Topock Project Executive Abstract

Document Title:

Biological Resources Completion Report for the East Ravine Groundwater Investigation, Topock Compressor Station Needles, California

Submitting Agency/Authored by: BLM, USFWS

Final Document? ☒ Yes ☐ No

Date of Document: September 22, 2009

Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other)

PG&E

Priority Status: ☐ HIGH ☐ MED ☒ LOW
Is this time critical? ☐ Yes ☒ No

Type of Document:
☐ Draft ☒ Report ☐ Letter ☐ Memo
☐ Other / Explain:

Action Required:
☒ Information Only ☐ Review & Comment
Return to:_____
By Date: _____

☐ Other / Explain:

What does this information pertain to?
☐ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA)
☐ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment)
☐ Corrective Measures Study (CMS)/Feasibility Study (FS)
☐ Corrective Measures Implementation (CMI)/Remedial Action
☐ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR)
☐ Interim Measures
☒ Other / Explain: Programmatic Biological Assessment (PBA)

Is this a Regulatory Requirement?
☒ Yes
☐ No
If no, why is the document needed?

What is the consequence of NOT doing this item? What is the consequence of DOING this item?

This report is required by the approved PBA. Not performing the survey and preparing this report constitute non-compliance with the PBA.

Other Justification/s:
☐ Permit ☐ Other / Explain:

Brief Summary of attached document:

The Biological Resources Completion Report for the East Ravine Groundwater Investigation (ERGI), was prepared to determine if there were any adverse effects on species protected under the federal Endangered Species Act resulting from remedial and investigative activities during the ERGI at the Topock Compressor Station. The General Project Management Measures described in the PBA, and followed throughout the ERGI, were effective in minimizing impacts to the work area and surrounding lands. The project was conducted under a "may affect, but not likely to adversely affect" determination for the southwestern willow flycatcher, Mojave desert tortoise, Yuma clapper rail, razorback sucker, and bonytail chub and under a "no effect" determination for the Colorado pikeminnow. In compliance with these determinations, there was no take of these species.

Written by: PG&E

Recommendations:

This report is for information only.

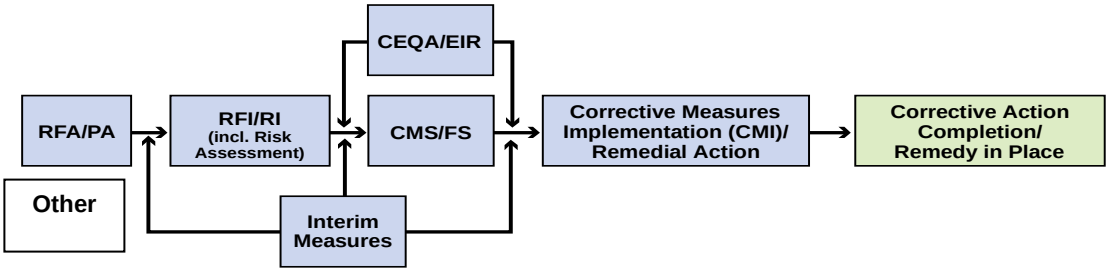
How is this information related to the Final Remedy or Regulatory Requirements:

This report is a requirement of the PBA upon the completion of construction activities.

Other requirements of this information?
None

Related Reports and Documents:

Click any boxes in the Regulatory Road Map (below) to be linked to the Documents Library on the DTSC Topock Web Site (www.dtsc-topock.com). **The link to the Documents Library is currently UNDER CONSTRUCTION.**



Legend
RFA/PA – RCRA Facility Assessment/Preliminary Assessment
RFI/RI – RCRA Facility Investigation/CERCLA Remedial Investigation (including Risk Assessment)
CMS/FS – RCRA Corrective Measure Study/CERCLA Feasibility Study
CEQA/EIR – California Environmental Quality Act/Environmental Impact Report

Version 9

Pacific Gas and Electric Company

Yvonne Meeks
Manager

Environmental Remediation
Gas T&D Department

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September 22, 2009

Ms. Cathy Wolfe-White
U.S. Department of the Interior
Bureau of Land Management
2610 Sweetwater Avenue
Lake Havasu City, Arizona 86406

Ms. Carrie Marr
U.S. Fish and Wildlife Service Project Manager
2321 W Royal Palm Road, Suite 103
Phoenix, AZ 85021

Subject: Biological Resources Completion Report for the East Ravine Groundwater Investigation, PG&E Topock Compressor Station, Needles, California

Dear Ms. Wolfe-White & Ms. Marr:

This letter transmits the *Biological Resources Completion Report for the East Ravine Groundwater Investigation* at the Topock Compressor Station. The document is submitted in conformance with the January 2007 *Programmatic Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (PBA). This report has been prepared in compliance with the General Project Management Measure 23 of the PBA. This condition requires that, within 60 days of completion of construction activities, a brief report shall be prepared and submitted to the Bureau of Land Management and the Havasu National Wildlife Refuge.

