**Pacific Gas and Electric Company**

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November 10, 2006

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

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

Dear Mr. Yue:

This letter transmits the *Well PGE-6 Revised Decommissioning Work Plan*. The revised work plan is submitted in conformance with DTSC's October 23, 2006 letter.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 234-2257.

Sincerely,

Julie Eakins for Yvonne Meeks

cc. Karen Baker/DTSC
Chris Guerre/ DTSC
John Earle/HNWR
Casey Padgett/DOI

Enclosure

# Well PGE-6 Revised Decommissioning Work Plan

## PG&E Topock Compressor Station
## Needles, California

Prepared for

## California Department of Toxic Substances Control

On Behalf of

## Pacific Gas and Electric Company

November 10, 2006

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, CA 94612

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## PG&E Topock Compressor Station
## Needles, California

Prepared for
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On behalf of
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November 10, 2006

**This work plan was prepared under supervision of a California Certified Engineering Geologist**


Paul Bertucci, C.E.G.
Project Hydrogeologist

# Contents

# Acronyms and Abbreviations

| | |
|---|---|
| µg/L | micrograms per liter |
| bgs | below ground surface |
| BLM | U.S. Bureau of Land Management |
| Cr(VI) | hexavalent chromium |
| DTSC | California Department of Toxic Substances Control |
| DEHS | San Bernardino County Department of Environmental Health Services |
| DWR | California Department of Water Resources |
| ft bgs | feet below ground surface |
| HNWR | Havasu National Wildlife Refuge |
| IDW | investigation-derived waste |
| PG&E | Pacific Gas and Electric Company |
| USFWS | U.S. Fish and Wildlife Service |

# 1.0 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). In a January 6, 2006 letter "Conditional Approval of the Draft Well Installation Work Plan for Interim Measures Performance Monitoring Program, PG&E Topock Compressor Station" (DTSC 2006a), DTSC requested a technical memorandum be submitted by February 28, 2006 with recommendations regarding whether the inactive water supply well PGE-6 should be decommissioned. If decommissioning was recommended, DTSC required that a work plan for decommissioning be submitted on the same date as the technical memorandum. PG&E submitted the *Well PGE-6 Decommissioning Work Plan* (Work Plan) to DTSC on February 28, 2006 (CH2M HILL 2006a).

Existing well construction, drilling logs, water level, and water quality data were reviewed for PGE-6 and nearby wells. Recommendations for the potential future use and decommissioning of PGE-6 were provided in the technical memorandum that accompanied the Work Plan entitled *Well PGE-6 Decommissioning Evaluation, PG&E Topock Compressor Station (*CH2M HILL 2006b). The technical memorandum recommended that PGE-6 could possibly be useful as an injection or extraction well in a pilot test of in-situ remediation. After the pilot test was complete, or once it is determined that PGE-6 wouldn't be needed for the pilot test, it was recommended that the well be decommissioned. This work plan describes the methods, materials, waste management, schedule, and authorizations pertinent to the decommissioning work.

In a letter dated October 23, 2006, DTSC provided comments on the February 2006 Work Plan for decommissioning well PGE-6 (DTSC 2006b). DTSC's comments required modified procedures for decommissioning well PGE-6 and requested that a revised Work Plan be submitted by November 10, 2006. The February 2006 Work Plan has been revised to incorporate DTSC's comments on decommissioning procedures and field work staging areas, as directed.

## 1.1 Well PGE-6 Construction Details and Present Condition

As shown on Figure 1, well PGE-6 is located approximately 400 feet northeast from the northern boundary of PG&E's Topock Compressor Station, in an area known as the MW-24 bench. PGE-6 was originally installed in 1964 as a standby industrial water supply well for the Topock Compressor Station. It has not been in service as a production well since at least 1971 and was reportedly rarely pumped prior to that time. It has been sampled periodically since 1997. Concentrations of hexavalent chromium [Cr(VI)] in samples from PGE-6 have ranged from non-detect (<10 micrograms per liter [µg/L]) to 3,100 µg/L.

