Building 11 (CH2M HILL, 2002).

SWMU 16 – Pesticide Storage Area (Building 165) *No Further Action*

Building 165 is a prefabricated metal building sitting on a concrete floor with dimensions 14 feet by 14 feet that once stored pesticides for use at the facility (between 1975 and 1979). Currently the building stores miscellaneous signs and temporary traffic barriers.

This unit is located at the northern edge of the built-up industrial area of the RBAAP, north of Building 9. The building door opens to an asphalt area. The other three sides of the building are surrounded by bare ground up to the building foundation.

Building 165 was received at the RBAAP on July 17, 1975, and erected shortly thereafter. Pesticide storage was transferred from Building 165 to Building 170 after the latter was constructed on January 22, 1979.

No wastes ever were stored in Building 165. Pesticides and herbicides were stored temporarily in the building in their original containers and used as necessary at the facility. The following pesticides/herbicides were identified in the Pesticide Management Survey (Number 66-0849-78, 26-28 October 1977):

- Amitrol-T
- Avitrol
- Baygon
- Chlordane
- Dalapon
- Diazinon dust
- Diazinon 4E, 47.5 percent
- 2,4-D (Formula 40)
- Princes 80 W (Simazine)
- Green

Some or all of these pesticides/herbicides possibly were stored in this unit between 1975 and 1979.

No releases have been reported for this unit. During previous investigations, no evidence of spills or releases (visual or odor) of pesticides/herbicides was noted of the unit and the concrete floor was in good condition with no evidence of cracking or staining. The prefabricated metal walls are bolted to the floor and form a partial barrier preventing migration of spills that potentially occurred historically inside the building to the outside soil. However, the barrier is not watertight and liquid seepage out of the building could have occurred. RBAAP personnel have indicated that the unit is periodically washed out with a hose and that this has been the case in the past as well. If a spill had occurred in the past, this practice could potentially have transported trace levels of pesticides/herbicides to the soil adjacent to the building foundation.

Chlordane is listed as an organochlorine pesticide in the October 1977 Pesticide Management Survey. Chlordane is very persistent in the environment and is currently banned for application in the United States. Because more than 15 years have passed since

Building 165 was used to store pesticides/herbicides, it is possible that minor releases may have occurred has biodegraded in the environment. The possible exception would be persistent organochlorine pesticides such as chlordane.

In a letter dated May 14, 2001, DTSC approved a May 19, 1999, Work Plan detailing collection of additional samples around Building 165 to assess the potential for historic releases from the building. This sampling was performed in 2001 and a plan for additional characterization was included in the RFI Phase 1 Work Plan submitted to DTSC in September 2002. The 2002 sampling activities in and immediately around Building 165 reported only trace detections of pesticides on the north side of the building. None of the reported detections exceeded IPRGs. Subsequent stepout and step down samples collected for pesticide and herbicide analyses contained only trace detections (all below IPRGs) of pesticides in one sample. Herbicides were not detected above reporting limits in any of the samples collected (CH2M HILL, 2002).

Recent soil sampling adjacent to Building 165 confirmed the presence of chlordane in a composite sample from one side of the building. Based on the sampling results, the Final RFI Report recommended no further action be taken for this SWMU (CH2M HILL, 2005a). DTSC concurred by approving the Final RFI Report.

SWMU 17 – Pesticide Storage Area (Building 170) *No Further Action*

Since 1979, the pesticide storage area has been located in Building 170 on the east side of the RBAAP. Building 170 is a 600 square foot steel building erected on a concrete pad. It was previously equipped with a steel-reinforced concrete sump. The building has containment and security fencing. All pesticide mixing occurs within this building. Rinseate is collected and used for dilution of pesticide to the appropriate ratio. The concrete sump historically was used to collect spillage, if any, from mixing pesticides with water. In 1982, the sump was taken offline. No wastes have been stored in Building 170, only actively used pesticides in their original containers. Periodic pesticide rinsate historically generated in the building was piped to the concrete sump located outside the building. The concrete sump located adjacent to Building 170 was removed in December 1994 under the oversight of the Stanislaus County Environmental Resources Department. During the removal process, the concrete material of the sump and the surrounding soil was sampled. The soil sample contained chlordane, so approximately 20 yards of soil were excavated for disposal. Visual inspection of the concrete sump did not reveal any holes, cracks, or deterioration of the walls or floor of the sump. In general, very low volumes of pesticides are used at RBAAP. Because the concrete floor of the building was in good condition (without cracks or stains) and the sump had been removed, no sampling was performed during the RI (NI, 2006e).

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required at the Pesticide Storage Area in Building 170 (CH2M HILL, 2002).

SWMU 18 – Former Sludge Desiccating Pit (Waste Salt Disposal Pit) *No Further Action*

The waste salt disposal pit originally was constructed in 1969 for use as an evaporation basin for wash water from a nitrate molten salt annealing process. However, the pit never was used for this or any other purpose. Although literature from 1975 points to the use of this pit for sludge storage, this was never the case. The sludge was shipped directly offsite for disposal. No known contamination exists in this area, and no sampling was necessary.

Therefore, it technically should not be considered a SWMU because no waste was ever placed in this unit. It is included here only because it is on the list of SWMUs from DTSC in the CACA.

The ROD concluded that remedial action was not warranted for this unit because it was never used for the stated purpose. DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required at the Former Sludge Desiccating Pit (CH2M HILL, 2002).

SWMU 19 – Waste Zinc-Cyanide Solution Neutralizing Tanks *No Further Action*

The waste zinc-cyanide neutralization tanks consisted of two aboveground steel tanks in the IWTP area–the cyanide reaction tank and the cyanide equalization tank. The cyanide reaction tank was located south of the existing effluent sump. The cyanide equalization tank was located within what is now the IWTP waste oil storage tank bermed area.

The cyanide reaction tank was an aboveground storage tank 10 feet in diameter and 20 feet high, constructed of 0.25-inch-thick steel. Capacity of the tank was approximately 12,000 gallons. The cyanide equalization tank was similar but was 18 feet in diameter and 16 feet high with a capacity of approximately 30,000 gallons.

The cyanide reaction tank separated suspended solids from the cyanide wastewater. The cyanide equalization tank equalized the cyanide wastewater pH. The two tanks were installed on January 27, 1955, and operated until 1958. It is believed that the cyanide reaction tank was not used after 1958. The cyanide equalization tank was later used for waste oil storage and became SWMU 8. It was retired in 1994 after it failed a tank inspection because of advanced pitting. No holes were identified in the tank when retired, and no releases were reported from the tank when it was used to store waste oil. No information is available concerning the condition of the cyanide reaction tank at closure.

No evidence exists that a release ever occurred from this unit in the short period of operation (1955 through 1958,) and both tanks were removed on September 27, 1994.

The Army, in Revision 4 of the RFI Phase 1 Work Plan, presented justification supporting a finding that no further action is recommended at the Waste Zinc-Cyanide Solution Neutralizing Tanks. DTSC (in a letter dated July 27, 1998) concurred with this recommendation (CH2M HILL, 2002).

SWMU 20 – Northwest Storm Reservoir *No Further Action*

The NW Storm Reservoir is located in the northern portion of the site. The reservoir receives stormwater from most of the installation and from the SE Storm Reservoir. The NW Storm Reservoir is used as a holding pond for the stormwater, which is eventually discharged into the OID Canal that transverses the site.

The NW Storm Reservoir consists of two reservoirs totaling 415 feet in length and ranging 135 to 215 feet wide. The total storage capacity is 3,000,000 gallons. The NW Storm Reservoir originally was constructed in the 1940s and has been in use ever since. Stormwater runoff is the only known source to the reservoir.

Sampling was conducted during the RI, and the results did not indicate elevated levels of inorganics in the sediments at the reservoir. Therefore, no known contamination exists in the reservoir.

In 1993, a cross-connection between the industrial sewer system and the stormwater sewer system was discovered in an inline cistern leading to the NW Storm Reservoir. As a result, the 40,000-gallon cistern was pumped out and cleaned with a soap solution.

The ROD concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required at the NW Storm Reservoir (CH2M HILL, 2002).

SWMU 21 – Southeast Storm Reservoir *No Further Action*

The SE Storm Reservoir is located at the southeastern corner of the production area. This reservoir receives stormwater from the southeastern area of the facility. Collected stormwater is pumped to the NW Storm Reservoir for ultimate discharge offsite.

The SE Storm Reservoir is 230 feet long and 44 feet wide. The total storage capacity is 430,000 gallons. The SE Storm Reservoir originally was constructed in 1954 and has been in use ever since. Stormwater runoff is the only known source to the reservoir.

Investigations during the RI did not indicate contaminants of concern in this area. Therefore, no known contamination exists in this reservoir.

The ROD concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required at the SE Storm Reservoir (CH2M HILL, 2002).

More recently, a sample was collected in this reservoir for PCB analysis (associated with the investigation of AOC 16). PCBs were detected at 4.5 mg/kg, and additional sampling was conducted as part of the 2004 RFI at AOC 16. Soil removal was conducted as part of the AOC 16 RA. Based on the removal action, the Final RFI Report recommended no further action for this SWMU (CH2M HIL, 2005a). DTSC concurred by approving the Final RFI Report.

SWMU 22 – Sanitary Wastewater Settling Ponds *No Further Action*

The sanitary sewage beds (also known as the sanitary wastewater settling ponds) located at the northern portion of the facility were in operation from 1944 to approximately 1987, when the plant was connected to the City of Riverbank sewage system. The sanitary sewage beds consisted of a pumping station, Imhoff tank, and the sewage beds themselves. The system was designed for a capacity of 35,000 gallons per day. The pumping station contained a wet well with a bar rack and platform and two automatic pumps. Sanitary wastes entered the pumping station and were periodically pumped to the Imhoff tank. Following settling in the Imhoff tank, the effluent was discharged to six sewage beds for evaporation and/or percolation. The beds consisted of sand with a total bed area of 15,240 square meters. Soil sampling was conducted in the sewage beds during the RI conducted at the site (Weston, 1991). Since results of the sampling did not indicate constituent concentrations above background and no releases were reported from this unit, no further investigations were conducted.

The ROD concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the original

October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required at the Sanitary Wastewater Settling Ponds (CH2M HILL, 2002).

SWMU 23 – E/P Ponds *No Further Action*

The E/P Ponds were constructed in 1952 for the disposal of treated effluent generated by the RBAAP. The four unlined ponds are located approximately 1.5 miles north of the RBAAP boundary on 27 acres of land adjacent to the Stanislaus River. The treated effluent from the RBAAP IWTP and groundwater treatment plant is discharged through a force main to a point where it travels by gravity through a 21-inch vitreous clay pipe for approximately 1.5 miles prior to emptying into the ponds. The effluent then is distributed to the four ponds. Berm heights were raised in late 1972 to increase the capacity of the ponds, and the existing baffles were reconstructed with native soil. The ponds are operated independently based on the volume of flow that requires containment. The flow is diverted into a second pond once the first becomes full and so forth. The effluent discharged to the ponds evaporates or percolates through the existing sediments to the groundwater. Data gathered from the five monitoring wells installed around the E/P Ponds indicate that the groundwater consistently flows southwesterly toward the river.

Based on the RI findings, a removal action was completed in 1993 to address zinc-contaminated soil. The ROD documented this removal action in detail and concluded that no further action was necessary at the ponds. RBAAP continues to use the E/P Ponds for discharge of treated water. This discharge is regulated under WDRs issued by the RWQCB. DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required at the E/P Ponds (CH2M HILL, 2002). The ongoing groundwater monitoring at the E/P Ponds is associated with the ongoing discharge of treated groundwater from the GWTS and treated industrial discharge from the IWTP. Both of these treated water discharges go to the E/P Ponds and are covered by the RWQCB WDRs, which require groundwater monitoring at the ponds.

SWMU 24 – Industrial Waste Pipe Leak *No Further Action*

An industrial waste pipe leak occurred in 1990 at the southern end of Building 13. This pipe carries wastewater from the chromium reduction unit in Building 13 to the IWTP. Norris Industries (the RBAAP operator) excavated the soil in this area to repair the break, and disposed of the soil through a qualified waste hauler. The excavation area was then sampled during the RI to determine if residual contamination existed as a result of the leak. Sample results indicated that elevated levels of inorganics did not exist in this area. Therefore, no known contamination exists at the location of the industrial waste pipe leak.

The ROD concluded that remedial action was not warranted in this area based on the RI findings. DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required at the Industrial Waste Pipe Leak (CH2M HILL, 2002).

SWMU 25 – Underground Storage Tanks *No Further Action*

The USTs that were located at the RBAAP have all been closed in place or removed and have received closure from the RWQCB (see Section 4.4.2, Underground Storage Tanks). No hazardous wastes were stored in the USTs. No known releases have been reported for the USTs. Additional information on the USTs is contained in a U.S. Army Corps of Engineers

(USACE) – Huntsville District study in September 1989 entitled "RBAAP Investigation and Evaluation of Underground Storage Tanks."

The ROD concluded that remedial action was not warranted at SWMU 25 under the CERCLA program because the USTs were being investigated and removed under separate programs. If any remedial actions were necessary for releases from the USTs (none had been discovered), they would have been addressed by the RWQCB.

DTSC concurred with the position of the Army (as detailed in the original October 30, 1995, version of the RFI Phase 1 Work Plan) that no further action was required at the USTs under the RCRA program (CH2M HILL, 2002).

AOC 1 – Mortar Line Accumulation Area (Building 4) *No Further Action*

Two main temporary accumulations were in AOC 1–Line 4 at the west tunnel, which was used predominantly for grenade wastes, and Line 7 at Broadway, which was used predominantly for mortar waste. The Line 4 temporary hazardous waste storage area was 30 feet by 45 feet and had the capability to store 330 55-gallon drums. The accumulation area was activated in June 1989 and was deactivated in February 1991.

The area temporarily stored the following hazardous waste: spent machine oils, spent chlorinated oils, spent acids, spent soaps, pickling sludge, spent solvents, zinc phosphate chips, floor dry mixed with oils, spent chromic acid, waste salts, waste paints and waste thinners.

A site inspection of the Mortar Line Accumulation Area showed the concrete area to be in good condition with no cracks or staining, and no known spills or releases were in this area. Therefore, no further action is necessary in this area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 2 – Machine Shop Accumulation Area (Building 9) *No Further Action*

The Machine Shop Accumulation Area was a satellite storage area for hazardous waste located in the north end of Building 9. This accumulation area was only 9 feet by 9 feet in size, with a possible storage capacity of 20 55-gallon drums. The Machine Shop Accumulation Area was activated in June 1989 and was not used after March 1992. During this time, the area stored the following waste types: spent machine oils, spent oils, and waste solvents.

A site inspection of the Machine Shop Accumulation Area showed the concrete area to be in good condition with no cracks or staining. Only a small number of drums were stored in this area and there were no known spills or releases. Therefore, no further action is necessary in the Machine Shop Accumulation Area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 3 – Vehicle Maintenance Accumulation Area (Building 15) *No Further Action*

The Vehicle Maintenance Accumulation Area is a hazardous waste satellite storage area located in Building 15. The area is very small, 3 feet by 5 feet, and is capable of storing just four 55-gallon drums. The Vehicle Maintenance Accumulation Area was activated for use in June 1989 and is still in use for satellite storage of hazardous waste material. Materials stored include waste oil, spent antifreeze, and waste solvent.

A site inspection of the Vehicle Maintenance Accumulation Area showed that the concrete area was in good condition with no cracks or staining. No known spills or releases have occurred in this area. Based on the small quantity of drums stored at this site and the lack of evidence of past spills or releases, no further action is deemed necessary.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 4 – Grenade Casing Line Accumulation Area *No Further Action*

The Grenade Casing Line Accumulation Area was used as hazardous waste satellite storage area. This 9-foot by 9-foot accumulation area was located north of Building 13 and had a storage capacity of 20 55-gallon drums. The Grenade Line Accumulation Area was activated in June 1989 and was in use only through June 1990. Hazardous waste materials (waste chlorinated oil and spent caustic cleaner) accumulated.

The site inspection of the Grenade Casing Line Accumulation Area showed the concrete area to be in good condition with no cracks or staining. No known spills or releases occurred at this unit. Based on these findings, no further action is necessary in this area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 5 – Former Windrowed Area *No Further Action*

The Former Windrowed Area is a location used to store and burn vegetation growth collected from other areas of the plant. When allowed by the County, the vegetation is burned yearly. The 1.3-acre area is located immediately west of the sanitary wastewater settling ponds. Collection and burning of vegetation has been in practice since 1985.

No waste ever has been placed in the former windrowed area. The area holds only tumbleweeds and other vegetation collected from throughout the site, and no known releases or spills have occurred in this area. Based on the usage of the area and the lack of releases or spills, no further action is necessary in this Former Windrowed Area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 6 – Sulfuric Acid Spill Area (1956) *No Further Action*

The 1956 sulfuric acid spill occurred in the area of the sulfuric acid feed system adjacent to the redwood equalization tanks. This is north of Building 173, next to the existing 80-foot clarifier. The sulfuric acid spill was reportedly 500 gallons of concentrated sulfuric acid. No information has been found concerning the general dimensions of the spill or the exact

location of the spill. The spill occurred adjacent to the former redwood equalization tanks and emanated from a pipe fed from the sulfuric acid storage tank east of the IWTP Area. No placement of waste was documented in the area. The only known waste is the sulfuric acid spill, a 500-gallon release from a pipe break that reportedly was neutralized immediately with lime.

Downgradient monitoring wells NI-20, NI-21, and MW-62A, B, and C were analyzed for inorganic compounds during the Phase IA and Phase II portions of the RI. The groundwater pH levels, an indicator of acidic or alkaline condition, were found to be essentially neutral in groundwater both upgradient and downgradient of the spill area (upgradient average pH was 6.9; downgradient average pH was 6.84). Groundwater pH in the area of the sulfuric acid spill does not indicate an acidic condition.

Sulfate can be a by-product of sulfuric acid. Historically, sulfate concentrations in groundwater in the IWTP area were present at levels slightly above the secondary MCL of 250 mg/L. Monitoring well NI-20, downgradient of the spill area, identified sulfate at concentrations of 450 mg/L) during Exploratory Phase 1B sampling in 1985. The groundwater table receded thereafter and NI-20 could no longer be sampled. Monitoring wells MW-62A, MW-62B and MW-62C were installed north of NI-20 and downgradient of the IWTP. In 1990, sulfate concentration was detected at 23.3 mg/L in the shallow groundwater zone A' and is no longer considered a groundwater concern in the IWTP area. It is unknown if the slightly elevated sulfate concentration found during the Exploratory Phase 1B was the result of the 1956 sulfuric acid spill.

The groundwater extraction system would capture any sulfate contamination in groundwater. Effluent from the Groundwater Treatment Plant is monitored for sulfate under the NPDES permit. Sulfate in groundwater is no longer a concern in the IWTP area because monitoring conducted after the detection of slightly elevated levels in 1985 did not identify concentrations in excess of the secondary MCL.

In a letter dated July 27, 1998, DTSC concurred with the position of the Army (as detailed in the February 1998 Revision 4 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 7 – Phosphoric Acid Spill Area (1978) *No Further Action*

The phosphoric acid spill area was in the phosphate coating area, upstairs in the southern end of Building 13. The 100-gallon spill occurred near a process unit for the zinc-phosphate coating of M42 Grenade casings. The phosphoric acid was used to clean parts prior to coating and was stored in a 160-gallon tank containing 15 to 25 percent strength phosphoric acid.

The zinc-phosphate machine was operated from 1978 to 1981 and 1983 to 1990. The spill occurred during the first year of operations. This AOC did not contain any waste, only the product (phosphoric acid). The phosphoric acid spill resulted in approximately 100 gallons of phosphoric acid being released onto the second story concrete floor. The acid was washed down the industrial sewer drain, did not leave the building and did not contact any soil or groundwater. Because the spill was contained inside the building and in the sewer system, no further action is required in this area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 8A – Horizontal ASTs – Propane Storage Tanks *No Further Action*

The propane storage area consists of 16 horizontal pressure tanks used for the storage of propane liquid. The storage area is located in the northeastern end of the main installation. Each horizontal steel tank has a 10-foot diameter, and is 50 feet long with a 30,000-gallon capacity. The propane storage tanks were built in 1952 and are currently still in service. Because the Army currently has only a limited need for propane at the RBAAP site, the propane storage tank area has been leased to a commercial propane vendor.

No known waste has been placed in the tanks, only liquid propane, and there have not been any known releases or spills. Because this area is used only for the storage of propane and the nature of propane would be to vaporize if a release did occur, no further action is deemed necessary in this area.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 8B – Horizontal ASTs – Transformer Oil Storage Tanks (including Transformer Oil Distribution System) *No Further Action*

AOC 8B currently consists of a pump house (Building 85) and an abandoned underground pipeline distribution system historically used to transport transformer coolant oil to transformers that subsequently have been removed. AOC 8B is located mainly west of the production plant.

Originally, three Transformer Oil Storage Tanks held the oil. The three 8,000-gallon ASTs sat in reinforced concrete cradles, and all sides and the bottom of the tanks were visible. All three of the tanks have been removed from the RBAAP. An estimated 3,500 to 4,000 feet of underground supply and return lines, made of 1.5- to 2.5-inch single-wall steel pipe, are located between the former tanks, the pump house, the former transformer locations, and Building 15. The pipelines have been cleaned (as requested by the DTSC) and encapsulated with cement slurry.

The Transformer Oil Tank System originally was built in the 1940s and was used until 1970 for transferring and filtering transformer oil. The three transformer oil tanks were cleaned out, tested for PCBs, and removed from the facility. No wastes were placed in this system; however, residual transformer oil in the tanks did contain PCBs. The distribution lines were drained of remaining transformer oil in 1995. Drained product was disposed of in accordance with federal and state regulations. No known releases or spills occurred from this system. A visual inspection in 1997 of the tank area and other system components did not show any indication of tank release. However, during the 1997 inspection stains of unknown origin were observed on the floor in Building 85.

Line Pressure Test. On October 21, 1997, a pressure test was performed on the supply and return lines of the Transformer Oil Distribution System to determine whether the pipelines had any leaks. Lines were pressure tested at 15 to 20 pounds per square inch (psi). Information identified in the pipeline leak test was to be used to identify the most cost-

effective closure method for the pipelines. The pressure test indicated that three of the five sections tested held pressure consistently for the duration of the test. One section slowly lost pressure over the test period. This may be indicative of a small leak or loose underground fitting. The fifth section had a slight pressure loss that is suspected to be related to loose valves or end caps, rather than actual pipeline leaks.

Soil Investigations. Soil samples were collected in 2001 and 2003 in the bermed area that formerly held the transformer oil storage tanks, adjacent to the pipeline heading to Building 15, and adjacent to the former transformer pads and the main distribution line. In summary:

- Elevated concentrations of PCBs were detected throughout the bermed area where the tanks formerly were located.
- PCBs were not detected adjacent to the pipeline heading to Building 15, and the pipe looked to be in good condition.
- PCBs were detected, but at concentrations below the USEPA Region 9 preliminary remediation goals (PRGs) for industrial uses, adjacent to the former transformer pads.
- PCBs were detected at concentrations that slightly exceed the industrial PRGs along the main distribution line between the pump house and the transformers.

As noted above, all components of the Transformer Oil Distribution System have now been either removed or closed in-place. The Transformer Oil Storage Tanks were cleaned, tested, and removed from the RBAAP. All of the transformers associated with this system had been removed previously. The floor of Building 85 has been decontaminated. The pipelines have been cleaned (the cleaning fluid tested) and encapsulated with cement grout. Based on the October 21 and 22, 1997, Pipeline Pressure Test, three sections appear to be tight and unlikely to have caused a release. Two sections exhibited slow pressure losses that could be indicative of a small leak or loose fitting. The air pressure losses identified in these two sections were small enough that they are probably not indicative of a loss of liquid transformer oil.

Based on the findings of the RFI investigation, 120 cubic yards of soil contaminated with PCBs (as Aroclor-1260) at concentrations greater than industrial preliminary remediation goals (IPRGs) within the bermed area where the Transformer Oil Storage Tanks have been removed successfully. Confirmation samples from the excavation floor were nondetect. Excavated soils that were removed were disposed at a licensed California Class I hazardous waste landfill. Based on these findings, no further action is recommended at the Oil Storage Tanks location of AOC 8B.

During the 2004 Storage Tank Area Soil Removal, additional samples were collected adjacent to former transformer pads along the distribution lines. These sample results were less than IPRGs and combined with the prior two sets of sampling results along the distribution system, confirm that significant releases did not occur along the distribution system. The Final RFI Report recommended no further action was recommended for the transformer oil storage tanks or distribution system (CH2M HILL, 2005a). DTSC concurred with this recommendation by approving the Final RFI Report.

AOC 9A – Vertical ASTs – Fuel Oil Storage Tanks *No Further Action*

There are two ASTs located side by side in the east-central portion of the installation, between the south end of the landfill and the propane storage tanks. These two tanks originally were used for fuel oil storage. However, when the groundwater treatment system was installed in 1991, the tanks were converted for temporary storage of treated groundwater from the CERCLA groundwater cleanup. The original fuel oil tanks were removed and replaced with the existing two tanks.

The two welded-steel storage tanks are 35 feet in diameter and 34 feet tall with a storage capacity of 250,000 gallons per tank. These tanks currently are used to temporarily store the treated effluent from the groundwater treatment system prior to discharge.

The two storage tanks originally were built in November 1952 and were used through 1958 to store fuel oil for use throughout the site. These tanks never have been used to store waste, only fuel oil and, starting in 1991, treated groundwater. The two fuel oil storage tanks were cleaned and inspected internally in 1991. The results of the visual inspection showed no signs of leakage. Additionally, the tanks were inspected ultrasonically in November 1992 and found to be sound. The associated piping is also believed to be sound.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 9B – Vertical ASTs – Fire Sprinkler Storage Tank *No Further Action*

The Fire Sprinkler Storage Tank, located in the southeast portion of the main installation, is used for storage of water. This tank is constructed of steel with welded seams. The tank has a storage capacity of 1,000,000 gallons with dimensions of 65 feet (diameter) by 40-feet high. The tank supplies water for the fire sprinkler system and the high-pressure (150 psi) water distribution system for the main production area. The Fire Sprinkler Storage Tank was built in June 1956 and has been in use since that time. This tank never has contained waste, just water. The tank and associated piping show no signs of deterioration (other than weathering) and are believed to be sound.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 10 – Former Solid Waste Pile (Southeast Corner) *No Further Action*

The 4.4-acre former Solid Waste Pile Area was located in the southeast corner of the main installation, in the south parking lot. This area was used in the mid-1950s through 1958 as a baseball diamond for installation personnel. The area later was used for personnel parking (1966 to 1975) and currently is characterized as vacant land. No known wastes ever were stored at this area, and no known releases or spills occurred.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 11A – Loading Racks – Propane Farm Loading/Unloading *No Further Action*

This AOC consists of the two propane tank loading racks located at the propane tank farm between the railroad tracks and the tanks in the northern portion of the main installation. The two propane loading racks are each 8 feet by 6 feet and are equipped with 100-gpm pumps for pumping propane to the propane tanks from railroad tanker cars.