PG&E appreciates your consideration of the attached report. Please contact me at (805) 234-2257 with any questions or concerns.

Sincerely,

Yvonne Meeks

Yvonne Meeks
Topock Project Manager

cc: Pam Innis/DOI
Aaron Yue/DTSC

Final Report

Biological Resources Completion Report for the East Ravine Groundwater Investigation, Topock Compressor Station Needles, California

Prepared for

United States Bureau of Land Management
United States Fish and Wildlife Service

On behalf of

Pacific Gas and Electric Company

September 22, 2009

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

Biological Resources Completion Report for the East Ravine Groundwater Investigation,
Topock Compressor Station
Needles, California

Gary Santolo
CH2M HILL Senior Biologist

Michael Cavaliere
CH2M HILL Project Manager

Contents

Acronyms and Abbreviations

Cr(VI)	hexavalent chromium
DOI	United States Department of the Interior
ESA	Endangered Species Act
PBA	*Programmatic Biological Assessment for the Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions*
PG&E	Pacific Gas and Electric Company
RCRA	Resource Conservation and Recovery Act
RFI/RI	RCRA facility investigation/remedial investigation
USFWS	United States Fish and Wildlife Service

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station located in eastern San Bernardino County, California, approximately 15 miles southeast of Needles, California. Figure 1-1 provides a site location map for the Topock Compressor Station.

Investigative and remedial activities at the Topock Compressor Station are being performed under the Resource Conservation and Recovery Act (RCRA) corrective action process under an agreement between PG&E and the California Environmental Protection Agency, Department of Toxic Substances Control, as well as under the Comprehensive Environmental Response, Compensation and Liability Act under an agreement between PG&E and the United States Department of the Interior (DOI). Under the terms of these agreements, PG&E is conducting the RCRA facility investigation/remedial investigation (RFI/RI) to identify and evaluate the nature and extent of hazardous waste and constituent releases at the compressor station.

Groundwater monitoring wells were installed at eight locations in the East Ravine area to provide additional groundwater characterization data for the RFI/RI for the Topock site. In addition, an existing monitoring well was overdrilled and recompleted as a multilevel well. Well installation activities began in January 2009 and continued through May 2009. Eighteen new monitoring points were established in the eight locations during the investigation. Well development, sampling, borehole flow characterization, and hydraulic monitoring occurred from February through July 2009. The primary technical objectives of the groundwater investigation in the East Ravine area were to:

- Determine whether elevated concentrations of hexavalent chromium (Cr[VI]) and other inorganic constituents are present in groundwater beneath the East Ravine area.
- If elevated concentrations of Cr(VI) were confirmed in bedrock, evaluate the presence and potential extent of the groundwater impact.
- Assess the potential for perched/shallow groundwater to occur at the base alluvium/weathered bedrock/bedrock contact underlying the East Ravine area and install perched/shallow groundwater monitoring wells as appropriate.
- Install monitoring wells within the bedrock, as appropriate, to facilitate ongoing groundwater quality monitoring in the East Ravine area.

Primary field tasks conducted during this investigation included:

- Site access, preparation, and compliance monitoring.
- Drilling, lithologic logging, and collecting continuous core at 12 boreholes.
- Overdrilling and retrofitting an existing monitoring well (MW-23) into a nested multilevel well.

- Collecting soil samples during drilling of the boreholes at Sites A and B (MW-57 and MW-58-series wells).
- Geophysical logging within cased boreholes at Sites A and B (MW-57BR and MW-58BR).
- Characterizing borehole flow using hydrophysics at four boreholes (MW-57BR, MW-58BR, MW-62BR, and MW-64BR).
- Collecting depth-specific groundwater samples prior to and/or during borehole flow characterization.
- Installing and developing one or more groundwater monitoring wells completed within each borehole.
- Collecting at least one round of groundwater samples for laboratory analysis from each newly installed monitoring well and depth-discrete sampling location.
- Managing investigation-derived waste.