Information on the drilling, construction, and current conditions of PGE-6 are included in Attachment A. The 1964 drillers log indicates that the well was constructed to a depth of 180 feet below ground surface (ft bgs) with 14-inch steel casing. A 20-inch diameter

conductor casing extends to a depth of 19 feet. The screened interval extends from 110 feet to 180 feet bgs with 3/32-inch by 1-inch long vertical cut slots. Based on available 1964 construction specifications in PG&E files, the 14-inch well casing is believed to have been installed directly (i.e., driven) in the 14-inch diameter borehole without an annular space, gravel pack, or bentonite seal. The construction records indicate that a drive shoe was installed on the bottom of the casing, which would imply that there is no end cap on the well.

A 1998 video log of PGE-6 shows the well to be filled with sediment or collapsed to a depth of 162 feet bgs. A well schematic diagram of the current condition of PGE-6 is provided in Attachment A. The PGE-6 video log (logging report included in Attachment A) shows the well casing to be in very poor condition. Numerous holes are visible in the casing between about 60 and 100 feet. The perforated well screen is heavily corroded and encrusted. The casing above the screen is in such poor condition that there is significant potential risk of collapse if attempts were made to clean out or rehabilitate this well.

# 2.0 PGE-6 Decommissioning

## 2.1 Site Access and Preparation

The MW-24 bench is on federal land owned by the Havasu National Wildlife Refuge (HNWR) and managed by the U.S. Fish and Wildlife Service (USFWS). Trucks and equipment needed to do the decommissioning work at PGE-6 will have to negotiate a steep, one-lane dirt road that leads from the Compressor Station down to the MW-24 bench. This road frequently becomes rutted after rains and may require some grading or filling of ruts to allow equipment access to the well site. Equipment needed for decommissioning may include a backhoe, dump truck, front loader, cement truck or trailer, and pump service truck. The decommissioning work could be accomplished in two to three days. Because of the short duration of the work and the relatively small amount of materials needed, there will be no need for an equipment or materials staging area. However, if a staging area becomes necessary, an area on the Compressor Station southeast of PGE-6 will be used for storing equipment and materials (Figure 1). It may be necessary to locate some pallets of cement at the work site during the decommissioning work. These would be stored in the areas outlined on Figure 1.

Buried gas pipelines cross PG&E and federal property just outside the north gate of the Compressor Station. An earthen berm will need to be placed over top of these pipelines to allow the safe passage of heavy vehicles across them. This berm would be removed at the completion of the decommissioning work.

Well PGE-6 is in an area that has been previously graded and is very sparsely vegetated. There are a few small creosote bushes located near the well that may be affected. It will not be necessary to trim or destroy any other vegetation during the course of this work.

## 2.2 Well Decommissioning Requirements and Scope

PGE-6 currently has a pump used for groundwater sampling that must be removed prior to the well decommissioning activities. It is unknown if a check valve is equipped on the pump. If one exists, the water column within the pump drop pipe will be discharged into 55-gallon drums or portable tanks and transported to the IM-3 treatment plant for processing. The pump will be removed and stored at the staging area until further disposition.

In accordance with DTSC's comments and requirements (DTSC 2006b), the PGE-6 decommissioning activity will involve an attempt to remove the collapsed formation or sediment fill at the bottom of the well, collection of a new well video log, complete sealing of the well using cement grout, and excavation and capping below grade of the well casings, as described below. Figure 2 presents a schematic diagram of the specifications and conditions proposed for decommissioning PGE-6.

Well decommissioning will be conducted in accordance with state and county regulations and guidelines. The San Bernardino County Department of Environmental Health Services (DEHS) is the lead agency the permitting and oversight of well decommissioning activities at the PG&E Topock site. Per San Bernardino County requirements, the area around the wellhead must be excavated and the casing removed from the uppermost 5 feet of the well. Except for this additional requirement, San Bernardino County follows the California Department of Water Resources (DWR) Standards which specify the techniques and types of materials suitable for well decommissioning.

Well decommissioning typically involves perforation of the casing in the upper portion of the well to allow the grout to penetrate and seal any annular space outside the casing. Based on the presence of a drive shoe on the bottom of the casing, it is likely that there was no annular space in the borehole when PGE-6 was installed. Due to the poor condition of the casing in PGE-6 it is likely that attempts to perforate the well might cause it to collapse. In preparing the February 2006 Work Plan, DEHS was contacted to discuss the proper means of decommissioning PGE-6. Because there is a significant risk of collapse if attempts were made to perforate the casing and considering that the casing is already perforated by corrosion in many places, the DEHS agreed that perforation of the casing in PGE-6 would not be required (personal communication between Martin Barackman/CH2M HILL and Marvyn Cerdenio/San Bernardino County DEHS, February 17, 2006).

DTSC's letter of October 23, 2006 directs that attempts be made to bail and perforate this well in order to assure a more thorough seal through this Cr(VI)-impacted aquifer. It is understood that there is some risk of well collapse associated with these activities. PG&E understands DTSC's direction to be that if the well collapses during the decommissioning process, it will be acceptable to DTSC to continue with the grouting operations outlined in this Work Plan and that DTSC will not require over-drilling of this well.

In their October 23 letter, DTSC required modified and additional procedures for decommissioning PGE-6 beyond the approach described in the February 2006 Work Plan. Per DTCS direction, and if conditions allow, the PGE-6 well decommissioning will include the following work activities:

1. Removal of sediment at the bottom of the well (162-180 ft bgs) will be attempted using a high-capacity suction bailer. If the sediment elevation does not decrease within a reasonable amount time (30-60 minutes), the bailing will be terminated. The sediment level will be measured during bailing. Sediment bailed from PGE-6 will be discharged into 55 gallon drums and stored at the staging area as IDW. The estimated sediment and liquid volume bailed from the well will be recorded.

2. To increase water clarity after using the high-capacity suction bailer, potable water will be added to the well through a garden hose until approximately 5-10 casing volumes of water are replaced. This will be necessary to increase visibility in the well prior to use of a downhole video camera.

3. After the water in the well has been cleared by flushing the well with potable water, a video camera survey will be conducted.

4. Tremied cement grout or poured bentonite chips will be emplaced in the bottom portion of the well screen (approximately 150 to 180 ft bgs). This procedure is intended to ensure

that the bottom of the well (assuming the well is open at the bottom) and that the final sediment fill interval in the bottom of the well casing is sealed.

5. If the video log indicates mostly closed or sealed screen perforations and no significant holes or breeches in the casing, a 10-foot interval above the bottom seal and below the historical static water level (106 ft bgs) will be perforated using a mechanical or hydraulic perforator (approximately 130-140 ft bgs). The perforating method used will be based upon the driller's recommendations but will not involve explosives. The intent of perforating the casing screen is to establish a grout seal if annular space is present between the outside of the well casing and the formation.
6. A packer will be utilized inside the 14-inch well casing to pressure cement grout the screened interval and any sections of blank casing where holes are visible in the video log. The packer will then be removed and grout placement will continue into the remainder of the well casing.
7. The concrete well pad will be removed and backfill/concrete around the 20-inch conductor casing will be excavated to approximately 6 ft bgs. It will be confirmed that concrete is securing the 20-inch conductor casing at that depth.
8. The 20-inch conductor casing and 14-inch well casing will be removed 5 ft bgs using a cutting torch.
9. If no grout seal is present around the outside of the 20-in conductor casing, the excavation will advance to the maximum depth practical to allow full surface seal around the outside of the 20-in conductor casing.
10. A concrete "mushroom cap" will be installed as a surface seal to a minimum depth of 3 ft bgs over the 14-inch well and 20-inch conductor casings. The remainder of the excavation will be backfilled with soil from the excavation and regulatory-approved backfill materials (see next section).

### 2.2.1 Backfill Materials

Section 23 of California Department of Water Resources Water Well Standards (DWR 1991) specifies the methods and materials to be used in decommissioning wells. For wells situated in unconsolidated material, such as the Alluvial Aquifer at the site, these standards specify that the lower portion of the well may be filled with clay, silt, sand, gravel, crushed stone, native soils, or mixtures of these materials so long as no organic matter is included. The uppermost 20 feet of the casing must be filled with impervious material with a coefficient of permeability less than 10 feet per year. San Bernardino County recommends a cement grout mixture for the impervious material in the upper portion of the well. Consistent with these regulations, the following backfill materials are proposed for decommissioning PGE-6:

- Bottom portion of well (depth greater than approximately 150 ft bgs): bentonite cement grout or bentonite
- Upper portion of well (depth less than 150 ft bgs): bentonite cement grout
- Surface excavation where casing was removed: native soil

Figure 2 provides a schematic diagram of the final decommissioned well.

