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August 10, 2007

Aaron Yue
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Kris Doebbler
BLM WO-360D, Building 50
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Denver, CO 80225

Subject: Revised Final RCRA Facility Investigation/Remedial Investigation, Volume 1—Site Background and History Report, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID NO. CAT080011729)

Dear Mr. Yue and Ms. Doebbler:

This letter transmits the Revised Final RCRA Facility Investigation/Remedial Investigation (RFI/RI), Volume 1—Site Background and History Report, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California.

This report incorporates changes to the Final RFI/RI, Volume 1—Site Background and History Report dated September 6, 2006, in response to DTSC's May 9, 2007 letter, and DTSC's emails dated July 18, 2007 and August 6, 2007. We understand from recent communications that the changes made are acceptable to both DTSC and DOI.

Please contact me at (805) 234-2257 if you have any questions regarding the attached report or any other aspect of the RFI/RI activities.

Sincerely,

Yvonne Meeks

Enclosures

Final Report

RCRA Facility Investigation/Remedial Investigation Report PG&E Topock Compressor Station Needles, California

Volume 1 – Site Background and History

Prepared for

Pacific Gas and Electric Company

August 2007

CH2MHILL
155 Grand Avenue, Suite 100
Oakland, California 94612

Certification

RCRA Facility Investigation (RFI)/Remedial Investigation (RI) Report

PG&E Topock Compressor Station
Needles, California

The information and results presented in this report are based on the review and compilation of available data obtained from numerous sources, including studies performed by others, and data from independent laboratories. To the best of our knowledge, CH2M HILL has collected and incorporated the relevant data from these previous studies and reports into this document. This document and any interpretations, conclusions, and recommendations contained within are based upon those data.

This report was prepared by CH2M HILL under the supervision of the professional whose seal and signature appears hereon, in accordance with currently accepted professional practices; no warranty, expressed or implied, is made.

Richard Sturm
Professional Geologist

Serena Lee
CH2M HILL Project Manager

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Acronyms and Abbreviations

°F	degrees Fahrenheit
ABS	Acrylonitrile-Butadiene-Styrene
ACM	asbestos-containing materials
AJCW	auxiliary jacket cooling water
ALOCW	auxiliary lubricating oil cooling water
AOC	area of concern
AST	aboveground storage tank
AT&SF	Atchison, Topeka, and Santa Fe Railway
bgs	below ground surface
BLM	United States Bureau of Land Management
BOR	United States Bureau of Reclamation
BTEX	benzene, toluene, ethylbenzene, and xylene
CACA	Corrective Action Consent Agreement
Cal/EPA	California Environmental Protection Agency
CAM	California Assessment Method
CDHS	California Department of Health Services
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMS	corrective measures study
COPC	constituent of potential concern
Cr(III)	trivalent chromium
Cr(T)	total chromium
Cr(VI)	hexavalent chromium
CSBFD	County of San Bernardino Fire Department
CWG	Consultative Workgroup
DOI	Department of Interior
DTSC	California Department of Toxic Substances Control

E&E	Ecology and Environment
FESA	Federal Endangered Species Act
FS	feasibility study
gpd	gallons per day
gpm	gallons per minute
HNWR	Havasu National Wildlife Refuge
IM	Interim Measure
JCW	jacket cooling water
LOCW	lubricating oil cooling water
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
msl	mean sea level
NOAA	National Oceanic and Atmospheric Administration
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OES	Office of Emergency Services
OWS	oil/water separator
OWSS	Oil/Water Separator System
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PG&E	Pacific Gas and Electric Company
ppm	parts per million
PRG	preliminary remediation goal
psi	pounds per square inch
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFA	Resource Conservation and Recovery Act facility assessment
RFI	Resource Conservation and Recovery Act facility investigation
RFI/RI	Resource Conservation and Recovery Act facility investigation/remedial investigation

scfd	standard cubic feet per day
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TBM	tertiary butyl mercaptan
TDS	total dissolved solids
THT	tetrahydrothiophene
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	volatile organic compound
Water Board	California Regional Water Quality Control Board
WET	Waste Extraction Test

Executive Summary

Pacific Gas and Electric Company (PG&E) is conducting investigative and remedial activities at the Topock Compressor Station located in eastern San Bernardino County, California. Investigative and remedial activities at the Topock site are being performed under both the Resource Conservation and Recovery Act (RCRA) Corrective Action process pursuant to a Corrective Action Consent Agreement (CACA) entered by PG&E and California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), as well as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) pursuant to an Administrative Consent Agreement between PG&E and the Department of Interior (DOI), including the Department's Bureau of Land Management, Fish and Wildlife Service, and Bureau of Reclamation.

This document contains the site background and history of the Topock Compressor Station in support of the RCRA Facility Investigation (RFI) and the CERCLA Remedial Investigation (RI), and is Volume 1 of the Final RFI/RI for the facility. Volumes 2 and 3 of the RFI/RI contain information to evaluate the nature and extent of hazardous waste and constituent releases in groundwater and soil, respectively, and will be published separately. Other requirements of the RCRA Corrective Action and CERCLA processes, such as the identification of applicable or relevant and appropriate requirements (ARARs) and risk assessment, will be addressed in future documents.

ES.1 Overview

The Topock Compressor Station is located about 12 miles southeast of Needles on approximately 15 acres of a 65-acre parcel of PG&E-owned land (Figure 1-1). The surrounding project area includes land owned and/or managed by a number of government agencies including the United States Bureau of Land Management (BLM), United States Bureau of Reclamation (BOR), United States Fish and Wildlife Service (USFWS), and San Bernardino County (Figure 1-2). The closest communities are Moabi Regional Park (California); Topock, Arizona; and Golden Shores, Arizona. Additionally, five sovereign nations (Indian tribes) have lands that border the Colorado River as it flows south from Needles, California through Nevada, Arizona, and California to the California-Mexico border. These five tribes (from north to south) are the Fort Mojave Indian Tribe, Chemehuevi Indian Tribe, Colorado River Indian Tribes, Fort Yuma-Quechan Indian Tribe, and the Cocopah Indian Tribe. Four additional Indian tribes have an expressed interest or a stake in the Topock project: Havasupai Indian Tribe; Hualapai Indian Tribe; Yavapai-Prescott Indian Tribe; and Twenty-Nine Palms Band of Mission Indians. The land, river, animals and plants in the area have special spiritual, traditional, and/or cultural meaning to these local tribes.

Investigative and remedial activities at the Topock Compressor Station date to the 1980s with the identification of solid waste management units (SWMUs) through a RCRA Facility Assessment. The RFI began in 1996 with the signing of the CACA, and numerous phases of data collection and evaluation have been implemented. To date, major portions of the

RFI/RI have been completed, IMs have been implemented, and work towards the CMS/FS is progressing.

ES.2 Physical Characteristics and Setting of the Study Area

The Topock site and study area are located in the southern portion of the Mohave Valley, along the California-Arizona border. The study area encompasses approximately 3 square miles of the north-sloping piedmont alluvial terrace along the margin of the Chemehuevi Mountains (located to the south and west) and the floodplain of the Colorado River and Topock Marsh (located to the east and north).

The land forms in the area are characterized by alluvial terraces and incised drainage channels. One of the largest incised channels is Bat Cave Wash, a north-south dry wash (ephemeral stream) adjacent to the Topock Compressor Station. Bat Cave Wash only has brief flows following intense rainfall events and drains to the Colorado River. Locally, a floodplain borders both sides of the Colorado River. The width of the floodplain adjacent to the site averages 500 feet and narrows to the south of the site as the river enters the Topock Gorge.

Geology beneath the study area is characterized by bedrock basement formations (pre-Tertiary metamorphic/igneous rocks and consolidated Miocene conglomerate) overlain by younger sedimentary deposits. The younger sedimentary units in the study area include Tertiary and Quaternary to Recent-age alluvial fan deposits, Pliocene lacustrine deposits, and Quaternary to Recent-age fluvial deposits of the Colorado River. The alluvial fan and lacustrine deposits are generally found in the western portion of the study area, while the fluvial deposits predominate in the eastern portion of the study area underlying and adjacent to the Colorado River.

Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial deposits beneath most of the Topock site. The water table in the Alluvial Aquifer is very flat throughout the study area and is typically 1 to 2 feet of the mean river level. Due to the variable topography at the site, the depth to groundwater ranges from as shallow as 5 feet below ground surface (bgs) in floodplain wells next to the river to approximately 170 feet bgs at the upland alluvial terrace areas.

While the overall trend of groundwater flow throughout most of the Mohave Valley is southerly, groundwater flow directions at the Topock site are predominantly easterly to northeasterly. Groundwater moving south down Mohave Valley is diverted to an easterly/northeasterly direction by the low-permeability bedrock of the Chemehuevi Mountains. Groundwater levels at the Topock site are greatly influenced by the Colorado River stage, which varies both daily and seasonally in response to upstream dam discharges.

The study area lies within an area with important cultural and/or spiritual meaning to Native American Tribes. The area is the homeland of the Aha Makav, or Mojave tribe, and a place of great traditional and spiritual use that knows no physical boundaries for the Mojave. The plants, the animals, the river, the landforms, and the material remains of the past all hold deep meaning. Archaeological surveys have documented 149 prehistoric and

historic resources in the study area, including the Topock Maze, which is included in the National Register of Historic Places.

The Havasu National Wildlife Refuge is located in the study area, a portion of which borders the compressor station. Ecological resources in the study area include five types of plant communities: Mojave Creosote Bush Scrub, Mojave Wash Scrub, Desert Riparian, Tamarisk Thicket, and Freshwater Marsh. The aquatic and terrestrial habitats in the project area support fish, amphibians, reptiles, birds and mammals, including several threatened or endangered species (state-listed and federally-listed).

ES.3 Site History

In December 1951, the Topock Compressor Station began operations to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The property on which the compressor station was built was owned by the State of California. From 1951 to 1965, PG&E leased the property from the State. In 1965, PG&E purchased the property from the State. The compressor station is still active and is anticipated to remain an active facility into the foreseeable future.

Current operations at the compressor station are very similar to the operations that occurred from the start of facility operations in 1951. The operations at the compressor station consist of six major activities: compression of natural gas, cooling of the compressed natural gas and compressor lubricating oil, water conditioning, wastewater treatment, facility and equipment maintenance, and miscellaneous operations. The greatest use of chemical products at the facility involves treatment of cooling water, and the greatest volume of waste produced consists of blowdown from the cooling towers (i.e., water that is routinely removed from the towers to prevent chemical buildup and scale formation).

From 1951 to 1985, hexavalent chromium [Cr(VI)]-based products were added to the cooling water to inhibit corrosion, minimize scale, and control biological growth. From 1951 to 1964, untreated wastewater (i.e., blowdown) containing Cr(VI) was discharged to Bat Cave Wash. Aerial photographs from that time period show what appears to be a light-colored flow in the wash that originates at the discharge point and, at times, extends up to 1,600 feet northward. Beginning in 1964, PG&E began to treat the wastewater in a single-step process to convert Cr(VI) to trivalent chromium [Cr(III)]. At about this time, PG&E also constructed a percolation bed in the wash by creating soil berms that impounded the discharged wastewater and allowed it to percolate into the ground and/or evaporate. In 1969, PG&E began treating the wastewater using a two-step process that converted Cr(VI) to Cr(III) (Step 1) and then removed Cr(III) (Step 2).

Beginning in May 1970, treated wastewater was discharged to an injection well (PGE-08) located on PG&E property, and discharges to Bat Cave Wash generally ceased. The well facilitated the injection of wastewater into the subsurface at depths in excess of 405 bgs. By 1971, PG&E had constructed the first of four single-lined evaporation ponds, and used this pond as a discharge location when operational problems were encountered with the injection well. In 1973, PG&E discontinued use of injection well PGE-08, and wastewater was discharged exclusively to the four, single-lined evaporation ponds, located about 1,600 feet west of the compressor station.

PG&E replaced the Cr(VI)-based cooling water treatment products with non-hazardous phosphate-based products in 1985, at which time PG&E discontinued operation of the wastewater treatment system. Use of the four, single-lined evaporation ponds continued until 1989. In 1989, the single-lined ponds were replaced with four new, Class II (double-lined) ponds, located approximately 1.2 miles to the northwest. The wastewater treatment system and the single-lined ponds were physically removed and clean-closed between 1988 and 1993. The four, Class II double-lined ponds, which are on BLM property, are still in use and are operated under the jurisdiction of the State of California Regional Water Quality Control Board, Colorado River Basin Region.

ES.4 SWMUs, AOCs, and Other Undesignated Areas

Fourteen solid waste management units (SWMUs) have been identified at the Topock compressor station. The following SWMUs were identified in the RCRA facility assessment performed by the United States Environmental Protection Agency (USEPA) in 1987 and/or by DTSC in the 1996 CACA:

- SWMU 1 (Unit 4.1) - Former Percolation Bed
- SWMU 2 (Unit 4.2) - Inactive Injection Well (PGE-08)
- SWMU 3 - PG&E Inactive Well #6 (PGE-06)
- SWMU 4 - PG&E Inactive Well #7 (PGE-07)
- SWMU 5 (Units 4.12 and 4.13) – Sludge Drying Beds
- SWMU 6 (Unit 4.7) - Chromate Reduction Tank
- SWMU 7 (Unit 4.9) - Precipitation Tank
- SWMU 8 (Unit 4.10) - Process Pump Tank
- SWMU 9 (Unit 4.8) - Transfer Sump
- SWMU 10 (Unit 4.11) - Old Evaporation Ponds
- Unit 4.3 - Oil/Water Holding Tank
- Unit 4.4 - Oil/Water Separator
- Unit 4.5 - Portable Waste Oil Storage Tank
- Unit 4.6 – Waste Oil Storage Tank

Twenty areas of concern (AOCs) have also been identified at the Topock Compressor Station. The following AOCs were identified by DTSC in the CACA or in subsequent DTSC directives:

- AOC 1 – Area Around Former Percolation Bed
- AOC 2 - Area Around Inactive Injection Well PGE-08
- AOC 3 - Area Around PG&E Inactive Wells PGE-06 and PGE-07
- AOC 4 - Debris Ravine
- AOC 5 - Cooling Tower A
- AOC 6 - Cooling Tower B
- AOC 7 - Hazardous Materials Storage Area
- AOC 8 - Paint Locker
- AOC 9 - Southeast Fenceline
- AOC 10 - East Ravine
- AOC 11 - Topographic Low Areas

- AOC 12 - Fill Area
- AOC 13 - Unpaved Areas at Compressor Station
- AOC 14 - Railroad Debris Site
- AOC 15 - Auxiliary Jacket Cooling Water Pumps
- AOC 16 - Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 18 - Combined Wastewater Transference Pipelines
- AOC 19 - Former Cooling Liquid Mixing Area
- AOC 20 - Industrial Floor Drains

Two other potentially impacted areas have been identified in the vicinity of the Topock Compressor Station through review of historical compressor station operational information. The two other undesignated areas are:

- Potential Pipe Disposal Area
- Former 300B Pipeline Liquids Tank

The locations of the SWMUs, AOCs, and undesignated areas are shown on Figure 4-1.

ES.5 Status of SWMUs, AOCs, and Other Undesignated Areas Within the Site Investigation and Closure Process

The SWMUs, AOCs, and other undesignated areas identified at the Topock Compressor Station have been identified at different times during the history of the RCRA Corrective Action process. Therefore, the status of many of the areas differs significantly, and ranges from those where no investigation has yet been performed to sites where remediation and closure have already been completed. For the purpose of developing appropriate conclusions and recommendations, the SWMUs, AOCs, and other undesignated areas have been divided into three groups according to their status within the site investigation, remediation, and closure process.

ES.5.1 SWMUs and AOCs for Which Site Investigation and Closure Process is Complete

The RCRA Corrective Action and CERCLA closure processes are considered to be complete at eight SWMUs and AOCs. They are:

- SWMU 2 – Inactive Injection Well (PGE-08) (soil only)
- SWMU 3 – Inactive Well PGE-06
- SWMU 4 – Inactive Well PGE-07
- SWMU 7 – Precipitation Tank
- SWMU 10 – Old Evaporation Ponds
- Unit 4.6 – Waste Oil Storage Tank
- AOC 2 – Area Around Inactive Injection Well (PGE-08)
- AOC 3 – Area Around Inactive Wells #6 and #7 (PGE-06 and PGE-07)

SWMU 2 is the injection well, PGE-08. The well was used for injection of treated wastewater. There is no evidence that any wastes would have been disposed around the well, and it is not expected that there is any soil contamination at SWMU 2. Therefore, the

unit is closed for soil, and no future soil evaluation is necessary. Groundwater will be evaluated as part of RFI Volume 2.

Review of historical information associated with SWMU 3 (Inactive Well PGE-06), SWMU 4 (Inactive Well PGE-07), and AOC 3 (Area Around Inactive Wells PGE-06 and PGE-07) has concluded that no wastes were disposed of in or around these inactive wells. These SWMUs/AOC are therefore considered closed, and will not be addressed further in RCRA Corrective Action or CERCLA site investigation and closure activities at the Topock Compressor Station.

SWMU 7 (Precipitation Tank) was part of the former wastewater treatment system, and was located within the facility fenceline on the southern portion of the lower yard. The precipitation tank was removed from service along with the rest of the treatment system in October 1985. The precipitation tank was clean closed by PG&E between November 1989 and March 1990, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. SWMU 7 is therefore considered closed, and will not be addressed further in RCRA Corrective Action or CERCLA site investigation and closure activities at the Topock Compressor Station.

SWMU 10 (Old Evaporation Ponds) consisted of four ponds, designated as Pond Nos. 1, 2, 3, and 4, located approximately 1,000 feet west-southwest of the compressor station. The construction of Pond No. 1 was completed in 1971 and Pond Nos. 2 through 4 were completed in 1974. The ponds received treated wastewater from the compressor station. The evaporation ponds were clean closed by PG&E in 1993, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. SWMU 10 is therefore considered closed, and will not be addressed further in RCRA Corrective Action or CERCLA site investigation and closure activities at the Topock Compressor Station.

Unit 4.6 (Waste Oil Storage Tank) is an above-ground storage tank in active service. The tank is located within the facility fenceline in the eastern portion of the facility within the oil and fuel storage area. The tank is equipped with secondary containment, periodically inspected, and there have been no known releases from this tank. Unit 4.6 will therefore not be addressed further in RCRA Corrective Action or CERCLA site investigation and closure activities at the Topock Compressor Station.

AOC2 consists of the surficial soil around PGE-08 as well as in the pipeline to the injection well which transmitted facility wastewater. There is no evidence of surficial releases to the area surrounding the former injection well, and any incidental releases from the pipeline to the well will be addressed through AOC 18. AOC 2 will therefore not be addressed further in the RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

ES.5.2 Previously Closed SWMUs and AOCs for Which Further Investigation Has Been Requested

The nine SWMUs and AOCs in this group are:

- SWMU 5 (Sludge Drying Beds)
- SWMU 6 (Chromate Reduction Tank)
- SWMU 8 (Process Pump Tank)

- SWMU 9 (Transfer Sump)
- AOC 18 (Former Two-step Wastewater Treatment System Piping)
- Unit 4.3 (Oil/Water Holding Tank)
- Unit 4.4 (Oil/Water Separator)
- Unit 4.5 (Portable Waste Oil Holding Tank)
- Former 300B Pipeline Liquids Tank

Five of these SWMUs and AOCs (SWMU 5, SWMU 6, SWMU 8, SWMU 9, and AOC 18) were part of the former wastewater treatment system. PG&E performed closure activities of this system between November 1988 and November 1993. Closure activities included removal of equipment and foundations, removal of impacted soil, and confirmation soil sampling. Closure activities were performed in accordance with an approved closure plan, and a closure certification acceptance letter was issued by DTSC on June 26, 1995. The piping (AOC 18) was not identified as a separate unit, but was included as part of the closure of the entire system. In a letter dated July 13, 2006 DTSC requested additional investigation at these five SWMUs and AOCs.

Similarly, DTSC also requested additional investigation of Units 4.3, 4.4, and 4.5, which were part of the former oily water treatment system. PG&E performed closure activities at the oily water treatment system between November 1989 and March 1990 that included removal of equipment, removal of impacted soil, and confirmation soil sampling.

DTSC, with concurrence from DOI, has further requested additional investigation at the Former 300B Pipeline Liquids Tank. Closure activities at this former aboveground tank were performed in 1995 and 1996 and included removal of the tank and associated piping, removal of impacted soil, and confirmation soil sampling. San Bernardino County issued a closure certification letter on June 9, 1997.

ES.5.3 SWMUs, AOCs, and Other Undesignated Areas to be Carried Forward in RFI/RI

The SWMUs, AOCs, and other undesignated areas in this group will be carried forward in the RCRA Corrective Action and CERCLA program. The 20 SWMUs, AOCs, and other undesignated areas in this group are:

- SWMU 1 – Former Percolation Bed
- SWMU 2 – Inactive Injection Well (PGE-08) (groundwater only)
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Lockers
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 - Topographic Low Area
- AOC 12 – Fill Area
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 14 – Railroad Debris Site

- AOC 15 – Auxiliary Jacket Water Cooling Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 19 – Former Cooling Liquid Mixing Area
- AOC 20 - Industrial Floor Drains
- Potential Pipe Disposal Area

For most of the SWMUs, AOCs, and other undesignated areas in this group, data have been collected during site investigation activities dating to the start of the RFI in 1996. Previous sampling has not been conducted at AOCs 7, 8, 11, 12, 16, 20, and the Potential Pipe Disposal Area. Through review of information associated with historic compressor station operations, these areas have been identified as potentially impacted, although no site investigation sampling has been performed in these areas to date. The remaining SWMUs, AOCs, and other undesignated areas in this group have been evaluated during the numerous phases of investigation conducted at the Topock site since RFI activities began in 1996.

Based upon information pertaining to past disposal practices, each of the 20 SWMUs, AOCs, and other undesignated areas in this group will either be addressed in Volume 2 (Groundwater) of the RFI/RI, and/or in Volume 3 (Soil) of the RFI/RI. Results of investigations, both past and present, will be incorporated into Volumes 2 and 3 of the RFI/RI to complete the site investigative requirements of the RCRA Corrective Action and CERCLA processes at these 20 SWMUs, AOCs, and other undesignated areas.

The SWMUs and AOCs to be addressed in Volume 2 (Groundwater) of the RFI/RI are:

- SWMU 1 – Former Percolation Bed
- SWMU 2 – Inactive Injection Well (PGE-08)
- AOC 1 – Area Around Former Percolation Bed

The SWMUs, AOCs and other undesignated areas to be addressed in Volume 3 (Soil) of the RFI/RI are:

- SWMU 1 – Former Percolation Bed
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Lockers
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 - Topographic Low Area
- AOC 12 – Fill Area
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 14 – Railroad Debris Site
- AOC 15 – Auxiliary Jacket Water Cooling Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System

- AOC 19 – Former Cooling Liquid Mixing Area
- AOC 20 - Industrial Floor Drains
- Potential Pipe Disposal Area

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is conducting investigative and remedial activities at the Topock Compressor Station (also referred to herein as "the compressor station" or "the facility") located in eastern San Bernardino County.

The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) is the state lead agency charged with directing remedial and investigative activities at the compressor station in accordance with the federal Resource Conservation and Recovery Act (RCRA). In February 1996, PG&E and DTSC entered into a Corrective Action Consent Agreement (CACA) pursuant to Section 25187 of the California Health and Safety Code (DTSC 1996). Under the terms of the CACA, PG&E agreed to conduct a RCRA facility investigation (RFI) to identify and evaluate the nature and extent of hazardous waste and constituent releases at the compressor station.

The United States Department of the Interior (DOI) is the lead Federal agency, on land under its jurisdiction, custody or control, and is responsible for oversight of response actions being conducted by PG&E pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Portions of the site where hazardous substances from the Topock compressor station have come to be located are on or under land managed by the Department's Bureau of Land Management (BLM), Fish and Wildlife Service (USFWS), and Bureau of Reclamation (BOR) (collectively the "federal agencies"). In July 2005, PG&E and the federal agencies entered into an Administrative Consent Agreement to implement response actions at the site as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (DOI 2005a).

This document contains the site background and history of the Topock Compressor Station in support of the RFI and the CERCLA remedial investigation, and is Volume 1 of the Final RFI/RI for the facility. Volumes 2 and 3 of the RFI/RI contain information to evaluate the nature and extent of hazardous waste and constituent releases in groundwater and soil, respectively, and are published separately.

Three draft versions of the RFI Report have previously been prepared, in April 2000 (E&E 2000a), February 2004 (E&E 2004), and February 2005 (CH2M HILL 2005). This document has been prepared in accordance with DTSC's review of and comments on the February 2005 RFI/RI, as documented in its letter dated July 13, 2006 (DTSC 2006a). In addition, Federal Agency comments on the February 2005 RFI/RI (DOI 2005b) are addressed in this document as they pertain to the site background and history of the compressor station. All comments and responses to the comments are included in Appendix A.

1.1 Project Setting

This section provides information about the location, land ownership and management, and nearby communities.

1.1.1 Location

The compressor station is located in eastern San Bernardino County, California, about 12 miles southeast of Needles, as shown in Figure 1-1. The compressor station began operations in 1951 to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California.

1.1.2 Land Ownership and Management

The compressor station occupies approximately 15 acres of a 65-acre parcel of PG&E-owned land. The property on which the compressor station was built was previously owned by the State of California. From 1951 to 1965, PG&E leased the property from the State. In 1965, PG&E purchased the property from the State.

PG&E also owns a 100-acre parcel located about 0.25 mile north of the compressor station, purchased in 2004 to facilitate interim remedial measures. The surrounding area includes land owned and/or managed by a number of government agencies including the BLM, BOR, USFWS, and San Bernardino County (Figure 1-2).

1.1.3 Nearby Communities

There are several communities in the general vicinity of the PG&E Topock Compressor Station, as shown in Figure 1-3. The nearest communities are mobile home parks at Topock, Arizona and Moabi Regional Park, California and the town of Golden Shores, Arizona.

Topock is located on the Arizona (or eastern) side of the Colorado River, about 0.5 mile east-northeast of the compressor station. Topock is a community of about 20 people in a small mobile home park near the Topock Gorge Marina. Most of the residents in Topock are retired senior citizens who live in the area part of the year, typically from late fall through spring. There are also a small number of permanent homes (i.e., the homes are occupied all year) located on the southern side of Interstate 40 (I-40).

Moabi Regional Park is located on the California (or western) side of the Colorado River, about 1 mile northwest of the compressor station. Moabi Regional Park is a part of San Bernardino County's regional parks system. It is primarily a recreational facility with mobile homes, camping units, and a boat marina. The park is located on a side channel of the Colorado River, approximately 1 mile west of the main river channel. The mobile homes are used primarily as weekend residences. As a regional park, it has no full-time residences.

Golden Shores is a community of about 1,300 homes (population approximately 1,800) in Mohave County, Arizona. It is located approximately 5 miles north of the compressor station on the east side of the Colorado River. Its demographics include both permanent and recreational residents. Golden Shores includes several small businesses, a fire station, a post office, and an elementary school.

The proximity of the compressor station to the Colorado River and to the California and Arizona state border has meant that DTSC and PG&E work to keep many additional cities and stakeholders informed (in addition to the most proximate, as required under RCRA). These additional cities and stakeholders include the City of Needles, approximately 12 miles

northwest of the facility, and Lake Havasu City and the City of Parker (18 and 40 miles south-southeast of the facility, respectively).

Additionally, five sovereign nations (Indian tribes) have lands that border the Colorado River as it flows over 230 miles south from Needles, California through Nevada, Arizona, and California to the California-Mexico border. These five tribes (from north to south) are the Fort Mojave Indian Tribe, Chemehuevi Indian Tribe, Colorado River Indian Tribes, Fort Yuma-Quechan Indian Tribe, and the Cocopah Indian Tribe. Four additional Indian tribes have an expressed interest or a stake in the Topock project: Havasupai Indian Tribe; Hualapai Indian Tribe; Yavapai-Prescott Indian Tribe; and Twenty-Nine Palms Band of Mission Indians. The land, river, animals, and plants in the area have special spiritual, traditional, and/or cultural meaning to these local tribes.

1.2 History of Investigative and Remedial Activities at Topock Compressor Station

Investigative and remedial activities at the Topock Compressor Station date to the 1980s with the identification of solid waste management units through a RCRA facility assessment (RFA). The RFI began in 1996 with the signing of the CACA, and numerous phases of data collection and evaluation have been implemented. Since 2005, investigative and remedial activities have been performed pursuant to both RCRA corrective action and CERCLA.

To date, major portions of the RFI/RI have been completed, Interim Measures (IMs) have been implemented, and work toward the corrective measures study (CMS) is progressing. The CMS will also address the requirements of the feasibility study under CERLCA. The status of the RFI/RI, IMs, and CMS/FS are summarized briefly below.

1.2.1 RCRA Facility Investigation/Remedial Investigation

The identification of solid waste management units (SWMUs) and areas of concern (AOCs) occurred through the RFA (Kearny 1987), the CACA (DTSC 1996), and subsequent research efforts including the February 2005 RFI/RI (CH2M HILL 2005). This document addresses agency comments on the February 2005 RFI/RI as they pertain to site background and history of the Topock Compressor Station, past materials and waste handling practices at the facility, and the identification of the SWMUs and AOCs to be characterized in the RFI/RI.

Since 1996, there have been six phases of investigation at the Topock site to collect data to evaluate the nature and extent of contamination at the SWMUs and AOCs. Much of the focus of investigation in recent years has been on defining the extent of hexavalent chromium in groundwater at the site. Additional investigation is planned to complete the characterization of soil contamination within the fenceline of the compressor station and at units outside the fenceline within and surrounding the PG&E property.

As directed by DTSC (DTSC 2006a), the Final RFI/RI is being separated into three volumes. This document is Volume 1 (Site Background and History). Volume 2 of the RFI/RI will contain groundwater, surface water, pore water, and river sediment data, and Volume 3 will contain soil data. The separation of the Final RFI/RI into three volumes is intended to

efficiently manage the large amount of information associated with the RFI/RI, and to accelerate site remediation by allowing earlier remedial planning of those portions of the RFI/RI completed earlier.

1.2.2 Interim Measure

PG&E began implementing interim measures at the site in March 2004. Initially groundwater was extracted from a monitoring well cluster located on a bench above and to the west of the river floodplain (commonly referred to as the MW-20 bench). This operation was eventually replaced by the existing extraction well system. Groundwater extraction began at wells TW-2S and TW-2D in May 2004, at well TW-3D in December 2005, and at well PE-1 in 2006. Prior to the construction and operation of the current groundwater treatment and extraction systems, a batch treatment plant was located on the MW-20 bench and treated groundwater was transported offsite for disposal at a permitted facility.

Currently, PG&E is implementing Interim Measure Number 3 (IM No. 3) at the Topock site. IM No. 3 consists of groundwater extraction for hydraulic control of the groundwater plume boundaries in the Colorado River floodplain and management of extracted groundwater. Operation of the current groundwater treatment and injection system began in July 2005. The groundwater pumping, transport and disposal activities are considered an IM pursuant to Section IV.A of the CACA. The purpose of the IM is to maintain hydraulic control of the groundwater plume boundaries until the time that a final corrective action is in place at the site. As defined by DTSC, the performance standard for IM No. 3 is to "establish and maintain a net landward hydraulic gradient, both horizontally and vertically, that ensures that hexavalent chromium (Cr[VI]) concentrations at or greater than 20 micrograms per liter (µg/L) in the floodplain are contained for removal and treatment."

Currently, the IM facilities include a groundwater extraction system (four extraction wells TW-2D, TW-3D, TW-2S, and PE-1), conveyance piping, a groundwater treatment plant, and an injection well field for the discharge of the treated groundwater. Of the four extraction wells, two are currently in operation (TW-3D and PE-1). The groundwater treatment system is a continuous, multi-step process that involves reduction of Cr(VI) to the less soluble trivalent form, Cr(III), precipitation and removal of precipitate solids by clarification and microfiltration, and lowering the naturally-occurring total dissolved solids (TDS) using reverse osmosis. Treated groundwater is returned to the aquifer through an injection system consisting of two injection wells, IW-2 and IW-3. The existing groundwater extraction, treatment, and injection systems, collectively, are referred to IM No. 3.

1.2.3 Corrective Measures Study/Feasibility Study

The CMS is the step in the RCRA corrective action process that corresponds to the feasibility study step in the CERCLA process. The results of the RFI/RI are used to define the release and to determine the cleanup objectives. The CMS/FS identifies the technologies that may be effective for remediating past releases and develops different combinations of those technologies into overall remedial alternatives for all or part of the site. Those alternatives are then evaluated based on state and federal selection criteria and used to identify a recommended cleanup approach for the site.

The objective of the CMS/FS at the Topock Compressor Station will be to develop and evaluate corrective measure alternatives and to recommend the most appropriate alternative to manage contaminated groundwater, sediment, and soil, where required. The CMS/FS will define cleanup levels for groundwater, and soil (as applicable) that will be protective of human health and the environment. The CMS/FS will focus on the evaluation of potential cleanup technologies and the development, evaluation, and selection of a recommended alternative that is both protective of human health and the environment and consistent with remedial objectives.

PG&E submitted a draft CMS work plan to DTSC in December 2002 (PG&E 2002a). Simultaneously with RFI/RI investigations and interim measures activities, PG&E has continued to collect information on and preliminarily evaluate remedial technologies for the Topock site. This information will be presented in the CMS/FS. Groundwater corrective measures/remedial actions to be evaluated in the CMS/FS will likely include: monitored natural attenuation; hydraulic control such as through groundwater extraction and/or an impermeable barrier; *in-situ* treatment through chemical and/or biological reducing agents; and *ex-situ* treatment through pumping groundwater to an aboveground treatment facility and treating it by chemical, physical, or biological processes. Soil corrective measure technologies, which will also be evaluated in the CMS/FS, may include institutional controls (deed restrictions), *in-situ* stabilization, capping, and excavation and disposal.

1.3 Purpose and Objectives of the RFI/RI

On February 26, 1996, DTSC issued the CACA based on the RCRA corrective action process. The CACA defines the required actions and documents that must be completed by PG&E for the Topock Compressor Station under the RCRA corrective action process. Since 1996, PG&E has worked through the RCRA corrective action process under the oversight of DTSC.

The Consent Agreement with the federal agencies requires that PG&E prepare an RFI Report that is equivalent to, and complies with all substantive requirements pertaining to, a Remedial Investigation conducted under CERCLA and the NCP, 40 Code of Federal Regulations (CFR) Part 300.

The RFI and CERCLA remedial investigation are similar site characterization programs. Table 1-1 provides a comparison of the site identification and investigative requirements of the RCRA corrective action and CERCLA processes. Where appropriate the regulatory citation is provided along with identification of how the current activities meet the requirements of each program.

1.4 Opportunities for Public Involvement

DTSC, with assistance from PG&E, has an extensive public participation and outreach program addressing corrective action activities at the Topock Compressor Station. The program activities are also in conformance with public participation requirements under CERCLA. These activities include hosting numerous meetings, briefings, and site tours for elected officials; federal, state, county, and city agency staff; and local tribal representatives. Additional activities include conducting community assessments, producing and

distributing fact sheets, maintaining a project website and site mailing list, holding public meetings, conducting site tours and other stakeholder briefings, and updating the Public Participation Plan and project information repositories.

1.4.1 Public Participation Resources

The Public Participation Plan for the project, dated February 2007, is available in the information repositories or from DTSC (DTSC 2007a). DTSC has also prepared communication process documents with the Chemehuevi and Colorado River Indian tribes (DTSC 2007b and DTSC 2007c) and is also working with other tribes on communication protocols. DTSC also maintains local information repositories located in six Mojave Desert cities and tribal reservations. DTSC also maintains a project Web site, www.dtsc-topock.com, which provides activity updates, project documents, locations of the information repositories, opportunities to join the site mailing list or provide comments to DTSC, and other related resources.

1.4.2 Stakeholder Involvement

Although DTSC is the lead agency and is responsible for making decisions with respect to RCRA corrective action activities, DTSC has been working closely with other state and federal regulators and key project stakeholders for many years. A key component of stakeholder involvement in the project is the Consultative Workgroup (CWG), convened by DTSC, which is comprised of over 15 federal, state, and other agencies who provide guidance on technical matters and project activities. Included in the CWG is the Arizona Department of Environmental Quality, with whom DTSC and PG&E coordinate public participation and outreach efforts in Arizona. DTSC coordinates public participation efforts with other stakeholders as appropriate. A full list of CWG members can be found on DTSC's Topock project Web site or in the Public Participation Plan referenced above.

Agency consultations for compliance with federal requirements such as the Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act are conducted separately and are the responsibility of the federal agencies.

1.5 Report Organization

This document is Volume I of the RFI/RI for the Topock Compressor Station (Final Site Background and History), intended to document the historical materials and waste management practices at the Topock Compressor Station and present a complete identification of potential areas for investigation based on the historical information. Characterization of the identified areas for investigation will be presented in Volumes 2 and 3 of the RFI.

Terms defined under RCRA that are used in this report and that correspond to terms defined under CERCLA are intended to be construed to include the CERCLA term. In particular, SWMUs and AOCs identified in this report shall be construed to be facilities where a release or threatened release of a hazardous substances has occurred, as defined under CERCLA. Additional requirements pertaining to a CERCLA remedial investigation report, if not adequately addressed in this report will be addressed in future documents.

The remainder of Volume 1 is organized in the following manner:

- A discussion of the physical characteristics and setting for the project area is provided in Section 2.0.
- Details on facility operations and history, including operational processes, chemical usage, and waste generation and management are provided in Section 3.0.
- Details on SWMUs and AOCs identified at or associated with the compressor station, are described in Section 4.0.
- The status of each SWMU or AOC, or other undesignated area is within the RFI process (i.e., closed, investigation complete/incomplete, or investigation pending) is presented in Section 5.0.
- Documents referenced in the preparation of this report are provided in Section 6.0.

TABLE 1-1
Status and compliance with the site identification and investigative requirements of the RCRA Corrective Action and CERCLA processes
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Activity	RCRA Corrective Action	CERCLA	Topock Compliance with both Regulations
Investigate the Nature and Extent of Contamination, i.e. Conduct Detailed Site Investigations (RFI/RI)	RCRA Facility Investigation (RFI) General purpose of the RFI is to characterize the nature, extent, direction, rate, movement, and concentration of releases, determine the potential need for corrective measures, and aid in selection and implementation of those measures Technical requirements, procedures, and reports The objectives of the RFI as specified in the CACA (DTSC 1996) and other DTSC directives (DTSC 2004a-b), are to: • Provide information pertinent to the facility including current and historical operations, processes, and waste management practices. • Identify and characterize sources of contamination. • Define the nature, degree, and extent of contamination. • Define the rate of movement and direction of contamination flow. • Characterize the potential pathways of contaminant migration. • Identify actual or potential human and/or ecological receptors and evaluate potential impacts to them. • Gather data needed to make decisions on interim measures/stabilization during the early phases of the RFI. • Support development of alternatives from which a corrective measure will be selected by DTSC.	Remedial Investigation (RI) General purpose of the RI is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. (40 CFR 300.430(d)(1)). • 40 CFR Section 300.430(d) requires that the RI adequately characterize the nature of and threat posed by the hazardous substances and materials and assess the extent to which the release poses a threat to human health and the environment. To define potential transport pathways and receptor populations and to support the analysis and design of potential response actions, the RI must assess the following factors: • Physical characteristics of the site to include surface features, soils, geology, hydrogeology, meteorology, and ecology • Characteristics of air, surface water, and groundwater • Source identification and characterization including facility characteristics that identify source locations; quantity of wastes that are contained in, or have been released in the environment; the physical and chemical characteristics of wastes present in the sources • Define exposure pathways and exposure routes • Define other factors, such as sensitive populations, that pertain to the characterization of the site or support analysis of remedial alternatives	Volumes 2 and 3 of the RFI/RI address the requirements under RCRA Corrective Action and CERCLA to characterize the source, nature and extent of contamination at each of the SWMUs and AOCs identified in Volume 1. Volumes 2 and 3 of the RFI/RI also characterize physical properties of the site, and identify potential receptors and exposure pathways. Identification of potential ARARs and potential site-related risk will be documented separately from the RFI/RI Volumes 1, 2, and 3. Treatability studies and identification of applicable technologies, are addressed separately from the RFI/RI Volumes 1, 2, and 3 in support of the RCRA Corrective Measures Study (CMS)/Feasibility Study (FS).

Needles

Topock

PG&E Topock
Compressor Station

Death Valley NP

Las Vegas

Grand Canyon NP

Mojave NPRES

Project Area

San Bernardino

Ontario

Riverside

Joshua Tree NP

Los Angeles Metro Area

San Diego Metro Area

N

0 2 4 6 Miles

1 inch equals 4.0 miles

FIGURE 1-1
PROJECT LOCATION MAP
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

650-151-01

Park Moabi

Colorado River

Havasu National Wildlife Refuge
(Managed by USFWS)

650-151-02

Bureau of Reclamation
(Managed by BLM)

650-151-04

San Bernardino County
(Managed by BLM)

650-151-03

Section 5

650-151-06

650-151-05

Section 6

650-161-02

PG&E

66

650-161-14

Bureau of Reclamation
(Managed by BLM)

40

Privately Owned

650-161-11

Havasu National Wildlife Refuge
(Managed by USFWS)

650-161-09

650-161-12

Bureau of Land Management
(Owned & managed by BLM)

650-161-03

PG&E

650-161-08

Metropolitan Water district of Southern California (MWDSC)

Section 7

Section 8

650-161-06
Section 18

650-161-05
Section 17

Legend

- Parcel Boundary
- Stream
- Railroad
- Highway
- Paved Road
- Dirt or Gravel Road
- Building

Owner

- BN & SF Railroad
- Bureau of Land Management (Owned and Managed by BLM)
- Bureau of Reclamation (Managed by BLM)
- Havasu National Wildlife Refuge (HNWR)
- Metropolitan Water District of Southern California (MWDSC)
- PG&E
- Privately Owned
- San Bernardino County (Managed by BLM)

Note: The boundary lines shown are approximate and for reference only.

Source: San Bernadino County Assessor, Parcel quest, State Board of Equalization, Pacific Gas and Electric Company, Ecology and Environment and Plat maps provided by BLM.

N

0 500 1,000 2,000 Feet

1 inch equals 1,000 feet

FIGURE 1-2
SURROUNDING PROPERTIES

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

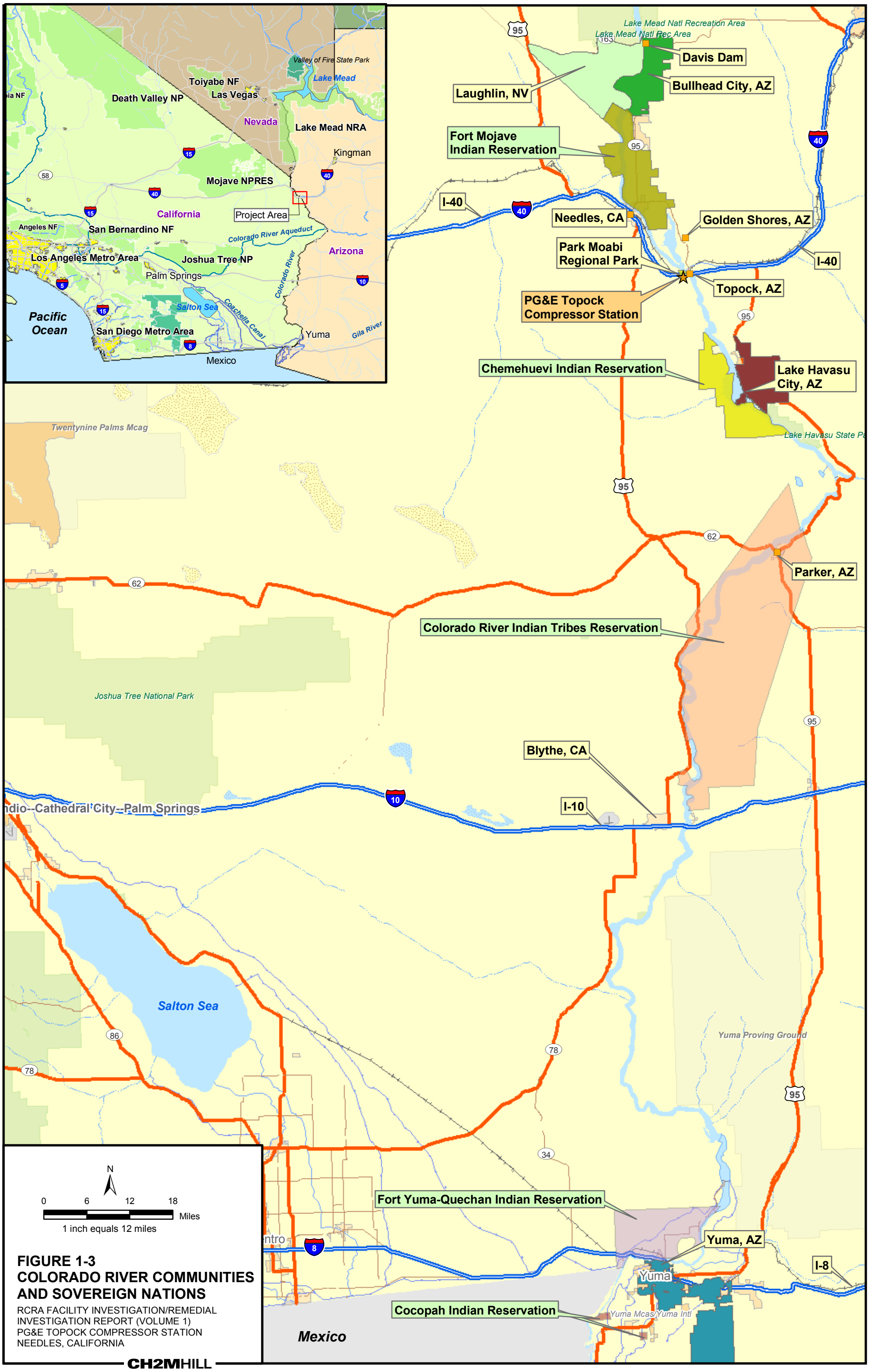


FIGURE 1-3
COLORADO RIVER COMMUNITIES AND SOVEREIGN NATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

2.0 Physical Characteristics and Setting of the Study Area

This section presents a summary of the physical characteristics and setting of the study area based on published geologic and previous technical reports prepared for the site. Surface features, meteorology, site geology, surface water hydrology, site hydrogeology, land use, cultural resources, and ecology are discussed below. Detailed information regarding hydrogeology and groundwater/surface water investigations completed to date for the RFI/RI are presented in Volume 2; soil investigation results are presented in Volume 3.

2.1 Surface Features and Topography

The study area is located in the southern portion of the Mohave Valley, along the California-Arizona border in eastern San Bernardino County, California. The study area is bounded by the Chemehuevi Mountains to the south, Park Moabi Road to the west, and the Colorado River to the east and north. Figure 2-1 shows the surface features and setting of the Mohave Valley and surrounding region. The study area encompasses approximately 3 square miles of the north-sloping piedmont alluvial terrace and floodplain along the northern margin of the Chemehuevi Mountains.

Topography in the study area is abrupt, rising from around 455 feet above mean sea level (msl) along the Colorado River to over 1,200 feet msl within 1 mile to the south and southwest. The Chemehuevi Mountains and drainage area to the south exceed 2,000 feet msl in elevation. As shown in Figure 2-2, the surface topography is characterized by moderate to deeply-dissected alluvial terraces, with elevations ranging from 650 to 500 feet msl, extending northward to the Colorado River floodplain. The Colorado River flows along the eastern and northern boundary of the site at an approximate elevation of 455 feet msl. The compressor station is located south of I-40, on a prominent alluvial terrace, at an elevation of 600 to 625 feet msl.

The land forms in the area are characterized by alluvial terraces and incised drainage channels. One of the largest incised channels is Bat Cave Wash, a north-south dry wash (ephemeral) stream adjacent to the Topock Compressor Station. Bat Cave Wash flows only briefly following intense rainfall events and drains to the Colorado River (Figure 2-2).

Locally, a floodplain borders both sides of the Colorado River, although the river no longer floods due to upstream dams and flow regulation. Topography on the floodplain is subtle, with elevations typically less than 40 feet above the river elevation. The width of the floodplain adjacent to the site averages 500 feet and narrows to the south of the site as the river enters the Topock Gorge where the shoreline becomes consolidated Miocene- and pre-Tertiary-aged bedrock.

Vegetation is very sparse except in portions of the river floodplain. The floodplain overstory predominately consists of non-native tamarisk (*Tamarix ramosissima*) trees. Native tree and shrub species also occur, including arrow weed (*Pluchea sericea*), palo verde (*Cercidium*

microphyllum), and an occasional honey mesquite (*Prosopis glandulosa*) and screwbean mesquite (*Prosopis pubescens*) tree.

2.2 Meteorology

The climate is typical of low desert areas along the Colorado River, with hot summer and mild winter seasons. The nearest weather station is 6.3 miles upriver in the Havasu National Wildlife Refuge (HNWR) and is operated by the BLM. The closest National Weather Service station is at the Needles airport, approximately 7.5 miles northwest of the compressor station.

The average daily maximum temperature ranges from 63.8 degrees Fahrenheit (°F) in January to 108.6°F in July. The average daily maximum temperature exceeds 100°F during June, July, August, and September (NOAA 2000), and rarely does the temperature drop below freezing.

Based on the 30-year period of 1961 through 1990, average precipitation was 4.67 inches per year in Needles. Between 1950 and 1990, the maximum annual rainfall was 9.6 inches (WRCC 2006). In a typical year, rain primarily occurs during summer thunderstorms from July through early September, or during the winter from January to March. May and June are typically the driest months. Figure 2-3 provides a graph of monthly precipitation and average monthly daytime highs and lows for the Needles meteorological station.

As summarized in *Current Conditions Report* (Alisto 1997), the predominant wind direction is south-southwest, with an average speed of 8.8 miles per hour, based on data from the Needles airport. The second most predominant wind direction is north-northwest, with an average speed of 10.7 miles per hour. Wind direction and speed are more variable at the compressor station site and adjoining areas and are largely controlled by the site topography. Station personnel report that winds at the compressor station are predominantly to the southeast (Russell 2006a).

2.3 Site Geology and Stratigraphy

This section summarizes the regional geologic setting and site stratigraphy of the study area based on published geologic studies, maps, and reports. Additional discussion and description of the geologic setting and the site stratigraphic units are presented in Volume 2 of the RFI/RI Report.

2.3.1 Regional Geology

The Topock site and study area are the Basin and Range geomorphic province, characterized by roughly parallel north/south fault-block mountains, separated by alluvial valleys (Figure 2-1). The dominant geologic feature in the vicinity of the site is the Chemehuevi Mountains, one of several metamorphic and plutonic basement core complexes exposed in southeastern California and western Arizona (Miller et al. 1983; Miller and John 1999). The Topock Compressor Station and the study area lie on the north-sloping piedmont terrace along the northern margin of the Chemehuevi Mountains.

Figure 2-4 presents a generalized geologic map of the Topock site and surrounding areas. The geologic features shown on Figure 2-4 include the principal geologic units, geologic contacts, and geologic faults mapped in the study area (Metzger and Loeltz 1973; John 1987; Howard et al. 1997). The oldest rocks in the study area are exposed in the Chemehuevi Mountains and include Precambrian and Mesozoic-age metamorphic and igneous rocks, primarily metadiorite, gneiss, and granite. Miocene-age sedimentary and volcanic rocks—associated with the tectonic uplift and faulting in the region—were deposited on the metamorphic and plutonic bedrock complex (John 1987; Miller and John 1999). Near-surface sedimentary units in the study area include Quaternary- to Recent-age alluvial fan deposits, Pliocene lacustrine deposits, and Tertiary- and Quaternary- to Recent-age fluvial deposits of the Colorado River (Figure 2-4). The alluvial fan and lacustrine deposits are generally found in the western portion of the study area, while the fluvial deposits predominate in the eastern portion of the study area adjacent to the Colorado River. The geologic formations and primary stratigraphic units at the Topock site are described in Section 2.3.3.

2.3.2 Geologic Structure

The most prominent geologic structural feature in the study area is a Miocene-age, low-angle normal fault (referred to as a detachment fault) that forms the northern boundary of the Chemehuevi Mountains (Figure 2-4). The Chemehuevi detachment fault is part of a series of low-angle detachment faults exposed within and surrounding the Chemehuevi Mountains that separate lower plate Precambrian and Mesozoic-age metamorphic and plutonic rocks from overlying upper plate pre-Tertiary metamorphic/plutonic, and Miocene volcanic and sedimentary rocks (John 1987; Howard et al. 1997).

The surface expression of the Chemehuevi detachment fault is evident as the pronounced northeast-southwest lineament that can be traced along the northern boundary of the Chemehuevi Mountains, terminating at the abrupt bend in the Colorado River east of the compressor station (see Figure 2-4 and site aerial photographs in Section 3.0). The surface trace of the detachment fault is partially concealed by younger alluvial deposits in the southwestern portion of the study area.

A major unconformity separates the bedrock formations from the overlying unconsolidated alluvial/fluvial deposits (Metzger and Loeltz 1973). In the area east of the compressor station, the thick-bedded Miocene Conglomerate has structural dip up to 40° to the northeast beneath the unconformity. Overlying alluvial deposits comprising the piedmont terraces are undeformed and have gentle structural dip of approximately 5° to 10° to the north. According to the geologic literature (Howard et al. 1997) and PG&E technical reports (PG&E 1995a), there is no evidence of continued fault movement on the detachment faults or evidence of other more recent active faulting in the study area.

2.3.3 Site Stratigraphy

The definition of geologic units and the stratigraphy at the Topock site is based on the published geologic maps and reports for the study area (Metzger and Loeltz 1973; Howard et al. 1997; John 1987) and PG&E's drilling investigations and other studies (described in Volume 2). For this RFI/RI, the stratigraphic terminology used in published reports has been modified to differentiate the site hydrostratigraphic units observed in the drilling

investigations. The terminology is considered informal stratigraphic unit naming, intended solely for the Topock project RFI/RI.

The geologic and stratigraphic units present in the study area are summarized in Table 2-1. Bedrock formations include pre-Tertiary metamorphic and igneous rocks and the Miocene Conglomerate. Overlying the bedrock formations are alluvial basin-fill deposits that include, from oldest to youngest: Basal Alluvium, Tertiary Alluvium, Bouse Formation, Older Quaternary Alluvium, and Younger Alluvium. The fluvial (river) deposits present at the Topock site include older Colorado River gravels and sediments (assumed Pleistocene-age) and younger Colorado River channel fill and fluvial deposits. Figure 2-5 presents a schematic section illustrating the distribution and relative age of the stratigraphic units encountered in the study area. The geologic formations and primary stratigraphic units are summarized below.

2.3.3.1 Bedrock Units

The consolidated bedrock that underlies the basin-fill deposits consists of Pre-Tertiary metamorphic and igneous rock (primarily grayish metadiorite, gneiss, and granitic rocks) and the Miocene Conglomerate (red-brown, cemented conglomerate, gravelly sandstone, and megabreccia). The metamorphic and igneous rocks are exposed in the Chemehuevi Mountains and surface outcrops immediately south of the compressor station. The Miocene Conglomerate is exposed in outcrops east of the compressor station along the Colorado River (Figure 2-4). In surface outcrops, both bedrock formations are locally fractured and weathered.

2.3.3.2 Tertiary Alluvium Units

Tertiary Alluvium refers to the oldest, undeformed alluvial deposits that overlie the Miocene Conglomerate and older bedrock formations in the study area. These alluvial fan deposits, termed "Tertiary Fanglomerate" by Metzger and Loeltz (1973), are composed primarily of moderately-consolidated sandy gravel and silty/clayey gravel. In surface outcrops west of the compressor station (Figure 2-4), the Tertiary Alluvium is exposed as deeply-dissected alluvial terraces with steep canyon walls. Based on hydrogeologic characteristics observed in the drilling investigations, the Tertiary Alluvium sequence is subdivided into three stratigraphic units: a Basal Alluvium depositional unit (previously referred to as either "Basal Saline unit" or "reworked Miocene Conglomerate"), and overlying lower and upper Tertiary Alluvium units (Figure 2-5).

2.3.3.3 Bouse Formation

The Bouse Formation consists of interbedded silty clay, claystone, and sandstone and is exposed in alluvial terraces and outcrops only in the western portion of the study area. Where present, the Bouse unit separates the Tertiary Alluvium from younger (Quaternary age) alluvial deposits. The Bouse represents a lacustrine (lakebed) deposit left by a Pliocene lake that covered a large portion of Mohave Valley (Howard et al. 1997). Most of the Bouse was eroded away by the Colorado River during Pleistocene and Holocene time. Although the Bouse Formation is exposed in outcrops in the Park Moabi area (Figure 2-4), the Bouse deposits were not encountered in the RFI/RI drilling investigations at the Topock site.

2.3.3.4 Quaternary Alluvium

Older (Pleistocene-age) Quaternary Alluvium, consisting of unconsolidated, sandy gravel and silty/clayey gravel, is exposed in the moderately-dissected alluvial terraces in the study area. The Older Quaternary Alluvium overlies either the Bouse Formation (where preserved in the western area) or the Tertiary Alluvium (where the Bouse was removed by erosion). In outcrop, Quaternary Alluvium is distinguished from older Tertiary Alluvium by alluvial terrace/wash slopes with moderate angle (i.e., 45-degree slopes).

Younger Alluvium includes unconsolidated, sandy gravel, and silty/clayey gravel alluvial deposits of Holocene and Recent age. This stratigraphic unit includes the youngest alluvial deposits (alluvium in streams and washes, recent alluvial/talus deposits, and windblown sand).

2.3.3.5 Fluvial (River) Deposits

Fluvial deposits of the Colorado River are present in surface outcrop and in the subsurface underlying the present Colorado River floodplain and channel. Based on geologic mapping and published reports (Metzger and Loeltz 1973; Howard et al. 1997), the Colorado River fluvial deposits within the study area are grouped into an older sequence (assumed Pleistocene-age) and a younger sequence (Holocene to Recent age). The relative age and informal stratigraphic unit descriptions of the fluvial deposits defined for this RFI/RI are shown on Figure 2-5 and Table 2-1.

Older fluvial sediments and river gravel, designated units Qrs and Qrg in Table 2-1, are exposed only in surface outcrops (above the water table) at the Topock site. The Older River Gravels include sandy, pebble-cobble gravel containing well-rounded clasts of rock types from distant and local sources, and reflects fluvial deposits of the early (Pleistocene-age) Colorado River. Fine-grained sand and silt/clay fluvial deposits (Qrs unit) also occur in surface outcrop remnants on alluvial terraces within the study area (above the water table).

The younger Colorado River fluvial deposits occur within the saturated zone underlying the floodplain and the present Colorado River channel and Topock Marsh area. For the RFI/RI hydrogeologic characterization, the younger fluvial deposits have been subdivided into four depositional units (Qr0, Qr1, Qr2, and Qr3, as depicted on Figure 2-5). The available drilling information indicates that the sediments in the younger fluvial sequence include sandy gravel, gravelly sand, well-sorted fine sand, and silt/clay deposits, which vary in thickness and distribution in the floodplain area.

2.4 Colorado River and Surface Water Features

The primary surface water feature at the site is the Colorado River and its adjacent wetlands and marshes. Figure 2-1 shows the geomorphic setting of the Colorado River and major drainages and surface water features in the region. The river system upstream of Topock, Arizona is characterized by the wide Mohave Valley floodplain, marsh, and alluvial valley. Downstream of Topock, the river traverses the exposed bedrock of the Chemehuevi Mountains of California and the northern portion of the Mohave Mountains in Arizona. The river channel narrows in the area of the Topock Gorge. Sacramento Wash is the principal dry wash surface drainage to the Colorado River from the Sacramento basin in Mohave

County, Arizona. Lake Havasu, formed in 1938 with the closure of Parker Dam, extends approximately 24 miles upstream from the city of Parker, Arizona.

The Colorado River channel ranges from approximately 600 to 700 feet wide in the area upstream of the bridge crossing at Topock. According to the BOR, when profiled near the site in 1994, the river channel was typically less than 9 feet deep with a maximum depth of 21 feet. The last major dredging in this area occurred in 1960 (Metzger and Loeltz 1973).

The flow of the Colorado River is very dynamic, fluctuating seasonally and daily largely due to upstream flow regulation. The flow of the Colorado River at the Topock site is primarily controlled by water releases at Davis Dam on Lake Mohave, approximately 33 miles upstream. River levels at the site fluctuate by 2 to 3 feet per day, and flows vary anywhere from 4,000 to 25,000 cubic feet per second according to the dam releases.

Figure 2-2 shows more detailed surface water features at the site including the Park Moabi inlet/slough, dry wash drainages, and the river floodplain and sand dune shoreline features in the study area. One of the largest incised channels is Bat Cave Wash, a north-south dry wash (ephemeral stream) adjacent to the Topock Compressor Station. Bat Cave Wash flows only briefly following intense rainfall events and drains to the Colorado River.

2.5 Site Hydrogeology and Groundwater Conditions

This section provides a general description of the Alluvial Aquifer and hydrogeologic setting at the Topock site. Additionally, this section presents a general summary of groundwater quality and groundwater flow conditions in the study area. The data and results of the specific hydrogeologic investigations and characterization completed for the RFI/RI are presented in Volume 2.

2.5.1 Hydrogeologic Setting of the Alluvial Aquifer

Following the nomenclature of Anderson, Freethey, and Tucci (1992), the study area is within the Mohave groundwater basin, which is bisected by the Colorado River. Groundwater in the Mohave basin occurs in the Tertiary and younger alluvial basin-fill deposits which include the fluvial deposits associated with the Colorado River. Based on drilling investigations and published reports, bedrock water-bearing zones occur locally where bedrock formations are weathered or fractured. No areas or locations where saturated bedrock formations are capable of significant storage, or sustained production or yield have been identified in the Mohave groundwater basin.

Figure 2-6 presents a schematic cross-section to illustrate the hydrogeologic setting at the Topock site. Groundwater occurs under unconfined to semi-confined conditions within the alluvial fan and fluvial sediments beneath most of the site. The saturated portion of the alluvial fan and fluvial deposits are collectively referred to as the Alluvial Aquifer. In the floodplain area adjacent to the Colorado River, the fluvial deposits interfinger with, and are hydraulically connected to, the alluvial fan sediments. It should be noted that the divisions between the stratigraphic units do not correspond to any aquitards dividing the aquifer. The Alluvial Aquifer at the Topock site is considered to be hydraulically undivided.

The unconsolidated alluvial and fluvial deposits are underlain by the Miocene Conglomerate and pre-Tertiary metamorphic and igneous bedrock with very low permeability; therefore, groundwater movement occurs primarily in the overlying unconsolidated deposits. As noted in Table 2-1, four of the site stratigraphic units—Younger Alluvium, Older Fluvial Sediments, Older River Gravels, and the Bouse Formation—occur above the water table at the Topock site and, hence, are not part of the Alluvial Aquifer at the Topock site.

The water table in the Alluvial Aquifer is very flat throughout the study area and is typically within 1 to 2 feet of the mean river level. Due to the variable topography at the site, the depth to groundwater ranges from as shallow as 5 feet below ground surface (bgs) in floodplain wells next to the river to approximately 170 feet bgs at the upland alluvial terrace areas. The saturated thickness of the Alluvial Aquifer is about 100 feet in the floodplain and thins to the south, pinching out along the Miocene Conglomerate and bedrock surface (Figure 2-6). The available drilling information indicates the saturated Alluvial Aquifer is over 250 feet thick in the central and western areas, and more than 350 feet thick in the northern portion of the study area, where the depth to bedrock increases significantly.

2.5.2 Groundwater Quality Characteristics

The general water chemistry of the Topock study area is dominated by sodium and chloride, with a few exceptions. The TDS content of site groundwater varies considerably, ranging from as low as 300 milligrams per liter (mg/L) to over 40,000 mg/L. Most site monitoring wells are in the 1,000 to 8,000 mg/L TDS range. For comparative purposes, the state of California does not consider groundwater with TDS concentrations above 3,000 mg/L to be a potential source of drinking water. In general, high TDS at the site is associated with bedrock wells, deep alluvial/fluvial wells, and a few shallow fluvial wells. Low TDS is found in shallow floodplain wells located close to the river and in shallow wells in the western portion of the site.

Groundwater samples from both the Miocene Conglomerate and metamorphic/igneous bedrock are sodium-chloride dominated with very high TDS, which ranges from about 8,000 to 13,000 mg/L. Alluvial fan deposits, which comprise the Alluvial Aquifer in all areas of the site except the floodplain, exhibit a wide range of TDS concentrations. In general, groundwater in the alluvial deposits is sodium-chloride dominated and ranges from relatively low TDS (<1,000 mg/L) in shallow water table wells to high TDS (>10,000 mg/L) in deeper portions of the aquifer. Although the fluvial deposits are of different origin than the alluvial deposits, the two are in hydraulic communication and groundwater flows from the alluvial sediments into the fluvial deposits. The general groundwater chemistry in most of the fluvial wells in the floodplain is sodium-chloride dominated with variable TDS, and similar to alluvial deposits in groundwater chemistry. Wells very close to the river and screened at shallow depths reflect Colorado River water chemistry (consistently low TDS averaging about 600 mg/L).

2.5.3 Groundwater Flow Conditions

The Topock site is located at the extreme southern (lower) end of the Mohave Valley along the western floodplain of the Colorado River. Bedrock outcrops to the south and west of the site create barriers to groundwater flow. While the overall trend of groundwater flow

throughout most of the Mohave Valley is southerly, groundwater flow directions at the Topock site are predominantly easterly to northeasterly. Groundwater moving south down Mohave Valley is diverted to an easterly / northeasterly by the low-permeability bedrock of the Chemehuevi Mountains. Because of the relatively high permeability of the aquifer material and the limited amount of groundwater underflow and local recharge, the groundwater gradients at the Topock site are very slight. Thinning alluvial material at this end of the basin acts to force groundwater upward and toward the Colorado River.

2.5.3.1 Surface Water – Groundwater Interaction

The Colorado River is by far the greatest influence on groundwater levels at the Topock site. The stage of the Colorado River varies both daily and seasonally in response to upstream dam discharges regulated by the Bureau of Reclamation to meet water and power delivery obligations. The fluctuations in river stage cause the surface water-groundwater interaction at this site to be very dynamic. Figure 2-7 presents hydrographs for the Colorado River and selected groundwater monitoring wells located varying distances from the river. As shown on the weekly hydrograph, the river level typically fluctuates up to 3 feet in one day, and the wells closest to the river show a corresponding rapid response in groundwater elevation. Water levels in all wells located within several hundred feet from the river typically rise and fall on the order of several feet twice daily due to fluctuations in river stage. Prior to interim measures pumping, which began in March 2004, groundwater could flow toward or away from the river, depending on the river stage.

The influence of river stage on water levels is also evident in the interior wells located more than 2,000 feet from the river. The six-month hydrograph (June 2005 through June 2006) shown on Figure 2-7 further illustrates the seasonal trend in river stage and its influence on groundwater elevations at the site.

2.5.3.2 Horizontal Gradient

Horizontal groundwater flow within the Alluvial Aquifer is primarily easterly across the majority of the site, outside of areas influenced by active IM extraction or injection. In the vicinity of the IM extraction system and floodplain, horizontal gradients are strongly westward towards the actively pumping wells TW-3D and PE-1. In recent 2006 compliance monitoring data, evidence of hydraulic mounding is present in the middle and deep wells around active IM injection well IW-2.

Figures 2-8a through 2-8c present June 2006 groundwater elevation contour maps for the three depth intervals of the Alluvial Aquifer. Figure 2-8a shows the groundwater elevations for shallow wells from a manual water level measurement survey conducted on June 14, 2006. Consistent with previous sitewide maps of shallow wells, flow outside of the IM pumping center is easterly towards the Colorado River, whereas flow on the floodplain is westerly or landward towards the extraction wells.

Figure 2-8b presents groundwater elevation data taken with pressure transducers during the month of June for the mid-depth interval, along with the contours from the June 2006 IM performance monitoring report (CH2M HILL 2006a). Also shown are the groundwater elevations for monitoring wells in the IM injection area. Strong landward gradients towards the pumping center are evident in the floodplain. Mounding from injection into well IW-2 is observed in the adjacent wells (data not contoured).

Figure 2-8c presents groundwater elevation data taken with pressure transducers during the month of June for wells in the deep interval, along with the contours from the performance monitoring report. Also shown are data from the deep monitoring wells in the IM injection area. Induced landward gradients are evident throughout the floodplain, while mounding is present close to injection well IW-2 (data not contoured). The horizontal gradients in all depth intervals of the Alluvial Aquifer are strongly affected by the IM pumping and river elevations.

2.5.3.3 Vertical Gradient

Monitoring well clusters are available at the Topock site to evaluate vertical hydraulic gradients within the Alluvial Aquifer and between bedrock and the Alluvial Aquifer. In areas beyond the influence of active IM extraction or injection, the groundwater elevations in the Alluvial Aquifer wells typically display upward hydraulic gradients.

The data available from bedrock wells indicate upward hydraulic gradients between the bedrock formations and the Alluvial Aquifer. The vertical and horizontal hydraulic gradients observed in the Alluvial Aquifer and bedrock wells indicate that the study area is primarily an area of groundwater discharge, with flow upward and to the east/northeast.

The hydraulic gradients and groundwater flow in the area of the IM extraction system are described and further characterized in the June 2006 IM performance monitoring reports (CH2M HILL 2006b). Additional description of the hydraulic gradients and groundwater flow conditions at the Topock site is provided in Volume 2 of the RFI/RI Report.

2.6 Land Use and Demography

Land use and demography in the area is described in the *Current Conditions Report* for the Topock Compressor Station area (Alisto 1997). The land-use information obtained for that report is still generally applicable and updated and briefly summarized below.

The compressor station is located in a sparsely-populated, rural area. The surrounding land is publicly owned (mostly by the federal government) and has important spiritual meaning to the Fort Mojave Indian tribe and other lower Colorado River Indian tribes Industrial or commercial developments within a 1-mile radius include the existing compressor station and IM No. 3 treatment plant facility. The nearest residents are located in Topock, AZ, a community of about 20 people in a small mobile home park near the Topock Gorge Marina. Most of the residents in Topock are retired senior citizens who live in the area part of the year, typically from late fall through spring. There are also a few permanent homes (i.e., the homes are occupied all year) located on the southern side of I-40.

The largest nearby community is Golden Shores, Arizona (population approximately 3,000), located approximately 8 miles to the northeast and on the opposite side of the Colorado River from the compressor station. The city of Needles, California, with a population of approximately 4,800, is located approximately 15 miles northwest of the facility.

Moabi Regional Park is a recreational facility operated by the San Bernardino County Department of Parks and Recreation. It is located on land leased from BLM and lies approximately 1 mile northwest of the compressor station on the west shore of the Colorado River. The park encompasses approximately 1,050 acres, includes a boat marina and 105

campsites, and provides access to the river for various sport and recreational activities. There are no year-round residents because campers are limited to 5-month stays. The park does not keep records of residency; therefore, the number of people at the park at any given time is unknown.

A major gas utility and transportation corridor is located within the project site. This corridor includes PG&E's two natural gas transmission pipelines, four natural gas transmission pipelines operated by other companies, the Burlington Northern Santa Fe Railway, and the I-40 freeway. Other developed land uses within the project site include, National Old Trails Highway, former Route 66, and various unnamed access roads. In addition, numerous groundwater well clusters, related to the ongoing groundwater investigation activities, are located throughout the site.

The HNWR encompasses approximately 37,515 acres along the Colorado River in Mohave and La Paz Counties, Arizona and in San Bernardino County, California (USFWS 2006). Most of the refuge extends from the upper end of Topock Marsh southward to the head of Lake Havasu on the Arizona side of the river. A small portion of the refuge borders the compressor station. Recreational activities at the HNWR include sightseeing, bird watching, fishing, hunting, camping and canoeing. Prior damming and channelization of the Colorado River have significantly altered the aquatic, marsh, and riparian habitats associated with the river. These water control and diversion actions have contributed to increased housing development along the river and facilitated an increase in the amount of river-related recreation (including watercraft, fishing, and hunting).

2.7 Cultural Resources

The study area lies within the Lower Colorado River Valley, a large area with important cultural and/or spiritual meaning to Native American Tribes. The area is the homeland of the Aha Makav, or Mojave tribe, and a place of great traditional and spiritual use that knows no physical boundaries for the Mojave. The plants, the animals, the river, the landforms, and the material remains of the past all hold deep meaning.

2.7.1 Ethnography and Ethnohistory

The Aha Makav were agricultural people who occupied the Colorado River Valley from just below Black Canyon (Hoover Dam) to the mouth of the Bill Williams River (near Parker Dam, Arizona). The core of the Mojave territory was the Mohave Valley (Stewart 1983). Mojave ethnography and ethnohistory have been documented by Kroeber (1925, 1974), Castetter and Bell (1951), Stewart (1983), Sherer (1994), and Furst (2001), and are summarized by CH2M HILL (2004).

The Aha Makav were generally far removed from the sixteenth- and seventeenth-century Spanish influences that affected the native inhabitants of western and southwestern North America. Although the first known contact with Spaniards occurred relatively early, when Juan de Oñate encountered the Mojave in 1604, no missions or Spanish settlements were ever established in the territory. They retained their autonomy and continued their traditional lifeways until the mid-nineteenth century, when the flow of emigrants en route to California began to increase. A United States military post—later named Fort Mojave—

was established in the area after the Aha Makav reportedly had attacked a wagon train bound for California in 1858.

Three federally-recognized tribal organizations currently hold large reservations in the general area. The Fort Mojave Indian Tribe of Arizona, California and Nevada holds 32,959 acres north of Needles. The Indian Tribe of the Chemehuevi Reservation, California has a reservation of 30,653 acres south of the project area along Lake Havasu. Farther south, the Colorado River Indian Tribes of the Colorado River Indian Reservation, Arizona and California hold 134,500 acres in California and Arizona. Six other tribes were consulted by the BLM: Quechan Tribe of the Fort Yuma Indian Reservation, California & Arizona; Cocopah Tribe of Arizona; Havasupai Tribe of the Havasupai Reservation; Hualapai Indian Tribe of the Hualapai Indian Reservation; Yavapai-Prescott Tribe of the Yavapai Reservation; and Twenty-Nine Palms Band of Mission Indians of California.

2.7.2 Prehistory

The prehistory and archaeology of the area are not well understood by archaeologists for various reasons. Dispersed settlement patterns, poor conditions for preservation, the destruction or inundation of sites during dam and reservoir construction, and limited inventory and investigation of known sites have contributed to the lack of knowledge about the region. Based on investigations in the areas to the east and west, most archaeologists agree that initial occupation occurred during terminal Pleistocene time, and that Paleoindian adaptations were replaced by Archaic hunter-gatherers some 7,500 years ago. Around 1,500 years ago, Archaic adaptations gave way to the intensified agricultural practices followed by the historic Yuman inhabitants of the study area.

Among others, Rogers (1945), Irwin-Williams (1979), Schroeder (1979), McGuire and Schiffer (1982), Moratto (1984), and Huckell (1996) have offered syntheses of local prehistory and archaeology. These are summarized in some detail by CH2M HILL (2004) and Applied EarthWorks (2005).

2.7.3 History

As summarized by CH2M HILL (2004), the principal historical themes related to the study area are transportation and energy development. Between 1846 and 1869, the US military surveyed the area for wagon roads and, in 1857, Captain Edward Beale surveyed a route between Fort Defiance, New Mexico and the Colorado River (Jackson 1964). Beale's wagon road, however, reached the river about 20 miles north of the project area at the north end of the Mohave Valley. Early wagon routes crossed the river at that point and continued west toward Barstow.

The Southern Pacific Railroad first bridged the Colorado River near Needles in 1883. A crossing near Topock was not built until 1890, when the Red Rock Bridge replaced several earlier structures near Needles that had been repeatedly washed away by the river (Rowe 1947). An automobile ferry was built the same year but could not survive the river's swift currents and many shoals. The Old Trails Arch Bridge, a highway bridge erected in 1916, became part of the National Old Trails Highway, the precursor to Route 66.

Subsequent transportation developments included the establishment of the original Route 66 in the 1920s; a mid-1940s realignment and expansion of the railroad right-of-way

(including the construction of a new railroad roadbed and bridge); and the rerouting of Route 66 to the old railroad roadbed and bridge. Additional federal highway construction occurred in the 1950s, and I-40 was built in the 1960s. Today the project area remains an important transportation corridor, with railroad traffic using the Burlington Northern Santa Fe Railroad bridge, truck and automobile traffic crossing the river on the I-40 bridge, and natural gas passing through several large interstate pipelines.

No features associated with ranching, farming, or historical settlements are located in the study area. The project area does contain several abandoned segments of the National Old Trails Highway and Route 66 and some associated features and refuse deposits. A portion of the National Old Trails Highway and Route 66 is currently used as the entrance road to the compressor station. The "Teapot Dome" restaurant and gas station was formerly located on a stretch of the National Old Trails Highway/Route 66 on a bench above the river just west of the Old Trails Arch Bridge. The former site of the Teapot Dome is located at the very northeast of corner of the compressor station. It is unknown when the Teapot Dome was built; however, based on aerial photography, the Teapot Dome was present at the site in 1936 (the earliest aerial photograph available). It was still present in 1947 but appears to have been demolished prior to, or during construction of, the compressor station in 1951.

2.7.4 Previous Archaeological Surveys

Between the mid-1970s and 2004, nine archaeological surveys were conducted within the project area. The first survey was conducted by Arizona State University (Fryman 1976); the study identified 16 cultural sites or features. Other important studies included Van Bueren (1986) who recorded an abandoned section of the original Route 66 between Park Moabi Road on the west and existing U.S. Route 66 on the east and Peyton's (1986) study that focused on the Topock Maze.

More recently, CH2M HILL (2004) inventoried approximately 155 acres of the study area. In total, CH2M HILL (2004) documented eight newly discovered sites and revisited three others. In addition, the survey identified five new features associated with Route 66.

In 2004 and 2005, Applied EarthWorks (2005) conducted a cultural resources survey of an approximately 1,528-acre area. A total of 149 prehistoric and historic resources have now been documented; this includes 136 prehistoric archaeological sites and 13 historic resources. In addition, 33 isolated finds (32 prehistoric and one historic) were also documented.

The Topock Maze is an important archeological feature located within the project site. The maze was created by modifying the desert landscape through creation of long parallel rows of stacked or piled dark colored desert-varnished rocks. These dark lines alternate with light bands formed where the varnished desert pavement was removed. The resultant pattern, also called the "Mystic Maze," carries cultural and spiritual significance for the Fort Mojave Indian tribe. One of the three manifestations of the Maze in the vicinity was included in the National Register of Historic Places in 1978 for its unique scale and design and for its potential to provide data on geoglyph (ground markings) construction and use. Although the physical aspects of the Maze have been damaged by highway and railroad construction, and other forms of modern land use, the entire area originally occupied by the Maze holds important spiritual meaning to the Fort Mojave Indian tribe.

The vast majority of recorded prehistoric cultural resources are located north of Interstate 40 (I-40) and the Burlington Northern-Santa Fe Railroad on dissected terraces and mesa tops and edges. According to Applied EarthWorks (2005), the 136 prehistoric sites that occur within the surveyed area consist of 57 lithic assay stations, 34 lithic assay/reduction stations, and 17 lithic quarry/assay/reduction areas. Other prehistoric site types documented within the project area include: lithic reduction areas (6); desert geoglyph/intaglio sites (4); possible temporary camps (3); trail alignments (3); rock alignments (3); simple lithic scatters (2); lithic assay/reduction stations that also contain prehistoric ceramics (2); rock rings (2); one complex lithic scatter (i.e., a site containing both flaked stone and ground stone artifacts); one ceramic scatter; and one rock shelter.

Historical resources documented in the 155-acre survey area (CH2M HILL 2004) include various segments of the oil and soil roadbed of the original 1926-1947 alignment of United States Route 66 and associated features, and a segment of the 1947-1966 paved alignment of United States Route 66 (currently National Trails Highway). Segments of the prepared gravel roadbed of the National Old Trails Highway and associated features are within the survey area. Also in the survey area are the razed remains of the El Rancho Colorado Roadhouse and Gas Stop, located along the 1947–1966 paved alignment of United States Route 66, and a tourist rest stop located along a newly recorded segment of the National Old Trails Highway, which is directly adjacent to Locus C of the Maze. Other historical resources include a segment of the 1890–1947 Atlantic & Pacific/Atchison Topeka & Santa Fe Railroad (AT&SF) Right-of-Way which was capped by the 1947–1966 paved alignment of United States Route 66, and a short segment of a railroad grade or siding within the survey area. Other historic sites are detailed in the CH2M HILL report (2004) and Applied EarthWorks (2005).

2.8 Ecology Resources

The area is characterized by arid conditions and high temperatures. The site consists of a series of terraces divided by dry desert washes. The landscape within the proposed project area is considerably eroded and can most suitably be described as badlands. The lands are made up of small- to moderately-sized terraces with very steep slopes. Terraces occurring in the project area are homogeneous, comprising rocky soils with very sparse vegetation.

The Colorado River is the primary aquatic habitat. The river is approximately 700 to 900 feet wide and 8 to 15 feet deep in this area. The main surface water drainage from the project area into the Colorado River is from Bat Cave Wash and a large unnamed desert wash with several tributaries located to the west. These ephemeral desert washes are dry most of the year.

As described in *Current Conditions Report* (Alisto 1997), the site is located either within the Mojave Desert province of California (Vasek and Barbour 1977), the Colorado Desert (Rowlands et al. 1982), or the boundary between these two deserts (Johnson 1976). However, the boundary between these deserts in this area is rather arbitrary, having a broad transition area (Vasek and Barbour 1977). Structurally-diverse vegetation in the project area is primarily limited to the Colorado River floodplain and the ephemeral washes.

Plant and wildlife species that are listed as threatened or endangered by the USFWS and species having equivalent status under the California Department of Fish and Game are provided protection under the Federal Endangered Species Act (FESA) and California Endangered Species Act, respectively. Critical habitat for a listed species is defined by FESA as specific areas within the geographic range of the species that contain the physical and biological features that are essential for the conservation of the species.

Federal agencies are required, under Section 7 of FESA, to consult with the USFWS for any federal action that may adversely affect listed species or modify critical habitat. A biological opinion is issued by the USFWS to determine if the action will jeopardize the continued existence of the species. PG&E has been issued a non-jeopardy biological opinion for ongoing maintenance activities PG&E's gas pipeline system in the California desert on lands managed by the BLM and its effects on the desert tortoise (*Gopherus agassizii*) and its critical habitat (USFWS 2000).

2.8.1 Flora

There are five types of plant communities in the vicinity of the project area, with the boundary between these communities characterized by a transitional zone in which representative species from each community are found. The plant communities at the site consist of Mojave creosote bush scrub, Mojave wash scrub, desert riparian, tamarisk thicket, and freshwater marsh.

- Mojave Creosote Bush Scrub: The dominant plant community is creosote bush scrub. The area is sparsely vegetated with widely-distributed creosote bushes (*Larrea tridentata*). Other plant species that occur within this plant community include burrobush (*Ambrosia dumosa*), allscale (*Atriplex polycarpa*), split grass (*Schismus* sp.), spineflower (*Chorizanthe* sp.), desert trumpet (*Eriogonum inflatum*), beavertail cactus (*Opuntia basilaris*), golden cholla (*Opuntia echinocarpa*), brittlebush (*Encelia farinosa*), cheesebush (*Hymenoclea salsola*), dalea (*Dalea mollisma*), red barrel cactus (*Ferocactus pilosus*), sweetbush (*Bebbia juncea*), and ratany (*Krameria erecta*). Also, during normal to wet years, dense growth of annuals occurs, including brittle spineflower (*Chorizanthe brevicornu*), buckwheat (*Eriogonum sp.*), plantain (*Plantago sp.*), Mediterranean grass (*Schismus sp.*), scattered pebble pincushion (*Chaenactis carphoclinia*), langloisia (*Langloisia setosissma*), peppergrass (*Lepidium sp.),* and Arizona lupine (*Lupinus arizonicus*).

- Mojave Wash Scrub: Another common community of the Mohave Desert, it is found in the sandy, gravelly bottoms of the washes and drainages in the area. The wash floors are relatively barren of vegetation and have a sand, gravel, and cobblestone substrate. Although the drainages occur within the creosote bush scrub plant community, these ephemeral washes contain small patches of acacia *(Acacia* and*greggii),* smoke tree (*Dalea spinosa*), palo verde (*Cercidium microphyllum*), and honey mesquite (*Prosopis glandulosa*). Additionally, this community typically consists of scattered sweetbush and burrobush, with occasional *brittlebush (Encelia farinosa*), wire-lettuce (*Stephanomeria pauciflora*), desert-lavender (*Hyptis emoryi*), and creosote bush. Common annuals include Mediterranean grass, Arizona lupine, brittle spineflower, and phacelia (*Phacelia sp.*).

- Desert Riparian: Desert riparian habitat exists at the confluence of Bat Cave Wash and other washes with the Colorado River. This plant community comprises scattered honey

mesquite (*Prosopis glandulosa*), palo verde (*Cercidium microphyllum*), and tamarisk (*Tamarix ramosissima*) amongst drifting sand dunes.

- Tamarisk Thicket: Tamarisk thicket exists along the shoreline of the Colorado River. This plant community consists of dense monotypic stands of tamarisk. This exotic plant has invaded several riparian habitats. Although this plant species is not known to provide optimal wildlife habitat, it does provide a roosting structure for several avian species.
- Freshwater Marsh: Little submergent vegetation exists within the river. Submergents include hydrilla (*Hydrilla verticillata*) and eel grass (*Zostera sp.*). Bat Cave Wash and other unnamed washes empty into freshwater marshes adjacent to the Colorado River. Like other freshwater marshes associated with the river, this community is characterized by perennial, emergent monocots that form completely closed canopies and is dominated by bulrush (*Scirpus sp.*) and cattail (*Typha sp.).* Other species typical of this community include woolly sedge (*Carex lanuginosa*), sedge (*Carex sp.*), spikerush (*Eleocharis sp.*), hydrocotyle (*Hydrocotyle sp.*), and common reed (*Phragmites australis*).

The slender-horned spineflower *(Dodecahema leptoceras)* is listed as an endangered plant species by the California Department of Fish and Game and the USFWS. This plant may occur in the Mojave creosote bush scrub and Mojave wash scrub communities within 1 mile of the project site. Additionally, the BLM has identified several sensitive plants, including the ocotillo (*Fouquieria splendens*), palo verde, acacia, mesquite, and all cactus species. The following BLM-listed sensitive species occur at the project site: ocotillo, palo verde, acacia, mesquite, golden cholla, and beavertail cactus.

2.8.2 Fauna

The aquatic habitat of the Colorado River supports several fish species listed as endangered, including the Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), and bonytail chub (*Gila elegans*). Additionally, game fish species, including striped bass (*Morone saxatillis*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), white crappie (*Pomoxis annularis*), flathead catfish (*Pylodictis olivaris*), and channel catfish (*Ictalurus punctatus*), were introduced into the river. Avian species commonly associated with the river include American coot (*Fulica americana*), mallard (*Anas platyrhynchos*), pied-billed grebe (*Podilymbus podiceps*), great egret (*Casmerodius albus*), great blue heron (*Ardea herodias*), and belted kingfisher (*Ceryle alcyon*). Mammalian species may include coyote (*Canis latrans*), striped skunk (*Mephitis mephitis*), beaver (*Castor canadensis*), and raccoon (*Procyon lotor*).

Terrestrial wildlife diversity and abundance are considered low at the site. In addition, due to the disturbed nature of the land at the project site and adjacent natural barriers such as the Chemehuevi Mountains and Colorado River, a continuous wildlife corridor is not available. This greatly inhibits movement of terrestrial wildlife species onto the site. However, the occurrence of trees and patches of native vegetation near the Colorado River may provide limited habitat for avian species and other common wildlife species.

Although the tamarisk thicket provides habitat and nest sites for some wildlife, many biologists conclude that it provides low-quality habitat for most native amphibians, reptiles, birds, and mammals. However, some literature has documented southwestern willow flycatchers (*Empidonax traillii extimus*), which are listed as endangered, as nesting in the

tamarisk thickets near watercourses, including the Colorado River (McLeod et al. 2005). Although tamarisk is not known to provide optimal wildlife habitat, the trees appear to provide the only significant roosting and nesting structure due to limited structural tree diversity in the area.

The terrestrial habitat supports various wildlife species. Reptiles that may occur in the area include chuckwalla (*Sauromalus obesus*), side-blotched lizard (*Uta stansburiana*), western whiptail lizard (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert iguana (*Dipsosaurus dorsalis*), coachwhip (*Masticophis flagellum*), gopher snake (*Pituophis melanoleucus*), western diamondback rattlesnake (*Crotalus atrox*), and Mojave rattlesnake (*Crotalus scutulatus*). Avian species include red-tailed hawk (*Buteo jamencensis*), California quail (*Callipepla californica*), mourning dove (*Zenaida macroura*), common raven (*Corvus corax*), song sparrow (*Melospiza melodia*), Canyon wren (*Catherpes mexicanus*), and brewer's blackbird (*Euphagus cyanocephalus*). Small mammals may include deer mouse (*Peromyscus maniculatus*), Merriam's kangaroo rat (*Dipodomys merriami*), desert woodrat (*Neotoma lepida*), California ground squirrel (*Spermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*), and black-tailed hare (*Lepus californicus*). Predators may include coyote (*Canis latrans*), desert kit fox (*Vulpes macrotis)*, American badger (*Taxidea taxus*), and bobcat (*Lynx rufus*).

2.8.3 Threatened or Endangered Species

Several threatened or endangered species (state-listed and federally-listed) could occur in or near the project area.

The desert tortoise (*Gopherus agassizii*) is the only threatened (state and federal) wildlife species that could occur in the Mojave creosote bush scrub or Mojave wash scrub communities. Designated critical habitat for the desert tortoise is not located within the study area but is within the project region. Threats to the tortoise include predation, disease, and habitat loss. The 2005 and 2006 tortoise protocol surveys have not detected recent activity of the species within the study area. However, several old desert tortoise carcasses have been documented within the study area indicating historical use.

The listed threatened or endangered wildlife species that could occur within the riparian plant community in the study area vicinity include the endangered (state) western yellow-billed cuckoo *(Coccyzus americanus occidentalis)*, the endangered (state) and threatened (federal) bald eagle *(Haliaeetus leucocephalus)*, the endangered (state) Gila woodpecker *(Melanerpes uropygialis)*, the endangered (state) elf owl *(Micrathene whitneyi)*, and the threatened (state) Arizona Bell's vireo *(Vireo bellii arizonae)*. In addition, the endangered (federal and state) southwestern willow flycatcher has historically been observed breeding along the Colorado River. According to the Southwestern Willow Flycatcher Recovery Plan, the largest breeding population (21 territories) currently known along the Colorado River is found at Topock Marsh (USFWS 2002) located approximately 1.3 miles northeast of the project site. Designated critical habitat for the southwestern willow flycatcher does not exist within the study area. The 2005 and 2006 flycatcher protocol surveys have not positively detected this species within the study area.

Within the freshwater marsh habitat, a listed species that occurs in the study area is the threatened (state) and endangered (federal) Yuma clapper rail *(Rallus longirostris yumanensis)*. Habitat requirements for the rail comprise large areas of emergent marsh

containing cattails and bulrush that are dissected by narrow water channels. Habitat loss is a major threat to the rail. Critical habitat has not been designated for this species. Based on past USFWS protocol surveys, this avian species has been observed at the Topock Marsh and Marina on the Arizona side of the Colorado River.

The fish species that are federally listed as threatened or endangered wildlife species that may occur within the Colorado River in the study area vicinity include the bonytail chub *(Gila elegans)*,[1] Colorado pikeminnow *(Ptychocheilus lucius)*, and the razorback sucker *(Xyrauchen texanus)*. Designated critical habitat for the bonytail chub is within the study area. Threats to these species include predation by introduced game fish species, poor water quality and flows, dams, and poor land management.

The Nelson's bighorn sheep (*Ovis canadensis nelsoni*) is not listed under FESA or California Endangered Species Act. However, it is a California species of concern. This species inhabits steep, rocky terrain in the higher mountains of the area including the White, Chocolate, Chemehuevi, and Sacramento Mountains. The sheep do not inhabit the lowlands near the river. The primary threat to the sheep is disease.

[1] This fish is also often referred to as the bonytail.

TABLE 2-1
Site Hydrostratigraphic Units, June 2006 Update
RCRA Facility Investigation/Remedial Investigation Report (Volume 1)
PG&E Topock Compressor Station

Stratigraphic Age	Site Hydrostratigraphic Units			
	Alluvial Deposits		Fluvial Deposits	
Holocene	**Younger Alluvium** surficial deposits & recent alluvial sediments in washes	**Qya**	**Upper Fluvial Sand & Silt** (Floodplain Area)	**Qr3**
			Middle Fluvial Deposits (Floodplain Area)	**Qr2**
			Lower Fluvial Deposits (Floodplain Area)	**Qr1**
			Colorado River Channel Fill fluvial deposits in paleo-channel	**Qr0**
Pleistocene	**Older Quaternary Alluvium** alluvial terraces, composed of unconsolidated sandy gravel & silty/clayey gravel	**Qoa**	**Older Fluvial Sediments** (surface outcrop)	**Qrs**
			Older River Gravels (surface outcrop)	**Qrg**
Pliocene	**Bouse Formation (Tb)** lacustrine deposits (clay & sand)			
Pliocene to Late Miocene Late Miocene	**Tertiary Alluvium - Upper**	**Toa2**	Moderately consolidated, undeformed, older alluvial fan deposits (sandy gravel, gravelly sand, silty/clayey gravel) = Tertiary Fanglomerate of Metzger & Loeltz, 1973	
	Tertiary Alluvium - Lower	**Toa1**		
	Basal Alluvium	**Toa0**		
angular unconformity (post-extension erosion)				
Middle Miocene	**Miocene Conglomerate**	**Tmc**	consolidated conglomerate & sandstone containing rock fragments & megabreccia derived from Chemehuevi Mountains	
unconformity & detachment faulting				
Pre-Tertiary	**Metamorphic & Igneous Bedrock**	**pTbr**	metadiorite, gneiss & granitic bedrock exposed in Chemehuevi Mountains & underlying the groundwater basin	

Notes:

1. Hydrostratigraphic units that comprise the Alluvial Aquifer in the Topock site area are shaded yellow.
2. Bedrock formations, grey shaded, are essentially impermeable but may locally yield water where fractured.
3. Within the Topock site area, the Bouse Formation, Younger Alluvium, Older Fluvial Sediments and Older River Gravels occur above the water table.
4. Stratigraphic age assignments are from published geologic reports and are generalized for units in the study area .

Black Mountains
Yucca
Mojave Valley
Sacramento Valley
I-40
Needles
CALIFORNIA
ARIZONA
Golden Shores
Topock Marsh
Sacramento Mountains
Colorado River
Topock
Sacramento Wash
I-40
PG&E Topock Compressor Station
Topock Gorge
Chemehuevi Mountains
Mohave Mountains
Lake Havasu

N

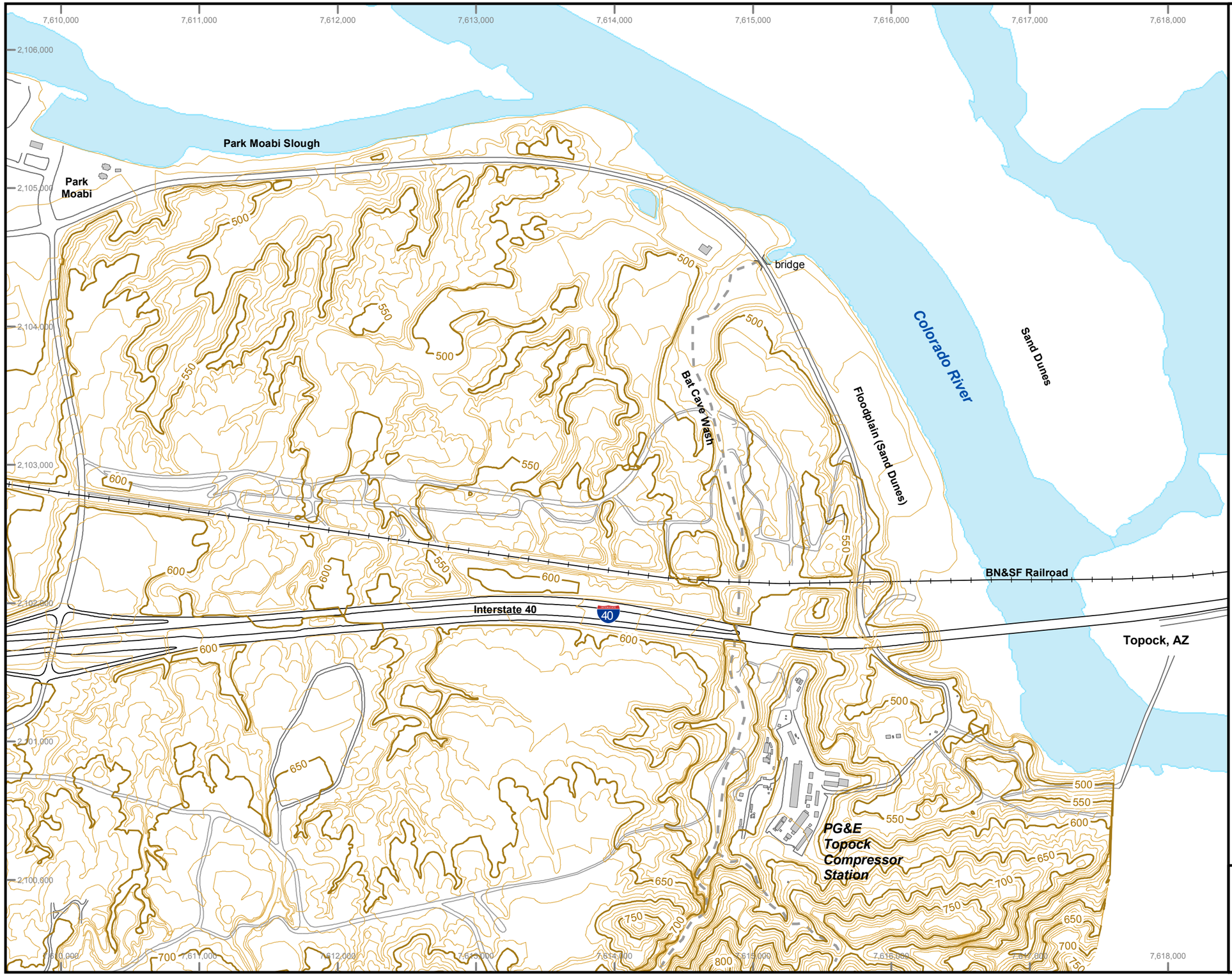
0 2.5 5 Miles

1 inch equals 2.5 miles

FIGURE 2-1
REGIONAL SURFACE FEATURES MAP

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Source: Topographic data from E & E, Inc., 1994, with additional aerial topographic mapping flown April, 2004 (CH2M HILL)

California State Plane, NAD 83, Zone 5, US Feet
Contour interval is 10 feet, with indices at 50 feet.

N

0 350 700 1,400 Feet

1 inch equals 700 feet

FIGURE 2-2
SITE TOPOGRAPHY
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

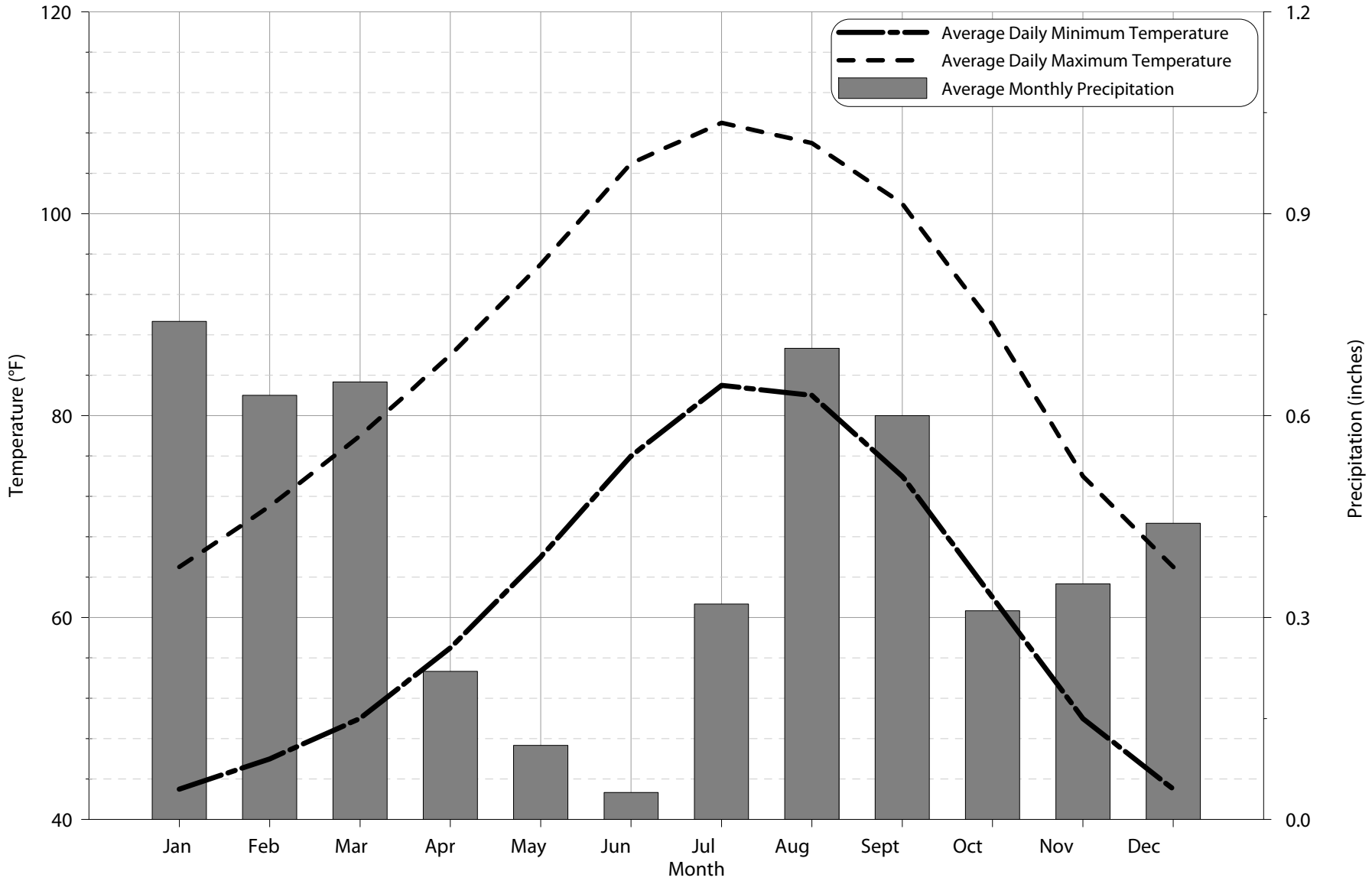


FIGURE 2-3
AVERAGE TEMPERATURE AND PRECIPITATION
NEEDLES AIRPORT
RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

Notes:
Meteorological data from Needles, CA Airport.
Data available from http://www.weather.com/activities/other/other/weather/climo-monthly.html?locid=USCA0753.

CH2MHILL

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ES072006003BAO_RFI-Fig 2-3_PrecipTemperature.pdf_81006_ll

TOPOCK MARSH

COLORADO RIVER

PARK MOABI

BAT CAVE WASH

BN&SF RAILROAD

TOPOCK, ARIZONA

PG&E TOPOCK COMPRESSOR STATION

Needles Graben (Quaternary-age fault structure) located approximately 6 miles north of study area

El Paso Natural Gas Mojave Topock Compressor Station

Chemehuevi Fault (concealed)

Chemehuevi Fault

Mohave Wash Fault

LEGEND

- Qrf = Quaternary Colorado River and recent Floodplain Deposits
- Qrg = Quaternary River Gravels
- Qa = Quaternary Alluvium and surficial deposits, undifferentiated
- Tb = Bouse Formation
- Toa = Tertiary Alluvium (Fanglomerate of Metzer and Loeltz)
- Tmc = Miocene Conglomerate (Bedrock)
- pTbr = Pre-Tertiary Bedrock (Metadiorite, Gneiss, Granitic Rocks)

- Normal Fault, ball on downthrown side
- Detachment Fault, barbs on downthrown side
- Detachment Fault concealed

NOTE:
Generalized surface geologic map compiled from Metzger and Loeltz (1973), John (1987), Howard and others (1997) and PG&E technical reports.

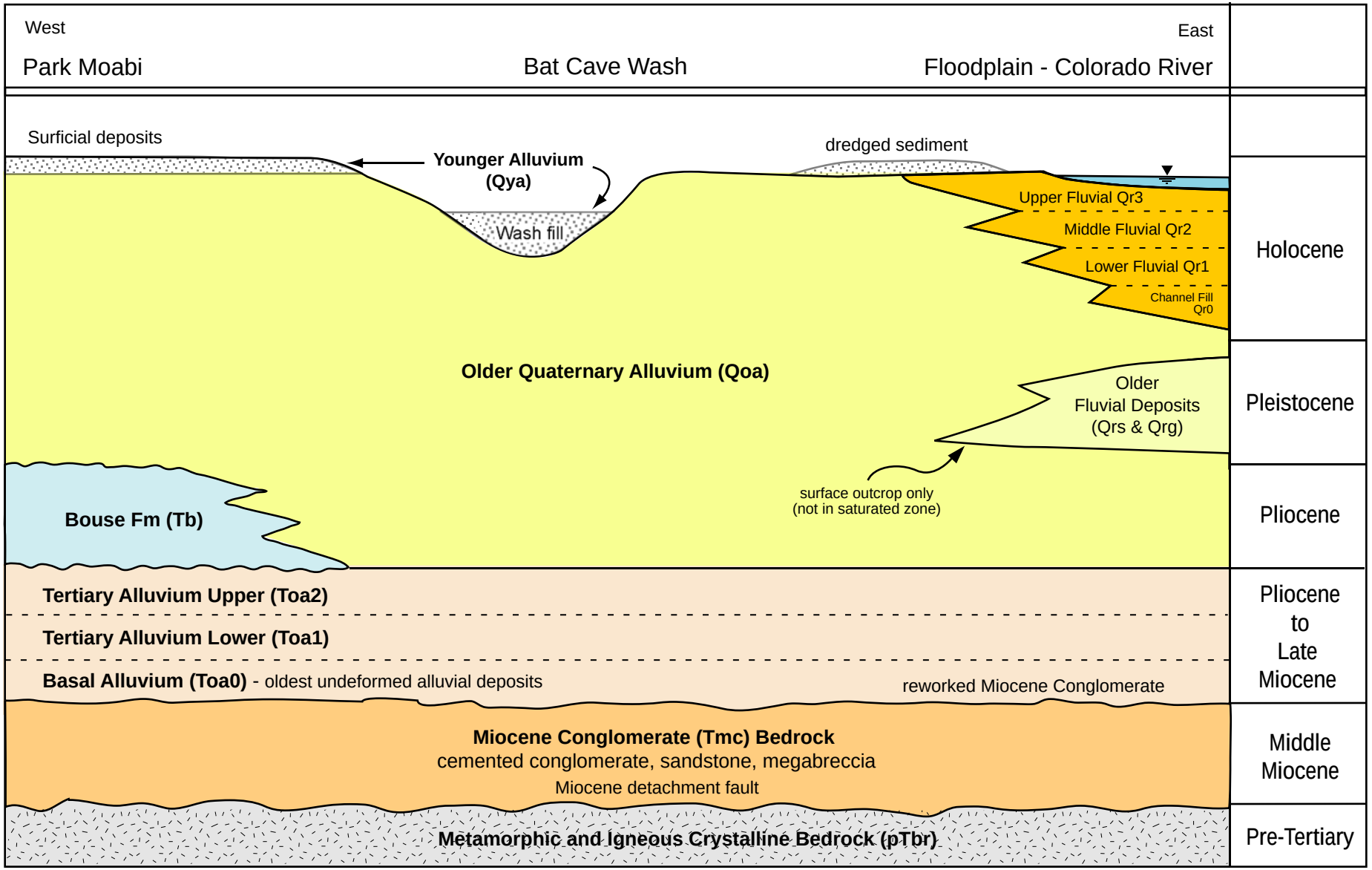
N

0 1,500 3,000 Feet

1 inch equals 1,500 feet

FIGURE 2-4
GEOLOGIC MAP OF STUDY AREA
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



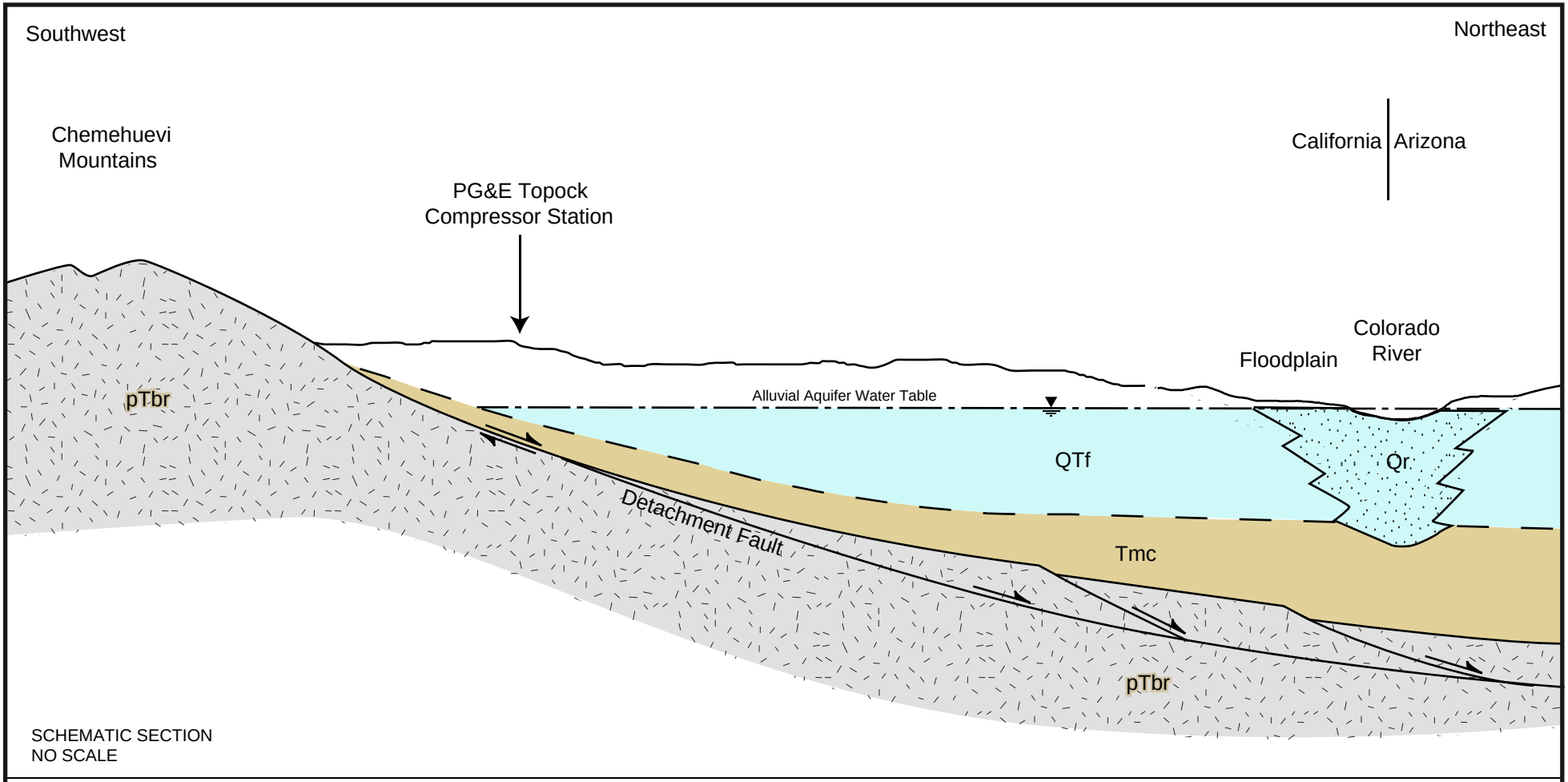
Schematic section illustrating distribution and age of stratigraphic units.
No scale implied.
Refer to Table 2-1 for stratigraphic unit descriptions.