The propane farm originally was built in 1952 and has been in use since that time. The level of activity has varied greatly depending on the amount of onsite propane use. Currently, there is considerable activity because of the commercial propane vendor that has leased the area. No waste has ever been placed in the propane farm or the loading/unloading racks. There have not been any known releases or spills at the loading racks. The units have only been used for the transfer of propane to and from railroad tanker cars. Because the physical characteristics of propane would cause it to vaporize if there was a release, there is no potential for soil or groundwater to be contaminated.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 11B – Loading Racks – Fire Sprinkler Pumping Station *No Further Action*

The Fire Sprinkler Pumping Station consists of fire pumps and associated controls, piping and valves. The station is located in the southeast corner of the main installation. The Fire Sprinkler Pumping Station is 49 feet by 21 feet and has two 1,000-gpm pumps and two 1,000-gpm propane powered backup pumps. The pumping station pumps water from the million-gallon fire sprinkler tank to the plant fire sprinkler system and high-pressure water distribution system. The fire sprinkler system was built in 1956 and has been in continuous use ever since. No waste has been placed in the Fire Sprinkler Pumping Station and no known releases or spills have occurred.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 12 – Industrial Wastewater Collection System *No Further Action*

The IWCS is a system of underground piping and waste sumps that historically collected industrial wastewater from the production plant and transferred it to the IWTP. The IWCS is routed throughout the production area and gravity fed the collected wastewater to the IWTP. The system consists of an estimated 3,500 to 4,000 linear feet of vitrified clay and cast iron pipe ranging from 4 inches to 21 inches in diameter. The sumps that were historically connected to the system were constructed of brick or concrete.

The system was built after the Army acquired the production plant in 1951 and began converting the plant to a steel cartridge case manufacturing facility. Manufacturing occurred from 1953 to 1958, when production ceased and the production plant was placed on standby status. From 1966 to 1992, the RBAAP manufactured steel cartridge cases, mortar projectiles, and M42/46/77 grenade casings. The IWCS has been disconnected from the production plant and the collection sumps filled with concrete in the late 1990s. There is a new, completely abovegrade collection system to transmit wastewater from the active production areas to the IWTP.

Industrial wastewater was historically generated during the cartridge case, mortar projectile, and grenade casing manufacturing processes. The metal finishing wastes consisted of rinse water, spent caustic solution, spent alkaline solution, spent phosphoric acid, spent chromic acid, spent nitric acid, spent sulfuric acid, and spent coolant oil. These wastes contained fugitive metals and other compounds, mainly chromium, molybdenum, nickel, and zinc. Fugitive organic compounds were also present.

Soil investigations involving collection of soil samples from within and adjacent to the sumps and trenches associated with production lines 2, 3, 4, and 5 were completed in accordance with DTSC-approved work plans. Soil samples were collected from both the production line trenches and sumps. The investigations did not identify contaminants at elevated concentrations in the soil samples.

Although no known releases were reported from the IWCS, there is the potential for historical releases from the pipelines to have occurred undetected, resulting in soil contamination beneath the system. The current potential for exposure to contaminated soil, if any is present under the production plant, is virtually nonexistent because of the thick concrete or asphalt floors. Thus, current human health risks are nearly nonexistent. AOC 12 has not been in use for quite some time and the collection sumps associated with the system have been cemented in-place, eliminating AOC 12 as a future contaminant source. Even if contaminated soil is present beneath the collection system, there is no possible infiltration of liquids that would drive the contaminants down towards the groundwater, because the system is located beneath buildings and under cement floors. Any contamination present does not currently represent a risk to the environment. The difficulties and costs associated with comprehensive investigation of soil beneath the production plant while the facility is still active is not justified by any reduction in risk to human health or the environment.

The latest RFI Phase 1 Work Plan, submitted to DTSC in September 2002, described the planned approach for completing an initial assessment of the potential for releases to have occurred from the industrial wastewater collection system. The work activities conducted included running a video survey of the collection system pipelines and collection of focused soil samples near major cracks or breaks observed in the video survey (CH2M HILL, 2002). The video survey and subsurface sampling adjacent to the IWCS did not indicate that significant leaks occurred. Soil analytical results did not contain contaminants that exceeded IPRGs. The Final RFI recommended that no further action be taken along the IWCS while the IWTP is still active (CH2M HILL, 2005a). DTSC concurred with this recommendation when they approved the Final RFI Report. In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required for SWMU 12 (DTSC, 2006).

AOC 13 – Draw Lube System (Building 178) *No Further Action*

The Draw Lube System in Building 178 is a chlorinated oil filter, heating, and cooling system. The draw lube system is located just west of Building 13 in a 22-foot by 17.5-foot building. The system has an oil storage capacity of 385 gallons. The draw lube system is a lube system for the grenade casing drawing press. It was built in 1987 and operated until grenade casing production stopped in 1990. The lube system filters, heats and cools the drawing press chlorinated oil. No known waste was placed in the area, as only the chlorinated oil product was used. In March 1993, during layaway activities for Building 13, contamination was discovered on the south side of Building 178. Thirteen soil samples were collected and elevated oil and grease concentrations were detected at two locations (three

total samples). Two additional hand-auger borings were installed adjacent to Building 178 to confirm the limited extent of contamination. All samples from these borings were nondetect for TPH. A soil removal action was taken to address the petroleum-contaminated soil. The upper 3 feet of soil was excavated in an area approximately 6-feet wide by 16-feet long immediately adjacent to Building 178. Extraction well 54B is located about 100 yards downgradient from Building 178. This well was sampled several times for oil and grease in the 3 years following the release with all sample results being nondetect.

In a letter dated June 5, 1996, DTSC concurred with the position of the Army (as detailed in the April 15, 1996, Revision 2 of the RFI Phase 1 Work Plan) that no further action was required for this AOC (CH2M HILL, 2002).

AOC 14 – Zinc-Cyanide Wastewater Collection System *No Further Action*

This system was designed and built in 1952 to collect all cyanide waste streams throughout the production plant. The system consisted of various underground pipes that once conveyed cyanide wastewater to a separate treatment unit at the IWTP. This system was isolated from the normal IWTP to handle only cyanide wastewater. The separate treatment system has since been removed from the IWTP to accommodate other improvements. The underground pipeline collection system remains in place. The majority of the individual production lines were not used for zinc cyanide coating and thus did not generate cyanide wastewater. In some cases, minor cyanide waste was noted in the waste collection system connection and the lowest point of the cyanide sump, because its design allowed water to backup in the system. The cyanide sump at the IWTP was decontaminated and converted into the sand filter sump.

The cyanide wastewater collection system is located primarily along the west side of the production plant and consists of approximately 1,400 to 1,500 feet of 4-inch- to 6-inch-diameter iron or vitrified clay pipe. This system apparently operated from 1954 to 1958. Use was discontinued due to production capability change. The cyanide wastewater collection system has been disconnected from the production plant and the collection sumps filled with concrete in the late 1990s. The system contained spent cyanide in wastewater from the zinc plating operation of production lines 5 and 6 and wastes associated with metal finishing processes including spent caustic solutions, coolant oils, and trace metals.

Soil samples collected below and near sump 6-11 at depths of 11 to 13 feet did not identify elevated cyanide contaminant concentrations. The soil investigations completed for the portions of the cyanide wastewater collection system near production lines 2 through 5 did not identify any significantly elevated concentrations.

Although no known releases were reported from the unit, there is the potential for historical releases from the pipelines to have occurred undetected, resulting in soil contamination beneath the system. However, given the relatively short period of operation for this system (1954 to 1958), the potential for leaks or releases due to pipeline corrosion is minimal.

As described above for AOC 12, the current potential for exposure to contaminated soil, if any is present under the production plant, is virtually nonexistent because of the thick concrete or asphalt floors. Thus, current human health risks are nearly nonexistent. AOC 14 has not been in use for over 40 years and the collection sumps associated with the system have been cemented in-place eliminating AOC 14 as a future contaminant source. Even if

contaminated soil is present beneath the collection system, there is no possible infiltration of liquids that would drive the contaminants down towards the groundwater because the system is located beneath buildings and under cement floors. Any contamination present does not currently represent a risk to the environment. The difficulties and costs associated with comprehensive investigation of soil beneath the production plant while the facility is still active is not justified by any reduction in risk to human health or the environment.

The RFI Phase 1 Work Plan, submitted to DTSC in September 2002, described the planned approach for completing an initial assessment of the potential for releases to have occurred from the zinc-cyanide wastewater collection system. The work activities included running a video survey of the collection system pipelines and, if accessible, collecting focused soil samples near major cracks or breaks observed in the video survey (CH2M HILL, 2002). The video survey was attempted at AOC 14, but it was determined that all entry and exit points along the former line had been sealed shut. A soil boring was advanced at one point along the line and no visual or analytical indication of contamination was found. Coupled with the fact that this waste line only saw limited operation from 1954 to 1958, the probability of significant releases of contamination is low. Therefore, the Final RFI recommended no further action for AOC 14 (CH2M HILL, 2005a). DTSC concurred with this recommendation by approving the Final RFI Report. In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required for AOC 14 (DTSC, 2006).

AOC 15 – Building 13 Temporary Wastewater Line *No Further Action*

Building 13 was not originally connected to the IWCS (AOC 12). A temporary wastewater pipeline was installed to facilitate transmission to the IWTP of wastes generated from the grenade casing production line setup in Building 13. This temporary line was installed towards the southern end of Building 13. The line left Building 13 heading east underneath the railroad tracks and connected with the far southwestern end of the IWCS.

This line has been removed from Building 13 and is capped outside of the building. There is no documentation of any spills or releases associated with this unit. The line was made of polyvinyl chloride (PVC) and operated for a relatively short period (ending when grenade casing production stopped in 1990). It is unlikely that there was any breakage or failure of the line during operation.

DTSC approval of the Current Conditions Report was considered concurrence that no further action is necessary. In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required for AOC 15 (DTSC, 2006).

AOC 16 – Substation 5 *No Further Action*

Substation 5 is located on the east side of the main installation, just east of the production area and just south of Building 11, which houses the waste oil transfer station. Substation 5 consists of three transformers sitting on a concrete pad. The concrete pad, approximately 16 feet by 32 feet, is inside a gated, chainlink-fence enclosure that measures 44 feet by 22 feet. The concrete pad is surrounded by several feet of gravel-covered ground. Outside the chainlink fence, the ground surface is covered completely with asphalt. Surface water runoff from the substation enters a nearby storm drain that discharges to the SE Storm Reservoir.

Soil samples were collected from the border of the Substation 5 transformer pad in 2001. These samples were not collected under a DTSC-approved Work Plan (CH2M HILL, 2002). A plan for additional characterization of AOC 16 was included in the latest RFI Phase 1 Work Plan submitted to DTSC in September 2002. Soil contaminated with PCBs (as Aroclor-1260) at concentrations greater than IPRGs has been successfully removed from the gravel and soil areas surrounding Substations 5 and from the stormwater discharge basin. Confirmation samples collected in 2003 from the excavation were nondetect. Excavated soils that were removed were disposed of at a licensed California Class I hazardous waste landfill. Therefore, the Final RFI recommended no further action for AOC 16 (CH2M HILL, 2005a). DTSC concurred by approving the Final RFI Report. In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required for AOC 16 (DTSC, 2006).

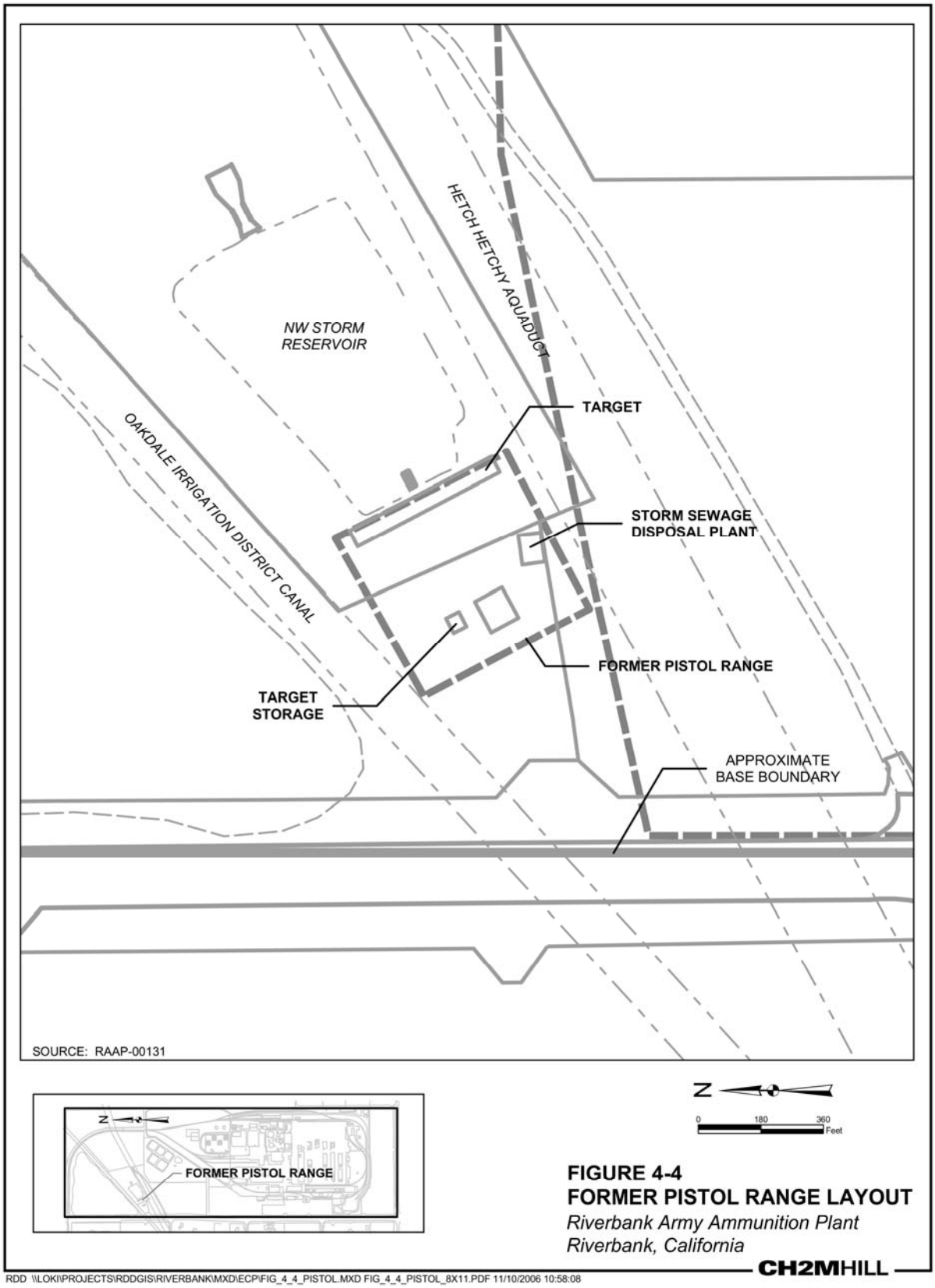
4.3.3 Military Munitions Response Program

Based on the initial archives search and documented in the Closed Transferring and Transferred Range/Site Inventory Report, RBAAP has one MMRP site listed as RBAAP-001-R-01, Closed Pistol Range (USAMC, 2003). The location of this closed pistol range is shown in Figure 4-4. Based on discussion during the August 2005 ECP Workshop, there are no definitive records of the existence of the range with the exception of the historical map from 1956, which is referenced in the Military Munitions Response Program (MMRP) Report. Further records review and archive search was recommended and was completed in January 2006 with the publication of the Final Historical Records Review (HRR) document (USACE, 2006).

The following description and conclusions from the 2006 HRR are provided as follows:

HRR Purpose and Approach. The purpose of the HRR was to perform a records search to document historical and other known information for the MMRP site at the RBAAP to supplement the inventory information, and to support the BRAC process. The scope of the effort required the collection of data pertaining to the existing Munitions Response (MR) site, identification of previously undefined MR sites, and identification of sites that may pose a potential explosive hazard that are not eligible for the MMRP. Six primary sources of information were researched as part of the data collection effort for the HRR. The following are types of data included:

- National Archives and Records Administration (NARA) including both national and regional archives
- USACE records review, including review of real estate records, existing Archive Search Reports (ASRs), Site Investigations, and RIs
- Installation site visit and interviews with pertinent site personnel
- Review of Phase 3 Inventory Report and backup data
- Aerial photographs
- Web Search


HETCH HETCHY AQUADUCT
NW STORM RESERVOIR
OAKDALE IRRIGATION DISTRICT CANAL
TARGET
STORM SEWAGE DISPOSAL PLANT
FORMER PISTOL RANGE
TARGET STORAGE
APPROXIMATE BASE BOUNDARY
SOURCE: RAAP-00131
N
0
180
360
Feet
FORMER PISTOL RANGE
FIGURE 4-4
FORMER PISTOL RANGE LAYOUT
Riverbank Army Ammunition Plant
Riverbank, California
CH2MHILL
RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_4_4_PISTOL.MXD FIG_4_4_PISTOL_8X11.PDF 11/10/2006 10:58:08

HRR Site Findings. This is a closed pistol range, still owned by the Army, comprising 0.29 acre in the northwestern portion of the main installation property, and oriented toward the northeast. Only small arms munitions were expended on this range. The range is part of an area that is currently undeveloped and is used for cattle grazing. Although documentation was not located indicating definite dates of construction or use, based on the available figures and interviews, it appears that it was used in the 1950s. This range is depicted on an historical map from 1956; however, more recent maps show no indication of the range. The range is located north of the main installation, adjacent to Claus Road. There is a locked gate along the western edge of the site that is accessible from Claus Road. The area, with the exception of the northwest storm reservoir, consists of open grassland that appeared to have been mowed at the time of the October 12, 2005, site visit. During the site visit, there was no sign of the range or any munitions. There appeared to be a concrete foundation from one of the former buildings, but none of the structures remain.

Past interviews with personnel employed with NI, Inc., indicated the range was only used in the 1950s. Additionally, it was indicated that it was used rarely and estimated that no more than 100 rounds would have been used over the years. The range was not used during anytime after 1967. The berm surrounding the reservoir was changed in the 1960s; however, no record exists of the project or what happened with the dirt. The levees surrounding the reservoir, which included the backstop for this range, also were torn down in 1980, due to their poor condition, and reconstructed. The range may be present in an aerial photograph from June 1963; but, due to the scale, it is not possible to determine. It is not visible in aerial photographs from April 1997. No known response actions have occurred at this range.

No additional sites with unexploded ordnance (UXO), discarded military munitions (DMM), or munitions constituents (MC) or areas containing an explosive hazard were found. The installation was only used for the manufacture of shell casings, which were then shipped to other locations for filling.

Because small arms were the only munitions used at the Pistol Range, potential munitions and explosives of concern (MEC) at the site may include complete rounds at the firing line. However, based on the reconstruction of the reservoir, no MEC or munitions debris is expected. Potential MC at this site includes nitrocellulose (NC), nitroglycerine (NG), dinitrotoluene (DNT), lead styphnate, barium nitrate, antimony sulfide, aluminum powder, pentaerythritoltetranitrate (PETN), copper, zinc, lead, and iron at the firing line, and copper, zinc, iron, lead, and antimony downrange.

HRR Conclusions. The following conclusions are provided as a result of the information reviewed for this HRR:

- Based on information collected or provided by an interviewee, it was determined that the pistol range MR site was used periodically as a small-arms range by security personnel during the 1950s.
- Because the site was used only briefly and the berm that was used as a backstop was reconstructed, it is unlikely that there is MC or MEC at the site related to use of the pistol range.
- No other areas of concern containing a potential explosive hazard or UXO, DMM, or MC were identified.

4.3.4 Previous Environmental Investigations

Numerous investigations have been conducted at the RBAAP. Since 1984, the investigations have been conducted with oversight from USEPA, DTSC, and the RWQCB. The investigations, listed in Table 4-4, are summarized in the following pages. In addition, Table 4-5 provides a chronology of site events related to CERCLA and RCRA actions at RBAAP (USAEC, 1994). The investigations described below are grouped by those associated with the RI/FS Program or Other Environmental Investigations.

TABLE 4-4
Previous CERCLA and RCRA Environmental Investigations at Riverbank Army Ammunition Plant California
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Investigation Type	Date	Investigating Entity	Remarks
Installation Assessment	January 1980	United States Army Toxic and Hazardous Materials Agency	Identified potential hazardous material sites.
Contamination Survey	June 1984 – July 1986	EEI	Included landfill soil sampling, aquifer testing, monitoring well installation, groundwater sampling, stratigraphic investigation, borehole geophysics, and GPR surveying.
Phase I RI Program	January 1987 – November 1988	Weston	Focused on confirming and updating the EEI Contamination Survey plus more extensive groundwater sampling on and off the RBAAP site.
Phase II RI Program	May – August 1990	Weston	Concluded that the chromium and cyanide plumes were moving offsite. No organic contamination was evident in the groundwater at the RBAAP.
Risk Assessment	May – August 1990	Clement International, Inc.	Quantitative risk characterization determined that no adverse noncarcinogenic risks are likely to occur from the groundwater.
RI Addendum	September 1991	Weston	Addendum activities included surface and subsurface soil sampling at the landfill, at the IWTP area, and at the sanitary sewer sludge drying beds.
Environmental Assessment	November 1996	NI Industries	The 4,500-ton press pit inside Building 8 was cleaned, and oil lines were replaced prior to tenant occupancy.
Corrective Action	May 1998	MascoTech	Recommended excavation of contaminated soil below Sump 4-11 in Building 4.
Environmental Assessment	June 1998	NI Industries	The cartridge case line in Building 6 was sampled. The zinc plater cyanide sump was contaminated with hazardous waste. The contaminated concrete and soil was excavated.
RFI	February 2005	CH2M HILL	At AOC 8B: Transformer Oil Storage Tanks and Distribution System, a removal action was conducted. No further action required. AOC-12: Industrial Wastewater Collection System, no further action is required at this time. AOC 14: Zinc-Cyanide Wastewater Collection System, no further action required. AOC-16: Substation 5 and Storm Drain Discharge Basin, a removal action was conducted. No further action required. SWMU-16: Pesticide Storage Building, Building 165, no further action required.

TABLE 4-5
Chronological List of Significant CERCLA and RCRA Actions at Riverbank Army Ammunition Plant California
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Date	Event
1980	The Army published an Installation Assessment that identified potential sites at the RBAAP that potentially contain hazardous materials.
1984 to 1986	Contamination Survey completed in three phases. Chromium and cyanide identified in groundwater at concentrations exceeding background.
1987 to 1991	Three phase RI program completed. Confirms chromium and cyanide as only contaminants of concern (COC) in groundwater.
1989	Interim response action initiated. Design of the IGWTS completed.
2/21/90	NPL listing.
1990	Construction of the IGWTS completed.
1990	USEPA completed a RCRA Facility Assessment (RFA).
4/5/90	Federal Facility Agreement signed.
10/91	IGWTS operation commenced with extraction from onsite wells.
12/92	City of Riverbank water supply lines extended to residential area west of the RBAAP.
12/93	E/P Ponds Removal Action completed.
3/23/94	ROD signed, requires formal landfill closure and implementation of a groundwater containment system.
2/13/95	RD for the landfill cap approved.
6/5/95	RA initiated for the landfill.
7/30/95	RCRA Part B Permit effective for the RBAAP, includes requirement for completion of a RFI.
10/3/96	Construction of the landfill cap, including drainage systems, completed.
11/96	Construction of the expanded GWTS completed.
9/15/97	Final off-base groundwater extraction well installed and operational.
9/29/97	RA construction completion, routine O&M begins.
9/30/97	Preliminary Close Out Report submitted to USEPA.
Sep 2001	First Five-Year Review for RBAAP.
7/27/01	Updated WDRs adopted by the RWQCB for discharges from the RBAAP.
6/21/02	CACA signed between DTSC and the Army.
2/01/05	RFI completed for sites listed as requiring further investigation ; AOC-8B, 12, 14, 16, and SWMU-16.

Reference: CH2M HILL, 2002.

RI/FS Program Investigations

- **RCRA Facility Investigation** - An RFI was conducted in 2005 to determine the nature and extent of contamination at four RBAAP AOCs and one SWMU listed as follows:
  - AOC 8B – Transformer Oil Storage Tanks and Distribution System
  - AOC 12 – Industrial Wastewater Collection System
  - AOC 14 – Zinc-Cyanide Wastewater Collection System
  - AOC 16 – Substation 5 and Storm Drain Discharge Basin

– SWMU 16 – Pesticide Storage Building

Based on the results of the RFI (including soil removal at AOC 8B and AOC 16) no further action was recommended for AOCs 8B, 14, 16 and SWMU 16 (CH2M HILL, 2005a). In a letter, dated August 10, 2006, the DTSC confirmed that no further action was required at the SWMUs and AOCs with the exception of SWMU-1, which is covered under the active RCRA Part B Permit (DTSC, 2006).

- **Phase I RI Program –** Weston conducted the Phase I RI Program between January 1987 and November 1998. The Phase I RI Program focused on confirming and updating the results of the Contamination Survey. Activities included potential source area sampling and more extensive groundwater sampling both onsite and offsite. The Phase I RI Program concluded that the chromium concentrations in the groundwater were primarily in the hexavalent chromium form, and that cyanide concentrations were primarily in the free cyanide form. The contaminant plume migration in the four aquifer zones (A, A′, B, and C) was found to be toward the west–northwest. Limited hydraulic connection between the four aquifer zones was determined, with a slight vertical downward gradient. In addition, the A aquifer zone was observed to have receded. Test pits and soil sampling determined that soils in the IWTP area and in the northern portion of the landfill exceeded background values for 10 analytes but were not considered hazardous. Further investigation was warranted in the southern portion of the landfill (Weston, 1991).

- **Phase II RI Program –** Weston conducted the Phase II RI Program at the RBAAP from May through August 1990. The Phase II RI Program activities include further sampling of source areas, the installation and sampling of monitoring wells and soil borings, groundwater sampling both onsite and offsite, and the performance of a groundwater recharge and discharge survey. The Phase II RI Program concluded that the chromium and cyanide plumes were progressing offsite and that a vertical gradient exists between the aquifer zones. No organic contamination was evident in the groundwater at the RBAAP. Cyanide contamination was determined to be present in the soil above the hardpan in the southern portion of the landfill. Pot liner material, which is a K088-listed waste under RCRA, was also found scattered throughout the southern portion of the landfill. (Weston, 1991)

- **RI Addendum –** Weston conducted additional sampling under the RI Program at the RBAAP in September 1991. The RI Addendum activities included surface and subsurface soil sampling at the landfill, at the IWTP area, and at the sanitary sewage drying beds. An addendum to the risk assessment was also performed focusing on a future onsite residential scenario at the RBAAP relating to soils. The results of the additional sampling indicated concentrations of cyanide in the surface and shallow subsurface soils in the southern portion of the landfill. Total chromium concentrations in subsurface soil samples were within background levels for the site. However, the composite surface soil samples indicated chromium concentrations up to 90.6 mg/kg. Samples taken in the IWTP area and in the sludge drying beds indicated concentrations of chromium and cyanide within background levels at these areas of RBAAP (Weston, 1992a).

- **Corrective Action –** MascoTech conducted sump/trench decontamination, followed by sampling at Production Lines 4 and 5, and Line 3 east of Broadway in 1998. Rinsate samples were taken from each trench sump system, and soil sampling depths began at six inches below the concrete/soil interface. The Line 4 soil sampling results showed elevated levels of oil and grease in the soil below the sump (soil sample 4-11S). All other samples showed no hazardous contaminants and or other indicator of releases from the sumps and trenches. Remediation of the contaminated soil was proposed. All contaminated soil was to be removed until a 100-parts-per-million (ppm) oil and grease level was achieved (Norris-Riverbank, 1998b).

Other Environmental Investigations

- **Environmental Baseline Survey, Line 3 West of Broadway –** Norris-Riverbank Environmental conducted a Phase I EBS for Line 3 (Building 3) west of Broadway in 1997. Visual observations of the concrete and brick in sumps and trenches revealed no large cracks or other conveyance devices that would lead to soil contamination below the concrete. Soil analysis and concrete analysis confirmed no leakage had occurred. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1997).