Well installation and testing activities were completed as outlined in the *Revised Work Plan for East Ravine Groundwater Investigation* (Work Plan) (CH2M HILL, 2008). The drilling, well installation, and associated groundwater investigations activities are collectively referred to in this report as the East Ravine Groundwater Investigation. The drill sites and completed well locations are depicted in Figure 1-2.

These activities have been approved and are addressed in the *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions* (PBA) (CH2M HILL, 2007). Well installation activities followed all applicable General Project Management Measures in the PBA, a 2007 United States Fish and Wildlife Service (USFWS) letter of concurrence (USFWS, 2007), and the DOI approval letter for the Revised Work Plan for the East Ravine Groundwater Investigation, dated November 7, 2008 (DOI, 2008).

1.1 Regional Environmental Setting

The Topock Compressor Station is located in a sparsely populated, rural area. Much of the nearby surrounding land is publicly owned by the federal government and has important spiritual meaning to local Indian tribes. Public lands in the area are owned and/or managed by a number of federal and regional agencies, including the Bureau of Land Management, USFWS, Bureau of Reclamation, and San Bernardino County.

Dominant features of the area include the Colorado River to the east; the Chemehuevi Mountains to the south; the Burlington Northern Santa Fe railroad tracks and bridge; and Interstate 40, which links Barstow, California and Topock, Arizona. Topography in the area is abrupt, rising from around 450 feet above mean sea level at the Colorado River to over 1,200 feet above mean sea level within 1 mile to the south and southwest.

The area is characterized by arid conditions and high temperatures. The surrounding land consists of a series of terraces divided by desert washes. The landscape within the project area is considerably eroded and can most suitably be described as badlands. The lands are made of small to moderately-sized terraces with very steep slopes. Terraces occurring in the

project area are homogeneous, composed of rocky soils with very sparse vegetation. Structurally diverse vegetation in the project area is primarily limited to the Colorado River floodplain and the ephemeral washes.

1.2 Report Objectives and Organization

This biological completion report documents field activities associated with performing well installation activities at the eight locations mentioned above from January 13, 2009 through July 24, 2009.

The PBA (CH2M HILL, 2007) was prepared to determine any potential effect on species protected under the federal Endangered Species Act (ESA) resulting from remedial and investigative activities at the Topock Compressor Station. The USFWS concurred with the determinations provided in the PBA, as documented in a letter dated February 8, 2007 (USFWS, 2007). The field activities addressed in this report are included in the PBA; therefore, this report, as part of the PBA, serves as supporting documentation under the ESA for the evaluation of project effects to federally-listed species and resulting determinations.

This report has been prepared in compliance with the General Project Management Measure 23 of the PBA (CH2M HILL, 2007). This condition requires that, within 60 days of completion of construction activities, a brief report shall be prepared for the Bureau of Land Management and the Havasu National Wildlife Refuge. This report shall document the effectiveness of the mitigation measures, make recommendations for modifying the measures to enhance species protection, and provide information on survey and monitoring activities, observed listed species, and the actual acreage disturbed by the project.

To comply with these requirements, this report contains:

- Documentation of awareness training and compliance monitoring (Section 2.0).
- Project location and existing disturbed areas (Section 3.0).
- Pre- and post-activity surveys, including the observed listed species (Section 4.0).
- Conclusions, including a discussion of the effectiveness of the mitigation measures and recommendations for modifying the measures to enhance species protection (Section 5.0).

2.0 Awareness Training and Compliance Monitoring

In accordance with the General Project Management Measure 5 described in the PBA (CH2M HILL, 2007), awareness training was provided to personnel before the start of construction activities. The awareness training focused on the southwestern willow flycatcher (*Empidonax traillii extimus*) and the desert tortoise (*Gopherus agassizii*) for activities in the desert washes and uplands. PG&E and CH2M HILL biologists provided training to onsite personnel prior to initiating work activities. The core groups were trained at the project initiation meeting on January 13, 2009, and new personnel were identified at safety meetings each morning before work. Training included a description of each species; its habitat, natural history, threats, and legal protection under the ESA; potential penalties; current survey findings; management; and protection measures in the PBA. The awareness training sign-off sheets are provided as Appendix A to this report.