UPDATED JUNE 2006

FIGURE 2-5
SCHEMATIC STRATIGRAPHIC SECTION
RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

ES072006003BAO_RFI-SchemStratSection.ai_80806_ll



PRIMARY GEOLOGIC UNITS

QTf	Alluvial Fan Deposits (Qoa, Toa units)	**Alluvial Aquifer**
Qr	Colorado River Fluvial Deposits (Qr0, Qrl, Qr2, Qr3 units)	
Tmc	Miocene Conglomerate	**Bedrock**
pTbr	Metamorphic and Igneous Rocks	

FIGURE 2-6
REGIONAL HYDROGEOLOGIC CROSS SECTION
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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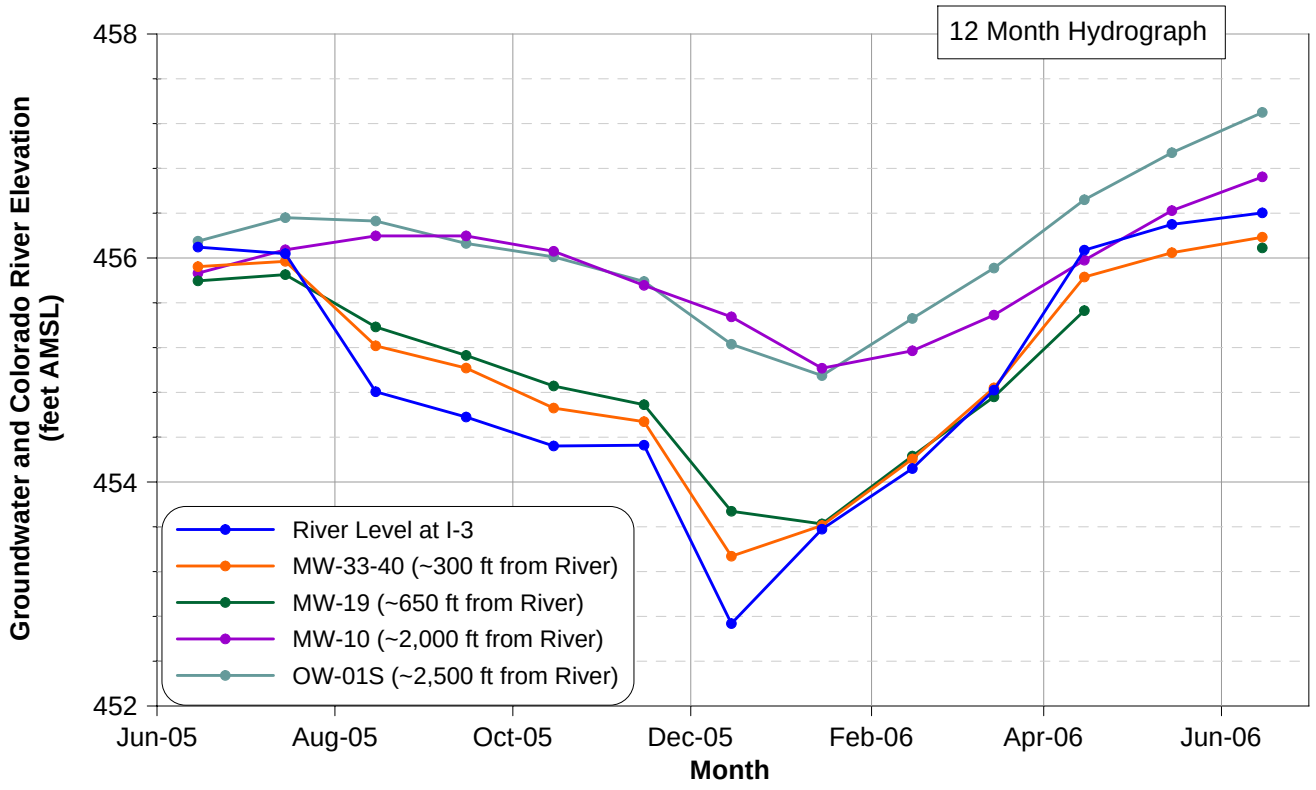

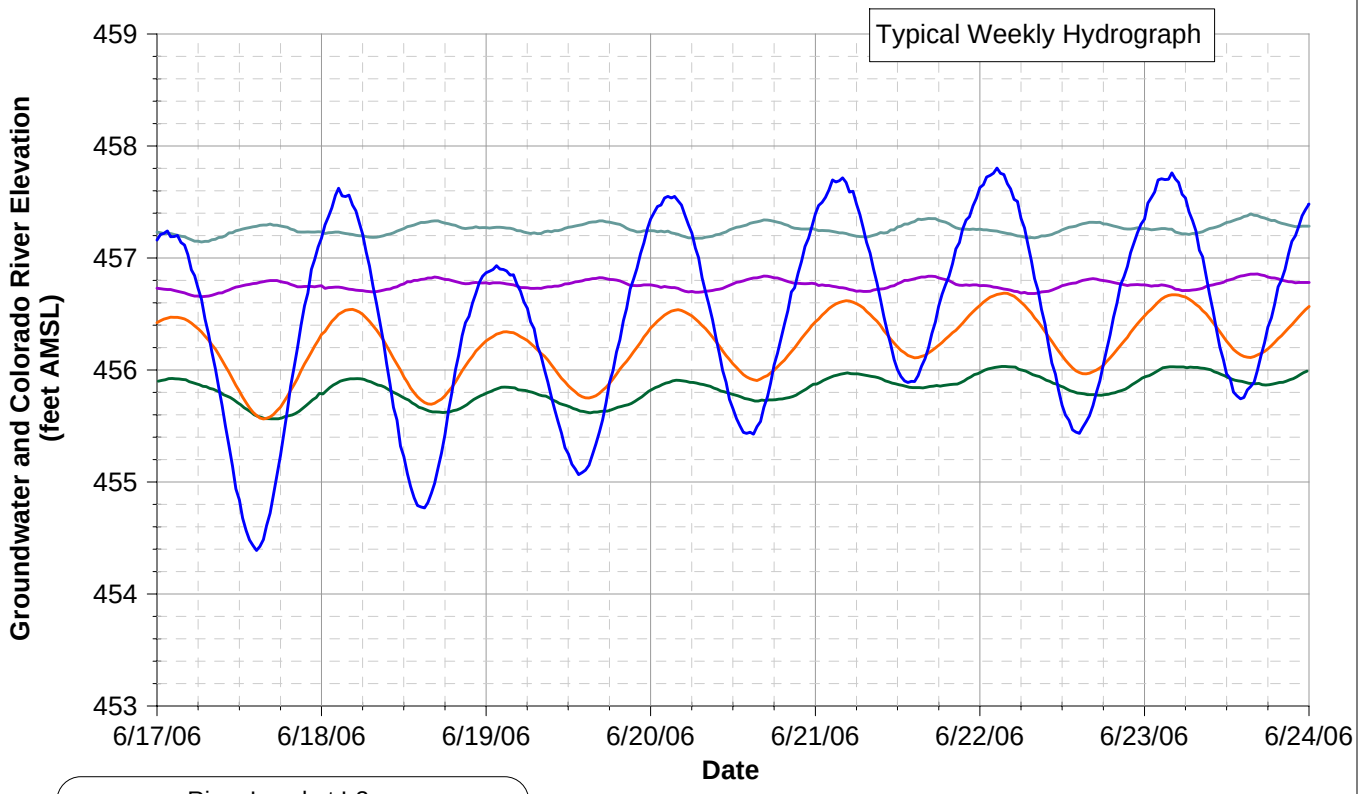

FIGURE 2-7
RIVER AND GROUNDWATER ELEVATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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PARK
M@ABI

Colorado River

BN & SF RAILROAD

INTERSTATE 40

BAT CAVE WASH

DEBRIS RAVINE

NEW
EVAPORATION
PONDS

FORMER
EVAPORATION
POND SITE

TOPOCK
COMPRESSOR
STATION

457.25

457.0

456.75

456.5

456.25

456.0

MW-35-060*
456.77

MW-41S
456.71

MW-33-040*
456.51

MW-31-060*
455.99

MW-28-025*
456.86

MW-27-020*
456.48

MW-43-025*
456.96

MW-21
455.96

MW-22
(455.55)

MW-12
456.03

MW-26
455.83

MW-25
456.13

MW-24A
456.61

MW-11
456.65

MW-10
456.69

MW-38S
(456.01)

MW-09
456.92

MW-19*
455.99

TW-2D
TW-3D

PE-01

MW-20-070*
455.16

MW-13
456.55

MW-14
456.92

MW-18
457.23

OW-01S
457.23

OW-02S
457.11

OW-05S
457.20

OW-03S
457.34

MW-17
457.40

MW-04
(456.94)

MW-07
(456.67)

MW-08
457.40

MW-05
(457.25)

MW-06
457.26

MW-16
457.31

MW-01
(456.56)

MW-03
NA

MW-15
(457.27)

N

0 700 1,400 Feet

1 inch equals 700 feet

LEGEND

- Extraction well
- Groundwater monitoring / observation well
- MW-20-100 454.75 — Well name with water level elevation (ft MSL)
- MW-20-100 (454.75) — Well name with water level elevation (ft MSL) not used in contouring
- MW-20-100* 454.75 — Groundwater Elevation from Transducer
- Groundwater Elevation Contour 0.25 ft
- Inferred or Approximate Groundwater Elevation Contour 0.25 ft
- NA — Data not available

Notes:
1. Water level contours for the floodplain area are presented in Performance Monitoring Reports.
2. TW-3D and PE-1 are pumping from lower portion of the aquifer.
3. Floodplain well data taken from pressure transducers at the time of manual measurements (6:00 AM).
4. Gradients shown on this figure show transient conditions in the aquifer at the time of measurement and may not reflect the expected average groundwater flow directions.

FIGURE 2-8A
GROUNDWATER ELEVATION MAP
FOR UPPER INTERVAL/WATER TABLE
JUNE 14, 2006 WATER LEVEL SURVEY

RCRA FACILIY INVESTIGATION/REMEDIAL INVESTIGATION
REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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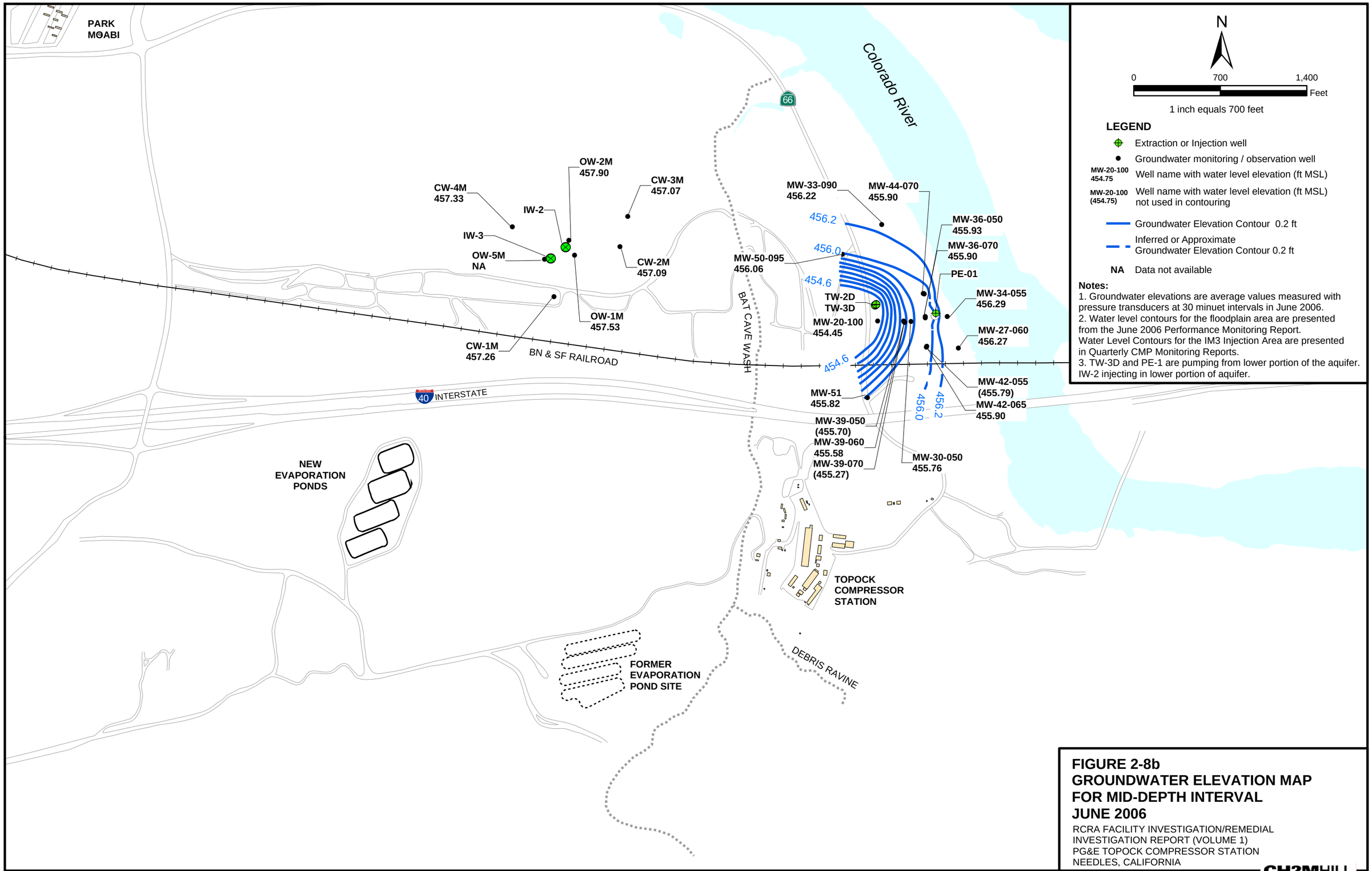

FIGURE 2-8b
GROUNDWATER ELEVATION MAP FOR MID-DEPTH INTERVAL JUNE 2006

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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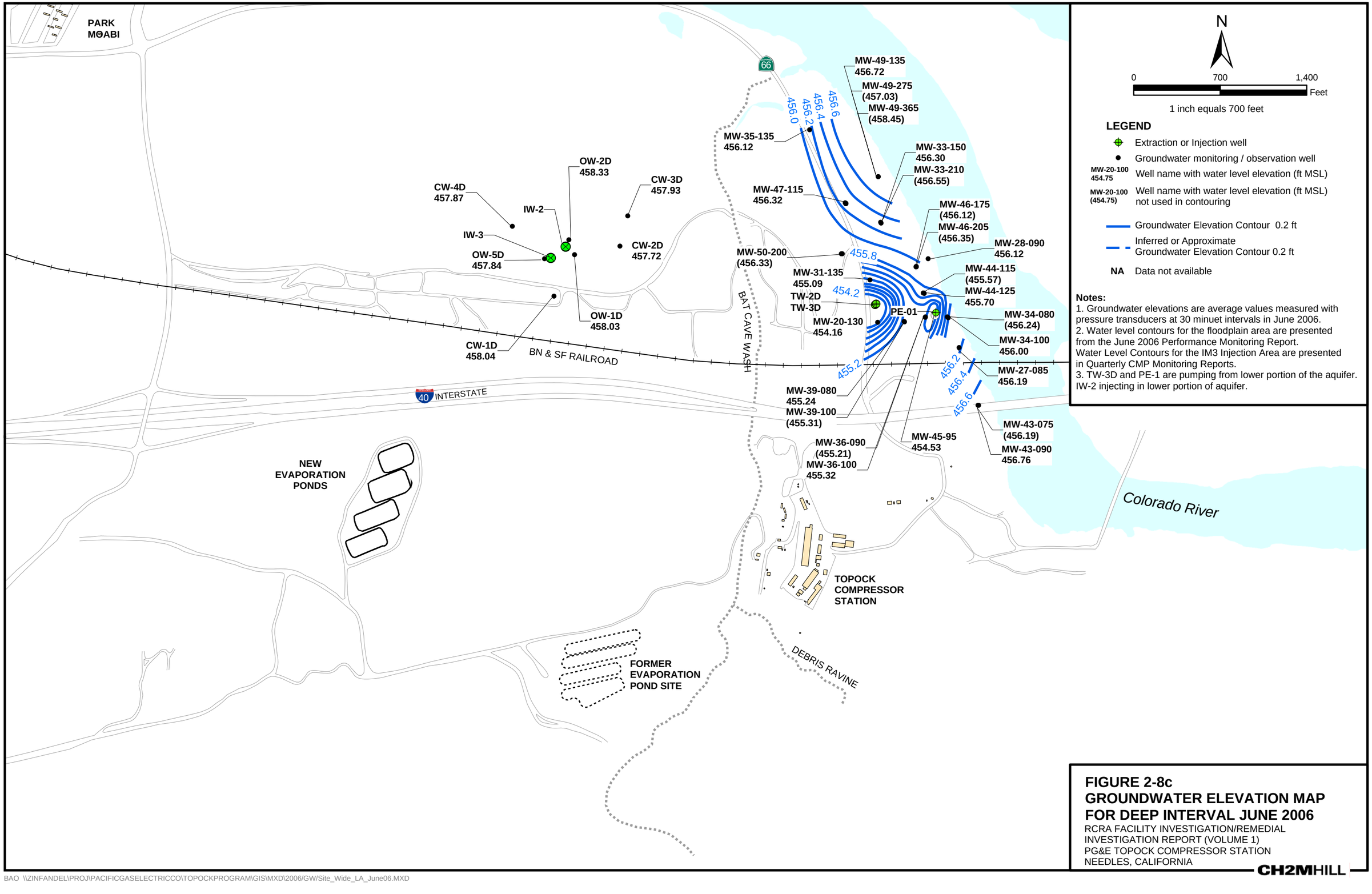

FIGURE 2-8c
GROUNDWATER ELEVATION MAP FOR DEEP INTERVAL JUNE 2006
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

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3.0 Facility Operations and History

The Topock Compressor Station began operations in December 1951 to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The compressor station is still active and is anticipated to remain an active facility into the foreseeable future (Riddle 2004). This section provides detailed information on the history of the facility and facility operations.

3.1 Current and Historic Operations

Prior to construction of the compressor station in 1951, the area on which the facility is currently located was mostly undeveloped land. The Teapot Dome restaurant and gas station occupied a small portion of the property at the very northern edge of the facility (Figure 3-1). It is unknown when the Teapot Dome was built; however, based on aerial photography, the Teapot Dome was present at the site in 1936 (the earliest aerial photograph available). It was still present in 1947 but appears to have been demolished prior to, or during construction of, the compressor station in 1951. The property on which the compressor station was built was owned by the State of California. From 1951 to 1965, PG&E leased the property from the State. In 1965, PG&E purchased the property from the State.

The main structures at the facility currently include the compressor building, Cooling Towers A and B, and the auxiliary building. Various auxiliary structures, including an office, a warehouse, a vehicle garage, maintenance buildings, equipment and chemical storage buildings, and a water-softening building, are adjacent to the main building. The facility also has aboveground tanks used for storage of water, water treatment chemicals, odorant, new and used compressor oil, gasoline and diesel, and wastewater. Figure 3-1 presents the layout of the major features of the compressor station.

When originally constructed, the facility was equipped with six compressors and was capable of processing 400 million standard cubic feet per day (scfd) of natural gas (PG&E 1952). As demand increased, additional compressors were added, and existing compressors were upgraded (by turbocharging and supercharging) to increase the volume of gas that could be processed. Most of the upgrades were completed in the early to mid-1950s. Following the upgrades, the facility was capable of processing 1.1 billion scfd. Depending on demand, the facility currently processes between 300 million to 1.1 billion scfd of natural gas per day (Riddle 2004). The facility operates and is staffed 24 hours per day, 7 days a week.

Current operations at the compressor station are very similar to the operations that occurred from the start of facility operations in 1951. The operations at the compressor station consist of:

- Water conditioning.
- Compression of natural gas.

- Cooling of the compressed natural gas and compressor lubricating oil.
- Wastewater treatment.
- Facility and equipment maintenance.
- Miscellaneous operations.

Facility operations and associated chemical product usage are summarized in Table 3-1. Waste generation and management associated with facility operations are summarized in Table 3-2. Available information regarding actual chemical usage is limited to incidental documentation and is summarized in Table 3-3. Facility operations, associated chemical use, and waste generation and management activities are described in detail below.

3.1.1 Water Conditioning Process

Water for use at the compressor station historically has been supplied by wells that tap local groundwater. Water is used at the facility for both domestic and industrial purposes. The primary industrial use of water at the compressor station is for cooling water.

From 1951 through 1960, PG&E wells 1 and 2 (also known as PGE-01 and PGE-02) were used to supply industrial and non-industrial water to the facility. The water from the wells was not used for drinking water; therefore, bottled water was supplied. A December 1951 Hornkohl laboratory report stated that the water from the wells contained high iron and high chloride which would make it disagreeable to the taste and could cause a physiological reaction (Hornkohl 1951). PG&E Wells 1 and 2 were located to the north of the compressor station (in the current I-40 corridor), as shown in Figure 3-2. Because TDS concentrations in the water obtained from PG&E Wells 1 and 2 were relatively high (PG&E 1960), the use of these wells was discontinued in late 1960 or early 1961, and an arrangement was made for water to be supplied from two wells owned by the AT&SF Railway (SGC 1960; ASDOH 1961). The AT&SF wells, Topock Well Nos. 1 and 2 (sometimes referred to as PG&E Wells 3 and 4) were located on the Arizona side of the Colorado River (Figure 3-2). PG&E Wells 1 and 2 were relegated to standby status at that time and were subsequently abandoned between 1964 and 1965 during the construction of I-40. A contract specification issued by PG&E in 1964 indicates that the wells were to be abandoned and capped, the cathodic protection was to be removed, and facilities were to be removed from the freeway construction area. The specification calls for the removal of pumps, motors, piping, and electrical service. Some of the material was salvaged to construct wells PGE-06 and PGE-07 (PG&E 1965a).

To meet the water demand of the facility, Topock Well No. 3 was installed in 1974 to supplement the AT&SF Topock Well Nos. 1 and 2. In 1980, the AT&SF Topock Wells No. 1 and No. 2 were removed from service, and Topock Well No. 2a[2] was installed to replace Topock Well No. 2. Currently, Topock Well No. 2a and No. 3 continue to supply water to the facility (and drinking water to the community of Topock, Arizona). As of 1981, Southwest Gas of Arizona was the registered owner of Topock Wells No. 2 and No. 3. In 1995, the City of Needles became the registered owner of the wells. Available records indicate that approximately 83 acre-feet of water were extracted from Topock Wells No. 2A and No. 3 in 2003, and approximately 72 acre-feet were extracted in 2004 (Kilgore 2005).

[2] Topock Well No. 2a is a replacement well for the original Topock Well No. 2. Current studies refer to Topock Well No. 2a as Topock-2 and Topock Well No. 3 as Topock-3.

The well water is pumped to two 210,000-gallon storage tanks located on the hill south of the station. Groundwater from the wells naturally contains several different types of minerals, most notably sodium chloride. Historically, the water was processed through a water-softening system to remove excess minerals and improve its suitability for use as process water.

3.1.1.1 Chemical Use in the Water Conditioning Process

In 1951, when the facility was first built, a water-conditioning plant, designed by Permutit, was employed to condition water used at the facility (PG&E 1958a). The plant was located in the southern portion of the facility at what has previously been identified as the "water-softening building" (it is currently identified as the "storage building"; see Figure 3-1). The plant consisted of one to two tanks that were used to handle a mixture of soda ash, lime, and sodium aluminate. Water was pumped through the plant to remove excess minerals and thereby soften the water.

In April 1962, the Permutit plant was replaced with a water conditioning system that used self-contained cartridges (PG&E 1962). The cartridge-based system was only used to treat the water used in the closed-loop cooling systems (i.e., the jacket cooling water, auxiliary jacket cooling water, and lubricating oil cooling systems). Water from the Topock wells used for non-industrial purposes (i.e., non-drinking water and cooling tower makeup) was not treated.[3] The cartridge system is still in use today.

3.1.1.2 Waste Generation and Management in the Water Conditioning Process

Lime sludge is known to have been generated as a byproduct of the Permutit water-conditioning process, although there are no records on the volume of lime sludge generated. The sludge was transferred to the sludge drying beds for dehydration (Kearny 1987). In historical aerial photographs from the mid-1950s, the drying beds contain whitish material. A whitish area is also present just south of the sludge drying beds. In addition, a similar-looking whitish area is present in those same photographs at what is now called the Railroad Debris Site (AOC 14, see Sections 4.2.11 for a detailed description of this area). Former plant employees report trucking the sludge to the Railroad Debris Site and spraying it on the ground there for disposal (Russell 2006b). This suggests that some of the dehydrated lime sludge was disposed of in this area between 1951 and 1962.

For the cartridge system, cartridge replacement is handled twice monthly by a contractor who removes the spent cartridges and transports them offsite for regeneration (Russell 2006b). The cartridge system is self-contained; no onsite effluent is generated by this system. Available information suggests that this cartridge removal process has been in place since 1962.

One employee reported that he was personally responsible for placing 200 to 300 bags of unused lime into the Debris Ravine and covering it with soil. This lime may have been left over from the water-softening treatment system; the employee conducting the disposal began work at the compressor station in 1964 (Russell 2006ba).

[3] Although water obtained from the Topock, Arizona wells is potable, bottled drinking water is still supplied to the facility.

3.1.2 Gas Transmission Process

Natural gas is discovered in naturally-occurring reservoirs in natural gas-producing regions such as the San Juan Basin in New Mexico and the Permian Basin in Texas. Natural gas wells are drilled into these reservoirs to allow the natural gas to be produced. From the well, the natural gas goes into gathering lines, which are like branches on a tree, getting larger as they get closer to the central collection point. Some natural gas-gathering systems include a processing facility that performs such functions as removing impurities (e.g., water, carbon dioxide, or sulfur) that may be corrosive or inert gases (e.g., helium) that would reduce the energy value of the gas. Some processing plants can also remove small quantities of hydrocarbon liquids, such as propane, butane, and other hydrocarbons. From the gathering system, the natural gas moves into the natural gas transmission system, which comprises about 272,000 miles of high-strength steel pipe ranging from 20 inches to 42 inches in diameter in the United States (American Gas Association 2004).

These transmission lines move large amounts of natural-gas thousands of miles from the producing regions to local distribution companies. Gas flowing from higher to lower pressure is the fundamental principle of the natural gas delivery system. The pressure of gas in each section of line typically ranges from 200 pounds to 1,500 pounds per square inch (psi), depending on the type of area in which the pipeline is operating. Compressor stations are located along each pipeline to boost the pressure that is lost through the friction of the natural gas moving through the steel pipe. A compressor is a machine driven by an internal combustion or turbine engine that increases the gas pressure to facilitate movement of the gas through the lines.

A schematic of the flow of natural gas through the Topock Compressor Station is provided in Figure 3-3. Natural gas enters the compressor station via three pipelines. Natural gas in two of the pipelines (PG&E's Line 300A and Line 300B) is supplied by the El Paso Natural Gas Company, and the other pipeline is owned by the Transwestern Gas Pipeline Company.

The combined gas from the pipelines flows through the scrubbers. When the station was first operated, the scrubbers contained an oil bath that facilitated the removal of particulate material that had the potential to damage the compressors. The oil in the scrubbers was removed sometime between the mid-1960s and 1970, and the scrubbers have not been used in the oil bath mode since that time (Russell 2006b). However, natural gas still flows through these scrubbers, which continue to collect some pipeline liquids that originate from the upstream pipelines (More 2004; Russell 2006b).

From the scrubbers, the gas flows to the suction header of the compressors. It then flows to the compressors where it is compressed to increase the pressure to facilitate the movement of the gas toward PG&E's service territory in Northern California. The compressor station is currently equipped with 10 natural-gas-powered, two-cycle internal combustion, reciprocating-type compressors (Units K-1 through K-10) that are housed in the Compressor Building. Units K-2 through K-10 are currently operational; unit K-1 is currently partially dismantled. Depending on the load and operating mode, from zero to all nine operational compressors may be in use at any one time. Once compressed, the gas is directed to the discharge header, where pressure can range from 600 to 875 psi, depending on the selected operating mode. From the discharge header, gas flows to Cooling Tower A and/or Cooling

Tower B (depending on the load, one or both cooling towers may be used in parallel mode, never sequentially).

The heated gas is cooled by passing the gas through a tube and shell heat exchanger, which is associated with the cooling tower system. The water that cools the gas in the heat exchanger is cooled in an updraft cooling tower. Typical gas temperatures entering the cooling tower system range from 70 to 180°F, while typical gas temperatures leaving the cooling tower system range from 40 to 120°F. Gas flows out of the station via two pipelines (Lines 300A and 300B).

PG&E measures the odorant content of the gas after the El Paso gas and Transwestern gas have been blended together. PG&E uses this odorant measurement to determine how much additional odorant to add to the gas, to ensure that the gas can be safely detected by smell by PG&E's customers and the public. The gas is odorized by injecting it with a small amount of 50/50 mixture of liquid tertiary butyl mercaptan (TBM) and liquid tetrahydrothiophene (THT). THT (C_4H_8S) and TBM [$(CH_3)_3C–SH$] are flammable colorless liquids with a distinct odor that is recognized by the public as having a distinct "natural-gas smell."

An ancillary part of the gas compression system is electrical power generation. The compressor station is equipped with four electrical generating units (P-1 through P-4) that are used to generate the electricity required to operate the facility. The generators are driven by natural-gas-powered, four-cycle internal combustion engines. The generators are housed in the auxiliary building (Figure 3-1). In addition, a diesel-powered generator, P-5, acts as an emergency generator.

3.1.2.1 Chemical Use in the Gas Compression Process

Chemicals used in the operation of the gas compression process are limited to lubricating oils for the compressor and generator engines and odorants.

The compressor engines and generator engines require lubricants (i.e., oil and grease) to operate. The compressor engines are two-cycle engines that continually consume small amounts of lubricating oil (motor oil); therefore, oil must be continually added to the engines. The generator engines are four-cycle; they consume minor amounts of oil and require periodic oil changes. Used oil from the generator engines is transferred to the waste oil storage tank.

Lubricating oil is the lubricant required in the largest volume. New lubricating oil is stored in a series of four 7,500-gallon above ground storage tank (ASTs) located in the oil and fuel storage area in the eastern portion of the facility (Figure 3-1). The storage area has been in the same location since the station was constructed in 1951. Approximately 25,000 gallons of new lubricating oil are used at the compressor station annually. Minor amounts of grease are also required for engine operation.

Odorant is added before gas is compressed. A 50/50 mixture of liquid TBM and THT is stored in a 3,000-gallon steel AST located in the lower yard (Figure 3-1). There are also two 75-gallon capacity "day" tanks (both ASTs) located in the lower yard that are used to feed the odorant into the pipelines. Odorants are transferred from the storage tank to the day tanks by small pipes. About 5,000 gallons of odorant are used at the facility annually.

Chemicals used in the cooling systems are described as part of the cooling water process (Section 3.1.3).

3.1.2.2 Waste Generation and Management in the Gas Compression Process

The primary waste stream generated by the gas compression process is oily water. However, minor amounts of pipeline liquids are also removed at pipeline drip points and the scrubbers.

Oily Water. Oily water is produced from equipment cleaning, minor leaks, and compressed air blowdown. The oily water is collected in industrial floor drains located in buildings and is routed to the oily water treatment system. Section 3.1.4.2 discusses the handling and treatment of oily water.

Scrubber Waste. As previously stated, from 1951 to between the mid-1960s and 1970, scrubbers were used to remove impurities from the gas prior to compression. The scrubbers used an oil bath system to remove the impurities, which consisted of water and small amounts of sediment. The oil bath included metal mesh frames contained within an oil bath. The oil bath system generated an oily waste contaminated with gas condensate dust, and other impurities. The oily waste from the scrubbers was collected in a sump near the scrubbers (referred to as the scrubber sump). The volume of oily waste collected in scrubber sump is unknown; however, this waste was transferred to the waste oil storage tank prior to disposal (see subsection in Section 3.1.5.2). In the mid-1990s, the scrubber sump was classified as underground storage tank (UST). At that time, the scrubber sump was removed and closed pursuant to UST regulations (Trident 1996a-b). Closure of the scrubber sump was approved by the County of San Bernardino Fire Department (CSBFD), Hazardous Materials Division on June 9, 1997 (CSBFD 1997).

Because modern natural-gas supplies contain fewer impurities and require less cleaning, the oil baths were removed from the scrubbers sometime between the mid-1960s and 1970. Gas still flows through the scrubber units; however, the scrubbers are not in service and only function as an incidental collection point for pipeline liquids. The scrubbers are drained annually to remove accumulated pipeline liquids. Since 1970, only a very small volume of pipeline liquids has been generated at the scrubbers. About 90 gallons of pipeline liquids are removed from the scrubbers roughly once a year (Riddle 2004). The pipeline liquids removed from the scrubbers are combined with the waste oil generated by the station (in the waste oil storage tank) and transported offsite for disposal at an appropriate facility.

Pipeline Liquids. Small amounts of pipeline liquids are removed from the PG&E pipelines outside of the Compressor Station fenceline. Most of the collection points (referred to as drips) are located immediately downstream and at various locations west of the compressor station; one drip is located near the pipeline crossing immediately west of the Colorado River. Downstream of the facility, drips are located relatively close to the compressor station to capture any oils that entered the gas stream during the compression process. Only the location of the former pipeline liquids tank and the drips immediately downstream of the compressor station are within the study area.

Historically, pipeline liquids collected at or near the Topock compressor station were composed of condensate, oils, and very small quantities of water and debris from the pipelines (i.e., the impurities removed by the scrubbers). Condensate is the highest

molecular-weight hydrocarbon fraction in the natural-gas stream and has a composition similar to that of gasoline. It is also referred to as natural gasoline. Historically, condensate made up the largest percentage of the pipeline liquids. Historically, an estimated 500 gallons per month of pipeline liquids were collected in the vicinity of the compressor station. Condensate is a high-value product. In the mid-1980s, El Paso Natural Gas installed a condensate stripper to recover this valuable material, and the volume of pipeline liquids collected dropped to approximately 50 gallons per month (Russell 2006b). In recent years, the pipeline liquids have been composed of primarily compressor oil which becomes entrained in the gas stream during the compression process.

Radon-222 (Rn-222) is a radioactive gas that accumulates in some natural gas reservoirs. As natural gas is removed from these reservoirs, a portion of the Rn-222 in the reservoir accompanies the gas into the pipeline and travels with the gas toward its destination. The vapor pressure of Rn-222 is similar to propane and thus Rn-222 tends to accumulate as a liquid when the pipeline conditions are suitable for forming natural gas condensate/pipeline liquids.

As a radioactive element, Rn-222 undergoes radioactive decay. In the case of Rn-222, the decay half-life is 3.8 days, which means that the concentration of Rn-222 declines by half after 3.8 days, to one-fourth after 7.6 days, to one-eighth after 11.4 days, and so forth. The decay series for Rn-222 includes several short-lived radioactive species and two longer-lived species, lead-210 (Pb-210) and polonium-210 (Po-210). Pb-210 has a half life of 22 years, and Po-210 has a half life of 138 days. Both Pb-210 and Po-210 are solids.

Radon-222 levels in the gas at Topock are fairly low; less than 10 parts per million (ppm) by volume. Because the natural gas that traveled though the compressor station has contained minute quantities of Rn-222, the potential exists for Rn-222 decay species (Pb-210 and Po-210) to exist as solids inside the pipeline and the associated pipeline appurtenances. These materials may also become entrained in pipeline liquids. The natural gas pipelines are closed and pressurized systems, and removal of any Rn-222 and Rn-222 decay species would only occur as part of the removal of pipeline liquids at the drips. Pipeline liquids never enter the oily water treatment system (CH2M HILL 2006a).

Pipeline liquids are removed from the drip points monthly. All pipeline liquids removed from the drip points are brought back to the facility for collection prior to recycling or offsite disposal. The volume of pipeline liquids collected varies but is generally only a few ounces per drip point. Following collection, the pipeline liquids are tested for the presence of polychlorinated biphenyls (PCBs). Testing for PCBs began in 1981. Pipeline liquids containing less than 5 parts per million (ppm) total PCBs are combined with the waste oil generated at the facility and are, ultimately, recycled. However, pipeline liquids containing more than 5 ppm PCBs are handled and disposed of as hazardous waste.

PCBs were not an issue at Topock prior to 1991.

The portion of the Transwestern Gas Pipeline that lies offsite and to the east of the facility historically has been contaminated with PCBs. Transwestern began delivering natural gas to Topock 1991. When the Transwestern gas was brought to the station, PG&E instituted a very rigorous natural gas specification to prevent PCB contamination at Topock. To prevent any possible PCB contamination of the lines at Topock, two phase-separator units were

installed upstream of Topock—one by Transwestern and one by PG&E. In 1998, Transwestern had a failure in their system, and some PCBs entered PG&E's portion of the pipeline system. PG&E tests and appropriately segregates all liquids recovered from the Transwestern pipeline, the compressor station, and PG&E's downstream pipelines (Russell 2006b). Transwestern's response to the PCB contamination was to make improvements to their pipeline to keep its gas extremely dry to prevent transport of PCB fluids in their system. Since those improvements have been made, only an estimated 4 ounces of pipeline liquids are collected from that pipeline over a several month period (Riddle 2004).

Information obtained from employees suggests that pipeline liquids historically may have been sprayed on station roads and unpaved areas for dust control (Russell 2006b). Based on available information, this practice ceased by 1975, and waste oil, including pipeline liquids, was sent offsite for reuse starting in 1975 (PG&E 1980a).

The 300B pipeline liquids collection tank ("drip tank") was removed in 1995. The 900-gallon drip tank was located southeast of the plant on a unpaved shelf in the hill next to the pipeline access road (Trident 1995a). The tank was removed in 1995, and associated piping was emptied, disconnected, and capped at the abandoned ends (Trident 1996c). Oil staining was observed below the center and southern portions of the tank, extending out a maximum of 6 feet from the footprint of the former tank (Trident 1995a). The total stained area was estimated to be approximately 20 feet by 40 feet.

Two samples were collected from a hand-dug test pit dug in the stained soil on the west side of the former tank location. Samples were collected at 1.2 and 2 feet bgs. No staining was observed below 2 feet bgs. The samples were analyzed for total recoverable petroleum hydrocarbons (TRPH), quantified as motor oil by gas chromograph/flame ionization detector. The detected concentrations were 100 milligrams per kilogram (mg/kg) and 13 mg/kg.

A subsequent soil sample (from 0 to 4 inches bgs), collected in April 1996 to characterize the stained soil in anticipation of disposal, indicated that TRPH was present at concentration of 68,000 mg/kg, but volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and PCBs were less than analytical detection limits. Generally, detected metals concentrations were in the same range as currently-estimated background concentrations. Closure activities, consisting of soil excavation and confirmation sampling, were implemented between July 1996 and September 1996. Samples collected during the last two sampling events indicated that the soil remaining in place below and adjacent to the excavation contained less than 1,000 mg/kg TRPH. Residual levels of TRPH ranged from less than analytical detection limits to 150 mg/kg. The soil excavation and sampling results are documented in the Closure Certification Report (Trident 1996d). Closure of the site was approved by San Bernardino County on June 9, 1997.

3.1.3 Cooling Water Systems

The six separate cooling systems at the compressor station are:

- Main jacket cooling water (JCW) system.
- Auxiliary jacket cooling water (AJCW) system.
- Lubricating oil cooling water system (LOCW).

- Auxiliary lubricating oil cooling water system (ALOCW).
- Combustion air cooling system (aqua towers).
- Cooling tower system.

Most of these cooling systems have been in service since the facility began operation in 1951. A schematic of the cooling water systems at the facility is provided in Figure 3-4.

3.1.3.1 Jacket Cooling Water System

The internal combustion compressor engines require a cooling system for temperature control. All compressor engines are cooled directly by using a single cooling system, referred to as the JCW system. The JCW system circulates water through the engine blocks and cylinder heads of each compressor unit. The heated water is then run through air-cooled heat exchanger units to dissipate the heat. The heat exchanger units are located just east of the compressor building (Figure 3-1). The JCW system is a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions).

The JCW system includes two 12,500-gallon tanks that provide surge capacity and ensure a steady flow of cooling water to the heat exchangers and the compressor engines. Currently, the JCW tanks are located in secondary containment. Historically, the JCW operated with a hot well (open-top concrete basin). The hot well was approximately 10 feet deep, with half the height set below ground, and occupied approximately twice the area currently occupied by the JCW tanks. The hot well was replaced with tanks prior to 1990. During installation of secondary containment around the tanks in 1994, remnants of the old hot well were discovered and removed. The soil contained in the former hot well was removed, and the remaining concrete was removed. The concrete and soil were tested for total chromium [Cr(T)] and Cr(VI) and appropriately disposed of offsite. Sampling conducted indicated that soluble chromium at levels exceeding California hazardous waste criteria was present in the soil and concrete associated with the hot well (PG&E 1994).

A small shed, referred to as the mixing shed, was located in this area immediately adjacent to the former hot well. Reports from former employees indicate that when the hot well was in service, coolant chemicals used in the JCW system may have been mixed in the mixing shed before being added to the hot well (Russell 2006b).

3.1.3.2 Auxiliary Jacket Cooling Water System

The generator engines are cooled by a similar closed-loop, common cooling system referred to as the AJCW system. The AJCW system circulates water through the engine blocks and cylinder heads of each generator engine. The heated water is then pumped through air-cooled heat exchanger units to dissipate the heat. The heat exchanger units are located just north of the auxiliary building (Figure 3-1). The AJCW system is a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions). There is no information to suggest that any major structural changes to this system have occurred, nor is there any information to suggest that the system ever had a hot well (Russell 2006a).

3.1.3.3 Lubricating Oil Cooling System

The lubricating oil used in the compressor engines requires cooling to prevent excessive deterioration. The lubricating oil from each compressor engine is circulated through a shell-and-tube heat exchanger. LOCW is circulated through the heat exchangers to remove

heat from the oil. The heated LOCW is cooled by circulating it through the plate and frame heat exchangers located at the cooling towers. Historically, the LOCW was circulated through tube bundles in the cooling towers (see discussion of Original Cooling Towers n Section 3.1.3.6, below). The LOCW system used to cool the compressor engine oil is also a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions). No major structural changes to this system have occurred since the 1950s.

3.1.3.4 Auxiliary Lubricating Oil Cooling System

The lubricating oil used in the generator engines also requires cooling to prevent excessive deterioration. The lubricating oil from each generator engine is circulated through the tubes of a shell-and-tube heat exchanger. ALOCW is circulated through the shell of these heat exchangers to remove heat from the oil. The heated ALOCW is then cooled by running it through the larger air-cooled heat exchangers located just north of the auxiliary building (Figure 3-1). The ALOCW system used to cool the compressor engine oil is a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions). No major structural changes to this system have occurred since the 1950s.

3.1.3.5 Combustion Air Cooling System (Aqua Towers)

The aqua towers were installed in the late 1950s and early 1960s when turbochargers were added to the compressor engines to increase horsepower. The aqua towers are used to cool the air used for combustion in the compressor engines. Each compressor engine is equipped with an individual aqua tower, located just east of the compressor building. Compressor engine combustion air is first drawn into the aqua tower through a paper-element filter, then through the main chamber of the aqua tower, prior to entering the compressor engine turbochargers. A fill material is installed in the main chamber of the aqua towers, which is continuously wetted by a pump and spray circulating water system. The air is cooled as it passes through the wetted fill material. After the gas passes through the turbochargers, it is cooled again in the intercooler heat exchangers mounted on the sides of the engine. The intercoolers are cooled by circulating the water from the cold basin in the aqua tower through the intercooler and returning the water to the top of the aqua tower.

The aqua towers are considered to be an open cooling system, because fresh water is added to make up for evaporative losses. In addition, the water in the system continues to concentrate the naturally-occurring chemicals in the water due to evaporation and must be periodically removed from the system to prevent the formation of scale on the heat transfer surfaces. Water drained from the system is referred to as blowdown. Blowdown from all of the aqua towers drains to a common sump and is pumped from there to the two cooling towers, where it is considered to be a source of make-up water for the cooling towers. The available information indicates that the blowdown from the aqua towers has always been directed to the cooling towers.

3.1.3.6 Cooling Tower System

A re-circulating cooling water system is used at the facility to cool the compressed natural gas and compressor engine LOCW. The cooling towers are open systems where cooling water is lost to evaporation and drift and therefore require regular removal and replenishment of water. A cooling water system has been in place since the facility began operation in 1951. Cooling Tower A was constructed as a four-cell tower in 1951. Cooling

Tower B was constructed as a two-cell tower in 1954 but was expanded to a four-cell tower in 1958 (PG&E 1958b). In 2001, the original Cooling Tower A was replaced with a new unit. Likewise, in 2002, the original Cooling Tower B was replaced. Both new cooling towers were built in the same location as the original towers.

Original Cooling Towers. Original Towers A and B were induced-draft counterflow coil-shed cooling towers (PG&E 1991a) (see Figure 3-5). Each tower was about 25 feet wide, 97 feet long, 34 feet high, and had a water capacity of 49,300 gallons. The original cooling towers were constructed of metal, concrete, and wooden components. Wooden components consisted of the frame, packing materials, upper basin, and drift eliminators. Cooling of the natural gas and LOCW was accomplished by circulating the fluids through cooling coils that ran inside the towers. Each tower had 16 natural-gas cooling coils and six LOCW coils (commonly referred to as "bundles"). Heat transfer occurred by the conduction of heat from the surface of the bundles to the circulated water and updrafted air.

Water entered the towers by means of a makeup water line that emptied into the hot water basin at the bottom of the tower. The cooling towers functioned in a two-step continuous process. In the first step, the water from the hot basin was cooled. Water was pumped to the top of the towers to a distribution system. The distribution system cascaded the water over honeycombed-shaped packing material, while a fan was used to pull air upwards through the packing material from the bottom (counterflow to the water). This process cooled the water. It also resulted in evaporation of some of the water. After the water passed through the packing, it was collected in the cold water basin near the middle portion of the tower.

In the second step, the cooled water was drained from the cold water basin and distributed over the gas and LOCW bundles in the lower portion of the tower to provide cooling of the gas and LOCW. The water was then once again collected in the hot water basin to be re-circulated through the process. The hot water basins were constructed of concrete and were at grade or slightly below grade. The concrete hot basins are now exposed (the new cooling towers are set into, but do not use, the old hot basins), and appear to be in good condition (no cracks or other defects are visible).

The original cooling towers were both open systems. Water losses from the cooling towers were caused by drift, evaporation, and blowdown. Drift is the loss of water that becomes physically entrained in the air that is circulated through the towers. If the entrained water is not removed from the airstream, it is lost to the atmosphere as the air exits the tower. Both cooling towers had drift eliminators that trapped entrained water and minimized water loss due to drift. Maximum drift loss was estimated to be less than 1 gallon per minute (gpm) (Wilber 1999). Approximately 80 to 100 gpm were lost to evaporation (PG&E 1991b). Because of evaporation, treatment chemicals and naturally-occurring minerals increase in concentration in the cooling water. To prevent chemical buildup and scale formation, a portion of the water is periodically removed (i.e., blowdown) and replaced with freshwater (i.e., makeup water).

New Cooling Towers. In 2001 and 2002, Cooling Towers A and B were replaced with new units.[4] The lower concrete basins of the original units were used as foundations for the new

[4] All wooden components and other potentially contaminated components of the original cooling towers were transported offsite for disposal at the McKittrick Waste Treatment Site in McKittrick, California.

towers (i.e., the new towers are in the same location as the original towers). The concrete basins are in good condition, with no obvious deterioration. The new units are metal and are self-contained (i.e., water does not flow outside the units into the concrete basins). The units are linked to heat exchangers located adjacent to the cooling towers. Each heat exchanger contains four tube bundles for natural gas and four tube bundles for lubricating oil cooling water. The cooling water within the heat exchangers is still circulated within an open system. Because it is an open system, some water is lost to evaporation and blowdown is still required.

Each of the two new cooling towers consists of three cells. Hot water from the LOCW heat exchangers enters at the top of the cooling tower cell and fills the basins on the east and west sides. These are called the hot basins. The nozzles that penetrate the bottom of the hot basins direct the hot water over the plastic cooling tower fill. The cooling tower fill is designed in such a way as to maximize surface area of the water as it flows down the fill. The fan in the center of each cell draws air through the fill and exhausts the air out of the top of the cooling tower. The air flowing over the wetted fill evaporates a portion of the water, causing the cooling effect. The cooled water drops by gravity into the lower cold basin. Cold water from the lower basin is pumped first to the four gas coolers. The four gas coolers are shell-and-tube heat exchangers. The cold water runs through the tubes, and the natural gas flows through the shell. The water exits the gas coolers and then flows through the four LOCW heat exchangers. These are plate-and-frame-type heat exchangers with cooling tower water on one side of the plates and LOCW on the other side of the plates. The cooling water exits the LOCW heat exchangers and flows back to the cooling tower hot basins to begin the cycle again.

As water is evaporated from the cooling tower, scale may begin to form on heat exchange surfaces, corrosion may occur, and biological growth may accelerate; therefore, the composition of the cooling water must be carefully maintained at optimal conditions. The cooling tower is equipped with a controller that automatically discharges water from the cooling tower when a specified electrical conductivity is reached. As needed, the controller automatically adds sulfuric acid, a phosphate-based corrosion inhibitor, a scale dispersant, and a biocide. Automatic level controls allow freshwater to flow into the cold basins to maintain a proper water level in the cooling towers.

3.1.3.7 Chemical Use in the Cooling Water System

Historically, cooling water was treated with chemicals to prevent corrosion of the metal components, fungus attack on wooden components (the original cooling towers contained some wooden components), algae and bacterial growth; and deposition of minerals (scale). With the exception of the need to control fungus attacks on wooden components (the new towers are constructed of all-metal components), cooling water treatment still serves the same purposes today. As described above, six separate cooling water systems are used at the compressor station (i.e., the JCW system, the AJCW system, the LOCW system, the ALOCW system, the combustion-air cooling system, and the cooling-tower system). Currently, water treatment chemicals are used in all of the cooling systems except the combustion-air cooling system; however, it appears that treatment chemicals may have been used in the combustion-air cooling system in the past (Riddle 2006a).

Cooling water in the cooling towers is currently treated using a multi-component additive system, consisting of a phosphate-based corrosion inhibitor, a biocide, and a dispersant. In addition, sulfuric acid is used to control the pH in the cooling towers. The closed-loop cooling systems currently use a molybdate-based additive system that serves the same functions. Concentrations of the additives are monitored and adjusted weekly.

From 1951 to 1985, Cr(VI)-based corrosion inhibitors and biocides were added to the cooling water. Several different corrosion inhibitors were used during this period; however, all are believed to have contained Cr(VI). Product specification sheets available for one of the additives (Krom-Trol X-5, also known as DE-307) indicates that it contained 30 percent sodium chromate (Betz 1985). In the early 1960s, a separate biocide was also apparently added to assist in the control algae, fungi, and/or bacteria (Betz 1965).

Scale control in the towers is achieved by adding a dispersant and controlling the pH. The function of the dispersant is to keep small particles of mineral salts in suspension in the cooling water to prevent the particles from precipitating on the tower components. It appears that dispersant may not have been required initially but was added when the mineral content of the makeup water began to increase. To control deposition of minerals, the pH of the cooling tower water was kept close to neutral (i.e., 7.0 pH units) through the addition of sulfuric acid (H_2SO_4).

The Cr(VI)-based corrosion inhibitors were maintained in a control range that differed for each cooling system and also varied over time. There is no available information on the control range for the Cr(VI)-based corrosion inhibitors prior to 1968. However, it is estimated that, prior to 1964/1965, chromate concentrations in the cooling towers were in the range of 77 to 101 ppm (Meredith/Boli & Associates 1999). Chromium control limits for the cooling towers after 1968 were in the range of 7 to 12 ppm chromate (Betz 1967a, 1969a). These control limits were in effect until at least 1978 (Betz 1978a). In general, chromate concentrations within the cooling towers from 1968 to 1985 appear to have been maintained at or near a control range of 7 to 12 ppm (Betz 1969a, 1972, 1978a, 1981).

Historically, the closed loop systems also used a chromium-based additive system similar to the system used for the cooling towers. Information on chromate control limits and actual chromate concentrations for the closed-loop cooling systems is limited. Information from 1978 (Betz 1978b, c) indicates that the target ranges were 250 to 300 ppm chromate in the JCW, AJCW, and ALOCW systems and 1,000 to 1,500 ppm in the LOCW system. The latter control limits were reduced to 800 to 1,000 ppm chromate in August 1978 (Betz 1978a). By the early 1980s, the LOCW system chromate control range was reduced to the same concentration range as the remaining closed-loop cooling systems (Betz 1981, 1982). No other pertinent information is available regarding historic chemical use in the cooling systems.

In September 1985, treatment of the cooling water in the cooling towers was changed to a non-hazardous, phosphate-based corrosion inhibitor, dispersant, and biocide package. The closed loop systems were converted to a molybdenum-based corrosion protection system at about the same time (Russell 2006a). Although the formulations of the phosphate-based treatment products used at the compressor station have varied slightly, the overall additive chemistry has not changed significantly since 1985. Table 3-4 summarizes the type, composition, and target concentrations of treatment products currently used in the cooling

water systems at the compressor station. In addition to the treatment chemicals, sulfuric acid (H_2SO_4) is used to keep the cooling water neutral (i.e., at 7.0 pH units).

3.1.3.8 Waste Generation and Management for the Cooling Water System

The primary waste product generated by the cooling water system is blowdown water. During operation of the cooling towers, about 80 to 100 gpm are lost to evaporation (PG&E 1991b). As water is lost to evaporation, naturally-occurring minerals and cooling water treatment chemicals build up in the cooling water. Periodically, a portion of the water in the cooling towers must be removed (i.e., blowdown) and replaced with fresh makeup water to prevent excessive scale formation.

The amount of blowdown generated each day depends on the mineral content of the makeup water, the effectiveness of the scale-control additives, the time of year (higher air temperatures result in greater evaporative losses), the total additive load,[5] and the compressor load. The number of "cycles" is the allowable concentration factor for certain scale-forming minerals. Thus, if the makeup water contains 10 ppm of certain minerals, a cooling tower operating at 10 cycles would discharge blowdown water containing 100 ppm of these minerals (i.e., a tenfold increase in concentration).

The daily blowdown rate ranges from as low as 10,000 gallons per day (gpd) or less on a low-load winter day to the maximum of 50,000 gpd on a high-load hot summer day (Riddle 2004). The facility operated at the highest number of cycles (14.3 to 17.6 cycles) immediately after startup (Betz 1952a-b). With increasing hardness of the makeup water, cooling tower cycles decreased to approximately five cycles in the mid-1960s (Betz 1965, 1967b) and dropped to as low as three to four cycles in the late 1960s (Betz 1969b). In the late 1970s and early 1980s, typical values were in the range of seven to eight cycles (Betz 1980a,b). The new cooling towers currently operate at approximately six cycles (Riddle 2006a).

The actual rate of blowdown from the towers during the 1950s and early 1960s cannot be determined. The earliest available information, which is from 1968, indicates that the average daily blowdown was on the order of 48,500 gpd and ranged from a minimum of 25,300 gpd in the winter to a maximum of 64,300 gpd in the summer (PG&E 1968a). The concentration of TDS in the blowdown ranged from about 4,600 to 6,600 mg/L (PG&E 1968a, 1993) but may have been as high as 11,000 mg/L (Water Board 1969).

A secondary waste stream associated with the cooling water system was sulfuric acid sludge. Documentation from 1982 indicates that some sulfuric acid sludge was generated in the sulfuric acid storage tanks. The storage tanks were constructed of unlined steel, and the sludge was a result of the interaction between the acid and the steel. About 2,000 pounds of sulfuric acid sludge per year were generated; disposal occurred approximately every 7 years (PG&E 1982). The sludge was removed and transported to an approved Class I disposal site. In 1984, new epoxy-lined acid storage tanks were installed (PG&E 1984a). No sludge has been removed since that time.

[5] The absolute amount of cooling water treatment additives added to the cooling water.

3.1.4 Wastewater Treatment Process

Wastewater generated at the compressor station consists primarily of cooling-tower blowdown (about 95 percent) and a minor volume of water discharged from the oily-water treatment system from facility operation and maintenance activities (about 5 percent) (PG&E 1993). As described above, wastewater generation has generally decreased through time as the cooling water system has been modernized. Discharge has ranged from about 17 million gallons per year in 1968 (the first year of recorded discharge) to about to 6 million gallons per year in 2003.

3.1.4.1 Cooling Water Blowdown Treatment

In late 1963 to early 1964, PG&E began treating the chromium-bearing blowdown (wastewater) from the cooling towers (PG&E 1965b). From 1964 through 1969, treatment was performed using a single-step treatment system. The original single-step system used an 800-square-foot treatment pond. Based on PG&E documentation (PG&E 1968a) and aerial photographs, the treatment pond was constructed within one of the sludge-drying beds (Figure 3-1). The sludge-drying beds were constructed of concrete. The exact design and construction details (e.g. joint locations) of the beds are unknown.

In the treatment pond, chromium-bearing wastewater was injected with sulfur dioxide (ferrous sulfide appears to have been used initially but was subsequently replaced with sulfur dioxide) to reduce Cr(VI) to Cr(III) (PG&E 1965c, 1968a). Samples of the effluent from the single-step treatment system contained Cr(T) at concentrations of 13.81 and 14.41 ppm (PG&E 1968a). No sludge was generated by this system.

In late 1969, a two-step treatment system was installed in the lower yard of the compressor station (Figure 3-1).[6] In Step 1, the blowdown was treated by reducing Cr(VI) to Cr(III) in the chromate reduction tank. Wastewater in the chromate reduction tank was injected with sulfur dioxide gas to maintain the pH between 2.9 and 3.2 units. Within this pH range, Cr(VI) was reduced to Cr(III). In Step 2, the effluent from the chromate reduction tank was transferred to the precipitation tank and was treated to remove chromium from solution. Wastewater in the precipitation tank was injected with sodium hydroxide to elevate the pH to between 6.7 and 7.2 units. Within this pH range, Cr(III) combined with the hydroxide ions to form a chromic hydroxide sludge that settled to the bottom of the tank (PG&E 1982). From 1970 to 1974 (the time during which injection well PGE-08 was operated), Poly Floc II and ferric sulfate were used, along with the sodium hydroxide, to further enhance the removal of chromium (PG&E 1975, 1985a) and other particulates to facilitate the injection of water into PG&E-08. After the use of PG&E-08 was discontinued, Poly Floc II and ferric sulfate were no longer used in the wastewater treatment process. According to the 1986 Closure Plan, which contained laboratory reports of wastewater samples collected in the mid 1970s, wastewater treated using the two-step treatment process generally contained 1 ppm or less of chromium (Mittelhauser 1986).

In 1985, a phosphate-based corrosion inhibitor replaced the Cr(VI)-based inhibitor. Blowdown from the cooling towers containing phosphate-based inhibitors is non-hazardous

[6] Historic documents indicate that the system was installed and began operation sometime between November 1969 and March 1970.

and does not require treatment prior to being discharged. Therefore, the treatment of cooling water blowdown ceased in October 1985.

3.1.4.2 Oily Water Treatment

Several of the industrial buildings within the compressor station are equipped with floor drains that capture liquids released to the floor of the building and convey the liquid to the Oil/Water Separator System (OWSS). In addition, other industrial facilities, such as the steam cleaning area and the main jacket water surge tanks, are equipped with drains that capture overflow and spills. A pipe trench that extends from just north of the steam cleaning area to the east side of the compressor building also drains to the OWSS, and has been included in this AOC. Collectively, these drains are referred to as industrial floor drains to distinguish their use and intent from the storm drains that are also present at the facility. These industrial floor drains are found in the following buildings and facilities: Compressor Building, Auxiliary Building, Jacket Cooing Water Pumps, Oil Storage Tank Area, Steam Rack (steam cleaning area), and Fire Water Pump Building (Former Water Softener Building). About 200,000 gallons per year are derived from floor drainage (Kearny 1987). In addition, about 10,000 gallons per year are generated from compressor engine-cleaning operations, and about 10,000 gallons per year are generated from steam-cleaning operations (Kearny 1987).

From 1951 to 1989, oily water produced at the facility was treated using a system that consisted of an oil/water holding tank and an oil/water separator (OWS), both located in the southern portion of the lower yard (Figure 3-1). From the collection points, the oily water was directed to the oil/water holding tank (a 3,000-gallon-capacity steel tank).[7] From this tank, the oily water flowed to an adjacent OWS. The OWS consisted of a concrete vault set below grade. The unit was equipped with an underflow weir and suction pump to separate and remove oil from the water.

Floating oil was pumped to a portable waste oil storage tank. When the portable tank was full, it was moved to the tank farm on the east side of the facility (Figure 3-1), and the oil was transferred from the portable tank into the stationary waste oil storage tank.

Available documentation indicates that treated effluent water from the OWS has routinely been combined with cooling water blowdown effluent prior to discharge, although the point of confluence has varied. Prior to 1964, treated water from the OWS was directed to the transfer sump prior to being discharged. From 1964 to 1969, treated effluent from the OWS may have been directed to a treatment pond and processed along with the cooling water blowdown through the single-step chromium treatment system prior to discharge. From 1969 through October 1985, treated effluent from the OWS was routed to the chromate reduction tank and was processed along with the cooling water blowdown through the two-step chromium treatment system prior to being discharged. In November 1985, the chromate reduction tank was converted into a holding tank (Kearny 1987), and the discharge from the OWS was routed to either the holding tank or the transfer sump prior to discharge.

[7] The RFA (Kearny 1987) indicates that the oil/water holding tank in place at the time of the RFA (1987) was installed in 1970. It is unknown whether the RFA information is incorrect, whether another oil/water holding tank was in place prior to 1970, or whether, prior to 1970, oily water flowed directly to the OWS.

In 1989, a new oily water treatment system was installed at the facility, and this system is still in use today. The oily water treatment system currently consists of a grit tank, an oily water collection tank, an OWS, a waste oil holding tank, and a clean water tank. The grit tank is located in the central portion of the lower yard within a concrete secondary containment enclosure (Figure 3-1). The oily water collection tank, OWS, waste oil holding tank, and clean water tank are all located within one large concrete secondary containment enclosure located in the southern portion of the lower yard (Figure 3-1).

The oily water flows from the collection points to the grit tank (a 3,000-gallon plastic tank) where sediment is allowed to settle out. Accumulated sediment in the grit tank is periodically removed and transported offsite for disposal at an appropriate facility. From the grit tank, the oily water flows to the sump and then is pumped to the oily water holding tank (a 3,000-gallon plastic tank). The oily water collection tank is elevated to provide sufficient head to operate the OWS. The OWS consists of a 3,000-gallon capacity, horizontal steel tank with internal partitions to separate the oil from the water. Separated oil is pumped to the waste oil holding tank, while the treated water is pumped to the clean water tank.

The waste oil holding tank is a 3,500-gallon plastic tank. At one point, the accumulated waste oil was pumped by pipeline from the holding tank to the waste oil sump and from there to waste oil storage tank (both located in the tank farm on the east side of the facility; Figure 3-1). Currently, a waste management contractor removes the waste oil generated by the oily water treatment system directly from the holding tank. Water discharged from the OWS generally contains about 48 mg/L oil and grease and about 3 mg/L total petroleum hydrocarbons (TPH) (PG&E 1993).

The clean water tank is a 9,200-gallon plastic tank. Treated water from the OWS is pumped to this tank, combined with the cooling water blowdown, and then periodically pumped to the evaporation ponds.

3.1.4.3 Chemical Use in the Wastewater Treatment Process

From 1964 to 1969, the single-step treatment system used sulfur dioxide to treat chromium-bearing cooling water blowdown. The sulfur dioxide used in this system was contained in a 1-ton liquid cylinder that was stored adjacent to the treatment pond.

In 1969, the two-step chromium treatment unit that used both sulfur dioxide and sodium hydroxide was installed. For the two-step system, a liquid sulfur dioxide cylinder was located next to the chromate reduction tank, and liquid sodium hydroxide was kept adjacent to the precipitation tank. From 1970 to 1973 (the time during which injection well PGE-08 was operated), Betz Poly Floc II and ferric sulfate were used along with the sodium hydroxide in the precipitation tank to further enhance the removal of chromium (PG&E 1975, 1985a). The use of the Poly Floc II and ferric sulfate appears to have been discontinued sometime after 1974. Since 1985 (when the use of chromium-based corrosion inhibitors was discontinued), no chemicals have been used in the wastewater treatment process.

3.1.4.4 Waste Generation and Management in the Wastewater Treatment Process

Wastes associated with the wastewater treatment process consist of the wastewater itself, sludge, and waste oil. The management of each waste stream is discussed below.

Wastewater Disposal. From 1951, when the compressor station first began operation, until 1970, when injection well PGE-8 went into operation, industrial wastewater (including effluent from both the cooling water blowdown and oily water treatment processes) generated at the facility was discharged to Bat Cave Wash (Figure 3-1). Based on historic aerial photographs, it appears that during the 1950s, wastewater was released to the wash without impoundment. Wastewater was released to the wash through a pipe that ran from the sludge drying beds area in the lower yard down the slope into Bat Cave Wash. Eleven aerial photographs taken between 1951 and 1970 were reviewed. The photographs show a light-colored flow in the wash that originates at the discharge point and, at least once, extends to the railroad tracks about 1,600 feet downstream. The light-colored flow does not extend beyond the railroad tracks in any of the 11 aerial photos reviewed. Based on this evidence, it does not appear likely that discharge routinely (or possibly ever) extended beyond this point.

In about 1964, a percolation bed was created in Bat Cave Wash west of the former sludge drying beds area, as depicted in Figure 3-6 (PG&E 1968a).[8] The bed was created by berming up soil on the west and south sides of the area (the sidewall of Bat Cave Wash formed the eastern boundary). PG&E documentation indicates that the percolation bed had an area of approximately 17,600 square feet (PG&E 1968a). Wastewater was discharged to this area from two pipelines (one 12-inch-diameter pipe and one 4-inch-diameter pipe) that ran from the lower yard down into Bat Cave Wash. Remnants of the -4-inch-diameter discharge pipe are still present on the slope above Bat Cave Wash. The percolation bed was not lined, and discharged wastewater was allowed to percolate into the ground and/or evaporate in this area.

By 1967, a graded impoundment is visible on aerial photographs on the inside loop of the access road that runs from the lower yard down into Bat Cave Wash (Figure 3-6). This portion of the impoundment is located in the area that has commonly been identified as the location for the former percolation bed in previous documents including the *Bat Cave Wash Soil Investigation* (Brown and Caldwell 1988). Based on field observations and information from aerial photographs, the impoundment was created by bulldozing soil from the center of the loop area and berming the soil up along the southern edge of the access road. This area represents the northern boundary of the percolation bed. Ponded water can be seen in this general area in aerial photographs from 1967 and 1969.

Former employees have reported that a crust would form on the impounded liquid and would have to be broken up. In addition, employees also reported that over time, the infiltration rate would decrease in a specific location, and a new impoundment would be constructed in the same general area of Bat Cave Wash (Russell 2006a).

Water Board Order 69-25 required PG&E to cease discharging industrial wastewater by infiltration no later than January 1, 1970 and required any retention of wastewater to be in basins from which no infiltration or surface run-off may occur (Water Board 1969). In response to this order, PG&E constructed wastewater injection well PGE-08. Injection of wastewater began in May 1970 and continued to August 1973. Records from the time (Dames & Moore 1970) indicate that there were some initial difficulties with the operation of

[8] The exact date for construction of the percolation pond is unknown but, based on aerial photographs, it appears to have been constructed in 1964 along with the single-step treatment system.

the injection well. From May 1970 to September 1971, some wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance. Based on available information, it is estimated that between approximately 29.4 million to 42 million gallons of wastewater were injected into PGE-08 while it was operational (PGE 1984a).

Pond 1, the first of four single-lined evaporation ponds (i.e., SWMU 10; the Old Evaporation Ponds), was completed September 1971. From September 1971 through August 1973, Pond 1 may have also been used temporarily for the disposal of wastewater when injection well PGE-08 was offline for repairs or maintenance. The 1972 annual report pursuant to Order 70-72 (Water Board 1970a) indicates that 1.6 million gallons of wastewater were discharged to Pond 1 in 1972 (PG&E 1972). This volume constitutes approximately 10 percent of the average annual wastewater volume at the time.[9] The remainder of the wastewater was injected into the injection well. In August and December 1973, treated wastewater was discharged alternately on a 3-day cycle between the injection well and Pond 1 (PG&E 1973a). Beginning in December 1973, wastewater was permanently routed to the evaporation ponds. Ponds 2 through 4 were subsequently completed in 1974 and began receiving wastewater shortly thereafter. Industrial wastewater generated at the compressor station between 1973 and 1989 was discharged to the single-lined evaporation ponds.

Handwritten notes indicate that between 1975 and 1980, the daily discharge rate ranged from 0 to 30,000 gpd, with average annual daily discharges ranging from approximately 8,000 to 17,600 gpd (i.e., between 20 percent and 40 percent of the flow documented in the Water Board Order) (PG&E 1980a).

The four single-lined evaporation ponds were replaced by four new, Class II (double-lined) evaporation ponds in 1989 (i.e., Ponds #1 through #4) constructed on BLM property. Since 1989, all industrial wastewater from the compressor station has been disposed of at the Class II ponds. The original, single-lined ponds were clean closed in 1993 (Trident 1993; DTSC 1995). A discussion of the closure process is summarized in Section 4.1.9.

Sludge Disposal. From 1969 through May 1985, sludge generated in the precipitation tank from the treatment of cooling-tower blowdown was transferred to the sludge drying beds for dehydration prior to disposal (Water Board 1970b; Kearny 1987). The sludge drying beds were constructed of concrete. The exact design and construction details of the beds are unknown. Prior to 1969, only a single-step treatment system was used to treat cooling water; therefore, very little sludge, if any, was generated. From May 1985 to October 1985, the sludge was pumped directly from the precipitation tank and transported offsite for disposal as a hazardous waste. The volume of chromic hydroxide sludge generated per year was relatively constant and averaged about 15,000 gallons per year (PG&E 1985b). PG&E data from 1984 (PG&E 1984b) indicate that the chromium hydroxide sludge contained Cr(T) at 570 mg/kg and Cr(IV) at 0.03 mg/kg. Soluble threshold limits concentration data for the elutriate derived from the same sample were reported as 170 mg/L Cr(T) and 0.98 mg/L Cr(VI).

[9] The reported average daily discharge rate at the time was 48,500 gallons, or approximately 17.7 million gallons per year (Water Board 1969).

A 1970 letter (PG&E 1970) indicates that PG&E was planning to bury the initial batch of sludge on or near the compressor station; however, there is no documentation to confirm whether this onsite disposal occurred. Several former long-term employees who were working at the facility during this time period were recently interviewed. None of them recalled the burial of sludge (Russell 2006a). Water Board Order 70-73, specifying the disposal requirements (location and placement) for the chromium hydroxide sludge at Needles Landfill, was issued on October 29, 1970 (Water Board 1970b). It appears that the chromium hydroxide sludge was disposed of at Needles Landfill from that time (October 1970) until 1983, although no specific documentation exists for 1971 and 1972.[10] Sludge shipping documents compiled by PG&E (PG&E 1984c) indicate that 166,500 gallons of sludge were disposed of at the Needles Landfill between 1973 and 1983. Annual volumes shipped varied widely, from 0 to 33,600 gallons, suggesting that there was storage capacity in the sludge drying beds. In response to California Department of Health Services (CDHS) directives (CDHS 1984a), no shipments were sent to the Needles Landfill after 1983 (PG&E 1984b-c). From January 1984 to October 1985, the dried sludge was transported offsite to an approved Class I hazardous waste facility (PG&E 1984c; CDHS 1984b).

Although there are non-PG&E references to sludge having been removed from the single-lined ponds (Kearny 1987; CDHS 1985), no first hand references have been located and it appears unlikely that the facility would have jeopardized the integrity of the pond liner by employing mechanical means of sludge removal. In addition, due to the size and depth of the ponds, it is unlikely that routine removal of sludge would have been required. The "sludge" that would have been present in the ponds would have consisted predominately of mineral salts found in the makeup water and dust blown into the ponds (Riddle 2004). Some solids were found in the ponds and tested as part of an overall sampling program for the wastewater treatment system (Brown and Caldwell 1985a). Based on information obtained from PG&E, it is likely that sludge removal would only have occurred if repairs were required to one of the ponds (Riddle 2004).

Very little sludge, if any, is generated using the phosphate-based cooling water treatment system. The current Class II evaporation ponds were designed for a 20-year life and have accumulated less than 12 inches of residue in the bottom since being placed into service in 1989. About 80 percent of the accumulated solids have recently been removed from the ponds as a maintenance function to ensure effective continuing operation of the ponds.

Waste Oil. Waste oil removed from oily wastewater is collected and transported offsite for disposal or recycling (additional information on the management of waste oil is provided in Section 3.1.5.2).

3.1.5 Facility and Equipment Maintenance

The fifth major activity at the compressor station is maintenance of the equipment at the facility and the facility itself. Typical maintenance tasks include:

- Preventive maintenance of mechanical and electrical systems.
- Mechanical and electrical repairs of operating equipment.

[10] Offsite disposal of chromium hydroxide sludge does not appear to have been performed at routine (e.g., quarterly) intervals, but appears to have been performed only sporadically. This suggests that the sludge was stockpiled onsite and disposed of only as necessary. This may explain the absence of disposal records for 1971 and 1972.

- Minor maintenance of buildings and structures on the property.
- Fueling and servicing of vehicles required for station operations.
- Chemical testing of cooling water.
- Construction.

Equipment maintenance consists of preventive maintenance and repairs for the mechanical and electrical equipment at the facility. Routine maintenance of small system components occurs on an as-needed basis. Special maintenance tasks consist primarily of compressor engine and generator engine overhauls. Compressor engines are overhauled when necessary, as indicated by equipment monitoring. Prior to 1998, compressor engines were overhauled after approximately every 30,000 hours of operating time (about 3.5 years of continuous operation); however, due to increased preventive maintenance, the engines are currently overhauled much less frequently (Riddle 2004). In addition, the closed-loop cooling water systems are drained on an as-needed basis, which is currently less than once per year. There is no information on the historical frequency of closed-loop cooling water system change-outs. Historically, maintenance also included maintaining mercury-containing meters (see Section 3.1.7).

Formerly, indicator chemicals were used to monitor the concentrations of cooling water additives in the various cooling water systems. Testing was performed in the onsite laboratory, and wastes were discharged to the laboratory sink, which drains to the septic system adjacent to the maintenance building.

Construction activities are conducted as needed to maintain and modernize the facility. Construction activities may include repairs to pipeline components, relocation or replacement of pipelines, replacement of major operating equipment, and construction/modification of small buildings. The plant access road was recently repaved, and a berm was added on the south side of the access road (Russell 2006b). No major construction has occurred at the facility since the cooling towers were replaced in 2001 and 2002.

3.1.5.1 Chemical Use in Facility and Equipment Maintenance

Chemical products used during performance of facility and equipment maintenance consist of fuels (i.e., gasoline and diesel), lubricants, solvents, paint, pesticides, and herbicides.

Historically, the facility had seven USTs including (Figure 3-1):

- One scrubber sump located in the lower yard.
- Two tanks adjacent to the compressor building used to temporarily store clean engine oil during compressor engine servicing.
- One tank adjacent to the auxiliary building used to temporarily store clean engine oil during generator engine servicing.
- One waste oil sump located in the tank farm on the east side of the facility (adjacent to the visitor parking lot).
- One 2,000-gallon gasoline tank located northwest of the office.
- One 1,000-gallon diesel tank located northwest of the office.

With the exception of the waste oil sump, all of the USTs have been closed in accordance with UST regulations in the late 1990s. UST closure was coordinated with, and approved by, the CSBFD (CSBFD 1997; Riddle 2004). The fuel and clean oil USTs were replaced with ASTs (the ASTs were generally placed in the same location as the removed USTs). The waste oil sump is still in active use and is permitted and operated under the jurisdiction of the CSBFD.

There are currently four fuel ASTs at the facility (Figure 3-1): a 1,000-gallon diesel AST, a 2,000-gallon gasoline AST used to fuel vehicles are located just northwest of the office, a 2,000-gallon diesel AST that provides fuel storage for the emergency electrical generator, and a 140-gallon diesel AST that provides fuel storage for an emergency fire water pump. There have been no releases associated with the fuel ASTs.

Currently, there are also eight ASTs used for oil storage at the facility (Figure 3-1). Five of the oil storage ASTs are located in the tank farm on the east side of the facility; of these five ASTs, four are used to store new oil product, and the fifth is used to store waste oil. Each of these five oil ASTs is constructed of steel and has a capacity of 7,500 gallons. The three remaining oil ASTs are used to temporarily hold oil that is drained from the compressor and generator engines during servicing. Two of these ASTs are located adjacent to the compressor building, and the third is located adjacent to the auxiliary building. Each of these three ASTs is constructed of steel and has a capacity of approximately 1,500 gallons (Riddle 2004). There have been no releases associated with the oil storage ASTs.

The station has an emergency battery backup system that has been in place for about 15 to 20 years. The battery backup system is used to operate the station controls, emergency lighting, and communications equipment during emergencies. There are eight Absolyte IIP Type 90A-23 batteries and eight Deka Unigy II Type 6AVR 2/85-9 batteries. Maintenance consists of an annual load test and quarterly inspections. The manufacturer replaces individual batteries if the load test shows the cells are bad. The batteries are also returned to the manufacturer for recycling at the end of their life. Historically, they were apparently sent to Wiley Wrecking for salvaging (PG&E 1980a).

Based on interviews with station personnel, weed and insect control is conducted by a contractor. Herbicides and pesticides are applied as necessary around the facility. Rodent control is performed by station personnel (Riddle 2004). No historical information is available regarding the specific chemicals used, quantities used, or specific application locations.

The compressor station has a small onsite chemical laboratory, located in the Auxiliary Building, an original plant building. Routine testing of the cooling water is performed to monitor chemical content and pH of the cooling water. There is no direct information on when the laboratory was first put into service. However, the plant would have needed to test its cooling treatment processes from the start of operations, which suggests that that laboratory has been in use since the inception of the facility. None of the former employees interviewed recalled the chemical laboratory ever being located in any other locations than the auxiliary building (Russell 2006b). Current testing includes pH, conductivity, concentration of corrosion inhibitors in all four cooling systems, and concentration of scale-control additive in the cooling towers. Test chemicals consist of indicator reagents supplied by the cooling water treatment chemical company.

Chemicals are brought to the site in cans, bags, drums, and tanker trucks (gasoline and diesel). Historically, Betz, the cooling water treatment chemical supplier, also provided cooling water treatment chemicals in bulk. It is likely that lubricating oil was also delivered in bulk; however, no records exist regarding historical lubricant deliveries. Bulk chemicals (lubricating oil, sulfuric acid, odorant, and water treatment chemicals) are stored in tanks. Drums of hazardous materials are stored in the hazardous materials storage area. Small containers of chemicals, primarily those used in maintenance activities, are currently stored in approved hazardous materials cabinets near the location of their intended use throughout the facility. Historically, at least some of these materials were stored in the chemical storage sheds formerly located near the cooling towers. Table 3-3 provides a list of chemicals that were known to be stored at the facility during various years for which information was available.

3.1.5.2 Waste Generation and Management Associated with Facility and Equipment Maintenance

The compressor engines and generator engines produce a small amount of waste oil. The compressor engines are two-cycle engines that consume small amounts of their lubricating oil. Therefore, oil must be continually added to the compressor engines. The generator engines are four-cycle engines and, therefore, consume only minor amounts of lubricating oil. The generator engines require periodic oil changes. Waste oil is generated from the engines when the oil must be removed during servicing or when the oil becomes contaminated due to operational problems (e.g., contamination by cooling water). During compressor maintenance requiring access to the interior of the engine, the oil is drained into a specially-designed storage system (i.e., the two storage ASTs for reusable oil discussed above) and is then returned to the engine crankcase when the maintenance activities have been completed. Any waste oil generated is pumped directly from the engines to the waste oil sump and then transferred from the sump to the waste oil storage tank. The waste oil sump is approximately 15 to 20 feet deep and 6 feet square. It was originally constructed as a concrete sump. It is now equipped with an inner steel liner, and the original concrete tank acts as secondary containment (Riddle 2004). The depth of the waste oil sump was historically designed to allow gravity flow of oil to the sump.

Handwritten notes (without an identified author) from 1980 regarding waste- and chemical-handling activities at the facility indicate that the waste oil storage tank was emptied approximately once every 9 months (PG&E 1980a). Assuming that the notes are accurate, prior to 1975, the oil may have been sprayed on facility roads for dust control (PG&E 1980a). This is consistent with information provided by former employees (Russell 2006b), which indicates that waste oil was sprayed on station roads and other unpaved areas. However, starting in 1975, the waste oil was apparently delivered to local power plants to be used as fuel. Since the early 1980s, the waste oil has been removed from the facility by a licensed contractor who transports the oil offsite for recycling (PG&E 1983a-b). The facility currently generates about 12,000 gallons of waste oil per year (Riddle 2004).

Steam cleaning also occurs at the facility in the area often referred to as the wash rack or wash down area. The discharge from the steam cleaning activities is routed to the oil-water separator. Other hazardous wastes generated as part of routine maintenance operations—such as oily rags, air filters, oil filters, contaminated "dry sweep" (oil absorbent), small quantities of paint, and spent aerosol cans of paint and solvent—are accumulated in

approved containers in the maintenance work areas. Building and facility maintenance also generates fluorescent lights in addition to the other wastes generated by equipment maintenance. Drums of hazardous waste and spent batteries are stored in the hazardous materials storage area. In the early 1980s, it appears that items such as oily rags, air filters, oil filters, and spent aerosol cans were disposed of with the domestic garbage (PG&E 1980a). Spent mercury, and cleaning materials contaminated with mercury were generated as part of the meter maintenance process (see Section 3.1.7). There is no information regarding disposal practices for mercury contaminated cleaning materials prior to the early 1980s.

No information is available regarding the handling of asbestos-containing materials (ACM) prior to the early 1980s. However, former employees indicated that ACM may have been disposed of by burial in two locations near the Transwestern Intertie and one location near the Old Evaporation Ponds. A few pieces of what may be transite panels have been noted in the Debris Ravine. In addition, asbestos was present in the Railroad Debris site, although it is not known if the material was placed there by PG&E. The ACM present that the Railroad Debris Site was removed in 1998 (PG&E 1999a). Since the early 1980s, all hazardous and controlled wastes have been transported offsite to an appropriate disposal facility (McCurdy 2004).

Construction wastes are similar to wastes generated by routine equipment maintenance but may also include construction materials such as waste concrete and asphalt. Concrete, asphalt, and recyclable metals are stockpiled for recycling. Miscellaneous construction wastes are handled like other maintenance wastes (Russell 2006b).

Laboratory waste chemicals (test solutions and small quantities of cooling water) historically have been and are currently disposed of by discharging them to the septic system (PG&E 1980a; Riddle 2004). According to handwritten notes (PG&E 1980a), approximately 1 pint per day of test chemicals was disposed of into the drain that is connected to the septic system. Laboratory chemicals identified on historical inventories and requisitions included silver nitrate, phenolphthalein, potassium chromate indicator, sulfuric acid (50-percent solution), Starfanic indicator, iodide crystals, sodium thiosulphate N/10, sulfanic acid, sodium hydroxide, potassium iodide (5 percent solution), and various indicators. Empty containers were drummed and disposed of offsite. (PG&E 1974).

3.1.6 Miscellaneous Operations

Other sources of wastes at the compressor station consist of miscellaneous wastes, domestic wastes, stormwater runoff, and domestic sewage. A central stormwater collection system for the compressor station does not exist. Stormwater is directed off the facility through numerous culverts to surrounding drainages including Bat Cave Wash, the Debris Ravine, the East Ravine, and an unnamed ravine to the northeast of the station.

Handwritten notes (PG&E 1980a) describe four miscellaneous waste streams: domestic waste, large metal scraps, empty 55-gallon drums, and laboratory chemicals. According to this document, most empty drums were returnable; the remainder were steam-cleaned and used at the station or donated to charity. Large scrap metal was stored in a designated 300,000-square-foot area and in one bin. Approximately 20 tons of large scrap metal were generated each year and sold to Wiley Wrecking. During this period old batteries were also sold to Wiley Wrecking (PG&E 1980a).

Domestic waste consisted of scrap paper, food waste, miscellaneous parts such as gaskets, small metal and wood scrap, tires, and vegetation. Domestic waste historically has been disposed of at the San Bernardino County Landfill (formerly known as the Needles Landfill). Currently, domestic waste is removed from the facility by Tri-State Disposal and is disposed of at the Mohave Valley Sanitary Landfill near El Rodeo, Arizona. A recent field visit to the facility revealed that some garbage appeared to have been disposed of along the southern portion of the Debris Ravine in the past. This is consistent with reports by former employees regarding disposal of domestic garbage at the Debris Ravine (Russell 2006b). Small amounts of wood, metal scraps, and a partially-melted graduated cylinder were observed on the upper bank of the ravine.

3.1.7 Mercury

Some of the monitoring instruments (e.g., manometers, thermometers, and flow meters) formerly used at the Topock Compressor Station contained mercury. This is the only known use of mercury at the facility (Russell 2006b). As part of PG&E's effort to reduce the use of hazardous materials at the facility, all mercury-containing equipment was removed from service beginning in the 1980s. The removal effort was completed by 1996 (Russell 2006b). The work consisted of draining the elemental mercury from each instrument and physical removal of all instruments and associated piping that had contained the mercury. The elemental mercury was transported offsite for recycling, and the instrument carcasses and other debris was transported offsite for disposal as hazardous waste. Details regarding the removal of the final mercury-containing equipment are provided in the *Closure Report for the Removal of Mercury Containing Instruments and Piping at PG&E's Topock Compressor Station and Related Facilities* (Trident 1997). An inspection of the facility following the removal confirmed that no other mercury-containing equipment remained at the Topock compressor station (Trident 1997).

In the 1960s, when mercury-containing equipment was in use, station employees would reportedly periodically empty the meters, clean the mercury to remove accumulated debris, and then refill the meters with mercury. The facility reportedly maintained approximately 40 to 50 pounds of mercury onsite (Russell 2006b). The facility owned a mercury vacuum for cleaning up mercury spills. PG&E had a company-wide mercury cleanup program in place by 1985.

3.1.8 Incidental Release History

During the operational history of the compressor station, some incidental releases of chemicals or waste products have occurred. When incidental releases occurred, the proper authorities were notified and the spill was cleaned up. Although the investigation and cleanup of incidental releases has not been performed under the RFI, the reporting of releases is required under the terms of the CACA (DTSC 1996). These incidental releases were reported to the appropriate regulatory agency (as described for each release, below). These minor cleanup activities are typically performed as maintenance activities and do not require, nor have they received, agency approval. Seventeen incidental releases have been documented at the facility since 1995, as summarized in Table 3-5. The location of each release is depicted in Figure 3-7. Details of each release are provided below. Although the site history has been extensively researched, quantities, precise dates, and follow-up

information regarding spills that may have occurred prior to 1995 are generally not available.

3.1.8.1 Spills Prior to 1995

Specific documentation regarding spills that occurred prior to 1995 does not exist. The following spill information is based on information that was gathered during employee interviews. The reported use of pipeline liquids and condensate for dust control was described earlier, and the information is not repeated here.

Mercury Spills. Two past employees recalled mercury spills. One spill reportedly occurred in the machine shop and consisted of 15 to 20 pounds of mercury. The employee could not recall how the spill was cleaned up. The former employee reported that mercury periodically was drained from the meters, accumulated debris was removed from the mercury, and the mercury was cleaned with chamois. He also indicated that the facility typically stored on the order of 40 to 50 pounds of mercury (Russell 2006b). The other spill reportedly occurred at the meter building in the lower yard, and the mercury reportedly entered a drain that leads to Bat Cave Wash (Bezanson 2006).

Cooling Water Spills. As described earlier (See Section 3.1.3.1), the jacket cooling water system originally was designed with a hot well that acted as a surge tank for the jacket cooling water system. There was no overflow control system on the hot well, and employees stated that they periodically overflowed. When the jacket cooling water system leaked (pump seals and/or valve seals may fail, causing leakage from the actual system) or the hot well overflowed, the cooling water would flow onto the graveled area near the pumps and sometimes onto the paved area between the jacket water system and the visitor parking lot/warehouse, then down the main entrance road leading to the station. The water flowing down the road typically stayed on the north side of the road and simply dried up before it flowed off the paved surface. However, if there was enough water, it could run over the other side of the road into the East Ravine (Russell 2006b).

Leaks could also have occurred at the AJCW pumps. The cooling water would have entered the unpaved areas around the AJCW pumps, and, in the event of a larger spills, could have entered a storm drain trench in the vicinity of the pumps.

One former employee indicated that he observed a release from Cooling Tower B into the Northeast Ravine.[11] There are three stormwater discharge pipes that appear to originate in the vicinity of Cooling Tower B and lead to the Northeast Ravine.

3.1.8.2 October 1995 Mercury Release

During the week of October 16, 1995, a length of gas meter piping adjacent to the east side of the compressor building was being removed to facilitate construction in the area. When the line was cut, metallic mercury (which was apparently trapped in the line) was released to an area of exposed soil. The area impacted by the mercury release measured about 18 feet long by 9 feet wide. Initial samples collected from the release area contained mercury ranging from 200 to 12,000 mg/kg.

[11] Plant personnel often refer to the AOC 10, officially called the East Ravine in the various documents pertaining to the RCRA program, as the South Ravine, and the ravine to the northeast of the plant as the East Ravine. Here the ravine to the northeast of the plant is referred to as the Northeast Ravine to avoid confusion.

Between November 20 and December 1, 1995, soil was excavated from the release area. Based on visual observations and interim sampling, the excavation ranged from 2 to 4 feet deep, and it extended laterally over the entire impacted area. When completed, 3,730 pounds of mercury-contaminated soil had been removed. The contaminated soil was placed into 55-gallon drums and shipped offsite for disposal at the Chemical Waste Management, Inc. facility in Kettleman City, California.

Following excavation, 12 samples were collected from the base of the excavation, and one sample was collected from each of the north and south walls. In addition, at the request of the CSBFD, samples were collected on both sides of a wooden form located adjacent to the release area. The results of confirmation samples are summarized in Table 3-6.

The results of the confirmation samples indicate that all soil containing mercury at concentrations exceeding the California hazardous waste standards and the United States Environmental Protection Agency (USEPA) preliminary remediation goals for both residential and industrial soil had been removed. In addition, a risk assessment performed following the removal action indicated that the residual concentrations of mercury that remained did not pose an unacceptable treat to human health (PG&E 1996a).

Details regarding the incident and the remediation effort were reported to the CSBFD in 1996 (PG&E 1996a). As previously indicated, removal of all mercury-containing instrumentation was completed in 1996 (Trident 1997). All mercury debris removed from the facility was transported offsite for disposal at the Chemical Waste Management, Inc. facility in Kettleman City, California.

3.1.8.3 June 1996 Cooling Tower Water Release

On Sunday, June 30, 1996, approximately 200 gallons of water from the lower basin of Cooling Tower A overflowed (PG&E 1996b). The overflow entered a facility drain that discharges to Bat Cave Wash. The portion of the wash that was affected by the spill was reportedly on PG&E property.

The overflow was caused by a failure of one of the cooling tower basin level controllers. Scale build-up on the float mechanism of the controller caused it to stick in the "fill" position. As a result, the makeup water line continuously filled the basin until it overflowed. Upon discovering the problem, the facility operator manually closed the makeup water line to stop the overflow. Water from the tower was then pumped to the evaporation ponds to achieve adequate freeboard in the basin.

At the time of the release, cooling water in the tower was non-hazardous and contained phosphate-based corrosion inhibitors. Analysis of cooling water samples collected prior to the release indicated an electrical conductivity of 9,000 micromhos and a pH of 7. The conductivity of the released water was thought to be lower due to dilution with the makeup (fresh) water.

The Water Board was notified of the release on Monday, July 1, 1996. Surface soil that was contacted by the overflow adjacent to the cooling tower basin and in Bat Cave Wash was removed (PG&E 1996b). No soil sampling was requested by the Water Board. Enhanced inspection and maintenance schedules were implemented to avoid recurrence of this incident.

3.1.8.4 August 1998 Cooling Tower Water Release

On August 4, 1998, during a routine daily facility inspection, an operator observed process water being released from Cooling Tower A. The majority of the water flowed onto the soil adjacent to the cooling tower. A small volume of water flowed down the side of the hill into the Bat Cave Wash area. The total release volume was estimated at about 500 gallons. The cooling tower water contained low concentrations of a non-hazardous, phosphate-based corrosion inhibitor. All of the water released evaporated rapidly due to the high summertime temperature. The Water Board was notified of the incident in a report dated August 11, 1998 (PG&E 1998). No sampling was conducted because future investigation of Bat Cave Wash was planned.

The cause of the release was determined to be a fouled screen associated with a drain return line. The screen was cleaned and the tower was restored to normal operating conditions.

3.1.8.5 December 2000 Wastewater Release

During the period from December 3 through 5, 2000, approximately 20,000 gallons of wastewater were accidentally released from a pipeline near Bat Cave Wash (PG&E 2002b). The wastewater release was associated with routine maintenance and cleaning of the cooling towers. The wastewater was normally pumped from the facility to the evaporation ponds via an underground pipeline. The release occurred as a result of the mechanical failure of an air vent valve on the pipeline northwest of Bat Cave Wash. The released wastewater flowed downhill, along the access road to the Old Evaporation Ponds, and eventually into Bat Cave Wash.

The release was discovered on December 5, 2000. The valve was immediately repaired, and no further releases occurred. Following the discovery, DTSC was notified by telephone on December 7, 2000 (within 48 hours of the incident, as required by the CACA). The affected area was inspected, and soil samples were collected from the affected area. Samples were also collected from unaffected areas for comparison purposes. The samples were subsequently submitted to a laboratory for analysis for Title 22 metals, several other general parameters and soluble concentrations of Cr(VI) (using the California Waste Extraction Test method). The results of these samples are summarized in Table 3-7.

Concentrations of metals in the samples from the affected areas did not appear to be significantly different than concentrations in samples from the unaffected areas. No detectable concentrations of Cr(VI) were identified in any of the samples. The pH level in affected samples also appeared to be consistent with background. Based on these results, no additional sampling or soil removal was performed. The results of the cleanup were provided to the Water Board; however, no response was received from that agency.

Corrective measures implemented following this release consist of weekly external inspections of the air vent valves. In addition, annual internal inspections and preventive maintenance of the valves has also been implemented.

3.1.8.6 August 2001 Oily Water Release

On Thursday, August 23, 2001, a small amount of oil was discovered in one of the new Class II evaporation ponds (Pond No. 1) (PG&E 2001). The cause of the release to the pond was determined to be a malfunctioning OWS at the compressor station. Work to service the OWS

and restore its ability to function properly began on August 24, 2001. During servicing of the separator, the waste oil tank used to collect oil from the separator became unusually full. Early Saturday morning, August 25, 2001, a waste oil transfer pipe that had been out of service was used to move the waste oil from the waste oil tank at the separator to a larger waste oil storage tank located at the tank farm. At some point later that morning, oily water apparently leaked out of the transfer pipe and into the subsurface trench through which the pipe passes.

Once the piping trench filled up, the oily water overflowed out onto the ground, ran downhill across the site, through a storm drain, and out into Bat Cave Wash, running downhill and along the dirt access road. The length of the spill occurring outside of the facility fence line was approximately 150 linear feet. Although outside the fence line of the facility, the release area was entirely on PG&E-owned property. Of the 300 gallons released, it is believed 100 gallons were waste compressor lubricating oil and 200 gallons were wastewater. In accordance with the CACA, DTSC was notified of the incident by telephone on August 25, 2001 (within 48 hours of the incident).

After discovery of the release, facility personnel took immediate steps to ensure the leakage from the pipe was stopped and constructed a berm around the storm drain to prevent any further releases. Cleanup efforts began immediately and included removing the accumulated oily water from the piping trench and Pond No. 1, removing the vast majority of oil-saturated soil both onsite and offsite, and cleaning the storm drain. Confirmatory samples were collected on October 1, 2001 and tested for Title 22 Metals, Cr(VI), and TPH. Metal concentrations were all below residential USEPA preliminary remediation goals (PRGs) with the exception of Cr(T) which exceeded industrial PRGs for one of the samples collected. The results of confirmatory samples collected following cleanup are presented in Table 3-8.

The waste oil transfer piping has been physically disconnected from the waste oil tank at the OWS to eliminate the potential for future oil transfers from one tank to another. Waste oil is currently pumped directly from the waste oil collection tank into a tank truck that transports the oil offsite for recycling. No soil removal was conducted.

3.1.8.7 August 2002 K-10 Aqua Tower Release

On Saturday evening, August 24, 2002, approximately 100 gallons of water containing a dilute, buffered hydrochloric acid and corrosion inhibitor mixture was accidentally released onto a paved area of the facility (PG&E 2002c). The corrosion inhibitor (Nalco A-Z-Lite 7356) contained 5 to 10 percent phosphoric acid and 1 to 5 percent zinc chloride. The release occurred during a descaling operation involving the aqua tower and after-cooler system heat exchanger on compressor unit K-10. Upon discovery of the release, operators quickly blocked a nearby storm drain, and the release was stopped. It is estimated that 25 gallons of the solution were trapped in the facility street gutter where it quickly evaporated. The remaining 75 gallons entered the storm drain on the east side of the station and flowed into a nearby gully, dampening the soil for about 35 feet. Neither the storm drain nor the gully drain into Bat Cave Wash or the Colorado River.

DTSC was initially notified of the release by telephone on August 25, 2002 (within 48 hours of the incident), in accordance with the CACA. The State of California Office of Emergency

Services (OES) was also notified by the station superintendent on August 24, 2002, and OES issued control No. 024593 for this event. The CSBFD was also notified.

On August 25, 2002, a sample was collected from the affected soil in the gully and submitted for laboratory analysis for pH, Title 22 metals, and Cr(VI). A sample of unaffected soil was also collected and analyzed for comparison purposes. The results of the analysis of these samples are summarized in Table 3-9. The results indicate that pH may have been slightly below background in the affected area but was still at a neutral 7.0 units. Metals concentrations in the affected area may also have been slightly elevated above background levels, but the concentrations were significantly below California hazardous waste standards and USEPA PRGs for industrial soil. Neither sample contained any detectable concentrations of Cr(VI). Based on these results, no additional soil sampling or soil removal was performed.

No new acid cleaning of this type is planned for the aqua tower and cooling equipment in the future. However, if this activity does ever become necessary, corrective actions associated with this activity include covering all storm drains, surrounding the cleaning area with temporary berms, and inspecting all piping prior to cleaning.

3.1.8.8 September 2002 Grit Tank Release

The grit tank is part of the compressor station wastewater system that treats oily water prior to the water being pumped to the evaporation ponds (Section 3.1.4.2). Water is collected from a number of drains located under pumps and other operating equipment in the upper yard that may at times generate oil and oily water. The drains deliver wastewater by gravity to the 1,350-gallon grit tank in the lower yard. A secondary containment berm surrounds the grit tank and associated sump. The purpose of the grit tank is to allow particulate matter to settle out of the wastewater. After flowing through the grit tank, water enters a sump located at the bottom of the bermed area, where a pump then transfers the water to an OWS. The sump pump is controlled automatically by a float mechanism that senses the level of the water.

At some point during the evening of September 1, 2002, the sump pump level controls failed, and water overflowed the sump and surrounding berm (PG&E 2002c). Approximately 500 gallons of oily wastewater overflowed the berm, traveled down an inclined area of the facility yard, and entered a storm drain at the northwest end of the station. The water traveled through a drainpipe and was released into Bat Cave Wash. The release was discovered during a routine facility inspection. A nearby surface drain was subsequently covered to prevent any additional water from being released offsite, and the inlet valve to the grit tank was shut off. However, some water continued to leak out of the bermed area. The OES was notified of the release within 24 hours of the event on September 2, 2002, and DTSC was notified within 48 hours of the event on September 3, 2002.

An inspection of the area following the release revealed that the water had a slight oily sheen. Soil in the facility yard that was contacted by the water became dry within 24 hours. During an inspection on September 6, 2002, only a few small areas (less than approximately 1 square foot) appeared stained. None of the soil in Bat Cave Wash appeared stained.

Soil samples were collected from the affected areas on September 5 and 9, 2002. A sample of unaffected soil was also collected from the area for comparison purposes. The samples were submitted to a laboratory and analyzed for TPH, Title 22 metals, and Cr(VI). The samples were also analyzed for PCBs as a precaution. The analytical results are summarized in Table 3-10.

The sample collected at the grit tank contained TPH as motor oil and as diesel at concentrations of 3,000 mg/kg and 390 mg/kg, respectively. Only minor concentrations of TPH were identified in the remaining samples collected from affected areas. Detected concentrations of metals in samples from the affected areas appeared to be slightly elevated for arsenic, barium, copper, lead, and molybdenum. Total chromium concentrations in samples from affected areas ranged from 11 to 360 mg/kg. PCB Aroclor-1254 was detected in only two samples from the affected area at concentrations of 0.30 and 0.086 mg/kg. Because soil affected by the release did not contain any concentrations of metals or PCBs exceeding California hazardous waste standards or USEPA PRGs for industrial soil, no additional sampling or soil removal was performed.

Corrective actions taken after the release was contained include repairing the sump pump controls and instituting weekly inspection of the equipment (PG&E 2006a).

3.1.8.9 April 2003 Cooling Water Release

On April 21, 2003, approximately 1,000 gallons of cooling tower water overflowed from the upper cooling tray of Cooling Tower A as the result of high winds. The water flowed from the facility yard down into Bat Cave Wash. The cooling water contained a non-hazardous, phosphate-based corrosion inhibitor. DTSC was notified within 24 hours of the release on April 22, 2003.

Surface and subsurface soil samples were collected and analyzed for Title 22 metals, pH, conductivity, and TDS. The results of these samples indicated that no hazardous constituents were present in the areas affected by the release; therefore, no soil removal was performed.

3.1.8.10 March 2004 Scrubber Pipeline Liquids Release

Topock Compressor Station is equipped with gas scrubbers that were formerly used to remove pipeline liquids from gas in the pipeline (Section 3.1.2). The quality of natural gas has improved greatly since the compressor station went into operation in 1951; consequently, the scrubbers no longer collect large quantities of liquids. Pipeline liquids at the facility are currently composed almost entirely of used compressor lubricating oil.

Once a year each scrubber is blown down to remove the accumulated liquids. A 2-inch-diameter blowdown line from each scrubber connects to a common 2-inch-diameter header that is buried below grade. The header ends in an aboveground hose fitting to which a drip tank is connected during blowdown. On March 3, 2004, a facility employee was engaged in the annual blowdown of the gas transmission line 300A scrubbers. When the underground scrubber drip header was pressurized, oil and gas began to bubble out of the ground (PG&E 2004). The employee immediately isolated the underground header from the scrubbers. As the header slowly depressurized, approximately 2 gallons of oil bubbled to

the surface and then soaked back into the ground. The scrubber blowdown valves were then immediately cleared and tagged for non-operation.

A sample taken from the affected soil contained 23,000 mg/kg TPH as motor oil but no detectable concentrations of PCBs (<0.3 mg/kg as Aroclor-1260). The 2-inch-diameter header in the area where the oil bubbled out of the ground was subsequently exposed and excavated. Standing oil and all visibly oil-stained soil on the surface and below ground was removed on the day of the release (March 3, 2004). The affected area was localized and could be readily defined because of the dark color of the oil. Approximately 200 pounds of soil were removed during excavation and cleanup. The soil was placed into drums and transported under manifest to the Chemical Waste Management, Inc. facility located in Kettleman City, California on June 15, 2004.

Two confirmatory samples were collected following soil removal and analyzed for TPH and benzene, toluene, ethylbenzene, and xylenes (BTEX). The results are summarized in Table 3-11. The TPH analysis on these samples was inadvertently performed for gasoline rather than motor oil. No subsequent samples were collected and analyzed for TPH as motor-oil. There were no detectable concentrations of TPH in either sample, and only one sample contained any BTEX (xylenes at 5.6 mg/kg). Although the TPH analysis was not specific to motor oil, the results suggest that no significant residual hydrocarbon concentrations remained in soil at the release location.

DTSC was notified of the release by email on March 5, 2004 and in writing in early April 2004. A final report on the release was submitted to DTSC on November 15, 2004 (PG&E 2004).

3.1.8.11 August 16, 2005 Bat Cave Wash Wastewater Release

On August 16, 2005, soil movement resulting from a heavy rainstorm event caused a boulder to fall on a 4-inch fiberglass pipeline. The pipeline cracked and approximately 1,000 gallons of nonhazardous facility wastewater (including cooling tower blowdown) were released onto HNWR property (Russell 2005). The pipeline was repaired, and the eroded soil was backfilled. Engineering studies have been conducted, and a pipeline replacement/erosion protection plan is currently being implemented. The Water Board, HNWR, BLM, FMIT, and DTSC were all notified on August 16, 2005, and soil sampling was requested by the agencies.

3.1.8.12 December 19, 2005 Grit Tank Spill

The purpose of the grit tank is to allow particulate matter to settle out of the wastewater. After flowing through the grit tank, water enters a sump located at the bottom of the bermed area, where a pump then transfers the water to an OWS. The grit tank is part of the compressor station wastewater system that treats oily water prior to the water being pumped to the evaporation ponds (Section 3.1.4.2).

On December 19, 2005, a joint failure occurred on the transfer piping between the grit tank and OWS. The failure occurred when a glued joint just upstream from a 45 degree bend separated. This joint failure resulted in the release of approximately 300 gallons of oily water that bubbled up aboveground. The Water Board, CSBFD, and DTSC were all notified within 24 hours. The separated joint was cleaned and re-glued. Following the proper cure

time, the joint was hydrostatically tested. A concrete thrust block was later installed at the 45 degree bend. This completed the permanent repair of the pipe.

On December 20, 2005, thee soil samples were taken in the affected areas of the release (Table 3-12). Two additional samples were taken from unaffected areas to be used as background sample results. All samples were tested for TPH in the diesel, gasoline, and motor-oil/hydraulic oil range. TPH-diesel and TPH-gasoline were not detected in any of the soil samples collected. TPH-motor-oil was detected in all three samples collected within the affected areas with concentrations ranging from 20 mg/kg to 420 mg/kg. The highest concentration was detected in the sample collected near the end of the release path in Bat Cave Wash. TPH-motor-oil was detected in the background sample collected from Bat Cave Wash at a concentration of 59 mg/kg. The TPH-motor oil concentration detected in affected soil originating from the December 19, 2005 release is not considered a hazardous waste (PG&E 2006b).

3.1.8.13 December 24, 2005 Compressor Lubricating Oil Release

On December 24, 2005, a rupture occurred in the copper tubing on top of the K-6 compressor lubricating oil filter. Oil was observed on the concrete under the filters and the soil area between the concrete and pavement on the east side of the Compressor Building. Oil also spread under the K-6 aqua cooling tower and toward the K-7 aqua cooling tower (PG&E 2006b). K-6 was shut down which depressurized the oil system and terminated the leak. An absorbent was then spread on the oil. Approximately 50 gallons of oil was released. California State OES, CSBFD, and DTSC were all notified within 24 hours.

The ¼-inch copper tubing connected to the K-6 oil filters and strainer was replaced and all of the oil on the concrete under the filters was cleaned up. Since the oil was contained and the further spread of the oil on the soil was unlikely, clean-up was delayed until a later date. Heavily-stained soil was removed from the affected area on December 27, 2005. On February 8, 2006, an additional approximately 10 cubic yards of soil was removed. The spill occurred under the walkways in areas of aboveground piping and footings, therefore the soil clean-up was difficult The soil was broken-up manually and then vacuumed up.

