Pacific Gas and Electric Company®

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April 22, 2005

Mr. Norman Shopay
Project Manager
California Department of Toxic Substances Control
Geology and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

Subject: Interim Measures Extraction System Operation and Maintenance Plan, Revision 0
Pacific Gas and Electric Company, Topock Project

Dear Mr. Shopay:

This letter transmits the *Interim Measures Extraction System Operation and Maintenance Plan, Revision 0*, for the Pacific Gas and Electric Company (PG&E) Topock site. This document has been prepared in compliance with Enclosure C, Action Item 2 (Interim Measures Extraction System Operation and Maintenance Plan submittal) in DTSC's February 14, 2005 letter. In the letter, DTSC established the performance standard, contingency and response action requirements, and deliverables associated with the Interim Measures activity in the floodplain area.

If you have any questions, please do not hesitate to contact me. I can be reached at (805) 546-5243.

Sincerely,

John Eaton for Yvonne Meeks

Cc: Kate Burger/DTSC

Interim Measures Extraction System Operation and Maintenance Plan

PG&E Topock Compressor Station
Needles, California

Prepared for

California Department of Toxic Substances Control

on behalf of

Pacific Gas and Electric Company

Revision 0

April 22, 2005

CH2MHILL
155 Grand Avenue, Suite 1000
Oakland, California 94612

Interim Measures Extraction System Operations and Maintenance Plan

prepared for
California Department of Toxic Substances Control

on behalf of
Pacific Gas and Electric Company

Revision 0
April 22, 2005

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

Paul Bertucci, C.E.G.
Project Hydrogeologist

Contents

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station in Needles, California under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). The Topock Compressor Station is located in eastern San Bernardino County, approximately 15 miles to the southeast of Needles, California (Figure 1-1).

In February 2004, DTSC directed PG&E to initiate an Interim Measure (IM) in the floodplain area of the site to prevent movement of the chromium plume toward the Colorado River. The current IM involves the pumping, treatment, transport and disposal of extracted groundwater near the floodplain area. The goal of the IM is to achieve a net landward gradient to hydraulically control the plume boundaries in this portion of the site.

The Interim Measures activity has been operated continuously under DTSC oversight since March 2004. In a letter to PG&E dated February 14, 2005, DTSC established the performance standard, performance criteria, and the contingency and response action requirements for the Interim Measures activity in the floodplain area.

The purpose of this document is to comply with Action Item 2 of Enclosure C in the February 14, 2005 DTSC letter to PG&E (DTSC 2005). Action Item 2 requires the submittal of an Interim Measure Extraction System Operation and Maintenance Plan (O&M Plan). Per the DTSC letter, this O&M Plan addresses:

- Documentation of and adjustments to groundwater extraction rates.
- Adjustments to the extraction system expansion in response to measured hydraulic gradients and position of the chromium plume.
- Contingencies in the event that a given extraction well is taken offline.
- Procedures and response times for well maintenance and repair.
- All design elements associated with bringing additional extraction wells online.
- Contingency plan for sentry well monitoring.

These topics are addressed in this document. Background information on the groundwater extraction system and general operation and maintenance procedures are described in the main sections of the *Interim Measures No. 3 Treatment and Extraction System Operation and Maintenance Plan* (CH2M HILL 2005a). As required by DTSC's February 14, 2005 directive, an associated *Performance Monitoring Plan for Interim Measures in the Floodplain Area* was prepared and submitted to DTSC April 15, 2005 (CH2M HILL 2005b).

Figure 1-2 shows the location of the IM groundwater extraction and treatment system and associated facilities. The extraction well system currently consists of TW-2D, TW-2S, and PE-1; all wells are located along the eastern portion of the plume area. Among this network of wells, groundwater extraction has been conducted at TW-2D and TW-2S. Currently,

TW-2D is the dedicated pumping well targeting extraction from the Lower zone of the Alluvial Aquifer. The piping system for extraction well PE-1 has not been installed due to biological resource constraints. The *Design Plan, Conveyance Piping and Power Supply for Extraction Well PE-1* (CH2M HILL 2005c) was submitted to DTSC and the U. S. Bureau of Land Management for approval. Upon authorization from the agencies and resolution of biological resource considerations, the PE-1 piping and power system will be installed and commissioned.

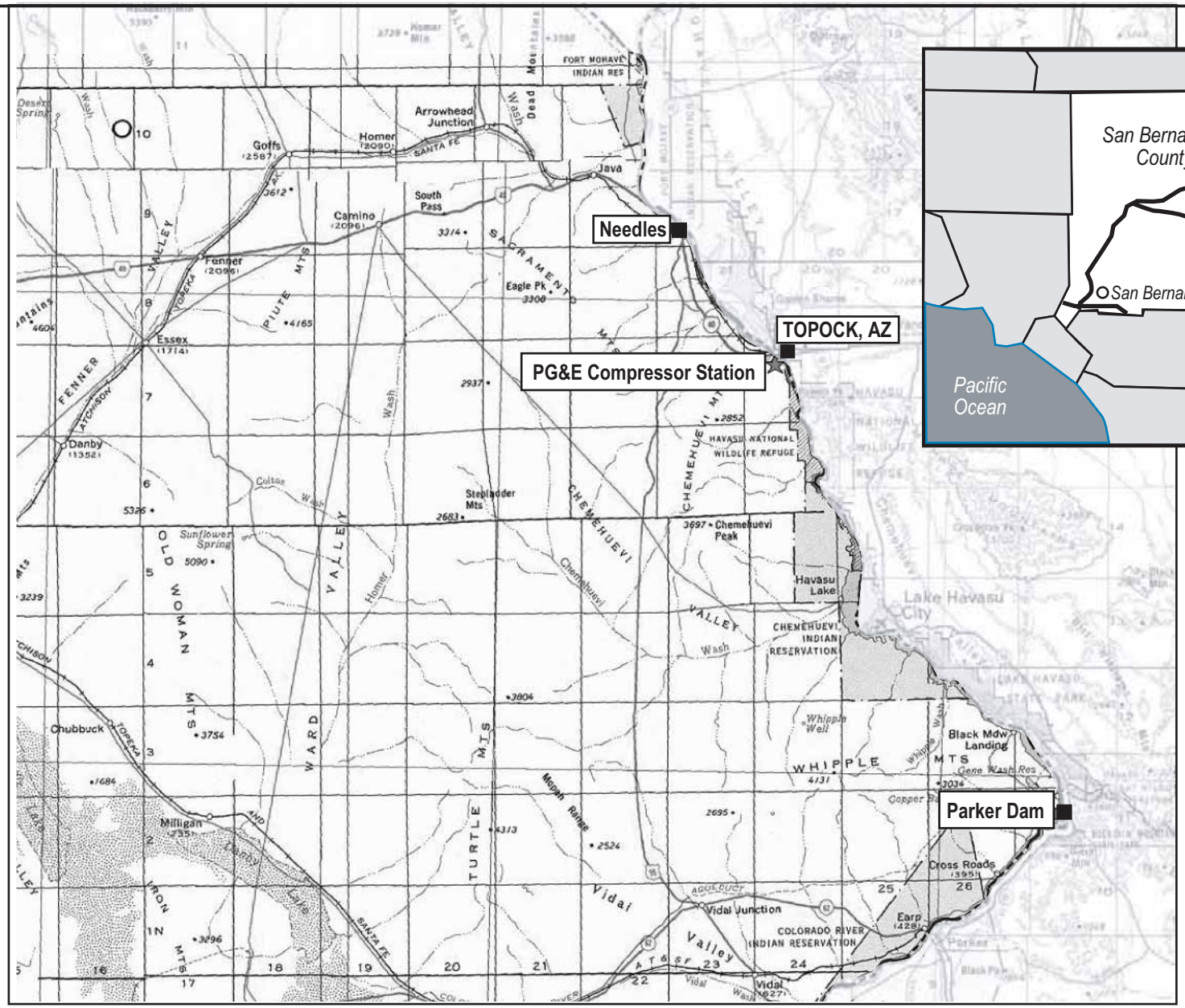


FIGURE 1-1
SITE LOCATION MAP
PERFORMANCE MONITORING PLAN FOR INTERIM MEASURES IN FLOODPLAIN AREA
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

326128.01.07.IM_Figure 1-1 SiteLocMap_4/14/05_ccc

N

0 350 700 Feet

1 inch equals 350 feet

California State Plane NAD83 Zone 5 US Feet

Treatment Plant

Injection Well IW-2

Injection Well IW-3

Potential Extraction Well PE-3

Park Moabi Rd.

Colorado River

MW-20 Bench

Extraction Well PE-1

Existing TW-2S, TW-2D Extraction Wells

Potential Extraction Well PE-2

Pipeline Route

BAT CAVE WASH

Old Route 66

BN&SF RAILROAD

INTERSTATE 40

66

FIGURE 1-2
PROJECT SITE PLAN

INTERIM MEASURES NO. 3 EXTRACTION AND TREATMENT SYSTEM
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

2.0 Adjustments to Groundwater Extraction Rates

The performance of the IM will be continuously monitored and evaluated to ensure that the hydraulic containment objective in the floodplain area is met and appropriate and timely adjustments can be made to the extraction system. Refer to the Performance Monitoring Plan for Interim Measures (CH2M HILL 2005b) for the decision process and description of the data collection, performance evaluation, and response action activities. Per DTSC requirements, the first contingency response action will be to increase pumping from the existing extraction wells. The procedures and documentation for this response action are described below.

2.1 Extraction Rate Adjustments

The target groundwater extraction rate for each month will be set at the higher of two rates: (1) the rate determined from groundwater model projections of required pumping rates based on predicted river stage and (2) the minimum rate specified by DTSC. The cumulative discharge flow rate from all operating extraction wells will be adjusted to exceed the target extraction rate. The discharge flow rate of each extraction well pump will be adjusted by the plant operator using the manual control valve located in the well vault to the approximate required flow rate. Although the well pumps may be temporarily cycled on and off by the control system to maintain a level of approximately 30-percent full in the raw water storage tank (T-100), the target extraction rate will be achieved monthly under routine operations. Throttling the manual control valve at the well head will help minimize pump cycling.

2.2 Documentation of Extraction Rate Adjustments

The discharge flow rate from each well pump will be recorded by flow meters (e.g., FE 101 for TW-2D). This information will be logged in the Interim Measures (IM) No. 3 system's computerized data records and will be retrieved through data downloads. Discharge flow rate readings will be recorded at least once per 10-minute interval. In addition, operators will record the "Target Extraction Rate" and "Current Extraction Rate" in the Daily Process Monitoring Checklist. Changes to the target extraction rate and/or discharge flow rate from each well pump will also be recorded in the Daily Process Monitoring Checklist.

The monthly/quarterly Performance Monitoring Reports will include groundwater extraction details. Average extraction rates and adjustments, as well as cumulative extracted volumes for the reporting period, will be documented in these reports.

3.0 Adjustments to Extraction System Expansion in Response to Measured Hydraulic Gradients and Position of the Chromium Plume

The ongoing IM floodplain performance monitoring consists of data collection, analysis, and evaluation. The floodplain performance monitoring data collection includes pressure transducer data in floodplain wells (i.e., hydraulic head readings), chemical sampling data at the floodplain well locations (i.e., hexavalent chromium [Cr(VI)], total chromium, and other water quality parameters), and extraction well operational data (i.e., flow and water quality). As directed by DTSC, the performance monitoring data will be analyzed monthly to calculate the hydraulic gradient at key well pairs to evaluate whether the IM objective has been achieved (CH2M HILL 2005b). Based on the hydraulic gradient and the chromium distribution and trends, the performance of the extraction system will be reported to DTSC.

If it becomes apparent, through water level monitoring or increasing concentrations of Cr(VI) in certain wells, that there are areas of the plume not being adequately captured by the existing wells, PG&E is prepared, at the direction of DTSC, to increase pumping rates or add one or more additional extraction wells.

Locations for potential extraction wells PE-2 and PE-3 have already been selected (Figure 1-2). The appropriate location of any new extraction well would be confirmed in consultation with DTSC. Groundwater modeling would be conducted to develop a pumping strategy that would incorporate the new well(s).

In addition, the groundwater model is used as a tool at the beginning of each month to forecast pumping requirements for that month based on the U. S. Bureau of Reclamation projections of Davis Dam releases and Lake Havasu levels. The actual water level data are obtained twice monthly from the I-3 gauge near the Topock site and the floodplain wells and compared against the Bureau of Reclamation projections. Corrections to the pumping rates can be made if the gradients are significantly larger or smaller than the target gradients. Evaluating this data is a way of preparing for unpredicted changes in the river level and of providing a tool to adjust the extraction rates mid-month, as needed. The groundwater model continues to be revised to improve its ability to match observed pumping rates and gradients.

The present gradient target of 0.001 feet per feet (ft/ft) was set by DTSC based on an estimate of the uncertainty inherent in the present methods of water level and salinity measurements. The purpose of this minimum gradient target is to insure that random error in the water level measurements will never result in a false indication of a landward gradient. PG&E is presently installing new data loggers in key wells that will measure salinity continuously along with water levels. If it can be shown that these new data loggers

have substantially reduced the uncertainty in the water level measurements, PG&E may request a re-evaluation of the 0.001 ft/ft minimum gradient target.

4.0 Contingencies in the Event that a Given Extraction Well is Taken Offline

Three wells will be available for extraction: TW-2D, TW-2S, and PE-1. Well TW-2D is expected to supply most of the extraction pumping, with supplemental pumping from wells TW-2S and PE-1.

In the event that a given extraction well is taken offline for more than 4 hours:

- DTSC will be consulted to determine an appropriate pumping strategy. This may include activation of additional available extraction wells to meet pumping needs, as shown in Table 4-1, or increasing extraction rates when the offline well is restarted.
- Maintenance or repair of offline well will be completed as soon as possible.

TABLE 4-1
Contingency Well Operation Plan
Extraction System Operation and Maintenance Plan, PG&E Topock Compressor Station, Needles, California

Operating Well Taken Off-line	Contingency Well Operation Plan	
	Supplemental Well 1	**Supplemental Well 2**
TW-2D	Begin (or continue) operation of TW-2S. Increase to full capacity as needed.	If necessary, also begin (or continue) operation of PE-1 in combination with TW-2S at approximately half the rate of TW-2S (or as dictated by groundwater modeling results). Do not operate PE-1 alone.
TW-2S	Begin (or continue) operation of TW-2D.	If necessary, also begin (or continue) operation of PE-1 in combination with TW-2D at no more than half the rate of TW-2D (or as dictated by groundwater modeling results). Do not operate PE-1 alone.
PE-1	Begin (or continue) operation of TW-2D.	If necessary, also begin (or continue) operation of TW-2S.