- **Environmental Baseline Survey, Buildings 3 East, 4, and 5 –** Norris–Riverbank Environmental conducted an EBS in 1998 of Buildings 3 East, 4 and 5, which included Buildings 47, 48, and 49. The project included the cleaning of all sumps, trenches, and pits that drained to the industrial sewer. The project required the removal of the eight trench/sump systems (4-8, 4-9, 4-10, 4-11, 5-8, 5-9, 5-10, and 5-11). Eighteen pits, sumps, and trenches were backfilled with clean compacted fill and floors restored with concrete (3-1, 3-2, 3-3, 3-5, 3-6, 4-1, 4-2, 4-3, 4-4, 4-5, 4-6, 4-7, 5-1, 5-2, 5-3, 5-5, 5-6, and 5-7). All industrial sewer drains were brought to the floor elevation and a threaded plug installed for future access. Taper presses were removed from Lines 3, 4, and 5, and the pits were visually inspected for cracks. All floors were repaired with concrete to form a flat production floor.

  During the removal of Sump 4-11, it was discovered that the soil beneath the sump was contaminated with oil and grease. The contaminated soil was removed and disposed of as hazardous waste. Soil sampling indicates that a small lens of contamination remains below the foundation to the building and crane support. Soil on the south wall had a residual oil and grease at a concentration of 140 ppm, which remained after the excavation. Clean soil was reached at the bottom of the excavation. It was recommended that upon closure of the facility, the extent of the contamination should be defined (Norris-Riverbank, 1998j). No follow-up investigation has been completed (NI, 2006e). However, the potential for migration in the soil is limited because of the relatively low concentration of residual oil and grease that remains in this area and because the area is beneath the concrete foundation of the building and crane support.

- **Environmental Baseline Survey, Buildings 8 and 153 –** Norris-Riverbank Environmental conducted the Phase I EBS for Buildings 8 and 153 in 1996. This EBS included inspection of the 4,500 ton press (Building 8) and showed no detectible evidence of cracks or avenues of conveyance for the migration of oil to underlying soils.

Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank Environmental, 1996a).

- **Environmental Baseline Survey, Building 9 –** Norris–Riverbank Environmental conducted an EBS of Building 9 in 1998. This EBS included visual observations of Building 9 that did not reveal minor discoloration of the concrete. Building 9 has been used as a general warehouse, tool and die crib, metal storage, general repair shop, office space, and machine shop. Sampling that was conducted included a soil sample outside Building 9 taken at the point where quench water was discharged into the stormwater line. This sample was analyzed for oil and grease, hexavalent chromium, sulfate, chloride, nitrate, nitrite, phosphate, zinc and total chromium, and manganese. Analytical results showed chloride, nitrite, nitrate, and hexavalent chromium at levels below detectable limits. Other analysis indicated detectable levels of sulfate (240 mg/kg), zinc (21 mg/kg), total chromium (12 mg/kg), manganese (245 mg/kg), and oil and grease (69 mg/kg) to be present in concentrations consistent with background levels at the RBAAP. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998g).

- **Environmental Baseline Survey, Building 10 –** Norris–Riverbank Environmental conducted an EBS of Building 10 in 1998. This EBS included visual observations of Building 9 that did not reveal minor discoloration of the concrete. Building 10 was initially used as for storage and warehouse activities. In 1974, the building was converted to a tool crib. Sampling that was conducted included a soil sample outside Building 10 along the southwest and northwest fenced perimeters. The samples were analyzed for oil and grease, Title 22 Metals. Results levels of oil and grease at 1,400 mg/kg (above the regulatory limits of 1,000 mg/kg). The location of this sample was in an area historically used to store hydrocarbons. This EBS recommended a Phase II assessment to determine the extent of the oil and grease contamination (Norris-Riverbank, 1998i). No follow-up investigation has been completed (NI, 2006e).

- **Environmental Baseline Survey, Building 11 –** Norris–Riverbank Environmental conducted an EBS of Building 11 in 1998. Building 11 was originally constructed in 1951 as a bauxite ore receiving facility. The ore was dropped from rail cars down two levels where it was later transported to the main plant via a conveyor belt. The conveyor was removed in approximately 1958. The lower two levels of this building have been used as a fallout shelter, records storage, and drummed materials (including lubricating oils) storage area. Five samples were collected from the gravel areas just outside Building 11, along the south and west sides. Samples were analyzed for:

  - Total Recoverable Petroleum Hydrocarbons (TRPH)
  - Gasoline
  - Diesel
  - BTEX
  - Pesticides
  - Cyanide
  - Hexavalent chromium
  - Lead
  - Chromium, zinc, and nickel

Sample results indicated 47 mg/kg for motor oil (not analyzed for directly). The EBS indicated the vertical extent of motor oil in at least two of the sample locations at the south end of Building 11 should be further investigated. Aroclor-1260 was identified in all five sample results, in concentrations ranging from 0.4 mg/kg to 1 mg/kg (above the Industrial PRG of 0.74 mg/kg). The lateral extent of the Aroclor-1260 was not delineated. Results for the other analytes indicated levels equivalent with background levels or non-detect. The report concluded that an additional Phase II investigation was recommended. (Norris-Riverbank, 1998k). No follow-up investigation has been completed (NI, 2006e). Based on this information, this site is included as part of the Phase II ECP investigation.

- **Environmental Baseline Survey, Building 12 –** Norris-Riverbank Environmental conducted a Phase I Environmental Baseline Survey (EBS) for Building 12 in 1998. This EBS included analysis of six near-surface soil samples obtained from areas just outside Building 12. Results of this analysis showed evidence of oil and gas in two of the samples (660 mg/kg, and 410 mg/kg), chromium in one sample (144 mg/kg; above the industrial PRG of 64 mg/kg) and lead in one sample (215 mg/kg). All other sample results presented constituent concentrations consistent with the RBAAP background levels and at or below established criteria (RCRA and California) for hazardous wastes. The report concluded that an additional Phase II investigation was recommended. No follow-up investigation has been completed (Norris-Riverbank, 1998a; NI, 2006e). Based on this information, this site is included as part of the Phase II ECP investigation.
- **Environmental Baseline Survey, Building 14 –** Norris-Riverbank Environmental conducted a Phase I EBS of Building 14 in 1998. This EBS included visual observations of Building 14 and did not reveal discoloration, odor, or signs of disposal that would lead to site contamination. This building originally served as a dispensary and washroom. At the time of the 1998 EBS, this building was used to store relief medical supplies. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998h).
- **Environmental Baseline Survey, Water Tower (Building 114) –** Norris-Riverbank Environmental conducted a Phase I EBS of the water tower (Building 114) in 1998. This EBS included visual observations of the soil below the water tower and did not reveal discoloration, odor, or signs of disposal that would lead to soil contamination. Four soil samples beneath the water tower were analyzed for lead. Soil sample results indicated no contamination was present below the water tower. Paint chips were taken from the water tower; the level of lead in the paint (4,088 ppm) was consistent with other samples take within the RBAAP and did not lead to soil contamination. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998b).
- **Environmental Baseline Survey, Building 130 –** Norris-Riverbank Environmental conducted a Phase I EBS of Building 130 in 1998. This EBS included visual observations of Building 130 and did not reveal discoloration, odor, or signs of disposal that would lead to site contamination. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998c).

- **Environmental Baseline Survey, Building 162 –** Norris–Riverbank Environmental conducted an EBS of Building 162 in 1998. This EBS included visual observations of Building 162 that did not reveal discoloration, odor, or signs of disposal that would lead to site contamination. The current use of Building 162 is for administration purposes. Prior use included training and storage of storage of training materials. No Recognized Environmental Conditions (RECs) were identified at this building. Radon levels at this building were determined to be 5.2 pC/L (above the 4.0-pC/L health risk). Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998f).

- **Environmental Baseline Survey, Building 164 –** Norris–Riverbank Environmental conducted an EBS of Building 164 in 1998. Building 164 was constructed in 1974 for paint mixing and supplied blended paint products such as olive drab lacquer and red oxide primer to Building 7. The building contains mixing tanks, motors, pumps, and support equipment. Three soil samples were analyzed for oil and grease, zinc, hexavalent and total chromium, lead, VOCs, and SVOCs. SVOCs and hexavalent chromium were below detectable limits. The analysis indicated detectable levels for 1,2-dichlorobenzene and xylene in one sample. Lead, total chromium, and zinc were detected in all samples. All analytes with detectable levels were present at or below background levels. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998l).

- **Environmental Baseline Survey, Building 169 –** Norris–Riverbank Environmental conducted an EBS of Building 169 in 1998. This EBS included visual observations of Building 192 that did not reveal discoloration, odor, or signs of disposal that would lead to site contamination. Building 169 has been used as a paint-spray facility since its construction in 1979. The paint-spray booth is located in the east portion of the building. A visual survey of this building indicated small paint or paint overspray. Paint was also observed on the asphalt paved area on the west side of the building. Sampling that was conducted included surface soil samples on the north, south, and east building walls. These samples were analyzed for oil and grease, hexavalent chromium, zinc and total chromium, lead, VOCs, semivolatile organic compounds (SVOC), and pH. Analytical results indicated elevated levels of benzene, toluene, ethyl benzene, xylenes (up to 905 mg/kg) (below the regulatory limits of 1,000 mg/kg). This EBS recommended a Phase II assessment to determine the extent of benzene, toluene, ethyl benzene, and total xylenes (BTEX) contamination (Norris-Riverbank, 1998e). No follow-up investigation has been completed (NI, 2006e).

- **Environmental Baseline Survey, Building 192 –** Norris-Riverbank Environmental conducted a Phase I EBS of Building 192 in 1998. This EBS included visual observations of Building 192 and did not reveal discoloration, odor, or signs of disposal that would lead to site contamination. Based on the findings of the EBS, it was determined that no additional Phase II investigation was required (Norris-Riverbank, 1998d).

- **IWCS Pipeline Video Survey –** A pipeline video survey was performed to evaluate the integrity of the IWCS and to identify locations of potential historic releases to soil from the pipelines. The pipeline video survey was conducted on March 11 and 12, 2003. Video surveys were conducted from every accessible location along main lines in the IWCS

(approximately 1,500 feet). A significant number of cleanouts and other potential points of access to the IWCS were found to be welded shut, filled with concrete, or located under heavy machinery in active portions of the production plant. Corrosion, sediment, and gaps at pipe joints were noted at various locations throughout the IWCS. Some of the damage to the IWCS may have occurred during or subsequent to the 1998 abandonment. In 2003, attempts were made to perform a video survey of the abandoned pipelines associated with the zinc-cyanide wastewater collection system (CH2M HILL, 2005a). No access could be obtained to the system at that time, as all accessible inlets have been welded shut or filled with concrete and the outlet was also filled with concrete.

- **Environmental Assessment, RBAAP LMC West –** NI Industries, Inc. conducted an Environmental Assessment (EA) of the proposed placement of tenant, LMC West, in Building 120. LMC West is a metal fabricator producing various metal products. The environmental effects of the proposed tenant transfer were expected to be limited, and a finding of no significant impact was justified (NI Industries, 1996a).
- **Environmental Assessment, Cartridge Case Line –** The pits, sumps, and trenches associated with the Building 6 cartridge case line were sampled for various analytes. The concrete and soil below the zinc plater cyanide sump showed indications of a release of hazardous materials. The walls and floor of the sump (15 cubic yards) and soil to a depth of 14 feet (30 cubic yards) were removed in December 1998 and disposed of as hazardous waste. Confirmatory samples for cyanide were nondetect and consistent with background levels for zinc. No other samples indicated a release of hazardous materials into the subsurface (NI, 1998d).
- **Installation Assessment –** In January 1980, the Army published an Installation Assessment that identified potential sites at RBAAP that may potentially contain hazardous materials (U.S. Army, 1980). As described in this report, Building 117 was the main cooling tower for the production lines. It is currently not in use. Smaller towers are located at the Boiler Plant and at Building 119 and 148. According to the report, wastewater in the cooling tower is a blend of bleed-off and blow-down waters containing chemicals added for dispersion of foulant-type deposits and for control of corrosion and algae (U.S. Army, 1980). The cooling water in the tower used Dearborn 533 as an additive. The additive is a corrosion inhibitor that contained 44.3 percent chromate as CrO_4. The report indicated that 9.8 kg of Dearborn 533 was added per day to the cooling tower water. The report does not indicate if Dearborn 533 was added to all of the cooling towers, but conversations with NI indicate that only the main cooling tower received the additive. The 1980 Installation Assessment indicates that Dearborn 533 is no longer used because of its chromate content. During the 2006 VSI, NI indicated that the chemical might have been used as early as the 1950s when the tower was built through the late 1980s, but no records existed of which they were aware.
- **Contamination Survey**. Exploratory and Confirmatory Phases – A Contamination Survey, conducted in three phases between June 1984 and July 1986, was performed by Envirodyne Engineers, Inc. (EEI) at the RBAAP. The survey included landfill soil sampling, aquifer testing, monitoring well installation, groundwater sampling, stratigraphic investigation, borehole geophysics, and ground-penetrating radar (GPR)

surveying. The Contamination Survey concluded that only two contaminants, chromium and cyanide, were found in the groundwater at levels above background values. Chromium was detected in excess of the MCL (50 µg/L) onsite and offsite, and cyanide was detected in excess of the MCL (200 µg/L) onsite. The groundwater was determined to be flowing generally to the west, and the contaminants were gradually migrating deeper in the aquifer. The survey also determined that the IWTP area was a major source of chromium contamination and a minor source of cyanide contamination and that the landfill was a major source of cyanide contamination at RBAAP (Envirodyne, 1986).

4.4 Hazardous Substances

A listing of the current hazardous materials stored at the RBAAP is provided in Appendix E (NI, 2006b).

4.4.1 Aboveground Storage Tanks

The RBAAP maintains a number of ASTs used for storage of hazardous waste and non-hazardous waste storage. Table 4-6 lists the current ASTs at the RBAAP based on information provided by NI Industries. The locations of ASTs located at the RBAAP are shown in Figure 4-5. Information on former ASTs which have been removed is provided as follows:

- Three cyanide tanks from Buildings 4, 5, and 6 were decontaminated, dismantled, and disposed of. These were 11,500-gallon steel ASTs. The removal is documented in the "Closure of Three Cyanide Tanks at Build 4, 5, and 6 Report" (Norris-Riverbank, 1998h).
- Diesel Tank T-02 was decontaminated and disposed of in August 1998. The removal is documented in a memo to Mr. James E. Gansel from John L. Ashley, General Manager, Norris-Riverbank, dated February 23, 1999 (MascoTech, 1999a).

4.4.2 Underground Storage Tanks

The USTs that were located at the RBAAP have all been removed and have received closure from the Stanislaus County Department of Environmental Resources, Hazardous Materials Division (Stanislaus County, 1995). Table 4-7 lists the former USTs that were located at the RBAAP. Figure 4-6 shows the locations of the USTs at RBAAP.

TABLE 4-6
Aboveground Storage Tanks (AST) Summary
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Tank No.	Location	Contents/ Description	Construction	Size (gal)	Date of Install	Status
G70	44 IWTP	Waste Oil	Steel	6,000	1994	Active
G71	44 IWTP	Hazardous Waste	Steel	1,200	1996	Active
USA019634	189	Convault, gas/diesel	Concrete	450	1995	Active
Building 182 – Groundwater Treatment Process Tanks						
182-13	182/Ahtna	Chemical Addition (CAT)				
182-16	182/Ahtna	Resin Column No. 1				

TABLE 4-6
Aboveground Storage Tanks (AST) Summary
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Tank No.	Location	Contents/ Description	Construction	Size (gal)	Date of Install	Status
182-17	182/Ahtna	Resin Column No. 2				
182-18	182/Ahtna	Neutralization				
182-21	182/Ahtna	Regeneration				
182-22	182/Ahtna	Resin Regeneration				
182-23	182/Ahtna	Storage Regeneration				
182-24	182/Ahtna	SAT Nurse				
182-25	182/Ahtna	Influent				
182-26	182/Ahtna	Treated Water, Equalization				
182-27	182/Ahtna	Backwash Water, Storage				
182-31	182/Ahtna	Precipitation				
182-32	182/Ahtna	Ferrous Addition				
182-33	182/Ahtna	Ferrous Sulfate day storage				
182-34	182/Ahtna	Chrome effluent				
182-35	182/Ahtna	Sludge Aging				
182-37	182/Ahtna	Surge				
182-38	182/Ahtna	Neutralization				
182-39	182/Ahtna	Backwash Supply				
182-40	182/Ahtna	Decant				
182-41	182/Ahtna	Chemical Addition				
182-9	182/Ahtna	Sludge Aging (SAT)				
Industrial Wastewater Treatment Plant – Process Tanks						
G2	44 IWTP	Equalization Tank				
G7	44 IWTP	Reactor Clarifier				
G8	44 IWTP	Thickener				

Reference: NI, 2006b; 2006d

Notes: The ASTs located at Building 182 are located on the inside of the building and are not shown on Figure 4-5. Tanks containing compressed gasses or tanks that are considered portable are not included in this table. The IWTP tanks listed above have tank certifications for containing hazardous waste; other process tanks within the IWTP are not included.

TABLE 4-7
Underground Storage Tanks (UST) Summary
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Tank ID	Year Installed (est.)	Tank Capacity (gal)	Construction Material	Product Stored	Location	Follow-up Action	Removal Date
1	3/1974	10,000	Steel	Unleaded Gasoline	Bldg. 15	Removed, no formal closure document	9/1994
6	Unknown	900	Concrete	Pesticide Use	Bldg. 170	Removed	12/7/1994
11A	11/1952	12,000	Steel	Bunker “C” Oil	Bldg. 11 (South)	Removed	4/1993
12	Unknown	1,300	Steel	Slurry Water, Asbestos Cuttings	Bldg. 7	Removed, no formal closure document	12/8/1994
12A	11/1952	8,000	Steel	Bunker “C” Oil	Bldg. 12	Removed	4/1993
12B	11/1952	10,000	Steel	Bunker “C” Oil	Bldg. 12	Removed	4/1993
15A	9/1954	1,000	Steel	Unleaded Gasoline	Bldg. 15	Removed	12/1989
15B	5/1981	1,000	Unknown	Unleaded Gasoline	Bldg. 15	Unknown	12/1989
22	Unknown	800	Unknown	Paint	Bldg. 1	Closed in place	1973
23	Unknown	800	Unknown	Paint	Bldg. 1	Closed in place	1973
24	Unknown	990	Steel	Varnish	Bldg. 2	Closed in place	1/23/1995
25	Unknown	880	Steel	Varnish	Bldg. 2	Closed in place	1/23/1995
26	Unknown	1,585	Steel	Varnish	Bldg. 160	Removed, no formal closure document	12/7/1994
27	Unknown	1,585	Steel	Varnish	Bldg. 3	Closed in place	12/7/1994
28	Unknown	2,115	Steel	Varnish	Bldg. 4	Closed in place	1/23/1995
29	Unknown	1,585	Steel	Varnish	Bldg. 4	Closed in place	1/23/1995
30	Unknown	3,300	Steel	Varnish	Bldg. 5	Closed in place	1/23/1995
31	Unknown	3,000	Steel	Varnish	Bldg. 5	Closed in place	1/23/1995
32	Unknown	3,300	Steel	Varnish	Bldg. 6	Closed in place	1/23/1995
33	Unknown	3,000	Steel	Varnish	Bldg. 6	Closed in place	1/23/1995
36	Unknown	3,000	Steel	Varnish	Bldg. 7	Closed in place	1974
37	Unknown	2,000	Steel	Varnish	Bldg. 7	Closed in place	1/23/1995
T77	4/1955	1,000	Steel	Sulfuric Acid	Area 77	Removed	5/1995
T137	6/1956	250	Steel	Unleaded Gasoline	Bldg. 137	Removed	12/1989

Reference: NI Industries, 2006c; Stanislaus County, 1995.

4.4.3 Hazardous Wastes

The four primary wastes generated at the RBAAP have been solid waste, wastewater from production plant operations, treated effluent from the IWTP and GWTS, and brine from regeneration of ion exchange units at the IWTP and GWTS. In addition, limited amounts of hazardous waste are generated from various operations at the RBAAP. These are stored at the hazardous waste storage area (SWMU 2), which is an active unit regulated under the RCRA Part B permit issued for the RBAAP. The RBAAP is listed as a Large Quantity Generator of Hazardous Waste (greater than 1,000 kg/mo). There are currently 26 discrete waste treatment and/or storage facilities located at the RBAAP as listed in the RCRA Permit (State of California, 2006). The facilities are listed and described below:

Industrial Wastewater Treatment Plant (IWTP) Equalization Basin

The unit is located in the northwest corner of the IWTP and consists of an aboveground reinforced-concrete tank that is 32 feet high and 60 feet in diameter. The 18-inch-thick concrete-reinforced walls and 28-inch-thick concrete-reinforced floor have a capacity of 676,800 gallons. The interior wall and floor are epoxy-coated and an MPVC material liner with leak detection was installed. Industrial wastewater is discharged to the tank. The wastewater is collected, stabilized, and fed by gravity to the mixing tank (high-flow mode) or reactor clarifier (low-flow mode). Influent wastewater pumped into the equalization tank (maximum water depth of 30 feet) can be adjusted for pH and gravity flows to the mixing tank (minimum water depth of 12 feet) or the reactor clarifier for low-flow modes. The tank has a high-level alarm installed.

IWTP Reactor Clarifier

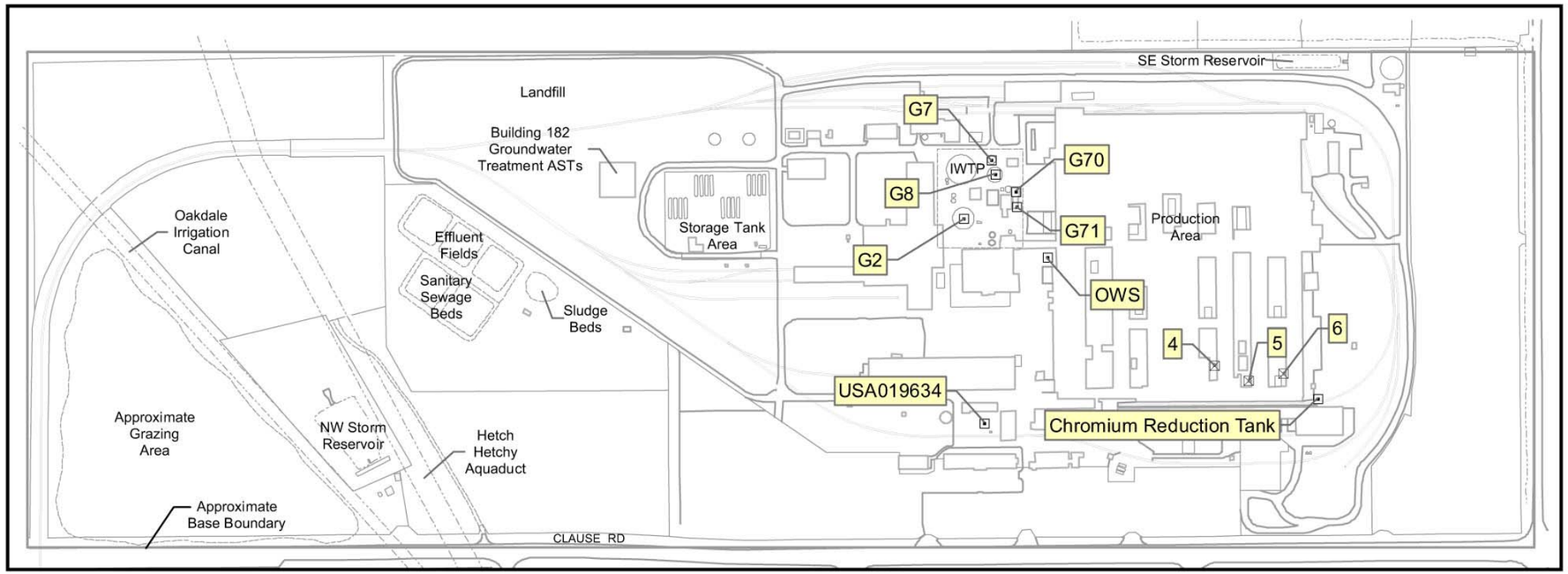
The Reactor Clarifier is a solids contact-type treatment unit that combines mixing, chemical reduction, flocculation, recirculation, clarification, and sludge concentration in a single reactor vessel. It is used as a pretreatment unit prior to process through the IWTP or as an independent treatment system. The tank is made of reinforced concrete with 8-inch thick walls coated with epoxy and a 1-foot foundation. The reactor clarifier has a capacity of 40,600 gallons and dimensions of 24 feet in diameter, with a 12-foot height. An MPVC material liner has been installed with leak detection and high level alarms.

IWTP Flash Mix Tank

Wastewater is fed by gravity from the equalization basin to this tank. Coagulants (flaked lime, sodium hydroxide, or polymer) are added to the wastewater, after which the water flows to the flocculation tank. The tank is constructed of 10-inch-thick reinforced-concrete, with a 1.5-foot foundation, and has a capacity of 9,350 gallons. The tank is 10 feet long by 10 feet wide, with a depth of 12.5 feet and has a copolymer coating on the interior walls.

IWTP Flocculation Tanks (2)

Wastewater containing coagulant flows from the IWTP mixing tank and is sent to one of the two flocculation tanks, at which time additional coagulant may be added. The processed water then flows to the 80-foot clarifier. The unit consists of two 8,500-gallon carbon steel tanks supported by steel legs that are 6 feet long. Each tank is 12 feet in diameter and 12 feet deep. The walls are constructed of 3/8-inch carbon steel and each tank has an interior coating of carboline carbomastic. A secondary containment dike has been constructed for the unit and high-level alarms have been installed on the tanks.