Three soil samples (Samples 2, 3, and 4) and one composite sample (Sample 1) were collected on March 8, 2006 within the release area. All samples were analyzed for Title 22 metals as well as TPH using the California LUFT method. A summary of these results is presented in Table 3-13. TPH in the motor oil/hydraulic oil range were detected in Samples 1 through 4 from the December 24, 2005 release. TPH motor oil/hydraulic oil concentrations ranged from 220 mg/kg (Sample 2) in the visually clean soil sample to 4,800 mg/kg (Sample 3) in the heavily stained soil sample. Soil with TPH concentrations less than 10,000 mg/kg is considered a non-hazardous waste and can be disposed of at a Class II landfill using a non-hazardous waste manifest. Title 22 metal concentrations were all below USEPA industrial soil PRGs.

3.1.8.14 December 27, 2005 Bat Cave Wash Wastewater Release

On December 27, 2005, a vent valve failure occurred which resulted in approximately 4,000 gallons of facility wastewater (including cooling tower blowdown) being released into Bat Cave Wash. USFWS, OES, CSBFD, and DTSC were all notified within 24 hours. The vent valve and all associated piping were replaced.

Six soil samples were collected following the spill, two of which were collected in areas that were not contacted by the released water (Table 3-14). A water sample was also collected from the OWS clean water tank. Test results show that none of the soil samples exceeded the California total threshold limit concentration for Title 22 metals. The metal concentrations detected were similar to those found in the soil samples not affected by the release. In addition, none of the USEPA PRGs for chromium, copper, nickel, and zinc were exceeded. General mineral levels (chlorides, sulfates, pH, conductivity, and total dissolved solids) were all comparable to those found in the two soil samples collected outside of the release area, and are considered background. Title 22 metals found in the clean water tank sample were generally less than 1 mg/L with the exception of molybdenum at 6.7 mg/L (PG&E 2006c).

3.1.8.15 January 2, 2006 JCW Release

On January 2, 2006, a valve located on one of the main jacket cooling water tanks failed, resulting in the release of approximately 120 gallons of treated cooling water. The treated cooling water contained molybdate-based corrosion inhibitors. Approximately 100 gallons of the treated cooling water was confined to the secondary containment; however, approximately 20 gallons of water soaked into the nearby soil. The Colorado River Water Board, CSBFD, and DTSC were all notified within 24 hours. The valve and associated PVC piping were replaced with metal piping and valve. No soil samples were requested by the agencies (McCurdy 2006).

3.1.8.16 April 16, 2006 Wastewater Release

On April 16, a section of the fiberglass pipe that transports wastewater to the new Class II evaporation ponds failed. After preliminary investigation, it was determined that the water was coming from the 4-inch fiberglass wastewater pipeline under the emergency capital stock warehouse (PG&E 2006d). To minimize leakage, the wastewater pumps were shut down. Temporary piping was installed to bypass the section of leaking fiberglass pipe. The temporary piping consisted of approximately 140 feet of 4-inch threaded carbon steel pipe, and sections of 4-inch plastic hose totaling 120 feet; all above ground. This action allowed the compressor station to continue to operate while more permanent repairs were made.

The failure in the pipe resulted in the release of approximately 200 gallons of facility wastewater (including cooling tower blowdown). The majority of the spill was confined to PG&E property; however, approximately 5 gallons of the wastewater ran into a nearby stormwater drain that empties into the Bat Cave Wash. The water did not reach the bottom of the Bat Cave Wash and the release was confined to PG&E property. The Colorado River Water Board, CSBFD, and DTSC were all notified on April 18, 2006.

On April 16, one wastewater sample was collected from the wastewater pipeline and one from the OWS. These samples were taken to confirm the source of the release. Two soil samples were collected on April 26, 2006 within the release area; one was collected in wet soil and the other was collected in dry soil. All collected samples were submitted to the laboratory for analysis on April 28, 2006. The soil samples were analyzed for Title 22 metals and general chemistry parameters (chlorides, sulfates, pH, conductivity and TDS). The wastewater samples were only analyzed for general chemistry parameters. A summary of these results is presented in Table 3-15. Test results show that none of the soil samples

exceeded the California total threshold limit concentrations for Title 22 metals. In addition, all of the metal concentrations detected in the soil samples were below the USEPA industrial soil PRGs.

3.1.8.17 April 23, 2006 Compressor Lubricating Oil Release

After a two-month-long overhaul of K-6, the unit was placed back into operation on April 23, 2006. On April 23, 2006, failure of another portion of the copper tubing on top of the K-6 Compressor lubricating oil filter caused the release of approximately 50 gallons of lubricating oil below the filters onto the concrete slab and then onto the soil between K-6 and K-7. An area of soil approximately 18 inches wide and 25 feet long was covered with oil from the release (PG&E 2006b). No oil was released to the nearby street and no oil was released offsite. A previous rupture in a different portion of the copper tubing occurred on December 24, 2005 causing a similar release (Section 3.1.8.13). The California State OES, Water Board, CSBFD, and DTSC were all notified within 24 hours. The pipeline fittings were replaced with new stainless steel fittings. Additionally, plans are underway to replace the oil filter air vent tubing system on all of the other compressor units at Topock.

The operator used a large vacuum to capture much of the released oil, and a dry sweep absorbent material was spread on the liquid that could not be vacuumed up. Four samples (Samples 1 through 4) were collected on April 26, 2006 within the release area. Sample 1 was an oil sample collected from the K-6 lube filter. The sample was used as a standard for analysis for TPH as lubricating oil. Sample 2 was collected from the saturated absorbent material near the K-6 filter. Samples 3 and 4 were surface soil samples collected near the K-6 filter. Samples 2 through 4 were analyzed for TPH using the California LUFT method. A summary of these results is presented in Table 3-13. TPH as lubricating oil was the only constituent detected in the samples collected from the release. TPH as lubricating oil was detected in Samples 2 through 4 at concentrations ranging from 510 mg/kg (Sample 3) to 240,000 mg/kg (Sample 2). Heavily-stained soil was removed during the week of April 30, 2006.

3.1.8.18 April 29 and May 2, 2006 Wastewater Release

A section of the temporary piping which was installed after the April 16, 2006 spill (Section 3.1.8.16) developed a crack. On April 29, 2006, approximately 30 gallons of facility wastewater (including cooling tower blowdown) were released within the compressor station fence line (PG&E 2006d). Approximately 5 gallons of wastewater ran down an old dirt road leading to Bat Cave Wash. The cause of the discharge was a crack in a flexible hose at the OWS. The station operator discovered the leak and turned the system off. The entire release was confined to PG&E property. Courtesy notifications were made to Water Board and CSBFD within 24 hours. The spill was also discussed with DTSC. The temporary piping was repaired. On May 2, 2006, following the April 29, 2006 leak, the cracked section of flexible hose was removed and replaced with all steel pipe. However, during a pressurized leak check of the repaired pipe, another section of flexible hose connecting the bypass piping to the original fiberglass pipe burst. The system was immediately shut down. Approximately 200 gallons of wastewater were released to an excavated area where the pipe was bypassed. Another 100 gallons of wastewater were pumped into temporary holding tank. This release was also confined to PG&E property, although just outside of fence line. All remaining plastic flexible lines were then removed and replaced with threaded carbon

steel pipe and fittings within the week. Because of the history of releases associated with this wastewater line, plans are underway to conduct extensive repairs, which may consist of activities up to and including complete replacement of the pipeline. The Water Board and the CSBFD were notified within 24 hours. An email was sent to DTSC summarizing the spills that occurred on April 17, April 29, and May 2, 2006.

Four soil samples (Samples SS-1 through SS-4) were collected on May 2 and 3, 2006, following the April 29 and May 2, 2006 releases. Samples SS-1 and SS-2 were collected within the April 29 release area, and Sample SS-3 was collected in the May 2 release area. Sample SS-4, which was collected outside of the release area, was collected to determine background concentrations. Samples were submitted to the laboratory on May 4, 2006 and analyzed for Title 22 metals, chlorides, sulfates, pH, conductivity and total dissolved solids. Test results show that all of the samples were below the California total threshold limit concentrations for Title 22 metals. In addition, all of the concentrations detected were below the USEPA industrial soil PRGs.

3.2 Chronology of Major Events

Current operations at the compressor station are very similar to the operations that occurred from the start of facility operations in 1951. However, the compressor station has undergone changes and has been upgraded since it was first constructed in 1951. A chronological summary of the major operational changes at the facility is provided in Table 3-16. Major regulatory agency directives and RCRA corrective action activities performed by PG&E are summarized in Table 3-17.

3.3 Historic Aerial Photographs

Historic aerial photographs were obtained for the area and reviewed to provide information on historic activities at and near the facility and how activities changed over time. Historic aerial photographs were obtained for the period from 1936 to 1997, which covers the entire period from before the facility was built (i.e., 1951) to recent time. Table 3-18 presents a summary of the information obtained from each of the historic aerial photographs. The aerial photographs are presented in Figures 3-8 through 3-27. Higher-resolution digital copies of the aerial photographs are provided on a CD that is included in Appendix B.

TABLE 3-1
Chemical Products Usage
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Process/Operation	Approximate Time Period	Products Used	Wastes Generated
Water conditioning	1951 to 1962	Soda ash, lime, and sodium aluminate	Lime softener sludge
	1962 to present	Self-contained canisters	Spent canisters (regenerated)
Natural gas compression	1951 to present	Odorants (THT & TBM) and lubricants	Oily water, scrubber waste, and pipeline liquids
Cooling	1951 to 1985	Chromium-based corrosion inhibitors, dispersants, and biocides; sulfuric acid	Wastewater containing metals (primarily chromium) and sulfuric acid sludge[a]
	1985 to present	Phosphate-based corrosion inhibitors, dispersants, and biocides; sulfuric acid. Molybdate-based corrosion inhibitors in closed-loop cooling systems.	Non-hazardous wastewater containing phosphates
Wastewater treatment	1964 to 1969	Sulfur dioxide	Waste oil
	1969 to 1985	Sulfur dioxide and sodium hydroxide	Waste oil and chromium-bearing sludge
	1985 to present	None	Waste oil
Equipment and facility maintenance	1951 to present	Gasoline and diesel fuel, lubricants, solvents, paint, asbestos-containing insulation, mercury, pesticides, and herbicides	Oily wastewater, waste oil, air filters, oil filters, oily rags, oil absorbent, asbestos-containing materials, spent aerosol cans, and spent batteries
Miscellaneous operations	1951 to present	Laboratory test solutions	Scrap metal, domestic garbage, liquid laboratory wastes, and domestic sewage

Notes:
[a] Sulfuric acid sludge generation ended in 1984 when the steel tanks were replaced by fiberglass tanks.

TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated Onsite?	Disposition
Water conditioning	Soda ash, lime, and sodium aluminate	Lime softener sludge	1951 to 1962	No	Exact disposition is unknown. Reportedly disposed of at the Railroad Debris Site, and possibly Debris Ravine.
	Self-contained canisters	Spent canisters	1962 to present	NA	Removed and regenerated by contractor
Natural gas compression	Odorants (TBM and THT)	Oily water	1951 to 1970	Yes	Treated water – Bat Cave Wash
					Waste oil – Waste Oil Storage Tank
	Lubricants		1970 to 1973	Yes	Treated water – Injection well PGE-08
					Waste oil – Waste Oil Storage Tank
			1973 to 1989	Yes	Treated water – Single-lined evaporation ponds
					Waste oil – Waste Oil Storage Tank
			1989 to present	Yes	Treated water – Double-lined evaporation ponds
					Waste oil – Waste Oil Storage Tank
		Pipeline liquids (from drips and scrubbers)	1951 to 1981	No	Waste oil – Waste Oil Storage Tank
			1981 to present	No	If PCB concentrations are below 5 ppm, collected in Waste Oil Storage tank. If PCB concentration exceeds 5 ppm, transported offsite as PCB-containing waste.

TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated Onsite?	Disposition
Cooling	Chromium-based corrosion inhibitors, dispersants, and biocides; sulfuric acid	Wastewater containing metals (primarily chromium)	1951 to 1964	No	Bat Cave Wash
			1964 to 1970	Yes	Bat Cave Wash [a]
			1970 to 1973	Yes	Injection well PGE-08 [a,b]
			1971 to 1985	Yes	Single-lined evaporation ponds [b]
	Phosphate-based corrosion inhibitors, dispersants, and biocides; sulfuric acid. Molybdate-based additives in closed loop cooling systems.	Non-hazardous wastewater containing phosphates	1985 to 1989	No	Single-lined evaporation ponds
			1989 to present	No	Double-lined evaporation ponds
	Sulfuric acid	Sulfuric acid sludge	Unknown to 1984	No	Transported offsite for Class I disposal
Wastewater treatment	None	Waste oil	1951 to present	No	Collected in Waste Oil Storage tank. Reportedly used in early years on roads for dust control. Reused (power plant fuel) offsite starting in 1975. Since the early 1980s, waste oil has been transported offsite for recycling.
	Sulfur dioxide and sodium hydroxide	Chromium-bearing sludge	1969 to 1983	No	Needles Landfill
			1984 to 1985	No	Transported offsite for Class I disposal

TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated Onsite?	Disposition
Equipment and facility maintenance	Gasoline and diesel fuel, lubricants, solvents, paint, pesticides, and herbicides	Oily water	1951 to 1970	Yes	Treated water – Bat Cave Wash
					Waste Oil – Waste Oil Storage Tank
			1970 to 1973	Yes	Treated water – Injection well PGE-08
					Waste Oil – Waste Oil Storage Tank
			1973 to 1989	Yes	Treated water – Single-lined evaporation ponds
					Waste Oil – Waste Oil Storage Tank
			1989 to present	Yes	Treated water – Double-lined evaporation ponds
					Waste Oil – Waste Oil Storage Tank
		Waste oil	1951 to present	No	Collected in Waste Oil Storage tank. Possibly used in early years on roads for dust control. Reused (power plant fuel) offsite starting in 1975. Since the early 1980s, waste oil has been transported offsite for recycling.
		Air filters, oil filters, oily rags, oil absorbent, and spent aerosol cans	1951 to 1980s	NA	Needles Landfill
			1980s to present	NA	Transported offsite for disposal under appropriate regulations
		Spent batteries	1951 to present	NA	Transported offsite by contractor/manufacturer

TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated Onsite?	Disposition
	Asbestos-containing materials	Asbestos-containing materials	Unknown	NA	Small amounts taken to railroad debris site, possibly buried at the facility (AOC 12), possibly buried east of Old Evaporation Ponds (Potential Pipeline Disposal Area), possibly placed into Debris Ravine (AOC 4)
			late 1970s to present	NA	Transported offsite for disposal under appropriate regulations
	Mercury	Mercury-contaminated cleaning materials	1951 to early 1980s	No	Unknown
			early 1980s to 1996	No	Transported offsite for disposal under appropriate regulations
Miscellaneous operations	Laboratory test solutions	Scrap metal	1951 to present	NA	Transported offsite for recycling
		Domestic garbage	1951 to present	NA	Needles Landfill
		Laboratory test solutions	1951 to present	No	Septic tank/leach field east of auxiliary building
		Domestic sewage	1951 to present	Yes	Leach fields

Notes:
[a] Some disposal to Bat Cave Wash may have occurred between May 1970 and September 1971 when injection well PGE-08 was offline for maintenance or repairs.
[b] Some disposal to Pond 1 occurred during the September 1971 to August 1973 time period when injection well PGE-08 was offline for maintenance or repair.
NA = not applicable.

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1968	Dianodic 971	20,000 lbs.
1968	Dianodic 109	4,000 lbs
1968	Dianodic AC	6,000 lbs
1968	Dianodic A9	110 gals.
1968	Kromtrol Y-7	13,500 lbs
1968	Slimicide A9	110 gals.
1968	Algicide	2,700 lbs.
1968	Sulfuric Acid	95,240 lbs
1969	Kromtrol Y-7	6,600 lbs.
1969	Kromtrol A9	440 gals.
1969	Kromtrol 403	7,500 lbs.
1969	Kromtrol 109	4,500 lbs.
1969	Kromtrol CP5	1,800 lbs
1973	Algicide C-5P	1,600 lbs.
1973	Krom—trol Y-7	4,800 lbs.
1973	Slimicide A-9	1,100 lbs.
1973	Slimicide C-35	4,675 lbs.
1973	Dianodic K-7	2,400 lbs.
1973	Dianodic 403	3,600 lbs.
1973	Poly-Floc #3	3,200 lbs.
1973	Sodium hydroxide	55 gals.
1973	Ferric sulphate	1,120 lbs.
1973	Sulfuric Acid N/50 Solution	6 quarts
1973	Silver Nitrate 207	2 gal.
1973	Phenolphthalein	2 pints
1973	Potassium Chromate Indicator	4 pints
1973	Sulphuric Acid 50% solution	11 pints
1973	Starfanic indicator	2,000 grams
1973	Iodide crystals	1,500 grams
1973	Sodium thiosulphate N/10	2 gals.

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1973	Acid Sulfanic	2,000 grams
1973	Sodium hydroxide	1 quart
1973	Potassium iodide 5% solution	3 quarts
1973	Starch indicator	4 pints
1973	Hardness indicator	1,000 grams
1973	Hardness buffer reagent powder	2,000 grams
1973	Hardness titrating solution	3 gal.
1973	Calcium indicator	1,500 grams
1973	Methyl purple indicator	4 pints
1973	Potassium Permanganate N/10	1 gal.
1973	Sulfuric Acid 5%	2 pints
1974	Algicide C-5P	400 lbs.
1974	Krom—trol Y-7	4,200 lbs.
1974	Slimicide A-9	550 lbs.
1974	Dianodic 109	400 lbs.
1974	Dianodic 403	300 lbs.
1974	Poly-Floc #3	2,000 lbs.
1974	Sodium hydroxide	330 gals.
1974	Ferric sulphate	80 lbs.
1974	Silver Nitrate 207	1 gal.
1974	Phenolphthalein	1 pint
1974	Potassium Chromate Indicator	1 pint
1974	Sulphuric Acid 50% solution	8 pints
1974	Starfanic indicator	1,000 grams
1974	Iodide crystals	1,000 grams
1974	Sodium thiosulphate N/10	2 gals.
1974	Acid Sulfanic	1,000 grams
1974	Sodium hydroxide	1 quart
1974	Potassium iodide 5% solution	10 quarts
1974	Starch indicator	3 pints

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1974	Hardness indicator	1,500 grams
1974	Hardness buffer reagent powder	500 grams
1974	Hardness titrating solution	1 gal.
1974	Calcium indicator	1,000 grams
1974	Methyl purple indicator	4 pints
1983	Algicide C-343	380 lbs.
1983	Slimicide C-30	4,60 lbs.
1983	Krom—trol X-5	1,170 lbs.
1983	Slimicide A-9	1,100 lbs.
1983	Sodium hydroxide	440 gals.
1983	Sulfuric Acid N/50 Solution	3 gals.
1983	Silver Nitrate 207	2 gals.
1983	Phenolphthalein	2 pints
1983	Potassium Chromate Indicator	4 pints
1983	Sulphuric Acid 50% solution	2 pints
1983	Starfanic indicator	1,000 grams
1983	Iodide crystals	1,000 grams
1983	Sodium thiosulphate N/10	3 quarts
1983	Acid Sulfanic	1,500 grams
1983	Sodium hydroxide	5 quarts
1983	Potassium iodide 5% solution	3 quarts
1983	Starch indicator	3 quarts
1983	Hardness indicator	1,000 grams
1983	Hardness buffer reagent powder	1,000 grams
1983	Hardness titrating solution	1 gal.
1983	Calcium indicator	2,000 grams
1983	Methyl purple indicator	2 pints
1983	Swipe Selig #68	165 gals.
1983	Skasol	110 gals.
1983	Kelite #24	200 lbs.

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1983	Big Joe	55 gals.
1983	Kelite #29	110 gals.
1983	Sulphur Dioxide	2
1983	Liquid Dust Mop	5 gals.
1983	Sulfuric Acid 66	300 gals.
1986	Betz 2020 (Potassium Hydroxide Phosphoric Acid)	500 gals.
1986	Betz 2040 (Potassium Hydroxide Phosphoric Acid)	500 gals.
1986	C-30 Slimicide	110 gals.
1986	Unleaded Gasoline	2,000 gals.
1986	Diesel Fuel	1,000 gals.
1986	Acetylene	NA
1986	Solvents	330 gals.
1986	Sulfuric Acid	3,000 gals.
1986	Odorant	2,000 lbs.
1986	Hydrogen	476 cf
1986	Crankcase Oil	28,500 gals.
1986	Paint	200 gals.
1986	Muriatic Acid	220 gals.
1986	Swipp Cleaning Compound	220 gals.
1988	Algicide C63	3 PL
1988	Phenolphthalein Indicator 942	10 boxes
1988	Silver Nitrate	3 cartons
1988	Choride 2	5 boxes
1988	ETDA Terrasodium Salt	8 cartons
1988	Calcium Calver 2	19 boxes
1988	Potassium Hydroxide Solution	8 Bottles
1988	Hexaver CTDA 0.800	11 cartons
1988	Hardness buffer solution	8 Bottles
1988	Manver 2 Pillow	2 boxes
1988	Molyver 1 Molyloderum Pillow	8 boxes

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1988	Molyver 2 Molyloderum Pillow	8 boxes
1988	Molyver 3 Molyloderum Pillow	9 boxes
1988	Sulfuric Acid	10 Bottles
1988	Molybdate Reagent	5 Bottles
1988	Amino Acid Pillows	11 boxes
1988	Polymer Reagent Betz 1253	2 Bottles
1988	Polymer Buffer Betz 1254	12 Bottles
1988	Sulfuric Acid 1 600	1 carton
1988	Bromcresol Green Methyl Red	2 boxes
1994	Acetylene	2,045 cf
1994	Argon Gas	535 cf
1994	Betz 2020 (Potassium Hydroxide Phosphoric Acid)	1,000 gals.
1994	Betz 2040 (Potassium Hydroxide Phosphoric Acid)	1,000 gals.
1994	Betz C-77	1,000 gals.
1994	Betz Foam-trol	55 gals.
1994	Betz Powerline 3200	440 gals.
1994	Betz Slimicide 508 (Alkyl Dimethyl Benzyl Ammonium Chloride/Ethanol	110 gals
1994	Betz Slimicide 508 (Tributyl Tin Oxide)	55 gals.
1994	Big Joe	55 gals.
1994	Crankcase oil (hydrocarbon based oils)	28,400 gals.
1994	Diesel	3,000 gals.
1994	Dimethyl sulfide/Nitrogen	1020 cf
1994	Helium	2,000 cf
1994	Hydrogen	510 cf
1994	Marvel mystery oil	110 gals.
1994	Mineral Spirits	110 gals.
1994	Mobil DelVac 15W-40	165 gals.
1994	Mobil DTE	385 gals.
1994	Mobil Rarus 824	220 gals.

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1994	Mobilith AW-2 Grease	60 tubes
1994	Mobilube 80W-90	55 gals
1994	MP gearlube 85/140	110 gals.
1994	National Sanitary Supply Breakthru	55 gals.
1994	Nitrogen	25,000 cf
1994	Odorant	3,000 gals.
1994	Oil	580 gals.
1994	Oxygen	890 cf
1994	Paint	275 gals.
1994	Selig 33XG heavy duty compound	240 gals.
1994	Selig descaler 1107	550 gals.
1994	Selig Swype 68	220 gals.
1994	Sulfuric Acid	5,200 gals.
1994	Testing gas (methane)	600 cf
1994	Toluene	110 gals.
1994	Unleaded gasoline	2,000 gals.
1995	Acetylene	2,045 cf
1995	Argon Gas	535 cf
1995	Betz 2020 (Potassium Hydroxide Phosphoric Acid)	1,000 gals.
1995	Betz 2040 (Potassium Hydroxide Phosphoric Acid)	1,000 gals.
	Betz C-77P	1,000 lbs.
1995	Betz Foam-trol	55 gals.
1995	Betz Powerline 3200	730 gals.
1995	Betz Slimicide 508 (Alkyl Dimethyl Benzyl Ammonium Chloride/Ethanol	110 gals
1995	Betz Slimicide 508 (Tributyl Tin Oxide)	55 gals.
1995	Big Joe	55 gals.
1995	Chemsearch ND150	70 gals.
1995	Crankcase oil (hydrocarbon based oils)	28,400 gals.
1995	Diesel	3,000 gals.

TABLE 3-3
Chemical Storage and Use Information, 1968 -1995 [a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date (Year)	Chemical	Amount Ordered or Stored[b]
1995	Dimethyl sulfide/Nitrogen	1020 cf
1995	Helium	280 cf
1995	Hydrogen	510 cf
1995	Mineral Spirits	110 gals.
1995	Mobil DelVac 15W-40	165 gals.
1995	Mobil DTE Heavy	165 gals.
1995	Mobil DTE Light	165 gals.
1995	Mobil Rarus 824	220 gals.
1995	Mobilith AW-2 Grease	60 tubes
1995	Mobilube 80W-90	55 gals
1995	MP gearlube 85/140	110 gals.
1995	National Sanitary Supply Breakthru	110 gals.
1995	Nitrogen	25,000 cf
1995	Odorant	3,000 gals.
1995	Oil	580 gals.
1995	Oxygen	890 cf
1995	Paint	75 gals.
1995	Selig 33XG heavy duty compound	240 gals.
1995	Selig descaler 1107	550 gals.
1995	Selig Swype 68	220 gals.
1995	Sulfuric Acid	5,200 gals.
1995	Testing gas (methane)	600 cf
1995	Toluene	110 gals.
1995	Unleaded gasoline	2,000 gals.
1995	Voltz	220 gals.

Notes:
[a] Items listed above are based on chemical inventory sheets for various years with the exception of chemicals listed for 1968 and 1969 which are based a handwritten sheet of ordered chemicals. (PG&E 1968c, 1969, 1973b, 1974, 1986, 1988, 1994a, 1995a)
[b] Amounts ordered or stored may be for portions of a year; annual consumption information is not available.

TABLE 3-4
Currently-used Cooling Water Treatment Products
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

System(s)	Product	Application	Primary Constituents	Target Range[a]
Cooling towers	NALCO 3D Trasar 3D T184	Corrosion inhibitor	Phosphoric acid (5 - 10%) Zinc chloride (1 - 5%)	40 ppm
	NALCO 3D TRASAR 3D T192	Dispersant	Sodium tolyltriazole (1 - 5%)	100 ppm
	NALCO STRABREX ST70	Biocide	Sodium hydroxide (1-5%) Sodium hypochlorite (6.36%) Sodium bromide (9.23%)	5 ppm
Closed loop[b]	NALCO 8322	Corrosion inhibitor	Sodium hydroxide (1-5%) Sodium molybdate (1-5%) Sodium tolyltriazole (1-5%) Sodium metaborate (1-5%)	300 ppm

Notes:
[a] Target range as product.
[b] Jacket water, auxiliary jacket water, lubricating oil, and auxiliary lubricating oil cooling systems.

TABLE 3-5[a]
Summary of Incidental Releases, 1995 - 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Release Identification	Release Date	Description	Sampling/ Investigations	Removal Actions	Status
Mercury release	October 16, 1995	During the removal of a length of gas meter piping on the east side of the compressor building, elemental mercury apparently contained within the pipe was released to an area of exposed soil measuring about 18 feet long by 9 feet wide.	Confirmatory soil samples were collected following soil excavation and analyzed for mercury.	Impacted soil was excavated and removed to depths up to 4 feet bgs. soil with mercury concentrations exceeding California hazardous waste standards, and/or residential and industrial soil PRGs was removed. A risk assessment indicated that residual concentrations did not pose an unacceptable risk to human health.	No further action proposed. Reports detailing the incident and remediation efforts were submitted to the CSBFD, Hazardous Materials Division on February 7 and June 25, 1996
Cooling tower water release	June 30, 1996	Approximately 200 gallons of non-hazardous water from the lower basin of Cooling Tower A overflowed due to the mechanical failure of a level controller. The overflow entered a facility drain that discharges to Bat Cave Wash. The portion of the wash that was affected by the spill was on PG&E property.	Cooling water samples collected prior to the release indicated an electrical conductivity of 9,000 micromhos and a pH of 7. No soil samples were collected because no samples were requested by the agencies.	Surface soil that was contacted by the overflow (adjacent to the cooling tower basin and in Bat Cave Wash) was removed.	No further action proposed. The Water Board was notified of the release on July 1, 1996, and a report of the incident was submitted on July 18, 1996.
Cooling tower water release	August 4, 1998	Approximately 500 gallons on non-hazardous process water were released from Cooling Tower A due to a fouled screen in a drain return. The process water flowed onto the soil adjacent to the tower, and a small volume of the water flowed down the hill into the Bat Cave Wash Area. All the water evaporated quickly due to the high temperatures.	No samples were collected because the affected area will be investigated as part of the investigation of Bat Cave Wash.	The screen was cleaned and the tower restored to normal operating conditions. No soil removal was conducted.	No further action proposed. The Water Board was notified of the release in a report dated August 11, 1998.
Wastewater release	December 3-5, 2000	Approximately 20,000 gallons of non-hazardous facility wastewater was released from a pipeline into Bat Cave Wash. The wastewater normally is transported to the evaporation ponds. The release was caused by a mechanical failure of an air vent valve.	Surface and subsurface soil samples were obtained and analyzed for Title 22 metals, pH, conductivity, TDS, and soluble Cr(VI).	Soil sample analytical results were all below hazardous waste standards and soluble threshold limit concentrations. Soil removal was not warranted.	No further action proposed. DTSC was initially notified on December 7, 2000, and a final closure report was submitted on January 9, 2002.

TABLE 3-5[a]
Summary of Incidental Releases, 1995 - 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Release Identification	Release Date	Description	Sampling/ Investigations	Removal Actions	Status
Oily water release	August 25, 2001	Approximately 300 gallons of oily water were released during the repair of a malfunctioning OWS. The oily water flowed downhill across the site, through a storm drain, and entered Bat Cave Wash. Of the 300 gallons released, about 100 gallons were believed to be compressor lubricating oil and 200 gallons were wastewater.	Samples of soil were taken and analyzed for Title 22 metals, Cr(T), Cr(VI) and TPH.	The storm drain was cleaned and oil-stained soil was removed. Oily water handling equipment was also reconfigured to minimize the potential for further releases. Title 22 metal concentrations were all below residential PRGs, with the exception of one sample which contained Cr(T) above the industrial PRG. No soil removal was conducted.	No further action proposed. DTSC was initially notified on August 25, 2001, and a report was submitted on September 6, 2001.
Compressor K-10 Aqua Tower release	August 24, 2002	Approximately 100 gallons of water containing a dilute, buffered hydrochloric acid and corrosion inhibitor mixture was released onto a paved area of the facility during a descaling operation involving the Aqua Tower and the after-cooler system heat exchanger on Compressor K-10. About 25 gallons trapped in the gutter quickly evaporated. The remaining 75 gallons entered a storm drain on the east side of the facility and emptied into a nearby gully, dampening the soil.	Soil samples were obtained and analyzed for Title 22 metals, pH, and Cr(VI).	Soil samples results were all below hazardous waste standards and USEPA PRGs. Soil removal was not warranted.	No further action proposed. DTSC was initially notified on August 25, 2002, and a final closure report was submitted on October 4, 2002.
Grit tank release	September 1, 2002	Approximately 500 gallons of oily water overflowed an existing berm, traveled through a drainpipe, and then into Bat Cave Wash. The release was due to the failure of a sump pump level controller. The sump pump normally transfers water accumulated in the bermed sump to the facility OWS.	Samples of soil were taken and analyzed for Title 22 metals, Cr(VI), PCBs, and TPH.	The sump pump was repaired and weekly inspection of the equipment was instituted. TPH in the motor oil range was detected at a maximum concentration of 3,000 mg/kg; TPH-diesel was detected at a maximum concentration of 390 mg/kg. All metals were below industrial PRGs, and only a trace level of PCBs (Arocolor 1254 at 0.30 and 0.086 mg/kg respectively) was detected. No additional soil sampling or removal was performed.	No further action proposed. DTSC was initially notified on August 25, 2002, and a final closure report was submitted on October 4, 2002.

TABLE 3-5[a]
Summary of Incidental Releases, 1995 - 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Release Identification	Release Date	Description	Sampling/ Investigations	Removal Actions	Status
Cooling Tower A water release	April 21, 2003	Approximately 1,000 gallons of cooling tower water overflowed the upper cooling tray as the result of high winds. The water flowed from the facility yard and into Bat Cave Wash.	Surface and subsurface soil samples were obtained and analyzed for Title 22 metals, pH, conductivity, and TDS.	Soil sample test results showed that no hazardous constituents were present in affected areas.	No further action proposed. DTSC was notified on April 22, 2002.
Scrubber pipeline liquids release	March 3, 2004	Pipeline liquids leaked into subsurface soil from a corroded transfer pipe during a routine blowdown of one of the facility gas scrubbers. Approximately 2 gallons of oil were released.	Surface and subsurface soil were analyzed for TPH, BTEX, and PCBs.	The leaking section of transfer pipe was replaced with new pipe. Visibly-stained soil was removed, drummed, and disposed of via a licensed hazardous waster hauler to an approved hazardous waste disposal facility. Confirmation testing indicated that the affected area is free from detectable levels of TPH and PCBs. Xylene was the only BTEX constituent detected (at 5.6 mg/kg).	No further action proposed. DTSC was initially notified via e-mail on March 5, 2004, and a final report was issued on November 15, 2004.
Bat Cave Wash Wastewater release	August 18, 2005	Erosion of soil due to a heavy rainstorm event caused a heavy boulder to fall on a 4” fiberglass pipeline. The pipeline cracked and approximately 1,000 gallons of facility wastewater was released.	The agencies did not request soil samples for this incident.	The pipeline was repaired and eroded soil backfilled. Engineering studies have been conducted and a pipeline replacement/erosion protection plan was developed and is currently being implemented.	No further action proposed. DTSC was notified on August 16, 2005.
Grit tank release	December 19, 2005	A joint failure occurred on the transfer piping between the grit solids settling tank and the OWS. This joint failure resulted in the release of approximately 300 gallons of oily water.	Surface and Subsurface soil samples were obtained and sampled for TPH.	The pipeline was repaired. TPH concentrations ranged from 20 mg/kg to 420 mg/kg. No soil removal was conducted.	No further action proposed. DTSC was notified on Dec. 20, 2005.

TABLE 3-5[a]
Summary of Incidental Releases, 1995 - 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Release Identification	Release Date	Description	Sampling/ Investigations	Removal Actions	Status
Compressor Lubricating Oil Release	December 24, 2005	A rupture occurred in the copper tubing on top of the K-6 compressor lubricating oil filter causing the release of approximately 50 gallons of lubricating oil below the oil filter and onto the soil adjacent to the K-6 compressor building.	Soil samples were obtained on March 8, following excavation of stained soil, and analyzed for Title 22 metals and TPH.	The pipe fitting was replaced. Heavily stained soil was removed form the area on December 27. An additional approximately 10 cubic yards of heavily stained soil was removed in February. None of the soil samples exceeded the California TTLC for Title 22 metals. TPH in the motor oil range was detected in the samples collected (maximum 4,800 mg/kg).	No further action proposed. DTSC was notified on Dec. 25, 2005.
Bat Cave Wash Wastewater Release	December 27, 2005	A vent valve failure resulted in approximately 4,000 gallons of facility waste water (including tower blowdown) being released into Bat Cave Wash.	Surface and Subsurface soil samples were obtained and analyzed for Title 22 metals, pH, conductivity, and TDS.	The vent valve and all associated piping were replaced. Test results show that none of the soil samples exceeded the California TTLC for Title 22 metals.	No further action proposed. DTSC was notified on Dec. 28, 2005.
Jacket Cooling Water Release	Jan 2, 2006	A valve located on one of the main jacket cooling water tanks failed resulting in the release of approximately 120 gallons of cooling water which contained molybdate based corrosion inhibitors. Approximately 100 gallons of were confined to the secondary containment; 20 gallons of water soaked into the nearby soil.	The agencies did not request soil samples for this incident.	The valve and associated PVC piping were replaced with metal piping and valve. No follow-up sampling was conducted in the area.	No further action proposed. DTSC was notified on Jan. 2, 2006.
PG&E Property Wastewater Release	April 16, 2006	A section of the fiberglass pipe that transports wastewater to the evaporation ponds failed. The failure in the pipe resulted in the release of approximately 200 gallons of facility waste water (including cooling tower blowdown). Approximately 5 gallons of the wastewater were released into Bat Cave Wash.	Wastewater and soil samples were collected n April 16 and 26. Soil samples were analyzed for Title 22 metals, pH, conductivity, and TDS; wastewater samples were analyzed of pH, conductivity, and TDS.	Temporary piping was installed to bypass the section of leaking fiberglass pipe. Test results show that none of the soil samples exceeded the California total threshold limit concentration or industrial PRG for Title 22 metals.	No further action proposed. DTSC was notified on April 18, 2006.

TABLE 3-5[a]
Summary of Incidental Releases, 1995 - 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Release Identification	Release Date	Description	Sampling/ Investigations	Removal Actions	Status
Compressor Lubricating Oil Release	April 23, 2006	Failure of another portion of the copper tubing on top of the K-6 Compressor lubricating oil filter caused the release of approximately 50 gallons of lubricating oil below the filters and onto soil adjacent to K-6 compressor building.	Samples were obtained on April 26 and analyzed for TPH.	TPH in the lubricating oil range was detected in the samples collected (maximum 240,000 mg/kg). Heavily stained soil was removed during the week of April 30, 2006.	No further action proposed. DTSC was notified on April 24, 2006.
PG&E Property Wastewater Release	April 29, 2006	A section of the temporary piping which was installed after the April 16, 2006 spill developed a crack. Approximately 30 gallons of facility wastewater (including cooling tower blowdown) were released. Approximately 25 gallons were confined with the station fence line. Approximately 5 gallons of wastewater ran down an old dirt road leading to Bat Cave Wash.	Soil samples were collected and analyzed for Title 22 metals, pH, conductivity, and TDS.	The temporary piping was repaired.	No further action proposed. DTSC was notified on May 2, 2006.
PG&E Property Wastewater Release	May 2, 2006	Another section of the temporary piping, which was installed after the April 16, 2006 spill, failed during a pressure check following temporary piping repairs. Approximately 200 gallons of wastewater were released but confined to PG&E property.	Soil samples were collected and analyzed for Title 22 metals, pH, conductivity, and TDS.	The temporary piping that resulted in the two small releases in the area (April 16 and April 29 2006) was replaced with a threaded carbon steel pipe. Test results show that none of the soil samples exceeded the California total threshold limit concentration or industrial PRG for Title 22 metals in soil.	No further action proposed. DTSC was notified on May 2, 2006.

Note:
[a] Available information regarding pre-1995 releases is provided in Section 3.1.8

TABLE 3-6
Soil Sample Results
Mercury Release, October 1995
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample	Total Mercury (mg/kg)	Soluble Mercury (mg/L)
C1	0.72	-
C2	0.76	-
C3	0.55	-
C4	0.025	-
C5	0.38	-
C6	3.4	<0.005
C7	0.071	-
C8	0.26	-
C9 (#2)	0.008	-
C10	0.60	-
C11	2.1	<0.005
C12	0.083	-
South Wall	0.12	-
North Wall	0.19	-
South Lateral (inside wooden form)	0.82	-
North Lateral (inside wooden form)	2.8	<0.005
North Lateral (outside wooden form)	0.65	-
CA Title 22 total threshold limit concentration [a]	20	-
CA Title 22 soluble threshold limit concentration [b]	-	0.2
Residential soil PRG [c]	23	-
Industrial soil RRG [c]	310	-

Notes:
All analyses performed using USEPA Method 7471 modified.
[a] California Title 22 TTLC - Total Threshold Limit Concentration.
[b] California Title 22 STLC - Soluble Threshold Limit Concentration.
[c] USEPA Region 9 PRGs (October 2004).

TABLE 3-7
Soil Sample Results
Wastewater Release, December 2000
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	5	6			
Analyte (units)	**Affected Topsoil**	**Affected Topsoil Sample No. 1 at 12-inch depth**	**Unaffected Topsoil Adjacent to Sample No.1**	**Affected Soil Near Vent Valve**	**Affected Soil Near Vent Valve Sample 4 at 12-inch depth**	**Unaffected Topsoil Adjacent to Vent Valve Sample No. 4**	**USEPA Residential Soil PRGs[a]**	**USEPA Industrial Soil PRGs[a]**	**CA Title 22 STLC [c]**
Title 22 Metals (mg/kg)									
Antimony		ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	31	410	
Arsenic	4.9	ND (<1.0)	ND (<1.0)	1.7	3.1	1.6	0.39[b]	1.6[b]	
Barium	270	84	74	140	200	230	5,400	67,000	
Beryllium	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	150	1,900	
Cadmium	0.87	0.69	0.65	0.78	0.6	0.64	37	450	
Total Chromium	11	12	11	8.2	8.6	9.4	210	450	
Cobalt	4.5	4.9	4.6	2.7	3.7	3.9	900	1,900	
Copper	17	12	11	18	6.7	7.9	3,100	41,000	
Lead	5.0	3.3	2.8	1.7	2.8	2.4	400, 150 [d]	800	
Mercury	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	ND (<0.05)	23	310	
Molybdenum	9.7	ND (<1.0)	ND (<1.0)	17	1.3	ND (<1.0)	390	5,100	
Nickel	9.4	10	8.7	5.8	6.7	6.1	1,600	20,000	
Selenium	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	390	5,100	
Silver	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	390	5,100	
Thallium	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	5.2	67	
Vanadium	23	20	19	15	18	18	78	1,000	
Zinc	150	29	27	240	29	49	23,000	100,000	

TABLE 3-7
Soil Sample Results
Wastewater Release, December 2000
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	5	6			
Analyte (units)	**Affected Topsoil**	**Affected Topsoil Sample No. 1 at 12-inch depth**	**Unaffected Topsoil Adjacent to Sample No.1**	**Affected Soil Near Vent Valve**	**Affected Soil Near Vent Valve Sample 4 at 12-inch depth**	**Unaffected Topsoil Adjacent to Vent Valve Sample No. 4**	**USEPA Residential Soil PRGs[a]**	**USEPA Industrial Soil PRGs[a]**	**CA Title 22 STLC [c]**
Iron [e]	12,000	11,000	11,000	13,000	8,800	9,500	23,000	100,000	
California WET Test Results [f]									
Hexavalent Chromium (mg/L)	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)			5.0
Chloride (as Cl) (mg/L)	115	17	3.2	33	20	0.71			
Sulfate (as SO_4) (mg/L)	109	14	2.7	48	81	1.4			
pH	8.26	8.72	9.57	8.23	9.18	9.43			
Conductivity (mmho/cm)	0.8	0.2	ND (<0.10)	0.4	0.4	ND (<0.10)			
TDS (mg/L)	450	126	55	204	208	57			

Notes:
[a] USEPA Region 9 PRGs for residential and industrial soil (2004).
[b] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.
[c] California Title 22 Soluble Threshold Limit Concentration.
[d] USEPA and California-modified residential PRGs, respectively.
[e] Iron is not a Title 22 metal but was analyzed for informational purposes.
[f] Title 22 WET Test - Results are from modified Waste Extraction Test method; samples extracted using deionized water instead of citric acid.
ND = not detected (detection limit in parentheses).

TABLE 3-8
Soil Sample Results
Oily Water Release, August 2001
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID:	Sample #1	Sample #2	Sample #3	Sample #4	USEPA Residential Soil PRGs [a]	USEPA Industrial Soil PRGs [a]
Sample Date:	**10/02/2001**	**10/02/2001**	**10/10/2001**	**10/10/2001**		
Analyte						
Metals (mg/kg)						
Antimony	<2.0	<2.0	<2.0	<2.0	31	410
Arsenic	<1.0	4.7	<1.0	2.2	0.39[b]	1.6[b]
Barium	79	200	78	150	5,400	67,000
Beryllium	<0.5	<0.5	<0.5	<0.5	150	1,900
Cadmium	<0.5	<0.5	<0.5	<0.5	37	450
Chromium (total)	63	1,100	13	15	210	450
Chromium (hexavalent)	<0.2	0.2	<0.2	<0.2	30	64
Cobalt	5.5	2.8	4.7	4	900	1,900
Copper	18	63	12	8.6	3,100	41,000
Lead	9.6	110	2.3	4.3	400, 150[c]	800
Molybdenum	4.2	270	<1.0	6.2	390	5,100
Nickel	11	9.1	8.9	7.4	1,600	20,000
Selenium	<2.0	<2.0	<2.0	<2.0	390	5,100
Silver	<1.0	<1.0	<1.0	<1.0	390	5,100
Thallium	<1.0	<1.0	1.7	<1.0	5.2	67
Vanadium	29	18	20	19	78	1,000
Zinc	74	650	25	27	23,000	100,000
Mercury	<0.05	0.07	<0.05	<0.05	23	310
Petroleum Hydrocarbons (mg/kg)						
Diesel	300	1,400	<1.0	1.1	NA	NA
Motor Oil	6,900	27,000	<50	<50	NA	NA

Source: PG&E 2001.
[a] USEPA Region 9 PRGs for residential and industrial soil (2004).
[b] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.
[c] USEPA and California-modified residential PRGs, respectively.
NA = Not Applicable.

TABLE 3-9
Soil Sample Results
K-10 Aqua Tower Release, August 2002
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID: / Sample Date: / Analyte	K-10 Drain 8/25/2002 Affected Soil[a] K-10 Release Area	#3 9/9/2002 Comparison Location Near K-10	USEPA Industrial Soil PRGs [b]
Title 22 Metals (mg/kg)			
Antimony	ND (<2.0)	ND (<2.0)	410
Arsenic	6.1	2.0	1.6[c]
Barium	110	66	67,000
Beryllium	ND (<0.50)	ND (<0.50)	1,900
Cadmium	2.3	0.73	450
Total Chromium	35	6.6	450
Cobalt	5.0	2.8	1,900
Copper	140	5.0	41,000
Lead	77	4.5	800
Mercury	0.074	0.066	310
Molybdenum	420	ND (<1.0)	5,100
Nickel	16	5.8	20,000
Selenium	ND (<2.0)	ND (<2.0)	5,100
Silver	ND (<1.0)	ND (<1.0)	5,100
Thallium	ND (<1.0)	ND (<1.0)	67
Vanadium	11	12	1,000
Zinc	160	16	100,000
Additional Parameters			
pH (units)	7.0	9.1	
Hexavalent Chromium (mg/kg)	ND (<0.01)	ND (<0.20)	

Notes:
[a] The cleaning solution released from K-10 drain was a dilute mixture of buffered hydrochloric acid and corrosion inhibitor containing 5-10% phosphoric acid and 1-5% zinc chloride.
[b] USEPA Region 9 PRGs for industrial soil (2004).
[c] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.

ND = not detected (detection limits in parentheses).

Source: PG&E 2002c.

TABLE 3-10
Soil Sample Results
Grit Tank Release, August 2002
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID:	#1	#2	#4	#5	#6	
Sample Date:	9/5/2002	9/5/2002	9/9/2002	9/9/2002	9/9/2002	
Analyte	B29 Valve Grit Tank	Trench Grit Tank Area	TW Drip Bat Cave Wash	Photo Location #7 Bat Cave Wash	Comparison Location Bat Cave Wash	USEPA Industrial Soil PRGs[a]
Petroleum Hydrocarbons (mg/kg)						
Diesel	390	5.6	8.6	2.3	ND (<1.0)	NA
Motor Oil	3,000	69	110	62	ND (<50)	NNA
Title 22 Metals (mg/kg)						
Antimony	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	410
Arsenic	2.7	2.9	1.0	ND (<1.0)	ND (<1.0)	1.6[b]
Barium	140	260	72	58	37	67,000
Beryllium	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	ND (<0.50)	1,900
Cadmium	1.2	1.4	1.2	1.1	1.1	450
Total Chromium	11	25	360	53	16	450
Cobalt	4.2	4.2	4.4	4.0	4.2	1,900
Copper	21	13	19	8.1	6.2	41,000
Lead	9.6	64	8.7	6.1	2.7	800
Mercury	0.26	0.19	0.094	ND (<0.050)	0.072	310
Molybdenum	13	1.2	7.9	6.8	ND (<1.0)	5,100
Nickel	8.8	9.8	8.3	8.0	7.6	20,000
Selenium	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	ND (<2.0)	5,100
Silver	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	5,100
Thallium	ND (<1.0)	2.9	ND (<1.0)	ND (<1.0)	ND (<1.0)	67
Vanadium	16	17	18	15	15	1,000
Zinc	29	55	75	38	28	100,000
Additional Parameter (mg/kg)						
Hexavalent Chromium	ND (<0.20)	ND (<0.20)	0.20	ND (<0.20)	ND (<0.20)	310

TABLE 3-10
Soil Sample Results
Grit Tank Release, August 2002
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID:	#1	#2	#4	#5	#6	
Sample Date:	9/5/2002	9/5/2002	9/9/2002	9/9/2002	9/9/2002	
Analyte	B29 Valve Grit Tank	Trench Grit Tank Area	TW Drip Bat Cave Wash	Photo Location #7 Bat Cave Wash	Comparison Location Bat Cave Wash	USEPA Industrial Soil PRGs[a]
PCBs (mg/kg)						
Aroclor 1016	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	21 [c]
Aroclor 1221	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	0.74[d]
Aroclor 1232	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	0.74[d]
Aroclor 1242	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	0.74[d]
Aroclor 1248	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	0.74[d]
Aroclor 1254	ND (<0.50)	0.30	ND (<0.050)	0.086	ND (<0.050)	0.74[d]
Aroclor 1260	ND (<0.50)	ND (<0.050)	ND (<0.050)	ND (<0.050)	ND (<0.050)	0.74[d]

Notes:

[a] USEPA Region 9 PRGs for industrial soil (2004).
[b] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.
[c] Composite PRG for low risk isomers.
[d] Composite PRG for high risk isomers.
ND = not detected (detection limits in parentheses).
Source: PG&E 2002c.

TABLE 3-11
Sample Results
Scrubber Oil Release, March 2004
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID:	#1	#2	#3	USEPA Industrial Soil PRGs[a]
(Sample Date):	(05/21/2004)	(05/21/2004)	(05/21/2004)	
Description:	West Side of Trench	East Side of Trench	2' Blowdown Pipe	
Parameter				
Petroleum Hydrocarbons (mg/kg)				
Gasoline	ND (<1.0)	ND (<1.0)	--	NA
BTEX (µg/kg)				
Benzene	ND (<3.0)	ND (<3.0)	--	1,400
Toluene	ND (<3.0)	ND (<3.0)	--	520,000
Ethylbenzene	ND (<3.0)	ND (<3.0)	--	400,000
Total Xylenes	ND (<3.0)	5.6	--	420,000
PCBs (mg/kg)				
Aroclor-1260	ND (<0.30)	ND (<0.30)	2.0	0.74[b]

Notes:
[a] USEPA Region 9 PRGs for industrial soil (2004).
[b] Composite PRG for high risk isomers.
ND = not detected (detection limits in parentheses).
µg/kg = micrograms per kilogram.

TABLE 3-12
Soil Sample Results
Grit Tank Release, December 19, 2005
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample ID:	**#1**	**#2**	**#3**	**#4**	**#5**	
Sample Date:	**12/20/05**	**12/20/05**	**12/20/05**	**12/20/05**	**12/20/05**	
Analyte	**Hole at Pipe Break**	**Near Facility Yard Drain**	**Unaffected Area near Leak Source (Background)**	**Near end of Release Path in Bat Cave Wash**	**Unaffected Area Near Sample No. 4 (Background)**	**USEPA Industrial Soil PRGs**
Petroleum Hydrocarbons (mg/kg)						
Gasoline	ND (< 20)	ND (< 20)	ND (< 20)	ND (< 40)	ND (< 20)	NA
Diesel	ND (< 10)	ND (< 10)	ND (< 10)	ND (< 20)	ND (< 10)	NA
Motor Oil / Hydraulic Oil	79	20	ND (< 20)	420	59	NA

Notes:
ND = not detected (detection limits in parentheses).
NA = not available.
Source: PG&E 2006a.

TABLE 3-13
Soil Sample Results
Compressor Lubricating Oil Release, December 24. 2005 and April 23, 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	1	2	3	4	
Sample Date:	**3/8/06**	**3/8/06**	**3/8/06**	**3/8/06**	**4/26/06**	**4/26/06**	**4/26/06**	**4/26/06**	
Analyte (units)	**Composite Surface Sample[a]**	**Visually Clean - Surface Sample**	**Heavily-stained Soil**	**Moderately-stained Soil**	**Oil obtained from K-6 Filter (used as a standard for analysis)**	**Saturated Absosrbant material obtained near the K-6 Filter**	**Stained Surface Soil Northeast Intersection Below Walkway, near K-6 Filter**	**Clean Appearing Surface Soil Obtained Near Sample # 3**	**USEPA Industrial Soil PRGs[c]**
Petroleum Hydrocarbons (mg/kg)									
Gasoline	N/A	ND (< 20)	ND (< 410)	ND (< 400)	N/A	ND (< 16000)	ND (< 2000)	ND (< 40)	NA
Diesel	N/A	ND (< 10)	ND (< 200)	ND (< 200)	N/A	ND (<8000)	ND (< 1000)	ND (< 20)	NA
Kerosene	N/A	ND (< 20)	ND (< 200)	ND (< 200)	N/A	ND (< 8000)	ND (< 1000)	ND (< 20)	NA
Motor Oil / Hydraulic Oil	5200	220	4800	3900	N/A	240,000[b]	25,000[b]	510[b]	NA
Title 22 Metals (mg/kg)									
Antimony	ND (< 10)	ND (< 5.0)	ND (< 5.0)	ND (< 10)	N/A	N/A	N/A	N/A	410
Arsenic	3.3	2.9	4.5	3.9	N/A	N/A	N/A	N/A	1.6[d]
Barium	160	96	100	160	N/A	N/A	N/A	N/A	67,000
Beryllium	0.47	ND (< 0.50)	ND (< 0.50)	ND (<1.0)	N/A	N/A	N/A	N/A	1,900
Cadmium	0.39	ND (< 0.50)	ND (< 0.50)	ND (<1.0)	N/A	N/A	N/A	N/A	450
Total Chromium	49	13	20	51	N/A	N/A	N/A	N/A	450
Hexavalent Chromium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	64
Cobalt	7.5	3.3	4.6	ND (< 5.0)	N/A	N/A	N/A	N/A	1,900
Copper	26	7.5	13	43	N/A	N/A	N/A	N/A	41,000
Lead	46	57	24	170	N/A	N/A	N/A	N/A	800

TABLE 3-13
Soil Sample Results
Compressor Lubricating Oil Release, December 24. 2005 and April 23, 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	1	2	3	4	
Sample Date:	**3/8/06**	**3/8/06**	**3/8/06**	**3/8/06**	**4/26/06**	**4/26/06**	**4/26/06**	**4/26/06**	
Analyte (units)	**Composite Surface Sample[a]**	**Visually Clean - Surface Sample**	**Heavily-stained Soil**	**Moderately-stained Soil**	**Oil obtained from K-6 Filter (used as a standard for analysis)**	**Saturated Absosrbant material obtained near the K-6 Filter**	**Stained Surface Soil Northeast Intersection Below Walkway, near K-6 Filter**	**Clean Appearing Surface Soil Obtained Near Sample # 3**	**USEPA Industrial Soil PRGs[c]**
Mercury	ND (< 0.16)	ND (< 0.16)	ND (< 0.16)	ND (< 0.16)	N/A	N/A	N/A	N/A	310
Molybdenum	ND (< 5.0)	ND (< 2.5)	ND (< 2.5)	15	N/A	N/A	N/A	N/A	5,100
Nickel	22	7.8	13	13	N/A	N/A	N/A	N/A	20,000
Selenium	ND (<1.0)	ND (< 0.50)	ND (< 0.50)	1.0	N/A	N/A	N/A	N/A	5,100
Silver	ND (<1.0)	ND (< 0.50)	ND (< 0.50)	ND (1.0)	N/A	N/A	N/A	N/A	5,100
Thallium	ND (< 10)	ND (< 5.0)	ND (< 5.0)	ND (< 10)	N/A	N/A	N/A	N/A	67
Vanadium	37	16	30	23	N/A	N/A	N/A	N/A	1,000
Zinc	140	42	65	200	N/A	N/A	N/A	N/A	100,000

Notes:

Samples collected on March 8, 2006 are associated with the December 24, 2005 release.

[a] Sample is a composite of Samples 2, 3 and 4. The sample was mistakenly composited by the testing laboratory.

[b] Sample analyzed for K-6 Lube Oil. A sample was collected from the K-6 Lube Oil filter and used as an analytical standard.

[c] USEPA Region 9 PRGs for industrial soil (2004).

[d] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.

ND = not detected (detection limit in parentheses).

N/A = constituent not analyzed.

NA = not available.

TABLE 3-14
Soil Sample Results
Wastewater Release, December 27, 2005
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	5	6	7	
Sample Date:	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	
Analyte (units)	**End of Wet Soil in BC Wash - Surface Sample**	**End of Wet Soil in BC Wash - 1 ft. Depth Sample**	**BC Wash - Background Sample**	**BC Wash - Immediately Downstream of Valve Vault - Surface Sample**	**BC Wash - Immediately Downstream of Valve Vault - 1 ft. Depth Sample**	**BC Wash - Background Sample Near Valve Vault**	**Oily Water Separator Clean Water Tank Sample**	**USEPA Industrial Soil PRGs[a]**
Title 22 Metals (mg/kg)							**(µg/L)**	
Antimony	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	270	410
Arsenic	1.1	0.95	3.8	2.4	2.5	3.4	ND (< 50)	1.6[b]
Barium	57	88	110	160	180	200	100	67,000
Beryllium	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 10)	1,900
Cadmium	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	ND (< 10)	450
Total Chromium	22	18	20	11	11	12	47	450
Hexavalent Chromium	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)	ND (<0.20)	0.03 mg/L	64
Cobalt	4.8	5.5	5.9	3.4	4.5	4.4	ND (< 50)	1,900
Copper	8.5	11	10	11	6.4	7.4	85	41,000
Lead	3.2	3	5.9	3.4	3.4	3.9	ND (<50)	800
Mercury	ND (<0.14)	ND (<0.16)	ND (<0.16)	ND (<0.16)	ND (<0.16)	ND (<0.16)	ND (< 0.20)	310
Molybdenum	ND (< 2.5)	ND (< 2.5)	ND (<2.5)	ND (<2.5)	ND (<2.5)	ND (<2.5)	6700	5,100
Nickel	12	11	12	6	7	8.3	ND (< 10)	20,000
Selenium	0.82	0.88	ND (<.87)	0.68	0.57	0.7	ND (< 100)	5,100
Silver	ND (<0.5)	ND (<0.5)	ND (<0.50)	ND (<0.5)	ND (<0.5)	ND (<0.5)	ND (< 10)	5,100

TABLE 3-14
Soil Sample Results
Wastewater Release, December 27, 2005
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	5	6	7	
Sample Date:	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	**12/29/05**	
Analyte (units)	**End of Wet Soil in BC Wash - Surface Sample**	**End of Wet Soil in BC Wash - 1 ft. Depth Sample**	**BC Wash - Background Sample**	**BC Wash - Immediately Downstream of Valve Vault - Surface Sample**	**BC Wash - Immediately Downstream of Valve Vault - 1 ft. Depth Sample**	**BC Wash - Background Sample Near Valve Vault**	**Oily Water Separator Clean Water Tank Sample**	**USEPA Industrial Soil PRGs[a]**
Thallium	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	ND (< 5.0)	ND (<5.0)	ND (<5.0)	ND (< 100)	67
Vanadium	22	24	28	21	25	26	62	1,000
Zinc	29	29	39	120	27	24	660	100,000
Additional Parameters								
Chlorides, mg/kg (as Cl^-)	12	9	0.58	17	10	8.2	1300 mg/L	
Sulfates, mg/kg as ($SO_4^=$)	8.2	6.5	20	9.2	9.3	80	690 mg/L	
PH (units)	8.05	8.46	7.86	8.05	8.32	7.71	7.64	
Conductivity (mmho/cm^3)	1400	120	120	200	150	280	5700	
Total Dissolved Solids (mg/kg)	100	89	85	150	110	180	3800	

Notes:
[a] USEPA Region 9 PRGs for industrial soil (2004).
[b] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.
[c] California Title 22 Soluble Threshold Limit Concentration.

ND = not detected (detection limit in parentheses).
Source: PG&E 2006c.

TABLE 3-15
Soil Sample Results
Wastewater Release, April 16, April 29, and May 2, 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	SS1	SS2	SS3	SS4	
Sample Date:	**4/26/06**	**4/26/06**	**4/16/06**	**4/16/06**	**5/2/06**	**5/2/06**	**5/2/06**	**5/3/06**	
Analyte (units)	**Wet soil Near Release**	**Dry Soil near release**	**Waste-water from pipe**	**Waste-water from O/W Separator**	**Within the 4/29/06 Release**	**Within the 4/29/06 Release**	**With the 5/2/06 Release**	**Background sample**	**USEPA Industrial Soil PRGs[a]**
Title 22 Metals (mg/kg)									
Antimony	ND	ND	N/A	N/A	ND	ND	ND	ND	410
Arsenic	2.3	4.6	N/A	N/A	4.1	2.5	4.8	1.9	1.6[b]
Barium	140	210	N/A	N/A	140	160	170	58	67,000
Beryllium	ND	ND	N/A	N/A	ND	ND	0.56	ND	1,900
Cadmium	ND	ND	N/A	N/A	ND	1.1	ND	ND	450
Total Chromium	35	20	N/A	N/A	30	42	27	23	450
Cobalt	5.3	7	N/A	N/A	6.3	7.5	6.3	7.7	1,900
Copper	10	11	N/A	N/A	16	19	15	11	41,000
Lead	18	6.2	N/A	N/A	11	67	9.5	6.6	800
Mercury	ND	ND	N/A	N/A	ND	ND	ND	ND	310
Molybdenum	2.7	ND	N/A	N/A	5.3	7.3	3.6	ND	5,100
Nickel	15	15	N/A	N/A	16	27	16	17	20,000
Selenium	ND	ND	N/A	N/A	ND	ND	ND	ND	5,100
Silver	ND	ND	N/A	N/A	ND	ND	ND	ND	5,100
Thallium	ND	ND	N/A	N/A	ND	ND	ND	ND	67
Vanadium	24	34	N/A	N/A	35	39	38	34	1,000
Zinc	78	42	N/A	N/A	30	150	58	45	100,000

TABLE 3-15
Soil Sample Results
Wastewater Release, April 16, April 29, and May 2, 2006
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample No.:	1	2	3	4	SS1	SS2	SS3	SS4	
Sample Date:	**4/26/06**	**4/26/06**	**4/16/06**	**4/16/06**	**5/2/06**	**5/2/06**	**5/2/06**	**5/3/06**	
Analyte (units)	**Wet soil Near Release**	**Dry Soil near release**	**Waste-water from pipe**	**Waste-water from O/W Separator**	**Within the 4/29/06 Release**	**Within the 4/29/06 Release**	**With the 5/2/06 Release**	**Background sample**	**USEPA Industrial Soil PRGs[a]**
Additional Parameters									
pH (units)	8.25	8.41	7.59	7.5	8.06	9.11	8.26	8.57	NA
Chloride (mg/kg [as Cl^-])	530	380	1200	1100	1900	58	170	11	NA
Sulfate (mg/kg as [$SO_4^=$])	230	1700	560	520	750	60	470	17	NA
Electrical conductivity @ 25°C (mmho/cm^3)	320	610	5000	4700	900	120	210	80	NA

Notes:

[a] USEPA Region 9 PRGs for industrial soil (2004).

[b] Arsenic is a compound whose natural background concentrations in California typically exceed the PRGs.

ND = not detected (detection limit in parentheses).

N/A = constituent not analyzed.

TABLE 3-16
Chronology of Major Operational Changes
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Year	Action
1951	Topock Compressor Station begins operation with six compressor units (K-1 through K-6), three generator units (P-1 through P-3), and one four-cell cooling tower (Cooling Tower A). Cooling tower blowdown discharged directly to Bat Cave Wash.
1953	Two additional compressor units (K-7 and K-8) and one additional generator unit (P-4) are installed.
1954	Another compressor unit (K-9) is installed. Cooling Tower B constructed (two cells).
1957	Another compressor unit (K-10) is installed.
1958	Cooling Tower B expanded to four cells.
1960 to 1961	Use of water production wells PG&E Nos. 1 and 2 ceases; water for the facility is procured from wells across the Colorado River in Topock, Arizona (Topock Wells Nos. 1 and 2).
1962	Original Permutit water conditioning unit is removed from service; canister-type water conditioning system is installed.
1964	Single-step treatment system to reduce Cr(VI) in cooling water blowdown installed; a percolation bed for impoundment of treated cooling tower blowdown constructed in Bat Cave Wash.[a]
1964	Interstate 40 is constructed. Wells PG&E Nos. 1 and 2 are destroyed, and new standby wells PGE-06 and PGE-07 are installed.
1969	Two-step treatment system to reduce Cr(VI) and remove chromium from cooling tower blowdown is installed. Injection well PGE-08 also installed at this time.
1970	Use of injection well PGE-08 for underground injection of facility wastewater begins. From May 1970 to September 1971, wastewater is diverted to percolation bed when injection well PGE-08 is out of service. Gas scrubbers removed from service between mid-1960s and 1970.
1971	Construction of single-lined evaporation Pond No. 1 is completed. From September 1971 to August 1973, Pond No. 1 receives facility wastewater only when injection well PGE-08 is out of service. Between August and December 1973, wastewater disposal alternates on a 3-day cycle between PGE-08 and Pond No. 1.
1974	Single-lined evaporation Pond Nos. 2 through 4 are completed and all facility wastewater is conveyed directly to these ponds. PGE-08 is permanently taken out of service.
1974	Topock Well No. 3 is installed.
1980	Topock Well No. 1 is removed from service. Topock Well No. 2a replaces Topock Well 2. Topock Well Nos. 2a and 3 are used to supply water to the compressor station.
1985	Chromium-based cooling water additives are replaced with phosphate-based additives for the open system, and molybdate-based system for the closed-loop systems. Operation of the two-step chromium treatment unit ceases.
1989	Four new double-lined evaporation ponds are completed and all facility wastewater is directed to these ponds. The four single-lined evaporation ponds (i.e., the Old Evaporation Ponds) are removed from service.
1989 to 1990	The two-step chromium treatment unit is closed and removed. The original oily wastewater treatment system is removed and replaced with a new system.
2001	The original coil shed Cooling Tower A is replaced with a new cooling tower/heat exchanger unit.
2002	The original coil shed Cooling Tower B is replaced with a new cooling tower/heat exchanger unit.

Note:
[a] The exact date for construction of the percolation pond is unknown, but based on aerial photographs, it appears to have been constructed in 1964 (i.e., with the single-step treatment system).

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TABLE 3-17
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date	Event
August 14, 1969	Water Board adopts Resolution 69-25 requiring PG&E to cease discharging industrial wastewater containing hexavalent chromium by infiltration to Bat Cave Wash (Water Board 1969)..
November 6, 1970	PG&E submits a Report of Waste Discharge to the Water Board for disposal of industrial wastewater from cooling tower operations into single-lined evaporation Pond #1.
December 10, 1970	Water Board adopts Resolution 70-72 regulating the discharge of treated wastewater into single-lined evaporation pond #1 (Water Board 1970a).
December 10, 1970	Water Board adopts Resolution No. 70-73, regulating the disposal of chromic hydroxide sludge at an approved offsite facility (Needles Dump) (Water Board 1970b).
September 11, 1975	Water Board rescinds Resolution No. 70-72 and adopts Board Order No. 75-52 for four single-lined evaporation ponds (SWMU 10; Old Evaporation Ponds). On November 20, the Water Board issued a revised Board Order No. 75-52 changing the minimum freeboard requirement from 2 feet to 1 foot (Water Board 1975). Also, the Board Order prohibited the discharge of wastewater to the Colorado River or to any channel draining to the Colorado River. In addition, the Board Order specified that chemical residues obtained by chemical flocculation or evaporation of process wastewater shall be discharged only at a solid waste disposal site approved to receive these wastes.
August 18, 1980	As required by RCRA, PG&E files a Notification of Hazardous Waste Activity Form with the USEPA for the two-step wastewater treatment system, which included the chromic hydroxide sludge drying beds.
November 17, 1980	PG&E submits a RCRA Part A application to the DTSC covering all hazardous waste management facilities at the compressor station (i.e., the former two-step wastewater treatment system and the four former single-lined evaporation ponds).
April 6, 1981	An Interim Status Document, which outlines the requirements for operation of the Topock Compressor Station as a RCRA hazardous waste facility (USEPA ID No. CAT080011729), is issued by the DTSC to PG&E.
June 9, 1981	PG&E files a Notification of Hazardous Waste Site with USEPA Region 9, pursuant to Section 103 (c) of CERCLA.
March 11, 1983	Water Board adopts Order 83-29 that rescinds Order 69-25.
December 15, 1982	Pursuant to a request from DTSC, PG&E submits an Operation Plan for the hazardous waste facilities covered by the Interim Status Document.
May 8, 1985	USEPA Region 9 requests that PG&E prepare a Part B Permit Application for the waste treatment units at Topock Compressor Station. After a review of applicable regulations affecting the operation of the hazardous waste management facilities, PG&E submits a notice to the USEPA on September 6 of its intent to decommission and close these facilities (including the four old evaporation ponds).
October 2, 1985	The Water Board adopts Board Order No. 85-99 for the four former single-lined evaporation ponds, which superseded Board Order No. 75-52 (Water Board 1985). Order No. 85-99 allows PG&E to replace the chromate-based cooling tower water treatment process with phosphate-based inhibitors. Phosphate-based inhibitors are in use today.
November 7, 1985	PG&E submits a Closure Plan (dated October 28, 1985) to USEPA with copies to DTSC and Water Board. This Closure Plan covered closure of all hazardous waste management facilities at Topock identified in the Part A RCRA permit application, including the two-step wastewater treatment system (Phase 1 and 2 closure) and the four former single-lined evaporation ponds (Phase 3 Closure).

TABLE 3-17
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date	Event
August 14, 1986	PG&E submits a revised Closure Plan for hazardous waste management facilities at Topock identified in the Part A RCRA permit application.
May 19, 1987	The Water Board determines that PG&E Topock Compressor Station's old evaporation ponds were not subject to regulation under the California Toxic Pits Control Act.
June 26 and July 10, 1987	The Closure Plan (and subsequent revisions) for closure of the hazardous waste management facilities at Topock identified in the Part A RCRA permit application (the two-step wastewater treatment system and the four single-lined evaporation ponds) is approved by USEPA Region 9 (June 26) and DTSC (July 10).
July 7, 1987	DTSC, Water Board, and USEPA approve the Closure Plan for the hazardous waste facilities (PG&E receives notification of approval on September 7, 1987).
August 1987	USEPA completes an RFA for the Topock Compressor Station. The RFA identified 13 SWMUs (Units 4.1 through 4.13) through records review, data evaluation, interviews, and a visual site inspection.
January 27, 1988	Water Board rescinds Board Order No. 85-99 and adopts Board Order No. 88-30, which is revised on March 23, 1988 (Water Board 1988). Revised Order No. 88-30 allows discharge to four Class II surface impoundments.
March 9, 1988	DTSC issued a Stipulation and Order on January 27, 1988 (Docket No. HWCA 87/88-018), which set forth the agreement reached between DTSC and PG&E regarding events that would trigger upgrading the groundwater monitoring system at the four single-lined evaporation ponds and settling the alleged monitoring deficiencies identified in 1986.
November, 1988	PG&E began closure activities of hazardous waste management facilities at Topock identified in the Part A RCRA permit application. Closure activities associated with the two-step wastewater treatment system consisting of the chromate reduction tank, precipitation tank, process pump tank, transfer sump, sludge drying beds, and associated piping were completed in 1990 (Phases 1 and 2). Closure of the four single-lined evaporation ponds could not proceed until new surface impoundments were constructed to replace the old evaporation ponds and the waste had dried sufficiently.
September, 1989	DTSC issues a Report of Violation. This report listed essentially the same groundwater monitoring violations settled by the Stipulation and Order issued March 9, 1988.
July 23, 1990	PG&E submits a Closure Certification Report for clean closure of the facilities in Phases 1 and 2 (the two-step wastewater treatment system) to DTSC, USEPA, and Water Board.
February 25, 1991	DTSC issues a Corrective Action Order listing the same alleged violations as contained in the previous Report of Violations and the Stipulation and Order.
September to November 1993	PG&E conducts closure construction work at the four former single-lined evaporation ponds.
December 31, 1993	PG&E submits the *Closure Certification Report for the Old Evaporation Ponds* dated December 27, 1993 to DTSC and the Water Board.
November to December 1994	In response to regulatory agency concerns, additional site excavation work at the four former single-lined evaporation ponds area is conducted.
May 11, 1995	The Water Board approves the clean closure of the four former single-lined evaporative ponds.

TABLE 3-17
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date	Event
June 26, 1995	The DTSC approves clean closure of the former two-step wastewater treatment system and the four former single-lined evaporation ponds (the former hazardous waste management facilities) and considers these waste management units clean closed.
August 3, 1995	DTSC submits a letter to PG&E requesting that a Corrective Action Program be conducted at the site.
February 26,1996	PG&E and the DTSC enter into a CACA, whereby PG&E agreed to address past waste discharges at the Bat Cave Wash project site and to conduct an RFI and implement corrective action, if warranted. The CACA identifies 10 SWMUs (SWMU 1 through SWMU 10) and three AOCs (AOC 1 through AOC 3) at the Topock Compressor Station. Eight of the SWMUs identified in the CACA were also identified as SWMUs in the RFA. However, four SWMUs identified in the RFA were not included in the CACA; the CACA combined two of the RFA SWMUs into one SWMU; and the CACA listed two additional SWMUs and three additional AOCs that were not identified in the RFA.
July 2, 1996	DTSC acknowledges the receipt of the Current Conditions Report, RFI Work Plan, Health and Safety Plan, and Public Involvement Plan.
December 19, 1996	DTSC approves the RFI work plan, Current Conditions Report, and the Health and Safety Plan.
January 12, 1998	PG&E receives, from DTSC, the RFA prepared by A.T. Kearny (August 1987).
February 19, 1998	DTSC approves the RFI work plan amendment per comments given in a February 11, 1996 DTSC memorandum prepared by the Geological Support Unit of DTSC.
May 14, 1998	Water Board rescinds Order No. 88-30 and adopts Order No. 98-050 regulating the Class II ponds (Water Board 1998). The Class II ponds are currently regulated under Order No. 98-050.
April 17, 2000	PG&E submits the Draft RFI Report to DTSC.
October 12, 2000	PG&E submits a work plan for additional soils sampling to DTSC. The work plan identifies 10 potentially-impacted areas associated with the Topock Compressor Station that required investigation. The areas were identified through a review of historic aerial photographs, interviews with knowledgeable employees, a review of chemical use processes, and a field reconnaissance within and around the compressor station.
January 4, 2001	DTSC issues a letter to PG&E indicating that the 10 potentially-impacted areas identified in PG&E's October 12, 2000 work plan are considered AOCs under the RCRA corrective action process.
December 2002	PG&E submits the Draft Corrective Measures Study Work Plan.
June 24, 2003	DTSC approves the Draft Corrective Measure Study Work Plan.
August 11, 2003	DTSC is established as the lead agency for the Topock project at a meeting of the Cal/USEPA Site Designation Committee.
August 2003	DTSC requests that PG&E install a pilot groundwater extraction and treatment system and that the CWG, with representatives from regional, state, and federal agencies, be rechartered.
February 2004	PG&E submits revised Draft RFI Report to DTSC.
February 9, 2004	DTSC directs PG&E to begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW-20 cluster and monthly surface water sampling at six locations (Interim Measure No. 2).

TABLE 3-17
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Date	Event
March 8, 2004	PG&E begins implementation of Interim Measure No. 2.
May 17, 2004	DTSC directs PG&E to prepare a revised RFI Report.
June 30, 2004	To continue to achieve the objectives of the interim measures, DTSC issues a California Environmental Quality Act notice of exemption for increased groundwater extraction, piping and conveyance of extracted water to treatment system on nearby land owned by Metropolitan Water District, and management of treatment waste streams (Interim Measure No. 3).
September 2004	PG&E completes purchase of land parcel owned by Metropolitan Water District for Interim Measure No. 3 and begins grading work in preparation for Interim Measure No. 3 construction.
October 13, 2004	Water Board adopts Orders for three options to manage the treated water from Interim Measures No. 3: subsurface injection, discharge to the Colorado River under a National Pollutant Discharge Elimination System permit, and re-use of the treated water at the Topock Compressor Station.
February 2005	PG&E submits a revised Draft RFI Report to DTSC
July, 2005	PG&E completes construction of Interim Measure No. 3. Groundwater injection begins.
July 11, 2005	DOI, BOR, USFWS, BLM, and PG&E enter into an Administrative Order on Consent for the Topock project. The order defines how cooperation will be facilitated between the federal agencies and PG&E, and includes an agreement that cleanup activities will be completed pursuant with CERCLA.
March 23, 2006	Water Board adopts Order R7-2006-0008 for implementation of a Floodplain Reductive Zone In-situ Pilot Test.
July 13, 2006	DTSC provides comments on the Site History and Background portions of the 2005 Draft RFI. DTSC identifies four new AOCs, and provides AOC designations for two previously-undesignated areas. DTSC also requests additional soil investigation at eight SWMUs associated with the cooling water blowdown and oily treatment processes that had been closed by DTSC in the 1990s.

TABLE 3-18
Summary of Aerial Photographs, 1936 to 1997
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Year	Description
1936 (Figure 3-8)	The AT&SF railroad line and Route 66 are the primary manmade features visible in this photograph. The original railroad line crosses the Colorado River on the northernmost bridge (the Red Rock Bridge) and turns northward to run along the western bank of the river (part of the right-of-way may currently being occupied by National Trails Highway). Route 66 crosses the river to the south of the railroad using the Old Trails Arch bridge and runs westward in a fairly circuitous route. Route 66 runs through the future compressor station site (a portion of this route is now used as the entrance to the compressor station) and a single structure is present at the northern end of the future site of the facility. The structure is believed to be the Teapot Dome restaurant and gas station (CH2M HILL 2004). The Topock Maze is also visible in the photograph. There are also numerous structures located on the east side of the Colorado River in Topock. Most of the structures are clustered around the railroad line and Route 66. North of the railroad bridge, the river is quite wide and not well defined, indicating that it has not been dredged.
1942 (Figure 3-9)	No significant changes in land use can be seen between this photograph and the 1936 photograph. The river appears to be much lower in this photograph (when compared to the 1936 photograph) and numerous sand bars can be seen along the western edge of the river north of the railroad bridge.
1944 (Figure 3-10)	Construction of the re-alignment of the AT&SF railroad line is visible in this photograph. The right-of-way is graded and bridge piers are present in the river channel, but the track and bridge have not yet been completed. A small spur now appears to connect Route 66 and the railroad right-of-way near the western end of the railroad bridge. Several structures are also present just south of the western end of the railroad bridge. The nature of these structures in unknown. A detour for Route 66 has been constructed where it crosses the new railroad grade; the original route was apparently blocked by railroad cut and fill activities. There is also a large graded area and construction activity in the location that is now known as the Railroad Debris site (AOC 4).
1947 (Figure 3-11)	The new AT&SF railroad line and trestle have been completed. Route 66 has been re-aligned. Route 66 now occupies the original railroad right-of-way and uses the Red Rock Bridge to cross the Colorado River. The former alignment of Route 66 has become a secondary road. The structure believed to be Teapot Dome is still present.
1953 (Figure 3-12)	The paths of the railroad and Route 66 have been altered on the east side of the river. The compressor station is present and it includes the main compressor building, cooling tower A, generator building, carport, warehouse, and water tanks. The scrubber units and sludge drying beds are also present on the lower bench just west of the main facility. There is what appears to be a light colored liquid flow beginning in Bat Cave Wash that appears to originate downslope of the bench on the northwest side the facility (near the current location of monitoring well MW-10) and ends on the south side of the railroad tracks. The river channel appears more defined upstream of the railroad trestle and sand dunes appear on both sides of the main channel, suggesting that dredging has occurred. There are also what appear to be several structures near the mouth of Bat Cave Wash on Route 66. The structures appear to be a gas station and motel known to have occupied this area at the time (CH2M HILL 2004).
1955a (Figure 3-13)	Cooling tower B is now present at the facility. Another new building is also present in the southeast corner of the facility across from the generator building. The sludge drying beds (SWMU 5) are now visible in the lower yard on the western side of the facility. A large whitish area is also present just south of the sludge drying beds. There is what appears to be a light-colored liquid flow in Bat Cave Wash beginning just downslope of the sludge drying beds area and extending to the railroad tracks. There is also what appears to be a light colored liquid flow that originates downslope of the lower yard on the northwest side the facility (near the current location of monitoring well MW-10) that meets the lighter colored flow in Bat Cave Wash. There is a large white patch just north of the station and just east of Bat Cave Wash, at what is now called the Railroad Debris site. An unpaved road runs from the north end of the compressor station of the facility to this area. The river channel is more defined upstream of the railroad trestle and sand dunes are present on the eastern side of the river. The structures located at the end of Bat Cave wash are still present.

TABLE 3-18
Summary of Aerial Photographs, 1936 to 1997
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Year	Description
1955b (Figure 3-14)	In this oblique aerial photograph looking to the northeast, the layout of the compressor station is clearly visible, including the main facility and the lower yard. There is a large white patch located just south of the sludge drying beds. There is also a pipe that runs down the slope of Bat Cave Wash just west of the sludge drying beds. A light-colored flow emanates from the pipe and flows northward down Bat Cave Wash. Another liquid flow appears to originate on the slope on the northwest side of the facility (near the current location of monitoring well MW-10) and meets the lighter colored flow in Bat Cave Wash. No evidence of a holding pond (i.e., percolation bed) (SWMU 1) can be seen in this photograph. A large white patch and some debris is present at what is now called the Railroad Debris site. An unpaved road (a portion of the old Route 66) runs from the north end of the compressor station of the facility to this area. Several structures are also clearly evident on the eastern side of the river.
1955c (Figure 3-15)	An oblique aerial photograph looking to the northwest. An unpaved road (a portion of the former Route 66) runs from the north end of the compressor station to the Railroad Debris site. There appear to be materials stored in the southern end of the lower bench. A small shed is present on the southeast side of the facility, just above the slope down into the East Ravine. Debris is present around the shed and down the slope. There are also two drainage channels that run from the compressor station into East Ravine. At least one drainage appears to contain (or to have recently contained) flowing liquid.
1961 (Figure 3-16)	There are two additional pipeline crossings downstream of Route 66. Cooling Tower B has been enlarged to 4 cells and a new office building is located at the east entrance to the facility. There is a light-colored patch on the east side of Bat Cave Wash just down slope of the sludge drying beds area. There are also several dark patches at the bottom of the wash in that same area. The 1962 photograph covers more area to the north of the compressor station. The Park Moabi facility appears to be under construction.
1962 (Figure 3-17)	The light-colored patch on the east side of Bat Cave Wash just down slope of the sludge drying beds area is still visible. There also appears to be a minor amount of liquid flow in Bat Cave Wash originating from that same area. The Park Moabi facility is still under construction, and a dredge can be seen operating at the mouth of the side channel that leads to the Park Moabi Marina.
1964 (Figure 3-18)	The compressor station is clearly visible and it appears that the road leading up to the facility and the onsite access roads have been paved. The flowing liquid identified in Bat Cave Wash in earlier photographs is no longer visible. The sludge drying beds are dark, suggesting that liquid is present in the beds. There is what appears to be an impoundment containing liquid east of the facility and south of the entrance road to the site (in the East Ravine). There is also a small patch of light-colored material in a drainage area near the southeast fence line of the facility. The river is very well defined suggesting more dredging had occurred, and there appears to be the beginning of vegetation growth in the sand dunes north of the railroad.
1966 (Figure 3-19)	The 1966 photograph encompasses a narrow east-west swath along the newly constructed I-40. Coverage extends from the northern edge of the compressor station to the railroad line. The white powder in the Railroad Debris site appears to have been covered with soil (although it is still partially exposed in some areas). Wells PG&E-6 (SWMU 3) and PG&E-7 (SWMU 4) are visible with what appears to be a pipeline connecting the two. There appears to be a small depression containing liquid on the north side of Bat Cave Wash, just northwest of the facility. This is the same area where liquid flows were previously identified. The very northern edge of the holding pond can also be seen inside the loop of the road that runs from the lower yard down into Bat Cave Wash. Route 66 has been replaced with the newly constructed I-40, located between the compressor station and the Railroad Debris site. The original railroad bridge crossing the river has also been replaced.

TABLE 3-18
Summary of Aerial Photographs, 1936 to 1997
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Year	Description
1967a (Figure 3-20)	There is what appears to be ponded water in the holding pond located in Bat Cave Wash. The ponded water appears as a dark crescent in the inside loop of the road that leads from the lower yard down into Bat Cave Wash. A light colored patch is also present in Bat Cave Wash in the southern portion of the holding pond, in the area where liquid discharge originating on the northwest side of the facility was observed in earlier photographs. The small impoundment in the East Ravine identified in the 1964 photograph is still present. The sludge drying beds appear dark, suggesting liquid within the beds. Moabi Regional Park is visible upriver from the compressor station. Two constructed ponds containing water are also visible just south of Moabi Park.
1967b (Figure 3-21)	An impounded area (i.e., the holding pond or former percolation bed [SWMU 1]) is clearly evident in this photograph. The impoundment area lies inside the curve of the access road that runs from the lower yard to into Bat Cave Wash. Evidence of recent grading in this area can be discerned. The impoundment has been created by bulldozing soil from the center of the area and berming it up along the edge of the access road. A dark area that appears to be liquid can be seen ponded along the western edge of the impounded area. The sludge drying beds also appear to contain liquid.
1969 (Figure 3-22)	There is still what appears to be ponded water in the holding pond located in Bat Cave Wash. The ponded water appears as a dark crescent in the inside loop of the road that leads from the lower yard down into Bat Cave Wash. There is a light colored patch in the Debris Ravine just south of the facility. The sludge drying beds still appear dark, suggesting liquid within the beds.
1975 (Figure 3-23)	The holding pond area is visible in this photograph, although it does not appear to contain any liquid. The area of the holding pond that formerly held ponded water appears lighter in color than surrounding soil. Four evaporation ponds (i.e., the Former Evaporation Ponds, SWMU 10) are present to the southwest of the facility. All of the ponds appear to contain water.
1983 (Figure 3-24)	The old Route 66 bridge across the river has been removed. The marina on the eastern side of the river is clearly visible. The buildings (or remnants of such) at the mouth of Bat Cave Wash are still present. The mouth of Bat Cave Wash immediately west of Route 66 is heavily vegetated. The Railroad Debris site is no longer visible. The former site of the ponded water in the east ravine has an orange-brown tint.
1994 (Figure 3-25)	Some structures are now present on the bench located to the east of the compressor station. The former location of the four evaporation ponds (SWMU 10) is visible to the southwest of the compressor station. Four new Class II ponds are present further to the west. The new oil/water separator can also be seen in the lower yard. All other features appear similar to the 1983 photograph.
1997 (Figure 3-26)	Additional structures and construction activities are present on the bench located to the east of the compressor station. The Colorado River is very clearly defined. Remnants or foundations of the buildings located at the mouth of Bat Cave Wash are still visible; however, it does not appear that the buildings are still intact. All other features appear similar to the 1994 photograph.
2004 (Figure 3-27)	This photograph reflects the station as it is currently configured with the new cooling towers in place. Activities on the MW-20 bench can also be seen. All other features appear similar to the 1997 photograph.

13" Valve Nest
Teapot Dome Restaurant and Gas Station (Location Approximate)
Well Purge Water AST
Bat Cave Wash
Storage Container
Storage Trailer
Transwestern Intertie
Transwestern Interconnect Pipeline Fluids AST
Odorant Day Tank (AST)
Grit Tank Sump
Oily Water Separator System Grit AST
Scrubbers
Chromatograph Building
Meter Building
Odorant Day Tank (AST)
Scrubbers
Approximate Area of Former Percolation Bed
Sand Blast Shelter
PGE-08
Transfer Pumps
Transfer Sump
Chromate Reduction Tank
Former Scrubber Sump
Odorant Storage AST
Lower Yard
Sludge Drying Beds
Portable Waste Oil Storage Tank
To Class II Ponds
Clean Water AST
Waste Oil Holding AST\
Oil/Water Collection AST
Oil/Water Separator
Oil/Water Separator (AST)
Oil/Water Holding Tank
Storage Container
Storage Building
To Class I Ponds
"A" Valve Nest Area
Storage Area
Debris Ravine
Potable Water Tanks
Cooling Tower B
Heat Exchanger
Cooling Tower
Sulfuric Acid AST
Storage Tank
Aqua Towers (10)
Former Temporary Compressor Engine Oil Holding USTs
Control Room
Compressor Building
Dock
Jacket Water Coolers
Former Gasoline UST
Former Diesel UST
Gasoline AST
Fuel Dispenser
Diesel AST
Car Port
Temporary Compressor Engine Oil Holding ASTs
Chemical AST
Loading Dock
Warehouse
District Office
Control Building
Auxiliary Jacket Water Coolers
Waste Oil AST
New Oil ASTs (4)
Waste Oil Collection Sump
Oil Transfer Tanks
Wash Rack Sump
Wash Rack Shed
Leach Field
East Ravine
Chemical Storage ASTs
Cooling Tower A
Heat Exchanger
Cooling Tower
Sulfuric Acid AST
Machine Shop
Auxiliary Building
Battery Room
Emergency Generator
Temporary Generator Engine Oil Holding AST
Diesel AST
Former Temporary Generator Engine Oil Holding UST
Air Dryer Building
Septic Tank
Dock
Technical Maintenance Shop
Welding Shop
Garage
Covered Storage
Maintenance Shop
Hazardous Materials and Waste Storage Area
Dock
Fire Water Pump Building (Diesel AST Inside)
Precipitation Tank
Process Pump Tank
Storage Building (Former Water Conditioning Building)
Paint Locker
Spill Control Storage Area

LEGEND

- Current Structures
- Historic Structures
- Current Piping
- Historic Piping

N

0 20 40 80 120 Feet

1 inch equals 40 feet

FIGURE 3-1
FACILITY LAYOUT
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_FACILITY_LAYOUT_D.MXD RFI_FIG_3_1_FACILITY_LAYOUT_D.PDF 8/10/2006 09:25:00

Colorado River

Park Moabi Rd.

Topock-3 (Active)

Topock-2 (Abandoned)

Topock-2A (Active)

Topock-1 (Abandoned)

PGE-1 (Abandoned)

PGE-2 (Abandoned)

INTERSTATE 40

PGE-06 (Inactive)

PGE-07 (Inactive)

PG&E

TOPOCK COMPRESSOR STATION

BAT CAVE WASH

Legend

- Production Well
- Stream
- Ravine
- Gravel Road / Area
- Paved Road
- Water
- Building

Notes:

Wells PGE-1 and PGE-2 abandoned in 1964-1965

Wells Topock-1 and Topock-2 began usage in 1961, abandoned in 1980

Well Topock-2A replaced Topock-2 in 1980

Well Topock-3 installed in 1974

Wells Topock-2A and Topock-3 are City of Needles Wells and supply water to facility

N

0 300 600 1,200 Feet

1 inch equals 600 feet

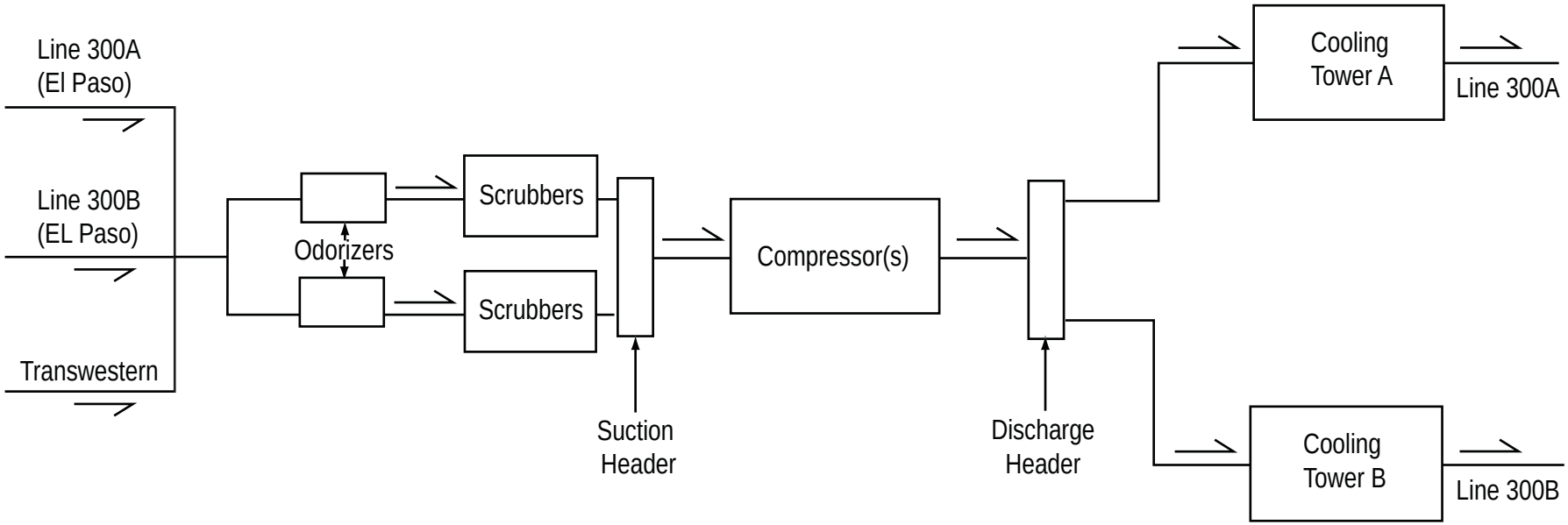
California State Plane Coordinate System
NAD 83 Zone 5 US. Feet.

FIGURE 3-2
LOCATION OF WATER SUPPLY TOPOCK COMPRESSOR STATION WELLS

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_LOCATION_OF_WATER_PRODUCTION_WELLS.MXD RFI_FIG_3_2_LOCATION_OF_WATER_PRODUCTION_WELLS.PDF 8/14/2006 15:31:00



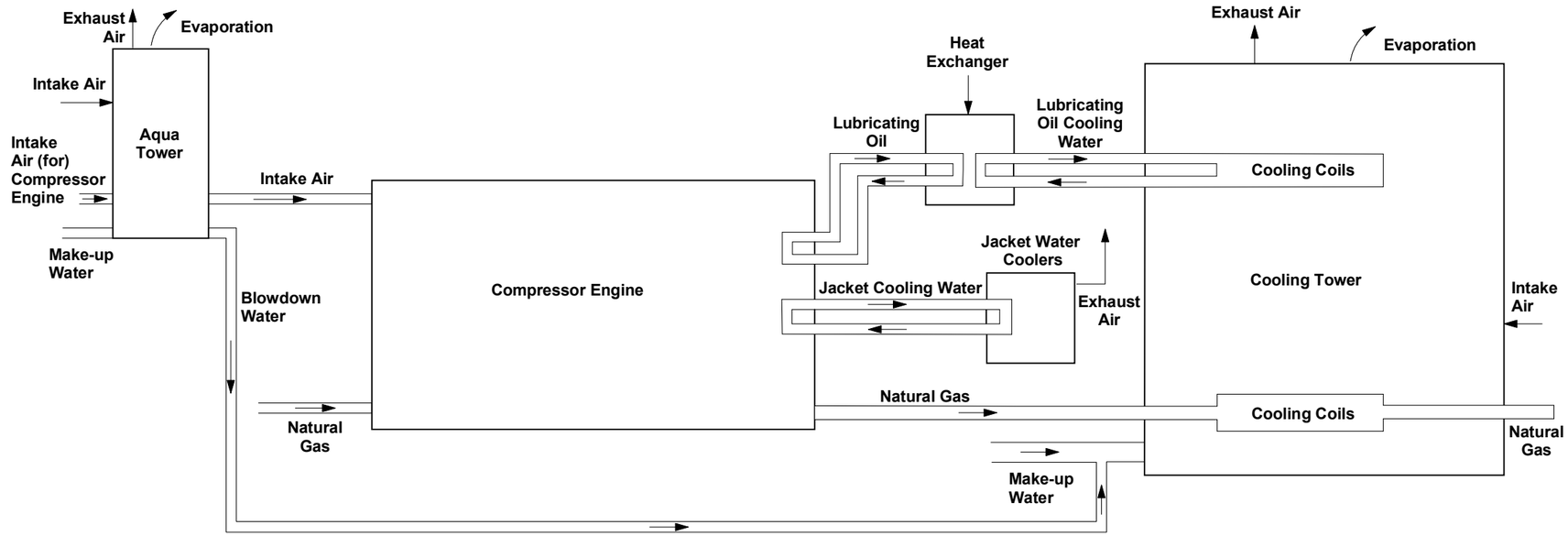
Legend:

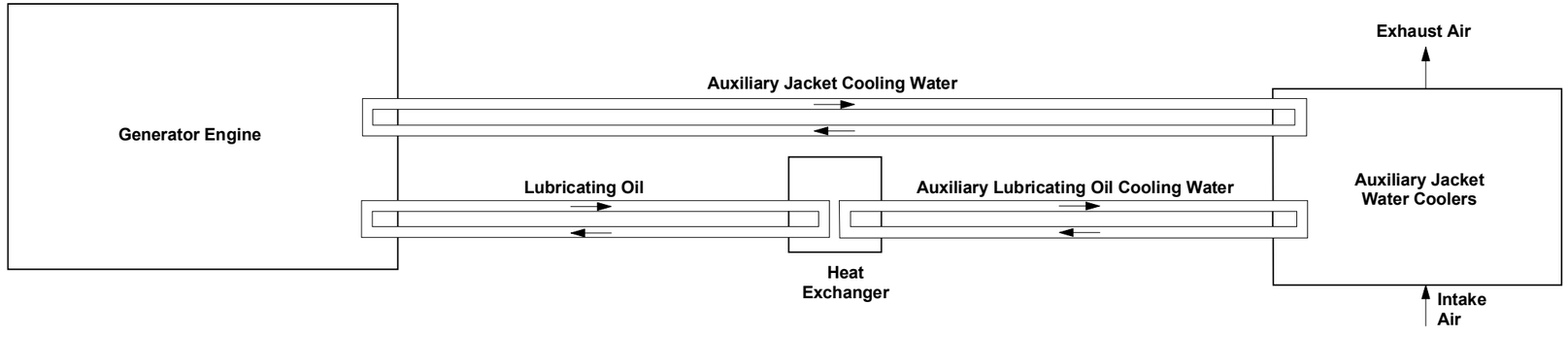
Natural Gas Flow Direction

FIGURE 3-3
SCHEMATIC OF NATURAL GAS FLOW THROUGH COMPRESSOR STATION
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

ES072006003BAO_RFI-Fig 3-3 Natural Gas Fl.pdf_82806_ll





LEGEND

Flow Direction

FIGURE 3-4
SCHEMATIC OF COOLING WATER SYSTEMS
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

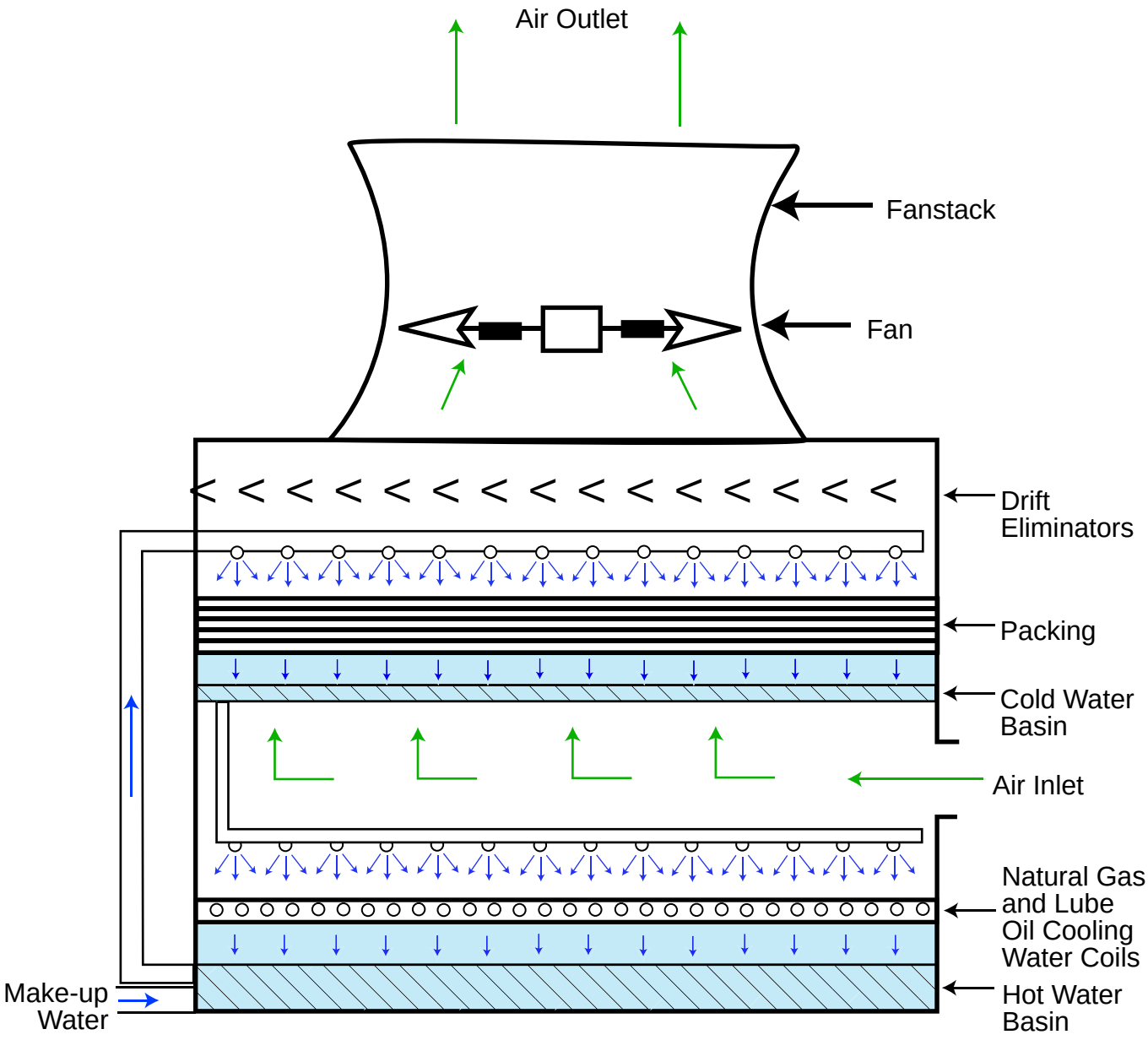


FIGURE 3-5
TYPICAL COIL SHED COOLING TOWER
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

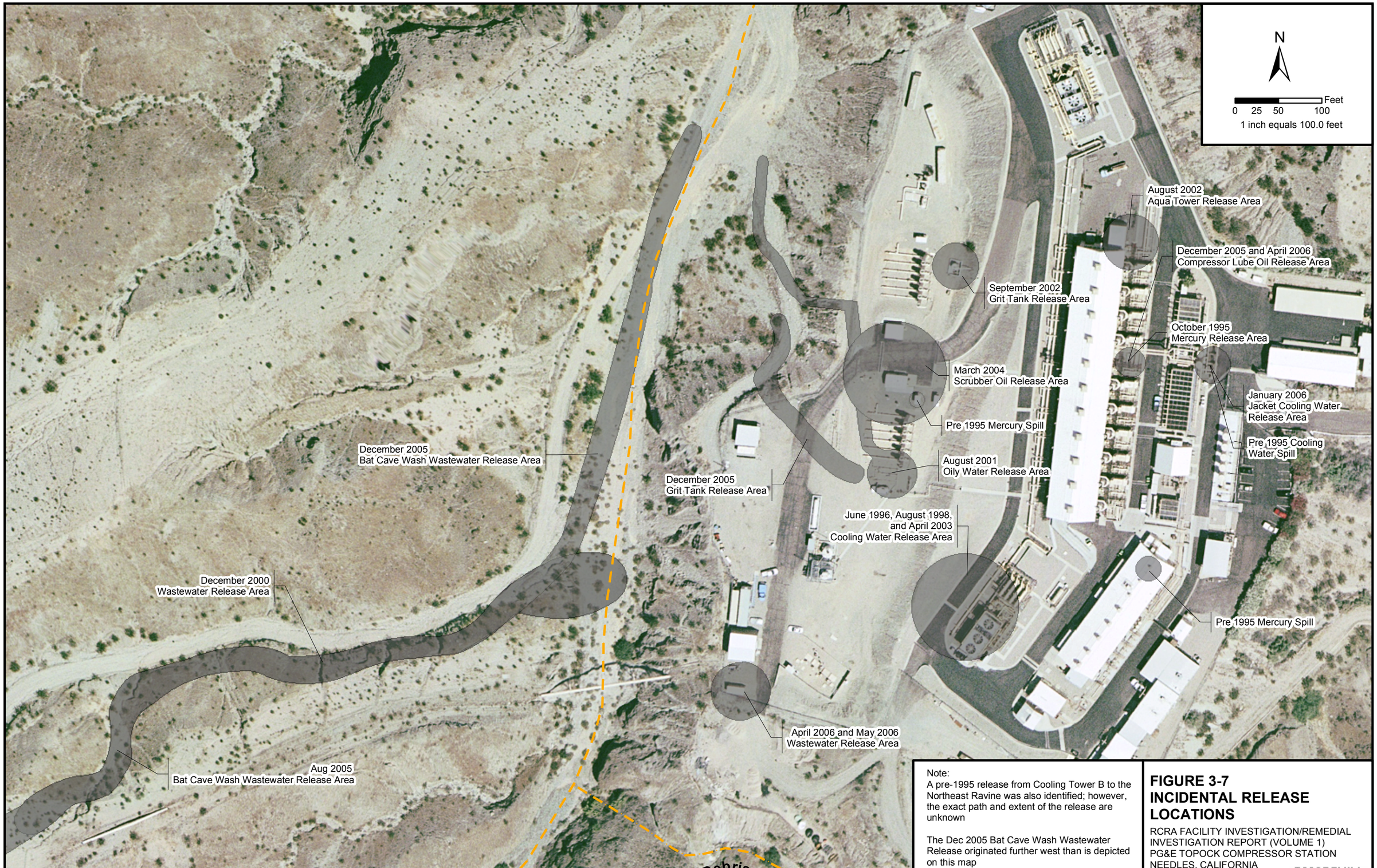
Source: PG&E 1995

CH2MHILL

FIGURE 3-6
LOCATION OF FORMER PERCOLATION BED
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

SOURCE: PG&E 1968A-B

CH2MHILL



Note:
A pre-1995 release from Cooling Tower B to the Northeast Ravine was also identified; however, the exact path and extent of the release are unknown

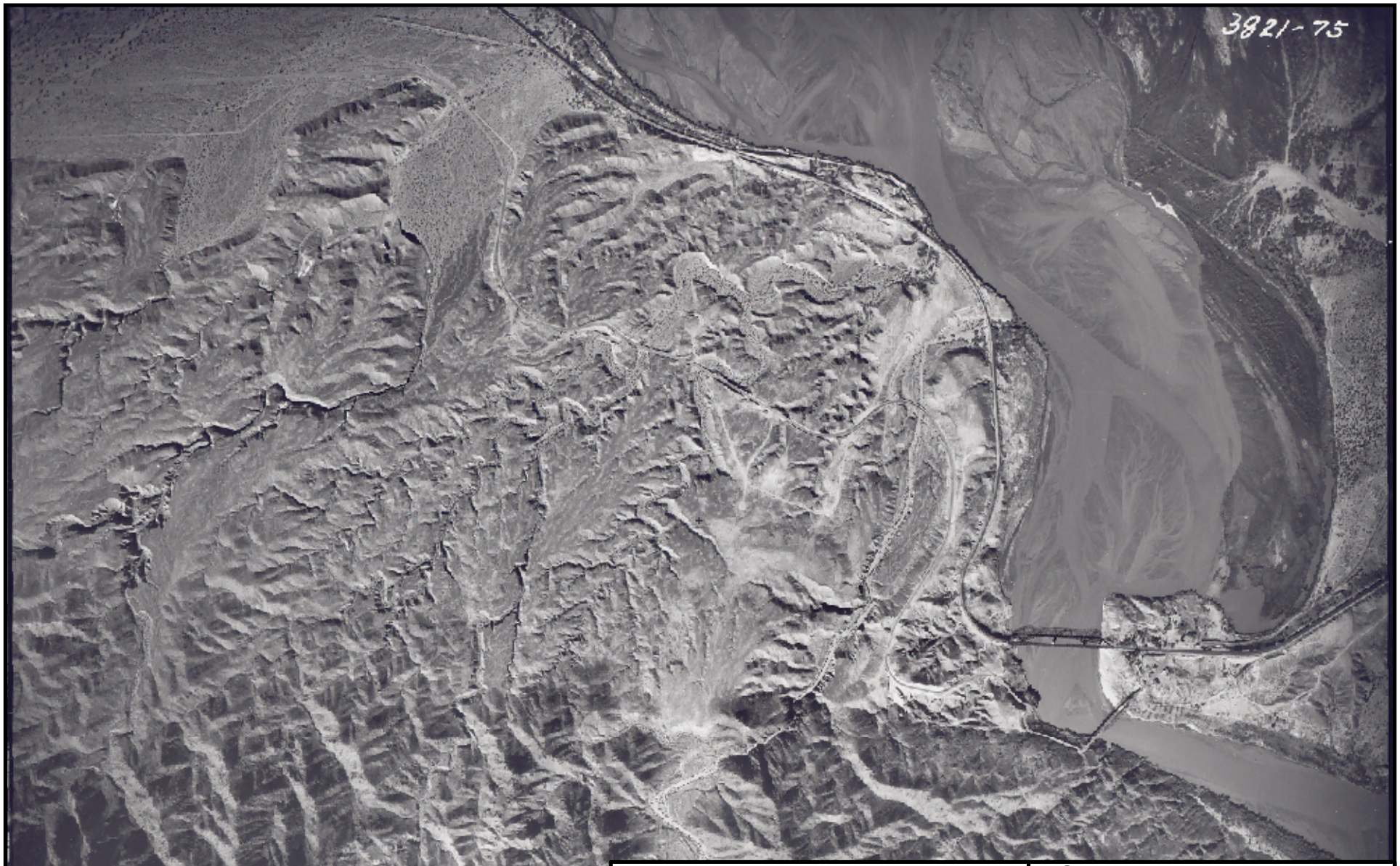
The Dec 2005 Bat Cave Wash Wastewater Release originated further west than is depicted on this map

FIGURE 3-7
INCIDENTAL RELEASE LOCATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

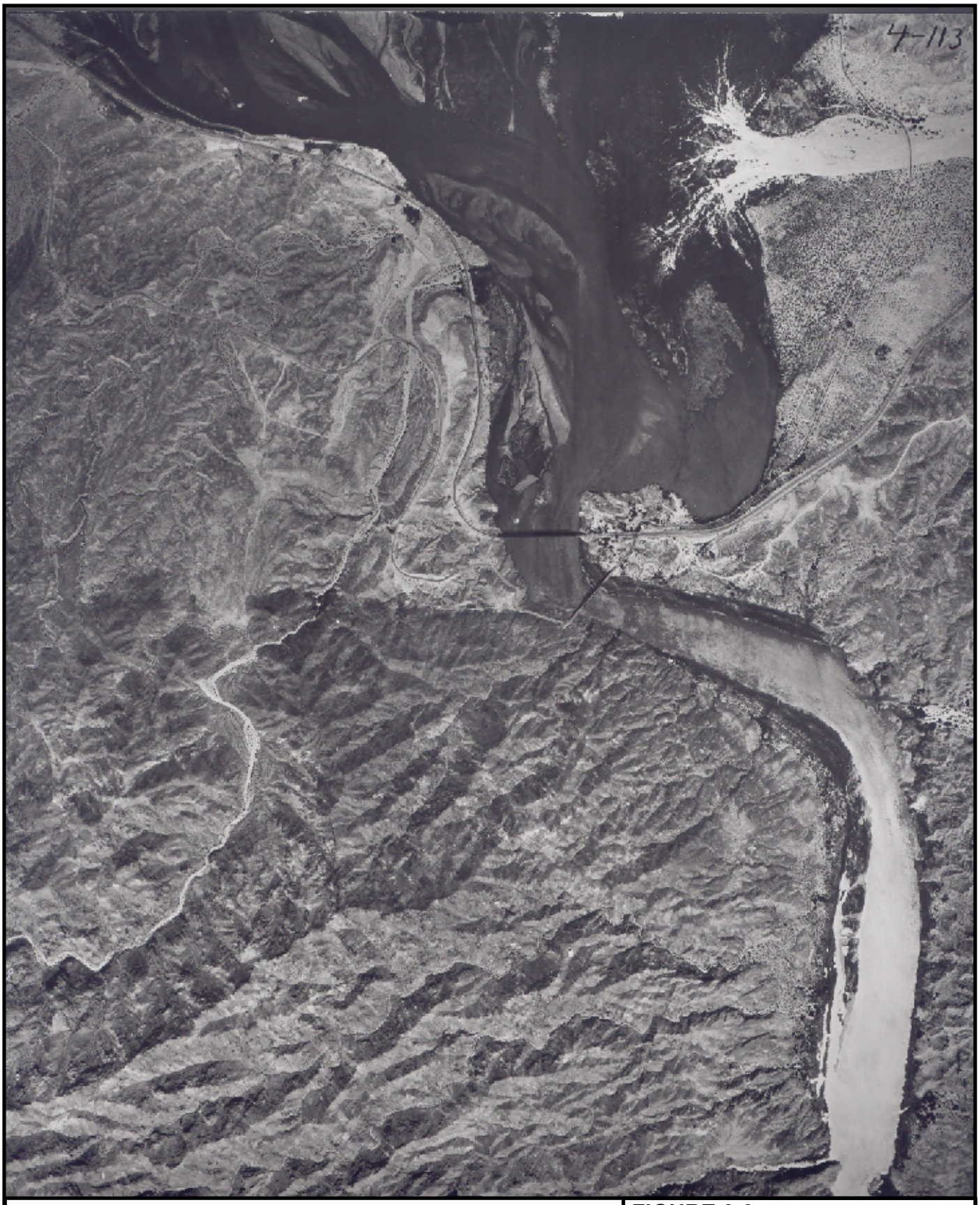
BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_RELEASE_AREA.MXD RFI_FIG_3_7_RELEASE_AREA.PDF 8/28/2006 13:38:00



Date: 01/12/36
Flight/Frame(s): C-3821/75
Source: Fairchild Aerial Photography Collection
Whittier College
Whittier, CA 90608

FIGURE 3-8
AERIAL PHOTOGRAPH
JANUARY 12, 1936
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

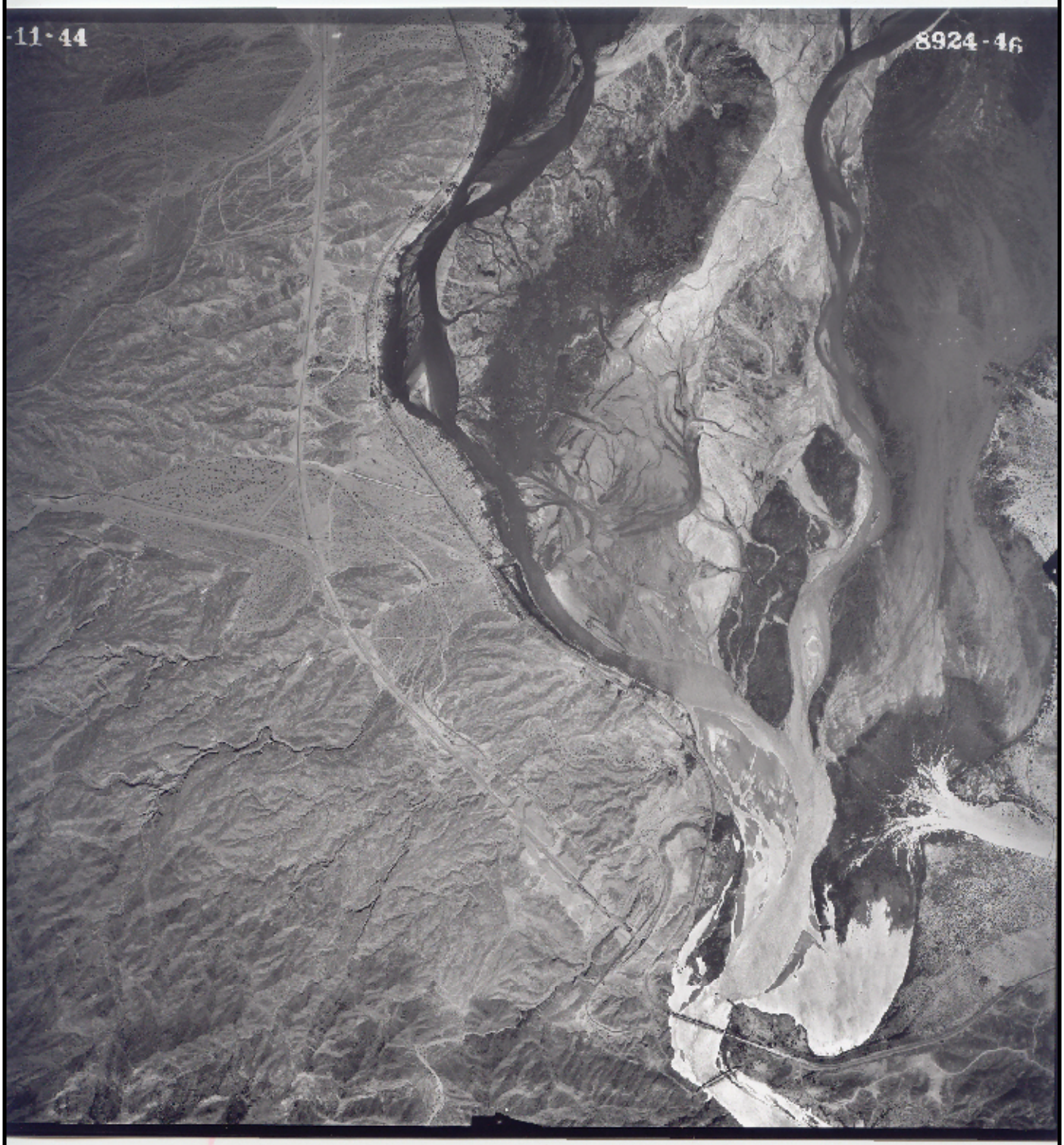
CH2MHILL



Date: 04/24/42
Flight/Frame(s): C-7800/4:113
Source: Fairchild Aerial Photography Collection
Whittier College
Whittier, CA 90608

FIGURE 3-9
AERIAL PHOTOGRAPH
APRIL 24, 1942
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Date: 05/11/44
Flight/Frame(s): C-8924/Section A:46
Source: Fairchild Aerial Photography Collection
Whittier College
Whittier, CA 90608

FIGURE 3-10
AERIAL PHOTOGRAPH
MAY 11, 1944
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 09/30/47
Flight/Frame(s): GS-EU 1-5
Source: USGS Rocky Mountain Mapping Center
Earth Science Information Center
Box 25046, Stop 504, DFC
Denver, CO 80225

FIGURE 3-11
AERIAL PHOTOGRAPH
SEPTEMBER 30, 1947
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 05/07/53
Flight/Frame(s): AXL-5M-48, AXL-5M-49
Source: USDA photo via
County of San Bernardino Flood Control District
825 E. Third Street
San Bernardino, CA 92415-0835

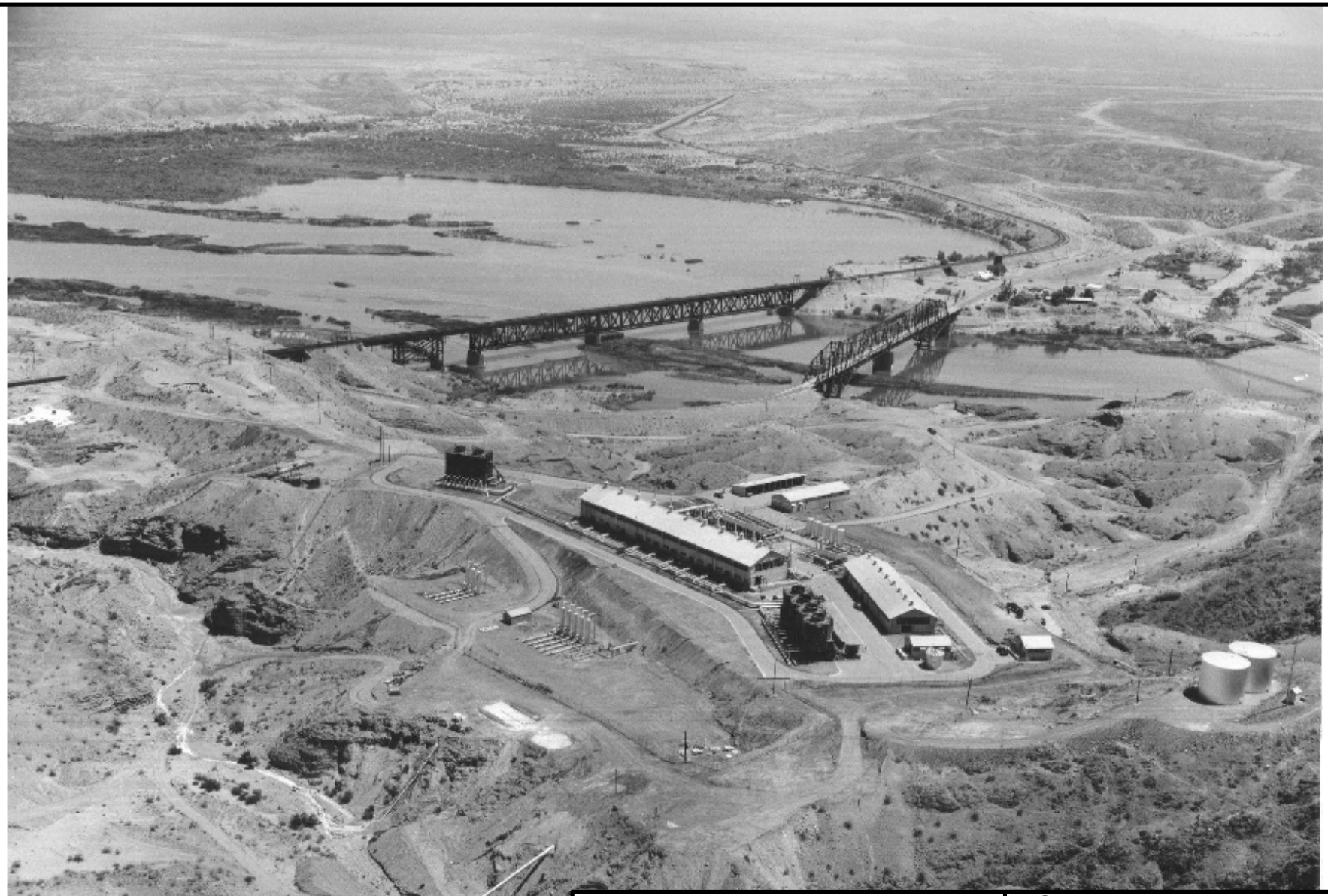
FIGURE 3-12
AERIAL PHOTOGRAPH
MAY 7, 1953
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 05/24/55
Roll/Frame(s): 55W 8015, 8016
Source: NOAA National Geodetic Survey, SSMC#3
Information Services Branch, N/NGS12
1315 East West Highway
Silver Spring, MD 20910

FIGURE 3-13
AERIAL PHOTOGRAPH
MAY 24, 1955
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

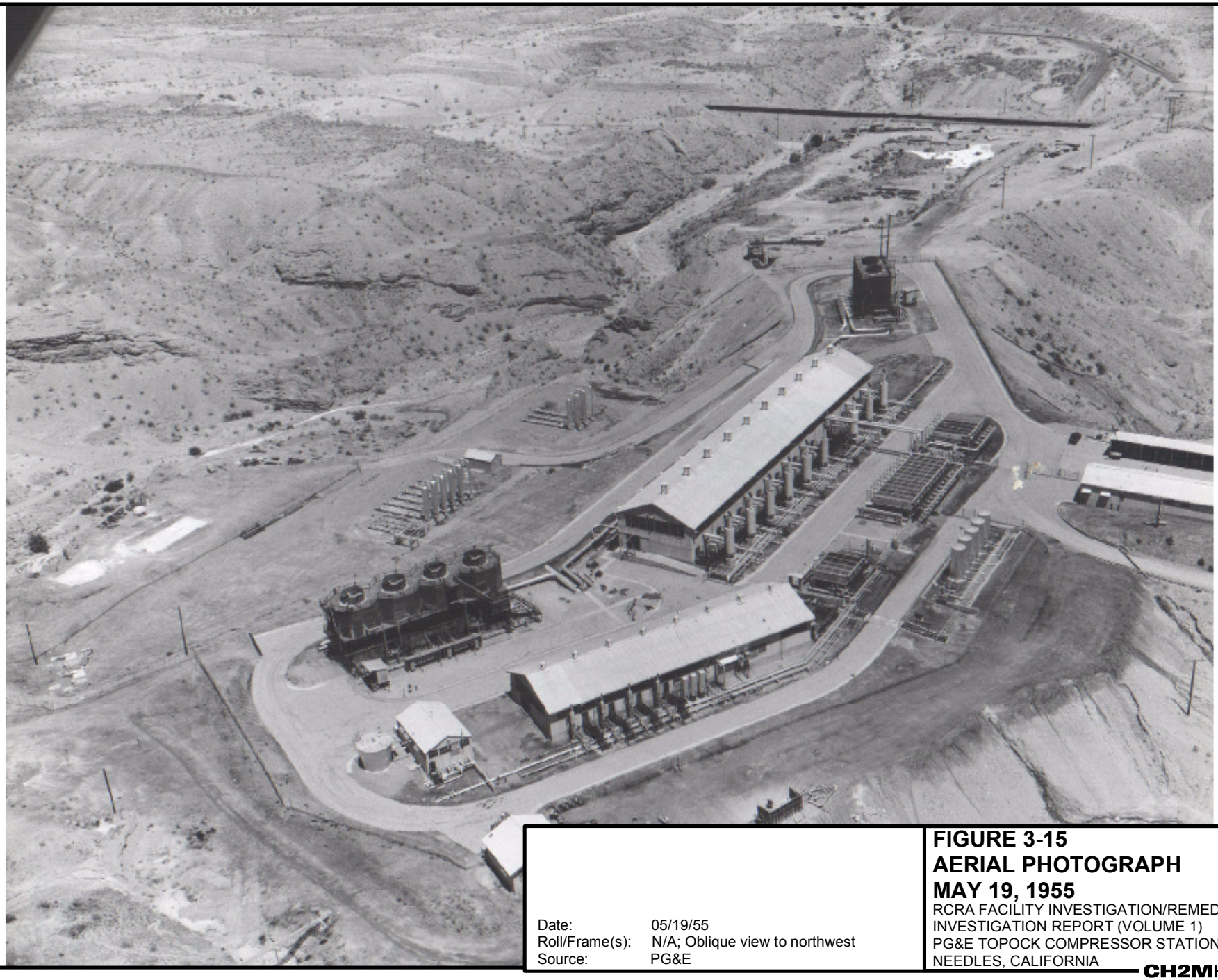
CH2MHILL



Date: 05/19/55
Roll/Frame(s): N/A; Oblique view to northeast
Source: PG&E

FIGURE 3-14
AERIAL PHOTOGRAPH
MAY 19, 1955
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Date: 05/19/55
Roll/Frame(s): N/A; Oblique view to northwest
Source: PG&E

FIGURE 3-15
AERIAL PHOTOGRAPH
MAY 19, 1955
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 11/04/61
Roll/Frame(s): 61S 7907
Source: NOAA National Geodetic Survey, SSMC#3
Information Services Branch, N/NGS12
1315 East West Highway
Silver Spring, MD 20910

FIGURE 3-16
AERIAL PHOTOGRAPH
NOVEMBER 04, 1961
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 07/24/62
Roll/Frame(s): 62S 9892,9893
Source: NOAA National Geodetic Survey, SSMC#3
Information Services Branch, N/NGS12
1315 East West Highway
Silver Spring, MD 20910

FIGURE 3-17
AERIAL PHOTOGRAPH
JULY 24, 1962
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 05/18/64
Roll/Frame(s): BR 423-5-125, BR 432-5-126
Source: US Bureau of Reclamation
Lower Colorado Region
P.O. Box 61470
Boulder City, NV 89006-1470

FIGURE 3-18
AERIAL PHOTOGRAPH
MAY 18, 1964
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 10/06/66
Flight/Frame(s): 08-SBd 7-2, 7-3
Source: California Department of Transportation
1120 N Street
Sacramento, CA 94273

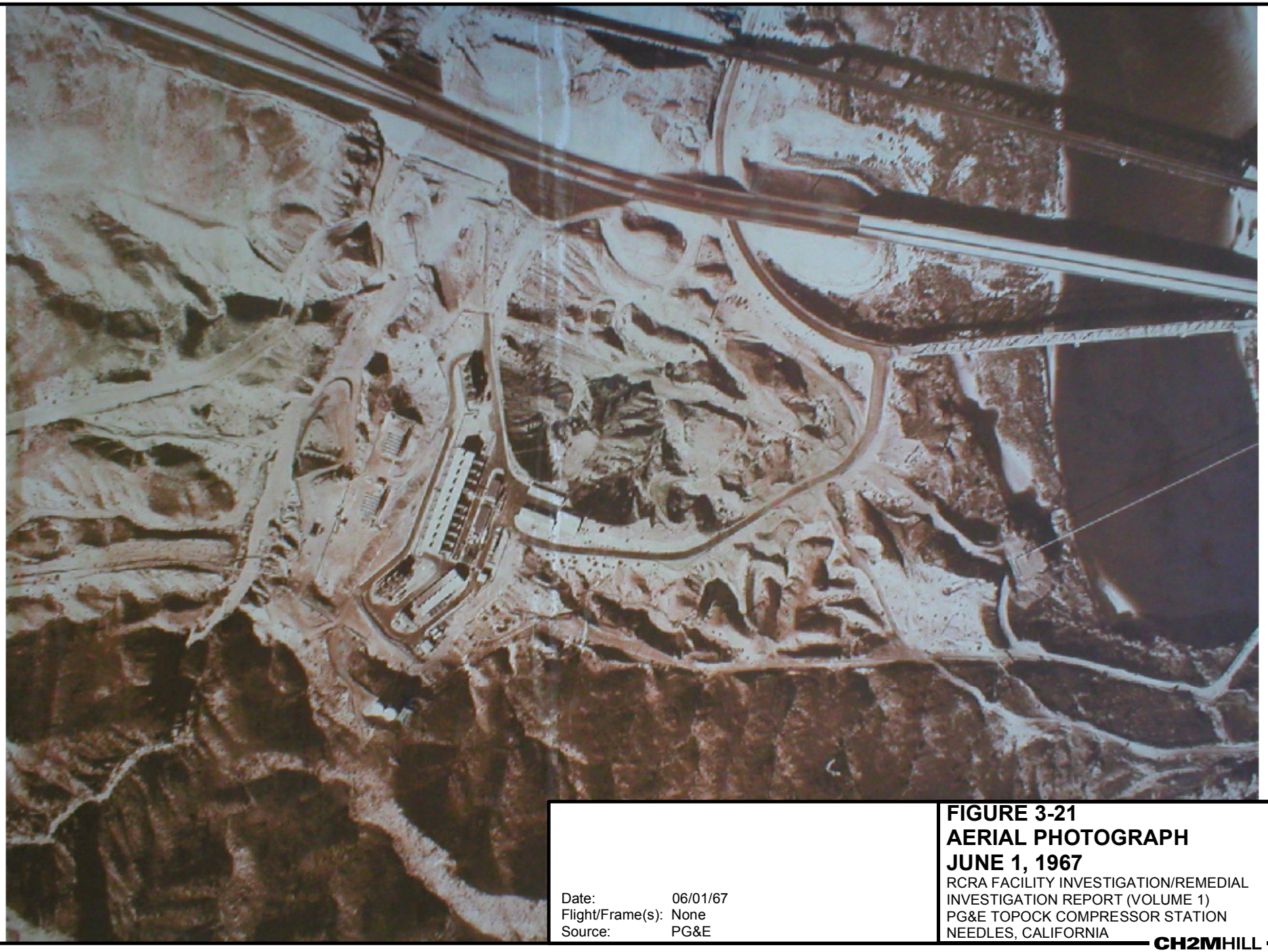
FIGURE 3-19
AERIAL PHOTOGRAPH
OCTOBER 6, 1966
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 05/22/67
Roll/Frame(s): BR 423-1-133
Source: US Bureau of Reclamation
Lower Colorado Region
P.O. Box 61470
Boulder City, NV 89006-1470

FIGURE 3-20
AERIAL PHOTOGRAPH
MAY 22, 1967
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

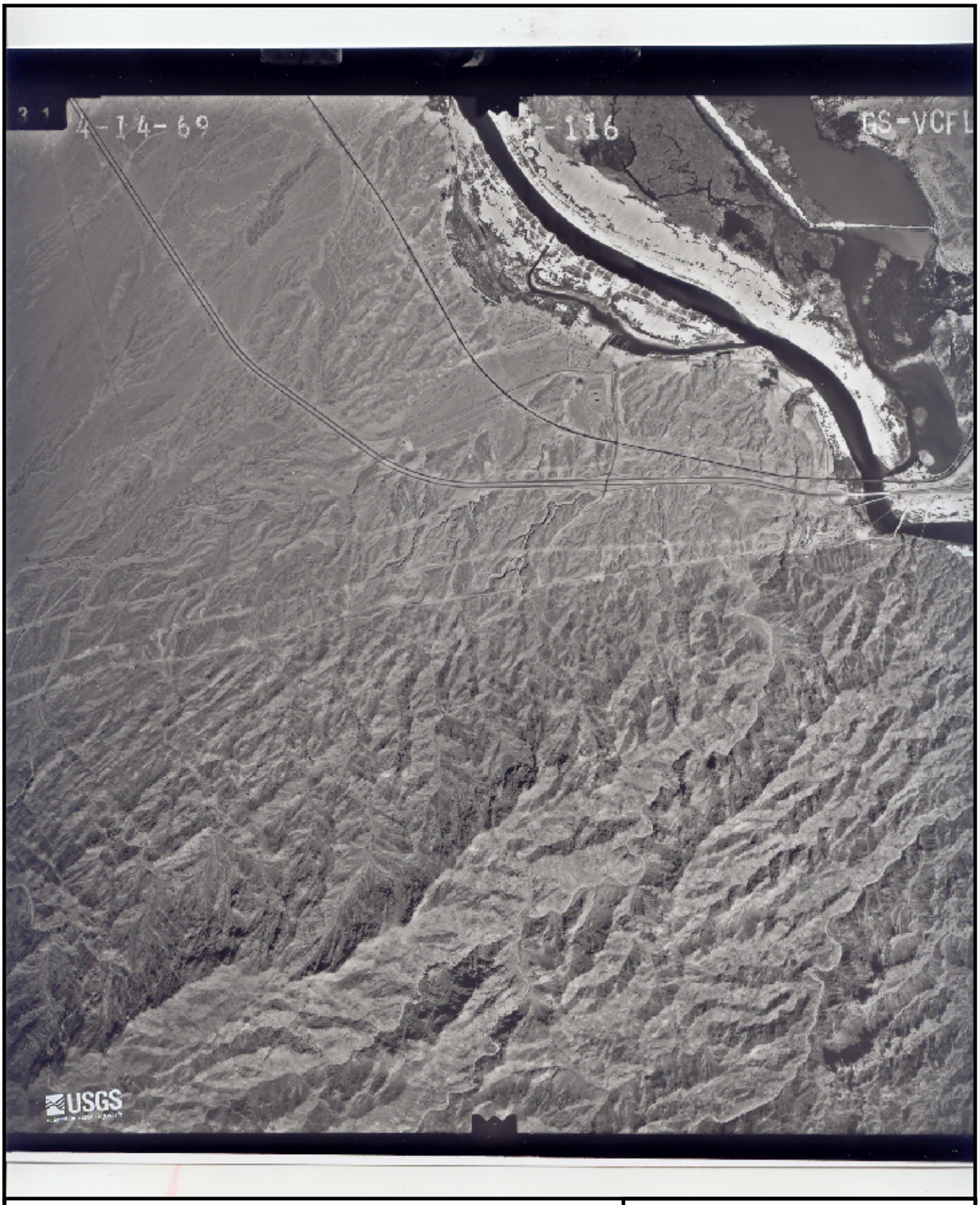
CH2MHILL



Date: 06/01/67
Flight/Frame(s): None
Source: PG&E

FIGURE 3-21
AERIAL PHOTOGRAPH
JUNE 1, 1967
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

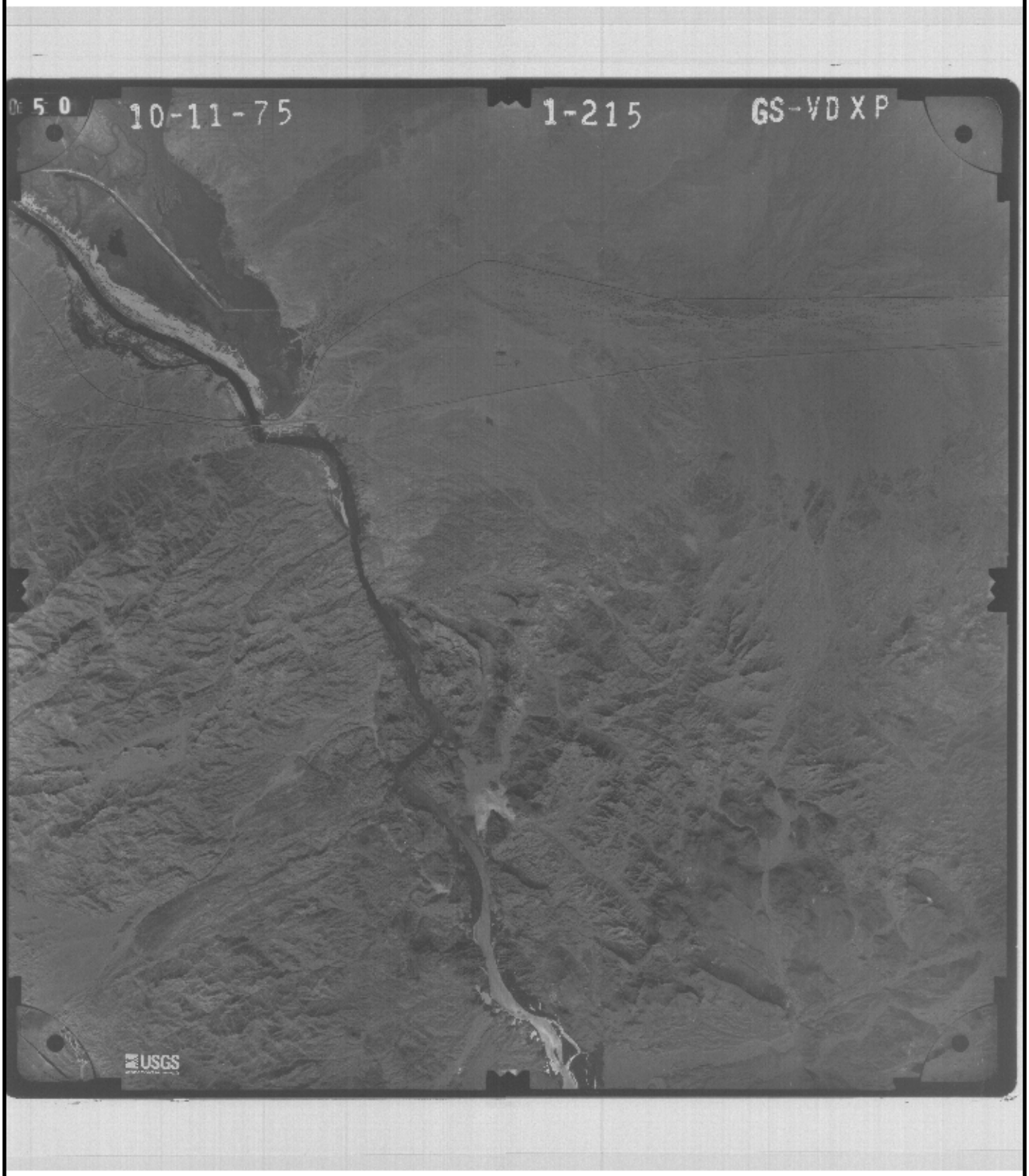
CH2MHILL



Date: 04/14/69
Roll/Frame(s): GS-VCFL 1-160
Source: USGS Rocky Mountain Mapping Center
Earth Science Information Center
Box 25046, Stop 504, DFC
Denver, CO 80225

FIGURE 3-22
AERIAL PHOTOGRAPH
APRIL 14, 1969
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Date: 10/11/75
Roll/Frame(s): GS-VDXP 1-215
Source: USGS Rocky Mountain Mapping Center
Earth Science Information Center
Box 25046, Stop 504, DFC
Denver, CO 80225

FIGURE 3-23
AERIAL PHOTOGRAPH
OCTOBER 11, 1975
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 07/08/83
Roll/Frame(s): 421 BR 212 303
Source: US Bureau of Reclamation
Lower Colorado Region
P.O. Box 61470
Boulder City, NV 89006-1470

FIGURE 3-24
AERIAL PHOTOGRAPH
JULY 8, 1983
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 05/21/94
Flight/Frame(s): N/A
Source: TerraServer/USGS

FIGURE 3-25
AERIAL PHOTOGRAPH
MAY 21, 1994
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 11/02/97
Roll/Frame(s): 97096-1,2,3
Source: PG&E

FIGURE 3-26
AERIAL PHOTOGRAPH
NOVEMBER 2, 1997
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

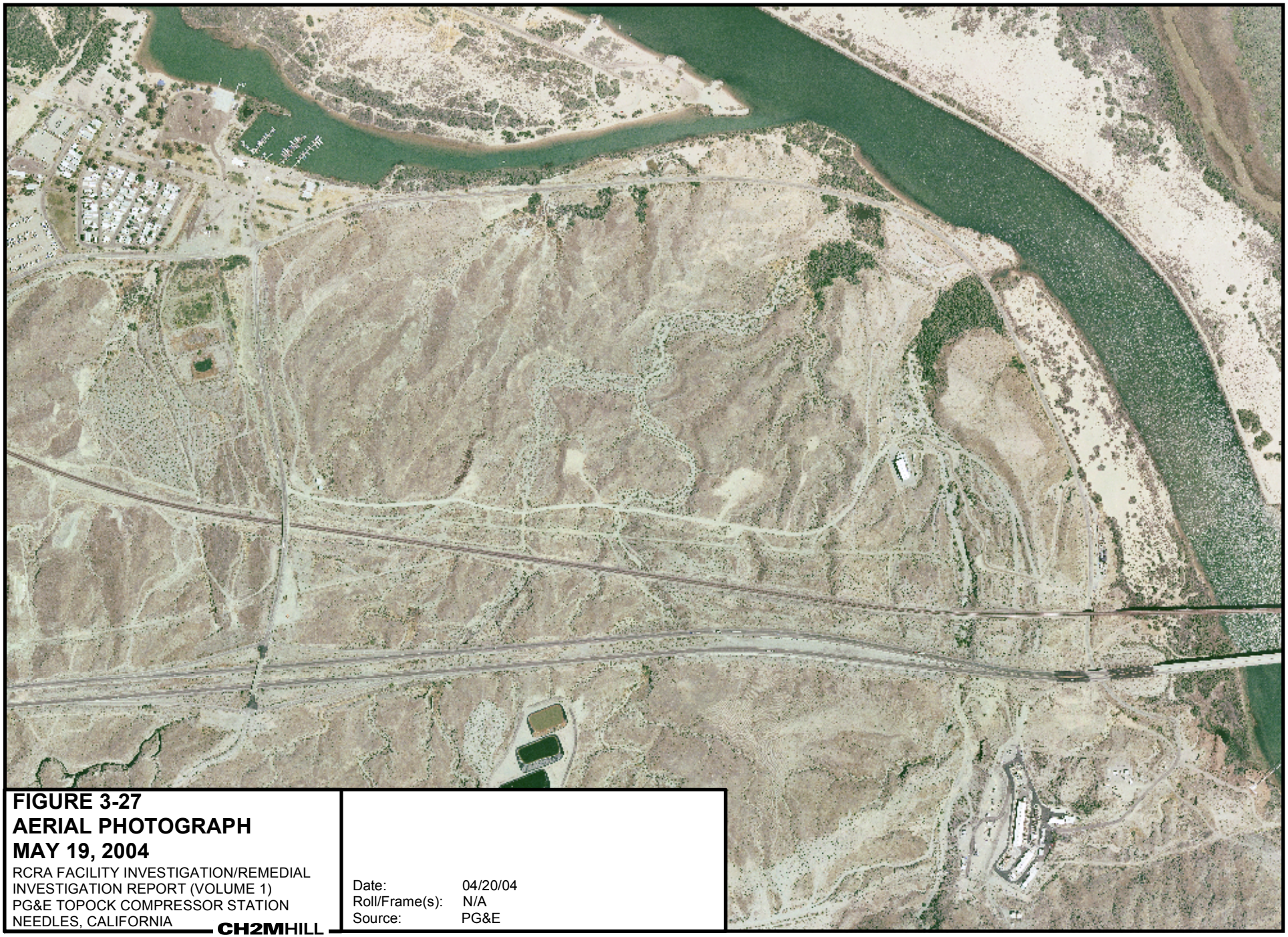


FIGURE 3-27
AERIAL PHOTOGRAPH
MAY 19, 2004

RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

Date: 04/20/04
Roll/Frame(s): N/A
Source: PG&E

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_AERIAL_PHOTO_2004.MXD RFI_FIG_3_27_AERIAL_PHOTO_2004.PDF 8/9/2006 12:07:22

4.0 Identification of SWMUs, AOCs, and Other Undesignated Areas

Tables 4-1 through 4-3 provide descriptions of the SWMUs, AOCs, and other undesignated areas that have been identified at, or associated with, the Topock Compressor Station. The location of each SWMU, AOC, and other undesignated area is depicted in Figure 4-1. These three types of units have been identified as part of the RCRA corrective action activities that began with the RFA in 1987. The following provides a brief history of the identification of RCRA sites at the Topock Compressor Station.

The results of the RFA that USEPA conducted at the Topock Compressor Station in 1987 indicated that 13 SWMUs (Units 4.1 through 4.13) were identified at the facility (Kearny 1987). Although the text of the RFA Report indicates the number of SWMUs to be 16, only 13 SWMUs are identified and discussed in that report. SWMUs identified during the RFA were discovered through records review, data evaluation, interviews, and a visual site inspection (Kearny 1987).

When the CACA was developed by DTSC in 1996, a total of 10 SWMUs (SWMU 1 through SWMU 10) and 3 AOCs (AOC 1 through AOC 3) were identified at the Topock Compressor Station (DTSC 1996). Eight of the SWMUs identified in the CACA were also identified as SWMUs during the RFA. However, four SWMUs identified in the RFA (Units 4.3 through 4.6) were not included in the CACA. In addition, the CACA combined two of the RFA SWMUs (Units 4.12 and 4.13) into one SWMU, and listed two additional SWMUs (SWMUs 3 and 4) and three AOCs (AOCs 1 through 3) that were not identified in the RFA. Table 4-1 provides a cross-index of SWMUs between the RFA and the CACA.

In October 2000, PG&E developed the *Work Plan for Additional Soil Sampling* (E&E 2000b). The Work Plan identified ten potentially impacted areas associated with the Topock Compressor Station that required investigation. These areas were identified through a review of historic aerial photographs, interviews with knowledgeable employees, a review of chemical use processes, and a field reconnaissance within and around the compressor station (E&E 2000b). In a letter to PG&E dated January 4, 2001, DTSC indicated that these ten areas are considered to be AOCs under the RCRA corrective action process (DTSC 2001). These 10 areas have subsequently been identified as AOCs 4 through 13 (Table 4-2).

In February 2005, PG&E completed the Draft RFI (CH2M HILL 2005) that incorporated the results of additional historic research. In a letter dated July 13, 2006 providing DTSC review of that additional historic research, DTSC formally designated two previously undesignated units, the Railroad Debris site and the Auxiliary Jacket Cooling Water Pumps, as AOCs 14 and 15, respectively. In addition, four new AOCs, AOC 16 through AOC 19, were formally identified (see Table 4-2). These new AOCs were identified based on incomplete COC evaluation, incomplete extent evaluation (or a combination of COC and extent evaluation), or lack of investigation (DTSC 2006a). In May 2007, a unit consisting of the industrial floor drains, AOC 20, was added as a result of a request by DTSC in its May 9, 2007 (DTSC 2007d) comment letter on the Final RFI/RI Volume 1.

In addition to sites that have been identified and formally designated as SWMUs and AOCs by USEPA (Kearny 1987) and by DTSC (DTSC 1996, 2001, 2006), two other potentially impacted areas have been identified in the vicinity of the Topock Compressor Station during review of historic facility information (see Table 4-3). These areas consist of an area where asbestos-covered piping may potentially have been buried east of the access road for the Old Evaporation Pond (referred to as the Potential Pipe Disposal Area), and the former 300B Pipeline Liquids Tank location.

Aerial photos were evaluated in conjunction with information gathered during site visits to determine if there were areas of white powdery residue that were not already identified. No additional areas of white powdery residue were found. If a white powdery substance is found at any of the units, PG&E will notify DTSC and conduct further investigation where necessary.

In summary, there are currently 10 SWMUs, and 20 AOCs that have been formally designated at the Topock Compressor Station. Two additional potentially impacted units have been identified as the result of recent site reconnaissance activities. The SWMUs, AOCs and other areas were identified and formally designated at various points in the RCRA corrective action process at Topock. Detailed information regarding each SWMU, AOC, and other undesignated areas is provided in the following sections.

Constituents of potential concern (COPCs) identified for each unit are based on available information regarding historic activities at the unit and overall compressor station operations. Based on regulatory review, additional COPCs have been identified by DTSC at some units (DTSC 2006b and 2007e). These additional COPCs are described in the discussion of each SWMU, AOC, or unit. As appropriate, these additional COPCs will be addressed as part of the RFI/RI soil investigation program currently being developed. Tables 4-1, 4-2, and 4-3 also provide a summary of the description, constituents of potential concern, and other pertinent information concerning the SWMUs, AOCs, and other undesignated areas identified at the Topock Compressor Station.

4.1 SWMUs and AOCs Identified in the RCRA Facility Assessment and Corrective Action Consent Agreement

This section presents information regarding the SWMUs identified in the USEPA RFA (Kearny 1987) and the CACA (DTSC 1996). In the RFA, SWMUs were designated by units (e.g., Unit 4.1), while in the CACA, SWMUs are designated by SWMU (e.g., SWMU 1). As previously indicated, there is not a direct correlation between SWMU designations in the RFA and CACA.

4.1.1 SWMU 1– Former Percolation Bed

SWMU 1, the Former Percolation Bed, was located outside the facility fenceline in Bat Cave Wash as depicted in Figure 4-1. About half of SWMU 1 is located on PG&E property; the remainder of SWMU 1 is located on property owned by the HNWR and managed by the USFWS.

4.1.1.1 Description and History

From 1951, when the compressor station first began operation, until 1970, when injection well PGE-08 went into operation, wastewater generated at the facility was discharged to Bat Cave Wash.

Based on historic aerial photographs, it appears that during the 1950s, wastewater was released to the wash without any impoundment. Wastewater was released to the wash through a pipe that ran from the sludge drying beds area in the lower yard down the slope into Bat Cave Wash. Aerial photographs from that time period show a light-colored flow in the wash that originates at the discharge point and, at times, extends to the railroad tracks about 1,600 feet downstream. The light-colored flow does not extend beyond the railroad tracks.

Based on aerial photograph and document review, in about 1964 a percolation bed was created in Bat Cave Wash west of the former sludge drying beds area (PG&E 1968a). PG&E documentation indicates that the bed had an area of approximately 17,600 square feet (PG&E 1968a). Wastewater was discharged to this area from two pipelines (one 10-inch diameter pipe and one 4-inch-diameter pipe) that ran from the lower yard down into Bat Cave Wash. The bed was not lined and discharged wastewater was allowed to percolate into the ground and/or evaporate in this area. A former employee reported that the percolation bed sometimes crusted over, and that it was periodically moved within the wash, but was within the general area depicted in Figure 4-1 (Russell 2006b).

Ponded water can be seen in this general area of the percolation bed in aerial photographs from 1967 and 1969. In addition, remnants of the 4-inch-diameter discharge pipe are also present on the slope above Bat Cave Wash. For the purposes of this RFI, the entire discharge area within Bat Cave Wash (i.e., the percolation bed area) will be addressed under SWMU 1.

Wastewater discharged to Bat Cave Wash consisted primarily of cooling tower blowdown (about 95 percent) and a minor volume of effluent from an oil/water separator and other facility maintenance operations (about 5 percent) (PG&E 1993). Based on information from PG&E (1968a), during the late 1960s, an average of about 48,500 gpd of cooling water blowdown were discharged to Bat Cave Wash, with a high of about 64,300 gpd in July and a low of about 25,600 gallons per day in February.

From 1951 until 1964, cooling water blowdown was not treated prior to being released to the wash. The cooling water blowdown contained chromium, including both Cr(III) and Cr(VI). From 1964 to 1969, the cooling water blowdown was treated with a one-step system to reduce Cr(VI) in the wastewater to Cr(III) prior to discharge to the wash. Although the process converted Cr(VI) to Cr(III), the concentration of Cr(T) was apparently not reduced. Concentrations of Cr(T) in the wastewater discharged to Bat Cave Wash, as measured from samples collected in the late 1960s, ranged from 13.81 to 14.41 ppm (PG&E 1968a). Wastewater discharged to Bat Cave Wash also contained high concentrations (4,000 to 11,000 mg/L) of TDS, primarily sodium chloride (Water Board 1969; PG&E 1993). Beginning in late 1969, cooling water blowdown was treated with a two-step system to reduce Cr(VI) to Cr(III), and then to remove Cr(III) from the wastewater prior to discharge to Bat Cave Wash. Following the two-step treatment, Cr(VI) concentrations in the wastewater were generally reduced to below 1 mg/L (Mittelhauser 1986).

The continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 was brought online. However, between May 1970 and September 1971 (when Pond 1of the Old Evaporation Ponds was completed), some treated wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance.

4.1.1.2 Constituents of Potential Concern

The following COPCs were identified in the CACA (DTSC 1996) for SWMU 1: Cr(T), Cr(IV), copper, nickel, zinc, electrical conductivity, and pH. Although not specified as such, these COPCs appear to be for all media. The following paragraphs present the rationale for the selection of media-specific COPCs for SWMU 1.

During the time frame from 1951 to 1970, SWMU 1 received wastewater consisting of cooling tower blowdown and the effluent from the OWS. The wastewater was released to the surface of the wash, thereby resulting in impacts to soil. Wastewater also penetrated the soil column and migrated to the water table, resulting in impacts to groundwater.

Cooling tower blowdown during the 1951 to 1970 time period contained Cr(VI)-based products that were added to the cooling water to inhibit corrosion, minimize scale, and control biological growth. In addition, due to evaporation loss in the cooling towers, metals and naturally-occurring other inorganics (e.g., sodium chloride) in the cooling water were concentrated. In addition, copper, nickel and zinc are wear metals that could have been released from the tubes in the heat exchangers and therefore been contained in the blowdown.

The blowdown may have also been slightly acidic due to the addition of sulfuric acid for pH control in the cooling towers. Although the cooling towers were intended to operate at a neutral pH (pH 7), there may have been occasional upsets. The two-step wastewater treatment system also resulted in a neutral or near-neutral effluent pH during normal operating conditions. There is no record of any pH adjustment following chromium reduction in the single-step treatment process. Therefore it is possible that the treated blowdown from the single-step treatment system used from approximately 1964 to 1968 was acidic.

The oily water directed to the OWS was derived from a variety of sources, including leaks and drips from plant equipment, and drainage from the steam cleaning area. The effluent from the OWS contained entrained heavy hydrocarbons derived from compressor oil and potentially other sources such as steam cleaning operations. Sources of TPH in the oily water treated by the OWS are expected to consist of high boiling point straight- and branched-chain hydrocarbons analyzable as TPH. An effluent sample collected in November 1986 showed TPH concentrations at 3 mg/L (Brown and Caldwell 1986). The effluent may also have contained minor amounts of residual solvents; however, volatile compounds are not expected to have remained in the wastewater once it was released to Bat Cave Wash and therefore are not considered COPCs. Wear metals such as copper, lead, nickel, and zinc could also have been contained in the oily water treated in the OWS.

In 1985 and 1986, samples were collected from facility makeup water, cooling water blowdown, treated wastewater (including both cooling water blowdown and oily water), sludge samples from the precipitation tank, and water and solids samples from the

evaporation ponds (Brown and Caldwell 1985a-b, 1986). The samples were analyzed for PCBs, VOCs, and metals, including mercury. Based on these data, metals of concern consist of Cr(T), Cr(VI), copper, lead, nickel, and zinc.

Several storm drains apparently discharge from the station to Bat Cave Wash. The area drained by these storm drains is not known, but would most likely include portions of the lower yard. Stormwater runoff from the lower yard could historically have contained TPH and polynuclear aromatic hydrocarbons (PAHs) associated with pipeline liquids and potentially waste oil sprayed on station roads for dust control. Finally, a former employee reported that a mercury spill at the meter building had entered a storm drain that discharges to Bat Cave Wash (Russell 2006b). No information is available regarding the amount of mercury that entered the storm drain, or whether the material entered Bat Cave Wash.

A plant employee reported that he was personally responsible for welding a cap onto an approximately 12-inch-diameter vertical pipe located in Bat Cave Wash. The pipe apparently looked like a regular well casing. The casing only extended a small amount above the ground, and the area where the pipe was located is now covered by an additional 18 to 24 inches of sediment. The pipe had been covered with a wooden cover and gravel, and there were no materials of any kind visible in the pipe (Russell 2006b). This well casing may be one of the exploratory borings installed in 1950 to evaluate the potential water supply for the proposed Topock Compressor Station (PG&E 1950).

Based on the foregoing, the COPCs for soil within SWMU 1, identified by PG&E, consist of Cr(T), Cr(VI), copper, lead, mercury, nickel, zinc, pH, TPH, and PAHs. COPCs for groundwater associated with SWMU 1 consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, electrical conductivity, pH, and TPH. DTSC also identified all Title 22 metals, VOCs, and all other SVOCs in addition to PAHs as COPCs for this unit (DTSC 2006b).

4.1.2 SWMU 2 – Inactive Injection Well (PGE-08)

Inactive injection well PGE-08 is located within the facility fenceline in the lower yard on the western side of the compressor station (Figure 4-1).

4.1.2.1 Description and History

Inactive injection well PGE-08 was installed in 1969 to facilitate underground injection of treated wastewater generated during facility operations, pursuant to Water Board Order 69-25. The order required PG&E to cease percolation into Bat Cave Wash by January 1, 1970. PG&E requested an extension of 5 months to June 1, 1970 (PG&E 1984a). The original boring for the well extended to approximately 530 feet bgs (Dames and Moore 1969).[12] Unconsolidated sediments were encountered in the boring to a depth of about 175 feet bgs, and below 175 feet, the boring penetrated hard, fractured crystalline bedrock (Dames and Moore 1969). The original well was cased with 6-inch-diameter solid steel casing to a depth of 405 feet bgs, with the remainder of the borehole in the fractured bedrock being left uncased. Yield tests on the well provided short-term flow rates ranging from 20 to 51 gpm, and a long-term flow rate of about 26 gpm, with a calculated transmissivity of 10,000 gallons

[12] The Dames and Moore report (1969) lists the total depth of the boring in various places at 530, 540, and 548 feet bgs. The electric log included in the report lists a driller's report of 530 feet, but a logged depth of 525 feet bgs.

per day per foot (Dames and Moore 1969). This is equivalent to a hydraulic conductivity of 3.8×10^{-3} centimeters per second using the open hole length of 125 feet (E&E 2004).

Water quality data collected following completion of the well indicated that a distinct stratification was present at about 280 feet bgs (Dames and Moore 1969). Above 280 feet bgs, brackish water was present with TDS values ranging from 3,500 to 8,900 ppm. Below 280 feet bgs, water was saline, with TDS values ranging from 11,000 to 14,000 ppm.

Following testing, 2-7/8-inch-diameter tubing was placed inside the well casing and anchored to the bottom of the casing with a packer (Dames and Moore 1969). The annulus between the casing and the tubing was to be filled with a non-corrosive fluid (diesel fuel was suggested, but it is unknown what, if any, fluid was actually used) (Dames and Moore 1969). The design allowed for the injection of wastewater into the lower section of the well through the tubing.

PGE-08 remained unused for approximately one year after it was completed. On or about April 1, 1970, freshwater was injected into the well for testing purposes. Injection of treated wastewater began on May 30, 1970 (Dames and Moore 1970). Several days after wastewater was initially injected into the well, the pressure rose dramatically. Hydrochloric acid (HCl) was initially injected into the well (50 gallons of 38 percent HCl) in an attempt to unclog the well. Handwritten notes (PG&E 1984a) indicate that the purpose was to acidize the well in an attempt to clean the well and alleviate high backpressure in the well. It was subsequently determined that the bottom 15 feet of the well had collapsed.

In June, 1970, the well was cleaned out and deepened to 562 feet bgs. A stainless steel well screen and liner assembly was installed in the well and set at a depth of 405 to 554 feet bgs (Dames and Moore 1970). A high-pressure pump was also installed to increase injection pressure. In addition, PG&E installed diatomaceous earth filters to remove the small quantities of precipitate noted in the injection water. Well PGE-07 was also deepened at this time and used as a monitoring well during active injection at well PGE-08.

Injection well PGE-08 was used for the injection of treated wastewater from May 1970 through August 1973. A former employee reported that the well would periodically clog, and he recalled at least one event where sulfuric acid was injected into the well in an effort to unclog it. The employee recalled 2,800 gallons of sulfuric acid being injected into the well (Russell 2006b). Between August and December 1973, treated wastewater was discharged alternately on a 3-day cycle between the injection well and the first of four newly constructed lined evaporation ponds (i.e., SWMU 10, Pond 1). In October 1973, the salinity of the water in the upper portion of the well began to increase notably (PG&E 1984a). In December 1973, all treated wastewater was permanently routed to the evaporation ponds. Since December 1973, PGE-08 has been completely inactive; it has only been used for routine groundwater sample collection.

PG&E estimated that during the injection period (June 1970 through December 1973), approximately 29.4 million gallons of treated wastewater were injected into this well (PG&E 1987). Handwritten notes by an unknown author ca. 1984 indicated that 42 million gallons of wastewater had been injected into the well (PG&E 1984a). Approximately 95 percent of the wastewater generated at the facility was from cooling tower blowdown, and the remaining 5 percent consisted of effluent from an oil/water separator and other

facility maintenance operations (PG&E 1993). Treated wastewater sent to PGE-08 for subsurface injection generally contained 1 ppm or less of chromium (Mittelhauser 1986).

The total volume of blowdown discharged during any given day, month, or year is difficult to estimate because the volume discharged varied on a daily basis depending on load (i.e., how much gas was compressed), ambient temperature (hotter temperatures resulted in increased blowdown), and other operational factors. In addition, it appears that overall annual blowdown rates decreased over the years. The first recorded blowdown rate, for 1968, indicated an average of 48,500 gpd or roughly 17.7 million gallons per year. Currently, the station only produces about 6 million gallons per year (16,400 gpd). Handwritten notes from 1980 (PG&E 1980a) indicate the average annual blow down rates ranged from approximately 8,000 gpd to approximately 17,600 gpd during the period between 1975 and 1980.

4.1.2.2 Constituents of Potential Concern

PGE-08 was used for the subsurface injection of facility wastewater. Treated wastewater was injected directly into groundwater at depths exceeding 405 feet bgs; therefore, groundwater is considered the medium of concern at this SWMU. There is no evidence of soil contamination at SWMU 2 and the area around SWMU 2 (i.e., the soil) has been designated as AOC 2; therefore, no future soil evaluation is necessary. Releases to groundwater associated with this SWMU will be evaluated as part of Volume 2 (Groundwater) of the RFI/RI.

There were no significant modifications in the handling and treatment of the cooling tower blowdown and the OWS effluent during the operation of the injection well from 1970 to 1973. Therefore, the COPCs for groundwater associated with SWMU 2 consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, electrical conductivity, pH, and TPH. There are no COPCs for soil.

4.1.3 SWMUs 3 and 4: PG&E Inactive Well #6 (PGE-06) and Inactive Well #7 (PGE-07)

PGE-06 and PGE-07 are located on HNWR to the property north of the compressor station (Figure 4-1).

4.1.3.1 Description and History – Inactive Well #6 (PGE-06)

Well PGE-06 was drilled and completed in June 1964 (Peaker 1964). Due to relatively poor quality of the water extracted from wells near PG& E property, water for the compressor station is derived from wells located on the eastern side of the Colorado River. However, PG&E maintained these wells near their property to provide a backup source of water for the facility. PGE-06 was constructed as a replacement for PG&E wells 1 and 2 (also known as PGE-01 and PGE-02) that were to be abandoned during construction of I-40. Because PGE-06 was a standby well, there are no records that indicate this well was ever used to produce water for the facility. However, during construction of I-40, the grading contractor (E.L. Yeager Construction Company) used the well to produce water for dust suppression purposes (PG&E 1964a).

Based on the well log supplied by the driller (Peaker 1964), well PGE-06 was drilled to 180 feet bgs. Conductor casing consisting of 20-inch-diameter steel pipe was installed from the ground surface to 19 feet bgs. The well was constructed of solid steel casing, 14 inches in diameter, from the ground surface to a depth of 110 feet bgs. The screened section of the well runs from 110 to 180 feet bgs, and it consists of 14-inch-diameter perforated steel casing.

Initial tests of water quality from well PGE-06 indicated that water within the well was of poor quality and that it was unfit for domestic or industrial use (Hornkohl 1964). The results indicated a TDS concentration of about 3,600 ppm. Chromates were detected in the sample at a concentration of 32.5 ppm. Chromium concentrations in groundwater from well PGE-06 are most likely related to the discharge of wastewater to Bat Cave Wash. There is no evidence of the disposal of wastes into or around well PGE-06. The Hornkohl laboratory data sheet is provided in Appendix C.

Well PGE-06 is currently being sampled on a routine basis as part of the groundwater monitoring program for the Topock Compressor Station.

4.1.3.2 Description and History – Inactive Well #7 (PGE-07)

Although it is unclear exactly when this well was drilled, it was completed sometime around September 1964 (PG&E 1964b). Along with well PGE-06, PGE-07 was constructed as a replacement for PG&E wells 1 and 2 (also known as PGE-01 and PGE-02) that were to be abandoned during construction of I-40. Because PGE-07 was a standby well, there are no records that indicate this well was ever used to produce water for the facility.

Reportedly, well PGE-07 was originally drilled and constructed to the same specifications as well PGE-06 (Peaker 1964). In conjunction with the installation of injection well PGE-08 in August 1969, well PGE-07 was deepened to act as a monitoring well during the injection of wastewater into the subsurface (Dames and Moore 1969). Well PGE-07 was deepened from 180 feet bgs to 330 feet bgs. A 7-inch-diameter liner was installed from the ground surface to 195 feet bgs. From 195 feet bgs to 330 feet bgs, the borehole was left open (i.e., uncased).

There is no evidence of the disposal of wastes into or around well PGE-07. During wastewater injection operations at well PGE-08, well PGE-07 was used as a monitoring well.[13] Well PGE-07 is currently being sampled on a routine basis as part of the groundwater monitoring program for the Topock Compressor Station.

Information regarding the destruction methods used for wells PGE-01 and PGE-02 is not currently available. If additional information on the destruction of these wells is obtained and the information suggests a potential concern, further evaluation may be conducted if necessary.

4.1.3.3 Constituents of Potential Concern

Although groundwater at PG&E Inactive Wells #6 and #7 (wells PGE-06 and PGE-07) is impacted by the release of the wastewater into Bat Cave Wash during the period from 1951 to 1970, there is no evidence of either the intentional or incidental disposal of wastes into these wells. Therefore, there are no COPCs associated with SWMUs 3 and 4.

[13] The response seen in PGE-07 during injection operations at well PGE-08 is addressed in Volume 2 of the RFI.

4.1.4 SWMU 5 – Sludge Drying Beds

The former sludge drying beds were located within the facility fenceline in the southern part of the lower yard (Figures 4-1 and 4-2).

4.1.4.1 Description and History

The sludge drying beds were constructed in 1951 along with the rest of the compressor station. The two sludge drying beds were located directly adjacent to one another. The closure report for this unit indicates that each bed was approximately 20 feet wide by 50 feet long. Both beds sloped longitudinally with the upper end at grade level and the lower end about 2 feet below grade. The walls and floors of both beds were constructed of 8-inch-thick concrete. A drain line ran from the beds to the Transfer Sump (SWMU 9) to facilitate the removal of liquids (Mittelhauser 1990a).

The drying beds were used from 1951 until April 1962 to dehydrate lime sludge generated by a water-conditioning process used at the facility (PG&E 1962, 1968b). In historical aerial photographs from the mid-1950s, the drying beds contain whitish material. A whitish area is also present just south of the sludge drying beds. In addition, a similar whitish area is present in those photographs at what is now called the Railroad Debris site (Section 4.2.11). Former employees reported that dehydrated lime sludge was trucked to the Railroad Debris site (AOC 14) and sprayed there (Russell, 2006a). A light area is also present in what is now called the Debris Ravine (AOC 4; Section 4.2.1); however, the coloration in the Debris Ravine is much darker than that at the sludge drying beds or Railroad Debris Site.

From 1964 through 1969, a treatment pond constructed within one of the beds was used to treat chromium-bearing wastewater (PG&E 1968a). Wastewater was allowed to flow through the pond and was injected with sulfur dioxide to reduce Cr(VI) to Cr(III) prior to discharge.

From 1969 through October 1985, the drying beds were used to dehydrate chromic hydroxide sludge generated by the two-step wastewater treatment system (SWMUs 6 through 9) prior to disposal. The chromate hydroxide sludge discharged into the drying beds was found to contain 37,500 mg/kg Cr(T) and 4 mg/kg Cr(VI) (Mittelhauser 1986). The volume of chromic hydroxide sludge disposed of offsite was about 15,000 gallons per year (PG&E 1984b).

A 1970 letter (PG&E 1970) indicates that PG&E was planning on burying the initial batch of sludge on or near the compressor station; however, there is no information to suggest that this occurred (Russell 2006b). Water Board Order 70-73 was issued on December 10, 1970 (Water Board 1970), and it appears that the chromium hydroxide sludge was disposed of at Needles Landfill from that time until 1983. As discussed in Section, shipping documentation compiled by PG&E indicated that the amount of sludge disposed of each year was highly variable, and it appears that the sludge drying beds had some storage capacity. Disposal of the chromium sludge at Needles Landfill was discontinued by 1984. From January 1984 to May 1985, the dried sludge was transported offsite to an approved Class I hazardous waste facility (PG&E 1984b).

Use of both sludge drying beds ceased in October 1985. Closure of the drying beds was initiated in December 1988, and most of the beds were removed by February 1989

(Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of the sludge drying beds are presented in Section 5.0.

4.1.4.2 Constituents of Potential Concern

The sludge drying beds were clean closed by PG&E between November 1988 and February 1989, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. At the time of closure, no evaluation of organic constituents potentially present in the wastewater (as a result of treated water discharge from the OWS) was conducted. COPCs potentially associated with discharge of treated effluent from the OWS include TPH and PAHs. There is no information to suggest that significant amounts of solvents were used at Topock. Only small volumes of VOCs were used at Topock, such as paint thinner and cleaning solvent (PG&E 1980a). Steam cleaning was used for most equipment such as compressor engines (Russell 2006b). Any VOCs present in the wastewater that were released to the environment with the wastewater would have quickly evaporated due to the high temperatures typically encountered at the station. Therefore, PG&E has identified TPH and PAHs as COPCs for soil associated with SWMU 5. COPCs are anticipated to be limited to soil only. DTSC also identified VOCs and all other SVOCs (in addition to PAHs) as COPCs at this unit (DTSC 2006b).

4.1.5 SWMU 6 – Chromate Reduction Tank

The chromate reduction tank was a component of the two-step wastewater treatment system installed at the compressor station in late 1969.[14] This system consisted of the chromium reduction tank to reduce Cr(VI) in the wastewater to Cr(III) (Step 1), and a precipitation tank for removing chromium from the wastewater (Step 2). This system also employed the sludge drying beds for drying to dry precipitated solids, as well as miscellaneous transfer tanks and sumps, pumps, piping, and valves. The layout of this system is depicted in Figure 4-2. The two-step treatment system remained in service from 1969 through October 1985, when the use of a chromium-based inhibitor in the cooling water was replaced with a phosphate-based inhibitor. The chromate reduction tank was formerly located within the facility fenceline in the southern end of the lower yard (Figures 4-1 and 4-2).

4.1.5.1 Description and History

The chromate reduction tank was approximately 10 feet high and 5 feet in diameter, with a capacity of 1,500 gallons (PG&E 1982; Kearny 1987). The tank was of steel construction and had an open top. The tank was partially set below grade within a pit that measured 10 feet wide by 10 feet long by 6 feet deep. The pit was supported on all four sides with wooden retaining walls; however, the bottom of the pit was not lined or paved (Kearny 1987).

Cooling water blowdown containing chromium flowed by gravity from the cooling towers to the chromate reduction tank via a 3-inch-diameter steel pipe. A maximum combined flow of 30,000 gpd were discharged continuously from the cooling towers into this tank

[14] Historic documents indicate that the system was installed and began operation sometime between November 1969 and March 1970.

(Mittelhauser 1986). Wastewater in the tank was injected with sulfur dioxide gas to maintain the pH between 2.9 and 3.2 units. Within this pH range, Cr(VI) was reduced to Cr(III). Treated wastewater was then discharged by gravity flow through a 3-inch-diameter steel pipe into the transfer sump (SWMU 9; Unit 4.8) (Section 4.1.8).

Wastewater samples collected from the cooling towers contained Cr(T) and Cr(VI) ranging from 2.6 to 7.8 mg/L and 0.62 to 6.0 mg/L, respectively (Mittelhauser 1986). Concentrations of Cr(T) and Cr(VI) in the effluent from the chromate reduction tank were found to be at 23 mg/L and 0.42 mg/L, respectively (Mittelhauser 1986). No indication of any release was observed during a facility inspection performed as part of the RFA (Kearny 1987).

The chromate reduction tank was removed from service as part of the chromium treatment system in October 1985. However, starting in November 1985, the tank was reportedly used as a holding tank for an unspecified period of time (Kearny 1987).[15] As a holding tank, it received treated effluent from the OWS (Unit 4.4) prior to discharge of the treated effluent to the evaporation ponds.

Closure of the chromium treatment system was completed between December 1988 and March 1990. Physical removal of the chromate reduction tank occurred during Phase 2 of the hazardous waste management facilities closure process between November 1989 and March 1990 (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of the treatment system are presented in Section 5.0.

4.1.5.2 Constituents of Potential Concern

The chromate reduction tank was clean closed by PG&E between November 1989 and March 1990, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. The closure report identified oil stained soil on the south wall. No apparent VOCs, TPH, or PAH analysis was conducted. SWMU 6 received wastewater from the OWS. COPCs potentially associated with discharge of treated effluent from the OWS include TPH and PAHs. As discussed for SWMU 5, there is no information to suggest that significant amounts of solvents were used at Topock. Therefore, PG&E identified the COPCs for soil associated with SWMU 6 as TPH and PAHs. DTSC identified VOCs and all other SVOCs (in addition to PAHs) as COPCs at this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.1.6 SWMU 7 – Precipitation Tank

The precipitation tank was part of the two-step cooling water blowdown treatment system, and was located within the facility fenceline on the southern end of lower yard (Figures 4-1 and 4-2).

[15] It is possible that the tank was used as holding tank up until October 1989 when the associated transfer sump was also removed from service.

4.1.6.1 Description and History

The tank was of steel construction and had an open top. The tank was about 15 feet high and 13 feet in diameter, with a capacity of 15,000 gallons (PG&E 1982; Kearny 1987). The tank was situated at grade level on a concrete pad.

The precipitation tank received effluent from the chromate reduction tank (SWMU 6; Unit 4.7) via the transfer sump (SWMU 9; Unit 4.8) from late 1969 through October 1985. Wastewater in this tank was injected with sodium hydroxide to maintain a pH between 6.7 and 7.2 units. Within this pH range, Cr(III) combined with the hydroxide ions to form a chromic hydroxide sludge that settled to the bottom of the tank (PG&E 1982). From 1970 to 1974 (the time during which injection well PGE-08 was operated), Poly Floc II and ferric sulfate were used along with the sodium hydroxide to further enhance the removal of chromium (PG&E 1975, 1985a). The use of Poly Floc II and ferric sulfate was discontinued sometime after 1974.

Treated effluent from the precipitation tank was routed to the process pump tank (SWMU 8; Unit 4.10) before ultimately being discharged.

From 1969 to May 1985, sludge from the tank was pumped via pipeline to the sludge drying beds (SWMU 5; Units 4.12 and 4.13) for dehydration prior to disposal (Water Board 1970; PG&E 1984b). From 1969 to 1983, dried sludge was transported to the Needles Landfill for disposal.[16] Starting in 1984, dried sludge was transported offsite as a hazardous waste. From May 1985 to October 1985, the sludge was pumped directly from the precipitation tank and transported to an approved hazardous waste disposal facility (USEPA 1985).

The contents within the precipitation tank were sampled in October 1984 (Mittelhauser 1986). Wastewater in the tank contained 3.8 mg/L Cr(T) and 0.04 mg/L Cr(VI). Sludge within the tank contained 37,500 mg/kg Cr(T) and 4 mg/kg Cr(VI). No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987).

The precipitation tank was removed from service along with the rest of the treatment system in October 1985. Closure of the treatment system was completed during the time frame from December 1988 through March 1990. Physical removal of the precipitation tank occurred during Phase 1 of the hazardous waste management facilities closure process between December 1988 and February 1989 (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of the precipitation tank are presented in Section 5.0.

4.1.6.2 Constituents of Potential Concern

The precipitation tank was clean closed by PG&E between November 1989 and March 1990, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. Therefore, there are no current COPCs for this unit.

[16] A 1970 letter (PG&E 1970) indicates that PG&E was planning on burying the initial batch of sludge on or near the compressor station; however, there is no documentation to confirm whether this onsite disposal occurred.

4.1.7 SWMU 8 – Process Pump Tank

The process pump tank was part of the two-step cooling water blowdown treatment system, and was located within the facility fenceline on the southern end of lower yard (Figures 4-1 and 4-2).

4.1.7.1 Description and History

The process pump tank consisted of a 1,500-gallon capacity steel holding tank about 8 feet high and 5.5 feet in diameter (PG&E 1982; Kearny 1987). The tank had an open top and was situated on a concrete pad.

The process pump tank was used as a temporary holding tank for wastewater discharged from the precipitation tank (SWMU 7; Unit 4.9). From May 1970 to December 1973 effluent was discharged primarily to injection well PGE-08 (SWMU 2); however, after Pond 1 (SWMU 10; Unit 4.11) was constructed in late 1971, it also received some of the discharged wastewater. From December 1973 to October 1987, the effluent was discharged to the old evaporation ponds (SWMU 10; Unit 4.11).

Chemical analysis data for wastewater held within the process pump tank are not available. No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987).

The process pump tank was removed from service along with the rest of the treatment system in October 1985. Closure of the treatment system was completed between December 1988 and March 1990. Physical removal of the process pump tank occurred during Phase 1 of the closure process between December 1988 and February 1989 (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of the treatment system are presented in Section 5.0.

4.1.7.2 Constituents of Potential Concern

The process pump tank was clean closed by PG&E between December 1988 and March 1990, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. At the time of closure, no evaluation of organic constituents potentially present in the wastewater (as a result of treated water discharge from the OWS) was conducted. COPCs potentially associated with discharge of treated effluent from the OWS include TPH and PAHs. As discussed earlier, there is no information to suggest that significant amounts of solvents were used at Topock and any VOCs present in the wastewater that were released to the environment would have quickly evaporated due to the high temperatures typically encountered at the station. Therefore, the COPCs for soil associated with SWMU 8 consist of TPH and PAHs. DTSC also identified VOCs and all other SVOCs (in addition to PAHs) as COPCs at this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.1.8 SWMU 9 – Transfer Sump

The transfer sump was part of the two-step cooling water blowdown treatment system, and was located within the facility fenceline in the southern end of the lower yard (Figures 4-1 and 4-2).

4.1.8.1 Description and History

The transfer sump was a pre-fabricated concrete septic tank with a capacity of 1,500 gallons (PG&E 1982; Mittelhauser 1990a). The sump measured about 3 feet in diameter and 20 feet deep, of which 18.5 feet was set below grade. The sump was also fitted with a concrete cover.

From 1969 to October 1985, effluent containing chromium from the chromate reduction tank (SWMU 6; Unit 4.7) was routed through the transfer sump to the precipitation tank (SWMU 7; Unit 4.9). Sometime around 1974, the transfer sump also started to receive treated effluent water from the OWS (either directly or through the chromate reduction tank) (Kearny 1987). From November 1985 to October 1989, the transfer sump received non-hazardous (i.e., phosphate-based) cooling water blowdown, and the effluent from the transfer sump was discharged directly to the old evaporation ponds (SWMU 10; Unit 4.11). Oily sludges and solids that accumulated in the transfer sump were periodically removed and transported to an offsite disposal facility (Kearny 1987). The transfer sump was removed from service in October 1989. Physical removal of the transfer sump occurred during Phase 2 of the hazardous waste management facilities closure process between November 1989 and March 1990 (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of this unit are presented in Section 5.0.

4.1.8.2 Constituents of Potential Concern

The transfer sump was clean closed by PG&E between December 1988 and March 1990, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. At the time of closure, no evaluation of organic constituents potentially present in the OWS treated effluent water was performed, although apparently oily sludges did accumulate in the sump. COPCs potentially associated with discharge of treated effluent from the OWS include TPH and PAHs. Therefore, PG&E has identified TPH and PAHs as the COPCs associated with SWMU 9. DTSC also identified VOCs and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.1.9 SWMU 10 – Old Evaporation Ponds

The old evaporation ponds were formerly located approximately 1,000 feet west-southwest of the compressor station (Figure 4-1). The site of the former ponds is (and was) on property owned by the HNWR and managed by the USFWS.

4.1.9.1 Description and History

This unit was comprised of four ponds, designated as Pond Nos. 1, 2, 3, and 4, with Pond No. 1 being the northernmost pond and Pond No. 4 being the southernmost pond. Pond No. 1 was completed in 1971 and Pond Nos. 2 through 4 were completed in 1974.

The ponds occupied a total surface area of about 181,000 square feet (4.15 acres). Each pond was lined with a 20-millimeter PVC synthetic liner. The liners were underlain by a layer of sand at least 4 inches thick, and overlain by a 1-foot-thick layer of sand (PG&E 1993). The inside sloping surface of the berms surrounding each pond was spray-coated with asphalt

to prevent erosion. Each pond had a total depth of about 6 feet. When in use, a 1-foot freeboard was maintained as per waiver from the Water Board, Colorado River Region (Water Board 1975). Based on a 1-foot freeboard, the four ponds had a total capacity of nearly 5 million gallons. Each pond was equipped with a resistivity grid leak detection system. Wastewater was transferred from the facility to the ponds via pipeline. The pipeline was about 1,500 feet long and was constructed primarily of 3-inch-diameter PVC (Figure 4-1).

From October 1971, when Pond No. 1 was first placed in service, until August 1973, wastewater was only discharged to the pond when injection well PGE-08 was out of service. From August 1973 to December 1973, wastewater was discharged to SWMU 10 on an alternating 3-day cycle with Injection Well PGE-8. Beginning in December 1973, when PGE-08 was permanently removed from service, wastewater from the compressor station was continuously discharged into the ponds and allowed to evaporate. Wastewater discharged to the ponds consisted primarily of treated cooling tower blowdown (about 95 percent) and a minor volume of effluent from the OWS (about 5 percent) (PG&E 1993). A maximum of roughly 30,000 gpd of wastewater were discharged to the old evaporation ponds; the average daily rate between 1975 and 1980 ranged from 8,000 to 17,600 gpd (PG&E 1984a).

The ponds became inactive as RCRA-regulated units in October 1985 (Kearny 1987); however, the four ponds remained in use for the disposal of non-hazardous wastewater until they were replaced with four new Class II (i.e., double-lined) ponds in October 1989.

Wastewater disposed of in the ponds between 1971 and 1985 contained Cr(T) at concentrations ranging from 0.49 to 1.6 mg/L and Cr(VI) at concentrations ranging from <0.1 to 0.75 mg/L (Brown and Caldwell 1985a). Solids that accumulated within the ponds contained Cr(T) and Cr(VI) concentrations ranging from 18 to 1,000 mg/kg and <1.0 to 6.2 mg/kg, respectively (Brown and Caldwell 1985b). Other metals, primarily copper, nickel, and zinc, were also present in the solids. Laboratory data sheets for this unit are provided in Appendix C.

The ponds were removed from service in October 1989. The ponds were physically removed and closed in 1993, during Phase 3 of the hazardous waste treatment system closure (Trident 1993). In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details regarding the closure of this unit are presented in Section 5.0.

4.1.9.2 Constituents of Potential Concern

The evaporation ponds were clean closed by PG&E in 1993, and a closure certification acceptance letter for this unit was issued by DTSC in 1995. At the time of closure, no evaluation of organic constituents potentially present in the wastewater was conducted. However, there is no reason to suspect that any organic constituents would have migrated through the liner, as the liner was intact and in good condition when it was removed (Mittelhauser 1990a). Furthermore, any leaks would have been detected by the leak detection system. Therefore, there are no current COPCs for this unit.

4.1.10 Unit 4.3 – Oil/Water Holding Tank

The oil/water holding tank was identified by the USEPA in the RFA (Kearny 1987), but not subsequently designated as a SWMU or AOC by DTSC. The oil/water holding tank was part of the original oily water treatment system that operated until 1989 (Section 3.1.4.2). The oil/water holding tank was formerly located within the facility fenceline in the southern portion of the lower yard (Figures 4-1 and 4-2).

4.1.10.1 Description and History

The oil/water holding tank is believed to have been installed in 1951.[17] It consisted of a cylindrical steel tank about 15 feet long and 5 feet in diameter. The tank had a capacity of 3,000 gallons. The tank was mounted horizontally on two concrete supports; the area beneath the tank was unpaved.

The oil/water holding tank was used to collect oily water from the compressor floor drainage (about 200,000 gallons per year), compressor engine cleaning operations (about 10,000 gallons per year), and steam cleaning operations (about 10,000 gallons per year) (Kearny 1987). In general, all oily water discharged to the oily water system, as is the case today (Russell 2006b). Wastewater that was collected in this tank was discharged by gravity flow via an aboveground 3-inch diameter steel pipe to the adjacent OWS (Unit 4.4).

Chemical analysis data for wastewater processed through the oil/water holding tank indicate that the wastewater contained 48 mg/L oil and grease (Brown and Caldwell 1986). Detectable concentrations of some metals, including Cr(T), were also present in the wastewater. No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987).

The oil/water holding tank was removed in conjunction with the sludge drying beds (SWMU 5) between November 1988 and February 1989 (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. Additional details regarding the closure of this unit are presented in Section 5.0.

4.1.10.2 Constituents of Potential Concern

The oil/water holding tank was closed and removed between November 1989 and March 1990 (Mittelhauser 1990b). No sampling has been conducted for this unit. The pipeline for the oil/water system exhibited the highest-residual TPH results (1,200 mg/kg). Only TPH in the heavier-than-diesel range was detected; TPH-d and TPH-g were not detected. Based on the historical operations, PG&E has identified Cr(T), copper, nickel, lead, zinc, Cr(VI), TPH, and PAHs as COPCs for this unit. DTSC also identified other Title 22 metals, VOCs, all other SVOCs (in addition to PAHs), and pH as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.1.11 Unit 4.4 – Oil/Water Separator

The former OWS (it has since been replaced with a new system) was identified by the USEPA in the RFA (Kearny 1987), but not subsequently designated as a SWMU or AOC by

[17] The RFA (Kearny, 1987) indicates that the oil/water holding tank in place at the time of the RFI was installed in 1970. It is unknown whether the RFA information is incorrect, whether another oil/water holding tank was in place prior to 1970, or whether prior to 1970, oily water flowed directly to the oil/water separator.

DTSC. The former OWS was part of the original oily water treatment system that operated until 1989 and was located adjacent to the oil/water holding tank (Unit 4.3) within the facility fenceline in the southern portion of the lower yard (Figures 4-1 and 4-2).

4.1.11.1 Description and History

The former OWS was approximately 4.5 feet deep, 15 feet long, and 6 feet wide, and it was constructed of 6-inch thick concrete (Kearny 1987). The unit reportedly received oily water from the oil/water holding tank (Kearny 1987). The unit was equipped with an underflow weir to control discharges and a suction pump on the effluent end to collect and remove floating oil. The floating oil was transferred by flexible hose to a portable waste oil storage tank (Unit 4.5). Prior to 1964, treated water from the OWS was directed to the transfer sump prior to discharge to Bat Cave Wash. From 1964 to 1969, effluent from the OWS may have been directed to a treatment pond and processed along with the cooling water blowdown through the single-step chromium treatment system prior to discharge. From 1969 through October 1985, effluent from the OWS was routed to the chromate reduction tank and was processed along with the cooling water blowdown through the two-step chromium treatment system prior to being discharged. In November 1985, the chromate reduction tank was converted into a holding tank (Kearny 1987), and the discharge from the OWS was routed to either the holding tank or the transfer sump prior to discharge.

Chemical analysis data for wastewater processed through the OWS indicate that the wastewater contained 60 mg/L oil and grease (Brown and Caldwell 1986). Detectable concentrations of some metals including Cr(T), copper, and zinc were also present in the wastewater. No indication of a release was observed during a facility inspection performed as part of the RFA (Kearny 1987).

This OWS was closed and removed between November 1989 and March 1990 (Mittelhauser, 1990b). Laboratory data sheets are provided for this unit in Appendix C. Additional details regarding the closure of this unit are presented in Section 5.0.

4.1.11.2 Constituents of Potential Concern

At the time of closure, only limited TPH analysis was conducted. Soil samples from beneath the OWS were analyzed only for TPH quantified as diesel. Limited soil removal was conducted, and residual concentrations ranged from ND to 18 mg/kg. However, TPH concentrations in the heavier-than-diesel range were not evaluated. Based on the historical operations, PG&E identified TPH, Cr(VI), wearmetals (Cr[T], copper, lead, nickel, and zinc), and PAHs as the COPCs for this unit. DTSC also identified all other Title 22 metals, VOCs, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b, 2007f). COPCs are anticipated to be limited to soil only.

4.1.12 Unit 4.5 – Portable Waste Oil Storage Tank

The portable waste oil storage tank was identified by the USEPA in the RFA (Kearny 1987), but not subsequently designated as a SWMU or AOC by DTSC. The portable waste oil storage tank was located within the facility fenceline in the southern portion of the lower yard adjacent to the OWS (Unit 4.4), as depicted in Figures 4-1 and 4-2.

4.1.12.1 Description and History

The portable waste oil storage tanks consisted of an enclosed steel tank about 6 feet long and 2 feet in diameter mounted horizontally on a trailer (Kearny 1987). The tank was connected to a suction pump within the OWS with a flexible hose. The portable tank was stationed on a concrete pad that was bermed on three sides with a 6-inch high curb. The fourth side of the pad was left open to allow removal of the unit.

The tank was used to collect floating oil from the OWS. When the tank was full, it was transported to the east side of the facility and placed next to the stationary waste oil storage tank (Unit 4.6). Oil within the portable tank was then transferred to the stationary tank. Starting in 1975, oil within the stationary tank was periodically removed and initially sold for reuse and later transported offsite for recycling (PG&E 1980a; Riddle 2004).

The portable waste oil storage tank was removed from service in 1989. During the removal of the transfer sump (SWMU 9) and the OWS (Unit 4.4), the portable tank was used to temporarily hold waste oil removed from the sump and OWS. The waste oil was subsequently removed from the portable tank, and the tank was then transported offsite to Chemical Transportation in Wilmington (Mittelhauser 1990a). Laboratory data sheets are provided for this unit in Appendix C. No indication of a release associated with the portable waste oil storage tank was observed during a facility inspection performed as part of the RFA (Kearny 1987).

4.1.12.2 Constituents of Potential Concern

The portable waste oil storage tank was closed and removed between November 1989 and March 1990 (Mittelhauser 1990b). At the time of closure, no evaluation of organic constituents was performed. COPCs potentially associated with incidental releases from the portable waste oil storage tank include TPH and PAHs. DTSC also identified VOCs as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil.

4.1.13 Unit 4.6 – Waste Oil Storage Tank

The waste oil storage tank was identified by the USEPA in the RFA (Kearny 1987), but not subsequently designated as a SWMU or AOC by DTSC. The waste oil storage tank is located within the facility fenceline in the eastern portion of the facility within the oil and fuel storage area (Figure 4-1).

4.1.13.1 Description and History

This tank was installed during the construction of the facility in 1951. The tank is an enclosed vertical steel tank that is about 20 feet high and 8 feet in diameter, and has a capacity of 7,500 gallons. The tank is located within the oil and fuel storage area, which is equipped with secondary containment consisting of a concrete paved area about 20 feet wide and 100 feet long that is surrounded by a 2-foot-high concrete curb.

The waste oil storage tank is still in active service. Waste oil generated at the compressor station is accumulated in this tank for temporary storage. The contents of the tank are periodically removed and transported offsite for recycling (PG&E 1980a; Riddle 2004).

4.1.13.2 Constituents of Potential Concern

The waste oil storage tank is still in active service, and there have been no known releases from this tank. Therefore, there are no COPCs for this unit.

4.1.14 AOC 1 – Area Around Percolation Bed

AOC 1 consists of the area that surrounds SWMU 1, the former percolation bed. AOC 1 is located outside the facility fenceline west of the compressor station within Bat Cave Wash (Figure 4-1).

4.1.14.1 Description and History

The areal extent of AOC 1 has not been formally defined; however, by definition it is considered to consist of the floor of Bat Cave Wash in the area surrounding the location of the discharge area (SWMU 1). It also includes the floor of Bat Cave Wash from the discharge area to the railroad tracks (none of historic aerial photographs indicates that the flow of wastewater in the wash extended beyond the railroad tracks). Portions of AOC 1 are located on PG&E property and portions are located on property owned by the HNWR.

4.1.14.2 Constituents of Potential Concern

COPCs for soil associated with AOC 1 are the same as for SWMU 1, and consist of Cr(T), Cr(VI), copper, lead, mercury, nickel, zinc, pH, TPH and PAHs. The COPCs for groundwater are Cr(T), Cr(VI), copper, lead, nickel, zinc, electrical conductivity, pH, and TPH. For AOC 1, DTSC also recommended further evaluation of the Title 22 metals and VOCs (if VOCs are present in soil at SWMU 1) and other organic COPC analyses (TPH and SVOCs, including PAHs) if elevated concentrations are detected at SWMU 1.

4.1.15 AOC 2 – Area Around Inactive Injection Well (PGE-08)

AOC 2 consists of the unpaved soil area around inactive injection well PGE-08 (SWMU 2). AOC 2 is located within the facility fenceline on the west side of the lower yard (Figure 4-1).

4.1.15.1 Description and History

The areal limits of AOC 2 have not been formally defined. However, AOC 2 is considered to consist of the unpaved surficial area in the immediate vicinity of the well, and the interconnecting piping. The area in the immediate vicinity of injection well PGE-08 is unpaved.

Injection well PGE-08 was used from May 1970 through December 1973 for the subsurface injection of treated wastewater from facility operations. Based on the construction of the well, injection of wastewater occurred in fractured bedrock at depths in excess of 405 feet bgs. Because wastewater was injected into bedrock at depth, releases to surface and subsurface soil are unlikely. The wastewater piping will be addressed as part of AOC 18. Additionally, there is no evidence of any surface releases to the area surrounding the former injection well. Laboratory data sheets for this unit are provided in Appendix C. Further assessment and delineation of this unit is not required.

4.1.15.2 Constituents of Potential Concern

AOC 2 consists only of the unpaved surficial area surrounding inactive injection well PGE-08 (SWMU 2). No constituents of concern have been detected in surficial areas around SWMU; therefore, are no COPCs for soil or groundwater for AOC 2.

4.1.16 AOC 3 – Area Around PG&E Inactive Wells #6 & #7 (PGE-06 and PGE-07)

4.1.16.1 Description and History

The areal limits of AOC 3 have not been formally defined. However, AOC 3 is considered to consist of the area in the immediate vicinity of the two wells. The area in the immediate vicinity of both wells is unpaved.

Wells PGE-06 and PGE-07 were constructed as standby water production wells. There is no evidence to indicate that any wastes were disposed of into or around these wells.

4.1.16.2 Constituents of Potential Concern

Wells PGE-06 and PGE-07 are standby water production wells, and there is no evidence to indicate that any wastes were disposed of into or around these wells. Therefore, there are no COPCs for AOC 3.

4.2 AOCs Identified by DTSC Subsequent to the CACA

Additional AOCs were identified by DTSC in 2001 (DTSC 2001) and 2006 (DTSC 2006a). AOCs 4 through 13 were identified subsequent to the 2000 Ecology and Environment soil investigation work plan. AOCs 15 through 19 were formally designated by DTSC in 2006, and were identified as the result of additional site history review and site reconnaissance. AOC 20 was added as a result of a request by DTSC in its May 9, 2007 (DTSC 2007d) comment letter on the Final RFI/RI Volume 1.

4.2.1 AOC 4 – Debris Ravine

The Debris Ravine is located on PG&E property south of the compressor station, outside the facility fenceline (Figure 4-1).

4.2.1.1 Description and History

The Debris Ravine is a narrow, steep-sided arroyo that drains into Bat Cave Wash at the southwest corner of the facility. The bottom of the ravine mainly consists of bedrock, with a thin veneer (i.e., less than 1 foot) of sediments and debris. The southern portion of the lower yard just above the ravine has historically been used to store and/or dispose of scrap and debris.

Historical operations in this area are not documented; however, over the years some scrap and debris have ended up at the bottom of the ravine. Materials identified in the ravine include wood, metal (e.g., cans, machine parts, rebar, etc.), concrete, apparent transite siding, and small quantities of white powder. A former employee reported disposing of 200 to 300 bags of lime in this area after the old lime softening process was discontinued (Russell 2006b). Other employees have reported that domestic garbage has been disposed of at the

Debris Ravine (Russell 2006b), and glass, wood, and a partially melted graduated cylinder have been identified on the slope of the Debris Ravine, east of the scrap storage area.

4.2.1.2 Constituents of Potential Concern

A variety of solid waste has been discarded in the Debris Ravine. Based on these observations and analysis of prior samples, PG&E has identified Cr(VI), Title 22 metals, PAHs, and asbestos as the COPCs in soil. DTSC also identified VOCs, TPH, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b). Based on the types of materials in the ravine (solids) and depth to groundwater in the area, COPCs are anticipated to be limited to soil only.

4.2.2 AOC 5 –Cooling Tower A

For the purposes of the RFI, AOC 5 includes the entire area surrounding original Cooling Tower A as shown in Figure 4-1. The new Cooling Tower A is in the same location as the original Cooling Tower A. AOC 5 is located within the facility fenceline.

4.2.2.1 Description and History

AOC 5 encompasses the cooling tower, the site of the former chemical shed, the site of the sulfuric acid tank, and the site of the current cooling water treatment product tanks. A portion of AOC 5 is unpaved (covered with gravel), but it is bounded on all sides by pavement.

Operations in this area consist of the storage, handling, and use of cooling water additives. From 1951 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present time, non-hazardous, phosphate-based inhibitors, scale control agents, and biocides have been used. Sulfuric acid has been used from 1951 to the present time to control the pH of the cooling water. The major features located in this AOC are discussed below.

Original Cooling Tower A. The original Cooling Tower A was a coil shed tower constructed along with the rest of the compressor station in 1951. The original tower was replaced with a new tower in 2001. The cooling tower is used to cool compressed natural gas and lubricating oil cooling water. Limited soil sampling conducted in the unpaved areas in the vicinity of the cooling tower indicated that Cr(T), Cr(VI), zinc and copper are present at concentrations exceeding the expected background. One of the four samples contained Cr(T) at a concentration above the industrial PRG.

Former Chemical Shed. The former chemical shed was located about 15 feet east of Cooling Tower A. The shed was used to store chromium-based cooling water additives used in the cooling tower from 1951 to 1985. The shed was demolished in the summer of 2000 as part of the construction involved in replacing Cooling Tower A. Stained soils beneath the former chemical storage shed were observed after its demolition (PG&E 2000a). The stained soils were reportedly limited to a small area about 4 feet by 4 feet square. The stained soils were excavated by the construction crew and removed offsite. Confirmation soil samples were not collected. However, this area is recommended for further sampling as part of AOC 5. After removal, the area was backfilled with clean fill. As part of the new cooling tower

construction, a reinforced concrete pad was built adjacent to the removal area and a small portion of the area is covered with this pad.

Sulfuric Acid Tank. Sulfuric acid is used at this site to control the pH of the cooling water in Cooling Tower A. The original tank was an unlined steel AST with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E 1984a).

Chemical Storage Tanks. There are currently three ASTs located at the southern end of the cooling tower that are used for the storage of phosphate-based cooling water treatment products (Table 3-3). The tanks are constructed of polyethylene and have secondary containment.

4.2.2.2 Constituents of Potential Concern

Only chemical products related to the cooling water treatment have been stored within AOC 5, including the chromate- and phosphate-based inhibitors, and sulfuric acid. Therefore, COPCs for AOC 5 consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, and soil pH. In addition, DTSC identified other Title 22 metals as COPCs (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.3 AOC 6 –Cooling Tower B

For the purposes of the RFI, AOC 6 includes the entire area surrounding original Cooling Tower B as shown in Figure 4-1. The new Cooling Tower B is in the same location as the original Cooling Tower B. AOC 6 is located within the facility fenceline.

4.2.3.1 Description and History

The area encompasses the cooling tower, the site of the former chemical shed, the site of the sulfuric acid tank, and the site of the current cooling water treatment product tanks. AOC 6 is partially unpaved (covered with gravel), but is bounded on all sides by pavement. A former employee stated that he had observed cooling water from Cooling Tower B overflowing and discharging into the Northeast Ravine (Russell 2006b).

Operations in this area consist of the storage, handling, and use of cooling water additives. Operations in this area began in 1954 with the construction of a two-cell cooling tower. From 1954 to 1985, chromium-based corrosion inhibitors were used to treat the cooling water. From 1985 to the present time, non-hazardous, phosphate-based inhibitors, scale control agents, and biocides have been used. Sulfuric acid has been used from 1954 to the present time to control the pH of the cooling water. The major features located in this AOC are discussed below.

Cooling Tower B. The original Cooling Tower B was a coil shed tower constructed as a two-cell unit in 1954 to support the expansion of the compressor station. Cooling Tower B was subsequently expanded to a four-cell tower in 1958. The original tower was replaced with a new tower in 2002. The cooling tower is used to cool compressed natural gas and lubricating oil cooling water.

Former Chemical Shed. The former chemical shed was located about 15 feet east of Cooling Tower B. The shed was used to store the chromium-based cooling water additives used in the cooling tower from 1954 to 1985. The shed was demolished in the winter of 2001 in conjunction with the installation of the new cooling tower. Stained soil was observed beneath the shed following its removal. Limited soil sampling indicated that Cr(T), Cr(VI), copper and zinc were present at concentrations exceeding the expected background. Two samples contained Cr(T) above the industrial PRG. The stained soil was removed, generating five drums of material that were shipped offsite for disposal. The excavation was backfilled with clean soil.

Sulfuric Acid Tank. Sulfuric acid has been used at this site to control the pH of the cooling water in Cooling Tower B. The original tank was an unlined steel AST with a capacity of 2,600 gallons. The tank was located within a concrete secondary containment area. In 1984, the original tank was replaced with a new epoxy-lined AST of the same size and capacity (PG&E 1984a).

Chemical Storage Tanks. There are currently three ASTs located just east of the cooling tower that are used for the storage of phosphate-based cooling water treatment products (Table 3-3). The tanks are constructed of polyethylene and have secondary containment.

4.2.3.2 Constituents of Potential Concern

Only chemical products related to the cooling water treatment have been stored within AOC 6, including the chromate- and phosphate-based inhibitors, and sulfuric acid. Therefore, COPCs for AOC 6 consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, and soil pH. DTSC also identified other Title 22 metals as COPCs (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.4 AOC 7 – Hazardous Material Storage Area

A hazardous materials storage building and loading dock is located in the southeastern portion of the facility, inside the facility fenceline (Figure 4-1).

4.2.4.1 Description and History

This facility is concrete-lined and is equipped with secondary containment walls. The area currently serves as the storage area for hazardous wastes generated at the facility (e.g., oily rags, used oil filters, etc.). This area has been used for the collection and storage of hazardous materials since at least the early to mid 1980s (Riddle 2004). The area is also used to store chemical products used at the compressor station (e.g., lubricants, parts cleaning compounds, and small quantities of solvents). This area has apparently always been used for chemical storage (Riddle 2004), though the types of chemicals stored there is unknown. A roof was installed over the storage area during in the 1960s (Russell 2006a). Review of aerial photographs suggests that this area was unpaved until at least the mid-1950s.

4.2.4.2 Constituents of Potential Concern

A more general characterization of this AOC is appropriate because of its use as the hazardous material accumulation area for the facility. This area is also used to store chemicals used in routine maintenance such as lubricants and parts cleaning compounds, including small quantities of solvents. Hazardous wastes such as oily rags, air filters, oil

filters, contaminated "dry sweep" (oil absorbent), small quantities of paint, and spent aerosol cans of solvent are generated as part of equipment and facility maintenance. Based on interviews with station personnel, weed and insect control is conducted by a contractor, so these materials are not stored onsite. Based on the types of chemical products and wastes stored in this area, COPCs in soil associated with AOC 7 consist of VOCs, SVOCs including PAHs, PCBs, TPH, and Title 22 metals. DTSC also identified Cr(VI) and pH as COPCs (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.5 AOC 8 - Paint Locker

A small locker used for the storage of paint is located within the facility fenceline in the southeastern portion of the facility (Figure 4-1).

4.2.5.1 Description and History

The paint locker measures about 5 feet wide by 5 feet long, and is constructed of steel. The locker has tight-fitting doors and was designed for the fire-safe storage of flammable materials. Large-scale painting activities at the compressor station are handled by outside crews (Riddle 2004). Therefore, only small quantities of paint and thinners used for minor touch-up work are stored in this shed. Paint is stored in both spray cans and in 1- to 5-gallon cans. Non-chlorinated paint thinners are also stored in 1-gallon cans. About 100 gallons of paint and thinners are routinely stored in this shed. No evidence of any release is present in or around the shed.

4.2.5.2 Constituents of Potential Concern

It is likely that paints contained within the locker have consisted of oil-based, and water-based paints. Thinners are believed to have consisted of non-chlorinated thinners. During the use of these products, it is possible that small quantities of paint and/or thinners may have spilled in the vicinity of the paint locker. Based on this information, COPCs for soil associated with AOC 8 consist of VOCs, TPH, and some metals (e.g., lead from lead-based paint). COPCs are anticipated to be limited to soil only.

4.2.6 AOC 9 – Southeast Fence Line (Outside Visitor Parking Lot)

AOC 9 is located in the southeast portion of the facility, just south of the visitor parking lot and immediately east of (outside) the facility fence line (Figure 4-1). It is also located in the vicinity of the leachfield and septic tank associated with the Auxiliary Building.

4.2.6.1 Description and History

In the spring of 2000, PG&E informed the DTSC that a worker at the compressor station had encountered a small amount of discolored surface soil just outside the fence line on the southeast side of the facility (PG&E 2000b). The discolored soil was located on an extremely steep slope. It was uncovered by erosion, which caused a storm drain pipe to break off near the top of the ravine. The pipe was replaced, the pipe was extended into the East Ravine, and the end was covered with gravel.

The storm drain is believed to be connected to a trench that could have received runoff from leaks originating from the AJCW pumps (AOC 15). Two employees indicated that leaks from the AJCW entered a pipe trench in the road near the AJCW system in the past (Russell

2006b). The trench system leading to the storm drain at AOC 9 and/or another nearby storm drain may also have captured a portion of the steam cleaning (washrack) runoff before the washrack area was bermed (Russell 2006b). AOC 9 is also located in the vicinity of the leachfield and septic tank associated with the laboratory. Review of aerial photographs indicates that this area was formerly unpaved.

About 1.5 cubic yards of the stained soil was removed and shipped offsite for disposal. Site conditions (the steepness of the terrain) limited the feasible extent of excavation. Confirmation samples indicated that residual Cr(T) and Cr(VI) still remained in the soil; however, other metals and pH appear to be at background levels (PG&E 2000c).

4.2.6.2 Constituents of Potential Concern

The color of the soil and the results of samples collected from AOC 9, indicated that some chromium-containing material may have been released in this area. Based on these data, COPCs for AOC 9 consist of Cr(T) and Cr(VI). Because this AOC may have received runoff from the steam cleaning area, and leaks of non-hazardous molybdenum-containing cooling water, other COPC for soil associated with AOC 9 include TPH, PAHs, molybdenum, and wear metals (copper, lead, nickel, and zinc). DTSC identified Title 22 metals, VOCs, pH, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.7 AOC 10 – East Ravine

The East Ravine is a small ravine located on the southeast side of the compressor station (Figure 4-1). The ravine runs eastward towards the Colorado River. Portions of the East Ravine are on PG&E property outside the facility fenceline, and other portions of the ravine are located on property owned by the HNWR.

4.2.7.1 Description and History

The East Ravine is approximately 1,600 feet long and is bisected by three man-made impoundments (one constructed dam and two dirt roads). Due to the impoundments, flow from most of the length of this ravine (west of the lower dirt road) does not typically reach the Colorado River. The drainage for this ravine includes minor runoff from the access road to the facility, runoff from the mountains to the south, and some runoff from the compressor station. Several small erosion channels are visible in a 1955 aerial photograph (Figure 3-15), and plant personnel report having to repair erosion damage on the slopes on a regular basis (Russell 2006b). Runoff from the station access road may have included leakage from the Jacket Cooling Water pumps and/or hot well, as described in Section 4.2.12 (Russell 2006b).

The origin of the berms in the East Ravine is uncertain. Some former employees have said that the berms were constructed (or improved) by PG&E as part of backhoe practice, but other former employees have said that the berms were there before they started their employment with PG&E. The station employees said that they have heard that the berms were constructed as (1) a stock reservoir, (2) to protect Route 66, or (3) to protect the pipeline and associated roads (Russell 2006b). The berms were in place by 1964 (Russell 2006b).

The East Ravine contains three small drainage depressions that contain fine-grained sediments. The most upstream drainage depression, and the largest, is located behind an

earthen dam that was built across the ravine. This small dam stands approximately 9 feet above the fine-grained soils trapped behind it. Approximately 1 foot below the top of the dam is a culvert to allow water flow. This culvert is now collapsed, but erosion on the downhill side shows that water has flowed through this culvert in the past. Aerial photographs from 1964 and 1967 show what appears to be water ponded behind this dam. The construction date and purpose of this small dam are not known. Fine-grained sand and silt are more than 2 feet thick behind the dam.

The second and third drainage depressions are separated by a dirt road. This road has no culvert, and there is no evidence of erosion to suggest that water has flowed over the top of the road from one side to the other. Two test pits dug into the middle depression indicate that the fine-grained soils were less than 15 inches thick (E&E 2004). The easternmost dirt road serving as a barrier to water flow has a drainage culvert that exits near the top of the road; however, the upstream side of the culvert could not be found, and is likely buried. The nearest drainage depression would have to fill up before much water could flow through this culvert. East of the third impoundment, the East Ravine is linked to the Colorado River via a culvert under the pipeline access road adjacent to the river. If any water is discharged from the upstream portions of the East Ravine, it could discharge to the river via this culvert. A vegetated wetland area is present at the mouth of the East Ravine. About one-half of the length of the ravine is on PG&E property.

Three subareas (10b, 10c and 10d) have been identified within the East Ravine where water and sediment collects within low areas or behind impoundments. In the upstream drainage depression (10b), behind the dam, there is a thin (less than 1 inch thick) greenish gray layer. In the middle drainage depression (10c), a layer of white fine-grained material, less than 2 inches thick and similar in appearance to the white material in Bat Cave Wash and at the Railroad Debris site, was found at a depth of less than 1 foot. This white material was just on top of, or within a few inches of, underlying coarser material. The third area, 10d, is the easternmost impoundment, formed by the construction of an access road.

During a recent site visit, a small area of stained soil (10a) (possibly hydrocarbon staining) was noted at the discharge of a storm drain leading from the southeastern portion of the compressor station. This storm drain may have captured some runoff from the steam cleaning area before the steam cleaning area was fully bermed (Russell 2006b). The storm drain discharges into the East Ravine upstream of the previously-identified subareas.

The natural runoff from the southeastern portion of the facility eventually flows to the East Ravine. This area was unpaved during the early years of station operation, and only partially paved by the mid-1960s. In addition, during larger rain events, runoff from the station access road could also enter the East Ravine from the station road. Until early 2006, only the southernmost portion of the station access road adjacent to the East Ravine was bermed (Russell 2006b).

4.2.7.2 Constituents of Potential Concern

The natural runoff from the eastern portion of the facility eventually flows to the East Ravine. The runoff may contain dissolved and suspended materials that may have been incidentally released at the facility. The runoff accumulates in low-lying areas in the ravine where the suspended and dissolved constituents would tend to concentrate and deposit on

the surface soils. Volatile constituents would not be expected to remain in the runoff as it flows down the ravine; however, less volatile constituents may have been transported to, and deposited in, the low-lying areas. Based on this information, PG&E identified PAHs, TPH, Cr(T), Cr(VI), molybdenum, copper, lead, nickel, and zinc as COPCs for soil in AOC 10. DTSC identified Title 22 metals, VOCs, all other SVOCs (in addition to PAHs), and pH as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.8 AOC 11 – Topographic Low Areas

The five topographic low areas that comprise AOC 11 are depicted in Figure 4-1. These areas were identified based on aerial photographs, a site reconnaissance performed by Ecology and Environment (2000b), and a recent site reconnaissance. Some portions of AOC 11 are on PG&E property outside the facility fenceline and some portions of AOC 11 are located on property owned by the HNWR.

4.2.8.1 Description and History

The principal drainage pathways leading away from the compressor station have been identified (E&E 2000b). While historic drainage patterns have changed over the years as a result of road re-alignments, paving, and/or the installation of new culverts, in general, stormwater or other drainage from the facility flows overland, or via drainage collection facilities, to reach small ravines surrounding the station. These small ravines feed into defined channels, such as the Debris Ravine, that in turn drain into larger washes, such as the Bat Cave Wash. However, certain channels drain into topographic low points or depressions. Runoff collects at these low points and infiltrates or evaporates rather than draining away. Based on a recent site visit, there are at least three apparent stormdrain outlets that discharge to AOC-11. It is not known whether all of these stormdrains are currently active. A former employee reported that he observed a release from Cooling Tower B that entered the ravine containing AOC 11 (the Northeast Ravine) (Russell 2006b). Stormwater runoff from the northeastern portion of the station, and from the area containing the Transwestern Intertie would also have flowed to AOC 11. In addition a stormwater pipe that captures water run-off from I-40 also discharges to AOC 11.

AOC 11 consists of five topographic low areas to the northeast of the compressor station (in the Northeast Ravine). Low areas 11a, 11b, 11c, and 11d are located on HNWR property, and 11e is located on PG&E property. Three of these low areas were previously identified by E&E and were labeled as L4a (11a), L4b (11b), and L5 (11d). Low areas 11c and 11e were identified during the May 2006 site reconnaissance. E&E had identified one additional low area (L6) as part of AOC 11. L6 was located in Bat Cave Wash on the east side immediately north of the road leading into Bat Cave Wash. This area is fully contained within and has been incorporated into AOC 1.

Two newly-identified areas have been added to AOC-11. During a recent site visit, remnants of two former dams were identified in the Northeast Ravine. Small amounts of fine-grained soils appear to be present at the upper dam, and a larger volume of fine grained soil is present behind the lower dam. These dams may have been constructed to protect the gas pipelines and the old station access road from flooding (Russell 2006b). These two newly-identified areas are designated 11c and 11e. Because these areas represent topographic low spots, drainage from the facility may accumulate in these areas.

The original plant access road ran through the area now identified as 11a. A stormwater pipe that captures runoff from I-40 and Park Moabi Road discharges into AOC 11 north of 11a, immediately south of the I-40 overcrossing. Stormwater runoff from I-40 could have resulted in the release of TPH, PAHs, lead, and wear metals (including barium, chromium, copper, nickel, and zinc) into AOC 11, and specifically 11a., that are not due to PG&E's operations at the Topock Compressor Station. During storm events, water pools in subarea 11a. Substantial flow has been noted from the I-40 stormwater pipe.

As originally described, AOC 11 also included definable drainage channels or ravines immediately downstream of potential source areas at the compressor station and the soils at drainage pipe outlets (areas R1 to R20). Because these areas represent topographic low spots, drainage from the facility may accumulate in these areas. However, discharge from these areas would have migrated to the low areas within each ravine or wash, and would have commingled with other potential discharges to these ravines and/or washes. Consequently, potential releases from these stormdrains are addressed as part of the SWMUs and AOCs that would have received the flow from the stormdrains. The COPCs associated with potential stormwater discharges are addressed in SWMU 1, AOC 1, AOC 4, AOC 10 and AOC 11.

4.2.8.2 Constituents of Potential Concern

The topographical low areas act as concentration and deposition sites for constituents entrained in runoff from the compressor station and surrounding areas. It is possible that materials used at the compressor station may have been carried outside the fenceline by runoff. Volatile constituents would not be expected to remain in the runoff as it flows down the ravine; however, less volatile constituents may have been transported to, and deposited in, the low-lying areas. Based on this information, PG&E has identified PAHs, TPH, and metals, including Cr(T), Cr(VI), copper, lead, nickel, and zinc, as COPCs for soil associated with AOC 11. DTSC identified Title 22 metals, VOCs, all other SVOCs (in addition to PAHs), and pH as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.9 AOC 12 – Fill Area

The potential fill areas that comprise AOC 12 are depicted in Figure 4-1. AOC 12 was identified based on aerial photographs, a site reconnaissance performed by Ecology and Environment (2000b), and information provided by former employees. Originally, only location 12a (formerly referred to as location F2) was identified as a potential fill location; locations 12b and 12c were identified based on additional historical information provided by former employees.

4.2.9.1 Description and History

The area containing AOC 12 was formerly a hill bisected by ravines (Figure 3-14). The original plant access road ran to the east of the hill. Former employees indicated that this area was used for backhoe practice (Russell 2006b). Review of aerial photographs suggests that by 1967 a portion of this area had been leveled. It is possible that during backhoe practice and or grading and leveling of the area, other materials could have been buried in the low areas. E&E identified a fill area located on the bench north of the metering station

(area F2), on property owned by the HNWR. This area was identified based on employee interviews and the presence of small pieces of concrete debris on the slope.

Two potential fill locations were identified by interviewees (Russell 2006b). These two locations are adjacent to the northwestern and southwestern corners of the Transwestern Intertie Facility (Figure 4-1), and may be completely or partially located on PG&E property. According to one employee, several bags of asbestos and two leaking 55-gallon drums were buried near the northwest corner of the Transwestern Intertie. (Russell 2006b). Asbestos that may not have been bagged was reportedly buried in a small (6-foot deep) ravine near the southwestern corner of the Transwestern Intertie area. The elevation of the area at the time was reportedly several feet lower (Russell 2006b). The continuation of the small ravine is still visible. No excavation or sampling has been performed at any of these locations.

4.2.9.2 Constituents of Potential Concern

The 12a fill area appears to be a disposal area for construction-related debris; however, it is possible that other materials may have been disposed of in this area. While asbestos was reportedly disposed of at the other two locations within AOC 12, the exact nature of the materials placed into these areas is unknown. Therefore, COPCs for soil associated with AOC 12 include a broad range of possible contaminants including VOCs, PAHs, Title 22 metals, asbestos, and TPH; specific COPCs vary by subarea (see Table 4-2). DTSC also identified Cr(VI), pH, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.10 AOC 13 – Unpaved Areas Within the Compressor Station

AOC 13 consists of unpaved areas within the fence line of the compressor station. The unpaved areas are located in various strips and patches among buildings and structures on this active facility. The majority of the unpaved areas within the fence line that are not part of another SWMU, AOC, or other undesignated areas lie within the lower yard on the west side of the facility (Figure 4-1). E&E identified numerous subareas within AOC 13; however, given that stormwater runoff is likely to have traversed various areas, and that potential spills of cooling water could have occurred in various areas, AOC 13 will be addressed as one unit.

4.2.10.1 Description and History

AOC 13 consists of unpaved areas within the fence line of the compressor station. These areas could have incidentally been impacted as a result of facility activities. In addition, as discussed earlier, former employees have reported and existing documentation suggests that pipeline liquids and/or waste oil were sprayed on station roads for dust control (PG&E 1980a; Russell 2006b).

4.2.10.2 Constituents of Potential Concern

Chemical products may have been incidentally released to unpaved areas, or surface runoff may have carried materials from paved areas and infiltrated the soil in the unpaved areas. Incidental leaks and spills could also have infiltrated into the soil at unpaved areas. Based on this information, PG&E has identified PAHs, Cr(T), copper, lead, zinc, molybdenum, mercury, Cr (VI), TPH, and soil pH as COPCs for soil associated with AOC 13. Due to the

incidental nature of the potential releases, and the great depth to groundwater at the station itself, COPCs are anticipated to be limited to soil only. DTSC identified Title 22 metals, VOCs, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b).

4.2.11 AOC 14 – Railroad Debris Site

The Railroad Debris site is located on property owned by the HNWR about 1,000 feet north of the compressor station, and is currently bounded by the Burlington Northern and Santa Fe railroad tracks to the north, I-40 to the south, and Bat Cave Wash to the west. An old alignment of Route 66, which apparently provided the access from the station to the Railroad Debris site, forms the eastern boundary of the unit (Figure 4-1).

4.2.11.1 Description and History

The Railroad Debris site occupies roughly 1.5 acres and first appears in an aerial photograph dated 1947. In that photograph, a mound of soil apparently related to construction of the rail line is present on the site. In subsequent aerial photographs dated 1955, a white patch and other materials are present on this site. A dirt road that runs from the north end of the compressor station to this area is also visible on the 1955 aerial photographs. Although the source of the white patch is unknown, similar material can be seen on aerial photographs from the same time period (mid 1950s) on the ground adjacent to the Sludge Drying Beds (SWMU 5). The white material is probably dehydrated lime sludge from the Permutit water conditioning system. As discussed earlier, former employees report that the lime sludge was trucked to this site and sprayed on the ground (Russell 2006b). The site currently contains miscellaneous construction debris including chunks of asphalt, railroad ties, and piping. Asbestos-containing material has also been identified at this site. Historical operations at this site and the source of this debris are unknown.

Employee reports suggest that a removal action for white powdery material was conducted in the early 1990s; however, no documentation regarding the removal has been found (Russell 2006b). The contours of the site suggest that some excavation may have occurred. Some white powdery material remains in the embankment adjacent to I-40, and it appears that a thin lens of additional material has been uncovered by erosion on the northern portion of the site. A roughly 1-foot thick layer of residual material is present immediately adjacent to I-40 and a thin lens of the same material is visible to the north of the excavation area. In addition, a 1998 investigation of the area indicated that a layer of white powdery material is present below the current soil surface (PG&E 1999b).

An asbestos removal action was completed at this site in 1999 (PG&E 1999c). In November 1998 during soil sampling at AOC 14, a small amount of friable construction debris and transite were found. The friable material contained over 1 percent asbestos. The transite was non-friable and after sampling, the trench was covered with clean fill material. PG&E removed the friable ACM on April 14, 1999 and disposed of the material at an appropriate landfill. Two shallow confirmation samples were collected of the underlying soils. At one sample location, asbestos was detected in the underlying soil. Additional sampling was implemented to characterize the extent of the asbestos in the soil underlying the loose construction material near this sample. On June 1, 1999, 14 additional samples were taken and no asbestos was detected in any of the sample locations.

4.2.11.2 Constituents of Potential Concern

The Railroad Debris site contains construction debris and likely dehydrated lime sludge from the Permutit water conditioning system, as well as possibly other materials. During trenching operations at the Railroad Debris site (Phase 1 of the RFI), asphalt material, creosote-treated railroad ties, construction debris, ACM, and a white powdery material were encountered at this site. Based on the foregoing observations and laboratory data analysis, PG&E has identified SVOCs (including pentachlorophenol and PAHs), Title 22 metals, Cr(VI), TPH, and asbestos as COPCs for this site. DTSC also identified VOCs as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.12 AOC 15 – Auxiliary Jacket Cooling Water Pumps

The AJCW pumps are part of the AJCW system and are located within the facility fenceline north of the auxiliary building (Figure 4-1).

4.2.12.1 Description and History

The AJCW system is a closed-loop cooling water system for the generator engines. The pumps are used to circulate the cooling water through the system. The AJCW system was subject to occasional leaks due to failure of pump and valve seals. Two employees indicated that in the past leaks from the AJCW entered a pipe trench in the road near the AJCW system (Russell 2006b). The trench led to a storm drain that discharged in the area of AOC 9.

The ground surface in the immediate vicinity of the pumps is unpaved, but covered with gravel; the area outside the containment berm is paved. There is currently no exposed soil in this area; however, the area immediately adjacent to the AJCW system was historically unpaved. Aerial photos from 1967 and earlier clearly indicate that the area was unpaved. Intervening aerial photographs do not provide sufficient resolution to determine when the area was first paved. Chromium-based cooling water additives were used in this system from 1951 through 1985. In 1985, this system was converted to using non-hazardous, molybdate-based cooling water additives. Incidental leaks and spills have occurred and may have resulted in impacts to the soil beneath the pumps. Historic information indicates that concentrations of molybdenum as molybdate (MoO_4) typically ranged from 300 to 800 ppm (Betz 1987, 1989, 1990, 1991).

4.2.12.2 Constituents of Potential Concern

Based on the historic use of chromium-based cooling water additives in this system, PG&E has identified Cr(T), Cr(VI), copper, lead, molybdenum, nickel, zinc, and pH as COPCs for soil. In addition, DTSC identified other Title 22 metals as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.13 AOC 16 – Sandblast Shelter

The sandblast shelter is located near the injection well PGE-08. The area is and has historically been unpaved.

4.2.13.1 Description and History

The sandblast shelter was apparently used to prepare metal at the facility for protective coating. Most of the sand blasting conducted at Topock apparently consisted of removing paint from plant equipment. No other information is available regarding this site.

4.2.13.2 Constituents of Potential Concern

No sampling has been done directly for this AOC. However, a soil sample (AOC 2A) collected for SWMU 2/AOC 2 (an area close to the sandblast shelter) showed elevated concentration of zinc compared to background levels. COPCs for soil associated with AOC 16 are Title 22 metals. COPCs are anticipated to be limited to soil only. DTSC had no additional COPCs (DTSC 2006b).

4.2.14 AOC 17 – Onsite Septic System

AOC 17 consists of the onsite septic system connected to the Auxiliary Building. This septic system received wastes from the facility laboratory.

4.2.14.1 Description and History

The plant cooling water was routinely sampled to monitor its chemical content and pH. Test chemicals consisted of indicator reagents, which were supplied by the cooling water treatment chemical company. Once the cooling water was tested, the laboratory waste (testing solutions and small amounts of cooling water) was discharged into the septic system. Approximately 1 pint per day of test chemicals was disposed of into the septic system connected to the facility laboratory.

The same septic system also serves the remainder of the Auxiliary Building and other nearby buildings (the Technical Maintenance Building, Weld Shop, Garage, and Maintenance Shop). The Auxiliary Building includes the electric generators (P-Units), air compressors, electric switchgear, battery room, laboratory, mechanics' office, machine shop, locker room, and crew lunchroom. Incidental releases of maintenance-type chemicals could therefore also have entered the septic system.

The septic tank associated with the laboratory is reportedly located 4 feet out from the wash rack and is buried 4 feet deep (Russell 2006b). A leachfield is believed to exist in the general vicinity of the septic tank. Aerial photos from 1967 and earlier clearly indicate that the area around the septic tank location was unpaved. While review of the aerial photograph from 2004 documents that the area was paved, aerial photographs between 1967 and 2004 do not have sufficient resolution to determine whether or not the area was paved.

4.2.14.2 Constituents of Potential Concern

No sampling has been conducted for this AOC. Based on the unit operations, COPCs associated with AOC 17 consist of Title 22 metals, Cr(VI), pH, VOCs, TPH, and PAHs. DTSC identified SVOCs (including PAHs) as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.15 AOC 18 – Combined Wastewater Transference Pipelines

AOC 18 includes pipelines that were used to connect the cooling towers to the wastewater system including SWMUs 1 (Former Percolation Bed), 2 (Inactive Injection Well PGE-08), 5 (Sludge Drying Beds), 6 (Chromate Reduction Tank), 7 (Precipitation Tank), 8 (Process Pump Tank), 9 (Transfer Sump), and 10 (Old Evaporation Ponds) and Units 4.3 (Oil/Water Holding Tank), 4.4 (Oil/Water Separator), and 4.5 (Portable Waste Oil Storage Tank). Several of these pipelines were removed at the time of the closure of the hazardous waste management system, although some may still be in active use. There is limited information regarding these pipelines. No as-built drawings are available. Some additional information is available as part of a separate closure of the original oil/water separator system.

4.2.15.1 Description and History

Wastewater pipelines at the site were made of polyethylene, PVC, aluminum, cast iron, and vitrified clay (Mittelhauser 1986). These pipelines were used only to convey wastewater. Pipelines for gas transmission and stormwater are separate systems.

The hazardous waste management system and the related piping were closed, and piping was pressure tested for leaks as part of the closure process, as described in the *Phase 1 and 2 Closure Certification Report Hazardous Waste Management Facilities* (Mittelhauser 1990b). Laboratory data sheets are provided for this unit in Appendix C. The pipes that were removed as part of the closure operations are not part of the RFI process.

Except for the vitrified clay sludge pipeline (Pipeline H) and other short sections, the pipelines that were inactive at the time of the wastewater treatment system closure were pressure tested, inspected, and the wastewater from the pressure test was sampled. The wastewater samples were analyzed for Title 22 metals, pH, and fluoride.

Most of the wastewater pipelines passed within the limits of the test. Only one pipeline failed and was removed along with most of the other inactive pipelines. During removal of some pipes, there was visible staining below some sections of pipe. The interior of most of the pipelines had a visible green sludge and they were disposed of as hazardous waste. Several sections of pipeline, including D-3, F-5, G-1, all of A-3, G-2 and G-3, were not removed because they were inaccessible, sufficiently decontaminated, and still active, or they were long and difficult to remove. Pipelines A-3, G-2, and G-3 have been extensively flushed since 1985 when cooling water treatment with chromate ceased.

As part of the closure process, soil was removed from five areas with metals concentrations greater than background. A second round of confirmatory sampling was conducted to determine if the site was cleaned to background standards.

Pipeline H, the vitrified clay pipeline, was not pressured tested. After contaminated soils (visible green and white soils) identified in the vicinity of the pipeline were removed, a second round of soil sampling was conducted for each section of the pipeline to confirm that the area was clean. A sample was also taken where a portion of the pipeline had been removed a few years earlier.

The original OWSS was closed around 1990 (Mittelhauser 1990a) and there was some characterization of leaks near the pipelines associated with the OWSS. The OWSS 3-inch diameter underground piping was removed as part of the closure. Water from the

OWSS flowed into this pipe and discharged into the Chromate Reduction Tank. During the closure, leaks in the OWSS appeared to have occurred. Piping was removed where accessible, but some sections of the pipe were capped and left in place.

4.2.15.2 Constituents of Potential Concern

The pipelines were used to convey wastewater from various SWMUs at the facility. Based on the available data and operations history, PG&E identified Cr(T), copper, mercury, lead, molybdenum, nickel, zinc, Cr(VI), pH, TPH, and PAHs as COPCs for this unit. DTSC also identified other Title 22 metals, VOCs, and all other SVOCs (in addition to PAHs) as COPCs for this unit (DTSC 2006b). COPCs are anticipated to be limited to soil only.

4.2.16 AOC 19 – Former Cooling Liquid Mixing Area

AOC 19 was identified by routine inspection in January 2006. During the most recent test of the eyewash shower located in this area, droplets of green liquid were observed on the concrete pad below the eyewash shower (PG&E 2006e). AOC 19 was initially defined as consisting of the concrete pad area associated with the former cooling additive mixing shed. Recent information regarding potential leaks from the JCW system (Russell 2006b) has led to the inclusion of the adjacent jacket cooling water pumps and tank area into AOC 19. AOC 19 is located directly east of the compressor building and consists of the footprint of the JCW area. The former cooling additive mixing shed is located within this footprint between the JCW pumps and the JCW tanks (Figure 4-1). The pad from the former shed currently exists, and is located adjacent to a smaller concrete pad that presently serves as a base for an exterior employee emergency safety shower.

4.2.16.1 Description and History

The JCW system originally was designed with a hot well (a large rectangular concrete structure, partially below grade) that acted as a surge tank for the jacket cooling water system. Cooling water additives for this system were chromium-based until October 1985; since 1985, the additive package has been molybdate-based. Historic records (Betz 1987, 1989, 1990, 1991) indicate that concentrations of molybdenum as molybdate typically ranged from 300 to 800 ppm. The water was pumped from the hot well into the heat exchangers. There was no overflow control system on the hot well, and employees stated that they periodically overflowed. The hot well was approximately 10 feet deep, with about half that height above ground. The area covered by the hot well was about twice the area covered by the current concrete containment area for the jacket water tanks. The hot well was abandoned in place and replaced with jacket cooling water tanks (which still exist) prior to 1990. In the early 1990s, a construction project began to provide secondary containment in the area. During the construction, remnants of the old hot well were discovered.

A cleanup project was conducted to remove the hot well remnants. The remaining concrete and the soil contained in the hot well were removed, and the concrete debris and soil were sampled. The soil samples contained Cr(T) at 280 and 220 mg/kg respectively, and Cr(VI) at 4 and 3.6 mg/kg. The concrete sampled contained Cr(T) at concentrations ranging from 530 to 2,300 mg/kg, and Cr(VI) at concentrations ranging from 37 to 330 mg/kg. The two samples with the highest Cr(T) concentrations were analyzed for soluble Cr(T) and Cr (VI) using the California Waste Extraction Test (WET). The two samples were also tested for soluble Cr(T) using the toxicity characteristic leaching procedure (TCLP). All samples

exceed the soluble threshold limit concentration (STLC) and total threshold limit concentration (TTLC) criteria of 5 mg/L. The TCLP indicated soluble Cr(T) at 40 and 68 mg/L, respectively, while the WET indicated soluble Cr(T) at 78 and 110 mg/L, respectively. The soluble Cr(VI) concentrations were 64 mg/kg and 80 mg/kg, respectively. No soil samples were collected under the hot well.

The JCW system was also subject to occasional leaks from the hot well and pump and valve seal failure. The cooling water would flow onto the graveled area near the pumps. Larger leaks could sometimes result in releases onto the paved area between the JCW system and the visitor parking lot/warehouse, and then potentially down the main entrance road leading to the station (Russell 2006b).

The chemical additive shed was located between the jacket water pumps and tanks/hot well. The pad from the shed remains; it is adjacent to an eyewash station/emergency shower. Upon discovery of the droplets of green-colored water, sampling was conducted in the area. The affected area was covered with visquine to minimize employee contact and a wooden pad was installed over the pad to minimize human exposure and to allow the safety shower to remain in operation. During some time periods in the past, powdered coolant chemicals were mixed here, and then reportedly hand-added to the hot well (Russell 2006b).The area around the former shed/concrete pad is unpaved.

4.2.16.2 Constituents of Potential Concern

Soil samples were collected and analyzed for metals. WET tests were also performed for Cr(T) and Cr(VI). The soil samples collected in this area were limited to the area immediately adjacent to the concrete pad. Preliminary soil samples collected in the area indicate the presence of Cr(T) at concentrations exceeding CCR Title 22 TTLC concentrations; all other metals were below their respective TTLCs. Soil samples analyzed exceeded the STLC for Cr(T). Soluble Cr (VI) concentrations were below the STLC for all samples. Based on the operations history and available data, COPCs for soil associated with AOC 19 consist of Cr(T), Cr(VI), molybdenum, and potentially wear metals from the heat exchangers (copper, lead, nickel, and zinc). DTSC identified Title 22 metals and pH as COPCs for this unit (DTSC 2006b).

4.2.17 AOC 20 – Industrial Floor Drains

AOC 20 was identified at the request of DTSC (DTSC 2007d). AOC 20 consists of the industrial floor drains within the compressor station buildings and other industrial structures and facilities within the upper yard of the compressor station that are routed to the Oil/Water Separator System. AOC 20 does not include the miscellaneous floor drains in areas such as lavatories that drain to one of the three septic systems on the station.

4.2.17.1 Description and History

Several of the industrial buildings within the compressor station are equipped with floor drains that capture liquids released to the floor of the building, and convey the liquid to the OWSS. In addition, other industrial facilities, such as the steam cleaning area and the main jacket water surge tanks, are equipped with drains that capture overflow and spills. A pipe trench - that extends from just north of the steam cleaning area to the east side of the compressor building - also drains to the OWSS and has been included in this AOC.

Collectively, these drains are referred to as industrial floor drains to distinguish their use and intent from the storm drains that are also present at the facility. As shown in Figure 4-3, industrial floor drains are found in the following buildings and facilities: Compressor Building, Auxiliary Building, Jacket Cooing Water Pumps, Oil Storage Tank Area, Steam Rack (steam cleaning area), and Fire Water Pump Building (Former Water Softener Building).

Pipelines that are connected to the OWSS were historically made primarily of vitrified clay. Currently, the system contains a variety of pipe materials including reinforced fiberglass, PVC, cast iron, and Acrylonitrile-Butadiene-Styrene (ABS). The aboveground lines (shown on Figure 4-3) are all welded carbon steel pipe (PG&E 1991c). No sampling of the industrial floor drains has been conducted. Many of the pipes leading from the industrial floor drains to the OWSS are located under building floors and machinery, and/or are buried below ground and largely inaccessible.

The liquids potentially discharged to the industrial floor drains would consist primarily of liquids present within the industrial buildings and facilities. Liquids used in the operations in the industrial buildings included lubricating oil, oily water from the steam cleaning area and compressor and generator engine steam cleaning, jacket cooling water, and lubricating oil cooling water. The other two sources of liquids consist of the rainwater that collected in the pipe trench and hose-down water used when the pipe trench was cleaned. Drainage from the various cooling water systems would have contained chromium compounds and, later, molybdenum. No records exist of any specific releases to the industrial floor drains; however, both are expected to have captured incidental drips and spills during plant operations, as well as occasional washing liquid from floor cleaning within the buildings.

4.2.17.2 Constituents of Potential Concern

Based on the operations history, COPCs associated with AOC 20 include Cr(T), copper, mercury, lead, molybdenum, nickel, zinc, Cr(VI), TPH, and PAHs. COPCs are anticipated to be limited to soil. DTSC also identified all other Title 22 metals and VOCs as COPCs for this unit (DTSC 2007f).

4.3 Other Undesignated Areas

4.3.1 Potential Pipe Disposal Area

Metal pipelines insulated with asbestos may have been buried on the east side of the access road leading to the Old Evaporation Pond. A former employee described 20-foot lengths of asbestos-covered metal pipes being buried in a trench immediately east of the access road, across from the northern boundary of the former ponds. Potential constituents of concern in this area are limited to asbestos in soil.

4.3.2 Former 300B Pipeline Liquids Tank

PG&E's 300B pipeline was formerly equipped with a 900-gallon capacity above-ground drip tank. The drip tank was located east of the Topock Compressor Station, south of the compressor station access road, immediately west of the pipeline access road adjacent to the Colorado River, on the Havasu National Wildlife Refuge. The tank was 2 feet, 10 inches in

diameter, and 20 feet long. It was an aboveground tank located on two concrete saddle supports. The tank pad was unpaved (Trident 1995a). The tank was removed by 1995.

4.3.2.1 Description and History

The tank was designed to capture pipeline liquids. It was drained periodically (Russell 2006b). The tank was removed in 1995, and associated piping was emptied, disconnected, and capped at the abandoned ends (Trident 1996d). Trident Environmental and Engineering conducted an investigation of the former tank location in December 1994 (Trident 1995a). Oil staining was observed below the center and southern portions of the tank, extending out a maximum of 6 feet from the footprint of the former tank (Trident 1995a). The total stained area was estimated to be approximately 20 feet by 40 feet. Trident speculated that the oil had sprayed out of the southern outlet of the tank, and noted that oil staining was also observed on the near vertical embankment north of the tank location.

In 1994, oil-stained soil was observed underneath and immediately adjacent to a portion of the tank, and an initial site investigation was performed December 2, 1994. Samples were analyzed for TPH-motor-oil by gas chromatography/flame ionization detector. Low levels of TPH-motor-oil were detected at 1.2 and 2.0 feet bgs (Trident 1995a).

The tank was subsequently removed in 1995, and excavation of soil and confirmation sampling were performed between July and September 1996. On June 9, 1997, San Bernardino County issued a letter confirming the completion of the site investigation and remedial action of the contaminated soil at the site. Additional details regarding the closure of the Former 300B Pipeline Liquids Tank are presented in Section 5.0.

4.3.2.2 Constituents of Potential Concern

At the time the tank was in service, pipeline liquids would have contained both condensate and lubricating oils from compressors, with the latter representing an increasing fraction of the pipeline liquids after El Paso Natural Gas began removing the condensate prior to transmitting the natural gas in the mid-1980s. Condensate is composed primarily of straight-chain aliphatic hydrocarbons in the pentane to octane range ("natural gasoline") (Russell 2006b), whereas the lubricating oils are heavier weight hydrocarbons.

One surface soil sample was collected on April 16, 1996 to characterize the stained soil for future disposal. The soil sample was analyzed for TRPH by USEPA Methods 418.1, VOCs by USEPA Method 8240, SVOCs by USEPA Method 8270 PCBs by USEPA Method 8080, and California Assessment Method (CAM) 17 metals. The sample results were less than analytical limits for VOCs, SVOCs, and PCBs. Metals concentrations were reported as being near background. Metals, VOCs, SVOCs, and PCBs were sampled at a location coincident with the highest level of TRPH, and analytical results indicate no elevated concentrations of these constituents; therefore, COPCs associated with this area are limited to TRPH in soil. DTSC also identified Title 22 metals, VOCs, SVOCs PAHs, and PCBs as COPCs for this unit (DTSC 2007e).

TABLE 4-1
Summary of SWMUs and AOCs Identified in the RFA and CACA
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

RFA Designation[a]	RFA Identification[a]	CACA Designation[b]	CACA Identification[b]	Description	Constituents of Potential Concern in CACA[c]	Constituents of Potential Concern in this RFI – Soil[d]	Constituents of Potential Concern in this RFI – Groundwater[d]
Unit 4.1	Percolation Pond	SWMU 1	Former Percolation Bed	Located in Bat Cave Wash immediately west of the compressor station. From 1951 to 1964, untreated wastewater (containing chromium) was discharged to the wash. Single step treatment of wastewater to reduce Cr(VI) to Cr(III) began in 1964. A percolation bed was also created in about 1964 and reportedly covered an area of about 17,600 square feet. Wastewater discharged to this area was allowed to percolate into the ground and/or evaporate. In 1969, a two-step wastewater treatment system was installed to both reduce Cr(VI) to Cr(III), and then to remove Cr(III) from the wastewater. Reportedly received an estimated 6 million gallons per year of treated wastewater comprised of cooling water blowdown (95%) and oily water (5%). Treated wastewater contained residual chromium and TDS. Disposal of wastewater to Bat Cave Wash ceased in 1970[e].	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity[f]	Cr(T), Cr(VI), Cu, Hg, Ni, Pb, Zn, pH, PAH, and TPH	Cr(T), Cr(VI), Cu, Ni, Pb, Zn, pH, electrical conductivity, and TPH
Unit 4.2	Injection Well	SWMU 2	Inactive Injection Well PGE-08	Located in the lower yard on the west side of the compressor station. Installed in 1969 to facilitate the underground injection of treated wastewater at depths in excess of 405 feet below ground surface. An estimated 42 million gallons of treated wastewater were injected into well PGE-08 between May 1970 and December 1973[e]. PGE-08 still exists, but was taken out of service in December 1973.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None	Cr(T), Cr(VI), Cu, Ni, Pb, Zn, pH, electrical conductivity, and TPH

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RFA Designation[a]	RFA Identification[a]	CACA Designation[b]	CACA Identification[b]	Description	Constituents of Potential Concern in CACA[c]	Constituents of Potential Concern in this RFI – Soil[d]	Constituents of Potential Concern in this RFI – Groundwater[d]
Unit 4.3	Oil/Water Holding Tank	None	None	Formerly located in the southern portion of the lower yard. The tank was installed in 1951 and consisted of a cylindrical steel tank with a capacity of 3,000 gallons. The tank was used to collect oily wastewater generated at the facility. Wastewater collected in this tank was directed to the OWS (Unit 4.4). The tank was removed during the period between November 1988 and February 1989.	None	Cr(T), Cu, Ni, Pb, Zn, Cr(VI), TPH, and PAHs	None
Unit 4.4	Oil/Water Separator	None	None	Formerly located in the southern portion of the lower yard. The unit was installed in 1951. It was constructed of concrete and was about 4.5 feet deep, 15 feet long, and 6 feet wide. The unit received oily wastewater from the adjacent oil/water holding tank (Unit 4.3). From 1951 to 1970, treated wastewater from this unit was discharged to the former percolation bed (SWMU 1) in Bat Cave Wash, and from 1970 to December 1973, treated wastewater from this unit was discharged to injection well PGE-08[e]. From 1973 to about 1988, treated effluent from the unit was ultimately disposed in the evaporation ponds (Unit 4.11, SWMU 10). This OWS was removed during the period between November 1988 and February 1989.	None	Cr(VI), Cr(T), Cu, Ni, Pb, Zn, TPH and PAHs	None

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Unit 4.5	Portable Waste Oil Storage Tank	None	None	Formerly located in the lower yard adjacent to the OWS (Unit 4.4). It was a steel, cylindrical tank about 2 feet in diameter and 6 feet long mounted horizontally on a trailer. It was connected to a suction pump in the OWS by hose and was used to remove floating oils from the OWS. The tank sat on a concrete pad (10 feet by 8 feet) that had a 6-inch concrete berm on 3 sides. When the tank was full, it was moved to the east end of the facility and the contents were transferred to the waste oil storage tank (Unit 4.6). The tank was removed from service in 1989 and subsequently removed from the facility.	None	TPH and PAHs	None
Unit 4.6	Waste Oil Storage Tank	None	None	Located in the product oil and fuel storage area on the east side of the facility. The storage area is located within a concrete secondary containment unit. The tank is a vertical steel vessel about 8 feet in diameter and 20 feet high. Waste oils generated at the facility are collected in this tank. Waste oil is periodically removed from the tank and taken offsite for recycling. The tank is still in active use.	None	None	None
Unit 4.7	Chromate Reduction Tank	SWMU 6	Chromate Reduction Tank	Formerly located in the southern end of the lower yard. The tank was constructed of steel and measured 10 feet high and 5 feet in diameter. Cooling water blowdown containing chromium was treated in this tank from 1969 to October 1985 by injecting the wastewater with sulfur dioxide. The treatment reduced Cr(VI) to Cr(III). Treated wastewater flowed from this tank to the Transfer Sump (SWMU 9).	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	TPH and PAHs	None

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Unit 4.8	Transfer Sump	SWMU 9	Transfer Sump	Formerly located in the lower yard. This sump was a pre-fabricated concrete septic tank measuring 20 feet deep (18.5 feet below grade) and 3 feet in diameter. It was used to transfer treated cooling tower blowdown from the Chromate Reduction Tank (SWMU 6) to the Precipitation Tank (SWMU 7) from 1969 through October 1985. It also received treated wastewater from the OWS. The sump was removed from service in October 1985, and was physically removed between November 1989 and March 1990.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	TPH and PAHs	None
Unit 4.9	Precipitator Tank	SWMU 7	Precipitation Tank	Formerly located at the south end of the facility, just south of the former 'water treatment building" (currently known as the "storage building"). This tank was constructed of steel and measured 15 feet high by 13 feet in diameter. It was used to treat cooling water blowdown from 1969 through October 1985 by injecting sodium hydroxide into the wastewater to precipitate out Cr(III). Chromium hydroxide sludge was produced in this process. Treated wastewater was discharged to the Process Pump Tank (SWMU 8) and the sludge was transferred to the Sludge Drying Beds (SWMU 5). The tank was removed from service in October 1985, and was physically removed between December 1998 and March 1990.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None[h]	None

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Unit 4.10	Process Pump Tank	SWMU 8	Process Pump Tank	Formerly located adjacent to the Precipitation Tank (SWMU 7). This tank was constructed of steel and measured 8 feet high by 5.5 feet in diameter. It was used as a holding tank for treated cooling tower blowdown prior to discharge. Treated wastewater from this system was sent to the former percolation bed (SWMU 1) from late 1969 to May 1970; to injection well PGE-08 (SWMU 2) from May 1970 to December 1973; and to the Evaporation Ponds (SWMU 10) from December 1973 to October 1985[e].	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	TPH and PAHs	None
Unit 4.11	Four Evaporation Ponds	SWMU 10	Old Evaporation Ponds	Formerly located west of the facility on property owed by the HNWR, SWMU-10 consists of four former single-lined evaporation ponds that occupied a total surface area of about 181,00 square feet (4.15 acres). The ponds were used from 1971 to October 1985 to receive treated effluent from the facility.[e]	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None[h]	None
Units 4.12 and 4.13	East and West Chromic Hydroxide Sludge Drying Beds	SWMU 5	Sludge Drying Beds	Formerly located in the lower yard. The two concrete beds were constructed in 1951 and measured approximately 20 feet by 50 feet each. The beds were originally used from 1951 to about 1961 to dehydrate lime sludge from the facility's Permutit water softening system. From 1964 to 1969, a single-step chromium treatment pond was constructed in one of the beds. From 1969 through October 1985, the beds were used to periodically dehydrate chromium hydroxide sludge prior to disposal. The beds were removed from service in October 1985, and were physically removed between November 1988 and February 1989.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	TPH and PAHs	None

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RFA Designation[(a)]	RFA Identification[(a)]	CACA Designation[(b)]	CACA Identification[(b)]	Description	Constituents of Potential Concern in CACA[(c)]	Constituents of Potential Concern in this RFI – Soil[(d)]	Constituents of Potential Concern in this RFI – Groundwater[(d)]
None	None	SWMU 3	PG&E Inactive Well #6 (PGE-06)	Well PGE-06 was drilled and completed in 1964 as a standby well to provide a backup source of industrial water supply for the compressor station. The well was only used for a short period of time during the construction of Interstate 40 (I-40) to produce water for dust suppression. The well has never been used to supply water to the compressor station.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None	None
None	None	SWMU 4	PG&E Inactive Well #7 (PGE-07)	Well PGE-7 was drilled and completed in 1964 as a standby well to provide a backup source of industrial water supply for the compressor station. There are no records that indicate this well was ever used to produce water for any purpose. This well was converted to a monitoring well for injection well PGE-08 in 1969.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None	None
None	None	AOC 1	Area Around Percolation Bed	AOC 1 consists of the area surrounding the Percolation Beds (SWMU 1); however, the limits of AOC 1 have not been formally defined. Based on historic discharge information, AOC 1 includes the floor of Bat Cave Wash from the discharge area to the railroad tracks.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	Cr(T), Cr(VI), Cu, Hg, Ni, Pb, Zn, pH, PAH, and TPH	Cr(T), Cr(VI), Cu, Ni, Pb, Zn, pH, EC, and TPH
None	None	AOC 2	Area Around Inactive Injection Well PGE-08	AOC 2 consists of the unpaved soil area around injection well PGE-08 (SWMU 2). Because wastewater was injected at depth (greater than 405 feet below ground surface), surface releases are not likely.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None	None
None	None	AOC 3	Area Around PG&E Inactive Well #6 & #7 (PGE-06 and PGE-07)	AOC 3 consists of the unpaved soil areas around standby production wells PGE-06 and PGE-07. There is no evidence that any wastes were disposed of into or around these wells.	Cr(T), Cr(VI), Ni, Cu, Zn, pH, and electrical conductivity	None	None

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Notes:
(a) Designation and identification per the *RCRA Facility Assessment* (Kearny 1987).
(b) Designation and identification per the *Corrective Action Consent Agreement* (DTSC 1996).
(c) COPCs from the *Corrective Action Consent Agreement* (DTSC 1996).
(d) COPCs as developed in this RFI. Additional COPCs have been identified by DTSC (DTSC 2006b). These additional COPCs are described in the discussion of each SWMU, AOC or unit.
(e) Some wastewater may have been discharged to Bat Cave Wash from 1970 through 1971 when PGE-08 was offline; some wastewater was also discharged to Pond 1 from 1971 to 1973 when PGE-08 was offline.
(f) Electrical conductivity is a measurement that includes naturally-occurring minerals such as sodium, chloride, calcium, and sulfate.
(g) These units were closed and removed between 1988 and 1990; therefore, there are no current COPCs.
(h) The hazardous waste treatment system was clean closed by PG&E between 1989 and 1993, and DTSC issued a closure certification acceptance letter in 1995; therefore, there are no current COPCs.

Sources:
RCRA Facility Assessment (Kearny 1987)
Corrective Action Consent Agreement (DTSC 1996)
Current Conditions Report (Alisto 1997)
RCRA Facility Investigation Work Plan (Alisto 1997)
Work Plan for Additional Soils Sampling (E&E 2000b)
RCRA Facility Investigation Report (E&E 2004)

TABLE 4-2
Summary of Other AOCs[a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Designation	Identification	Subareas	Subarea Designation in this RFI [b]	Description	Constituents of Potential Concern[c]
AOC 4	Debris Ravine	Lower Road Lower Hillside Upper Road Upper Hillside		Located at the southern end of PG&E property. A narrow, steep-sided arroyo that drains to Bat Cave Wash. The southern end of the PG&E property has historically been used to store and/or dispose of scrap debris. Some of the debris ended up at the bottom of the ravine (e.g., wood, metal, concrete and some small quantities of white powder).	Title 22 metals and Cr(VI), PAHs and asbestos.
AOC 5	Cooling Tower A	None		AOC 5 consists of the area around Cooling Tower A including the former chemical storage shed, sulfuric acid tank, and current cooling water treatment product tanks.	Cr(T), Cr(VI), Cu, Ni, Pb, Zn, and pH.
AOC 6	Cooling Tower B	None		AOC 6 consists of the area around Cooling Tower B including the former chemical storage shed, sulfuric acid tank, and current cooling water treatment product tanks.	Cr(T), Cr(VI), Cu, Ni, Pb, Zn, and pH.
AOC 7	Hazardous Materials Storage Area	None		A chemical storage building and loading dock located in the southeastern portion of the compressor station. The area has historically been used for chemical product storage. Small quantities of chemical products are still stored in this area. A portion of the area is currently concrete-lined with secondary containment walls, and it has been used since the mid 1980s as a hazardous waste accumulation area.	Title 22 metals, VOCs, SVOCs, PCBs, and TPH.
AOC 8	Paint Locker	None		A small, fire-safe flammable materials locker located in the southeastern portion of the compressor station used for the storage of minor quantities of paint (about 100 gallons).	VOCs, TPH, and Title 22 metals.
AOC 9	Southeast Fence Line (Outside Visitor Parking Lot)	None		A small area of discolored (i.e., green) surface soil observed near the southeast fence line in early 2000. Some soil removal has occurred in this area. Soil samples collected at the time of soil removal indicate the presence of Cr(T) and Cr(VI).	Cr(T), Cr(VI), TPH, PAHs, Mo, and wear metals (Cu, Pb, Ni, Zn).
AOC 10	East Ravine	Southeast Fence Ravine Low Area Downstream of SE Fence Low Area Behind Berm Low Area Behind Berm	10a 10b 10c 10d	The East Ravine is a small ravine starting near the southeast fenceline of the compressor station and extending eastward to the Colorado River. The ravine is about 1,600 feet long and is bisected by one constructed dam and two dirt roads that also form dams. Behind each dam is a small drainage depression where water ponds during storm events and fine-grained sediments have accumulated.	Cr(T), Cr(VI), Mo, Cu, Ni, Pb, Zn, PAHs, and TPH.

TABLE 4-2
Summary of Other AOCs[a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Designation	Identification	Subareas	Subarea Designation in this RFI [b]	Description	Constituents of Potential Concern[c]
AOC 11	Topographic Low Areas	Low Area Near MW-12	11-a	Certain drainage channels around the compressor station drain into topographic low points where runoff ponds and/or infiltrates into the ground. The five identified low areas may have received runoff from the compressor station.	Cr(T), Cr(VI), Cu, Pb, Ni, Zn, PAHs, and TPH.
		Low Area Near Road	11-b		
		Remnant Dam in Lower Portion of Ravine	11-c		
		Small low area by pipeline alignment	11-d		
		Remnant Dam in Upper Portion of Ravine	11-e		
AOC 12	Fill Area	North Bench Near Metering Station	12-a	Located on a bench by the Transwestern Intertie, these three small areas been filled and may have received construction debris or other residues.	Title 22 metals, Cr(VI), PAHs, and TPH.
		Near Northwest Corner of Transwestern Intertie Fence	12-b		ACM, Title 22 metals, TPH, PAHs, VOCs
		Near Southwest Corner of Transwestern Intertie Fence	12-c		ACM
AOC 13	Unpaved Areas at Compressor Station	None	None	Unpaved areas within the compressor station or immediately adjacent to potential source areas.	Cr(T), Cr(VI),Cu, Pb, Ni, Zn, Mo, Hg, PAHs, and TPH, and pH.

TABLE 4-2
Summary of Other AOCs[a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Designation	Identification	Subareas	Subarea Designation in this RFI [b]	Description	Constituents of Potential Concern[c]
AOC 14	Railroad Debris Site	None	None	A 1.5-acre area located about 1,000 feet north of the compressor station on property owned by the HNWR. It is bounded by Interstate 40 (I-40) to the south, the BNSF railroad tracks to the north, Bat Cave Wash to the west and the former Route 66 alternate alignment to the east. Debris in this area consisted of chunks of asphalt, railroad ties, piping, and a 2-foot to 3-foot-thick lens of white powder (likely lime sludge). Asbestos-containing material has also been identified at this site. Removal actions were conducted to remove the white powder and ACM. Small amounts of the white powder remain. Based on review of aerial photographs, this site was apparently used by others prior to its use by PG&E. Historical operations by others at this site are unknown.	Title 22 metals, Cr(VI), SVOCs including pentachlorophenol, TPH, and asbestos.
AOC 15	Auxiliary Jacket Cooling Water Pumps	None	None	Three AJCW pumps are located in a small unpaved area southeast of the main compressor building. The pumps are part of the cooling water system and handled chromium-containing cooling water.	Cr(T), Cr(VI), Cu, Mo, Ni, Pb, Zn, and pH.
AOC 16	Sandblast Shelter	None	None	Located near injection well PGE-08. Apparently used to prepare metal at the facility for protective coating. The area is unpaved.	Title 22 metals.
AOC 17	Onsite Septic System	None	None	Onsite septic system connected to the facility laboratory and machine shop. Small quantities of laboratory wastes from cooling water monitoring activities were discharged to the septic system.	Metals, Cr(VI), VOCs, TPH, PAHs, and pH.
AOC 18	Combined Wastewater Transference Pipelines	None	None	All pipelines connecting cooling towers to wastewater system including SWMUs 1, 2, 5, 6, 7, 8, 9, and 10 and Units 4.3, 4,4, and 4.5. A portion of these pipelines were removed during the closure of the hazardous waste treatment system and replacement of the old OWS system.	Cr(T), Cu, Hg, Pb, Mo, Ni, Zn,, Cr(VI), pH, TPH, and PAHs.
AOC 19	Former Cooling Liquid Mixing Area	None	None	Located adjacent to the compressor building and consists of the footprint of the jacket cooling water area. The former cooling additive mixing shed is located within this footprint between the JCW pumps and the jacket cooling water tanks/former hot well.	Cr(T), Cr(VI), Cu, Mo, Ni, Pb, and Zn.

TABLE 4-2
Summary of Other AOCs[a]
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Designation	Identification	Subareas	Subarea Designation in this RFI [b]	Description	Constituents of Potential Concern[c]
AOC 20	Industrial Floor Drains	None	None	Industrial floor drains and associated pipelines leading to the OWSS. Floor drains and overflow drains are located in the Compressor Building, Auxiliary Building, Jacket Cooling Water Pumps, Oil Storage Tank Area, Steam Rack (steam cleaning area), and Fire Water Pump Building (Former Water Softener Building).	Title 22 metals, Cr(VI), TPH, VOCs, and PAHs

Notes:
[a] Considered AOCs by DTSC in letters to PG&E dated January 4, 2006 and July 13, 2006.
[b] Subarea designation is shown on Figure 4-1.
[c] COPCs developed in this RFI. COPCs are limited to soil; there are no COPCs for groundwater associated with these AOCs. Additional COPCs have been identified by DTSC (DTSC 2006b, 2007f). These additional COPCs are described in the discussion of each SWMU, AOC or unit.

Sources:
Work Plan for Additional Soils Sampling (E&E 2000b).
Draft RCRA Facility Investigation Report (E&E 2004).

TABLE 4-3
Summary of Other Undesignated Areas
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Identification	Description	Constituents of Potential Concern[(a)]
Potential Pipe Disposal Area	An employee reported that 20 foot lengths of asbestos-covered piping were buried in a trench on the East side of the access road by the Old Evaporation Ponds.	ACM
Former 300B Pipeline Liquids Tank	The Pipeline Liquids Tank located east of the compressor station was removed in 1995. Apparent leaks on the south side of the tank resulted in TRPH contamination below the southern end of the tank. Soil was removed in 1996, and the site was closed by San Bernardino County in 1997. Sample analysis indicated that PCBs, VOCs, and SVOCs were less than analytical detection limits. CAM 17 metals were at background levels, and TRPH was below 150 mg/kg.	TRPH

Notes:
(a) COPCs developed in this RFI. COPCs are limited to soil; there are no COPCs for groundwater associated with these areas. Additional COPCs have been identified by DTSC (DTSC 2007e). These additional COPCs are described in the discussion of each SWMU, AOC or unit.

Sources:
Russell 2006b
Trident 1996d

Bureau of Reclamation
(Managed by BLM)

HAVASU NATIONAL
WILDLIFE REFUGE
(HNWR)
(Managed by U.S. Fish and Wildlife Service)

Metropolitan Water District
of Souther California
(MWDSC)

PG&E

AOC 14
Railroad Debris
Site

SWMU 3
PGE-06

AOC 3

SWMU 4
PGE-07

Bat Cave Wash

AOC 1

SWMU 1
(Unit 4.1)
Former
Percolation Bed

SWMU 2
(Unit 4.2)
Inactive
Injection Well
PGE-08

SWMU 9
(Unit 4.8)
Former
Transfer Sump

SWMU 5
(Unit 4.12 & 4.13)
Former Sludge
Drying Beds

AOC 16
Sand Blast
Shelter

AOC 2

SWMU 6
(Unit 4.7)
Former
Chromate
Reduction
Tank

UNIT 4.5
Former Portable
Waste Oil
Storage Tank

UNIT 4.4
Former Oil/Water
Separator

UNIT 4.3
Former Oil/Water
Holding Tank

SWMU 7
(Unit 4.9)
Former
Precipitation Tank

SWMU 8
(Unit 4.10)
Former Process
Pump Tank

AOC4
Debris Ravine

AOC6
Cooling
Tower B

AOC5
Cooling
Tower A

AOC8
Paint Locker

AOC7
Hazardous
Materials
Storage Area

AOC 19
Former Cooling
Liquid Mixing Area

Unit 4.6
Waste Oil
Storage Tank

AOC 15
Auxiliary
Jacket Water
Cooling Pumps

AOC 17
On-Site Septic System

AOC9
Southeast
Fence Line

AOC10
East Ravine

11a
11b
11c
11d
11e
AOC11
Topographic
Low Areas

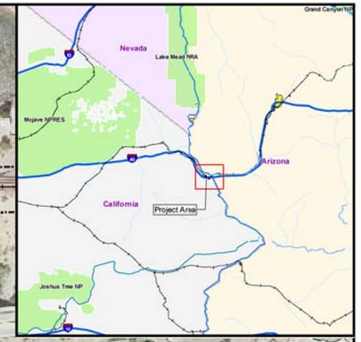
12a
12b
12c
AOC 12
(F2)
Fill Area

10a
10b
10c
10d

Former 300B Pipeline
Liquids Tank

Potential Pipe
Disposal Area

SWMU 10
(unit 4.11)
Old Evaporation Ponds



LEGEND

- Solid Waste Management Unit (SWMU)
- Area of Concern (AOC)
- Other Undesignated Areas

Notes:

AOC 13 is not depicted on this figure. It consists of the unpaved areas within the compressor station.

AOC 18 is not depicted on this figure. Please see Figure 4-2.

AOC 20 is not depicted on this figure. Please see Figure 4-3.

Boundaries of all SWMUs, AOCs, and Other Undesignated Areas are approximate.

N

0 150 300 600 Feet

1 inch equals 150 feet

FIGURE 4-1
SOLID WASTE MANAGEMENT UNITS (SWMUS), AREAS OF CONCERN (AOCS), AND OTHER UNDESIGNATED AREAS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

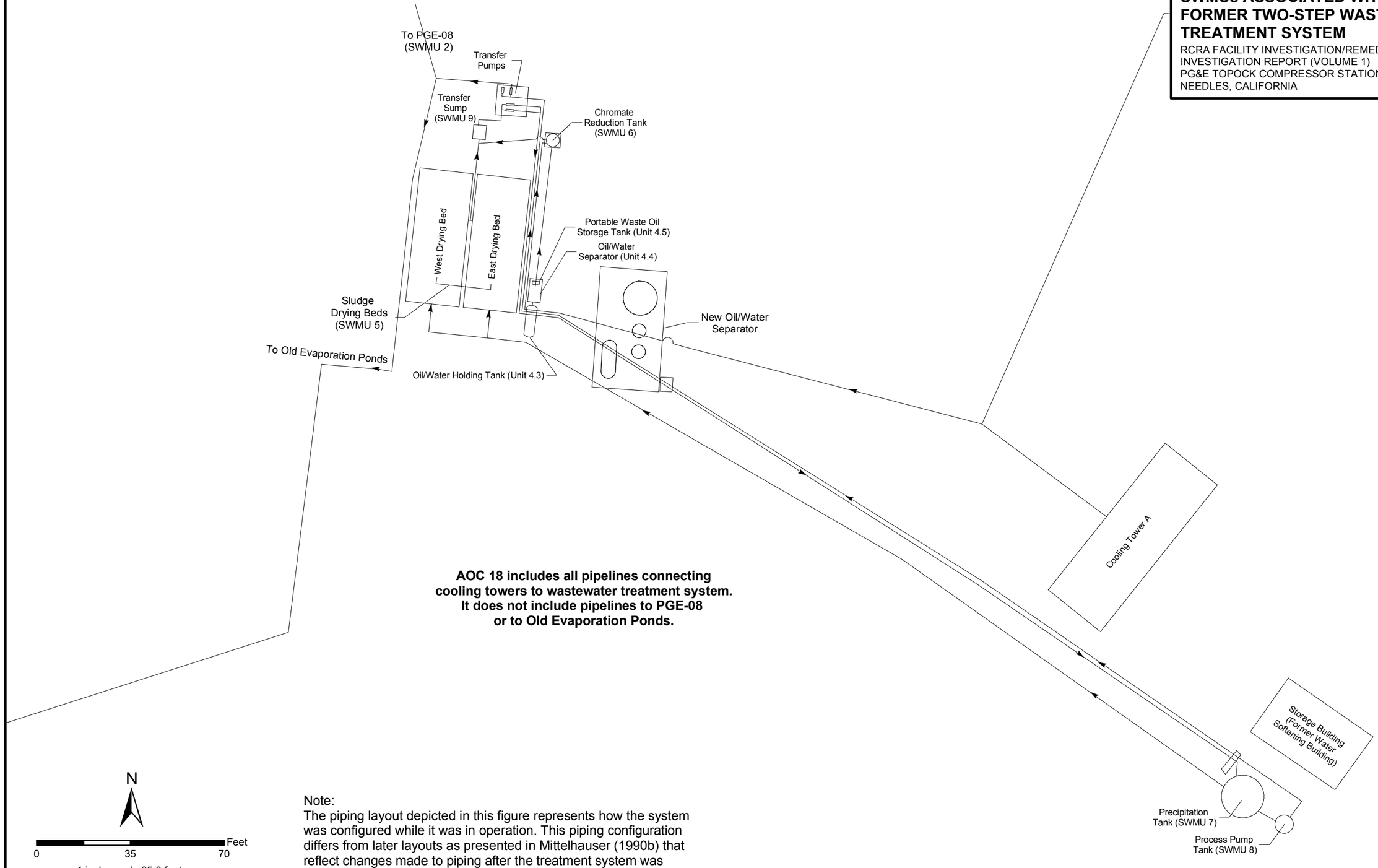
CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_SWMU_JUNE04_D.MXD RFI_SWMU_JUNE04_D.PDF 9/6/2006 15:32:26

FIGURE 4-2
SWMUs ASSOCIATED WITH THE FORMER TWO-STEP WASTEWATER TREATMENT SYSTEM

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



AOC 18 includes all pipelines connecting cooling towers to wastewater treatment system. It does not include pipelines to PGE-08 or to Old Evaporation Ponds.

N

0 35 70 Feet

1 inch equals 35.0 feet

Note:
The piping layout depicted in this figure represents how the system was configured while it was in operation. This piping configuration differs from later layouts as presented in Mittelhauser (1990b) that reflect changes made to piping after the treatment system was removed from service. All piping locations are approximate.

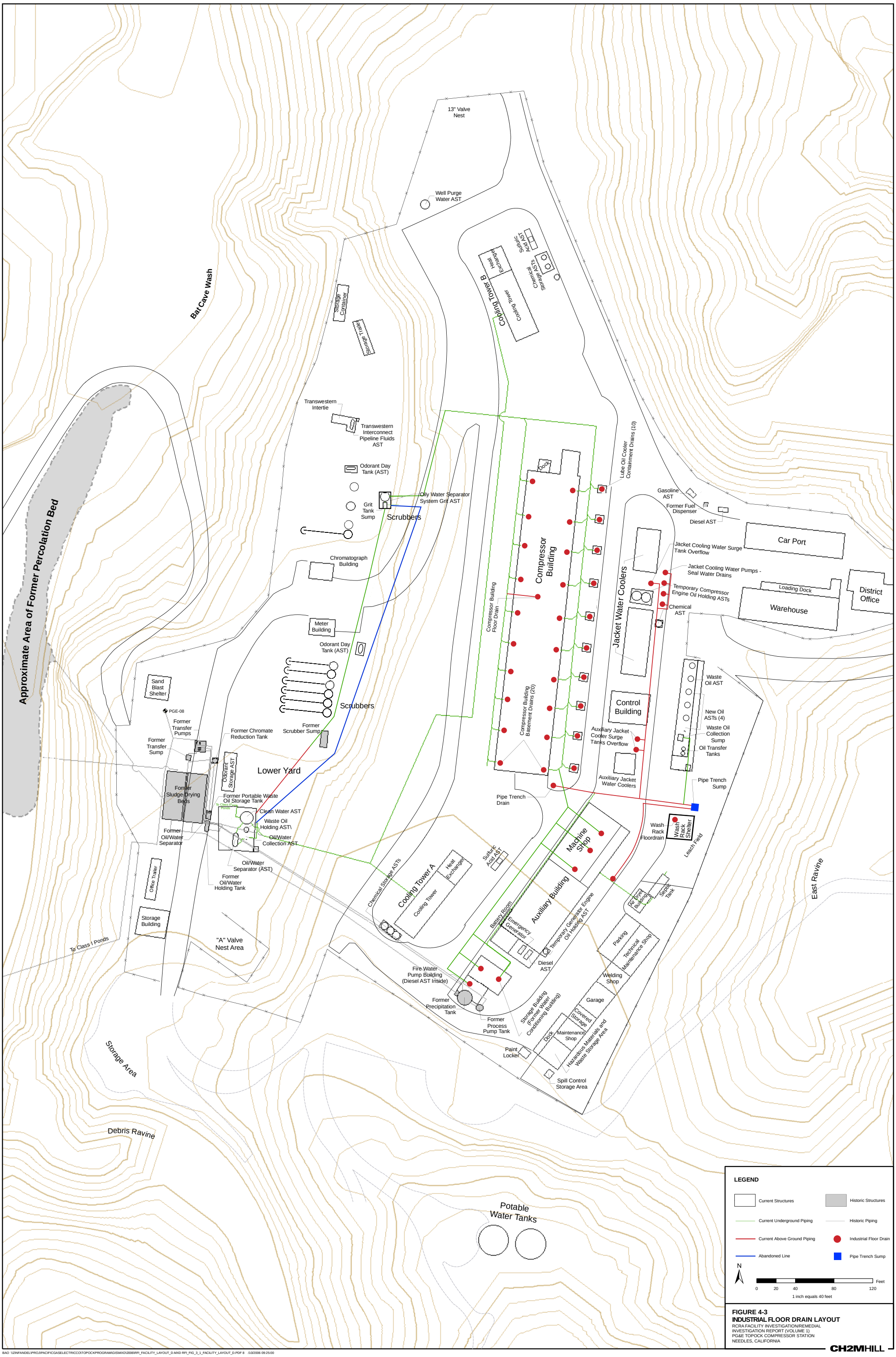


FIGURE 4-3
INDUSTRIAL FLOOR DRAIN LAYOUT
RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRIC\COTOPOCKPROGRAM\GIS\MXD\2006\RFI_FACILITY_LAYOUT_D.MXD RFI_FIG_3_1_FACILITY_LAYOUT_D.PDF 8 /10/2006 09:25:00

ES052007010BAO_Fig4-3.ai_062507_llui

5.0 Status of SWMUs, AOCs, and Other Undesignated Areas within the Site Investigation and Closure Process

As outlined in Section 4.0, a total of 14 SWMUs, 20 AOCs, and two other undesignated areas have been identified at the Topock Compressor Station. The SWMUs, AOCs, and other undesignated areas have been identified at different times during the history of RCRA corrective action process, and therefore, the status of the various sites differs significantly. The status of sites ranges from those where no investigation has yet been performed to sites where remediation and closure have already been completed.

Table 5-1 summarizes the status of SWMUs, AOCs, and other undesignated areas at the Topock Compressor Station. For the purpose of developing appropriate conclusions and recommendations, the sites have been divided into three groups according to their status within the site investigation, remediation, and closure process:

- SWMUs and AOCs for which the Site Investigation and Closure Process is Complete.
- Previously Closed SWMUs and AOCs for which Further Investigation has been Requested.
- SWMUs, AOCs, and Other Undesignated Areas to be Carried Forward in the RFI/RI.

5.1 SWMUs and AOCs for Which Site Investigation and Closure Process is Complete

The RCRA corrective action and CERCLA closure process is considered to be complete at the SWMUs and AOCs in this group. SWMUs and AOCs in this group are: SWMU 2 (soil only), SWMU 3, SWMU 4, SWMU 7, SWMU 10, Unit 4.6, AOC 2 and AOC 3. A summary of each of these SWMUs and AOCs is below. Details were provided in Section 4.0.

5.1.1 SWMU 2

SWMU 2 is the injection well, PGE-08. The well was used for injection of treated wastewater. There is no evidence that any wastes would have been disposed around the well, and it is not expected that there is any soil contamination at SWMU 2. Therefore, the unit is closed for soil and no future soil evaluation is necessary. Groundwater will be evaluated as part of RFI Volume 2 (Groundwater).

5.1.2 SWMU 3, SWMU 4, and AOC 3

SWMU 3 is Well PGE-06 and SWMU 4 is Well PGE-07. AOC 3 consists of the area around PGE-06 and PGE-07. Wells PGE-06 and PGE-07 were drilled and completed to provide a backup source of industrial water supply for the compressor station. Both wells have been

on standby status since installation and have never been used to supply water to the facility. There is no evidence to indicate that any wastes were disposed of in or around the wells. Detected concentrations of Cr(T) and Cr(VI) in the groundwater within the wells are related to discharges of wastewater to Bat Cave Wash and do not reflect the disposal of wastes into the wells.

Wells PGE-06 and PGE-07 will continue to be sampled as part of ongoing groundwater investigation activities. DTSC's review of the historic information associated with SWMU 3, SWMU 4, and AOC 3 has concluded that no further investigation is required (DTSC 2006a). SWMU 3, SWMU 4, and AOC 3 are therefore considered closed, and will not be addressed further in RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

5.1.3 SWMU 7 – Precipitation Tank

PG&E completed the clean closure of six units comprising former hazardous waste management facilities and associated pipelines at Topock. SWMU 7 (Precipitation Tank) was one of the sites identified in the RCRA Part A Permit application (PG&E 1980b) filed with USEPA on November 17, 1980, and closed prior to the execution of the CACA (DTSC 1996). On June 26, 1995, a closure certification acceptance letter was issued by DTSC for the six units (DTSC 1995).

Complete details on the closure of SWMU 7 is presented in *Phases 1 and 2 Closure Certification Report, Hazardous Waste Management Facilities* (Mittelhauser 1990a). This report addressed the five units comprising the onsite hazardous waste treatment system (SWMUs 5, 6, 7, 8, and 9), and provides a complete description of closure activities and contains data from disposal characterization sampling, disposal manifesting information, and ultimate disposal locations. A closure certification acceptance letter that included SWMU 7 was issued by DTSC on June 26, 1995 (DTSC 1995). A summary of the closure activities for SWMU 7 is provided below. This section presents data for the final Confirmation samples (representative of final site conditions).

The precipitation tank was located on the southern portion of the upper yard (Figure 5-1) and constituted Step 2 of the two-step chromium treatment system installed at the compressor station in 1969. Sodium hydroxide was added to chromium-bearing wastewater within this tank to induce precipitation of chromium out of the wastewater. The precipitation tank was removed from service, along with the remainder of the two-step treatment system, in October 1985.

5.1.3.1 Closure Activities

Closure of the precipitation tank was accomplished during Phase 1 closure activities performed from December 1988 through February 1989. The steps taken during closure of the precipitation tank included:

- Hydroblasting of the steel tank; the hydroblast water was containerized and disposed of as hazardous waste.
- Removal of sludge from the base of the tank and disposal of the sludge as hazardous waste (reported to be five drums).

- Removal of the precipitation tank from its foundation; the tank was cut up and transported to American Metal Recycling, Inc. for recycling.
- Removal of the concrete foundation of the tank and a small concrete pad (4 feet by 6 feet) where a small sodium hydroxide tank was stored; this concrete was combined with the concrete from the Process Pump Tank (for a total of about 30 cubic yards) and it was disposed of offsite as a Class III waste.
- Removal of soil after the initial confirmation samples indicated contamination (the volume of soil removed is estimated to be about 0.25 cubic yard).
- Collection of final confirmation samples.
- Backfilling of the area with local material and final grading.

5.1.3.2 Confirmation Samples

Following removal of the tank, concrete foundation and subsoils, and approximately 1 foot of contaminated soils, a sample trench was excavated, and confirmation samples were collected from two locations in the wall of the trench. At location PT-3, samples were collected at approximately 4 and 6 feet bgs. At location PT-4, samples were collected at 3.5 feet bgs. The locations of these samples are presented in Figure 5-2. These samples were analyzed for Title 22 metals, Cr(VI), fluoride, and pH.

Results of the final samples collected from the sample trench are presented in Table 5-2. The results of the final confirmation samples (PT-3_2, PT-3_4, and PT-4_1.5) indicate that all COPCs were at levels below cleanup objectives (i.e., established background concentrations).

5.1.3.3 Status and Summary

Based on confirmation results, this SWMU was considered clean-closed (Mittelhauser, 1990a). A closure certification acceptance letter that included this SWMU was issued by DTSC on June 26, 1995 (DTSC 1995), and DTSC has required no further investigation of SWMU 7 (DTSC 2006a). SWMU 7 is therefore considered closed, and will not be addressed further in RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

5.1.4 SWMU 10 – Old Evaporation Ponds

PG&E completed the clean closure of the Old Evaporation Ponds (SWMU 10) during Phase 3 of the hazardous waste treatment system closure at Topock. Complete details regarding the closure of SWMU 10 are documented in *Closure Certification Report for the Wastewater Evaporation Ponds* (Trident 1993), and *Closure Certification Report Addendum for the Wastewater Evaporation Ponds* (Trident 1995b). These reports include a complete description of all closure activities and contain all data from disposal characterization sampling, disposal manifesting information, and ultimate disposal locations. The closure certification acceptance letter was issued by DTSC on June 26, 1995 (DTSC 1995). The Water Board also issued a closure acceptance letter for the Old Evaporation Ponds (SWMU 10) on May 11, 1995 (Water Board 1995). A summary of the closure activities for SWMU 10 is provided

below. This section presents data for the final confirmation samples (representative of final site conditions).

The Old Evaporation Ponds were located approximately 1,000 feet west-southwest of the compressor station on property owned by the HNWR (Figure 5-3). This unit comprised four ponds—designated as Pond Nos. 1, 2, 3, and 4—with Pond No. 1 being the northernmost pond and Pond No. 4 the southernmost pond. Pond No. 1 was completed in 1971, while Pond Nos. 2 through 4 were completed in 1974.

The ponds occupied a total surface area of about 181,000 square feet (4.15 acres). Each pond was lined with a 20-millimeter PVC synthetic liner. The liners were underlain by a layer of sand at least 4 inches thick and overlain by a 1-foot-thick layer of sand (PG&E 1993). The inside sloping surface of the berms surrounding each pond were spray-coated with asphalt to prevent erosion. Each pond had depth of about 6 feet. Wastewater was transferred from the facility to the ponds by pipeline.

The four ponds remained in use until they were replaced with four new Class II (i.e., double-lined) ponds, located approximately 1.2 miles to the northwest, in October 1989.

5.1.4.1 Closure Activities

Closure of the old evaporation ponds was accomplished during Phase 3 closure activities performed from September through November 1993 (Trident 1993). The steps taken during closure of the old evaporation ponds included:

- Removal of a portion of pipeline section G1; the remaining portion was encased in concrete. The removed portion was disposed of as hazardous waste. One confirmation sample (PG-2) was collected from beneath pipeline section G1 following its removal (the results for this sample are presented below in Section 5.2.6).
- Pressure testing of pipeline G2/G3 that ran from the lower yard of the compressor station to the evaporation ponds (about 1,500 feet); the pipeline was tested at 38 psi for 16 hours and was reportedly leak free (therefore, no samples were collected from beneath these sections).
- Removal of about 200 feet of aboveground piping and offsite disposal of the pipe at the Laidlaw Lake Havasu Class III facility; the remaining pipe was capped and left in place.
- Salt crust that had formed on the surfaces of Pond Nos. 2 through 4 was broken up to enhance the evaporation of water remaining in these three ponds; Pond No. 1 did not contain any standing water.
- Removal of residual solids and 3 inches of liner cover sand from Pond No. 1, and the removal of residual solids, liner cover sand, and about 1 to 3 inches of sand underlying the liner from Pond Nos. 2 through 4; this material totaled about 5,500 cubic yards and was transported offsite and disposed of at the USPCI Class I facility in Beatty, Nevada.
- Removal of the remaining liner cover sand from Pond 1 and some sand from the side slopes of Pond No. 2 through 4; this material totaled about 3,000 cubic yards and was transported offsite for disposal at the Laidlaw Lake Havasu Class III facility.

- Inspection of the 20-millimeter PVC pond liners; the liners were reported to be in excellent condition, and no punctures, rips, or environmental stress cracks were found.
- Removal of the pond liners; the liner from Pond No. 1 was disposed offsite at the at the Laidlaw Lake Havasu Class III facility, while the liners from Pond Nos. 2 through 4 were disposed of at the USPCI Class I facility in Beatty, Nevada.
- Drilling of soil borings and collection of confirmation soil samples from beneath each pond.
- Monitoring of groundwater adjacent to the ponds.
- Filling and regrading of the area (clean berm soil was used to fill in the pond areas).
- Revegetation of the area with native plants according to specifications provided by the USFWS.

5.1.4.2 Confirmation Samples

After removal of the ponds, a subsurface sampling program was conducted to collect samples of the soil beneath the former ponds. These samples were collected from seven locations in former Pond No. 1 (P1-1 through P1-7), seven locations in former Pond No. 2 (P2-1 through P2-7), six locations in former Pond No. 3 (P3-1 through P3-6), and seven locations in former Pond No. 4 (P4-1 through P4-7). Locations for the confirmation samples were selected based upon the *Closure Plan for the Hazardous Waste Management Facilities at the Topock Compressor Station* (Mittelhauser, 1986) that was reviewed and approved by DTSC. Samples were initially collected on a grid. Additional confirmation samples were selected to demonstrate the removal was complete. The locations of these samples are presented on Figure 5-3.

At each of these locations, samples were collected at depths up to 25 feet. The samples were analyzed for Title 22 metals, Cr(VI), fluoride, pH, and specific conductance.

Results of the soil samples collected from the subsurface sampling program are presented in Table 5-3. The cleanup objectives as specified in the Closure Plan were based on background concentrations of COPCs (Mittelhauser 1986, 1990a). Results of the subsurface sampling program indicated that metals concentrations were below or near cleanup objectives. Although some parameter concentrations exceeded the background standards, concentrations were at low levels and appeared to be within the naturally-occurring soil concentration ranges for these metals.

To assess whether the former ponds had leaked and possibly affected groundwater, PG&E performed an extensive study of groundwater quality in the vicinity of the ponds. This study is documented in the reported entitled *Water Quality Analysis Report Old Evaporation Ponds* (PG&E 1993). The conclusion of the study was that operation of the ponds had not resulted in any impact to groundwater. Groundwater data evaluated as part of this study are summarized in Table 5-4.

5.1.4.3 Status and Summary

Based on the closure data, the closure certification acceptance letter that included the old evaporation ponds was issued by DTSC on June 26, 1995 (DTSC 1995), and DTSC has

required no further investigation of SWMU 10 (DTSC 2006a). The Water Board also issued a closure acceptance letter for the old evaporation ponds on May 11, 1995 (Water Board 1995). SWMU 10 is therefore considered closed, and will not be addressed further in RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

5.1.5 Unit 4.6 – Waste Oil Storage Tank

Unit 4.6 consists of the waste oil storage tank that is located within the oil and fuel storage area on the eastern side of the facility. The tank is still in active service. The tank is an AST that is routinely visually inspected. In addition, the tank is situated on top of a concrete pad that is bermed on all sides to form secondary containment for the area. The tank and secondary containment were installed in 1951, and no known releases have occurred from this tank.

The waste oil storage tank was modified in 1995 to reduce its capacity from 7,500 gallons to 5,000 gallons. Because the capacity has been reduced to 5,000 gallons, this tank is no longer classified as a RCRA storage facility.

There have been no known releases associated with this tank, and the tank is no longer classified as a RCRA storage facility. DTSC's review of the historic information associated with Unit 4.6 has concluded that no further investigation is required (DTSC 2006a). Unit 4.6 is therefore considered closed, and will not be addressed further in RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

5.1.6 AOC2 – Area Around Inactive Injection Well (PGE-08)

AOC 2 consists of the surficial soil around Well PGE-08 as well as the pipeline to the injection well which transmitted treated facility wastewater to the injection well. Injection well PGE-08 was used from May 1970 through December 1973 for subsurface injection of treated wastewater from facility operations. There is no evidence of any releases to the area surrounding the former injection well; therefore, further assessment and delineation of this area is not warranted. Two shallow soil samples have been collected near the injection wellhead and along the wastewater transference pipeline. Cr(T) was detected in both samples but results were within the currently estimated background range. Any incidental releases from the pipeline to the well will be identified through the pipeline evaluation for AOC 18. Per DTSC (2006), AOC 2 requires no further investigation, and will not be addressed further in the RCRA corrective action or CERCLA site investigation and closure activities at the Topock Compressor Station.

5.2 Previously Closed SWMUs and AOCs for Which Further Investigation Has Been Requested

In a letter dated July 13, 2006 DTSC requested further investigation for eight units that have previously been closed (DTSC 2006a). These eight units consist of 5 units associated with the former hazardous waste management system (SWMUs 5, 6, 8, and 9, and AOC 18), and three units associated with the former oily water treatment system (Units 4.3, 4.4, and 4.5).

As discussed above, PG&E completed the clean closure of the six units comprising former hazardous waste management facilities and associated pipelines at Topock. The six units consisted of the Sludge Drying Beds (SWMU 5), Chromate Reduction Tank (SWMU 6), Precipitation Tank (SWMU 7), Process Pump Tank (SWMU 8), Transfer Sump (SWMU 9), and the Old Evaporation Ponds (SWMU 10). These sites were identified in the RCRA Part A Permit application (PG&E 1980b) filed with USEPA on November 17, 1980. These sites were closed prior to the execution of the CACA (DTSC 1996). On June 26, 1995, a closure certification acceptance letter was issued by DTSC for the six units (DTSC 1995); the piping was not identified as a separate unit, but was considered closed as part of the entire system. Closure of the former hazardous waste management facilities at the compressor station was performed in three phases (Phases 1 through 3) from November 1988 through November 1993 in general accordance with the *Closure Plan for the Hazardous Waste Management Facilities at the Topock Compressor Station* (Mittelhauser 1986), which was reviewed and approved by DTSC (Mittelhauser 1990a; Trident 1993).

Complete details regarding the closure of these facilities are described in *Phases 1 and 2 Closure Certification Report, Hazardous Waste Management Facilities* (Mittelhauser 1990a). A summary of the closure activities for these facilities is provided below. Material that was determined to be hazardous waste was transported offsite for disposal at the Chemical Waste Management, Inc. Class I Landfill in Kettleman, California. Material that was determined to be non-hazardous was either disposed of offsite at a San Bernardino County Class III Landfill (near Barstow), or was used at the facility as fill material. DTSC has requested additional investigation at four of the closed units (SWMUs 5, 6, 8, and 9), and for the associated piping (AOC 18) (DTSC 2006a).

PG&E also completed closure of the former oily water treatment system that consisted of the oil/water holding tank (Unit 4.3), the OWS (Unit 4.4), the portable waste oil storage tank (Unit 4.5), and the interconnecting piping. Closure of these facilities was performed between November 1989 and March 1990, in general accordance with the *Work Plan for Removal of the Oil Water Separator System* (Mittelhauser 1989). Complete details regarding the closure of this system are provided in the *Closure Activity Report, Oil Water Separator System, Topock Compressor Station* (Mittelhauser 1990b). Material that was determined to be hazardous waste was transported offsite for disposal at the Chemical Waste Management, Inc. Class I Landfill in Kettleman, California. Material that was determined to be non-hazardous was either disposed of offsite at a San Bernardino County Class III Landfill (near Barstow), or was used at the facility as fill material. DTSC has requested additional investigation of Units 4.3, 4.4, and 4.5 (DTSC 2006a).

PG&E also completed closure of the Former 300B Pipeline Liquids Tank. Closure activities were performed between July and September 1996 in accordance with the *Former Pipeline Liquid Closure Plan* (Trident 1996c). Complete details regarding the closure of the Former 300B Pipeline Liquids Tank are provided in the *Former Pipeline Liquid Oil Tank Closure Certification Report* (Trident 1996d). Closure activities consisted of soil excavation and confirmation sampling. Four rounds of excavation were performed to a total depth of 5.5 feet bgs. San Bernardino County issued a letter on June 9, 1997 confirming the completion of the site investigation and remedial action for the contaminated soil at this site. DTSC has requested additional investigation of the Former 300B Pipeline Liquids Tank (DTSC 2007e).

A summary of the closure activities for SWMUs 5, 6, 8, and 9, AOC 18, Units 4.3- 4.5, and the Former 300B Pipeline Liquids Tank is provided below. This section presents data for the final confirmation samples (representative of final site conditions).

5.2.1 SWMU 5 – Sludge Drying Beds

The two sludge drying beds were formerly located directly adjacent to one another in the southern part of the lower yard (Figure 5-1). At the time of removal, each bed was approximately 20 feet wide by 50 feet long, and the walls and floors of both beds were constructed of 8-inch-thick concrete.

The drying beds were used from 1951 until April 1962 to dehydrate lime sludge generated by the water conditioning process used at the facility (Kearny 1987; PG&E 1968a). From 1964 to 1969, a single-step wastewater treatment pond was constructed in one of the beds. From 1969 through October 1985, the drying beds were used to dehydrate chromic hydroxide sludge generated by the chromium reduction process used to treat cooling water blowdown (performed in SWMU 6 through SWMU 9). Use of the beds ceased in October 1985.

5.2.1.1 Closure Activities

Closure of the sludge drying beds was accomplished during Phase 1 closure activities performed from December 1988 through February 1989. The steps taken during closure of the sludge drying beds included:

- Removal of a thin layer (0 to 5 millimeters) of dry solids consisting of sand and some clay and removal of a small volume of stormwater using a sorbent material; the dry solids and sorbent were placed in a roll-off bin and transported offsite for disposal as hazardous waste.
- Hydroblasting of the concrete walls and floors to remove green deposits observed on the concrete; the hydroblast water was containerized, characterized, and properly disposed of as hazardous waste.
- Demolition, removal, and disposal of an estimated 95 cubic yards of concrete from the walls and floors of the beds; the concrete was broken up, characterized, and disposed of offsite as a Class III waste. Rebar from the concrete was transported offsite for recycling.
- Removal of the concrete footings; after determining that this concrete was not hazardous, the concrete was used as fill material onsite.
- Collection of confirmation samples.
- Final filling and grading of the area.

5.2.1.2 Confirmation Samples

Following removal of the sludge drying beds, confirmation soil samples were collected. Four confirmation samples are representative of existing site conditions (WDB-4, WDB-5, EDB-4, and EDB-5). The locations of these samples are presented in Figure 5-2. These samples were analyzed for Title 22 metals, Cr(VI), fluoride, and pH.

Results of the confirmation soil sampling are presented in Table 5-5. With two exceptions, concentrations of all parameters in the soil sample were less than the cleanup objectives established in the closure plan (Mittelhauser 1986). The cleanup objectives as specified in the Closure Plan were based on background concentrations of COPCs (Mittelhauser 1986, 1990a). The lead concentration in sample EDB-4 was 17 mg/kg and the Cr(T) concentration in EDB-5D (a field duplicate) was 47 mg/kg; both results were considered only a *de minimis* amount greater than the cleanup objectives (16 mg/kg for lead and 43 mg/kg for Cr[T]).

5.2.1.3 Status and Summary

Based on these results, SWMU 5 was considered clean closed (Mittelhauser 1990a). A closure certification acceptance letter that included this SWMU was issued by DTSC on June 26, 1995 (DTSC 1995). DTSC, however, has requested that additional analysis be conducted for VOCs, TPH, and SVOCs in soil at SWMU 5 (DTSC 2006a).

5.2.2 SWMU 6 – Chromate Reduction Tank

The chromate reduction tank was formerly located in the southern end of the lower yard (Figure 5-1) and constituted the first step of the two-step wastewater treatment system installed at the compressor station in 1969. Sulfur dioxide was added to Cr(VI)-bearing cooling water blowdown within this tank to reduce Cr(VI) to Cr(III). The chromate reduction tank was removed from service as part of the treatment system in October 1985. However, beginning in November 1985, the tank was reportedly used as a holding tank for an unspecified period of time (Kearny 1987). As a holding tank, it received treated water from the OWS (Unit 4.4) prior to discharge of the water to the former evaporation ponds.

The chromate reduction tank was partially set below grade within a pit that measured 10 feet wide by 10 feet long by 6 feet deep. The pit was supported on all four sides with wooden retaining walls; however, the bottom of the pit was not lined or paved.

5.2.2.1 Closure Activities

Closure of the chromate reduction tank was accomplished during Phase 2 closure activities performed from November 1989 through March 1990. The steps taken during closure of the chromate reduction tank included:

- Removal of sludge and water in the tank for characterization and disposal of the materials as hazardous waste.
- Hydroblasting of the steel tank; the hydroblast water was containerized and properly disposed of as hazardous waste.
- Removal of the tank from the pit; inspection revealed that all the green sludge adhering to the tank could not be removed. The tank was disposed of as hazardous waste.
- Removal of the concrete footings; after determining that this concrete was non-hazardous, the concrete was used as fill material onsite.
- Removal of approximately 1 foot of soil over the entire floor and disposal of the soil as hazardous waste.
- Collection of confirmation samples.

- Removal of the wooden shoring from the excavation, backfilling with local fill material, and final grading.

5.2.2.2 Confirmation Samples

After removal of the approximately 1 foot of soil from the entire floor of the tank pit area, a sample trench was excavated and samples were collected from the wall of the trench at one location at depths of 0.5, 1, and 1.5 feet.[18] The location of these co-located samples (CRT-4) is presented in Figure 5-2. These samples were analyzed for Title 22 metals, Cr(VI), fluoride, and soil pH.

Results of the samples collected from the sample trench are presented in Table 5-6. With one exception, concentrations of all parameters in the soil sample were less than the cleanup objectives. The Cr(T) concentration in the original sample from 0.5 foot bgs was 120 mg/kg, which was above the cleanup objective of 43 mg/kg. However, concentrations of all other COPCs were below cleanup objectives (i.e., established background concentrations).

5.2.2.3 Status and Summary

Based on these results, this SWMU was considered clean closed (Mittelhauser 1990a). A closure certification acceptance letter that included this SWMU was issued by DTSC on June 26, 1995 (DTSC 1995). DTSC, however, has requested that additional analysis be conducted for VOCs, TPH, and SVOCs in soil at SWMU 6 (DTSC 2006a).

5.2.3 SWMU 8 – Process Pump Tank

The process pump tank was located on the southern side of the facility (Figure 5-1) and was used as a temporary holding tank for treated wastewater discharged from the precipitation tank (SWMU 7; Unit 4.9). The process pump tank was removed from service, along with the remainder of the two-step treatment system, in October 1985.

5.2.3.1 Closure Activities

Closure of the process pump tank was accomplished during Phase 1 closure activities performed from December 1988 through February 1989. The steps taken during closure of the process pump tank included:

- Hydroblasting of the steel tank; the hydroblast water was containerized and disposed of as hazardous waste.
- Removal of sludge from the tank and disposal of the sludge as hazardous waste.
- Removal of the tank from its foundation; the tank was cut up and recycled.
- Removal of the concrete foundation; this concrete was combined with the concrete from the Precipitation Tank (for a total of about 30 cubic yard) and it was disposed of as Class III waste.
- Collection of an initial round of confirmation samples.

[18] Because the tank pit was originally 6 feet deep and another 1 foot of soil was removed, actual sample depths were 7.5, 8, and 8.5 feet bgs.

- Soil removal after the initial confirmation samples indicated residual contamination (the volume of soil removed is estimated to be about 0.25 cubic yards).
- Collection of final confirmation samples.
- Backfilling of the area with local material and final grading.

5.2.3.2 Confirmation Samples

Following removal of the tank, concrete foundation and subsoils, and approximately 1.5 feet of contaminated soil, a sample trench was excavated and samples were collected from one location on the wall of the trench at approximately 4 and 5 feet bgs. The location of this sampling point (PPT-4) is shown in Figure 5-2. Locations for the confirmation samples were selected based upon the *Closure Plan for the Hazardous Waste Management Facilities at the Topock Compressor Station* (Mittelhauser 1986) that was reviewed and approved by DTSC. Samples were initially collected on a grid and additional confirmation samples were collected as indicated. These samples were analyzed for Title 22 metals, Cr(VI), fluoride, and soil pH.

Results of the samples collected from the sample trench are presented in Table 5-7. The results of the final confirmation samples (PPT-4_2, and PPT-4_3) indicate that the COPCs were at levels below cleanup objectives (i.e., established background concentrations).

5.2.3.3 Status and Summary

Based on these results, this SWMU was considered clean closed (Mittelhauser 1990a). A closure certification acceptance letter that included this SWMU was issued by DTSC on June 26, 1995 (DTSC 1995). DTSC, however, has requested that additional analysis be conducted for VOCs, TPH, and SVOCs in soil at SWMU 8 (DTSC 2006a).

5.2.4 SWMU 9 – Transfer Sump

The transfer sump was located in the southern end of the lower yard (Figure 5-1). From 1969 to October 1985, effluent containing chromium from the chromate reduction tank (SWMU 6; Unit 4.7) was routed through the transfer sump to the precipitation tank (SWMU 7; Unit 4.9). In approximately 1974, the transfer sump also started to receive wastewater from an OWS (either directly or through the chromate reduction tank) (Kearny 1987). The transfer sump was removed from service in October 1989.

The concrete sump measured about 3 feet in diameter and 20 feet deep, of which 18.5 feet was set below grade. The sump was fitted with a concrete cover.

5.2.4.1 Closure Activities

Closure of the transfer sump was accomplished during Phase 2 closure activities performed from November 1989 through March 1990. The steps taken during closure of the transfer sump included:

- Removal of the surface soil around the manhole of the sump that was visibly stained with oil; approximately 2 cubic feet of stained soil was removed and disposed of as hazardous waste.

- Removal of sludge and water in the sump followed by hydroblasting of the concrete sump; the sludge and hydroblast water was containerized and disposed of as a hazardous waste.
- Demolition of the sump in place; the concrete rubble was found to be non-hazardous and was used as fill onsite.
- Collection of confirmation samples.
- Backfilling of the pit with local material and final grading.

5.2.4.2 Confirmation Samples

Following removal of the sump, a sample was collected from the base of the excavation. This sample (Sump TS-3) was collected using a trowel at a shallow depth of less than 0.5 foot.[19] The location of this sample is shown in Figure 5-2. This sample was analyzed for Title 22 metals, Cr(VI), fluoride, and soil pH.

Results of the sample collected from the base of the excavation are presented in Table 5-8. Concentrations of all parameters in the soil sample were less than cleanup objectives (i.e., established background concentrations).

5.2.4.3 Status and Summary

Based on these results, this SWMU was considered clean closed (Mittelhauser 1990a). A closure certification acceptance letter that included this SWMU was issued by DTSC on June 26, 1995 (DTSC 1995). DTSC, however, has requested that additional analysis be conducted for VOCs, TPH, and SVOCs in soil at SWMU 9 (DTSC 2006a).

5.2.5 Units 4.3, 4.4 and 4.5 – Former Oily Water Treatment System

The former oily water treatment system consisted of the oil/water holding tank (Unit 4.3), the OWS (Unit 4.4), the portable waste oil storage tank (Unit 4.5), and the interconnecting piping. Closure of these facilities was performed between November 1989 through March 1990 in general accordance with the *Work Plan for Removal of the Oil Water Separator System, Topock Compressor Station* (Mittelhauser 1989). These three units were identified in the USEPA RFA but were not designated as SWMUs or AOCs by DTSC in the CACA (DTSC 1996).

Complete details regarding the closure of this system are presented in the *Closure Activity Report, Oil Water Separator System, Topock Compressor Station* (Mittelhauser 1990b). This report includes a description of the closure activities and contains the data from disposal characterization sampling, disposal manifesting information, and ultimate disposal locations. A summary of the closure activities for this system is provided below.

5.2.5.1 Unit 4.3 – Oil/Water Holding Tank

The oil/water holding tank consisted of a 3,000-gallon cylindrical steel tank mounted horizontally on two concrete supports; the area beneath the tank was unpaved.

[19] The bottom of the excavation was at 18.5 feet bgs, so this sample was collected from 18.5 to 19 feet bgs.

Closure Activities. The oil/water holding tank was closed and removed between November 1989 and March 1990. The steps taken during closure of the oil/water holding tank included:

- Hydroblasting of the steel tank; the hydroblast water was containerized and disposed of as hazardous waste.
- Removal of the tank from its foundation.
- The tank was cut up; due to the presence of oily sludge deposits in the tank that could not be removed, the tank was disposed of as hazardous waste.
- Removal of the concrete foundation; the tank foundation was not visibly contaminated and was therefore used as fill at the station.
- Soil beneath the tank and concrete foundation were inspected and found not to be visibly contaminated; therefore, no confirmation samples were collected from this area.

Status and Summary. Mittelhauser concluded that all contaminated soil had been removed. The soil cleanup standard was 10,000 ppm, per LUFT manual guidance (Mittelhauser 1990b). DTSC has requested that additional analysis be conducted for metals, Cr(VI), pH, VOCs, TPH, and SVOCs in soil at Unit 4.3 (DTSC 2006a).

5.2.5.2 Unit 4.4 – Oil/Water Separator

The OWS was approximately 4.5 feet deep, 15 feet long, and 6 feet wide, and it was constructed of 6-inch-thick concrete. The unit was set below grade (i.e., the top of the unit was at grade).

Closure Activities. The steps taken during closure of the OWS included:

- Hydroblasting of the concrete OWS; the hydroblast water was containerized and disposed of as hazardous waste.
- The concrete OWS was broken up; due to oily sludge that could not be adequately removed, a majority of the concrete was disposed of as hazardous waste.
- Approximately 14 cubic yards of visibly-stained soil were excavated and removed from the area around the former OWS; the soil was disposed of as hazardous waste.
- Collection of three initial confirmation samples.
- Removal of another 5 cubic yards of soil; the soil was disposed of as a hazardous waste.
- Collection of another confirmation sample.
- Backfilling of the pit with local material and final grading.

Confirmation Samples. After removal of the OWS and visibly-stained soil, three soil samples were collected from the excavation (1042-55-10, 1042-55-11, and 1042-55-12) and analyzed for TPH using USEPA Method 8015. Based on the work plan (Mittelhauser 1989), the cleanup criterion for soil was established at 10,000 mg/kg TPH. Sample 1042-55-12 contained TPH at a concentration exceeding the cleanup criterion, so an additional 5 cubic

yards of soil were excavated from that area. A fourth confirmation sample (1042-55-32) was then collected. The locations of the samples are depicted in Figure 5-2.

The results of the confirmation samples are summarized in Table 5-9. Concentrations of TPH in the three final confirmation samples (1042-55-10, 1042-55-11, and 1042-55-32) are all well below the cleanup criterion of 10,000 mg/kg TPH.

Based on the nature of the wastewater handled by the oily water treatment system, COPCs identified for the OWS consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, TPH, and PAHs (Section 4.0). The confirmation samples were only analyzed for TPH; therefore, no metals data are available. However, because metals PAHs, and TPH were mixed within the wastewater, leakage of wastewater to surrounding soil should have resulted in collocated metals and TPH impacts. Because elevated TPH impacts have been physically removed, the existing confirmation data suggest that associated potential metals and PAH impacts should also have been removed.

Status and Summary. Soil samples collected in this area indicate that residual TPH-diesel concentrations range from ND to 18 mg/kg. The samples were not analyzed for constituents heavier than diesel. Mittelhauser concluded that all contaminated soil had been removed (Mittelhauser 1990b). DTSC has requested that additional analysis be conducted for VOCs and TPH, and SVOCs in soil at Unit 4.4 (DTSC 2006a).

5.2.5.3 Unit 4.5 – Portable Waste Oil Holding Tank

The potable waste oil storage tank consisted of an enclosed steel tank approximately 6 feet long and 2 feet in diameter mounted horizontally on a trailer. The tank was used to temporarily hold waste oil skimmed from the OWS. The portable tank was positioned on a bermed concrete pad adjacent to the OWS.

Closure Activities. The steps taken during closure of the portable waste oil storage tank included:

- Waste oil in the tank was transferred to the waste oil storage tank (Unit 4.6) and was ultimately transported offsite for recycling.
- The empty tank was then transported offsite to Chemical Transportation for disposal or recycling.
- The concrete pad was broken up and disposed of along with the concrete from the OWS.

Because the portable tank and pad were directly adjacent to the OWS, confirmation samples collected for the OWS also represent this unit. The constituents of concern are the same as for the OWS.

Status and Summary. Mittelhauser concluded that all contaminated soil had been removed. The cleanup standard was 10,000 pm TPH, per LUFT manual guidance (Mittelhauser 1990b). The highest residual concentration is in this area; a sample contained 4,300 mg/kg. TPH quantified as heavier than diesel. DTSC has requested that additional analysis be conducted for VOCs and TPH in soil at Unit 4.5 (DTSC 2006a).

5.2.6 AOC 18 – Former Two-step Wastewater Treatment System Piping

The hazardous waste treatment system closure plan (Mittelhauser 1986) designated by letter each of the pipelines that conveyed wastewater to the former two-step wastewater treatment system, through the system, and from the system to the old evaporation ponds. The layout of the former two-step wastewater treatment system piping is presented in Figure 5-4. Table 5-10 defines the piping segments associated with the former two-step wastewater treatment system by letter and number. The letter/number designation is used in the following discussion of the piping sections.

5.2.6.1 Closure Activities

Closure of the former two-step wastewater treatment system piping was accomplished during Phase 1 and Phase 2 closure activities performed from November 1988 through March 1990 (Mittelhauser 1990a). The steps taken during closure of the former treatment system piping included:

- With the exception of Sections A-3, E, and H, all pipeline segments were pressure tested to assess potential leakage. Section A-3 was not tested because it is still in use as part of the current wastewater treatment system. Section E was a short section (15 feet) of exposed piping that could be visually inspected, and Section H could not be pressure tested because a portion of it consisted of clay pipe.
- Much of the wastewater treatment system piping was removed during the closure activities. Pipeline sections that were removed included A-1, A-2, B-1, C-1, D-1, D-2, portion of D-3, E-1, F-1, F-2, F-3, portion of F-5, portion of G-1, H-1, H-2 H-3, H-4, and J-2. The interiors of much of the removed piping had a visible green sludge coating; this piping was disposed of as hazardous waste.
- The remaining portions of sections D-3 and F-5 were capped in place and the remaining section of G-1 was encased in concrete.
- Sections G-2 and G-3 were closed in place without removal; these sections consisted of two long sections (approximately 1,500 feet) of 3-inch PVC and polyethylene piping that served to connect the former evaporation ponds with the compressor station. The piping passed the pressure test, and a portion crosses Bat Cave Wash, on a high pipeline bridge, making access a challenge.
- Removal and proper disposal of visibly-stained soils and soil beneath pipe joints and valves that leaked during pressure testing.
- Collection of confirmation samples.
- Backfilling excavated areas.

5.2.6.2 Confirmation Samples

After removal of visibly-stained soils and soils beneath pipe joints and valves that leaked during pressure testing, confirmation samples were collected. Samples were collected from 18 locations along the former pipelines; the locations targeted points along the pipelines with the highest likelihood of a release based on results of pressure testing, locations of valves and joints, and visual evidence of leaking. The samples consisted of PA-3, PC-1, PF-6,

PF-8, PG-2, and PH-1 through PH-13. The locations of these samples are presented on Figure 5-4. The samples were collected from various depths between 1 and 6 feet. Each of these samples was analyzed for Title 22 metals, Cr(VI), fluoride, soil pH, and specific conductance.

Results of the sampling conducted along the former pipelines are presented in Table 5-11. Concentrations of all parameters in the soil sample were less than cleanup objectives.

5.2.6.3 Status and Summary

Based on these results, the former treatment system piping was considered clean closed (Mittelhauser 1990a). A closure certification acceptance letter dated June 26, 1995, was issued and included this portion of the former hazardous waste management facility (DTSC 1995). DTSC, however, has requested that additional analysis be conducted for VOCs, TPH, and SVOCs in soil at AOC 18 (DTSC 2006a).

5.2.7 Former 300B Pipeline Liquids Tank

The Former 300B Pipeline Liquids Tank was a 900-gallon aboveground tank used to collect pipeline liquids from the 300B natural gas pipeline.

5.2.7.1 Closure Activities

Closure activities at the Former 300B Pipeline Liquids Tank were performed between 1995 and 1996. The steps taken during closure of the Former 300B Pipeline Liquids tank included:

- Removal of the tank (removing residual liquids from the tanks; removing and disposing of the tank at an approved facility; and emptying, disconnecting, and capping the abandoned pipe ends).
- Excavation of soil to a total depth of 5.5 feet bgs.
- Collection of confirmation samples.

5.2.7.2 Confirmation Samples

Four rounds of excavation were performed to 5.5 feet bgs, and confirmation samples were collected after each round of excavation. Samples collected during the last two sampling events indicated that the soil remaining in place below and adjacent to the excavation contained TRPH at concentrations ranging from less than analytical detection limits to 150 mg/kg, below the TRPH target cleanup of 1,000 mg/kg. Results of the confirmation samples are presented in Table 5-12.

5.2.7.3 Status and Summary

Based on the closure data, San Bernardino County, County Fire Department, Hazardous Materials Division issued a letter on June 9, 1997 confirming the completion of the site investigation and remedial action for the contaminated soil at this site. DTSC, however, has requested that additional analysis be conducted at this site for TPH, metals, SVOCs, VOCs, PAHs, and PCBs (DTSC 2007e).

5.3 SWMUs, AOCs, and Other Undesignated Areas to be Carried Forward in RFI/RI

The SWMUs, AOCs, and other undesignated areas in this group will be carried forward in the RCRA Corrective Action and CERCLA site investigative programs. For most of the SWMUs, AOCs, and other undesignated areas in this group, data have been collected during site investigative activities dating to the start of the RFI in 1996. SWMUs, AOCs, and other undesignated areas in this group are as follows:

- SWMU 1 – Former Percolation Bed
- SWMU 2 – Inactive Injection Well (PGE-08) for groundwater only
- AOC 1 – Area around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Lockers
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 – Topographic Low Area
- AOC 12 – Fill Area
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 14 – Railroad Debris Site
- AOC 15 – Auxiliary Jacket Water Cooling Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 19 – Former Cooling Liquid Mixing Area
- AOC 20 – Industrial Floor Drains
- Potential Pipe Disposal Area

Previous sampling has not been conducted at AOCs 7, 8, 11, 12, 16, and the Potential Pipe Disposal Area. Through review of information associated with historic compressor station operations, these areas have been identified as potentially impacted, although no site investigation sampling has been performed in these areas to date. The remaining SWMUs, AOCs and other undesignated areas in this group have been evaluated during the numerous phases of investigation conducted at the Topock site since RFI activities began in 1996.

Based upon information pertaining to past disposal practices, each of the 20 SWMUs, AOCs, and other undesignated areas in this group will either be addressed in Volume 2 (Groundwater) of the RFI/RI, and/or in Volume 3 (Soil) of the RFI/RI. Results of investigations, both past and present, will be incorporated into Volumes 2 and 3 of the RFI/RI to complete the site investigative requirements of the RCRA Corrective Action and CERCLA processes at these 20 SWMUs, AOCs, and other undesignated areas.

The SWMUs and AOCs to be addressed in Volume 2 (Groundwater) of the RFI/RI are:

- SWMU 1 – Former Percolation Bed
- SWMU 2 – Inactive Injection Well (PGE-08)
- AOC 1 – Area Around Former Percolation Bed

The SWMUs, AOCs and other undesignated areas to be addressed in Volume 3 (Soil) of the RFI/RI are:

- SWMU 1 – Former Percolation Bed
- AOC 1 – Area Around Former Percolation Bed
- AOC 4 – Debris Ravine
- AOC 5 – Cooling Tower A
- AOC 6 – Cooling Tower B
- AOC 7 – Hazardous Materials Storage Area
- AOC 8 – Paint Lockers
- AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
- AOC 10 – East Ravine
- AOC 11 - Topographic Low Area
- AOC 12 – Fill Area
- AOC 13 – Unpaved Areas within the Compressor Station
- AOC 14 – Railroad Debris Site
- AOC 15 – Auxiliary Jacket Water Cooling Pumps
- AOC 16 – Sandblast Shelter
- AOC 17 – Onsite Septic System
- AOC 19 – Former Cooling Liquid Mixing Area
- AOC 20 – Industrial Floor Drains
- Potential Pipe Disposal Area

TABLE 5-1
Status of SWMUs, AOCs, and Other Undesignated Areas Within the Site Investigation and Closure Process
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Status	Sites
SWMUs and AOCs for which Site Investigation and Closure Process is Complete	SWMU 2 – Inactive Injection Well PGE-8 (soil only)
	SWMU 3 – PG&E Abandoned Well #6
	SWMU 4 – PG&E Abandoned Well #7
	SWMU 7 – Precipitation Tank
	SWMU 10 – Old Evaporation Ponds
	AOC-2 – Area Around Inactive Injection Well PGE-8
	AOC 3 – Area Around PG&E Inactive Wells #6 & #7 (PGE-06 and PGE-07)
	Unit 4.6 – Waste Oil Storage Tank
Previously Closed SWMUs and AOCs for Which Additional Investigation Has Been Requested	SWMU 5 – Sludge Drying Beds
	SWMU 6 – Chromate Reduction Tank
	SWMU 8 – Process Pump Tank
	SWMU 9 – Transfer Sump
	Unit 4.3 – Oil/Water Holding Tank
	Unit 4.4 – Oil/Water Separator
	Unit 4.5 – Portable Waste Oil Storage Tank
	AOC 18 – Former Two-step Wastewater Treatment System Piping
	Former 300B Pipeline Liquids Tank
SWMUs, AOCs, and Other Undesignated Areas	SWMU 1 – Former Percolation Bed
To Be Carried Forward in RFI/RI	SWMU 2 – Inactive Injection Well PGE-8 (for groundwater only)
	AOC 1 – Area Around Former Percolation Bed
	AOC 4 – Debris Ravine
	AOC 5 – Cooling Tower A
	AOC 6 – Cooling Tower B
	AOC 7 – Hazardous Materials Storage Area
	AOC 8 – Paint Locker
	AOC 9 – Southeast Fence Line (Outside Visitor Parking Area)
	AOC 10 – East Ravine
	AOC 11 – Topographic Low Areas
	AOC 12 – Fill Area
	AOC 13 – Unpaved Areas Within the Compressor Station
	AOC 14 – Railroad Debris Site
	AOC 15 – Auxiliary Jacket Water Cooling Pumps
	AOC 16 – Sandblast Shelter
	AOC 17 – Onsite Septic System
	AOC 19 – Former Cooling Chemical Mixing Shed
	AOC 20 – Industrial Floor Drains
	Potential Pipe Disposal Area

TABLE 5-2

Soil Sample Results

SWMU 7 (Unit 4.9) - Precipitation Tank

RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted	
Cleanup Objectives:					7.2	4.4	373	1	0.6	19		43	20	16	0.123	1.7	53	1	0.5	5	50	135	914	
Sample ID	**Location**	**Depth* ft**	**Sample Type**	**Sample Date**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Cobalt**	**Hexavalent Chromium**	**Total Chromium**	**Copper**	**Lead**	**Mercury**	**Molybdenum**	**Nickel**	**Silver**	**Selenium**	**Thallium**	**Vanadium**	**Zinc**	**Fluoride**	**pH in pH units**
PT-3_2	PT-3	2	N	2/8/1989	0.3 U	**2.4**	**110**	1 U	**0.9**	**8**	1 U	**38**	**16**	**10**	**0.015**	1 U	**19**	1 U	0.5 U	5 U	**28**	**45**	**424**	11.93
PT-3_4	PT-3	4	N	2/8/1989	0.3 U	**1.5**	**100**	1 U	0.5 U	**9**	1 U	**26**	**15**	**6**	0.002 U	1 U	**24**	1 U	0.5 U	5 U	**30**	**34**	**421**	11.37
PT-4_1.5	PT-4	1.5	N	12/9/1988	0.3 U	**1.78**	**180**	1 U	**0.6**	**8.6**	1 U	**22**	**8**	**2.7**	**0.007**	1 U	**22**	1 U	0.5 U	5 U	**29**	**64**	**804**	10.23

Notes:

N	primary sample
FD	field duplicate
mg/kg	milligrams per kilograms
---	not analyzed
U	not detected at the reporting limit listed
J	estimated value
	Detected results are shown in bold

*Depths shown are the depth below the bottom of the excavation which was approximately 2 feet deep. The excavation was backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-3
Soil Sample Results
SWMU 10 (Unit 4.11) - Old Evaporation Ponds
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					18	5.6	449	0.6	1.5	8	0.5	25	27	15	0.6	6	14	3	1.5	15	42	54			
Sample ID	Location	Depth, ft bgs	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in umhos/cm
P1-1_0.5	P1-1	0.5	N	10/14/1993	5 U	1.4	220	0.1	1 U	6	0.1 U	15	5 U	12	0.1 U	5 U	11	1	2.2	0.5 U	35	33	2.4	8.9	1,040
P1-1_2.5	P1-1	2.5	N	10/14/1993	5 U	1.1	82	0.3	1 U	5 U	0.1 U	9	5 U	8	0.1 U	5 U	8	1 U	1.7	0.5 U	22	20	4.5	9	1,050
P1-1_4.5	P1-1	4.5	N	10/14/1993	5 U	3	76	0.5	1 U	5 U	0.1 U	13	5 U	14	0.1 U	5 U	9	1	2.3	0.5 U	20	29	4.3	8.5	1,810
P1-2_0.5	P1-2	0.5	N	10/14/1993	5 U	2.7	240	0.1	1 U	6	0.1 U	16	5 U	8	0.1 U	5 U	11	1	1.7	0.5 U	28	27	3.1	8.6	4,170
P1-2_2.5	P1-2	2.5	N	10/14/1993	5 U	4.8	100	0.1 U	1 U	5 U	0.1 U	36	5 U	5	0.1 U	5 U	13	1 U	2.1	0.5 U	25	33	1.7	9.3	1,660
P1-2_4.5	P1-2	4.5	N	10/14/1993	5 U	3.1	200	0.1 U	1 U	5 U	0.1 U	1 U	5 U	5 U	0.1 U	5 U	5 U	1 U	2	0.5 U	9	9	1.3	9.7	455
P1-3_0.5	P1-3	0.5	N	10/15/1993	5 U	3.1	270	0.1	1 U	5 U	0.2	8	5 U	8	0.1 U	5 U	6	1 U	2.3	0.5 U	13	19	8.3	9.1	479
P1-3_2.5	P1-3	2.5	N	10/15/1993	5 U	4.6	320	0.1	1 U	5 U	0.2	13	5 U	10	0.1 U	5 U	7	1	1.9	0.5 U	12	19	14.2	9.4	855
P1-3_4.5	P1-3	4.5	N	10/15/1993	5 U	2.3	150	0.1	1 U	5 U	0.1 U	5	5 U	13	0.1 U	5 U	5 U	1 U	1.7	0.5 U	8	17	1.6	9	2,140
P1-4_0.5	P1-4	0.5	N	10/15/1993	5 U	4.7	270	0.1 U	1 U	9	0.1 U	7	5 U	9	0.1 U	5 U	7	1 U	1.3	0.5 U	15	21	1.6	8.5	1,650
P1-4_2.5	P1-4	2.5	N	10/15/1993	5 U	3	43	0.2	1 U	6	0.1 U	8	5 U	10	0.1 U	5 U	8	1 U	1.9	0.5 U	17	23	2.7	9	1,950
P1-4_4.5	P1-4	4.5	N	10/15/1993	5 U	3	67	0.3	1 U	5 U	0.1 U	7	5 U	14	0.1 U	5 U	8	1 U	1	0.5 U	19	26	4.8	9.1	2,100
P1-5_0.5	P1-5	0.5	N	10/15/1993	5 U	2	10	0.2	1 U	5 U	0.1	17	5 U	11	0.1 U	5 U	11	1 U	0.7	0.5 U	23	31	6.8	9	293
P1-5_2.5	P1-5	2.5	N	10/15/1993	5 U	2.4	88	0.1	1 U	5 U	0.1 U	29	5 U	7	0.1 U	5 U	7	1 U	0.3 U	0.5 U	15	21	4.3	9	237
P1-5_4.5	P1-5	4.5	N	10/15/1993	5 U	2.9	90	0.1 U	1 U	5 U	0.1 U	10	5 U	5	0.1 U	5 U	13	1 U	2	0.5 U	19	28	3.7	9.3	246
P1-6_0.5	P1-6	0.5	N	10/15/1993	5 U	2.9	74	0.1 U	1 U	7	0.1 U	9	5 U	5 U	0.1 U	5 U	6	1 U	3.1	0.5 U	14	20	2.1	8.9	1,210
P1-6_2.5	P1-6	2.5	N	10/15/1993	5 U	3.4	51	0.1 U	1 U	8	0.1 U	7	5 U	5 U	0.1 U	5 U	6	1 U	2	0.5 U	13	13	1.4	9.7	671
P1-6_4.5	P1-6	4.5	N	10/15/1993	5 U	3.3	80	0.1	1 U	5 U	0.1 U	11	5 U	5	0.1 U	5 U	9	1 U	0.5	0.5 U	19	23	3.4	9.7	670
P1-7_0.5	P1-7	0.5	N	10/15/1993	5 U	3.3	220	0.1	1 U	5 U	0.1 U	10	5 U	7	0.1 U	5 U	7	1 U	0.3	0.5 U	14	21	1.7	8.6	1,720
P1-7_2.5	P1-7	2.5	N	10/15/1993	5 U	1.8	61	0.1	1 U	5 U	0.1 U	9	5 U	5 U	0.1 U	5 U	7	1 U	0.3 U	0.5 U	18	25	3.6	8.9	1,230
P1-7_4.5	P1-7	4.5	N	10/15/1993	5 U	0.2 U	250	0.4	1 U	5 U	0.1 U	8	5	14	0.1 U	5 U	12	1 U	0.3 U	0.5 U	17	27	5.8	8.3	1,650
P2-1_0.5	P2-1	0.5	N	10/12/1993	5 U	3.5	140	0.1 U	1 U	5	0.1 U	13	5 U	9	0.1 U	5 U	6	1 U	4.7	0.5 U	24	27	1.8	8.6	22,200
P2-1_2.5	P2-1	2.5	N	10/12/1993	5 U	2.4	91	0.1 U	1 U	6	0.1 U	4	5 U	6	0.1 U	5 U	5 U	1 U	3.8	0.5 U	10	7	0.6	8.4	3,349
P2-1_4.5	P2-1	4.5	N	10/12/1993	5 U	4.1	68	0.1 U	1 U	5 U	0.1 U	3	5 U	6	0.1 U	5 U	5 U	1 U	2	0.5 U	10	10	0.7	8.6	3,840
P2-1_6.5	P2-1	6.5	N	10/12/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1,690
P2-2_0.5	P2-2	0.5	N	10/12/1993	5 U	3.6	220	0.1	1 U	5 U	0.1 U	17	5 U	10	0.1 U	5 U	10	1 U	4.2	0.5 U	18	33	2.2	8.4	3,800
P2-2_2.5	P2-2	2.5	N	10/12/1993	5 U	3.5	110	0.1	1 U	7	0.1 U	17	5 U	9	0.1 U	5 U	11	1 U	4.1	0.5 U	31	31	1.5	9.1	270
P2-2_4.5	P2-2	4.5	N	10/12/1993	5 U	4	50	0.1	1 U	5 U	0.1 U	5	5 U	7	0.1 U	5 U	6	1 U	0.3 U	0.5 U	8	13	2.6	9.3	340

TABLE 5-3
Soil Sample Results
SWMU 10 (Unit 4.11) - Old Evaporation Ponds
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					18	5.6	449	0.6	1.5	8	0.5	25	27	15	0.6	6	14	3	1.5	15	42	54			
Sample ID	Location	Depth, ft bgs	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in umhos/cm
P2-3_0.5	P2-3	0.5	N	10/12/1993	5 U	4.6	290	0.1	1 U	6	0.1 U	15	5 U	10	0.1 U	5 U	9	1 U	1.3	0.5 U	18	28	2.4	8.5	9,170
P2-3_2.5	P2-3	2.5	N	10/12/1993	5 U	3.4	280	0.1 U	1 U	6	0.1 U	16	5 U	9	0.1 U	5 U	11	1 U	1.5	0.5 U	31	30	2.4	8.9	2,360
P2-3_4.5	P2-3	4.5	N	10/12/1993	5 U	3.4	140	0.1	1 U	9	0.1 U	25	5 U	9	0.1 U	5 U	29	1 U	1.1	0.5 U	38	38	2.7	9.3	2,570
P2-4_0.5	P2-4	0.5	N	10/12/1993	5 U	3.7	220	0.1	1 U	5	0.1 U	16	5 U	9	0.1 U	5 U	10	1 U	1.3	0.5 U	24	28	0.7	9	3,100
P2-4_2.5	P2-4	2.5	N	10/12/1993	5 U	5	290	0.1	1 U	7	0.1 U	12	5 U	10	0.1 U	5 U	12	1 U	1.4	0.5 U	33	33	1	9	2,920
P2-4_4.5	P2-4	4.5	N	10/12/1993	5 U	4.5	210	0.1	1 U	6	0.1 U	23	5 U	10	0.1 U	5 U	14	1 U	1.4	0.5 U	36	39	2	9.1	3,590
P2-4_6.5	P2-4	6.5	N	10/12/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,920
P2-4_9.5	P2-4	9.5	N	10/12/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,130
P2-5_0.5	P2-5	0.5	N	10/13/1993	5 U	3.6	370	0.1	1 U	5 U	0.1 U	10	5 U	6	0.1 U	5 U	7	1 U	1.2	0.5 U	16	23	6.2	8.9	14,400
P2-5_2.5	P2-5	2.5	N	10/13/1993	5 U	4.8	84	0.1 U	1 U	5 U	0.1 U	11	5 U	8	0.1 U	5 U	6	1 U	1.3	0.5 U	15	22	4.4	8.8	9,210
P2-5_4.5	P2-5	4.5	N	10/13/1993	5 U	2.9	66	0.1 U	1 U	5 U	0.1 U	7	8	5 U	0.1 U	5 U	5 U	1 U	2.8	0.5 U	10	16	3.2	8.9	6,790
P2-5_6.5	P2-5	6.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5,540
P2-5_9.5	P2-5	9.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	8,000
P2-5_14.5	P2-5	14.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1,420
P2-6_0.5	P2-6	0.5	N	10/13/1993	5 U	3.2	230	0.1	1 U	5	0.1 U	9	5 U	7	0.1 U	5 U	6	1 U	4.2	0.5 U	16	24	1.5	8.8	5,290
P2-6_2.5	P2-6	2.5	N	10/13/1993	5 U	3.3	130	0.1 U	1 U	6	0.1 U	22	5 U	5	0.1 U	5 U	10	1 U	0.4	0.5 U	22	35	1.4	8.9	2,640
P2-6_4.5	P2-6	4.5	N	10/13/1993	5 U	0.2	72	0.1 U	1 U	5 U	0.1 U	46	5 U	5 U	0.1 U	5 U	7	1 U	2.3	0.5 U	13	19	1	8.6	3,940
P2-6_6.5	P2-6	6.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3,020
P2-6_9.5	P2-6	9.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,230
P2-7_0.5	P2-7	0.5	N	10/13/1993	5 U	5.1	250	0.1	1 U	5 U	0.1 U	11	5 U	7	0.1 U	5 U	10	1 U	1.8	0.5 U	18	29	2.3	8.6	10,100
P2-7_2.5	P2-7	2.5	N	10/13/1993	5 U	3.3	120	0.1 U	1 U	5 U	0.1 U	11	5 U	5 U	0.1 U	5 U	9	1 U	1.7	0.5 U	19	24	1.2	9.1	3,420
P2-7_4.5	P2-7	4.5	N	10/13/1993	5 U	3.3	28	0.1 U	1 U	5 U	0.1 U	4	5 U	5 U	0.1 U	5 U	5 U	1 U	1.8	0.5 U	9	12	1	8.7	5,080
P2-7_6.5	P2-7	6.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5,180
P2-7_9.5	P2-7	9.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	5,520
P2-7_14.5	P2-7	14.5	N	10/13/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1,300
P3-1_0.5	P3-1	0.5	N	10/18/1993	5 U	2.9	92	0.1 U	1 U	5 U	0.1 U	11	6	9	0.1 U	5 U	6	1 U	1.3	0.5 U	19	19	1.4	8.9	5,830
P3-1_2.5	P3-1	2.5	N	10/18/1993	5 U	1.9	73	0.1 U	1 U	7	0.1 U	17	6	8	0.1 U	5 U	9	1 U	0.4	0.5 U	24	31	1.4	9.1	3,640
P3-1_4.5	P3-1	4.5	N	10/18/1993	5 U	1.9	140	0.1 U	1 U	6	0.1 U	19	5	8	0.1 U	5 U	10	1 U	0.6	0.5 U	25	37	1.4	9	2,430

TABLE 5-3
Soil Sample Results
SWMU 10 (Unit 4.11) - Old Evaporation Ponds
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					18	5.6	449	0.6	1.5	8	0.5	25	27	15	0.6	6	14	3	1.5	15	42	54			
Sample ID	Location	Depth, ft bgs	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in umhos/cm
P3-2_0.5	P3-2	0.5	N	10/18/1993	5 U	3.1	180	0.1 U	1 U	5	0.1 U	22	9	10	0.1 U	5 U	9	1 U	2.1	0.5 U	34	35	0.9	9.1	1,130
P3-2_2.5	P3-2	2.5	N	10/18/1993	5 U	1.9	93	0.1 U	1 U	7	0.1 U	25	10	9	0.1 U	5 U	10	1 U	0.5	0.5 U	34	39	1.6	9.1	1,600
P3-2_4.5	P3-2	4.5	N	10/18/1993	5 U	5	40	0.4	1 U	5 U	0.1 U	14	8	20	0.1 U	5 U	9	1 U	0.3 U	0.5 U	29	45	2.1	8.5	3,420
P3-2_6.5	P3-2	6.5	N	10/18/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,490
P3-3_0.5	P3-3	0.5	N	10/18/1993	5 U	2.9	170	0.1 U	1 U	5 U	0.1 U	15	8	9	0.1 U	5 U	7	1 U	0.5	0.5 U	23	26	0.8	8.7	14,700
P3-3_2.5	P3-3	2.5	N	10/18/1993	5 U	1.8	110	0.1 U	1 U	6	0.1 U	17	9	10	0.1 U	5 U	7	1 U	0.7	0.5 U	27	41	1.1	8.8	1,620
P3-3_4.5	P3-3	4.5	N	10/18/1993	5 U	2.7	110	0.1 U	1 U	7	0.1 U	24	11	11	0.1 U	5 U	9	1 U	0.6	0.5 U	38	36	1.2	8.8	1,930
P3-4_0.5	P3-4	0.5	N	10/19/1993	5 U	3.8	300	0.1 U	1 U	6	0.1 U	23	7	11	0.1 U	5 U	10	2	1.7	0.5 U	28	30	1.2	8.5	1,120
P3-4_2.5	P3-4	2.5	N	10/19/1993	5 U	1.6	120	0.1 U	1 U	5 U	0.1 U	14	5 U	7	0.1 U	5 U	5 U	1 U	0.4	0.5 U	17	22	0.8	9.2	661
P3-4_4.5	P3-4	4.5	N	10/19/1993	5 U	1.7	64	0.1 U	1 U	5 U	0.1 U	11	6	5	0.1 U	5 U	7	1 U	0.6	0.5 U	19	20	2.4	9.6	1,180
P3-5_0.5	P3-5	0.5	N	10/19/1993	5 U	3.1	290	0.1 U	1 U	5	0.1 U	13	7	12	0.1 U	5 U	7	1 U	0.8	0.5 U	25	22	0.9	8.4	5,520
P3-5_2.5	P3-5	2.5	N	10/19/1993	5 U	1.9	93	0.1 U	1 U	5	0.1 U	16	7	7	0.1 U	5 U	7	1 U	0.7	0.5 U	25	25	0.7	8.7	1,750
P3-5_4.5	P3-5	4.5	N	10/19/1993	5 U	1.8	78	0.1 U	1 U	7	0.1 U	21	9	8	0.1 U	5 U	11	1 U	0.8	0.5 U	30	33	0.7	8.5	1,750
P3-6_0.5	P3-6	0.5	N	10/19/1993	5 U	5.2	430	0.1 U	1 U	5 U	0.1 U	13	9	15	0.1 U	5 U	6	1	3.1	0.5 U	21	24	4.9	8.7	7,320
P3-6_2.5	P3-6	2.5	N	10/19/1993	5 U	4.6	220	0.1 U	1 U	5 U	0.1 U	13	5 U	13	0.1 U	5 U	7	1	0.8	0.5 U	22	20	2.6	8.4	12,200
P3-6_4.5	P3-6	4.5	N	10/19/1993	5 U	4.9	120	0.3	1 U	8	0.1 U	26	10	8	0.1 U	5 U	12	1 U	0.3	0.5 U	26	33	1.6	8.8	4,090
P3-6_6.5	P3-6	6.5	N	10/20/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,340
P4-1_0.5	P4-1	0.5	N	10/20/1993	5 U	1.3	82	0.1	1 U	7	0.1 U	20	28	6	0.1 U	5 U	10	1 U	3.8	0.5 U	41	42	1	9.1	7,810
P4-1_2.5	P4-1	2.5	N	10/20/1993	5 U	1.9	73	0.1 U	1 U	5	0.1 U	12	40	8	0.1 U	5 U	9	1 U	0.7	0.5 U	30	50	1.1	8.5	5,660
P4-1_4.5	P4-1	4.5	N	10/20/1993	5 U	3.4	220	0.8	1 U	6	0.1 U	20	31	21	0.1 U	5 U	16	1	0.3 U	0.5 U	35	57	2	8.1	4,360
P4-1_6.5	P4-1	6.5	N	10/20/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4,570
P4-1_9.5	P4-1	9.5	N	10/20/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	750
P4-2_0.5	P4-2	0.5	N	10/20/1993	5 U	1.4	120	0.1 U	1 U	6	0.1 U	10	29	5	0.1 U	5 U	6	1 U	0.9	0.5 U	28	39	0.7	9.2	739
P4-2_2.5	P4-2	2.5	N	10/20/1993	5 U	1.4	100	0.1	1 U	6	0.1 U	16	53	8	0.1 U	5 U	11	1	2.9	0.5 U	30	50	1.1	8.9	1,440
P4-2_4.5	P4-2	4.5	N	10/20/1993	5 U	2.4	150	0.1	1 U	5 U	0.1 U	4	16	7	0.1 U	5 U	5 U	1 U	0.6	0.5 U	10	18	0.9	9	703
P4-3_0.5	P4-3	0.5	N	10/20/1993	5 U	1.8	92	0.1 U	1 U	6	0.1 U	12	30	7	0.1 U	5 U	7	1 U	0.9	0.5 U	28	55	0.9	9.2	9,310
P4-3_2.5	P4-3	2.5	N	10/20/1993	5 U	1.5	84	0.1	1 U	6	0.1 U	15	34	9	0.1 U	5 U	9	1 U	1	0.5 U	33	44	1.2	9.2	13,200
P4-3_4.5	P4-3	4.5	N	10/20/1993	5 U	1.8	130	0.1	1 U	8	0.1 U	20	25	9	0.1 U	5 U	13	1 U	4.1	0.5 U	38	45	1.1	8.9	971

TABLE 5-3
Soil Sample Results
SWMU 10 (Unit 4.11) - Old Evaporation Ponds
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					18	5.6	449	0.6	1.5	8	0.5	25	27	15	0.6	6	14	3	1.5	15	42	54			
Sample ID	Location	Depth, ft bgs	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in umhos/cm
P4-4_0.5	P4-4	0.5	N	10/20/1993	5 U	2.9	250	0.1 U	1 U	15	0.1 U	19	75	7	0.1 U	5 U	24	1	1.7	0.5 U	53	49	0.7	8.4	1,370
P4-4_2.5	P4-4	2.5	N	10/20/1993	5 U	1.8	300	0.1	1	11	0.1 U	21	31	7	0.1 U	5 U	16	1 U	1.7	0.5 U	26	44	0.7	8.9	889
P4-4_4.5	P4-4	4.5	N	10/20/1993	5 U	2.2	160	0.1 U	1 U	7	0.1 U	16	30	8	0.1 U	5 U	8	1 U	1.7	0.5 U	32	50	1.1	8.7	786
P4-5_0.5	P4-5	0.5	N	10/21/1993	5 U	7.8	540	0.1	1 U	5 U	0.1 U	9	9	11	0.1 U	5 U	6	1 U	5.3	0.5 U	18	23	2	8.8	1,590
P4-5_2.5	P4-5	2.5	N	10/21/1993	5 U	3	90	0.1 U	1 U	5	0.1 U	13	33	5 U	0.1 U	5 U	9	1 U	0.3 U	0.5 U	21	41	0.9	9.5	409
P4-5_4.5	P4-5	4.5	N	10/21/1993	5 U	2.8	76	0.2	1	10	0.1 U	13	20	5 U	0.1 U	5 U	12	1 U	0.3 U	0.5 U	26	39	1.2	9.6	379
P4-6_0.5	P4-6	0.5	N	10/21/1993	5 U	4.6	610	0.1	1 U	5 U	0.1 U	10	70	10	0.1 U	5 U	8	1	1.2	0.5 U	24	57	3.2	8.7	4,170
P4-6_2.5	P4-6	2.5	N	10/21/1993	5 U	2.3	520	0.1 U	1	10	0.1 U	15	44	7	0.1 U	5 U	14	1	1	0.5 U	26	59	2	9.2	2,070
P4-6_4.5	P4-6	4.5	N	10/21/1993	5 U	2	84	0.1 U	1 U	5 U	0.1 U	13	25	5 U	0.1 U	5 U	9	1 U	0.3 U	0.5 U	22	39	1.5	8.7	1,600
P4-7_0.5	P4-7	0.5	N	10/21/1993	5 U	0.9	91	0.1	1 U	5 U	0.1 U	10	57	13	0.1 U	5 U	7	2	1.3	0.5 U	24	43	5.6	9	23,000
P4-7_2.5	P4-7	2.5	N	10/21/1993	5 U	0.9	170	0.1 U	1 U	8	0.1 U	18	69	9	0.1 U	5 U	13	1	1.5	0.5 U	31	59	5.1	9.4	14,300
P4-7_4.5	P4-7	4.5	N	10/21/1993	5 U	0.8	170	0.1	1 U	7	0.1 U	18	70	10	0.1 U	5	12	1	1.6	0.5 U	35	64	2.7	9	14,200
P4-7_6.5	P4-7	6.5	N	10/21/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	9,950
P4-7_14.5	P4-7	14.5	N	10/21/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	14,000
P4-7_19.5	P4-7	19.5	N	10/21/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	13,000
P4-7_24.5	P4-7	24.5	N	10/21/1993	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2,080

Notes:
ft bgs feet below ground surface
N primary sample
FD field duplicate
mg/kg milligrams per kilograms
--- not analyzed
U not detected at the reporting limit listed
J estimated value
Detected Results are shown in bold

Cleanup Objectives are based on background concentrations specific to Evaporation Ponds

Source: Mittelhauser 1989 and Trident 1994

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-12	Upgradient	2,4,5-TP (Silvex)	0.1	U	1	U
MWP-12	Upgradient	2,4-D	0.5	U	10	U
MWP-12	Upgradient	Arsenic	0.001	U	0.009	
MWP-12	Upgradient	Barium	0.1	U	0.1	U
MWP-12	Upgradient	BHC, gamma isomer (Lindane)	0.05	U	2	U
MWP-12	Upgradient	Bicarbonate as HCO3	140		239	
MWP-12	Upgradient	Cadmium	0.01	U	0.01	U
MWP-12	Upgradient	Calcium	55		121	
MWP-12	Upgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-12	Upgradient	Chloride	150		319	
MWP-12	Upgradient	Chromium	0.005	U	0.1	U
MWP-12	Upgradient	Copper	0.01	U	0.08	U
MWP-12	Upgradient	Endrin	0.01	U	0.1	U
MWP-12	Upgradient	Fluoride	0.21		0.59	
MWP-12	Upgradient	Hexavalent Chromium, dissolved	0.002	U	0.01	U
MWP-12	Upgradient	Hexavalent Chromium, total	0.002	U	0.02	
MWP-12	Upgradient	Iron	0.03	U	5	
MWP-12	Upgradient	Lead	0.001	U	0.14	
MWP-12	Upgradient	Low Level Phenolics	0.005	U	0.05	U
MWP-12	Upgradient	Magnesium	19		29	
MWP-12	Upgradient	Manganese	0.01	U	0.09	
MWP-12	Upgradient	Mercury	0.0001	U	0.0001	U
MWP-12	Upgradient	Methoxychlor	0.2	U	10	U
MWP-12	Upgradient	Nitrate	0.97		18	
MWP-12	Upgradient	pH	6.5		7.9	
MWP-12	Upgradient	pH, field	7.09		7.6	
MWP-12	Upgradient	Potassium	6		20	
MWP-12	Upgradient	Radioactivity, gross alpha	1+/-1.9	U	1+/-1.9	U
MWP-12	Upgradient	Radioactivity, gross beta	1+/-14	U	1+/-14	U
MWP-12	Upgradient	Selenium	0.001	U	0.003	
MWP-12	Upgradient	Silver	0.01	U	0.01	U
MWP-12	Upgradient	Sodium	59		270	
MWP-12	Upgradient	Specific Conductance	1080		1680	
MWP-12	Upgradient	Specific Conductance, field	1149		1221	
MWP-12	Upgradient	Sulfate	120		160	
MWP-12	Upgradient	TOC	0.5	U	7	
MWP-12	Upgradient	Total Alkalinity as CaCO3	---		140	
MWP-12	Upgradient	Total Coliform	2	U	17	
MWP-12	Upgradient	Total Dissolved Solids	420		1600	
MWP-12	Upgradient	Total Phosphorous, as P	0.01	U	3.1	
MWP-12	Upgradient	Total Radium	1+/-10	U	1+/-10	U
MWP-12	Upgradient	TOX	0.02	U	0.48	
MWP-12	Upgradient	Toxaphene	0.1	U	1	U
MWP-12	Upgradient	Zinc	0.01	U	0.05	
MWP-3	Upgradient	2,4,5-TP (Silvex)	0.1	U	1	U
MWP-3	Upgradient	2,4-D	0.5	U	10	U

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-3	Upgradient	Arsenic	0.009		0.001	U
MWP-3	Upgradient	Barium	0.1	U	0.1	U
MWP-3	Upgradient	BHC, gamma isomer (Lindane)	0.05	U	2	U
MWP-3	Upgradient	Bicarbonate as HCO3	100		185	
MWP-3	Upgradient	Cadmium	0.01	U	0.01	U
MWP-3	Upgradient	Calcium	78		99	
MWP-3	Upgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-3	Upgradient	Chloride	110		172	
MWP-3	Upgradient	Chromium	0.005	U	0.1	U
MWP-3	Upgradient	Copper	0.01	U	0.08	U
MWP-3	Upgradient	Endrin	0.01	U	0.1	U
MWP-3	Upgradient	Fluoride	0.24		0.35	
MWP-3	Upgradient	Hexavalent Chromium, dissolved	0.01	U	0.02	U
MWP-3	Upgradient	Hexavalent Chromium, total	0.01	U	0.01	U
MWP-3	Upgradient	Iron	0.03		4.3	
MWP-3	Upgradient	Lead	0.001		0.021	
MWP-3	Upgradient	Low Level Phenolics	0.005	U	0.011	
MWP-3	Upgradient	Magnesium	15		33	
MWP-3	Upgradient	Manganese	0.01	U	0.08	
MWP-3	Upgradient	Mercury	0.0001		0.0003	
MWP-3	Upgradient	Methoxychlor	0.2	U	10	U
MWP-3	Upgradient	Nitrate	1.3		20	
MWP-3	Upgradient	pH	6.2		8.1	
MWP-3	Upgradient	pH, field	7.07		8.12	
MWP-3	Upgradient	Potassium	5.7		8.4	
MWP-3	Upgradient	Radioactivity, gross alpha	1+/-1.4	U	1+/-1.4	U
MWP-3	Upgradient	Radioactivity, gross beta	1+/-12	U	1+/-12	U
MWP-3	Upgradient	Selenium	0.001	U	0.004	
MWP-3	Upgradient	Silver	0.01	U	0.01	U
MWP-3	Upgradient	Sodium	51		77	
MWP-3	Upgradient	Specific Conductance	500		1070	
MWP-3	Upgradient	Specific Conductance, field	757		1032	
MWP-3	Upgradient	Sulfate	100		147	
MWP-3	Upgradient	TOC	0.3		7	
MWP-3	Upgradient	Total Alkalinity as CaCO3	---		140	
MWP-3	Upgradient	Total Coliform	2	U	2.2	U
MWP-3	Upgradient	Total Dissolved Solids	390		740	
MWP-3	Upgradient	Total Phosphorous, as P	0.01		0.72	
MWP-3	Upgradient	Total Radium	1+/-1.0	U	1+/-1.0	U
MWP-3	Upgradient	TOX	0.02	U	0.13	U
MWP-3	Upgradient	Toxaphene	0.1	U	1	U
MWP-3	Upgradient	Zinc	0.01	U	0.06	
P-1	Upgradient	2,4,5-TP (Silvex)	0.1	U	1	U
P-1	Upgradient	2,4-D	0.5	U	10	U
P-1	Upgradient	Arsenic	0.001	U	0.002	U
P-1	Upgradient	Barium	0.1	U	0.1	U

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
P-1	Upgradient	BHC, gamma isomer (Lindane)	0.05	U	0.5	U
P-1	Upgradient	Bicarbonate as HCO3	130		178	
P-1	Upgradient	Cadmium	0.01	U	0.01	U
P-1	Upgradient	Calcium	85		110	
P-1	Upgradient	Carbonate as CO3	0.6	U	0.6	U
P-1	Upgradient	Chloride	130		153	
P-1	Upgradient	Chromium	0.005	U	0.1	U
P-1	Upgradient	Copper	0.02	U	0.08	U
P-1	Upgradient	Endrin	0.01	U	0.1	U
P-1	Upgradient	Fluoride	0.24		0.33	
P-1	Upgradient	Hexavalent Chromium, dissolved	0.01	U	0.01	U
P-1	Upgradient	Hexavalent Chromium, total	0.01	U	0.01	U
P-1	Upgradient	Iron	0.03	U	0.22	
P-1	Upgradient	Lead	0.001	U	0.004	
P-1	Upgradient	Low Level Phenolics	0.005	U	0.005	U
P-1	Upgradient	Magnesium	17		26	
P-1	Upgradient	Manganese	0.01	U	0.05	U
P-1	Upgradient	Mercury	0.0001	U	0.0001	U
P-1	Upgradient	Methoxychlor	0.2	U	10	U
P-1	Upgradient	Nitrate	2.6		22	
P-1	Upgradient	pH	7.2		8	
P-1	Upgradient	pH, field	7.25		8.13	
P-1	Upgradient	Potassium	5.6		12	
P-1	Upgradient	Radioactivity, gross alpha	1+/-5.5		1+/-5.5	
P-1	Upgradient	Radioactivity, gross beta	5+/-4		5+/-4	
P-1	Upgradient	Selenium	0.001	U	0.004	
P-1	Upgradient	Silver	0.01	U	0.01	U
P-1	Upgradient	Sodium	59		82	
P-1	Upgradient	Specific Conductance	810		1140	
P-1	Upgradient	Specific Conductance, field	1094		1112	
P-1	Upgradient	Sulfate	130		160	
P-1	Upgradient	TOC	0.5	U	1.1	
P-1	Upgradient	Total Alkalinity as CaCO3	---		140	
P-1	Upgradient	Total Coliform	2	U	2.2	U
P-1	Upgradient	Total Dissolved Solids	510		800	
P-1	Upgradient	Total Phosphorous, as P	0.01	U	1.6	
P-1	Upgradient	Total Radium	1+/-1.0	U	1+/-1.0	U
P-1	Upgradient	TOX	0.02	U	0.1	U
P-1	Upgradient	Toxaphene	0.1	U	1	U
P-1	Upgradient	Zinc	0.01	U	0.06	
MWP-16	Midgradient	2,4,5-TP (Silvex)	---		---	
MWP-16	Midgradient	2,4-D	---		---	
MWP-16	Midgradient	Arsenic	---		---	
MWP-16	Midgradient	Barium	---		---	
MWP-16	Midgradient	BHC, gamma isomer (Lindane)	---		---	
MWP-16	Midgradient	Bicarbonate as HCO3	26		110	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-16	Midgradient	Cadmium	---		---	
MWP-16	Midgradient	Calcium	71		76	
MWP-16	Midgradient	Carbonate as CO3	0.6	U	9.6	
MWP-16	Midgradient	Chloride	150		200	
MWP-16	Midgradient	Chromium	0.05	U	0.05	U
MWP-16	Midgradient	Copper	0.05	U	0.05	U
MWP-16	Midgradient	Endrin	---		---	
MWP-16	Midgradient	Fluoride	0.21		0.31	
MWP-16	Midgradient	Hexavalent Chromium, dissolved	---		---	
MWP-16	Midgradient	Hexavalent Chromium, total	---		---	
MWP-16	Midgradient	Iron	0.1	U	0.1	U
MWP-16	Midgradient	Lead	---		---	
MWP-16	Midgradient	Low Level Phenolics	0.005	U	0.005	U
MWP-16	Midgradient	Magnesium	5.8		13	
MWP-16	Midgradient	Manganese	0.05	U	0.05	U
MWP-16	Midgradient	Mercury	---		---	
MWP-16	Midgradient	Methoxychlor	---		---	
MWP-16	Midgradient	Nitrate	16		19	
MWP-16	Midgradient	pH	8.3		8.7	
MWP-16	Midgradient	pH, field	7.8		9.33	
MWP-16	Midgradient	Potassium	7.8		12	
MWP-16	Midgradient	Radioactivity, gross alpha	---		---	
MWP-16	Midgradient	Radioactivity, gross beta	---		---	
MWP-16	Midgradient	Selenium	---		---	
MWP-16	Midgradient	Silver	---		---	
MWP-16	Midgradient	Sodium	86		160	
MWP-16	Midgradient	Specific Conductance	770		1190	
MWP-16	Midgradient	Specific Conductance, field	923		1321	
MWP-16	Midgradient	Sulfate	160		260	
MWP-16	Midgradient	TOC	0.5	U	1.4	
MWP-16	Midgradient	Total Alkalinity as CaCO3	---		91	
MWP-16	Midgradient	Total Coliform	---		---	
MWP-16	Midgradient	Total Dissolved Solids	560		780	
MWP-16	Midgradient	Total Phosphorous, as P	0.069		0.086	
MWP-16	Midgradient	Total Radium	---		---	
MWP-16	Midgradient	TOX	0.02	U	0.066	
MWP-16	Midgradient	Toxaphene	---		---	
MWP-16	Midgradient	Zinc	0.05	U	0.05	U
MWP-2RD	Downgradient	2,4,5-TP (Silvex)	---		---	
MWP-2RD	Downgradient	2,4-D	---		---	
MWP-2RD	Downgradient	Arsenic	---		---	
MWP-2RD	Downgradient	Barium	---		---	
MWP-2RD	Downgradient	BHC, gamma isomer (Lindane)	---		---	
MWP-2RD	Downgradient	Bicarbonate as HCO3	100		130	
MWP-2RD	Downgradient	Cadmium	---		---	
MWP-2RD	Downgradient	Calcium	96		140	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-2RD	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-2RD	Downgradient	Chloride	440		590	
MWP-2RD	Downgradient	Chromium	0.05	U	0.05	U
MWP-2RD	Downgradient	Copper	0.05	U	0.05	U
MWP-2RD	Downgradient	Endrin	---		---	
MWP-2RD	Downgradient	Fluoride	0.67		0.82	
MWP-2RD	Downgradient	Hexavalent Chromium, dissolved	---		---	
MWP-2RD	Downgradient	Hexavalent Chromium, total	---		---	
MWP-2RD	Downgradient	Iron	0.1	U	0.1	U
MWP-2RD	Downgradient	Lead	---		---	
MWP-2RD	Downgradient	Low Level Phenolics	0.005	U	0.0057	
MWP-2RD	Downgradient	Magnesium	33		39	
MWP-2RD	Downgradient	Manganese	0.05	U	0.05	U
MWP-2RD	Downgradient	Mercury	---		---	
MWP-2RD	Downgradient	Methoxychlor	---		---	
MWP-2RD	Downgradient	Nitrate	0.4	U	9.6	
MWP-2RD	Downgradient	pH	7.5		7.9	
MWP-2RD	Downgradient	pH, field	7.61		7.77	
MWP-2RD	Downgradient	Potassium	12		20	
MWP-2RD	Downgradient	Radioactivity, gross alpha	---		---	
MWP-2RD	Downgradient	Radioactivity, gross beta	---		---	
MWP-2RD	Downgradient	Selenium	---		---	
MWP-2RD	Downgradient	Silver	---		---	
MWP-2RD	Downgradient	Sodium	240		260	
MWP-2RD	Downgradient	Specific Conductance	2110		2340	
MWP-2RD	Downgradient	Specific Conductance, field	2410		2022	
MWP-2RD	Downgradient	Sulfate	150		200	
MWP-2RD	Downgradient	TOC	1.4		5.5	
MWP-2RD	Downgradient	Total Alkalinity as CaCO3	---		110	
MWP-2RD	Downgradient	Total Coliform	---		---	
MWP-2RD	Downgradient	Total Dissolved Solids	1100		1300	
MWP-2RD	Downgradient	Total Phosphorous, as P	0.6		1	
MWP-2RD	Downgradient	Total Radium	---		---	
MWP-2RD	Downgradient	TOX	0.021		0.11	
MWP-2RD	Downgradient	Toxaphene	---		---	
MWP-2RD	Downgradient	Zinc	0.05	U	0.16	
MWP-8	Downgradient	2,4,5-TP (Silvex)	0.1	U	1	U
MWP-8	Downgradient	2,4-D	0.5	U	10	U
MWP-8	Downgradient	Arsenic	0.001	U	0.003	
MWP-8	Downgradient	Barium	0.1	U	0.5	
MWP-8	Downgradient	BHC, gamma isomer (Lindane)	0.05	U	0.5	U
MWP-8	Downgradient	Bicarbonate as HCO3	59		536	
MWP-8	Downgradient	Cadmium	0.01	U	0.02	
MWP-8	Downgradient	Calcium	1400		3200	
MWP-8	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-8	Downgradient	Chloride	3730		7800	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-8	Downgradient	Chromium	0.006		0.14	
MWP-8	Downgradient	Copper	0.02	U	0.18	
MWP-8	Downgradient	Endrin	0.01	U	0.1	U
MWP-8	Downgradient	Fluoride	0.1		0.14	
MWP-8	Downgradient	Hexavalent Chromium, dissolved	0.01	U	0.01	U
MWP-8	Downgradient	Hexavalent Chromium, total	0.01	U	0.02	
MWP-8	Downgradient	Iron	0.04		280	
MWP-8	Downgradient	Lead	0.001	U	0.02	
MWP-8	Downgradient	Low Level Phenolics	0.005	U	0.005	U
MWP-8	Downgradient	Magnesium	370		850	
MWP-8	Downgradient	Manganese	0.01	U	3.7	
MWP-8	Downgradient	Mercury	0.0001	U	0.0005	
MWP-8	Downgradient	Methoxychlor	0.2	U	10	U
MWP-8	Downgradient	Nitrate	3.5		61	
MWP-8	Downgradient	pH	6.1		7.7	
MWP-8	Downgradient	pH, field	6.66		8.23	
MWP-8	Downgradient	Potassium	26		67	
MWP-8	Downgradient	Radioactivity, gross alpha	1+/-15	U	1+/-15	U
MWP-8	Downgradient	Radioactivity, gross beta	1+/-42	U	1+/-42	U
MWP-8	Downgradient	Selenium	0.001	U	0.003	
MWP-8	Downgradient	Silver	0.01		0.06	
MWP-8	Downgradient	Sodium	270		490	
MWP-8	Downgradient	Specific Conductance	13500		23000	
MWP-8	Downgradient	Specific Conductance, field	13860		48530	
MWP-8	Downgradient	Sulfate	110		690	
MWP-8	Downgradient	TOC	0.2		8	
MWP-8	Downgradient	Total Alkalinity as CaCO3	---		85	
MWP-8	Downgradient	Total Coliform	2	U	110	
MWP-8	Downgradient	Total Dissolved Solids	6370		24000	
MWP-8	Downgradient	Total Phosphorous, as P	0.01		1.6	
MWP-8	Downgradient	Total Radium	1+/-1.0	U	1+/-1.0	U
MWP-8	Downgradient	TOX	0.02	U	0.67	
MWP-8	Downgradient	Toxaphene	0.1	U	1	U
MWP-8	Downgradient	Zinc	0.01	U	0.36	
MWP-9	Downgradient	2,4,5-TP (Silvex)	0.1	U	1	U
MWP-9	Downgradient	2,4-D	0.5	U	10	U
MWP-9	Downgradient	Arsenic	0.001	U	0.046	
MWP-9	Downgradient	Barium	0.1	U	0.2	
MWP-9	Downgradient	BHC, gamma isomer (Lindane)	0.05	U	2	U
MWP-9	Downgradient	Bicarbonate as HCO3	100		161	
MWP-9	Downgradient	Cadmium	0.01	U	0.01	U
MWP-9	Downgradient	Calcium	88		250	
MWP-9	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-9	Downgradient	Chloride	172		600	
MWP-9	Downgradient	Chromium	0.005	U	0.1	U
MWP-9	Downgradient	Copper	0.01	U	0.08	U

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-9	Downgradient	Endrin	0.01	U	0.1	U
MWP-9	Downgradient	Fluoride	0.18		0.5	
MWP-9	Downgradient	Hexavalent Chromium, dissolved	0.01	U	0.01	U
MWP-9	Downgradient	Hexavalent Chromium, total	0.01	U	0.02	
MWP-9	Downgradient	Iron	0.03	U	6.5	
MWP-9	Downgradient	Lead	0.001	U	0.006	
MWP-9	Downgradient	Low Level Phenolics	0.005	U	0.008	
MWP-9	Downgradient	Magnesium	19		72	
MWP-9	Downgradient	Manganese	0.01	U	0.22	
MWP-9	Downgradient	Mercury	0.0001	U	0.0004	
MWP-9	Downgradient	Methoxychlor	0.2	U	10	U
MWP-9	Downgradient	Nitrate	0.57		34	
MWP-9	Downgradient	pH	0		8.1	
MWP-9	Downgradient	pH, field	7.21		7.8	
MWP-9	Downgradient	Potassium	8.6		14	
MWP-9	Downgradient	Radioactivity, gross alpha	1+/-1.9	U	1+/-1.9	U
MWP-9	Downgradient	Radioactivity, gross beta	1+/-14	U	1+/-14	U
MWP-9	Downgradient	Selenium	0.001	U	0.004	
MWP-9	Downgradient	Silver	0.01	U	0.01	U
MWP-9	Downgradient	Sodium	71		140	
MWP-9	Downgradient	Specific Conductance	1670		2550	
MWP-9	Downgradient	Specific Conductance, field	1968		2600	
MWP-9	Downgradient	Sulfate	130		240	
MWP-9	Downgradient	TOC	0.5		5	U
MWP-9	Downgradient	Total Alkalinity as CaCO3	---		120	
MWP-9	Downgradient	Total Coliform	2	U	2.2	U
MWP-9	Downgradient	Total Dissolved Solids	650		1900	
MWP-9	Downgradient	Total Phosphorous, as P	0.01	U	0.88	
MWP-9	Downgradient	Total Radium	1+/-1.0	U	1+/-1.0	U
MWP-9	Downgradient	TOX	0.02	U	0.32	
MWP-9	Downgradient	Toxaphene	0.1	U	1	U
MWP-9	Downgradient	Zinc	0.01	U	0.06	
MWP-10	Downgradient	2,4,5-TP (Silvex)	0.1	U	1	U
MWP-10	Downgradient	2,4-D	0.5	U	10	U
MWP-10	Downgradient	Arsenic	0.001	U	0.005	
MWP-10	Downgradient	Barium	0.1	U	0.1	U
MWP-10	Downgradient	BHC, gamma isomer (Lindane)	0.05	U	2	U
MWP-10	Downgradient	Bicarbonate as HCO3	120		160	
MWP-10	Downgradient	Cadmium	0.01	U	0.01	U
MWP-10	Downgradient	Calcium	93		120	
MWP-10	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-10	Downgradient	Chloride	156		430	
MWP-10	Downgradient	Chromium	0.005	U	0.1	U
MWP-10	Downgradient	Copper	0.01	U	0.08	U
MWP-10	Downgradient	Endrin	0.01	U	0.1	U
MWP-10	Downgradient	Fluoride	0.25		0.38	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-10	Downgradient	Hexavalent Chromium, dissolved	0.002	U	0.01	U
MWP-10	Downgradient	Hexavalent Chromium, total	0.002	U	0.01	U
MWP-10	Downgradient	Iron	0.02	U	0.13	
MWP-10	Downgradient	Lead	0.001	U	0.031	
MWP-10	Downgradient	Low Level Phenolics	0.005	U	0.05	U
MWP-10	Downgradient	Magnesium	22		36	
MWP-10	Downgradient	Manganese	0.01		0.05	U
MWP-10	Downgradient	Mercury	0.0001	U	0.0003	
MWP-10	Downgradient	Methoxychlor	0.2	U	10	U
MWP-10	Downgradient	Nitrate	1.1		15	
MWP-10	Downgradient	pH	6.6		8.1	
MWP-10	Downgradient	pH, field	7.05		7.82	
MWP-10	Downgradient	Potassium	5.8		9.4	
MWP-10	Downgradient	Radioactivity, gross alpha	1+/-1.0	U	1+/-1.0	U
MWP-10	Downgradient	Radioactivity, gross beta	1+/-15	U	1+/-15	U
MWP-10	Downgradient	Selenium	0.001	U	0.004	
MWP-10	Downgradient	Silver	0.01	U	0.01	U
MWP-10	Downgradient	Sodium	66		88	
MWP-10	Downgradient	Specific Conductance	1050		1440	
MWP-10	Downgradient	Specific Conductance, field	1224		1378	
MWP-10	Downgradient	Sulfate	130		163	
MWP-10	Downgradient	TOC	0.5	U	6	
MWP-10	Downgradient	Total Alkalinity as CaCO3	120		120	
MWP-10	Downgradient	Total Coliform	2		2.2	U
MWP-10	Downgradient	Total Dissolved Solids	590		1100	
MWP-10	Downgradient	Total Phosphorous, as P	0.01	U	3.2	
MWP-10	Downgradient	Total Radium	1+/-1.0	U	1+/-1.0	U
MWP-10	Downgradient	TOX	0.02	U	0.15	
MWP-10	Downgradient	Toxaphene	0.1	U	1	U
MWP-10	Downgradient	Zinc	0.01	U	0.06	
MWP-14	Downgradient	2,4,5-TP (Silvex)	---		---	
MWP-14	Downgradient	2,4-D	---		---	
MWP-14	Downgradient	Arsenic	---		---	
MWP-14	Downgradient	Barium	---		---	
MWP-14	Downgradient	BHC, gamma isomer (Lindane)	---		---	
MWP-14	Downgradient	Bicarbonate as HCO3	110		130	
MWP-14	Downgradient	Cadmium	---		---	
MWP-14	Downgradient	Calcium	170		250	
MWP-14	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-14	Downgradient	Chloride	490		710	
MWP-14	Downgradient	Chromium	0.05	U	0.05	U
MWP-14	Downgradient	Copper	0.05	U	0.05	U
MWP-14	Downgradient	Endrin	---		---	
MWP-14	Downgradient	Fluoride	0.18		0.24	
MWP-14	Downgradient	Hexavalent Chromium, dissolved	---		---	
MWP-14	Downgradient	Hexavalent Chromium, total	---		---	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-14	Downgradient	Iron	0.1	U	0.1	U
MWP-14	Downgradient	Lead	---		---	
MWP-14	Downgradient	Low Level Phenolics	0.005	U	0.005	U
MWP-14	Downgradient	Magnesium	48		75	
MWP-14	Downgradient	Manganese	0.05	U	0.05	U
MWP-14	Downgradient	Mercury	---		---	
MWP-14	Downgradient	Methoxychlor	---		---	
MWP-14	Downgradient	Nitrate	33		34	
MWP-14	Downgradient	pH	8.1		8.3	
MWP-14	Downgradient	pH, field	7.62		8.27	
MWP-14	Downgradient	Potassium	11		15	
MWP-14	Downgradient	Radioactivity, gross alpha	---		---	
MWP-14	Downgradient	Radioactivity, gross beta	---		---	
MWP-14	Downgradient	Selenium	---		---	
MWP-14	Downgradient	Silver	---		---	
MWP-14	Downgradient	Sodium	120		160	
MWP-14	Downgradient	Specific Conductance	1890		2550	
MWP-14	Downgradient	Specific Conductance, field	2140		2710	
MWP-14	Downgradient	Sulfate	160		190	
MWP-14	Downgradient	TOC	0.69		6.8	
MWP-14	Downgradient	Total Alkalinity as CaCO3	---		110	
MWP-14	Downgradient	Total Coliform	---		---	
MWP-14	Downgradient	Total Dissolved Solids	1300		2000	
MWP-14	Downgradient	Total Phosphorous, as P	0.049		1.4	
MWP-14	Downgradient	Total Radium	---		---	
MWP-14	Downgradient	TOX	0.046		9.1	
MWP-14	Downgradient	Toxaphene	---		---	
MWP-14	Downgradient	Zinc	0.05	U	0.05	U
MWP-15	Downgradient	2,4,5-TP (Silvex)	---		---	
MWP-15	Downgradient	2,4-D	---		---	
MWP-15	Downgradient	Arsenic	---		---	
MWP-15	Downgradient	Barium	---		---	
MWP-15	Downgradient	BHC, gamma isomer (Lindane)	---		---	
MWP-15	Downgradient	Bicarbonate as HCO3	100		120	
MWP-15	Downgradient	Cadmium	---		---	
MWP-15	Downgradient	Calcium	340		510	
MWP-15	Downgradient	Carbonate as CO3	0.6	U	0.6	U
MWP-15	Downgradient	Chloride	860		1400	
MWP-15	Downgradient	Chromium	0.05	U	0.05	U
MWP-15	Downgradient	Copper	0.05	U	0.05	U
MWP-15	Downgradient	Endrin	---		---	
MWP-15	Downgradient	Fluoride	0.12		0.16	
MWP-15	Downgradient	Hexavalent Chromium, dissolved	---		---	
MWP-15	Downgradient	Hexavalent Chromium, total	---		---	
MWP-15	Downgradient	Iron	0.1	U	0.1	U
MWP-15	Downgradient	Lead	---		---	

TABLE 5-4
Groundwater Monitoring Results
SWMU 10 (Unit 4.11) Old Evaporation
PG&E Topock Compressor Station

Well	Location	Analyte	Min Value	Qualifier	Max Value	Qualifier
MWP-15	Downgradient	Low Level Phenolics	0.005	U	0.005	U
MWP-15	Downgradient	Magnesium	92		130	
MWP-15	Downgradient	Manganese	0.05	U	0.05	U
MWP-15	Downgradient	Mercury	---		---	
MWP-15	Downgradient	Methoxychlor	---		---	
MWP-15	Downgradient	Nitrate	46		92	
MWP-15	Downgradient	pH	8		8.3	
MWP-15	Downgradient	pH, field	7.72		8.47	
MWP-15	Downgradient	Potassium	16		18	
MWP-15	Downgradient	Radioactivity, gross alpha	---		---	
MWP-15	Downgradient	Radioactivity, gross beta	---		---	
MWP-15	Downgradient	Selenium	---		---	
MWP-15	Downgradient	Silver	---		---	
MWP-15	Downgradient	Sodium	190		210	
MWP-15	Downgradient	Specific Conductance	3690		4180	
MWP-15	Downgradient	Specific Conductance, field	4210		4480	
MWP-15	Downgradient	Sulfate	260		300	
MWP-15	Downgradient	TOC	0.5	U	0.62	
MWP-15	Downgradient	Total Alkalinity as CaCO3	---		110	
MWP-15	Downgradient	Total Coliform	---		---	
MWP-15	Downgradient	Total Dissolved Solids	2600		3000	
MWP-15	Downgradient	Total Phosphorous, as P	0.32		0.47	
MWP-15	Downgradient	Total Radium	---		---	
MWP-15	Downgradient	TOX	0.02	U	0.33	
MWP-15	Downgradient	Toxaphene	---		---	
MWP-15	Downgradient	Zinc	0.05	U	0.05	U

Notes:
--- not analyzed or not available
U not detected at the reporting limit listed

Source: Pacific Gas and Electric Company, 1993

TABLE 5-5

Soil Sample Results

SWMU 5 (Units 4.12 and 4.13) - Sludge Drying Beds

RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																General Chemistry in mg/kg unless otherwise noted	
				Cleanup Objectives:	7.2	4.4	373	1	0.6	19		43	20	16	0.123	1.7	53	1	0.5	5	50	135	914	
Sample ID	Location	Depth	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units
ED -4	ED -4	0	N	12/9/1988	0.3 U	1.63	120	1 U	0.5 U	6.4	1 U	23	3 U	17	0.002 U	1 U	12	1 U	0.5 U	5 U	18	34	504	11.25
ED -5	ED -5	0	N	12/9/1988	0.3 U	1.21	110	1 U	0.5 U	8.2	1 U	37	3.8	4.4	0.016	1 U	9.3	1 U	0.5 U	5 U	24	53	791	10.85
D -4	D -4	0	N	12/9/1988	0.3	1.3	78	0.05 U	0.2	2.3	1 U	18	8.1	4	0.019	0.11	6.5	0.05 U	0.1 U	0.3 U	8.1	93	130	10.35
D -4	D -4	0	N	12/9/1988	0.3 U	1.84	210	1 U	0.5	8.3	1 U	30	3.1	5.2	0.012	1 U	11	1 U	0.5 U	5 U	20	100	310	10.21
D -5	D -5	0	N	12/9/1988	0.3 U	1.29	110	1 U	0.5 U	7.1	1 U	22	3 U	15	0.014	1 U	7.5	1 U	0.5 U	5 U	21	33	528	10.53

Notes:

N primary sample
FD field duplicate
mg/kg milligrams per kilograms
--- not analyzed
U not detected at the reporting limit listed
J estimated value
Detected results are shown in bold

Samples were collected at the surface of the e cavation which was appro imately 2 feet deep. The e cavation was backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-6
Soil Sample Results
SWMU 6 (Unit 4.7) - Chromate Reduction Tank
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																		General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					7.2	4.4	373	1	0.6	19			43	20	16	0.123	1.7	53	1	0.5	5	50	135	914		
Sample ID	Location	Depth ft	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Trivalent Chromium	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in mhos/cm
CRT-4_0.5	CRT-4	0.5	N	11/15/1989	0.3 U	4.3	165	1 U	0.5 U	10	---	1	120	14	6	0.002 U	1 U	19	1 U	0.5 U	5 U	26	96	380	8.42	170
DUP-2 CRT-4	CRT-4	0.5	FD	11/15/1989	---	---	---	---	---	---	---	1 U	43	8.3	---	---	---	8.1	---	---	---	---	59	---	10.01	---
CRT-4_1	CRT-4	1	N	11/15/1989	0.3 U	1.7	103	1 U	0.5 U	9	---	1 U	23	7	2	0.002 U	1 U	14	1 U	0.5 U	5 U	23	47	490	9.03	65
CRT-4_1.5	CRT-4	1.5	N	11/15/1989	0.3 U	2.5	168	1 U	0.5 U	10	---	1 U	21	8	3	0.002 U	1 U	18	1 U	0.5 U	5 U	24	49	400	9.52	45
CRT-4_5	CRT-4	5	N	11/15/1989	1 U	1.9	56	0.1	0.2	3	43	1 U	43	8.3	1.9	0.02 U	0.67	8.1	0.05 U	0.1 U	1 U	14	59	650	10.01	380

Notes:

N primary sample
FD field duplicate
mg/kg milligrams per kilograms
--- not analyzed
U not detected at the reporting limit listed
J estimated value
Detected results are shown in bold

Depths shown are the depth below the bottom of the e cavation which was appro imately 7 feet deep. The e cavation was backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-7
Soil Sample Results
SWMU 8 (Unit 4.10) - Process Pump Tank
RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted	
	Cleanup Objectives:				7.2	4.4	373	1	0.6	19		43	20	16	0.123	1.7	53	1	0.5	5	50	135	914	
Sample ID	Location	Depth ft	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units
DUP-1 PPT-4	PPT-4	1.5	FD	12/9/1988	---	---	---	---	---	---	1 U	29	15	---	---	---	26	---	---	---	---	35	---	8.74
PPT-4_2	PPT-4	2	N	2/8/1989	0.3 U	1.1	63	1 U	0.5 U	13	1 U	32	19	5	0.02	1 U	33	1 U	0.5 U	5 U	41	44	636	8.68
PPT-4_2D	PPT-4	2	FD	2/8/1989	0.3 U	1.2	65	1 U	0.5 U	9	1 U	29	15	4	0.027	1 U	26	1 U	0.5 U	5 U	32	36	664	8.74
PPT-4_3	PPT-4	3	N	2/8/1989	0.3 U	1.3	50	1 U	0.5	10	1 U	26	16	5	0.007	1 U	25	1 U	0.5 U	5 U	38	44	576	9.34

Notes:
N primary sample
FD field duplicate
mg/kg milligrams per kilograms
--- not analyzed
U not detected at the reporting limit listed
J estimated value
Detected results are shown in bold

Depths shown are the depth below the bottom of the e cavation which was appro imately 2 feet deep. The e cavation was backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-8

Soil Sample Results

SWMU 9 (Unit 4.8) - Transfer Sump

RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																	General Chemistry in mg/kg unless otherwise noted		
Cleanup Objectives:					7.2	4.4	373	1	0.6	19		43	20	16	0.123	1.7	53	1	0.5	5	50	135	914		
Sample ID	Location	Depth ft	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in mhos/cm
SumpTS-3	SumpTS-3	0.5	N	11/15/1989	0.3 U	2.1	100	1	0.5 U	11	1 U	20	8	4	0.002 U	1 U	16	1 U	0.5 U	5 U	23	54	400	9.05	87

Notes:

N	primary sample
FD	field duplicate
mg/kg	milligrams per kilograms
---	not analyzed
U	not detected at the reporting limit listed
J	estimated value
	Detected results are shown in bold

Depths shown are the depth below the bottom of the excavation which was approximately 18.5 feet deep. The excavation was backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-9

Soil Sample Results

Former Oily Water Treatment System

RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

Sample ID	Location	Depth*, ft	Sample Type	Sample Date	Total Petroleum Hydrocarbons in mg/kg				
					TPH - Gasoline	TPH - Extractables	TPH - Diesel	TPH - Motor Oil	TPH - Jet Fuel
1042-55-4	OWS PI-1^		N	11/17/1989	8 U	---	5 U	**1,200**	3 U
1042-55-6	OWS Valve PI-1^		N	11/17/1989	8 U	---	5 U	**850**	3 U
1042-55-10	OWS-10^		N	11/18/1989	---	2 U	---	---	---
1042-55-11	OWS-11^		N	11/18/1989	---	1 U	---	---	---
1042-43-32	OWS-12 Deeper^		N	3/20/1990	---	**18**	---	---	---

Notes:

*	Samples collected beneath I-1 pipe or beneath Oil Water Separator
N	primary sample
mg/kg	milligrams per kilograms
OWS	oil/water separater
---	not analyzed
U	not detected at the reporting limit listed

Detected results are shown in bold

Table 5-10

Former Wastewaster Treatment System Piping Designations and Details
RCRA Facility Investigation/Remedial Investigation (Volume 1)
PG&E Topock Compressor Station, Needles, California

Piping Section	Connection	Diameter (inch)	Material	Length (feet)
A	Cooling Towers to Chromate Reduction Tank	3	PVC	1500[(1)]
B	Chromate Reduction Tank to Transfer Sump	3	PVC	30
C	Transfer Sump to transfer pumps	3	PVC	15
D	Process Pump Tank to transfer pumps	3	PVC	500
E	Precipitation Tank to Process Pump Tank	4	Steel	15
F	Transfer pumps to Precipitation Tank	3	PVC	500
G	Transfer pumps to Old Evaporation Ponds	3	PVC[(2)]	1500
H	Precipitation Tank to Sludge Drying Beds	6	Cast iron	500

Notes:

PVC = Polyvinyl chloride
(1) 750 feet per tower
(2) Portions of the pipe that were buried were 3-inch diameter polyethylene and the portion that was suspended above Bat Cave Wash was aluminum.

TABLE 5-11

Soil Sample Results

Former Hazardous Waste Treatment System Piping

RCRA Facility Investigation/Remedial Investigation (Volume 1) , PG&E Topock Compressor Station, Needles, California

					Metals in mg/kg																		General Chemistry in mg/kg unless otherwise noted		
				Cleanup Objectives:	7.2	4.4	373	1	0.6	19			43	20	16	0.123	1.7	53	1	0.5	5	50	135	914		
Sample ID	Location	Depth ft	Sample Type	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Cobalt	Trivalent Chromium	Hexavalent Chromium	Total Chromium	Copper	Lead	Mercury	Molybdenum	Nickel	Silver	Selenium	Thallium	Vanadium	Zinc	Fluoride	pH in pH units	Specific Conductance in mhos/cm
P -3	P -3	1	N	11/19/1989	0.3 U	2.3	168	1 U	0.5 U	3 U	---	1 U	45	7	14.8	0.058	1 U	14	1 U	0.5 U	5 U	24	87	583	8.2	244
P -3D	P -3	1	FD	11/19/1989	0.3 U	2.6	169	1 U	0.5 U	3 U	---	---	49	8	12.4	0.036	---	12	1 U	0.5 U	5 U	25	91	---	---	---
PC-1	PC-1	1	N	11/14/1989	0.3 U	2	123	1 U	0.5 U	6	---	1 U	10	10	9.4	0.032	1 U	16	1 U	0.5 U	5 U	10	26	310	8.59	120
PF-6	PF-6	1	N	11/18/1989	1 U	2	47	0.12	0.11	1.8	26	1 U	26	6.7	16	0.02 U	0.27	5.4	0.05 U	0.1 U	1 U	7.3	26	380	8.69	980
PF-6	PF-6	1	N	11/18/1989	0.3 U	1.7	80	1 U	0.5 U	3 U	---	1 U	22	3	28.5	0.002 U	1 U	8	1 U	0.5 U	5 U	8	51	355	8.2	265
PF-8	PF-8	1	N	11/18/1989	0.3 U	1.9	92	1 U	0.5 U	3 U	---	1 U	12	7	9	0.007	0.82	7	1 U	0.5 U	5 U	1 U	27	519	8.5	98
P -2	P -2		N	11/15/1989	0.3 U	2.18	152	1 U	0.5 U	3 U	---	1 U	24.7	3.3	10.6	0.026	1 U	9.6	4.4	0.5 U	5 U	1 U	92.8	890	9	430
DUP-1 P -2	P -2		FD	11/15/1989	0.3 U	3	219	1 U	0.5 U	3 U	---	1 U	26	9	4.1	0.002 U	1 U	8	1 U	0.5 U	5 U	7	45	---	8.8	686
P 1	P -1		N	12/5/1988	0.3 U	3.19	170	1 U	0.5 U	5.1	---	1 U	23	3 U	10	0.061	1 U	8.5	1 U	0.5 U	5 U	13	30	498	8.57	---
P 1D	P -1		FD	12/5/1988	0.3 U	2.48	180	1 U	0.5 U	5.1	---	1 U	22	3 U	20	0.043	1 U	6.8	1 U	0.5 U	1 U	15	33	502	8.4	---
P 2	P -2		N	12/5/1988	0.3 U	2.42	150	1 U	0.6	6	---	1.9	510	8.7	38	0.076	1 U	6.7	1 U	0.5 U	5 U	13	210	500	8.45	---
P -3	P -3	3	N	11/14/1989	0.3 U	2.1	199	1 U	0.5 U	7	---	2	25	9	4	0.032	1 U	16	1 U	0.5 U	5 U	23	37	520	9.96	320
P -4	P -4	3	N	11/14/1989	5.8	2.1	175	1 U	0.5 U	6	---	1 U	35	8	9	0.006	1 U	17	1 U	0.5 U	5 U	23	53	480	9.14	270
P -5	P -5	6	N	11/14/1989	0.3 U	2.2	216	1 U	0.5 U	7	---	1 U	12	5	6	0.15	1 U	11	1 U	0.5 U	5 U	13	29	570	8.42	160
P -5D	P -5	6	FD	11/14/1989	0.3 U	2.7	201	1 U	0.5 U	4	---	---	11	5	5	0.172	15	9	1 U	0.5 U	5 U	8	29	---	---	---
P -6	P -6	1.5	N	11/18/1989	0.3 U	1.7	66	1 U	0.5 U	9	---	1 U	10	13	2.3	0.045	1 U	32	1 U	0.5 U	5 U	29	58	506	10.3	412
P -7	P -7	5	N	11/18/1989	0.3 U	1.7	149	1 U	0.5 U	7	---	1 U	52	10	9.6	0.034	1 U	25	1 U	0.5 U	5 U	23	118	640	9.6	380
P -7	P -7	5	N	11/18/1989	1 U	1.4	79	0.2	0.19	3.3	27	1 U	27	11	2.2	0.02	0.2	12	0.05 U	0.1 U	1 U	14	34	650	10.26	810
P -8	P -8	3	N	11/18/1989	0.3 U	2.1	83	1	0.5 U	6	---	1 U	37	16	6.1	0.002 U	1 U	25	1 U	0.5 U	5 U	42	41	584	10.2	449
P -9	P -9	3	N	11/20/1989	0.3 U	1.7	56	1 U	0.5 U	3 U	---	1 U	34	15	6.4	0.011	1 U	24	1 U	0.5 U	5 U	40	61	851	9.7	368
P -10	P -10	2	N	11/20/1989	0.3 U	1.4	113	0.26	0.5 U	3 U	---	1 U	26	5.1	20	0.075	1 U	18	1 U	0.6	5 U	25	12	516	10.2	418
P -11	P -11	4	N	11/21/1989	0.3 U	1.7	111	1	0.5 U	5	---	1 U	26	12	8	0.002 U	1 U	18	1 U	0.5 U	5 U	33	47	617	8.6	225
P -12	P -12	4	N	11/21/1989	0.3 U	2.2	90	1	0.5 U	4	---	1 U	28	12	8	0.002 U	1 U	19	1 U	0.5 U	5 U	35	44	629	8.9	303
P -13	P -13	6	N	11/21/1989	0.3 U	2.5	216	1 U	0.5 U	3 U	---	1 U	37	8	12.5	0.009	1 U	9	1 U	0.5 U	5 U	24	102	670	8.5	328

Notes:

N	primary sample
FD	field duplicate
mg/kg	milligrams per kilograms
---	not analyzed
U	not detected at the reporting limit listed
J	estimated value
	Detected results are shown in bold

Results from sample collected at lower depth than represented in the table, after additional soil removal.

Samples were collected beneath pipelines located at varying depths. Confirmation samples were collected after e cavation of contaminated soil surrounding pipelines. E cavations were backfilled after confirmation sample collection.

Cleanup objectives are based on background concentrations.

Source: Mittelhauser 1990

TABLE 5-12
Soil Sampling Results
Former 300B Pipeline Liquids Tank
Total Recoverable Petroleum Hydrocarbons and TPH-Motor Oil
RCRA Facility Investigation/Remedial Investigation (Volume 1), PG&E Topock Compressor Station, Needles, California

Sample Event/ Sample ID	Sample Date	Sample Depth (bgs)	TPH-Motor Oil[a] (mg/kg)	Total Recoverable Petroleum Hydrocarbons[b] (mg/kg)	Comments
Initial Site Investigation Results					
HDPT 1/1.2	12/2/94	1.2 feet	100		
HDPT 1/2	12/2/94	2 feet	13		
Soil Disposal Characterization Results					
TODT-1	4/16/96	0-4 inches		68,000	Excavated
Post Excavation Confirmation Sampling Round 1					
ODT-1	7/18/96	2.5 feet		1,200	Re-excavated
ODT-2	7/18/96	3.0 feet		360	Re-excavated
ODT-3	7/18/96	1.5 feet		3,800	Re-excavated
ODT-4	7/18/96	0.5 feet		ND <20	
Post Excavation Confirmation Sampling Round 2					
ODT-5	8/22/96	2.0 feet		2,500	Re-excavated
ODT-6	8/22/96	3.0 feet		1,300	Re-excavated
Post Excavation Confirmation Sampling Round 3					
ODT-7	9/5/96	2.0 feet		ND <20	
ODT-8	9/5/96	2.5 feet		ND <20	
ODT-9	9/5/96	2.5 feet		ND <20	
ODT-10	9/5/96	4.0 feet		ND <20	
ODT-11	9/5/96	4.5 feet		690	Re-excavated
Post Excavation Confirmation Sampling Round 4					
ODT-12	9/26/96	5.5 feet		ND <20	
ODT-13	9/26/96	5.0 feet		120	
ODT-14	9/26/96	5.0 feet		66	
ODT-15	9/26/96	5.0 feet		150	

Notes:
[a] Analysis Method was GC/FID.
[b] Analysis Method EPA 418.1.
ND = Not Detected at the stated reporting limit

Sources:
Investigation of Pipeline Liquid Oil Tank at PG&E's Topock Compressor Station, Needles, California, dated July 6, 1995 (Trident 1995a)

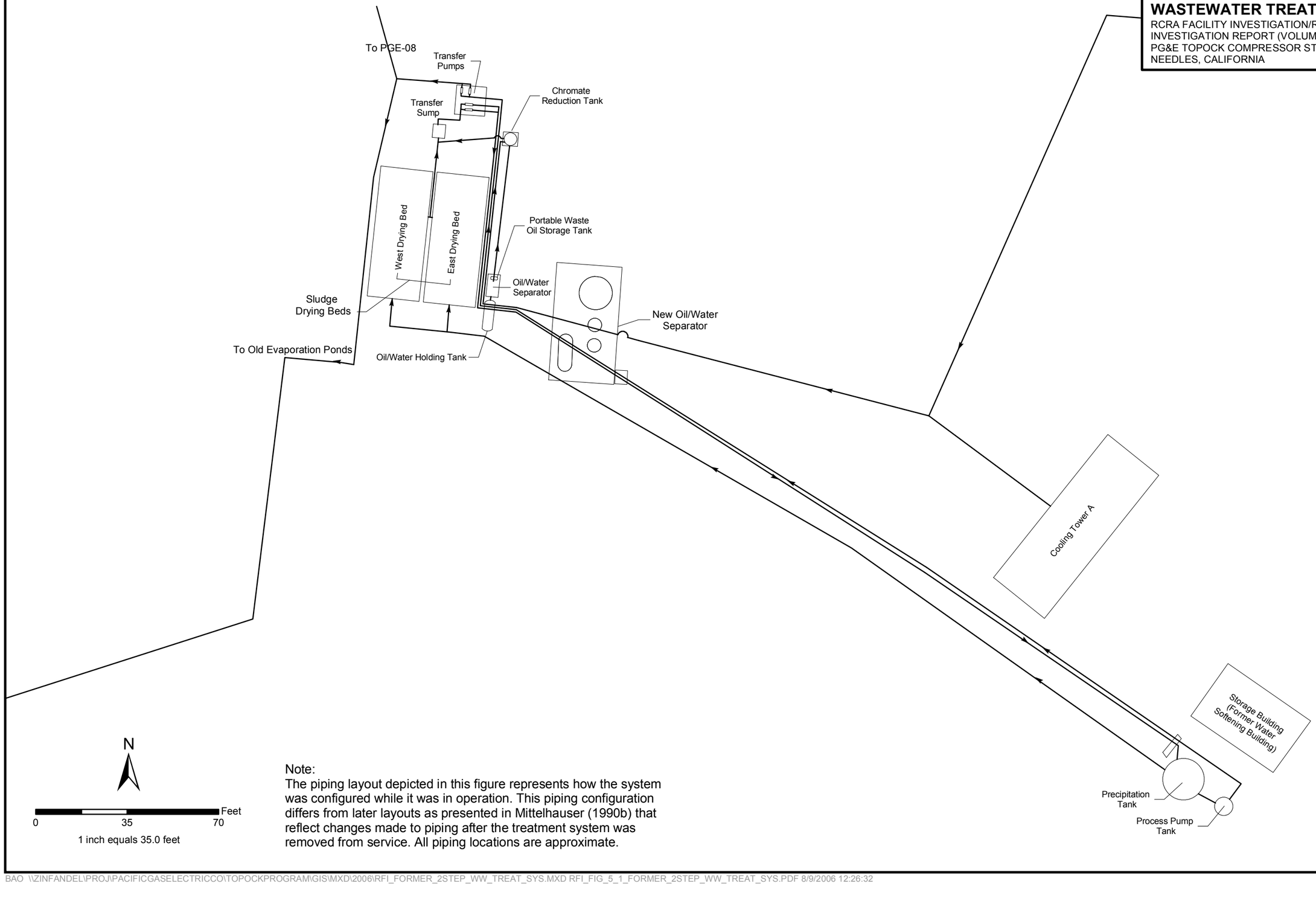
Former Pipeline Liquid Closure Plan PG&E Topock Compressor Station, Needles, California, dated May 7, 1996 (Trident 1996c)

Former Pipeline Liquid Oil Tank Closure Certification Report, PG&E Topock Gas Compressor Station Needles, California, dated October 10, 1996 (Trident 1996d).

FIGURE 5-1
LAYOUT OF THE FORMER WASTEWATER TREATMENT SYSTEMS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

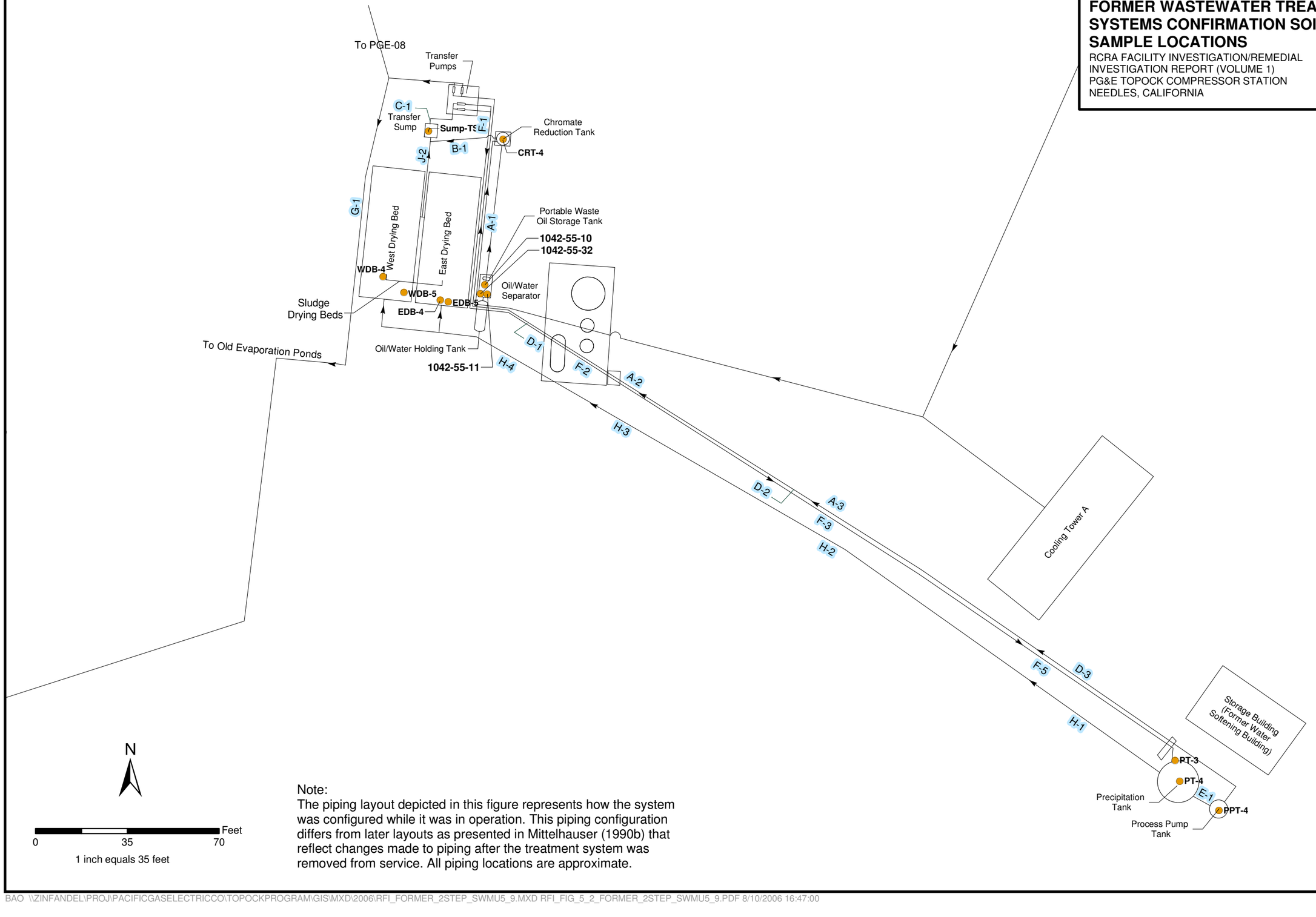


Note:
The piping layout depicted in this figure represents how the system was configured while it was in operation. This piping configuration differs from later layouts as presented in Mittelhauser (1990b) that reflect changes made to piping after the treatment system was removed from service. All piping locations are approximate.

FIGURE 5-2
FORMER WASTEWATER TREATMENT SYSTEMS CONFIRMATION SOIL SAMPLE LOCATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Note:
The piping layout depicted in this figure represents how the system was configured while it was in operation. This piping configuration differs from later layouts as presented in Mittelhauser (1990b) that reflect changes made to piping after the treatment system was removed from service. All piping locations are approximate.

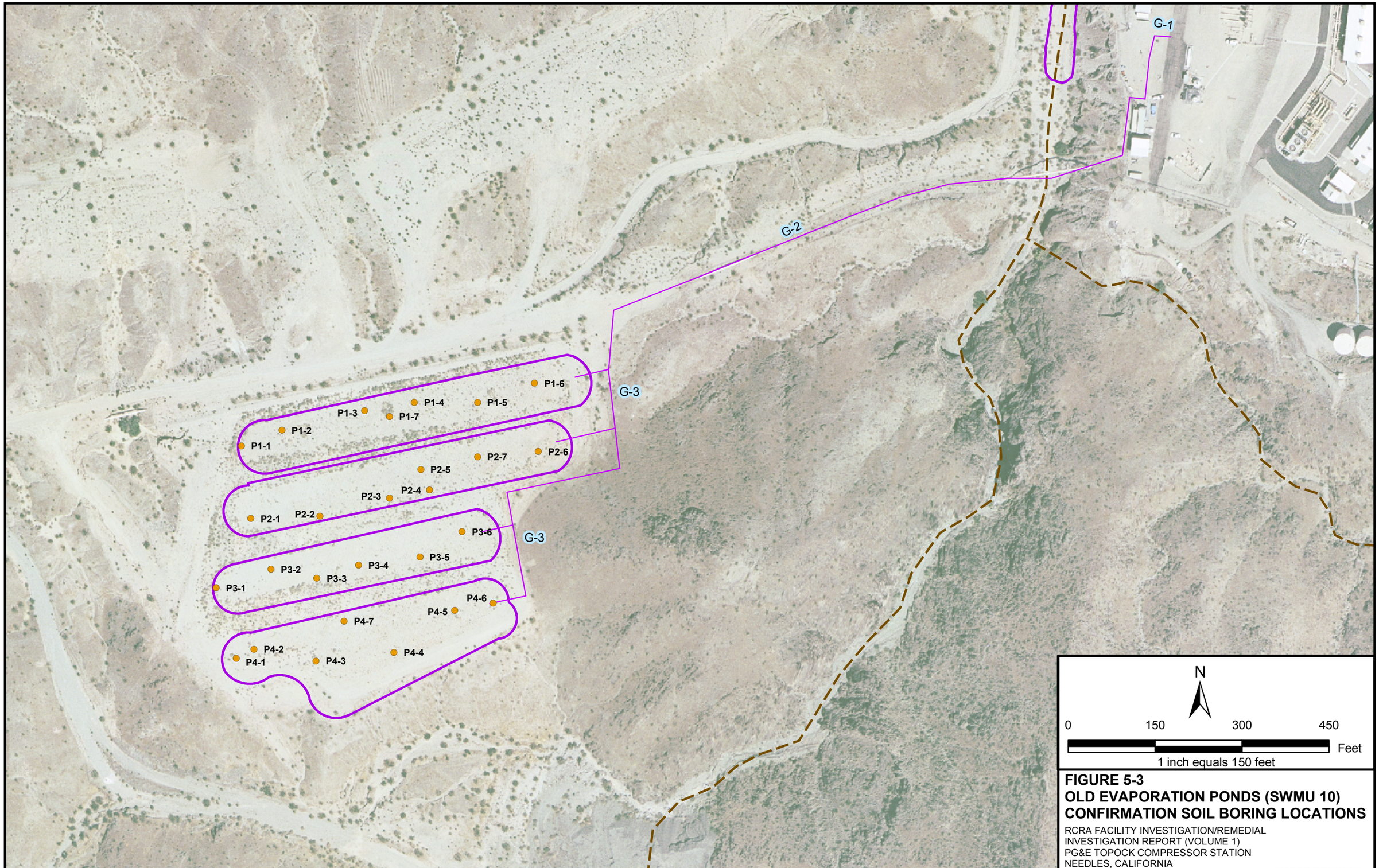


FIGURE 5-3
OLD EVAPORATION PONDS (SWMU 10)
CONFIRMATION SOIL BORING LOCATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

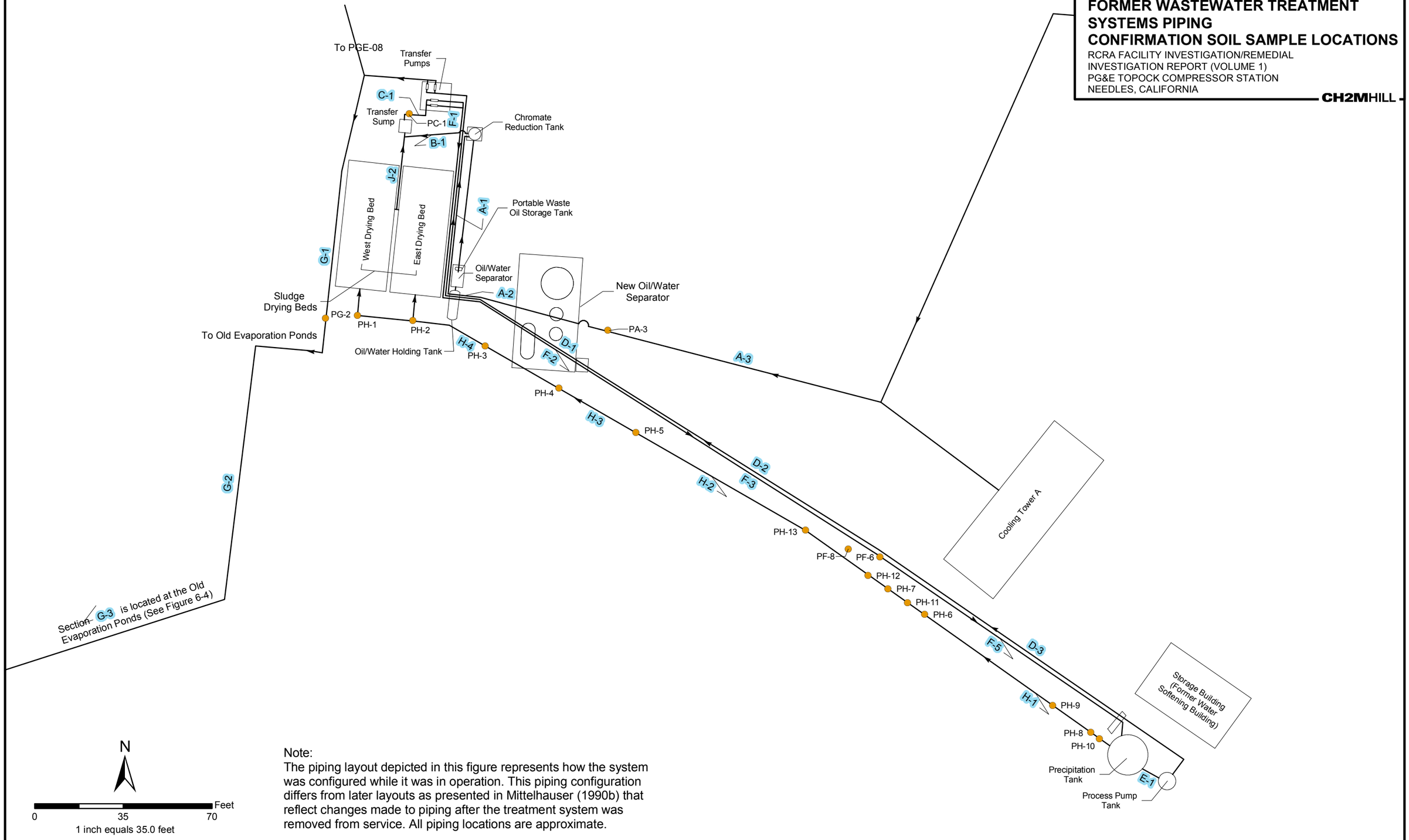
CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MXD\2006\RFI_EVAP_POND_SAMP_LOC.MXD RFI_FIG_5_3_EVAP_POND_SAMP_LOC.PDF 8/25/2006 09:55:47

FIGURE 5-4
FORMER WASTEWATER TREATMENT SYSTEMS PIPING CONFIRMATION SOIL SAMPLE LOCATIONS

RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION REPORT (VOLUME 1)
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL



Note:
The piping layout depicted in this figure represents how the system was configured while it was in operation. This piping configuration differs from later layouts as presented in Mittelhauser (1990b) that reflect changes made to piping after the treatment system was removed from service. All piping locations are approximate.

6.0 References (Volume 1)

Alisto Engineering Group (Alisto). 1997. *Current Conditions Report, Bat Cave Wash Project.* Prepared for California Department of Toxic Substances Control. May.

American Gas Association. 2004. "How Does the Natural Gas Delivery System Work?". http://www.aga.org/Content/ContentGroups/Home_Page/Limelight/How_Does_The_Natural_Gas_Delivery_System_Work_.htm.

Anderson, T.W., G.W. Freethey, and P. Tucci. 1992. "Geohydrology and Water Resources in Alluvial Basins in South-Central Arizona and Parts of Adjacent States." United States Geological Survey Professional Paper 1406-B. 74p.

Applied EarthWorks, Inc. 2005. *DRAFT: Cultural Resources Investigations, Third Addendum: Survey of the Original and Expanded APE: Volume I, for Topock Compressor Station Site Vicinity, San Bernardino County, California.* Prepared for Pacific Gas & Electric Company, San Francisco, California.

Arizona State Department of Health (ASDOH). 1961. Letter from G. W. Marx (ASDOH) to Mr. Adler (PG&E) regarding Topock water system. February 27.

Betz. 1952a. *Topock Cooling Water Analyses Report.* January 21.

_____. 1952b. *Topock Cooling Water Analyses Report.* March 19.

_____. 1965. *Topock Cooling Water Analyses Report.* February 2.

_____. 1967a. *Topock Cooling Water Analyses Report.* August 2.

_____. 1967b. *Topock Cooling Water Analyses Report.* May 10.

_____. 1969a. *Topock Cooling Water Analyses Reports.* February 13, May 28, and November 11.

_____. 1969b. *Topock Cooling Water Analyses Reports.* February 13 and 28.

_____. 1972. *Topock Cooling Water Analyses Report.* February 17.

_____. 1978a. *Topock Cooling Water Analyses Report.* April 19.

_____. 1978b. Letter from L. D. Breazeale (Betz) to Dennis Woods (PG&E) regarding a summary of water analysis performed on the Topock cooling systems. August 10.

_____. 1978c. Letter from L. D. Breazeale (Betz) to Dennis Woods (PG&E) regarding a decision to switch from Betz Orocol to Krom Trol X-5 in the Topock closed loop system. November 2.

_____. 1980a. *Topock Cooling Water Analyses Report.* February 28.

_____. 1980b. *Topock Cooling Water Analyses Report.* November 14.

_____. 1981. *Topock Cooling Water Analyses Report.* December 23.

_____. 1982. *Topock Cooling Water Analyses Report.* June 14.

_____. 1985. Transmittal letter from Harold M. March (Betz) to Dick Davis (PG&E) and material safety data sheets for Betz products. August 16.

_____. 1987. *Topock Cooling Water Analyses Report*. March 12.

_____. 1989. *Topock Cooling Water Analyses Report*. March 21.

_____. 1990. *Topock Cooling Water Analyses Report*. September 26.

_____. 1991. *Topock Cooling Water Analyses Report.* January 30.

Bezanson, Rick. 2006. Personal Communication between Susanne von Rosenberg (GAIA Consulting, Inc) and Rick Bezanson. June 28.

Brown and Caldwell. 1985a. *Sampling and Analysis for Closure of Waste Management Facilities, Topock Compressor Station, Pacific Gas and Electric Company*.

_____. 1985b. *Report of Analytical Results, Log No. P85-10-364*. November 8.

_____. 1986. *Report of Analytical Results, Log No. E86-11-434*. December 16.

_____. 1988. *Bat Cave Wash Soil Investigations, Topock Gas Compressor Station, Pacific Gas & Electric Company*. October.

California Department of Health Services (CDHS). 1984a. Letter from Angelo Bellomo (CDHS) to H.M. Howe (PG&E). "Improper Disposal of Hazardous Waste – Needles Solid Waste Disposal Site." January 6.

_____. 1984b. *Preliminary Assessment Summary, Needles Disposal Site, U.S. Highway 95 @ Miles South of Needles*. July.

_____. 1985. *Preliminary Assessment Summary, Needles Disposal Site, U.S. Highway 95 @ Miles South of Needles*. October.

Castetter, E. F., and W. H. Bell. 1951. *Yuman Indian Agriculture: Primitive Subsistence on the Lower Colorado and Gila Rivers.* University of New Mexico Press, Albuquerque.

CH2M HILL. 2004. *Cultural Resources Investigations for Interim Measures No. 3: Topock Compressor Station Expanded Groundwater Extraction and Treatment System San Bernardino County, California.* Draft. September.

_____. 2005. *Pacific Gas and Electric Company, PG&E Topock Compressor Station, Needles, California: Draft RCRA Facility Investigation and Remedial Investigation Report*. February.

_____. 2006a. Technical Memorandum. *Background Information Concerning PCBs and Naturally-Occurring Radioactive Materials at PG&E's Topock Compressor Station.* March.

_____. 2006b. *Interim Measure No. 3 Performance Monitoring Report.* June.

County of San Bernardino Fire Department. 1997. Letter from Catherine B. Richards (County) to Rex Bell (PG&E). "Report of Scrubber Sump Investigation Results and Former Pipeline Liquid Oil Tank Closure Certification Report of the PGE Topock

Compressor Station Located 15 Miles South of Needle off I-40, Needles, California." June 9.

Dames & Moore. 1969. *Proposed System for Waste Water Disposal, Topock Compressor Station Near Needles, California*. Prepared for Pacific Gas and Electric Company. August 19.

_____. 1970. *Proposed System for Waste Water Disposal, Topock Compressor Station near Needles, California*. Prepared for Pacific Gas and Electric Company. August 31.

Department of Toxic Substances Control (DTSC). 1995. Letter from Mohinder Sandhu (DTSC) to Mel Wong (PG&E). "Closure Certification Acceptance: Hazardous Waste Management Units at PG&E Topock Compressor Station." June 26.

_____. 1996. *Corrective Action Consent Agreement (Revised), Pacific Gas and Electric Company's Topock Compressor Station, Needles, California (USEPA Identification No. CAT080011729)*. February 2.

_____. 2001. Letter from Robert Senga (DTSC) to Mel Wong (PG&E). *Re: Comments on Work Plan for Additional Soil Sampling, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California.* January 4.

_____. 2003. Letter to Linda Gonsalves (PG&E). "Approval of Corrective Measures Study Work Plan. Topock Compressor Station, Needles, California." June 24.

_____. 2004a. *Initial Comments Regarding the Draft RCRA Facility Investigation (RFI) Report dated February 2004, Pacific Gas and Electric Company Topock Compressor Station, Needles, California (USEPA Identification No. CAT080011729).* May 17.

_____. 2004b. *Additional Comments Regarding the Draft RCRA Facility Investigation (RFI) Report dated February 2004, Pacific Gas and Electric Company Topock Compressor Station, Needles, California (USEPA Identification No. CAT080011729).* June 4.

_____. 2006a. *Response to Comments Related to the Site History Position of the RCRA Facility Investigation Report Dated February 2005. Pacific Gas and Electric Company Topock Compressor Station, Needles, California.* July.

_____. 2006b. Internal DTSC Memorandum from Greg Neal to Norman Shopay. *Comments on Soil Portions of "Draft RCRA Facility Investigation (RFI) Report, PG&E Topock Compressor Station, Needles, California."* March 29.

_____. 2007a. *Public Participation Plan, Pacific Gas and Electric Company's Topock Compressor Station, Needles, California (USEPA Identification No CAT080011729).* February 12.

_____. 2007b. Letter to The Honorable Charles Wood (Chemehuevi Indian Tribe). *Communication Process Between DTSC and the Chemehuevi Indian Tribe PG&E Topock Compressor Station Project.* March 15.

_____. 2007c. Letter to The Honorable Daniel Eddy, Jr. (Colorado River Indian **Tribe).** *Communication Process Between DTSC and the Colorado River Indian Tribe PG&E Topock Compressor Station Project.* March 15.

_____. 2007d. Letter to Yvonne Meeks (PG&E). "Comments on the RCRA Facility Investigation/Remedial Investigation, Volume 1 – Site Background and History Report, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California (EPA ID No. CAT080011729)." May 9.

_____. 2007e. Internal Draft DTSC Memorandum from Greg Neal and Chris Guerre to Aaron Yue. "Comments on the RCRA Facility Investigation/Remedial Investigation Soil Investigation Work Plan Part A, Pacific Gas and Electric Company (PG&E), Topock Compressor Station, Needles, California No. 22120/540015/48/36/HWMP Tracking No. 640338/640160." May 14.

_____. 2007f. DTSC Email from Aaron Yue to Cathy Wolff-White, Kris Doebbler, Julie Eakins, and Yvonne J Meeks. Subject: Greetings. July 18.

Ecology and Environment (E&E). 2000a. *Draft RCRA Facility Investigation (RFI) Report, Bat Cave Wash Area, Pacific Gas and Electric Company's Topock Compressor Station.* April.

_____. 2000b. *Work Plan for Additional Soils Sampling, Corrective Action Consent Agreement for Bat Cave Wash Area, PG&E Topock Compressor Station, Needles, California.* October 12.

_____. 2004. *Draft RCRA Facility Investigation (RFI) Report, Bat Cave Wash Area, Pacific Gas and Electric Company's Topock Compressor Station.* February.

Fryman, Frank B. 1976 *An Archaeological Survey of the Proposed Park Moabi Motorcycle Race Course Project Area, San Bernardino County, Ca.* Arizona State University, Tempe.

Furst, Jill L. 2001. *Mojave Pottery, Mojave People: The Dillingham Collection of Mojave Ceramics*. School of American Research Press, Santa Fe, New Mexico.

Hornkohl Laboratory. 1951. *Complete Sanitary Chemical Water Analysis, Drinking Fountain – Topock Machine Shop*. December 28.

_____. 1964. *Domestic Water Analysis Report, PG&E Well No. 6.* June 24.

Howard, K. A., B.E. John, and J.E. Nielson. 1997. Preliminary Geologic Map of the Eastern and Northern Parts of the Topock 7.5-minute Quadrangle, Arizona and California, United States Geological Survey Open-File report 95-534.

Huckell, Bruce B. 1996. "The Archaic Prehistory of the North American Southwest." *Journal of World Prehistory* 10:305–373.

Irwin-Williams, Cynthia. 1979. "Post-Pleistocene Archaeology, 7000–2000 B.C." In "Southwest," edited by Alfonso Ortiz, pp. 31–42. *Handbook of North American Indians*, vol. 9, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Jackson, W. Turrentine. 1964. *Wagon Roads West: A Study of Federal Wagon Road Surveys and Construction in the Trans-Mississippi West: 1846–1869*. Yale University Press, New Haven, Connecticut.

John, B. E. 1987. Geologic Map of the Chemehuevi Mountains area, San Bernardino County, California and Mohave County, Arizona, United States Geological Survey Open-File Report 87-666.

Johnson. 1976. *Vegetation Plant Communities of Southern California Deserts – A Functional View.*

Kearny, A.T. 1987. *RCRA Facility Assessment, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California.* August.

Kilgore, Kristie. 2005. Peronal communication between Martin Baracliman (CH2M HILL) and Kristie Kilgore (Senior Permits Advisor, Arizona Department of Environmental Quality). February 3.

Kroeber, Alfred L. 1925. "Handbook of the Indians of California." *Bureau of American Ethnology* Bulletin 78. Smithsonian Institution, Washington, D.C.

_____. 1974. *Mojave Indians: Report on Aboriginal Territory and Occupancy of the Mojave Tribe*. Garland, New York.

McCurdy, Richard. 2004. Personal communication between Rick Sturm (CH2M HILL) and Richard McCurdy (PG&E Senior Consulting Environmental Specialist). November 4.

_____. 2006."Summary of TCS Spills in 2005-2006". Handout 10A CWG. June 21.

McGuire, Randall H., and M. B. Schiffer (editors). 1982. *Hohokam and Patayan: Prehistory of Southern Arizona*. Academic Press, New York.

McLeod, M.A., T.J. Koronkiewicz, B.T. Brown, and S.W. Carothers. (McLeod et. al) 2005. "Southwestern Willow Flycatcher Surveys, Demography, and Ecology Along the Lower Colorado River and Tributaries, 2004 Annual Report. " U.S. Bureau of Reclamation, Boulder City, NV. pp. 155.

Meredith/Boli & Associates. 1999. *Analysis of Chromium-based Corrosion Inhibitor Use in Cooling Towers at Two PG&E Facilities.* December.

Metzger, D.G. and O.J. Loeltz. 1973. "Geohydrology of the Needles Area, Arizona, California, Nevada." United States Geological Survey Professional Paper 486-J.

Miller, D.M., B.E. John, J.C. Antweiler, R.W. Simpson, D.B. Hoover, G.L. Raines, and T.J. Kreidler. 1983. *Mineral Resources Potential of the Chemehuevi Mountains Wilderness Study Area (CDCA-310), San Bernardino County, California, Summary Report.* Department of the Interior. United States Geological Survey.

Miller, J.M.G and B.E. John. 1999. Sedimentation patterns support seismogenic low-angle normal faulting, southeastern California and western Arizona. Geological Society of America Bulletin, v.111, no.9, p. 1350-1370.

Mittelhauser Corporation. 1986. *Closure Plan for the Hazardous Waste Management Facilities at the Topock Compressor Station.* Revision 1. August.

_____. 1989. *Work Plan for Removal of the Oil Water Separator System, Topock Compressor Station*. May.

_____. 1990a. *Phases 1 and 2 Closure Certification Report, Hazardous Waste Management Facilities, Topock Compressor Station, Needles, California.* June.

_____. 1990b. *Closure Activity Report, Oil Water Separator System, Topock Compressor Station*. July.

Moratto, Michael J. 1984. *California Archaeology*. Academic Press, New York.

More, Chris. 2004. Personal communication between Rick Sturm (CH2M HILL) and Chris More (Maintenance Planner, Topock Compressor Station). September 15.

National Oceanic and Atmospheric Administration (NOAA). 2000. *Annual Climatological Summary* (http://www.nndc.noaa.gov/cgi-bin/nndc/genOL-005.cgi). February 29.

Pacific Gas and Electric Company (PG&E). 1950. Internal Memorandum from D.W. Peterson to W.G.B. Euler. "Topock Compressor Station Site Cooling Water Supply." April 25.

_____. 1952. *Compressor Station Operating Report, Year-1952.* Department of Gas Supply and Control.

_____. 1958a. Internal letter from V. W. Adler to J. S. Hays. *Water Treatment at Topock Compressor Station*. September 19.

_____. 1958b. Internal letter from V. W. Adler to J. S. Hays. *Topock Plant Expansion*. November 19.

_____. 1960. Internal letter from Harry Prudhomme to R. S. Nabors. July 28.

_____. 1962. PG&E Work Order 473-D: Installation of Water Softener for Hot Well Make-Up. April 17.

_____. 1964a. Letter from Albert B. Cook (PG&E) to K. B. Anderson (E. L. Yeager Construction Company) regarding the furnishing of temporary water service from Well No. 6 at Topock Compressor Station. October 23.

_____. 1964b. Letter from C.A. Miller (PG&E) to Paul R. Peaker. *Proposal for Drilling and Developing Water Well #7.* July 15.

_____. 1965a. Cost Estimate and Work Order. "Replace Water Well System – Freeway Crossing – Topock. "August.

_____. 1965b. Memorandum from C. A. Miller (PG&E Pipeline Operations). "Chromate Infiltration of Water Supply." September 24.

_____. 1965c. Internal letter from J. P. Fairfax to K. B. Anderson. *Water Treatment, Topock-Hinkley-Kettleman*. June 10.

_____. 1968a. Letter from H. P. Prudhomme (PG&E) to Mr. Arthur Swajian (Water Board). No title; response to request for a report on waste disposal at Topock compressor station. October 7.

_____. 1968b. Letter from H. P. Prudhomme (PG&E) to Mr. Arthur Swajian (Water Board). No title; response to request for additional information concerning waste water disposal at Topock Compressor Station. October 25.

_____. 1968c. Author Unknown. Handwritten Notes Listing Ordered Chemicals.

_____. 1969. Author Unknown. Handwritten Notes Listing Ordered Chemicals.

_____. 1970. Letter from H. P. Prudhomme (PG&E) to the attention of Mr. Arthur Swajian (Water Board). *Re: Resolution 69-25, Pacific Gas and Electric Company Topock Compressor Station, San Bernadino County*. August 26.

_____. 1972. Annual Report (to comply with the monitoring provisions of Water Board Resolution 76-72), Topock Compressor Station.

_____. 1973a. Inter-company Memorandum from H. P. Prudhomme to R. I. Stark. August 17.

_____. 1973b. *Chemical Inventory, Pipeline Operations Department, Topock Compressor Station*. May 1.

_____. 1974. *Chemical Inventory, Pipeline Operations Department, Topock Compressor Station*. March 1.

_____. 1975. Letter from H. P. Prudhomme (PG&E) to Mr. Arthur Swajian (Water Board). "Resolution 70-72." January 31.

_____. 1980a. Author unknown. Handwritten notes describing chemical and waste handling practices at Topock Compressor Station. November 5.

_____. 1980b. Letter from N.H. Daines to Paul De Falco (USEPA). "Submittal of PG&E's Part A 'Hazardous Waste Facility Permit Applications.'" November 17.

_____. 1982. *Operation Plan for Hazardous Waste Facility at the Topock Compressor Station.* December.

_____. 1983a. *Facility Biennial Hazardous Waste Report*.

_____. 1983b. *Chemical and Oil Inventory, Pipeline Operation Department, Topock Compressor Station*. May 5.

_____. 1984a. Author unknown. Handwritten notes summarizing correspondence of waste water disposal history and dates of importance (1969 – 1984), with emphasis on Injection Well PGE-8.

_____. 1984b. Letter from H. Howe (PG&E) to Mr. Angelo Bellomo (CDHS). "Interim Status Document for Topock Compressor Station, USEPA ID Number CAT080011729." May 25.

_____. 1984c. Letter from K.D. Oelson (PG&E) to Mr. Angelo Bellomo (CDHS). "Alleged Improper Disposal of Hazardous Waste – Needles Solid Waste Disposal Site." February 1.

_____. 1985a. Intracompany memorandum from G. W. Rowe to H. M. Howe. "Topock Compressor Station Cooling Tower Waste Water Treatment Practices – DHS Inquiry." May 2.

_____. 1985b. Letter from H. Howe (PG&E) to Ms. Cathy Barwick (CDHS). "Response to telephone inquiries concerning past waste practices at PG&E's Topock Compressor Station." June 20.

_____. 1986. *Chemical inventory, Pipeline Operation Department, Topock Compressor Station.*

_____. 1987. *Hazardous Waste Injection Well Statement*. November 16.

_____. 1988. *Chemical Inventory, Pipeline Operation Department, Topock Compressor Station*. April 22.

_____. 1991a. *Topock Cooling Tower Economic Evaluation*. October 14.

_____. 1991b. *Specification for Cooling Towers "A" and "B" Upgrade at Topock Compressor Station.* Specification No. CE-1092; GM 485412-1. March 1.

_____. 1991c. Drawing: *Elementary-Mechanical Drain and Sewer Systems, Topock Compressor Station, Gas Operations, Pacific Gas and Electric Company*, Drawing 387706. March 29.

_____. 1993. *Water Quality Analysis Report, Old Evaporation Ponds, Pacific Gas and Electric Company Topock Compressor Station.* Prepared by Technical and Ecological Services. June 11.

_____. 1994a. *PG&E Topock Compressor Station Business Plan Deficiencies.* David Zeiger to Ms. Jacquelyn Medellin, County of San Bernardino. September 6.

_____. 1994. Memorandum from Bryan Nicholson (PG&E) to Jaime Troncoso (PG&E). "Topock Concrete Removal." October 14.

_____. 1995a. *Topock Compressor Station Bat Cave Wash, Background Geologic, Hydrogeologic, and Water Quality Information.* Prepared by Technical and Ecological Services. October.

_____. 1995b. Hazardous Material Inventory, Topock Compressor Station. February 27.

_____. 1996a. *Remediation Closure Report and Risk Assessment for Surface Mercury Release Adjacent to the Compressor Building at PG&E's Topock Natural Gas Compressor Station, Topock, California.* February 7.

_____. 1996b. Letter from Kim Sloat (PG&E) to Neal Krull (Water Board). "Cooling Tower Water Overflow – PG&E's Topock Compressor Station." July 18.

_____. 1998. Letter from Philip A. Steiner (PG&E) to Orlando Gonzales (Water Board). "Water Board Order #98-050 (Formerly 88-030), Water Board WDID #7B362186001." August 11.

_____. 1999a. Letter to Department of Toxic Substances Control. "Investigation at Railroad Debris Site." February 5.

_____. 1999b. Letter from Melvin Wong (PG&E) to Mr. Robert Senga (DTSC). "Soil Sampling Results, RCRA Facility Investigation at Bat Cave Wash Area, PG&E Topock Compressor Station, Needles California, USEPA ID No. CAT080011729". February 5.

_____. 1999c. Letter from Melvin Wong (PG&E) to Mr. Robert Senga (DTSC). "Additional Asbestos Results, Railroad Debris Site, Topock Compressor Station, Needles, California". June 16.

_____. 2000a. Letter from Mel Wong (PG&E) to Robert Senga (DTSC). "Additional Soil Sampling Results, PG&E Topock Compressor Station, Needles, California, USEPA ID No. CAT080011729." June 2.

_____. 2000b. Letter from Mel Wong (PG&E) to Robert Senga (DTSC). "Additional Soil Sampling, Corrective Action Consent Agreement for Bat Cave Wash Area, PG&E Topock Compressor Station, Needles, California, USEPA ID No. CAT080011729." April 5.

_____. 2000c. Letter from Mel Wong (PG&E) to Robert Senga (DTSC). "Additional Soil Sampling, Corrective Action Consent Agreement for Bat Cave Wash Area, PG&E Topock Compressor Station, Needles, California, USEPA ID No. CAT080011729." May 17.

_____. 2001. Letter from Richard McCurdy (PG&E) to Fred Zanoria (DTSC). "Release of Oily Water at PG&E's Topock Compressor Station, Needles, California." September 6.

_____. 2002a. *Draft Corrective Measures Work Plan.* December.

_____. 2002b. Letter from Linda Gonsalves (PG&E) to Fred Zanoria (DTSC). "Closure Report for Wastewater Release Incident, December 2000, PG&E's Topock Compressor Station, Needles, California." January 9.

_____. 2002c. Letter from Linda Gonsalves (PG&E) to Luke Peters (DTSC). "Closure Report for Material Release Incidents, August and September 2002, PG&E's Topock Compressor Station, Needles, California." October 4.

_____. 2004. Letter from Rich McCurdy (PG&E) to Norman Shopay (DTSC). "March 3, 2004, Topock Compressor Station Minor Pipeline Liquids Scrubber Oil Release: Soil Cleanup and Transfer Piping Repair." November 15.

_____. 2006a. Letter from Rich McCurdy (PG&E) to Norman Shopay (DTSC). "December 19, 2005 Grit Tank Water Release at PG&E's Topock Compressor Station – Results of Investigation." April 11.

_____. 2006b. Letter from Rich McCurdy (PG&E) to Chris Guerre (DTSC). "December 24, 2005 and April 23, 2006 Lubricating Oil Releases at the Topock Compressor Station – Results of Investigation." (pending)

_____. 2006c. Letter from Rich McCurdy (PG&E) to Norman Shopay (DTSC). "December 27, 2005 Waste Water Release at PG&E's Topock Compressor Station – Results of Investigation." March 23.

_____. 2006d. Draft Letter from Rich McCurdy (PG&E) to Chris Guerre (DTSC). "April and May, 2006 Waste Water Releases at PG&E's Topock Compressor Station – Results of Investigation." September 5.

_____. 2006e. Letter from Rich McCurdy (PG&E) to Norman Shopay (DTSC). "Preliminary results of Investigation of Stained Concrete Pad Located at the Jacket Cooling Water Units, January, 2006, PG&E's Topock Compressor Station, Needles, California." February 28.

Peaker, Paul R. 1964. "Drillers' Log for Well PGE-06." June 17.

Peyton, Paige M. 1986 *Ground Drawings of the Lower Colorado River: An Analysis of Technique, Context, and Design.* Submitted to California State University, San Bernardino.

Regional Water Quality Control Board, Colorado River Region (Water Board). 1969. *Resolution No. 69-25 of the Colorado River Basin Regional Water Quality Control Board, Pacific Gas and Electric Company – Topock Compressor Station, San Bernardino County*. August 14.

_____. 1970a. *Resolution No. 70-72, Waste Discharge Requirements for Pacific Gas and Electric Company – Topock Compressor Station, Colorado River – San Bernardino County*. December 10.

_____. 1970b. *Resolution No. 70-73, Waste Discharge Requirements for Pacific Gas and Electric Company – Topock Compressor Station, Colorado River – San Bernardino County*. December 10.

_____. 1975. *Resolution No. 75-52 (Revised), Waste Discharge Requirements for Pacific Gas and Electric Company – Topock Compressor Station, Southeast of Needles– San Bernardino County*. November 20.

_____. 1985. *Resolution No. 85-99 Colorado Waste Discharge Requirements for Pacific Gas and Electric Company – Topock Compressor Station, San Bernardino County*. October 2.

_____. 1988. *Resolution No. 88-30, Waste Discharge Requirements for Pacific Gas and Electric Company – Topock Compressor Station, Colorado River – San Bernardino County*. March 23.

_____. 1995. Letter from Neal Krull (Water Board) to Mel Wong (PG&E). Re: *Closure Certification Report Addendum for the Wastewater Evaporation Ponds at PG&E's Topock Compressor Station dated March 15, 1995*. May 11.

_____. 1998. *Order No. 98-050, Waste Discharge Requirements for Pacific Gas and Electric Company, Owner/Operator, and U.S. Bureau of Land Management, Landowner, Topock Compressor Station Wastewater Treatment Plant, Southeast of Needles -- San Bernadino County*. May 14.

Riddle, Glen. 2004. Personal communication between Rick Sturm (CH2M HILL) and Glen Riddle (District Superintendent, Topock Compressor Station). September 15.

_____. 2006a. Personal Communication between Susanne von Rosenberg (GAIA Consulting, Inc) and Glen Riddle. July 3.

_____. 2006b. Personal Communication between Susanne von Rosenberg (GAIA Consulting, Inc) and Glen Riddle. June 30.

Rowe, R. Robinson. 1947. "Red Rock Bridge Becomes Interstate Link on U.S. 66, Illustrated." *California Highways and Public Works* 26:20–22.

Rowlands, P., H.B. Johnson, E. Ritter, and A. Endo. 1982. "The Mojave Desert." *Reference Handbook on the Deserts of North America.* Edited by G.L. Bender. Greenwood Press. Westport, Connecticut.

Russell, Curt. 2005. Personal Communication between Curt Russell (PG&E) and Yvonne Meeks (PG&E). "Courtesy Notifications - TCS Cooling Tower Blowdown Pipeline Failure and Release." August 17.

_____. 2006a. Personal Communication between Susanne von Rosenberg (GAIA Consulting, Inc) and Curt Russell. July 15.

_____. 2006b. Personal Communication in "Final Field Notes Memorandum, May 8 to 9, 2006." May.

Schroeder, Albert H. 1979. "Prehistory: Hakataya." In "Southwest," edited by Alfonso Ortiz, pp. 100–107. *Handbook of North American Indians*, vol. 9, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Sherer, Lorraine M. 1994. *The Bitterness Road: The Mojave, 1604 to 1860*, edited by S. B. Vane and J. L. Bean. Ballena Press Anthropological Papers 41. Menlo Park, California.

Southwestern Gas Company (SGC). 1960. Permit to install and operate a water pipeline to serve Pacific Gas and Electric Company. July 29.

Stewart, K. M. 1983. "Mojave." In "Southwest," edited by Alfonso Ortiz. *Handbook of North American Indians*, vol. 10, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Trident Environmental Consultants (Trident). 1993. *Closure Certification Report for Wastewater Evaporation Ponds at PG&E's Topock Compressor Station, Needles, California*. December 27.

_____. 1995a. *Investigation of Pipeline Liquid Oil Tank at PG&E's Topock Compressor Station, Needles, California.* July 6.

_____. 1995b. *Closure Certification Report Addendum for Wastewater Evaporation Ponds at PG&E's Topock Compressor Station, Needles, California.* March 25.

_____. 1996a. *Scrubber Sump Closure Certification Report, PG&E Topock Gas Compressor Station, Needles, California.* August 23.

_____. 1996b. *Addendum No. 1 to Scrubber Oil Sump Closure Certification Report, PG&E Topock Gas Compressor Station, Needles, California.* October 10.

_____. 1996c. *Former Pipeline Liquid Closure Plan PG&E Topock Compressor Station, Needles, California.* May 7.

_____. 1996d. *Former Pipeline Liquid Oil Tank Closure Certification Report PG&E Topock Compressor Station, Needles, California.* October 10.

_____. 1997. *Closure Report for the Removal of Mercury Containing Instruments and Piping at PG&E's Topock Compressor Station and Related Facilities.* March 14.

United States Department of the Interior (DOI). 2005. IN THE MATTER OF: Topock Compressor Station, PACIFIC GAS AND ELECTRIC COMPANY (Respondent),

Proceeding Under Sections 104 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act as amended 42 U.S.C. §§ 9604 and 9622 -- Administrative Consent Agreement. July 11.

_____. 2005b. Letter from Timothy Z. Smith (US DOI, Bureau of Land Management Field Manager) to Norman Shopay (DTSC) regarding consolidated comments from Bureau of Land Management (BLM), Bureau of Reclamation, and United States Fish & Wildlife Service on the draft RCRA Facility Investigation and Remedial Investigation Report prepared for the Pacific Gas and Electric Topock Compressor Facility. July 1.

United States Environmental Protection Agency (USEPA). 1985. *RCRA Inspection Report.* Prepared by T.J. Bode and D. Horgan. August 5.

United States Fish and Wildlife Service. 2000. *Biological Opinion for Maintenance Activities on the Pacific Gas and Electric Company Gas Pipeline System in the California Desert* (6840, CA-063.50) (1-8-99-F-71). January 7, 2000

_____. 2002. *Southwestern Willow Flycatcher Recovery Plan, Albuquerque, New Mexico.* Appendices A-O. Pp 210.

Western Regional . 2006. http://library.fws.gov/Refuges/havasu.pdf

Van Bueren, Thad 1986 *Topock Evaporation Pond Project: Intensive Cultural Resources Survey.* INFOTEC Research, Inc., Sonora, California. Prepared for Pacific Gas and Electric Company, San Francisco.

Vasek and M.G. Barbour. 1977. "Mojave Desert Scrub Vegetation." *Terrestrial Vegetation of California.* Edited by M.G. Barbour and J. Major. John Wiley & Sons. New York, New York.

Western Regional Climate Center. 2006. http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?caneed

Wilber, Karl P.E. 1999. *Cooling Tower Operations Report*. Pacific Gas & Electric Company Kettleman and Hinkley Gas Compressor Stations. December.

Appendix A
Responses to Comments

Site History is Incomplete

The RFI/RI does not adequately identify hazardous materials brought to the site by either chemical class or volume, nor does it provide volumes for wastes generated at the site. In order to evaluate the threats posed to the Colorado River, the RFI/RI needs to include this basic historical information.

S2-1 What the RFI/RI and supporting documents do describe is the extensive discharge of hazardous wastes on and near the facility from the 1950s through the 1970s, prior to the existence of environmental regulations requiring appropriate management and disposal of such wastes. Much of the waste discharged at or near the facility evidently was either released in ravines and depressions such as Bat Cave Wash, East Ravine, and Debris Ravine, or was injected into an unregulated well. However, the types and volumes of the wastes discharged to most of these areas are not characterized in the RFI/RI. Discharges also occurred at the site in areas that are neither identified nor characterized in either the RCRA Facility Assessment (RFA) completed in 1986, or the series of draft RFI reports to date. Such areas include a septic disposal system that reportedly received potentially hazardous wastes generated in an onsite laboratory (previously unidentified), and from floor drains located near areas where hazardous materials were used at the facility.

To develop a basic understanding of past operational practices at the Topock site, a number of additional sources should be incorporated, including PG&E company records, more than a single former-employee interview, and records from other PG&E gas compressor stations.

Environmental Setting Requires Additional Characterization

PG&E has made improvements in understanding the local geology as compared to earlier drafts of the RFI. However, the current RFI/RI relies on outdated geologic information and should be updated to include more current information related to river protection. In particular, recently completed floodplain wells have identified highly transmissive geologic deposits located adjacent to the Colorado River that contain a groundwater plume with high concentrations of Cr6. Recognition of these contaminant pathways is vital to assessing migration of contamination
S2-2 to the river.

The bedrock geology that received wastes discharged through injection well PG&E-8 is also inadequately characterized. Geologic reports of the site bedrock have described a rock that is highly fractured and sheared due to tectonic movement along ancient faults. It is widely recognized in the geologic community that faults, fractures and shears can be efficient groundwater conductors that provide a means for contaminant migration. Therefore, additional investigation of the bedrock characteristics is warranted to more fully understand the extent of contamination that occurred from the unregulated discharges into well PG&E-8.

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Response to Comment S2-1(RS_101805_4)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. The site history has been extensively researched by PG&E and a significant amount of information relating to facility operations has been compiled and documented in the draft RFI/RI Report. The compiled information provides a detailed account of chemical usage and waste disposal practices from the beginning of facility operation in 1951 through the present time. Sources used for the research include PG&E company records (for Topock and other compressor stations), interviews with current employees, reviews of information gained from interviews with former employees, and regulatory agency (DTSC, RWQCB, County, EPA, etc.) files.

With any project that dates back to 1951 it can be anticipated that some specific details and information may have been lost. However, the historic information collected by PG&E to date provides a reasonable and sufficient effort and understanding relative to general chemical category usage and waste disposal practices at the PG&E Topock Compressor Station for the purposes of identifying potentially affected areas and contaminants of concern, and the development of conceptual site models. Continued additional historic research would be repetitive and may introduce unnecessary delays into the RFI/RI process, and it most likely would produce little if

any additional significant information. It is also likely that any additional information (e.g., identification of chemical class and volume) would not significantly alter the overall basic understanding of site history or significantly aid in the identification and assessment of potentially contaminated areas. In addition, any uncertainties with respect to the types of potential contaminants will not significantly alter the overall identification or assessment of Areas Of Concern (AOCs).

PG&E has made a best faith effort to provide a study that meets the standard level of care prescribed for the development of site history and the documentation of chemical usage and waste management practices associated with Resource Conservation Recovery Act (RCRA) RCRA Facility Assessment (RFA)/RCRA Facility Investigation RFI and CERCLA Preliminary Assessment (PA)/Site Assessment (SI)/Remedial Investigation (RI) programs. Additional historical documentation is not warranted at this time and would not materially assist or improve the Site History section of the draft RFI/RI.

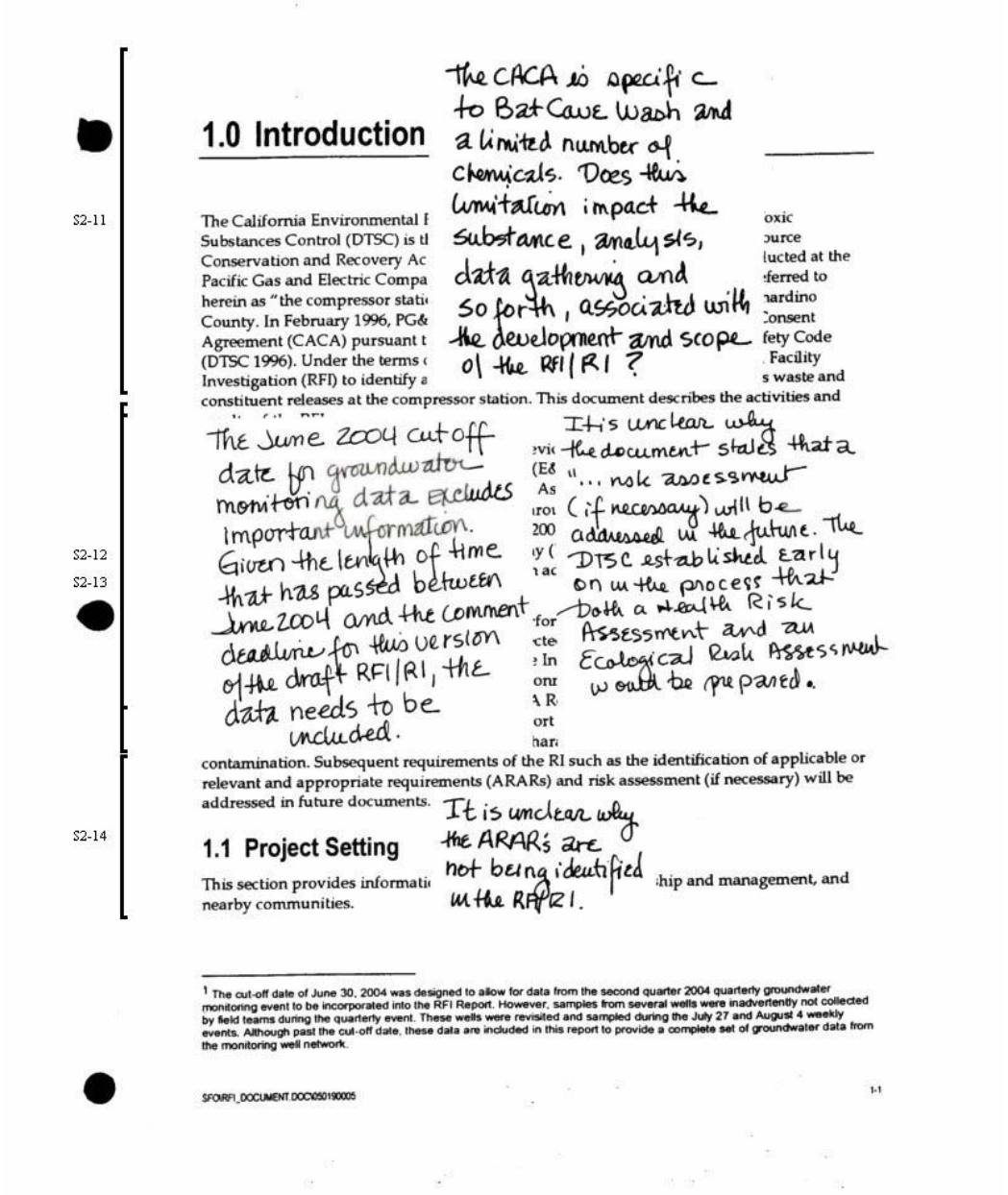
PG&E shall complete the RCRA RFA questionnaire and sign the certification provided in the DTSC letter dated January 6, 2006. A copy of the completed questionnaire and executed certification shall be placed in an Appendix of the Revised Site History Section.

PG&E RESPONSE: PG&E reviewed the few historical files not available at the time of the 2005 RFI and conducted additional interviews with former employees. Only limited additional information was identified. This information is reflected in Sections 3.0 through 5.0. Detailed information regarding specific chemicals used and specific quantities and disposal locations for each potential waste stream is not available. A new table has been included in Section 3.0 that summarizes available historic information regarding volumes of chemicals purchased and/or stored.

DTSC RESPONSE to Comment S2-2

Comment Noted. PG&E is not required to address this comment at this time. DTSC has deferred response to this comment to a future date since the comment does not relate to the site history section of the RFI. In accordance with DTSC's instructions and direction, PG&E was directed to establish an initial data cut-off-date of June 2004 for the RFI. Otherwise no defined data end point could be established since data continues to be collected on a frequent and regular basis. DTSC anticipates establishing a new RFI data cut-off-date in April 2006 for groundwater, surface water, pore water and river sediment data to be included into Volume 2 and March 30, 2007 for the soil data to be included into Volume 3. These dates will be identified in future written correspondence from DTSC to PG&E.

PG&E RESPONSE: No response required.



1.0 Introduction

The CACA is specific to Bat Cave Wash and a limited number of chemicals. Does this limitation impact the substance, analysis, data gathering and so forth, associated with the development and scope of the RFI/RI?

S2-11

The California Environmental P
Substances Control (DTSC) is tl
Conservation and Recovery Ac
Pacific Gas and Electric Compa
herein as "the compressor stati
County. In February 1996, PG&
Agreement (CACA) pursuant t
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Investigation (RFI) to identify a
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The June 2004 cut off date for groundwater monitoring data excludes important information. Given the length of time that has passed between June 2004 and the comment deadline for this version of the draft RFI/RI, the data needs to be included.

S2-12
S2-13

It is unclear why the document states that a "... risk assessment (if necessary) will be addressed in the future. The DTSC established early on in the process that both a Health Risk Assessment and an Ecological Risk Assessment would be prepared.

contamination. Subsequent requirements of the RI such as the identification of applicable or relevant and appropriate requirements (ARARs) and risk assessment (if necessary) will be addressed in future documents.

S2-14

It is unclear why the ARARs are not being identified in the RFI/RI.

1.1 Project Setting

This section provides informati
nearby communities.

hip and management, and

[1] The cut-off date of June 30, 2004 was designed to allow for data from the second quarter 2004 quarterly groundwater monitoring event to be incorporated into the RFI Report. However, samples from several wells were inadvertently not collected by field teams during the quarterly event. These wells were revisited and sampled during the July 27 and August 4 weekly events. Although past the cut-off date, these data are included in this report to provide a complete set of groundwater data from the monitoring well network.

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Response to Comment S2-11(RS_110105_51)

Comment noted. PG&E is not required to address this comment at this time. The RFI/RI Report provides a reasonable level of information on the entire facility and identified chemicals of concern in addition too those listed in the Corrective Action Consent Agreement (CACA).

PG&E RESPONSE: No response required.

Response to Comment S2-12(RS_110105_52)

DTSC will defer a response to this comment to a future date. PG&E is not required to address this comment at this time. Response to comment is deferred to Volumes 2 and 3. For additional information see response to comment S2-1.

PG&E RESPONSE: No response required.

Response to Comment S2-13(RS_110105_54)

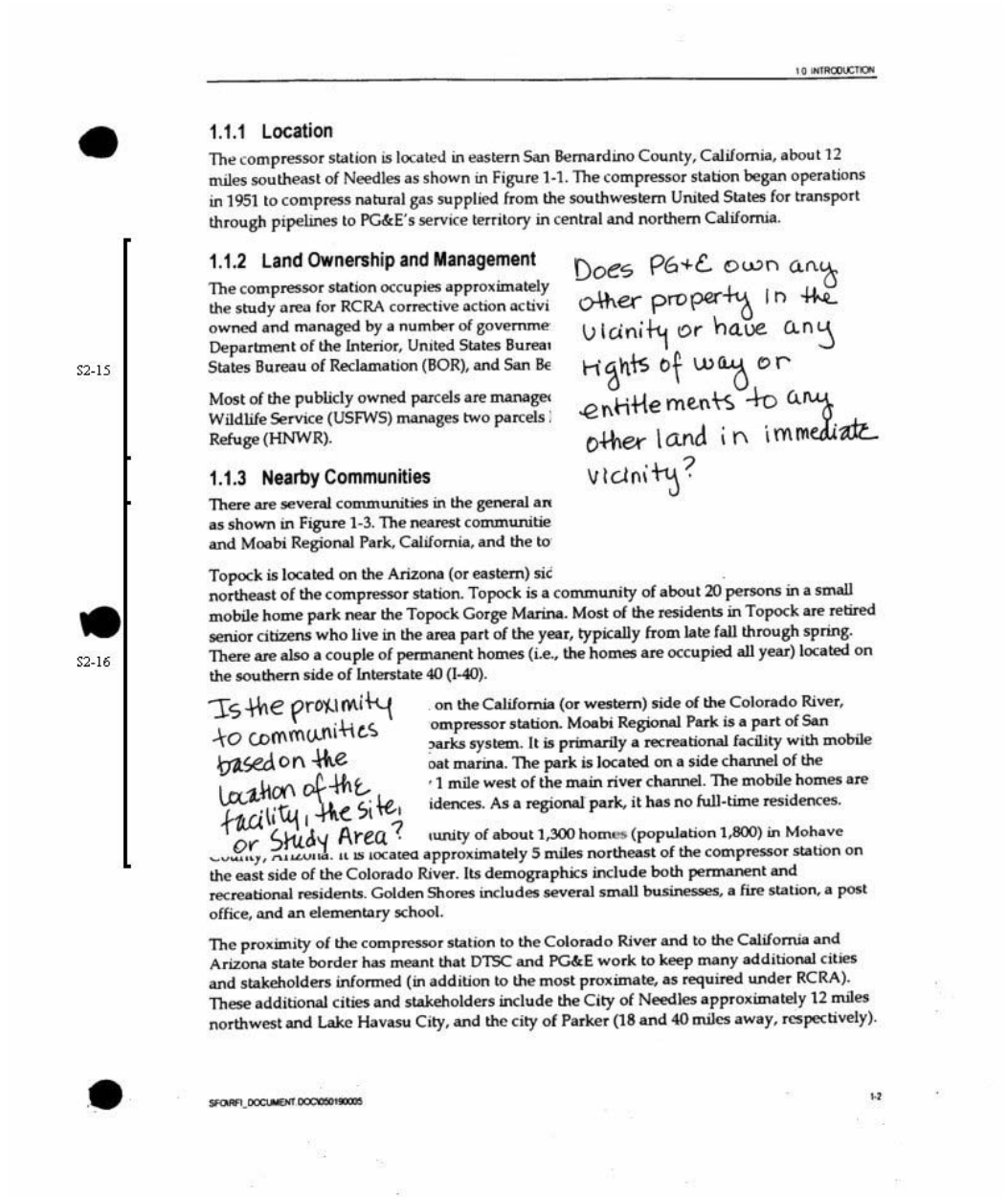
PG&E shall revise the text to indicate that a Human and Ecological Risk assessment will be prepared as was previous required by DTSC.

PG&E RESPONSE: The following text has been added "A human health and ecological risk assessment will be prepared as a stand-alone document following completion of the soil investigation program."

Response to Comment S2-14(RS_110105_55)

Comment noted. PG&E is not required to address this comment at this time. Applicable Relevant and Appropriate Requirements (ARARs) will be identified in a separate document that will be prepared by DTSC.

PG&E RESPONSE: No response required.



1.0 INTRODUCTION

1.1.1 Location

The compressor station is located in eastern San Bernardino County, California, about 12 miles southeast of Needles as shown in Figure 1-1. The compressor station began operations in 1951 to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California.

1.1.2 Land Ownership and Management

Does PG+E own any other property in the vicinity or have any rights of way or entitlements to any other land in immediate vicinity?

The compressor station occupies approximately
the study area for RCRA corrective action activi
owned and managed by a number of governme
Department of the Interior, United States Bureau
States Bureau of Reclamation (BOR), and San Be

S2-15

Most of the publicly owned parcels are manage
Wildlife Service (USFWS) manages two parcels
Refuge (HNWR).

1.1.3 Nearby Communities

There are several communities in the general ar
as shown in Figure 1-3. The nearest communitie
and Moabi Regional Park, California, and the to

Topock is located on the Arizona (or eastern) sid
northeast of the compressor station. Topock is a community of about 20 persons in a small mobile home park near the Topock Gorge Marina. Most of the residents in Topock are retired senior citizens who live in the area part of the year, typically from late fall through spring. There are also a couple of permanent homes (i.e., the homes are occupied all year) located on the southern side of Interstate 40 (I-40).

S2-16

Is the proximity to communities based on the location of the facility, the site, or Study Area?

on the California (or western) side of the Colorado River,
ompressor station. Moabi Regional Park is a part of San
parks system. It is primarily a recreational facility with mobile
oat marina. The park is located on a side channel of the
1 mile west of the main river channel. The mobile homes are
idences. As a regional park, it has no full-time residences.

tunity of about 1,300 homes (population 1,800) in Mohave
County, Arizona. It is located approximately 5 miles northeast of the compressor station on the east side of the Colorado River. Its demographics include both permanent and recreational residents. Golden Shores includes several small businesses, a fire station, a post office, and an elementary school.

The proximity of the compressor station to the Colorado River and to the California and Arizona state border has meant that DTSC and PG&E work to keep many additional cities and stakeholders informed (in addition to the most proximate, as required under RCRA). These additional cities and stakeholders include the City of Needles approximately 12 miles northwest and Lake Havasu City, and the city of Parker (18 and 40 miles away, respectively).

SFO\RFI_DOCUMENT.DOC\050190005

1-2

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Response to Comment S2-15(RS_110105_56)

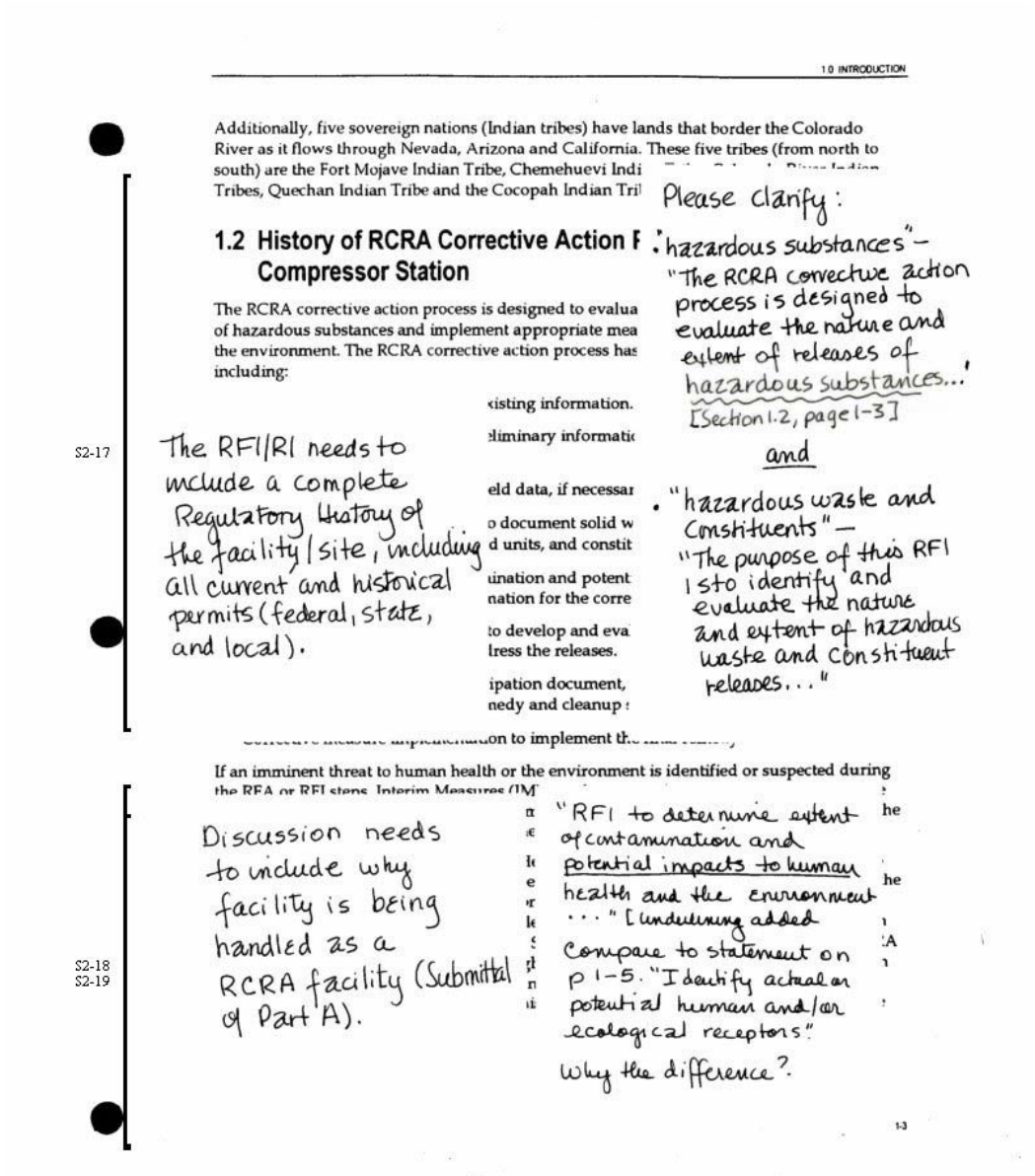
DTSC RESPONSE: PG&E shall include any information on other properties in the immediate vicinity that are owned or leased to PG&E (if any exist).

PG&E RESPONSE: The additional information has been included as requested.

Response to Comment S2-16(RS_110105_57)

DTSC RESPONSE: PG&E shall provide additional clarification in the text that that the values are based on distance from the facility.

PG&E RESPONSE: The clarification has been made as requested.



1.0 INTRODUCTION

Additionally, five sovereign nations (Indian tribes) have lands that border the Colorado River as it flows through Nevada, Arizona and California. These five tribes (from north to south) are the Fort Mojave Indian Tribe, Chemehuevi Indi… Tribes, Quechan Indian Tribe and the Cocopah Indian Tri…

Please clarify:

1.2 History of RCRA Corrective Action F… Compressor Station

The RCRA corrective action process is designed to evalua… of hazardous substances and implement appropriate mea… the environment. The RCRA corrective action process has… including:

- "hazardous substances" – "The RCRA corrective action process is designed to evaluate the nature and extent of releases of hazardous substances..." [Section 1.2, page 1-3]

and

- "hazardous waste and Constituents" – "The purpose of this RFI is to identify and evaluate the nature and extent of hazardous waste and constituent releases..."

S2-17 The RFI/RI needs to include a complete Regulatory History of the facility/site, including all current and historical permits (federal, state, and local).

…isting information.
…liminary informati…
…eld data, if necessar…
…o document solid w… d units, and constit…
…ination and potent… nation for the corre…
…to develop and eva… lress the releases.
…ipation document, nedy and cleanup …

…on to implement th…

If an imminent threat to human health or the environment is identified or suspected during the RFA or RFI steps, Interim Measures (IM…

S2-18 S2-19 Discussion needs to include why facility is being handled as a RCRA facility (Submittal of Part A).

"RFI to determine extent of contamination and potential impacts to human health and the environment ..." [underlining added] Compare to statement on p 1-5. "Identify actual or potential human and/or ecological receptors." Why the difference?

1-3

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Response to Comment S2-17(RS_110105_58)

DTSC RESPONSE: Comment noted. PG&E is not required to address this comment at this time. The report does include a complete regulatory history in Section 3. The level of effort and inclusion of all historic and current permits is not warranted as these permits are not likely to provide any substantive information that is not already identified.

PG&E RESPONSE: No response required.

DTSC RESPONSE: PG&E should provide additional clarification related to the statement "hazardous substances" that this is taken directly from RCRA guidance documents, while the statement regarding "hazardous waste and constituent releases" is taken directly from the CACA.

PG&E RESPONSE: The text in Section 1.2 has been revised and streamlined to clarify the regulatory framework for the project, and the requirements of the RCRA Corrective Program (and CERCLA) are described in Table 1-1.

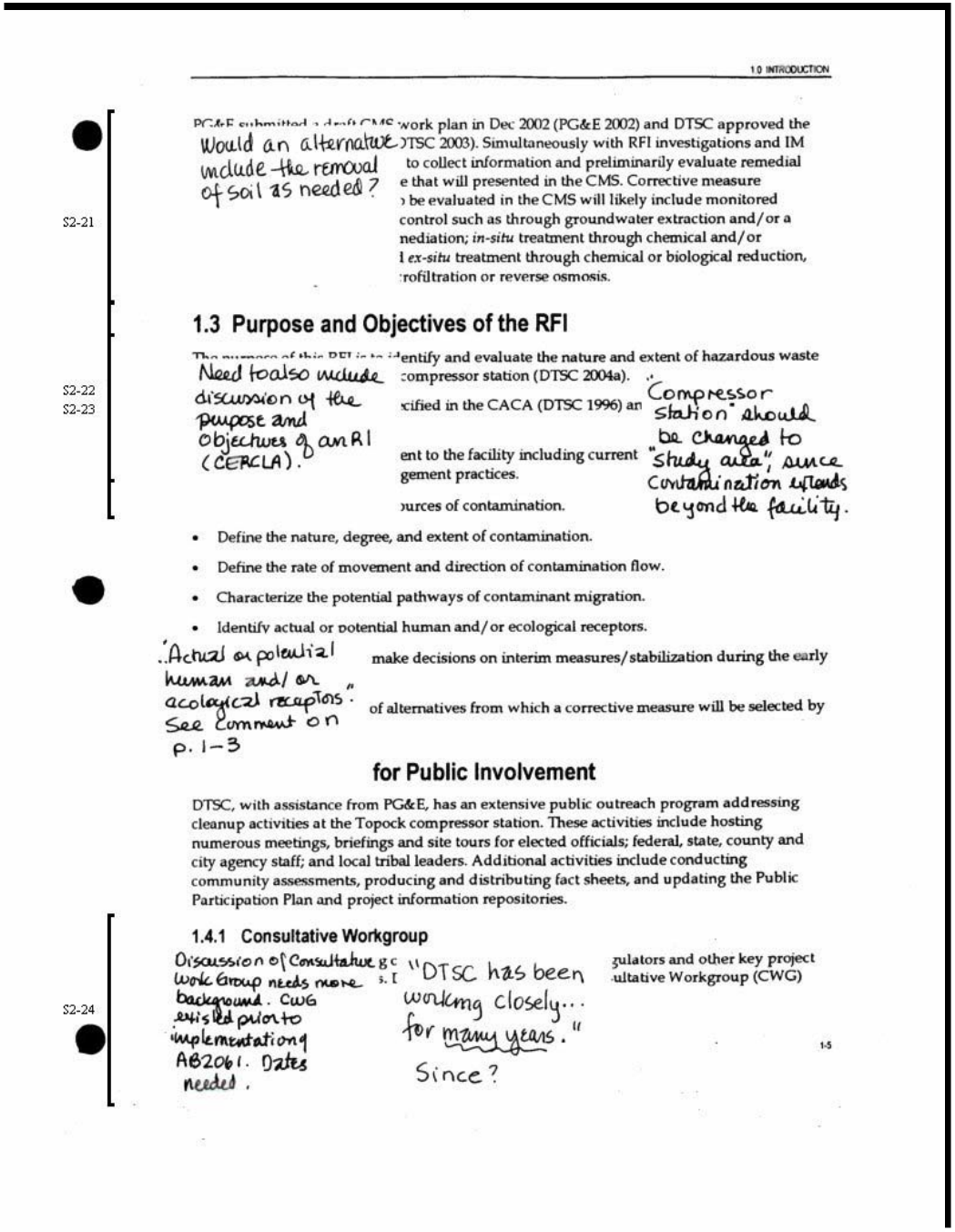
Response to Comment S2-18(RS_110105_59)

DTSC RESPONSE: PG&E shall address this comment by including information on why the facility is being addressed under RCRA.

PG&E RESPONSE: See response to second comment under comment S2-17.

DTSC RESPONSE: PG&E shall address this comment. The text shall be clarified and revised to be consistent.

PG&E RESPONSE: The text in both sections has been streamlined and clarified to refer to the requirements of the CACA.



1.0 INTRODUCTION

PG&E submitted a draft CMS work plan in Dec 2002 (PG&E 2002) and DTSC approved the
Would an alternative include the removal of soil as needed?
DTSC 2003). Simultaneously with RFI investigations and IM
to collect information and preliminarily evaluate remedial
e that will presented in the CMS. Corrective measure
be evaluated in the CMS will likely include monitored
S2-21 control such as through groundwater extraction and/or a
nediation; *in-situ* treatment through chemical and/or
l *ex-situ* treatment through chemical or biological reduction,
rofiltration or reverse osmosis.

1.3 Purpose and Objectives of the RFI

The purpose of this RFI is to identify and evaluate the nature and extent of hazardous waste
compressor station (DTSC 2004a).
S2-22 Need to also include discussion of the purpose and objectives of an RI (CERCLA).
S2-23 cified in the CACA (DTSC 1996) an
"Compressor station" should be changed to "study area", since contamination extends beyond the facility.
ent to the facility including current
gement practices.
ources of contamination.

- Define the nature, degree, and extent of contamination.
- Define the rate of movement and direction of contamination flow.
- Characterize the potential pathways of contaminant migration.
- Identify actual or potential human and/or ecological receptors.

"Actual or potential human and/or ecological receptors." See Comment on p. 1-3

make decisions on interim measures/stabilization during the early

of alternatives from which a corrective measure will be selected by

for Public Involvement

DTSC, with assistance from PG&E, has an extensive public outreach program addressing cleanup activities at the Topock compressor station. These activities include hosting numerous meetings, briefings and site tours for elected officials; federal, state, county and city agency staff; and local tribal leaders. Additional activities include conducting community assessments, producing and distributing fact sheets, and updating the Public Participation Plan and project information repositories.

1.4.1 Consultative Workgroup

Discussion of Consultative Work Group needs more background. CWG existed prior to implementation of AB2061. Dates needed.
S2-24
"DTSC has been working closely... for many years." Since?
gulators and other key project
ultative Workgroup (CWG)

1-5

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Response to Comment S2-21(RS_110105_62)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. DTSC assumes that soil removal could and probably will be one likely alternative for evaluation.

PG&E RESPONSE: No response required.

Response to Comment S2-23(RS_110105_64)

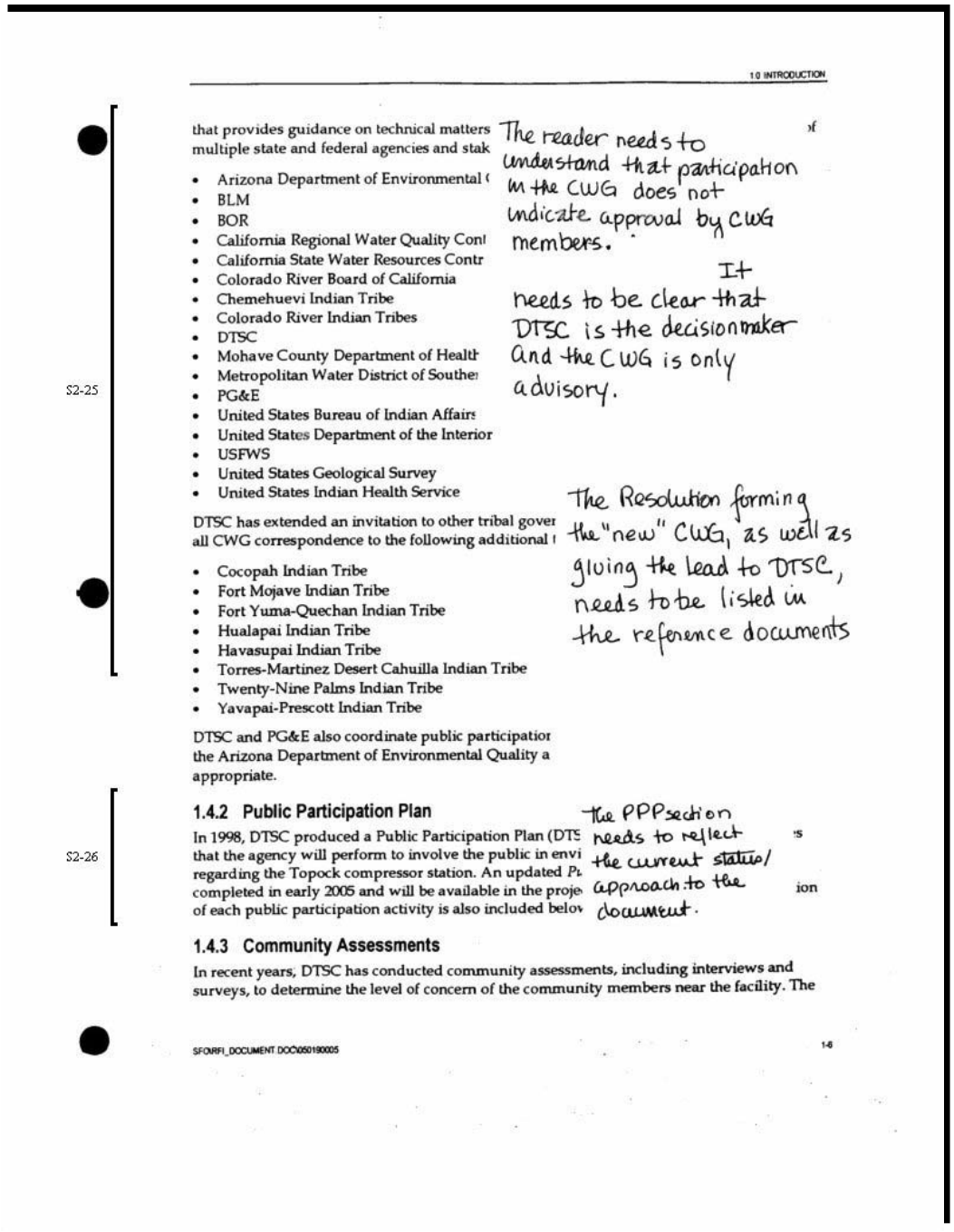
DTSC RESPONSE: PG&E shall address this comment. Please note that the objectives are taken directly from the CACA; however, PG&E shall revise the wording to indicate that an area larger than just the compressor station will be addressed. Reference to the Area of Potential Effect (APE) as determined by BLM should be incorporated with an appropriate reference figure that identifies the APE. Include a discussion of the purpose and definition of the APE.

PG&E RESPONSE: The text has been changed to refer to the Topock Compressor Station site.

Response to Comment S2-24(RS_110105_65)

DTSC RESPONSE: PG&E shall address this comment. Additional information on the CWG shall be provided and the time period shall be better defined.

PG&E RESPONSE: Per direction from DTSC, Section 1.4 has been streamlined, and the reader is referred to the Public Participation Plan for detailed information. This change has not been made.



1.0 INTRODUCTION

that provides guidance on technical matters
multiple state and federal agencies and stak

- Arizona Department of Environmental
- BLM
- BOR
- California Regional Water Quality Cont
- California State Water Resources Contr
- Colorado River Board of California
- Chemehuevi Indian Tribe
- Colorado River Indian Tribes
- DTSC
- Mohave County Department of Health
- Metropolitan Water District of Souther
- PG&E
- United States Bureau of Indian Affairs
- United States Department of the Interior
- USFWS
- United States Geological Survey
- United States Indian Health Service

S2-25

The reader needs to understand that participation in the CWG does not indicate approval by CWG members.

It needs to be clear that DTSC is the decisionmaker and the CWG is only advisory.

DTSC has extended an invitation to other tribal gover
all CWG correspondence to the following additional

- Cocopah Indian Tribe
- Fort Mojave Indian Tribe
- Fort Yuma-Quechan Indian Tribe
- Hualapai Indian Tribe
- Havasupai Indian Tribe
- Torres-Martinez Desert Cahuilla Indian Tribe
- Twenty-Nine Palms Indian Tribe
- Yavapai-Prescott Indian Tribe

The Resolution forming the "new" CWG, as well as giving the lead to DTSC, needs to be listed in the reference documents

DTSC and PG&E also coordinate public participatior
the Arizona Department of Environmental Quality a
appropriate.

1.4.2 Public Participation Plan

S2-26

In 1998, DTSC produced a Public Participation Plan (DTS
that the agency will perform to involve the public in envi
regarding the Topock compressor station. An updated *Pu*
completed in early 2005 and will be available in the proje
of each public participation activity is also included belov

The PPP section needs to reflect the current status/ approach to the document.

1.4.3 Community Assessments

In recent years, DTSC has conducted community assessments, including interviews and surveys, to determine the level of concern of the community members near the facility. The

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Response to Comment S2-25(RS_110105_66)

DTSC RESPONSE: PG&E shall address this comment. The text will be revised to state that the CWG has a responsibility to participate and provide meaningful input as an advisory resource to DTSC. DTSC is sole and final decision making authority as the lead regulatory administrating agency.

PG&E RESPONSE: Per direction from DTSC, Section 1.4 has been streamlined, and the reader is referred to the Public Participation Plan for detailed information. The text was clarified to indicate that DTSC is the sole decision-making agency with respect to RCRA and that the CWG is an advisory group.

Response to Comment S2-26(RS_110105_67)

DTSC RESPONSE: PG&E shall address this comment. The section shall be updated as requested.

PG&E RESPONSE: Per direction from DTSC, Section 1.4 has been streamlined, and the reader is referred to the Public Participation Plan for detailed information.

S2-27

The Community Assessments needs to be updated.

ıd in 1997. Concerns expressed during this assessment fell into nications and health. Concerns about communications terviewees had very little knowledge of the environmental ior to being contacted for the 1997 assessment. As a result of the SC determined the need to keep the public informed regarding spond to this need, DTSC began producing fact sheets and sitories (a list of information repositories is included in Section 1.4.6).

In June 2002, a second survey was mailed to approximately 74 individuals and organizations. Eight individuals requested to be interviewed after receiving the 2002 survey, and these interviews were conducted in January 2003. Additional interviews were conducted in July and September 2004. DTSC learned that most interviewees were aware of the environmental investigation at the facility, and interviewees expressed a high to moderate level of concern regarding the following categories: environmental impacts, the cleanup process, economics, adequate communication, and health effects.

Public preferences expressed during these community assessments will be summarized in the updated *Public Participation Plan*, to be published by DTSC in early 2005. However, DTSC will respond to public requests at any time and is continuously incorporating feedback from Indian tribes, other stakeholders and the public throughout the course of the corrective action process.

1.4.4 Fact Sheets

Fact sheets are published at project milestones or as the project changes. DTSC published fact sheets in March 1998, September 1999, May 2004 and August 2004 to update the public and stakeholders about project progress. Fact sheets were distributed to elected officials, agency staff, and the residents of local communities including Golden Shores, Topock, and Lake Havasu City, Arizona, as well as to Indian tribes including the Fort Mojave, Chemehuevi, Cocopah, Quechan, Yavapai-Prescott, Hualapai, Havasupai, Torres-Martinez Desert Cahuilla and Colorado River Indian Tribes, and the Twenty-Nine Palms Band of Mission Indians.

1.4.5 Site Tours

During the January 2003 interviews, local sovereign nation officials requested a tour of the compressor station. DTSC and PG&E responded to this request by hosting members of the Fort Mojave, Chemehuevi, and Colorado River Indian Tribes at a site tour in April 2003. DTSC and PG&E brought tribal representatives up to date on the status of the investigation and the facility superintendent guided them through the compressor and compressor station grounds. Between January 2003 and June 2004, DTSC and PG&E have held an additional four site tours at the facility to brief elected officials, members of the CWG, and tribal representatives on project plans and implementation, including various aspects and stages of the Interim Measures. DTSC and PG&E will continue to host site tours as the project progresses.

1.4.6 Sovereign Nation Briefings

DTSC and PG&E committed to keeping the members and leaders of local Indian tribes informed. DTSC and PG&E have met regularly with staff and members of the Fort Mojave,

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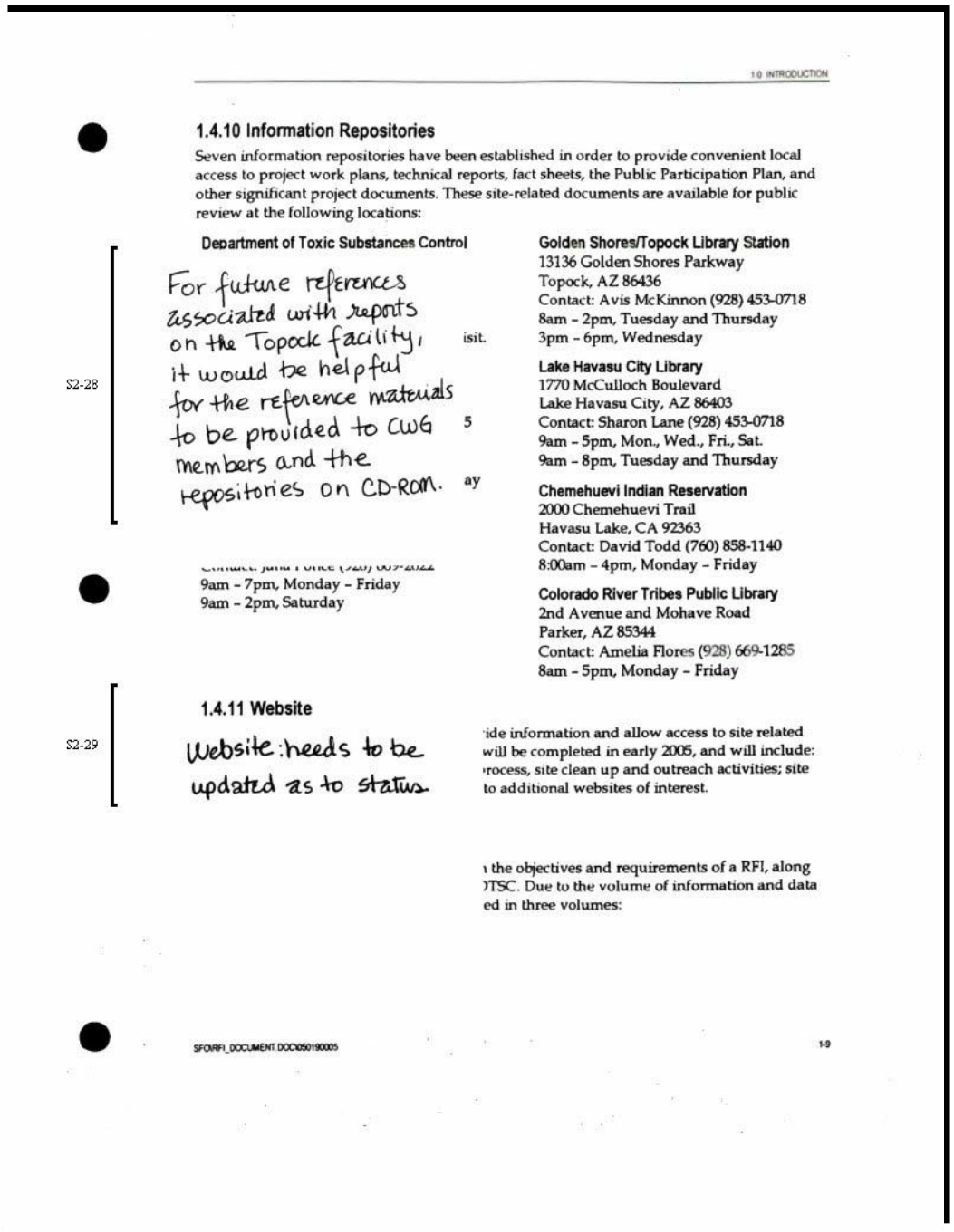
Response to Comment S2-27(RS_110105_68)

DTSC RESPONSE: PG&E shall address this comment and update the text

PG&E RESPONSE: Per direction from DTSC, Section 1.4 has been streamlined, and the reader is referred to the Public Participation Plan for detailed information. This change has not been made.



1.0 INTRODUCTION

1.4.10 Information Repositories

Seven information repositories have been established in order to provide convenient local access to project work plans, technical reports, fact sheets, the Public Participation Plan, and other significant project documents. These site-related documents are available for public review at the following locations:

Department of Toxic Substances Control

For future references associated with reports on the Topock facility, it would be helpful for the reference materials to be provided to CWG members and the repositories on CD-ROM.

S2-28

isit.

5

ay

Contact: Jana Ponce (928) 809-2022
9am - 7pm, Monday - Friday
9am - 2pm, Saturday

Golden Shores/Topock Library Station
13136 Golden Shores Parkway
Topock, AZ 86436
Contact: Avis McKinnon (928) 453-0718
8am - 2pm, Tuesday and Thursday
3pm - 6pm, Wednesday

Lake Havasu City Library
1770 McCulloch Boulevard
Lake Havasu City, AZ 86403
Contact: Sharon Lane (928) 453-0718
9am - 5pm, Mon., Wed., Fri., Sat.
9am - 8pm, Tuesday and Thursday

Chemehuevi Indian Reservation
2000 Chemehuevi Trail
Havasu Lake, CA 92363
Contact: David Todd (760) 858-1140
8:00am - 4pm, Monday - Friday

Colorado River Tribes Public Library
2nd Avenue and Mohave Road
Parker, AZ 85344
Contact: Amelia Flores (928) 669-1285
8am - 5pm, Monday - Friday

1.4.11 Website

Website: needs to be updated as to status.

S2-29

ide information and allow access to site related will be completed in early 2005, and will include: rocess, site clean up and outreach activities; site to additional websites of interest.

the objectives and requirements of a RFI, along DTSC. Due to the volume of information and data ed in three volumes:

SFORFI_DOCUMENT.DOC050190005

1-9

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Response to Comment S2-28(RS_110105_69)

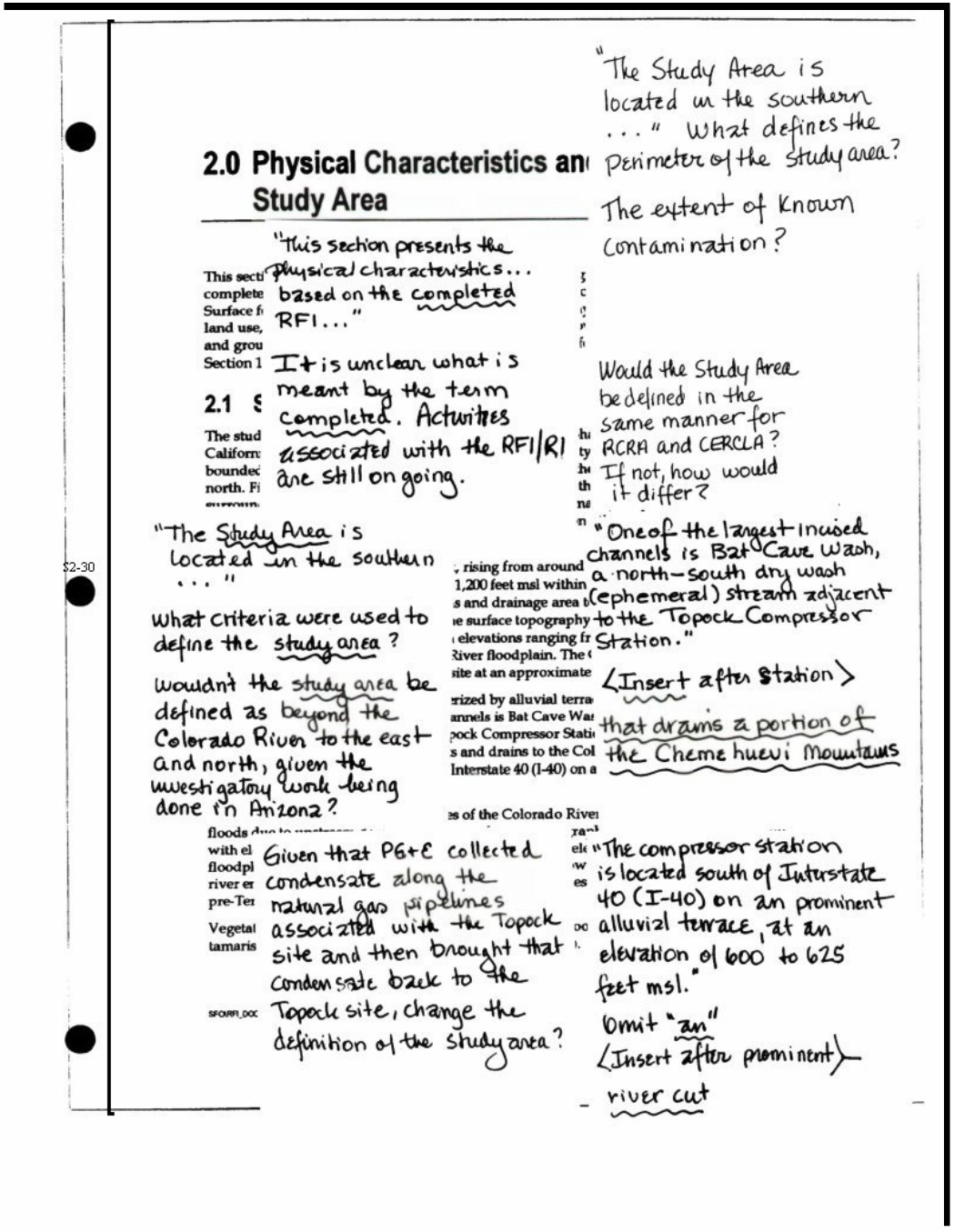
DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. Documents referenced in the RFI/RI have been provided in hardcopy and placed in several central locations. Providing these documents on CD to CWG members may be considered in the future.

PG&E RESPONSE: No response required.

Response to Comment S2-29(RS_110105_70)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. The Website will be continually updated. However, this activity is not part of the RFI/RI.

PG&E RESPONSE: No response required.



2.0 Physical Characteristics an Study Area

"This section presents the physical characteristics... based on the completed RFI..."

It is unclear what is meant by the term completed. Activities associated with the RFI/RI are still on going.

"The Study Area is located in the southern ..."

What criteria were used to define the study area?

Wouldn't the study area be defined as beyond the Colorado River to the east and north, given the investigatory work being done in Arizona?

Given that PG+E collected condensate along the natural gas pipelines associated with the Topock site and then brought that condensate back to the Topock site, change the definition of the study area?

"The Study Area is located in the southern ..." What defines the perimeter of the study area?

The extent of known contamination?

Would the Study Area be defined in the same manner for RCRA and CERCLA? If not, how would it differ?

"One of the largest incised channels is Bat Cave Wash, a north-south dry wash (ephemeral) stream adjacent to the Topock Compressor Station."

<Insert after Station>

that drains a portion of the Chemehuevi Mountains

"The compressor station is located south of Interstate 40 (I-40) on an prominent alluvial terrace, at an elevation of 600 to 625 feet msl."

Omit "an"

<Insert after prominent>

river cut

S2-30

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Response to Comment S2-30(RS_110105_71)

DTSC RESPONSE: PG&E shall address this comment and update the text to better define the study area in future documents. The remaining editorial comments may be incorporated as desired.

PG&E RESPONSE: The western extent of the study area has been clarified. A portion of the requested editorial changes have been incorporated.

DTSC RESPONSE: PG&E shall clarify that the text refers to RFI/RI work "completed to date".

PG&E RESPONSE: The text has been revised to refer to the relevant types of source documents only.

3.0 Facility Operations and History

The Topock Compressor Station began operations in December 1951 to compress natural gas supplied from the southwestern United States for transport through pipelines to PG&E's service territory in central and northern California. The com ... is still active and is anticipated to remain an active facility into the foreseeabl ... section provides detailed information on the history of the ...

Ownership of property where facility is located prior to PG+E needs to be documented with appropriate citations. Identify ownership of property prior to ownership by state. References need to be listed in the Reference section.

3.1 Current and Historic Operations

Prior to construction of the compressor station in 1951, the ... was mostly undeveloped land, thought the Teapot Dome ... occupied a small portion of the property at the very north ... (Figure 3-1). It is unknown when the Teapot Dome was bu ... photography, the Teapot Dome was present at the site in ... photograph available). It was still present in 1947, but apj ... prior to, or during construction of, the compressor statior ... the compressor station was built was owned by the State ... PG&E leased the property from the State. In 1965, PG&E ... State.

The main structures at the facility include the compressor building, ... B, and the generator building. Adjacent to the main buildings are various auxiliary structures including an office, a warehouse, a vehicle garage, maintenance buildings, equipment and chemical storage buildings, and a water softening bu ... aboveground tanks at the facility that are used for storage of water, ... mpressor oil, gasoline and diesel, and wa ... ajor features of the compressor station.

S2-58

"Aboveground tanks" Are there now, or were there historically, any below ground tanks?

The main structures at the facility <Insert: currently> include the compressor building..."

... l, the facility was equipped with six com ... illion standard cubic feet per day (scfd) ... creased, additional compressors were ad ... l (by turbocharging and supercharging) ... ed. Most of the upgrades were completed in the early to ... ograde, ... essing 1.1 billion scfd. ... million to ... erates and is staffed

Did the change in increase of gas processed correlate to a change in waste or waste handing practices.

Depending on demand, the facility ... 1.1 billion scfd of natural gas per da ... 24 hours per day, 7 days a week.

Current operations at the compress ... operations that occurred from the start of facility operations ... ompressor station consist of:

- Water conditioning.
- Compression of natural gas.

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Response to Comment S2-58(RS_101805_36)

DTSC RESPONSE: PG&E shall address this comment and update the historic ownership of the property with available information.

The word "currently" shall be inserted as requested.

Comment Noted. PG&E is not required to address this comment at this time. Underground tanks are discussed in detail in Section 3.1.5.1.

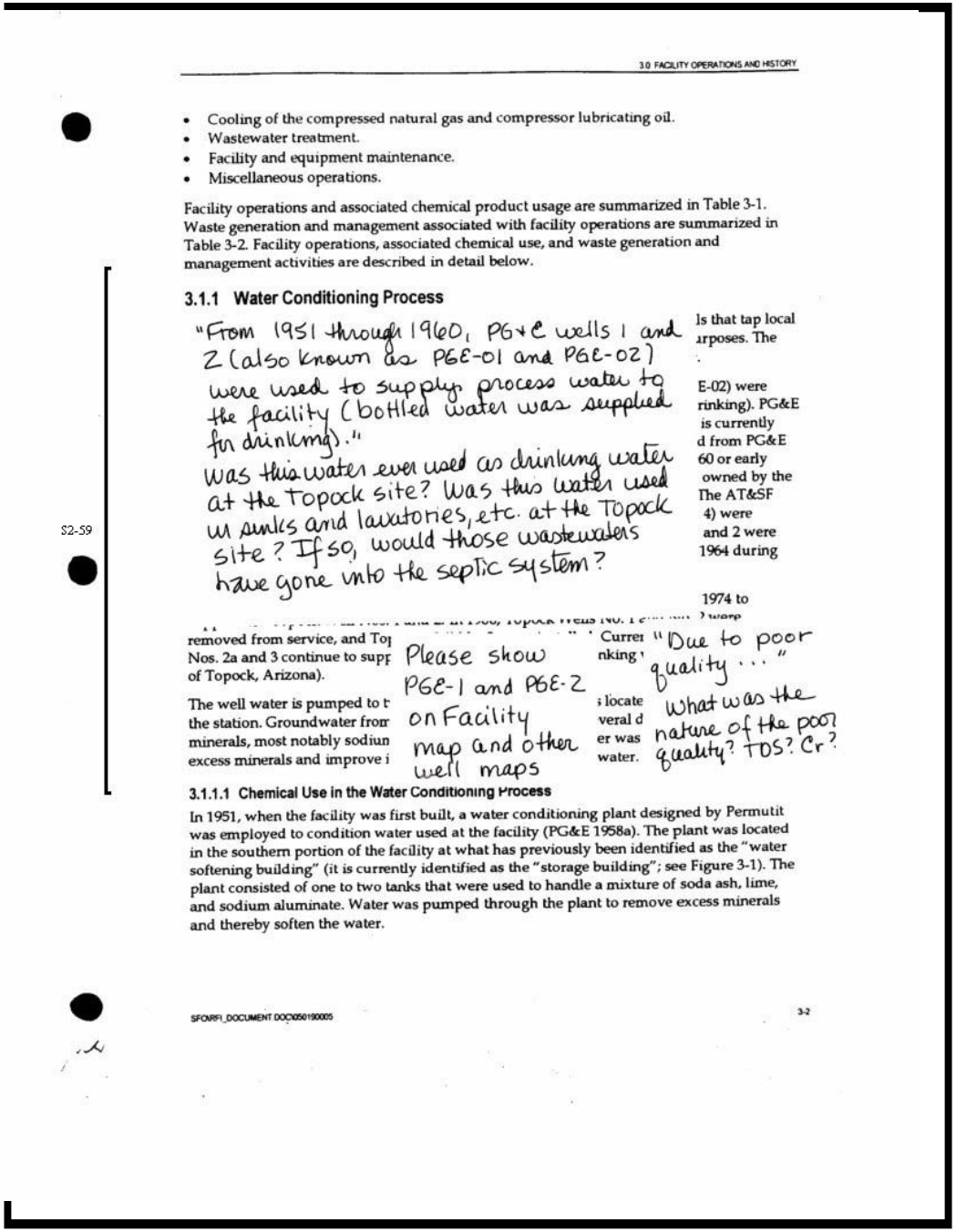
Information on changes in gas processed and associated changes in waste/waste handing shall be provided as available. See also response to Comment S2-1.

PG&E RESPONSE: No additional information regarding historic property ownership was identified during the supplemental site history review.

The word "currently" was inserted as requested.

No response required. Underground tanks are discussed in detail in Section 3.1.5.1.

No response required. See response to Comment S2-1.



3.0 FACILITY OPERATIONS AND HISTORY

- Cooling of the compressed natural gas and compressor lubricating oil.
- Wastewater treatment.
- Facility and equipment maintenance.
- Miscellaneous operations.

Facility operations and associated chemical product usage are summarized in Table 3-1. Waste generation and management associated with facility operations are summarized in Table 3-2. Facility operations, associated chemical use, and waste generation and management activities are described in detail below.

3.1.1 Water Conditioning Process

"From 1951 through 1960, PG+E wells 1 and 2 (also known as PGE-01 and PGE-02) were used to supply process water to the facility (bottled water was supplied for drinking)."
Was this water ever used as drinking water at the Topock site? Was this water used in sinks and lavatories, etc. at the Topock site? If so, would those wastewaters have gone into the septic system?

S2-59

ls that tap local
urposes. The

E-02) were
rinking). PG&E
is currently
d from PG&E
60 or early
owned by the
The AT&SF
4) were
and 2 were
1964 during

1974 to

removed from service, and To
Nos. 2a and 3 continue to supp
of Topock, Arizona).

Please show PGE-1 and PGE-2 on Facility map and other well maps

Curre
nking

"Due to poor quality ..." What was the nature of the poor quality? TDS? Cr?

The well water is pumped to t
the station. Groundwater from
minerals, most notably sodiun
excess minerals and improve i

locate
veral d
er was
water.

3.1.1.1 Chemical Use in the Water Conditioning Process

In 1951, when the facility was first built, a water conditioning plant designed by Permutit was employed to condition water used at the facility (PG&E 1958a). The plant was located in the southern portion of the facility at what has previously been identified as the "water softening building" (it is currently identified as the "storage building"; see Figure 3-1). The plant consisted of one to two tanks that were used to handle a mixture of soda ash, lime, and sodium aluminate. Water was pumped through the plant to remove excess minerals and thereby soften the water.

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Response to Comment S2-59(RS_101805_38)

DTSC RESPONSE: PG&E shall address this comment and update the text. PG&E shall determine if water derived from wells PGE-01 and PGE-02 was apparently used for all domestic purposes except drinking water and that domestic wastewater presumably was discharged to a septic system.

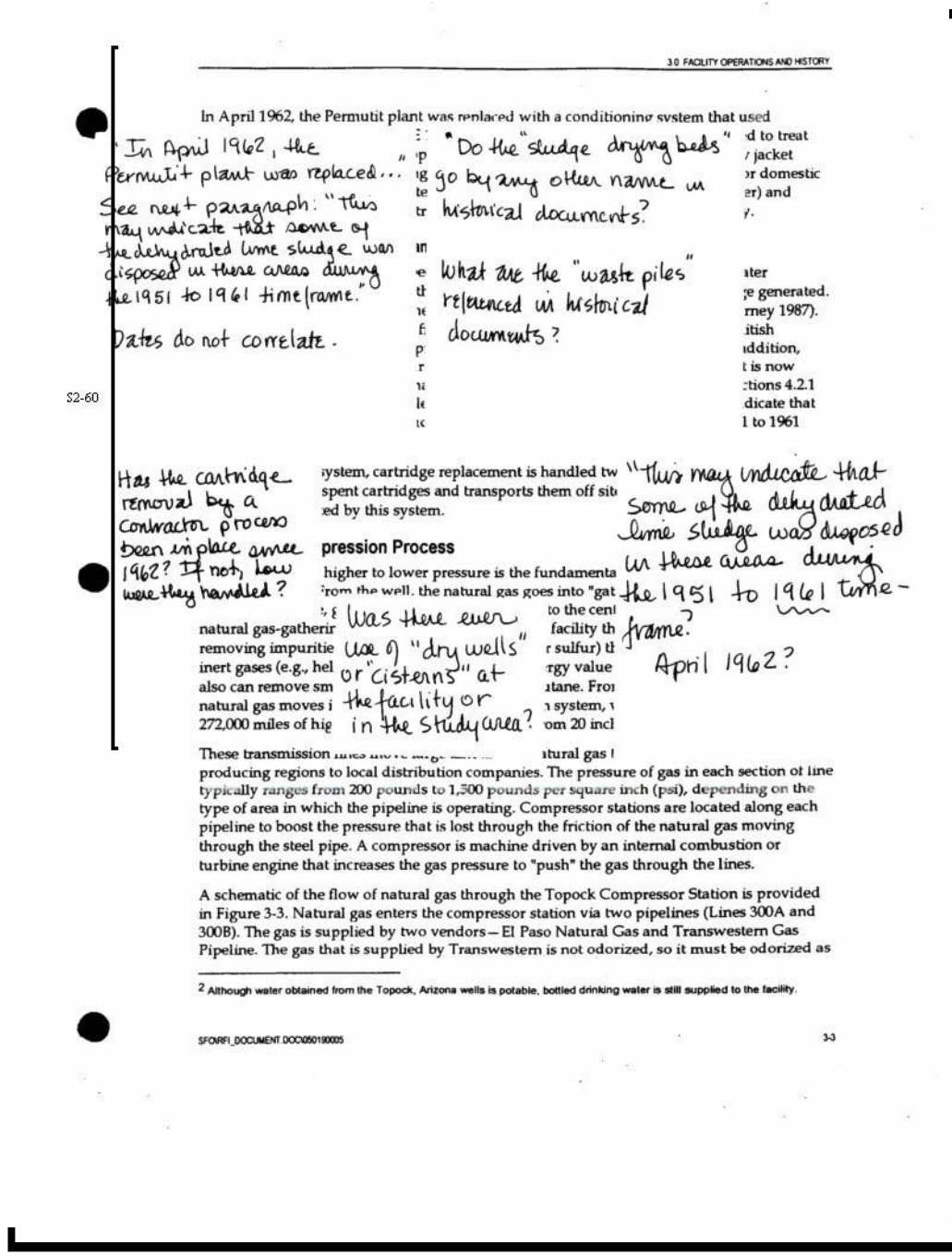
Comment Noted. PG&E is not required to address this comment at this time. The locations of wells PGE-01 and PGE-02 are shown on Figure 3-2.

The predominate water quality issue with wells PGE-01 and PGE-02 was TDS. PG&E shall revise the text as necessary.

PG&E RESPONSE: The text was updated as requested.

No response required.

The text was revised to indicate that the predominant water quality issue with wells PGE-01 and PGE-02 was TDS (high iron and chloride).



3.0 FACILITY OPERATIONS AND HISTORY

In April 1962, the Permutit plant was replaced with a conditioning system that used

"In April 1962, the Permutit plant was replaced... See next paragraph: "This may indicate that some of the dehydrated lime sludge was disposed in these areas during the 1951 to 1961 timeframe." Dates do not correlate.

"Do the "sludge drying beds" go by any other name in historical documents?

What are the "waste piles" referenced in historical documents?

S2-60

Has the cartridge removal by a contractor process been in place since 1962? If not, how were they handled?

"This may indicate that some of the dehydrated lime sludge was disposed in these areas during the 1951 to 1961 time-frame."

April 1962?

Was there ever use of "dry wells" or "cisterns" at the facility or in the Study area?

ystem, cartridge replacement is handled tw
spent cartridges and transports them off site
ed by this system.

pression Process

higher to lower pressure is the fundamenta
from the well. the natural gas goes into "gat
to the cent
natural gas-gatherir facility th
removing impuritie r sulfur) tl
inert gases (e.g., hel rgy value
also can remove sm ıtane. Fron
natural gas moves i ı system, ı
272,000 miles of hig om 20 incl

These transmission ıtural gas l
producing regions to local distribution companies. The pressure of gas in each section of line typically ranges from 200 pounds to 1,500 pounds per square inch (psi), depending on the type of area in which the pipeline is operating. Compressor stations are located along each pipeline to boost the pressure that is lost through the friction of the natural gas moving through the steel pipe. A compressor is machine driven by an internal combustion or turbine engine that increases the gas pressure to "push" the gas through the lines.

A schematic of the flow of natural gas through the Topock Compressor Station is provided in Figure 3-3. Natural gas enters the compressor station via two pipelines (Lines 300A and 300B). The gas is supplied by two vendors – El Paso Natural Gas and Transwestern Gas Pipeline. The gas that is supplied by Transwestern is not odorized, so it must be odorized as

[2] Although water obtained from the Topock, Arizona wells is potable, bottled drinking water is still supplied to the facility.

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3-3

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Response to Comment S2-60(RS_101805_6)

DTSC RESPONSE: PG&E shall address this comment and clarify and update the text. Statement regarding lime sludge disposal should read "1951 to 1962", not "1951 to 1961".

It is possible that other “names” may have been used for the Sludge Dry Beds; PG&E shall identify if possible.

Comment Noted. PG&E is not required to address this comment at this time. Since no citation for where the term "waste piles" is used. PG&E is not able to make an assessment whether the terms refer to the same or separate features

PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to gather additional information on dry wells and cisterns, and on cartridge removal. See also the response to Comment S2-1.

PG&E RESPONSE: The text was revised as requested.

No other names for the sludge-drying beds were identified as part of the additional site history review.

No response required.

Available information suggests that cartridges were removed and regenerated starting in 1962 (when the cartridge system was put into service). This information has been included in the text. There is no information to suggest that dry wells or cisterns were used at the site.

it first enters the facility. The gas is odorized by injecting it with a 50/50 mixture of liquid an (TBM) and liquid tetrahydrothiophene (THT). After being /s to the scrubbers. Historically, the scrubbers removed foreign amage the compressors. The scrubbers have been out of service since natural gas still flows through these units (More 2004). From the ws to the suction header where suction pressure is maintained at about s then flows to the compressors where it is compressed to increase the essor station is currently equipped with 10 natural gas-powered, mbustion, reciprocating-type compressors (Units K-1 through K-10) that are housed in the compressor building. Units K-2 through K-10 are currently , unit K-1 has been permanently decommissioned. Depending on the ine operational compressors may be in use at any one time. Once s directed to the discharge header where pressure can range from he discharge header the gas flows to Cooling Tower A and/or Cooling on the load, one or both cooling towers may be used). The heated gas is gas through the cooling tower system in bundles of small tubes ypical gas temperatures entering the cooling tower system range from ical gas temperatures leaving the cooling tower system range from s out of the station via two pipelines (Lines 300A and 300B).

Pre 1970: What were the historically removed "foreign material" that were removed by the scrubbers?

How were the "foreign materials" disposed of and where were they disposed?

"The scrubbers have been out of service since about 1970..." How have the "foreign materials" been removed from 1970's on? Where disposed?

An ancillary part of the gas compression system is electrical power generation. The compressor station is equipped with four electrical generating units (P-1 through P-4) that are used to generate the electricity required to operate the facility.[3] The generators are driven by natural gas-powered, two-cycle internal combustion engines. The generators are housed in the auxiliary building (Figure 3-1).

S2-61

3.1.2.1 Chemical Use in the Gas Compression Process

Chemicals used in the operation of the gas compression process are limited to odorant (TBM and THT) and lubricating oils for the compressor and generator engines.

"Chemicals used in the operation of the gas compression process are limited to odorant (TBM and THT) and lubricating oils for the compressor and generator engines."

What is the chemical make up of TBM and THT?

T are used to odorize the gas delivered to the compressor station. TBM and THT is stored in a 3,000-gallon steel aboveground in the lower yard (Figure 3-1). There are also two 75-gallon ASTs) located in the lower yard that are used to feed the odorant s are transferred from the storage tank to the day tanks by ns of odorants are used at the facility annually.

Have there been any changes in the location of the pipeline delivering natural gas to the facility? If so, that needs to be included in text + maps.

cants (i.e., oil and grease) to wo-cycle engines that ; therefore, oil must be ant required in the largest -gallon ASTs located in the oil gure 3- or stati

Is the location of the "oil and fuel storage area" the same since 1951?

[3] The facility is also equipped with one self-contained, diesel-powered emergency generator mode, but it is not used routinely.

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Response to Comment S2-61(RS_101805_7)

DTSC RESPONSE: PG&E shall address this comment regarding “foreign Material” and update/clarify the text.

Comment Noted. PG&E is not required to address this comment at this time. Handling and disposal of scrubber waste (both pre- and post-1970) are discussed in Section 3.1.2.2.

PG&E shall address this comment to clarify that the fuel and oil storage area has been in the same location since the station was constructed in 1951.

PG&E shall address this comment and describe the chemical make up of TBM and THT.

PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall attempt to gather additional information on the incoming gas pipeline. See also the response to Comment S2-1.

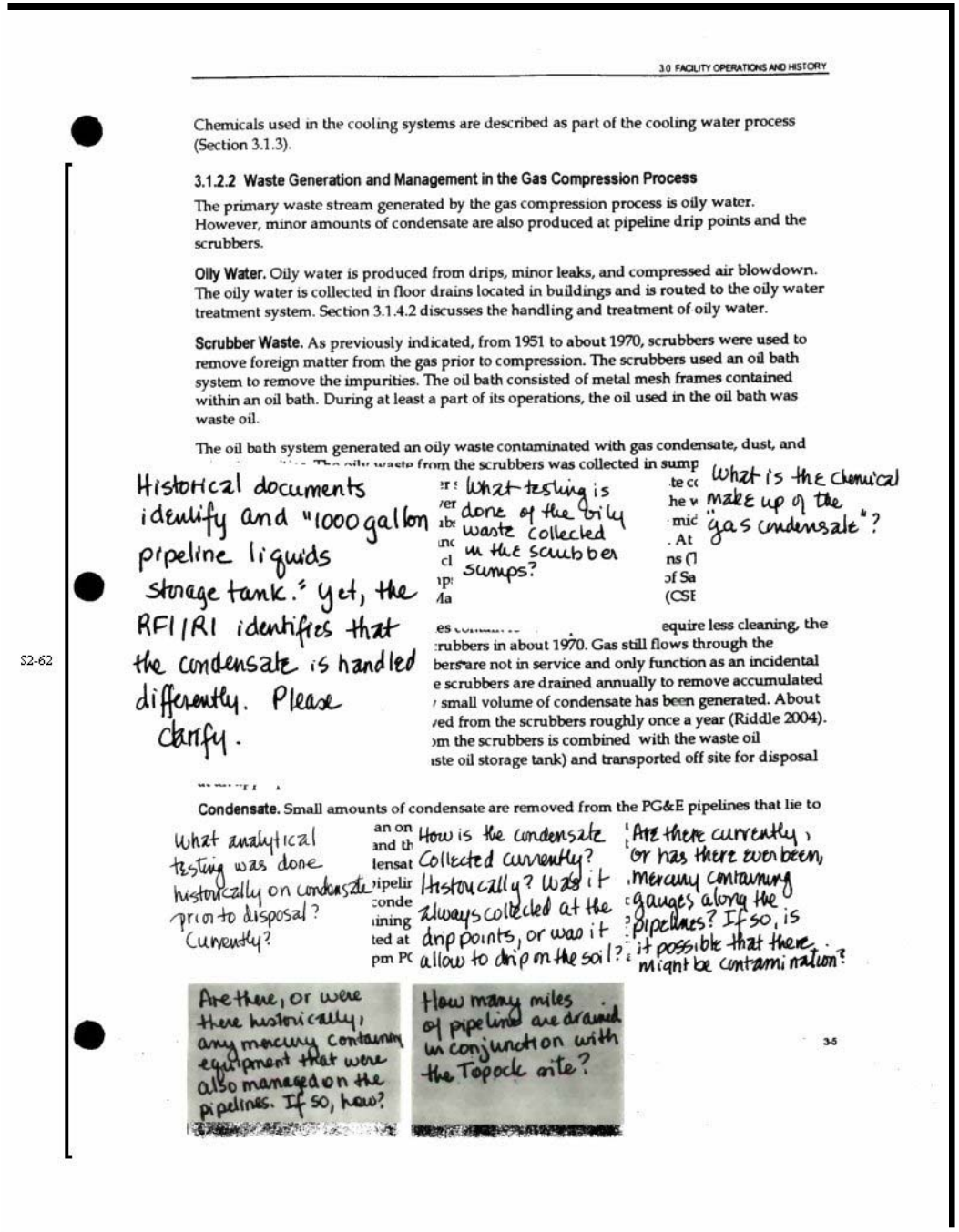
PG&E RESPONSE: The discussion of pipeline liquids, including composition, source, and disposal, has been expanded and clarified (see Section 3.1.2.2).

No response required.

The text was revised as requested.

The text was revised as requested.

The pipelines have generally been in the same locations as they are today. No changes to the document are required.



3.0 FACILITY OPERATIONS AND HISTORY

Chemicals used in the cooling systems are described as part of the cooling water process (Section 3.1.3).

3.1.2.2 Waste Generation and Management in the Gas Compression Process

The primary waste stream generated by the gas compression process is oily water. However, minor amounts of condensate are also produced at pipeline drip points and the scrubbers.

Oily Water. Oily water is produced from drips, minor leaks, and compressed air blowdown. The oily water is collected in floor drains located in buildings and is routed to the oily water treatment system. Section 3.1.4.2 discusses the handling and treatment of oily water.

Scrubber Waste. As previously indicated, from 1951 to about 1970, scrubbers were used to remove foreign matter from the gas prior to compression. The scrubbers used an oil bath system to remove the impurities. The oil bath consisted of metal mesh frames contained within an oil bath. During at least a part of its operations, the oil used in the oil bath was waste oil.

The oil bath system generated an oily waste contaminated with gas condensate, dust, and

Historical documents identify and "1000 gallon pipeline liquids storage tank." Yet, the RFI/RI identifies that the condensate is handled differently. Please clarify.

What testing is done of the oily waste collected in the scrubber sumps?

What is the chemical make up of the "gas condensate"?

S2-62

equire less cleaning, the
rubbers in about 1970. Gas still flows through the
bers are not in service and only function as an incidental
e scrubbers are drained annually to remove accumulated
small volume of condensate has been generated. About
ved from the scrubbers roughly once a year (Riddle 2004).
m the scrubbers is combined with the waste oil
iste oil storage tank) and transported off site for disposal

Condensate. Small amounts of condensate are removed from the PG&E pipelines that lie to

What analytical testing was done historically on condensate prior to disposal? Currently?

How is the condensate Collected currently? Historically? Was it always collected at the drip points, or was it allow to drip on the soil?

Are there currently, or has there ever been, mercury containing gauges along the pipelines? If so, is it possible that there might be contamination?

Are there, or were there historically, any mercury containing equipment that were also managed on the pipelines. If so, how?

How many miles of pipeline are drained in conjunction with the Topock site?

3-5

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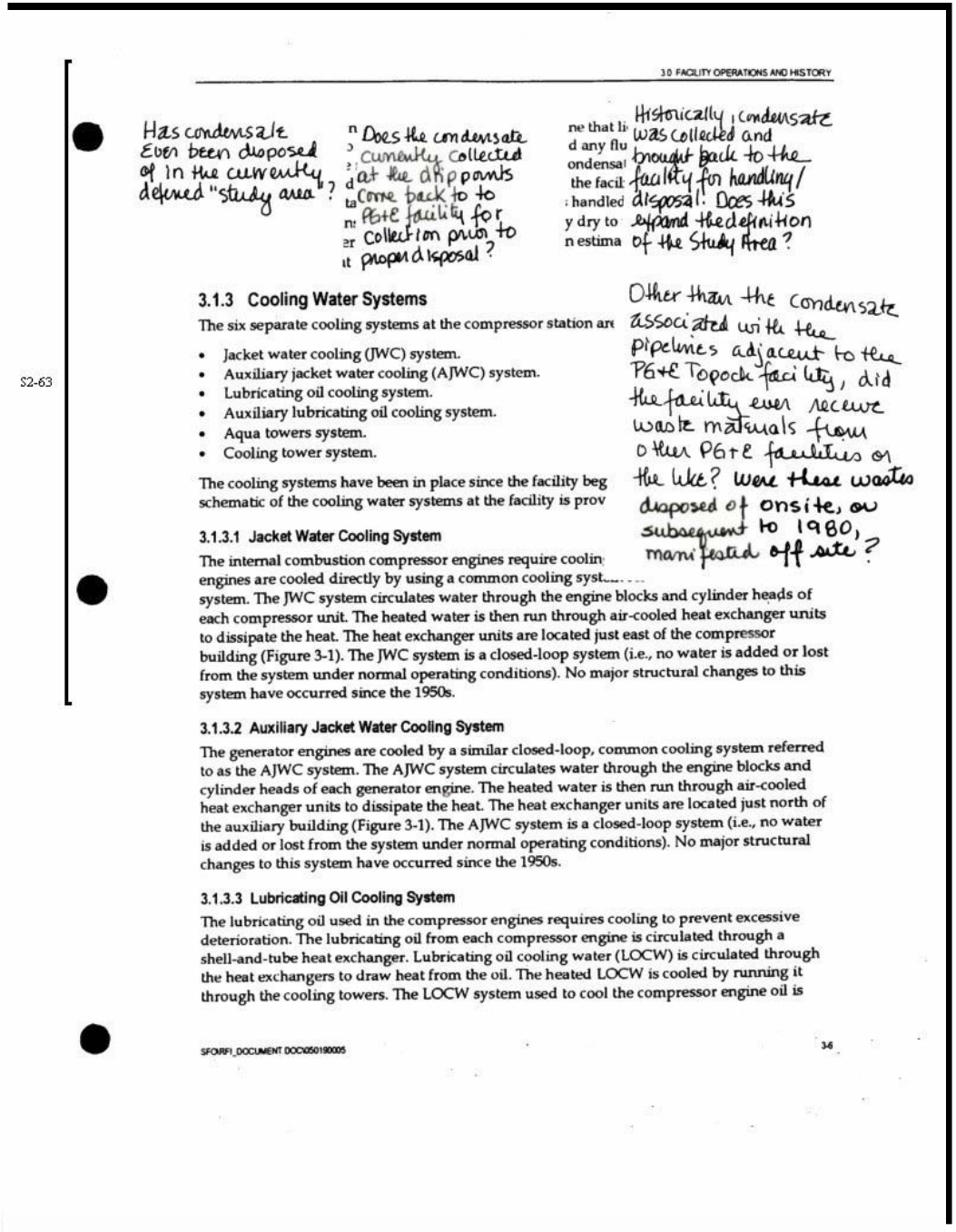
Response to Comment S2-62(RS_101805_39)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to identify the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: Available information on the pipeline liquids tank has been added to the document (Sections 3.1.2.2 and 4.3.2).



3.0 FACILITY OPERATIONS AND HISTORY

Has condensate Ever been disposed of in the currently defined "study area"?

Does the condensate currently collected at the drip points come back to to PG&E facility for collection prior to proper disposal?

Historically, condensate was collected and brought back to the facility for handling/ disposal. Does this expand the definition of the Study Area?

3.1.3 Cooling Water Systems

The six separate cooling systems at the compressor station are

- Jacket water cooling (JWC) system.
- Auxiliary jacket water cooling (AJWC) system.
- Lubricating oil cooling system.
- Auxiliary lubricating oil cooling system.
- Aqua towers system.
- Cooling tower system.

S2-63

Other than the condensate associated with the pipelines adjacent to the PG&E Topock facility, did the facility ever receive waste materials from other PG&E facilities or the like? Were these wastes disposed of onsite, or subsequent to 1980, manifested off site?

The cooling systems have been in place since the facility beg schematic of the cooling water systems at the facility is prov

3.1.3.1 Jacket Water Cooling System

The internal combustion compressor engines require cooli engines are cooled directly by using a common cooling syst system. The JWC system circulates water through the engine blocks and cylinder heads of each compressor unit. The heated water is then run through air-cooled heat exchanger units to dissipate the heat. The heat exchanger units are located just east of the compressor building (Figure 3-1). The JWC system is a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions). No major structural changes to this system have occurred since the 1950s.

3.1.3.2 Auxiliary Jacket Water Cooling System

The generator engines are cooled by a similar closed-loop, common cooling system referred to as the AJWC system. The AJWC system circulates water through the engine blocks and cylinder heads of each generator engine. The heated water is then run through air-cooled heat exchanger units to dissipate the heat. The heat exchanger units are located just north of the auxiliary building (Figure 3-1). The AJWC system is a closed-loop system (i.e., no water is added or lost from the system under normal operating conditions). No major structural changes to this system have occurred since the 1950s.

3.1.3.3 Lubricating Oil Cooling System

The lubricating oil used in the compressor engines requires cooling to prevent excessive deterioration. The lubricating oil from each compressor engine is circulated through a shell-and-tube heat exchanger. Lubricating oil cooling water (LOCW) is circulated through the heat exchangers to draw heat from the oil. The heated LOCW is cooled by running it through the cooling towers. The LOCW system used to cool the compressor engine oil is

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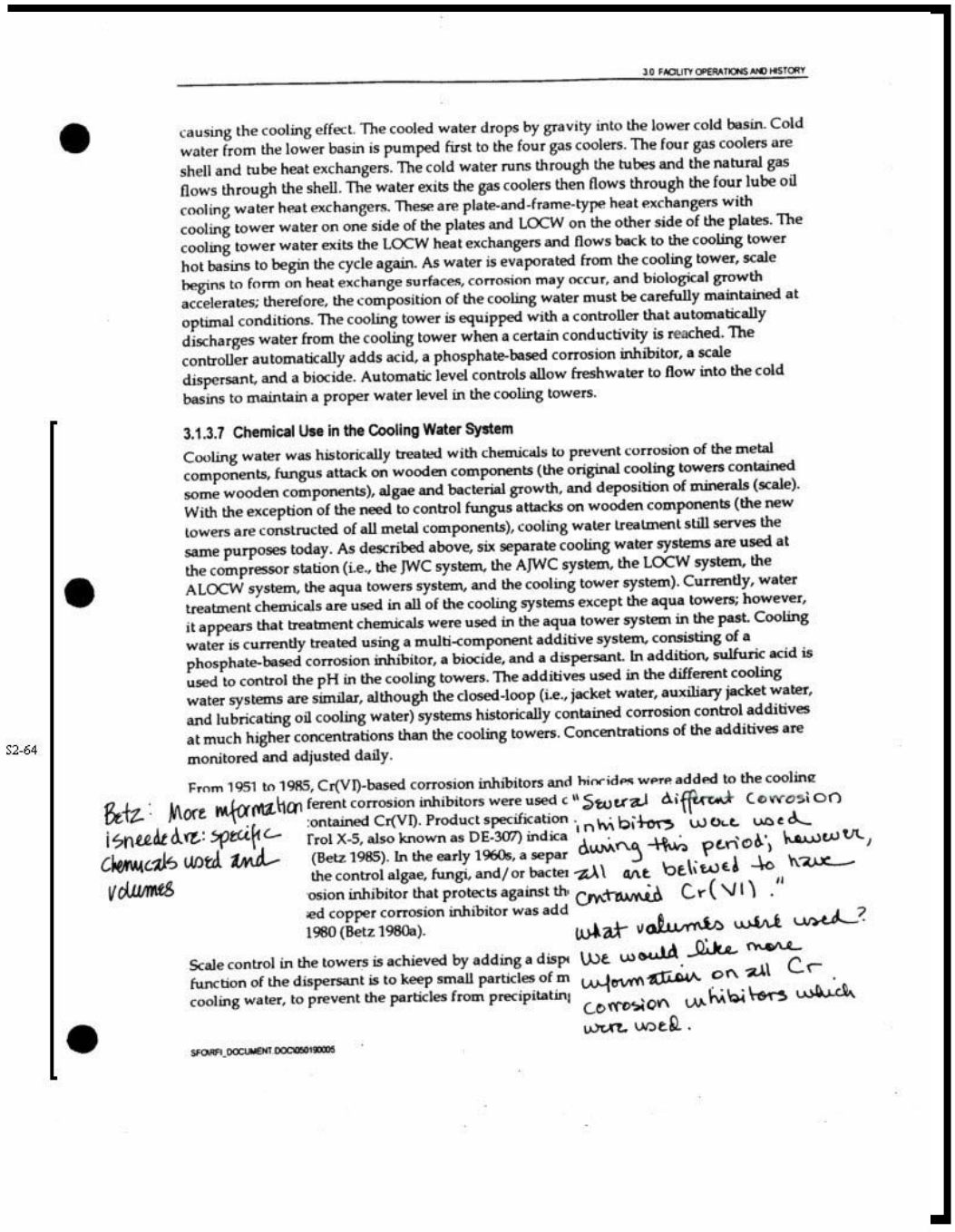
Response to Comment S2-63(RS_101805_40)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to respond to the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: The text was revised (Section 3.1.2.2) to state that pipeline liquids currently collected at the drip points do come back to the facility prior to proper disposal. However, this does not expand the definition of the study area. Past disposal practices may have included the spraying of pipeline liquids on plant roads; this information is also provided in Section 3.1.2.2.

The text was revised to state that there has been no known record of waste disposal from offsite locations.



3.0 FACILITY OPERATIONS AND HISTORY

causing the cooling effect. The cooled water drops by gravity into the lower cold basin. Cold water from the lower basin is pumped first to the four gas coolers. The four gas coolers are shell and tube heat exchangers. The cold water runs through the tubes and the natural gas flows through the shell. The water exits the gas coolers then flows through the four lube oil cooling water heat exchangers. These are plate-and-frame-type heat exchangers with cooling tower water on one side of the plates and LOCW on the other side of the plates. The cooling tower water exits the LOCW heat exchangers and flows back to the cooling tower hot basins to begin the cycle again. As water is evaporated from the cooling tower, scale begins to form on heat exchange surfaces, corrosion may occur, and biological growth accelerates; therefore, the composition of the cooling water must be carefully maintained at optimal conditions. The cooling tower is equipped with a controller that automatically discharges water from the cooling tower when a certain conductivity is reached. The controller automatically adds acid, a phosphate-based corrosion inhibitor, a scale dispersant, and a biocide. Automatic level controls allow freshwater to flow into the cold basins to maintain a proper water level in the cooling towers.

3.1.3.7 Chemical Use in the Cooling Water System

Cooling water was historically treated with chemicals to prevent corrosion of the metal components, fungus attack on wooden components (the original cooling towers contained some wooden components), algae and bacterial growth, and deposition of minerals (scale). With the exception of the need to control fungus attacks on wooden components (the new towers are constructed of all metal components), cooling water treatment still serves the same purposes today. As described above, six separate cooling water systems are used at the compressor station (i.e., the JWC system, the AJWC system, the LOCW system, the ALOCW system, the aqua towers system, and the cooling tower system). Currently, water treatment chemicals are used in all of the cooling systems except the aqua towers; however, it appears that treatment chemicals were used in the aqua tower system in the past. Cooling water is currently treated using a multi-component additive system, consisting of a phosphate-based corrosion inhibitor, a biocide, and a dispersant. In addition, sulfuric acid is used to control the pH in the cooling towers. The additives used in the different cooling water systems are similar, although the closed-loop (i.e., jacket water, auxiliary jacket water, and lubricating oil cooling water) systems historically contained corrosion control additives at much higher concentrations than the cooling towers. Concentrations of the additives are monitored and adjusted daily.

S2-64

From 1951 to 1985, Cr(VI)-based corrosion inhibitors and biocides were added to the cooling
ferent corrosion inhibitors were used c
:ontained Cr(VI). Product specification
Trol X-5, also known as DE-307) indica
(Betz 1985). In the early 1960s, a separ
the control algae, fungi, and/or bacter
osion inhibitor that protects against th
ed copper corrosion inhibitor was add
1980 (Betz 1980a).

Scale control in the towers is achieved by adding a disp
function of the dispersant is to keep small particles of m
cooling water, to prevent the particles from precipitatin

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Betz: More information is needed re: specific chemicals used and volumes

"Several different corrosion inhibitors were used during this period; however, all are believed to have contained Cr(VI)."

what volumes were used? We would like more information on all Cr corrosion inhibitors which were used.

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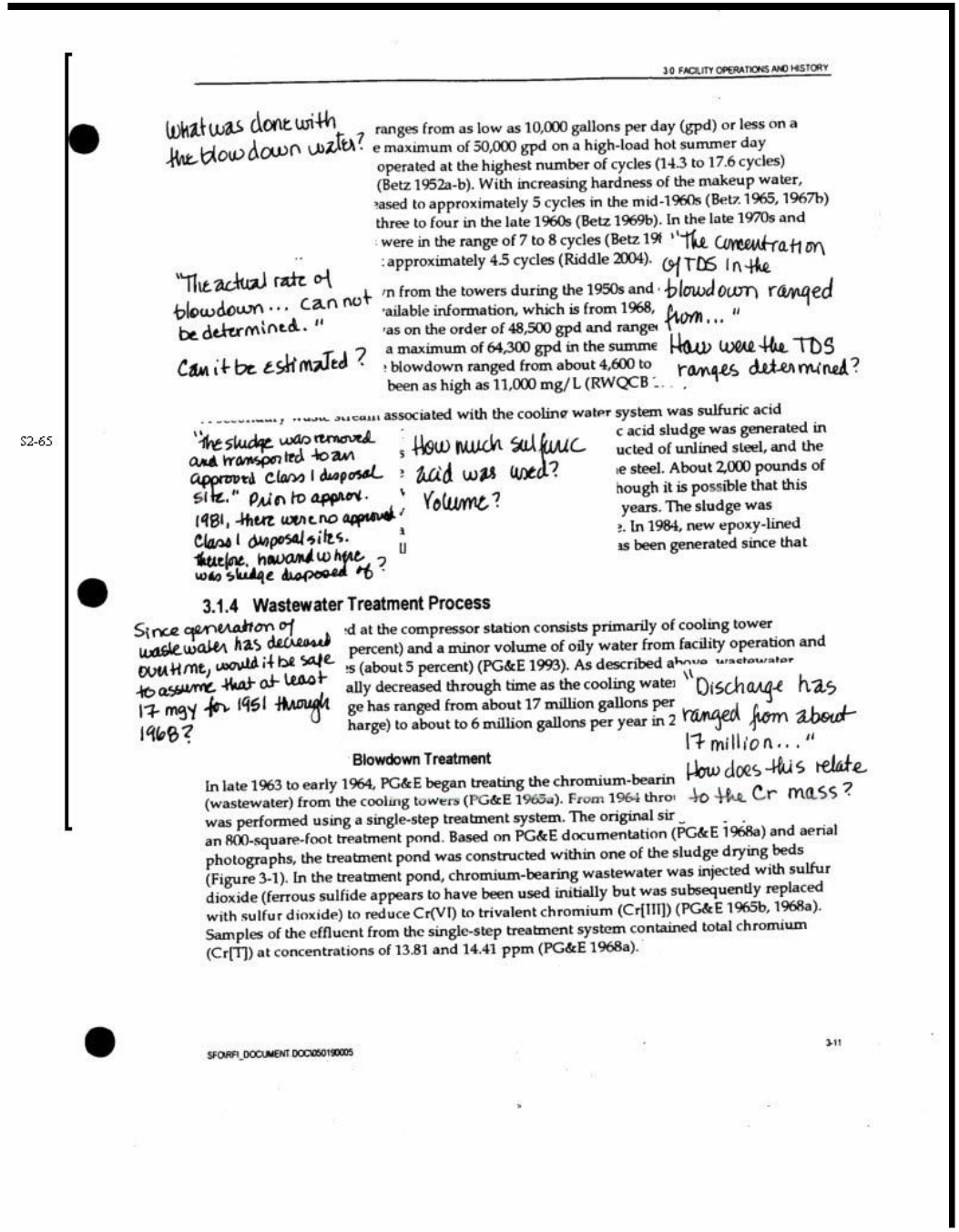
Response to Comment S2-64(RS_101805_8)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. According to PG&E, available information on the Betz products has been provided. Sources include monitoring and inspection reports prepared by Betz, Betz product information sheets, and correspondence between Betz and PG&E. PG&E shall provide additional clarification in the text. See also the response to Comment S2-1.

PG&E RESPONSE: A new table, Table 3-3, has been added to the text that summarizes the limited information available regarding chemicals ordered and stored at the facility. The lack of any other information is explicitly stated in Section 3.1.3.7.



3.0 FACILITY OPERATIONS AND HISTORY

What was done with the blowdown water?

ranges from as low as 10,000 gallons per day (gpd) or less on a
e maximum of 50,000 gpd on a high-load hot summer day
operated at the highest number of cycles (14.3 to 17.6 cycles)
(Betz 1952a-b). With increasing hardness of the makeup water,
ased to approximately 5 cycles in the mid-1960s (Betz 1965, 1967b)
three to four in the late 1960s (Betz 1969b). In the late 1970s and
were in the range of 7 to 8 cycles (Betz 19
approximately 4.5 cycles (Riddle 2004).

"The concentration of TDS in the blowdown ranged from..."

"The actual rate of blowdown... can not be determined."

Can it be estimated?

How were the TDS ranges determined?

n from the towers during the 1950s and
ailable information, which is from 1968,
as on the order of 48,500 gpd and range
a maximum of 64,300 gpd in the summe
blowdown ranged from about 4,600 to
been as high as 11,000 mg/L (RWQCB

S2-65

associated with the cooling water system was sulfuric acid
c acid sludge was generated in
ucted of unlined steel, and the
e steel. About 2,000 pounds of
hough it is possible that this
years. The sludge was
. In 1984, new epoxy-lined
as been generated since that

"the sludge was removed and transported to an approved Class I disposal site." Prior to approx. 1981, there were no approved Class I disposal sites. Therefore, hazard where was sludge disposed of?

How much sulfuric acid was used? Volume?

3.1.4 Wastewater Treatment Process

Since generation of wastewater has decreased overtime, would it be safe to assume that at least 17 mgy for 1951 through 1968?

d at the compressor station consists primarily of cooling tower
percent) and a minor volume of oily water from facility operation and
s (about 5 percent) (PG&E 1993). As described above, wastewater
ally decreased through time as the cooling wate
ge has ranged from about 17 million gallons per
harge) to about to 6 million gallons per year in 2

"Discharge has ranged from about 17 million..."

How does this relate to the Cr mass?

Blowdown Treatment

In late 1963 to early 1964, PG&E began treating the chromium-bearin
(wastewater) from the cooling towers (PG&E 1965a). From 1964 thro
was performed using a single-step treatment system. The original sir
an 800-square-foot treatment pond. Based on PG&E documentation (PG&E 1968a) and aerial photographs, the treatment pond was constructed within one of the sludge drying beds (Figure 3-1). In the treatment pond, chromium-bearing wastewater was injected with sulfur dioxide (ferrous sulfide appears to have been used initially but was subsequently replaced with sulfur dioxide) to reduce Cr(VI) to trivalent chromium (Cr[III]) (PG&E 1965b, 1968a). Samples of the effluent from the single-step treatment system contained total chromium (Cr[T]) at concentrations of 13.81 and 14.41 ppm (PG&E 1968a).

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3-11

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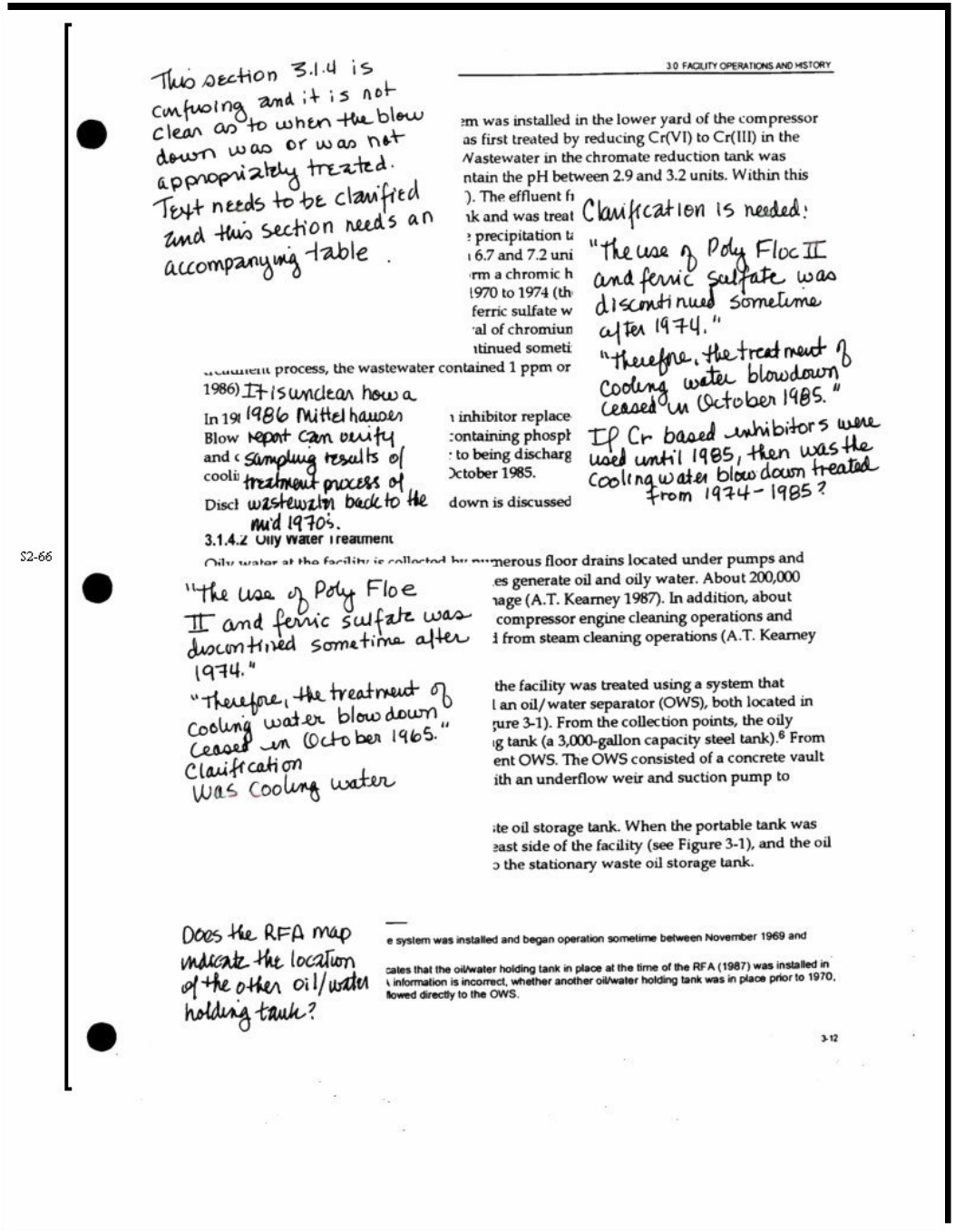
Response to Comment S2-65(RS_101805_41)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt respond to the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: The processing and treatment of blowdown water is described in detail in the text (Section 3.1.3.8). The blowdown rate cannot be estimated. As is stated in the text, it varies daily, seasonally, and annually, depending on temperature, gas flow, additive efficiency, etc. No minimum or discharge rate or trend can be determined. It is not known how TDS ranges were determined; however, some historic laboratory data reports provide information that could be used in calculating TDS. The volume of sulfuric acid used is unknown. The sulfuric acid tanks have a capacity of 2,000 gallons. Chromium mass cannot be accurately estimated from the available data because chromium concentration data in the effluent are limited, and the actual concentration is likely to have varied extensively over time (see discussion in Section 3.1.3.7).



This section 3.1.4 is confusing and it is not clear as to when the blow down was or was not appropriately treated. Text needs to be clarified and this section needs an accompanying table.

3.0 FACILITY OPERATIONS AND HISTORY

em was installed in the lower yard of the compressor as first treated by reducing Cr(VI) to Cr(III) in the Wastewater in the chromate reduction tank was ntain the pH between 2.9 and 3.2 units. Within this). The effluent fr ık and was treat precipitation ta 6.7 and 7.2 uni rm a chromic h 1970 to 1974 (th ferric sulfate w al of chromium ıtinued someti

Clarification is needed:
"The use of Poly Floc II and ferric sulfate was discontinued sometime after 1974."
"therefore, the treatment of cooling water blowdown ceased in October 1985."
If Cr based inhibitors were used until 1985, then was the cooling water blow down treated from 1974-1985?

treatment process, the wastewater contained 1 ppm or

1986) It is unclear how a

In 19 1986 Mittelhauser Blow report can verify and c sampling results of cooli treatment process of Disc wastewater back to the mid 1970's.

inhibitor replace containing phospl to being discharg October 1985.

down is discussed

3.1.4.2 Oily Water Treatment

S2-66

Oily water at the facility is collected by numerous floor drains located under pumps and

"The use of Poly Floc II and ferric sulfate was discontinued sometime after 1974."
"Therefore, the treatment of cooling water blow down ceased in October 1965."
Clarification
Was cooling water

es generate oil and oily water. About 200,000 nage (A.T. Kearney 1987). In addition, about compressor engine cleaning operations and l from steam cleaning operations (A.T. Kearney

the facility was treated using a system that l an oil/water separator (OWS), both located in gure 3-1). From the collection points, the oily g tank (a 3,000-gallon capacity steel tank).[6] From ent OWS. The OWS consisted of a concrete vault ith an underflow weir and suction pump to

te oil storage tank. When the portable tank was east side of the facility (see Figure 3-1), and the oil o the stationary waste oil storage tank.

Does the RFA map indicate the location of the other oil/water holding tank?

e system was installed and began operation sometime between November 1969 and

cates that the oil/water holding tank in place at the time of the RFA (1987) was installed in . information is incorrect, whether another oil/water holding tank was in place prior to 1970, flowed directly to the OWS.

3-12

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Response to Comment S2-66(RS_101805_9)

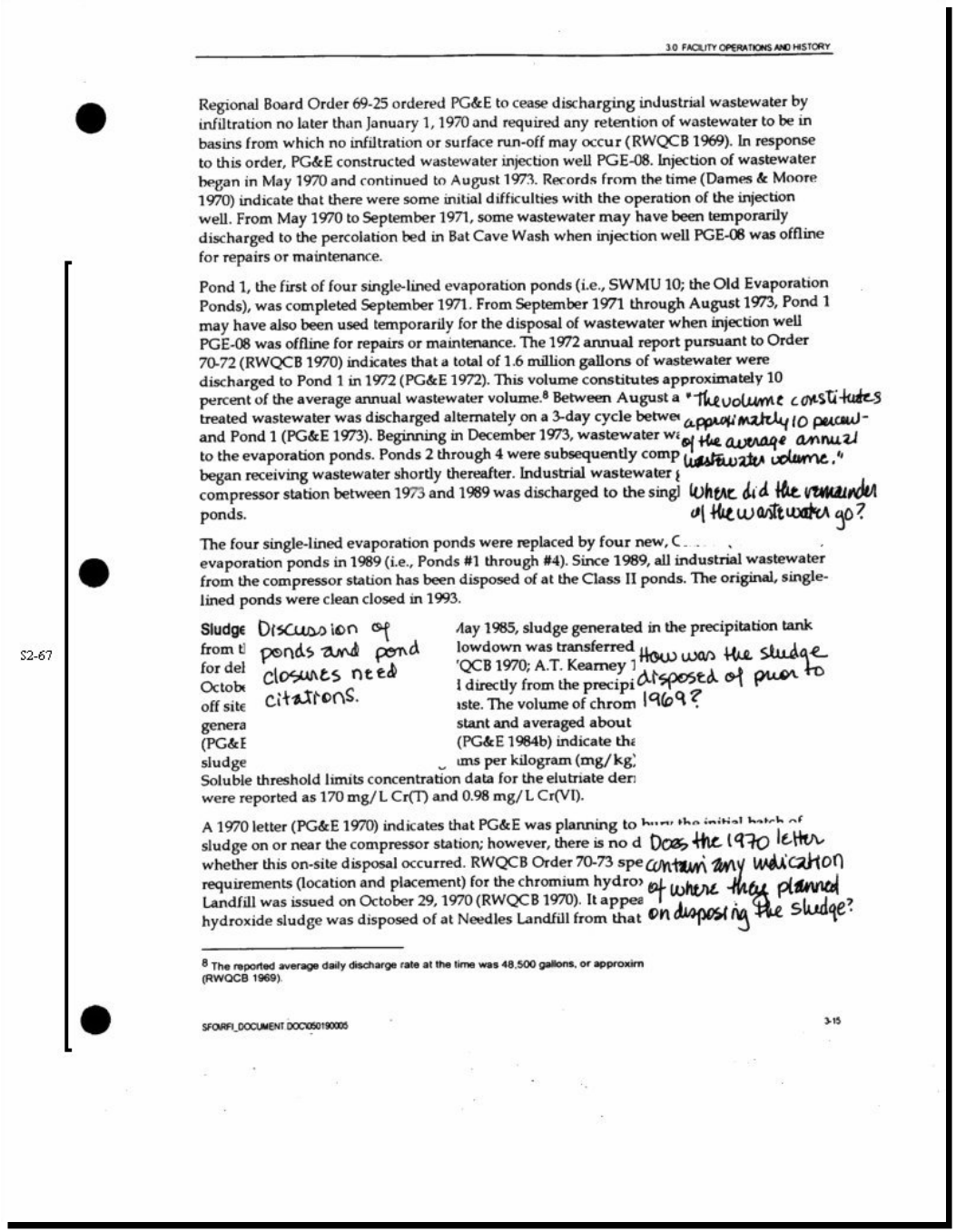
DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. Section 3.1.4 clearly documents when and how blowdown was treated.

Poly Floc II and ferric sulfate were used to minimize particulate matter in the wastewater which was important while the injection well was being used. Once use of the injection was discontinued, the use of Poly Floc II and ferric sulfate was also discontinued (i.e., after 1974).

The Mittelhauser report (1986) contained copies of laboratory reports of blow down and wastewater samples collected in the mid 1970s. Mittelhauser used these data to identify contaminants of concern for the removal of the wastewater treatment facilities.

The RFI map does include the location of both oil/water holding tanks.

PG&E RESPONSE: To clarify, the only change made to the wastewater treatment process between 1969 and 1985 was the temporary use of Poly Floc II and ferric sulfate while the injection well was in use. The goal was to remove the maximum amount of particulates possible to avoid clogging the injection well. No changes are required to the text.



3.0 FACILITY OPERATIONS AND HISTORY

Regional Board Order 69-25 ordered PG&E to cease discharging industrial wastewater by infiltration no later than January 1, 1970 and required any retention of wastewater to be in basins from which no infiltration or surface run-off may occur (RWQCB 1969). In response to this order, PG&E constructed wastewater injection well PGE-08. Injection of wastewater began in May 1970 and continued to August 1973. Records from the time (Dames & Moore 1970) indicate that there were some initial difficulties with the operation of the injection well. From May 1970 to September 1971, some wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance.

Pond 1, the first of four single-lined evaporation ponds (i.e., SWMU 10; the Old Evaporation Ponds), was completed September 1971. From September 1971 through August 1973, Pond 1 may have also been used temporarily for the disposal of wastewater when injection well PGE-08 was offline for repairs or maintenance. The 1972 annual report pursuant to Order 70-72 (RWQCB 1970) indicates that a total of 1.6 million gallons of wastewater were discharged to Pond 1 in 1972 (PG&E 1972). This volume constitutes approximately 10 percent of the average annual wastewater volume.[8] Between August a
treated wastewater was discharged alternately on a 3-day cycle betwe
and Pond 1 (PG&E 1973). Beginning in December 1973, wastewater w
to the evaporation ponds. Ponds 2 through 4 were subsequently comp
began receiving wastewater shortly thereafter. Industrial wastewater
compressor station between 1973 and 1989 was discharged to the sing
ponds.

"The volume constitutes approximately 10 percent of the average annual wastewater volume."

Where did the remainder of the wastewater go?

The four single-lined evaporation ponds were replaced by four new, C
evaporation ponds in 1989 (i.e., Ponds #1 through #4). Since 1989, all industrial wastewater from the compressor station has been disposed of at the Class II ponds. The original, single-lined ponds were clean closed in 1993.

S2-67

Discussion of ponds and pond closures need citations.

Sludge
from t
for del
Octob
off site
genera
(PG&E
sludge
May 1985, sludge generated in the precipitation tank
lowdown was transferred
'QCB 1970; A.T. Kearney 1
l directly from the precipi
aste. The volume of chrom
stant and averaged about
(PG&E 1984b) indicate tha
ams per kilogram (mg/kg)
Soluble threshold limits concentration data for the elutriate der
were reported as 170 mg/L Cr(T) and 0.98 mg/L Cr(VI).

How was the sludge disposed of prior to 1969?

A 1970 letter (PG&E 1970) indicates that PG&E was planning to bury the initial batch of
sludge on or near the compressor station; however, there is no d
whether this on-site disposal occurred. RWQCB Order 70-73 spe
requirements (location and placement) for the chromium hydro
Landfill was issued on October 29, 1970 (RWQCB 1970). It appea
hydroxide sludge was disposed of at Needles Landfill from that

Does the 1970 letter contain any indication of where they planned on disposing the sludge?

[8] The reported average daily discharge rate at the time was 48,500 gallons, or approxim
(RWQCB 1969).

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3-15

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Response to Comment S2-67(RS_101805_10)

DTSC RESPONSE: PG&E shall address this comment indicating that the remainder of the wastewater was injected through PGE-08.

Pond closure citations shall be added.

PG&E shall clarify that little if any sludge was generated prior to 1969 since only a single-step treatment system was used. The single-step system converts Cr(VI) to Cr(III), but does not remove the chromium (i.e., precipitate).

The 1970 letter does not contain any information on where disposal was planned.

PG&E RESPONSE: The text has been changed as requested for the first two items.

No response is required for the other two items.

1983, although no specific documentation exists for 1971 and 1972.[9] Sludge shipping manifests compiled by PG&E (PG&E 1984c) indicate that a total of 166,500 gallons of sludge were disposed of at the Needles Landfill between 1973 and 1983. Annual volumes shipped varied widely, from 0 to 33,600 gallons, suggesting that there was storage capacity in the sludge drying beds. In response to California Department of Health Services (CDHS) directives (CDHS 1984a), no shipments were sent to the Needles Landfill after 1983 (PG&E 1984b-c). From January 1984 to October 1985, the dried sludge was transported off site to an approved Class I hazardous waste facility (PG&E 1984c; CDHS 1984b).

Although there are non-PG&E references to sludge having been removed from the single-lined ponds (A.T. Kearney 1987; CDHS 1985), it appears unlikely that the facility would have jeopardized the integrity of the pond liner by employing mechanical means of sludge removal. In addition, due to the size and depth of the ponds, it is unlikely that routine removal of sludge would have been required. The "sludge" that would have been present in the ponds would have consisted predominately of mineral salts found in the makeup water and dust blown into the ponds (Riddle 2004). Some solids were found in the ponds and tested as part of an overall sampling program for the wastewater treatment system (Brown and Caldwell 1985a). Based on information obtained from PG&E, it is likely that sludge removal would only have occurred if repairs were required to one of the ponds (Riddle 2004).

Very little sludge, if any, is generated using the phosphate-based cooling water treatment system. The current Class II evaporation ponds were designed for a 20-year life and have accumulated less than 6 inches of residue in the bottom since being placed into service in 1989. Most of the residue currently found in the ponds is dust and sand that has blown into the ponds (Riddle 2004).

S2-68

Waste Oil. Waste oil removed from the oily wastewater is collected and transported off site for disposal or recycling (additional information on the management of provided in Section 3.1.5.2).

Transported since 1980 by licensed transporter... What happened prior to 1980?

3.1.5 Facility and Equipment Maintenance

The fifth major activity at the compressor station is maintenance of the equipment. Typical maintenance tasks include:

- Preventive maintenance of mechanical and electrical systems.
- Mechanical and electrical repairs of operating equipment.
- Minor maintenance of buildings and structures on the property.
- Fueling and servicing of vehicles required for station operations.
- Chemical testing of cooling water.

Equipment maintenance consists of preventive maintenance and repairs for the various mechanical and electrical equipment at the facility. Routine maintenance of small system components occurs on an as-needed basis. Special maintenance tasks consist primarily of compressor engine and generator engine overhauls. Compressor engines are overhauled

[9] Off-site disposal of chromium hydroxide sludge does not appear to have been performed at routine (e.g., quarterly) intervals, but appears to have been performed only sporadically. This suggests that the sludge was stockpiled on site and disposed of only as necessary. This may explain the absence of disposal records for 1971 and 1972.

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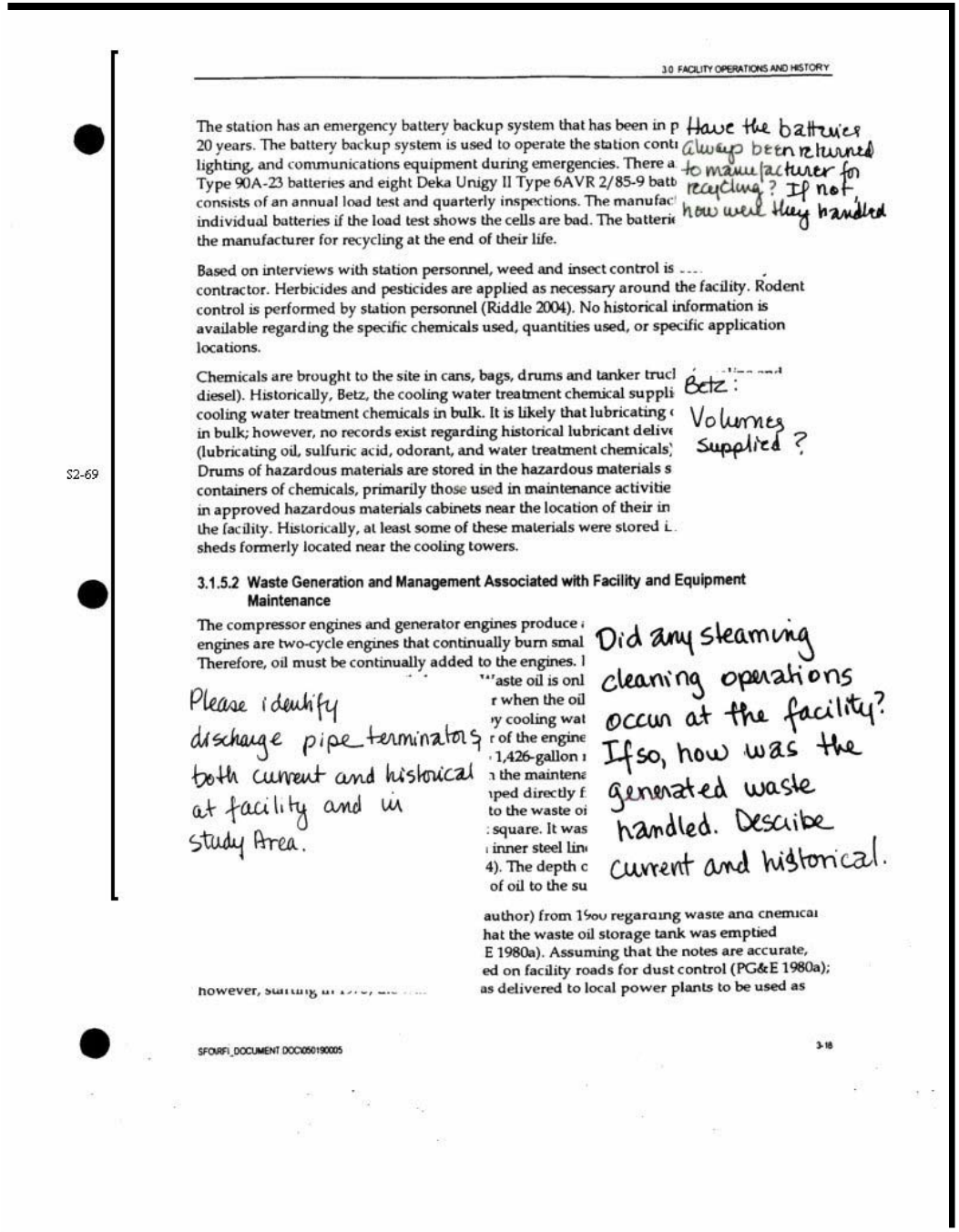
Response to Comment S2-68(RS_101805_29)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to address the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: Additional employee interviews indicate that some of the waste oil may have been sprayed for dust control on station roads. This information is provided in Section 3.1.5.2. No other new information was identified.



3.0 FACILITY OPERATIONS AND HISTORY

The station has an emergency battery backup system that has been in p
20 years. The battery backup system is used to operate the station conti
lighting, and communications equipment during emergencies. There a
Type 90A-23 batteries and eight Deka Unigy II Type 6AVR 2/85-9 batt
consists of an annual load test and quarterly inspections. The manufac
individual batteries if the load test shows the cells are bad. The batteri
the manufacturer for recycling at the end of their life.

Have the batteries always been returned to manufacturer for recycling? If not, how were they handled

Based on interviews with station personnel, weed and insect control is
contractor. Herbicides and pesticides are applied as necessary around the facility. Rodent control is performed by station personnel (Riddle 2004). No historical information is available regarding the specific chemicals used, quantities used, or specific application locations.

Chemicals are brought to the site in cans, bags, drums and tanker trucl
diesel). Historically, Betz, the cooling water treatment chemical suppli
cooling water treatment chemicals in bulk. It is likely that lubricating
in bulk; however, no records exist regarding historical lubricant delive
(lubricating oil, sulfuric acid, odorant, and water treatment chemicals)
Drums of hazardous materials are stored in the hazardous materials s
containers of chemicals, primarily those used in maintenance activitie
in approved hazardous materials cabinets near the location of their in
the facility. Historically, at least some of these materials were stored i
sheds formerly located near the cooling towers.

Betz: Volumes supplied?

S2-69

3.1.5.2 Waste Generation and Management Associated with Facility and Equipment Maintenance

The compressor engines and generator engines produce
engines are two-cycle engines that continually burn smal
Therefore, oil must be continually added to the engines.
aste oil is onl
r when the oil
y cooling wat
r of the engine
1,426-gallon
the maintena
ped directly f
to the waste oi
square. It was
inner steel lin
4). The depth c
of oil to the su

Did any steaming cleaning operations occur at the facility? If so, how was the generated waste handled. Describe current and historical.

Please identify discharge pipe terminators both current and historical at facility and in study Area.

author) from 1980 regarding waste and chemical
hat the waste oil storage tank was emptied
E 1980a). Assuming that the notes are accurate,
ed on facility roads for dust control (PG&E 1980a);
as delivered to local power plants to be used as

however, starting in

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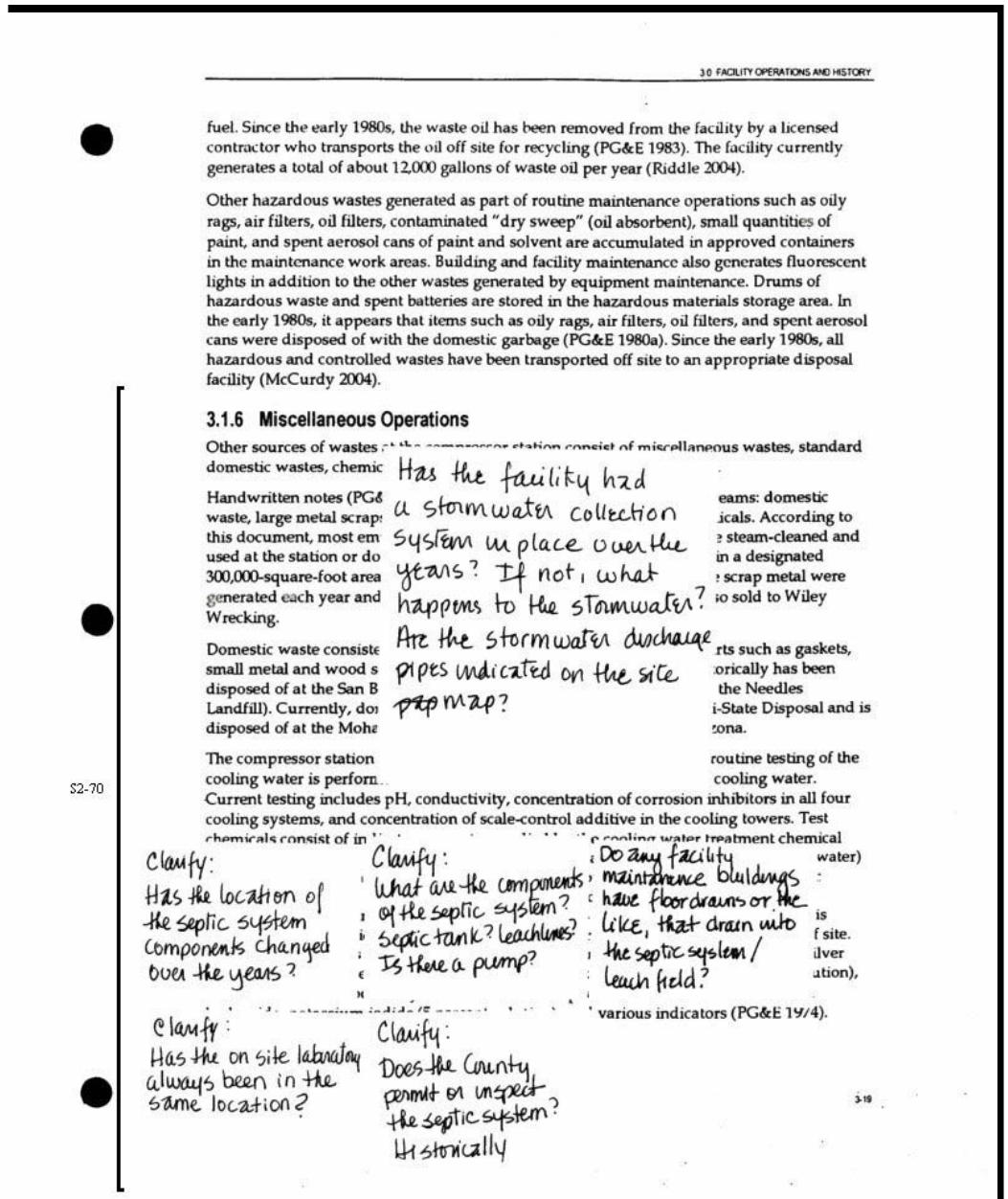
Response to Comment S2-69(RS_101805_11)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: Based on the available information, batteries were either returned to the manufacturer or Wiley Wrecking for salvaging. No additional information was identified.

Text was added to Section 3.1.5.2 to briefly discuss steam cleaning. Discharge from steam-cleaning area was routed to the oil/water separator.



3.0 FACILITY OPERATIONS AND HISTORY

fuel. Since the early 1980s, the waste oil has been removed from the facility by a licensed contractor who transports the oil off site for recycling (PG&E 1983). The facility currently generates a total of about 12,000 gallons of waste oil per year (Riddle 2004).

Other hazardous wastes generated as part of routine maintenance operations such as oily rags, air filters, oil filters, contaminated "dry sweep" (oil absorbent), small quantities of paint, and spent aerosol cans of paint and solvent are accumulated in approved containers in the maintenance work areas. Building and facility maintenance also generates fluorescent lights in addition to the other wastes generated by equipment maintenance. Drums of hazardous waste and spent batteries are stored in the hazardous materials storage area. In the early 1980s, it appears that items such as oily rags, air filters, oil filters, and spent aerosol cans were disposed of with the domestic garbage (PG&E 1980a). Since the early 1980s, all hazardous and controlled wastes have been transported off site to an appropriate disposal facility (McCurdy 2004).

3.1.6 Miscellaneous Operations

Other sources of wastes at the compressor station consist of miscellaneous wastes, standard domestic wastes, chemic

Handwritten notes (PG& waste, large metal scrap this document, most em used at the station or do 300,000-square-foot area generated each year and Wrecking.

eams: domestic icals. According to steam-cleaned and in a designated scrap metal were io sold to Wiley

Domestic waste consiste small metal and wood s disposed of at the San B Landfill). Currently, do disposed of at the Moha

rts such as gaskets, orically has been the Needles i-State Disposal and is ona.

The compressor station cooling water is perform

routine testing of the cooling water.

S2-70

Current testing includes pH, conductivity, concentration of corrosion inhibitors in all four cooling systems, and concentration of scale-control additive in the cooling towers. Test chemicals consist of in

cooling water treatment chemical water)

is f site. ilver ation),

various indicators (PG&E 1974).

3-19

Has the facility had a stormwater collection system in place over the years? If not, what happens to the stormwater? Are the stormwater discharge pipes indicated on the site map?

Clarify: Has the location of the septic system components changed over the years?

Clarify: What are the components of the septic system? Septic tank? Leachlines? Is there a pump?

Do any facility maintenance buildings have floor drains or the like, that drain into the septic system / leach field?

Clarify: Has the on site laboratory always been in the same location?

Clarify: Does the County permit or inspect the septic system? Historically

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Response to Comment S2-70(RS_101805_24)

DTSC RESPONSE: PG&E shall clarify in the text that there is no central stormwater collection system for the compressor station. Stormwater is directed off the facility through numerous culverts to surrounding drainages including Bat Cave Wash, the Debris Ravine, and the East Ravine. All of the surrounding drainages either have, or will be investigated for potential impacts associated with the compressor station. Including stormwater culverts on the facility map is unnecessary.

PG&E shall provide additional available information on the septic system will be provided in the final RFI/RI report.

PG&E RESPONSE: The text in Section 3.1.6 has been clarified with respect to the stormwater run-off process.

The septic system for the site laboratory apparently consists of a septic tank and leachfield. Domestic waste from the Auxiliary Building also drains to this system. The best-available information indicates that the laboratory has been in the same location. The text was revised to clarify this (Section 3.1.6 and Section 4.2.14).

S2-71

What occurred with the mercury contaminated instruments and associated wastes, prior to the change that occurred in 1996?

...iments (e.g., manometers, thermometers, and flow meters) Compressor Station contained mercury. As part of PG&E's ...ardous materials at the facility, all mercury-containing ...996. The work consisted of the draining the elemental mercury ...e physical removal of all instruments and associated piping ...ry. The elemental mercury was transported off site for ...carcasses and other debris was transported off site for disposal ...f this activity are provided in the *Closure Report for the Removal ...ents and Piping at PG&E's Topock Compressor Station and Related Facilities* (Trident 1997). An inspection of the facility following the removal confirmed that no other mercury-containing equipment remained at the Topock compressor station (Trident 1997).

3.1.7 Incidental Release History

During the operational history of the compressor station, some incidental releases of chemicals or waste products have occurred. When incidental releases occurred, the proper authorities were notified and the spilt material was cleaned up. Although the investigation and cleanup of incidental releases has not been performed under the RFI, the reporting of releases is required under the terms of the CACA (DTSC 1996). Nine incidental releases have been documented at the facility since 1995, as summarized in Table 3-4. The location of each release is depicted in Figure 3-7. Details of each release are provided below. There is no available documentation regarding releases prior to 1995.

3.1.7.1 October 1995 Mercury Release

During the week of October 16, 1995, a length of gas meter piping adjacent to the east side of the compressor building was being removed to facilitate construction in the area. When the line was cut, metallic mercury (which was unknowingly trapped in the line) was released to an area of exposed soil. The area impacted by the mercury release measured about 18 feet long by 9 feet wide. Initial samples collected from the release area contained mercury ranging from 200 to 12,000 mg/kg.

Between November 20 and December 1, 1995, soil was excavated from the release area. Based on visual observations and interim sampling, the excavation ranged from 2 to 4 feet deep, and it extended laterally over the entire impacted area. When completed, 3,730 pounds of mercury contaminated soil had been removed. The contaminated soil was placed into 55-gallon drums and shipped off site for disposal at the Chemical Waste Management, Inc. facility in Kettleman City, California.

Following excavation, 12 samples were collected from the base of the excavation and one sample was collected from each of the north and south walls. In addition, at the request of the CSBFD, samples were collected on both sides of a wooden form located adjacent to the release area. The results of confirmation samples are summarized in Table 3-5.

The results of the confirmation samples indicate that all mercury exceeding California hazardous waste level, and United States Environmental Protection Agency (USEPA) preliminary remediation goals for both residential and industrial soil had been removed. In addition, a risk assessment performed following the removal action indicated that the

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Response to Comment S2-71(RS_101805_25)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: A new subsection, Section 3.1.7, was added to the text to summarize available information pertaining to mercury-related instruments and handling at the facility.

residual concentrations of mercury that remained did not pose an unacceptable treat to human health

S2-72

"In addition, a risk assessment performed following the removal action indicated..."

Citation/ Reference needed.

i the remediation effort were reported to the CSBFD in 1996
ısly indicated, all mercury-containing instrumentation was
in 1996 (Trident 1997). All mercury debris removed from the
ff site for disposal at the Chemical Waste Management, Inc. facility
nia.

Tower Water Release

On Sunday, June 30, 1996, approximately 200 gallons of water from the lower basin of Cooling Tower A overflowed (PG&E 1996b). The overflow entered a facility drain that discharges to Bat Cave Wash. The portion of the wash that was affected by the spill was reportedly on PG&E property.

The overflow was caused by a failure of one of the cooling tower basin level controllers. Scale build-up on the float mechanism of the controller caused it to stick in the "fill" position. As a result, the makeup water line continuously filled the basin until it overflowed. Upon discovering the problem, the facility operator manually closed the makeup water line to stop the overflow. Water from the tower was then pumped to the evaporation ponds to achieve adequate freeboard in the basin.

At the time of the release, cooling water in the tower was non-hazardous and contained phosphate-based corrosion inhibitors. Analysis of cooling samples collected prior to the release indicated an electrical conductivity of 9,000 micromhos and a pH of 7. The conductivity of the released water was thought to be lower due to dilution with the makeup water.

The RWQCB was notified of the release on Monday, July 1, 1996. Surface soil that was contacted by the overflow adjacent to the cooling tower basin and in Bat Cave Wash was removed (PG&E 1996b). Enhanced inspection and maintenance schedules were implemented to avoid recurrence of this incident.

3.1.7.3 August 1998 Cooling Tower Water Release

On August 4, 1998, during a routine daily facility inspection, an operator observed process water being released from Cooling Tower A. The majority of the water flowed onto the soil adjacent to the cooling tower. A small volume of water flowed down the side of the hill into the Bat Cave Wash area. The total release volume was estimated at about 500 gallons. The cooling tower water contained low concentrations of a non-hazardous, phosphate-based corrosion inhibitor. All of the water released evaporated rapidly due to the high summertime temperature. The RWQCB was notified of the incident in a report dated August 11, 1998 (PG&E 1998).

The cause of the release was determined to be a fouled screen associated with a drain return line. The screen was cleaned and the tower was restored to normal operating conditions.

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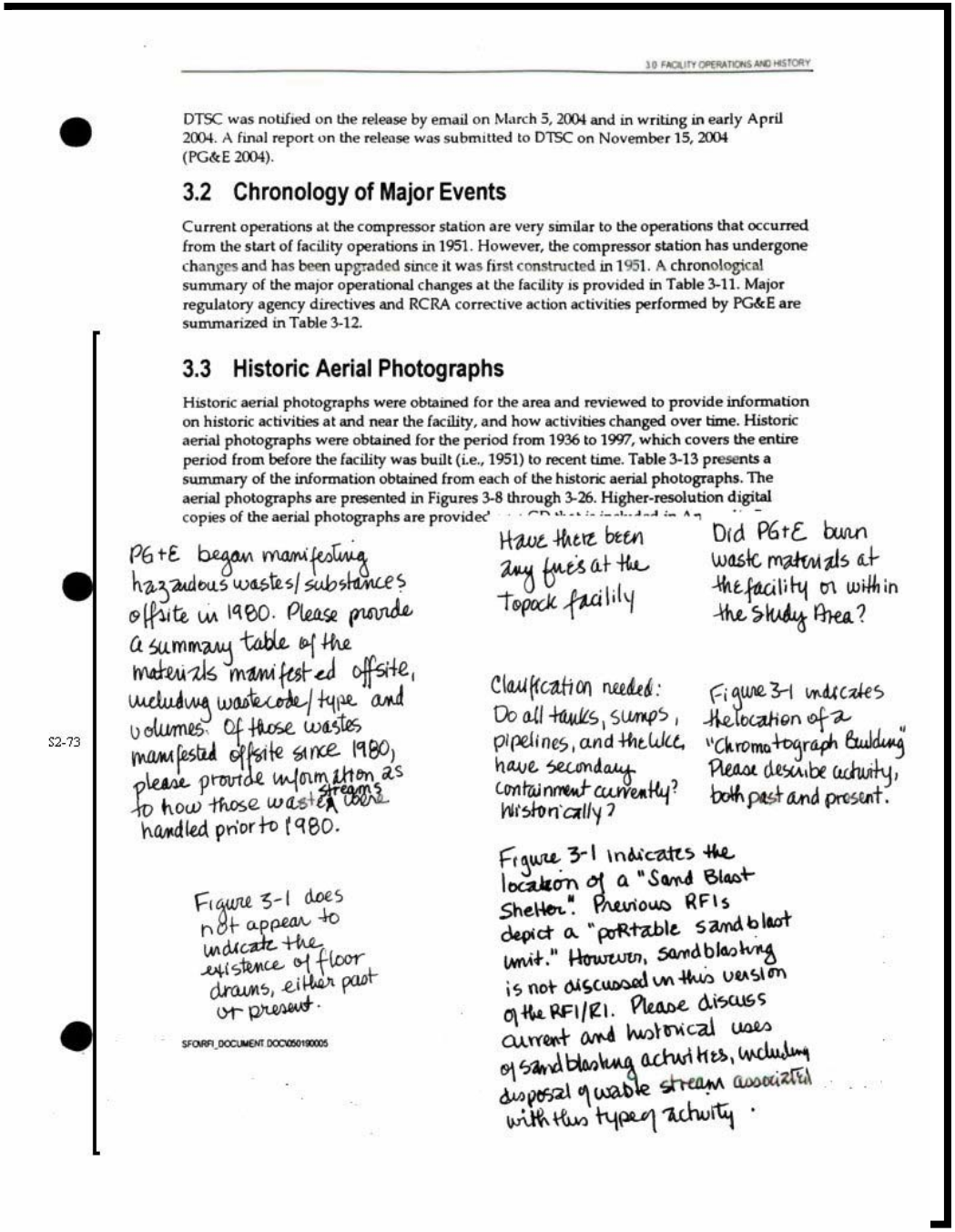
Response to Comment S2-72(RS_101805_27)

DTSC RESPONSE: PG&E shall provide the citation as requested.

PG&E RESPONSE: The citation was added to the text in Section 3.1.7.



3.0 FACILITY OPERATIONS AND HISTORY

DTSC was notified on the release by email on March 5, 2004 and in writing in early April 2004. A final report on the release was submitted to DTSC on November 15, 2004 (PG&E 2004).

3.2 Chronology of Major Events

Current operations at the compressor station are very similar to the operations that occurred from the start of facility operations in 1951. However, the compressor station has undergone changes and has been upgraded since it was first constructed in 1951. A chronological summary of the major operational changes at the facility is provided in Table 3-11. Major regulatory agency directives and RCRA corrective action activities performed by PG&E are summarized in Table 3-12.

3.3 Historic Aerial Photographs

Historic aerial photographs were obtained for the area and reviewed to provide information on historic activities at and near the facility, and how activities changed over time. Historic aerial photographs were obtained for the period from 1936 to 1997, which covers the entire period from before the facility was built (i.e., 1951) to recent time. Table 3-13 presents a summary of the information obtained from each of the historic aerial photographs. The aerial photographs are presented in Figures 3-8 through 3-26. Higher-resolution digital copies of the aerial photographs are provided

PG+E began manifesting hazardous wastes/substances offsite in 1980. Please provide a summary table of the materials manifested offsite, including waste code/type and volumes. Of those wastes manifested offsite since 1980, please provide information as to how those waste streams were handled prior to 1980.

S2-73

Have there been any fires at the Topock facility

Did PG+E burn waste materials at the facility or within the Study Area?

Clarification needed: Do all tanks, sumps, pipelines, and the like, have secondary containment currently? Historically?

Figure 3-1 indicates the location of a "Chromatograph Building" Please describe activity, both past and present.

Figure 3-1 does not appear to indicate the existence of floor drains, either past or present.

Figure 3-1 indicates the location of a "Sand Blast Shelter". Previous RFIs depict a "portable sandblast unit." However, sandblasting is not discussed in this version of the RFI/RI. Please discuss current and historical uses of sandblasting activities, including disposal of waste stream associated with this type of activity.

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Response to Comment S2-73(RS_101805_26)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: There is no record or information regarding any fires or waste burning at the facility. The status of secondary containment for each of the units varies; for example, most stormwater pipelines do not have secondary containment. Secondary containment was installed over a period of years.

The Chromatograph Building houses chromatographs that monitor the composition of the natural gas at the facility. Chromatographs replaced the earlier mercury-filled meters located within the meter building. No chemicals were used at the chromatograph building.

A figure has been added depicting the industrial floor drain locations, and a new AOC (AOC 20), has been added to address the industrial floor drains. Figure 4-3 depicts the industrial floor drains, a description of the new AOC is provided in Section 4.2.17, and AOC 20 has also been added to Tables 4-2 and Section 5.3.

All available information regarding waste handling practices prior to 1980 has been provided in the text previously. The level of effort required to obtain and

tabulate all hazardous waste manifests was not deemed a reasonable effort given the value of the information that could be derived from that effort. The sandblast shelter has been added as an AOC, AOC 16 (Section 4.2.1.). Very limited information is available regarding the operations at this unit.

It is unknown whether or not PG&E burned waste at the facility.

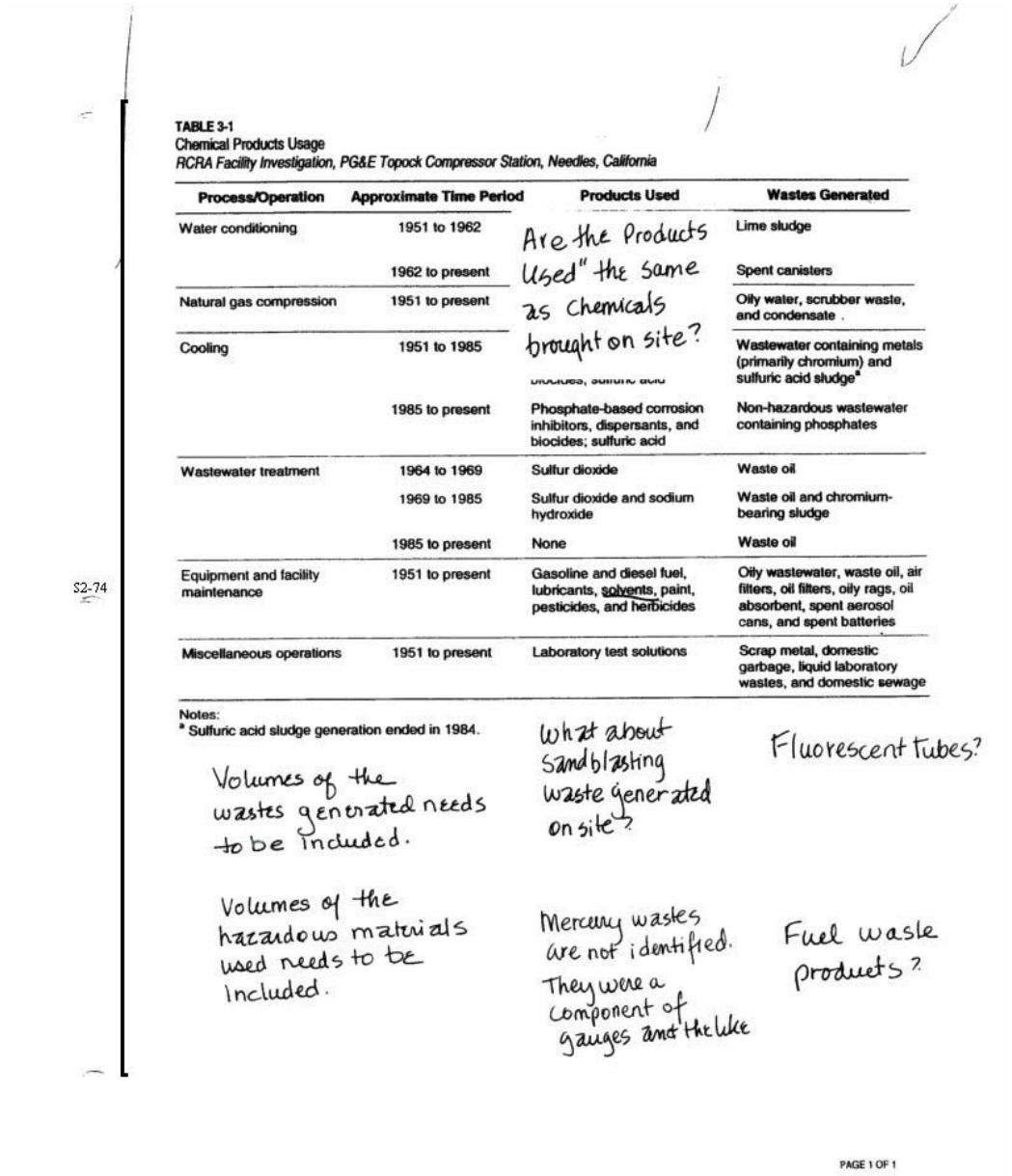

TABLE 3-1
Chemical Products Usage
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Process/Operation	Approximate Time Period	Products Used	Wastes Generated
Water conditioning	1951 to 1962		Lime sludge
	1962 to present		Spent canisters
Natural gas compression	1951 to present		Oily water, scrubber waste, and condensate
Cooling	1951 to 1985		Wastewater containing metals (primarily chromium) and sulfuric acid sludge*
	1985 to present	Phosphate-based corrosion inhibitors, dispersants, and biocides; sulfuric acid	Non-hazardous wastewater containing phosphates
Wastewater treatment	1964 to 1969	Sulfur dioxide	Waste oil
	1969 to 1985	Sulfur dioxide and sodium hydroxide	Waste oil and chromium-bearing sludge
	1985 to present	None	Waste oil
Equipment and facility maintenance	1951 to present	Gasoline and diesel fuel, lubricants, solvents, paint, pesticides, and herbicides	Oily wastewater, waste oil, air filters, oil filters, oily rags, oil absorbent, spent aerosol cans, and spent batteries
Miscellaneous operations	1951 to present	Laboratory test solutions	Scrap metal, domestic garbage, liquid laboratory wastes, and domestic sewage

Notes:
* Sulfuric acid sludge generation ended in 1984.

S2-74

Are the Products Used" the same as chemicals brought on site?

What about sandblasting waste generated on site?

Fluorescent Tubes?

Volumes of the wastes generated needs to be included.

Volumes of the hazardous materials used needs to be included.

Mercury wastes are not identified. They were a component of gauges and the like

Fuel waste products?

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Response to Comment S2-74(RS_101805_28)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: The limited information available regarding volumes of waste generated is discussed in the text throughout Section 3.0. There is no information on the disposition of used sandblast sand. Information on the disposal of mercury-containing waste was added to Section 3.1.7. There are no known fuel waste products; the disposal of pipeline liquids and waste oil is described in Sections 3.1.2.2 and 3.1.5.2.

A reference to mercury has been added to the table. Although fluorescent tubes require special disposal, they are considered a routine domestic waste and, as such, have not been addressed separately.

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TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated On Site?	Disposition
Water conditioning	Soda ash, lime, and sodium aluminate	Lime sludge	1951 to 1962	No	Exa disp Deb Please provide
	Self-contained canisters	Spent canisters	1962 to present	NA	Ren volumes for
Natural gas compression	Odorants (TBM and THT)	Oily water	1951 to 1970	Yes	Bat. amounts
			1970 to 1973	Yes	Injec disposed.
			1973 to 1989	Yes	Single-lined evaporation ponds
			1989 to present	Yes	Double-lined evaporation ponds
	Lubricants	Scrubber waste	1951 to 1970	NA	Collected in Waste Oil Storage tank
		Condensate	1951 to present	No	If PCB concentrations are below 5 ppm, collected in Waste Oil Storage tank. If PCB concentration exceeds 5 ppm, transported offsite as PCB waste.
Cooling	Chromium-based corrosion inhibitors, dispersants, and biocides; sulfuric acid	[illegible]	[illegible]	No	See Condensate, 1951 to present and disposition
	rosion , and	Sludge		Yes	

Page 3-12 states that "the use of the Poly Floc II and ferric sulfate was discontinued sometime after 1974." Based on this, how can it be stated on this table that cooling water was treated from 1974-1985?

Disposition states that the sludge was transported to Class I disposal.

Were PCB regulations in place in 1951? Was condensate tested for PCBs in the 1950s? Please clarify.

Designation of Class I disposal sites began in?

S2-75

Response to Comment S2-75(RS_101805_19)

DTSC RESPONSE: PG&E shall expand Table 3-2 and revised with available information. PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: No information is available regarding the disposal of sulfuric acid sludge prior to 1980. Additional information has been added to the table to clarify that testing for PCBs began in 1981, and information has been added to the text to document that PCBS were not of concern at Topock prior to 1998 (Section 3.1.2.2). Poly-Floc II was not a cooling water treatment. It was used only to enhance the removal of precipitated sludge from the treated cooling water prior to injection.

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TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Wastes Generated	Approximate Time Period	Treated On Site?	Disposition
Wastewater treatment None		Waste oil	1951 to present	No	Collected in Waste Oil Storage tank. Possibly used in early years on roads for dust control. Reused (power plant fuel) offsite starting in 1975. Since the early 1980s, waste oil has been transported off site for recycling.
	Sulfur dioxide and sodium hydroxide	Chromium-bearing sludge	1969 to 1983	No	Needles Landfill [c]
			1984 to 1985	No	Transported offsite for Class I disposal
Equipment and facility maintenance	Gasoline and diesel fuel, lubricants, solvents, paint pesticides, and herbicides	Oily water	1951 to 1970	Yes	See "condensate", page 1 of 3, Table 3-2
				Yes	Prior to PCB requirements, was condensate contaminated with PCBs placed in waste oil storage tank? Was this used on roads for dust control?
				Yes	
				No	
				NA	
		Spent batteries	1951 to present	NA	Transported off site by contractor/manufacturer

How was oily water "treated" before being disposed of in Bat Cave wash in 1951?

See "oily water," 1951 to 1970

S2-76

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Response to Comment S2-76(RS_101805_20)

DTSC RESPONSE: PG&E shall expand Table 3-2 and revised with available information. PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: Oily water has always been treated in an oil/water separator. PCBs were not of concern at Topock until 1998; thus, they would not have been present in the waste oil that may have been used on station roads. See also comment response to comment S2-75 above.

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Response to Comment S2-77(RS_101805_21)

DTSC RESPONSE: PG&E shall expand Table 3-2 and revised with available information. PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: The table has been revised to indicate that laboratory test solutions were discharged into the septic tank and were not treated. The text has also been clarified.

S2-77

TABLE 3-2
Waste Generation and Management
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Process/Operation	Products Used	Waste Generated	Approximate Time Period	Treated On Site?	Disposition
Miscellaneous operations	Laboratory test solutions	Scrap metal	1951 to present	NA	Transported off site for recycling
		Domestic garbage	1951 to present	NA	Needles Landfill
		Laboratory test solutions	1951 to present	Yes [d]	Leach field
		Domestic sewage	1951 to present	Yes [d]	Leach field

Notes:
Some disposal to Bat Cave Wash may have occurred between May 1970 and September 1971 when injection well PGE-08 was offline for maintenance or repairs.
[b] Some disposal to Pond 1 occurred during the September 1971 to August 1973 time period when injection well PGE-08 was offline for maintenance or repairs.
[c] The first batch of chromium-bearing sludge may have been disposed of on site.
[d] Treated via a septic tank.
NA = not applicable.

See "Laboratory test solutions," 1951 to present, "treated" in septic tank?
Clarification needed.

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S2-78

TABLE 3-12
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Date	Event
August 14, 1969	RWQCB adopts Resolution 69-25 requiring PG&E to cease discharging industrial wastewater containing hexavalent chromium by infiltration to Bat Cave Wash.
November 6, 1970	PG&E submits a Report of Waste Discharge to the RWQCB for disposal of industrial wastewater from cooling tower operations into single-lined evaporation pond #1.
December 10, 1970	RWQCB adopts Resolution 70-72 regulating the discharge of treated wastewater into single-lined evaporation pond #1.
December 10, 1970	RWQCB adopts Resolution No. 70-73, regulati Please include Resolution 70-72 in the References , sludge at an approved offsite facility (Needles Dump).
September 11, 1975	RWQCB rescinds Resolution No. 70-72 and ad single- lined evaporation ponds (SWMU 10; Old Evapc RWQCB issued a revised Board Order No. 75-! requirement from 2 feet to 1 foot. Also, the Boa wastewater to the Colorado River or to any cha In addition, the Board Order specified that chemic culation or evaporation of process wastewater shall be discharged only at a solid waste disposal site approved to receive these wastes.
August 18, 1980	As required by RCRA, PG&E files a Notification of Hazardous Waste Activity Form with the USEPA for the two-step wastewater treatment system, which included the chromic hydroxide sludge drying beds.
November 17, 1980	PG&E submits a RCRA Part A application to the DTSC covering all hazardous waste management facilities at the compressor station (i.e., the former two-step wastewater treatment system and the four former single-lined evaporation ponds).
April 6, 1981	An Interim Status Document, which outlines the requirements for operation of the Topock Compressor Station as a RCRA hazardous waste facility (USEPA ID No. CAT080011729), is issued by the DTSC to PG&E.
June 9, 1981	PG&E files a Notification of Hazardous Waste Site with USEPA Region 9, pursuant to Section 103 (c) of CERCLA.
March 11, 1983	RWQCB adopts Order 83-29 that rescinds Order 69-25.
December 15, 1982	Pursuant to a request from DTSC, PG&E submits an Operation Plan for the hazardous waste facilities covered by the Interim Status Document.
May 8, 1985	USEPA Region 9 requests that PG&E prepare a Part B Permit Application for the waste treatment units at Topock Compressor Station. After a review of applicable regulations affecting the operation of the hazardous waste management facilities, PG&E submits a notice to the USEPA on September 6 of its intent to decommission and close these facilities (including the four old evaporation ponds).
October 2, 1985	The RWQCB adopts Board Order No. 85-99 for the four for Please include Board Order No. 85-99 in the References ponds, which superseded Board Order No. 75-52. Order No the chromate-based cooling tower water treatment process Phosphate-based inhibitors are in use today.
November 7, 1985	PG&E submits a Closure Plan (dated October 28, 1985) to I and RWQCB. This Closure Plan covered closure of all haza facilities at Topock identified in the Part A RCRA permit app wastewater treatment system (Phase 1 and 2 closure) and t evaporation ponds (Phase 3 Closure).

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Response to Comment S2-78(RS_101805_18)

DTSC RESPONSE: PG&E shall include all RWQCB Resolutions in Table 3-12 in the references.

PG&E RESPONSE: The four resolutions (70-72, 85-99, 88-30, and 98-050) have been included in the references.

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TABLE 3-12
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Date	Event
August 14, 1986	PG&E submits a revised Closure Plan for hazardous waste management facilities at Topock identified in the Part A RCRA permit application.
May 19, 1987	The RWQCB determines that PG&E Topock Compressor Station's old evaporation ponds were not subject to regulation under the California Toxic Pits Control Act.
June 26 and July 10, 1987	The Closure Plan (and subsequent revisions) for closure of the hazardous waste management facilities at Topock identified in the Part A RCRA permit application (the two-step wastewater treatment system and the four single-lined evaporation ponds) is approved by USEPA Region 9 (June 26) and DTSC (July 10).
July 7, 1987	DTSC, RWQCB, and USEPA approve the Closure Plan for the hazardous waste facilities (PG&E receives notification of approval on September 7, 1987).
August 1987	USEPA completes an RFA for the Topock Compressor Station. The RFA identified 13 SWMUs (Units 4.1 through 4.13) through records review, data evaluation, interviews, and a visual site inspection.
January 27, 1988	RWQCB rescinds Board Order No. 85-99 and adopts Board Order No. 88-30, which is revised on March 23, 1988. Revised Order No. 88-30 allows discharge to four Class II surface impoundments.
March 9, 1988	DTSC issued a Stipulation and Order on January 27, 1988 which set forth the agreement reached between DTSC and would trigger upgrading the groundwater monitoring syster evaporation ponds and settling the alleged monitoring defic
November, 1988	PG&E began closure activities of hazardous waste manag identified in the Part A RCRA permit application. Closure a two-step wastewater treatment system consisting of the ch precipitation tank, process pump tank, transfer sump, sludg piping were completed in 1990 (Phases 1 and 2). Closure of the four single-lined evaporation ponds could not proceed until new surface impoundments were constructed to replace the old evaporation ponds and the waste had dried sufficiently.
September, 1989	DTSC issues a Report of Violation. This report listed essentially the same groundwater monitoring violations settled by the Stipulation and Order issued March 9, 1988.
July 23, 1990	PG&E submits a Closure Certification Report for clean closure of the facilities in Phases 1 and 2 (the two-step wastewater treatment system) to DTSC, USEPA, and RWQCB.
February 25, 1991	DTSC issues a Corrective Action Order listing the same alleged violations as contained in the previous Report of Violations and the Stipulation and Order.
September to November 1993	PG&E conducts closure construction work at the four former single-lined evaporation ponds.
December 31, 1993	PG&E submits the *Closure Certification Report for the Old Evaporation Ponds* dated December 27, 1993 to DTSC and the RWQCB.
November to December 1994	In response to regulatory agency concerns, additional site excavation work at the four former single-lined evaporation ponds area is conducted.
May 11, 1995	The RWQCB approves the clean closure of the four former single-lined evaporative ponds.
June 26, 1995	The DTSC approves clean closure of the former two-step wastewater treatment system and the four former single-lined evaporation ponds (the former hazardous waste management facilities) and considers these waste management units clean closed.

Please Include Board Order No. 88-30 in the References

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S2-78

TABLE 3-12
Chronology of Major Regulatory Agency Directives and RCRA Corrective Action Activities
RCRA Facility Investigation, PG&E Topock Compressor Station, Needles, California

Date	Event
August 3, 1995	DTSC submits a letter to PG&E requesting that a Corrective Action Program be conducted at the site.
February 26,1996	PG&E and the DTSC enter into a CACA, whereby PG&E agreed to address past waste discharges at the Bat Cave Wash project site and to conduct an RFI and implement corrective action, if warranted. The CACA identifies 10 SWMUs (SWMU 1 through SWMU 10) and three AOCs (AOC 1 through AOC 3) at the Topock Compressor Station. Eight of the SWMUs identified in the CACA were also identified as SWMUs in the RFA. However, four SWMUs identified in the RFA were not included in the CACA; the CACA combined two of the RFA SWMUs into one SWMU; and the CACA listed two additional SWMUs and three additional AOCs that were not identified in the RFA.
July 2, 1996	DTSC acknowledges the receipt of the Current Conditions Report, RFI work plan, Health and Safety Plan, and Public Involvement Plan.
December 19, 1996	DTSC approves the RFI work plan, Current Conditions Report, and the Health and Safety Plan.
January 12, 1998	PG&E receives, from DTSC, the RFA prepared by A.T. Kearney (August 1987).
February 19, 1998	DTSC approves the RFI work plan amendment per comments given in a February 11, 1996 DTSC memorandum prepared by the Geological Support Unit of DTSC.
May 14, 1998	RWQCB rescinds Order No. 88-30 and adopts Order No. 98-050 regulating the Class II ponds. The Class II ponds are currently regulated ui
April 17, 2000	PG&E submits the Draft RFI Report to DTSC.
October 12, 2000	PG&E submits a work plan for additional soils samp es 10 potentially-impacted areas associated with the T ired investigation. The areas were identified through a re interviews with knowledgeable employees, a review eld reconnaissance within and around the compressor
January 4, 2001	DTSC issues a letter to PG&E indicating that the 1(d in PG&E's October 12, 2000 work plan are considered AOCs under the RCRA corrective action process.
December 2002	PG&E submits the Draft Corrective Measures Study Work Plan.
June 24, 2003	DTSC approves the Draft Corrective Measure Study Work Plan.
August 11, 2003	DTSC is established as the lead agency for the Topock project at a meeting of the Cal/USEPA Site Designation Committee.
August 2003	DTSC requests that PG&E install a pilot groundwater extraction and treatment system and that the CWG, with representatives from regional, state, and federal agencies, be rechartered.
January 22, 2004	DTSC directs PG&E to prepare immediately an Interim Measures Work Plan to mitigate Cr(VI) detected in monitoring wells near the Colorado River and monitor six monitoring wells along the river floodplain weekly.
February 2004	PG&E submits revised Draft RFI Report to DTSC.
February 9, 2004	DTSC directs PG&E to begin pumping, transport and disposal of groundwater from existing monitoring wells at the MW-20 cluster and monthly surface water sampling at six locations (Interim Measure No. 2).

Please include Order No. 98-050 in the References

S2-78

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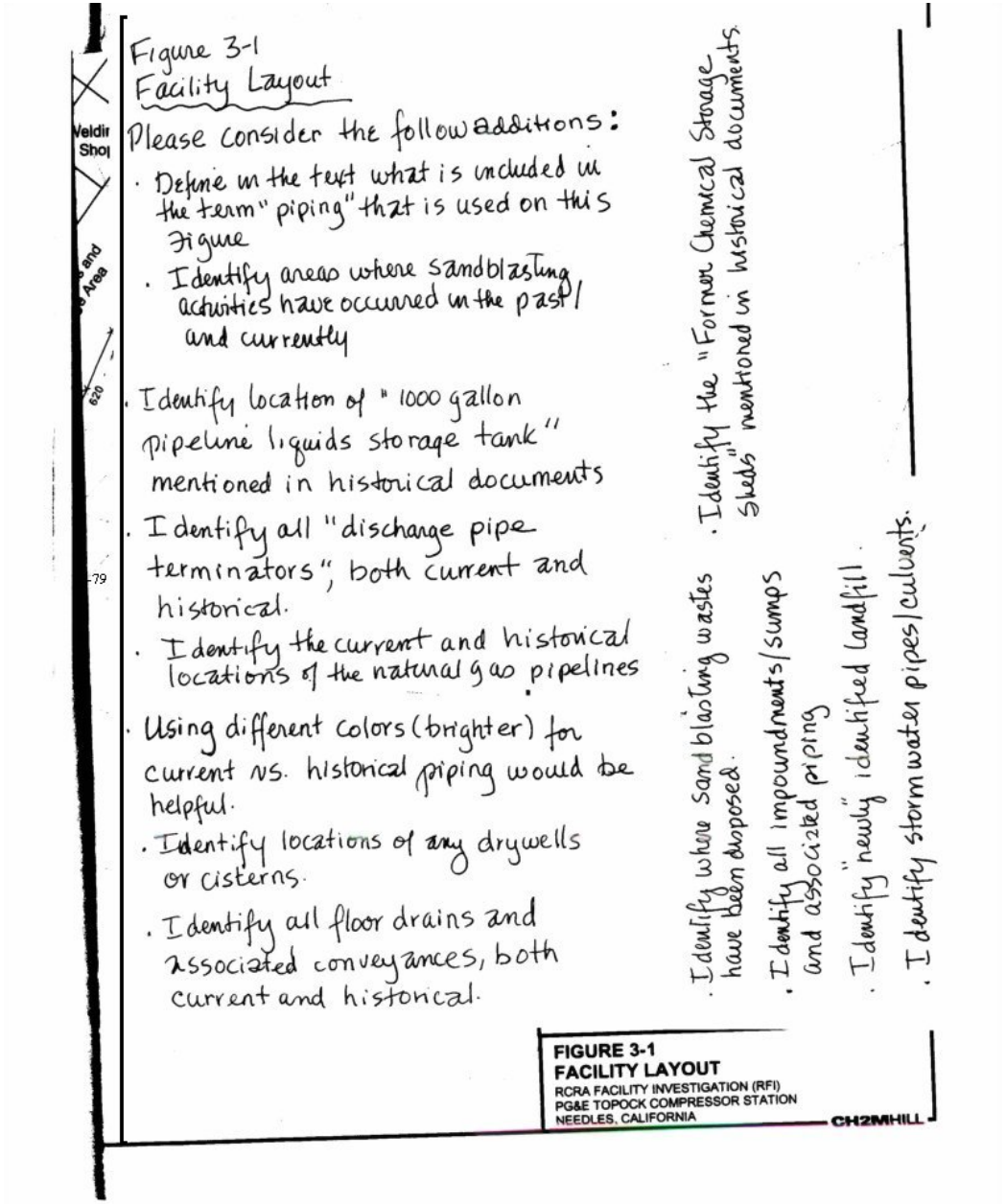

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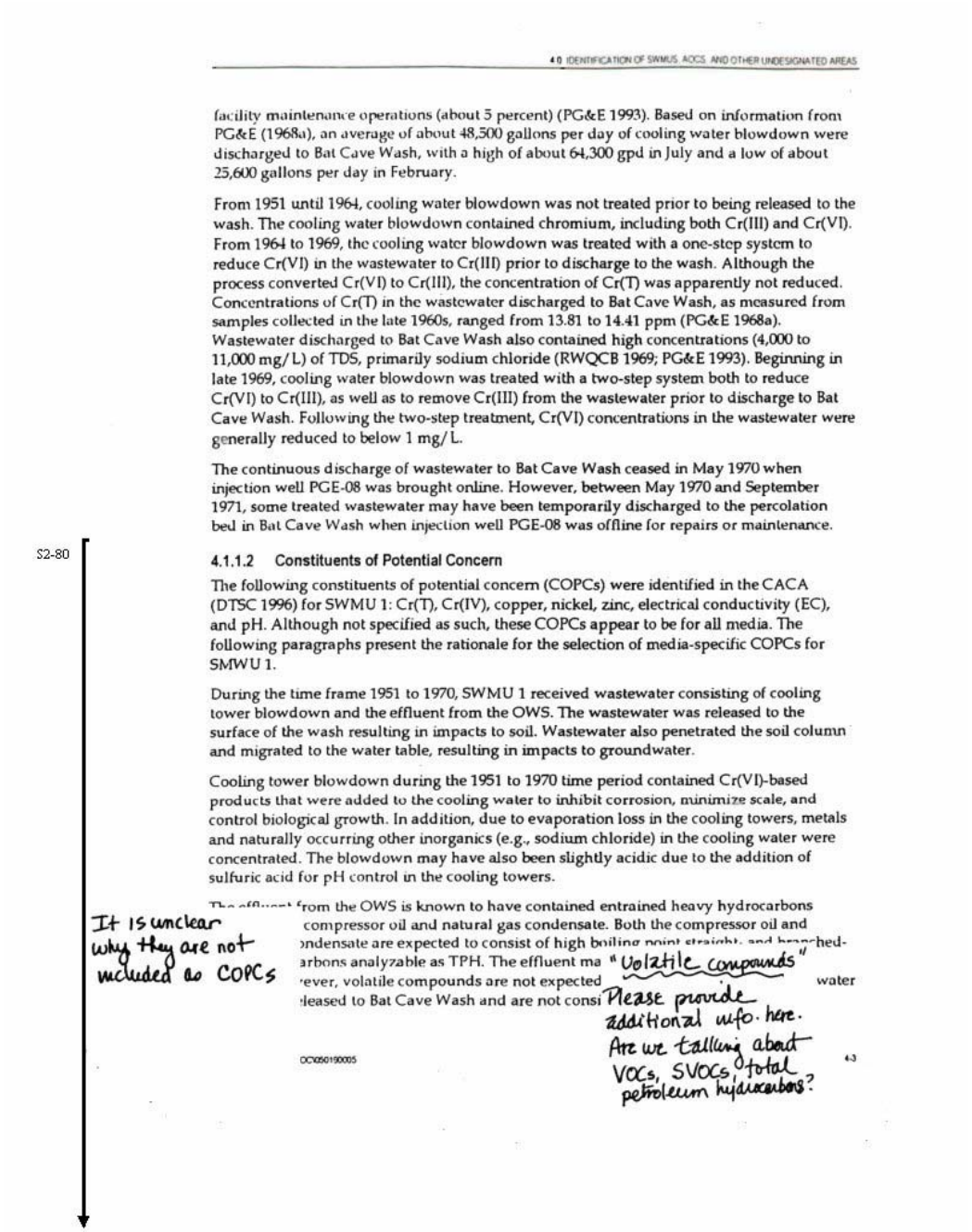
Response to Comment S2-79(RS_101805_22)

DTSC RESPONSE: PG&E shall add additional available information to Figure 3-1 as available. PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: No changes have been made to Figure 3-1. The only known information regarding sandblasting activities is at the Sandblast Shelter. No information is available regarding sandblast waste disposal. The Pipeline Liquids Tank can not be called out in Figure 3-1 because it is located along the northeast edge of the site (significantly east of the area covered by this figure). The tank has been called out in Figure 4-1.

PG&E is unable to identify discharge pipe terminators because the information is not available. A schematic of the wastewater treatment system piping is provided in Figure 4-2. No cisterns or dry wells were identified. As discussed earlier, floor drains have not been added to this figure because they are generally known to discharge to the oily water treatment system. The former chemical storage sheds are located within AOCs 5, 6, and 19 (see Figure 4-1). All sumps are shown on Figure 3-1, impoundments at the site are limited to the Old Evaporation Ponds (SWMU 10), and the new Class II Evaporation Ponds (both sets of ponds are outside of the area covered by this figure). SWMU 10 is shown in Figure 4-1. We are not familiar with any newly-identified landfill.



4.0 IDENTIFICATION OF SWMUS, AOCS, AND OTHER UNDESIGNATED AREAS

facility maintenance operations (about 5 percent) (PG&E 1993). Based on information from PG&E (1968a), an average of about 48,500 gallons per day of cooling water blowdown were discharged to Bat Cave Wash, with a high of about 64,300 gpd in July and a low of about 25,600 gallons per day in February.

From 1951 until 1964, cooling water blowdown was not treated prior to being released to the wash. The cooling water blowdown contained chromium, including both Cr(III) and Cr(VI). From 1964 to 1969, the cooling water blowdown was treated with a one-step system to reduce Cr(VI) in the wastewater to Cr(III) prior to discharge to the wash. Although the process converted Cr(VI) to Cr(III), the concentration of Cr(T) was apparently not reduced. Concentrations of Cr(T) in the wastewater discharged to Bat Cave Wash, as measured from samples collected in the late 1960s, ranged from 13.81 to 14.41 ppm (PG&E 1968a). Wastewater discharged to Bat Cave Wash also contained high concentrations (4,000 to 11,000 mg/L) of TDS, primarily sodium chloride (RWQCB 1969; PG&E 1993). Beginning in late 1969, cooling water blowdown was treated with a two-step system both to reduce Cr(VI) to Cr(III), as well as to remove Cr(III) from the wastewater prior to discharge to Bat Cave Wash. Following the two-step treatment, Cr(VI) concentrations in the wastewater were generally reduced to below 1 mg/L.

The continuous discharge of wastewater to Bat Cave Wash ceased in May 1970 when injection well PGE-08 was brought online. However, between May 1970 and September 1971, some treated wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance.

S2-80

4.1.1.2 Constituents of Potential Concern

The following constituents of potential concern (COPCs) were identified in the CACA (DTSC 1996) for SWMU 1: Cr(T), Cr(IV), copper, nickel, zinc, electrical conductivity (EC), and pH. Although not specified as such, these COPCs appear to be for all media. The following paragraphs present the rationale for the selection of media-specific COPCs for SMWU 1.

During the time frame 1951 to 1970, SWMU 1 received wastewater consisting of cooling tower blowdown and the effluent from the OWS. The wastewater was released to the surface of the wash resulting in impacts to soil. Wastewater also penetrated the soil column and migrated to the water table, resulting in impacts to groundwater.

Cooling tower blowdown during the 1951 to 1970 time period contained Cr(VI)-based products that were added to the cooling water to inhibit corrosion, minimize scale, and control biological growth. In addition, due to evaporation loss in the cooling towers, metals and naturally occurring other inorganics (e.g., sodium chloride) in the cooling water were concentrated. The blowdown may have also been slightly acidic due to the addition of sulfuric acid for pH control in the cooling towers.

The effluent from the OWS is known to have contained entrained heavy hydrocarbons compressor oil and natural gas condensate. Both the compressor oil and ondensate are expected to consist of high boiling point straight- and branched-arbons analyzable as TPH. The effluent ma "volatile compounds" water ever, volatile compounds are not expected released to Bat Cave Wash and are not consi

It is unclear why they are not included as COPCs

Please provide additional info. here. Are we talking about VOCs, SVOCs, total petroleum hydrocarbons?

OCX050190005

4-3

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Response to Comment S2-80(RS_101805_30)

DTSC RESPONSE: PG&E shall provide additional information on COPCs associated with the oil/water separator as requested.

PG&E RESPONSE: There are no records of any significant solvent (steam cleaning was used for large equipment, solvent use was incidental). Furthermore, solvents (VOCs) are not included as COPC because they would have volatilized immediately due to high temperatures and would not be present in the subsurface after so many years. However, TPH and PAHs may be present at low concentrations. The text in Section 4.0 has been revised to include these COPCs, where applicable.

Samples were tested for VOCs, PCBs, and Title 22 metals. The text was revised to reflect this information.

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S2-80

In 1985 and 1986, samples were collected from facility makeup water, cooling water blowdown, treated wastewater (including both cooling water blowdown and oily water), ...e precipitation tank, and water and solids samples from the ...own and Caldwell 1985a-b, 1986). Based on these data, metals of ..., Cr(VI), copper, lead, nickel, and zinc.

Were these samples also tested for VOCs, PCBs and mercury?

..., COPCs for soil with SWMU 1 consist of Cr(T), Cr(VI), copper, lead, ...H. COPCs for groundwater associated with SWMU 1 consist of ...ead, nickel, zinc, EC, pH, and TPH.

...active Injection Well (PGE-08)

Inactive injection well PGE-08 is located within the facility fenceline in the lower yard on the western side of the compressor station (Figure 4-1).

4.1.2.1 Description and History

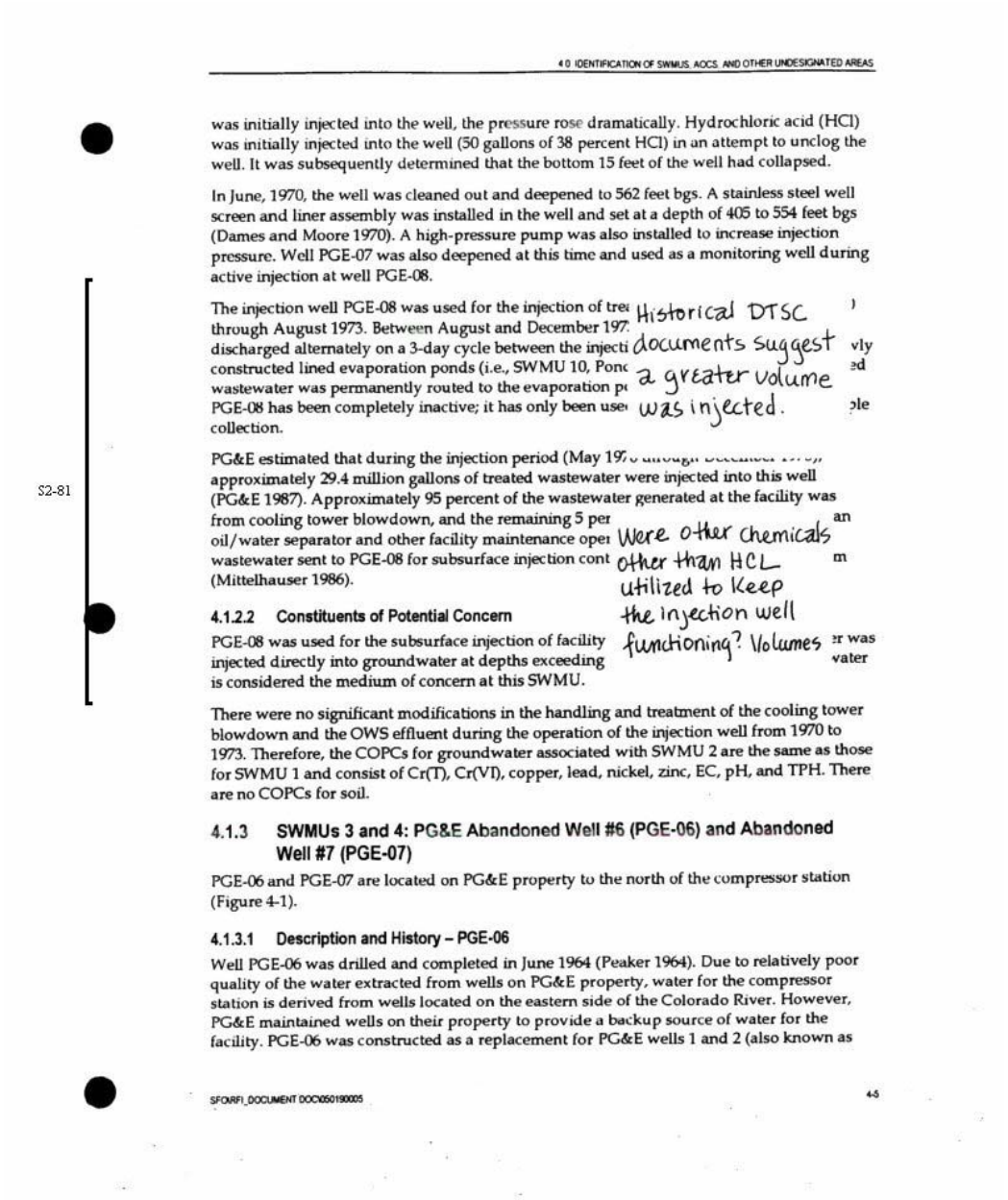
Inactive injection well PGE-08 was installed in 1969 to facilitate underground injection of treated wastewater generated during facility operations. The original boring for the well extended to approximately 530 feet bgs (Dames and Moore 1969).[10] Unconsolidated sediments were encountered in the boring to a depth of about 175 feet bgs, and below 175 feet, the boring penetrated hard, fractured crystalline bedrock (Dames and Moore 1969). The original well was cased with 6-inch-diameter solid steel casing to a depth of 405 feet bgs, with the remainder of the borehole in the fractured bedrock being left uncased. Yield tests on the well provided short-term flow rates ranging from 20 to 51 gpm, and a long-term flow rate of about 26 gpm, with a calculated transmissivity of 10,000 gallons per day per foot (gpd/ft) (Dames and Moore 1969). This is equivalent to a hydraulic conductivity of 3.8×10^{-3} centimeters per second (cm/sec) using the open hole length of 125 feet (E&E 2004).

During drilling of the borehole, water level measurements were consistently around 138 feet bgs, indicating that the fractured bedrock network was thorough and that there were no isolated, confined water-bearing zones (Dames and Moore 1969). Water quality data collected following completion of the well indicated that a distinct stratification was present at about 280 feet bgs (Dames and Moore 1969). Above 280 feet bgs, brackish water was present with TDS values ranging from 3,500 to 8,900 ppm. Below 280 feet bgs, water was saline, with TDS values ranging from 11,000 to 14,000 ppm.

Following testing, 2-7/8-inch-diameter tubing was placed inside the well casing and anchored to the bottom of the casing with a packer (Dames and Moore 1969). The annulus between the casing and the tubing was to be filled with a non-corrosive fluid (diesel fuel was suggested, but it is unknown what, if any, fluid was actually used) (Dames and Moore 1969). The design allowed for the injection of wastewater into the lower section of the well through the tubing.

PGE-08 remained unused for approximately one year after it was completed. On or about April 1, 1970, freshwater was injected into the well for testing purposes. Injection of treated wastewater began on May 30, 1970 (Dames and Moore 1970). Several days after wastewater

[10] The Dames and Moore report (1969) lists the total depth of the boring in various places at 530, 540, and 548 feet bgs. The electric log included in the report lists a driller's report of 530 feet, but a logged depth of 525 feet bgs.



was initially injected into the well, the pressure rose dramatically. Hydrochloric acid (HCl) was initially injected into the well (50 gallons of 38 percent HCl) in an attempt to unclog the well. It was subsequently determined that the bottom 15 feet of the well had collapsed.

In June, 1970, the well was cleaned out and deepened to 562 feet bgs. A stainless steel well screen and liner assembly was installed in the well and set at a depth of 405 to 554 feet bgs (Dames and Moore 1970). A high-pressure pump was also installed to increase injection pressure. Well PGE-07 was also deepened at this time and used as a monitoring well during active injection at well PGE-08.

The injection well PGE-08 was used for the injection of trea
through August 1973. Between August and December 197
discharged alternately on a 3-day cycle between the injecti
constructed lined evaporation ponds (i.e., SWMU 10, Ponc
wastewater was permanently routed to the evaporation pc
PGE-08 has been completely inactive; it has only been use
collection.

Historical DTSC documents suggest a greater volume was injected.

S2-81

PG&E estimated that during the injection period (May 197
approximately 29.4 million gallons of treated wastewater were injected into this well (PG&E 1987). Approximately 95 percent of the wastewater generated at the facility was from cooling tower blowdown, and the remaining 5 per
oil/water separator and other facility maintenance oper
wastewater sent to PGE-08 for subsurface injection cont
(Mittelhauser 1986).

Were other chemicals other than HCL utilized to keep the injection well functioning? Volumes

4.1.2.2 Constituents of Potential Concern

PGE-08 was used for the subsurface injection of facility
injected directly into groundwater at depths exceeding
is considered the medium of concern at this SWMU.

There were no significant modifications in the handling and treatment of the cooling tower blowdown and the OWS effluent during the operation of the injection well from 1970 to 1973. Therefore, the COPCs for groundwater associated with SWMU 2 are the same as those for SWMU 1 and consist of Cr(T), Cr(VI), copper, lead, nickel, zinc, EC, pH, and TPH. There are no COPCs for soil.

4.1.3 SWMUs 3 and 4: PG&E Abandoned Well #6 (PGE-06) and Abandoned Well #7 (PGE-07)

PGE-06 and PGE-07 are located on PG&E property to the north of the compressor station (Figure 4-1).

4.1.3.1 Description and History – PGE-06

Well PGE-06 was drilled and completed in June 1964 (Peaker 1964). Due to relatively poor quality of the water extracted from wells on PG&E property, water for the compressor station is derived from wells located on the eastern side of the Colorado River. However, PG&E maintained wells on their property to provide a backup source of water for the facility. PGE-06 was constructed as a replacement for PG&E wells 1 and 2 (also known as

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Response to Comment S2-81(RS_101805_31)

DTSC RESPONSE: PG&E shall clarify the estimated volume of wastewater discharged to PGE-08. Different sources appear to indicate different volumes; therefore, it may be necessary to provide an estimated range.

Comment Noted. PG&E is not required to address this comment at this time. A discussion of the chemicals used in association with the injection well are discussed in Section 3.1.4.1.

PG&E RESPONSE: The volume of wastewater injected has been clarified (Section 4.1.2), and new information regarding a possible one-time treatment of the well with sulfuric acid has been added.

4.1.4 SWMU 5 – Sludge Drying Beds

The former sludge drying beds were located within the facility fenceline in the southern part of the lower yard (Figures 4-1 and 4-2

Clarification needed:
Are the "sludge drying beds" the same as the "waste piles" that are mentioned in historical regulatory documents.

4.1.4.1 Description and History

S2-82

The sludge drying beds were constructed station. The two sludge drying beds were bed was approximately 20 feet wide by 50 the upper end at grade level and the lowe floors of both beds were constructed of 8-i to the Transfer Sump (SWMU 9) to facilita

The drying beds were used from 1951 unti by a water conditioning process used at th photographs from the mid-1950s, the dryi also present just south of the sludge dryin similar are present in those photographs a Section 4.3.1) and what is now called the D that some of the dehydrated lime sludge n the 1951 to 1962 time frame.

From 1964 through 1969, a treatment pond constructed within one of the beds was used to treat chromium-bearing wastewater (PG&E 1968a). Wastewater was allowed to flow through the pond and was injected with sulfur dioxide to reduce Cr(VI) to Cr(III) prior to discharge.

From 1969 through October 1985, the drying beds were used to dehydrate chromic hydroxide sludge generated by the two-step wastewater treatment system (SWMUs 6 through 9) prior to disposal. The chromate hydroxide sludge discharged into the drying beds was found to contain 37,500 mg/kg Cr(T) and 4 mg/kg Cr(VI) (Mittelhauser 1986). The volume of chromic hydroxide sludge disposed of offsite was about 15,000 gallons per year (PG&E 1984b).

A 1970 letter (PG&E 1970) indicates that PG&E was planning on burying the initial batch of sludge on or near the compressor station; however, there is no documentation to confirm whether this occurred. RWQCB Order 70-73 was issued on December 10, 1970 (RWQCB 1970), and it appears that the chromium hydroxide sludge was disposed of at Needles Landfill from that time until 1983. Disposal of the chromium sludge at Needles Landfill was discontinued by 1984. From January 1984 to May 1985, the dried sludge was transported off site to an approved Class I hazardous waste facility (PG&E 1984b).

Use of both sludge drying beds ceased in October 1985. Closure of the drying beds was initiated in December 1988, and most of the beds were removed by February 1989 (Mittelhauser 1990a). In 1995, DTSC issued a closure certification acceptance letter for this unit (DTSC 1995). Additional details on the closure of the sludge drying beds is presented in Section 6.0.

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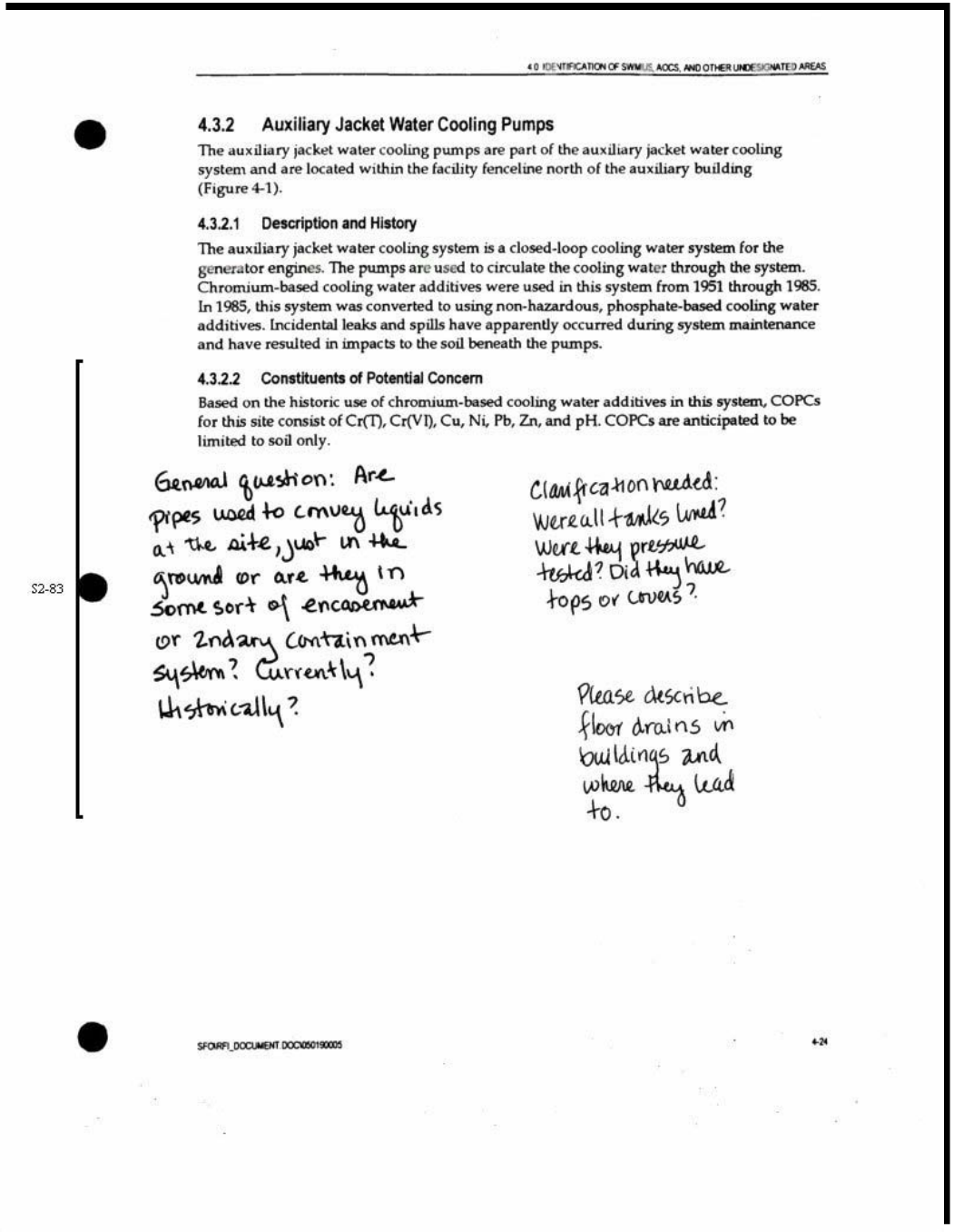
Response to Comment S2-82(RS_101805_32)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. Since no citation for where the term "waste piles" is used. PG&E is not able to make an assessment whether the terms refer to the same or separate features.

PG&E RESPONSE: No response required.



4.3.2 Auxiliary Jacket Water Cooling Pumps

The auxiliary jacket water cooling pumps are part of the auxiliary jacket water cooling system and are located within the facility fenceline north of the auxiliary building (Figure 4-1).

4.3.2.1 Description and History

The auxiliary jacket water cooling system is a closed-loop cooling water system for the generator engines. The pumps are used to circulate the cooling water through the system. Chromium-based cooling water additives were used in this system from 1951 through 1985. In 1985, this system was converted to using non-hazardous, phosphate-based cooling water additives. Incidental leaks and spills have apparently occurred during system maintenance and have resulted in impacts to the soil beneath the pumps.

4.3.2.2 Constituents of Potential Concern

Based on the historic use of chromium-based cooling water additives in this system, COPCs for this site consist of Cr(T), Cr(VI), Cu, Ni, Pb, Zn, and pH. COPCs are anticipated to be limited to soil only.

General question: Are pipes used to convey liquids at the site, just in the ground or are they in some sort of encasement or 2ndary containment system? Currently? Historically?

Clarification needed: Were all tanks lined? Were they pressure tested? Did they have tops or covers?

S2-83

Please describe floor drains in buildings and where they lead to.

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Response to Comment S2-83(RS_101805_33)

DTSC RESPONSE: PG&E has already performed a significant historical information search and have compiled sufficient chemical usage and waste disposal information to support the identification of potentially affected areas and contaminants of concern, and the development of conceptual site models. However, PG&E shall make a reasonable attempt to obtain the additional requested information. See also the response to Comment S2-1.

PG&E RESPONSE: Pipelines at the site typically do not have secondary containment. It is unknown whether the tanks were lined. No changes have been made to the text in response to these two comments. As noted earlier, floor drains within the compressor building are known to generally discharge to the oily water treatment system. This information was included in the text in Section 3.0.

S2-84

6.0 SWMUs Closed Prior to the RFI

The closed Swmu's (prior to RFI/RI) need to be re-evaluated based on current guidance and regulatory requirements to ensure that the closed units meet current regular standards for both state and federal requirements.

ıe clean closure of six former hazardous waste
ge Drying Beds (SWMU 5), Chromate Reduction
7), Process Pump Tank (SWMU 8), Transfer
onds (SWMU 10). PG&E has also completed
stem that consisted of the oil/water holding
ortable waste oil storage tank (Unit 4.5). Details
ovided below.

Management Facilities

cilities at the compressor station consisted of
ıe old evaporation ponds, and the
ities was performed in three phases (Phases 1
vember 1993 in general accordance with the
ent Facilities at the Topock Compressor Station
(Mittelhauser 1986), which was reviewed and approved by DTSC (Mittelhauser 1990a; Trident 1993).

Complete details on the closure of these facilities are presented the documents entitled *Phases 1 and 2 Closure Certification Report, Hazardous Waste Management Facilities* (Mittelhauser 1990a), *Closure Certification Report for the Wastewater Evaporation Ponds* (Trident 1993), and *Closure Certification Report Addendum for the Wastewater Evaporation Ponds* (Trident 1995). These reports include a complete description of all closure activities and contain all data from disposal characterization sampling, disposal manifesting information, and ultimate disposal locations. A closure certification acceptance letter that included all six former hazardous waste management facilities was issued by DTSC on June 26, 1995 (DTSC 1995). The RWQCB also issued a closure acceptance letter for the old evaporation ponds (SWMU 10) on May 11, 1995 (RWQCB 1995).

A summary of the closure activities for these facilities is provided below. This section presents data only for the final confirmatory samples (i.e., representative of final site conditions). Material that was determined to be hazardous waste was transported off site for disposal at the Chemical Waste Management, Inc. Class I Landfill in Kettleman, California. Material that was determined to be non-hazardous was either disposed of off site at a San Bernardino County Class III Landfill (near Barstow), or was used at the facility as fill material.

6.1.1 SWMU 5 (Units 4.12 and 4.13) – Sludge Drying Beds

The two sludge drying beds were formerly located directly adjacent to one another in the southern part of the lower yard (Figure 6-1). Each bed was approximately 20 feet wide by 50 feet long, and the walls and floors of both beds were constructed of 8-inch-thick concrete.

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Page 81

Response to Comment S2-84(RS_110105_72)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. SWMUs that were previously closed were closed in accordance with Work Plans that were reviewed and approved by DTSC and/or the RWQCB. In addition, DTSC and /or the RWQCB reviewed and approved the post-closure reports for these sites and issued letters of approval. As indicated in the cover letter to these comments, DTSC has identified certain closed SWMUs that will be further investigated under the RFI/RI Soil Data Gaps Workplan.

PG&E RESPONSE: No response required.

S2-85

7.0 SWMUs and AOCs Eligible for Closure Without Further Investigation

The SWMUs & AOCs that are suggested for closure without further investigation may require assurances that the past investigations and conclusions met the current federal / state requirements under CERCLA / RCRA.

Based on l ...ure
without fu ...als
were disp ...sure
without fu ...nale
for the clo

7.1 Sl

SWMU 3 ... s of
the area a ...illed
and comp ...or
station. B ...ised
to supply
disposed
groundwater within the wells are related to discharges of wastewater to Bat Cave Wash and do not reflect the disposal of wastes into the wells.

Wells PGE-06 and PGE-07 will continue to be sampled as part of ongoing investigation activities. However, these wells should not continue to be designated as SWMUs and should be closed. Similarly, AOC 3 should also be closed.

7.2 Unit 4.6

Unit 4.6 consists of the waste oil storage tank that is located within the oil and fuel storage area on the eastern side of the facility. The tank is still in active service. The tank is an AST that is routinely visually inspected. In addition, the tank is situated on top of a concrete pad that is bermed on all sides to form secondary containment for the area. The tank and secondary containment were installed in 1951, and no known releases have occurred from this tank.

The waste oil storage tank was modified in 1995 to reduce its capacity from 7,500 gallons to 5,000 gallons. Because the capacity has been reduced to 5,000 gallons, this tank is no longer classified as a RCRA storage facility.

Because there have been no known releases associated with this tank, and the tank is no longer classified as a RCRA storage facility, this SWMU is recommended for closure.

Letter - S2 : Document Id - TOPOCK-MWD_00001

Page 82

Response to Comment S2-85(RS_110105_74)

DTSC RESPONSE: Comment Noted. PG&E is not required to address this comment at this time. SWMUs that were previously closed were closed in accordance with Work Plans that were reviewed and approved by DTSC and/or the RWQCB. In addition, DTSC and /or the RWQCB reviewed and approved the post-closure reports for these sites and issued letters of approval. As indicated in the cover letter to these comments, DTSC has identified certain closed SWMUs that will be further investigated under the RFI/RI Soil Data Gaps Workplan.

PG&E RESPONSE: No response required.

COMMENTER: Department of Toxic Substances Control

S4-37 37. Page 3-1, Section 3.1. Include a separate subsection that discusses the mercury pressure switches and mercury-containing gas flow meters that were historically used by the facility. The discussion should address the locations where the devices were used, any historical releases associated with the devices, historical disposal practices for the devices, and the mercury closure process. Currently portions of this discussion are buried in Section 3.1.7.1 (October 1995 Mercury Release).

DTSC RESPONSE: The use of mercury-containing devices supported several operations; therefore, a discussion of these devices was provided under "Miscellaneous Operations". PG&E shall revise and expand Section 3.1.5 (Miscellaneous Operations) to provide the requested information on mercury-containing devices.

PG&E RESPONSE: A new section, Section 3.1.7 has been added to the text to discuss mercury-related equipment that was used at the facility.

COMMENTER: Department of Toxic Substances Control

S4-38 38. Page 3-1, Section 3.1. Include a section that discusses lead-containing devices or products that were historically used by the facility.

DTSC RESPONSE: Because the use of these devices is not an operation by itself, it should not be listed separately in Section 3.1. Lead-acid batteries were the only lead containing devices identified at the compressor station. PG&E shall revise Section 3.1.5 to provide a more detailed discussion of battery use and disposal.

PG&E RESPONSE: Section 3.1 discusses facility operations. Lead-acid batteries were the only lead-containing devices identified at the compressor station. Battery use and disposal is discussed in Section 3.1.5. The only other potential source of lead at the facility was associated with sandblasting operations. The limited available information on sandblasting has been incorporated into Section 3.1.5.

COMMENTER: Department of Toxic Substances Control

S4-39 39. Page 3-2, Section 3.1.1.1. As appropriate, please cross reference the well numbers cited in this section with the well numbers used in the PG&E Groundwater Background Study. For example, are Topock wells No. 2a and No. 3 the same as wells Topock-2 and Topock-3 from the Groundwater Background Study?

DTSC RESPONSE: PG&E shall cross-reference the wells between the RFI/RI Report and the Background Study as requested.

PG&E RESPONSE: Cross-referencing of the wells between the RFI/RI Report and the Background Study will be presented in Volume 2 of the RFI. A footnote has been added to Section 3.1.1 to clarify that Topock Well No. 2a is a replacement for the original Topock Well No. 2, and that current studies refer to Topock Well No. 2a as Topock-2 and Topock Well No. 3 as Topock-3.

COMMENTER: Department of Toxic Substances Control

S4-40

40. Page 3-3, Section 3.1.1.2. The discussion of the disposal practices for lime sludge generated by the Permutit water conditioning process seems incomplete. The discussion should acknowledge that all disposal practices for this sludge are not known. For example, the white, chromium-containing material that appears in the Interstate 40 road cut above Bat Cave Wash could be lime sludge from the Permutit process. This material is not associated with any other identified solid waste management units (SWMUs) or areas of concern (AOCs).

DTSC RESPONSE: PG&E shall revise the discussion in Section 3.1.1.2 to acknowledge that all disposal practices for the lime sludge are not known.

PG&E RESPONSE: The discussion in Section 3.1.1.2 was revised to include additional information on lime softener sludge disposal obtained from former employees. The referenced location appears to be part of the Railroad Debris Site, and lime softener sludge is known to have been sprayed at the Railroad Debris Site for disposal. There is no other reported or known disposal location for the lime softener sludge. The RFI simply indicates that a portion of the sludge was likely disposed of at the Railroad Debris Site, thereby allowing for the possibility that other locations were also used.

COMMENTER: Department of Toxic Substances Control

S4-41

41. Page 3-7, Section 3.1.3.6. Is there a potential for water loss through the cooling tower foundation (e.g., concrete joints, unsealed concrete)? Please discuss the condition of the concrete foundations when the cooling towers were replaced. Was there evidence of leakage through the concrete?

DTSC RESPONSE: PG&E shall evaluate the potential for water loss through the cooling tower foundations and add these findings to Section 3.1.3.6.

PG&E RESPONSE: The new cooling towers are set into the lower concrete basins (hot basins) of the old cooling towers. These basins appear to be in excellent condition. There is no information to suggest that leakage occurred through the basins. However, any potential

leakage through the hot basins would be identified as part of the investigation of AOCs 5 and 6.

COMMENTER: Department of Toxic Substances Control

S4-42 42. Page 3-14, Section 3.1.4.4, second paragraph, first sentence. It seems too definitive to state that all discharges to Bat Cave Wash ceased in 1970 when the injection well came on line. The first paragraph on Page 3-15 states that wastewater may have been discharged to Bat Cave Wash between May 1970 and September 1971 when the injection well was off-line for repairs.

DTSC RESPONSE: PG&E shall revise the discussion in Section 3.1.4.4 to clarify that some discharge to Bat Cave Wash may have occurred after 1970.

PG&E RESPONSE: The discussion in Section 3.1.4.4 was revised to clarify that some discharge to Bat Cave Wash may have occurred after 1970. The sixth paragraph under Section 3.1.4.4 was revised to state that, from May 1970 to September 1971, some wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance.

COMMENTER: Department of Toxic Substances Control

S4-43 43. Page 3-20, Section 3.1.7. This section seems incomplete because the earliest release discussed in the RFI Report occurred in October 1995.

DTSC RESPONSE: PG&E shall make reasonable efforts to determine that there are no written records of releases that occurred prior to 1995. PG&E shall add additional clarification in the introduction to Section 3.1.7 that acknowledges that releases may have occurred prior to 1995, but that no available documentation was found for these potential releases.

PG&E RESPONSE: Specific documentation regarding spills that occurred prior to 1995 does not exist. A new subsection was added to the text, Section 3.1.8.1, to discuss available information regarding spills prior to 1995. This spill information is based on information that was gathered during employee interviews.

COMMENTER: Department of Toxic Substances Control

S4-44

44. Page 4-2, Section 4.1.1, first sentence. It seems too definitive to state that all discharges to Bat Cave Wash ceased in 1970 when the injection well came on line. The last paragraph of Section 4.1.1.1 states that wastewater may have been discharged to Bat Cave Wash between May 1970 and September 1971 when the injection well was off-line for repairs.

DTSC RESPONSE: PG&E shall revise the discussion in Section 4.1.1 to clarify that some discharge to Bat Cave Wash may have occurred after 1970.

PG&E RESPONSE: The sentence was revised to read "From 1951, when the compressor station first began operation, until 1970, when injection well PGE-08 went into operation, wastewater generated at the facility was discharged to Bat Cave Wash." The last paragraph in section 4.1.1.1 states that the "…**continuous** discharge ceased in 1970. However, between May 1970 and September 1971 (when Pond 1 of the Old Evaporation Ponds was completed), some treated wastewater may have been temporarily discharged to the percolation bed in Bat Cave Wash when injection well PGE-08 was offline for repairs or maintenance."

COMMENTER: Department of Toxic Substances Control

S4-45

45. Page 4-5, Section 4.1.2.2. The constituents of concern (COC) list for SWMU 2 (PGE-08, injection well) is incomplete because it does not reflect constituents contained in the wastewater from all facility processes. The list does not reflect waste streams from the oil/water separator or facility maintenance. The list does not include all metals of concern for the facility (e.g., molybdenum).

DTSC RESPONSE: PG&E shall determine if the groundwater COC list should include – parameters identified in wastewater streams from the facility oil/water separator and maintenance. PG&E shall determine if the list includes all metals of concern for the facility, including metals that may have been present in known or suspected cooling tower additives. PG&E shall provide additional explanation as to why various metals and wastewater stream constituents were not identified as COCs. In addition, PG&E shall summarize available wastewater effluent data that support the COCs identified for SWMU 2.

PG&E RESPONSE: The list includes groundwater COPCs identified from all wastewater streams at the facility. While TPH was treated (TPH samples by Brown and Caldwell showed 3 ppm TPH for effluent released from the oil/water separator) and diluted (the oil/water separator effluent comprised only 5 percent of the discharge to the injection well), TPH is identified as a COPC for groundwater at SWMU 2. Molybdenum was not identified as a COPC because there was no evidence to suggest that molybdenum was present in the cooling water additives prior to 1986 (the closed-loop cooling systems were converted to non-hazardous molybdate-based system when the cooling towers were converted to the non-hazardous phosphate-based system). In addition, samples of wastewater effluent from 1985 and 1986 did not contain elevated levels of molybdenum.

COMMENTER: Department of Toxic Substances Control

S4-46

46. Page 4-6, Section 4.1.3.1, second full paragraph. This paragraph describes the results of initial testing of well PGE-06 (in 1964) that indicated the presence of "chromates" at a concentration of 32.5 parts per million. Please provide further discussion of this analytical result.

DTSC RESPONSE: PG&E shall provide additional details (if available) on the reported chromate result for PGE-06. At a minimum, PG&E shall clarify why the chromate result is not directly comparable to hexavalent chromium results currently reported for site groundwater.

PG&E RESPONSE: No additional information regarding this result is available (the laboratory conducted a standard water analysis plus chromate). Chromate analysis measures the concentration of CrO_4, which is an indirect evaluation of the Cr(VI) concentration. The concentration is not directly comparable to current Cr(VI) analyses. There are no other chromate results for this time period other than those already included in the text. No additional information was uncovered during the additional file review conducted in response to this comment.

COMMENTER: Department of Toxic Substances Control

S4-47

47. Page 4-6, Section 4.1.3.2, last paragraph. Please refer the reader to the section of the RFI Report that describes the responses observed in well PGE-07 during injection in well PGE-08.

DTSC RESPONSE: PG&E shall present the testing of well PGE-08 and any response seen in PGE-07 in Volume 2 of the RFI/RI Report. PG&E shall add a footnote to this section that refers the reader to Volume 2 for additional information on this subject.

PG&E RESPONSE: The testing of well PGE-08 and the response seen in PGE-07 will be presented in Volume 2 of the RFI/RI Report. A footnote was added to Section 4.1.3.2 referring the reader to Volume 2 for additional information on this subject.

COMMENTER: Department of Toxic Substances Control

S4-48

48. Page 4-20, Section 4.2.7.1. The historical discussion of East Ravine should address the two ditches observed in the 1955 aerial historical photograph that, apparently, could have been used to convey facility wastewater to the ravine. These ditches are discussed in Table 3-12.

DTSC RESPONSE: PG&E shall revise the text in Section 4.2.7.1 to include a discussion of the two drainage channels that run from the compressor station into the East Ravine (as shown in the 1955 aerial photograph and discussed in Table 3-13). PG&E shall provide further clarification if these channels facilitate the drainage of surface water (i.e., Stormwater) from the facility or if there is evidence to suggest that these drainages were used to convey facility wastewater to the East Ravine.

PG&E RESPONSE: The text in Section 4.2.7.1 was revised to include a discussion of the two small erosion channels that run from the compressor station into the East Ravine (as shown in the 1955 aerial photograph and discussed in Table 3-13). The two erosion channels are not drainage ditches. There is no evidence to indicate that these drainages were used to convey facility wastewater to the East Ravine. There are no wastewater facilities near the erosion channels in the 1955 aerial photo. Table 3-12 (now Table 3-18) was corrected to reflect the nature of the two small channels.

COMMENTER: Department of Toxic Substances Control

S4-49

49. Page 4-21, Section 4.2.7.1. The Revised RFI Report should discuss the potential for water impounded in the ravine to move eastward via shallow subgrade flow, via groundwater flow, and through the culvert downstream of subarea L3. The Phase 2 Soil RFI Workplan should include contingencies for further investigation east of subarea L3. The COC list for the East Ravine seems incomplete if the wastewater from the facility was historically discharged to the ravine.

DTSC RESPONSE: PG&E shall evaluate the potential movement of surface water in the East Ravine and add to the text in Section 4.2.7.1 and other report sections, as appropriate. PG&E shall take this information into consideration during the design of future sampling efforts for this AOC. PG&E shall evaluate if facility wastewater (i.e., cooling water or oily wastewater) was historically discharged to the East Ravine.

PG&E RESPONSE: Information on the potential movement of surface water was added to the RFI. Further evaluation of potential water movement patterns will be included in the Soil Sampling Work Plan, as appropriate. Stormwater runoff was discharged to the East Ravine, but there does not appear to have been any deliberate discharge of facility wastewater to the East Ravine. Only incidental releases of wastewater to the East Ravine have been reported by former employees. This information is reflected in Sections 3 and 4 of RFI Volume 1.

Subsurface flow in the East Ravine will be discussed as part of the conceptual model in Volume 2 of the RFI/RI (Groundwater) using existing data and the site conceptual model. Evaluation of leaching to groundwater from SWMUs will be included in Volume 3 of the RFI/RI (Soil).

DOCUMENT REVIEW AND COMMENT RESOLUTION SHEET

Document Title	**PG&E Topock Compressor Station Draft RCRA Facility Investigation and Remedial Investigation Report**	**Document Date/Revision**	**February 2005**
Reviewer, Organization, and Phone Number	**Department of Interior: BLM, BOR, FWS, and USGS**	**Review Criteria**	**Full**
		Date Comments Due	**June 30, 2005**

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
VOLUME 1 - BACKGROUND				
1. General Comment	FWS	For all volumes (i.e., acres, square feet, etc.) discussed in the report provide a literature citation and ensure the citation is listed in the References section.	When units of measure presented in the report were derived from literature sources, those sources were referenced.	M
2. Acronyms	FWS	Include PRG, Preliminary Action Goals	The acronym for "Preliminary Remediation Goal" has been added to the acronyms list.	M
3. Page ES-3 Section ES.2	BOR	Third paragraph: Consider revising the following sentence, "The stage of the Colorado River varies both daily and seasonally in response to upstream dam discharges regulated **for resource management and electricity production,**" to read as "….upstream dam discharges regulated **to meet water and power delivery obligations**." The same comment applies to Page 2-18, Section 2.5.4.1, third paragraph.	The text in Section 2.5.3.1 has been changed as requested.	S
4. Page ES-4 Section ES.3	BLM	First full paragraph, "The four, Class II double-lined ponds are still in use…, Colorado River Region." Revise the above sentence to read, "The four, Class II double-lined ponds, *on BLM property*, are still in use…"	The text in Section 3.1.4.4 has been added as requested.	M

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
5. Page ES-4 Section ES.4	BLM	Why is the septic tank, associated with the lab site that has been in place since 1951, not identified as an SWMU? An AOC map and a SWMU map should be included in this section.	The septic tank and associated leach system have been added as an AOC (AOC 17). The text in the Executive Summary has been revised to reflect the changes in AOCs. The Executive Summary refers the reader to Figure 4-1; duplicating the SWMU/AOC figure is not necessary.	M
6. Page ES-8 Section ES.9.1	BLM	Second paragraph: "*SWMU1/AOC1 is located just outside the facility fence line; therefore, potential human receptors consist of industrial workers and recreational users for soil and recreational swimmers and anglers for sediment*." This sentence is unclear, revise as follows: "SWMU1/AOC1 is located just inside the facility fence line; therefore, potential human receptors include industrial workers and recreational users for soil pathways, and recreational swimmers and anglers for sediment pathways."	CSMs will be presented in RFI/RI Volumes 2 and 3. References to exposure pathways have been deleted from Volume 1.	S
7. Page ES-9 Section ES.9.1	BLM	First paragraph: "No TPH has been performed, additional investigation for the COPC in soil is recommended. No further action is recommended for the sediment media at SWMU 1/AOC 1." Without this information how can we decide if this will be or is an issue. Additional TPH sampling will be conducted and make that information available.	TPH has been added as a COPC for SWMU 1 and AOC 1. Samples from these units will be analyzed for TPH if TPH is present in soil at the compressor station, lower yard. The sampling plan will address the most appropriate strategy for evaluating TPH for this unit and other units where TPH may be a COPC. The sampling plan will also address the need for additional sampling for Bat Cave Wash.	M

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
8. Page ES-9 Section ES.9.3	BLM	ES.9.3 discusses the fact that "further investigation is not warranted." Buried asbestos is always an issue and should be addressed further.	There is very little soil cover within the Debris Ravine, and materials were disposed of onto the ground surface in this area; therefore, buried asbestos is unlikely. Asbestos present in the Debris Ravine is most likely mixed with other surface debris, which can be visually delineated. However, as discussed in Section 4.2.1.2, asbestos has been identified as COPC for this unit. The proposed approach for addressing potential contaminants in the Debris Ravine will be defined in the soil sampling work plan.	M
9. Page ES-11 Section ES.9.6	BLM	First sentence: "Although the source of the release is unknown, it is probably related to the incidental release of a small volume of Chromium bearing material." The report states it is unknown when the release occurred but then relates it to an incidental release. Explain in the text what details exist to make this relation (e.g., date, year, volume of release).	The release is identified as incidental because of the small area affected. Additional information has been obtained regarding the potential source of the chromium detected, and that information is described in Section 4.2.6.	M
10. Page ES-12 Section ES.9.8	BLM	First paragraph, second sentence: Modify the following statement, "…residential land use in this area is unlikely and ecological receptors are not expected to be present," to read instead: "…residential land use in this area is unlikely. Ecological receptors may also **be** present."	CSMs will be presented in RFI/RI Volumes 2 and 3. All references to exposure pathways have been deleted from Volume 1.	M
		SECTION 1.0		
11. Page 1-4 Section 1.2.1	BLM	Fourth paragraph: "*Due to space and treatment capacity limitations, and landowner lease arrangement (existing IM activities occur on property owned by the BLM...*" The closing paran is missing at the end of this sentence. Additionally, consider deleting the text "the landowner lease arrangement" from the sentence.	The section has been updated to reflect the current status of the interim measures at Topock.	M
12. Page 1-2 Section 1.1.2	BLM	First paragraph: add the United States Fish and Wildlife Service (USFWS) to the list of agencies in the last sentence of this paragraph. Delete the last paragraph.	The text was revised as requested.	M

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
13. Figure 1-2	BLM	The Refuge boundaries are incorrect on this figure. Correct the figure.	The boundaries on the figure have been corrected.	M
14. Page 1-5 Section 1.2.2	BOR	First paragraph: In response to the following statement, "Corrective measure alternatives for groundwater ***to be evaluated in the CMS will likely include*** monitored natural attenuation…" The Remedial Investigation/Feasibility Study (RI/FS), (40 CFR 300.430) characterizes the site and evaluates various alternatives for cleanup. The RI is the collection of sufficient, detailed information to characterize site conditions, the nature and extent of contamination, evaluate the risks posed by the site, assess the performance of options for remediation, and make an informed risk management decision. This RCRA Facility Investigation Report does not evaluate the risks posed by the site (it only details complete and incomplete exposure pathways to receptors), assess the performance of options for remediation, or make an informed risk management decision. The next draft should include discussions of these topics.	The text was revised as requested. Table 1-1 has been added that discusses the CERCLA requirements as they pertain to this document. Risk assessment requirements of CERCLA will be submitted separately from the RFI/RI.	
15. Page 1-6 Section 1.4.1	BLM	Use all acronyms or write them all out for members of the CWG. BLM = US DOI BLM BOR = US DOI BOR USFWS = US DOI FWS	Per prior discussions with DTSC and the federal agencies, details of the public participation program have been removed from the RFI/RI and the text instead refers the reader to DTSC's Public Participation Plan.	M

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
16. Page 1-8 Section 1.4.6	BLM	First paragraph: Revise the sentence "Additionally, government-to-government consultations were conducted…" to read as follows, "Additionally, government-to-government formal coordination and consultations were conducted…" Delete the name Torres-Martinez Desert Cahuilla from this same sentence. Modify the last sentence of this paragraph to read as follows, "…and participate in government-to-government information sharing as requested by the Lake Havasu Field Office of the BLM."	Per prior discussions with DTSC and the federal agencies, details of the public participation program have been removed from the RFI/RI and the text instead refers the reader to DTSC's Public Participation Plan.	M
		SECTION 2.0		
17. Section 2.0 General Comment	BLM	Because of the manner in which data are presented in this RFI, the reviewer must search for a table(s) and Appendices to validate any conclusion made in the RFI, and too often the data cannot easily be found. This re-occurring problem impedes the clarity of the RFI. This problem needs to be remedied in future versions of the RFI report. Additional inconsistencies relevant to this comment: According to Table 2-4, seven borings encountered the basal unit (Tsu) that include MW-20-130, MW-24B, MW-38D, MW-40D, TW-1, TW-2D, and TW-2S. - Appendix A4, Figure A4-2 presents well TW-2. It is unclear if this log is relevant to either well TW-2S or TW2D. - the resistivity and conductivity geophysical logs for MW-20-130 are so poor a footnote should be provided explaining their condition - Figure A4-4 presents a geophysical log for MW-38 and MW-40. It is unclear if this is actually well MW-38D and MW-40D.	Section 2.0 of Volume 1 has been streamlined to provide only a summary of the physical setting. Detailed discussion and data presentation regarding soil and groundwater conditions at the Topock Compressor Station will be provided in Volumes 2 (Groundwater) and 3 (Soil) of the RFI. Due to the volume of data being presented in the RFI report, summarizing the data into tables and placing more detailed information into appendices is and will be required to keep the document from becoming overly large and difficult to read. An attempt to make the copious data more readily accessible to the reviewer will be made in Volumes 2 and 3.	M

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
57. Page 2-22 Section 2.6	FWS	First full paragraph: The Havasu National Wildlife Refuge encompasses the Mohave and **La Paz** counties in Arizona, not Yuma county as provided in text. Revise the sentence to reflect the correct county. The acreage of the HNWR is 37,505. Provide the literature citation, and ensure the citation is listed in the References section.	The text in Section 2.6 has been revised as to correct the reference to La Paz county. The RFI/RI indicates that the refuge is 37,515 acres, as stated in the following reference: http://library.fws.gov/Refuges/havasu.pdf	M
58. Page 2-26 Section 2.8.2	FWS	Third paragraph, second sentence: Provide the following literature citation to support this sentence. (McLeod et al. 2005), McLeod, M.A., T.J. Koronkiewicz, B.T. Brown, and S.W. Carothers. 2005. Southwestern Willow Flycatcher surveys, demography, and ecology along the lower Colorado River and tributaries, 2004. Annual report submitted to U.S. Bureau of Reclamation, Boulder City, NV, by SWCA Environmental Consultants, Flagstaff, AZ. 155 pp.	The text in Section 2.8.2 has been revised as requested.	M
59. Page 2-27 Section 2.8.3	FWS	Fourth paragraph: Restate the sentence to read "*The listed threatened or endangered…include the endangered (federal) bonytail ~~chub~~…*" The bonytail chub if often referred to as the bonytail.	The text in Section 2.8.3 has been clarified to include threatened and endangered	M
		SECTION 3		
60. Page 3-18 Section 3.1.5.2	BLM	Last paragraph: "…the oil may have been sprayed on facility roads for dust control…" The need for sampling on the road should be addressed?	AOC 13 has been designated to address unpaved areas on the compressor station. TPH has been identified as COPC for AOC 13. The sampling program required to address unpaved areas on the compressor station will be described in the soil sampling work plan.	S
61. Page 3-19 Section 3.1.6	BLM	"Other sources of wastes at the compressor station consist of miscellaneous wastes, standard domestic…" Delete the word "standard" from the sentence.	The word "standard" has been deleted from Section 3.1.6.	S

Comment No./ Location	Agency	Comment	Comment Response	Type[a]
62. Page 3-20 Section 3.1.6	BLM	First paragraph: Please include when the lab was put into place on the PG&E facility. For example, "in 1951 PG&E included a lab site at this facility."	There is no direct information on when the laboratory was first put into service. However, the plant would have needed to test their cooling treatment processes from the start of operations, which suggests that that laboratory has been in use since the inception of the facility. The text was revised accordingly in Section 3.1.5.1.	M
63. Page 3-20 Section 3.1.7	BLM	How many prior to 1995…see Casey Padgett's comments.	Specific documentation regarding spills that occurred prior to 1995 does not exist. Section 3.1.8.1 was added to the text to discuss spills prior to 1995. The spill information is based on information that was gathered during employee interviews.	
64. Page 3-20 Section 3.1.7.2	BLM	Are there any documented/suspected releases prior to 1995?	Specific documentation regarding spills that occurred prior to 1995 does not exist. Section 3.1.8.1 was added to the text to discuss spills prior to 1995. The spill information is based on information that was gathered during employee interviews.	
65. Page 3-20 Section 3.1.7.2	BLM	Were the clean up of the incidental releases approved by the regulatory agencies? If yes, then the RFI should state this fact.	Information regarding regulatory approval of the various clean up actions has been added to Section 3. Information on all spill cleanup actions has been provided to the appropriate regulatory agencies.	M
66. Page 3-20 Section 3.1.7.2	BLM	Last paragraph: Were any confirmation samples collected from the clean up activities? If yes, then add a statement in the text regarding the confirmation samples.	A sentence has been added to Section 3.1.8.3 to state that confirmation samples were not collected for the June 1996 cooling tower water release.	M
67. Page 3-22 Section 3.1.7.4	BLM	Third paragraph: Was this approved by the RWQCB? If yes, then the RFI should state this fact.	Section 3.1.8.5 was revised to state that while the results of the cleanup of the December 2000 wastewater release were provided to the Water Board, no response was received from that agency.	M

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68. Page 3-25 Section 3.1.7.9	BLM	Fourth paragraph: Was another sample collected and analyzed for the correct TPH range? A statement should be added to the text stating whether or not another sample was/was not collected.	Section 3.1.8.10 was revised to state that no additional samples were collected and analyzed for TPH as motor oil for the March 2004 scrubber pipeline liquids release.	M
69. Table 3-5	BLM	It would be useful to provide the regulatory criteria on the table to which the results were compared to show that acceptable levels remain.	Regulatory criteria have been included in all the tables providing spill data in Section 3.	S
70. Table 3-6 and Table 3-8	BLM	Why are only the PRGs for Cr (T) and Cr (IV), Cu, Ni, and Pb listed and none of the others?	PRGs have been listed for all compounds in all the tables providing spill data in Section 3.	S
71. Table 3-7	BLM	It would be useful to list the regulatory criteria on the table.	The regulatory criteria were added to the table (which is now Table 3-8).	S
		SECTION 4		
72. Page 4-11 Section 4.1.9	BLM	Which old evaporation ponds are being referenced here, the unlined percolation beds or the unlined evaporation ponds? Both should be discussed here. Percolation beds were in place from 1951 to 1970.	SWMU 10 consists of the former single-lined evaporation ponds. The former unlined percolation bed in Bat Cave Wash has been designated as SWMU 1 and is discussed separately in Section 4.1.1. Because these are distinctly different units with different regulatory status and designations, discussing them together is not appropriate.	M
73. Page 4-16 Section 4.1.15.1	BLM	When will the extent of this area be defined? Is it to be included in the subsequent effort?	There is no history of releases to the area surrounding the former injection well; therefore, further assessment and delineation of this area is not warranted. DTSC has agreed that further investigation of this area is not required.	S
74. Page 4-17 Section 4.2.2.1	BLM	Former Chemical Shed: Were any confirmation samples collected from the excavation of the soil? The RFI should state whether or not samples were collected.	No confirmation samples were collected for Cooling Tower A; the text in Section 4.2.2.1 has been revised to indicate this. The area is, however, recommended for further sampling as part of AOC 5. Samples were collected for the former chemical shed at Cooling Tower B.	M

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		SECTION 5 – No Comments		
		SECTION 6		
75. Page 6-1 Section 6.1	USGS	Third paragraph, first sentence: Change "presented the" to "presented in the."	The text was revised.	E
76. Page 6-8 Section 6.1.7	USGS	Second paragraph: It appears the number "181,00" is typo error. Correct the typo to either 181,000 or 18,100, whichever is appropriate.	The correct value is 181,000 square feet; The number has been corrected in the text in Section 5.1.4.	E
77. Table 6-2	BLM	Sample CRT-4_05: Although the concentrations were all below the regulatory criteria, there seems to be a difference in the concentration of the metals in the sample compared to the other samples on the table. Could this possibility represent a difference in the lithology and therefore the natural metal concentration of the sample media? The RFI should provide possible explanations.	The difference in concentrations (if any) is slight. Please note that there are differences in concentrations between the primary CRT-5_05 sample and the associated field duplicate sample. Slight differences in concentration could be related to many factors, including inherent uncertainties in the laboratory analysis. Without additional information, any further explanation would be purely speculative.	M
78. Table 6-4	BLM	The RFI should explain how the confirmation samples for the EV ponds were located. Was it a random or judgmental method?	The comment should have referred to Table 6-8 (now Table 5-3). The revised text is provided in Section 5.1.4.2. Locations for the confirmation samples were selected based upon the *Closure Plan for the Hazardous Waste Management Facilities at the Topock Compressor Station* (Mittelhauser 1986) that was reviewed and approved by DTSC. Samples were initially collected on a grid. Additional confirmation samples were collected in a purposeful manner. The text in Section 5.1.4.2 was revised to include this information.	M
79. Table 6-7	BLM	Sample PF-6: **Explain h**ow it is possible to have more trivalent Cr than total Cr in the sample.	The Cr(III) values reported for samples PF-6 and PH-7 were calculated values (i.e., Cr(T) minus Cr(VI) values) generated based on a duplicate sample; however, the data were not presented correctly. Table 5-11 (former Table 6-7) has been revised to correct this error.	M

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80. Table 6-9	BLM	It would be useful to have the regulatory criteria listed on the table as for the other table in the section.	The report did not use regulatory criteria for decision-making but instead relied on a comparison of upgradient versus downgradient concentrations.	S
		SECTION 7.0 – No Comments		
		SECTION 8.0 – No Comments		
179. General Comment	DOI	Add the following language to the end of the first paragraph: The United States Department of the Interior is the lead Federal agency, on land under its jurisdiction, custody, or control, and is responsible for oversight of response actions being conducted by PG&E pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Portions of the site where hazardous substances from the Topock compressor station have come to be located are on or under land managed by the Department's Bureau of Land Management, Fish and Wildlife Service, or Bureau of Reclamation.	The recommended language has been added to the third paragraph in Section 1.0:	M

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180. General Comment ES-1	DOI	Replace the second paragraph with the following language: Prior RCRA facility investigation (RFI) activities at the Topock facility have been performed under the RCRA corrective action process pursuant to a Corrective Action Consent Agreement entered by PG&E and DTSC. Pursuant to an Administrative Consent Agreement entered by PG&E and the Department of the Interior, PG&E has agreed to conduct a CERCLA Remedial Investigation and Feasibility Study (RI/FS). This Draft Report has been prepared to fulfill the requirements of both an RFI Report under RCRA and an RI Report under CERCLA. Terms defined under RCRA that are used in this Draft Report and that correspond to terms defined under CERCLA are intended to be construed to include the CERCLA term. In particular, solid waste management units (SWMUs) and areas of concern (AOCs) identified in this Draft Report shall be construed to be facilities where a release or threatened release of a hazardous substance has occurred, as defined under CERCLA. Additional requirements pertaining to a CERCLA RI Report, if not addressed adequately in this Draft Report, will be addressed in future documents.	The following language has been added to the third paragraph in Section 1: "In July 2005, PG&E and the Federal Agencies entered into an Administrative consent Agreement to implement response actions at the site as set forth in the National Oil and Hazardous Substance Pollution contingency Plan." The following language has been added to the fourth paragraph in Section 1.0: "This document contains the site background and history of the Topock Compressor Station in support of the RCRA Facility Investigation (RFI) and the CERCLA Remedial Investigation (RI) . . ." The following language has been added to Section 1.5: "Terms defined under RCRA that are used in this report and that correspond to terms defined under CERCLA are intended to be construed to include the CERCLA term. In particular, SWMUs and AOCs identified in this report shall be construed to be facilities where a release or threatened release of a hazardous substance has occurred, as defined under CERCLA." Also, Table 1-1 has been added that discusses the CERCLA requirements as they pertain to this document.	M

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181. Page ES-8 Section ES-8.2	DOI	Delete the first sentence of Section ES.8.2 and replace it with the following: Pursuant to a Consent Agreement entered by PG&E and the Department of the Interior, PG&E has agreed to satisfy the requirements for a CERCLA RI/FS, including the identification and evaluation of applicable or relevant and appropriate requirements (ARARs).	The following language has been added to the Executive Summary: "Investigative and remedial activities at the Topock site are being performed under . . .the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) pursuant to an Administrative Consent Agreement between PG&E and the Department of Interior (DOI)" Also "Other requirements of the RCRA Corrective Action and CERCLA processes such as the identification of applicable or relevant and appropriate requirements (ARARs) . . .will be addressed in future documents."	M