During project activities, a designated PG&E or CH2M HILL field contact representative provided compliance monitoring. In accordance with General Project Management Measure 2, the field contact representative was responsible for overseeing compliance with the mitigation measures.

3.0 Project Location and Existing Disturbance

Various past activities have resulted in land disturbance of the general area of the Topock Compressor Station. The area is traversed by a major highway, a railway, several gas pipelines, gas pipeline access roads, overhead electric power lines, county roads, private property access roads, and parking areas.

3.1 Well Locations

All drill site locations described in Section 1.0, the associated construction staging areas, and the access routes were located within previously disturbed areas on the Topock Compressor Station and Havasu National Wildlife Refuge land adjacent to the Topock Compressor Station. Well locations are presented in Figure 1-2. All monitoring locations were installed with flush to ground surface completions, except wells installed at Sites A and G.

- **Site A** is in a previously disturbed desert wash located southeast of the Topock Compressor Station. The wash is sparsely vegetated with creosote bush scrub species and mesquite, and has been previously disturbed by construction of earthen berms, culverts, roads, and pipelines within or adjacent to the wash. Two boreholes were advanced, and three monitoring locations (MW-58-065, MW-58-115, and MW-58-205) were installed at this location.
- **Site B** is located east of the Topock Compressor Station along a pre-existing dirt pipeline access road. Three boreholes were advanced, and three wells (MW-57-050, MW-57-070, and MW-57-185) were installed at this location.
- **Site C Alternate** is located east of the Topock Compressor Station along a pre-existing dirt pipeline access road. One borehole was advanced, and three monitoring locations (MW-64-150, MW-64-205, and MW-64-260) were installed at this location.
- **Site C** is located east of Topock Compressor Station along a pre-existing dirt pipeline access road. One borehole was advanced, and one well (MW-61-110) was installed at this location.
- **Site E** is located on previously disturbed land adjacent to an existing dirt pipeline access road. This area is located east of the Topock Compressor Station and west of the Colorado River. Two boreholes were advanced, and three monitoring locations (MW-62-065, MW-62-110, and MW-62-190) were installed at this location.
- **Site E Alternate-2** is located on previously disturbed and graded land adjacent to the PG&E's 300-B Pipeline Bridge's southern foundation. This area is located east of the Topock Compressor Station and south of the Colorado River. One borehole was advanced, and one well (MW-63-065) was installed at this location.

- **Site F** is located southeast of the Topock Compressor Station along a pre-existing dirt pipeline ROW road. One borehole was advanced, and one well (MW-60-125) was installed at this location.
- **Site G** is located northeast of the Topock Compressor Station and south of Interstate 40. This area has been previously graded and disturbed by facility, pipeline, and road construction. One borehole was advanced, and one well (MW-59-100) was installed at this location.

Because the groundwater investigation locations, associated staging areas, and access routes have been used for past activities, these areas have vegetation cover that ranges from none to sparse. All vegetation adjacent to pre-existing disturbed areas was avoided during project activities. All construction occurred within previously disturbed areas. No additional areas were disturbed by the activity, and no habitat loss occurred. Pre- and post-construction photographs are included as Appendix B.

Site A wells are located within a large unnamed desert wash disturbed by previous activities. Equipment access and egress was kept to the active channel to limit impacts to the wash. In all cases, access to the well locations was kept to previously disturbed routes and to the active wash channel to limit impacts to biological resources.

4.0 Pre- and Post-activity Surveys

4.1 Preconstruction Surveys

Prior to January 13, 2009, the start of construction activity, qualified biologists surveyed work sites and surrounding areas for sensitive biological resources. No listed species or nesting birds were observed during the pre-activity survey. Photographs of pre-construction conditions are provided as Appendix B.

During the pre-construction survey, sensitive vegetation that was to be avoided was flagged, and the areas were photographed and conditions noted. On July 16, 2009, following well construction, development, and demobilization, a post-activity survey was conducted to document field conditions. No listed species were observed during the post-activity survey. Photographs of post-construction conditions are provided as Appendix B. All sampling activities were confined to areas with pre-existing disturbance and active channels in the desert wash. No vegetation was cleared as a result of mobilization, well construction, well development, and demobilization.

Flora and fauna observed during the pre- and post-activity survey are listed in Table 4-1.

TABLE 4-1
List of Observed Plants and Wildlife Incidental to Pre- and Post-activity Surveys
Biological Resources Completion Report for the East Ravine Groundwater Investigation Project, Topock Compressor Station, Needles, California

Common Name	Scientific Name
Plants	
Anderson lycium	*Lycium andersonii*
Apricot mallow	*Sphaeralcea ambigua var ambigua*
Beavertail cactus	*Opuntia basilaris*
Cat claw acacia	*Acacia greggii*
Creosote bush	*Larrea tridentata*
Desert trumpet	*Eriogonum inflatum*
Fluff grass	*Erioneuron pulchellum*
Honey mesquite	*Prosopis glandulosa*
Palo verde	*Parkinsonia* spp
Red brome	*Bromus madritensis* var. *rubens*
Rip-gut brome	*Bromus diandrus*
Russian thistle	*Salsola tragus*
Salt Cedar	*Tamarix ramosissima*

TABLE 4-1
List of Observed Plants and Wildlife Incidental to Pre- and Post-activity Surveys
Biological Resources Completion Report for the East Ravine Groundwater Investigation Project, Topock Compressor Station, Needles, California

Common Name	Scientific Name
Saltgrass	*Distichlis spicata*
Screwbean mesquite	*Prosopis pubescens*
Storks bill	*Erodium cicutarium*
Reptiles	
Side-blotched lizard	*Uta stansburiana*
Birds	
Black-throated sparrow	*Amphispiza bilineata*
California quail	*Callipepla californica*
Common raven	*Corvus corax*
Great-tailed grackle	*Quiscalus mexicanus*
House finch	*Carpodacus mexicanus*
House sparrow	*Passer domesticus*
Mourning dove	*Zenaida macroura*
Rock pigeon	*Columba livia*
Say's phoebe	*Sayornis saya*
Turkey vulture	*Cathartes aura*
White-winged dove	*Zenaida asiatica*
Mammals	
Desert cottontail	*Sylvilagus audubonii*

5.0 Conclusion

Well construction activities were approved by the federal regulatory agencies. In conformance with the PBA General Project Management Measures, personnel were provided with awareness training, and qualified biologists conducted pre- and post-activity surveys in all areas subject to construction use. A field contact representative remained onsite during all construction activities.

The General Project Management Measures described in the PBA were effective in minimizing impacts to the work area and surrounding lands. The project was conducted under a "may affect, but not likely to adversely affect" determination for the southwestern willow flycatcher, Mojave desert tortoise, Yuma clapper rail (*Rallus longirostris yumanensis*), razorback sucker (*Xyrauchen texanus*), and bonytail chub (*Gila elegans*) and under a "no effect" determination for the Colorado pikeminnow (*Ptycheilus lucius*). In compliance with these determinations, there was no take of these species.

6.0 References

CH2M HILL. 2007. *Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial and Investigative Actions.* January.

_____. 2008. *Revised Work Plan for East Ravine Groundwater Investigation PG&E Topock Compressor Station, Needles, California.* November.

United States Department of the Interior (DOI). 2008. *Letter to Yvonne Meeks PG&E. "PG&E Topock Compressor Station Remediation Site –Federal agency consultation on Revised Work Plan for the East Ravine Groundwater Investigation (Revised Workplan), dated July 11, 2008."* November 7.

United States Fish and Wildlife Service (USFWS). 2007. Letter to Field Manager, Lake Havasu Field Office, Bureau of Land Management. "Programmatic Biological Assessment for Pacific Gas and Electric Topock Compressor Station Remedial Investigative Actions, January 2007." February 8.

Figures

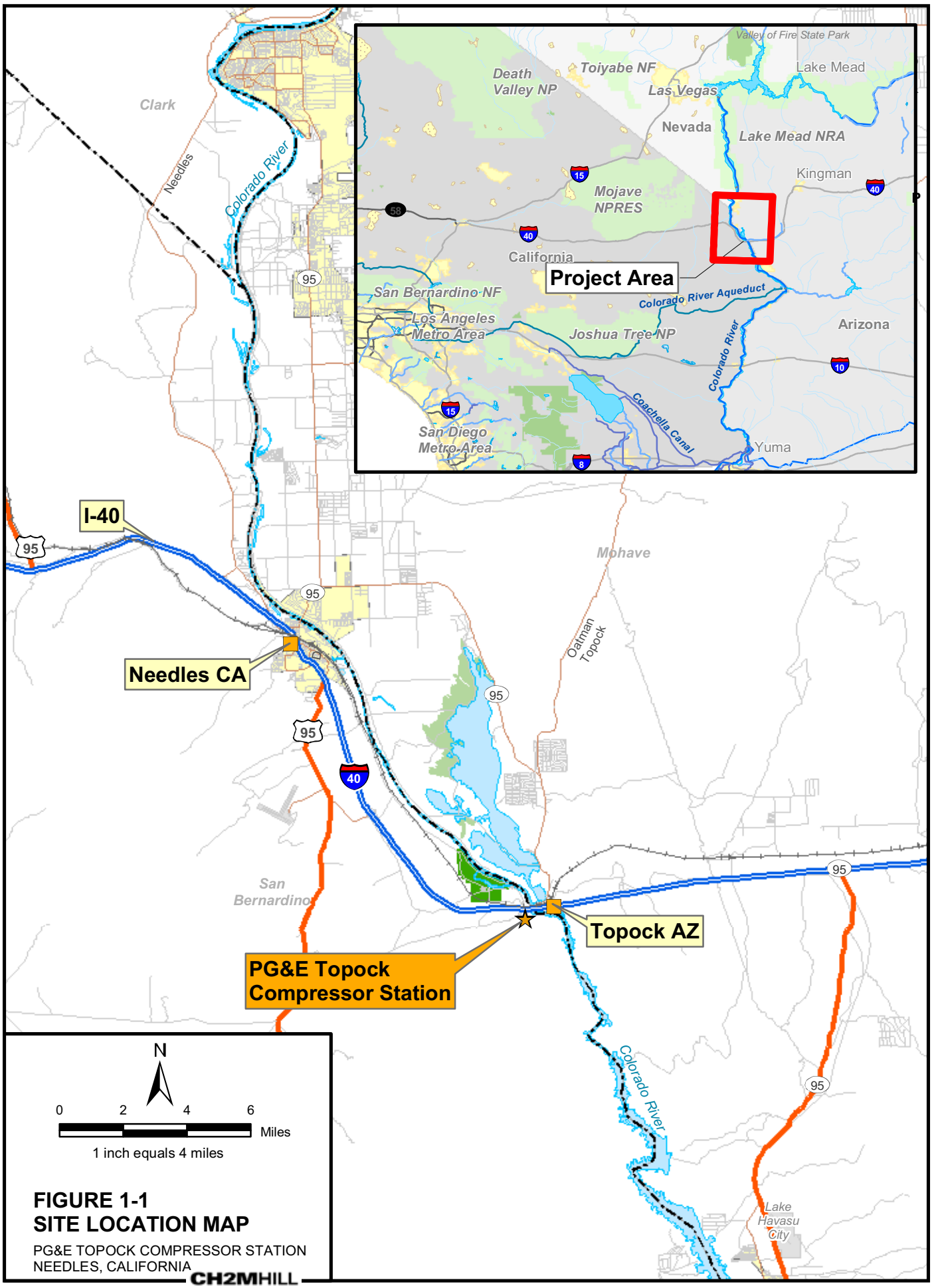

FIGURE 1-1
SITE LOCATION MAP

PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

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LEGEND

- Surface Water Sampling Location
- New Surface Water Sampling Location
- Existing Groundwater Well

East Ravine Groundwater Investigation (ERGI) Monitoring Wells

- Perched Zone Well
- Water Table Well / Shallow Bedrock Well
- Deeper Bedrock Well
- ERGI Site For Drilling and Well Installation
- Property Boundary

N

0 100 200 Feet

Updated 08/27/2009

MW-21
MW-48
MW-12
SAN BERNARDINO COUNTY RIGHT OF WAY (Owned by HNWR)
COLORADO RIVER
MW-23-060
MW-23-080
Site E Alternate-1
HAVASU NATIONAL WILDLIFE REFUGE (HNWR) (Managed by U.S. Fish and Wildlife Service)
MW-62-110
MW-62-190
MW-62-065
Site E
Site E Alternate-2
MW-63-065
Site B
Site G
MW-57-050
MW-57-070
MW-57-185
PG&E
MW-59-100
Site D
Site C
MW-61-110
East Ravine Area
Site A
MW-58-065
MW-58-115
MW-58-205
Site C Alternate
MW-64-150
MW-64-205
MW-64-260
Site F
MW-60-125
PG&E Topock Compressor Station

FIGURE 1-2
LOCATION OF EAST RAVINE GROUNDWATER INVESTIGATION SITES
BIOLOGICAL RESOURCES COMPLETION REPORT FOR THE EAST RAVINE GROUNDWATER INVESTIGATION
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

BAO \\ZINFANDEL\PROJ\PACIFICGASELECTRICCO\TOPOCKPROGRAM\GIS\MAPFILES\2009\ERGI\ERGI_LOCATIONSURVEY_MAP.MXD 8/27/2009 10:14:30

Appendix A
Awareness Training Sign-off Sheets

Biological & Cultural Resources Awareness Training Attendance Sheet

Pacific Gas and Electric Topock Groundwater Extraction & Remediation Project 2009

Your signature constitutes an agreement to abide by the biological and cultural resources avoidance and minimazation measures presented in this training.

Date	Name (print)	Company/Affiliation	Telephone	Signature	NEED COPY ✓
1-13-09	CHRIS SMITH	PG+E	760-258-7899		
1-13-09	GLENN CARUSO	PG+E	925-301-6954		
1-13-09	CURT RUSSELL	PG&E	760-791-5884		
1-13-09	Arlin Brewster	Northstar	949-274-1719		
1-13-09	Rick Cavil	CH2M Hill	408-896-0140		
1-13-09	Chris Guerre	DTSC	714-484-5422		✓
1-13-09	Barry Collom	CH2M Hill	541-740-3250		✓
1-13-09	GARY SANTOLO	CH2M HILL	916-849-9043		✓
1-13-2009	DR. GEORGE SHANNON	DOI (BLM)	928-505-1255		
1-13-2009	Nora McDowell-Antone	Ft. Mojave Tribe	928 768-4475		✓
1-13-09	FELTON BRACKER SR.	FT MOJAVE TRIBE	928-346-1990		
1-15-09	STEVE LACEY	BOART LONGYEAR	623 521 1471		
1-13-09	TIZRACY EDWARDS	BOART LONGYEAR	928-674-6872		
1-13-09	Jeff Thornhill	Boart Longyear	562 239 8237		
1-13-09	JOEL HALLOWELL	BOART LONGYEAR	740-521-0203		
1-13-09	GARY CLIFT	ARCADIS	510-619-6075		
1-13-09	Brett Engard	ARCADIS	510 619 6027		
1-13-09	JANIS LUCRICK	ARCADIS	303-726-6237		✓
1-13-2009	MIKE CAVALIERE	CH2M HILL	510-325-0022		✓
1-13-2009	Norman Shapay	CRIT	707-333-5560		✓
13 Jan 2009	Ralph McCullers	PG&E	408-893-2582		
1-13-09		CPIF	928 669-1272		
1-13-09	Cindi Hall	CISFUS	760-365-7024		
1-13-09	Lee Leonhart	HTA/IFMIT	520-881-7300		✓
1-13-09	Denzil Roberts	Boart Longyear	928-234-1026		

Biological & Cultural Resources Awareness Training Attendance Sheet

Pacific Gas and Electric Topock Groundwater Extraction & Remediation Project 2009

Your signature constitutes an agreement to abide by the biological and cultural resources avoidance and minimazation measures presented in this training.

Date	Name (print)	Company/Affiliation	Telephone	Signature
1-13-09	Travis Osterberg	BOART LONGYEAR	602 999 6965	[illegible]
1-13-09	Lisa Swick	CRIT	9286691272	[illegible]

Appendix B
Photograph Documentation

Photo 1: Pre-construction view of East Ravine Groundwater Investigation (ERGI) Site A.

Photo 2: Post-construction view of ERGI Site A

Topock East Ravine Groundwater Investigation. 2009.

Photo 3: Pre-construction view of ERGI Site B

Photo 4: Post-construction view of ERGI Site B.

Photo 5: Pre-construction view of ERGI Site C.

Photo 6: Post-construction view northwest of ERGI Site C.

Photo 7: Pre-construction view of ERGI Site C Alternate.

Photo 8: Post-construction view of ERGI Site C Alternate.

Photo 9: Pre-construction view of ERGI Site E.

Photo 10: Post-construction view of ERGI Site E.

Photo 11: Post-construction view of ERGI Site E Alternate.

Photo 12: Post-construction view of ERGI Site G.