LEGEND

ABOVEGROUND STORAGE TANK STATUS

- ▣ ACTIVE
- ☒ REMOVED

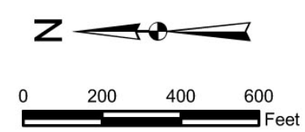
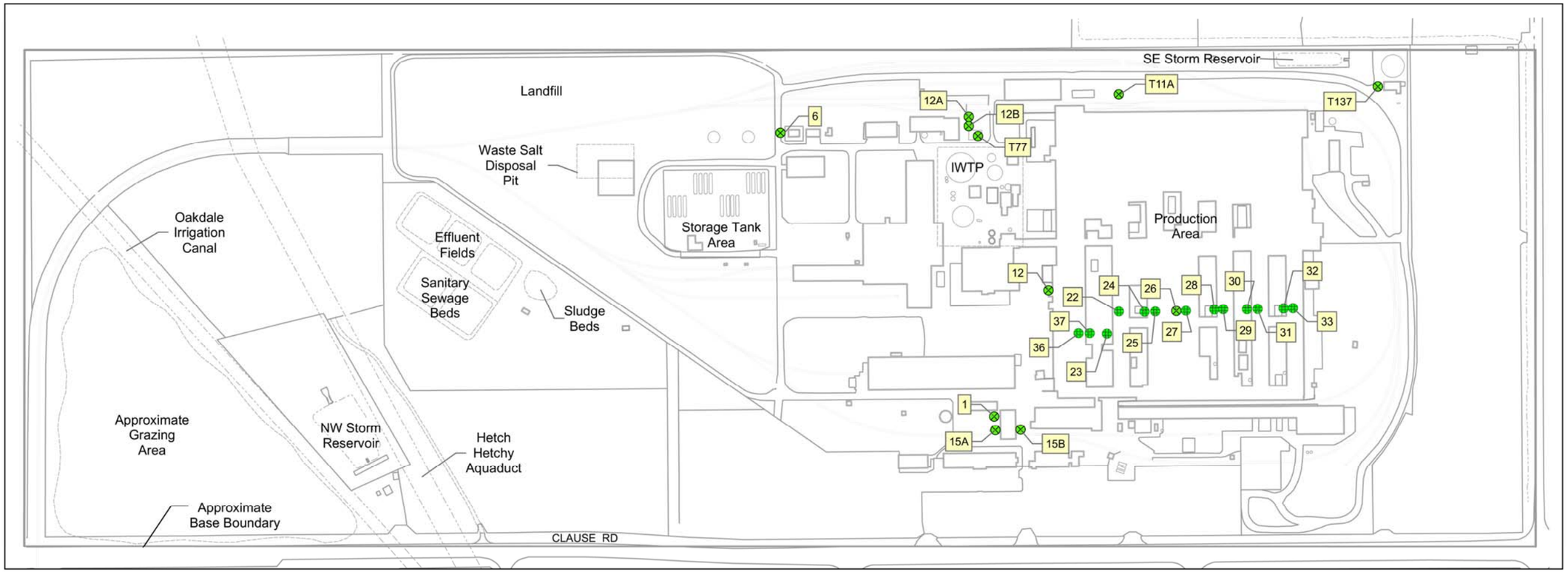


FIGURE 4-5
ABOVEGROUND STORAGE TANKS
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_4_5_AST.MXD FIG_4_5_AST_8X11.PDF 11/19/2006 21:27:51



LEGEND

- UST (Removed)
- UST (Closed in Place)

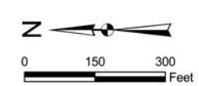


FIGURE 4-6
UNDERGROUND STORAGE TANKS
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\LOKI\PROJECTS\RDDGIS\RIVERBANK\MXD\ECP\FIG_4_6_UST.MXD FIG_4_6_UST.PDF 11/15/2006 20:30:01

IWTP 80-Foot Clarifier

Coagulant-treated wastewater flows from the flocculation tank to this tank. The resulting precipitate is allowed to settle to the bottom of the clarifier and is raked and pumped to the sludge thickener. The tank is constructed of 8-inch-thick reinforced-concrete and is 80 feet in diameter with an 11.5-foot depth. The foundation is 4-feet, 8-inches thick and slopes down toward the center of the tank. The 432,400-gallon tank has epoxy-coated walls. The tank is not currently in use, and the will not return it to use until an MPVC material dual-liner and a high-level alarm have been installed and the permittee has complied with Special Condition No. 6 in Part V of the RCRA Permit.

IWTP Scum Tank

The IWTP clarifier unit is equipped with a skimmer that rotates on the surface. All floating matter (foam, oil, miscellaneous floating matter) is collected and fed by gravity to this tank. It is then stored and pumped to the IWTP sludge thickener. The 940-gallon tank is constructed of 3/8-inch-thick reinforced fiberglass that is 4 feet in diameter and 10 feet high, and sits on a concrete pad. The unit is gravity fed from the clarifier and is equipped with a sludge pump for transfer to the sludge thickener.

IWTP Sand Filter Sump

This unit receives treated water from the 80-foot clarifier, the reactor clarifier, and the GWTS. The water is pumped from this tank through a sand filter, ion exchange, and carbon filter, if appropriate. The 14,000-gallon sump is constructed of concrete reinforced with steel and is lined with PVC. The sump is 14.5 feet long, 8 feet 4 inches wide, and 17 feet 5 inches deep and has a high-level alarm and interstitial monitoring installed.

IWTP Sand Filter

After clarification, IWTP treated water is filtered through the sand and carbon filter if organic constituents exceed established levels. When the filtration media becomes exhausted, the filters are backwashed and the backwash water is sent to the transfer tank. This unit consists of four 275-gallon capacity tanks, which are constructed from 3/16-inch-thick carbon steel. The overall dimensions are approximately 17 feet 8 inches long, 6 feet 8 inches high, and 4 feet 3 inches wide. The tanks are elevated and the IWTP pavement system provides secondary containment.

IWTP Carbon Filter

After clarification, IWTP-treated water is filtered through sand and carbon filters if organic constituents exceed established levels. When the filtration media becomes exhausted, the filters are backwashed and the backwash water is sent to the transfer tank. Media is replaced when the backwash cycle no longer renews the media. The unit consists of five tanks with a total capacity of 2,730 gallons. The tanks are constructed of 3/16-inch-thick carbon steel, with dimensions of approximately 27 feet 4 inches long, 11 feet 2 inches high, and 5 feet 5 inches wide. The tanks are elevated and the IWTP pavement system provides secondary containment.

IWTP Ion Exchange (DI)

This unit receives treated wastewater from the IWTP and the IGWTS. Treated wastewater is pumped from the sand filter sump through the sand filter to this unit at a rate of 400 gpm.

The unit removes phosphates and nitrates and is regenerated using NaOH and HCl. Regenerated waste and slow rinse streams are piped to the regeneration tank. The backwash and fast rinse streams are discharged to the publicly owned treatment works (POTW). The unit is an automatic two-step demineralizer with two 96-inch diameter by 120-inch sideshell, 80- pounds per square inch gauge (psig) vessels, with a 550-cubic-foot capacity. Vessels, controls, and piping are skid mounted and located on a 12-foot by 22-foot concrete slab.

IWTP Sludge Thickener

Sludges formed from the clarifier, chromium reduction, scum tank, reactor clarifier, and filtration backwash tank are pumped to this unit. This tank collects and concentrates the precipitate by settling and raking. The collected sludge is pumped to the filter press for dewatering. The excess liquid is returned to the transfer tank pump discharge line for further processing. The 112,850-gallon tank is constructed of 8-inch-thick reinforced-concrete with dimensions of 40 feet in diameter by 2 feet in height. The concrete foundation is 4 feet 2 inches thick and slopes downward toward the center of the tank. The walls of the tank are coated with an epoxy coating and a PVC material liner. The tank is equipped with interstitial monitoring and high level alarms.

IWTP Filter Press

Sludge from the sludge thickener is pumped to this plate and frame filter press for dewatering. The dewatering sludge is collected in roll-off boxes for transport to an off-site disposal facility. Liquid effluent from the sludge thickener and the filter press is directed to the transfer tank and transfer tank pump discharge line, respectively. The plate and frame filter press is a JWI filter press model 1200-32/50 and has a 50-square-foot capacity. The press has 27 chambers and measures 221.5 inches in length and 60 inches in width. A 6-inch concrete curb provides secondary containment.

IWTP Transfer Tank

This tank is used to collect wastewater from the reactor/clarifier and sludge thickener (via the 8-inch gravity conveyance line), filter press liquid, coolant recovery liquid, and backwash from the sand filter and granular activated carbon units. The 12-gauge, 316-open-top stainless-steel transfer tank has a 1,300-gallon capacity with dimensions of 6 inches in diameter by 6 feet high. High/low level sensors control and sequence a duplex pump system transferring wastewater to the equalization basin. The low level is 6 inches and the high level is at 4 feet (900 gallons) with an overflow at 5 feet.

IWTP Filter Cake Accumulation Area

This area is used for long-term storage of bulk material in IWTP roll-off bins for disposal at an appropriate permitted treatment/disposal facility. The 1,500-square-feet area has a 6-inch-high concrete curb on three sides.

Ion Exchange Waste Regeneration Tank

After clarification, IWTP treated water passes through an ion exchange column. When the ion exchange is regenerated, the resulting waste that is regenerated is stored in this unit. The regenerated waste is discharged to the Riverbank POTW under a discharge agreement after appropriate pH adjustments. The 14,000-gallon operating capacity polyethylene tank sits on

a concrete slab. The dimensions are 12 feet in diameter and 20 feet 10 inches high. A high-level alarm, pH adjustment, and overfill protection have been installed.

Chromium Reduction Unit Batch Process

The batch chromium reduction process is performed in a 1,200-gallon stainless steel tank. Sulfuric acid is added to lower the pH of the solution and then sodium metabisulfite is added to convert the hexavalent chromium to trivalent chromium. The trivalent chromium is then precipitated by the addition of lime and a coagulant. The resultant sludge is transferred to the IWTP for dewatering and effluent is sent to the IWTP for further treatment.

Chromium Reduction Unit Continuous Process

The continuous chromium reduction process is performed in a 1,000-gallon polyethylene tank. Sulfuric acid is added to lower pH of the solution and sodium metabisulfite is added to convert the hexavalent chromium to trivalent chromium. The trivalent chromium effluent is sent to the IWTP for further treatment.

Equipment Wash Facility

This triple rinsing facility is a 30-foot by 48-foot concrete slab with secondary containment. The maximum capacity is 1,440 square feet. The facility is used to decontaminate any equipment, empty drums, and containers that contain wastes that are treatable at the IWTP. It has a 240-gallon sump. The water is pumped to an oil-water separator and then transferred to the IWTP for treatment.

Equipment Wash Facility Oil/Water Separator Unit

This unit is located at the equipment wash facility and has a capacity of 538 gallons. The oil/water separator is a container constructed of 3/16 inch thick steel with dimensions of 3 feet wide, 6 feet long, and 4 feet deep. The slab slopes toward the sump, which provides secondary containment, located in the center. Steam cleaning equipment is used to decontaminate equipment, empty drums, and containers that contain wastes treatable at the IWTP. Waste oil and process water is collected in the sump and pumped to the oil/water separator tank. The oil is decanted and skimmed into a container. The used oil is periodically transferred to the IWTP used oil tank. Process water is pumped into the IWTP influent piping for further processing.

Equipment Wash Facility Platform

This unit is a 30-foot by 48-foot concrete slab with secondary containment, which slopes toward the sump located in the center of the slab. The platform is 10 feet square and 1 foot deep with a capacity of 748 gallons, and the sump is 3 feet square and 2 feet deep. The platform, which includes a deck and containment sump, is constructed of galvanized steel. The sump is equipped with a pump connection for transferring oily waste water to the oil/water separator. The wash facility sump provides the secondary containment for the wash facility platform and is lined with stainless steel.

Drum Storage Facility Stabilization

The drum storage facility is a 100-foot by 50-foot concrete pad. It has a metal roof and partial height walls for weather protection. There is an 8-foot-high chain-link fence along the perimeter of the pad. The slab is sloped to provide three segregated areas of storage;

flammables, caustics, and acids. Each area has a 400-gallon sump. There is a curb around the pad to prevent surface water run-on and provide secondary containment. The stabilization unit has a capacity of 55 gallons and is used to stabilize solid waste by adding absorbent to the waste. Stabilization occurs in the area of the unit designated for storage of the specific hazardous waste.

Drum Storage Facility Storage

This facility is a 100-foot by 50-foot concrete pad. It has a metal roof and partial height walls for weather protection. There is also an 8-foot-high chain link fence along the perimeter of the pad. The slab is sloped to provide three segregated areas of storage; flammables, caustics, and acids. Each area has a 400-gallon sump. There is a curb around the pad to prevent surface water run-on and provide secondary containment. The capacity of the facility is 312 55-gallon drums, for a total storage volume of 17,160 gallons. Waste may be stored for up to 1 year and stabilization of the waste may also occur. Containers with PCBs cannot be stored at this facility.

Used Oil Storage Tank

Waste oil from emulsion breaker (oil recycling) and skim oil from the equipment wash facilities are pumped into the tank for storage. The 6,000-gallon horizontal steel tank is set on elevated saddles. The tank has a secondary containment structure with the dimensions of 30 feet by 20 feet by 3 feet high. High-level alarms and overfill protection have been installed.

Hazardous Waste Accumulation Area Steam Cleaning

The unit is located in the south end of the IWTP and consists of a concrete pad with epoxy that is 26 feet by 31 feet, with a capacity of 806 square feet. Portable steam cleaning equipment is used to decontaminate equipment and material drums. The concrete pad and trench provide secondary containment. The wastewater from the platform is collected and pumped to the IWTP influent piping by an air diaphragm pump for further processing.

Hazardous Waste Accumulation Area Stabilization

Containerized hazardous waste is moved from its point of origin to the hazardous waste accumulation area, which is a 90-day or less temporary storage area located at the south end of the IWTP. Stabilization of the waste may also occur by adding floor dry to the drums. The unit is a concrete pad coated with epoxy that is 26 feet by 31 feet, with a capacity of 806 square feet.

Hazardous Waste Accumulation Area Storage

The IWTP hazardous waste accumulation area is located in the south end of the IWTP and consists of a concrete pad with epoxy that is 26 feet by 31 feet, with a capacity of 806 square feet. Hazardous waste from generation points is moved to the 90-day temporary storage area at the IWTP. Each container is evaluated and tested, if needed, for final disposition. All waste designated for off-site disposal are transferred to the drum storage facility. The area is equipped with drainage to the IWTP collection sump.

4.5 Petroleum Products

4.5.1 Aboveground Storage Tanks

A petroleum AST is located north of Building 130 is used for the storage of gasoline and diesel product. A description of this AST is found in Table 4-6.

4.5.2 Underground Storage Tanks

Petroleum products used at the RBAAP include gasoline and diesel, lubricating oils, oil for electrical transformers and stored waste oil. RBAAP has closed in place or removed all USTs and currently relies on petroleum storage in either ASTs or in smaller quantity containers. Information regarding closed or removed petroleum product USTs is provided in Table 4-7.

The operating contractor, NI Industries, completed a SPCCP for the RBAAP that lists 19 locations that may store oil products excluding the ASTs, which are listed in Section 4.5.1 of this ECP (NI, 2003d). The sites listed in the plan are as follows:

- Lubricating Room-Building 78
- Waste Oil Treatment and Storage-Area 44
- Temporary Hazardous Waste Storage Area –IWTP
- Propane Storage Tank Area
- Hazardous Waste Storage Area –Building 174
- Crib- Building 188
- Electrical Substation 5
- Electrical Substation 6
- Electrical Substation 7
- Electrical Substation 8
- Electrical Substation 10
- Electrical Substation 12
- Electrical Substation 13
- Electrical Substation 15
- Electrical Substation 17
- Electrical Substation 18
- Electrical Substation Area 109
- Main Electrical Switch Yard- Area 108
- Transportation Routes-Various

In addition, Building 11 is being leased by a tenant, Riverbank Oil Transport, who uses the facility for collecting and transporting waste oil for recycling. Transportation of waste oil to the facility is by way of tanker truck and transportation of this waste oil from the facility is by railroad tanker car.

4.5.3 Polychlorinated Biphenyls

A complete listing of PCB-containing transformers in excess of 50 ppm was provided by NI Industries (NI, 2006b). The list is presented in Table 4-8.

Two sites were investigated under the RFI and removal actions completed to address PCB contamination in soils. The sites are briefly described below.

TABLE 4-8
Polychlorinated Biphenyls (PCB)-Containing Transformers Greater than 50 ppm at Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Unit No.	Serial No.	Location	PCB Conc. (ppm)	Unit Status	PCB QTY. (kg)	OIL QTY. (GAL)
TRANS SUB 1	3400153	Line No. 1, W. Outside 95	106	Active	1,700	386
TRANS SUB 3-N	3164726	Structure 97 Main St. and Structure No. 8	64	Active		386
TRANS SUB 5-N	1A71522		768	Active	3060	966
TRANS SUB 13-W	2351391	Structure 54 – X Cooling Tower	248	Active		966
TRANS SUB 15-W	1861-1	Structure 100 Line No. 1 Courtyard	998	Active	3091	680
TRANS SUB 15-E	1861-2	Structure 100 Line No. 1 Courtyard	1514	Active	3091	680
TRANS SUB 17-E	1A71511	Structure 145	134	Active	4391	966
TRANS SUB 18	3161095	Structure 146	35,000	Active	4391	966
OCB 30 CENTER		Yard	90			
Motor Generator –Lub A – No. 12831		Bldg. 7-Me2-2	4300			

AOC 8-B and AOC 8-B—Transformer Oil Storage Tanks and Distribution System

Contamination was detected at AOC 8-B-Tranformer Oil Storage Tanks and Distribution System. The transformer oil tank system originally was built in the 1940s and was used until 1970 for transferring and filtering transformer oil. The three transformer oil tanks were cleaned out, tested for PCBs, and removed from the facility. The transformer oil storage tanks were cleaned, tested, and removed from the RBAAP. All of the transformers associated with this system had previously been removed. The floor of Building 85, which tested positive for PCBs, has been decontaminated. The pipelines have been cleaned (the cleaning fluid tested) and encapsulated with cement grout. Based on the October 21 and 22, 1997, pipeline pressure test, the distribution systems appears to be fairly tight and unlikely to have caused a release. Soil sampling of the bermed area that formally contained the transformer oil tanks revealed the presence of PCBs in soils. As a result, a removal action was conducted within the bermed area of the transformer oil storage tanks area as part of the RFI and additional sampling was conducted along the distribution system pipeline. The objective of the excavation at the oil tanks area was to remove the PCB-impacted soil above IPRGs and dispose offsite. Approximately 120 cubic yards of soil were excavated from within the bermed area of AOC 8B and confirmation sampling showed nondetect for PCBs. This site has been approved by DTSC for no further action in accordance with the Final RFI (CH2M HILL, 2005a).

AOC 16—Substation 5 Transformer Pad

The 2003 sampling results indicated that PCBs, primarily Aroclor-1260, exceed IPRGs in the gravel and soil that surrounds the Substation 5 transformer pad. As proposed in the 2003 RFI Work Plan Addendum, a removal action was implemented to remove all of the gravel and soil exceeding IPRGs. Approximately 60 cubic yards of gravel and soil were

excavated from within the concrete bermed area surrounding the transformer pad of Substation 5 in March 2004. Approximately 18 inches to 2 feet of gravel were present. The excavation was to a depth of approximately 3 to 4 feet bgs (minimum of 18 inches into native soil). No stained soil or other evidence of contamination was observed during the excavation. Once the excavation was concluded, confirmation samples were collected from the excavation floor and analyzed for PCBs (by Method SW8082) to ensure that all PCB-impacted soil above IPRGs had been removed. All confirmation samples were below the method detection limit. This site has been approved by DTSC for no further action in accordance with the Final RFI Report (CH2M HILL, 2005a).

Observations of the substations and transformers located at the RBAAP on June 22, 2006, as part of the ECP are described here. Transformers or substations recommended for further investigation are identified in Section 5 as Category 7 sites.

- At Structure 54, Substation No. 13, minor oil staining was observed on concrete at the base of two transformers. The oil within these two transformers has PCB concentrations of 35,000 ppm. No reported releases have been reported at these transformers and the integrity of the concrete appeared to be in good condition. Additionally, there are no unpaved areas in the immediate vicinity of these transformers. Based on available information, the potential for PCB contamination from the minor staining observed beneath the transformers to have impacted the soil beneath the transformers is considered low.
- At Structure 145, Substation No. 18, minor oil staining was observed on concrete at the base of the transformer. The oil within this transformer has a PCB concentration of approximately 35,000 ppm. No reported releases have been reported at this transformer and the integrity of the concrete appeared to be in good condition. Additionally, there are no unpaved areas in the immediate vicinity of this transformer. Based on available information, the potential for PCB contamination from the minor staining observed beneath the transformer to have impacted the soil beneath the concrete at these transformers is considered low.
- Minor staining was also observed beneath the transformers located at the following locations. The integrity of the concrete appeared to be in good condition at these sites, with the exception of Structure 145, where minor cracking was observed. Gravel surrounded the concrete pads at all of the transformers described below.
  - Structure 95, Substation No. 1. One transformer with a PCB concentration of 106 ppm.
  - Structure 96, Substation No. 2. Two transformers with PCB concentrations of 8.4 ppm and 2.7 ppm, respectively.
  - Structure 97, Substation No. 3. Two transformers with PCB concentrations of 64 ppm and 33 ppm, respectively.
  - Structure 101, Substation Spare. One inactive transformer with an unknown PCB concentration.

- Structure 109, Main Transformer Substations Nos. 2 and 3. Two transformers with an unknown PCB concentration.
- Structure 145, Substation No. 17. Two transformers with PCB concentrations of 28 and 134 ppm.

Based on these observations, there is a potential for PCBs to have impacted the soil in the gravel areas that are near these transformers. Because of the cracking observed in the concrete pad for the transformer located at Structure 145, there is a potential for the PCBs to have impacted the soil beneath the concrete pad.

- At Structure 54, Substation No. 13, oil staining was observed on concrete at the base of two transformers with PCB concentrations of 32 and 40 ppm. At Structure 145, Substation No. 18, oil staining was observed on concrete at the base of one transformer with a PCB concentration of approximately 30,000 ppm. Because the integrity of the concrete appeared to be in good condition and no pathways exist to any unpaved areas, these sites do not require a removal or other response.
- At Structure 95, Substation No. 1, oil staining was observed on concrete at the base of one transformer with a PCB concentration of 106 ppm. At Structure 96, Substation No. 2, oil staining was observed on concrete at the base of two transformers with PCB concentrations of 8.4 and 2.7 ppm. At Structure 97, Substation No. 3, oil staining was observed on concrete at the base of two transformers with PCB concentrations of 64 and 33 ppm. At Structure 101, Substation Spare, oil staining was observed on concrete at the base of one inactive transformer with an unknown PCB concentration. Structure 109, Main Transformer Substations No. 2 and 3, oil staining was observed on concrete at the base of transformers with an unknown PCB concentration. At Structure 145, Substation No. 17, oil staining was observed on concrete at the base of two transformers with PCB concentrations of 28 and 134 ppm. The integrity of the concrete appeared to be in good condition at these sites, with the exception of Structure 145, which shows minor cracking. However, gravel surrounded the concrete pads at all of the substations. There is a potential pathway to these unpaved areas, and these sites require further investigation.

4.6 Asbestos-Containing Materials

Based on an asbestos inventory summary conducted in March 2005, most buildings on the plant contain suspect asbestos-containing materials (ACM). Galbestos building material, which contains asbestos, is a common siding material. An asbestos survey and asbestos abatement of friable materials was reportedly performed, although no summary report aside from the inventory summary was available during the records review. RBAAP personnel, however, confirmed the survey and abatement of friable materials (USAEC, 2005b). The operating contractor, NI Industries, has an Asbestos Management Plan in place to maintain a permanent record of status and condition of all asbestos containing material at the RBAAP and respond to ACM conditions that pose any potential health risks (NI, 2004a).

4.7 Lead and Lead-Based Paint

The RBAAP has conducted several lead-based paint (LBP) sampling surveys as presented in Table 4-9. Because of the age and use of the buildings at the RBAAP, it is assumed that all contain various amounts of LBP. The operating contractor, NI Industries, has a Lead Compliance Plan that is designed to aid in compliance with state and federal safety and health regulations (NI, 2005f).

TABLE 4-9
Summary of Lead Based Paint Sampling at Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Sample ID	Lab ID	RL	Method	Analyte	Results * mg/Kg	Date Sampled
03-0218-4 Sample No. 1 – Paint Chips from Bldg. 26A Heating, Ventilation And Air Conditioning (HVAC) Ductwork	P200292	5.0	6010B	Lead	1700	3/14/03
03-0218-5 Sample No. 2 – Paint Chips from Bldg. 26A Ceiling	P200293	5.0	6010B	Lead	1730	3/14/03
03-0314-10 Sample 250 Unit, South Side	P200446	5.0	6010B	Lead	302	3/14/03
Paint Chips from North Wood Door at Bldg. 15A	92-0812-5		7420	Lead		8/18/92
No. 93-0604-7 Composite LBP-Plantwide	E10482		LUFT	Organic Lead	ND	6/13/93
Paint Chips from Fence Surrounding 2nd Storm Drain Pond No. 920709-5	D21580		7420	Total Lead	14,700	7/13/92
Paint Chips No. 93-082-6	E10882		7420	Lead	60	8/31/93
Building 26A, Sample I	94-0302-8	5.0	7420	Lead	1530	3/7/97
Building 26A, Sample II	94-0302-9	5.0	7420	Lead	2180	3/7/94
East of Broadway, Line 3, North Wall, Column 13A	94-0221-14		7420	Lead	317	2/23/94
East of Broadway, Line 3, South Wall, Composite	94-0221-15		7420	Lead	396	2/23/94
Line 1, Acme No. 5	94-0222-6		7420	Lead	1100	2/23/94
Line 7, Col. 23C, West Side, Green Paint, 5' up, 6" x 6"	94-0622-6		7420	Lead	23,800	6/27/94
Broadway, Bldg. 25A, East Wall, Green Paint, 6' up, 6" x 12"	94-0622-7		7420	Lead	59,900	6/27/94
Line 7, Col. 32C, West Side, Red Paint, 6' up, 6" x 12"	94-0622-8		7420	Lead	82,300	6/27/94
Line 7, col. 34A, East and South Side, Gray Paint, 5' up, 6" x 12"	94-0622-9		7420	Lead	51,100	6/27/94
Line 7, Col. 33C, South Side, Yellow Paint, 4' up, 4 ¼" x 10"	94-0622-10		7420	Lead	74,500	6/27/94
Line 7, Col. 33C, South Side, Black Paint, 3 1/2' up, 9 ½" x 10" (triangle)	94-0622-11		7420	Lead	47,600	6/27/94
Paint Chips, Building 157, Access Platform	94-0815-16		7040	Lead	883	9/13/94
Bldg. 6, Col. 33B – 39B	94-1121-15	5.0	7040	Lead	626	11/23/94

TABLE 4-9
Summary of Lead Based Paint Sampling at Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Sample ID	Lab ID	RL	Method	Analyte	Results * mg/Kg	Date Sampled
Bldg. 6, Col. 33B – 39B	94-1121-15 Dup	5.0	7040	Lead	1036	11/23/94
Bldg. 5 and 6, Col. 40A and 40B (Between corrugated)	94-1121-16	5.0	7040	Lead	626	11/23/94
Bldg. 5 between Col. 29B and 35B	94-1121-17	5.0	7040	Lead	603	11/23/94
Bldg. 4 Corrugated between Col. 30A and 32A	94-1121-18	5.0	7040	Lead	361	11/23/94
Bldg. 3 Corrugated between Col. 25A and 26A	94-1121-19	5.0	7040	Lead	17,713	11/23/94
Bldg. 2 Corrugated between Col. 33A and 37A	94-1121-20	5.0	7040	Lead	5753	11/23/94
Bldg. 1 Corrugated between Col. 36A and 37A	94-1121-21	5.0	7040	Lead	688	11/23/94
Bldg. 1 and 7 corrugated	94-1121-22	5.0	7040	Lead	926	11/23/94
Building 17, East Side, Window Sash Paint Chips	96-0109-6	5.0	7420	Lead	37,464	1/15/96
Bldg. 12, Sample 1 – Boiler No. 4, Exhaust Stach and Rear Surface 96-1025-16	H10432	5.0	7420	Lead	43,000	10/28/96
Bldg. 12, Sample 2 – Boiler No. 5, Exhaust Stach and Rear Surface 96-1025-17	H10433	5.0	7420	Lead	25,000	10/28/96
Bldg. 12, Sample 3, No. and So. Water Pump 96-1025-18	H10434	5.0	7420	Lead	16,000	10/28/96
Bldg. 12, Sample 4, Green Paint dearation and Boiler piping 96-1025-19	H10435	5.0	7420	Lead	41,000	10/28/96
Bldg. 3, Wall Cleaning/Paint Chip Removal – 020497-01PL	97-0205-11			Lead	4.3	2/6/97

Reference: NI Industries, 2005f.

4.8 Radioactive Material

According to Army records, the RBAAP does not currently use or store any radioactive material. Based on records reviews conducted by the RBAAP Radioactive Point of Contact Mr. Dale Clemens, no licensed radioactive material has been used at the RBAAP (USAMC, 2005). During the Phase I ECP, three buildings (Buildings 11, 162, and 174) were identified as having the potential for the presence of radioactive material.