### 2.2.2 Surface Excavation and Casing Removal

San Bernardino County requires removal of the top 5 feet of casing during decommissioning. This involves excavating a trench around the casing large enough and deep enough for personnel to enter and operate cutting tools. PGE-6 includes both a 20-inch diameter conductor casing and a 14-inch diameter production casing. The records do not indicate what material was used to fill the annular space between the conductor and surface casings. If concrete was used in this annular space, the size of the excavation might need to be as large as 10 feet in diameter and up to 7 feet deep to allow use of a jackhammer in the excavation. The excavation will be benched and sloped to allow workers to enter the excavation without the need for shoring. All excavation activities will meet applicable California OSHA regulations pertaining to excavation work.

The soil excavated from the hole will be placed back in the hole as backfill. Additional clean topsoil will be added as needed to re-establish the existing grade. Backfill materials will be compacted using the backhoe during emplacement. The surface will be restored to original grade and smoothed.

### 2.2.3 Grout Requirements

The grout requirements are as follows:

- The grout will be a bentonite cement mixture in the following proportions:
  - 94 pounds of neat Type V Portland or American Petroleum Institute Class A cement
  - Not more than 7 gallons of potable water and approximately 3 to 5 pounds of powdered bentonite per sack of cement
- All grout will be pumped into place using a tremie pipe beginning at the bottom of the borehole. The end of the tremie pipe will be kept at least 2 feet below the surface of the grout during emplacement.
- The cement grout will extend from a depth of approximately 150 feet below grade to the top of the cut-off casing at approximately 5 feet below grade.
- The expected volume of each ingredient in the grout mixture will be pre-calculated and documented.
- Grout will be poured in a single continuous lift and will completely fill the cut off well casing and flow out into the excavation around the casing.
- Grout will be allowed to cure for at least 30 minutes prior to placing any backfill in the surface excavation.

San Bernardino County will be notified at least 4 hours prior to grouting to provide them the opportunity to have a representative onsite during grouting.

# 3.0 Waste Management

Investigation derived waste (IDW) materials that will be generated during well decommissioning include incidental trash, the 5-foot sections of steel casing that will be cut off the top of the well, and possibly a small amount of Cr(VI)-bearing groundwater.

Incidental trash typically includes empty cement and sand bags, pallets, empty drink and food containers, plastic sheeting and other disposables associated with construction work. Incidental trash will be collected at the end of each shift and hauled off the site to an appropriate disposal facility.

The 5-foot sections of well casing will be pressure washed to remove any residual contamination and, depending on the condition of the steel, either recycled as scrap metal or disposed of as solid waste. The IDW will be placed on secondary containment at the MW-24 bench while the well decommissioning work is underway, then moved to staging areas on PG&E Compressor Station property.

As the top of the grout approaches the top of the casing, any groundwater found to be floating on top of the grout layer will be pumped off and placed in drums or a temporary tank near the well site. No groundwater will be allowed to spill out of the top of the well casing.

Any groundwater generated during the decommissioning operation will likely have a very high pH from being in contact with the grout. If the pH is greater than 12.5, this water would be classified as hazardous waste and managed accordingly. If the pH is less than 12.5, the water would be managed in the same way as other purge water at the Topock site.

# 4.0 Schedule and Reporting

The PGE-6 decommissioning activities are subject to obtaining approvals and authorizations as outlined in Section 5.0. Therefore, the schedule below is presented in terms of duration of work without a definite start date being identified. Per DTSC's letter of October 23, 2006, PG&E will work to complete the well decommissioning prior to the start of the uplands in-situ pilot study.

**TABLE 1**
Duration of Major Tasks
*Well PGE-6 Decommissioning Work Plan,*
*PG&E Topock Compressor Station, Needles, California*

| Activity | Duration |
|---|---|
| Site Preparation Work (grading of road, berm over gas pipeline) | 10 days |
| Mobilize Equipment to Site | 7 days |
| Decommissioning Work | 4 days |
| Reporting | 60 days |

Within 60 days of the completion of the decommissioning work, PG&E will submit a report documenting the decommissioning of the well. This report will include documentation of the decommissioning activities, quantities of materials used, photographs of the decommissioning work, and copies of the well destruction reports filed with the California Department of Water Resources and San Bernardino County.

# 5.0 Required Approvals and Authorizations

Table 2 provides a listing of approvals that have been identified as applicable to the decommissioning of well PGE-6 on the HNWR land near the PG&E Topock Compressor Station. Applicable approvals will be obtained prior to initiating any site preparation work or moving equipment to the site.

**TABLE 2**
Approvals for Well PGE-6 Decommissioning
*Well PGE-6 Decommissioning Work Plan,*
*PG&E Topock Compressor Station, Needles, California*

| Agency | Approvals and Authorizations |
|---|---|
| DTSC | Approval of decommissioning work plan |
| U.S. Fish & Wildlife Service, and Havasu National Wildlife Refuge | Approval of decommissioning work plan |
| San Bernardino County | Well Destruction Permit |

# 6.0 References

California Department of Toxic Substances Control (DTSC). 2006a. Letter to PG&E. "Conditional Approval of the Draft Well Installation Work Plan for Interim Measures Performance Monitoring Program, PG&E Topock Compressor Station." January 6.

_____. 2006b. Letter to PG&E. "Review of Workplan for Decommissioning Well PGE-6 at Pacific Gas and Electric Company, Topock Compressor Station, Needles, California." October 23.

California Department of Water Resources (DWR). 1991. California Well Standards. Bulletin 74-90, Part III Destruction of Wells. June.

CH2M HILL. 2006a. *Well PGE-6 Decommissioning Work Plan, PG&E Topock Compressor Station*. February 28.

_____. 2006b. *Well PGE-6 Decommissioning Evaluation, PG&E Topock Compressor Station*. February 28.

# Figures

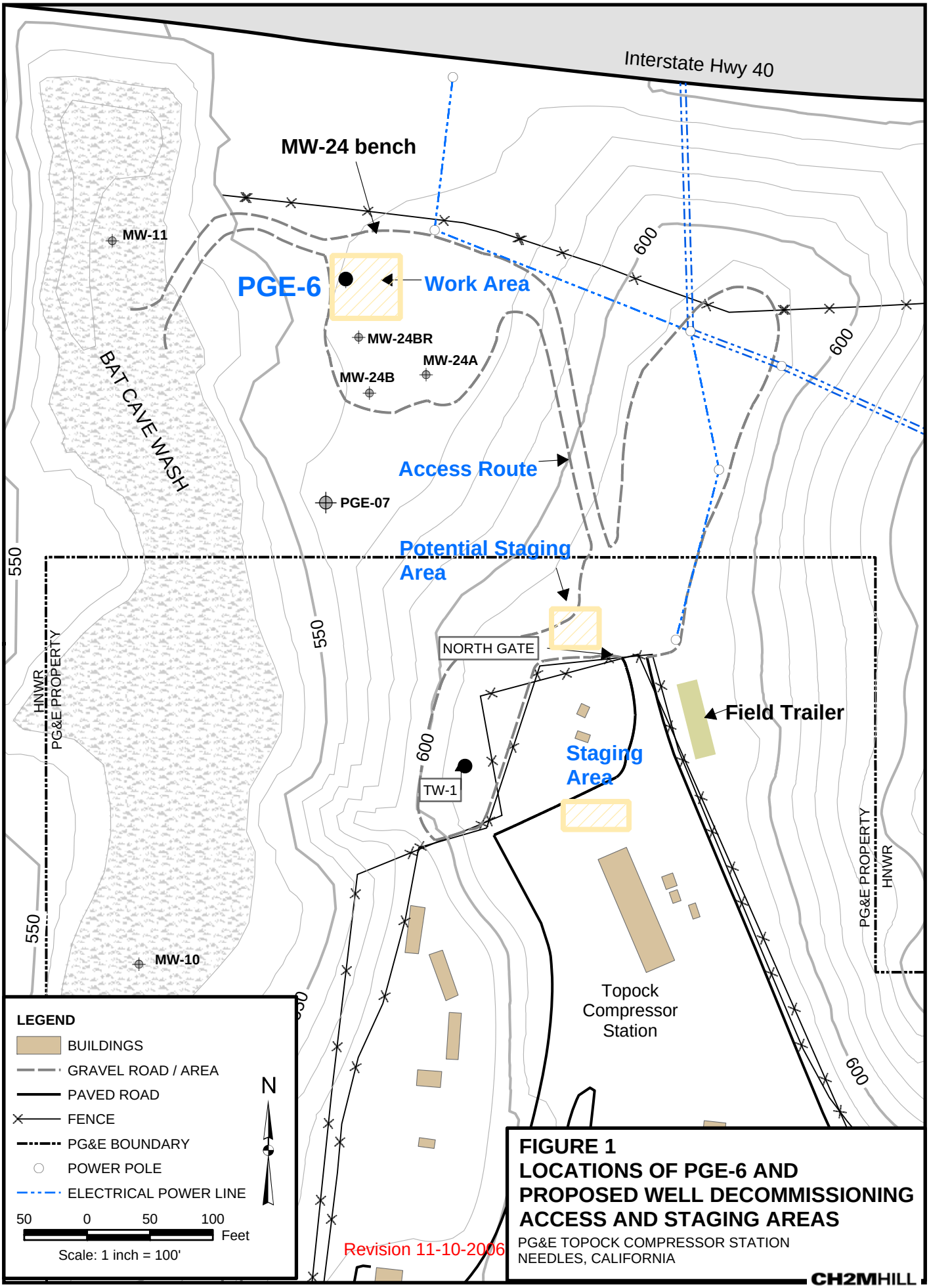
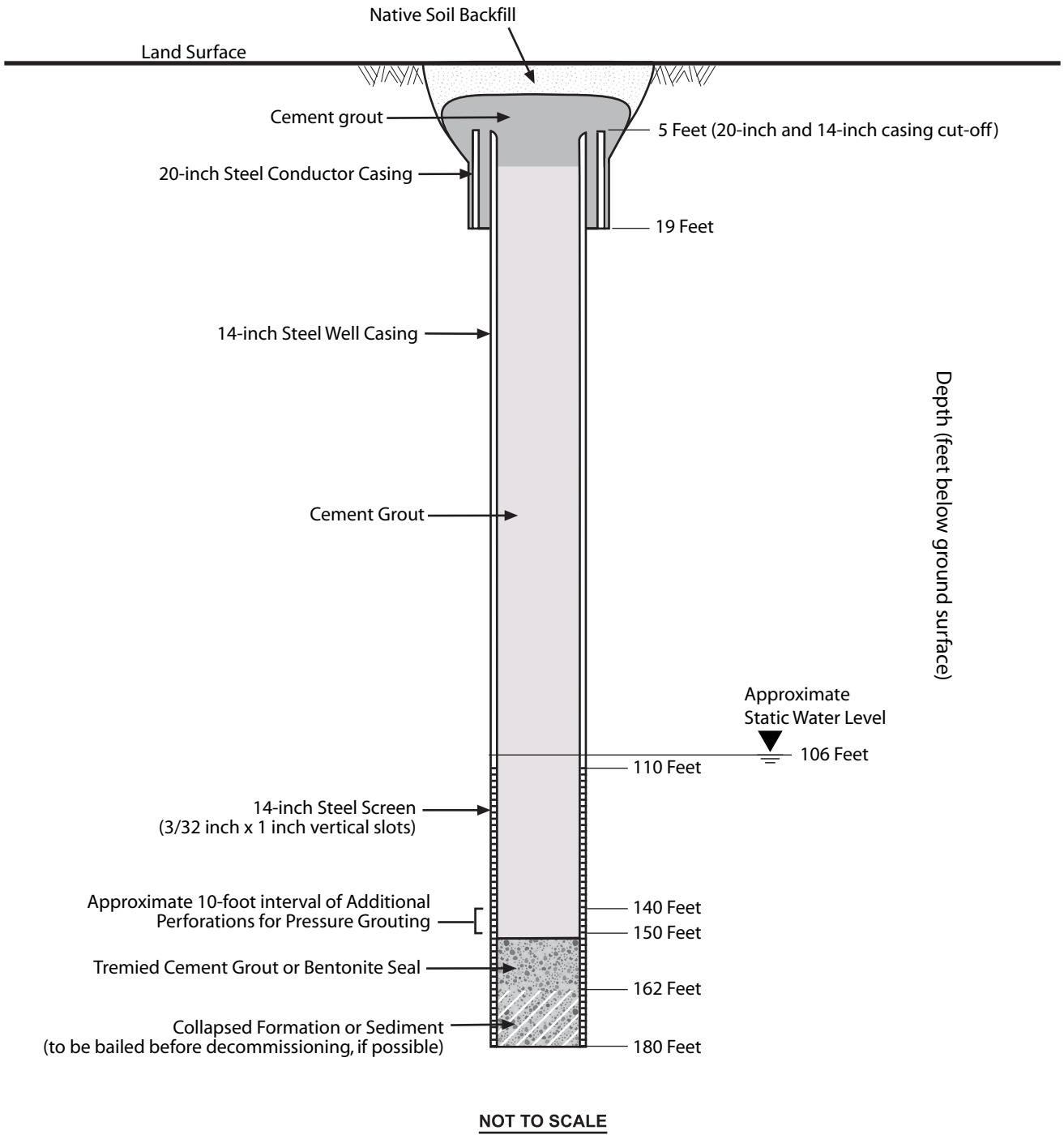



**FIGURE 1**
**LOCATIONS OF PGE-6 AND PROPOSED WELL DECOMMISSIONING ACCESS AND STAGING AREAS**
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL




**NOT TO SCALE**

Revised 11-8-06

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

CH2MHILL

ES112006001BAO PGE_6_figure2.ai 11-08-06 dash

# Attachment A
# Driller's Log and Video Logging Report (1998)

# PAUL R. PEAKER

WATER WELL REPAIRING AND DRILLING

ROUTE 6, BOX 522-T • TELEPHONE TH ornwall 5-0823

BAKERSFIELD, CALIFORNIA


June 17, 1964

WATER WELL LOG

for No. 6-WELL

Pacfic Gas and Electric Co., Box 488, Barstow, California
14", 180', at Topock Compressor Station.

| DEPTH | FORMATION |
|---|---|
| 0 - 19' | Boulders and gravel |
| 19 - 30' | Coblestone and gravel |
| 30 - 60' | Some boulders and gravel |
| 60 - 180' | Sand, gravel, and rocks |

CASING LOG

| | |
|---|---|
| 0 - 110' | Blank #8 gage Kai-weld |
| 110 - 180' | Perf. 3/32 x 1", with a 3/4 x 12 x 14" shoe on bottom |

There is 19' of 20" conductor pipe on top, and the water level is 106'.

PGS434692

Refer to G.M. 159114
Contract # 11-10-64
Contract # 11-29-64

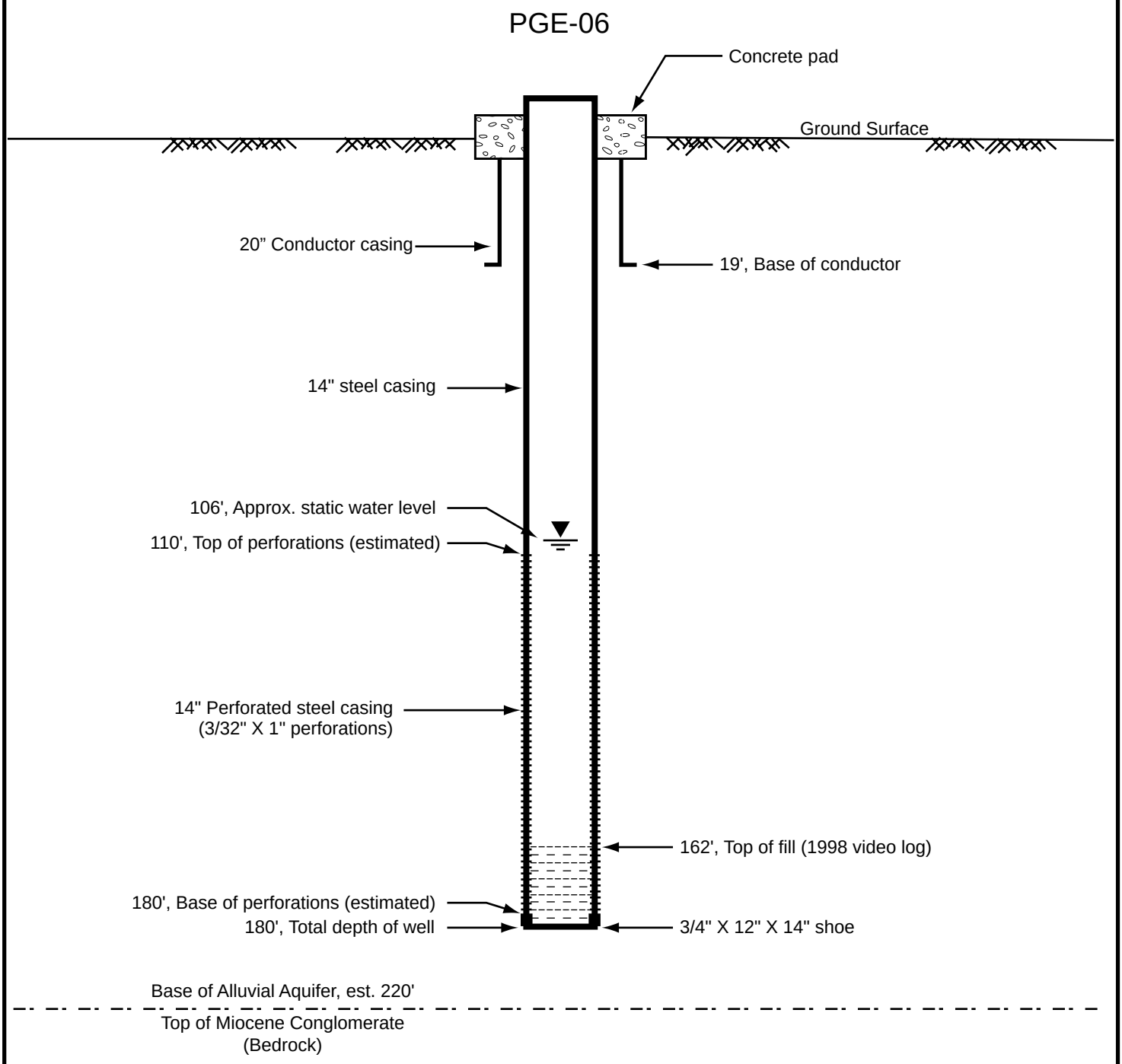



DIAGRAM NOT TO SCALE

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

CH2MHILL

# welenco
## VIDEO SURVEY REPORT

Fax (805) 834-2550 • (800) 445-9914 • (805) 834-8100

Customer ECOLOGY + ENVIRONMENT
Address 350 SANSOM ST Ste 300
City SAN FRANCISCO State CA Zip 94104
Request By RALPH LAMBERT Cust. P.O. _____
Copy To _____
Reason for Survey GENERAL INSPECTION

Job No. 29098 Run No. ONE
Well No. PG+E # 6 Date 3-25-98
Location TOPOCK - PG+E COMPRESSOR STATION - NEEDLES AREA
Zero Datum TOP OF CASING
Survey By DAN THOS Truck No. L-17

| DEPTH | REMARKS |
|---|---|
| 0 FT | RECORDING STARTS |
| 39 | MARK ON CASING |
| 50 | MARK ON CASING BEHIND PIPE |
| 58 | HEAVY SCALE |
| 63 | LARGE HOLE |
| 64 | LARGE HOLES TO 65' |
| 71 | HOLES |
| 74 | HOLES |
| 78 | HOLES |
| 98 | HOLES |
| 106 | STATIC WATER LEVEL - FAIR TO POOR VISIBILITY |
| 123 | BOTTOM OF PUMP |
| 162 | FILL - BOTTOM OF WELL |
| 110 | POSSIBLE TOP OF VERTICAL SLOTS |
| | |
| | |
| | |
| | |
| | |

**NOTE:** PUMP IN WELL - PERFORATIONS REPORTED 110' - 180'

**CASING CONDITION:**

ID at Surface 14" Reduces to _____ at _____ : _____ at _____ : _____ at _____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☒ Heavy ☒ Increases with Depth