Pacific Gas and Electric Company

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July 29, 2005

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

Subject: Final Design Plan – Conveyance Piping and Power Supply for Extraction Well PE-1, Topock Compressor Station, Needles, California.

Dear Mr. Shopay:

This letter transmits the final design plan for the conveyance piping and power supply for extraction well PE-1 at the Pacific Gas and Electric Company (PG&E) Topock site. The final design plan reflects the suggestions from the United States Bureau of Land Management (BLM) and California Department of Toxic Substances Control (DTSC) for the pipeline route proposed in the draft design plan submitted to DTSC and BLM in March 2005.

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

Sincerely,

for Yvonne Meeks

Final

Design Plan
Conveyance Piping and Power Supply for Extraction Well PE-1

Topock Compressor Station
Needles, California

Prepared for

California Department of Toxic Substances Control

On behalf of

Pacific Gas and Electric Company

July 2005

CH2MHILL

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Prepared by

CH2M HILL

This document was prepared by CH2M HILL under the supervision of:

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July 2005

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2 Permits, Approvals, and Certifications for Extraction Wells

Appendix

A Drawings for PE-1

Acronyms and Abbreviations

BLM	United States Bureau of Land Management
Cr(VI)	hexavalent chromium
DTSC	California Department of Toxic Substances Control
gpm	gallons per minute
IM	Interim Measures
µg/L	micrograms per liter
PE-1	potential extraction well no. 1
PG&E	Pacific Gas and Electric Company

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 Department of Toxic Substances Control (DTSC). 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 2005a). The directive was issued as a result of the detection of hexavalent chromium [Cr(VI)] in a sample collected from monitoring well MW-34-100 at a concentration of 357 micrograms per liter (µg/L) in February 2005. Well MW-34-100 is located on the Colorado River floodplain, approximately 600 feet east of the location of the existing groundwater extraction well TW-2D and the treatment facilities operated as part of Interim Measures (IM) No. 2. Well MW-34-100 monitors the deep portion of the Alluvial Aquifer.

On February 23, 2005, PG&E submitted a work plan to the DTSC and United States Bureau of Land Management (BLM) to site, install, and test a new extraction well, referred to as potential extraction (PE) well PE-1, in the Colorado River floodplain (CH2M HILL 2005a). The DTSC and BLM conditionally approved the extraction well work plan on February 25, 2005 (DTSC 2005b; BLM 2005). Exploratory borings and drilling activities began on February 26, 2005, and the PE-1 was installed on March 5, 2005. The BLM directed PG&E to complete the new extraction well by March 15, 2005 to avoid potential impacts to wildlife and any local or transient threatened or endangered species (e.g., Willow Flycatcher) that could occur within this project area.

On March 4, 2005, PG&E submitted a request for DTSC and BLM approval to design and install piping, well vaults, and power supply for the new extraction well. A draft design plan was submitted to DTSC on March 21, 2005 that provided the details for the new extraction well and facilities. Two site walks were held with BLM and DTSC representatives on May 5 and June 9, 2005 to review the pipeline alignment. In July 2005, DTSC requested that PG&E submit this final design package for the PE-1 pipeline.

1.1 Authorizations

The extraction well, conveyance piping, and power supply will be installed on BLM-managed property. BLM has authorized this activity under an Action Memorandum, dated March 3, 2004 (BLM 2004). Section V of this Action Memorandum requires BLM review and approval of such work before implementation so that appropriate mitigation measures can be identified, and any concerns for biological or cultural resources can be addressed for the proposed work area. Cultural resource survey(s) conducted in 2004 did not identify any cultural resources in the Colorado River floodplain (CH2M HILL 2004a). All activities associated with piping and power installation will be coordinated with BLM to protect resources.

2.0 Design Plan

Two potential extraction wells, including a floodplain extraction well, PE-1, were included in the IM No. 3 *Thirty Percent Design Submittal, Interim Measures No. 3, PG&E, Topock Compressor Station, Needles, California* (CH2M HILL 2004b) that was conditionally approved for construction in a DTSC letter dated September 21, 2004 (DTSC 2004).

This design plan describes the updated design criteria for extraction well PE-1 and describes the facilities that will be constructed in the Colorado River floodplain to convey extracted groundwater to the IM No. 3 treatment plant (or IM No. 2 batch plant).

2.1 Referenced Drawings

Appendix A contains drawings showing details of the conveyance piping, instrumentation and controls, and power supply for extraction well PE-1. The attached drawings are part of a comprehensive drawing package for the IM No. 3 treatment plant that currently consists of over 130 individual drawings. As such, drawing numbers, revision dates (due to ongoing construction changes), and supplemental information not specific to extraction well PE-1 may be included on the drawings provided in this design plan. As part of the design-build approach for the IM No. 3 project, certain details and field modifications will be developed as construction progresses and will be documented as design modifications and in the as-built drawings for the IM No. 3 project.

Table 1 lists the drawings included as part of this submittal that are specifically related to PE-1.

TABLE 1
Referenced Drawings for PE-1
PG&E Topock Compressor Station, Needles, California

Drawing No.	Title	Description
SK-TP-PE1-1	Plan View – Proposed PE-1 Pipeline Route	Sketch of pipeline alignment over aerial photography collected in 2004. Show the alignment in relation to site vegetation. Not a construction drawing.
TP-PC-10-01-07	Piping Plan and Profile	Shows the proposed piping alignment from extraction well PE-1 to Valve Vault #1 at the MW-20 bench.
TP-PC-10-10-08	Detail Sheet 1	Shows a typical trench detail for a single double-contained pipe. Also includes a typical detail for a leak detection sensor station.
TP-EE-20-01-24	PE-1 Electrical Conduit Route	Shows the route of the electrical conduit in the same trench as the piping.

TABLE 1
Referenced Drawings for PE-1
PG&E Topock Compressor Station, Needles, California

Drawing No.	Title	Description
TP-SE-20-00-15	PE-1 Well Vault #3 Sections and Details – Sheet 1	Shows the well vault for extraction well PE-1 (referred to as well vault #3).
TP-PI-20-02-02	Underground Piping - Extraction Wells TW-2D and TW-2S Well Vaults, Bench Site 20 Valve Vault	Shows the piping running from PE-1 into Valve Vault #1 at the MW-20 bench.
TP-PI-20-02-06	Extraction Wells – PE-1 Well Vault	Shows the piping in the PE-1 well vault.
TP-PR-10-10-03	Process and Instrumentation Diagram - Extraction Wells PE-1, PE-1, TW-2D, and TW-2S	Process and Instrumentation Diagram for extraction well PE-1.

2.2 Groundwater Extraction System for Extraction Well PE-1

The groundwater extraction system for PE-1 consists of an extraction well, well pump, conveyance piping, power supply, and instrumentation and controls. The following sections describe the facilities to be installed to convey water from PE-1 to Valve Vault #1 on the MW-20 bench. Valve Vault #1 is designed to combine flows from each extraction well (TW-2D, TW-2S, and PE-1) to the IM No. 3 treatment plant. This vault is also designed to accommodate flows from future extraction wells if necessary.

2.2.1 Extraction Well Design Pump Rate

Extraction Well PE-1 is located in the Colorado River floodplain approximately 75 feet east of the MW-36 cluster. The extraction well was installed in early March 2005 after DTSC and BLM approved of the extraction well work plan. The extraction well was constructed with 6-inch schedule 40 polyvinyl chloride well casing that extends to the ground surface. Based on concurrence from DTSC, the extraction well was screened over a 10-foot interval from approximately 79 feet to 89 feet below ground surface. The well screen was a 6-inch-diameter type 304 stainless-steel screen with 0.060-inch slot size. Initial testing of PE-1 was completed during well development on March 5, 2005. The extraction well pumping capacity was tested for short durations (up to 30 minutes) at flow rates from 10 to 40 gallons per minute (gpm). The specific capacity at these flow rates ranged from 0.75 to 1 gpm per foot of drawdown in the well. The well installation and initial testing of PE-1 was documented in a field summary report submitted to the DTSC April 2005 (CH2M HILL 2005b).

Based on the results of initial testing, a design maximum pumping rate of 40 gpm is proposed for PE-1.

2.2.2 Well Pump

Extraction well PE-1 will be equipped with a Grundfos Model 40S50-12 submersible pump with a rated capacity of 40 gpm capable of conveying extracted groundwater to the IM No. 3 treatment plant. The well pump will be installed at the mid-point of the well screen, approximately 84 feet below ground surface.

2.2.3 Well Vault

The extraction well will be completed within a subsurface pre-cast concrete well vault (Well Vault #3). This vault is similar to that to be installed at TW-2D and TW-2S. The well vault is approximately 7 feet wide, 10 feet long, and 7 feet deep to accommodate the underground double-wall conveyance piping and associated valves and fittings. Drawing TP-SE-20-00-15 depicts the well vault dimensions.

2.2.4 Conveyance and Conduit Systems

Underground piping and electrical and control conduits will be connected to the well head to (1) convey extracted water from PE-1 to Valve Vault #1 on the MW-20 bench and (2) provide power and control for the pump and instrumentation. The alignment and profile for the piping and conduits that will be installed between the Well Vault #3 and Valve Vault #1 on the MW-20 bench is shown on Drawing TP-PC-10-01-07. The length of the alignment is approximately 500 feet. The alignment includes suggestions by BLM during site walks to avoid native vegetation (e.g., mesquite trees) and reduce the removal of non-native salt cedar that serves as potential nesting habit for the southwestern willow flycatcher.

Extracted groundwater will be conveyed in double-contained high-density polyethylene pipeline (3-inch-diameter pipe contained within a 6-inch-diameter pipe, minimum). The piping and appurtenances are sized to accommodate the 40 gpm design flow rate from PE-1. PG&E will also consider the use of extra piping at the site (e.g., 3-inch by 6-inch or 4-inch by 8-inch) to use existing materials that are onsite. The pipeline will be equipped with a leak detection sensor station at a low point (or 400-foot interval) in the line to detect any leaks in the inner conveyance pipe. The location of this sensor station can be adjusted in the field to avoid disturbing vegetation.

Piping inside the Well Vault #3 will be Schedule 80 chlorinated polyvinyl chloride. The design includes one 2.5-inch conduit for 460V/3-phase power supply and one 2-inch conduit for instrumentation. A third, spare 2-inch conduit may be installed between Well Vault #3 and Valve Vault #1 to accommodate future performance monitoring requirements, such as automating water level data collection from monitoring wells.

Drawing TP-PC-10-10-08 includes a typical trench detail for a single pipeline (see profile No. 6 on drawing) and a typical leak detection sensor station for the double-contained high-density polyethylene pipeline. The containment influent pipe, conduits for power and instrumentation, and leak detection sensor(s) will be constructed within a common trench across the floodplain. The nominal bottom width of the trench will be 24 inches wide and approximately 5 feet deep (on average) to accommodate the installations and maintain a minimum of 3 feet of cover. The sidewalls of the trench will be sloped per OSHA guidelines to allow workers to enter the trench.

It is important to note that future tie-ins to the double-contained piping between PE-1 to Valve Vault #1 are not recommended, primarily due to the logistics of draining and/or controlling leakage of the contents and uncertainties in future flow rates. Such tie-ins would also require the construction of additional valve vaults in the Colorado River floodplain. Given the uncertainty of additional extraction wells and conveyance piping in the Colorado River floodplain, it would be difficult to site additional valve vault(s) along the PE-1 alignment. The current IM No. 3 design plan includes provisions for an additional extraction well PE-2 located to the south of the MW-20 bench, if needed in the future. Valve Vault #1 is also designed to accommodate up to five extraction wells. Drawing TP-PI-20-02-02 depicts the current plan to tie-in PE-1 and future extraction wells into Valve Vault #1 on the MW-20 bench. Valve Vault #4 located near monitoring well MW-19 can accommodate pipelines from future extraction wells.

2.2.5 Instrumentation and Controls

Drawing TP-PR-10-10-03 includes a process and instrumentation diagram for extraction well PE-1. As shown in the drawing, extraction well PE-1 will be outfitted with the following instrumentation and controls:

- Water level indicator to monitor low water levels in the well to protect the pump.
- Pressure relief valve and pressure indicator inside the well vault to protect the pipe and allow operators to monitor pump performance.
- Pressure indicator, flow meter, and flow control valves inside Valve Vault #1 at the MW-20 bench.

A sample port for extraction well PE-1 will be available inside Valve Vault #1 for water quality sampling.

2.3 Construction Access and Work Limits

The staging area being considered for these activities is the north end of the MW-20 bench and would be approved by the agencies prior to its use. Construction materials will be stockpiled at the IM No. 3 treatment plant and/or the MW-20 bench and moved to the staging area as needed. Access to the floodplain would be from Park Moabi Road at the MW-35 cluster, similar to prior drilling and groundwater monitoring program access to the floodplain. The access route is noted on Drawing SK-TP-PE1-1.

Due to the nature of the fine sandy soils in the floodplain, it is anticipated that a 50-foot-wide minimum right-of-way will be required to accommodate the trench, temporary soil stockpile, and access for materials and equipment. Existing vegetation that is within the trench excavation area will be removed. It is assumed that the trench excavation may be up to 20 feet wide, assuming one-half to 1 or shallower trench side slopes. Excavated soil will be stockpiled to avoid disturbing vegetation to the extent possible to complete the work. Drawing SK-TP-PE1-1 shows the alignment in relation to site vegetation. A biological monitor will be onsite to monitor the construction activities in the floodplain.

The sequence of construction activities would be to grub the route and install and backfill the well vault. Trenching would be done in approximately 250-foot increments (between

vaults), with the piping and conduits being joined together in the trench. Installing components in the vault could be completed concurrently with pipeline installation.

Required equipment will include a track hoe for grubbing, excavation, and transport of construction materials, a front-end loader, a track-mounted fusion bonding machine, a water buffalo (trailer with water tank and pump for compaction of trench backfill), and four-wheel-drive Gators. Small gas-driven generators will be needed to install the vault components. Construction will be overseen by a construction superintendent. Construction staff will include equipment operators, pipe installers, electricians, and general laborers (10 to 15 workers).

3.0 Mitigation Measures

PG&E anticipates that the following mitigation measures will apply during construction of the conveying piping and power supply in the Colorado River floodplain from extraction well PE-1 to Valve Vault #1 on the MW-20 bench.

- An onsite biologist and cultural resources monitor will be present as appropriate during trenching activities.
- Minor vegetation removal will be required along the pipeline alignment. A biologist knowledgeable with southwestern flora and fauna will conduct a pre-construction survey and will be present during vegetation removal to identify native tree species. In the event native tree species cannot be avoided, those trees will be transplanted to a nearby location approved by the onsite biologist.
- All applicable measures described in the September 17, 2004 Action Memo authorizing IM No. 3 activities will be implemented.