Building 11 Paint & Oil Storage. According to the Installation Assessment from 1980, personnel interviewed recalled from memory that radiological material may have been stored during the late 1950s in Building 11. The U.S. Army Materiel Development Readiness Command (DARCOM) Headquarters indicated that NRC Permits were not required in the 1950s, and information concerning these radiation activities were not available (U.S. Army, 1980). No additional information concerning the storage of radioactive materials at

Building 11 was identified through records searches conducted by the AMC Radiation Safety Staff Officer (Prins, 2006), U.S. Army Joint Munitions Command (Crooks, 2006), or the U.S Army CHPPM Office (Alberth, 2006). Correspondence with NI indicated that the building had a sign on it for a fallout shelter with the radioactive material symbol on it during this time. It may be that the personnel saw this sign and believed radioactive material was stored there (Mendes, 2006).

Building 162 Autodin A.B. Terminal Building – Training Room. The name of building indicates that an Automated Digital Information Network (AUTODIN) operation was conducted in this building built in 1971. The AUTODIN is a communication system that has supported the DoD communications needs for thirty years and has been replaced (Department of Defense Office of the Inspector General. 2003). It is not known when the operation ceased at Riverbank. Small quantities of radioactive material may be associated with AUTODIN operations (Alberth, 2006). The small building is currently being used for administrative functions.

Building 174 Hazardous Waste Storage Area: According to the former Commanders Representative, Mr. Gansel, there was one temporary activity in 1995 inside Building 174 involving the packaging of instruments and gauges known to contain radium (USAEC, 2005b). According to Mr. Gansel, the RBAAP was contacted in 1995 by the state and asked if the RBAAP could assist a contractor with repacking DoD instruments and gauges that were know to contain radium. They further advised that none of the items were broken and therefore the radium would not be released to the environment. The action resulted in packing activities that lasted for approximately 1 week. It included a contractor working in the storage facility with 55-gallon drums putting the allowed number of gauges in them, and then encasing all gauges in concrete in the barrel. Once packed, the drums were sent off-base. During this operation, Mr. Gansel was personally present most of the time, and no releases or spills occurred. Mr. Gansel recalls that the gauges were received from bases overseas, and were sent initially to Tracy Defense Site, which had no facility to allow the transfer into drums. No additional information concerning the packaging of instruments and gauges known to contain radium or the storage of radioactive materials at Building 174 was identified through records searches conducted by the AMC Radiation Safety Staff Officer (Prins, 2006), U.S. Army Joint Munitions Command (Crooks, 2006), or the U.S Army CHPPM Office (Alberth, 2006).

4.9 Historical Landfills/Dumps

The only known landfill is identified under the current IRP as RBAAP- 01, which is currently undergoing long-term management and monitoring as described in the ROD. The Army agreed to install and maintain a clay cap at the landfill in 1995. The final sitewide ROD documents this remedial action selection. There are no other known historical landfills or dumps (USAEC, 2005b). A detailed description of RBAAP-01 Landfill is provided in Section 4.3.1.

4.10 Explosive Contaminated Structures

Bulk explosives were never handled at the RBAAP and there is no evidence or reason to suspect that structures have been contaminated by explosive compounds (USAEC, 2005b).

4.11 Radon

A radon survey was conducted from September 1990 through November 1991 in Buildings 172, 9, 1, 13, 162, 14A, 120, 16A, and 9. Building 162 was the only building with radon above the limit of 4 picocuries of radon per liter of air (pCi/L). Building 162 had a measured level of 5.2 pCi/L (MasoTech, 1999b).

4.12 Pesticides

In general, very low volumes of pesticides are used at RBAAP. The main pest control activity at RBAAP is the use of herbicides to control undesirable vegetation such as weeds around buildings, on berms, and along railroad tracks. Additionally, pest control activities at RBAAP include control of disease vectors such as mosquitoes, bats, pigeons, and spiders; real property pests such as termites, wood-decaying fungi, ground squirrels, ants, bees, and wasps; stored product pests; and household and nuisance pests such as flies, gophers, and mice (NI, 2003a, 2004b).

All pesticide storage and mixing is currently located within Building 170. This site is identified as SWMU 17 under the RCRA permit. Table 4-10 provides a description of the pesticides used or stored at the RBAAP in 2003.

TABLE 4-10
Pesticides at Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Chemical Name	EPA Registration Number	Active Ingredient	Use
KNAPP Formula K Insect Killer	33176-21-9975	1.90%	Control of population of mosquitoes, flies, and ants
Avitrol	11649-9	0.5% by weight	Control of ectoparasites (pigeons)
Pyrenone	4816-416	1% pyrethrins	Control populations of black widow spiders, ants, aphids, thrips, moths, beetles, cockroaches, crickets, mites, silverfish, and ticks
Chlorophacinone	36029-50004-AA	0.005% 2-((p-chlorophenyl) phenylacetyl)-1,3-Indandione	Bait pellets to control population of ground squirrels
Aluminum Phosphide	5857-1	55% by weight Aluminum Phosphide	Fumigation tablets to control population of ground squirrels
Diazinon 4E	655-457	47.55 0,0-Diethyl 0-(2-Isopro-pyl-6-Methyl-4-Pyrimidinyl) Phosphorothioate; 30% Petroleum Solvent	Control ant infestation establishment
Glyphosate	524-308-AA	41% Isopropryl amine salt of glyphosate	Control annual grasses and broadleaf weeds
Oryzalin	62719-112	75% 3,5-Dinitro-N4,-N4-Dipropylsulfanilamide	Control annual grasses and broadleaf weeds
Surface Active Agent		100% Alkyl Phenoxy olyethoxy ethanols and petroleum	Control annual grasses and broadleaf weeds

TABLE 4-10
Pesticides at Riverbank Army Ammunition Plant
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Chemical Name	EPA Registration Number	Active Ingredient	Use
Glyphosate (Rodeo)	524-343	53.8% Isopropylamine salt of glyphosate	Control annual grasses and broadleaf weeds
Diuron FL	19713-36	4% (3-(3,4-Dichlorophenyl)-1,1-dimethylyrea)	Control annual grasses and broadleaf weeds
Goal T/O	707-174	19.4% oxyfluorfen-E-Chloro-1-(3-Ethody-4-Nitrophenoxyl)-4-(Trifluiromethyl)benzene	Control annual grasses and broadleaf weeds
Hyvar XL	352-346	21.9% Lithium salt of bromocil - (5-bromo-3-sec-butyl-6-methyl uracil)	Control annual grasses and broadleaf weeds
Oust	352-401	75% sulfometuron methyl (Methyl 2-[[[[(4,6-dimethyl-2-pyrimidinyl)-amino]carbonyl] amino]sulfonyl]benzoate	Control annual grasses and broadleaf weeds
Transline	62719-259	40.9% Clopyralid: 3,6 dichloro-2-pyridinecarboxylic acid, monoethanolamine salt	Starthistle control
Garlon 4	62719-40	61.6% (3,5,6-tri chloro-2-pyridnyloxy) acetic acid butyl ethyl ester	Blackberries and woody plants control
Gallery	62719-145	75% isoxaben N-[3-(1-ethyl-1-1-methylpropyl)-5-isoxazolyl]-2,6-climethoxybenzamide and isomers	Control annual grasses and broadleaf weeds
Propoxur	3125-121-ZA	2% 2-(1 methyl ethoxy) Phenol Methyl Carbamate	Control infestations of cockroaches and crickets
Diphacinone	56-42	0.005% Diphacinone 2-(Di phenylacetyl)-1H-Indene-1,3(2H)-dione	Control infestations of mice
Metaldehyde (Bug-geta Snail and Slug Pellets	239-2373-AA	3.25% Metaldehyde	Control infestations of snails

Reference: NI, 2004b

4.13 Other Identified Concerns

Other concerns as noted during the August 2005 ECP Workshop are discussed below.

Encroachment. During the site visit of the Evaporation/Percolation Ponds, there was encroachment on to the property from adjacent property owners. See Section 4.17.4 for further details.

CH2M HILL Visual Site Inspection. A site inspection was conducted at Building 169, Paint Spraying Facility on June 21, 2006. Paint of all kinds, including LBP was used at this facility. Paint splatters and minor cracking were observed on the concrete floor of the facility. There are no drains inside the building.

Production Area Sumps and Pits. Pits and sumps associated with the production line equipment and presses are located inside Buildings 1, 6, and 8 remain in place and have not been investigated for possible cracks and/or potential soil contamination, with the exception of the Zinc Plater Cyanide Sump in Building 6 (see Section 4.3.4, Environmental Assessment, Cartridge Case Line [NI, 1998d]). Based on information from previous investigations that have been performed on former pits and sumps (e.g., Sump 4-11 in Building 4 and the Zinc Plater Sump in Building 6), there is a potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.

4.14 Identification of Uncontaminated Property

This section describes portions of the Property that are considered "uncontaminated." The identification of uncontaminated property was based on the records review, VSI, and interviews. Based on this available information, no CERCLA defined release or disposal of hazardous substances or petroleum products or their derivatives has occurred, including no migration of these substances from adjacent areas. These uncontaminated sites are further discussed in the Conclusions Section (Section 5.1.1). The approximate acreage for each site is provided below. The total approximate acreage for all of the uncontaminated sites is 45.71 acres.

- AOC 9B Vertical ASTs – Fire Sprinkler Storage Tank (Acreage 0.08 acre)
- AOC 10, Former Solid Waste Pile (Southeast Corner) (Acreage 0.44 acre)
- Buildings 138, 139, 188, (Acreage 0.02 acre) (Building 139 is also AOC 9B)
- Open Land, North Railroad Area, South Parking, Southeast Utilities, South Open Storage, (Acreage 45.17 acres)

4.15 Description of Remaining Property

The remaining property at the RBAAP and the E/P Ponds has been determined to fall within a property category of 2, 3, 4, 5, 6, or 7 based on the records review, VSI, interviews, and site visit as part of this ECP. Therefore, the remaining property is characterized by a release or disposal of petroleum products or hazardous substances, or requires additional evaluation. The remaining property is further discussed in the Conclusions Section (Sections 5.1.2 through 5.1.7). The approximate acreage for the remaining property is approximately 126.83 acres.

4.15.1 National Environmental Policy Act

A NEPA Information Needs Questionnaire was completed for the RBAAP. The NEPA Support Team determined that an Environmental Assessment for closure of the RBAAP would be required to meet NEPA requirements (USAEC, 2005a). It was also recommended that the inventory of threatened and endangered species needs to be updated and that the Integrated Cultural Resources Plan and the archeological survey will need to be performed.

Recent National Environmental Policy Act Documentation

Environmental Assessments that have been completed at the RBAAP include the following:

- Environmental Assessment, RBAAP, LMC West – Tenant Placement. April 2, 1996
- Environmental Assessment, RBAAP, Ceracon – Tenant Placement. November 7, 1996
- Environmental Assessment, RBAAP, D&M Hancock, Inc. – Tenant Placement. January 28, 1996
- Environmental Assessment, RBAAP, Asbestos Program. March 3, 1998

Anticipated Level of Documentation

Based on information provided by the BRAC NEPA Support Team, the anticipated level of documentation for the transfer of the remaining property at the RBAAP is an Environmental Assessment (Peck, 2006).

4.16 Applicable Regulatory Compliance Issues

In June 2002, a CACA was signed between the Army and DTSC, Docket HWCA: P1-99/00-007. The CACA required that the Army perform an RFI on four AOCs:

- AOC 8B – Transformer Oil Storage Tanks and Distribution System
- AOC 12 – Industrial Wastewater Collection System
- AOC 14 – Zinc-Cyanide Collection System
- AOC 16 – Substation 5/Building 11
- SWMU 16 – Pesticide Storage Area (Building 165).

Results of the RFI recommended no further action for AOC 8B, 14, 16, and SWMU 16 and deferred any additional actions at AOC 12 until base closure (CH2M HILL, 2005a). In a letter from the DTSC, dated August 10, 2006, the DTSC confirmed that no further action was required at the SWMUs and AOCs with the exception of SWMU-1. As previously noted, additional characterization of the IWTP is precluded until permit closure due to the presence of existing system components.

Based on information provided by Riverbank personnel, no Notices of Violation (NOVs) have been reported for the Property (CH2M HILL, 2006).

Additional information regarding historical or current NOVs located at the Property is being obtained through the Environmental Quality Report (EQR) system maintained by the U.S. Army. The EQR tracks issues concerning compliance with environmental laws and regulations. Information from the EQR for the Property was not available during this investigation and currently is pending.

4.17 Adjacent Properties

The predominant land use in the vicinity of the RBAAP is agricultural. Most of the land to the north, west, and south, of the plant is characterized by sparse residential areas. To the east of RBAAP is primarily pastureland. (Envirodyne, 1987).

The residential area immediately to the west of the RBAAP is light density with about 150 homes per square mile (60 homes per square kilometer). Only a very small percentage of the nearby land is in commercial use (Envirodyne, 1987).

4.17.1 Underground Storage Tank (Private Farm)

An active UST is located on a farm less than 0.25 mile south of the E/P Ponds. The 500-gallon tank was installed in 1979 and is used to store leaded fuel. This facility is listed on the CA FID UST, SWEEPS UST listing, and HIST UST (EDR, 2006a). Because this site is located approximately 0.25 mile away in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to impact the E/P Ponds (EDR, 2006c).

4.17.2 Stop-N-Save No. 5

A Stop-N-Save No. 5 facility is located less than 0.5 mile west-southwest of the E/P Ponds. A leaking gasoline UST was confirmed in September 1991. Methyl tert-butyl ether (MTBE) was detected in groundwater and affected the drinking water aquifer. The groundwater was monitored in June 2003. In addition, unspecified oil-containing waste and unspecified aqueous solution were located at the facility. The disposal methods included recycling and the use of a transfer station. This facility is listed on the HAZNET database, LUST list, and Cortese list (EDR, 2006a). Because this site is located approximately 0.5 mile away in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to impact the E/P Ponds (EDR, 2006c).

4.17.3 U-Gas

A U-Gas gas station is located less than 0.5 mile west-southwest of the E/P Ponds. Six USTs were installed at the facility between 1971 and 1974. Four 10,000-gallon tanks contained leaded and unleaded gasoline, and two 2,000-gallon tanks contained diesel fuel. The tanks were pressure tested for leaks. Leaking gasoline USTs were confirmed in May 1997. MTBE was detected in groundwater and affected the drinking water aquifer. This facility is listed on the LUST list, Cortese, CA UST, HIST UST, and SWEEPS UST (EDR, 2006). Because this site is located approximately 0.5 mile away in a location that is generally downgradient to cross-gradient relative to the E/P Ponds, this site is considered to have a low potential to impact the E/P Ponds (EDR, 2006c).

4.17.4 Evaporation/Percolation Ponds Encroachment

On the east side of the E/P Ponds, there are four adjacent properties where encroachment onto the E/P Pond property has been documented by the U.S. Army. The encroachment is currently under investigation by U.S. Army and USACE office in Sacramento. Provided below are descriptions of the encroachment issues associated with each of the adjacent properties.

Parcel No. 062-008-010

At Parcel No. 062-008-010, a drainage piping was documented that drains onto the RBAAP E/P Pond property. The property owner has been informed of the requirement to remove the piping and repair the erosion caused by the piping (U. S. Army, 2006a).

Parcel No. 062-008-005

At Parcel No. 062-008-005, the RBAAP E/P Pond boundary fence has been removed and replaced by a deck, retaining wall, ornamental plants, and various building materials, and fill dirt. The owner has been informed of the requirement to remove all personal property, return the slope to its natural contour, and replace the chain link fence (U. S. Army, 2006b).

Parcel No. 062-008-007

At Parcel No. 062-008-007, personal property and debris has been placed along the RBAAP E/P Pond fence, causing damage to the fence and failure of the slope. The owner has been informed of the requirement to remove all personal property from this area, return the slope to its natural contour, and repair the fence damage (U. S. Army, 2006c).

Parcel No. 062-008-011

At Parcel No. 062-008-011 a stormwater drain pipe was observed entering the RBAAP E/P Pond property, as well as oil stains at the foot of a retaining wall on the RBAAP E/P Pond property. The source of the oil stains is apparently from a waste oil tank located on Parcel No. 062-008-011. Preliminary soil samples on the RBAAP E/P Pond property indicate concentrations of 276,000 mg/kg (U. S. Army, 2006d).

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5. Conclusions

This ECP has established the environmental condition of the RBAAP property. A summary of CERCLA, IRP, or cleanup areas of concern is shown in Table 5-1. A summary of environmental conditions at each building and associated areas is provided in Table 5-2. Both tables are placed at the end of this section.

5.1 Environmental Conditions Findings

The environmental features and areas located at the RBAAP are classified in Categories 1 through 7. These categories are further described below. Figure 5-1 (at the end of this section) shows the ECP property categories at the RBAAP and the E/P Ponds.

- **Category 1:** Areas where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas)
- **Category 2:** Areas where only release or disposal of petroleum products has occurred
- **Category 3**: Areas where release, disposal, and/or migration of hazardous substances has occurred, but at concentrations that do not require a removal or remedial response
- **Category 4**: Areas where release, disposal, and/or migration of hazardous substances has occurred, and all removal or remedial actions to protect human health and the environment have been taken
- **Category 5:** Areas where release, disposal, and/or migration of hazardous substances has occurred, and removal or remedial actions are underway, but all required remedial actions that have not yet been taken
- **Category 6:** Areas where release, disposal, and/or migration of hazardous substances has occurred, but where required actions have not yet been implemented
- **Category 7:** Areas that are not evaluated or that require additional evaluation

The condition of all of the environmental features and areas is presented below by category.

5.1.1 Category 1 Property

All parcels listed as a Category 1 are considered "uncontaminated property" (as amended by the Fiscal Year 1997 Defense Authorization Act) where no release or disposal of hazardous substances or petroleum products has occurred (including no migration of these substances from adjacent areas). The Community Environmental Response Facilitation Act (CERFA) Section 120[h] (4)(iii) and (iv) and amendment to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980(CERCLA, Section 120[h]) was enacted to facilitate the rapid return of uncontaminated properties identified during the BRAC process to the local communities. The parcels that have been classified as Category 1 properties are listed below. Approximately 45.710 acres of land are designated as Category 1 property.

- **AOC 9B Vertical ASTs – Fire Sprinkler Storage Tank**: This tank has only contained water for the fire sprinkler system and the high-pressure water distribution system.
- **AOC 10, Former Solid Waste Pile (Southeast Corner):** No known wastes have been stored at this site. There are no reported releases or spills at this site.
- **AOC 11B, Loading Racks – Fire Sprinkler Pumping Station**: There have been no releases or spills reported at this site.
- **Buildings** 138, 139, and 188.
- **Open Areas:** Open Land, North Railroad Area, South Parking, South Open Storage.

5.1.2 Category 2 Property

Areas in which only release or disposal of petroleum products has occurred are listed below. Approximately 0.026 acres of land are designated as Category 2 property.

- **SWMU 25, Former UST:** The underground storage tank T137 was removed and was given the regulatory status of no further action.
- **AOC 11B, Loading Racks – Fire Sprinkler Pumping Station**: Category 2 based on small lens of petroleum contaminated soil remaining beneath Building 137, associated with UST T137.
- **Building 4, Sump 4-11:** Elevated levels of oil and grease were found in a soil sample below the sump. The potential for migration in the soil is limited because of the relatively low concentration of residual oil and grease that remains in this area and because the area is beneath the concrete foundation of the building and crane support (Norris-Riverbank. 1998j).
- **Building 137:** Based on the removal of UST T137, a small lens of contaminated soil remains beneath Building 137.
- **Building 10, Soil Samples:** Surface samples collected outside Building 10 along the southwest and northwest fenced perimeters indicated levels of oil and grease at 1,400 mg/kg (above the regulatory limits of 1,000 mg/kg). The location of this sample was in an area historically used to store hydrocarbons.

5.1.3 Category 3 Property

Areas in which release, disposal, or migration of hazardous substances has occurred in concentrations that do not require a removal or other remedial response are listed below. Groundwater in certain areas of RBAAP has been shown to have levels of chromium and cyanide that are currently below maximum contaminant levels (MCLs). As a result, the entire area lying above the generalized area defined as contaminated groundwater is designated as Category 3. Approximately 56.012 acres of land are designated as Category 3 property.

- **RBAAP-02, Waste Salt Disposal Pit; Solid Waste Management Unit (SWMU) 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit), Facility 161:** The waste salt disposal pit was never used for its intended purpose, or for any other purpose. Sampling

was not conducted at the site based on this information, and it is considered response complete under the IRP.

- **RBAAP-04, IWTP Effluent Sewer Line Break; SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main):** An unknown amount of treated wastewater leaked from the pipe. Subsequent sampling of the soil in the vicinity of the line break identified no contamination. The IRP investigation has been completed.
- **RBAAP-05, Building 13, Chromium Pretreatment; SWMU 5, Chromium Reduction Unit (Building 13):** The system was installed in 1978 as part of an upgrade to the IWTP, but a groundwater investigation concluded that the major source of chromium contamination was the leaking tanks of the IWTP and that the contamination had occurred prior to the system upgrade. There were no releases, and the site is considered response complete under the IRP.
- **RBAAP-07, Building 13 Phosphoric Acid Spill; AOC 7, Phosphoric Acid Spill Area (1978):** The contaminants of concern identified in the groundwater investigations included chromium and cyanide, neither of which were associated with the phosphoric acid spill. The spill was contained inside the building and to the sewer system. The IRP investigation has been completed.
- **RBAAP-09, NW Storm Reservoir; SWMU 20, NW Storm Reservoir, Facility 127:** Analysis of two sediment samples taken at the reservoir indicated that the reservoir is not a source of groundwater contamination. The IRP investigation has been completed.
- **RBAAP-10, Sewage Treatment Plant/Sludge Beds; SWMU 22, Sanitary Wastewater Settling Ponds:** Sampling at the sludge beds concluded that the area did not contain chromium or cyanide above background levels. The IRP investigation has been completed.
- **SWMU 5, Chromium Reduction Unit (Buildings 13):** The unit consists of a 1,200-gallon stainless steel tank. Sodium metabisulfide was added to chromic acid solution to reduce hexavalent chromium to a trivalent state in a batch process. The wastewater was then piped to the IWTP for further treatment. No evidence was found that any releases occurred from this unit.
- **SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main):** A break in the effluent sewer line that runs from the IWTP to the E/P Ponds occurred in 1972. Sampling was conducted in this area. A status of no further action was applied to this unit.
- **SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit):** The waste salt disposal pit originally was constructed in 1969 for use as an evaporation basin for wash water from a nitrate molten salt annealing process. However, the pit never was used for this or any other purpose. It was determined that no further action was required at the Former Sludge Desiccating Pit.
- **SWMU 20, Northwest Storm Reservoir:** The NW Storm Reservoir is located in the northern portion of the site. The reservoir receives stormwater from most of the installation and from the SE Storm Reservoir. It was determined that no further action was required at the NW Storm Reservoir.

- **SWMU 22, Sanitary Wastewater Settling Ponds:** The sanitary sewage beds (also known as the sanitary wastewater settling ponds) located at the northern portion of the facility were in operation from 1944 to approximately 1987, when the plant was connected to the City of Riverbank sewage system. Investigations did not indicate constituent concentrations above background and no releases were reported from this unit. It was determined that no further action was required at the Sanitary Wastewater Settling Ponds.
- **SWMU 25, Former USTs:** Underground storage tanks 11A, 24, 25, 26, 27, 28, 29, 30, 31, and 32 were removed or closed in-place and were given the regulatory status of no further action.
- **AOC 1, Mortar Line Accumulation Area (Building 4**): Previous investigations at this AOC 1 did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 5, Former Windrowed Area:** This site was used as an area for collection and burning of vegetation growth collected from other areas of the Property. Based on available information, no hazardous materials or wastes were stored or used in this area, and there have been no known spills or releases reported in this area.
- **AOC 7, Phosphoric Acid Spill Area (1978):** The phosphoric acid spill area was in the phosphate coating area, upstairs in the southern end of Building 13. The 100-gallon spill occurred near a process unit for the zinc-phosphate coating of M42 Grenade casings. Because the spill was contained inside the building and in the sewer system, it was determined that no further action was required for this AOC.
- **AOC 9A Vertical ASTs – Fuel Oil Storage Tanks**: These two tanks were originally used for fuel oil storage and were converted to temporary storage of treated groundwater in 1991. Prior to this use, the tanks were cleaned and inspected. The integrity of the associated piping was reported to be good. There have been no reported releases from these tanks.
- **AOC 12, IWCS:** There have been no releases or spills reported at the IWCS. A pipeline video survey and subsurface sampling completed in 2004 indicated that no significant leaks had occurred and that contaminants did not exceed industrial PRGs. No further action was recommended in the Final RFI (CH2M HILL. 2005a). Additional soil sampling may be required when the IWTP undergoes closure.
- **AOC 14, Zinc-Cyanide Wastewater Collection System**: No known releases were reported from the system. A pipeline video survey was attempted, but all entry and exit points along the former line had been sealed. A soil boring advanced along the line in 2004 did not indicate contamination. This result, coupled with the waste line's limited operation (the waste line was in use from 1954 to 1958), suggest the probability of significant releases of contamination is low.
- **AOC 15, Building 13 Temporary Wastewater Line:** There have been no reported releases associated with this wastewater line. The line has been removed from the building and capped on the outside.

- **Structure 54, Substation No. 13: D**uring CH2M HILL's visual site inspection on June 22, 2006, oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 32 ppm and 40 ppm, respectively. Because the integrity of the concrete appeared to be good and there were no nearby unpaved areas, the potential for PCBs to have impacted the soil is considered low. Therefore, further investigation at this site does not appear to be warranted.
- **Structure 96, Substation No. 2:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 8.4 ppm and 2.7 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soils in this unpaved area.
- **Building 117, Former Cooling Tower:** Building 117 was the main cooling tower for the production lines. The cooling water in the tower used Dearborn 533 as a corrosion inhibitor that contained 44.3 percent chromate as CrO_4. The report indicated that 9.8 kg of Dearborn 533 was added per day to the cooling tower water. The chemical might have been used from the time the tower was built in the 1950s through the late 1980s. Based on this information, there is a potential for low concentrations (i.e., below industrial PRGs) of chromate to have impacted the unpaved areas surrounding Building 117 as a result of water droplet drift from the cooling tower operations.
- **Building 145, Substation No. 18:** During CH2M HILL's visual site inspection on June 22, 2006, oil staining was observed on concrete at the base of one transformer with a PCB concentration of approximately 30,000 ppm. Because the integrity of the concrete appeared to be good and there were no nearby unpaved areas, the potential for PCBs to have impacted the soil is considered low. Therefore, further investigation at this site does not appear to be warranted.

5.1.4 Category 4 Property

Areas in which release, disposal, or migration of hazardous substances has occurred, but all removal or other remedial actions necessary to protect human health and the environment have been taken are listed below. Approximately 28.233 acres of land are designated as Category 4 property.

- **RBAAP-08, SE Storm Reservoir; SWMU 21, SE Storm Reservoir, Facility 135:** PCBs were detected at concentrations above industrial PRGs in soil samples taken in 2003. In 2004, approximately 15 cubic yards were excavated and disposed of at an offsite Class I landfill. Confirmation samples were nondetect, and no further action was recommended in the Final RFI.
- **RBAAP-11, E/P Ponds (Stanislaus); SWMU 23, E/P Ponds:** Zinc-contaminated soil was excavated and disposed of during a 1993 removal action. Confirmation samples taken during the removal indicated that remaining soils did not exceed the established action levels. The IRP investigation has been completed.
- **SWMU 21, Southeast Storm Reservoir:** The SE Storm Reservoir is located at the southeastern corner of the production area. This reservoir receives stormwater from the

southeastern area of the facility. Collected stormwater is pumped to the NW Storm Reservoir for ultimate discharge offsite. It was determined that no further action was required at the SE Storm Reservoir.