As per the February 14, 2005 DTSC letter (DTSC 2005), PG&E shall maintain a minimum combined pumping rate of 50 gallons per minute from the extraction wells at all times, except for brief periods of downtime for maintenance and repair activities. Therefore, supplemental wells operated for contingency purposes will generally be operated at a combined pumping rate of at least 50 gallons per minute, subject to DTSC event-specific direction. If the average pumping rate during the period the given well is offline is less than the target rate, extraction rates may also be increased when the offline well is restarted so that the target volume is achieved if feasible.

Because Well PE-1 is located near the margin of the chromium plume, pumping from PE-1 has the potential to influence movement of the plume toward the Colorado River. The potential to move the plume in the direction of the river can be mitigated if PE-1 is never pumped by itself, but rather pumped in conjunction with and at a lower pumping rate than TW-2D or TW-2S. After PE-1 is equipped with a pump and connected to the treatment system, additional aquifer testing will be conducted to evaluate the hydraulic influence of this well at various pumping rates. The groundwater model will be used to develop a pumping strategy that will prevent pumping at PE-1 from pulling higher concentrations of chromium closer to the river. The PE-1 pumping strategy will be an addendum to this O&M Plan once it is developed, prior to bringing PE-1 online as an extraction well.

Although PE-1 is identified as a supplemental well in Table 4-1, DTSC has indicated that PE-1 may need to be pumped continuously as long as elevated concentrations of Cr(VI) are detected in wells near the river. Currently, the only well near the river with elevated concentrations of Cr(VI) is MW-34-100, which was recently drilled. If elevated or increasing concentrations of Cr(VI) persist in MW-34-100, this O&M Plan will be revised to identify PE-1 as a primary pumping well (in conjunction with TW-2D) whenever Cr(VI) concentrations at MW-34-100 warrant.

5.0 Procedures and Response Times for Well Maintenance and Repair

The most likely mode of failure for the extraction wells is well pump failure. Planned preventative maintenance will be done on the well pumps per manufacturer recommendations. At a minimum, pumps in extraction wells that have been shut down for longer than one month will be energized and run for one hour each month. Records of maintenance will be kept on site. In the event of failure or degraded performance of a well pump, the first response by the operators will be to activate other available extraction wells. The next response will be to repair or replace the out-of-service well pump. A spare pump for Well TW-2D will be kept on site as a "shelf spare." Pulling a well pump of this size will likely require a lift truck; it is anticipated that 1 to 2 days would be required to arrange for a lift truck and approximately one-half day would be required to replace the pump once the truck was onsite.

If the well itself needs maintenance (e.g., due to decline in specific capacity), it will be repaired as deemed appropriate. The initial step in well maintenance is baseline specific-capacity testing and video logging to assess the issues. Rehabilitation could require one or a combination of methods, including bailing, wire brushing, dual swab/airlifting, addition of dispersants, acidization, and/or superchlorination. The procedures for such repair will be dictated by the severity of the suspected problems and the required repair strategy. Typically, well redevelopment could be accomplished within 2 to 3 weeks. Well redevelopment activities will be scheduled during months of lower target extraction rates (i.e., when the river is rising) to minimize the effects from taking a well offline for up to a week.

The surface equipment of the wells will be visually inspected monthly as a preventative maintenance step.

As per the February 14, 2005 DTSC letter to PG&E (DTSC 2005), PG&E shall seek DTSC approval for any downtime expected to last more than 4 hours.

6.0 Design Elements Associated with Bringing Additional Extraction Wells Online

As per the February 14, 2005 DTSC letter (DTSC 2005), if a need is identified for additional extraction wells as a response action for containment of the Cr(VI) plume, additional extraction wells shall be proposed by PG&E within 7 days of receiving such notice from DTSC. A draft work plan will be submitted to DTSC within 10 days of receiving DTSC approval of the proposal, as will any necessary permit or right-of-way applications to appropriate agencies. Additional extraction wells, piping, and power lines will be installed within 45 days of receiving permit approval, and pumping will be initiated within 60 days.

6.1 Design Elements for Extraction Wells PE-2 and PE-3

The 30-percent designs for all design elements associated with extraction wells PE-2 and PE-3 have been completed and are included as Appendix A. These design documents could be used to proceed with procurement of materials and equipment to install PE-2 and/or PE-3, if directed to do so by DTSC. Additional permitting activities must be conducted prior to installation of new extraction wells.

6.2 Design Elements for Other New Extraction Wells

Design of additional new extraction wells will be integrated with previous work performed for the extraction system. Because the need for other new extraction wells has not been identified by DTSC, locations for other new wells have not been selected, and no design basis or drawings are included for this submittal.

7.0 Contingency Plan for Sentry Well Monitoring

Per DTSC's directive, response actions for the IM include requirements for verification groundwater sampling and reporting if new Cr(VI) detections or increasing trends are observed in the sentry monitoring wells (DTSC 2005). This response action is described in the approved *Contingency Planning for Sentry Well Groundwater Monitoring* decision diagram attached to DTSC's February 14, 2005 letter. If a verification sample confirms a change in Cr(VI) concentration, DTSC will be notified and short-term actions will be assessed. These actions include monitoring of adjacent monitoring wells, increasing sampling frequency, increasing extraction well pumping capacity, and beginning operation of existing extraction wells.

The February 2005 DTSC-approved contingency plan for sentry well monitoring is incorporated in this O&M Plan. Refer to Section 7.0 and Figure 7-1 in the Performance Monitoring Plan for Interim Measures (CH2M HILL 2005b) for further description of the contingency plan and response actions for the Interim Measures extraction system.

8.0 References

California Department of Toxic Substances Control (DTSC). 2005. Letter to PG&E "*Criteria for Evaluating Interim Measures Performance Requirements to Hydraulically Contain Chromium Plume in Floodplain Area.*" February 14.

CH2M HILL. 2005a. *Interim Measures No. 3 Treatment and Extraction System Operation and Maintenance Plan.* April 11.

_____. 2005b. *Draft Performance Monitoring Plan for Interim Measures in the Floodplain Area.* April 15.

_____. 2005c. *Design Plan, Conveyance Piping and Power Supply for Extraction Well PE-1.* March 15.

Appendix A
Design Elements for Extraction Wells

APPENDIX A

Design Elements for Extraction Wells

1.0 Introduction

Pacific Gas and Electric Company (PG&E) is addressing chromium in groundwater at the Topock Compressor Station under the oversight of the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). The Topock Compressor Station is located in San Bernardino County, approximately 15 miles southeast of Needles, California. This document serves to update the Design Basis ("30 percent design") for the extraction wells that have been identified as potential additional wells beyond TW-2D, TW-2S, and PE-1.

In a letter dated February 14, 2005 (DTSC 2005a), DTSC directed PG&E to provide, as part of an Interim Measures Extraction System Operation and Maintenance Plan, all design elements associated with bringing additional extraction wells on-line.

1.1 Purpose and Format of Design Information

This Design Basis Report and accompanying drawings represent a 30 percent design submittal. Per direction provided by DTSC to PG&E on April 8, 2005, a 30 percent level of design is required to meet the DTSC (2005a) requirement to supply "all design elements associated with bringing additional extraction wells on-line" for PE-2 and PE-3. The *Draft Design Plan; Conveyance Piping and Power Supply for Extraction Well PE-1* (CH2M HILL, 2005) contains the design elements associated with bringing extraction well PE-1 on-line, and future design plans for PE-2, PE-3, or other extraction wells would include these elements at a minimum.

The 30 percent design information provided in this document is a step towards meeting the requirement of DTSC (2005a) that requires PG&E be able to:

- Install one or more of proposed extraction wells PE-1, PE-2, and PE-3 within 30 days of identifying the need for additional extraction capacity.
- Initiate groundwater extraction within 45 days of identifying the need for the wells, or as directed by DTSC.

Additional permitting and impact mitigation activities will also be key steps in bringing new extraction well(s) on-line.

2.0 Description of Additional Wells

2.1 Interim Measures No. 3 Description

The Interim Measures No. 3 (IM No. 3) project is described in the *Interim Measures Number 3 Design Basis Report* (CH2M HILL 2004). The project consists of the following components:

- Groundwater extraction system
- Conveyance system
- Treatment system
- Treated water management and reuse system (injection wells)

Figure 2-1 is a process flow diagram for IM No. 3; it has been updated from the June 2004 *Design Basis Report* (CH2M HILL 2004) to show that there may be as many as five extraction wells. Figure 2-2 is a layout showing the location of extraction, conveyance, treatment and disposal facilities. The groundwater treatment and disposal facilities are located on parcel 650-151-06, which PG&E has purchased from the Metropolitan Water District (MWD). Piping will convey groundwater from the extraction wells to the treatment and management and reuse facilities.

2.1.1 Groundwater Extraction System

Groundwater extraction wells comprise an extraction system that is sited to meet the objectives of the interim measure. The two existing extraction wells (TW-2S [shallow] and TW-2D [deep]) are located within the chromium plume near a road providing easy access. At the direction of DTSC, currently PG&E is pumping from TW-2D.

In a letter dated February 16, 2005, DTSC directed PG&E to install a new groundwater extraction well in the Colorado River floodplain at the site (DTSC 2005b). In response, extraction well PE-1 was installed on March 5, 2005 according to the *Design Plan, Conveyance Piping and Power Supply for Extraction Well PE-1* (CH2M HILL 2005).

The installation and use of additional extraction wells has been discussed during Consultative Work Group (CWG) technical committee meetings. Two possible additional extraction well locations are shown on Figure 2-2 and include:

- PE-2 is located south of TW-2D.
- PE-3 is located north of TW-2D.

The new wells would be installed in a manner similar to that used for wells TW-2S, TW-2D, and PE-1 and would be screened in appropriate sections of the aquifer. The process and instrumentation details for PE-2 are shown on Drawing Number TP-PR-10-10-03 in Section 10.0. Wellhead details for PE-3 would be similar to the details for extractions wells TW-2S, TW-2D, or PE-1. Details on the PE-3 connection to the conveyance piping to the IM No. 3 treatment plant are included on Drawing Number TP-PR-10-10-04. Symbols and

nomenclature for these drawings are shown on TP-PR-10-10-01 and TP-PR-10-10-02. The new wells will not be installed until directed by DTSC.

Submersible pumps will be placed down-hole, and subsurface concrete vaults equipped with instrumentation, valves, and other pipe appurtenances would complete the well head construction. Underground piping and electrical conduit will be connected to the well heads to convey water and provide power and control for the pump and instrumentation. Piping inside the vault and connecting to the main influent line would be secondarily contained to comply with hazardous waste regulations.

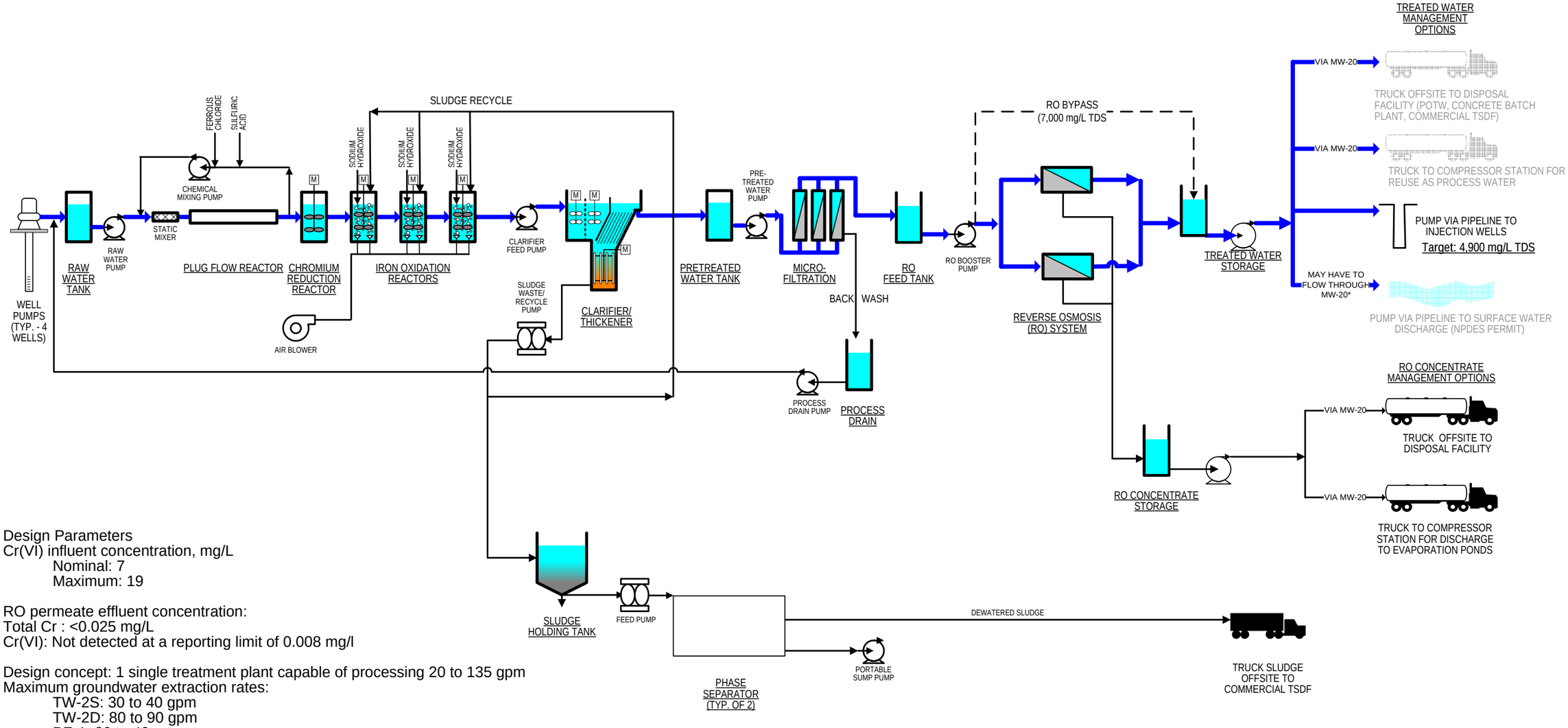
2.1.2 Conveyance System

Depending on the location of the new extraction well, piping will be installed in one of the following ways:

- Between the new extraction well and the MW-20 bench for connection in the MW-20 bench valve vault (e.g., PE-2); or
- Between the new extraction well and the valve vault (Valve Vault #4) along the pipeline from the MW-20 bench to the IM No. 3 treatment plant (e.g., PE-3).