4.0 Construction Schedule

The main elements of the construction schedule for conveyance piping and power supply in the Colorado River floodplain are as follows:

- DTSC and BLM approval of the design plan for the conveyance facilities from the new extraction well.
- Materials required to construct the pipeline will be be ordered after DTSC and BLM approve the design plan. It is assumed that it may take up to 4 weeks to have all of the materials for the pipeline manufactured and delivered to the site. PG&E will also use any extra piping and materials still onsite from IM No. 3 construction to build the PE-1 pipeline.
- The BLM has indicated that drilling and construction activities in the Colorado River floodplain may be constrained by biological resource considerations (e.g., potential habitat for the Willow Flycatcher may occur within this project area). The breeding season for the Willow Flycatcher extends from the spring through the summer and early fall. Approval to begin construction is subject to consideration by federal representatives, specifically biological resource experts.

It is expected that the conveyance piping and power supply can be constructed, tested, and brought into service over a 4- to 5-week period once materials are delivered to the site and BLM approves construction in the Colorado River floodplain. Mobilization time may vary depending on whether the PE-1 construction is completed in conjunction with current IM No. 3 plant construction or is completed later.

5.0 Required Permits and Approvals

Table 2 provides a listing of permits and approvals that have been identified as applicable to the installation of the extraction well facilities on the BLM-managed land adjacent to the Colorado River, near the PG&E Topock Compressor Station. All applicable and necessary permits and approvals will be documented prior to moving construction equipment to the site.

TABLE 2
Permits, Approvals, and Certifications for Extraction Wells
PG&E Topock Compressor Station, Needles, California

Agency	Permits, Approvals, Certifications, etc.
BLM	BLM issued Action Memorandum authorizing IM activities on BLM land. BLM field office review and approval pending.
DTSC	DTSC is evaluating DTSC's responsibilities under California Environmental Quality Act as they relate to this project.
State Water Resources Control Board/ Colorado River Basin Regional Water Quality Control Board	Notice of Intent and Storm Water Pollution Prevention Plan for construction activities; coverage under statewide general permit.
United States Fish and Wildlife Service (USFWS)	Informal Consultation by BLM with USFWS. Project activities shall avoid potential impacts to sensitive species.
California Department of Fish and Game (CDFG)	CDFG 1600 (emergency exemption)
State Historic Preservation Office	Section 106 Consultation
San Bernardino County	San Bernardino County issued well permit. No other permits pending. Site inspections will proceed consistent with current IM No. 3 construction.

6.0 References

CH2M HILL. 2004a. *Cultural Resources Investigations for Interim Measures No. 3: Topock Compressor Station, Expanded Groundwater Extraction and Treatment System.* August.

_____. 2004b. *Thirty Percent Design Submittal, Interim Measures No. 3, PG&E, Topock Compressor Station, Needles, California*. September 16.

_____. 2005a. *Extraction Well Work Plan, PG&E Topock Compressor Station, Needles, California*. February 23.

_____. 2005b. *Groundwater Extraction Well, PE-1 Installation Report, PG&E Topock Compressor Station, Needles, California.* April 29.

Department of Toxic Substances Control (DTSC). 2004. Letter to Yvonne Meeks/PG&E from Norman Shopay/DTSC. September 21.

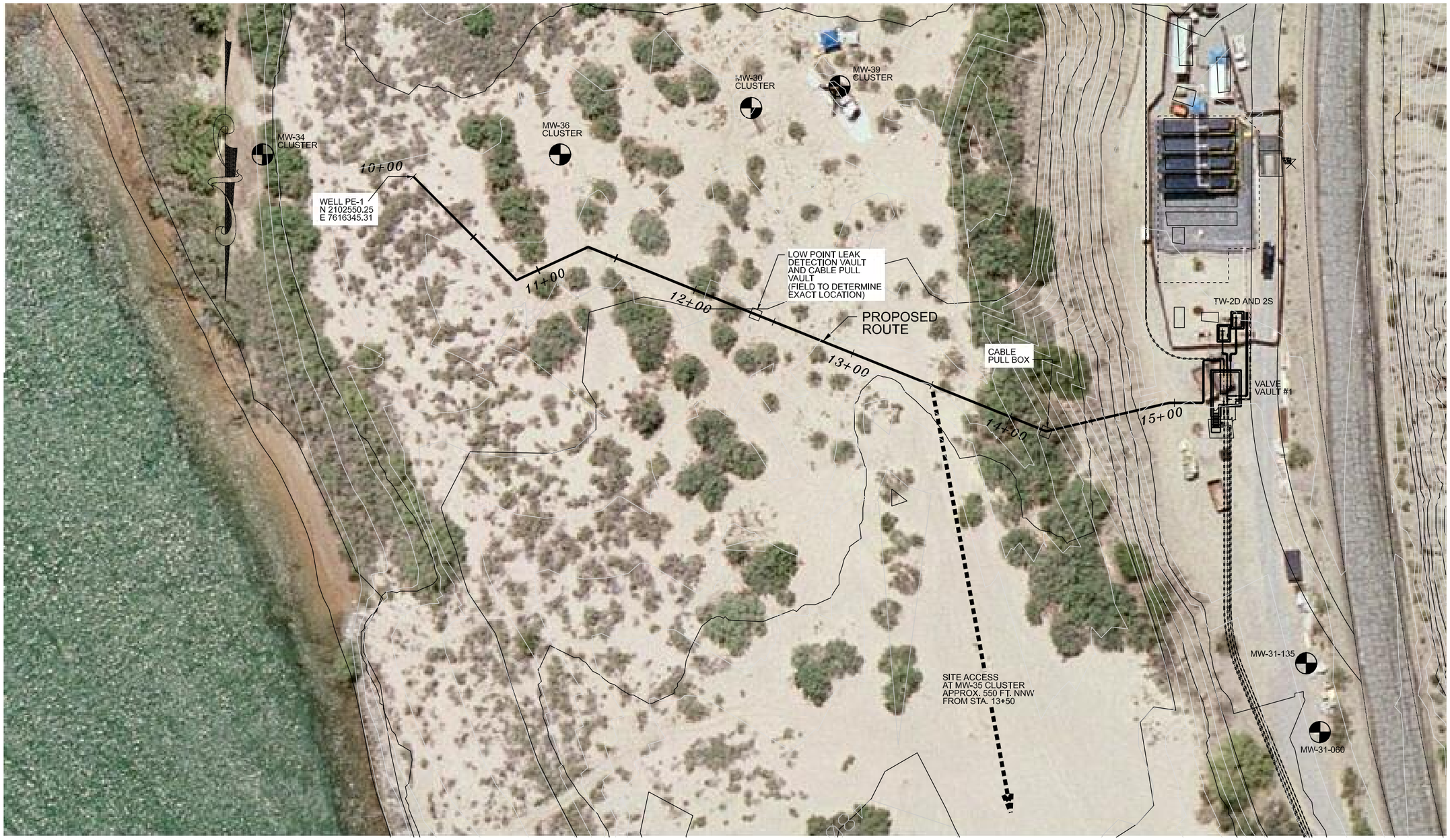
_____. 2005a. Letter to Yvonne Meeks/PG&E, from Norman Shopay/DTSC. February 16.

_____. 2005b. Letter to Yvonne Meeks/PG&E, from Norman Shopay/DTSC. February 25.

United States Bureau of Land Management (BLM). 2004. *Time Critical Removal Action, Pacific Gas and Electric Topock Compressor Facility*. March 3.

_____. 2005. Letter to Yvonne Meeks/PG&E, from Robert Henderson/BLM. February 25.

Appendix A
Drawings for PE-1



NO.	DATE	REVISION	BY	CHK
B	07/26/05	REVISED ROUTE PER COMMENTS	EFC	SDH
A	05/17/05	Conceptual layout for review and comment	JBW	SDH

RESPONSIBLE ENGINEER

PE #

REVISION APPROVAL		REV B	DATE 07/26/05
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				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL	B	07/26/05		
APPROVED FOR CONSTRUCTION		/ /		
REVISED & APPROVED FOR CONSTRUCTION		/ /		

SCALE 1"=30'

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

PROJECT NO. 327061

CH2MHILL

PIPING

PLAN VIEW PROPOSED PE-1 PIPELINE ROUTE

DWG. NO. SK-TP-PE1-1

REV. B

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

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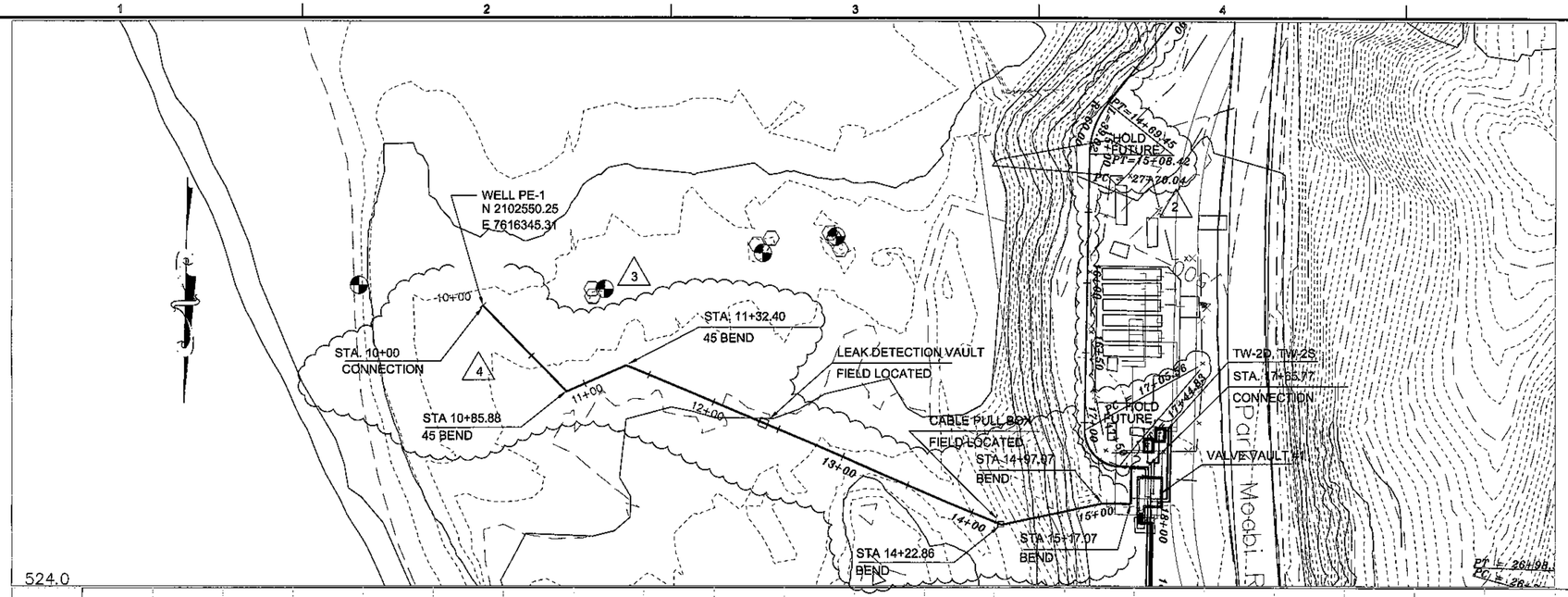

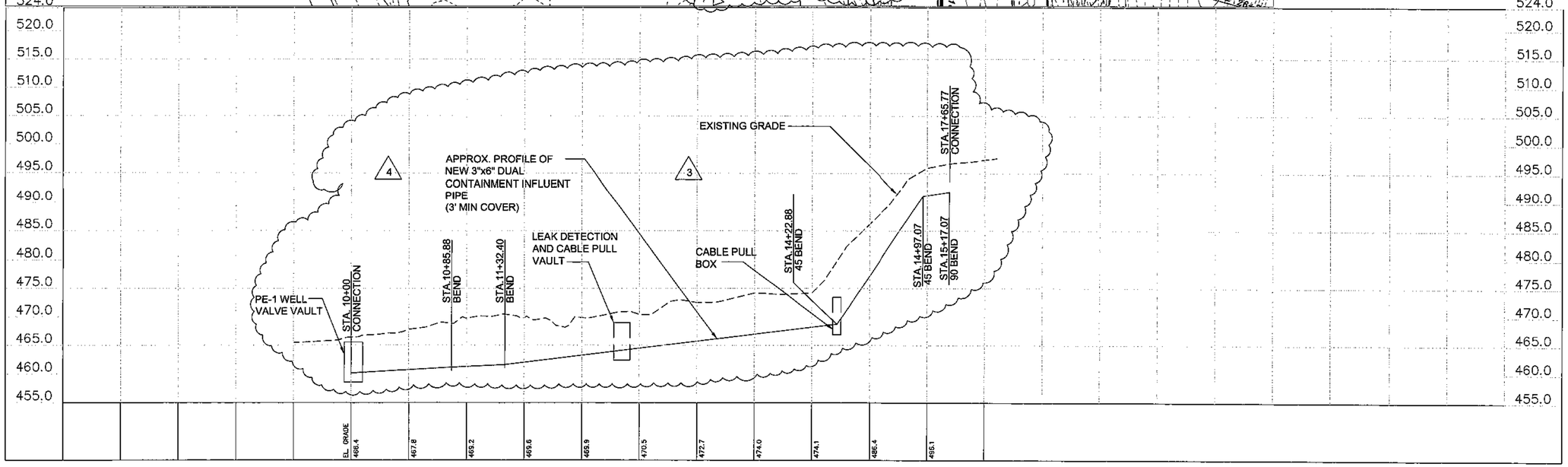

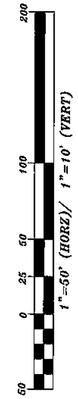

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS W. LANDFEAR
No. C-66545
Exp. 06-30-06
CIVIL
STATE OF CALIFORNIA

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

NO.	DATE	REVISION	BY	CHK
0	8/04	APPROVED FOR CONSTRUCTION	ABH	DWL
1	9/04	REVISED AS NOTED	ABH	DWL
2	11/04	REVISED AS NOTED	ABH	DWL
3	03/05	REVISED ALIGNMENT	WHD	DWL
4	07/05	REVISED ALIGNMENT	EFC	

REVISION APPROVAL		REV 4	DATE 07/26/05	PRINT DISTRIBUTION	
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MECHANICAL		ARCHITECTURAL		CLIENT	
PROCESS		ENVIRONMENTAL		FIELD	
PIPING		GEN. ARRANG.		INTRA CO.	

STATUS	REV	DATE	SDE	PEM
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FOR REVIEW AND APPROVAL	A	7/28/04	DWL	
APPROVED FOR CONSTRUCTION	0	8/06/04	DWL	
REVISED & APPROVED FOR CONSTRUCTION	4			

SCALE AS SHOWN

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

PROJ NO. 315994

CH2MHILL

PIPING
PLAN & PROFILE
INFLUENT PIPELINE
STA.10+00 TO 15+00

DWG. NO. TP-PC-10-01-07

REV. 4

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0 1"

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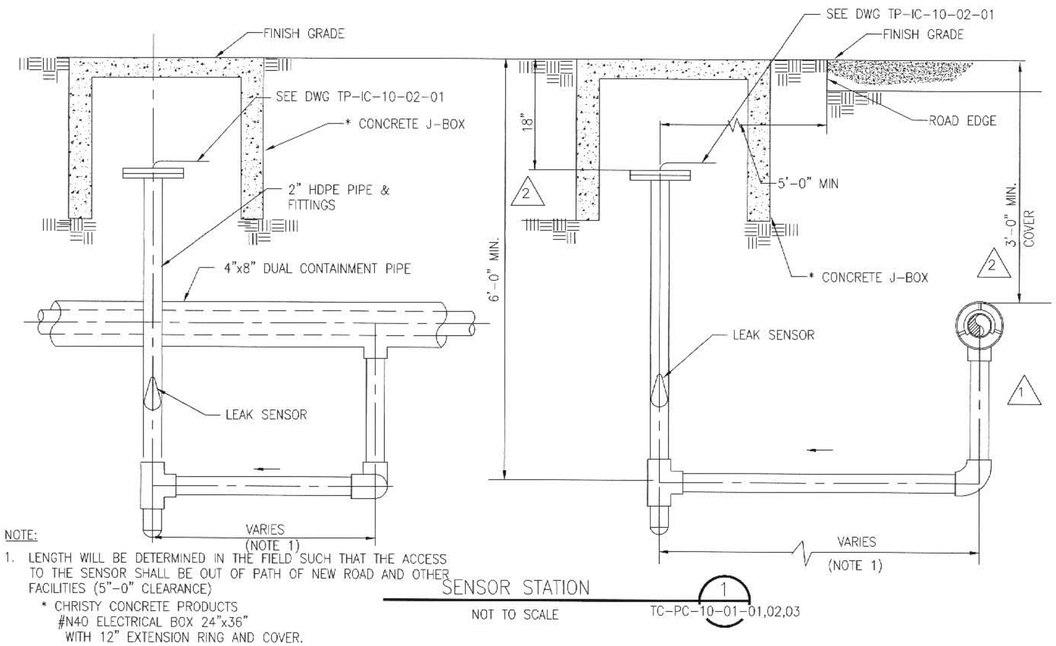
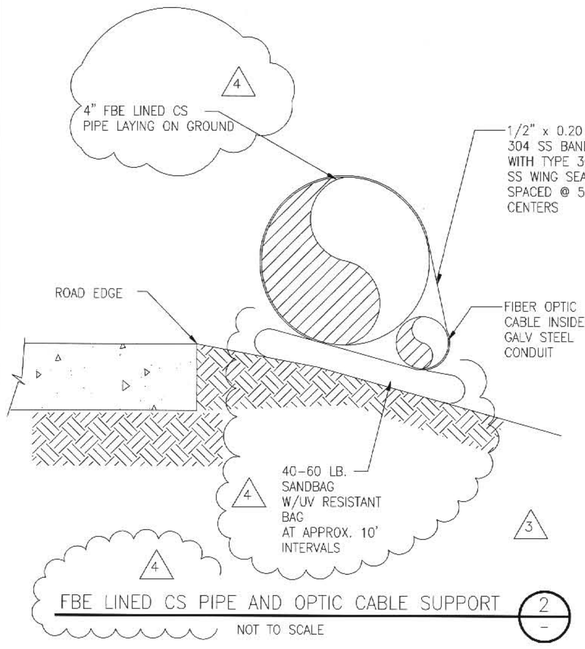
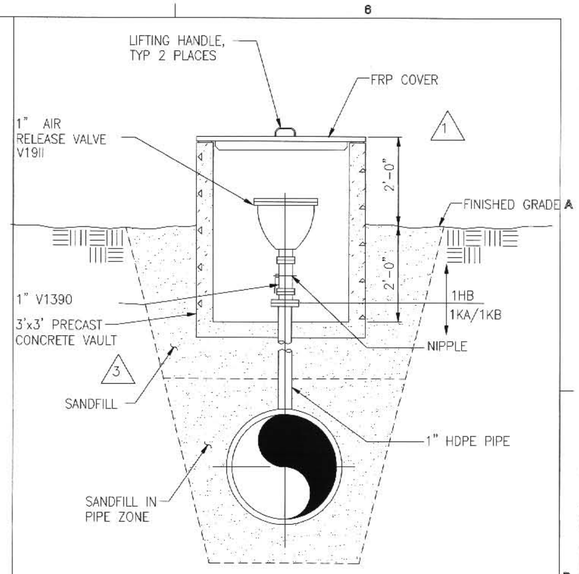


NOTE:
1. LENGTH WILL BE DETERMINED IN THE FIELD SUCH THAT THE ACCESS TO THE SENSOR SHALL BE OUT OF PATH OF NEW ROAD AND OTHER FACILITIES (5"-0" CLEARANCE)
   * CHRISTY CONCRETE PRODUCTS #N40 ELECTRICAL BOX 24"x36" WITH 12" EXTENSION RING AND COVER.

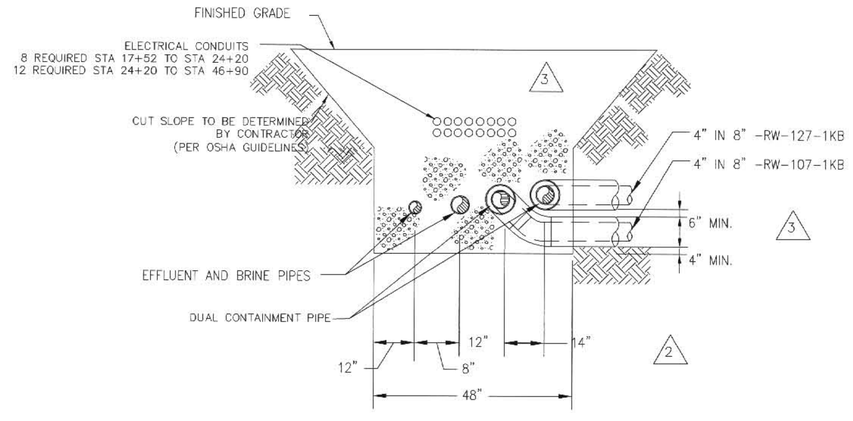
SENSOR STATION
NOT TO SCALE
1 TC-PC-10-01-01,02,03



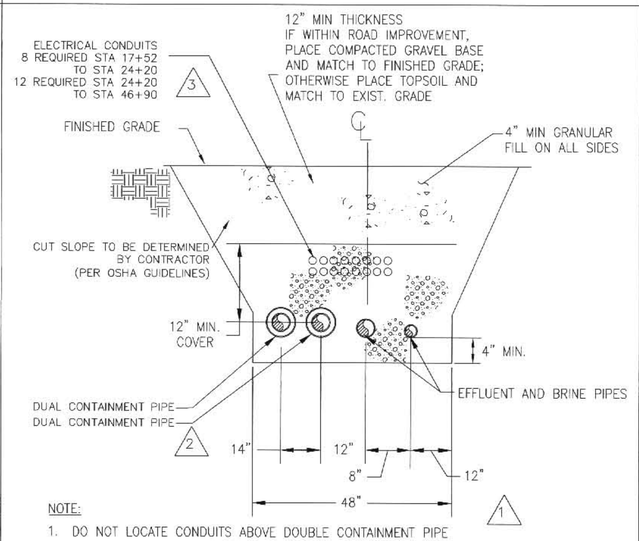
FBE LINED CS PIPE AND OPTIC CABLE SUPPORT
NOT TO SCALE
2 –



AIR RELEASE VALVE ASSEMBLY
NOT TO SCALE
3 TP-PC-10-01-02

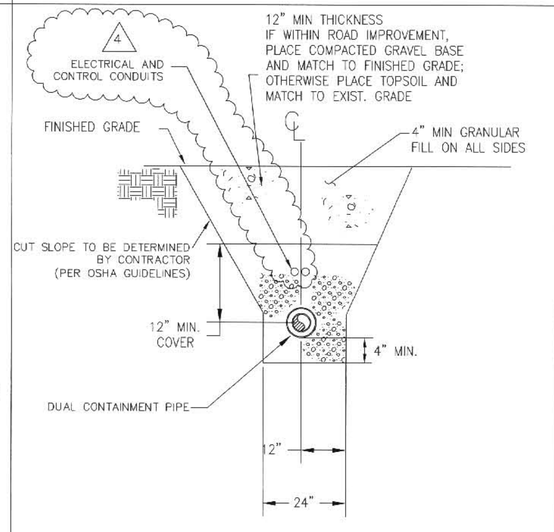


CROSS OVER PIPING
NOT TO SCALE
4 TP-PC-10-01-01



NOTE:
1. DO NOT LOCATE CONDUITS ABOVE DOUBLE CONTAINMENT PIPE

FOUR PIPE TRENCH DETAIL
NOT TO SCALE
5 –



SINGLE PIPE TRENCH DETAIL
NOT TO SCALE
6 –

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

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

NO.	DATE	REVISION	BY	CHK
0	8/04	APPROVED FOR CONSTRUCTION	ABH	DWL
1	8/04	REVISED AS NOTED	ABH	DWL
2	9/04	REVISED AS NOTED	ABH	DWL
3	11/04	REVISED AS NOTED	ABH	DWL
4	02/05	REVISED PIPE MATERIAL	WHD	DWL

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

REV 4 DATE 02/15/05

STATUS				
ISSUED	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	4	3/8/05	SDH	AJ

SCALE NONE

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

PROJ NO. 315994

CH2MHILL

PIPING
DETAIL SHEET 1

DWG. NO. TP-PC-10-10-08 REV. 4

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: PLOT DATE: PLOT TIME:

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REUSE OF DOCUMENTS:

RESPONSIBLE ENGINEER

NO.	DATE	REVISION	BY	CHK
A	07/14/05	CONCEPTUAL LAYOUT FOR REVIEW AND COMMENT	JDS	KCM

REVISION APPROVAL		REV A	DATE 07/14/05	PRINT DISTRIBUTION
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	DATE
CIVIL	—	ELECTRICAL	KCM	STATUS
STRUCTURAL	—	INST & CONTROL	KCM	REV.
MECHANICAL	—	ARCHITECTURAL	—	CLIENT
PROCESS	—	ENVIRONMENTAL	—	FIELD
PIPING	—	GEN. ARRANG.	—	INTRA CO.

STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL	A	07/14/05	KCM	AJ
APPROVED FOR CONSTRUCTION		/ /		
REVISED & APPROVED FOR CONSTRUCTION		/ /		

SCALE 1"=30'

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

PROJECT NO. 327061

CH2MHILL

ELECTRICAL

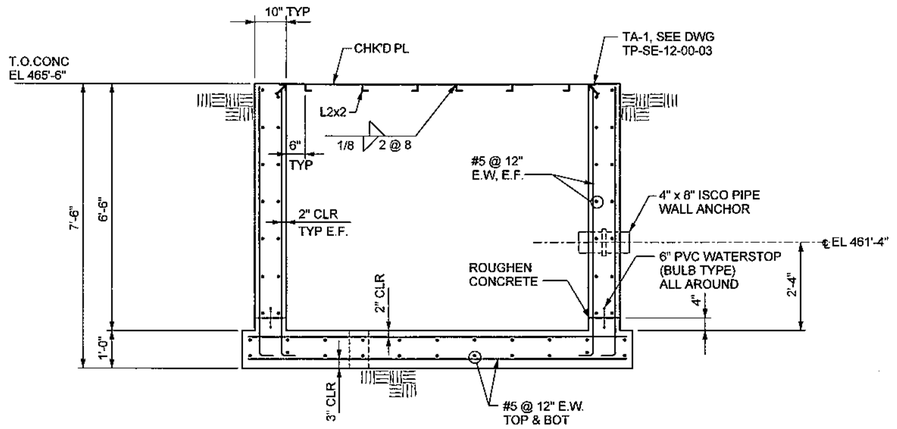
PLAN VIEW

PE-1 ELECTRICAL CONDUIT ROUTE

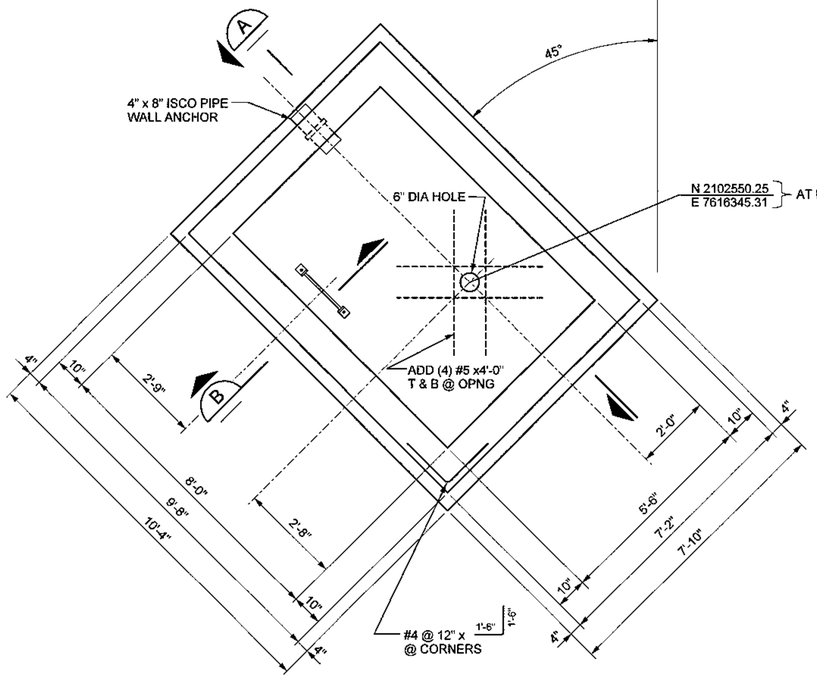
DWG. NO. TP-EE-20-01-24 REV. A

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

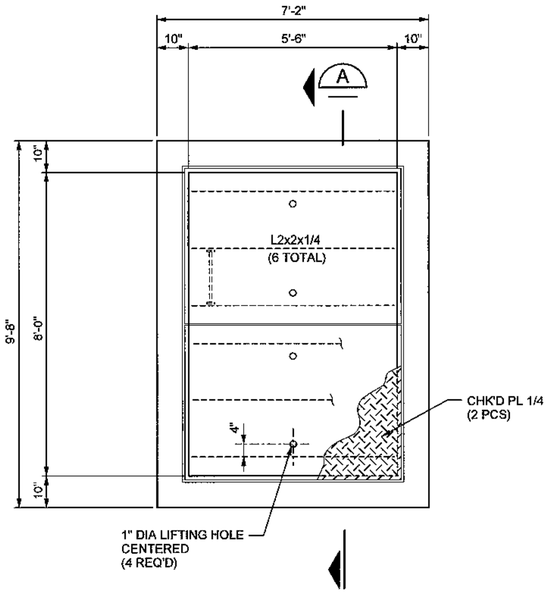
FILENAME: SKTPPE1-2.DLV PLOT DATE: 20-JUL-2005 PLOT TIME:



SECTION A
1/2"=1'-0"

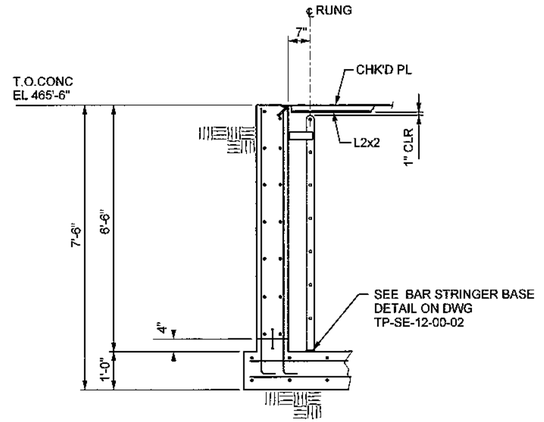


WELL VAULT DETAIL 1
1/2"=1'-0"



NOTE : 2 REQ'D

WELL VAULT TOP VIEW
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.

REGISTERED PROFESSIONAL ENGINEER MARIO N. SCACCO Exp. 12/31/06 No. 37744 CIVIL STATE OF CALIFORNIA 7/18/05

RESPONSIBLE ENGINEER: MARIO N SCACCO PE # 37744

NO.	DATE	REVISION	BY	CHK
0	07/18/05	APPROVED FOR CONSTRUCTION	EFC	MNS
	/ /			
	/ /			
	/ /			
	/ /			
	/ /			

REVISION APPROVAL				REV 0 DATE 07/18/05
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED	
CIVIL	mns	ELECTRICAL		
STRUCTURAL	mns	INST & CONTROL		
MECHANICAL		ARCHITECTURAL	—	
PROCESS		ENVIRONMENTAL		
PIPING		GEN. ARRANG.		

PRINT DISTRIBUTION
DATE
STATUS
REV.
CLIENT
FIELD
INTRA CO.

STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY				
FOR REVIEW AND APPROVAL				
APPROVED FOR CONSTRUCTION	0	07/18/05	mns	
REVISED & APPROVED FOR CONSTRUCTION				

SCALE AS NOTED

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

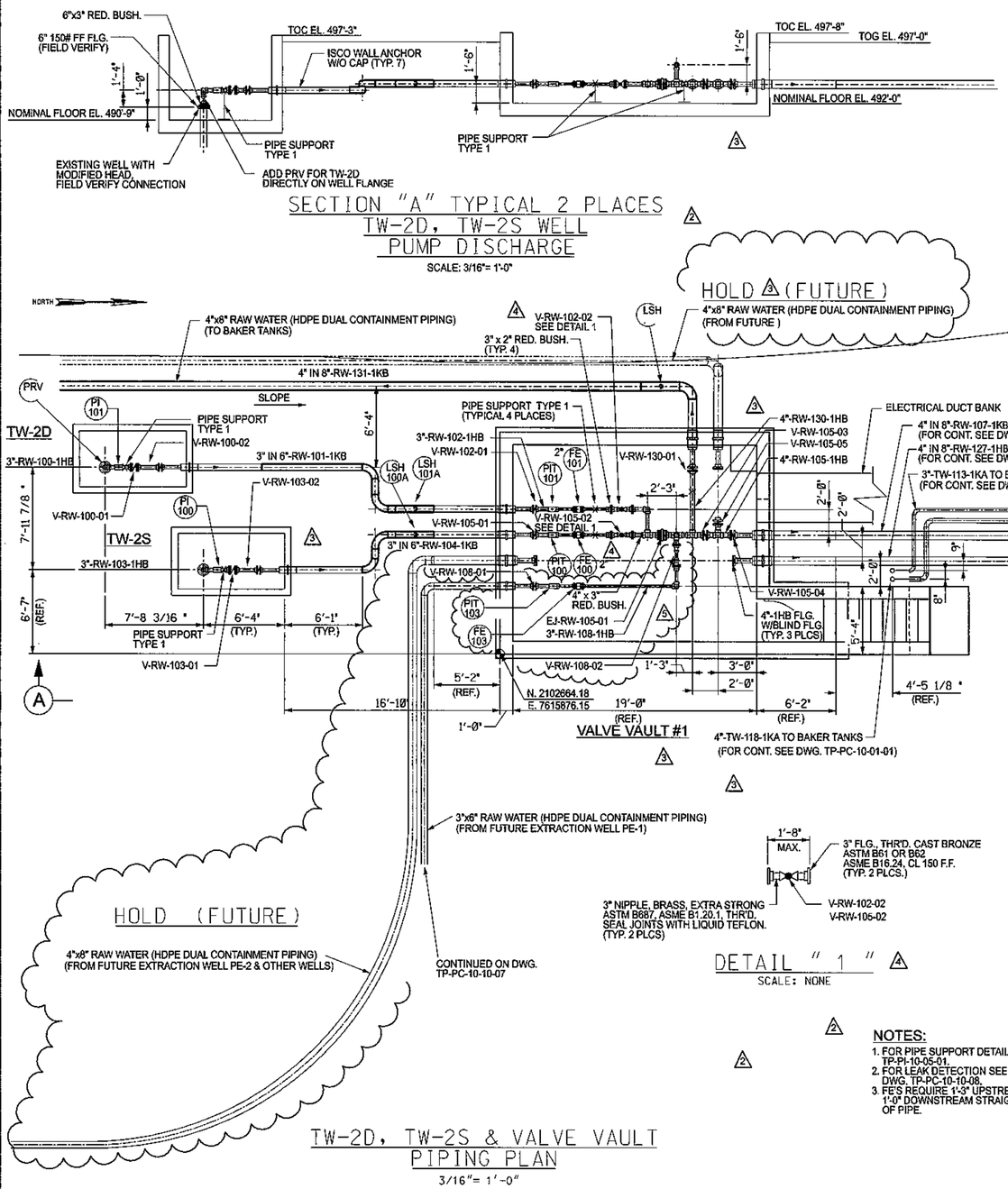
CH2MHILL

CONCRETE
PE-1 WELL VAULT #3
SECTIONS & DETAILS
SHEET 1

DWG. NO. TP-SE-20-00-15 REV. 0

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tpse200015.dlv PLOT DATE: 18-JUL-2005 PLOT TIME:



NO.	DATE	REVISION	BY	CHK
0	08/31/04	APPROVED FOR CONSTRUCTION	WHD	SDH
1	10/01/04	REVISED AS NOTED	ASH	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	SDH
5	07/14/05	REVISED VALVE VAULT #1 PIPING PLAN	EFC	

REVISION APPROVAL		REV 5	DATE 07/14/05
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING	SDH	GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
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	5	07/14/05	SDH	

SCALE AS NOTED

RESPONSIBLE ENGINEER: STEVEN D. HOVER CA M31888 PE#

REGISTERED PROFESSIONAL ENGINEER STEVEN DOUGLAS HOVER No. 31888 Exp. 12/31/05 MECHANICAL STATE OF CALIFORNIA

7/14/05

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

PROJ NO. 315994

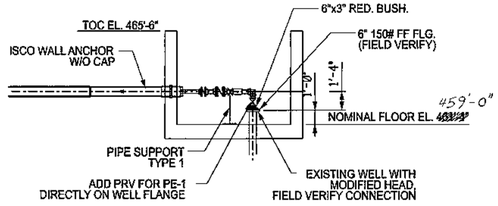
CH2MHILL

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

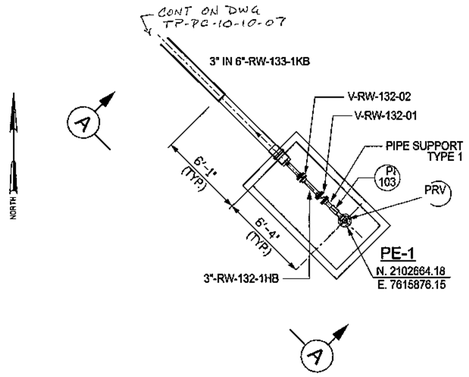
DWG. NO. TP-PI-20-02-02 REV. 5

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tppi200202.dlv PLOT DATE: 14-JUL-2005 PLOT TIME: 06:05:26



SECTION "A"
PE-1 WELL
PUMP DISCHARGE



PE-1 WELL VAULT
PIPING PLAN

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REGISTERED PROFESSIONAL ENGINEER STEVEN DOUGLAS HOYER No. 31888, Exp. 12/31/05 MECHANICAL STATE OF CALIFORNIA
7/14/05

RESPONSIBLE ENGINEER: STEVEN D. HOYER
P.E.# CA 31888

NO.	DATE	REVISION	BY	CHK
0	07/14/05	APPROVED FOR CONSTRUCTION	EFC	SDH
	/ /			
	/ /			
	/ /			

REVISION APPROVAL		REV 0 DATE 07/14/05	
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL		ELECTRICAL	
STRUCTURAL		INST & CONTROL	
MECHANICAL		ARCHITECTURAL	
PROCESS		ENVIRONMENTAL	
PIPING	SDH	GEN. ARRANG.	

PRINT DISTRIBUTION	
DATE	
STATUS	
REV.	
CLIENT	
FIELD	
INTRA CO.	

STATUS	REV	DATE	SDE	PEM
ISSUED				
PRELIMINARY		/ /		
FOR REVIEW AND APPROVAL		/ /		
APPROVED FOR CONSTRUCTION	0	07/14/05	~~SDH~~ SDH	
REVISED & APPROVED FOR CONSTRUCTION		/ /		

SCALE 1" = 20'

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-1 WELL VAULT

DWG. NO. TP-PI-20-02-06 REV. 0

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

FILENAME: tppi200206.dlv PLOT DATE: 14-JUL-2005 PLOT TIME: 06:05:26

CONTROL PANEL LCP-100

WELL PE-2 CONTROL: LSH, LSHH, LSH, LVL RUN, ON, RM, PRESS FLOW

WELL TW-2S CONTROL: LSH, LVL RUN, ON, RM, PRESS FLOW, LSH, LSHH

WELL TW-2D CONTROL: LSH, LVL RUN, ON, RM, PRESS FLOW

WELL PE-1 CONTROL: LSH, LVL RUN, ON, RM, PRESS FLOW

ALM, 1, -120V

LEAK DETECTION PANEL - 003

HS 102 LOR

HS 100 LOR

HS 101 LOR

HS 103 LOR

RW 1HB, RW 1KB

LSH 002, LSHH 002

4" IN 8"- RW-139-1KB

FUTURE

4"-RW-138-1HB

V-RW-138-01

VALVE VAULT No. 2

4" IN 8"- RW-140-1KB

FUTURE

4"-RW-137-1HB

V-RW-137-01

NOTE 1

3"-RW-136-1HB

V-RW-136-01

LSH 102A

3" IN 6"-RW-135-1KB

NOTE 1

HOLD

4" IN 8"- FUTURE

4" IN 8"- FUTURE

LSH 001, LSHH 001

VENT LT 100

PIT 100, FE 100, FIT 100, PE 100

3"x2" MAG 3"x2" 3"-RW-105-1HB THROTTLING V-RW-105-02

V-1390

V-RW-105-01

VALVE VAULT No. 1

LSH 100A

3" IN 6"-RW-104-1KB

NOTE 1

VENT LT 101

PIT 101, FE 101, FIT 101

3"x2" MAG 3"x2" 3"-RW-102-1HB THROTTLING V-RW-102-02

V-1390

V-RW-102-01

LSH 101A

3" IN 6"-RW-101-1KB

NOTE 1

4" x 3"

4"-RW-105-1HB

EJ-RW-105-01

4" IN 8" RW-127-1KB SPARE

4" IN 8" RW-127-1KB

TP-PR-10-10-04 [C1]

SPARE TO VALVE VAULT 4

NOTES 1 & 2

V-RW-105-05

V-RW-105-03

V-RW-105-04

4" IN 8" RW-107-1KB

TP-PR-10-10-04 [C1]

TO RAW WATER STORAGE

V-RW-108-02

4"-RW-130-1HB

V-RW-130-01

VENT LT 103

PIT 103, FE 103, FIT 103

3"x2" MAG 3"x2" 3"-RW-108-1HB THROTTLING V-RW-108-01

V-1390

LSH 103A

4" IN 6"-RW-131-1KB

NOTE 1

TO BAKER TANKS V-RW-131-01

3" IN 6"-RW-133-1KB

NOTE 1

VENT LT 102

PI 102, PRV 102, PIT 102, PE 102, FE 102, FIT 102

SET AT 120 PSI

V-1390

3"-RW-134-1HB

V-RW-134-01

3"x2" MAG 3"x2"

V-RW-134-03

V-RW-134-02 THROTTLING

LSH 102

WELL VAULT No. 4

P-102

LE 102

EXTRACTION WELL PE-2

40 GPM x 248 FT. H20

PI 100

V-1390

3"-RW-103-1HB

V-RW-103-01

V-RW-103-02

LSH 100

WELL VAULT No. 2

P-100

LE 100

EXTRACTION WELL TW-2S

40 GPM x 180 FT. H20

PI 101, PRV 101

SET AT 120 PSI

V-1390

3"-RW-100-1HB

V-RW-100-01

V-RW-100-02

LSH 101

WELL VAULT No. 1

P-101

LE 101

EXTRACTION WELL TW-2D

90 GPM x 245 FT. H20

PI 103, PRV 103

SET AT 120 PSI

V-1390

3"-RW-132-1HB

V-RW-132-01

V-RW-132-02

LSH 103

WELL VAULT No. 3

P-103

LE 103

EXTRACTION WELL PE-1

40 GPM x 235 FT. H20

NOTES

1. PROVIDE LEAK DETECTION AT LOWS AND/OR EVERY 500 FT.
2. INSTALL AIR RELEASE VALVES AT HIGH POINTS.

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
3	03/16/05	DELETED NOTES. APPROVED FOR CONSTRUCTION	EFC	AJ
4	07/20/05	RELIEF VALVE SETTINGS. WELL PE-1 LINE TAGS. HOLDS REMOVED. APPROVED FOR CONSTRUCTION		

REVISION APPROVAL		REV 4	DATE 07/20/05
DISCIPLINE	REVIEWED	DISCIPLINE	REVIEWED
CIVIL	—	ELECTRICAL	RCM
STRUCTURAL	—	INST & CONTROL	RCM
MECHANICAL	AJ	ARCHITECTURAL	—
PROCESS	—	ENVIRONMENTAL	—
PIPING	AJ for JDH	GEN. ARRANG.	DLP

PRINT DISTRIBUTION: DATE, STATUS, REV., CLIENT, FIELD, 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	4	07/20/05		AJ

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

REGISTERED PROFESSIONAL ENGINEER — KENNETH L. MARTINS — No. CH04876 — Exp. 06/30/06 — CIVIL — STATE OF CALIFORNIA

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. 4

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

FILENAME: tppr101003.dwg PLOT DATE: 20-JUL-2005 PLOT TIME: