



**Pacific Gas and  
Electric  
Company**

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**Yvonne J. Meeks**  
Topock Project Manager  
Chromium Remediation Project Office  
Gas Transmission & Distribution

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San Luis Obispo, CA 93405

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San Luis Obispo, CA 93401

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July 3, 2007

Mr. Aaron Yue  
Project Manager  
California Department of Toxic Substances Control  
5796 Corporate Avenue  
Cypress, CA 90630

Subject: Well PGE-6 Decommissioning Summary  
PG&E Topock Compressor Station, Needles, California

Dear Mr. Yue:

This letter transmits the *Well PGE-6 Decommissioning Summary*, documenting the activities performed to implement the *Well PGE-6 Revised Decommissioning Work Plan* approved by DTSC on March 28, 2007.

If you have questions, please do not hesitate to contact me. I can be reached at (805) 234-2247.

Sincerely,

A handwritten signature in blue ink that reads 'Yvonne Meeks'.

cc: Chris Guerre/DTSC  
John Earle/HNWR  
Cathy Wolff-White/BLM  
Marvin Cerdanio/San Bernardino County

## Well PGE-6 Decommissioning Summary

PREPARED FOR: Pacific Gas and Electric Company  
PREPARED BY: CH2M HILL  
DATE: July 3, 2007

### Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station near Needles, California, under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) and the United States Department of the Interior.

This technical memorandum summarizes the field activities conducted during decommissioning of well PGE-6 at the PG&E Topock site. PGE-6 was originally installed as a standby industrial water supply well in 1964, and is located on the Havasu National Wildlife Refuge (HNWR) approximately 200 feet north of the PG&E Topock Compressor Station property line. Decommissioning of PGE-6 was performed in April and May 2007, following procedures outlined in the *Well PGE-6 Revised Decommissioning Work Plan*, dated November 10, 2006 (CH2M HILL, 2006).

The PGE-6 decommissioning activities were executed in accordance with DTSC's approval letter dated March 28, 2007 (DTSC 2007), and HNWR's approval letter dated March 14, 2007 (USFWS 2007).

Figure 1 shows a schematic diagram of well PGE-6 prior to decommissioning activities. Figure 2 is a schematic diagram of PGE-6 upon completion of decommissioning activities. Attachment 1 contains photos of well decommissioning activities. Attachment 2 contains driller report submitted to the California Department of Water Resources and Attachment 3 is the San Bernardino County Department of Public Health, Division of Environmental Health Services (DEHS) well permit.

### PGE-6 Decommissioning

Decommissioning of well PGE-6 occurred in two phases. It was necessary to conduct the decommissioning work in this manner after discovering that no seal was present between the inner casing and conductor casing at approximately 4 feet below ground surface (bgs) during the second day of decommissioning work. DTSC's conditional approval letter (DTSC, 2007) required that PG&E attempt removal of the 20-inch-diameter conductor casing if a seal did not exist inside or outside of the casings. The 1964 driller's construction record indicated that a seal was present inside the conductor casing. As a result, the first crew onsite did not come prepared to attempt removal of the conductor casing.

## Well Decommissioning Phase One

The first phase of decommissioning work occurred during the week of April 2, 2007. Work included removing the pump from the well, conducting a well bore video (Attachment 4), attempting to bail sediment from the well, placing a bentonite seal near the bottom of the well screen, perforating the well screen and casing, and pressure-grouting. Grouting during this step was terminated at 33 feet bgs to allow for upcoming removal of the conductor casing.

Details of activities conducted during the first phase of decommissioning (April 2 through April 6, 2007) include:

- On April 2, a well bore video was conducted at PGE-6 (Attachment 4) that showed the well to be filled with sediment and scale to a depth of 161 feet bgs. Consistent with the 1998 video log, the new video showed the well casing to be in very poor condition. Numerous holes were visible in the casing between about 50 and 90 feet bgs, with heavy scaling above the water table (depth to water 106 feet bgs). Heavy corrosion and encrustation of the screen interval was prevalent, such that no screen slots were visible within the screened interval of the well.
- On April 3 and 4, approximately 2 feet of sediment were bailed from the well, deepening the well to 163 feet bgs. Sediment bailed from the well consisted primarily of large pieces of scale from the casing up to 1 inch in diameter. Comparison of the volume of material bailed from the well with the observed decrease in sediment level in the well indicated that the bailing process was producing further collapse of the casing walls rather than reaching the objective of bailing out the sediment and scale already present at the bottom of the well.
- On April 4, approval to stop bailing was received via a phone call with DTSC. Progress removing the larger pieces of casing from the bottom of the well was slow, and there were concerns of further compromising the strength of the already weak casing to the point of collapse. Bentonite chips/pellets were added to seal the bottom of the well from 163 to 154 feet bgs. The well screen was perforated with a mills knife from approximately 140 to 126 feet bgs. Four 1-foot-long vertical cuts, approximately 2 inches wide, were made in the casing at 90 degrees to each other over this entire interval.
- On April 4, the San Bernardino County Department of Public Health was informed that grouting would be occurring the next day. The County declined to come to the site to oversee grouting.
- On April 5, the well was pressure-grouted with a submerged 2-inch tremmie pipe from 154 feet to 79 feet bgs. On April 6, the well was pressure-grouted with a submerged 2-inch tremmie pipe from 79 feet to 33 feet bgs.
- Approximately 1,200 gallons of grout were added to the well. The calculated volume necessary to fill the well without loss to the formation was approximately 970 gallons.
- A steel plate was welded to the top of the casing to secure the well until phase two of well abandonment.

## Well Decommissioning Phase Two

On April 19, 2007, alternative options for removal of the 20-inch conductor casing were discussed with DTSC. It was considered unlikely that the 20-inch casing could be pulled from the ground due to the thin wall construction, the corrosion likely to be present due to the age of the well, and the partial cementing between the inner and outer casing. In addition, an attempt to pull the outer casing would require mobilization of a very large drilling rig that would likely not be able to negotiate the steep, narrow access road to access the well. In an email to DTSC on April 30, 2007, PG&E requested approval for perforating the inner casing and then pressure-grouting through the perforated inner casing as an alternative to removal of the outer casing. The objective of the pressure-grouting procedures was to produce a seal between the inner casing and conductor casing without attempting risky alternatives of over drilling or using hydraulic jacks to attempt removal of the conductor casing. Approval of these modified field procedures to complete decommissioning of well PGE-6 were granted in an email from DTSC on May 1, 2007.

The following activities were performed during the second phase of well decommissioning, which occurred May 3 through 5, 2007:

- The 14-inch well casing was perforated from the top of the grout plug at 33 feet bgs to approximately 9 feet bgs with a mills knife, making five cuts per lineal foot 1.5 inches long by 0.375 inches wide.
- The 3-foot concrete block around the wellhead was removed.
- Grout (Type V Portland cement with 3% bentonite) was emplaced in the perforated section of well casing via positive pressure tremmie. A total of 230 gallons of grout was added from 33 to 9 feet bgs.
- A trench was cut to approximately 6 feet bgs around the well using an air knife.
- The 14-inch casing was cut off at approximately 5 feet bgs.
- The 20-inch conductor casing was cut from the outside at about approximately 5 feet bgs. An additional 120 gallons of grout were added to fill the remaining portion of the 14-inch well casing and complete the "mushroom cap" over the top of the cut off well casings.
- The excavation above the "mushroom cap" was filled with native soil removed from around the well.

No soil was removed from the work area; soil excavated from around the casings to facilitate surface casing removal at 5 feet bgs was added back to the excavation and the ground surface was returned to grade. The last photograph in Attachment 1 illustrates the final condition of the worksite upon completion of decommissioning activities.

## Waste Management

Investigation-derived waste materials generated during well decommissioning included incidental trash, scale and formation materials bailed from the well, two 5-foot sections of steel casing cut from the top of the well, and approximately 300 gallons of groundwater. The

groundwater was transported to the Interim Measures No. 3 treatment facility at the Topock site. Bailed sediment (mostly scale from the well casing) was taken to the Interim Measures No. 3 treatment facility and separated from water in a phase separator. Sediment/scale was then transported to an offsite hazardous waste disposal facility since it had been in contact with hexavalent chromium contaminated groundwater. The 5-foot sections of well casing were pressure washed to remove potential residual contamination and recycled as scrap metal.

## Certification

This memorandum 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.



Paul F. Bertucci  
Certified Engineering Geologist



## References

California Department of Toxic Substances Control (DTSC). 2007. Letter to PG&E.

"Conditional Approval of Well PGE-6 Decommissioning Workplan, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California." March 28.

CH2M HILL. 2006. *Revised Well PGE-6 Decommissioning Work Plan, PG&E Topock Compressor Station*. November 10.

United States Fish and Wildlife Service, Havasu National Wildlife Refuge (USFWS). 2007.

Letter to PG&E authorizing, with special conditions, PG&E's request as outlined in the *In Situ Hexavalent Chromium Reduction Pilot Test Work Plan - Upland Plume Treatment*. March 14.

## Figures

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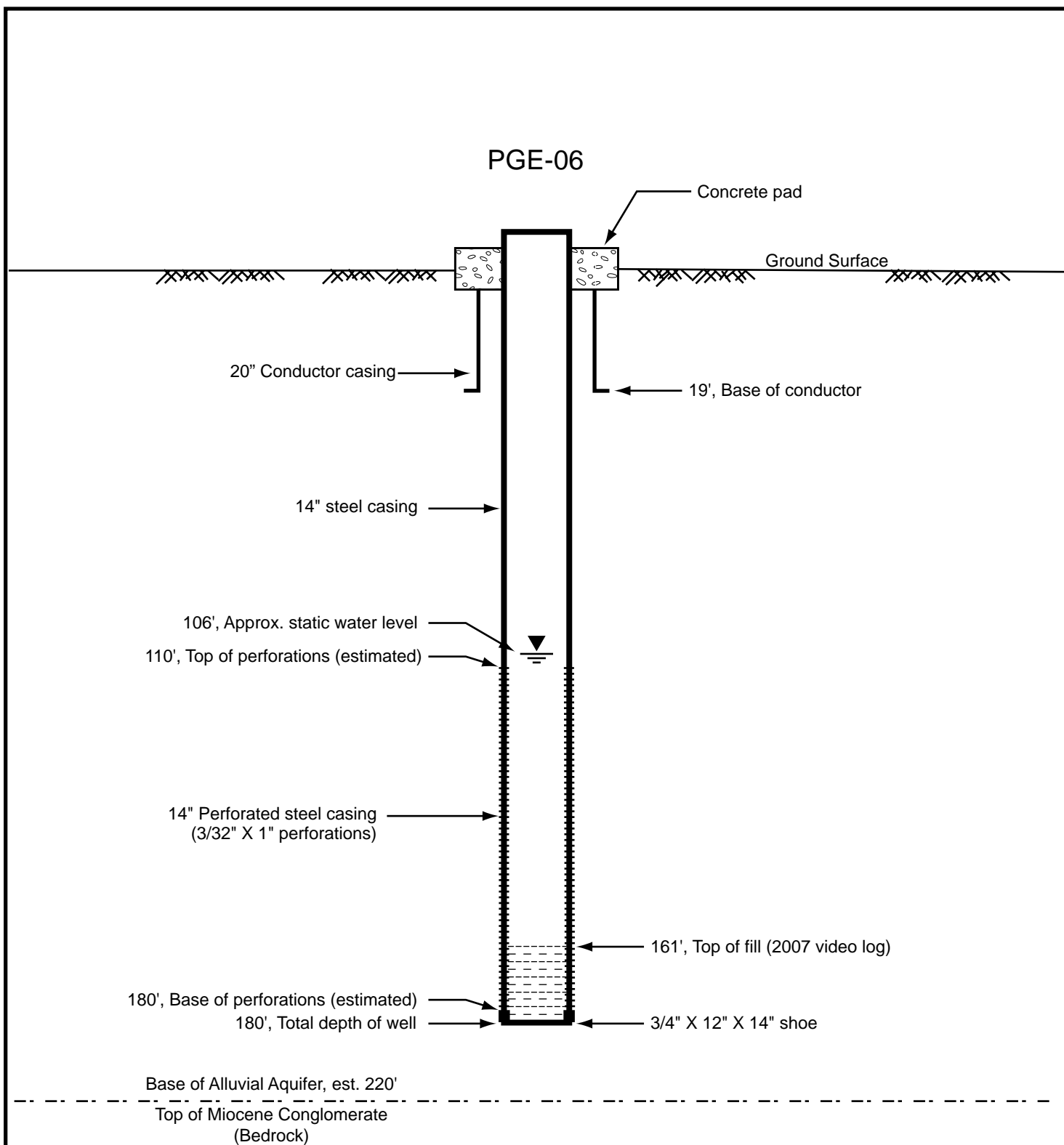
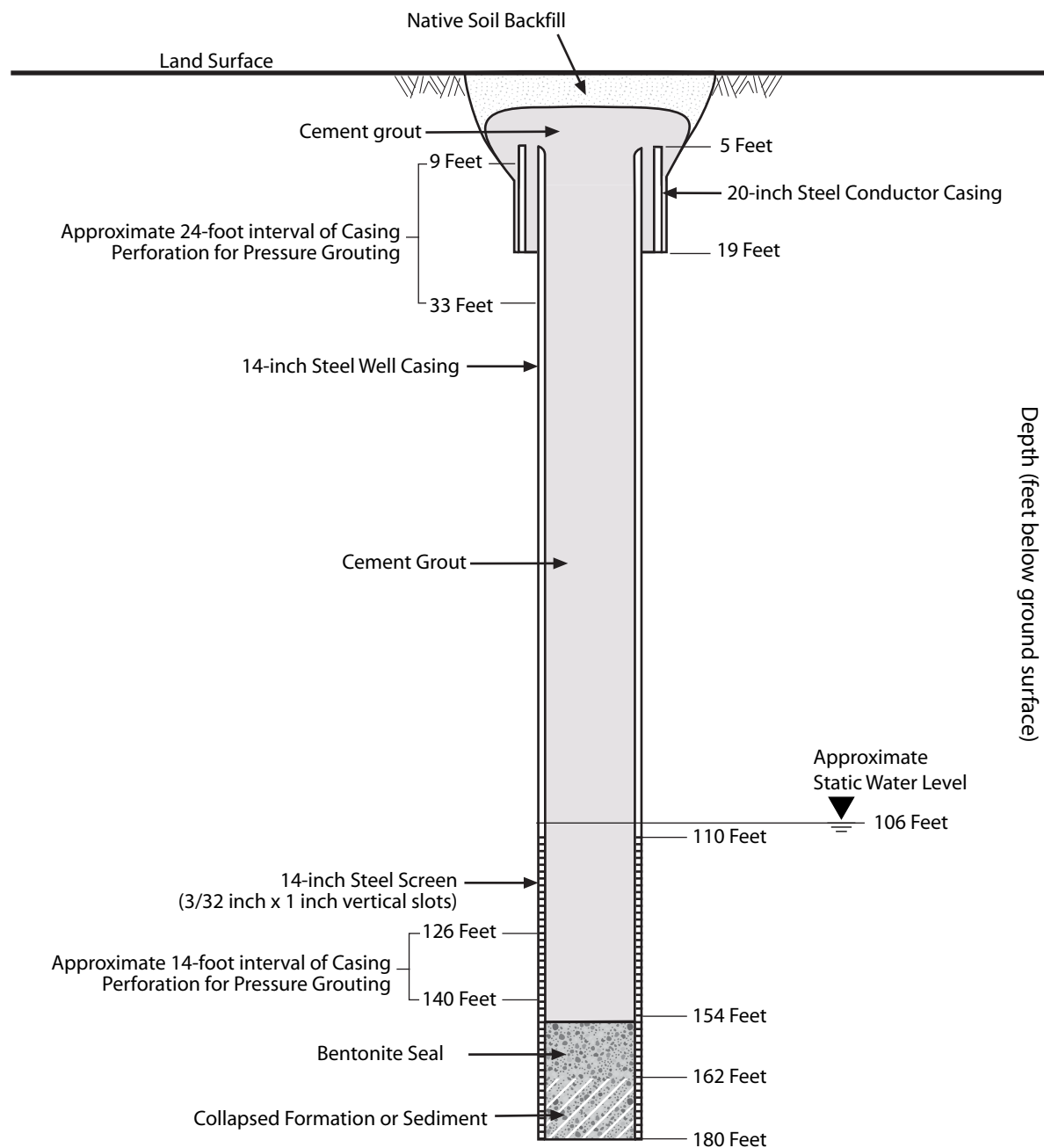


DIAGRAM NOT TO SCALE

All depths in feet below ground surface (bgs)

PGE-6 is an inactive water supply well that was installed in 1964. Well contains Grundfos submersible pump for periodic sampling.

**FIGURE 1**  
**SCHEMATIC DIAGRAM OF INACTIVE**  
**SUPPLY WELL PGE-6**  
 PG&E TOPOCK COMPRESSOR STATION  
 NEEDLES, CALIFORNIA



NOT TO SCALE

Revised 6/19/07

**FIGURE 2**  
**SCHEMATIC DIAGRAM OF PGE-6**  
**DECOMMISSIONING**  
 PG&E TOPOCK COMPRESSOR STATION  
 NEEDLES, CALIFORNIA



**Attachment 1**  
**Photos**

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MW-24 Bench Work Area. Drill Rig Staged at Well PGE-6



## Well PGE-6 Well Screen and Casing Perforating Phase One





## Mixing Grout Phase One



## Mixing Grout Phase One



## Air Knifing Around Conductor Casing





Well PGE-6 Excavation Around 20 inch Conductor Casing



## Cutting and Removing 20" Conductor Casing





Adding the “mushroom cap”



## PGE-6 Site Upon Completion of Well Abandonment



**Attachment 2**  
**Driller Reports**

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File Original with DWR

State of California

# Well Completion Report

Refer to Instruction Pamphlet

No. e055565

Page 1 of 1

Owner's Well Number Pacific Gas & Electric Co

Date Work Began 04/02/2007

Date Work Ended 4/6/2007

Local Permit Agency San Bernardino County Department of Public Health

Permit Number 2007030310

Permit Date 3/29/07

DWR Use Only - Do Not Fill In

State Well Number/Site Number

Latitude

Longitude

APN/TRS/Other

## Geologic Log

Orientation ☒ Vertical ☐ Horizontal ☐ Angle Specify \_\_\_\_\_  
Drilling Method ABANDONMENT Drilling Fluid \_\_\_\_\_

Depth from Surface		Description
Feet	to Feet	Describe material, grain size, color, etc.
126	140	Mills knife 2 cuts per foot
33	154	Abandonment with Cement bentonite grout
154	163	Bentonite chips

## Well Owner

Name Pacific Gas & Electric Co.

Mailing Address P.O. Box 337

City Needles State CA Zip 92363

## Well Location

Address \_\_\_\_\_

City Topock County San Bernardino

Latitude 5 56 26 N Longitude 95 14 15 W  
Dec. Min. Sec. Dec. Min. Sec.

Datum \_\_\_\_\_ Decimal Lat. \_\_\_\_\_ Decimal Long. \_\_\_\_\_

APN Book \_\_\_\_\_ Page \_\_\_\_\_ Parcel 0650-161-11

Township 7N Range 24E Section 8

## Location Sketch

(Sketch must be drawn by hand after form is printed.)

North

West

East

South

Illustrate or describe distance of well from roads, buildings, fences, rivers, etc. and attach a map. Use additional paper if necessary. Please be accurate and complete.

## Activity

- ☐ New Well  
☐ Modification/Repair  
☐ Deepen  
☐ Other \_\_\_\_\_  
☒ Destroy  
Describe procedures and materials under "GEOLOGIC LOG"

## Planned Uses

- ☐ Water Supply  
☐ Domestic ☐ Public  
☐ Irrigation ☐ Industrial  
☐ Cathodic Protection  
☐ Dewatering  
☐ Heat Exchange  
☐ Injection  
☐ Monitoring  
☐ Remediation  
☐ Sparging  
☐ Test Well  
☐ Vapor Extraction  
☐ Other \_\_\_\_\_

Total Depth of Boring 180 Feet

Total Depth of Completed Well 180 Feet

## Water Level and Yield of Completed Well

Depth to first water \_\_\_\_\_ (Feet below surface)

Depth to Static \_\_\_\_\_

Water Level \_\_\_\_\_ (Feet) Date Measured \_\_\_\_\_

Estimated Yield \* \_\_\_\_\_ (GPM) Test Type \_\_\_\_\_

Test Length \_\_\_\_\_ (Hours) Total Drawdown \_\_\_\_\_ (Feet)

\*May not be representative of a well's long term yield.

## Casings

Depth from Surface	Borehole Diameter	Type	Material	Wall Thickness	Outside Diameter	Screen Type	Slot Size if Any
Feet to Feet	(Inches)			(Inches)	(Inches)		(Inches)
0	19	Conductor	Low Carbon Steel		20"		
0	110	Blank	Low Carbon Steel		14"		
110	118	Screen	Low Carbon Steel		14"	Milled Slots	

## Annular Material

Depth from Surface	Fill	Description
Feet to Feet		
33	154	Cement
154	163	Bentonite chips

## Attachments

- ☐ Geologic Log  
☒ Well Construction Diagram  
☐ Geophysical Log(s)  
☐ Soil/Water Chemical Analyses  
☐ Other \_\_\_\_\_

Attach additional information, if it exists.

## Certification Statement

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief

Name Boart Longyear

Person, Firm or Corporation

7773 W. Seldon

Address

Peoria

City

AZ

State

85345

Zip

Signed

C-57 Licensed Water Well Contractor

Date Signed

6/2/10 717510

C-57 License Number





**Attachment 3**  
**Well Permit**

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San Bernardino County Department of Public Health  
DIVISION OF ENVIRONMENTAL HEALTH SERVICES  
385 North Arrowhead Avenue, San Bernardino, CA 92415-0160

wp 3740  
SR 17564

DO NOT FILL IN  
Permit Number 2007030310  
Expiration 09-29-07  
SN \_\_\_\_\_

WELL PERMIT  
(Please Print)

Boring/Well - PGE-6

DO NOT FILL IN  
Date 03-29-07  
Amount \$ 233.00  
Receipt Number 62021  
Paid by ISAAC WOOD

1. OWNER: Name Pacific Gas and Electric Co.  
Attn: Glen Riddle  
Mailing Address PO Box 337  
City Needles, CA Zip 92363  
PG&E Topock Compressor Station  
Site Address off I-40 @ Park Moabi exit  
City Needles, CA Zip 92363  
Telephone Number (760) 326-5516

Items 6 through 10 to be estimated for new wells, exact for all other wells

5. ANNUAL SEAL: Seal Depth \_\_\_\_\_ Ft  
Furnished by: ☐ Owner ☒ Contractor  
20  
☒ Driven Conductor Dia. \_\_\_\_\_ inches in., Wall (Gage) \_\_\_\_\_  
☐ Sealing Material \_\_\_\_\_, Thickness \_\_\_\_\_ in.  
TYPE 5 CMT

6. DEPTH OF WELL (feet):  
Proposed \_\_\_\_\_ Existing 180 feet  
DIAMETER OF BORE (in.): 14 inches

2. WELL DRILLER: Prosonic ALBERT LONGYEAR  
Business Name  
4/2/2007 4/13/2007  
Start Date Completion Date

7. CASING INSTALLED:  
☒ Steel ☐ Plastic ☐ Other

From (ft.)	To (ft.)	Dia. (in.)	Wall (Gage)
0	180	14	Steel

Gravel Pack: ☐ Yes ☒ No  
From \_\_\_\_\_ to \_\_\_\_\_ ft.

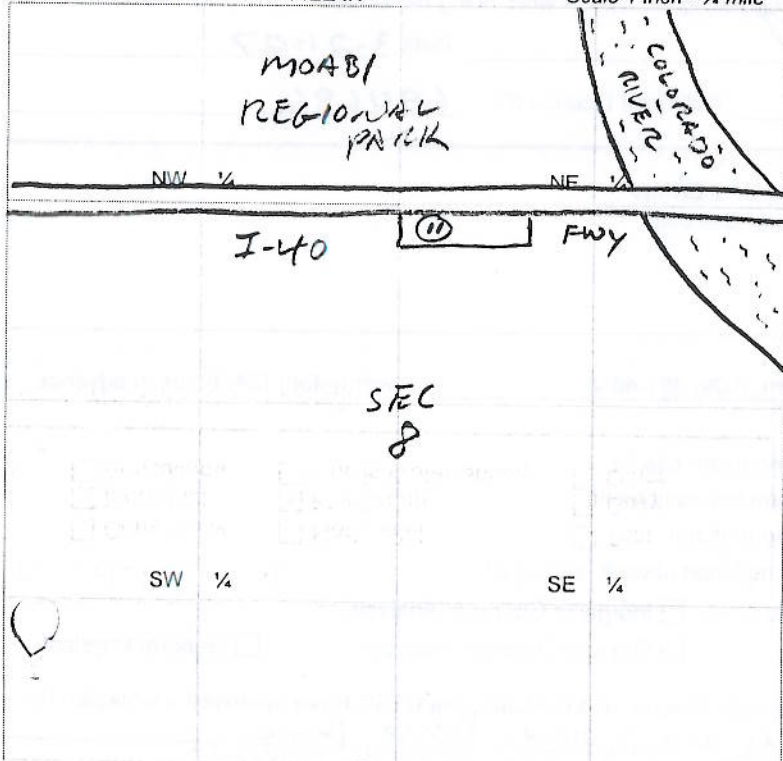
Unknown Gravel Pack depth

8. PERFORATIONS (if applicable):  
From 110 to 180 ft.

9. SEALED ZONES (if applicable):  
From \_\_\_\_\_ to \_\_\_\_\_ ft.

SECTION MAP - DO NOT FILL IN

Scale 1 inch = 1/4 mile



10. LOCATION INFORMATION 352 C11  
(a) TOWNSHIP:  
Tier 7 N Range 24 E Section 8  
(b) Assessor's Parcel No. 0650-161-11  
(c) Latitude and Longitude  
Lat: 5 ° 56 ' 26.040 "N/S  
Long: 95 ° 14 ' 15.203 "E/W  
(d) Solid or Liquid Disposal Site within Two Miles  
☐ Yes ☒ No  
Location \_\_\_\_\_

DO NOT FILL IN

Seal \_\_\_\_\_  
Cap \_\_\_\_\_  
Check Valve \_\_\_\_\_  
Electricals \_\_\_\_\_  
Stab \_\_\_\_\_  
Tag \_\_\_\_\_  
Building & Safety Notified \_\_\_\_\_



Assessor's Parcel No. 0650-161-11

11. PLOT PLAN:

(a) In perspective to the well site, sketch and label the following items: well lot property lines, other wells (include abandoned wells), sewage disposal systems (sewers, septic tanks, leaching fields, seepage pits, cesspools), lakes and ponds, watercourses and animals or fowl kept.

(b) Indicate the distance, in feet, of any of the following which are within 500 ft. of the well site:

Other	_____
Sewers	_____
Septic tanks	_____
Leaching fields	_____
Seepage pits	_____
Cesspools	_____
Lakes and ponds	_____
Watercourses	500 ft
Animal or fowl kept	_____

See Attached  
Location Map

(c) ☐ None of the above are within 500 feet of the well site.

Scale: 1/2 inch = 100 feet

12. I have read this application and agree to comply with all laws regulating the type of work being performed.

C-57 Contractor's Signature

Date 3-21-07

County Registration No. 161

California License No. 694686

DISPOSITION OF PERMIT

(For Department Use Only)

- ☐ Sent to Water Agency for review.  
☐ Water Agency conditions or recommendations attached.  
☐ Denied

☒ Approved subject to the following:

A. ☒ Notify the Department, Safe Drinking Water Program, (909) 387-4666, twenty-four (24) hours in advance to make an inspection of the following operations:

- ☐ Prior to sealing of the annular space or filling of the conductor casing.  
☐ After installation of the surface protective slab and pumping equipment.  
☒ During destruction of wells, prior to pouring the sealing material.

B. ☒ Submit to the Department, within thirty (30) days after completion of work, a copy of:

- ☒ Water Well Driller's Report ☐ Bacterial Analysis ☐ Inorganic Chemical Analysis  
☐ Radiological Analysis ☐ General Mineral ☐ Organic Chemical analysis ☐ General Physical

Comments

U.S. Fish and Wildlife Service, the Havasu National Wildlife Refuge, and the California DTSC have approved a workplan for destruction of PGE-6. All necessary permits are in place. Please phone

Isaac Wood at CH2M Hill for questions regarding this permit



**Attachment 4**  
**Video Report**

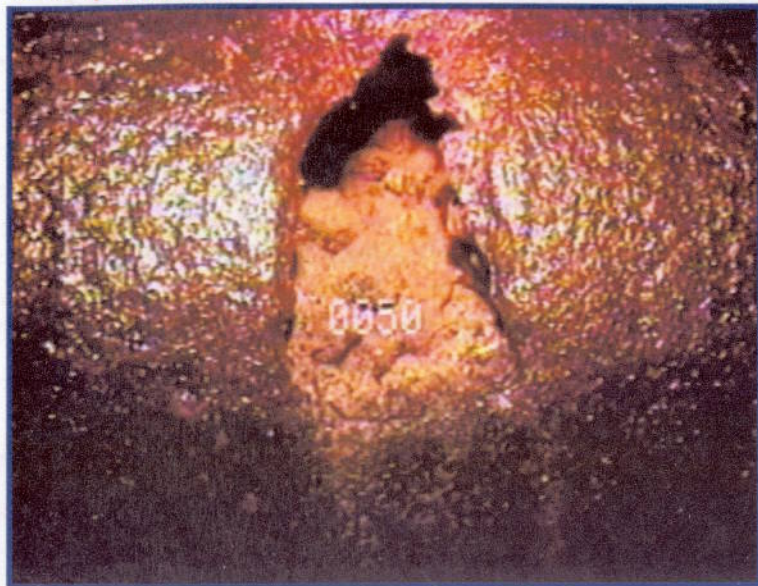
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(NOTE: Latitude and Longitude values determined using a recreational GPS accurate to +/- 45'. The SEC, TWP, RGE and Meridian then determined using the TRS conversion program, accuracy not guaranteed.

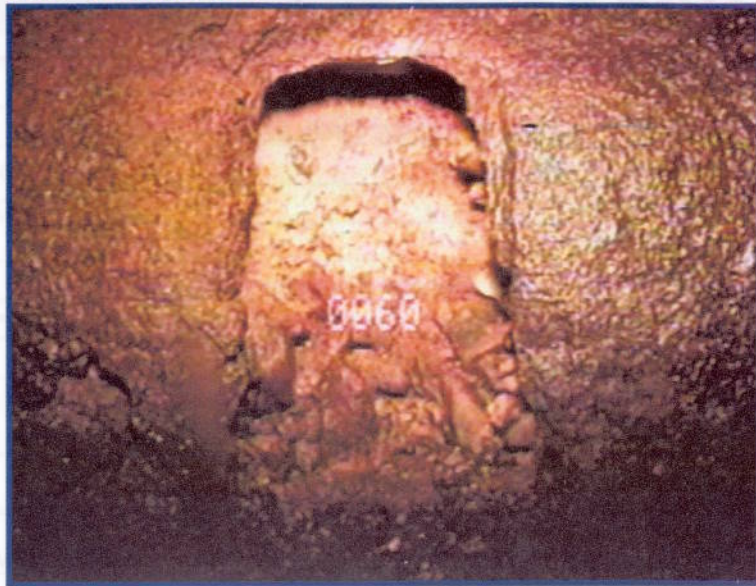
welenco, inc. 5201 Woodmere Drive, Bakersfield, California, 93313 Phone: (800) 445-9914, Fax: (661) 834-2550, Web: [www.welenco.com](http://www.welenco.com)



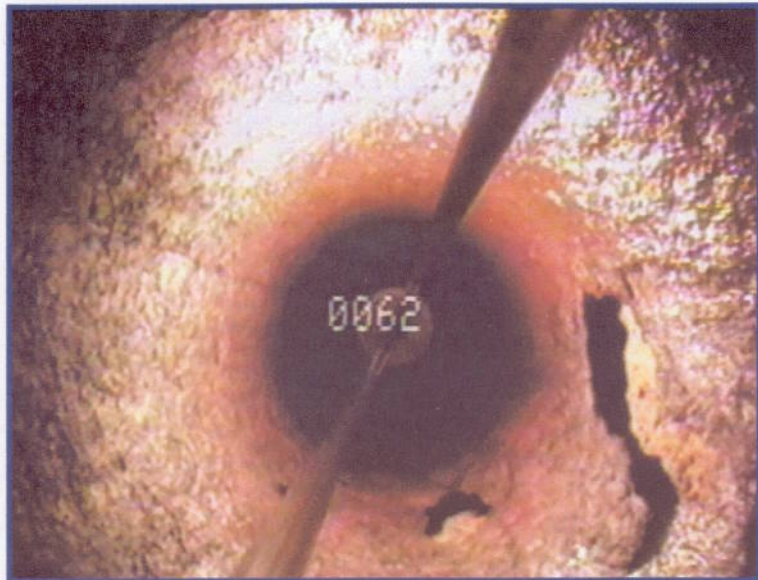
0050' (Enlargement)



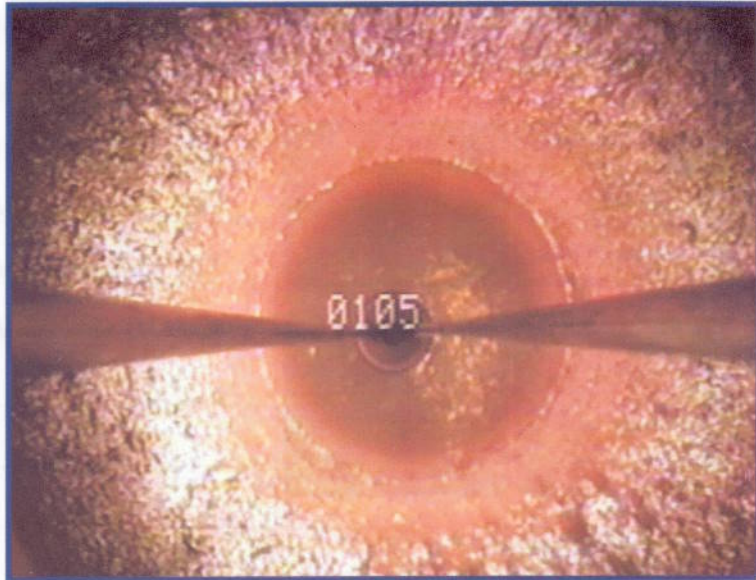
0060' (Enlargement)



0062' (Enlargement)



0105' (Enlargement)



0142' (Enlargement)



0160' (Enlargement)