Drawing Number TP-PI-20-02-02 shows the future connection in the MW-20 bench valve vault. Drawing Numbers TP-PC-10-01-02 and TP-PI-20-02-03 show Valve Vault #4 between the MW-20 bench and the IM No. 3 plant that would be used to connect PE-3 pipeline.

Pipelines conveying water from the extraction wells will be double-contained high-density polyethylene (HDPE). Piping and appurtenances will be sized to accommodate the anticipated system flow rates. To minimize and avoid impacts to cultural resources, a combination of subsurface and aboveground alignments may be used.



Design Parameters
Cr(VI) influent concentration, mg/L
- Nominal: 7
- Maximum: 19

RO permeate effluent concentration:
Total Cr : <0.025 mg/L
Cr(VI): Not detected at a reporting limit of 0.008 mg/l

Design concept: 1 single treatment plant capable of processing 20 to 135 gpm
Maximum groundwater extraction rates:
- TW-2S: 30 to 40 gpm
- TW-2D: 80 to 90 gpm
- PE-1: 30 to 40 gpm
- Potential PE-2: 30 to 40 gpm
- Potential PE-3: 20 to 40 gpm

Notes:
Cr - chromium
Cr(VI) - hexavalent chromium
gpm - gallons per minute
mg/L - milligrams per liter
NPDES - National Pollutant Discharge Elimination System
POTW - Publicly-owned treatment works
RO - Reverse osmosis
TSDF - treatment storage or disposal facility

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FIGURE 2-1
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM PROCESS FLOW DIAGRAM
INTERIM MEASURES NUMBER 3
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

N

0 350 700 Feet

1 inch equals 350 feet

California State Plane NAD83 Zone 5 US Feet

Treatment Plant

Injection Well IW-2

Injection Well IW-3

Potential Extraction Well PE-3

Park Moabi Rd.

MW-20 Bench

Colorado River

Old Route 66

BAT CAVE WASH

Extraction Well PE-1

Existing TW-2S, TW-2D Extraction Wells

Pipeline Route

BN&SF RAILROAD

Potential Extraction Well PE-2

INTERSTATE 40

Figure 2-2
Project Site Plan
INTERIM MEASURES NO. 3
PG&E TOPOCK COMPRESSOR STATION
NEEDLES, CALIFORNIA

CH2MHILL

3.0 Process Description

IM No. 3 will consist of extraction, treatment, and water management as shown in the process flow diagram in Figure 2-1. The design criteria for the extraction wells PE-2 and PE-3 are shown in Table 3-1.

3.1 Extraction System Process Description

3.1.1 Process

Additional groundwater extraction wells may be installed and used to meet the objectives of the interim measure. Locations and description of extraction wells PE-2 and PE-3 are discussed in Section 2.2.1.

3.1.2 Controls

The extraction system controls will consist of:

- Groundwater extraction wells and pumps.
  - **Flow Control:** Flow-control valves will be used to set required pumping rate.
  - **Process Control:** At each well flow, well level, and line pressure will be monitored and transmitted to the central programmable logic controller (PLC) located at the treatment plant.
  - **Start/Stop:** Pumps will be normally on. Pumps will be shut down by general plant alarm, low water level in the well, or by extraction pipe leak alarm.
- Double-contained pipe to carry water to treatment system. Leak detection will be provided by a series of sumps connected to the outer carrier pipe. If water leaks from the inner carrier pipe it will flow by gravity along the outer pipe to a sump where a level sensor will indicate water accumulation. Level sensors will send alarm signals to the main plant control system.

TABLE 3-1
Design Criteria Table for Proposed Extraction Wells
Interim Measures Extraction System Operation and Maintenance Plan
PG&E Topock Compressor Station, Needles, California

	General			System-Specific					
Pumps & Blowers	**Tag**	**Type**	**Wetted Material**	**Process Flow (gpm)**	**#/ Train**	**Total #**	**TDH (ft)**	**Motor Size (hp)**	**P&ID**
Extraction Well PE-2	P-102	Submersible	304 SS	40	1	1	248	5	TP-PR-10-10-03
Extraction Well PE-3	P-104	Submersible	304 SS	40	1	1	230	5	TP-PR-10-10-04

Notes:
gpm = gallons per minute
hp = horsepower
P&ID = process and instrumentation diagram (see Section 10.0)
SS = stainless steel
TDH = total dynamic head

4.0 Process/Mechanical Design

4.1 Mechanical Components of Groundwater Extraction System

4.1.1 Extraction Wells

Wells will be installed to collect groundwater. A pump, discharge piping, electric cables, level element, and return signal wiring will be installed in each well for extraction of groundwater and monitoring of drawdown due to pumping. Pump controls will be located in a control panel near the extraction wells or in the treatment system Electrical and Control Building.

The extraction wells will be constructed of 6-inch-diameter PVC well casing with 6-inch-diameter stainless-steel screen sections. The screened intervals of these new wells would be chosen based on conditions encountered during drilling, after consultation with the DTSC and the CWG. Wells PE-2 and PE-3 would likely be similar in depth to well TW-2D.

4.1.2 Pumps

The design criteria of the extraction pumps are shown in Table 3-1. Pumps will be submersible centrifugal pumps constructed of metal (304 stainless) compatible with the water quality and capable of conveying extracted groundwater to the IM No. 3 treatment plant (e.g., Grundfos Model 40S50-12 submersible pump with a rated capacity of 40 gpm). The well pump will be installed at the mid-point of the well screen.

5.0 Civil Design

The site work for the additional wells will include:

- Construction of the groundwater extraction well system and groundwater conveyance piping, as well as associated piping.
- Construction of access road improvements.

The site plan presented is for conceptual design only and must not be used for construction. The exact location of the existing and new structures and equipment must be confirmed prior to construction. The type, extent, and location of underground obstacles must also be determined prior to the construction phases.

6.0 Architectural / Structural Design

The visible portion of the extraction system is the well head, protective bollards, and the top of associated underground vaults. Colors of these structures will be coordinated with DTSC and the U.S. Department of the Interior Bureau of Land Management (BLM). Structural design of these structures will be similar to those detailed in Drawing TP-SE-20-00-09 for TW-2S and TW-2D (see Section 10.0, Drawings).

7.0 Electrical Design

The power for the treatment facility comes from the City of Needles distribution system. An existing City power line has been extended to a service pole near the Electrical and Control Building at the IM No. 3 treatment plant. A pad-mounted transformer steps the voltage down to 480-volt, three-phase, which will be the utilization voltage for motors ½ hp and above. An additional transformer and panel board is installed in the Electrical and Control Building electrical room to provide 120/208 volt power for general plant loads. All loads will be fed from this location (electrical room). The starters for the extraction well pumps will be located in a 480-volt motor control center, also in the electrical room. The electrical feeders to the well pump motors will be routed in underground conduit. Local control power for the well pumps in PE-2 and/or PE-3 will be provided by a small 480-volt to 120/208-volt load center-mounted transformer in the pump vault near well TW-2D. Horsepower loads for the systems are included in Table 3-1. The electrical oneline diagram including pump P-102 in extraction well PE-2 is shown in drawing number TP-EE-20-00-02 in Section 10.0. These oneline details would also be adequate for installing pump P-104 in extraction well PE-3 in the extraction system.

8.0 Project Requirements

8.1 Regulatory Framework

Permits, approvals, and other filing requirements for the IM No. 3 additional wells include the following:

Pertaining to Extraction Well PE-2 and Associated Conveyance Piping

- Burlington Northern Santa Fe Railway (BNSF) – PG&E may have an existing Right-of-Way (ROW) in Park Moabi Road for the PE-2 conveyance piping. If the ROW is not executable, a draft license agreement provided by BNSF earlier this year may be executed.
- County of San Bernardino – Well permit must be obtained. In addition, compliance with Road Permit for activities in Park Moabi Road must be demonstrated. A traffic control plan must be implemented as part of construction activities.
- U.S. Fish and Wildlife Service (USFWS) - Approval for extraction well and pipeline via a Special Use Permit subject to certain conditions.
- BLM– Workplan must be approved for PE-2 and pipeline alignment.

Pertaining to Extraction Well PE-3 and Associated Conveyance Piping

- County of San Bernardino – Well permit must be obtained.
- BLM – Workplan must be approved for PE-3 and pipeline alignment.
- County of San Bernardino - If PE-3 involves an alignment with Park Moabi Road, the Road Permit may need to be updated. The County is looking for a means to keep traffic flowing safely if a lane requires temporary closure.

8.2 Easements / Areas to Avoid

There are several areas that should be avoided in siting any additional extraction wells and conveyance piping. These include:

- **Native American cultural resources:** The project site has been thoroughly surveyed by qualified cultural resource professionals to document existing cultural resources onsite. All proposed project activities will first be reviewed and approved by BLM and the State Historic Preservation Office (SHPO) to protect cultural resources.
- **Historic Route 66 cultural resource:** Design alternatives have been formulated to avoid direct impacts to cultural resources. All proposed project activities will first be reviewed and approved by the BLM and the SHPO to protect cultural resources.

- **Utilities – buried natural gas lines:** Design will be include coordination with gas utility line owners, review of setback requirements and BLM issued ROW terms and conditions. Project will comply with all necessary stipulations.
- **Railroad line:** No direct impacts to the BNSF railway crossing will result. The potential extraction well conveyance piping will be sited in Park Moabi Road ROW, avoiding any impact to the structure of the railway crossing.
- **Interstate I-40:** All facilities will be located outside of the Caltrans ROW.
- **Natural resources – potential desert tortoise habitat:** The project site has been surveyed and evaluated for potential impacts to sensitive biological resources, notably the desert tortoise. Project facilities have been sited in previously disturbed areas (e.g., pipeline alignment generally follows existing roadways), which minimizes the potential to affect the desert tortoise. Based on survey data and the project design, no impacts are expected to result. However, all activities will occur in close coordination with the BLM and the USFWS.
- **Steep terrain:** The project has been designed to limit the amount of cut and fill necessary to construct the project facilities. As such, areas of steep terrain have been avoided in favor of areas with more moderate slopes (e.g., existing roadways, plateaus, etc.). Some areas are not accessible for construction due to terrain.
- **Natural washes:** Impacts to regulated waterbodies such as the existing desert washes on site have been avoided whenever possible, and will be limited by project design. All-weather access to the treatment facilities will be provided from the eastern portion of the project site only in order to avoid additional impacts to washes on the western portion of the project site. Temporary material will be placed within the washed-out segments of roadway within the western portion of the site to avoid the placement of permanent fill material and subsequent impacts to wash areas.

The accompanying design drawings (Section 10.0) reflect the use of avoidance as a primary means of protecting the easements, and cultural and natural resources.

8.3 Waste Generation, Handling, and Disposal

8.3.1 Construction Investigation-derived Waste (IDW)

Wastes from drilling and grading will be reused when possible. When not possible, IDW will be disposed of in compliance with applicable environmental regulations.

8.3.2 Other IDW

Disposable IDW related to sampling activities will be decontaminated if appropriate, double-bagged, and disposed of in a waste dumpster.

9.0 References

CH2M HILL. 2004. *Interim Measures Number 3 Design Basis Report, Topock Compressor Station, Needles, California*. Prepared for Department of Toxic Substances Control. July.

CH2M HILL. 2005. *Draft Design Plan; Conveyance Piping and Power Supply for Extraction Well PE-1.* March 2005.

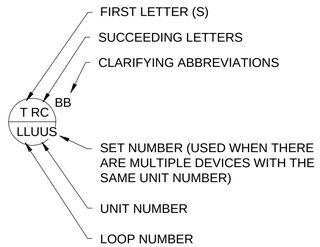
Department of Toxic Substances Control (DTSC). 2005a. Letter. "*Criteria for Evaluating Interim Measures Performance Requirements to Hydraulically Contain Chromium Plume in Floodplain Area, Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (EPA ID No. CAT80011729*" to Ms. Yvonne Meeks, Pacific Gas and Electric Company, dated February 14, 2005.

DTSC. 2005b. Letter. "*Response to Elevated Levels of Hexavalent and Total Chromium Concentrations Reported in Newly Installed Monitoring Well MW-34-100 at Pacific Gas and Electric Company, Topock Compressor Station, Needles, California (EPA ID No. CAT80011729*" to Ms. Yvonne Meeks, Pacific Gas and Electric Company, dated February 16, 2005.

10.0 Drawings

INSTRUMENT IDENTIFICATION

EXAMPLE SYMBOLS



INSTRUMENT IDENTIFICATION LETTERS TABLE

LETTER	FIRST-LETTER		SUCCEEDING-LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (+)		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE (*)	USER'S CHOICE (*)	USER'S CHOICE (*)
C	USER'S CHOICE (*)			CONTROL	
D	DENSITY (S.G)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT, SENSOR		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE (*)		GLASS, GAUGE VIEWING DEVICE	GATE	
H	HAND (MANUAL)				HIGH
!	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION	MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE		USER'S CHOICE (*)	USER'S CHOICE (*)	USER'S CHOICE (*)
O	USER'S CHOICE (*)		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD OR PRINT		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED (+)	X AXIS	UNCLASSIFIED (+)	UNCLASSIFIED (+)	UNCLASSIFIED (+)
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z AXIS		DRIVE, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

TABLE BASED ON THE INSTRUMENTATION, SYSTEMS, AND AUTOMATION SOCIETY (ISA) STANDARD.

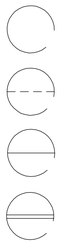
(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.