- **SWMU 24, Industrial Waste Pipe Leak:** Wastewater leaked in 1990 from a pipe that led from the chromium reduction unit in Building 13 to the IWTP. Norris Industries excavated the soil in the area to repair the break, and disposed of the soil through a qualified waste hauler. Confirmation sampling indicated that elevated levels of inorganics were not present, and DTSC agreed that no further action is required at this site.
- **AOC 16, Substation 5 and Storm Drain Discharge Basin:** PCBs were detected in soil at Substation 5 in 2001. In 2003, more samples were taken at this location and at the SE Storm Reservoir, which also revealed PCB contamination. In 2004, approximately 60 cubic yards of gravel and soil were excavated from Substation 5, and 15 cubic yards of soil were removed from the SE Storm Reservoir. Confirmation sampling of Substation 5 indicated that all of the impacted soil had been removed and the excavation was backfilled with clean soil and gravel. Confirmation sampling of the SE Storm Reservoir came back nondetect, and the AOC was recommended for no further action in the Final RFI.

5.1.5 Category 5 Property

Areas in which release, disposal, or migration of hazardous substances has occurred, and removal or other remedial actions are underway. All required actions not yet taken are listed below. Groundwater in certain areas of RBAAP has been shown to have concentrations of chromium and cyanide above MCLs. As a result, the entire area lying above the generalized area defined as contaminated groundwater is designated as category 5. Approximately 37.004 acres of land are designated as Category 5 property.

- **RBAAP-01, Landfill; SWMU 10, Landfill (Southern Portion); SWMU 11, Landfill (Northern Portion)**: The source of groundwater contamination has been depleted at the landfill. The RBAAP has installed a clay cap, which will be maintained, and this site will be subject to long-term management (LTM). The remedy is protective of human health and the environment.
- **RBAAP-03, Contaminated Groundwater:** The expansion of the GWTP is a response action to groundwater contamination from the IWTP. The IWTP is a source of chromium and cyanide contamination in groundwater. The former redwood tanks have been replaced with concrete tanks. LTM and operations of RBAAP-03 will continue and the remedy is protective of human health and the environment.
- **SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility):** This is a storage facility only, and there have been no releases reported at this location.
- **SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area), Building 20:** Although no releases have been reported for this site, this area was suspected as a potential source of contamination. Based on this information, soil and soil gas samples were taken during the Remedial Investigation (RI). Soil results did not indicate

inorganics above background levels, and soil gas results indicated the site was an unlikely source of VOC contamination.

- **SWMU 6, Chromium Reduction Unit (Building 1):** There is no evidence of any release reported for this unit.
- **SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area):** There have been no releases reported at this facility. Rinse water from drums containing hazardous materials are collected in a sump, pumped to an oil/water separator, and pumped to the IWTP for treatment.
- **SWMUs 10 and 11, Landfill (Southern and Northern Portions): T**he landfill underwent formal closure, which was completed in 1996. No further action is required for the landfill.
- **SWMU 13, Incinerator (Building 123):** There have been no reported releases at this facility.
- **SWMU 14, Incinerator (Building 163):** There have been no reported releases at this facility.
- **SWMU 15, Pesticide Storage Area (West of Building 11):** There have been no reported releases at this site. Previous investigations reported no evidence of floor stains at this building.
- **SWMU 16, Pesticide Storage Area (Building 165):** No releases have been reported for this unit. The building is not watertight, and a hose was periodically used to wash the unit out. Recent soil sampling confirmed the presence of chlordane but at levels that did require cleanup. No further action was recommended.
- **SWMU 17, Pesticide Storage Area (Building 170):** The building was equipped with a concrete sump, which was taken offline and removed. A soil sample taken during the removal contained chlordane, and approximately 20 yards of soil were excavated for disposal. The sump was in good condition (without cracks or stains) upon removal and DTSC concurred with a recommendation of no further action at this facility.
- **SWMU 25, Former USTs:** Underground storage tanks 1, 6, 12, 12A, 12B, 15A, 15B, 23, 36, 37, and T77 were removed or closed in-place and were given the regulatory status of no further action.
- **AOC 2, Machine Shop Accumulation Area (Building 9):** Previous investigations did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 3, Vehicle Maintenance Accumulation Area (Building 15):** Previous investigations at this site did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.
- **AOC 4, Grenade Line Accumulation Area:** Previous investigations at this site did not reveal any cracks or staining of the concrete. Based on available information, no known spills or releases have been reported in this area.

- **AOC 8A, Horizontal ASTs – Propane Storage Tanks:** There have been no known releases or spills in this area, and the nature of propane would be to vaporize if a release did occur.
- **AOC 8B, Horizontal ASTs - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System):** Elevated levels of PCBs were detected in the bermed area where the tanks were formerly located. Contaminant levels slightly above the industrial PRGs were detected along the main distribution line, and levels below the PRGs were detected adjacent to the former transformer pads. The transformer oil storage tanks were cleaned, tested, and removed. All transformers associated with this system had been removed previously. The floor of building 85 has been decontaminated (stains of unknown origin were found). The pipelines have been cleaned and encapsulated with cement grout. The 1997 pipeline pressure test concluded that three of the five sections are unlikely to have caused a leak. The other two sections showed evidence of air pressure losses; however, these were small and not indicative of a liquid transformer oil loss. In 2004, over 120 cubic yards of soil were excavated from the bermed area, and confirmation samples were nondetect. Two additional sampling locations were selected to delineate the extent of contamination along the distribution system, and results confirm that significant releases did not occur along the distribution system. No further action was recommended in the Final RCRA Facility Investigation (RFI) (CH2M HILL. 2005a).
- **AOC 11A, Loading Racks – Propane Farm Loading/Unloading**: There are no releases or spills that have been reported at this site.
- **AOC 13, Draw Lube System (Building 178):** Contamination was found in 1993, with elevated oil and grease concentrations in soil samples. Approximately 13 cubic yards were excavated as part of a soil removal action. Following the removal action, a downgradient well was sampled several times over 3 years for oil and grease with all results being nondetect. DTSC concurred that no further action is required for this site.
- **Building 169, Paint Spraying Facility:** Sampling that was conducted at Building 169 included surface soil samples on the north, south, and east building walls. These samples were analyzed for oil and grease, hexavalent chromium, zinc and total chromium, lead, VOCs, SVOCs, and pH. Analytical results indicated elevated levels of benzene, toluene, ethyl benzene, xylenes (up to 905 mg/kg). The EBS completed for this site recommended a Phase II assessment to determine the extent of benzene, toluene, ethyl benzene, and total xylenes (BTEX) contamination.
- **E/P Pond Soil Staining Area:** Oil-saturated soil was observed at the foot of a retaining wall on RBAAP E/P Pond property. The source of the oil stains is apparently a waste oil tank located on Parcel No. 062-008-011. Preliminary soil samples on the RBAAP E/P Pond property indicate indicated levels of motor oil at concentrations of 276,000 mg/kg. The U.S. Army and USACE office in Sacramento is investigating and pursuing clean-up efforts for the site.

5.1.6 Category 6 Property

The areas in which release, disposal, or migration of hazardous substances has occurred, but required remedial actions have not yet been implemented. No category 6 sites were identified.

5.1.7 Category 7 Property

Areas that have not been evaluated or require additional evaluation are listed below. Approximately 5.568 acres of land are designated as Category 7 property.

- **RBAAP-001-R-01, Former Pistol Range:** An interviewee mentioned that the levies surrounding the reservoir, used as a backstop for this former range, were torn down in 1980 and reconstructed. The Historical Records Review indicated that there is potential for the presence of nitrocellulose (NC), nitroglycerine (NG), dinitrotoluene (DNT), lead styphnate, barium nitrate, antimony sulfide, aluminum powder, pentaerythritoltetranitrate (PETN), copper, zinc, lead, and iron at the firing line, and copper, zinc, iron, lead, and antimony to remain at this site.
- **RBAAP-06, IWTP H2SO4 Spill; AOC 6, Sulfuric Acid Spill Area (1956):** Contamination levels of sulfuric acid that would adversely impact human health or the environment were not found in the IWTP area. The IRP investigation has been completed. This site is located within the boundary of SWMU 1.
- **SWMU 1, IWTP:** The IWTP is a source of chromium and cyanide contamination in groundwater. The former redwood tanks that leaked have been replaced with concrete tanks. The entire IWTP area is now covered with impermeable concrete or asphalt. Concrete drainage trenches capture spills and overflow and then drain to a secondary containment sump. A limited soil investigation was performed in the IWTP consisting of two soil borings. Additional characterization of the soil is required at the site.
- **SWMU 4, Drum Staging Area (at the IWTP):** Past spillage of drum contents consisting of various wastes has occurred at this site onto a concrete area with an epoxy sealant. There is no indication that spillage has penetrated through the impermeable surface. No further action was recommended, with DTSC concurrence. This site is located within the boundary of SWMU 1.
- **SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration [UF] Unit):** There have been no releases reported at this unit. Previous investigations reported no evidence of spills outside the containment area. A small collection sump at the unit was steam cleaned and visually inspected for cracks or holes in the concrete. The integrity of the sump was reported to be in good condition. This site is located within the boundary of SWMU 1.
- **SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank):** There have been no releases reported for the current 6,000-gallon waste oil tank. Previous investigations reported that no evidence of leaks from the former 30,000-gallon waste oil tank were observed at the time of removal. This site is located within the boundary of SWMU 1.
- **SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks**: These neutralizing tanks were reported to have been also used for waste oil storage. Consequently, these tanks

were also given the designation of SWMU 8. Previous investigations reported no evidence that a release occurred from this unit (the cyanide equalization tank and the cyanide reaction tank). This site is located within the boundary of SWMU 1.

- **SWMU 25, Former USTs** Underground storage tanks 22 and 33 were removed or closed in-place and were given the regulatory status of no further actio**n.** These tanks are Category 7 based on their location within a Category 7 building (i.e., Buildings 1 and 6).
- **AOC 6, Sulfuric Acid Spill Area (1956):** The 1956 sulfuric acid spill occurred in the area of the sulfuric acid feed system adjacent to the redwood equalization tanks. This is north of Building 173, next to the existing 80-foot clarifier. The sulfuric acid spill was reportedly 500 gallons of concentrated sulfuric acid. Based on investigations in this area, it was determined that no further action was required for this AOC. This site is located within the boundary of SWMU 1.
- **Building 6, Zinc Plater Cyanide Sump:** Upon removal of the Zinc Plater Cyanide sump, the soil beneath the concrete sump was investigated for possible contamination. Results of the investigation indicated that the soil was contaminated with cyanide and zinc. The walls and floor of the sump and 30 cubic yards of soil were excavated in 1997 and confirmatory samples collected. Results of the confirmatory sampling indicated that cyanide levels were non-detect, and zinc levels were found to be consistent with background levels. This feature is Category 7 based on its location within a Category 7 building (i.e., Building 6).
- **Building 11, Paint and Oil Storage:** Soil samples revealed motor oil in two samples taken from the south side of the building at 11 and 47 mg/kg. Aroclor-1260 was identified in all five sample results, in concentrations ranging from 0.4 mg/kg to 1 mg/kg (above the Industrial PRG of 0.74 mg/kg).
- **Buildings 1, 6, and 8, Production Area Sumps and Pits:** Pits and sumps associated with the production line equipment and presses are located inside Buildings 1, 6, and 8 remain in place and have not been investigated for possible cracks and/or potential soil contamination. Based on information from previous investigations that have been performed on former pits and sumps (e.g., Sump 4-11 in Building 4 and the Zinc Plater Sump in Building 6), there is a potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
- **Building 8, Production Line – Press Room and 4500 Ton Press Pit:** An investigation of this pit showed no detectible evidence of cracks or avenues of conveyance for the migration of oil to underlying soils. The report prepared for this pit determined that no additional investigation was warranted. The Press Room and 4500 Ton Press Pit are located within Building 8 which is Category 7 due to other pits and sumps that have not been investigated.
- **Building 12, Boiler House:** Oil and grease were found in two near-surface soil samples at concentrations of 660 mg/kg and 410 mg/kg. Arsenic, barium, chromium, cobalt, copper, lead, molybdenum, nickel, vanadium, and zinc were present in concentrations consistent with background levels, with the exception of one sample for chromium (144 mg/kg) and one sample for lead (215 mg/kg).

- **Structure 95, Substation No. 1:** Oil staining was observed on the concrete at the base of one transformer with a PCB concentration of 106 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 97, Substation No. 3:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 64 ppm and 33 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 101, Substation Spare:** Oil staining was observed on the concrete at the base of one inactive transformer with an unknown PCB concentration during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 109, Main Transformer Substations No. 2 and 3:** Oil staining was observed on the concrete at the base of transformers with an unknown PCB concentration during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to be in good condition. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area.
- **Structure 145, Substation No. 17:** Oil staining was observed on the concrete at the base of two transformers with PCB concentrations of 28 ppm and 134 ppm during CH2M HILL's visual site inspection on June 22, 2006. The integrity of the concrete pad appeared to indicate minor cracking. A gravel area surrounds the concrete pad. Based on these observations, there is a potential for PCBs to have impacted the soil in this unpaved area. Additionally, because of the cracking observed in the concrete pad, there is a potential for the PCBs to have impacted the soil beneath the concrete pad.

TABLE 5-1
Summary of Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Installation Restoration Program (IRP) or Cleanup Sites
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Site or Area Where Release or Disposal of CERCLA Hazardous Substances or Petroleum Products Occurred	Comments	Was Release or Disposal in Excess of the CERCLA RQ (40 CFR 302.4)?	Reference
RBAAP-01, Landfill; SWMU 10, Landfill (Southern Portion); SWMU 11, Landfill (Northern Portion)	Disposal trenches and surface disturbance, capped, long term monitoring. The site was addressed under 1994 ROD as a source of cyanide contamination in groundwater.	Unknown	USAEC, 2005

TABLE 5-1
Summary of Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Installation Restoration Program (IRP) or Cleanup Sites
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Site or Area Where Release or Disposal of CERCLA Hazardous Substances or Petroleum Products Occurred	Comments	Was Release or Disposal in Excess of the CERCLA RQ (40 CFR 302.4)?	Reference
RBAAP-03 Groundwater Contamination; SWMU 1, IWTP	Remedial action for IWTP. Long-term monitoring and operations. The site was addressed under 1994 ROD (U.S. Army Environmental Center (USAEC). 1994) to address chromium and cyanide contamination in groundwater (source of chromium was the old IWTP).	Unknown	USAEC, 2005
RBAAP-04, IWTP Effluent Sewer Line Break; SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main)	PA completed 1980, RC as of June 1993. 1994 ROD determined NFA.	Unknown	USAEC, 2005
RBAAP-06, IWTP H2SO4 Spill; AOC 6; Sulfuric Acid Spill (1956)	PA completed 1980, RC as of June 1993. 1994 ROD determined NFA.	Unknown	USAEC, 2005
RBAAP-07, Building 13 Phosphate Spill; AOC 7, Phosphoric Acid Spill Area (1978)	PA completed 1980, RC as of June 1993. 1994 ROD determined NFA.	Unknown	USAEC, 2005
RBAAP-10, Sewage Treatment Plant/Sludge Beds; SWMU 22, Sanitary Wastewater Settling Ponds	PA completed 1980, RC as of June 1993. 1994 ROD determined NFA.	Unknown	USAEC, 2005
RBAAP-11, Percolation/Evaporation Ponds (Stanislaus); SWMU 23, E/P Ponds	PA Complete 1980, RC as of December 1993. 1994 ROD determined NFA.	Unknown	USAEC, 2005
SWMU 4, Drum Staging Area (at the IWTP)	Soil samples indicated nothing above background. NFA as of June 1996.	Unknown	CH2M HILL, 2002
SWMU 16, Pesticide Storage Area (Building 165)	Chlordane found in soil, based on recent sampling, NFA recommended in 2005.	Unknown	CH2M HILL, 2005
SWMU 17, Pesticide Storage Area (Building 170)	Chlordane found in soil, sump and soil excavated, NFA as of June 1996.	Unknown	CH2M HILL, 2002
SWMU 24, Industrial Waste Pipe Leak	Soil was excavated, NFA.	Unknown	CH2M HILL, 2002
AOC 8B, Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)	Contaminated soil was excavated, NFA recommended in 2005.	Unknown	CH2M HILL, 2005

TABLE 5-1
Summary of Comprehensive Environment Response, Compensation, and Liability Act (CERCLA), Installation Restoration Program (IRP) or Cleanup Sites
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Site or Area Where Release or Disposal of CERCLA Hazardous Substances or Petroleum Products Occurred	Comments	Was Release or Disposal in Excess of the CERCLA RQ (40 CFR 302.4)?	Reference
AOC 12, Industrial Wastewater Collection System	Latest sampling did not indicate contaminants above PRGs, NFA at this time recommended in 2005.	Unknown	CH2M HILL, 2005
AOC 13, Draw Lube System (Building 178)	Contaminated soil was excavated, NFA as of June 1996.	Unknown	CH2M HILL, 2002
AOC 16, Substation 5 and Storm Drain Discharge Basin	Contaminated soil was excavated, NFA recommended in 2005.	Unknown	CH2M HILL, 2005

Notes: RC – Response Complete, PA – Preliminary Assessment, NFA – No Further Action

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
1	N/A	RBAAP-01, Landfill	5	V								5.52	A3	Category 5 based on terms of the ROD specifying Long Term Maintenance (LTM) until 2015.
2	161	RBAAP-02, Waste Salt Disposal Pit	3	A								0.47	B3	Category 3 based on groundwater contamination currently present but below MCLs. No Further Action (NFA) status based on investigation results.
3	N/A	RBAAP-03, Groundwater Contamination	5	V								1.76	B5	Category 5 based on continuing LTM and operations of the GWTS until 2023.
4	N/A	RBAAP-04, IWTP Effluent Sewer Line Break	3	V								0.71	A2	Category 3 based on investigation results. NFA status based on investigation results.
5	13	RBAAP-05, Building 13, Chromium Pretreatment	3	A								0.09	D7	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
6	N/A	RBAAP-06, IWTP H2SO4 Spill	7	V								0.05	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
7	13	RBAAP-07, Building 13 Phosphate Spill	3	V								0.09	D7	Category 3 based on investigation results. NFA status.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

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Summary of Environmental Condition of Property Findings
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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
8	135	RBAAP-08, Southeast Storm Reservoir	4	R								0.39	A6	Category 4 based on investigation results. NFA status.
9	127	RBAAP-09, Northwest Storm Reservoir	3	V								1.55	D2	Category 3 based on investigation results. NFA status.
10	42	RBAAP-10, Sewage Treatment Plant/Sludge Beds	3	V								2.21	C2	Category 3 based on investigation results. NFA status.
11	N/A	RBAAP-11, Percolation/ Evaporation Ponds (Stanislaus)	4	R								25.87	N/A	Category 4 based on investigation results. NFA status.
12	N/A	RBAAP-001-R-01, Former Pistol Range	7				A				S	0.35	E2	Category 7 based on potential for metals contamination in soil.
13	IWTP Area	SWMU 1, Industrial Wastewater Treatment Plant (IWTP)	7	V								1.60	B5	Category 7 based on potential for contamination in soil.
14	174	SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility)	5	V								0.14	B4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
15	20	SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area)	5	S								0.18	A5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.

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16	N/A	SWMU 4, Drum Staging Area (at the IWTP)	7	S								0.05	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
17	13	SWMU 5, Chromium Reduction Unit (Building 13)	3	S								0.06	D7	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
18	1	SWMU 6, Chromium Reduction Unit (Building 1)	5	S								0.01	C5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
19	N/A	SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultra Filtration Unit)	7	S								0.02	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
20	N/A	SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank)	7	A								0.02	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
21	177	SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area)	5	V								0.03	C5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
22	N/A	SWMU 10, Landfill (Southern Portion)	5	V								0.50	A4	Category 5 based on investigation results. NFA status.
23	N/A	SWMU 11, Landfill (Northern Portion)	5	V								1.88	A3	Category 5 based on investigation results. NFA status.
24	N/A	SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main)	3	V								0.65	A2	Category 3 based on investigation results. NFA status.
25	123	SWMU 13, Incinerator (Building 123)	5	S								0.01	B4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
26	163	SWMU 14, Incinerator (Building 163)	5	S								0.01	D5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
27	N/A	SWMU 15, Pesticide Storage Area (West of Building 11)	5	S								0.02	A5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.

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Summary of Environmental Condition of Property Findings
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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
28	165	SWMU 16, Pesticide Storage Area (Building 165)	5	V								0.02	D4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
29	170	SWMU 17, Pesticide Storage Area (Building 170)	5	R								0.06	A4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
30	161	SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit)	3	A								0.39	B3	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
31	N/A	SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks	7	S								0.02	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
32	127	SWMU 20, Northwest Storm Reservoir	3	V								1.40	D2	Category 3 based on investigation results. NFA status.
33	135	SWMU 21, Southeast Storm Reservoir	4	R								0.32	A6	Category 4 based on investigation results. NFA status.
34	42	SWMU 22, Sanitary Wastewater Settling Ponds	3	V								2.01	C2	

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
35	N/A	SWMU 23, E/P Ponds	4	R								23.96	N/A	Category 4 based on investigation results. NFA status.
36	N/A	SWMU 24, Industrial Waste Pipe Leak	4	R								0.02	D6	Category 4 based on investigation results. NFA status.
37	137	SWMU 25, Former Underground Storage Tank T137	2		V							N/A	A7	The underground storage tank T137 was removed. NFA status based on investigation results.
37	2, 3, 4, 5, 6	SWMU 25, Former Underground Storage Tanks 11A, 24, 25, 26, 27, 28, 29, 30, 31, 32	3	V	V							N/A	A6, C6,	Category 3 based on groundwater contamination currently present but below MCLs. Tanks 11A, 24, 25, 26, 27, 28, 29, 30, 31, and 32 were removed or closed in-place. NFA status based on investigation results.
37	1, 7, 12, 15, 77, 170	SWMU 25, Former Underground Storage Tanks 1, 6, 12, 12A, 12B,15A,15B, 23, 36, 37, T77	5	V	V							N/A	A4, A5, C5 D5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results. Underground storage tanks 1, 6, 12, 12A, 12B, 15A, 15B, 23, 36, 37, and T77 were removed or closed in-place. NFA status based on investigation results.

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
37	1, 6,	SWMU 25, Former Underground Storage Tanks 22, 33	7	V								N/A	C6	Category 7 based on location within a Category 7 building. Underground storage tanks 22 and 33 were removed or closed in-place. NFA status based on investigation results.
38	4	AOC 1, Mortar Line Accumulation Area (Building 4)	3	S								0.04	D6	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
39	9	AOC 2, Machine Shop Accumulation Area (Building 9)	5	S								0.06	D4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
40	15	AOC 3, Vehicle Maintenance Accumulation Area (Building 15)	5	S								0.02	D5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
41	N/A	AOC 4, Grenade Line Accumulation Area	5	S								0.03	D5	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
42	N/A	AOC 5, Former Windrowed Area	3	S								0.97	D3	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
43	N/A	AOC 6, Sulfuric Acid Spill Area (1956)	7	V								0.03	B5	Category 7 based on location within SMWU 1 boundary. NFA status based on investigation results.
44	13	AOC 7, Phosphoric Acid Spill Area (1978)	3	V								0.03	D7	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
45	75	AOC 8A, Horizontal Aboveground Storage Tanks - Propane Storage Tanks	5	A								0.32	B4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
46	85	AOC 8B, Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)	5	R								0.66	D6	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
47	76	AOC 9A, Vertical Aboveground Storage Tanks – Fuel Oil Storage Tanks	3	S								0.07	A4	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
48	139	AOC 9B, Vertical Aboveground Storage Tanks - Fire Sprinkler Storage Tank	1	A								0.08	A7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination.
49	N/A	AOC 10, Former Solid Waste Pile (Southeast Corner)	1	A								0.44	A7	No known wastes ever were stored at this area, and no known releases or spills occurred. Does not fall within the Area of Groundwater contamination.
50	125, 126	AOC 11A, Loading Racks – Propane Farm Loading/Unloading	5	S								0.02	C4	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
51	137	AOC 11B, Loading Racks – Fire Sprinkler Pumping Station	2	A								0.03	A7	Category 2 based on small lens of petroleum contaminated soil remaining beneath Building 137, associated with UST T137.

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
52	Prod. Area and IWTP	AOC 12, Industrial Wastewater Collection System	3	V									B6	Category 3 based on investigation results. NFA status.
53	178	AOC 13, Draw Lube System (Building 178)	5	R								0.01	D6	Category 5 based on groundwater contamination currently exceeding MCLs. NFA status based on investigation results.
54	Prod. Area and IWTP	AOC 14, Zinc-Cyanide Wastewater Collection System	3	S									B6	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
55	13	AOC 15, Building 13 Temporary Wastewater Line	3	S									D6	Category 3 based on groundwater contamination currently present but below MCLs. NFA status based on investigation results.
56	53	AOC 16, Substation 5 and Storm Drain Discharge Basin	4	R								0.27	A6	Category 4 based on investigation results. NFA status.
1001	1	Production Line	7				V	V		B		0.85	C6	Category 7 based on the potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.

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1002	2	Production Line	3				V	V				0.86	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1003	3	Production Line	3			N	V	V				0.86	C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-1	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-2	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-3	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-6	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-7	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.

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	3	Sump 3-8	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-9	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-10	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	3	Sump 3-11	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
1004	4	Production Line	3				V					0.85	C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-1	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-2	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.

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	4	Sump 4-3	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-4	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-5	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-6	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-7	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-8	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-9	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.

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	4	Sump 4-10	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	4	Sump 4-11	3										D6	Category 3 based on groundwater contamination currently present but below MCLs.
1005	5	Production Line	3				V	V				0.86	C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-1	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-2	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-3	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-5	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.

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	5	Sump 5-6	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-8	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-10	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
	5	Sump 5-11	3										C6	Category 3 based on groundwater contamination currently present but below MCLs.
1006	6	Production Line	7	V			V	V				0.90	C6	Category 7 based on potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
	6	Zinc Plater Cyanide Sump	7	V									C6	Category 7 based on location within Building 7. Building 7 is Category 7 based on the potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.

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1007	7	Production Line	5				V	V				1.31	C5	Category 5 based on groundwater contamination currently exceeding MCLs.
1008	8	Production Line – Press Room	7		V	N	V					1.13	A6	Category 7 based on location within Building 7. Building 8 is Category 7 based on the potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
	8	Production Line Sump	7		V								A6	Category 7 based on potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
	8	4500 Ton Press Pit	7										A6	Category 7 based on location within Building 7. Building 8 is Category 7 based on the potential for the soil beneath the remaining sumps or pits to be impacted by hazardous substances.
1009	9	Machine Shop/Offices	5	V	V		V			B		0.92	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1010	10	Crib/Warehouse/Offices, Former National Guard	5				V					0.48	C5	Category 5 based on groundwater contamination currently exceeding MCLs.

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1011	11	Paint and Oil Storage, Oil Recycling and Transport See EBS 1998	7	V	V	V	V					0.22	A5	Category 7 based on soil samples that identified Aroclor-1260 at concentrations ranging from 0.4 mg/kg to 1 mg/kg (above the Industrial PRG of 0.74 mg/kg).
1012	12	Boiler House	7	V	V	N	V	V				0.16	A5	Category 7 based on soil samples that identified chromium in one sample at a concentration of 144 mg/kg (above the industrial PRG of 64 mg/kg).
1013	13	Production Line	5				V			B		0.08	D6	Category 5 based on groundwater contamination currently exceeding MCLs.
1014	14	Dispensary/Locker Rooms, Security Office	5		V		V			B		0.28	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1015	15	Equipment Maintenance (Vehicles)	5	V	V		V					0.08	D5	Category 5 based on groundwater contamination currently exceeding MCLs
	15	Sump	5										D5	Category 5 based on groundwater contamination currently exceeding MCLs
1016	16	Offices and Gate House	5				S			B		0.11	E5	Category 5 based on groundwater contamination currently exceeding MCLs
1017	17	Administrative Offices	5				S	V				0.20	E5	Category 5 based on groundwater contamination currently exceeding MCLs

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Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
1018	18	Cafeteria and Offices	5				A					0.07	E5	Category 5 based on groundwater contamination currently exceeding MCLs
1019	19	Production Restrooms	3				V					0.01	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1020	20	Empty Barrel Storage (No longer present)	5	S			A					0.18	A5	Category 5 based on groundwater contamination currently exceeding MCLs
1021	21	Plant Cafeteria	3				V					0.16	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1022	22	Aisleway and Office	3				V					0.05	C6	Category 3 based on groundwater contamination currently present but below MCLs.
	22A	Training Room	3				V						C6	Category 3 based on groundwater contamination currently present but below MCLs.
1023	23	Aisleway and Office	3				V					0.06	C6	Category 3 based on groundwater contamination currently present but below MCLs.

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1024	24	Aisleway and Gage Laboratory	3				V					0.05	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1025	25	Aisleway and Acctg Storage Area	3				V	V				0.06	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1026	26	Aisleway and Instrument Storage Area	3				V					0.05	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1027	27	Restroom and Passage	3				S					0.04	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1028	28	Restroom and Passage	3				S					0.03	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1029	29	Restroom	3				S	V				0.03	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1030	30	Restroom and Passage	3				S	V				0.03	C6	Category 3 based on groundwater contamination currently present but below MCLs.

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1031	31	Restroom and Passage	3				S					0.03	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1032	32	Restroom and Passage	3				S	V				0.03	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1033	33	Passage and Distribution PNL – S.S.No. 1	5				S	V				0.06	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1034	34	Passage and Office	5				S					0.05	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1035	35	Passage and Emerg. Gen No. 7	3				S	V				0.06	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1036	36	Passage	3				S					0.03	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1037	37	Passage and Office	3				S	V				0.05	D6	Category 3 based on groundwater contamination currently present but below MCLs.

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1038	38	Passage	3				S					0.05	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1039	39	Central Salvage Area	3				S					0.04	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1042	42	Sewage Disposal Plant	3	V			A					0.01	C3	Category 3 based on groundwater contamination currently present but below MCLs.
1043	43	Acid Neut and Cyanide Destruction Laboratory	7				V					0.07	B5	Category 7 based on location within SMWU 1 boundary.
1044	44	Acid Neut and Cyanide Destruction	7				A					0.28	B5	Category 7 based on location within SMWU 1 boundary.
1045	45	Production Line	3				A					0.17	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1046	46	Production Line	3				V					0.17	B6	Category 3 based on groundwater contamination currently present but below MCLs.

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1047	47	Production Line and Emerg. Gen No. 2 (Generator Removed)	3				V					0.16	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1048	48	Production Line and Office	3				V					0.18	B6	Category 3 based on groundwater contamination currently present but below MCLs.
	48A	Former Office	3				A						B6	Category 3 based on groundwater contamination currently present but below MCLs.
1049	49	Production Line and Emerg. Gen No. 4 and 5	3				V					0.23	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1050	50	Production Line and Emerg. Gen No. 6	3				S					0.22	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1051	51	Laboratory, Chemical and Metallurgical	3				V					0.07	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1052	52	Transformer Area – Substation No. 10	3				S					0.01	A6	Category 3 based on groundwater contamination currently present but below MCLs.

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1053	53	Transformer Area – Substation No. 5	4				S					0.03	A5	Category 4 based on investigation results. NFA status.
1054	54	Transformer Area – Substation No. 13	3			V	S					0.03	A6	Category 3 based on groundwater contamination currently present but below MCLs.
1055	55	Transformer Area – Substation No. 9	3				S					0.05	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1056	56	Transformer Area – Substation No. 7	3				S					0.02	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1057	57	Transformer Area – Substation No. 12	3				S	V				0.01	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1058	58	Transformer Area – Substation No. 8	3				S					0.01	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1059	59	Transformer Area –Substation No. 6	3				S					0.02	C6	Category 3 based on groundwater contamination currently present but below MCLs.

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1060	60	Transformer Area – Substation No. 11	3				S					0.02	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1061	61	Cooling Tower Control House	3				S					0.01	A7	Category 3 based on groundwater contamination currently present but below MCLs.
1062	62	Facilities Eng. Store House	3				S					0.01		Category 3 based on groundwater contamination currently present but below MCLs.
1064	64	Fuel Oil Unloading Serv. Bldg.	5				A					0.01	A4	Category 5 based on groundwater contamination currently exceeding MCLs
1073	73	Hose Cart House No. 1, Storage	7				A					0.01	B5	Category 7 based on location within SMWU 1 boundary.
1074	74	Compressor House, Propane Stor. Area	3		V							0.03	B4	Category 3 based on groundwater contamination currently present but below MCLs.
1075	75	Propane Storage Area	5	V			A						B4	Category 5 based on groundwater contamination currently exceeding MCLs
1076	76	Fuel Oil Storage Area, Water Tank	5				A					0.04	A4	Category 5 based on groundwater contamination currently exceeding MCLs.

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1077	77	Sulfuric Acid and Caustic Soda Storage	7				A					0.02	A5	Category 7 based on location within SMWU 1 boundary.
1078	78	Oil Room Building	3				V					0.03	B6	Category 3 based on groundwater contamination currently present but below MCLs n.
1079	79	Scale House (Demolished)	5										C4	Category 5 based on groundwater contamination currently exceeding MCLs
1080	80	Varnish Stripping Building	3				V					0.05	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1081	81	Production Line	3				S					0.25	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1082	82	Tocco Generator and Emerg. Gen No. 9	3				A					0.04	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1083	83	Plating Rack Repair Area	3				V					0.01	D6	Category 3 based on groundwater contamination currently present but below MCLs.

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1084	84	Loading Dock with Canopy	3				A							Category 3 based on groundwater contamination currently present but below MCLs.
1085	85	Transformer Oil Pump Building	5				A					0.01	E6	Category 5 based on groundwater contamination currently exceeding MCLs
1087	87	Storage Building	5				A					0.01	D5	Category 5 based on groundwater contamination currently exceeding MCLs
1095	95	Transformer Area – Substation No. 1	7			V	A					0.01	D5	Category 7 based on potential for PCBs to have impacted the soil adjacent from the transformer (PCB concentration of 106 ppm).
1096	96	Transformer Area – Substation No. 2	3			V	A					0.01	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1097	97	Transformer Area – Substation No. 3	7			V	A					0.02	A5	Category 7 based on potential for PCBs to have impacted the soil adjacent from two transformers (PCB concentrations of 64 ppm and 33 ppm).
1098	98	Transformer Area – Substation No. 4	5				A					0.02	C6	Category 5 based on groundwater contamination currently exceeding MCLs

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1099	99	Transformer Area – Substation No. 14	5				A					0.02	C5	Category 5 based on groundwater contamination currently exceeding MCLs
1100	100	Transformer Area – Substation No. 15	3				A					0.02	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1101	101	Transformer Area – Substation Spare	7				A					0.01	D4	Category 7 based on potential for PCBs to have impacted the soil adjacent from two transformers.
1102	102	Water Well No. 1	5	V			A					0.01	D5	Category 5 based on groundwater contamination currently exceeding MCLs
1103	103	Water Well No. 2	3				A					0.01	N/A	Category 3 based on groundwater contamination currently present but below MCLs.
1104	104	Water Well No. 3	5				A					0.01	A4	Category 5 based on groundwater contamination currently exceeding MCLs
1105	105	Water Well No. 4	4				A					0.01	E6	Category 4 based on location with AOC 8B.
1106	106	Water Well No. 5	3	V			A					0.01	C7	Category 3 based on groundwater contamination currently present but below MCLs.

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1107	107	Covered Passage	5				S					0.04	C6	Category 5 based on groundwater contamination currently exceeding MCLs
1108	108	Main Transformer Subst. No. 1	3			S	A					0.12	E6	Category 3 based on groundwater contamination currently present but below MCLs.
1109	109	Main Transformer Subst. No. 2 and 3	7			S	A					0.11	E6	Category 7 based on potential for PCBs to have impacted the soil adjacent from two transformers.
1110	110	Terminal House	4				A					0.01	D6	Category 4 based on location with AOC 8B.
1114	114	Tank, Water, Storage, 100,000 Gallons	5	N	N	N	A		N		N	0.02	D5	Category 5 based on groundwater contamination currently exceeding MCLs
1117	117	Cooling Tower, Main Plant	3	S			A					0.06	B7	Category 3 based on groundwater contamination currently present but below MCLs.
1118	118	Cooling Tower, Boiler House	5				A					0.01	A5	Category 5 based on groundwater contamination currently exceeding MCLs
1119	119	Cooling Tower, Steel Plant	7				A					0.01	B5	Category 7 based on location within SMWU 1 boundary.

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1120	120	Steel Plant and Emerg. Gen. No. 10	5	V	V		V			B		1.31	C5	Category 5 based on groundwater contamination currently exceeding MCLs
1121	121	Loading Dock, Steel Plant	5				A					0.20	C4	Category 5 based on groundwater contamination currently exceeding MCLs
1122	122	Crane Runway and Steel Storage Area	5				S					0.45	C4	Category 5 based on groundwater contamination currently exceeding MCLs
1125	125	Unloading Station No. 1 – Propane	5	V								0.01	C4	Category 5 based on groundwater contamination currently exceeding MCLs.
1126	126	Unloading Station No. 1 – Propane	5	V								0.01	C4	Category 5 based on groundwater contamination currently exceeding MCLs.
1127	127	Storage Sewage Disposal Plant	3	V			A					1.55	E2	Category 3 based on groundwater contamination currently present but below MCLs.
1129	129	Process Waste Water Percolation Beds	3				A					25.87	C2	Category 3 based on groundwater contamination currently present but below MCLs.
1130	130	Garage	5		V		A					0.06	D5	Category 5 based on groundwater contamination currently exceeding MCLs.

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1131	131	Process Water Tank and System	3				A						A7	Category 3 based on groundwater contamination currently present but below MCLs.
1133	133	Aisleway from Bldg. 10 to Line 7	5				V					0.06	B5	Category 5 based on groundwater contamination currently exceeding MCLs.
1134	134	Restroom at Line 7	5				S					0.02	C6	Category 5 based on groundwater contamination currently exceeding MCLs.
1135	135	Storm Drain Station	4	R			A					0.24	A6	Category 4 based on investigation results. NFA status.
1137	137	Pump House – Sprinkler System	2				A					0.03	A7	Category 2 based on small lens of petroleum contaminated soil remaining beneath Building 137, associated with UST T137
1138	138	Transformer Substation No. 16	1			A	A					0.01	A7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination.
1139	139	Tank, Water, Storage, 1,000,000 Gallons	1				A					0.08	A7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination.

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1140	140	Flagpole	5				A					N/A	E5	Category 5 based on groundwater contamination currently exceeding MCLs.
1145	145	Transformer Substation No. 17	7			V	S					0.03	B5	Category 7 based on potential for PCBs to have impacted the soil adjacent from two transformers (PCB concentrations of 28 ppm and 134 ppm).
1146	146	Transformer Substation No. 18	3			V	S					0.02	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1147	147	Transformer Substation No. 19	3				S					0.02	D6	Category 3 based on groundwater contamination. currently present but below MCLs
1148	148	Cooling Tower, Building 13	3				A					0.01	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1150	150	Compressor, Air	5				A					0.01	D6	Category 5 based on groundwater contamination currently exceeding MCLs.
1151	151	Compressor, Air	5		V		A					0.01	B5	Category 5 based on groundwater contamination currently exceeding MCLs.

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1152	152	Motor Generator Housing	5		V		S					0.02	B5	Category 5 based on groundwater contamination currently exceeding MCLs.
1154	154	Compressor, Air	5		V		A					0.01	C5	Category 5 based on groundwater contamination currently exceeding MCLs.
1155	155	Compressor, Air	3		V		A					0.01	A6	Category 3 based on groundwater contamination currently present but below MCLs.
1156	156	Production Building – Heat Treat	3				A					0.12	B6	Category 3 based on groundwater contamination currently present but below MCLs.
1157	157	Compressor, Air	3				A					0.02	C6	Category 3 based on groundwater contamination currently present but below MCLs.
1158	158	Water Well No. 6	3	V			A					0.01	B7	Category 3 based on groundwater contamination currently present but below MCLs.
1159	159	Sandblast Building	5				A					0.01	A5	Category 5 based on groundwater contamination currently exceeding MCLs.
1160	160	Covered Storage Warehouse	3				V					0.44	C6	Category 3 based on groundwater contamination currently exceeding MCLs.

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1161	161	Sludge Desiccating Pit (Never Used)	3	A			A					0.47	B3	Category 3 based on groundwater contamination currently present but below MCLs.
1162	162	Autodin A.B. Terminal Bldg-Training Rm	5				S			X		0.03	E5	Category 5 based on groundwater contamination currently exceeding MCLs.
1163	163	Incinerator	5	S			S					0.01	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1164	164	Paint Pumping Building	5				V					0.02	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1165	165	Shed, Former Pesticide Storage	5	V								0.01	D4	Category 5 based on groundwater contamination currently exceeding MCLs.
1166	166	Paint Pumping Building	5				A					0.01	D6	Category 5 based on groundwater contamination currently exceeding MCLs.
1167	167	Air Compressor No. 8	5				A					0.01	B4	Category 5 based on groundwater contamination currently exceeding MCLs.
1168	168	Security Lighting Emerg. Generator	3				A							Category 3 based on groundwater contamination currently present but below MCLs.

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1169	169	Paint Spraying Facility	5	V			S					0.02	A4	Category 5 based on groundwater contamination currently exceeding MCLs.
1170	170	Pesticide Facility	5	R			S					0.01	A4	Category 5 based on groundwater contamination currently exceeding MCLs.
1171	171	Austemper Facility – Furnace Room	3				A					0.15	D6	Category 3 based on groundwater contamination currently present but below MCLs.
1172	172	Former Fire Department	5				S			B		0.09	A4	Category 5 based on groundwater contamination currently exceeding MCLs.
1173	173	Environmental Test Facility	7				A					0.02	B5	Category 7 based on location within SMWU 1 boundary.
1174	174	Hazardous Waste Storage Area	5	V			A					0.14	B4	Category 5 based on groundwater contamination currently exceeding MCLs.
1175	175	Generator Building	3				A							Category 3 based on groundwater contamination currently present but below MCLs.
1176	176	Switching Station (Electrical)	3				S							Category 5 based on groundwater contamination currently exceeding MCLs.

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1177	177	Equipment Wash Facility	5	V			A					0.03	C5	Category 5 based on groundwater contamination currently exceeding MCLs.
	177	Sump	5										C5	Category 5 based on groundwater contamination currently exceeding MCLs.
	177	Oil Water Separator	5										C5	Category 5 based on groundwater contamination currently exceeding MCLs.
1178	178	Lubrication System Facility	5				A					0.02	D6	Category 5 based on groundwater contamination currently exceeding MCLs.
1180	180	Chrome Reduction Facility	5				A					0.01	C5	Category 5 based on groundwater contamination currently exceeding MCLs.
1181	181	Phosphate Facility	3				A					0.09	D7	Category 3 based on groundwater contamination currently present but below MCLs.
1182	182	Ground Water Treatment Facility	3	V			A					0.24	B3	Category 3 based on groundwater contamination currently present but below MCLs.
1184	184	Flammable Storage Warehouse	5	V			A						D5	Category 5 based on groundwater contamination currently exceeding MCLs.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
1185	185	Air Compressor Building	3				A							Category 3 based on groundwater contamination currently present but below MCLs.
1186	186	Haz-Bin Storage Containment Structure	5	V			A						B5	Category 5 based on groundwater contamination currently exceeding MCLs.
1187	187	Haz-Bin Storage Containment Structure	5	V			A						D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1188	188	Haz-Bin Storage Containment Structure	1	V			A					0.01	D5	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination.
1189	189	Land Vehicle Fuel Disp Sta Gas/Diesel	5		V								D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1190	190	Land Vehicle Fuel Disp Sta Propane	5	V			A						D5	Category 5 based on groundwater contamination currently exceeding MCLs.
1192	192	Ground Water Treatment Plant Office	3	N	N	N	A		N			0.02	B3	Category 3 based on groundwater contamination currently present but below MCLs.
1193	193	Vehicle Scale	5											Category 5 based on groundwater contamination currently exceeding MCLs.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
1195	195	Transformer Substation No. 20	5			A							C5	Category 5 based on groundwater contamination currently exceeding MCLs.
1196	196	Transformer Substation No. 21	5			A							B5	Category 5 based on groundwater contamination currently exceeding MCLs.
2000		Open Land	3									2.14	E2	Category 3 based on groundwater contamination currently present but below MCLs.
2000		Open Land	1									31.00	A1, B1, C1, D1, E1	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination
2001		North Railroad Area	1									2.12	B2	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination
2002		West Parking	5									6.38	E3	Category 5 based on groundwater contamination currently exceeding MCLs.
2003		South Parking	3									2.24	E7	Category 3 based on groundwater contamination currently present but below MCLs.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
2003		South Parking	1									6.75	E7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination
2004		North Utilities	3									7.50	C3	Category 3 based on groundwater contamination currently present but below MCLs.
2005		West Utilities	5									1.59	D4	Category 5 based on groundwater contamination currently exceeding MCLs.
2006		East Utilities	5									1.28	A4	Category 5 based on groundwater contamination currently exceeding MCLs.
2007		Southeast Utilities	1									3.92	A7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination
2007		Southeast Utilities	3									3.08	A7	Category 3 based on groundwater contamination currently present but below MCLs.
2008		South Utilities	5									1.38	E6	Category 5 based on groundwater contamination currently exceeding MCLs.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
2009		North Open Storage	5									2.40	C3	Category 5 based on groundwater contamination currently exceeding MCLs.
2010		West Open Storage	3									5.93	E3	Category 3 based on groundwater contamination currently present but below MCLs.
2011		Central Storage	5									3.49	C5	Category 5 based on groundwater contamination currently exceeding MCLs.
2012		South Open Storage	1									1.38	B7	No release or disposal of hazardous substances or petroleum products has occurred. Does not fall within the Area of Groundwater contamination
2013		North Warehouse Storage	5									1.40	B4	Category 5 based on groundwater contamination currently exceeding MCLs.
2014		West Warehouse Storage	5									0.22	D5	Category 5 based on groundwater contamination. currently exceeding MCLs
2015		Water Storage	5									0.16	A4	Category 5 based on groundwater contamination currently exceeding MCLs.
2016		South Warehouse Storage	3									3.39	C7	Category 3 based on groundwater contamination currently present but below MCLs.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

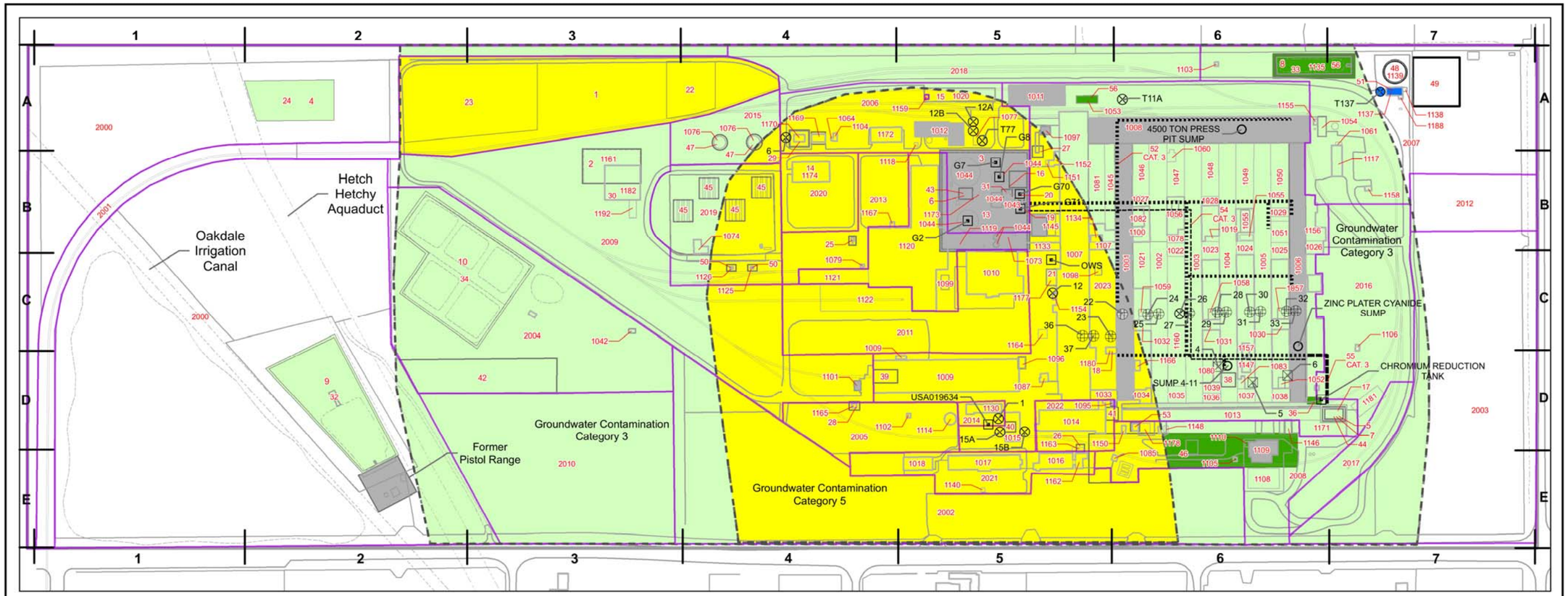
Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
2017		West Railroad Storage	3									0.99	E7	Category 3 based on groundwater contamination currently present but below MCLs.
2018		East Railroad Storage	3									3.34	A4	Category 3 based on groundwater contamination currently present but below MCLs.
2019		Fuel Storage	5									1.31	B4	Category 5 based on groundwater contamination currently exceeding MCLs.
2020		Hazardous Waste Storage	5									1.17	B4	Category 5 based on groundwater contamination currently exceeding MCLs.
2021		Administration Open Area	5									1.43	E5	Category 5 based on groundwater contamination currently exceeding MCLs.
2022		Medical Open Area	5									0.78	D5	Category 5 based on groundwater contamination currently exceeding MCLs.
2023		Production Open Area	5									8.52	C5	Category 5 based on groundwater contamination currently exceeding MCLs.

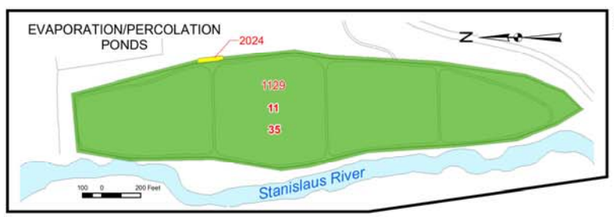
Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.

EXHIBIT 5-2
Summary of Environmental Condition of Property Findings
Environmental Condition of Property Report, Riverbank Army Ammunition Plant – Riverbank, California

Section	Building or Feature No.	Building Name/Area Name	ECP Category	Hazardous Substances	Petroleum	PCBs	Asbestos	Lead	Radiological	Radon	MEC	Acreage	Figure Coordinates	Comments
2024		E/P Ponds Soil Staining Area	5									0.07	N/A	Preliminary soil samples indicated levels of motor oil at concentrations of 276,000 mg/kg. The U.S. Army and USACE are investigating and pursuing clean-up efforts for the site.

Notes: V – Verified; S – Suspected; N – Not Suspected; A – Absent; R – Removed/Remediated; X – Radon measured > 4.0 pCi/L; B – Radon measured < 4.0 pCi/L.





Study Section	Figure Coordinates	Area Name
1	A3	RBAAP-01, Landfill
2	B3	RBAAP-02, Waste Salt Disposal Pit
3	D5	RBAAP-03, Groundwater Contamination
4	A2	RBAAP-04, IWTP Effluent Sewer Line Break
5	D7	RBAAP-05, Building 13, Chromium Pretreatment
6	B5	RBAAP-06, IWTP H2SO4 Spill
7	D7	RBAAP-07, Building 13 Phosphate Spill
8	A6	RBAAP-08, Southeast Storm Reservoir
9	D2	RBAAP-09, Northwest Storm Reservoir
10	C2	RBAAP-10, Sewage Treatment Plant/Sludge Beds
11	N/A	RBAAP-11, Evaporation/Percolation Ponds (Stanislaus)
12	E2	RBAAP-001-R-01, Pistol Range
13	B5	SWMU 1, Industrial Wastewater Treatment Plant (IWTP)
14	B4	SWMU 2, Hazardous Waste Storage Area (Drum Storage Facility)
15	A5	SWMU 3, Empty Drum Storage Area (Railroad Car Off-Loading Area)
16	B5	SWMU 4, Drum Staging Area (at the IWTP)
17	D7	SWMU 5, Chromium Reduction Unit (Building 13)
18	C5	SWMU 6, Chromium Reduction Unit (Building 1)
19	B5	SWMU 7, Coolant Recovery Unit (IWTP) (Hyde Ultrafiltration Unit)
20	B5	SWMU 8, Waste Oil Accumulation Unit (Waste Oil Storage Tank)
21	C5	SWMU 9, Equipment Wash Facility (Building 177 Triple Rinse Area)
22	A4	SWMU 10, Landfill (Southern Portion)
23	A3	SWMU 11, Landfill (Northern Portion)
24	A2	SWMU 12, IWTP Sewer Line Break Area (Effluent Force Main)
25	B4	SWMU 13, Incinerator (Building 123)
26	D5	SWMU 14, Incinerator (Building 163)
27	A5	SWMU 15, Pesticide Storage Area (West of Building 11)
28	D4	SWMU 16, Pesticide Storage Area (Building 165)
29	A4	SWMU 17, Pesticide Storage Area (Building 170)
30	B3	SWMU 18, Former Sludge Desiccating Pit (Waste Salt Disposal Pit)
31	B5	SWMU 19, Waste Zinc-Cyanide Solution Neutralizing Tanks
32	D2	SWMU 20, Northwest Storm Reservoir
33	A6	SWMU 21, Southeast Storm Reservoir
34	C2	SWMU 22, Sanitary Wastewater Settling Ponds
35	N/A	SWMU 23, E/P Ponds
36	D6	SWMU 24, Industrial Waste Pipe Leak
37	N/A	SWMU 25, Underground Storage Tanks
38	D6	AOC 1, Mortar Line Accumulation Area (Building 4)
39	D4	AOC 2, Machine Shop Accumulation Area (Building 9)
40	D5	AOC 3, Vehicle Maintenance Accumulation Area (Building 15)
41	D5	AOC 4, Grenade Line Accumulation Area
42	D3	AOC 5, Former Windrows Area
43	B5	AOC 6, Sulfuric Acid Spill Area (1956)
44	D7	AOC 7, Phosphoric Acid Spill Area (1978)
45	B4	AOC 8A, Horizontal Aboveground Storage Tanks - Propane Storage Tanks
46	D6	AOC 8B, Horizontal Aboveground Storage Tanks - Transformer Oil Storage Tanks (including the Transformer Oil Distribution System)
47	A4	AOC 9A, Vertical Aboveground Storage Tanks - Fuel Oil Storage Tanks
48	A7	AOC 9B, Vertical Aboveground Storage Tanks - Fire Sprinkler Storage Tank
49	A7	AOC 10, Former Solid Waste Pile (Southeast Corner)
50	C4	AOC 11A, Loading Racks - Propane Farm Loading/Unloading
51	A7	AOC 11B, Loading Racks - Fire Sprinkler Pumping Station
52	B6	AOC 12, Industrial Wastewater Collection System
53	D6	AOC 13, Draw Lube System (Building 178)
54	B6	AOC 14, Zinc-Cyanide Wastewater Collection System
55	D6	AOC 15, Building 13 Temporary Wastewater Line
56	A6	AOC 16, Substation 5 and Storm Drain Discharge Basin
1001	C6	Production Line
1002	C6	Production Line
1003	C6	Production Line
1004	C6	Production Line
1005	C6	Production Line
1006	C6	Production Line
1007	C5	Production Line
1008	A6	Production Line - Press Room
1009	D5	Machine Shop/Offices
1010	C5	Crib/Warehouse/Offices, Former National Guard
1011	A5	Paint & Oil Storage, Oil Recycling and Transport
1012	A5	Boiler House
1013	D6	Production Line
1014	D5	Dispensary/Locker Rooms, Security Office
1015	E2	Equipment Maintenance (Vehicles)
1016	E5	Offices & Gate House
1017	E5	Administrative Offices
1018	E5	Cafeteria/ Offices
1019	C6	Production Restrooms
1020	A5	Empty Barrel Storage (No longer present)
1021	C6	Plant Cafeteria
1022	C6	Aisleway & Office
1023	C6	Aisleway & Office
1024	C5	Aisleway & Gage Laboratory
1025	C6	Aisleway & Acctg Storage Area
1026	C6	Aisleway & Instrument Storage Area
1027	B6	Restroom & Passage
1028	B6	Restroom & Passage
1029	B6	Restroom
1030	C6	Restroom & Passage
1031	C6	Restroom & Passage
1032	C6	Restroom & Passage
1033	D6	Passage & Distribution PNL - S.S.#1
1034	D6	Passage & Office
1035	D6	Passage & Emerg. Gen #7
1036	D6	Passage
1037	D6	Passage & Office
1038	D6	Restroom
1039	D6	Central Salvage Area
1042	C3	Sewage Disposal Plant
1043	B5	Acid Neut & Cyanide Destruction Laboratory
1044	B5	Acid Neut & Cyanide Destruction
1045	B6	Production Line
1046	B6	Production Line
1047	B6	Production Line & Emerg. Gen #2 (Generator Removed)
1048	B6	Production Line & Office
1049	B6	Production Line & Emerg. Gen #4 & 5
1050	B6	Production Line & Emerg. Gen #6
1051	B6	Laboratory, Chemical & Metallurgical
1052	A6	Transformer Area - Substation No. 10
1053	A5	Transformer Area - Substation No. 5
1054	A6	Transformer Area - Substation No. 13
1055	B6	Transformer Area - Substation No. 9
1056	B6	Transformer Area - Substation No. 7
1057	C6	Transformer Area - Substation No. 12
1058	C6	Transformer Area - Substation No. 8
1059	C6	Transformer Area -Substation No. 6
1060	B6	Transformer Area - Substation No. 11
1061	A7	Cooling Tower Control House
1062	N/A	Facilities Eng. Store House
1064	A4	Fuel Oil Unloading Serv. Bldg.
1073	B5	Hose Cart House No. 1, Storage
1074	B4	Compressor House, Propane Stor. Area
1075	B4	Propane Storage Area, 75A, 75B, 75C
1076	A4	Fuel Oil Storage Area, Water Tank
1077	A5	Sulfuric Acid & Caustic Soda Storage
1078	B6	Oil Room Building
1079	C4	Scale House (Demolished)
1080	D6	Varnish Stripping Building
1081	B6	Production Line
1082	B6	Tocco Generator & Emerg. Gen No. 9
1083	D6	Plating Rack Repair Area
1084	N/A	Loading Dock with Canopy
1085	E6	Transformer Oil Pump Building
1087	D5	Storage Building
1095	D5	Transformer Area - Substation No. 1
1096	D5	Transformer Area - Substation No. 2
1097	A5	Transformer Area - Substation No. 3
1098	C6	Transformer Area - Substation No. 4
1099	C5	Transformer Area - Substation No. 14
1100	B6	Transformer Area - Substation No. 15
1101	D4	Transformer Area - Substation Spare
1102	D5	Water Well No. 1
1103	N/A	Water Well No. 2
1104	A4	Water Well No. 3
1105	E6	Water Well No. 4
1106	C7	Water Well No. 5
1107	C6	Covered Passage
1108	D5	Main Transformer Subst. No. 1
1109	E6	Main Transformer Subst. No. 2 & 3
1110	D6	Terminal House
1114	D5	Tank, Water, Storage, 100,000 Gallons
1117	B7	Cooling Tower, Main Plant
1118	A5	Cooling Tower, Boiler House
1119	B5	Cooling Tower, Steel Plant
1120	C5	Steel Plant & Emerg. Gen. No. 10
1121	C4	Loading Dock, Steel Plant
1122	C4	Crane Runway & Steel Storage Area
1125	C4	Unloading Station No. 1 - Propane
1126	C4	Unloading Station No. 1 - Propane
1127	E2	Storage Sewage Disposal Plant
1129	C2	Process Waste Water Percolation Beds
1130	D5	Garage
1131	A7	Process Water Tank and System
1133	B5	Aisleway from Bldg. 10 to Line 7
1134	C6	Restroom at Line 7
1135	A6	Storm Drain Station
1137	A7	Pump House - Sprinkler System
1138	A7	Transformer Substation No. 16
1139	A7	Tank, Water, Storage, 1,000,000 Gallons
1140	E5	Flagpole
1145	B5	Transformer Substation No. 17
1146	D6	Transformer Substation No. 18
1147	D6	Transformer Substation No. 19
1148	D6	Cooling Tower, Building 13
1150	D6	Compressor, Air
1151	B5	Compressor, Air
1152	B5	Motor Generator Housing
1154	C5	Compressor, Air
1155	A6	Compressor, Air
1156	B6	Production Building - Heat Treat
1157	C6	Compressor, Air
1158	B7	Water Well No. 6
1159	A5	Sandblast Building
1160	C6	Covered Storage Warehouse
1161	B3	Sludge Desiccating Pit (Never Used)
1162	E5	Autodin A.B. Terminal Bldg-Training Rm
1163	D5	Incinerator
1164	D5	Paint Pumping Building
1165	D4	Shed, Former Pesticide Storage
1166	D6	Paint Pumping Building
1167	B4	Air Compressor No. 8
1168	N/A	Security Lighting Emerg. Generator
1169	A4	Paint Spraying Facility
1170	A4	Pesticide Facility
1171	D6	Austemper Facility - Furnace Room
1172	A4	Former Fire Department
1173	B5	Environmental Test Facility
1174	B4	Hazardous Waste Storage Area
1175	N/A	Generator Building
1176	N/A	Switching Station (Electrical)
1177	C5	Equipment Wash Facility
1178	D6	Lubrication System Facility
1180	C5	Chrome Reduction Facility
1181	D7	Phosphate Facility
1182	B3	Ground Water Treatment Facility
1184	D5	Flammable Storage Warehouse
1185	N/A	Air Compressor Building
1186	B5	Haz-Bin Storage Containment Structure
1187	D5	Haz-Bin Storage Containment Structure
1188	D5	Haz-Bin Storage Containment Structure
1189	D5	Land Vehicle Fuel Disp Sta Gas/Diesel
1190	D5	Land Vehicle Fuel Disp Sta Propane
1192	B3	Ground Water Treatment Plant Office
1193	N/A	Vehicle Scale
1195	C5	Transformer Substation No. 20
1196	B5	Transformer Substation No. 21
2000	C1	Open Land
2001	B2	North Railroad Area
2002	E3	West Parking
2003	E7	South Parking
2004	C3	North Utilities
2005	D4	West Utilities
2006	A4	East Utilities
2007	A7	Southeast Utilities
2008	E6	South Utilities
2009	C3	North Open Storage
2010	E3	West Open Storage
2011	C5	Central Storage
2012	B7	South Open Storage
2013	B4	North Warehouse Storage
2014	D5	West Warehouse Storage
2015	A4	Water Storage
2016	C7	South Warehouse Storage
2017	E7	West Railroad Storage
2018	A4	East Railroad Storage
2019	B4	Fuel Storage
2020	B4	Hazardous Waste Storage
2021	E5	Administration Open Area
2022	D5	Medical Open Area
2023	C5	Production Open Area
2024	N/A	E/P Ponds Soil Staining Area

LEGEND

- UNDERGROUND STORAGE TANKS (CLOSED IN PLACE)
- UNDERGROUND STORAGE TANKS (REMOVED)
- ABOVEGROUND STORAGE TANKS (ACTIVE)
- ABOVEGROUND STORAGE TANKS (REMOVED)
- AOC 12 (PIPELINE)
- AOC 14 (PIPELINE)
- AOC 15 (PIPELINE)
- ECP STUDY SECTION BOUNDARY

CATEGORY 1
Areas in which no release or disposal of hazardous substances or petroleum products has occurred, and to which there has been no migration of such substances from adjacent areas.

CATEGORY 2
Areas in which only release or disposal of petroleum products has occurred.

CATEGORY 3
Areas in which release, disposal, or migration of hazardous substances has occurred, but in concentrations that do not require a removal or other remedial response.

CATEGORY 4
Areas in which release, disposal, or migration of hazardous substances has occurred, but all removal or other remedial actions necessary to protect human health and the environment have been taken.

CATEGORY 5
Areas in which release, disposal, or migration of hazardous substances has occurred, and removal or other remedial actions are under way, but all required actions have not yet been taken.

CATEGORY 6
Areas in which release, disposal, or migration of hazardous substances has occurred, but required remedial actions have not yet been implemented.

CATEGORY 7
Areas that have not been evaluated or require additional evaluation.

NOTES:

Category 3 Groundwater Contamination – The groundwater contamination area shown as Category 3 is an approximation of the area at RBAAP that has detected levels of chromium or cyanide. Buildings/land within this area are designated Category 3.

Category 5 Groundwater Contamination – The groundwater contamination area shown as Category 5 is an approximation of the area at RBAAP that has groundwater concentrations of chromium or cyanide above MCLs. Buildings/land within this area are designated Category 5.

SWMU 25 Addresses all former underground storage tank sites at RBAAP

N

0 150 300 Feet

FIGURE 5-1
PROPERTY CATEGORIZATION MAP
Riverbank Army Ammunition Plant
Riverbank, California

CH2MHILL

RDD \\RDD31022767\PROJECTS\RIVERBANK_NATIVE_FILES\MXD\ECP\FIG_5_1_CATEGORY_STUDY.MXD FIG_5_1_CATEGORY_STUDY_DSIZE.PDF 11/29/2006 08:56:25

6. Certification

The contents of this report meet the legislative requirements and DoD policies for the completion of an Environmental Condition of Property review.

Brownell Turner
Commander's Representative
Riverbank Army Ammunition Plant

Todd T. Beckwith
Environmental Engineer
U.S. Army Environmental Center

7. References

Ahtna Government Services Corporation (AGSC). 2004. *Project Management Plan, Operation and Maintenance of Groundwater Treatment Plant, Riverbank Army Ammunition Plant, CA.* July 13.

Ahtna Government Services Corporation (AGSC). 2005a. *Draft Groundwater Treatment Plant Ramp-Down Plan, Riverbank Army Ammunition Plant, CA.* April.

Ahtna Government Services Corporation (AGSC). 2005b. *Draft Long-Term Monitoring Ramp-Down Plan, Riverbank Army Ammunition Plant, CA.* May.

Ahtna Government Services Corporation (AGSC). 2005c. *Monthly Operations and Water Discharge Summary.* June.

Ahtna Government Services Corporation (AGSC). 2005d. *Property Management Plan for Land Use Control Actions, Riverbank Army Ammunition Plant.*

Ahtna Government Services Corporation (AGSC). 2006. D*raft Second Five Year Review Report for Riverbank Army Ammunition Plant, City of Riverbank, Stanislaus County, California.* July.

CH2M HILL. 1996. *Riverbank Army Ammunition Plant Landfill Closure – Final Closure Report.* January 30.

CH2M HILL. 1996. *Riverbank Army Ammunition Plant, Field Data Report.*

CH2M HILL. 1997a. *O&M Manual, Riverbank Army Ammunition Plant, Groundwater Treatment System (GWTS)*. September.

CH2M HILL. 1997b. *Supplement to Design Documentation for the Groundwater Extraction and Monitoring Network, IGWTS, GWTS, and IWTP.* September 23.

CH2M HILL. 1997c. *Final Extraction System Design and Monitoring Plan with System Operating Procedures. Riverbank Army Ammunition Plant, Riverbank, California.* September 24.

CH2M HILL. 2002. *RCRA Facility Investigation Current Conditions Report, Riverbank Army Ammunition Plant, Riverbank, California*. October.

CH2M HILL. 2005a. *RCRA Facility Investigation Report. Riverbank Army Ammunition Plant, Riverbank, California.* February 4.

CH2M HILL. 2005b. *Quarterly Groundwater monitoring Report, RBAAP Groundwater Monitoring Program, 2005 – First Quarter. Riverbank Army Ammunition Plant, Riverbank, California.*

CH2M HILL. 2006. *Quarterly Groundwater monitoring Report, RBAAP Groundwater Monitoring Program, 2005 – Fourth Quarter. Riverbank Army Ammunition Plant, Riverbank, California.*

EMSL Analytical, Inc. 2005. *Mold Sampling, L 6 West Restroom*. March 17.

Department of Toxic Substances (DTSC), 2006. *No Further Action Letter (NFA) from the DTSC for RCRA Current Conditions Report, RBAAP, Stanislaus County*. EPA ID No. CA210020759.

Envirodyne Engineers, Inc. (Envirodyne). 1986. T*echnical Plan for the Environmental Contamination Survey of the Riverbank Army Ammunition Plant, Riverbank, California, Phase II - Version 2.* March.

Envirodyne Engineers, Inc. (Envirodyne). 1987. *Remedial Investigation of the Riverbank Army Ammunition Plant, Riverbank, California.* April.

Environmental Data Resources Inc (EDR). 2006a. *The EDR Radius Map with GeoCheck, Riverbank AAP.* June 12.

Environmental Data Resources Inc (EDR). 2006b. *The EDR Aerial Photo Decade Package, Riverbank AAP.* June 12.

Environmental Data Resources Inc (EDR). 2006c. *The EDR Radius Map with GeoCheck, Riverbank E/P Ponds.* June 13.

Environmental Data Resources Inc (EDR). 2006d. *The EDR Aerial Photo Decade Package, Riverbank E/P Ponds.* June 14.

Environmental Photographic Interpretation Center (EPIC). 1981. *Installation Assessment, Riverbank Army Ammunition Plant, California.* September.

Environmental Photographic Interpretation Center (EPIC). 1987. *Site Analysis, Riverbank AAP, Riverbank, California.* September.

MacDonald and Mack Partnership. 1984. *Historic Properties Report, Riverbank Army Ammunition Plant, Riverbank, California.* August.

MascoTech. 1999a. *Final Tank Disposal for Tank T02.* February 23.

MascoTech. 1999b. *June 22, 1999 Meeting with Dr. Henry Crain (transmittal of radon monitoring data for building 162). Riverbank Army Ammunition Plant, Riverbank, California*. June 23.

NI Industries, Inc. (NI). 1996a. *Environmental Assessment Riverbank Army Ammunition Plant, LMC West – Tenant Placement*. April 2.

NI Industries, Inc. (NI). 1996b. *Environmental Assessment, Riverbank Army Ammunition Plant, Ceracon – Tenant Placement.* November 7, 1996.

NI Industries, Inc. (NI). 1998a. *Environmental Assessment, Riverbank Army Ammunition Plant, D & M Hancock, Inc – Tenant Placement*. January 28.

NI Industries, Inc. (NI). 1998b. *Environmental Assessment, Riverbank Army Ammunition Plant, Asbestos Program.* March 3.

NI Industries, Inc. (NI). 1998c. *PCB Log Sheet, Equipment in Service as of 3/20/98.* March 20.

NI Industries, Inc. (NI). 1998d. *Environmental Assessment, Riverbank Army Ammunition Plant, Cartridge Case Line.* June 25.

NI Industries, Inc. (NI). 1999. *Transformers Information*. January 18.

NI Industries, Inc. (NI). 2002. *RBAAP PCB Transformer Registration.* November 11.

NI Industries, Inc. (NI). 2003a. *2003 Pesticide Use Minimization Plan. Riverbank Army Ammunition Plant (RBAAP), Riverbank, California*. January 3.

NI Industries, Inc. (NI). 2003b. *Storm Water Pollution Prevention Plan (2003 SWPPP), Riverbank Army Ammunition Plant, Riverbank, California*. March 3.

NI Industries, Inc. (NI). 2003c. *Lead-Based Paint Sampling Data from 1992 to 2003*. March 7.

NI Industries, Inc. (NI). 2003d. *Oil Spill Prevention Control and Countermeasure Plan (SPCCP), Riverbank Army Ammunition Plant, Riverbank, California.* March 20.

NI Industries, Inc. (NI). 2004a. *Asbestos Management Plan and Survey. Riverbank Army Ammunition Plant.* March 30.

NI Industries, Inc. (NI). 2004b. *Installation Pest Management Plan (IPMP) Submission for FY 2004*. March 29.

NI Industries, Inc. (NI). 2004c. *2004 Polychlorinated Biphenyl (PCB) Management Plan for Riverbank Army Ammunition Plant*. March 31.

NI Industries, Inc. (NI). 2004d. *RCRA Part B Permit. Sections 8 and 13.* November.

NI Industries, Inc. (NI). 2005a. *2004 Hazardous Waste Report (DTSC Annual Facility Report)*. February 22.

NI Industries, Inc. (NI). 2005b. *2004 Permit Renewal and Emission Inventory Questionnaire for Riverbank Army Ammunition Plant*. March 9.

NI Industries, Inc. (NI). 2005c. *PCB Visual Inspection Record, 2nd Quarter 2005.* May 12.

NI Industries, Inc. (NI). 2005d. *State of California, State Water Resources Control Board Annual Report for Stormwater Discharges Associated with Industrial Activities*. June 27.

NI Industries, Inc. (NI). 2005e. Information provided at 2005 ECP Workshop by NI Representative Anthony Mendes. August.

NI Industries, Inc. (NI). 2005f. *Lead Compliance Plan and Survey*.

NI Industries, Inc. (NI). 2005g. *Aboveground Storage Tank Inventory.*

NI Industries, Inc. (NI). 2006a. Personal communication with Anthony Mendes regarding historical buildings located RBAAP. July.

NI Industries, Inc. (NI). 2006b. *Additional Documents Requested at the ECP Outbriefing Meeting*. July 24.

NI Industries, Inc. (NI). 2006c. *RBAAP Underground Storage Tank Map.* August 4.

NI Industries, Inc. (NI). 2006d. *RBAAP Aboveground Storage Tank, Tank Certifications.* December 19.

NI Industries, Inc. (NI). 2006e. *RBAAP Responses to ECP Comments Data Request.* September 21.

Norris-RBAAP. 1995. *Riverbank Army Ammunition Plant Underground Storage Tank Closure Report.* March 8.

Norris-Riverbank. 1996a. *Environmental Baseline Survey, Phase I Environmental Assessment Report, LMC West, Building 120, Sections A, Furnace Room West, a Portion of Section B, and the Atmosphere Generating Room.* April 15.

Norris-Riverbank. 1996b. *Waste Analysis Plan for Hazardous Waste Treatment and Storage Facility.* July 30.

Norris-Riverbank. 1996c. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Tenant: Ceracon. Facility: Buildings 8 and 153*. November 7.

Norris-Riverbank. 1997. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Facility: Line 3 West of Broadway, Business Development Center*. October 7.

Norris-Riverbank. 1998a. *Environmental Baseline Survey, Phase I Environmental Assessment Report Tenant: Harbor Oil. Facility: Building 11.* January 12.

Norris-Riverbank. 1998b. *Line 3 East of Broadway, 4 & 5 Corrective Action Report*. May.

Norris-Riverbank. 1998c. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Tenant: LMC. Facility: Building 12*. July 2.

Norris-Riverbank. 1998d. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Facility: Water Tower (Building 114)*. July 16.

Norris-Riverbank. 1998e. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Buildings 3 East, 4, and 5.* August 13.

Norris-Riverbank. 1998f. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Building 10.* September 22.

Norris-Riverbank. 1998g. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Facility: Building 192.* November 5.

Norris-Riverbank. 1998h. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Facility: Building 14.* November 11.

Norris-Riverbank. 1998i. *Environmental Baseline Survey, Phase I Environmental Assessment Report. Facility: Building 130.* November 23.

Norris-Riverbank. 1998j. *Closure of Three Cyanide Tanks at Building 4, 5, and 6 Report. Riverbank Army Ammunition Plant, Riverbank, California.* November 25.

Norris-Riverbank. 1998k. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Building 164.* November 25.

Norris-Riverbank. 1998l. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Building 9.* December 3.

Norris-Riverbank. 1998m. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Building 162.* December 3.

Norris-Riverbank. 1998n. *Environmental Baseline Survey Phase I Environmental Assessment Report. Facility: Building 169.* December 11.

Peck, Brian. 2006. Telecommunication between Brian Peck U.S. Army BRAC NEPA Support Team, regarding required level of NEPA documentation at RBAAP. September 11.

Roy F. Weston, Inc. (Weston). 1991. *Riverbank Army Ammunition Plant Remedial Investigation Report.* Prepared for Commander, U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland 21010-5401. July.

Roy F. Weston, Inc. (Weston). 1992a. *Remedial Investigation (RI) Report – Riverbank Army Ammunition Plant.* February.

Roy F. Weston, Inc. (Weston). 1992b. *Riverbank Army Ammunition Plant Remedial Investigation Report Addendum.* Prepared for Commander, U.S. Army Toxic and Hazardous Materials Agency, Aberdeen Proving Ground, Maryland 21010-5401. April.

Roy F. Weston, Inc. (Weston). 1993a. *Riverbank Army Ammunition Plant (RBAAP) Engineering Evaluation/Cost Analysis (EE/CA) for the Evaporation/Percolation (E/P) Ponds.* February.

Roy F. Weston, Inc. (Weston). 1993b. *Feasibility Study (FS) Report – Riverbank Army Ammunition Plant*. June.

Roy F. Westion, Inc. (Weston). 2003. *RBAAP E/P Ponds Characterization Report.*

San Joaquin Valley Air Pollution Control District (Valley Air District). 2003. *Applicability of Federally Mandated Operating Permits (Title V) Facility ID No. N-2138*. August 7.

SOTA Environmental Technologies, Inc. (SOTA). 1998. *RCRA Facility Investigation Phase I Work Plan Revision No. 4, Riverbank Army Ammunition Plant, Riverbank, California.* September.

Stanislaus County. 1995. *Memo Re: UST Closure Report for Riverbank Army Ammunition Plant (RAAP), 5300 Claus Road, Riverbank.* Department of Environmental Resources, Hazardous Materials Division. April 28.

State of California. 1997. *NPDES Industrial Storm Water Program – Permit. Riverbank Army Ammunition Plant, Riverbank, California.* California Regional Water Quality Control Board, Central Valley Region. April 17.

State of California. 2001a. *Draft MRP 5-01-200 (Amended) Permit Requirements, Riverbank Army Ammunition Depot, Riverbank, California.* Regional Water Quality Control Board, Central Valley Region. June.

State of California. 2001b. *Notice of Adoption of Updated Waste Discharge Requirements for United States Department of the Army and NI Industries – Waste Discharge Requirements Order. Riverbank Army Ammunitions Plant, Riverbank, California.* California Regional Water Quality Control Board, Central Valley Region. August 1.

State of California. 2002. *Corrective Action Consent Agreement – Health and Safety Code Section 23157. Riverbank Army Ammunition Plant, Riverbank, California.* Environmental Protection Agency, Department of Toxic Substances Control. June 21.

State of California. 2003. *Domestic Water Supply Permit Issued to Riverbank Army Ammunition Plant.* California Department of Health Services, Division of Drinking Water and Environmental Management Branch. May 14.

State of California. 2004. *Annual Inspection of the Riverbank Army Ammunition Plant Water System, (System No. 5000211).* Department of Health Services. March 8.

State of California. 2005. *Continuation of Expiring Hazardous Waste Storage and Treatment Permit, Riverbank Army Ammunition Plant (RBAAP), Stanislaus County.* Department of Toxic Substances Control. Environmental Protection Agency ID No. CA210020759. July 29.

State of California. 2006. *Hazardous Waste Facility Permit*. California Environmental Protection Agency, Department of Toxic Substances Control. April 16.

Thunderbolt, 2006. *Thunderbolt Wood Treating, Monitoring and Reporting Program Order No. R5-2002-0036, First Quarter 2006*. April 30.

U.S. Army. 1980. *Installation Assessment of Riverbank Army Ammunition Plant. U.S. Army Toxic and Hazardous Materials Agency Report No. 144.* January.

U.S. Army. 1996. *Riverbank Army Ammunition Plant, RCRA Facilities Investigation – Phase 1 Work Plan Revision No. 2.* Prepared by Norris Industries and Army staff at RBAAP. April.

U.S. Army. 2001. *First Five-Year Review Report for Riverbank Army Ammunition Plant, City of Riverbank, Stanislaus County, California*. February 20.

U.S. Army. 2006a. *Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-010.* Management and Disposal Branch. February 13.

U.S. Army. 2006b. Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-005. Management and Disposal Branch. February 13.

U.S. Army. 2006c. *Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-007.* Management and Disposal Branch. February 13.

U.S. Army. 2006d. *Riverbank Army Ammunition Plant California; Encroachment on Army Property from Assessors Parcel No. 062-008-011.* Management and Disposal Branch. February 22.

U.S. Army. 2006e. *Property Information Summary for Riverbank Army Ammunition Plant, California.* http://www.hqda.army.mil/ACSIM/brac/PropertyInformationSummaries/PropertyInformationSummaryRiverbankAAP.pdf. Base Realignment and Closure Division (BRACD).

U.S. Army Environmental Center (USAEC). 1993. *Action Memorandum for the Evaporation/Percolation (E/P) Ponds Removal Action*. August.

U.S. Army Environmental Center (USAEC). 1994. *Record of Decision, Riverbank Army Ammunition Plant*. March.

U.S. Army Environmental Center (USAEC). 2005a. *Draft 2006 Installation Action Plan, Riverbank Army Ammunition Plant.* July.

U.S. Army Environmental Center (USAEC). 2005b. *ECP Workshop Meeting held 8/10/05, Riverbank Army Ammunition Plant*. August.

U.S. Army Environmental Center (USAEC). 2006a. *U.S. Army BRAC 2005 Environmental Condition of Property Report, Riverbank Army Ammunition Plant, Riverbank, California. Working Draft.* March.

U.S. Army Environmental Center (USAEC). 2006b. *Riverbank Army Ammunition Plant, California, Base Realignment and Closure Installation Action Plan, FY06.* March.

U.S. Army Corps of Engineers (USACE). 1989. *RBAAP Investigation and Evaluation of Underground Storage Tanks. Omaha District.* September.

U.S. Army Corp of Engineers (USACE). 2005. *NEPA Action Plan*. Developed by the USACE Mobile District Corps of Engineers, NEPA Support Team.

U.S. Army Corps of Engineers (USACE). 2006. *Final Historical Records Review, Riverbank Army Ammunition Plant. Sacramento District*. January.

U.S. Army Material Command (USAMC). 2003. *Closed Transferring and Transferred Range/Site Inventory Report, Riverbank AAP.* March.

U.S. Army Material Command (USAMC). 2005. *Survey of Radiological POCs concerning radiological use at BRAC 2005 Installations*. June.

U.S. Environmental Protection Agency (USEPA). 1997. *Preliminary Close Out Report. Riverbank Army Ammunition Plant.* January.

WIRTH Environmental Services (WIRTH). 1988. *An Archeological Overview and Management Plan for the Riverbank Army Ammunition Plant, Riverbank, California*. February 10.