(*) WHEN USED, DEFINE THE MEANING HERE FOR THE PROJECT

DIGITAL SYSTEM INTERFACES

▲	ANALOG INPUT
▼	ANALOG OUTPUT
△	DISCRETE INPUT
▽	DISCRETE OUTPUT

GENERAL INSTRUMENT OR FUNCTIONAL SYMBOLS



FIELD MOUNTED INSTRUMENT

REAR-OF-PANEL MOUNTED INSTRUMENT

PANEL MOUNTED INSTRUMENT

MOTOR CONTROL CENTER MOUNTED INSTRUMENT

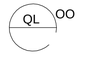
TRANSDUCERS

A	ANALOG	I	CURRENT
D	DIGITAL	P	PNEUMATIC
E	VOLTAGE	PF	PULSE FREQUENCY
F	FREQUENCY	PD	PULSE DURATION
H	HYDRAULIC	R	RESISTANCE

EXAMPLE:

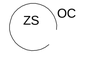
CURRENT TO PNEUMATIC TRANSDUCER (BACK OF PANEL, IN A FLOW LOOP)

SPECIAL CASES

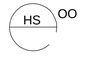


ON AND OFF EVENT LIGHTS

OPENED AND CLOSED POSITION LIGHTS

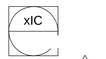


OPENED AND CLOSED POSITION SWITCHES



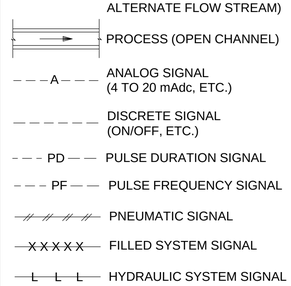
ON-OFF HAND SWITCH. MAINTAINED CONTACT SWITCH (CONTROLLED DEVICE WILL RESTART ON RETURN OF POWER AFTER POWER FAILURE).

STOP-START HAND SWITCH MOMENTARY CONTACT SWITCHES (CONTROLLED DEVICE WILL NOT RESTART ON RETURN OF POWER AFTER POWER FAILURE).

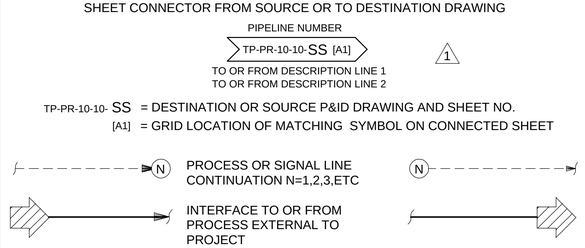


CONTROL OR DISPLAY FUNCTION VIA THE OPERATOR INTERFACE WITH THE DISTRIBUTED CONTROL SYSTEM (FUNCTION OPERATOR ACCESSIBLE)

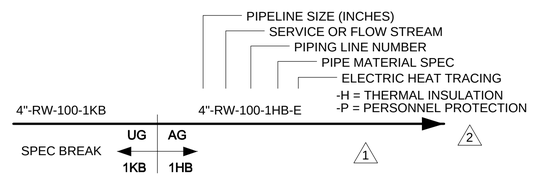
LINE LEGEND



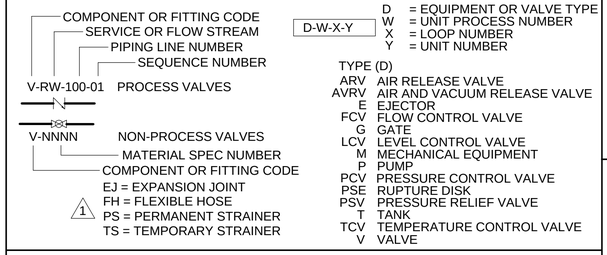
INTERFACE SYMBOLS



PIPELINE NUMBERING



VALVE & EQUIPMENT TAG NUMBERS



PIPELINE MATERIAL LIST

1CV = CARBON STEEL, WITH FLEXIBLE VICTAULIC FITTINGS
1HB = SCHEDULE 80 CPVC
1KA = SINGLE WALL HDPE, SDR 11
1KB = DOUBLE CONTAINMENT HDPE, SDR 11/ 7
1PV = FBE LINED CARBON STEEL, WITH FLEXIBLE VICTAULIC COUPLINGS
2CA CARBON STEEL, FIRE PROTECTION
3DV = 304L SS WITH VICTAULIC PRESS FIT COUPLINGS
8NA = 316 STAINLESS STEEL TUBING

3

ABBREVIATIONS & LETTER SYMBOLS

AC	ALTERNATING CURRENT
ALKY	ALKALINITY
AM	AUTO-MANUAL
CAM	COMPUTER-AUTO-MANUAL
CCS	CENTRAL CONTROL SYSTEM
CL_2 etc.	CHLORINE (TYPICAL: USE STANDARD CHEMICAL ELEMENT ABBREVIATION)
CM	COMPUTER-MANUAL
COD	CHEMICAL OXYGEN DEMAND
CP-X	CONTROL PANEL NO. X
DC	DIRECT CURRENT
DO	DISSOLVED OXYGEN
EJ	EXPANSION JOINT
FCL_2	FREE CHLORINE RESIDUAL
FH	FLEXIBLE HOSE
FOS	FAST-OFF-SLOW
FOSA	FAST-OFF-SLOW-AUTO
FOSR	FAST-OFF-SLOW-REMOTE
FP-W-X	FIELD PANEL NO. WX (W = UNIT PROCESS NUMBER X = PANEL NUMBER)
FR	FORWARD-REVERSE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
LOS	LOCKOUT STOP
LOR	LOCAL-OFF-REMOTE
LR	LOCAL-REMOTE
MA	MANUAL-AUTO
MC	MODULATE-CLOSE
MCC-X	MOTOR CONTROL CENTER NO. X
OC	OPEN-CLOSE (D)
OCR	OPEN-CLOSE-REMOTE
OCA	OPEN-CLOSE-AUTO
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
ORP	OXIDATION REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE
pH	HYDROGEN ION CONCENTRATION
PS	PERMANENT STRAINER
RM-X	REMOTE MULTIPLEXING MODULE NO. X
RTU-X	REMOTE TELEMETRY UNIT NO. X
SF	SLOWER-FASTER
SS	START-STOP
SSC	SUPERVISORY SET POINT CONTROL
TCL_2	TOTAL CHLORINE RESIDUAL
TOC	TOTAL ORGANIC CARBON
TOD	TOTAL OXYGEN DEMAND
TS	TEMPORARY STRAINER
TURB	TURBIDITY
VHC	VOLATILE HYDROCARBONS
VIB	VIBRATION
Δ	DIFFERENCE
Σ	SUM
X	MULTIPLY
÷	DIVIDE
f(x)	CHARACTERIZED
X^n	RAISE TO THE Nth POWER
√‾	SQUARE ROOT
AVG	AVERAGE
1:1	REPEAT OR BOOST
>	SELECT HIGHEST SIGNAL
<	SELECT LOWEST SIGNAL
±	BIAS
%	GAIN OR ATTENUATE

GENERAL NOTES

1. COMPONENTS AND PANELS SHOWN WITH A SINGLE ASTERISK (*) ARE TO BE PROVIDED AS PART OF A PACKAGE SYSTEM.
2. COMPONENTS AND PANELS SHOWN WITH A DOUBLE ASTERISK (**) ARE TO BE PROVIDED UNDER DIVISION 16, ELECTRICAL.
3. THIS IS A STANDARD LEGEND. THEREFORE, NOT ALL OF THIS INFORMATION MAY BE USED ON THIS PROJECT.

NO.	DATE	REVISION	BY	CHK	REVISION APPROVAL		REV 3	DATE 02/14/05	PRINT DISTRIBUTION
					DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE
0	07/28/04	FOR INTERNAL REVIEW	EFC	AJ	DISCIPLINE		DISCIPLINE		DATE
0	09/03/04	APPROVED FOR CONSTRUCTION	EFC	AJ	CIVIL		ELECTRICAL		STATUS
1	10/13/04	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ	STRUCTURAL		INST & CONTROL		REV.
2	01/23/05	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ	MECHANICAL		ARCHITECTURAL		CLIENT
3	02/14/05	REVISED PIPELINE MATERIAL LIST - APPROVED FOR CONSTRUCTION	EFC	AJ	PROCESS		ENVIRONMENTAL		FIELD
					PIPING		GEN. ARRANG.		INTRA CO.

RESPONSIBLE ENGINEER: Kenneth L. Martins CH4876 Exp. 6-30-05 PE #

STATUS	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL	D	07/28/04		
APPROVED FOR CONSTRUCTION	0	09/03/04	KLM	TP
REVISED & APPROVED FOR CONSTRUCTION	3	/ /		

SCALE NONE

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM
PROJ NO. 315994

CH2MHILL

PROCESS AND INSTRUMENTATION DIAGRAM
SHEET 01
SYMBOLS AND NOMENCLATURE
LEGEND 1 OF 2

DWG. NO. TP-PR-10-10-01 REV. 3

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tppr101001.dwg PLOT DATE: 14-FEB-2005 PLOT TIME:

VALVE SYMBOLS

- GATE
- KNIFE GATE
- BUTTERFLY
- GLOBE
- BALL
- VEE- BALL
- PLUG
- SEAT PORT ECCENTRIC PLUG
- DIAPHRAGM
- PINCH
- NEEDLE
- SWING CHECK
- BALL CHECK
- SAMPLE
- MUD
- PRESSURE RELIEF
- AIR AND / OR VACUUM RELEASE
- REGULATED SIDE
- PRESSURE CONTROL VALVE
- BPR BACK PRESSURE REGULATOR
- MULTI-PORT VALVES (BALL VALVE SHOWN. FOR OTHER VALVE TYPES, APPROPRIATE VALVE SYMBOL SHOWN.) ARROWS INDICATE FLOW PATTERN. SEAT PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.
- FIRE HYDRANT

GATE SYMBOLS

- SLUICE
- BUTTERFLY
- FLAP
- FABRICATED SLIDE
- SHEAR

PRIMARY ELEMENT SYMBOLS

- PARSHALL FLUME
- WEIR
- ORFICE PLATE
- FLOW TUBE
- PITOT-STATIC
- VORTEX METER
- ROTAMETER
- ULTRASONIC FLOWMETER (INLINE)
- ELECTROMAGNETIC FLOWMETER
- PROPELLER OR TURBINE METER
- STATIC MIXER
- DENSITY METER (X: N = NUCLEAR, O = OPTICAL, U = ULTRASONIC)
- ULTRASONIC FLOWMETER (CLAMP-ON)
- LEVEL (ULTRASONIC)
- LEVEL (BUBBLER TUBE)
- LEVEL (FLOAT)

ACTUATOR SYMBOLS

- PNEUMATIC W/POSITIONER
- PNEUMATIC W/SOLENOID
- ELECTRIC
- ELECTRIC W/POSITIONER
- ELECTROHYDRAULIC
- HYDRAULIC
- PNEUMATIC WITH VOLUME BOOSTER
- SOLENOID
- MANUAL

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL OR HYDRAULIC)
XX: FO =FAIL OPEN
FC =FAIL CLOSED
FLP=FAIL TO LAST POSITION

MISCELLANEOUS SYMBOLS

- SIGHT GLASS
- DIAPHRAGM SEAL
- BLIND FLANGE
- AIR GAP
- VENT TO ATMOSPHERE
- AERATOR
- PLUG
- RECEPTACLE
- SELF CONTAINED AIR SUPPLY
- COMPOSITE SAMPLER (DIPPER TYPE)
- COMPOSITE SAMPLER (SUCTION TYPE)
- TV CAMERA
- RADIO ANTENNA
- "ON" TIME DELAY B "ON" X-SEC. AFTER A "ON". INSTANT "OFF".
- "OFF TIME DELAY B "OFF" X-SEC. AFTER A "OFF" INSTANT "ON"
- INTERLOCK. SEE CONTROL DIAGRAMS
- MEMORY ELEMENT S= SET , R= RESET
- AIR SET XX= SUPPLY PRESSURE IN PSIG.
- FILTER/ REGULATOR/ GAUGE SET
- BFP BACK-FLOW PREVENTER
- PERMANENT STRAINER
- TEMPORARY STRAINER
- 120 VOLT, 60 HZ POWER
- 480 VOLT, 60 HZ POWER
- ANNULAR DIAPHRAGM SEAL
- RUPTURE DISK
- PIG INSERT POINT
- PIG CATCH POINT
- MIXER
- ELECTRIC MOTOR
- PRESSURE GAUGE
- TONE TRANSMITTER NO. X
- TONE RECEIVER NO. X
- VOICE COMMUNICATION POINT
- TV MONITOR
- LOGIC ELEMENT: IF A AND NOT B THEN C
- LOGIC ELEMENT: IF A OR B THEN C
- ON/OFF RELAY. INPUT IS CONNECTED TO OUTPUT WHEN SWITCHING SIGNAL IS PRESENT.
- SWITCHING SIGNAL
- SWITCHING RELAY. INPUT WITH DOT IS CONNECTED TO OUTPUT WHEM SWITCHING SIGNAL IS PRESENT
- OTHER INPUT IS CONNECTED TO OUTPUT WHEN SWITCHING SIGNAL IS NOT PRESENT.
- FLUSHING CONNECTION SIZES PER DWG. TP-PI-05-00-06
- V-1690 V-1390 HOSE ADAPTOR
- SEAL WATER SET
- V-1390 1/2" x 3/8"
- FLEXIBLE CONNECTOR (HOSE)
- HOSE CONNECTION

PUMP AND COMPRESSOR SYMBOLS

NOTE: XX: AS = ADJUSTABLE SPEED
CS-1 = CONSTANT SPEED (SINGLE SPEED)
CS-2 = CONSTANT SPEED (TWO SPEED)

- CENTRIFUGAL PUMP (DRY PIT)
- CENTRIFUGAL WET PIT PUMP OR TURBINE PUMP
- CHEMICAL FEED PUMP
- DIAPHRAGM PUMP
- GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT)
- PISTON PUMP
- PROGRESSIVE CAVITY PUMP
- SUBMERSIBLE SUMP PUMP
- COMPRESSOR (CENTRIFUGAL)
- COMPRESSOR (PISTON)
- BLOWER OR FAN (CENTRIFUGAL)
- EJECTOR

SERVICE OR FLOW STREAM IDENTIFCATION

AHP	AIR,HIGH PRESSURE PROCESS
AI	AIR, INSTRUMENT
AL	ALUM
ALP	AIR, LOW PRESSURE PROCESS
ASH	SODA ASH
B	BRINE
BA	BLOWING AIR
BDS	BLENDED DIGESTED SLUDGE
BFE	BIO-FILTER EFFLUENT
BFI	BIO-FILTER INFLUENT
BFR	BIO-FILTER RECYCLE
BFW	BRINE FEEDWATER
BS	BRINE SLUDGE
BWS	BACKWASH SUPPLY
BYP	BYPASS
C	CARBON SLURRY
CD	CARBON DIOXIDE GAS
CG	CHLORINE GAS (PRESSURE)
CGV	CHLORINE GAS (VACUUM)
CHS	CHEMICAL SLUDGE
CL	CHLORINE LIQUID
CNA	CELL CAUSTIC
CO	CONDENSATE DRAIN
CS	CHLORINE SOLUTION
CWR	COOLING WATER RETURN
CWS	COOLING WATER SUPPLY
DR	DRAIN (SANITARY)
DAS	DIGESTED ACTIVATED SLUDGE
DG	DIGESTER GAS
DIW	DEIONIZED WATER
DS	DIGESTED SLUDGE
DW	DISTILLED WATER
F	FILTRATE
FC	FERRIC CHLORINE
FE	FILTER EFFLUENT
FI	FILTER INFLUENT
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FTW	FILTER TO WASTE
G	NATURAL GAS
GAS	GASOLINE
GOX	GASEOUS OXYGEN
GOX 1	GOX PRODUCT
GOX 2	GOX PRODUCT
GOX 3	GOX VENT
GOX 4	GOX PRESSURE BUILD
GOX 5	GOX ADDITION
GR	GRIT SLURRY
H	HYDROGEN GAS
HPR	HIGH PRESSURE RETURN (CONDENSATE)
HPS	HIGH PRESSURE STEAM
HS	HEAVY SOLIDS
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
IA	INSTRUMENT AIR
LD	DRY LIME
LOX	LIQUID OXYGEN
LPO	LIQUID POLYMER
LPR	LOW PRESSURE RETURN (CONDENSATE)
LPS	LOW PRESSURE STEAM
LS	LIME SLURRY
LSD	LIME SLUDGE
ML	MIXED LIQUOR
MPR	MEDIUM PRESSURE RETURN (CONDENSATE)
MPS	MEDUIM PRESSURE STEAM
NA	SODIUM HYDROXIDE
NT	NITROGEN TRICHLORIDE
OF	OVERFLOW
P	PROPANE GAS
PDS	PRIMARY DIGESTED SLUDGE
PE	PRIMARY EFFLUENT
PI	PRIMARY INFLUENT
PLE	PLANT EFFLUENT
PO	POLYMER SOLUTION
PS	PRESSURE SEWER
PSD	PRIMARY SLUDGE
PSM	PRIMARY SCUM
RAS	RETURN ACTIVATED SLUDGE
RB	RAW BRINE
RCS	RECARBONATION SLUDGE
RCY	RECYCLE
RHW	RECIRCULATED HOT WATER
RS	RAW SEWAGE
RSD	RECIRCULATED SLUDGE
RW	RAW WATER
S	SANITARY SEWER (GRAVITY)
SA	SAMPLE
SAS	SODA ASH SOLUTION
SB	SPENT BRINE
SC	COLD SLUDGE
SDG	SULFUR DIOXIDE GAS
SDL	SULFUR DIOXIDE LIQUID
SDS	SULFUR DIOXIDE SOLUTION
SDV	SULFUR DIOXIDE GAS (VACUUM)
SE	SECONDARY EFFLUENT
SH	HEATED SLUDGE
SSD	SECONDARY DIGESTED SLUDGE
SSM	SECONDARY SCUM
SW	SURFACE WASH
TAS	THICKENED ACTIVATED SLUDGE
TB	TREATED BRINE
TBS	THICKENER BOTTOM SLUDGE
TDS	THICKENED DIGESTED SLUDGE
TPS	THICKENED PRIMARY SLUDGE
TUF	THICKENER UNDERFLOW
TW	TREATED WATER
UD	UNDERDRAIN
VT	VENT
VAC	VACUUM
WAS	WASTE ACTIVATED SLUDGE
WS	WASTE STREAM

NO.	DATE	REVISION	BY	CHK
0	07/28/04	FOR INTERNAL REVIEW	EFC	AJ
0	09/03/04	APPROVED FOR CONSTRUCTION	EFC	AJ
1	10/13/04	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
2	01/23/05	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ

REVISION APPROVAL — REV 2 — DATE 01/23/05

DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE
CIVIL		ELECTRICAL		STATUS
STRUCTURAL		INST & CONTROL		REV.
MECHANICAL		ARCHITECTURAL		CLIENT
PROCESS		ENVIRONMENTAL		FIELD
PIPING		GEN. ARRANG.		INTRA CO.

PRINT DISTRIBUTION

RESPONSIBLE ENGINEER: Kenneth L. Martins CH4876 Exp. 6-30-05 PE #

ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL	D	07/28/04		
APPROVED FOR CONSTRUCTION	0	09/03/04	KLM	TP
REVISED & APPROVED FOR CONSTRUCTION	2	01/23/05		

SCALE NONE

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM
PROJ NO. 315994

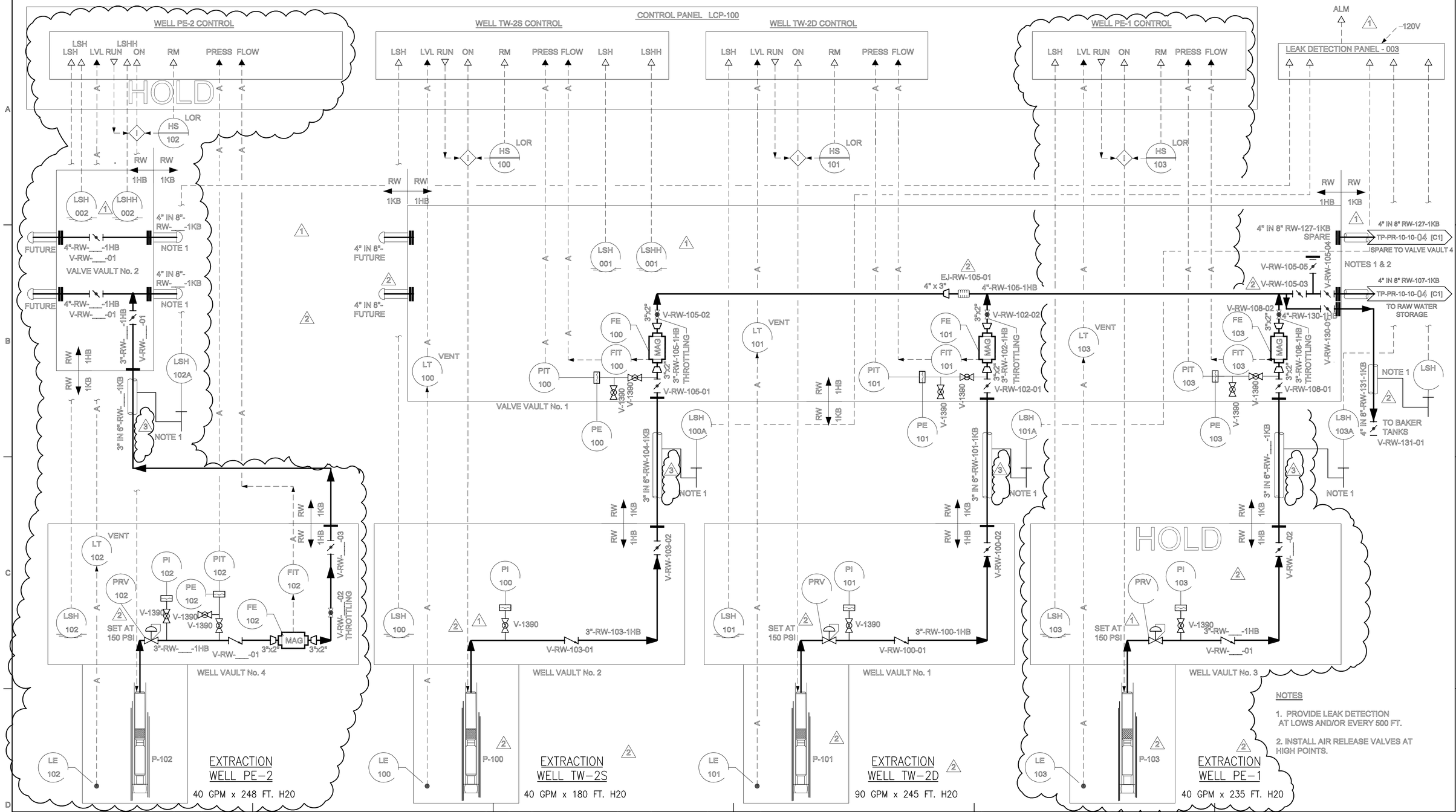
CH2MHILL

PROCESS AND INSTRUMENTATION DIAGRAM
SHEET 02
SYMBOLS AND NOMENCLATURE
LEGEND 2 OF 2

DWG. NO. TP-PR-10-10-02 REV. 2

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tppr101002.dwg PLOT DATE: 23-JAN-2005 PLOT TIME:



NO.	DATE	REVISION	BY	CHK
D	07/28/04	FOR INTERNAL REVIEW	EFC	AJ
0	09/03/04	APPROVED FOR CONSTRUCTION	EFC	AJ
1	10/13/04	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
2	01/23/05	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
3	03/16/05	DELETED NOTES. APPROVED FOR CONSTRUCTION	EFC	AJ

REVISION APPROVAL		REV 3	DATE 03/16/05	PRINT DISTRIBUTION
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE
CIVIL		ELECTRICAL		STATUS
STRUCTURAL		INST & CONTROL		REV.
MECHANICAL		ARCHITECTURAL		CLIENT
PROCESS		ENVIRONMENTAL		FIELD
PIPING		GEN. ARRANG.		INTRA CO.

STATUS	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL	D	07/28/04		
APPROVED FOR CONSTRUCTION	0	09/03/04	KLM	TP
REVISED & APPROVED FOR CONSTRUCTION	3	03/16/05		

RESPONSIBLE ENGINEER: Kenneth L. Martins CH4876 Exp. 6-30-05 PE #

SCALE NONE

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

PROJ NO. 315994

CH2MHILL

PROCESS AND INSTRUMENTATION DIAGRAM
SHEET 03
EXTRACTION WELLS
PE-1, PE-2, TW-2D AND TW-2S

DWG. NO. TP-PR-10-10-03 REV. 3

FILENAME: tppr101003.dwg PLOT DATE: 16-MAR-2005 PLOT TIME:

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

ALM
1
120V
LEAK DETECTION PANEL - 003
PLANT ALARM R YL1000
PLANT ALARM R YL1001
PLANT ALARM R YL1002
PLANT ALARM R YL1003
PLANT ALARM HORN H YL1004

TREATMENT PLANT CONTROL PANEL LCP - 100
CLOSED OPENED OPEN REM LVL COND.
RUN ON REM FLOW
LVL POSITION FLOW CONTROL
RUN ON REM PSL FLOW

TW-103-1HB
TP-PR-10-10- 08 [D6]
TREATED WATER R.O. BYPASS
4"-TW-103-1HB

TW-105-1HB
TP-PR-10-10- 08 [B6]
R.O. TREATED WATER
4"-TW-105-1HB
2 STATIC MIXER 4"x3" 4"x3"
AIT 702 2
AE 702
120 VAC
1 V-TW-105-02
HS 200 LOR
HS 700 LOR
1"-TW-137-1HB V-1390
TW-137-1HB TP-PR-10-10- 08 [C1]
TO ANTISCALANT DILUTION WATER
2"x1"

TW-128-1HB
TP-PR-10-10- 04 [B6]
SEAL WATER
1 1/2"-TW-128-1HB
PSL 1100
V-1390
2

TW-104-1HB
TP-PR-10-10- 08 [A1]
OFF-SPEC RECYCLE FROM R.O. FEED
4"-TW-104-1HB
HS 100A HOA 1
N.C. V-TW-114-01
V-TW-114-02
LIT 200 1
120 VAC
LE 200
4"-TW-114-1HB

RW-125-1HB
TP-PR-10-10- 07 [B1]
OFF-SPEC RECYCLE FROM MICROFILTER FEED
4"-RW-125-1HB

WS-111-1HB
TP-PR-10-10-06 [C6]
FROM PROCESS DRAINS TANK
4"-WS-111-1HB

LSH 201A-(H) 2
ZSC 100 ZSO 100 SV 100
120 PSIG AIR SET S F.C.
4"-RW-110-1HB
V-RW-110-01 FV 100
RW 1KB RW 1HB

RW-107-1KB
TP-PR-10-10-03 [B6]
RAW WATER FROM EXTRACTION WELLS
4" IN 8"-RW-107-1KB
NOTE 1 LEAK DETECTION (TYP 8)

RW-127-1KB
TP-PR-10-10-03 [B6]
FROM VALVE VAULT 1 SPARE
4" IN 8"-RW-127-1KB
NOTE 1 SPARE 1

4" IN 8"-RW-107-1KB
4" IN 8"-RW-127-1KB
V-RW-107-01 V-RW-127-01
VALVE VAULT No. 4
RW 1KB RW 1HB RW 1KB RW 1HB
FUTURE
4" IN 8" SPARE
4" IN 8" PE-3 2

VENT
MANHOLE
27,000 GAL.
RAW WATER STORAGE TANK
T-100
6"-DR-114-1HB
6"-DR-100-1HB
V-DR-100-01
V-RW-111-01 2
SC EJ-RW-111-01 6"x4"
6"-RW-111-1HB
PS-RW-111-01 1
1/2" x 3/8" S
PI 200
V-1390
P-200 RAW WATER FEED PUMP 190 GPM X 35 FT H20
4"x3" V-RW-112-01
V-RW-112-02
FE 200
4"x3" 4"x3" 4"x2 1/2" F.C.
FCV - 200 1
AIR SET 120 PSIG

2"-RW-113-1HB
MINIMUM RECIRC. 40 GPM MIN.
RO 200
6"-DR-115-1HB 2
6"-DR-101-1HB 2
V-DR-101-01
V-TW-126-01 1
3"-TW-126-1HB
FIT 200 1

VENT
MANHOLE
27,000 GAL.
TREATED WATER STORAGE TANK
PERMEATE
T-700
V-TW-116-01
6"-TW-116-1HB
6"x3"
T EJ-TW-116-01 2
4"x1 1/2"
TS-TW-116-01
P-700 TREATED WATER TRANSFER PUMP 150 GPM X 150 FT. H20
V-TW-117-01
V-TW-117-02
4"x3" 4"x3" MAG
TW-117-1HB TP-PR-10-10- 10 [A1]
TREATED WATER TO BAKER TANKS
FE 700
2" V-1390 2
TW-125-1HB TP-PR-10-10- 05,06...
FIELD ROUTE TO FLUSH SYS. HOSE CONNS.

1 LIT 700 1
120 VAC
LE 700
VFD - 1100
PRV 700 3
SET @ 50 PSI
3"-TW-143-1HB
3"x2" 3"x2"
VENT
MANHOLE
PI 700
V-1390
FIT 700
SC 1 FUTURE
TW-120-1HB TP-PR-10-10- 11 [C1]
TO INJECTION WELLS
4"-TW-120-1HB
V-TW-120-01
2"-TW-127-1HB
1"-TW-129-1HB V-1390
TW-129-1HB TP-PR-10-10- 09 [C1]
TO POLYELECTROLYTE MAKE-DOWN SYSTEM
1 1/2"-TW-128-1HB V-1390
TW-128-1HB TP-PR-10-10- 04,05..
SEAL WATER TO PUMPS SHTS 04, 05, 06, 07, 08

FIC 200
SEAL WATER PUMP 25 GPM X 115 FT. H20
SEAL WATER TANK
PI 1100
PT 1100
T-1100
P-1100
ZT 200
3"x1 1/4"
V-TW-126-02 4"x2 1/2"
BFP 2"x1"
PS-TW-127-01
V-TW-127-01
4"-RW-112-1HB
RW-112-1HB TP-PR-10-10- 05 [C1]
TO TREATMENT SYSTEM CONTINUOUS FLOW

NOTES

1. PROVIDE LEAK DETECTION AT LOWS AND/OR EVERY 500 FT.

THIS CONTAINMENT ENCOMPASSES ENTIRE PLANT, WITH EXCEPTION OF SEPARATE CHEMICAL CONTAINMENTS.

SECONDARY CONTAINMENT - PROCESS PLANT

NO.	DATE	REVISION	BY	CHK
D	07/28/04	FOR INTERNAL REVIEW	EFC	AJ
0	09/03/04	APPROVED FOR CONSTRUCTION	EFC	AJ
1	10/13/04	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
2	01/23/05	REVISED AND APPROVED FOR CONSTRUCTION	EFC	AJ
3	02/14/05	ADDED RECIRC. LINE AND PRV VALVE TO T-700 - APPROVED FOR CONSTRUCTION	EFC	AJ

REVISION APPROVAL				PRINT DISTRIBUTION
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE
CIVIL		ELECTRICAL		STATUS
STRUCTURAL		INST & CONTROL		REV.
MECHANICAL		ARCHITECTURAL		CLIENT
PROCESS		ENVIRONMENTAL		FIELD
PIPING		GEN. ARRANG.		INTRA CO.

REV 3 DATE 02/14/05

STATUS	REV	DATE	SDE	PEM
ISSUED				
PRELIMINARY				
FOR REVIEW AND APPROVAL	D	07/28/04		
APPROVED FOR CONSTRUCTION	0	09/03/04	KLM	TP
REVISED & APPROVED FOR CONSTRUCTION	3	/ /		

SCALE NONE

RESPONSIBLE ENGINEER: Kenneth L. Martins CH4876 Exp. 6-30-05
PE #

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
PROJ NO. 315994

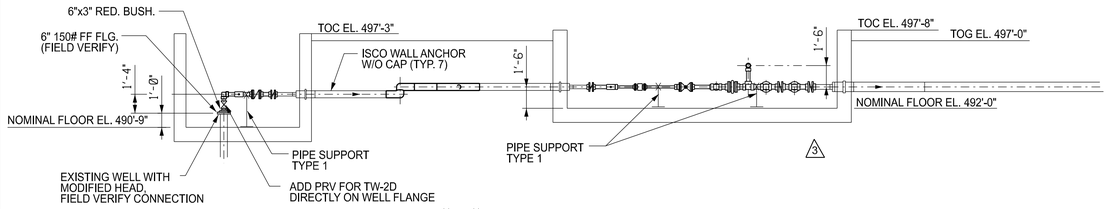
CH2MHILL

PROCESS AND INSTRUMENTATION DIAGRAM
SHEET 04
STORAGE AREA

DWG. NO. TP-PR-10-10-04 REV. 3

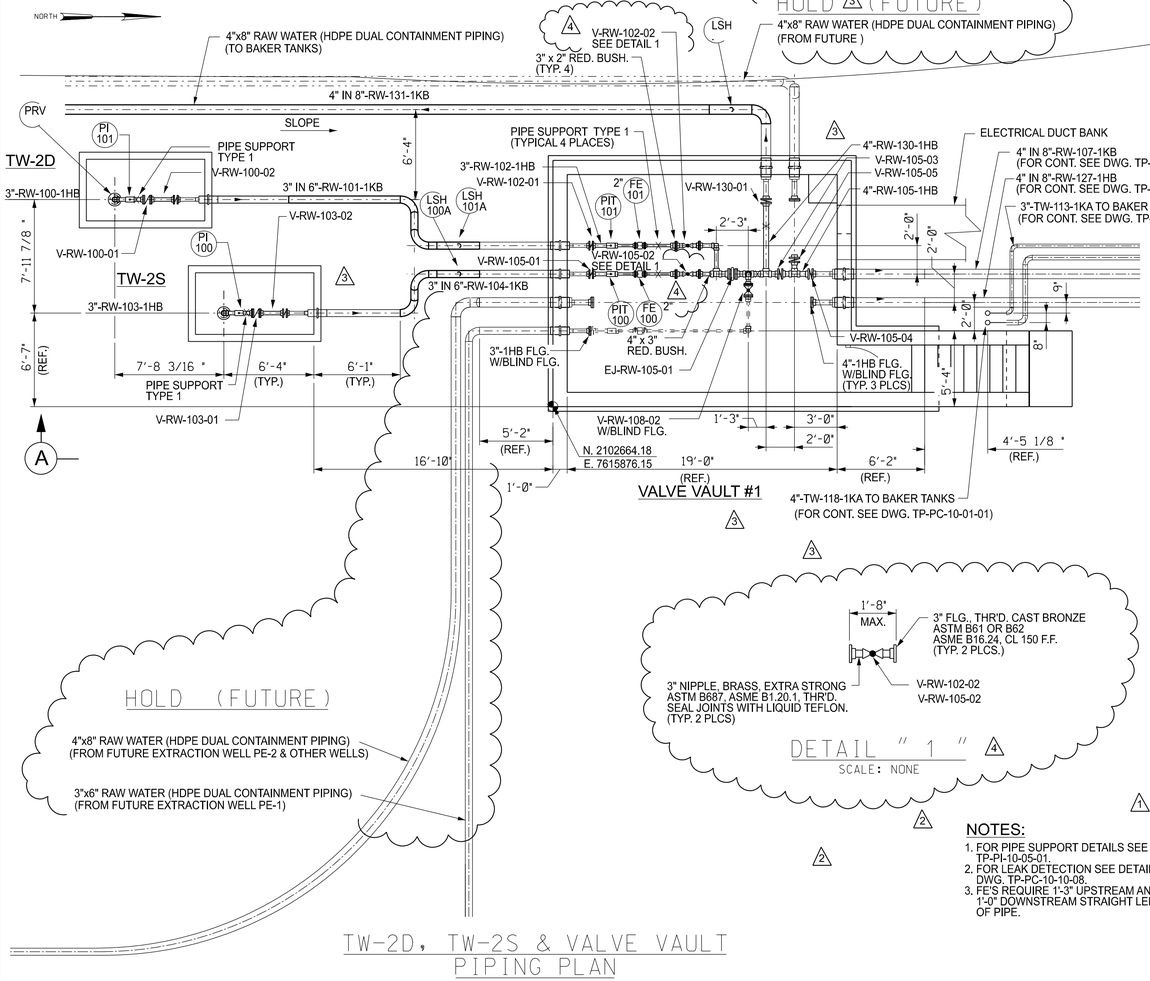
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tppr101004.dwg PLOT DATE: 14-FEB-2005 PLOT TIME:



SECTION "A" TYPICAL 2 PLACES
TW-2D, TW-2S WELL
PUMP DISCHARGE

SCALE: 3/16"= 1'-0"



TW-2D, TW-2S & VALVE VAULT
PIPING PLAN

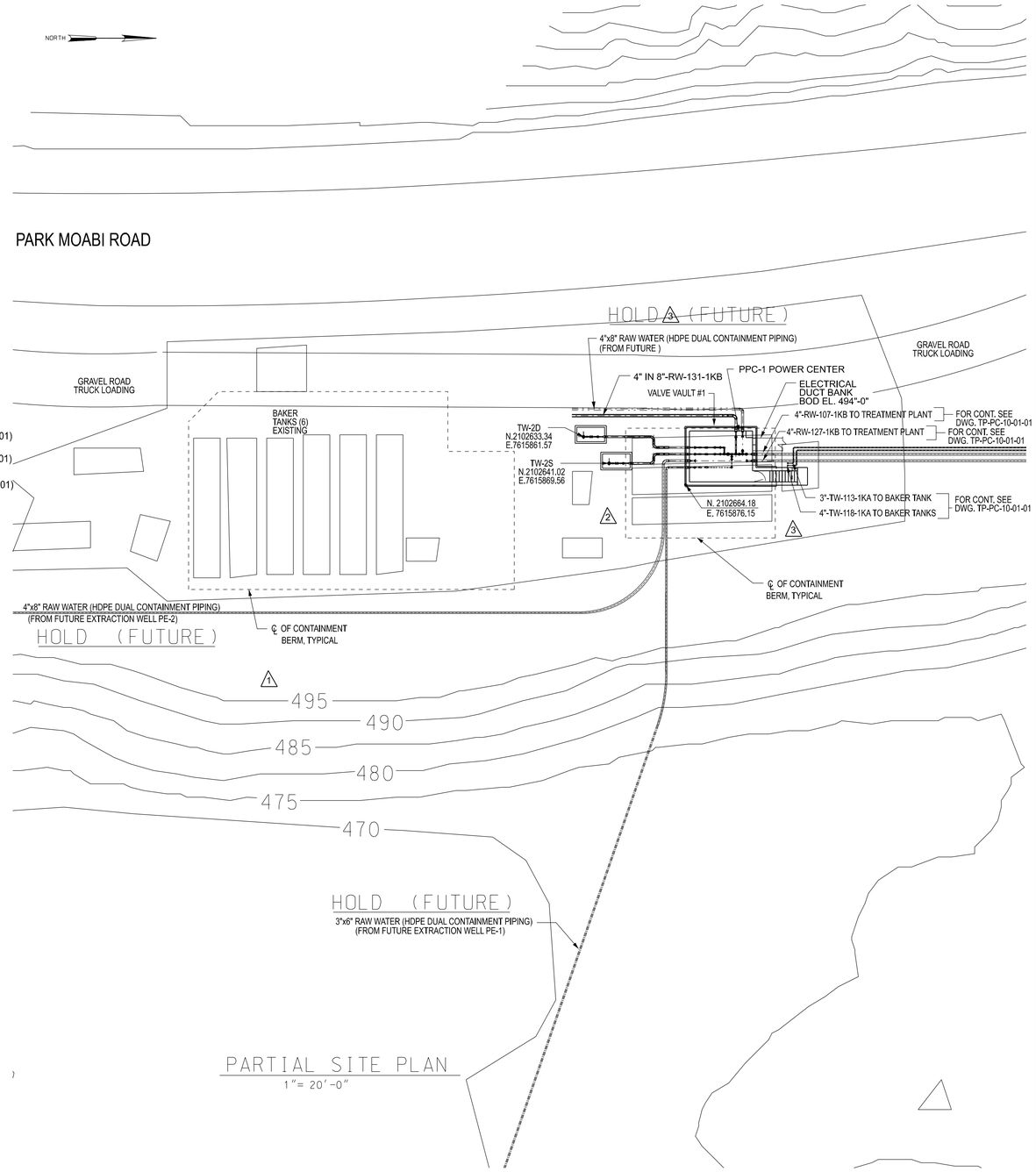
3/16"= 1'-0"

DETAIL "1"

SCALE: NONE

NOTES:

1. FOR PIPE SUPPORT DETAILS SEE DWG. TP-PI-10-05-01.
2. FOR LEAK DETECTION SEE DETAIL #1 DWG. TP-PC-10-10-08.
3. FE'S REQUIRE 1'-3" UPSTREAM AND 1'-0" DOWNSTREAM STRAIGHT LENGTHS OF PIPE.



PARTIAL SITE PLAN

1"= 20'-0"

RESPONSIBLE ENGINEER: STEVEN D. HOYER
RE# CA M31888

NO.	DATE	REVISION	BY	CHK
0	08/31/04	APPROVED FOR CONSTRUCTION	WHD	SDH
1	10/01/04	REVISED AS NOTED	ABH	SDH
2	10/20/04	REVISED AS NOTED	WHD	SDH
3	01/31/05	REVISED VALVE VAULT PIPING LAYOUT AND ELEVATIONS	WHD	SDH
4	03/08/05	ADDED DETAIL 1	WHD	
	/ /			
	/ /			
	/ /			

REVISION APPROVAL		REV 4	DATE 03/08/05
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING		GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
REV.	
CLIENT	
FIELD	
INTRA CO.	

STATUS	REV	DATE	SDE	PEM
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL		/ /		
APPROVED FOR CONSTRUCTION	0	9/2/04	SDH	TP
REVISED & APPROVED FOR CONSTRUCTION	4	/ /		

SCALE AS NOTED

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

PROJ NO. 315994

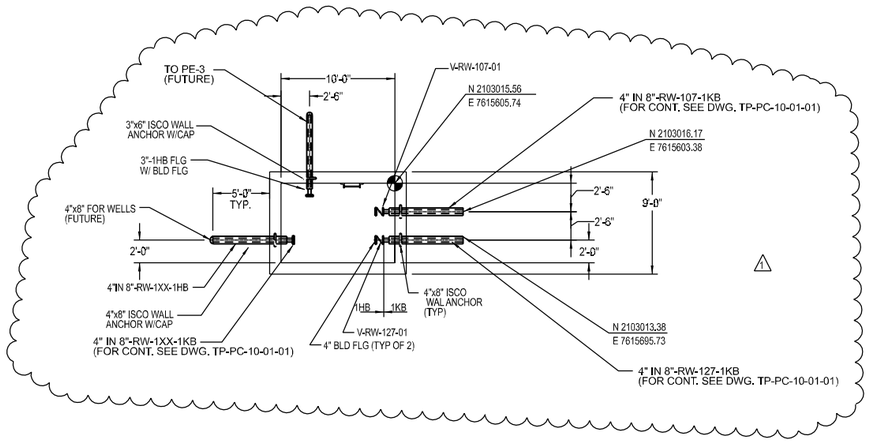
CH2MHILL

UNDERGROUND PIPING
EXTRACTION WELLS
TW-2D AND TW-2S WELL VAULTS
BENCH SITE 20 VALVE VAULT

DWG. NO. TP-PI-20-02-02 REV. 4

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: tppi200202r2.dlv PLOT DATE: 15-MAR-2005 PLOT TIME: 06:03:09

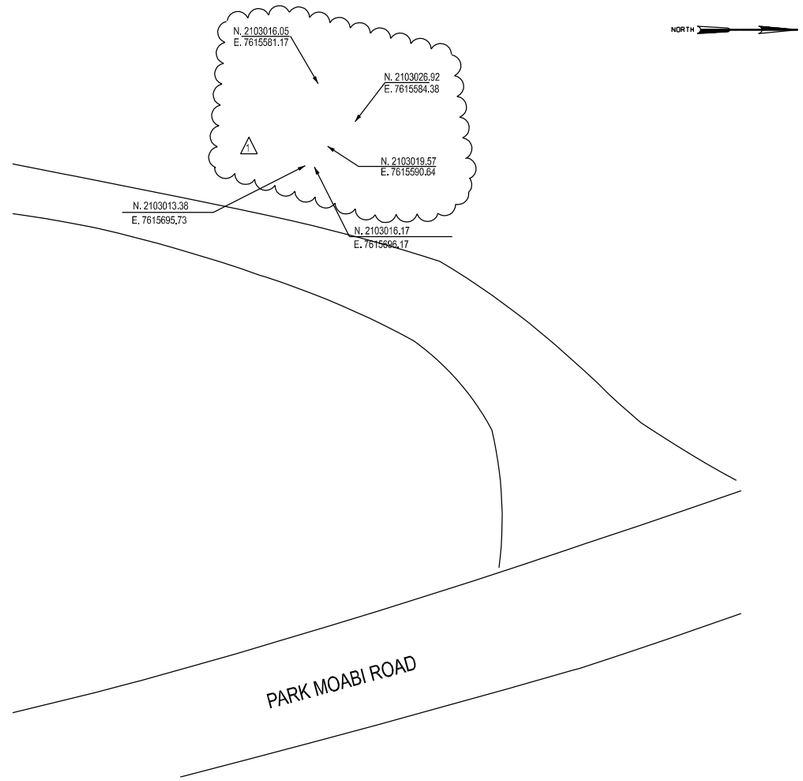


NOTES:

1. FOR PIPE SUPPORT DETAILS SEE DWG. TP-PI-10-05-01.

PE-3 WELL & VALVE VAULT PIPING PLAN 2 TP-PC-10-01-02

3/8"= 1'-0"



PARTIAL SITE PLAN 1 TP-PC-10-01-02

1"= 20'-0"

NO.	DATE	REVISION	BY	CHK
1	10/ 01/04	REVISED AS NOTED	ABH	SDH

REVISION APPROVAL		REV 1	DATE 10/01/04
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING		GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
REV.	
CLIENT	
FIELD	
INTRA CO.	

RESPONSIBLE ENGINEER: PE

STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL		/ /		
APPROVED FOR CONSTRUCTION	0	9/22/04		
REVISED & APPROVED FOR CONSTRUCTION	1	10/1/04		

SCALE AS NOTED

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

PROJ NO. 315994

CH2MHILL

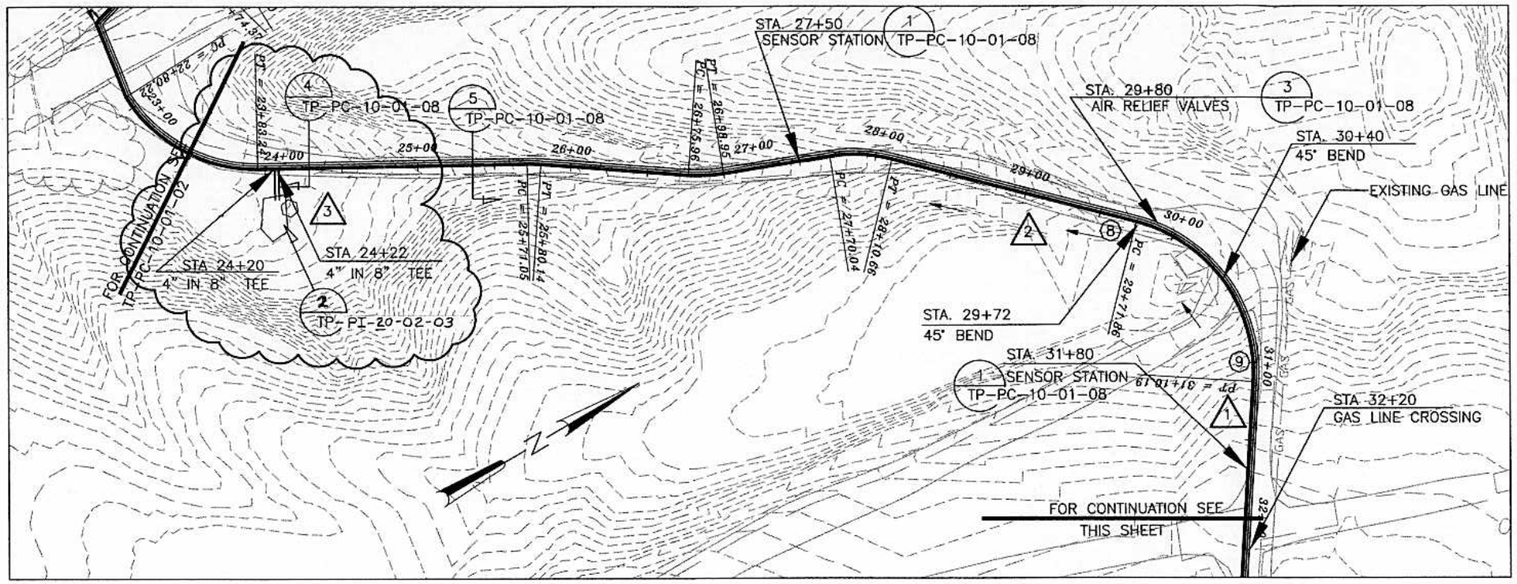
UNDERGROUND PIPING
EXTRACTION WELLS
PE-3 WELL VAULT & VALVE VAULT

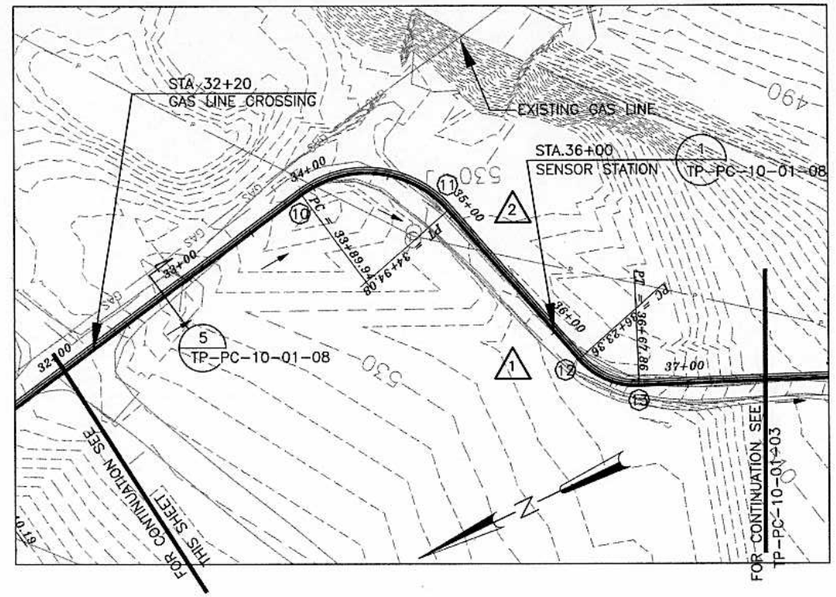
DWG. NO. TP-PI-20-02-03 REV. 1

STEVEN D. HOYER
CA M31688

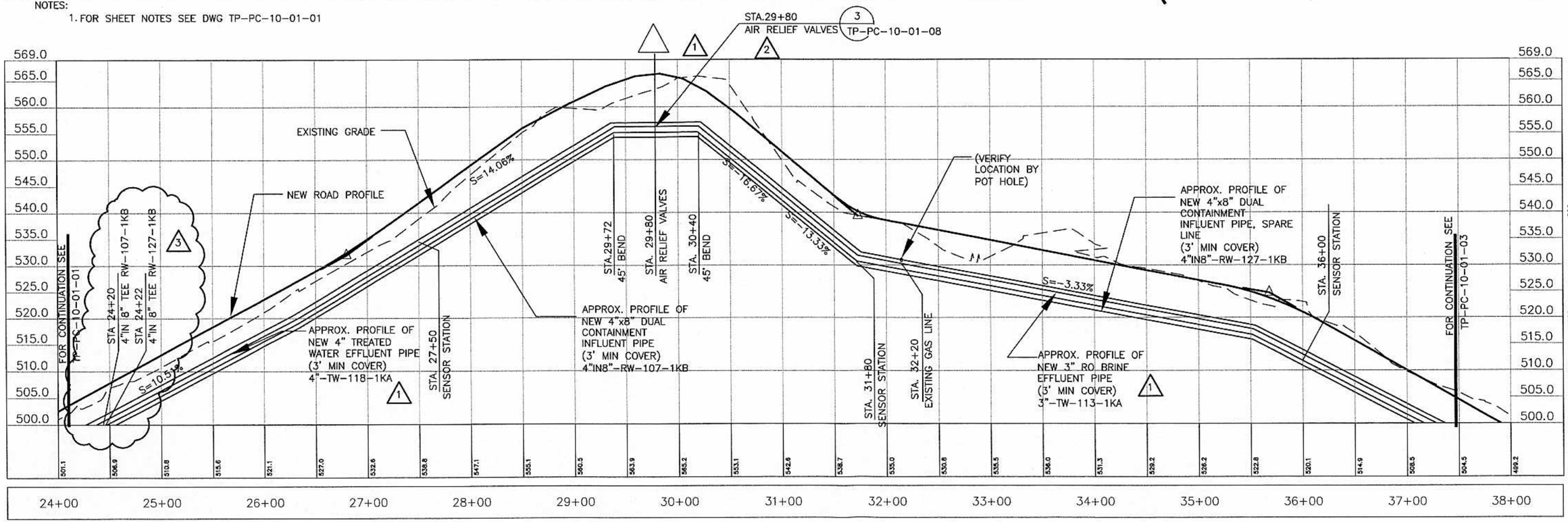
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: tppi200203.dlv PLOT DATE: 30-OCT-2004 PLOT TIME: 12:30:51





NOTES:
1. FOR SHEET NOTES SEE DWG TP-PC-10-01-01



NO.	DATE	REVISION	BY	CHK
0	8/04	APPROVED FOR CONSTRUCTION	ABH	DWL
1	8/04	REVISED AS NOTED	ABH	DWL
2	9/04	ADDED 4"IN 8" SPARE LINE	ABH	DWL
3	11/04	ADDED VAULT AND SPARE LINE	ABH	DWL

REVISION APPROVAL		REV 3	DATE 11/04/04
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL	-	ELECTRICAL	LJB
STRUCTURAL		INST & CONTROL	KGA
MECHANICAL	AJ	ARCHITECTURAL	—
PROCESS		ENVIRONMENTAL	—
PIPING	SDH	GEN. ARRANG.	

DATE — STATUS — REV. — CLIENT — FIELD — INTRA CO.

STATUS	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL	A	7/28/04	DWL	
APPROVED FOR CONSTRUCTION	0	8/06/04	DWL	
REVISED & APPROVED FOR CONSTRUCTION	3	11/04/04	DWL	AJ

SCALE AS SHOWN

RESPONSIBLE ENGINEER: DOUGLAS W. LANDFEAR
PE # CE C-66545

REGISTERED PROFESSIONAL ENGINEER — DOUGLAS W. LANDFEAR — No. C 66545 — 6/30/06 — CIVIL — STATE OF CALIFORNIA

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM

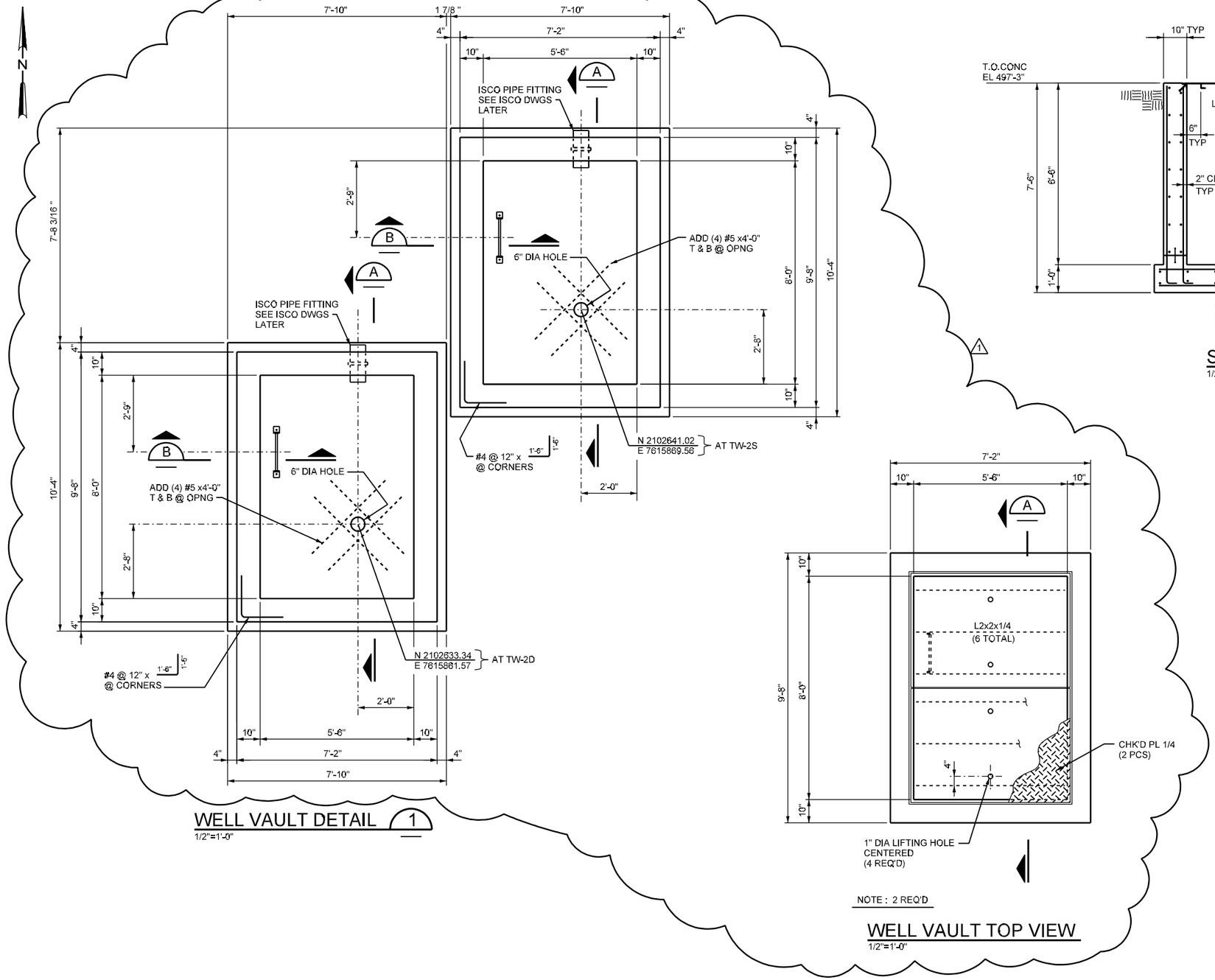
PROJ NO. 315994

CH2MHILL

PIPING
PLAN & PROFILE
INFLUENT & EFFLUENT PIPELINES STA. 24+00 TO 37+00

DWG. NO. TP-PC-10-01-02 | REV. 3

BAR IS ONE INCH ON — FILENAME: — PLOT DATE: — PLOT TIME:



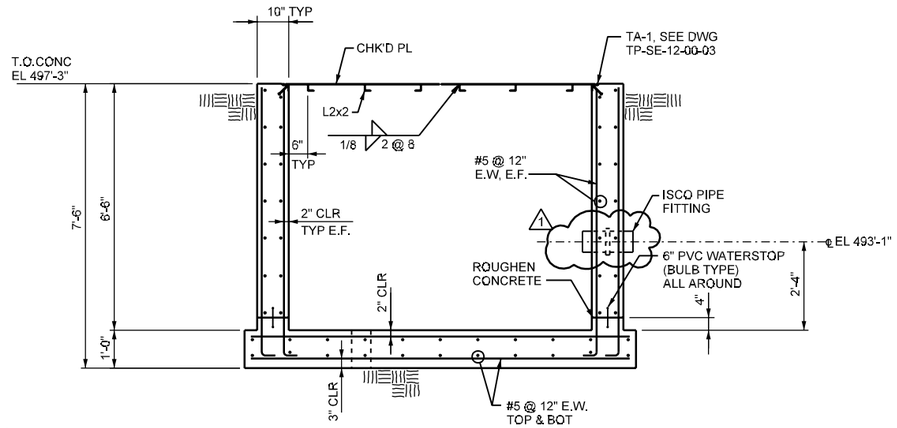
WELL VAULT DETAIL 1

1/2"=1'-0"

NOTE : 2 REQ'D

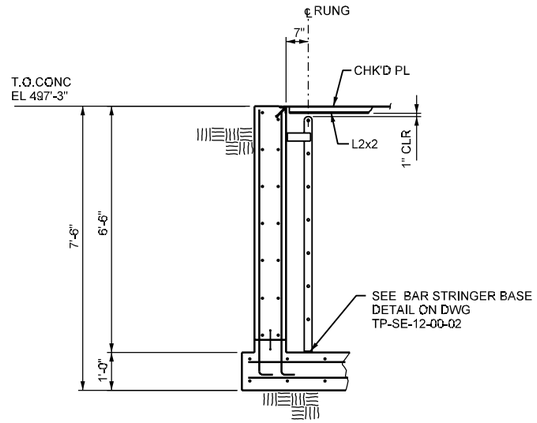
WELL VAULT TOP VIEW

1/2"=1'-0"



SECTION A

1/2"=1'-0"



SECTION B

1/2"=1'-0"

NOTES:

1. FOR GENERAL NOTES AND STANDARD DETAILS SEE DRAWINGS TP-SE-12-00-01 THRU 03.
2. WORK THIS DRAWING WITH DWGS TP-SE-20-00-01 THRU 10.

RESPONSIBLE ENGINEER: MARIO N. SCACCO PE# 37744

NO.	DATE	REVISION	BY	CHK
A	08/11/04	ISSUED FOR PERMIT APPLICATION	KCP	MNS
0	08/19/04	APPROVED FOR CONSTRUCTION	KCP	MNS
1	11/02/04	ROTATE WELL VAULTS & REDIMENSION. RELOCATE PIPE FITTINGS	KCP	MNS
	/ /			
	/ /			
	/ /			
	/ /			
	/ /			

REVISION APPROVAL		REV 1	DATE 11/02/04
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING		GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
REV.	
CLIENT	
FIELD	
INTRA CO.	

STATUS	REV	DATE	SDE	PEM
ISSUED				
PRELIMINARY	A	08/11/04	MNS	TP
FOR REVIEW AND APPROVAL		/ /		
APPROVED FOR CONSTRUCTION	0	08/19/04	MNS	TP
REVISED & APPROVED FOR CONSTRUCTION	1	11/02/04	MNS	TP

SCALE AS NOTED

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION
AND TREATMENT SYSTEM

PROJ NO. 315994

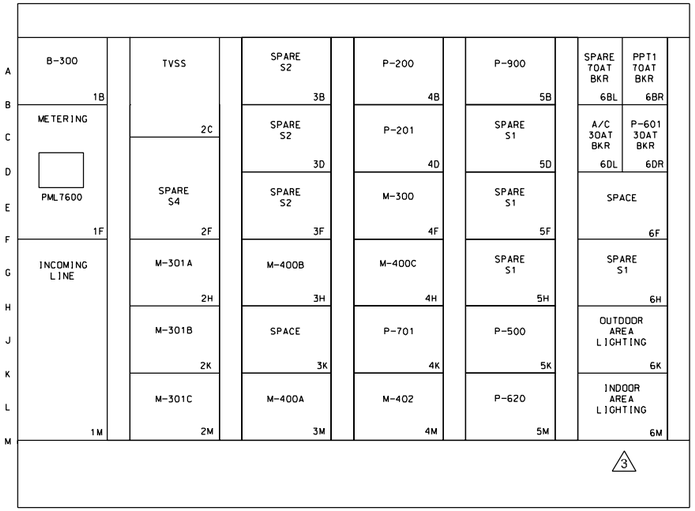
CH2MHILL

CONCRETE
WELL VAULT & VALVE VAULT
SECTIONS & DETAILS
SHEET 1

DWG. NO. TP-SE-20-00-09 REV. 1

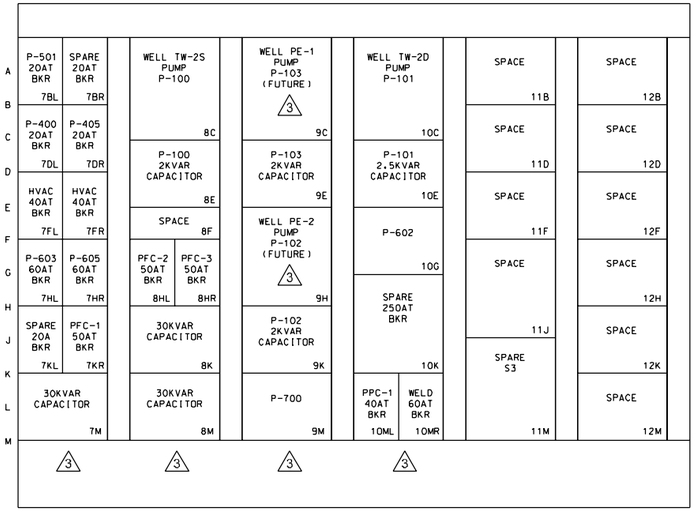
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tpse200009.dlv PLOT DATE: 02-NOV-2004 PLOT TIME:



TOPOCK MCC #1 FRONT LAYOUT
(SEE NOTE 2)

REVISED PER SHOP DRAWINGS



TOPOCK MCC #1 BACK LAYOUT
(SEE NOTE 2)

NOTES
1. L/U DENOTES CONTACTOR WITH LATCHING RELAY - REF SPEC 16440

2. MCC LAYOUT PER EQUIPMENT MANUFACTURER'S SHOP DRAWINGS.

3. MCC SHIPPED WITH 30A MCP INSTALLED. 50A MCP SHIPPED LOOSE FOR FUTURE CHANGE TO LARGER MOTORS.

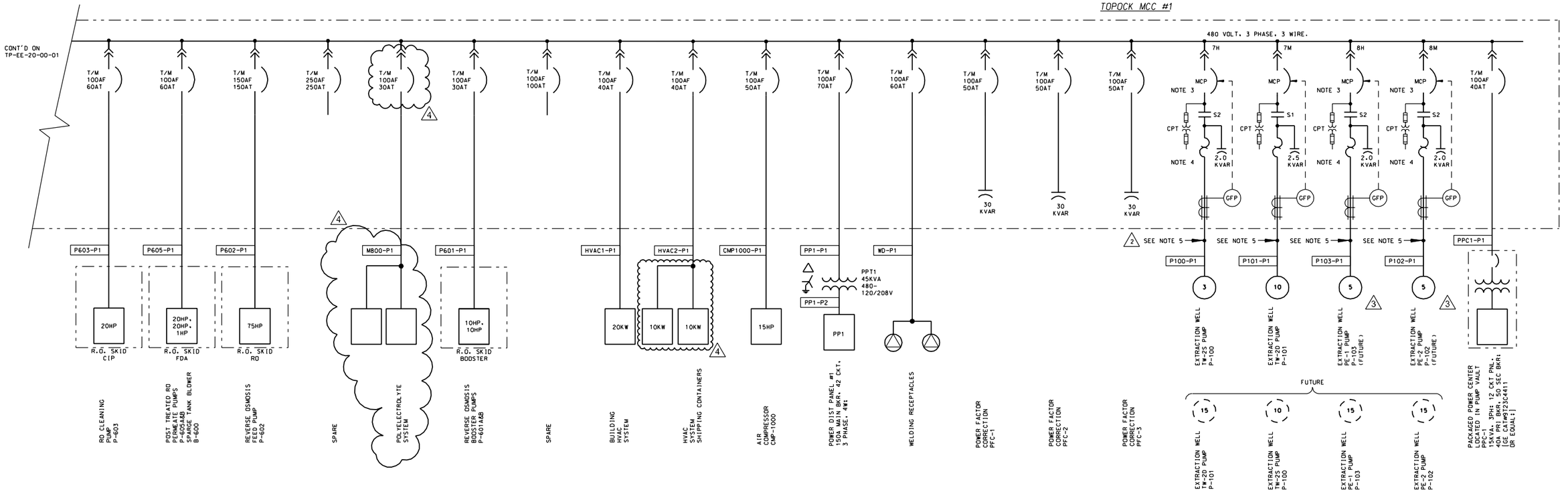
4. ADJUST OVERLOAD HEATERS TO PROTECT SMALLER MOTORS (PRESENT CONFIGURATION). READJUST FOR LARGER MOTORS (FUTURE).

2 5. A TRANSITION SHALL BE MADE FROM THE DUCT BANK PUMP FEEDER CABLE (#2/0) TO #10 AWG CONDUCTORS. THIS SHALL BE DONE IN THE DUCTBANK TERMINATION PULLBOX LOCATED ON THE SOUTH WALL OF THE CONTROL BLDG. THIS IS TO ACCOMIDATE THE LUG SIZE IN THE MCC MOTOR STARTER. THIS TRANSITION SHALL BE DONE USING A SUITABLE POWER DISTRIBUTION TERMINAL BLOCK W/TOUCH SAFE COVER. A MOUNTING PANEL SHALL BE INSTALLED IN THE PULLBOX.

LEGEND AND ABBREVIATIONS:

T/M - THERMAL MAGNETIC BREAKER
MCP - MOTOR CIRCUIT PROTECTOR TYPE BREAKER
CPT - CONTROL POWER TRANSFORMER
S1 - NEMA SIZE ONE STARTER
SB - SHORTING TYPE TERMINAL BLOCK
CT - CURRENT TRANSFORMER
TS - TEST SWITCH
AIC - AMPS INTERRUPTING CURRENT
PLC - PROGRAMMABLE CONTROLLER
C50 - DENOTES CT ACCURACY CLASS (E.G. C10, C100, C400, ETC.)
GFP - DENOTES GROUND FAULT PROTECTION
XXXX-PX - DENOTES CIRCUIT NUMBER SEE CIRCUIT SCHEDULE
TVSS - TRANSIENT VOLTAGE SURGE SUPRESSOR

TOPOCK MCC #1



NO.	DATE	REVISION	BY	CHK
0	09/13/04	ISSUED FOR CONSTRUCTION	LB	JB
1	10/14/04	REVISED AS NOTED	LB	JB
2	11/11/04	ADDED NOTE 5	LJB	KCM
3	12/14/04	REVISED AS NOTED	JDS	KCM
4	01/13/05	CHANGED POLYELECTROLYTE FEEDER TO 30 AMP	SAN	KCM

REVISION APPROVAL		REV 4	DATE 01/13/05
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING		GEN. ARRANG.	

PRINT DISTRIBUTION
DATE
STATUS
REV.
CLIENT
FIELD
INTRA CO.

STATUS	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL				
APPROVED FOR CONSTRUCTION	0	09/13/04	LJB	TP
REVISED & APPROVED FOR CONSTRUCTION	4	01/13/05		

SCALE AS SHOWN

RESPONSIBLE ENGINEER
PE #

PACIFIC GAS & ELECTRIC CO.
TOPOCK COMPRESSOR STATION
INTERIM MEASURE 3
EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
PROJ NO. 315994

CH2MHILL

ELECTRICAL

ONELINE DIAGRAM SHT 2

DWG. NO. TP-EE-20-00-02 REV. 4

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: tpee200002.dlv PLOT DATE: 14-DEC-2004 PLOT TIME: